

# Seal Survey Carlingford Lough, Ireland

Assessment of Abundance and Distribution of Harbour and Grey Seals in an Irish Sea Lough – Phase 1

2015-16



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## 1.0 Introduction

### 1.1 Context

On foot of planning permission (Ref: P/2013/0434/F) to develop a car ferry crossing between Greenore, county Louth, and Greencastle, county Down, a programme of seal counts prior to and during the operation of the ferry was conditioned by the planning authority to the permission granted. Details of the ferry route are provided in Appendix 1, and the survey method agreed with the planning authority in Appendix 2.

### 1.2 Scope

The scope of this report is confined to (i) describing Carlingford Lough; (ii) the target species; and (iii) presenting the findings of the survey, specifically:

Four sets of five boat-based counts covering harbour seal post-pupping (July) and moulting (August and September), grey seal breeding (October/November), and grey seal moulting (January to April) to assess harbour and grey seal populations, productivity, and distribution in the outer part of Carlingford Lough. Adults and pups were assessed; sub-adults (>1 year old) were included with adults; males and females were not separated.

### 1.3 Description of Carlingford Lough

Carlingford Lough is a drowned glacier-cut valley formed at the end of the last ice age. The mouth of the Lough, the area under study, is relatively shallow (less than 3 metres) due to the deposit of moraine and the decreased erosive force of the glacier meeting the sea, a feature typical of a fjord, while the inner part of the Lough is relatively deep (up to 30 metres) (Baxter, 2009). A shipping channel has been dredged to 8 metres to facilitate access for shipping.

At high water (MHWS) two islands (skerries) remain exposed, Green Island, essentially a shingle bank on dipping limestone, running north to south near Greencastle, and Blockhouse Island, a limestone reef, running east to west near Haulbowline lighthouse. At low water (MLWS) several reefs of dipping limestone are exposed, along with several individual boulders and outcrops to the west of Blockhouse Island. A large basalt intrusion (The Black Rock) and several smaller ones (eg Earl's rock) are exposed to the north of Greenore Point. Several reefs are also exposed at Mill Bay and further north (eg Carriganean). Extensive sandflats are exposed in this area, consisting of creeks and pans and a deeper channel from which the White Water and Causeway Water delta over the sand and mudflats. Further to the north-west a sandbank, the Killowen Bank, extends out into the Lough bounding a shallow inlet to rock outcrop at Carrigaroan.

On both north and south shores extensive aquaculture is practiced, primarily oyster cultivation using trestles and bags between the high and low water marks – see Appendix 3. The area is also marked by considerable recreational activity, particularly in the summer, involving swimming, kayaking, sailing, boating, jet skiing, and related activities. Cargo ships regularly pass through the channel to Warrenpoint port and Greenore port, typically with several passes per day in all seasons.

Because the large body of water narrows between Greenore Point and Greencastle, ebb and flow tidal velocities can be significant, reaching 5 knots per hour. The Lough is fed by several rivers; these in turn attract migratory fish such as trout and salmon. Significant numbers of mackerel are regularly caught off Greenore point during the summer.

The benthos consists of a mosaic of habitats including deep holes, tidal rapids supporting biogenic *Modiolus modiolus*, coarse gravel with cobbles and boulders, mud and sand flats, rocky outcrops and

other rocky substrates supporting extensive growths of *Lamanaria* and *Fucus* species as well as green algae.

According to the JNCC Marine Habitat Classification system, the intertidal rock habitats are dominated by the habitat type "*Fucus vesiculosus* and barnacle mosaics on moderately exposed mid-eulittoral rock" merging into "*Fucus serratus* on moderately exposed lower eulittoral rock".

These habitats supports a rich ecosystem including red and brown algae, soft corals, hydroids, bryozoans, large sponges, anemones, mussels, brittle stars, crustaceans, and other invertebrates. Fish include pollack, spurdog, flounder, rockling, dogfish, conger, wrass, mackerel, and ray.

The Lough is relatively protected by the mountains to the north and south and is probably in the rain shadow of Slieve Foye, though on occasion squalls can blow up, particularly in easterly airflows. Surface temperatures typically range from about 6 °C to about 17 °C between summer and winter. Water quality is generally good despite the discharge of untreated sewage into the Lough at various locations. According to the AFBI SMILE project "Organic-rich anoxic sediments with a high sulphide content can be found in the waters near the tidal limit, but water quality within the main Lough is good and it is not thought to be eutrophic. Nitrogen inputs associated with fresh water (concentrations of N decline seawards down the Lough) can feed or limit the algal growth within the Lough. Nutrient enrichment and algal bloom development within the Lough are low compared with some other coastal sites, and it has been suggested that plankton blooms are associated with localised enrichments, and a net export to the Irish Sea occurs with the ebbing tides."

The Lough is designated as a Special Protection Area by both the UK and Irish governments and is a Ramsar site. Terns (mainly common terns, historically roseates) breed on Green Island with variable success. Protected habitats on the county Louth shoreline are included in a Special Area of Conservation and include the sand and mudflats, Atlantic Salt Meadow, *Salicornia* and *Zostera* beds, and vegetation of stony banks and drift lines.

Given the above facts the outer part of the Lough should be a suitable ecosystem for grey and particularly harbour seals.

#### 1.4 Harbour Seals

Harbour seal (*Phoca vitulina concolor*) adults measure 140-185cm and weigh 8-16kg at birth and up to 130kg as adults. Harbour seals divide their time between foraging at sea and hauling out on to rocky shores or inter-tidal sandbanks to rest, or to give birth and to suckle their pups. They feed on various fish, including herring, sand eels, whiting, flatfish, shrimps/crabs and squid. Adults are thought to be faithful to favoured haul-out areas from year to year while young animals wander extensively; adults may travel up to 50km to feed and remain at sea for several days. Haul out/nesting sites vary with season, weather, feeding opportunities, disturbance, and other factors. Hunting is poorly understood. Females give birth to a single pup typically in June; pups can swim and dive when just a few hours old (MacDonald, 1993).

The ICUN has classified the Western Atlantic Harbour Seal as "least threatened" though its population trend is "unknown".

#### 1.5 Grey Seals

Grey seals (*Halichoerus grypus grypus*) show marked sexual dimorphism with males up to 210cm in length and females up to 180cm weighing 235kg and 155kg respectively.

Grey seals are found in a few locations in the Irish Sea mainly hauling out on exposed rocky coasts and sometimes on sand banks; they feed on sand eels and cod but are opportunistic "probably take

whatever fish are most abundant". They will often take offal discarded from fishing boats and harbours (author's observation). About two-thirds of greys seals' time is spent at sea hunting and feeding (Lyons, 2004).

At low tide they haul out sometimes separately, sometimes in groups, especially when moulting in spring. In autumn they breed, typically starting in late September and finishing in November. Grey seal pups are typically born in large colonies or rookeries of tens to many thousands of cows and weigh about 14kg at birth and have soft white fur and remain on land where they suckle from their mother for about 21 days (Anderson, 1990).

The Western European population of grey seals has been increasing in recent years and has been classified by the ICUN as "least threatened".

### 1.6 Diet in Carlingford Lough

A study (Wilson, 2012) undertaken by Tara Seal Research in August/September 2009/10 examining seal scat during the harbour seal moulting season found "The diet was found to consist principally of small gadoid fish, such as cod, haddock and whiting, and also flatfish such as flounder and plaice, and dragonet. All these types of fish have relatively low energy density. The remains of relatively high energy fish, such as herring, sand eel, mackerel and garfish, were occasionally found."

### 1.7 Previous Surveys

Prior to the 2008-11 survey, surveys were undertaken by both NPWS (south of a notional border separating the north and south of the Lough) and NIEA (north of that border).

## 2.0 Methodology

### 2.1 Reconnaissance of haul outs prior to survey

Prior to the start of the survey, and in October and February, all haul out sites were checked from both the north and south shore using a 20 – 60x terrestrial telescope on various tides to understand haul out patterns. Particular attention was paid to the possibility of grey seals pupping; grey seal pups have distinctive white coats and stay on shore for several weeks after pupping so would be easily picked out on the dark background of Blockhouse and Green islands.

In addition to this possible haul outs to the north and south of Carlingford Lough were checked. A large haul out of up to 60 harbour seals and 10 – 15 grey seals is present in Dundalk Bay along the Castletown river channel (author's observation) (Lyons, 2004).

During surveys, effort was made to ensure that the survey boat approached haul out sites obliquely, at slow speed (<5 knots) while observing the response of seals to the approach. High visibility clothing was avoided, as well as any unnecessary movement on the boat. All surveys started out at Greenore mainly following an anticlockwise route; this significantly improved photography as the sun was to the east and south during most surveys, behind the survey boat.

Counts were made from the count points listed below where possible; in two cases, Carrigroan and Mill Bay it was impossible to reach the actual count points on low tides because they were exposed (Mill Bay) or the water was too shallow (Carrigarean) – however despite this it was possible to make good counts at these locations on all occasions. To obtain accurate counts it was often necessary to move several tens or hundred meters either side of the actual count point to observe animals obscured by rocks, sand banks, oyster trestles or other seals. Several sites were checked from the shore either immediately before or after counts (eg Carrickbrada, "Seal Rock" and Carrigroan).

As each haul-out was approached several wide angle shots were taken to capture all animals; subsequently, on approach, detailed shots were taken of each animal or group of animals moving in a right to left arc with a GPS enabled camera using a 100-400mm lens. On some occasions a segment of video was taken to back up photography and a dictaphone was used to supplement photography with a verbal description. A second observer was used during the most challenging counts (August/September). Distances were verified using a laser range finder. At the end of each count results were compiled and verified.

### 2.2 Equipment

- Canon EOS 6D GPS-enabled
- 100 – 400mm IS EF Canon lens
- Monarch 10 x 42 binoculars
- Leica 20 – 60x Televid terrestrial telescope (from land)
- Viking 6x25 7 deg Laser Range Finder
- Roland R2 dictaphone/throat mic
- Canon Legria 41x optical HD video camera
- eTrex Vista GPS unit
- 6.1m Tornado RIB equipped with Yamaha 115 hp outboard and a Garmin GPS 451s

## 2.3 Detailed description of count points and haul outs

### 2.3.1 Ballyedmond

This haul out consists of a sandy creek leading to a rocky outcrop (Carrigaroan), but enclosed by the Killowen sand bank, making seal access and flight difficult. Aquaculture activities now span most of the area to the north and east.

### 2.3.2 Seal Rock

Identified as “Black Rock” on the Admiralty maps, this is a basaltic intrusion separated from the main mudflats and reefs by a deep channel.

### 2.3.3 Carriganean

The haul out is about 200 metres south of Carriganean rocky outcrop on sand along a relatively shallow sandy creek. Again there is considerable aquaculture activity in the vicinity.

### 2.3.4 Mill Bay

This refers to the many rocky outcrops immediately to the west of the pier at Greencastle. The White Water channel runs alongside these rocks. On some tides there is a section of exposed sand along the river channel.

### 2.3.5 Green Island

Two count points Vs and Vn refer to Green Island and its associated rocky outcrops of dipping limestone. The north part features many nooks and crannies while the south is more open. The permanently exposed part of the island is essentially a shingle bank. The results from the north and south count points are summed for simplicity.

### 2.3.6 Blockhouse Island

This is a very exposed rocky island with the remnants of several man-made structures “blocks” on view.

### 2.3.7 Blockhouse Reefs

This refers to several reefs and single rocks immediately to the south and east of Blockhouse Island and including Goose Rock, Haulbowline Rocks and Long Rock.

### 2.3.8 Greenore

This refers to Cooley Long Rock and Carrickbrada and a few single rocks in the immediate vicinity.

## 2.4 Count Methodology – Targets vs Actual

The count methodology followed the count points and transects set forth in the 2008-11 survey (Wilson, 2012). Given the relatively narrow windows for each set of counts, finding days when tide and weather were suitable during daylight hours was challenging. Calm sea with a sea state of 0 or 1 produced the best conditions for photography from a moving boat and it was possible to achieve this on most outings especially for the first two sets of counts.

Criterion	Target	Actual
Weather	Relatively calm (slight sea state) and dry conditions	Sea state < or = 2 on all counts except four winter counts when sea states of 3 were encountered. One winter squall required a 30 minute pause in survey.
Tide	Count to straddle low tide	All counts straddled low tide by at least 30 minutes either side.
Approach distance	Minimum 150 metres	Yes – typically 200+ metres
Count periods	Harbour seal pupping	Dates achieved are 1, 2, 9, 15, 28 July
	Harbour seal moulting	Dates achieved 7, 12, 30 Aug, 6, 9 Sept
	Grey seal pupping	Dates achieved 3, 10, 22, 24 Nov, 3 Dec
	Winter to early spring	1, 2, 15, 17 Mar, 14 Apr

## 2.5 Statistical methodology

The statistical methodology is based on a seminal paper by Oseliuk et al (Olesiuk, 1989) adapting Robson and Whitlock's bounded count method "The bounded count estimate is based on the premise that each animal in the population has some finite probability of being counted, such that it is theoretically possible, albeit highly unlikely, that all individuals would be counted during a census. Generally, however, the counts represented only a proportion of the actual population, with the proportion depending on tidal conditions, weather, the timing of censuses, the number and competence of observers, etc." It should be noted that this method is validated for Pacific harbour seals (*Phoca vitulina raichardsi*) in British Columbia at the end of the pupping season, but has been widely adapted in other studies involving harbour seals post-pupping (Cadhla, 2010), including Wilson's excellent series of surveys 2008-11 (Wilson, 2012). The methodology assumes that on any count a certain unknown number of animals will not be counted and estimates this number. The average proportion of seals hauled out  $P_{av}$  is thus calculated using the following equation:

$$P_{av} = C_x / [C_{max} + (C_{max} - C_{max-1})]$$

where  $C_x$  = mean,  $C_{max}$  = maximum count, and  $C_{max-1}$  = second highest count. Abundance is then calculated from  $C_x / P_{av}$ . Other parametric tests to estimate overall population are not normally applicable as the dataset is inherently non-normal given that an unknown number of animals is not counted on any given count. The method is not validated for estimating grey seals or harbour seals outside of the post-pupping/moulting period.



## 3.0 Results

### 3.1 Abundance

All planned counts were successfully completed in good conditions and tides, and without incident. Tables summarising results is provided in appendix 5. As with the 2008-11 surveys (Wilson, 2012), the photographic record produced better results both quantitatively and qualitatively, than the visual count, but the latter did serve as a useful validation of the photographic technique.

#### 3.1.1 Harbour Seals Post-pupping – July

The proportion of harbour seals hauled out (Pav) was 51% with an estimated population (Cx/Pav) of 228 adults and a maximum count of 29 pups from an observed range of 74 (93 – 167).

Grey seals ranged from 17 to 60 animals mainly in the Blockhouse/Greenore area. Two single pups were observed, presumably pupped the previous winter, and was included with the adults for the purposes of estimating abundance.

#### 3.1.2 Harbour Seals Moulting - August/September

The proportion of harbour seals hauled out (Pav) was 65% with an estimated population (Cx/Pav) of 341 adults.

Grey seals ranged from 35 to 73 animals with a max count of 73 recorded on the 6<sup>th</sup> September of which 48 hauled out on the western side of Green Island

#### 3.1.3 Grey seal Pupping – October/November

Harbour seals ranged from 49 to 105 animals while grey seals range from 10 to a maximum of 53. Almost all of the latter were sub-adults with no mature males seen at all. Only eight harbour seal pups were observed. No grey seal pups were seen.

#### 3.1.4 Grey Seal Moulting – January/April

Harbour seal ranged from a low of 29 to a maximum count of 140 in mid-April while grey seals were 13 to 80 animals. Only nine harbour seal pups were observed, however it is possible that some pups may have been counted as adults.

### 3.2 Distribution

The overall distribution pattern saw harbour seals occupying the inner less exposed parts of the Lough around Mill Bay, Green Island North and “Seal Rock” while grey seals occupied the more exposed outer parts around Blockhouse Island and reefs.

There was a noted concentration of common seals on the north of Green Island during August. A small increase in harbour seals using Carrickbrada rock (Greenore) in spring was an exception. Seal rock, Carrigarean and Green Island were the main pup haul outs. Carrigarean was the only sandy haul out in all tides, all of the others being rocky. A table detailing distribution is provided in Appendix 4; the cumulative distribution over all counts is summarised in the following table.

Place name	Ballyedmond	Seal rock	Carrigeanean	Mill bay	Green island	Blockhouse Island	Blockhouse reefs	Greenore
Harbour seals	7	340	482	588	841	47	29	221
Grey seals	0	9	10	42	138	200	207	232

The cumulative distribution graph shows a north south distribution with greys preferring the more exposed south and harbour seals preferring the inner more protected parts and that Green Island is the most important haul out overall.

### 3.3 Disturbance

There was a constant low level of disturbance stemming from aquaculture activities and shipping, with container and bulk vessels traversing the survey area several times per day serving Warepoint and Greenore ports. There was also a significant level of disturbance caused by shellfish collectors, mainly periwinkles but also possibly mussels. While disturbance was not directly observed the absence of seals in the immediate vicinity of the winkle collectors suggested disturbance. On a few occasions leisure activities caused some disturbance, notably kayaking around Green Island, fishing from open boat, lobster pot collection, and sailing close to Green Island and Blockhouse Island.

The survey vessel triggered alarm behaviour on a few occasions, with some haul outs being more susceptible to disturbance than others, notably Carrigeanean and the south-west side of Green Island for harbour seals, and Blockhouse Island for grey seals. Note that grey seals typically approached the survey vessel and some may have been more curious than alarmed. Other haul outs such as the rocks around Mill bay, Greenore and Seal Rock were less susceptible to disturbance. Overall the survey boat triggered this response on nine occasions out of 160 possible, or at a rate of 5.6%. On all occasions it was possible to complete the count before animals entered the water.

## 4.0 Discussion

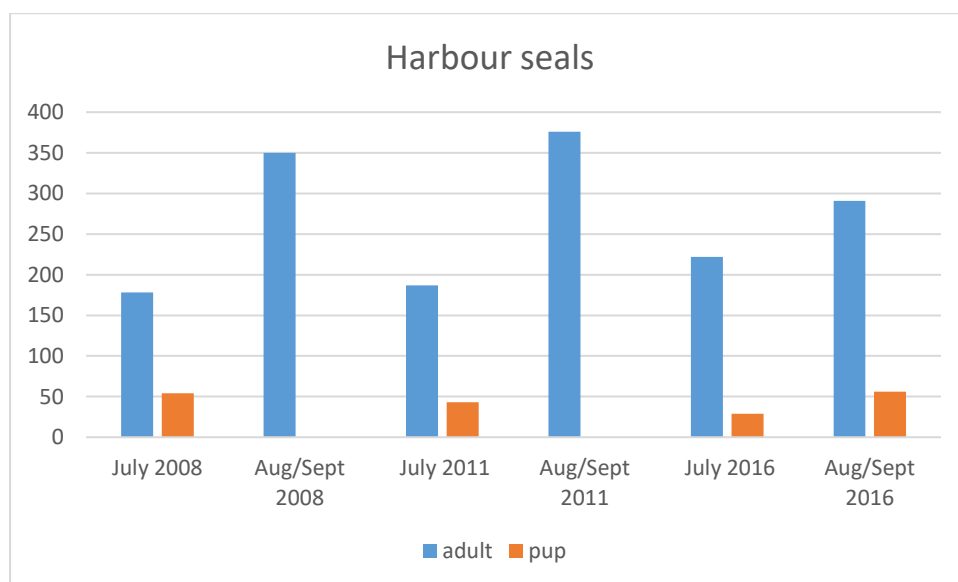
### 4.1 Abundance

Up until the series of surveys from 2008-11 (Wilson, 2012) count data from Carlingford Lough may have significantly underestimated numbers partly because the effort was undertaken from each side of the border independently, and partly because most counts were either shore based or aerial.

#### 4.1.1 Harbour Seals

The bounded count statistical method used to estimate abundance was developed for the harbour seals pacific sub-species in the Straits of Georgia, British Columbia in a mosaic of habitats including tidal islets, reefs, boulders, and sandbars. Though there are slight differences between the lifecycle, and diet of each sub-species, and significant differences in climate and tidal dynamics, the method has been widely used in a number of contexts and should be sufficiently robust of the present purpose, particularly as a baseline for future year comparisons.

Date	Harbour seals	
	adult	pup
July 2008	178	54
Aug/Sept 2008	350	
July 2011	187	43
Aug/Sept 2011	376	
July 2015	222	29
Aug/Sept 2015	347	



The data shows a regular increase in the July population of harbour seals from 178 to 222 adults. The August population shows an apparent slight decline in harbour seals in August/September from 350 to 376 to 347. However a slight decline in the ration of adults to pups was seen from 2008 (178/54) to 2015 (222/29) which may be significant given that it is possible that the population may be supplemented by arrivals of pups pupped elsewhere in August. Numbers of adults and pups dropped precipitously in November and Jan-April only rebounding in April. This pattern was observed in other harbour seal surveys (Thompson, 1997).

#### 4.1.2 Grey seals

Grey seals are thought to range more widely than harbour seals and to spend more time in the water hunting and feeding, though specific animals are known to be highly individualistic in their behaviour. During the survey it was noted that some distinctive animals (notably males) regularly used the same haul out over a succession of counts. The statistical method used in relation to harbour seals is not applicable so it is challenging to get an estimate of absolute abundance in Carlingford Lough, however given the relatively small numbers, a visual comparison with data gathered in the previous survey should be sufficient for the purposes of this study.

Year	July					Aug/Sept				
2008	Nc*	nc	nc	nc	nc	21	34	38	18	15
2009	12	10	16	20	30	nc	nc	nc	nc	nc
2011	8	8	47	39	nc	40	44	32	28	15
2015	23	17	52	40	60	64	48	35	73	57

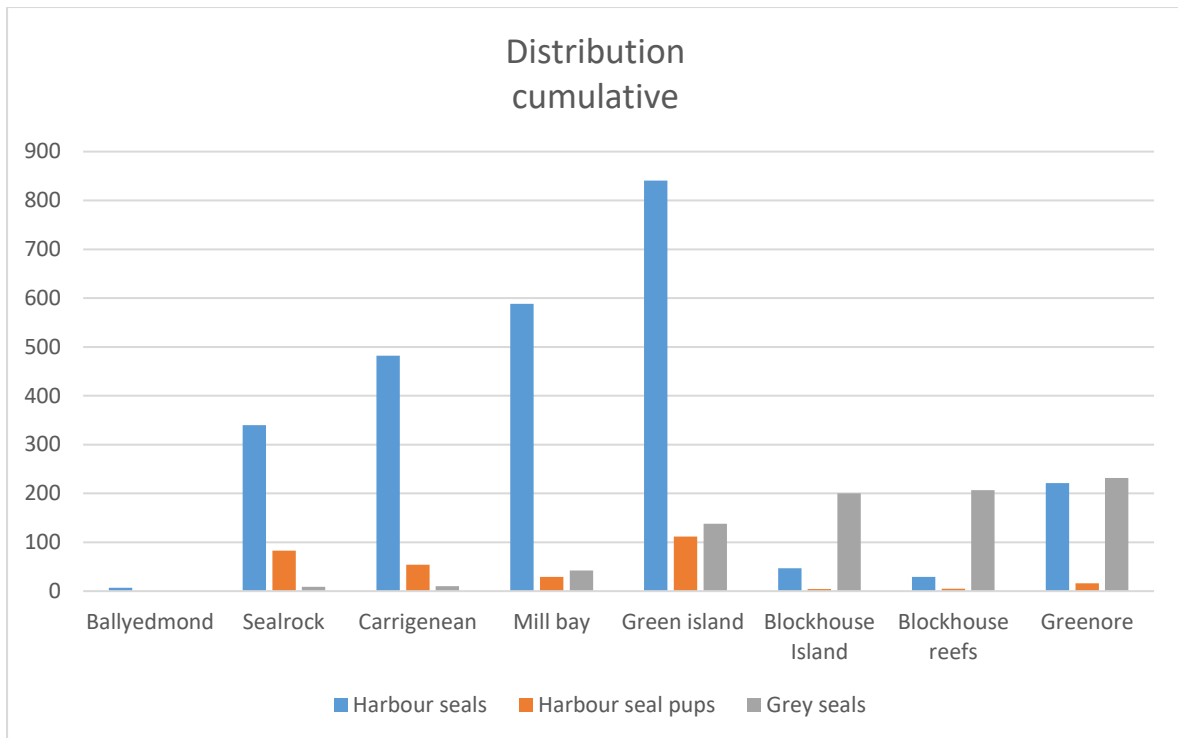
\*nc = no count

The data shows no discernible pattern except a consistent increase from July to August, with July numbers ranging from 8 to 60 individuals, and August ranging from 15 to 73. Numbers declined in winter and spring with no large males seen in November. This may be interpreted as representing a small sedentary population and a larger transitional population. The 2016 results show a generally larger population than seen in 2011 which is itself higher than 2008 which may reflect a known increase in the overall population over that period (ICUN).

#### 4.1.3 Distribution

Harbour seals primarily occupied the inner part of the Lough, "Seal Rock", Carrigean, Mill Bay and Green island. During August/September they had a pronounced preference for the north part of Green Island. An exception to this was that on occasions harbour seals would gather at Carrickbrada in the Greenore count area.

Grey seals primarily occupied the outer more exposed parts of the outer Lough at Blockhouse Island and reefs and the Cooley Long Rock.



#### 4.1.4 Disturbance

Apart from the disturbance caused by the survey boat (see methodology) the main source of disturbance was people gathering periwinkles or other shellfish. Typically seals would enter the water in the vicinity of the collector and haul out elsewhere. This was not directly observed during the survey but was observed from the shore during the reconnaissance visits. Other possible causes of disturbance were kayaking around Green Island and other boating activities straying too close to the seals. Shipping and fishing boats appeared to cause little disturbance and for the most part seals seemed habituated to aquaculture activities except at Ballyedmond and Carrigean, where activity may have increased in recent times. Harbour seals were most susceptible to flight at Carrigean, Seal Rock and the west side of Green Island. Grey seals were most susceptible to flight along Blockhouse reefs where the survey vessel must pass within about 180 metres of haul-outs.

In relation to the proposed ferry, animals hauled out on the south west part of Green Island will be closest to the route.

## 5.0 Conclusions

The July post-pupping population of harbour seals in Carlingford Lough appears to have increased with a 24% increase over seven years. No significant increase in pup numbers was observed with max. counts going from 54 to 56 individuals over the same time period. There is an apparent decline in adult/pup ratio which may represent a decline in pup numbers. The data gathered to date are not sufficient to determine the possible significance of this possible decline given the challenges in assessing pup numbers. Further data in future surveys, coupled with monitoring of pupping in Dundalk Bay (the most likely source of pups in August) should clarify the picture. Moulting harbour seal numbers appear stable.

Grey seal numbers showed an increase from July to August/September however it is proposed that the apparently aleatory nature of the grey seal data suggests a combination of a small sedentary population and a larger transient population. There is some evidence for an increase in grey seal population over 2008 – 2016. Grey seal breeding was not observed and all large grey males left the area from Oct/Nov.

Both species saw a significant decrease in numbers and an almost complete absence of harbour seal pups during the November and January-April counts with numbers starting to increase again in April. During November an absence of large male grey seals was noted.

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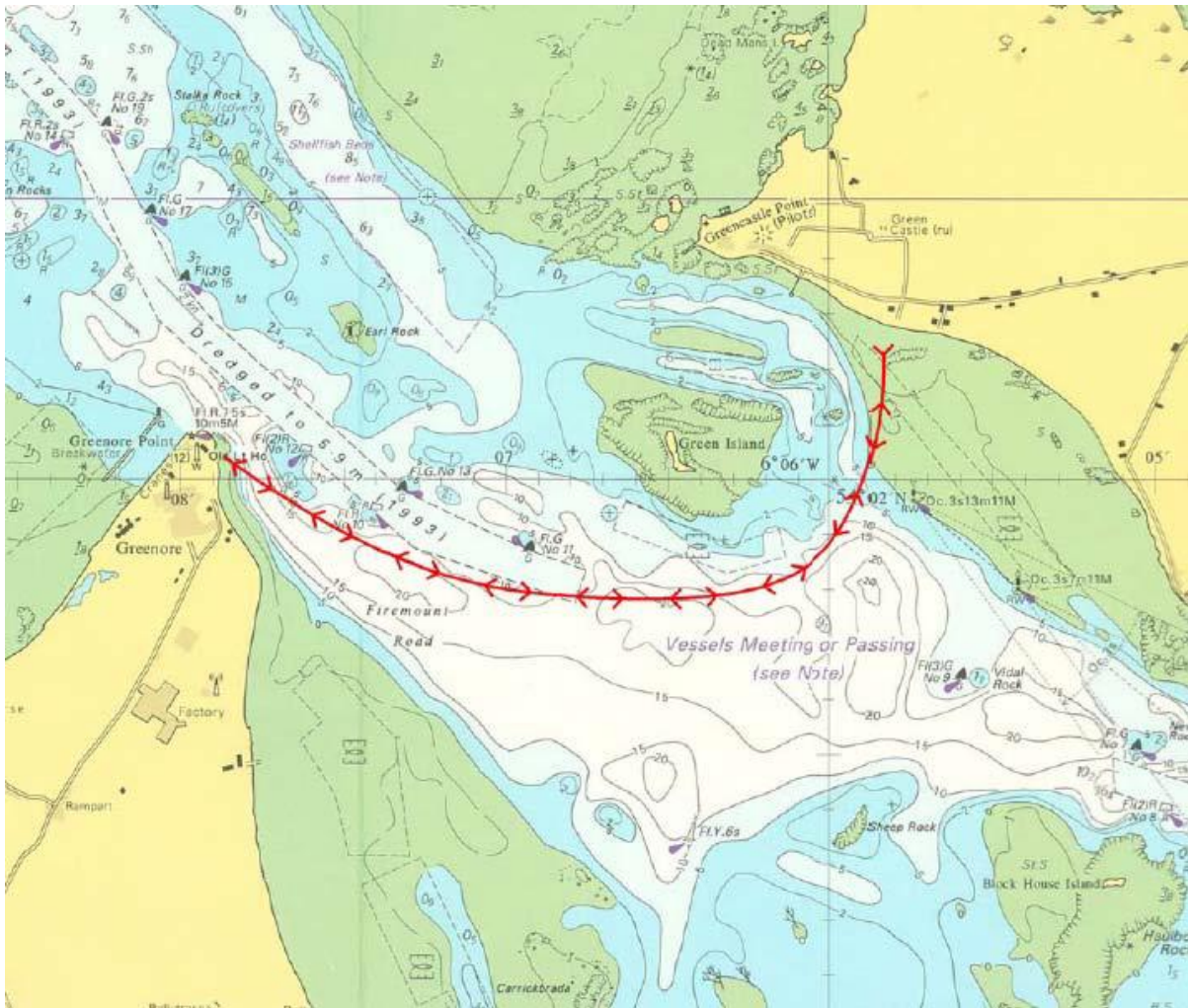
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## Appendices

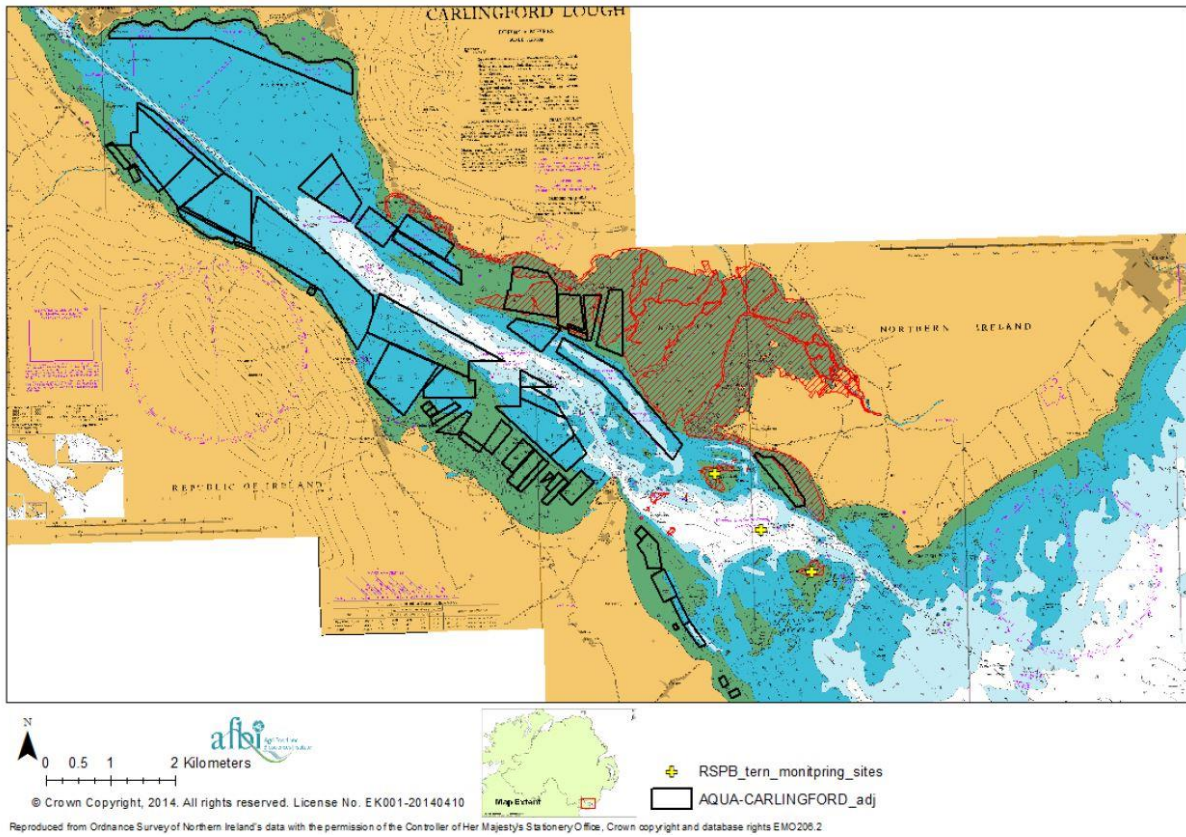


Appendix 1: Proposed ferry route

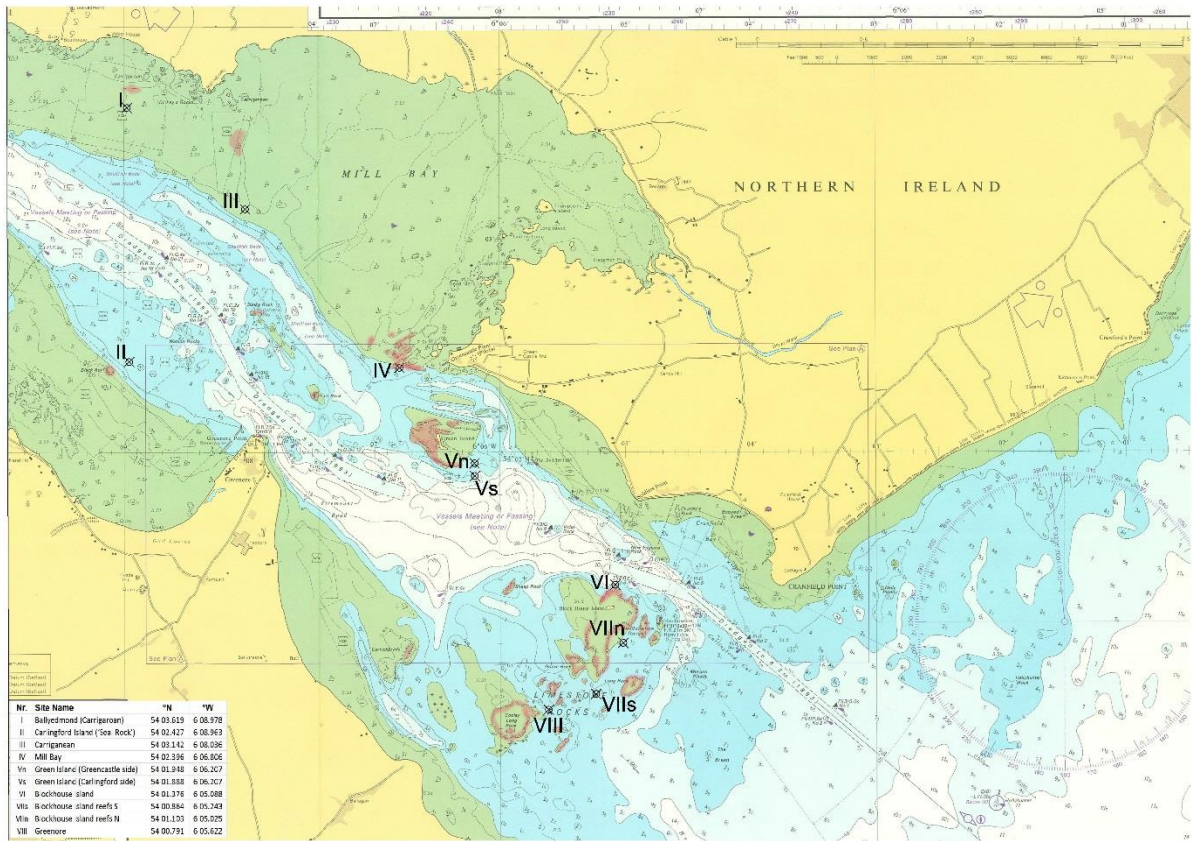


## Appendix 2: Proposed Methodology

### Appendix 3: Aquaculture concessions Carlingford Lough



## Appendix 4: Seal haul outs Carlingford Lough



## Appendix 5: Abundance and Distribution Summary Data

Harbour seals										
Place name	Ballyedmond	Sealrock	Carrigeenan	Mill bay	Green isl south	Green isl north	Blockhouse Island	Blockhouse reefs	Green ore	Tot
01/07/2015	0	18	21	43	10	1	4	8	4	109
02/07/2015	0	15	14	28	28	0	1	0	7	93
09/07/2015	0	39	19	48	1	0	0	2	3	112
15/07/2015	0	51	6	48	32	23	5	0	2	167
28/07/2015	5	28	19	1	5	34	3	0	2	97
07/08/2015	0	27	32	10	8	66	7	10	10	170
12/08/2015	0	52	7	4	35	92	14	7	2	213
30/08/2015	0	54	0	6	66	8	0	0	17	151
06/09/2015	0	11	55	1	208	0	0	1	5	281
08/09/2015	0	14	35	15	198	0	0	1	8	271
03/11/2015	0	3	71	1	0	0	0	0	15	90
10/11/2015	0	3	8	66	0	0	0	0	28	105
22/11/2015	0	2	8	35	0	0	0	0	27	72
24/11/2015	0	2	14	26	4	0	5	0	18	69
03/12/2015	0	2	6	22	0	0	4	0	15	49
01/03/2016	0		16	8	0	0	0	0	5	29
02/03/2016	0	4	41	31	0	0	0	0	27	103
15/03/2016	2	3	11	96	3	0	0	0	1	116
17/03/2016	0	2	54	34	11	0	0	0	17	118
14/04/2016	0	10	45	65	8	0	4	0	8	140
Totals	7	340	482	588	841		47	29	221	2555
Max	5	54	71	96	208	92	14	10	28	

Harbour seal pups										
Place name	Ballyedmond	Sealrock	Carrigeenan	Mill bay	Green islsouth	Green islnorth	Blockhouse Island	Blockhouse reefs	Greenore	Tot
01/07/2015	0	11	2	0	7	1	4	4	0	29
02/07/2015	0	5	0	2	3	0	0	0	2	12
09/07/2015	0	12	3	4	0	0	0	0	1	20
15/07/2015	0	8	1	5	0	2	0	0	0	16
28/07/2015	0	6	3	0	1	6	0	0	0	16
07/08/2015	0	0	0	0	0	0	0	0	0	0
12/08/2015	0	0	0	0	0	0	0	0	0	0
30/08/2015	0	0	0	0	0	0	0	0	0	0
06/09/2015	0	0	0	0	0	0	0	0	0	0
08/09/2015	0	0	0	0	0	0	0	1	3	0
03/11/2015	0	0	0	0	0	0	0	0	0	0
10/11/2015	0	0	0	0	0	0	0	0	0	0
22/11/2015	0	0	0	0	0	0	0	0	0	0
24/11/2015	0	0	0	0	0	0	0	0	0	0
03/12/2015	0	0	0	0	0	0	0	0	0	0
01/03/2016	0	0	0	0	0	0	0	0	0	0
02/03/2016	0	0	0	0	0	0	0	0	0	0
15/03/2016	0	0	0	0	0	0	0	0	0	0
17/03/2016	0	0	9	0	0	0	0	0	0	0
14/04/2016	0	0	0	0	0	0	0	0	0	0
Total	0	42	9	11	11		4	5	16	303
Max	0	12	3	5	7	6	4	4	2	

Grey seals										
Place name	Ballyedmond	Searock	Carrigenan	Mill bay	Green isl south	Green isl north	Blockhouse Island	Blockhouse reefs	Green ore	Total
01/07/2015	0	0	0	1	0	0	1	2	19	23
02/07/2015	0	0	0	0	2	0	4	2	9	17
09/07/2015	0	1	0	2	4	0	4	17	24	52
15/07/2015	0	0	0	2	4	2	3	18	11	40
28/07/2015	0	1	0	0	5	0	12	27	15	60
07/08/2015	0	1	0	0	29	0	14	14	6	64
12/08/2015	0	1	0	0	5	3	0	13	26	48
30/08/2015	0	0	0	0	0	0	1	12	22	35
06/09/2015	0	1	0	0	48	0	5	7	12	73
08/09/2015	0	3	2	1	6	0	17	16	12	57
03/11/2015	0	1	0	4	0	0	39	1	8	53
10/11/2015	0	0	0	1	0	0	2	14	2	19
22/11/2015	0	0	0	2	0	0	8	12	5	27
24/11/2015	0	0	0	0	0	0	12	4	5	21
03/12/2015	0	0	0	0	0	0	5	2	3	10
01/03/2016	0	0	2	0	0	0	0	4	7	13
02/03/2016	0	0	0	0	0	0	28	15	2	45
15/03/2016	0	0	0	9	27	0	0	4	2	42
17/03/2016	0	0	6	2	3	0	18	6	24	59
14/04/2016	0	0	0	18	0	0	27	17	18	80
Total	0	9	10	42	138		200	207	232	838
Max	0	3	6	18	48	3	39	27	26	