Post-cruise report of the TNASS2015 extension surveys conducted as part of the national cetacean surveys in the North Atlantic in 2015

10 November 2015, Tórshavn, Faroe Islands

Funding for the planned extensions of the national survey effort, as a continuation of the North Atlantic Sighting Surveys (NASS), was available in June 2015. The late approval of the funding complicated the logistical arrangements for the survey somewhat; however, with the exception of a two-week delay of the aerial survey in East Greenland, all parts of the extension surveys were accomplished.

Originally the survey was planned as a Trans-Atlantic Survey but the lack of participation from Canada and the US made the survey similar in coverage and range to the previous NASS surveys.

Intensified survey effort around the Faroe Isles targeting pilot whales

The Faroese participation in NASS 2015 was to cover basically the Faroese EEZ as well as an area south of the Faroese waters, south to 52°N, between UK EEZ and 21°W (Fig. 1). The waters to the west were surveyed by Iceland; and the plan is for UK to survey the waters to the east, the UK EEZ, in 2016.

The survey methodology was Independent Observer mode, with two parallel two-way independent platforms. Duplicate identification was to be done post survey. Target species was the pilot whale. Transects were designed by Daniel Pike, with a total planned effort of 3200 nm. The 65 m. long fishing vessel "Høgiklettur" was rented for 35 days. Eight observers, operating in two teams of four observers each, were contracted. Five of the observers had previous experienced with whale surveys, while three observers had basically no experience. Three observers were on effort on each platform at any time, one searching the transect line with 7x50 binocular, out to 30°, while the naked eye observers were covering each side of the transect line, out to 45°. The working schedule was a 30 min. rotation between the three positions on the platform, and 30 min. off, from 06 to 22, with 1/2h meal breaks at 12.30 and 18.30.

Effort data was registered in the software Logger 2010, running on a laptop, connected to a GPS antenna, for precise time and position logging. The computer was located on the right platform, and the observer located at the computer, was entering the effort data. Sightings were entered on paper forms, each observer responsible for own registrations. But observers helped each other for data recording, especially the 7x50 observer with precise time stamp and angle recording (distance was made with reticule readings). For distance estimation, each observer used a measure stich. A central time display was located on each platform, synchronized with the GPS time. Observers were responsible for validation and backup of own data in the end of each day.

Realized effort was approximately 2900 nm, or around 90% of planned effort. 65% of effort was covered in Beaufort 3 or less, 25% in Beaufort 4 and 10% of the effort was sailed in Beaufort 5. 16 cetacean species were observed during the survey. The sighting data is not been processed yet.

For more precise estimation of pilot whale group size, the idea was to use a drone to film compact groups from above, and compare with the group size estimates by the observers. During the survey, it was possible to film around eight individual groups by the drone. These data have not been analysed yet. The plan was also to tag some individuals from groups of pilot whales, with satellite transmitters, in order to follow the movements and distribution in the period during and after the survey. The combination of pilot whales presence and good weather was uncommon, and only one attempt was made to approach pilot whales from an inflatable. The whales avoided the boat, and it was not possible to come sufficiently close to the whales to deploy the tags.

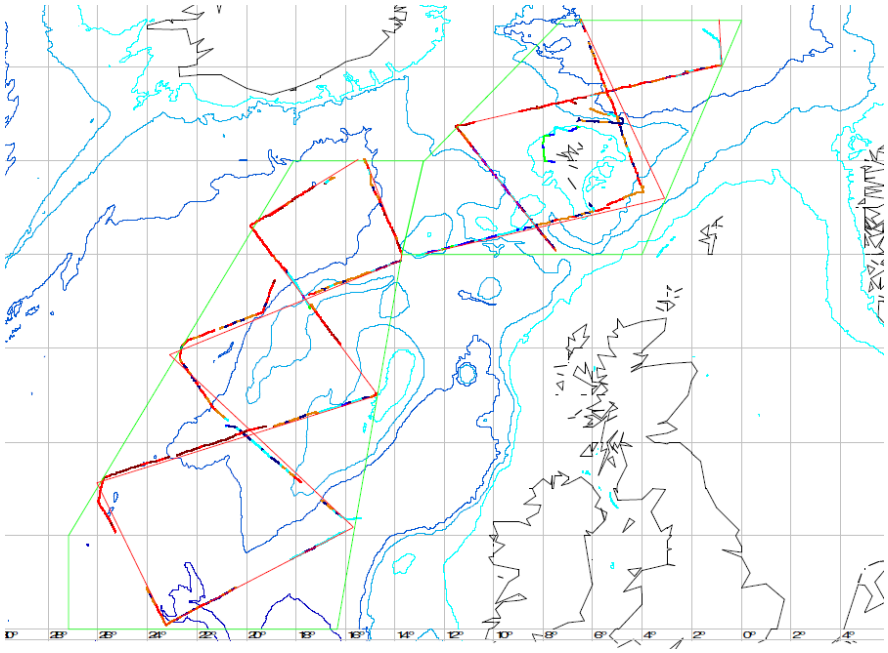

Fig. 1. Transect line covered by the Faroese ship-based survey effort in 2014.

Surveys of East and West Greenland

Aerial surveys of East and West Greenland were conducted between 15 August and 1 October 2015. The East Greenland coastal area was covered between 18 August and 27 August after initial observer training off the coast between Eyiafjördur and Skjálfandi Bay on 17 August. The survey platform was a high-winged twin engine DeHavilland Twin Otter charted from Norlandair and equipped with four bubble windows and a long range fuel tank. Observations were made independently from a front and a rear platform with a total of four observers. The observers were instructed to record data on time at first detection, angle abeam measured with Suuno inclinometers, group size and species. Recording of observations was done on Sony Dictaphones and on a specially developed recording system for aerial surveys developed by Remote Geo (3307 South College Ave. Fort Collins, Colorado) that included high definition video monitoring of the trackline with georeferenced GPS track and individual observer recordings.

Weather conditions were favourable during the survey of East Greenland however in West Greenland the alternating fog and wind provided limited windows with acceptable survey conditions with sea states less than 4. Parts of the northern area in West Greenland planned to be included in the survey could not be covered due to inclement weather conditions.

The total survey effort under acceptable conditions included 4,064 km in East Greenland and 9,235 km in West Greenland. The distribution of realized survey effort under acceptable conditions is shown in Fig. 2.

The total number of sightings was 564 and the distribution on species and East and West Greenland are indicated in Table 1.

The analyses of the survey results will include corrections for perception bias estimated from the double observer trials and availability bias will be addressed by telemetry studies of the time the animals are available to be detected at the surface. Data from telemetry studies are available for minke whales, humpback whales and harbour porpoises.

Table 1. Distribution of sightings and areas for the aerial surveys in East and West Greenland. The sightings include unique sightings seen by either the front or rear survey platforms.

Sightings	**Right side of plane**		**Left side of plane**		**Both sides of plane**		**TOTAL**
	East Greenland	West Greenland	East Greenland	West Greenland	East Greenland	West Greenland	
Minke whale	11	12	8	9	19	21	40
Fin whale	59	20	58	12	117	32	149
Humpback whale	34	11	45	8	79	19	98
Blue whale	0	0	1	0	1	0	1
Sei whale	0	1	0	0	0	1	1
Sperm whale	3	4	0	1	3	5	8
Bottlenose whale	0	5	0	8	0	13	13
Killer whale	2	1	2	0	4	1	5
Long-finned pilot whale	4	22	0	18	4	40	44
White-beaked dolphin	9	14	13	14	22	28	50
Harbour porpoise	2	44	0	11	2	55	57
Unidentified small whale	2	2	0	0	2	2	4
Unidentified medium whale	1	1	0	0	1	1	2
Unidentified large whale	26	3	30	4	56	7	63
Footprint	7	3	7	12	14	15	29
Sum							564

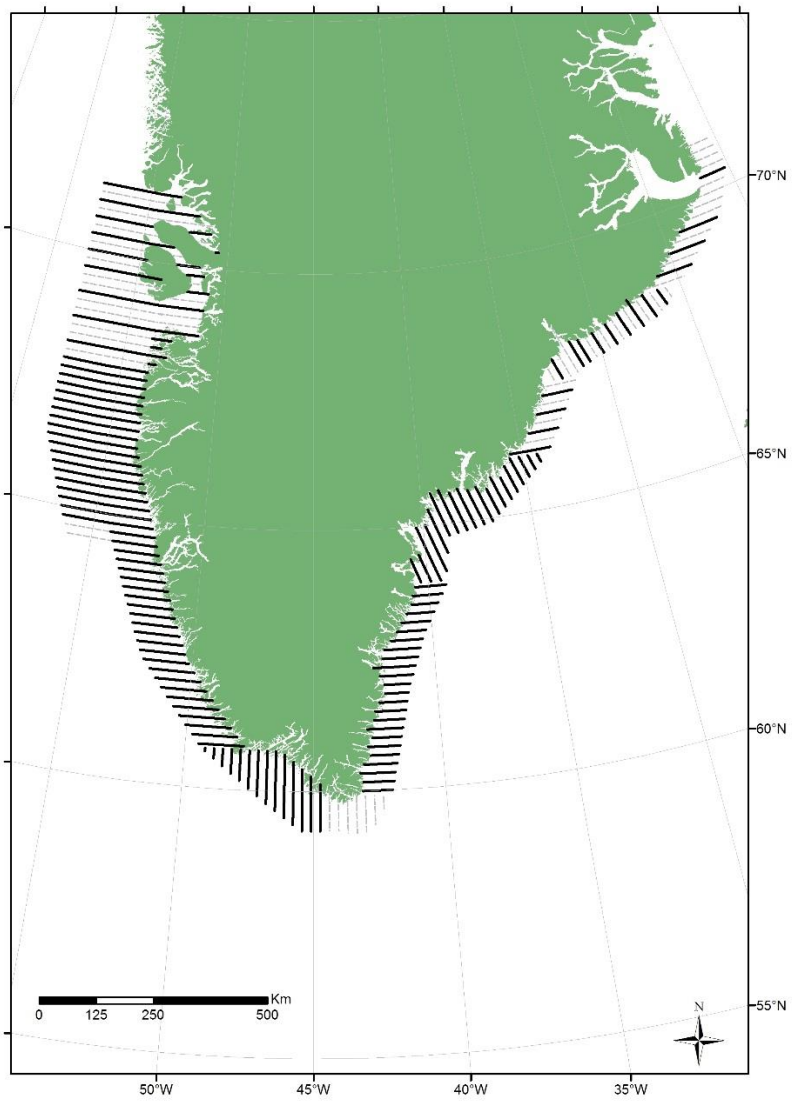

Fig. 2. Map of realized (black) versus planned (grey) survey effort in sea state <5.

Surveys of the Jan Mayen area and the Norwegian Sea

The surveys were conducted from the M/S Fisktrans (57.3m) over the period 22 June to 30 August 2015 with a double platform design, based on the methods adopted for the Norwegian national surveys with minke whales as the target species. The surveys involves two independent symmetrical platforms and tracking of minke whales. It was divided into three survey periods and finally the last week was dedicated to sampling of biopsies and photo ID. The first and third survey period was conducted within the originally planned EW are (coastal and eastern Norwegian Sea), while the second period (13 July to 2 August 2015) was dedicated to the Jan Mayen area.

In the Norwegian Sea (EW) about 55 % of the planned transect was covered in primary search mode (Fig. 3). The coverage seems to be about as in 2011 for the Norwegian Sea. For Jan Mayen numbers are not yet available, but apparently also there about 50 % of the planned transects were covered in primary search mode.

The number of sightings of groups are distributed by species and area are shown in Table 2. For the Norwegian Sea the total impression was that there were few sightings and many of them in the northeast, off North Norway. There were few minke whale sightings, and these were thinly distributed over the area but none were seen in coastal areas south of Vestfjorden. Fin whale sightings were made off North Norway, and there were perhaps more fin whale sightings in this area than in earlier surveys.

For the Jan Mayen area, the initial impression is that relatively few baleen whales were seen and minke whales were mainly seen in the northeastern part of CM3.

Table 2. Preliminary summary of sightings 2015. Number of groups of whales seen from the upper and lower platforms during primary search by survey stratum, during the 2015 survey. The 'F' effort is conducted in conditions outside the boundaries defined for the primary 'T' effort, and observations during 'F' effort are given in parentheses.

		Survey block					
Species	***Platform***	**EW1**	**EW2**	**EW3**	**CM1a**	**CM3**	**Total**
Minke whale	*Upper*	8	11	11	4	25	**59**
	Lower	9	10 (+1)	13	3	26 (+3)	**61 (+4)**
Fin whale	*Upper*	46	2	0	1	6	**55**
	Lower	35	1	0	0	4	**40**
Blue whale	*Upper*	0	0	0	0	2	**2**
	Lower	0	0	0	0	1	**1**
Humpback whale	*Upper*	10	3	0	0	1	**14**
	Lower	4	3	0	0	2	**9**
Harbour porpoise	*Upper*	7	0	0	0	0	**7**
	Lower	8	0	0	0	0	**8**
White-beaked dolphin	*Upper*	31	0	0	0	0	**31**
	Lower	26	0 (+3)	0	0	0	**26 (+3)**
White-sided dolphin	*Upper*	2	0	0	0	0	**2**
	Lower	1	0	0	0	0	**1**
Lagenorhynchus sp.	*Upper*	8	0	2	0	0	**10**
	Lower	2	0	0	0	0	**2**
Killer whale	*Upper*	3	8	5	0	6	**22**
	Lower	1 (+1)	4 (+1)	3	1 (+2)	10	**19 (+4)**
Northern bottlenose whale	*Upper*	0	0	0	1	0	**1**
	Lower	0	0	0	2	0 (+2)	**2 (+2)**
Sperm whale	*Upper*	5	20	3	9	1	**38**
	Lower	5 (+1)	12	3	10	2	**32 (+1)**
Large whales	*Upper*	3	4	0	0	2	**9**
	Lower	8	1	1	0	6	**16**
Total, groups	***Upper***	**123**	**48**	**21**	**15**	**43**	**250**
	Lower	**99 (+2)**	**31 (+5)**	**20**	**16 (+2)**	**51 (+5)**	**217 (+14)**

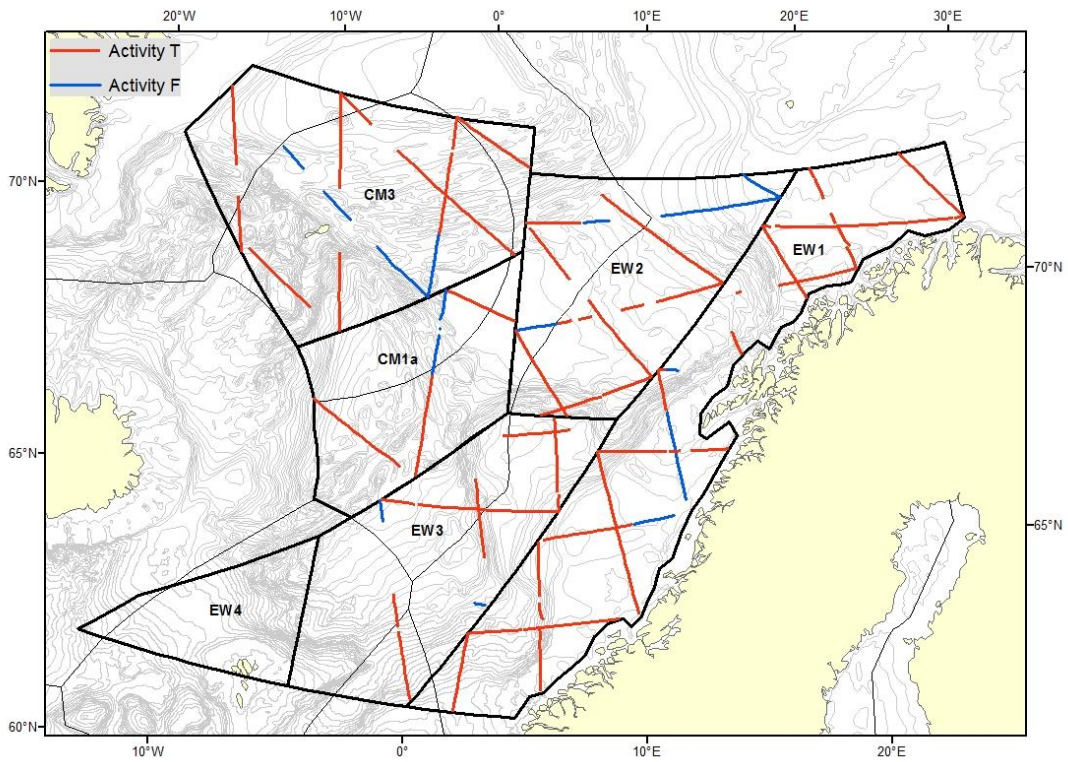

Fig. 3. Survey blocks and (preliminary) transects conducted in primary search mode (T, red) and secondary search mode (F, blue).

Brief review of survey effort funded nationally by NAMMCO member countries.

Greenland conducted an aerial survey in West Greenland that was combined with the East Greenland coastal survey mentioned above.

The **Icelandic** part of the North Atlantic Sightings survey (NASS 2015) was conducted during 9 June to 10th August 2015. The primary target species were fin whales and common minke whales. However, emphasis was made to identify as many sightings to species as possible, in particular to distinguish fin and blue whales and in the south, sei whales. Identification of long-finned pilot whales was also given high priority. The survey was conducted as a double platform two-way independent line transect survey. The survey was conducted in passing mode on the R/S Árni Friðriksson (AF) with possible delayed closing on the dedicated vessel, R/S Bjarni Sæmundsson (BS).

The BS surveyed in a southern block (IS) between 54°N and 61°N and 15°W to 42°W during the first part and during the second part it surveyed in a northern block (IN) between 65.3 and 72°N from Greenland coast to 12°W, but south of the Norwegian survey area CM2 (Fig. 4). The vessel AF surveyed west of Iceland in the Iceland (IW) Greenland (IG) area between the north and south blocks during the redfish survey and the latter part of the mackerel survey, where some effort at Greenland extended into the south block (IS) and west of 42°W (SW).

The first part of the mackerel survey covered mainly the Icelandic 200 nm EEZ (aerial survey block) (IC), with overlap into the south (IS) and north (IN) blocks and farther east than 10°W (IE) (Fig. 5).

A summary of sightings by area and observation effort is given in Table 3. Fin whales were the most commonly observed species (446 sightings) followed by long-finned pilot whales (108 sightings), common minke whales (92 sightings) and humpback whales (85 sightings).

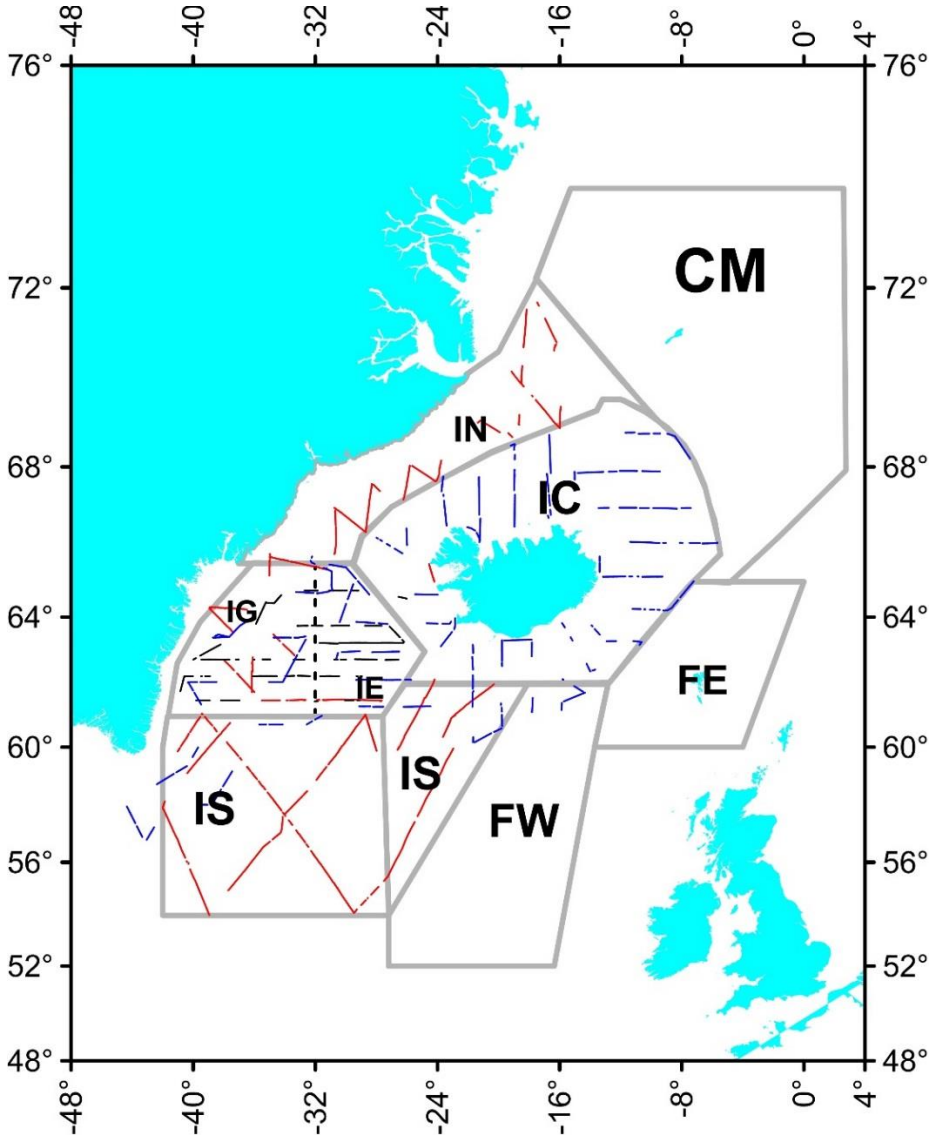

Fig. 4. Survey blocks and realized coverage of the Icelandic shipboard survey. Blue: R/S Árni Friðriksson (ÁF); Red: R/S Bjarni Sæmundsson (BS).

Table 3. Number of sightings of cetaceans encountered during the Icelandic shipboard survey. BP=fin whale, BB=sei whale, BA= minke whale, MN= humpback whale, PM= sperm whale, OO=killer whale, GM=pilot whale, HA=bottlenose whale, D?= dolphin, M?S?= xxxx

Area/Time	**nm**	**BP**	**BB**	**BM**	**BA**	**MN**	**B?**	**PM**	**OO**	**GM**	**HA**	**D?**	**M?,S?**
IW-I	569	53		3	1	2		1		1		3	
IW-III	435	74	3	5	2	2	55	15		22	4	17	6
IG-I	809	107	1	1	4		3	7	4	5	7	20	
IG-III	434	95	2	6	30	2	37	16		28		6	5
IC	952	26		1	29	16	11	9	12	26		29	10
IN	1128	60		14	14	61	14	1	2	3	1	2	1
IS	2371	27	30	10			6	12		16	1	9	1
<10°W	215	1			12	2		2	2	2	5		5
>42°W	118	4		1			3	10		5		3	1
Total	7031	446	36	41	92	85	129	73	20	108	18	89	29
Podsize		1.35	1.69	1.34	1.07	1.59	1.14	1.12	4.25	26.94	2.78	6.36	2.01

Iceland also conducted a coastal survey during June-July from a high-winged twin-engine Partenavia aircraft. The survey crew consisted of the pilot and cruise leader in the left and right front seats, and 2 primary observers in the right and left rear seats, using the bubble windows.

Realized effort is shown in Fig. 5 and Table 4. Blocks 1 and 8 received nearly complete coverage, while over 70% coverage was achieved in block 9. Blocks 2, 3 and 6 received under 50% coverage, while blocks 4, 5 and 7 were not covered at all. First-pass (*i.e*. non-repeat) coverage for the entire survey was only 37%, the lowest of the 6 surveys attempted since 1987.

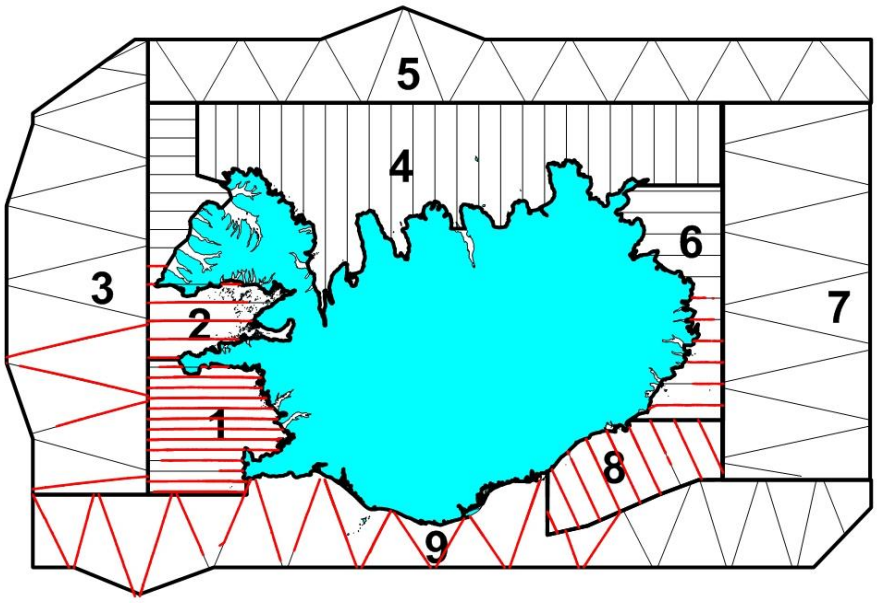

Fig. 5. Stratification and planned (black) and realized (red) effort in the 2015 Icelandic aerial survey.

Table 4. Cetacean sightings during Icelandic Aerial Survey in 2015. BA minke whale; BM blue whale; BP fin whale; GM long-finned pilot whale; GM/LA mixed pilot whale and white-beaked dolphins; LA white-beaked dolphin; MN humpback whale; OO killer whale; PM sperm whale.

STRATUM	BA	BM	BP	GM	GM/ LA	LA	MN	OO	PM	PP	OTHER	TOTAL
1	16		1	16	4	29		3		4	5	**79**
2	1					1	2	1		3	1	**9**
3	1			3		1	8				1	**14**
6	2									1	4	**7**
8	3					2					1	**6**
9	8	2	4	39	1	8			2	5	3	**72**
TOTAL	**31**	**2**	**5**	**58**	**5**	**41**	**10**	**4**	**2**	**13**	**16**	**187**

Norway covered the Norwegian Sea together with the Jan Mayen area – see above.

Financial status for the surveys

As proposed in the original budget there is funding left for initial analyses and development of abundance and for a review meeting of the results of the surveys.

Plan for analysis and presentation of results

A first step of the presentation of the results is to prepare standardized maps of all sightings, effort distributed by sea state as well as stratum delineations. This task will be undertaken by Nils Øien (Norway) the following **time schedule** has been decided:

1 February 2016: submission of raw positional data or shapefiles to Nils Øien
1 March 2016: draft maps are being circulated
1 April 2016: final maps should be ready after review by survey leaders.

For the analyses of the survey results the following schedule was decided for the initial analyses:

Analyses of **pilot whale abundance** from the Faroese (and the Icelandic) survey will be conducted by contracting Daniel Pike and the group suggested that could be paid by NAMMCO using the remaining MFA funds.

Analyses of the **Greenland** aerial survey data for the target species (minke whales, fin whales and humpback whale) will be conducted by the Greenland Institute of Natural Resources (Hansen and Heide-Jørgensen).

Analyses of minke and fin whale data from the Norwegian surveys will be conducted by the Institute of Marine Research Bergen (Øien).

The Iceland minke and fin whale data (incl. Faroese sightings) will be analysed by Daniel Pike and the group suggested that could be paid by NAMMCO using the remaining MFA funds.

The preliminary time schedule for the analyses was decided as follows:

Mid-April 2016: short update to group on progress of the analyses.

Mid-May 2016: Initial analyses should be completed and preliminary reports circulated for minke, fin whale and pilot whales.

A review meeting of the involved researchers is planned for mid May 2016. This will be a meeting of the NAMMCO Abundance Estimates Working Group. The location of the meeting will likely be the Greenland Institute of Natural Resources offices in Copenhagen.

Initial analyses of remaining species:

Greenland will complete a first presentation of humpback whale abundance estimates by mid May 2016.

Preliminary abundance estimates for other species (such as harbour porpoise, humpback whales (Iceland and Norway) and pilot whales and dolphins (Greenland)) will be presented in fall 2016 at next NAMMCO SC meeting.

Data deposition and future data sharing

Data from the surveys will be deposited with NAMMCO secretariat, but may also be deposited at IWC if required according to the RMP or the AMWP.

It was agreed to restrict the distribution of the raw data from this survey to only include the researchers involved. Data dissemination outside the survey group depends on agreement in the group.

Future of the TNASS2015 Steering Group

With reference to NAMMCO's FAC, it is recommended that the TNASS2015 Scientific Steering Group has, with the circulation of this report, completed its task. The follow-up on the survey and the development and approval of the abundance estimates are from now on deferred to the NAMMCO SC and no further activities are planned for the TNASS2015 Scientific Steering Committee.