Report name: Sound of Islay Marine Mammal Baseline Data – Year 2 Update

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4 Introduction

A marine mammal monitoring programme, to inform the Environmental Impact Assessment for the installation of a demonstration array of tidal turbines in the Sound of Islay, was designed and implemented in April 2009 by SMRU Ltd and Natural Research (Projects) Ltd. This monitoring programme consisted of land based visual observations and was initiated to provide sufficient data to inform the Environmental Impact Assessment of:

- What species are present? (Seals, cetaceans, birds, otters and basking sharks).
- What animals use the area for? (Behavioural data).
- Which areas in particular the animals use? (Location data to inform habitat use).
- When do animals use the area? (Seasonal, tidal and diurnal influences on relative density).

Natural Research (Projects) Ltd were contracted to carry out the shore based data collection for both birds and marine mammals and to carry out the bird data analysis and reporting. SMRU Ltd was contracted by SPR to carry out the marine mammal data analysis and reporting. The results of the first full year of monitoring (up to August 2010) were presented in a previous report to SPR which formed part of an addendum to the ES (SMRU Ltd. 2010). This report provides an update to the baseline, with the addition of the second year of data collection (September 2010 to August 2011).

In addition the Sea Mammal Research Unit at the University of St Andrews has carried out deployments of tagging studies of harbour seals at the Sound of Islay since the last report was written - this report also provides a basic summary of these seal tracking results.

5 Methods

Methods were as previously reported (SMRU Ltd 2010). Land based visual observations were carried out from a series of observation sites situated along the Sound of Islay on both Jura and Islay. Four main observation sites were used with two on either side of the Sound, south of Port Askaig (see Figure 2–sites I3, I4, J2[1] & J3). In order to obtain data on marine mammal species abundance and distribution north of the development site (red-line boundary displayed on Figure 1 and 2) in the Sound of Islay some effort was also initially focused on collecting observational data from sites north of the main observation sites. Following a review of the methods in August 2009, the area regularly surveyed was reduced to the southern two thirds of this area, using 4 VPs (Figure 2).

Experienced observers undertook observations during predefined 'watches' at each site. A range of environmental and effort related variables were recorded along with positional and behavioural data for each sighting. Table 1 details the target effort for the marine mammal observation periods.

[1] There were 2 sites used at J2: J2U, an upper (clifftop) site and J2L, a lower site, on the beach. The majority of watches from J2 were made from the upper site.

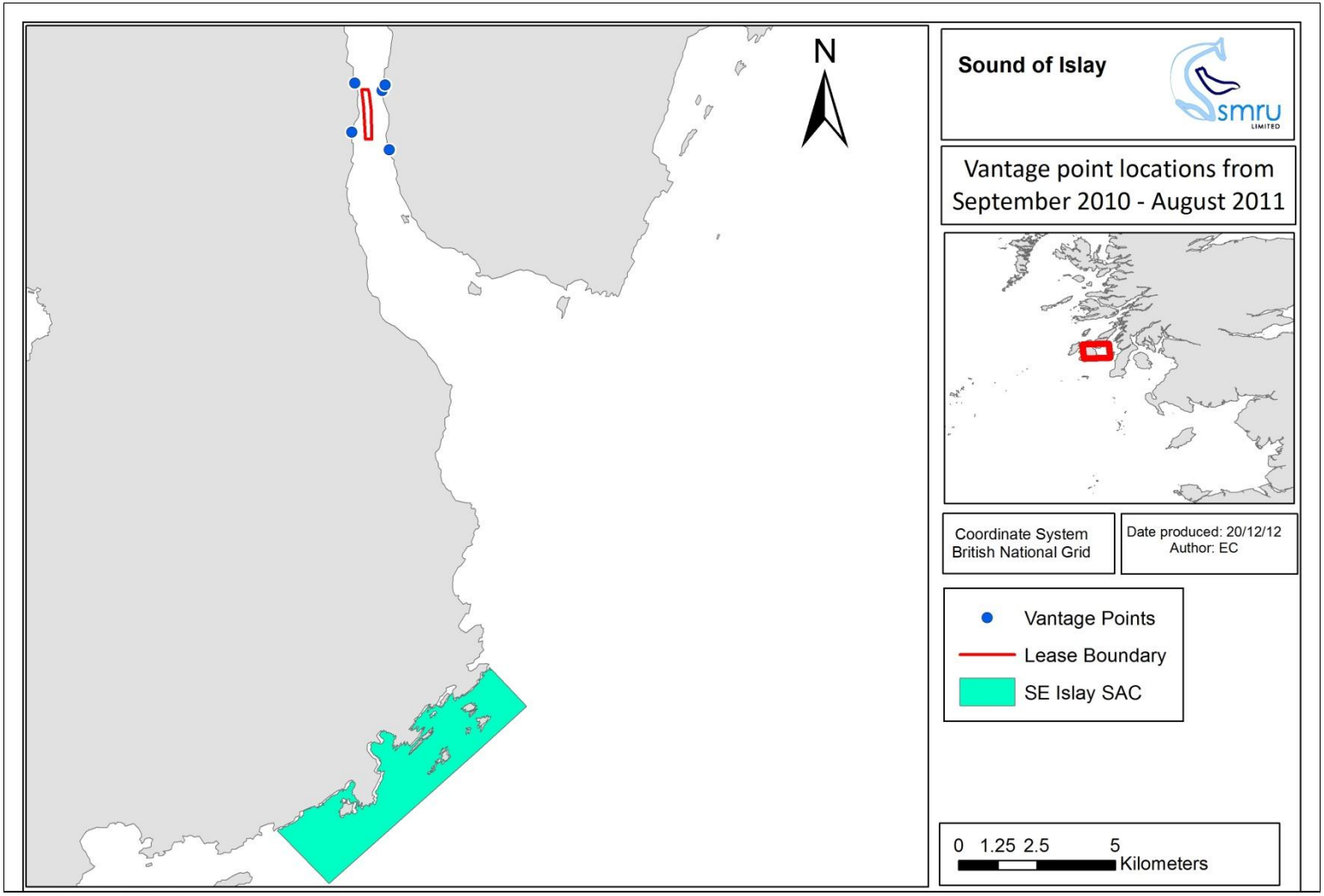


Figure 1. Locations of land based observation sites at the Sound of Islay, shown in relation to the development boundary (red line) and the South East Islay Skerries SAC.

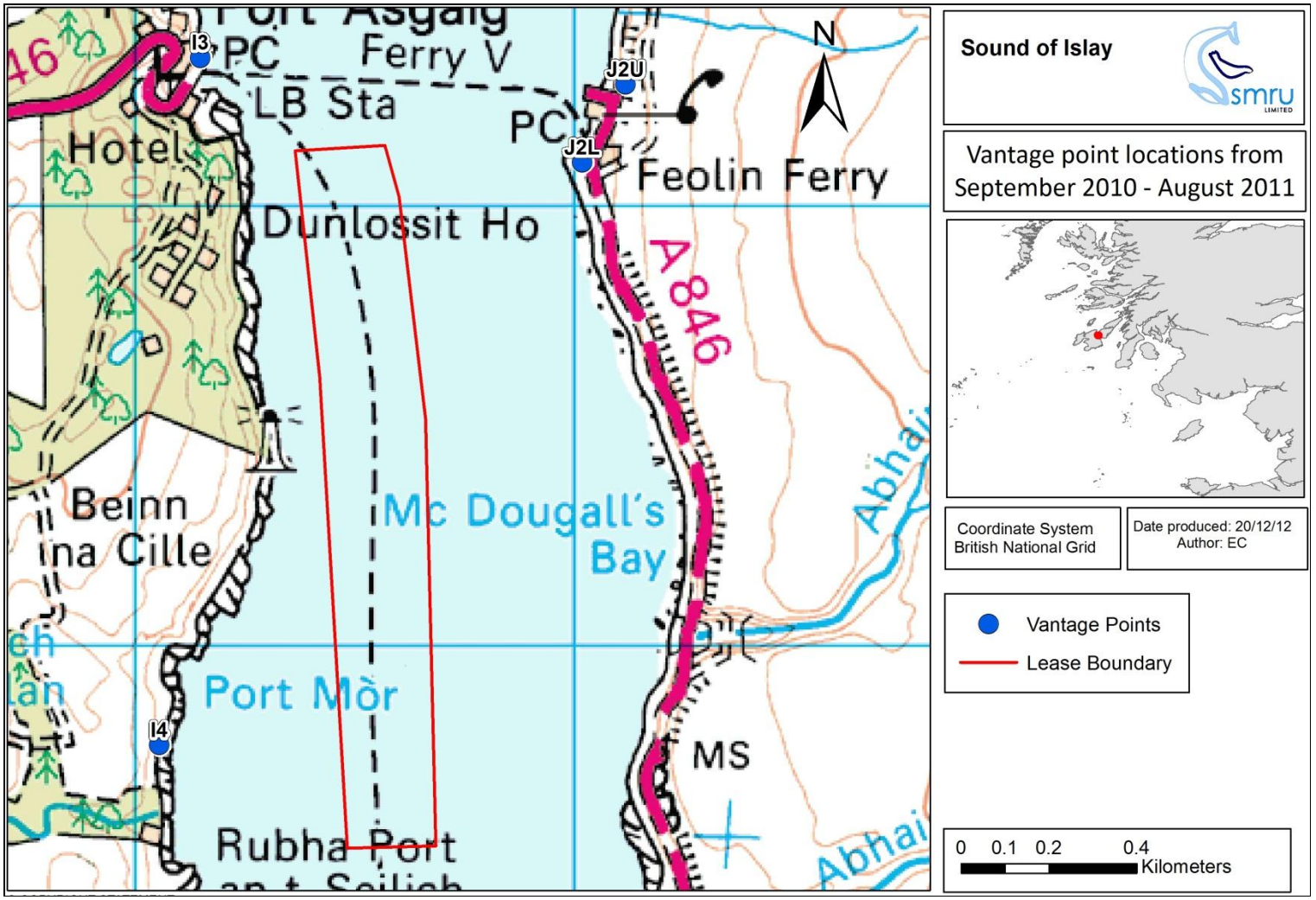


Figure 2. Locations of land based observation sites I3, J2, I4 and J3., shown in relation to the development boundary (red line). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673.

Table 1 Survey design – target for land based marine mammal survey effort at main observation sites

	Marine mammal effort	Total marine mammal effort
Weekly	4 Observation periods site x (8x15min)	8 hours
Monthly	4 weeks x 4 Obs site x (8x15min)	32 hours

The amount of effort required to detect changes in temporal and spatial variation in marine mammal density and habitat use depends partly on sighting rates or sighting probabilities. It was difficult to predict these rates at the design stage without prior data collection so it is anticipated that effort may have to be increased or decreased throughout any impact monitoring period to provide sufficient statistical power to measure changes with respect to these variables – formal power analysis using the data from the first year of the monitoring was presented in Mackenzie, Donovan and Sparling (2011) and it is recommended that this power analysis is repeated with the second year of data to inform the ability of these baseline data to act as a baseline against which any change may be detected as part of the Environmental Monitoring and Mitigation Plan for the site.

Survey effort is as much as possible equally distributed over all states of tide and time of day to take into account any tidal and temporal variation in animal distribution. The tidal cycle has been divided into 6 equal periods and was equally sampled in spring and neap tides. Each period was of approximately two hours duration, the exact time depending on the actual length of the tidal cycle. Periods 1 to 3 covered the ebb part of the cycle, Period 1 commenced at high tide and Period 3 ended at low tide. Periods 4 to 6 covered the flow part of the cycle starting at low tide and ending at high tide. The start and end times of tidal periods were calculated from tide tables.

6 Results

In this report, we present a summary of the marine mammal sightings collected between July 2009 and August 2011. This includes the year 1 baseline period between July 2009 and August 2010.

6.1 Effort

Survey effort was fairly even between months (with exception of the first 2 months during Year 1 in which there was less effort –

Table 2) and between tidal states within each month (Table 3). This supports the conclusion that any patterns evident in sighting rates seasonally and over the tidal cycle are a real reflection of changes in relative abundance. Survey effort was highest at the observation sites nearest the southern end of the development site – I4 and J3 with approximately 60% of all effort carried out at these two sites (Table 4). Most of the remainder of the effort was carried out at sites I3 and J2, with a very small amount (1%) carried out at reference sites to the north of the development site in Year 1. Watches at these sites were largely discontinued after August 2009 to concentrate effort at the development site. Approximately 26 hours per month on average was achieved over the two years of survey.

Table 2 Details of the marine mammal survey effort in year 1 and Year 2 of survey; Total number of minutes of marine mammal survey, total number of 15 minute scans and the total numbers of hours in each month.

'Year' of Survey	Month of Survey	Total effort (minutes)	#15 min scans	Total effort (hours)
Year 1	Jul-09	675	45	11
	Aug-09	675	45	11
	Sep-09	1455	97	24
	Oct-09	1710	114	29
	Nov-09	1425	95	24
	Dec-09	1200	80	20
	Jan-10	1574	105	26
	Feb-10	1395	93	23
	Mar-10	1425	95	24
	Apr-10	1230	82	21
	May-10	1260	84	21
	Jun-10	1485	99	25
	Jul-10	1455	97	24
	Aug-10	1535	102	26
Year 2	Sep-10	1845	123	31
	Oct-10	1920	128	32
	Nov-10	1785	119	30
	Dec-10	1440	96	24
	Jan-11	2010	134	34
	Feb-11	1185	79	20
	Mar-11	1695	113	28
	Apr-11	1785	119	30
	May-11	915	61	15
	Jun-11	2190	146	37
	Jul-11	1830	122	31
	Aug-11	1740	116	29

Table 3 Details of the marine mammal survey effort across tidal state in each month of survey (High tide at the start of period 1, low tide at the end of period 3, Tidal periods 2 and 5 representing mid ebb and mid flood respectively).

	Tidal State					
	1	**2**	**3**	**4**	**5**	**6**
Jul-09	20%	16%	13%	16%	18%	18%
Aug-09	16%	13%	20%	22%	20%	9%
Sep-09	21%	16%	10%	11%	19%	23%
Oct-09	15%	15%	17%	22%	16%	16%
Nov-09	14%	11%	9%	24%	25%	17%
Dec-09	10%	15%	14%	21%	23%	18%
Jan-10	18%	13%	17%	24%	15%	12%
Feb-10	6%	14%	20%	28%	22%	10%
Mar-10	16%	9%	24%	20%	17%	14%
Apr-10	20%	16%	23%	17%	15%	10%
May-10	15%	12%	15%	12%	25%	20%
Jun-10	22%	15%	17%	19%	14%	12%
Jul-10	11%	6%	18%	19%	23%	24%
Aug-10	12%	15%	25%	24%	14%	11%
All Yr1	**15%**	**13%**	**18%**	**21%**	**19%**	**15%**
Sep-10	17%	20%	24%	14%	15%	11%
Oct-10	17%	17%	11%	23%	20%	13%
Nov-10	12%	19%	21%	19%	19%	9%
Dec-10	17%	19%	20%	20%	11%	14%
Jan-11	19%	25%	25%	20%	8%	4%
Feb-11	20%	16%	15%	8%	28%	13%
Mar-11	16%	13%	17%	23%	14%	17%
Apr-11	17%	13%	15%	20%	18%	16%
May-11	20%	23%	13%	15%	15%	15%
Jun-11	21%	15%	13%	15%	12%	23%
Jul-11	22%	19%	15%	11%	12%	20%
Aug-11	16%	19%	20%	20%	12%	14%
All Yr2	**18%**	**18%**	**17%**	**18%**	**15%**	**14%**
ALL	**16%**	**16%**	**17%**	**19%**	**17%**	**15%**

Table 4 Percentage of total marine mammal survey effort by month and vantage point across both years of survey. (Ref sites are sites I1, I2 and J1 to the north of the main sites – see Figure 1)

	Vantage Point				
Month	**I3**	**I4**	**J2**	**J3**	**Ref sites**
Jul-09	18%	29%	16%	22%	16%
Aug-09	20%	29%	22%	29%	0%
Sep-09	23%	29%	25%	22%	2%
Oct-09	22%	30%	19%	22%	7%
Nov-09	32%	32%	14%	20%	3%
Dec-09	25%	31%	21%	20%	3%
Jan-10	28%	25%	25%	23%	0%
Feb-10	22%	32%	23%	24%	0%
Mar-10	20%	33%	15%	28%	4%
Apr-10	20%	28%	13%	39%	0%
May-10	13%	37%	18%	32%	0%
Jun-10	15%	36%	10%	38%	0%
Jul-10	21%	26%	12%	41%	0%
Aug-10	19%	32%	14%	35%	0%
ALL Yr 1	**21%**	**30%**	**18%**	**28%**	**2%**
Sep-10	20%	28%	24%	28%	0%
Oct-10	28%	23%	25%	28%	0%
Nov-10	24%	27%	20%	26%	0%
Dec-10	24%	26%	5%	23%	0%
Jan-11	24%	33%	25%	27%	0%
Feb-11	25%	20%	0%	20%	0%
Mar-11	16%	33%	19%	24%	0%
Apr-11	27%	25%	20%	25%	0%
May-11	13%	18%	0%	19%	0%
Jun-11	31%	26%	25%	37%	0%
Jul-11	34%	25%	8%	32%	0%
Aug-11	19%	28%	23%	25%	0%
ALL Yr2	**26%**	**28%**	**17%**	**28%**	**0%**
ALL	**22%**	**28%**	**17%**	**27%**	**1%**

6.2 Sighting rates

6.2.1 Seals

6.2.1.1 In water

Harbour seals (*Phoca vitulina*) were the most common species sighted and were recorded in all months of the year. Sightings rates were 1.94 seals per hour in year 1 of the survey, 0.96 in year 2 and 1.43 on average over the whole two years of survey.

Sighting rates were relatively high over the first few months of the survey period (Jul-Sept 2009) in year 1 and then were variable but generally declining over the winter months, beginning to increase again in early summer 2010. Peak sighting rates in 2010 occurred in July (Figure 3). Sightings rates declined again over the winter 2010/2011, rising again in April-July 2011, although rates in year 2 overall were lower than rates in Year 1 and the summer peak in July/August 2011 was lower than in the previous two years.

Although grey seals (*Halichorus grypus*) were much less common, they were also sighted in all months of the survey. Similar to the pattern seen in harbour seals, sightings rates were high in the first few months of survey period in the summer of 2009 and then declined through the winter months. In contrast to the pattern for harbour seals, there was a peak in grey seal sighting rates in March 2010 with a subsequent decrease throughout April and May, with sightings increasing in June before declining again in July and August 2010 (Figure 3). Grey seal rates remained low but variable over winter 2010 and spring 2011 rising to a peak in August 2011.

A small number of harbour seal pups were sighted in July/August across 2009, 2010 and 2011, with a maximum count of 8 in July 2009, 4 in July 2010, and 5 in July 2011.

Figure 3 Monthly sighting rates of seals in the water in the Sound of Islay (excludes hauled out seals) between July 2009 and August 2011.

6.2.1.2 Hauled out seals

Hauled out seals accounted for 55% of all seal sightings. It was difficult to distinguish between multiple sightings of the same hauled out seals between and within watches, an issue which may lead to a degree of inflation in the numbers of haul out sightings. To avoid these problems and to gain some measure of seasonal variation we calculated the maximum total number of hauled out seals in each month, counted during watches which were carried out 2 hours either side of low tide. This figure varied seasonally but with no clear pattern (Figure 4), peaks in harbour seals haul out numbers were seen January to march 2010, July and August 2010 and December 2010 and January 2011. Counts also varied depending on the vantage point (Figure 5).

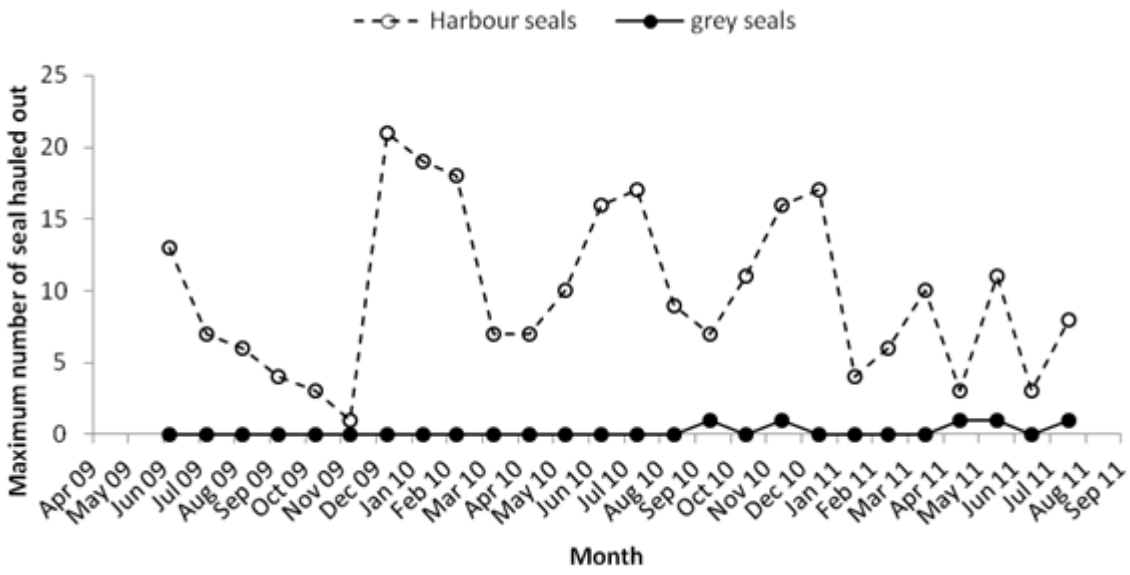


Figure 4 Maximum monthly haul out counts in the Sound of Islay between July 2009 and August 2011. Only includes counts made during watches 2 hours either side of low tide during dedicated marine mammal watches.

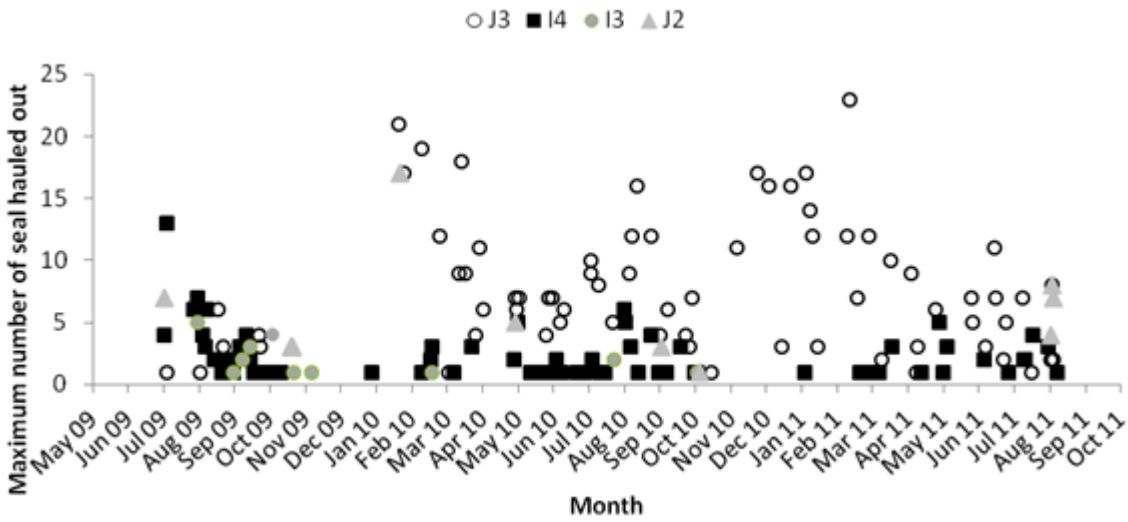
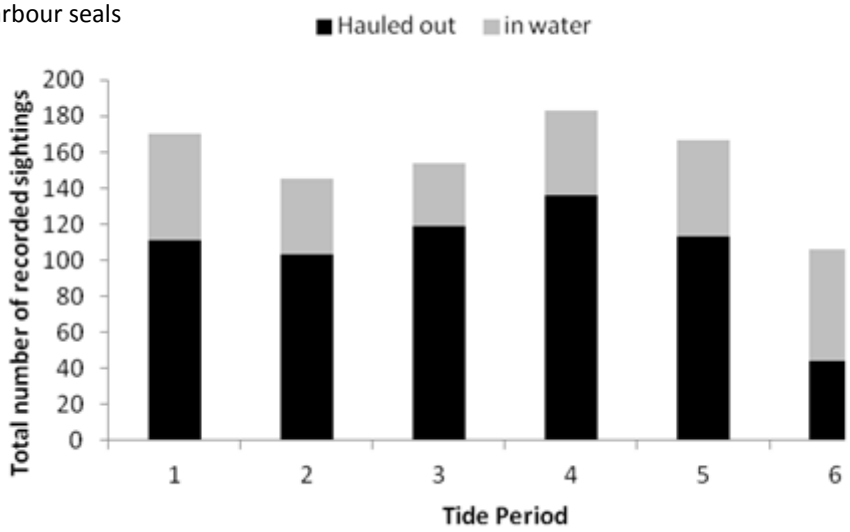


Figure 5 Seasonal variation in the daily maximum number of hauled out harbour seals by vantage point.

Very low numbers of hauled out seals were counted from I3 throughout the survey period, I4 had the highest maximum counts of hauled out seals in the early part of the study (July 2009) but then had very few seals counted at haul outs throughout the rest of the survey period with a slight increase in monthly maximum numbers in Spring/Summer 2010 and then again in Spring/Summer 2011. J2 had low maximum counts (3-7) throughout most of the survey period with the exception of February 2010 when 17 hauled out seals were counted from this VP. J3 had very low counts of hauled out seals during all surveys in 2009, but numbers increased in 2010 with monthly maximum counts varying between a low of 6 and a maximum of 23. The majority of haul out sightings were on the west side (Islay side) of the Sound so a large proportion of the seals sighted from J3 were actually hauled out on the opposite shore.

The number of sightings of harbour seals changed over the tidal cycle, with more sightings over low tide (Figure 6a). The proportion of seals hauled out relative to those sighted in the water also varied (Figure 6a). For harbour seals proportionately more sightings were of hauled out seals over low tide (2 hours before to 2 hours after low tide; periods 3 and 4), with the ratio of hauled out to in water sightings being more consistent at other states of the tide; in the hour prior to high tide (period 6) there were more sightings in the water than hauled out. For grey seals, most sightings were of animals in the water and there were relatively few sightings of hauled out grey seals (Figure 6b).

(a) Harbour seals



(b) Grey seals

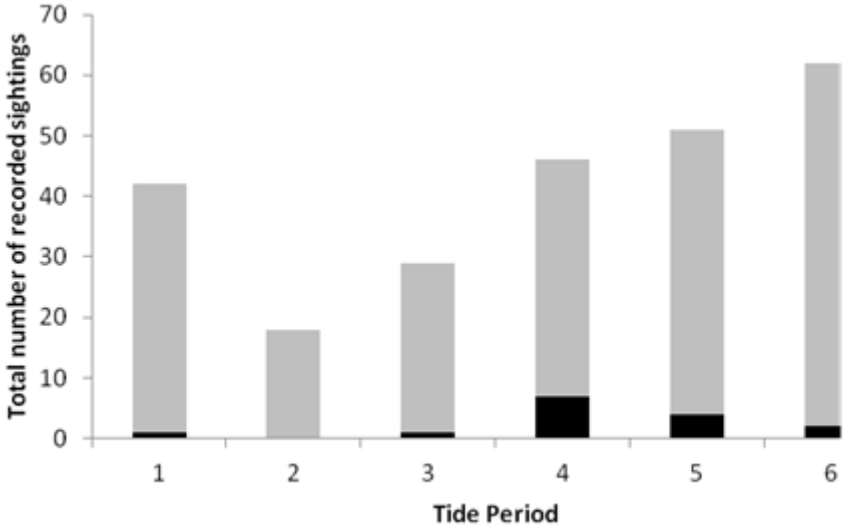


Figure 6 Proportion of sightings which were of seals hauled out compared to those in the water, in relation to the tidal cycle, for a) harbour seals and b) grey seals.

6.2.2 Basking sharks

Basking sharks were not frequently sighted in the Sound of Islay during year 2, with only a single individual being recorded on 1/9/2010 – this is likely one of the pair of animals spotted in previous

days which were included in the year 1 totals. In August 2010, a result of a pair of animals being sighted in the Sound on the 20th, 25th, 26th and 31st of August.

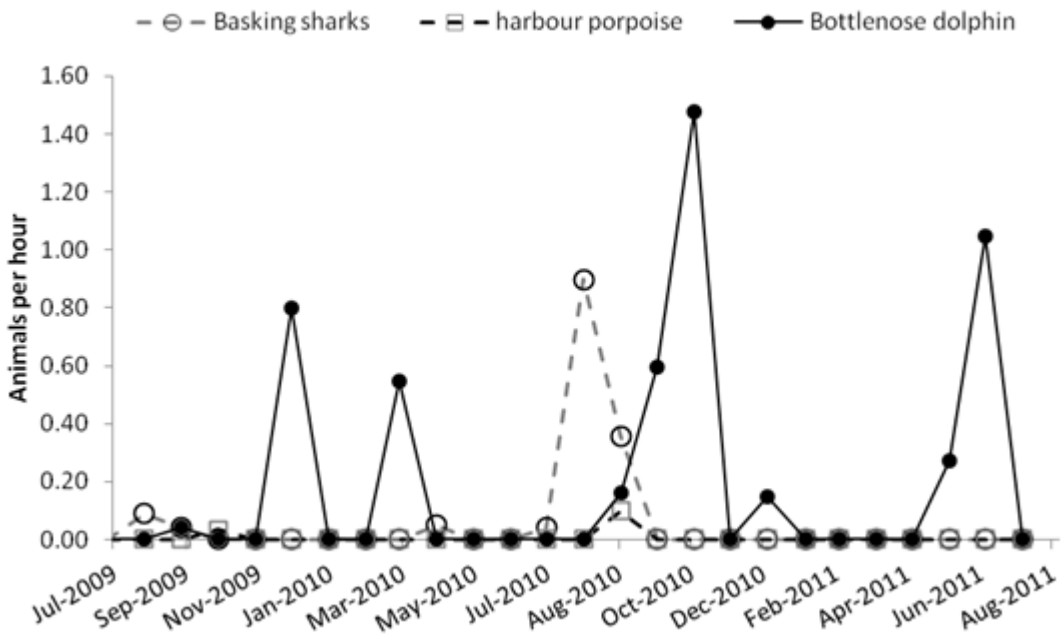


Figure 7 monthly sighting rates of cetaceans and basking shark in the Sound of Islay between July 2009 and August 2011.

6.2.3 Bottlenose dolphins

Bottlenose dolphins (*Tursiops truncatus*) were recorded during regular marine mammal scans on a total of 10 separate days over the Year 2 survey period. Bottlenose dolphins were sighted in September, October and November 2010 and in January, June and July 2011. These were all made from the Jura shore (in contrast to the Year 1 data where all bottlenose dolphin sightings were made from the Islay shore). Group sizes ranged from a single individual to a group of 13 animals. A total of 14 out of 681 watches recorded sightings of bottlenose dolphins (2%). Sighting rates were therefore low most of the time with very intermittent peaks where the same group of individuals was sighted over several consecutive watches (Figure 7). There are too few sightings to make any robust conclusions about patterns. Outside of the marine mammal watches, there were a total of 7 further sightings of bottlenose dolphins; two during flying bird watches and five during bird snapshot scans. These were mostly on days where dolphins were also sighted during MMW's – often in watch periods immediately preceding or subsequent to the FBW/BSS. The exceptions to this were a sighting of 7 dolphins on the 18th of October 2010 and of a single dolphin on the 28th March 2011.

6.2.4 Harbour porpoise

Harbour porpoise (*Phocoena phocoena*) were rarely sighted by observers, in fact there have only been two separate sightings over two years of survey; a sighting of a single individual on the 4th of October 2009 and a sighting of 3 individuals on the 22nd of September 2010. Both of these sightings were from the Islay shore, at the southernmost vantage point I4.

6.2.5 Otters

Otters (*Lutra lutra*) were seen regularly throughout the survey period on both sides of the SSound. Sightings rates were higher during the winter months, with a peak in February 2010. Sightings rates were lowest in summer months with very few sightings in July 2009 and Jun-Aug 2010 and April-July 2011 (Figure 8). Sightings of otters were generally coastal and were highest at observation sites I4, J2 and J3. Otter sightings varied with the tidal cycle with sighting rates being highest around low tide.

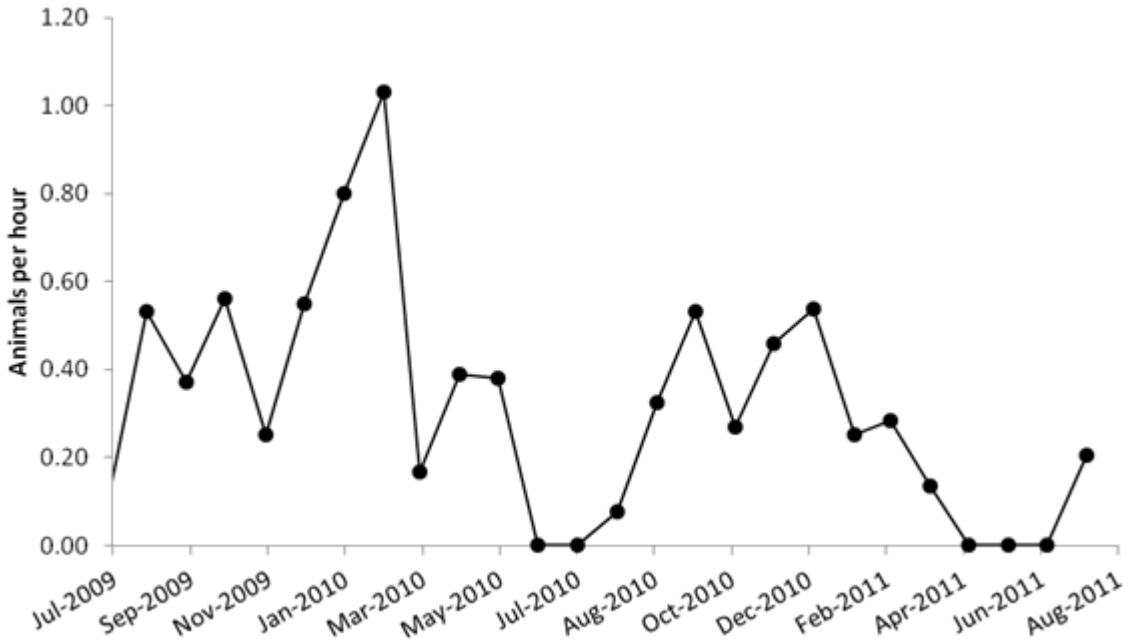


Figure 8 Monthly sighting rates of otters in the Sound of Islay from July 2009 to August 2011 (includes sightings during marine mammal watches only).

6.2.6 Behaviour

6.2.6.1 Seals

As already noted above, hauled out seals represented the majority of all seal sightings over the whole survey period in both years; 63% for all seal sightings combined in year 1 with this pattern varying between the two seal species; 68% of all harbour seal sightings were of hauled out seals, compared to only 5% for grey seals. In Year 2 the pattern was similar – half of all seal sightings were of hauled out seals, with 64% of all harbour seal sightings being of hauled out seals, compared to 5% for grey seals.

Of all the harbour seals sighted in the water, the majority were resting ("bottling" or "logging") (48%, in year 1; 46% in year 2) or swimming (41% in year 1; 35% in year 2) when first sighted. Grey seals showed a similar pattern with 27% and 35% swimming in years 1 and 2 respectively and 66% and 72% resting.

6.2.6.2 Cetaceans

In the first year of survey, eighty per cent of dolphin sightings were categorised as 'breaching' at first sighting, the remaining 20% were swimming. This pattern was the opposite in year 2 with 76% recorded as swimming and 12% breaching. The single harbour porpoise sighting in year 1 (September 2009) was of an animal breaching and in the only harbour porpoise sighting in the second year of survey was recorded as 'fast swimming'.

6.2.6.3 Basking sharks

In year 1, twenty six per cent of basking shark sightings had no behavioural codes associated with them and the remaining 74% were swimming. In year 2 100% of sightings were noted as swimming.

6.2.6.4 Otters

In year 1, 36% of otter sightings were at the surface of the water, 27% of otters were 'diving' when first sighted, and 9% of otter sightings were observed to be eating. In year 2, 30% were at the surface, 10% eating, 23% were swimming.

6.2.7 Comparison of Year 1 and Year 2 sighting rates

There was a reduction in the rate of sightings of both species of seal, basking sharks and otters between the first and second year of data collection whereas there was an increase in the rate of bottlenose dolphin sightings in year 2 (Table 5).

Table 5. Overall sighting rates for marine mammals, basking sharks and otters in both years of survey

Species	Sighting rate MMW Yr1	Sighting rate MMW Yr2	Overall Sighting rate
Harbour seal	1.94	0.96	1.43
Grey seal	0.76	0.71	0.73
Bottlenose dolphin	0.10	0.34	0.20
Basking shark	0.09	0.01	0.06
Otter	0.37	0.26	0.32

6.3 Seal haul outs in the vicinity of the cable landfall site

To characterise the usage of the shore in the vicinity of the proposed cable landfall sites, all records of sightings of hauled out harbour seals from vantage point J3 (the VP that overlooks the cable landing site), were isolated from the dataset and mapped. A location was attributed to each sighting using the bearing provided and locating the haul out where the bearing reached the opposite shore. Distances to sightings were not given but the binocular graticule reading provided confidence that these sightings were on the opposite shore rather than near the J3 VP site on the Jura shore. Figure 9 shows the locations where seals were recorded indicating which sites were more often recorded with seals present over all watches from J3. Figure 10 shows the overall maximum number of seals counted at each location. Figure 11a-l indicates counts of hauled out seals by month. These maps indicate that there are regularly small groups (up to a group size of 23 seals) hauling out along the section of coast immediately north of the proposed north cable landfall site (the first haul out is at a distance of approximately 70-100m, with small clusters of seal hauls extending several kilometres to the north). There is some variation from month to month in haul out use but no clear patterns. The last SMRU aerial harbour seal moult survey (carried out in August 2009) recorded 3 individuals on this section of coastline with 29 on Glas Eilean to the South East of the site (Figure 12).

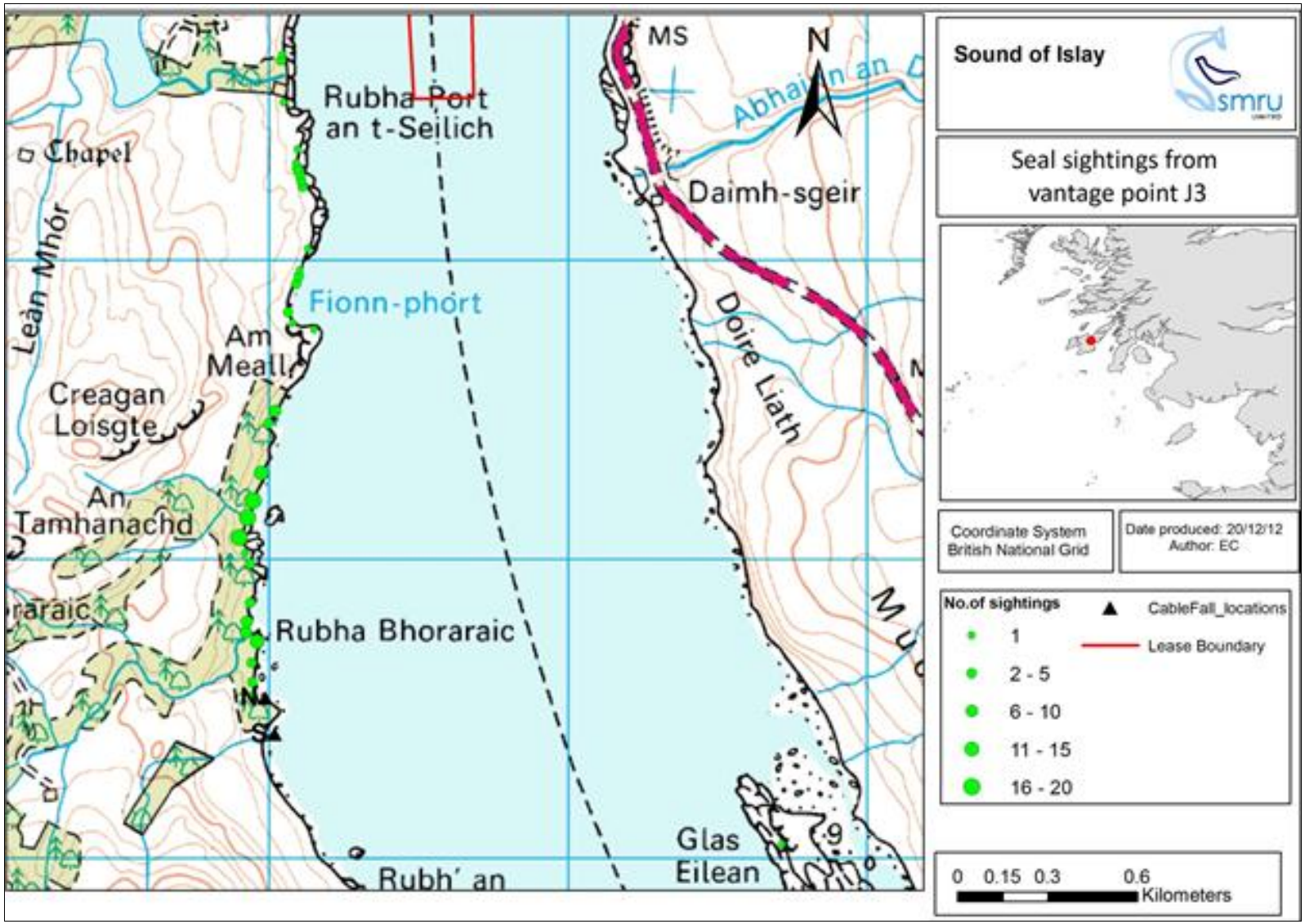


Figure 9: Seal Haul out counts from vantage point J3. Points are scaled by the total number of counts recorded at each location over all surveys in the second year of survey (September 2010-August 2011). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673.

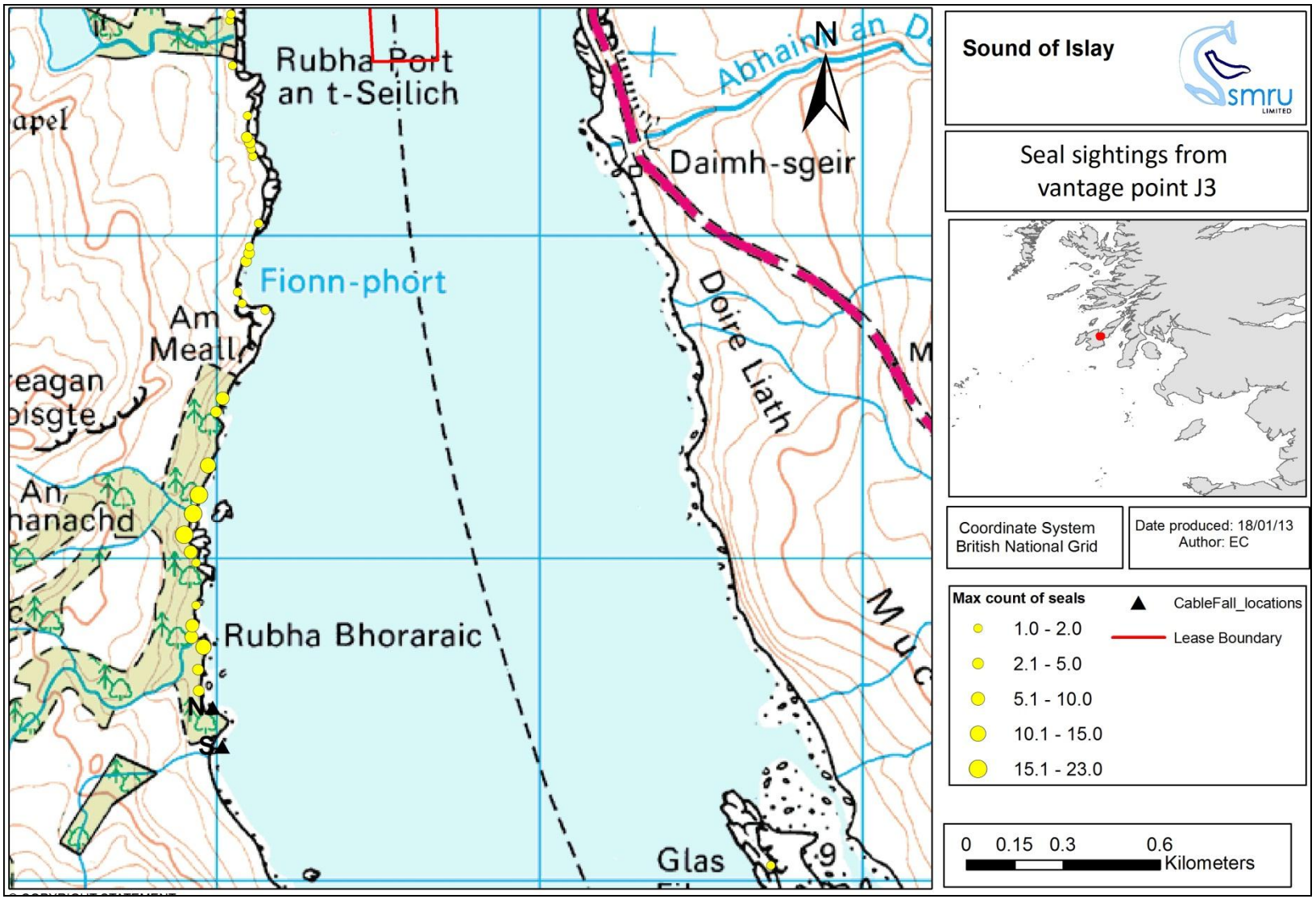


Figure 10: Seal Haul out counts from vantage point J3. Points are scaled by the maximum number of seals recorded at each location over all surveys in the second year of survey (September 2010-August 2011) Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

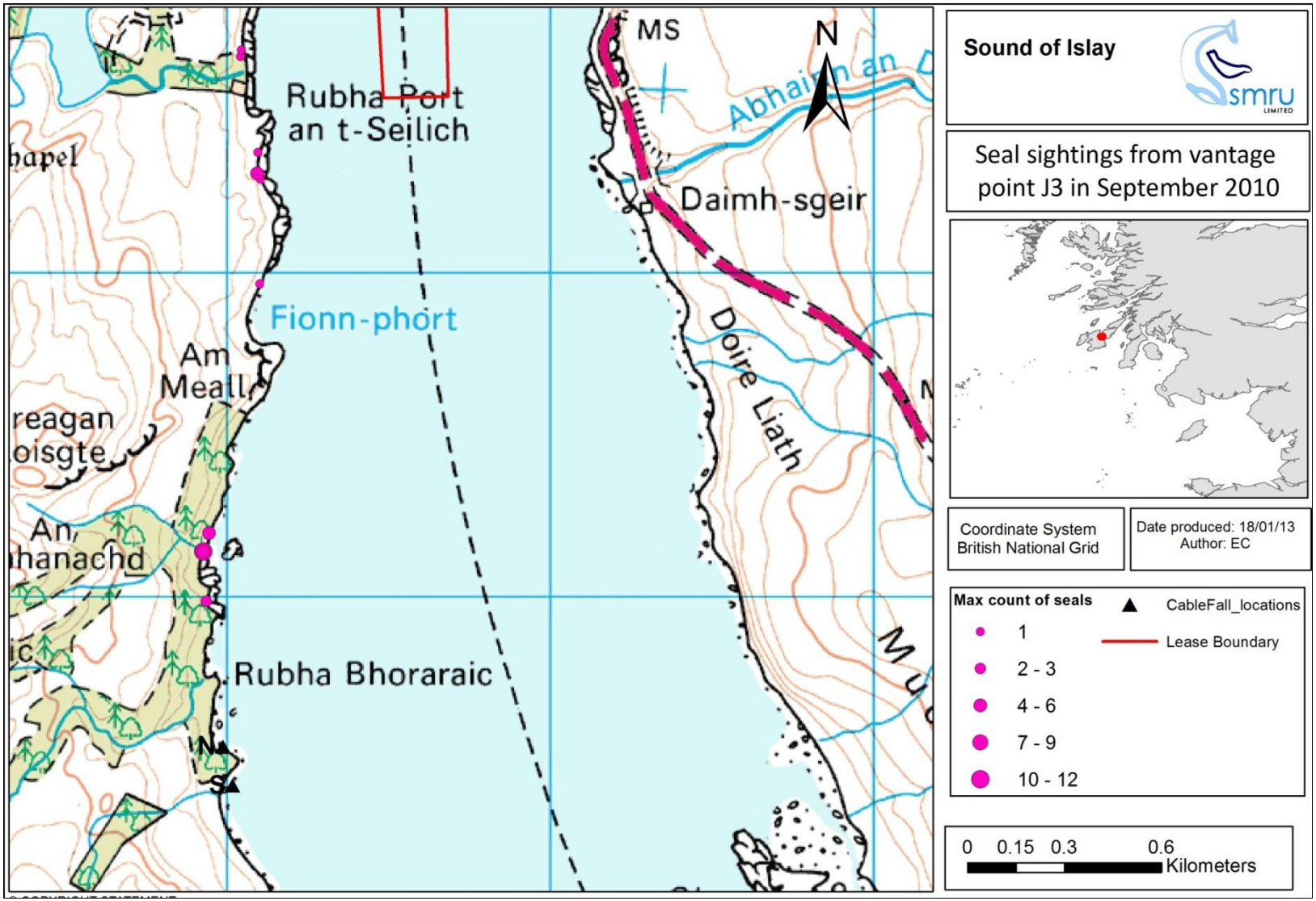


Figure 11a: September 2010 maximum counts of seals at haul out sites in the vicinity of the proposed cable landfall site (maximum count at each location within a given month). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

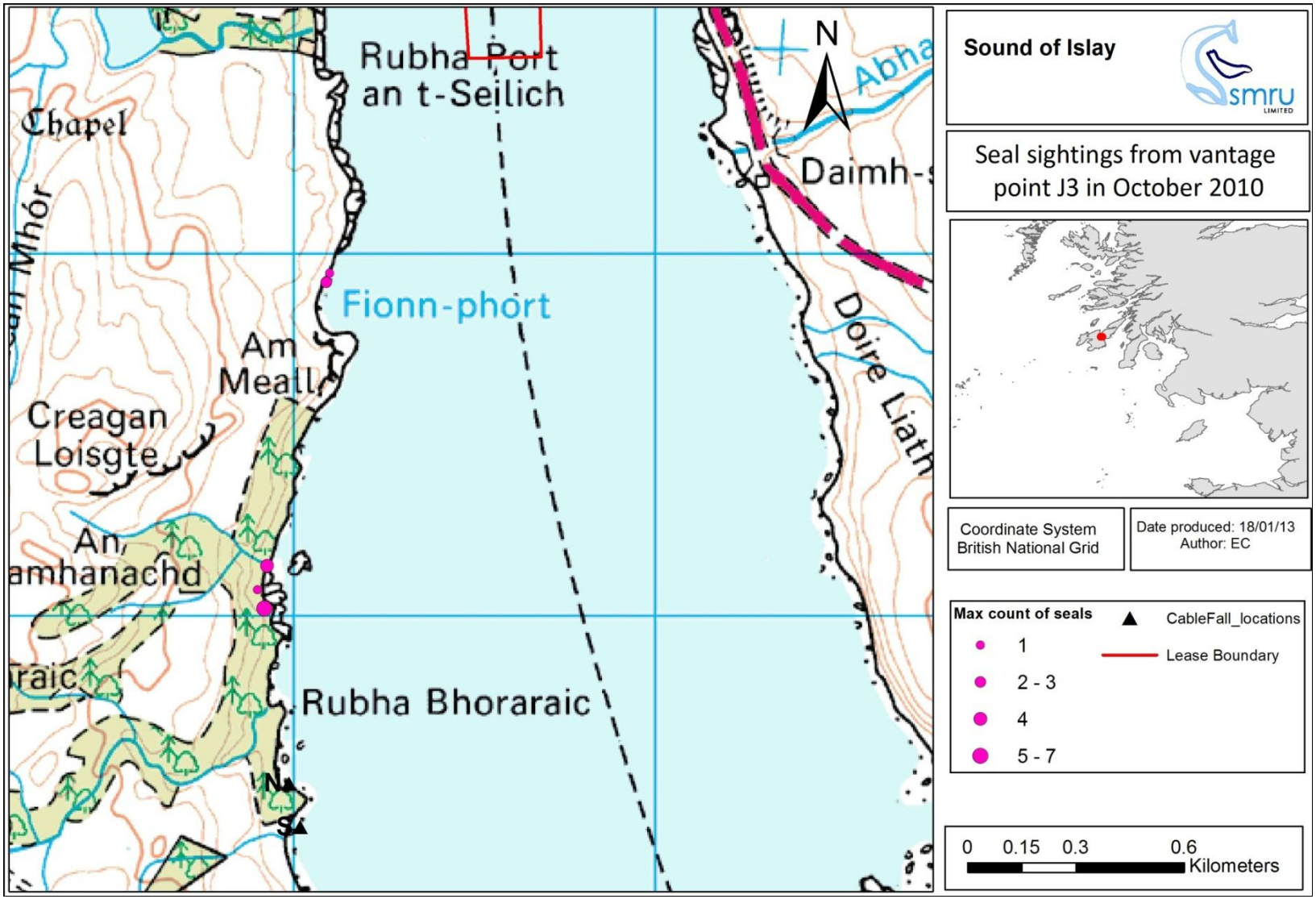


Figure 11b: October 2010 maximum counts of seals at haul out sites in the vicinity of the proposed cable landfall site (maximum count at each location within a given month). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

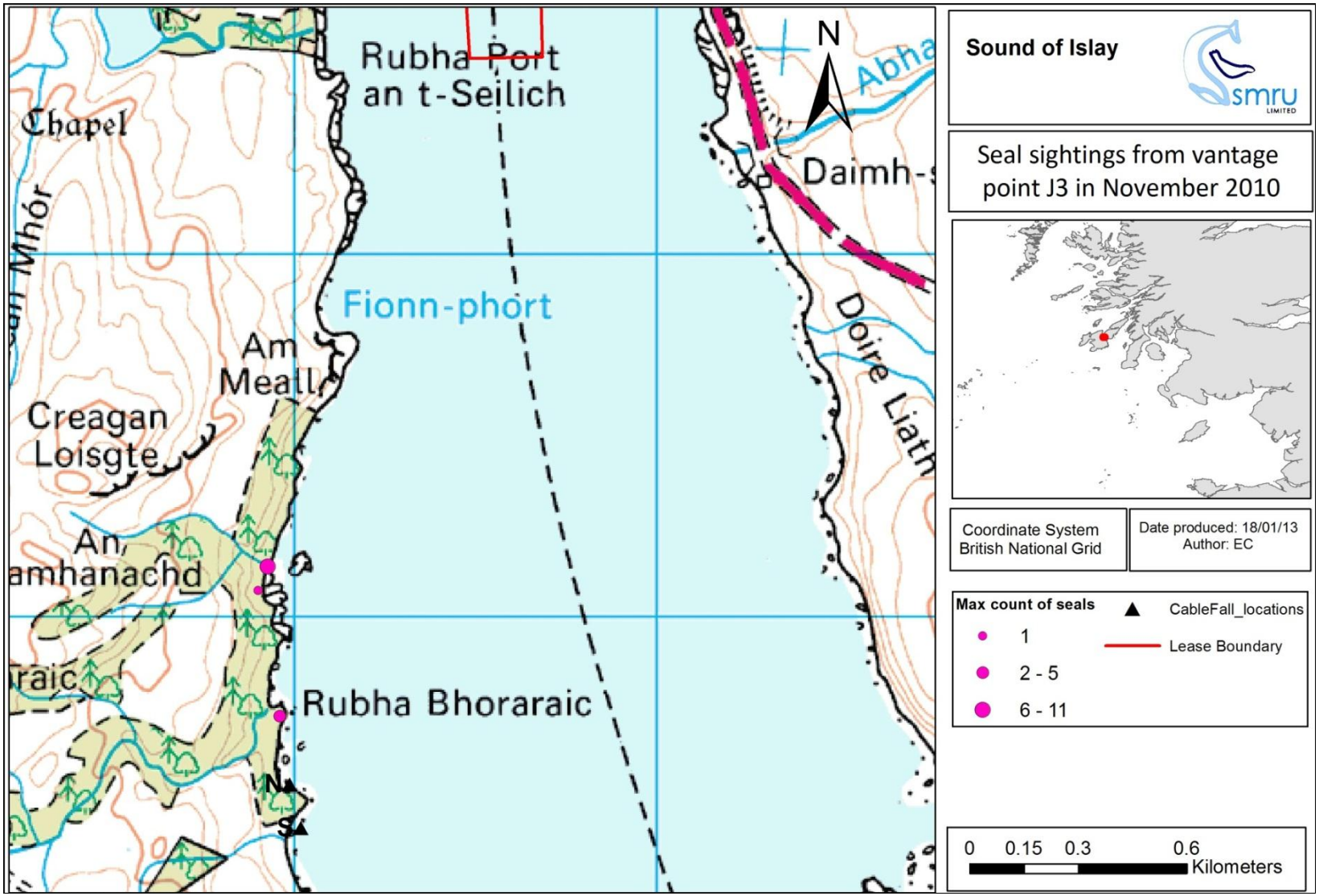


Figure 11c: November 2010 maximum counts of seals at haul out sites in the vicinity of the proposed cable landfall site (maximum count at each location within a given month). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

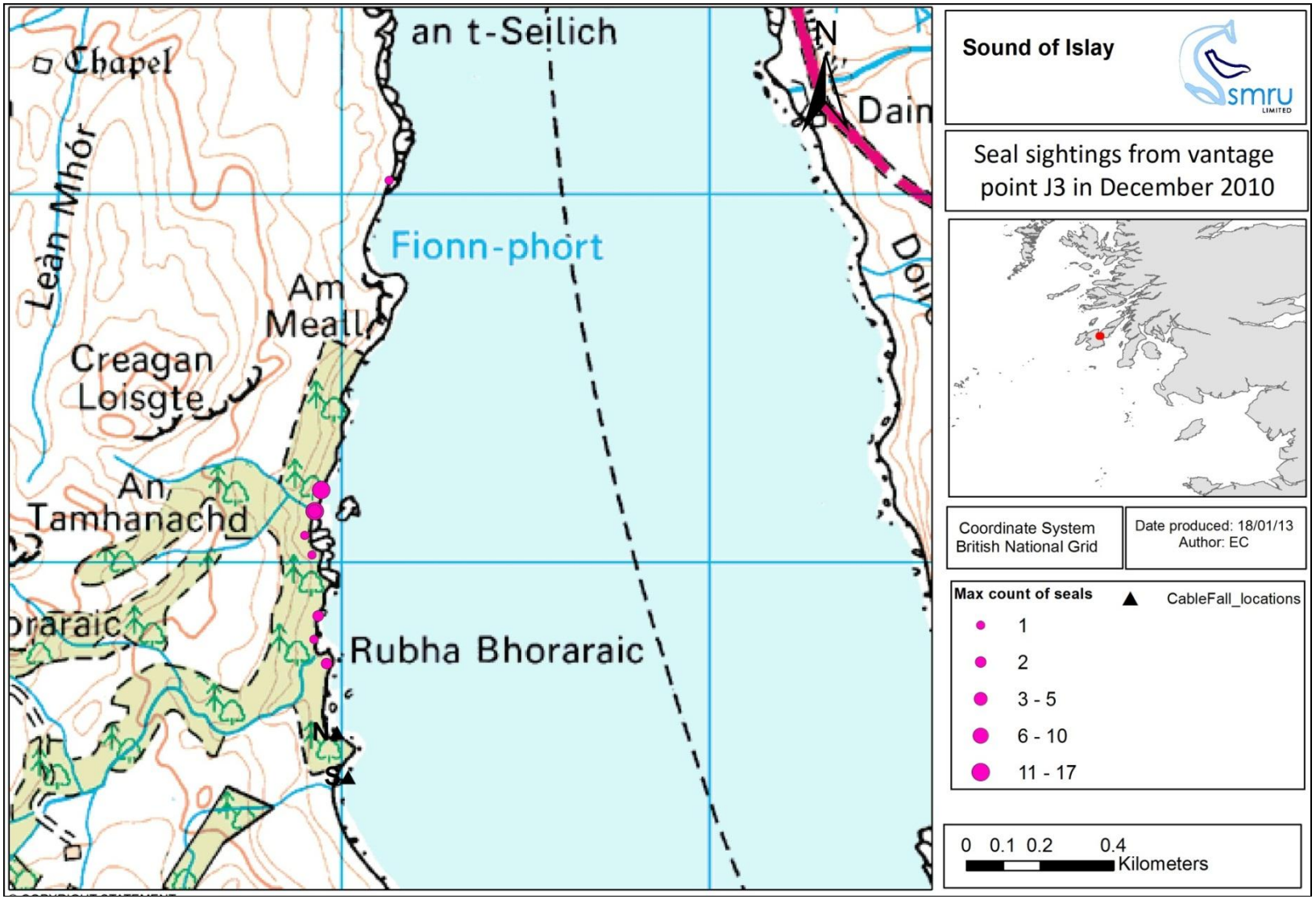


Figure 11d: December 2010 maximum counts of seals at haul out sites in the vicinity of the proposed cable landfall site (maximum count at each location within a given month). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

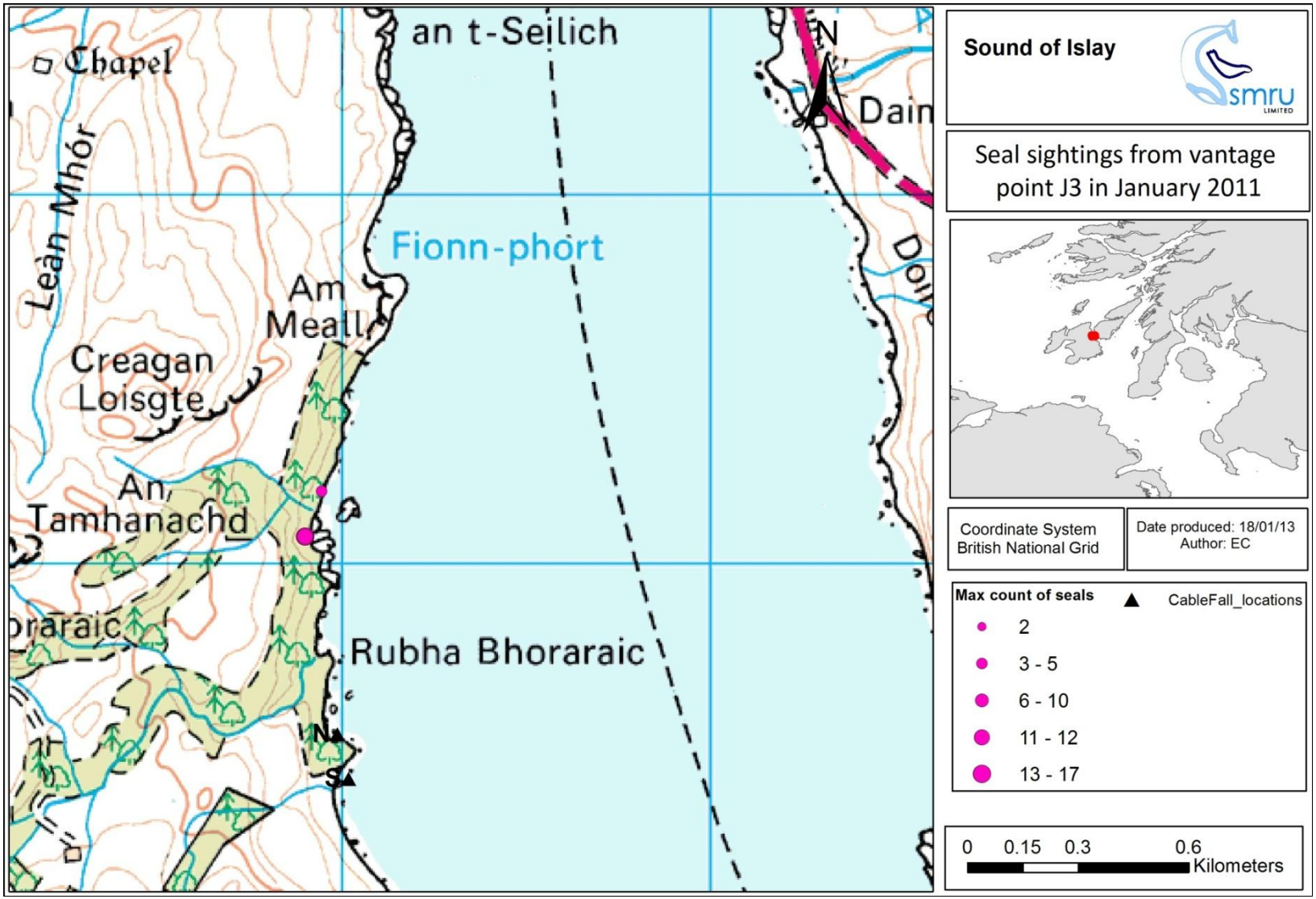


Figure 11e: January 2011 maximum counts of seals at haul out sites in the vicinity of the proposed cable landfall site (maximum count at each location within a given month). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

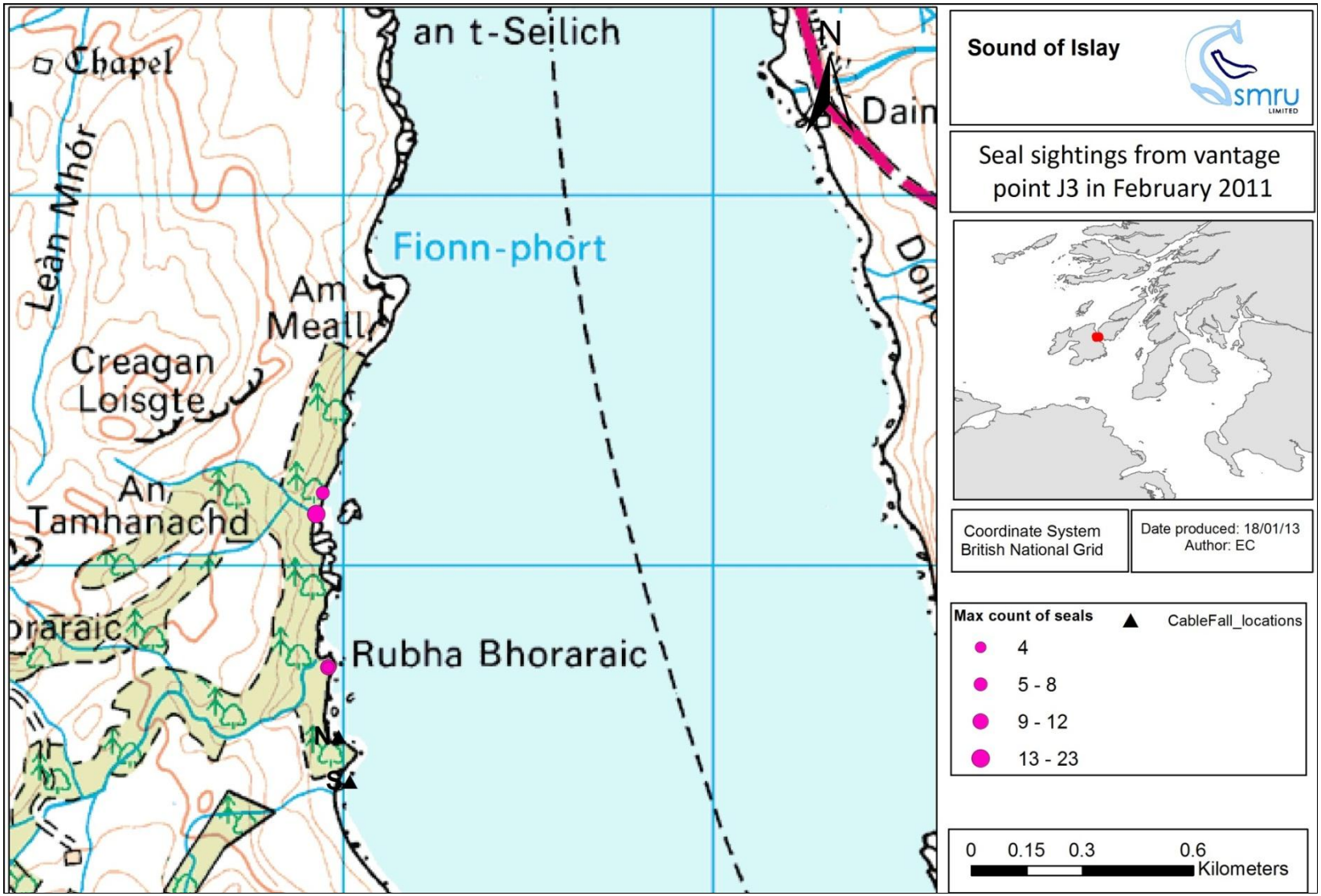


Figure 11f: February 2011 maximum counts of seals at haul out sites in the vicinity of the proposed cable landfall site (maximum count at each location within a given month). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

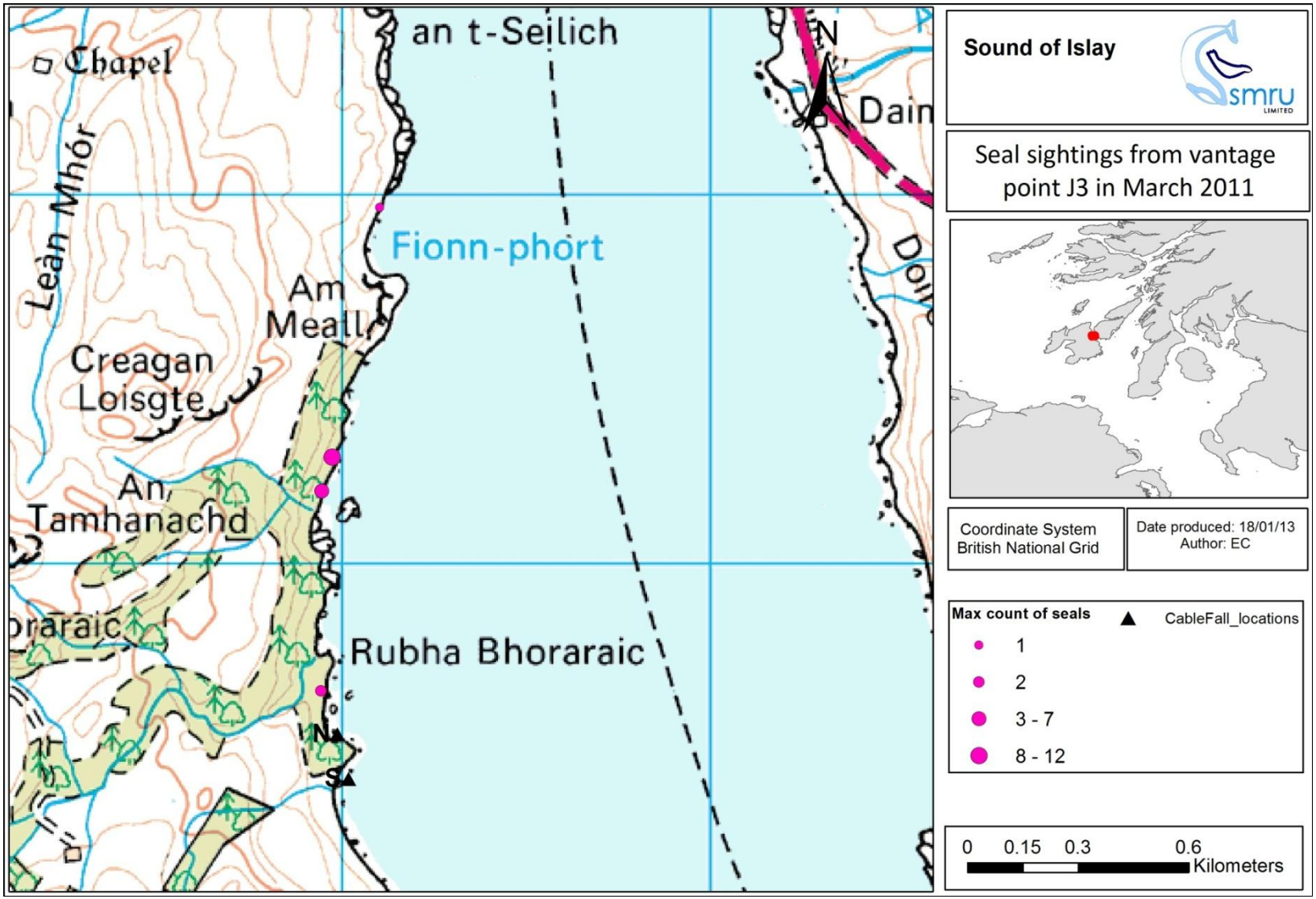


Figure 11g: March 2011 maximum counts of seals at haul out sites in the vicinity of the proposed cable landfall site (maximum count at each location within a given month). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

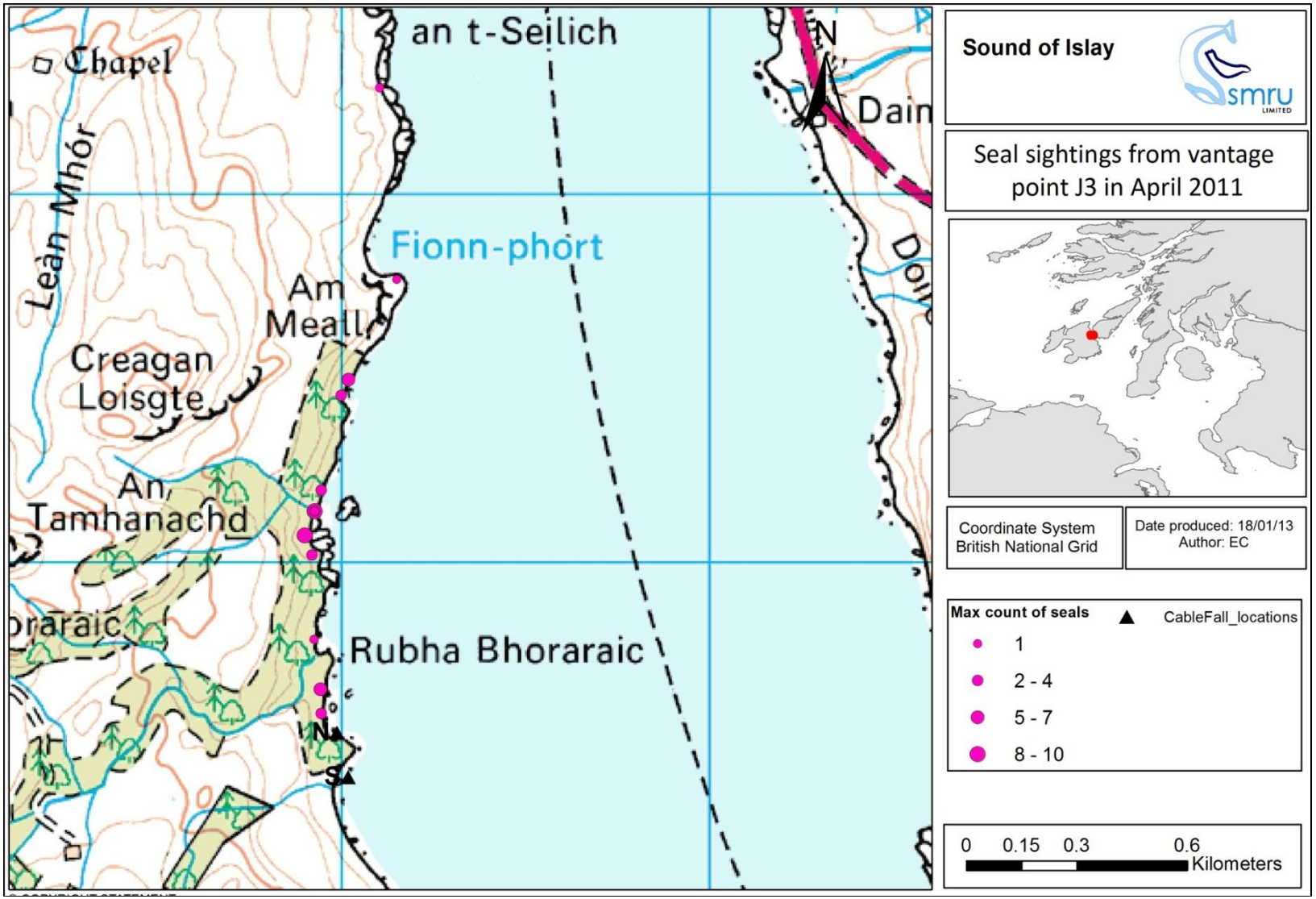


Figure 11h: April 2011 maximum counts of seals at haul out sites in the vicinity of the proposed cable landfall site (maximum count at each location within a given month). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

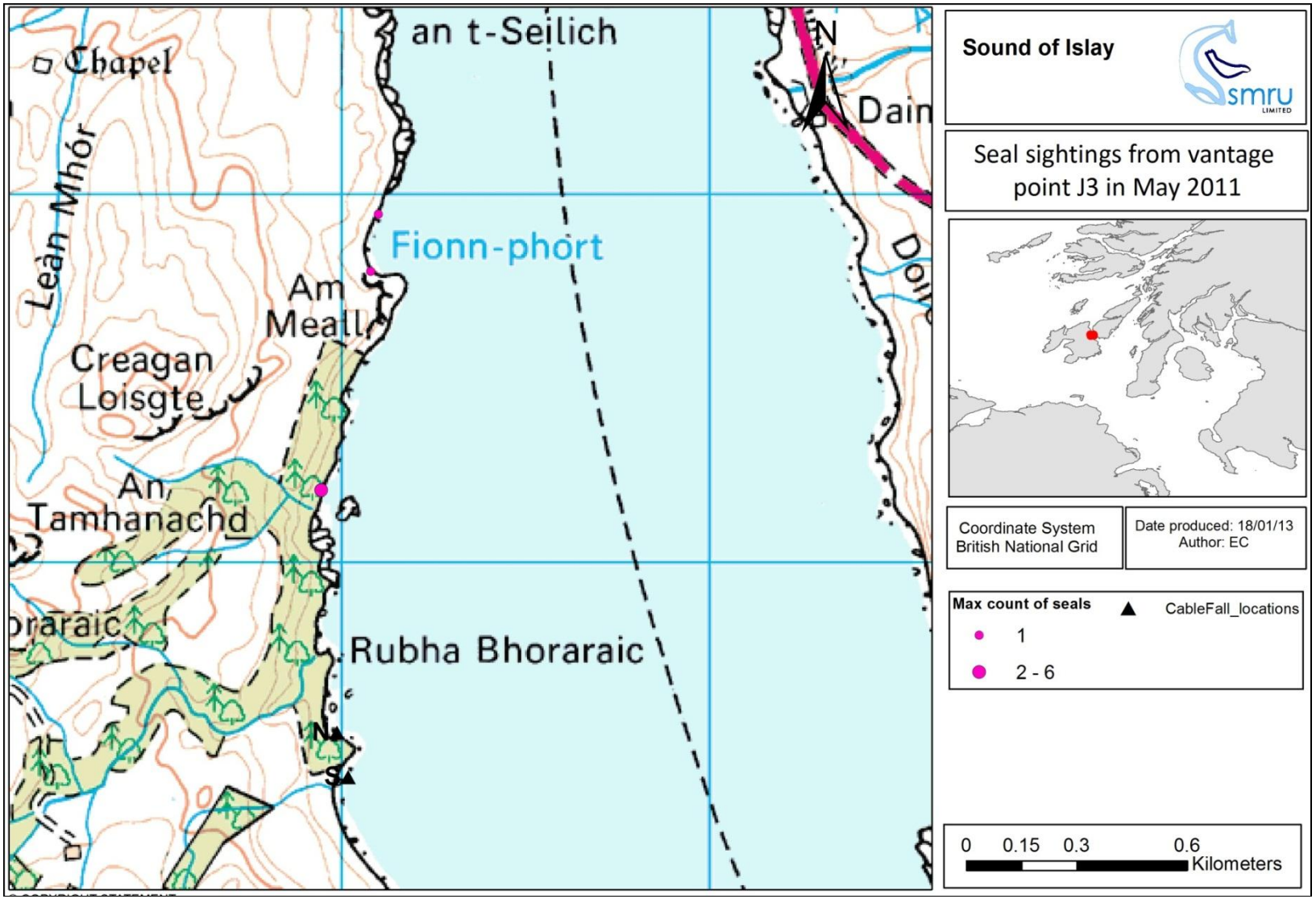


Figure 11i: May 2011 maximum counts of seals at haul out sites in the vicinity of the proposed cable landfall site (maximum count at each location within a given month). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

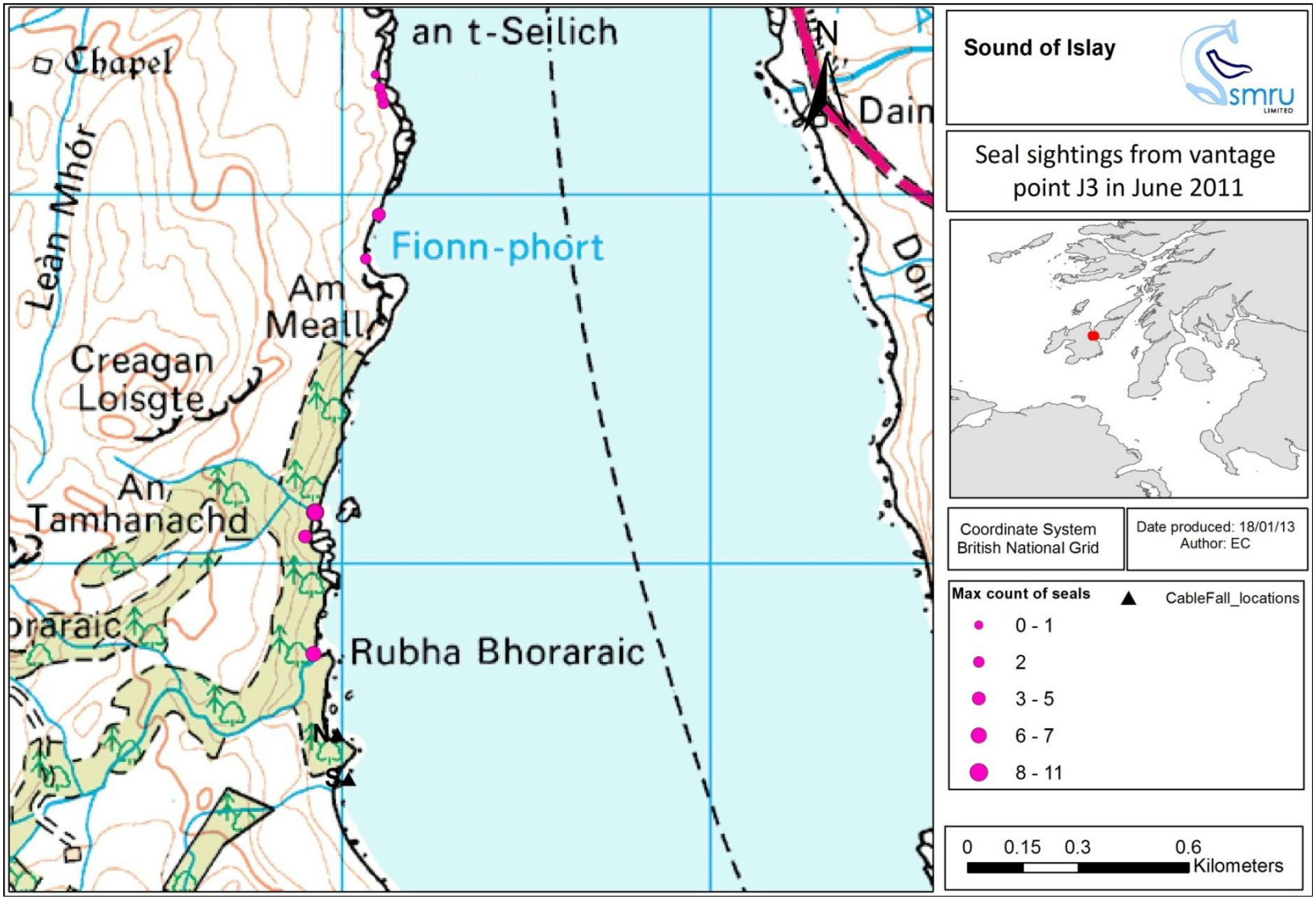


Figure 11j: June 2011 maximum counts of seals at haul out sites in the vicinity of the proposed cable landfall site (maximum count at each location within a given month). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

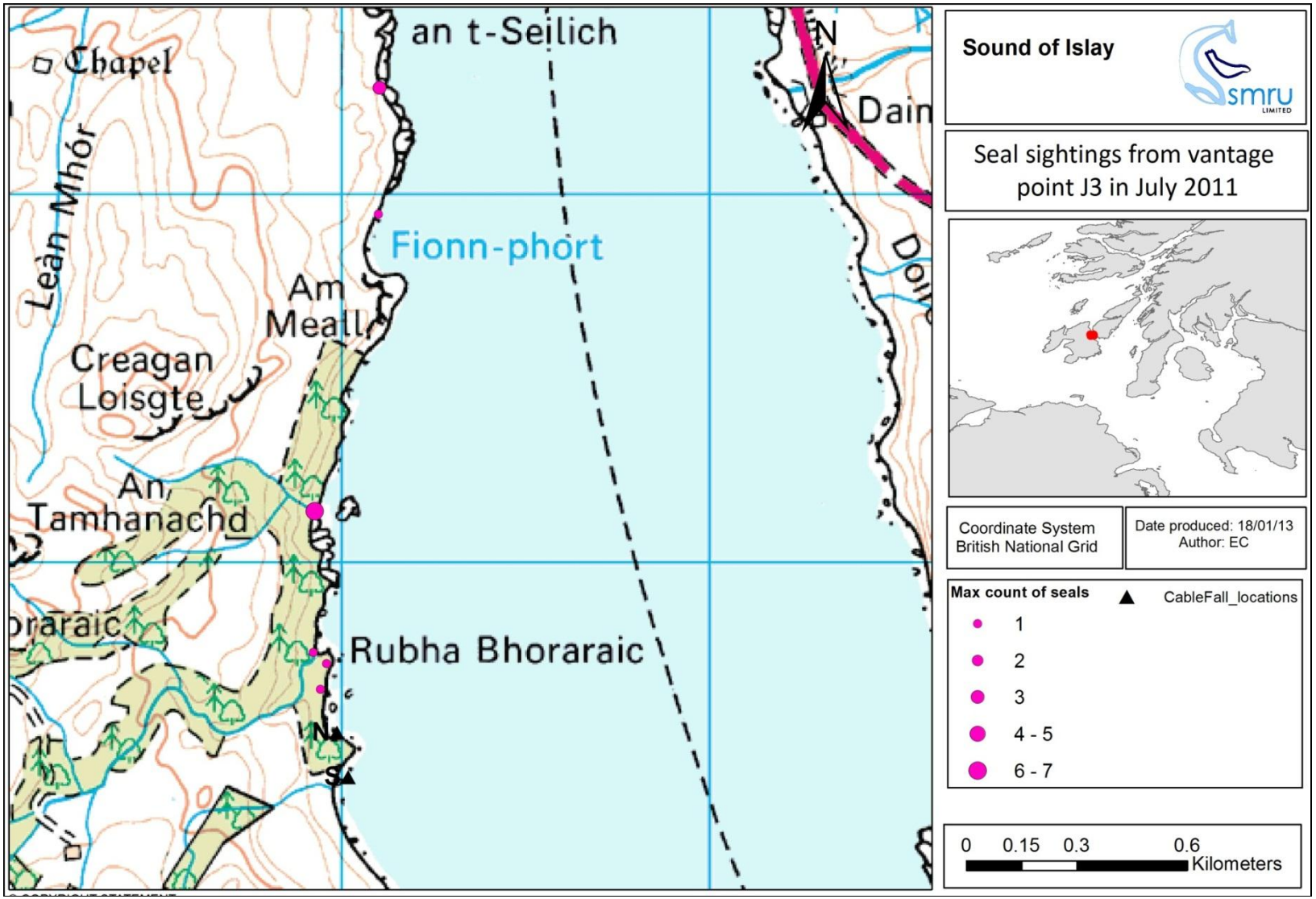


Figure 121k: July 2011 maximum counts of seals at haul out sites in the vicinity of the proposed cable landfall site (maximum count at each location within a given month). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

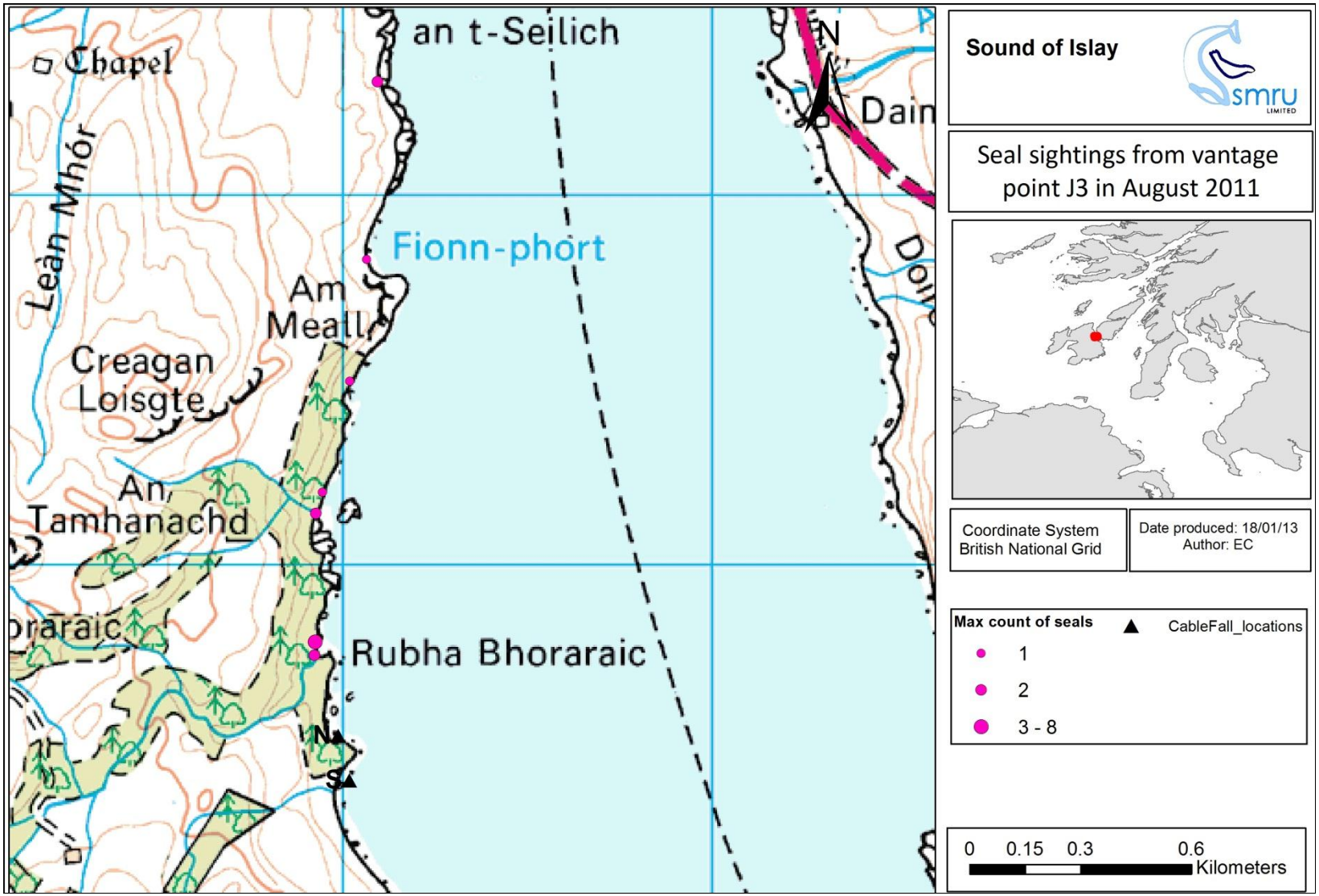


Figure 11l: August 2011 maximum counts of seals at haul out sites in the vicinity of the proposed cable landfall site (maximum count at each location within a given month). Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

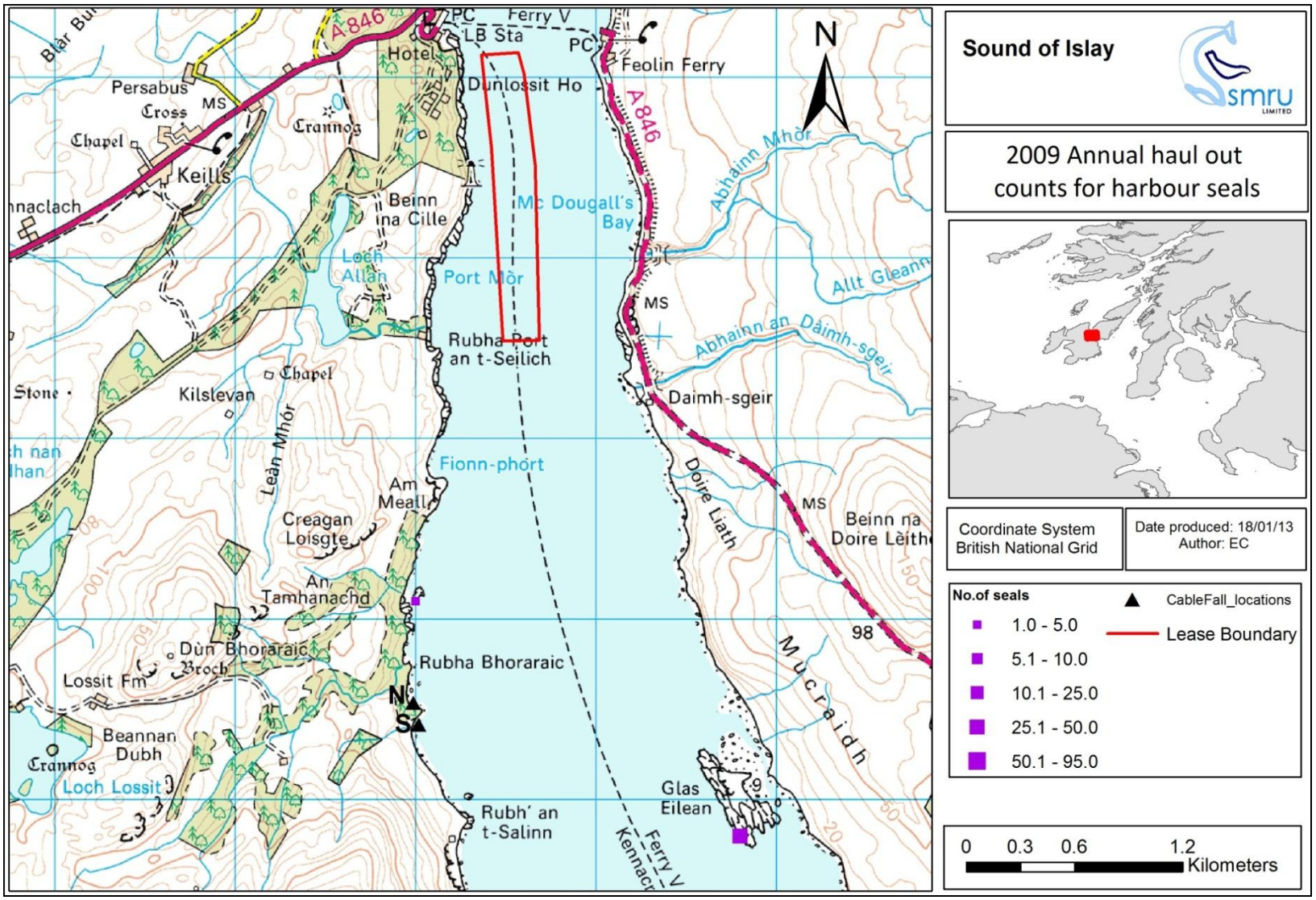


Figure 12: The number of harbour seals counted during the SMRU harbour seal moult aerial survey in August 2009.Reproduced from Ordnance Survey digital map data © Crown copyright 2013. All rights reserved. Licence number 0100031673

6.4 Telemetry

Telemetry tracks from 10 harbour seals in 2003 and 2004 were presented in the Year 1 baseline report. Here we present the tracks from a further 17 adult harbour seals tagged at Islay in 2011 and 2012. These data were collected by the Sea Mammal Research Unit under contract to the Scottish Government and SNH. A full report on this study will be available in 2013 (D. Thompson pers comm) but here we present the basic tracks to inform an updated assessment of harbour seal use of the Sound. Seven seals were tagged at the SE Islay SAC in 2011, two at Bunnahabhain Bay in 2011 and a further eight tagged at haul outs on the Islay coastline on the western side of the Sound of Islay – approximately 500m north of the proposed cable landfall site (3 in 2011, 5 in 2012).

Figure 13 a & b shows all of these seal tracks at two different scales. Figures 14, 15 and 16a-i show the tracks of the seals tagged at the SAC, Bunnahabhain Bay and W. Sound respectively.

None of the seals which were caught and tagged at the SAC entered the Sound of Islay. However four out of the eight seals tagged in the Sound itself did travel to the SAC. The seals that showed the highest use of the Sound and the area around the development site were tagged at haul outs within the Sound.. There was also some movement to the north of Islay with some seals travelling to Mull, Colonsay and Tiree. Both seals tagged to the north of the site at Bunnahabhain used the north end of the south and areas to the north of Islay and Jura.

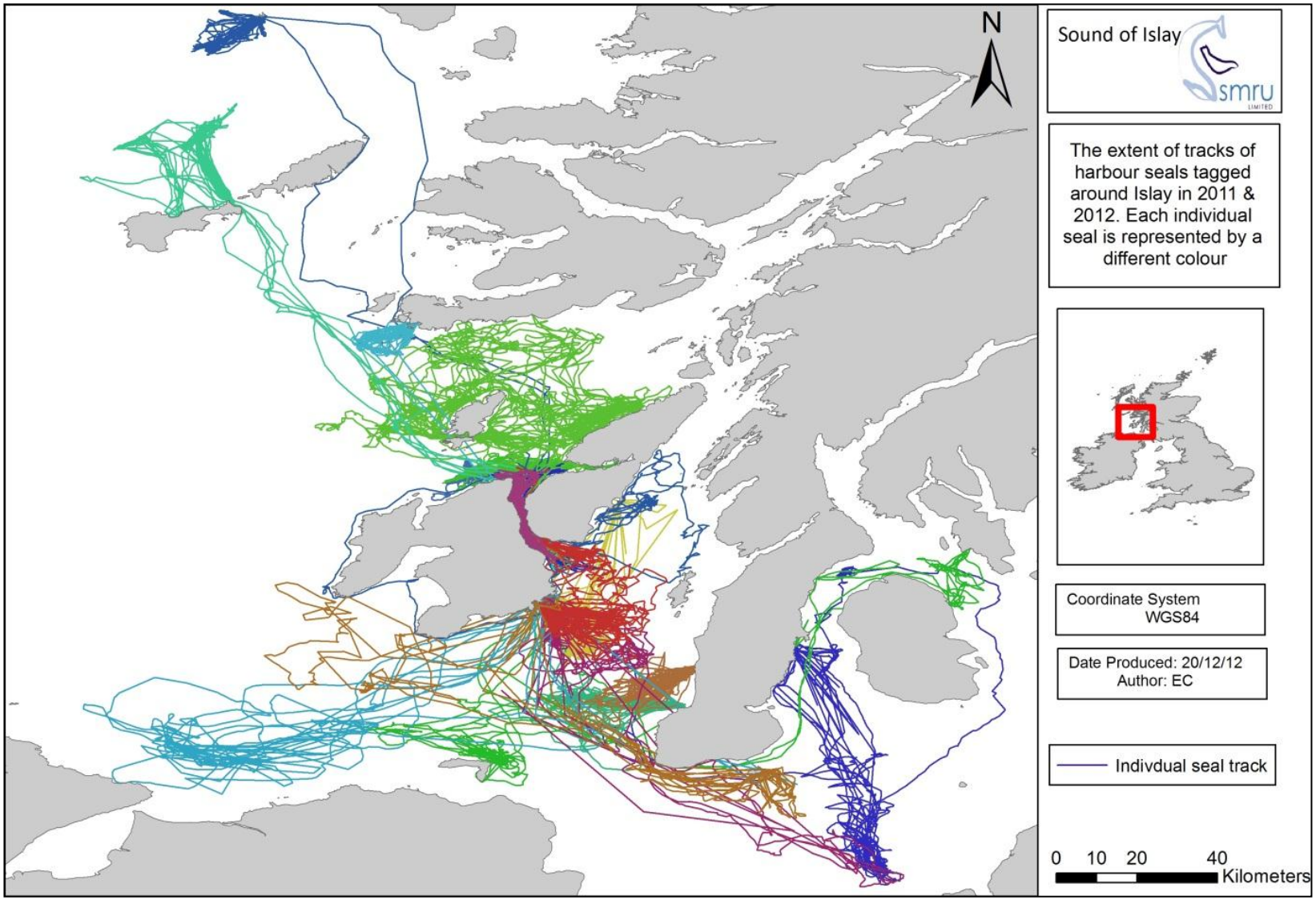


Figure 13a All tracks from SMRU 2011 and 2012 telemetry studies at Islay. Each individual seal track is a different colour. (a) Full extent of all tracks.

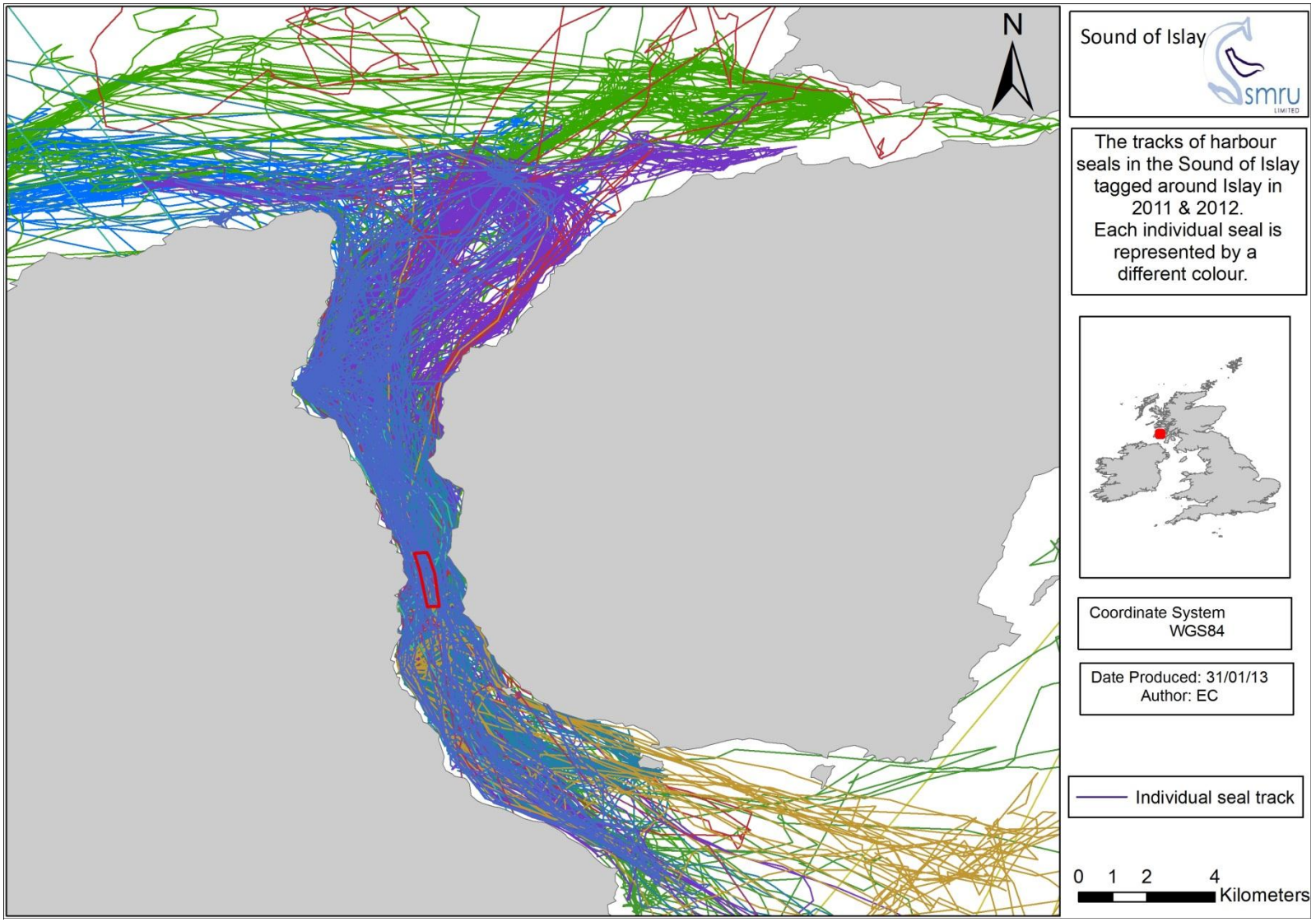


Figure 13b All tracks from SMRU 2011 and 2012 telemetry studies at Islay. Each individual seal track is a different colour. (b) zoomed in on the Sound of Islay.

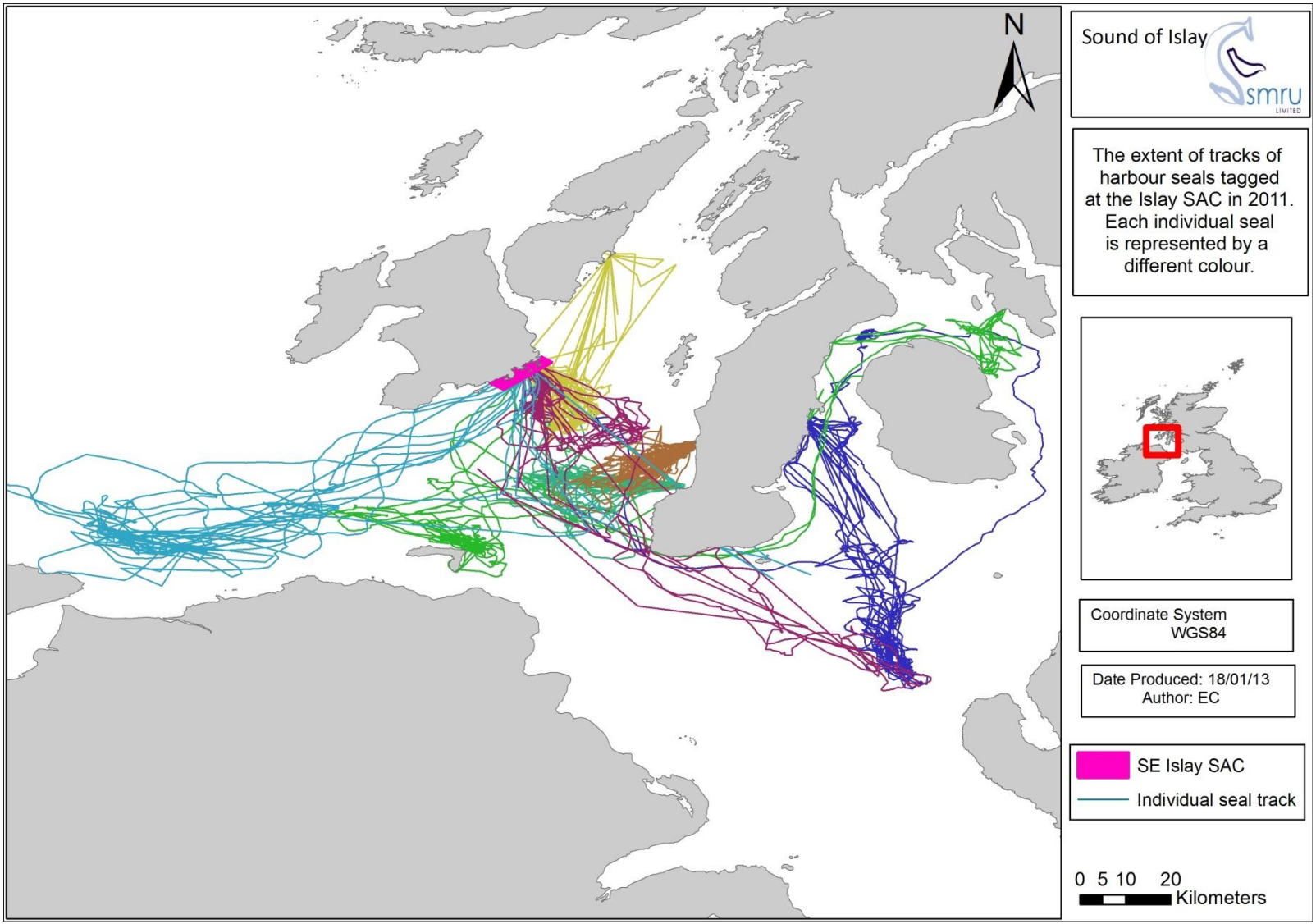


Figure 14. Tracks of the seals tagged at the South East Islay Skerries SAC.

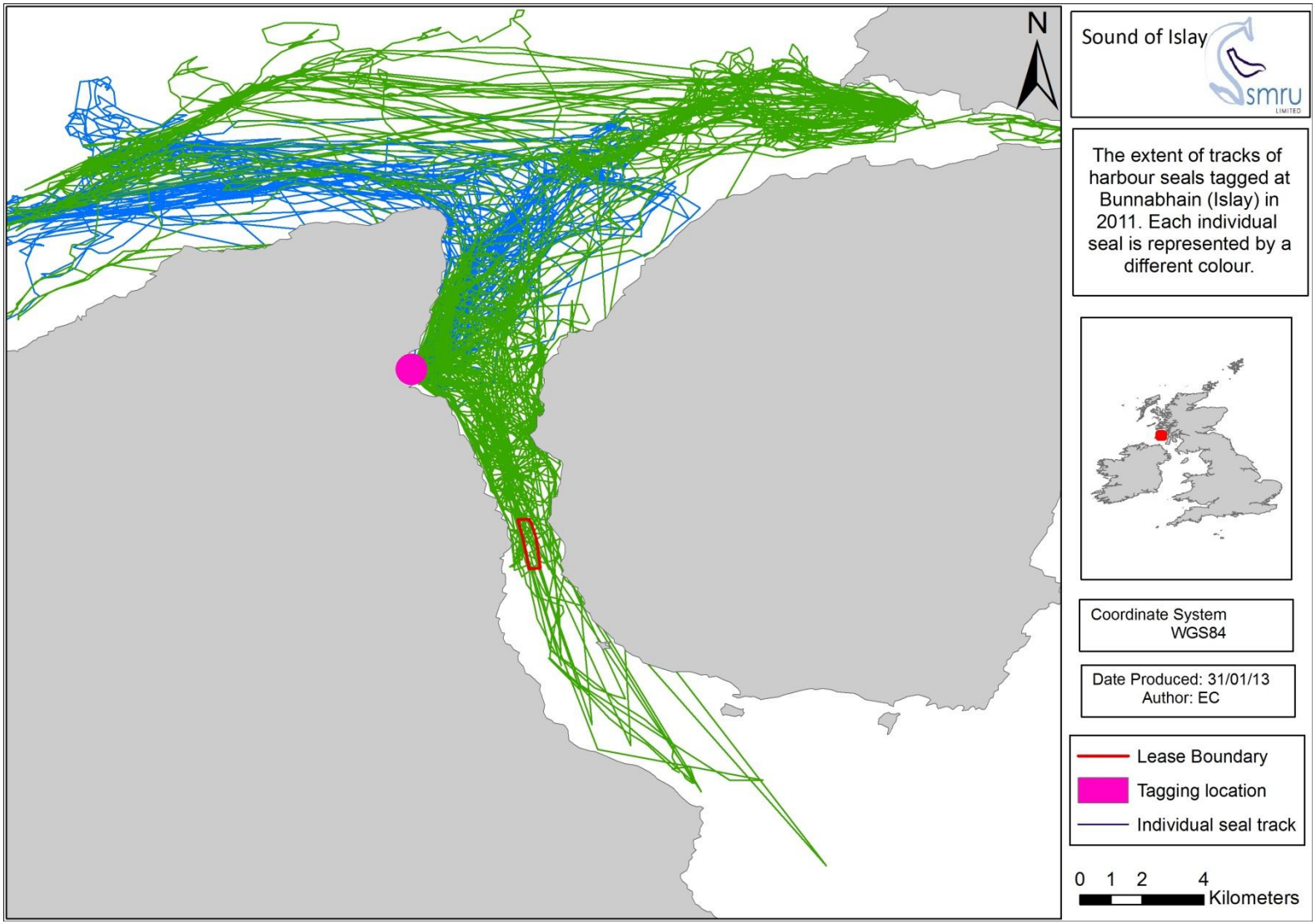


Figure 15. Seals tagged in the Western Sound of Islay, at Bunnahabhain Bay in 2011.

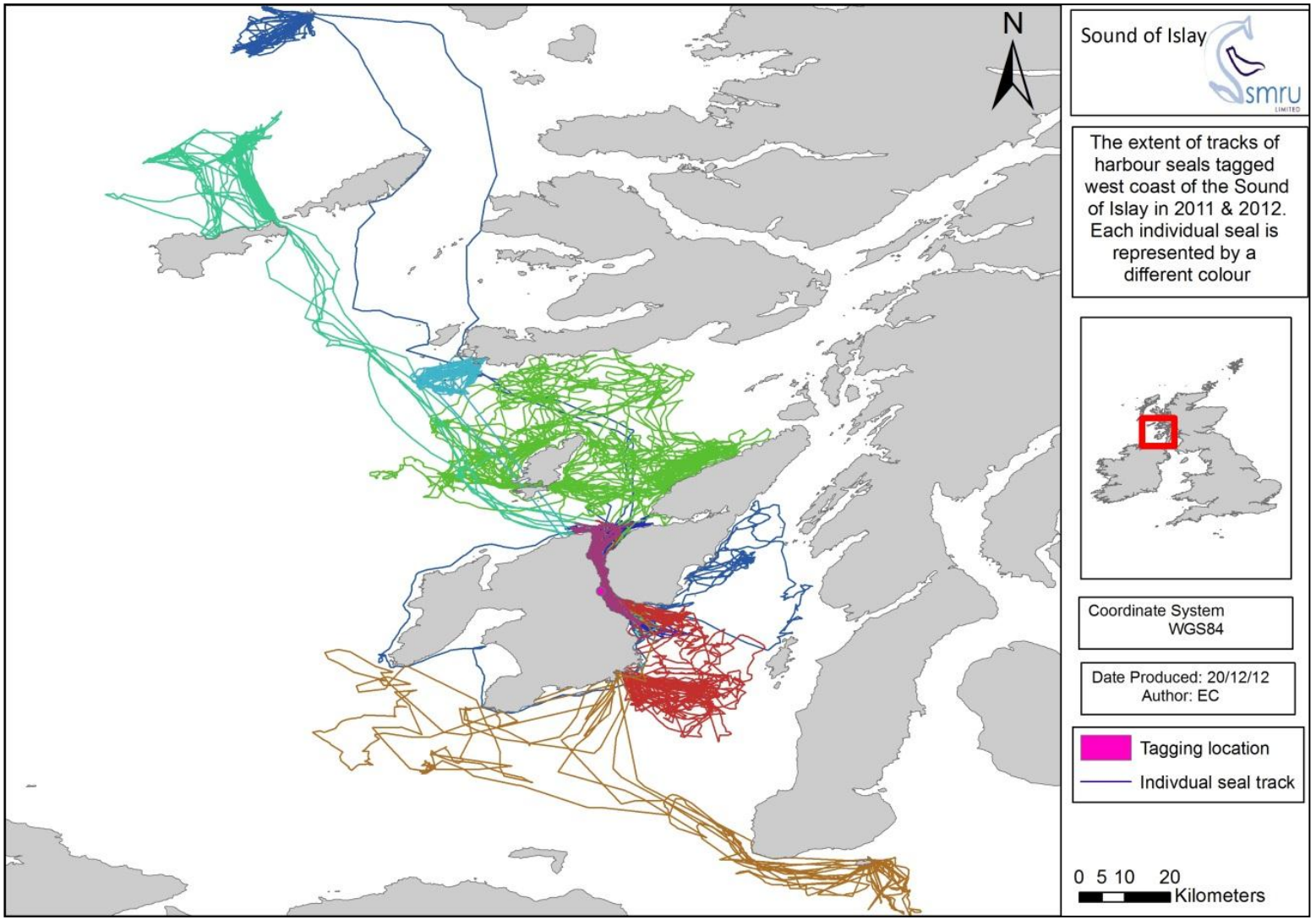


Figure 16a. Tracks of 8 seals tagged in the Western Sound of Islay, 'north of cable marker' (immediately north of the proposed cabndfall site). The individual tracks of these seals (b)-(i))are shown in the following maps.

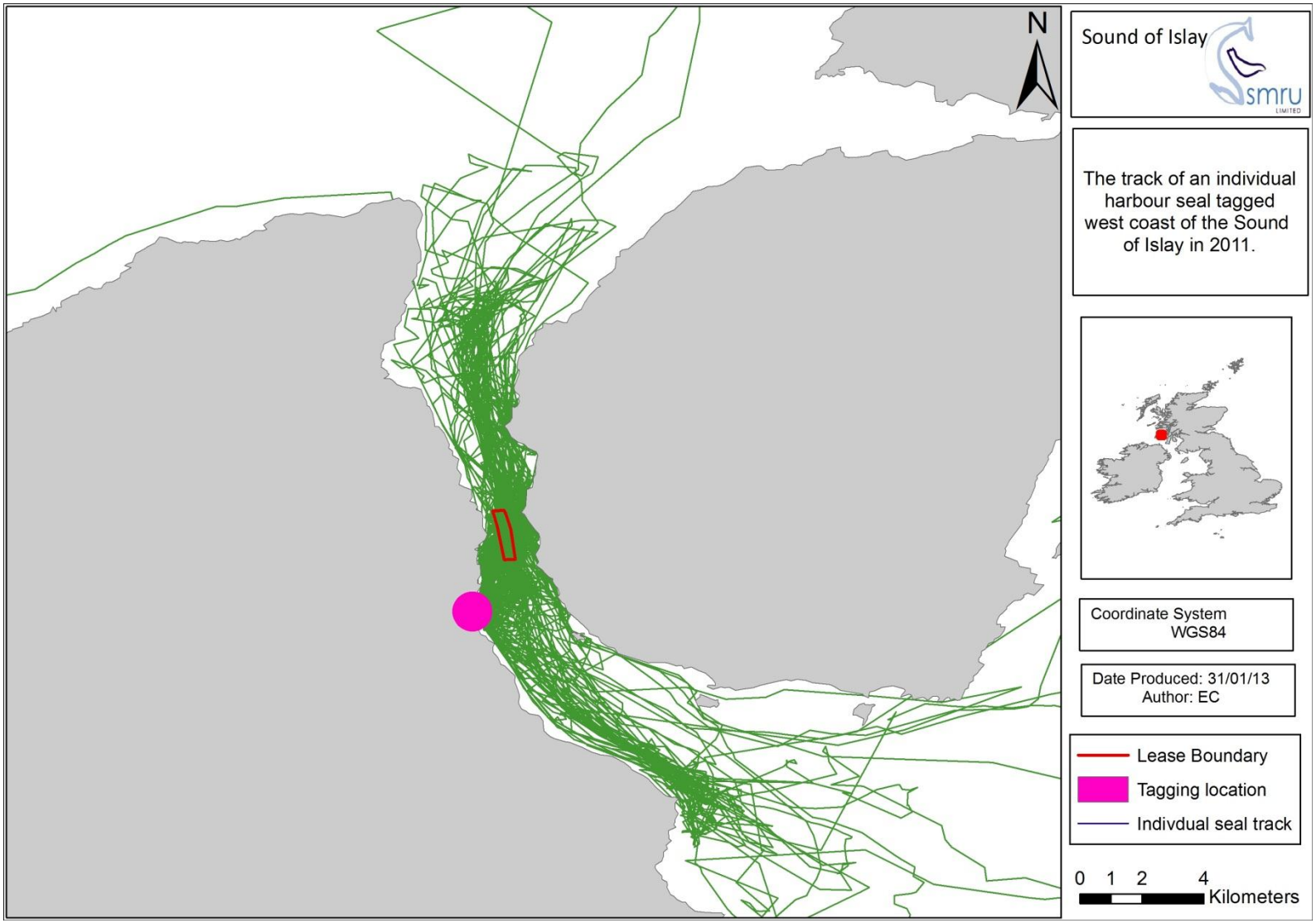


Figure 16b . Track of a seal tagged in the Western Sound of Islay, 'north of cable marker' (immediately north of the proposed cabndfall site).

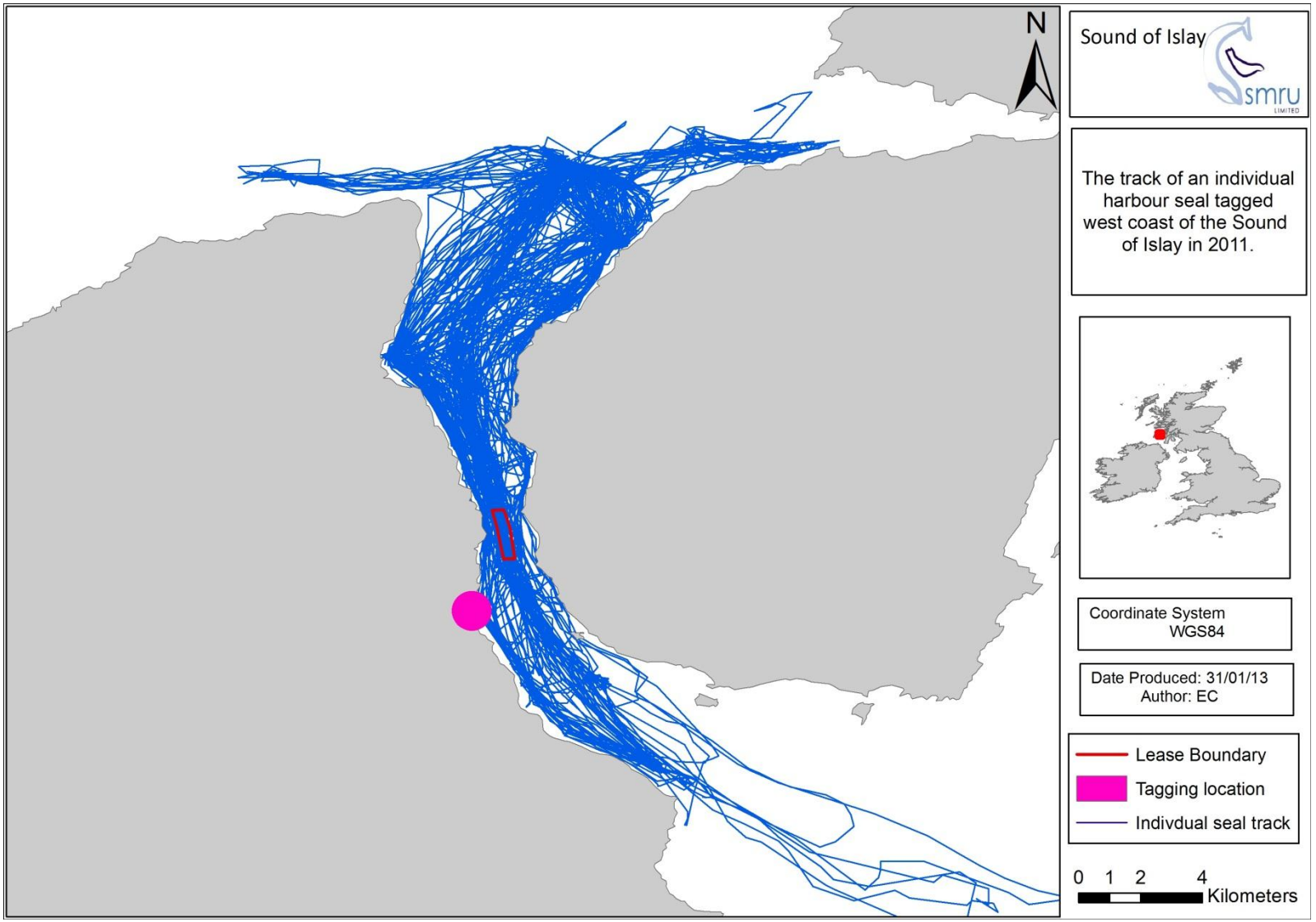


Figure 16c . Track of a seal tagged in the Western Sound of Islay, 'north of cable marker' (immediately north of the proposed cabndfall site).

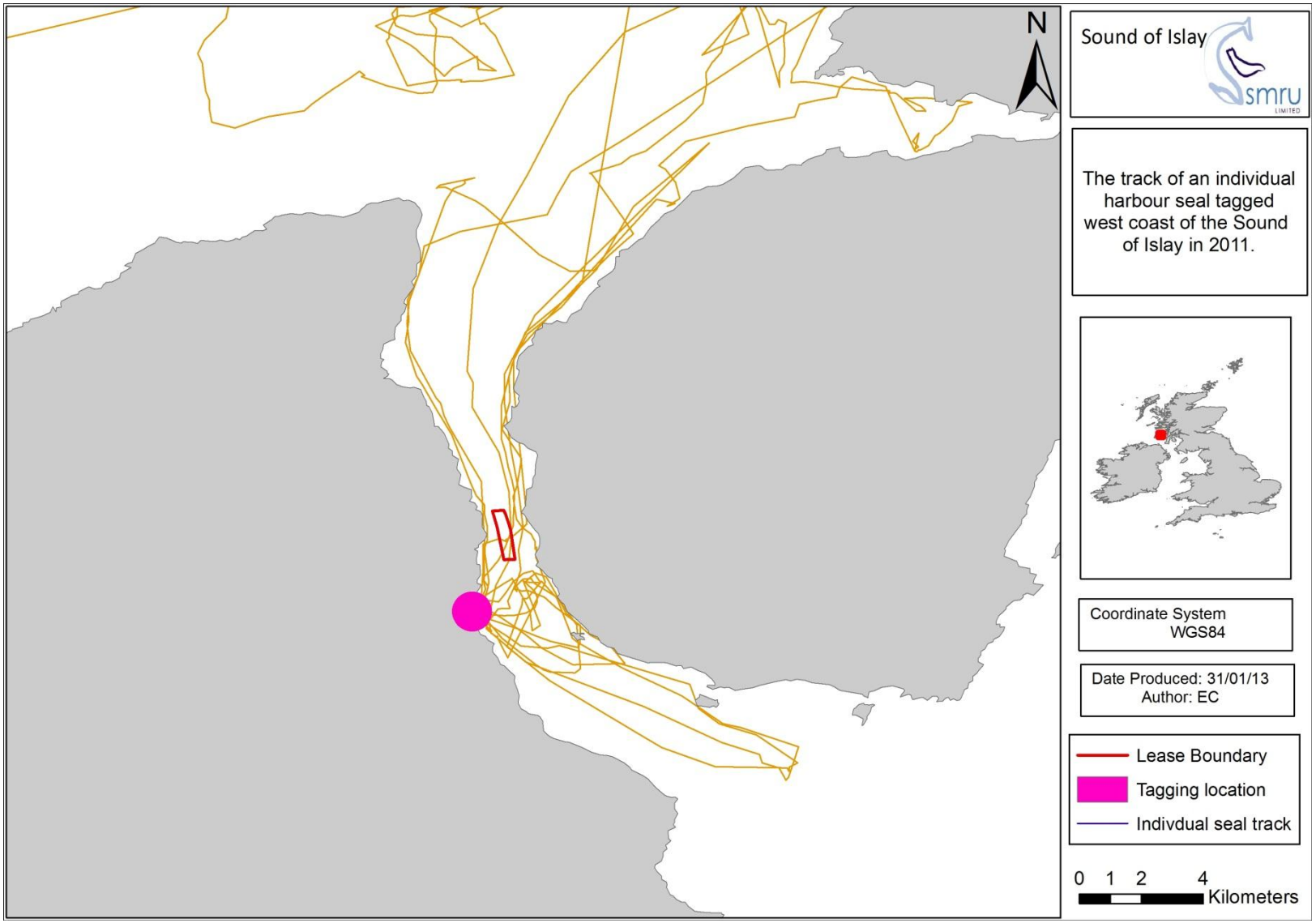


Figure 16d . Track of a seal tagged in the Western Sound of Islay, 'north of cable marker' (immediately north of the proposed cabndfall site).

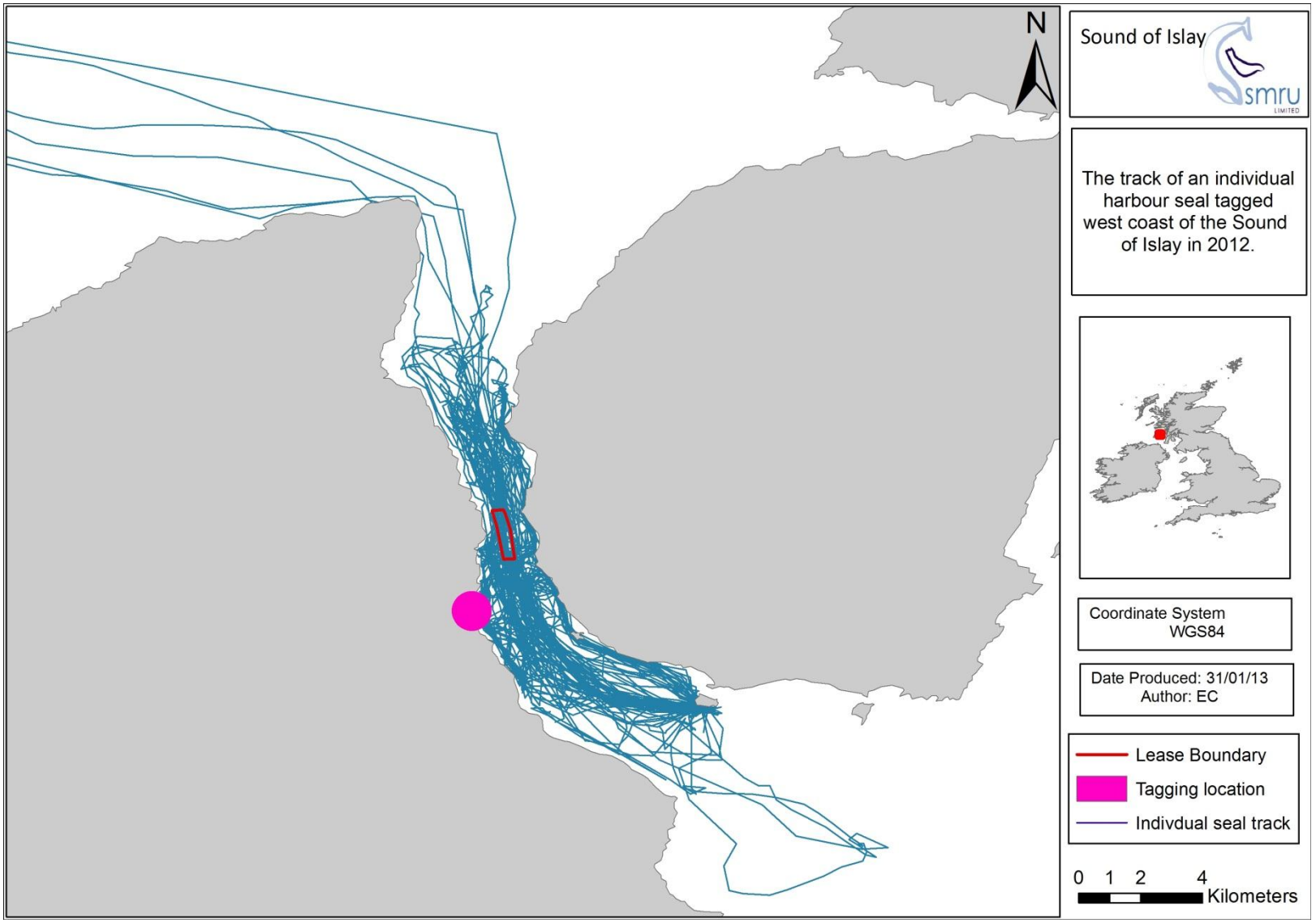


Figure 16e . Track of a seal tagged in the Western Sound of Islay, 'north of cable marker' (immediately north of the proposed cabndfall site).

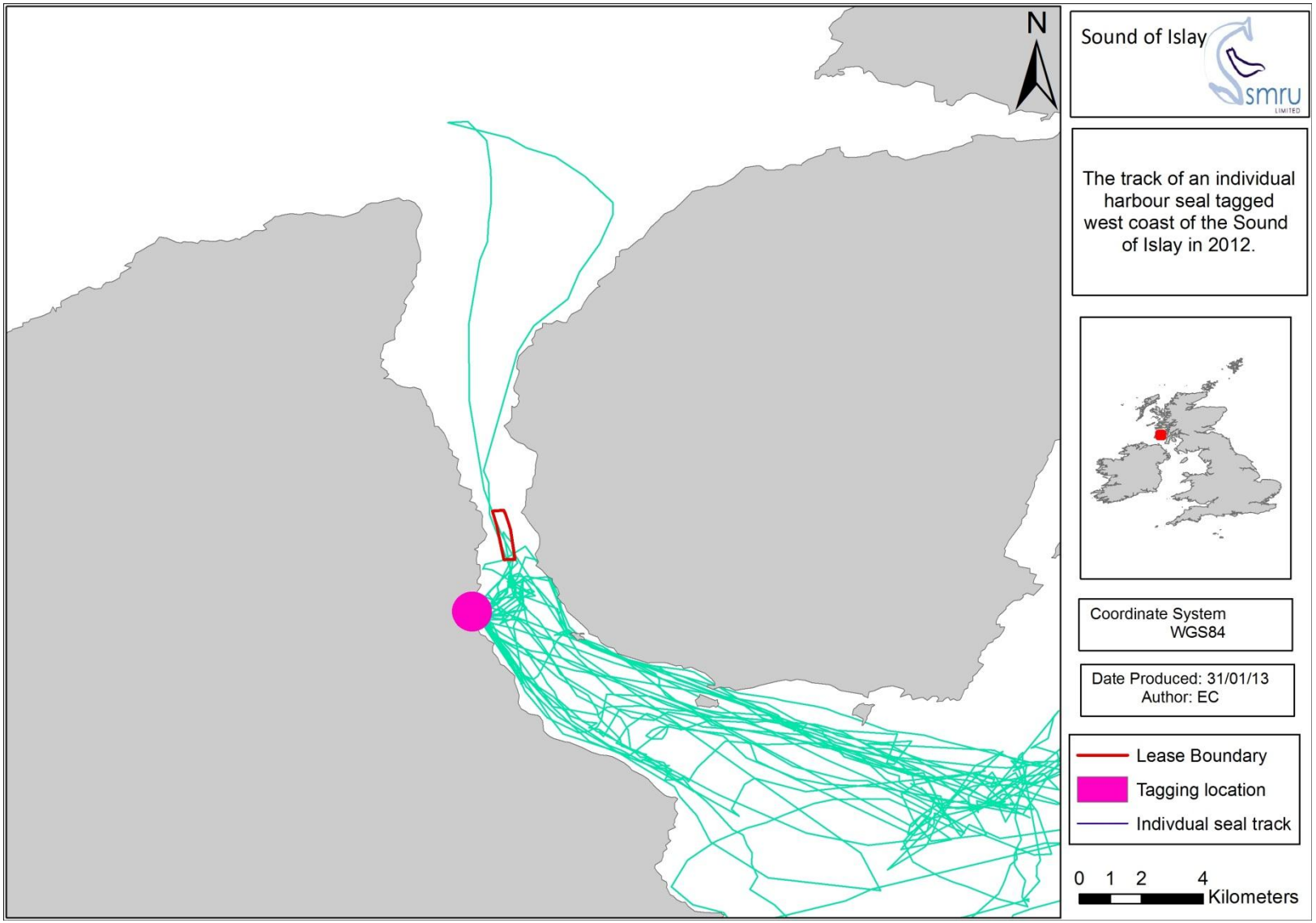


Figure 16f . Track of a seal tagged in the Western Sound of Islay, 'north of cable marker' (immediately north of the proposed cabndfall site).

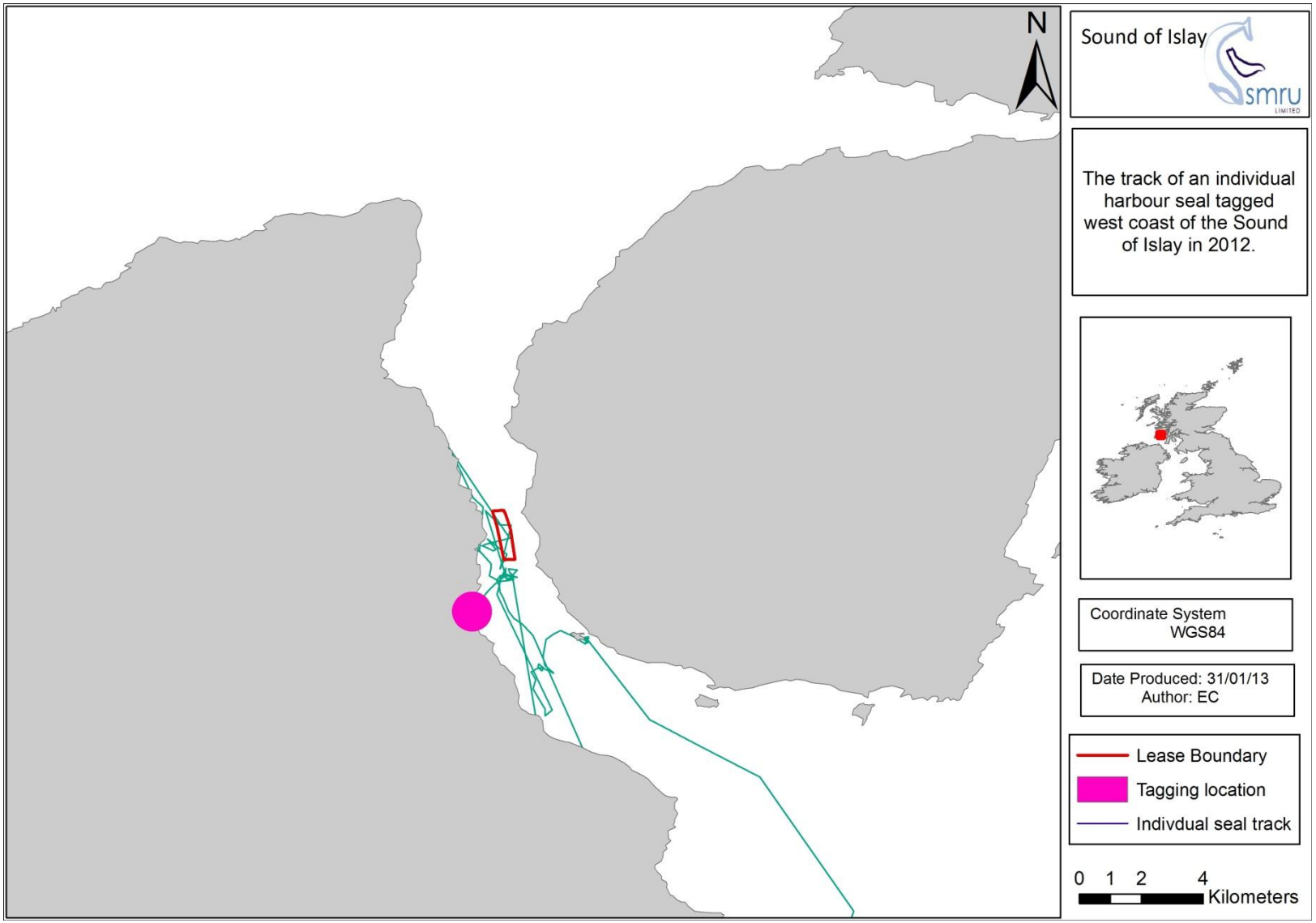


Figure 16g . Track of a seal tagged in the Western Sound of Islay, 'north of cable marker' (immediately north of the proposed cabndfall site).

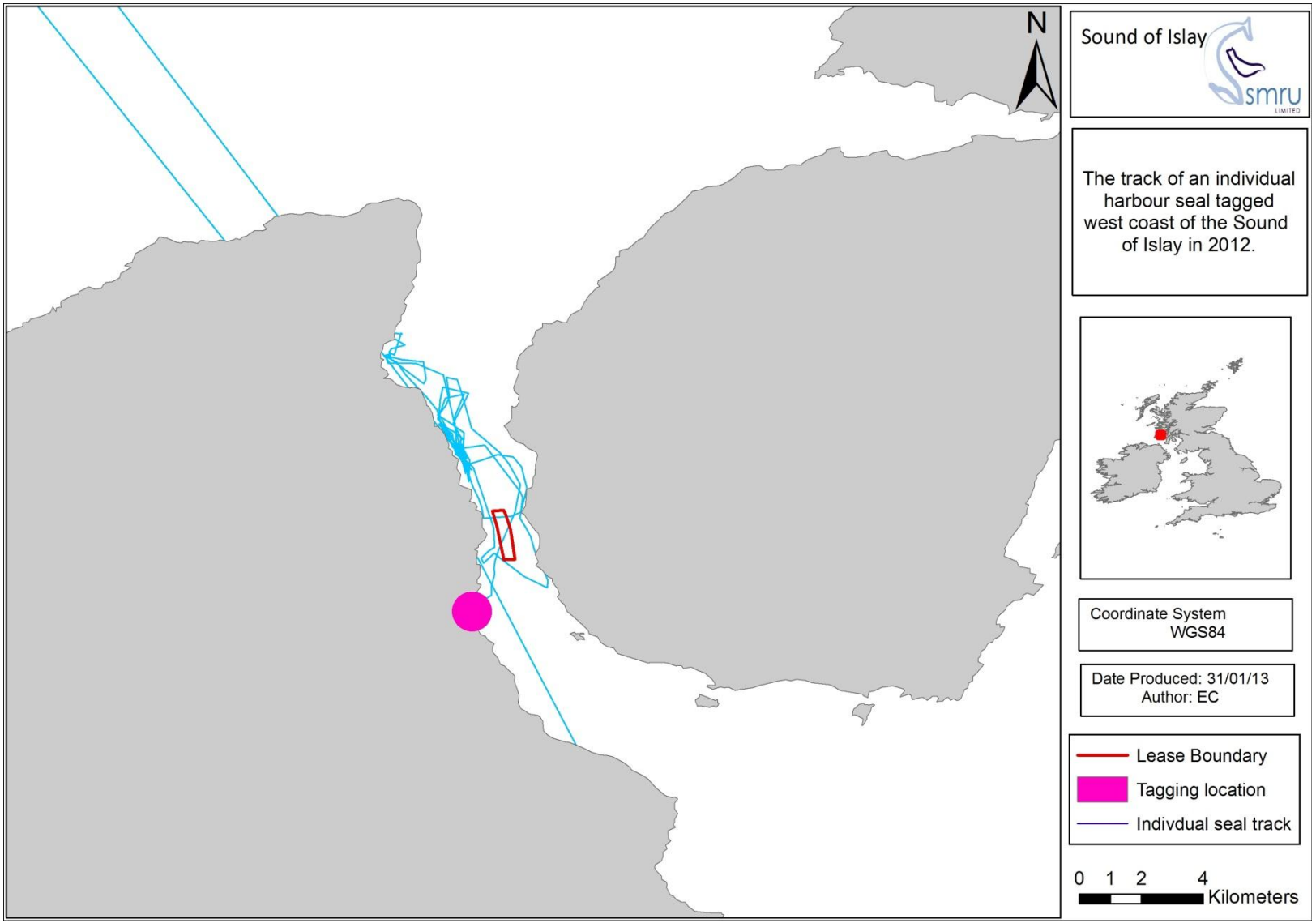


Figure 16h . Track of a seal tagged in the Western Sound of Islay, 'north of cable marker' (immediately north of the proposed cabndfall site).

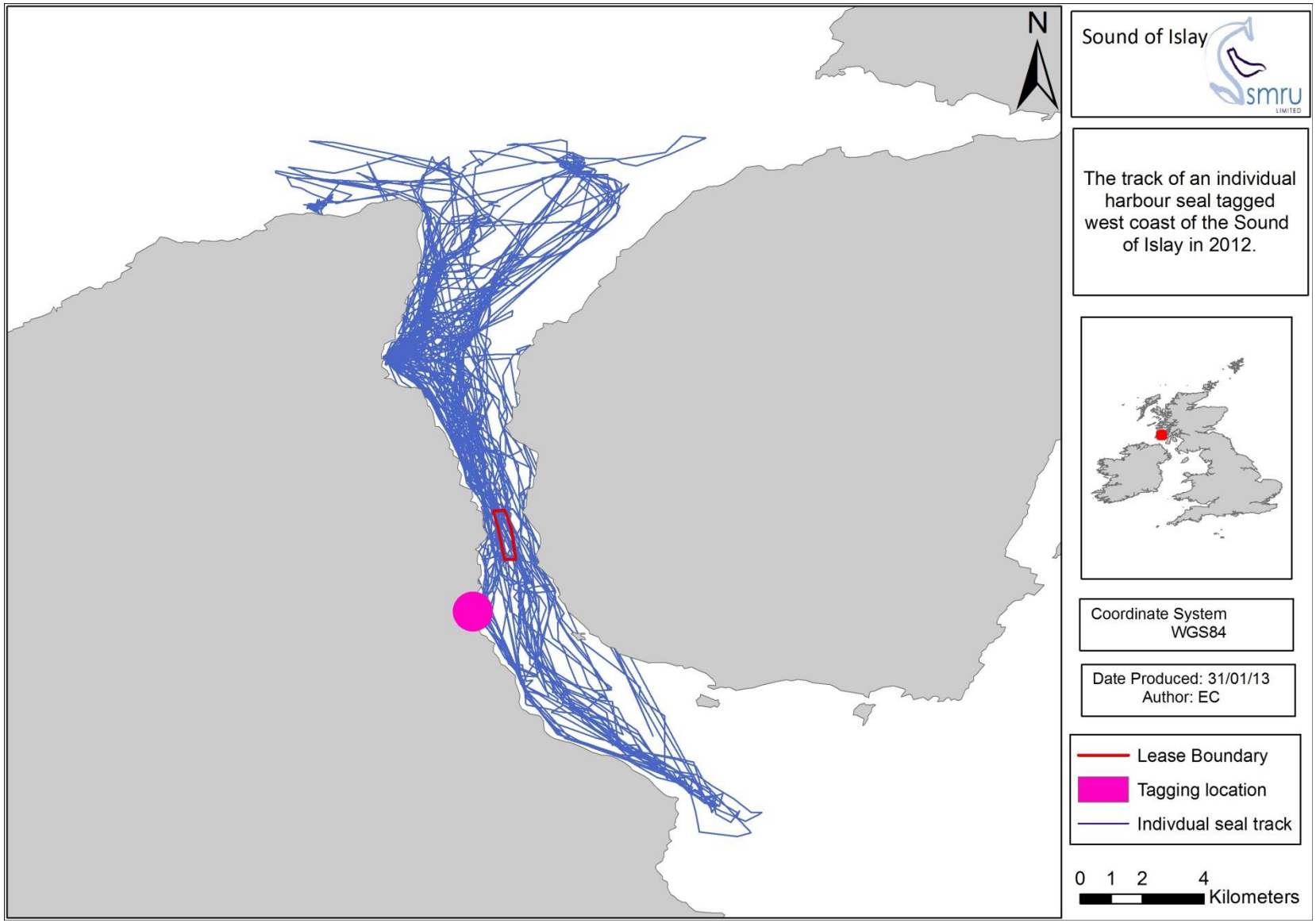


Figure 16i . Track of a seal tagged in the Western Sound of Islay, 'north of cable marker' (immediately north of the proposed cabndfall site).

7 Discussion

7.1 Land based observation data

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There are a number of general patterns apparent in the sightings data that can be relied upon to inform the baseline for the site. Conclusions from these data with the additional year of survey are not fundamentally different from the analysis of the data from the first year of survey. Harbour seals were by far the most commonly sighted seal species, with grey seals being sighted far less frequently. Most sightings were at low tide, and were of hauled out seals. There is a degree of uncertainty in the number of hauled out animals because of uncertainty in the recording of re-sightings of the same groups, between watches within a tidal cycle, although effort was made to code all re-sightings, it is possible that some remained in the data set and would thus slightly inflate the sightings of hauled out seals. However by presenting maximum counts of hauled out seals by month along with the total number of times seals were recorded at each location, we can build a good picture of seal haul out use in the Sound. Seals in water tended to be travelling or resting in water, presumably close to haul outs. Sightings were highest in summer months and lowest over the winter, although the peak in summer in 2011 was not as high as in previous years. Overall sightings rates were lower in the second year of data collection. Whether this reduction is statistically significant would require further analysis and modelling. It is difficult to tell if this is a reduction in true relative abundance or is as a result of observers being better at not recording multiple observations within the same watch period.

Cetacean sightings were generally very low. Bottlenose dolphins were occasional visitors to the Sound and harbour porpoise occurrence was very low. This was similar to the first year of data and to rule out the possibility that animals were present yet not visible, the recommendation was made in the year 1 report to carry out acoustic monitoring for harbour porpoises in particular. SPR did explore the possibility of carrying out bespoke acoustic surveys but consequent to the year 1 report, Scottish Government funded work carried out using towed hydrophones in the Sound has demonstrated that harbour porpoises were frequently detected to the North and South of the Sound, but much less often in the Sound itself (B. Wilson pers comm, final report available from Marine Scotland in early 2013), making a bespoke survey of the development site unnecessary. Given the 2 years of visual data and the towed acoustic work in the Sound, there is a high degree of confidence that the Sound itself is not an important area for echolocating cetaceans.

Seal haul outs were concentrated in the south of the Sound, around and south of I4 on the Islay coast. Most sightings were from I4 and J3, with sightings from J3 generally of seals hauled out on opposite shore. The proportion of seals hauled out to seals in the water varied depending on tidal state with proportionately more hauled out at low tide.

Locations of haul outs were determined by the compass bearing to each sighting provided by the observers so assumptions were necessary about the likely locations of each haul out group based on the VP and where the bearing intersected with potential haul out locations. Only watches made from VP's J3 and I4 regularly recorded hauled out seals. For VP J3 determining locations was relatively simple in that most of the haul out sites were on the opposite shore, it is likely that these locations are generally

accurate with an error of only a few tens of metres (at the closest locations to the proposed cable land fall locations, an error in a bearing of 1 degree would result in an error in the sighting location of approximately 15m).

We have not accounted for inherent variations in detectability in terms of distance from the observation point in the analyses presented here, and as such are cautious about the presentation of sightings rates as absolute measure of abundance. Furthermore, it is also likely that at any given watch period, a proportion of marine mammals are under water and therefore unable to be counted by the observers (so-called availability bias). As such, these rates may be underestimates of the total numbers of animals present and can be considered measures of relative abundance.

We have not commented on the significance of any trends or patterns seen (in relation to season, tide etc), as we have not accounted for distance-related detectability, availability biases or spatial or temporal autocorrelation in the data. This further detailed analysis of the data, similar to that presented for the year 1 analysis (Mackenzie, Donovan and Sparling, 2011) will be progressed and presented in a separate report. However the statistical analysis of the 1st year of data did not provide any unexpected results when compared to the general patterns seen in the initial analysis of sightings rates therefore we can be reasonably certain that the patterns described here are reflective of baseline conditions. . Analysis of the first year of data collection revealed that the probability of detecting a decrease in relative abundance of 20% would be 75% after 6 months of post impact monitoring. A repeat of this analysis would be required to assess whether this power has changed with the addition of another year of data, although the power to detect change has likely increased with the addition of a further year's data.

7.2 Haul outs in the vicinity of the cable landfall site

There were several haul outs along the coastline to the north of the proposed landfall sites, with a maximum of 27 seals counted in a single watch period. There was no clear pattern in seasonal use of these sites and there were seals hauled out there generally in all months of the year. There is very good visibility of the shore to the south of here from VP J3 so the southernmost counts represent a true southern boundary of haul outs. The minimum distance between the proposed northern cable landfall site was approximately 70-100m, although the closest sites were not necessarily those with the highest numbers of seal counts, or the most records of seals being present – these were generally a few hundred metres to several kilometres to the north. None of these sites were identified in the recent Scottish Government consultation for the designation of 'significant' seal haul outs to protect them from disturbance or harassment.

7.3 Telemetry

The SMRU harbour seal tracking data from 2011 and 2012 provided further insights into seal use of the Sound. As was the case with the 2004 telemetry study presented in the previous report (Cunningham et al 2009, in SMRU Ltd 2010), none of the seals tagged at the South East Islay SAC travelled into the Sound at any point. However contrary to the previous study, seals were tagged at locations other than the SAC and there was some degree of interchange between SAC and other haul out sites in the Sound. There was also a degree of interchange to other areas to the north of Islay with some seals from the Sound travelling as far afield as Mull and Tiree. Some individual seals demonstrated very high use of the Sound

and it is likely that this represents foraging activity in the Sound. A forthcoming SMRU report will provide more detailed analysis and interpretation of the data from this telemetry study, including analysis of dive behaviour and foraging activity in the Sound.

7.4 Conclusions

- Harbour seals are the most frequently sighted marine mammal species in the Sound of Islay. They were seen in all months of the year with monthly sightings rates ranging between 0.1 seals per hour to 2.5 seals per hour. There were more records of seals hauled out than in the water, with most of the haul outs on the west side of the Sound, south of the development area, but north of the proposed cable landfall locations.
- Grey seals were also present, but recorded much less frequently. Most sightings of grey seals were in the water and they were only rarely recorded hauling out in the Sound.
- Otters were seen frequently and were generally coastal with highest sightings at low tide.
- Cetaceans and basking sharks were rarely recorded with only occasional visits by bottlenose dolphins, basking sharks and harbour porpoises.
- Seals hauled out regularly along the stretch of coast to the north of the cable landfall site.
- Seal telemetry studies revealed a degree of movement between haul out sites in the Sound and elsewhere with some individual seals showing relatively high usage of the Sound, probably using it to forage.

8 References

Cunningham, L. B. (2009). Harbour seal movements and haul out patterns: implications for monitoring and management. *Aquatic Conservation: Marine and Freshwater Ecosystems , 19*, 398-407.

SMRU Ltd (2010). *Sound of Islay –Marine Mammal Data from Shore Based Observations. Year 1 baseline report to Scottish Power Renewables*.

Mackenzie, M.L., Donovan, C.D. and Sparling, C.E. (2011). *Statistical Analysis of seal data from the Sound of Islay. Report by DMP and SMRU Ltd to Scottish Power Renewables.*