NAMMCO STEERING COMMITTEE FOR PLANNING THE SECOND TRANS NORTH ATLANTIC SIGHTINGS SURVEY

Monday 3 February 2014
Greenland Representation, Copenhagen, Denmark

Draft Participant List

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NAMMCO STEERING COMMITTEE FOR PLANNING THE SECOND TRANS NORTH ATLANTIC SIGHTINGS SURVEY

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Draft agenda

1. OPENING REMARKS
2. ADOPTION OF AGENDA
3. APPOINTMENT OF RAPPORTEUR
4. PROPOSAL FOR A SURVEY OF THE EAST GREENLAND COASTAL AREA
5. PROPOSAL FOR A SURVEY TARGETING PILOT WHALES AROUND THE FAROE ISLES
6. PROPOSAL FOR A SURVEY OF THE JAN MAYEN AREA
7. OVERVIEW OF BUDGET
8. DELIVERABLES TO THE NEXT COUNCIL MEETING
9. INVITATION OF NEIGHBOURING COUNTRIES (CANADA, US AND EU) TO PARTICIPATE IN TNASS2015
10. FUTURE ACTIVITIES AND TIME AND PLACE OF NEXT MEETING

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NAMMCO STEERING COMMITTEE FOR PLANNING THE SECOND TRANS NORTH ATLANTIC SIGHTINGS SURVEY

Monday 3 February 2014
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Steering Group Terms of Reference

This Steering Committee (StC) has been established by Council at the NAMMCO 21 meeting in Svolvær in September 2012. The StC is under the Finance and Administration Committee (FAC) and is composed by one person appointed by each Member Country and as many members of the Secretariat as appropriate. This StC has its own Terms of Reference and budget (220,000 NOK for the rest of 2012 and the whole 2013). The StC reports directly to the FAC whose next meeting is planned for February 2014 and involves the Scientific Committee in its workings as necessary. In the first place Council asked the StC about the details of the costs of the planned effort scenarios for T-NASS in order to be able to make informed decisions on the planning and budgeting of the operations. In particular the StC is asked to highlight what part of the effort and expenses are part of regular national surveys, minimal, already planned coverage for international obligations such as the RMP, and what is going to be the burden of an integrated T-NASS, preferably in additive modules shopping-list style.

Terms of Reference are:

- One Scientific Committee member for each country and the Secretariat. The Steering Committee (StC) will appoint its own chair.
- Plan T-NASS-15 on a scale as large as possible in consultations with Finance and Administration Committee (FAC) and the Scientific Committee (SC) to:
    - Work intersessionally and report back to the FAC for decision making as soon as possible (no later than next year's SC meeting);
    - To be in charge of the SC T-NASS budget in consultation with the SC Chair and the Secretariat.
    - Work by "Skype", as well as up to two face-to-face meetings before next SC meeting;
    - Plan extended coverage including detailed budgets (including contacts to non-NAMMCO country participants);
    - Investigate and list expected national resources (integrating planned surveys);
    - Discuss, investigate and seek funding possibilities in consultation with FAC;
    - Define the needs for, and Terms of Reference for, a potential survey coordinator;
    - Decide on meetings of the Survey Planning Working Group (one potential meeting before next SC meeting).

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PROPOSAL FOR A NORTH ATLANTIC SURVEY OF SELECTED CETACEANS (TNASS2015)

Compiled by the TNASS2015 Scientific Steering Committee (StC); Niels Øien, Geneviève Desportes, Thorvaldur Gunnlaugsson and Mads Peter Heide-Jørgensen (Chairman)

Background

Due to national and international requirements, management decisions on cetacean harvests necessitate scientific advice based on updated abundance estimates. It is generally agreed within the NAMMCO SC that a better basis for the management of cetacean species in the area would be obtained through effort coordination aiming at a synoptic and contiguous survey across the whole North Atlantic. In particular it is important that the surveys are coordinated and designed to cover the target species, while at the same time allow for modifications necessary to meet national requirements.

The data gathered in such coordinated surveys could also be useful for detecting trends in distribution and abundance of species for ecosystem monitoring. This also requires a very large survey area and a series of surveys spread over time to be successful.

Objective

The general objective for a survey of selected cetaceans in the North Atlantic is:

To obtain fully corrected abundance estimates for predefined target species and developed for all areas of importance for management.

The specific objectives for the planned TNASS2015 are:

To obtain unbiased abundance estimates of

- *i) pilot whales around Faroe Islands useful for assessing the sustainability of the hunt*
- *ii) minke whales in West Greenland, around Iceland, Jan Mayen and Svalbard and the central Norwegian sea*
- *iii) fin whales southwest of Iceland*

Approach

1. The survey is focused on abundance estimates from areas and species that are important for providing robust abundance estimates useful for management
2. The following species are identified as primary target species: long-finned pilot whales, minke whales and fin whales. It is, however, assumed that the survey will also provide robust estimates of humpback whales, sei whales and to some extent also smaller cetaceans.

3. It should be attempted to include Canada and Russia and neighboring countries in surveying parts of the Atlantic to extend the coverage
4. The survey should be planned for 2015 to ensure sufficient time for preparations and because other areas of the Atlantic likely will be covered by surveys conducted by the US and by the EU.

Geographical coverage

The geographical extent of the planned survey is shown in Figure 1. In addition to areas covered in the past the following new areas were considered of primary importance for a TNASS2015 survey:

1. The East Greenland shelf from Kap Farvel to about 80^{o}N where significant numbers of baleen whales have been detected by platforms of opportunity in recent years;
2. The area between Iceland and Jan Mayen is important for minke whales and could be the sink for minke whales not encountered in recent surveys in Iceland. It will not likely be included in the Norwegian mosaic surveys in 2015 and should be surveyed in TNASS2015 to ensure a coherent coverage with coastal Icelandic and East Greenland surveys;
3. Intensified survey coverage will be established around the Faroe Islands based on 'home range' information from ongoing satellite tracking experiments of pilot whales instrumented on the Faroe Islands.

Areas of secondary importance that would be important to include if options appear for including survey effort by neighboring countries (i.e. Canada and Russia):

1. The offshore areas between the Labrador coast and the shelf areas of West Greenland that has not been surveyed in the past;
2. Areas south of the Irminger Sea and generally south of 55^{o}N where sei whales and pilot whales occur;
3. Areas north of 70^{o}N in West Greenland where recent catches of minke whales have been taken;
4. Areas between east Iceland and Norway depending on the Norwegian mosaic survey effort;
5. Areas in the northeast Barents Sea, Pechora Sea where Russian surveys have indicated increased presence of cetaceans.

Proper coverage of all areas of primary importance will ensure that unbiased estimates are obtained. The use of double-platforms will further reduce the bias of the estimates. Both approaches are critical for achieving a survey that will be of long-term value for the management of whales in this area. Coverage of areas of secondary importance will, depending on the applied survey methods, provide additional abundance estimates and data on distributional changes. Combined, such a large-scale survey will be able to detect major shifts in abundance caused by ongoing climatic perturbations in the North Atlantic. Finally the survey will provide critically important information on several of non-target species and provide abundance estimates for some of those.

An example of how the results of this planned survey will be fundamental to the interpretation of observed changes in abundance is the minke whales around Iceland. A significant decline in abundance in coastal areas of Iceland was detected in the T-NASS-07 survey compared with previous surveys. However, critical areas north of Iceland and along the East Greenland coast were not included in the survey effort in T-NASS-07. It is therefore impossible to say if the decline represents a catastrophic drop in population abundance or if it constitutes a shift

in occurrence, perhaps in response to oceanographic changes. In the survey planned for 2015 all areas will be covered and major shifts in abundance should be detectable.

The primary areas of focus for the 2015 survey extend about 1,740,000 nmi^2 (Figure 1).

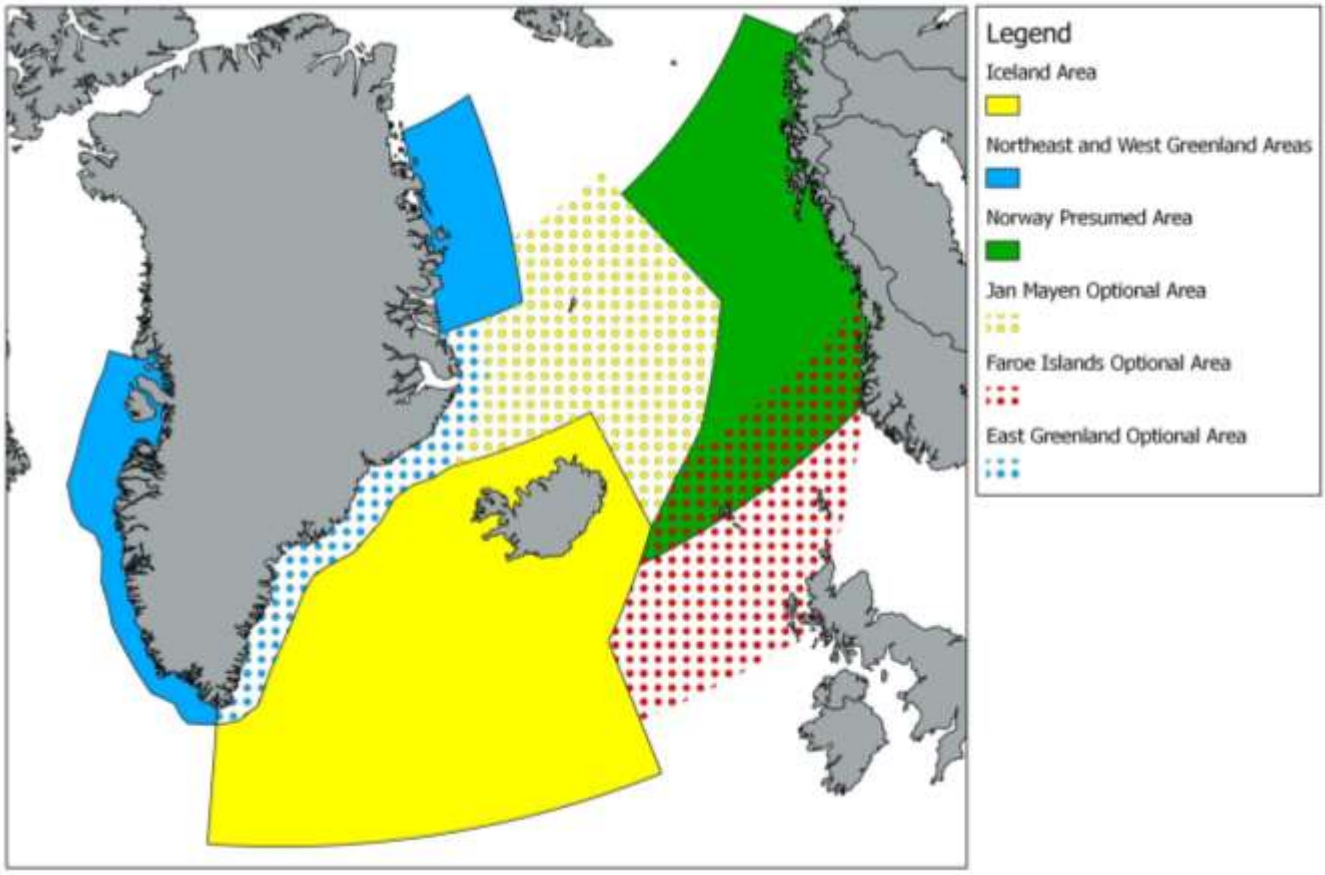

Figure 1. Extension of the proposed T-NASS 2015 and associated surveys. The size of the areas is estimated to be 235.529 km^2 for Northeast Greenland, 726044 km^{2}for the Jan Mayen area, 2860193 km^2 for the Iceland area, 934722 km^2 for the Norwegian area, ~768235 km^2 for the Faroe Island area, 233659 km^2 for the East Greenland area and 225285 km^2 for West Greenland.

Existing survey plans from member countries

Individual NAMMCO member countries plan to conduct local surveys in 2015 and these are generally planned to be similar to those of the 2007 T-NASS survey.

Greenland plans to conduct an aerial survey of West Greenland shelf area from Kap Farvel to Uummannaq in August-September 2015. No ship surveys are planned because of lack suitable survey ships and unfavorable weather conditions that require large effort during small windows of good survey conditions. Greenlandic scientists will ensure analysis and presentation of the survey results.

Norway conducts a series of mosaic surveys covering different part of the North Atlantic each year. According to the schedule of the mosaic surveys Norway will either cover the central Norwegian Sea or the area around Svalbard. Analysis and presentation of results are also covered by Norway.
Faroe Islands will provide a survey platform and has tentatively budgeted 1.5 mill NOK for this. Participation by Faorese scientists is included in national budgets as well.
Iceland will provide 2-3 survey platforms that will cover the areas traditionally covered by Iceland (see Fig.1) and Icelandic scientists will participate in survey design, survey execution and analysis and presentation of results.

Overview of survey expenses covered by National institutions for a TNASS2015:

Country	Contribution	Costs NOK
Greenland	Survey platform (Twin Otter aircraft with survey crew)	1.5 mill
Greenland	Preparation, analysis and presentation in subsequent years	1.0 mill
Iceland	Survey platform (Two large survey vessel, aircraft and crew)	8 mill
Iceland	Preparation, analysis and presentation in subsequent years	2.0 mill
Norway	Survey platform (One large survey vessel for 6 wks with crew)	12 mill
Norway	Preparation, analysis and presentation in subsequent years	2.0 mill
Faroe Islands	Survey platform (One large survey vessel for 4 wks with crew)	1.5 mill
Faroe Islands	Preparation, analysis and presentation in subsequent years	1.0 mill
Total		**29 mill**

Aside from already planned national survey activities there are also plans for surveys of cetaceans funded by oil companies in areas where oil exploration is planned (East Greenland approx 2.5 mill NOK) and there are also expected participations from Russia, Canada and other countries (estimated at ~6 mill NOK).

For the target species chosen for TNASS2015 however, it is desirable to have larger, more coherent survey coverage. The expenses for a large scale survey cannot solely be covered by current national budgets and it is unlikely that funding for such an effort can be secured from scientific funding agencies. Thus the NAMMCO TNASS2015 StC seeks advice from the Council on possible avenues for ensuring proper funding of the survey.

Budget

Based on experience from past surveys the StC has estimated the costs for a large scale survey to be in the magnitude of ~50mill NOK, including Russian and Canadian contributions and national post-survey analysis and presentations of results. In comparison the total cost of the T-NASS-07 survey was 30mill NOK, when corrected for inflation to 2012. National funding contributions in terms of already planned survey effort, incl. ship-time, are expected to cover about 45 mill NOK and additional 7 mill NOK are needed to ensure coherent survey coverage in areas adjacent to areas surveyed by NAMMCO member countries.
Partial funding of the survey could cause gaps in coverage that will leave areas without data that cannot be included in the abundance estimates and will also reduce the options for detecting shift in abundance between areas. This scenario will eventually hamper the assessment of whale stocks.

Overview of budget for the NAMMCO part of TNASS2015:

Year	Notes below	Activities within NAMMCO	Costs NOK
2013		Meeting, development & co-ordination	200 000
2014		Meeting, development & co-ordination	200 000
2015		Meeting	20 000
2015	1	Contribution to increased coverage of pilot whale areas	1 000 000
2015	2	Coverage of the Jan Mayen area	5 000 000
2015	3	Coverage of East Greenland areas	800 000
2016		Meetings and publication of results	200 000
		Total 2013 - 2016	7 420 000

1. The plan for the increased survey coverage of potential pilot whale habitat has two components:
   - Design of survey strata based on information on habitat delineation of whales tracked by satellite; this will ensure that areas with the highest abundance are covered and that the survey can be intensified in this area;
   - Independent estimation of group sizes based on aerial photographic counts of pilot whales in groups detected at seas by either the ship based survey platform, by satellit tracking or by the aerial platform; this will ensure that group sizes, that has been a notorious problem in past surveys, will be estimated precisely and independent of the survey that is then left with the task of counting groups in passing mode.

   This survey design should enable robust estimation of pilot whale abundance from an area where the hunt is recruited and with low variance on the relevant abundance estimates;
2. The plan for the coverage of the Jan Mayen area is to conduct a ship-based survey with the methods used in the Norwegian mosaic survey design to ensure that this important area is covered simultaneously with Icelandic coastal areas and areas in the Norwegian Sea;
3. The East Greenland coastal area has not been covered in the past due to sea ice and the area is known to have conspicuous numbers of baleen whales. It will therefor be covered in TNASS2015 with an aerial survey conducted in the same way as the surveys in West Greenland in the same year.

Organisation of the TNASS2015

The TNASS2015 will be organized by the StC appointed by the Council with members from the Scientific Committee. The StC will operate on their funding provided by the Council and this funding will be made available to national research agencies after an application procedure. For smaller amounts of funding for travels, meetings, preparation of proposals and purchase of equipment in 2013, 2014 and 2016 a simple request for funding should be submitted to the StC. For the three large projects in 2015 it is required that each participant submits a detailed project description that can be reviewed internally and externally by the StC before the funding is provided. The applicants may be required to adjust the proposal based on proposals from the StC. The agreed project description thereafter also functions as a contract between the StC and the applicant.

**NAMMCO STEERING COMMITTEE
FOR PLANNING THE SECOND
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**Monday 3 February 2014
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Draft Document List

Document No.	
TNASS/STC/3Feb14/01	List of participants.
TNASS/STC/3Feb14/02	Draft Agenda
TNASS/STC/3Feb14/03	Terms of Reference
TNASS/STC/3Feb14/04	Proposal for TNASS 2015
TNASS/STC/3Feb14/05	Document List
TNASS/STC/3Feb14/06	Proposal for East Greenland survey
TNASS/STC/3Feb14/07	Faroe Islands Proposal
TNASS/STC/3Feb14/08	Jan Mayen Proposal

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PROPOSAL FOR A SURVEY OF THE EAST GREENLAND COASTAL AREA AS PART OF TNASS2015

By Rikke G. Hansen, Greenland Institute of Natural Resources

Introduction

The coastal area of East Greenland is known to have large numbers of cetaceans during summer months. Especially humpback whales, fin whales and minke whales are known to occur in this area, but also several species of small cetaceans are abundant in East Greenland.

The East Greenland coastal area has not been surveyed successfully for large whales before and it is considered to be important to gain insight into the abundance of whales in the area as part of the planned TNASS2015 coverage of selected areas of the North Atlantic. Pilot whales, minke whales and fin whales are target species for TNASS2015 and major concentrations of these species in the North Atlantic need to be surveyed. The East Greenland coastal area is difficult to survey by ship because of unchartered waters and drifting sea ice and it is therefore proposed here that the coastal area should be covered by airplane out to the offshore parts that will be covered by Icelandic survey vessels.

Methods

The survey will be conducted with line transect methods and with a systematic coverage of the coastal area between Scoresby Sound and Kap Farvel. On average an area from the coast to about 50 km (16 km – 110 km) offshore will be covered (see Fig. 1). The survey platform will be a twin engine high-winged and fixed winged Twin Otter aircraft with four observers.

The survey area is divided in 10 strata covering 98,000 km^2. A total of 102 transect lines with a total effort of 6,389 km has been designed to provide a systematic coverage of the area. The survey will be conducted in the last 12 days of July 2015 with a maximum of 45 hours of flying. The airports of Constable Point, Kulusuk and Narsarsuaq will be used as bases depending on weather conditions.

The Twin Otter will be equipped with four bubble windows and a long range fuel tank providing for up to 11 hrs airtime. Sightings will be collected on digital recorders and positions will be tracked on a GPS. All sightings will include information on species, group size, behaviour, first time of the sighting, time when the sighting passes abeam and the declination angle to the sighting. Information on whether the whale is breaking the surface (cue) or detected below the surface will also be collected.

Target altitude and speed will be 213 m (700 feet) and 165 km/hr (90 knots).

Personnel

The survey will be conducted by cand. scient. Rikke Guldborg Hansen who has many years of experience with aerial surveys of whales in Greenland. In addition similarly experienced whale observers will participate in the survey.

Synergy

A survey with similar survey platform, observers and survey design will be conducted in West Greenland in August 2015. This will allow for training of the observers for conducting both surveys as well as data collection that can support both surveys. Estimation of all survey specific parameters

(detection functions, perception bias etc.) will thus be conducted on the combined survey effort allowing for much more precise estimation of these important parameters. Furthermore, it is planned, albeit not yet decided, to conduct an aerial survey of cetaceans in Northeast Greenland in summer 2015 as part of oil-related environmental studies.

Reporting

The abundance estimates will be developed using MRDS and conventional DS abundance estimators in Distance 6.0. The setup in the aircraft with two independent observation platforms will be used for estimation of perception bias between observer platforms. To correct for availability bias data from whales instrumented with satellite-linked-radio-transmitters will be used to estimate the proportion of time the whales are available for detection at the surface (0-2m). Currently these correction factors are developed for minke whales, humpback whales and harbour porpoises. It is the intention that a similar correction factor for fin whales will be developed in 2016-17. Modelling of the effect of time-in-view of the sightings will be considered as part of a later analysis depending on an assessment of the extent of the problem. A first report will be available in January 2016 and subsequent presentations in NAMMCO and IWC will allow for further adjustments of the estimates.

Budget

Subject	*Units*	*Price per unit*	*Total*
Airtime for whale survey	45	14000	630000
Observers	48	3000	144000
Travels - observer 1	4	3000	12000
Per diem	68	455	30940
Hotel	68	1200	81600
Handling / Landing fees	1	50000	50000
SUM			**948540**

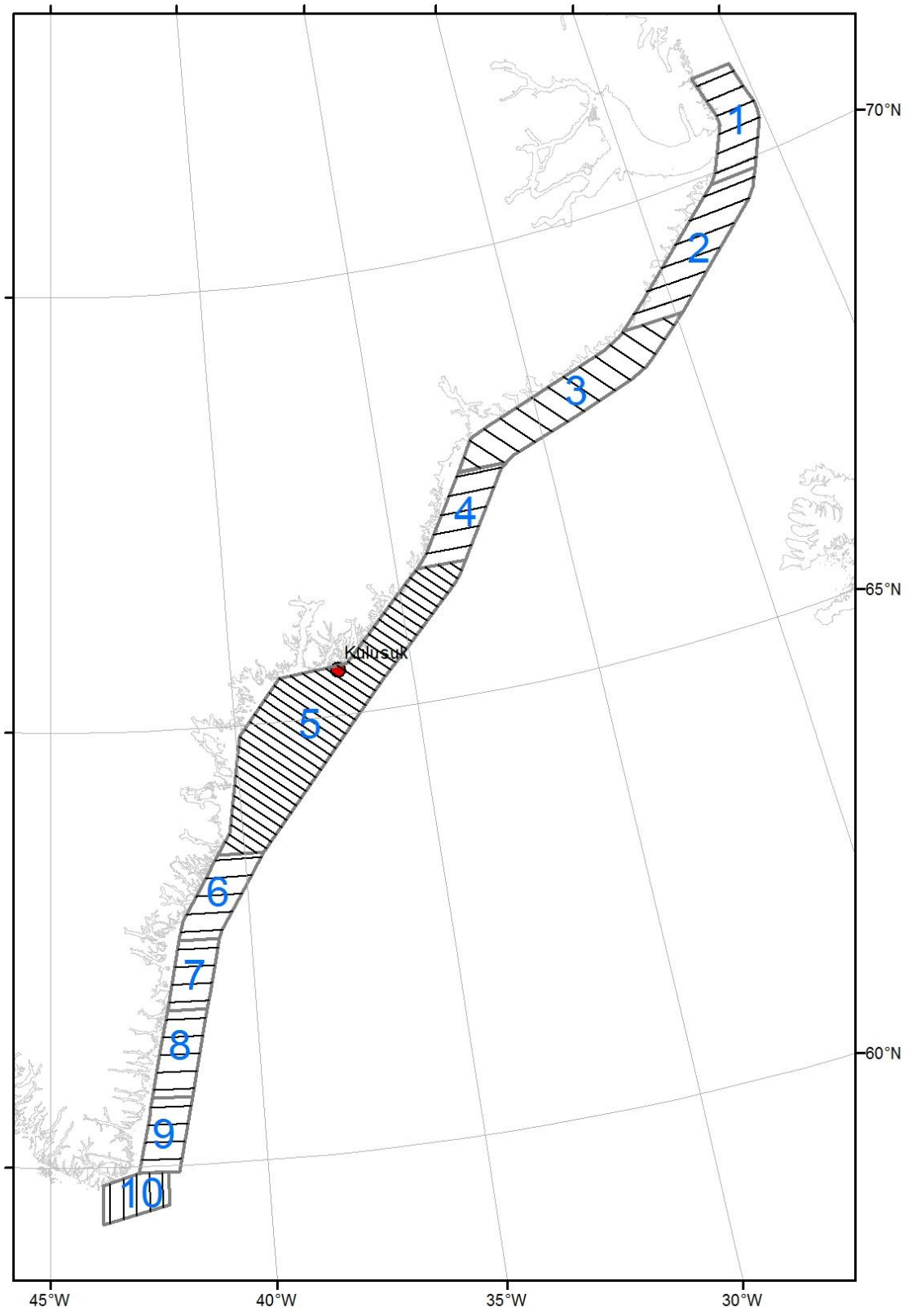


Figure 1. Survey design for an aerial survey covering the East Greenland coastal area as part of TNASS2015.

Trans North Atlantic Sightings Surveys 2015

NAMMCO Extension Project

Pilot whales around the Faroe Islands

PROJECT DESCRIPTION

Introduction

Management decisions to ensure sustainable harvest of cetaceans necessitate scientific advice based on new and updated abundance estimates. In order to estimate the abundance of cetaceans in North Atlantic, the North Atlantic Sightings Surveys (NASS) and associated surveys have been conducted in 1987, 1989, 1995, 2001 and 2007. These surveys have covered a large but varying portion of the North Atlantic.

Long-finned pilot whales occur throughout the southern part of the NASS survey area, especially around the Faroe Islands and south of Iceland. There is a long tradition for harvesting the long-finned pilot whale in the Faroe Islands. Therefore, the Faroe Islands has participated in all NASS surveys to date, with emphasis on the long-finned pilot whale.

Estimating the abundance of pilot whales from ship based sightings surveys involve challenges. The pilot whale has a wide distribution in North Atlantic, from about 40^{o} – 75^{o} N in the east. If the goal was to cover the total distribution range of the species, this would imply an enormous survey effort, which has not been feasible so far. Instead, the NASS surveys have focused on the areas close to the Faroe Islands, and have expanded the effort to the areas to east and south, depending on what effort has been allocated in neighbouring areas, so that a joint coordinated effort has secured the broadest and best coverage of the designed survey area.

In order to study the distribution and movements of pilot whales, and to understand how they recruit to the Faroese harvest, tracking studies have been performed in the Faroe Islands. Results so far show that pilot whales generally are distributed at and associated with the continental slope areas and the adjacent deeper waters. The movements of the pilot whales have generally been associated to the Faroe – Shetland channel and the areas north of the Plateau, with migrations towards both the Icelandic and Norwegian shelf. Animals that have moved southward have been associated to Bill Bailey and the other shallow banks and the areas south of there. There have been no strong seasonal patterns in

the movements. The plan is to track animals from more groups, to get a more complete picture of the movement and distribution of pilot whales in the North Atlantic.

The pilot whale is a social species, living in family groups or pods, comprising from a few ten up to some hundred animals. Estimation of pilot whale group size had a strong influence on estimated abundance and varied significantly among the surveys. It appears that the definition of a "group" and the estimation of its size have changed over the course of the surveys. One challenge is to get a precise estimate of the group size. Adaptions like closing in on the groups, and using video footage, have been implemented in order to sort some of these problems.

It is vital in an upcoming NASS survey to challenge these problems that have been identified in the abundance estimation of pilot whales, if the objective of a fully corrected low variance estimate of pilot whales is to be achieved.

Background

The NAMMCO member countries have agreed upon a new coordinated sightings survey in 2015 (TNASS 2015), to obtain fully corrected abundance estimates of selected cetaceans in North Atlantic. Target species are long-finned pilot whale, minke whale and fin whale. National institutions have made preliminary plans for the allocation of financial reserves for the TNASS 2015 survey, based on experiences, effort and coverage from past surveys, especially TNASS 2007. The Faroese government (Ministry of Fishery) has thus in the long term budget allocated 1.6 million DKr. for the Faroese part of TNASS 2015, and hereby indicating that the Faroe Islands will be part of TNASS 2015.

A NAMMCO scientific steering committee (StC) is established, to coordinate the TNASS 2015 survey. The StC has revised the preliminary national survey plans, and concluded that for the target species it would be desirable to have larger, more coherent survey coverage. The StC recommend increased survey effort for the three target species, and suggest that an extended North Atlantic sightings survey of selected cetaceans is established, under the co-ordination of NAMMCO, that shall supplement and improve the national surveys.

For pilot whales around the Faroe Islands, the plan of the StC for increased survey coverage of potential pilot whale habitats has two components:

- Design of survey strata based on information on habitat delineation of animals tracked by satellite; this will ensure that areas with the highest abundance are covered and that the survey can be intensified in this area;
- Independent estimation of group sizes based on aerial photographic counts of pilot whales in groups detected at seas by either the ship based survey platform, by satellite tracking or by the aerial platform; this will ensure that group sizes, that has been a

notorious problem in past surveys, will be estimated precisely and independent of the survey that is then left with the task of counting groups in passing mode.

Objective

The overall aim with TNASS 2015 is to design a survey that will enable robust estimation of pilot whale abundance from an area where the hunt is recruited and with low variance on the relevant abundance estimates. The objective of the extension survey is to complement the national survey, so that the overall aim is fulfilled. The extension survey will include satellite tracking and photographic methods for identifying pilot whale habitats and providing precise estimates of group size; that will identify abundant pilot whale areas to be surveyed more intensively, and deliver a low variance estimate of pilot whales relevant for management in the Faroe Islands.

Actions

Three action areas have been identified by the TNASS 2015 steering committee (StC), to deliver an unbiased abundance estimate of pilot whales around the Faroe Islands:

A - Survey design, effort and coverage

Traditionally, the NASS surveys have covered the exclusive economic zone (EEZ) and adjacent waters of the participating countries. Thus, all NASS surveys have had a contiguous coverage from east Greenland to south Norway, between approximately 59^{o} and 64^{o} N. The variation in coverage between surveys has been due to the effort allocated in waters north and south of the main area. For pilot whales around the Faroe Islands, especially two areas, to the east and south of the main NASS area, have revealed higher abundances of pilot whales in summer.

The east area, between the Faroe Islands and Norway, has traditionally been covered by the Norwegian national mosaic survey. The Norwegian mosaic survey does not cover the whole Norwegian EEZ in one year. Instead, the area is divided in to six boxes, with one box surveyed each year in a six year cycle. Norway has traditionally surveyed the east area, which means that the Faroe Islands are leaved with effort to be allocated to other areas instead. In the Norwegian survey, minke whale is the target species, and the survey methodology is different from the Faroese survey, and perhaps not as suitable for estimating pilot whale abundance. In the preparation of TNASS 2015, it will be important to know if Norway will survey the east area, and also whether the Norwegian survey methodology is expected to generate a robust estimate of pilot whales for the east area. If not, the Faroese survey most likely needs to allocate extra effort to the east area.

Pilot whales have been widely distributed in the surveys. And pilot whales have usually been observed relatively frequently at the southern border of the surveys. Also, the area south of the Faroese EEZ has generally revealed high aggregations of pilot whales. Although a good coverage of the distribution range of pilot whales would need effort in south, there is a trade-off between size of the survey area and acceptable degree of coverage. With limited effort, it is not possible to cover the southern area without reducing effort in north.

To have a successful survey, it is vital that the limited effort available in terms of vessel days at sea is used the most efficient way. One key issue is that most effort is used in areas expected to have the highest abundances. For pilot whales around the Faroe Islands, the plan is to use data from satellite tracking of distributions and movements of pilot whales to allocate survey effort, both for designing survey area and for intensifying efforts to areas with highest density.

B - Satellite tracking

The Museum of Natural History has previously tagged pilot whales with satellite transmitters, in order to explore movements and distributions of the species in North Atlantic. Animals from four pods have been tagged so far, using a method where entire groups (pods) are driven to shore, where selected individuals are equipped with satellite transmitters; that are fixed to the dorsal fin by two or three penetrating pins. Thereafter, the entire group has been driven back to sea. The Museum is of the opinion that handling the animals during the tagging operation is the best method to secure that the tags stay on the whale for an extended period. Alternatively, tags that are anchored to the body by one or two pins with barbs can be shot in the animals in open waters. Experience from this method is typically shorter tag longevity. But the method of distance deployment would be a valuable alternative, if the tags with short longevity still could give the distribution data needed for identifying the high abundance areas of pilot whales.

The main difficulty with tracking pilot whale in the Faroe Islands has been the poor access to groups for tagging, because tagging competes with the hunt. In the situations when a group has been allocated for tagging, this has typically occurred after a period with several pilot whale drives in one district, so that the local need for meat and blubber has been saturated. The Museum has established a network with sheriffs and foremen of the grind hunt in the six whaling districts, and is frequently informing about the tracking project, in order to increase chances for new tagging attempts. The Museum has stressed the importance that the tagged group is intact when released, so that the social structure or behaviour is not affected.

The Museum plan to use simple, inexpensive position-only, satellite tags. They provides the desired data, have proven reliable and robust, also when shot in the animal from distance,

and therefore gives the best values for money. Such standard tags can be delivered on a short notice (by e.g. Wildlife Computers, Sirtrack or Telonics).

The Museum intends to intensify the tagging effort, so that as many as possible groups of pilot whales are tagged in the period up to the start of the TNASS 2015 survey. The optimal solution is to tag individuals from an intact group. An alternative option could be to select some animals from a grinds, which is driven ashore during a hunt, tag a few animals, and release the subgroup. This would be an alternative only if the subgroup is believed to reflect a normal behaviour; otherwise the data may be misleading. Another option is to go offshore, and tag pilot whales in more open waters, by shooting tags in animals with an airgun. The Museum has some experience with this method. In order to be alerted about potential pilot whale groups to tag, a contact network will be established with fishing vessels operating in Faroese waters that can inform about observed pilot whale groups. The Museum will use the two Faroese Fishery Inspection Vessels as platforms during the offshore tagging operation.

C - Group size

The precision of group size estimations has strong influence upon the abundance estimate of pilot whales. It is thus vital to have a precise estimate of the number of animals in every group of pilot whales encountered during the sightings survey. Group size estimates have generally changed towards smaller group sizes in the recent surveys. Also, the estimated group sizes in the sightings surveys are generally smaller compared to the group sizes in the Faroese drive hunt. Since all animals in a group of pilot whales are not at the surface simultaneously, the task is to estimate the portion of the group that is under the surface at any time. This portion may also change, if the group is moving, feeding, resting etc. Pilot whales can be found in large aggregations, so called super groups, counting some thousand animals, which also complicate group size estimations. Group size is estimated by the observers on effort, and beside the best estimate, a low and high estimate is also given. Generally, larger group have a larger span in uncertainty.

One approach to increase the precision of the group size estimates has been to run the surveys in closing mode, where the survey vessels close upon some of the sightings. This most likely improves upon the uncertainty in group size estimation. But the problem with running the survey in closing mode is that this reduces the time the ship is on effort.

More recently, video cameras have been installed on the platform of survey vessels that continuously record potential sightings on the track line. The video is useful for estimating angle and distance to sightings, but also for species identification and group size estimations. Recording cetaceans groups from the platform with a handheld video camera

has also proven useful for an alternative estimate of the group size, especially for large and dispersed groups.

In order to overcome the problem with group size estimations, the plan is to develop and introduce a unmanned aerial vehicle (UAV or drone) with video and still camera on-board, that can take off from the survey vessel, fly over the observed group or aggregation of pilot whales, while continuously recording the track line with video and camera, and return to the vessel. The development of drones for the private market has escalated in recent years, due to the lifted ban of commercial drones for the private market in US. Today, reasonable priced drones are available, designed for ecological mapping, that can be programmed to fly predefined transect lines and are able to take-off and return to a vessel at sea. More advanced high tech drones, that are used for e.g. wildlife monitoring and mapping, provides both HD video and HR photo of the transect line simultaneously, and are able to be airborne and record data for up to one hour. The first step is to exploring the market to see if there are commercial drones available today that could be used in a sighting survey. If not, the alternative is to contact producers about the possibility to develop a drone suitable for ship born sightings survey. The most important specification of the drone is that it is easy to operate during take-off and landing on a moving vessel and manage to operate in moderate wind speed.

During ship born sightings surveys, it is recommended that the primary platform has a minimum height of ca. 10 meters, in order to have a satisfying search width of the track line. A higher platform gives a better and longer view away from the vessel, and also a better overview of the track line, sightings, species identification and group size. It can sometimes be problematic to install the platforms at a satisfying height, especially on small survey vessels.

Monitoring the track line by video recording, in order to assist on sighting distance and angle, species identification and group size, most likely will be a standard methodology in the TNASS 2015. For this purpose, it is important that the video provides a clear, broad overview of the track line. To further improve upon the video recording, by increasing the height of the recorder, the potential for using a helikite (helium-filled balloon) will be explored. Recording the track line with HD video camera from a helikite at 30 meters would be an enormous advantage during the sightings survey, if the setup is able to deliver a clear steady picture. The plan is to investigate if a helikite is stable enough as video platform. The advantages with the helikite is that it provides better measure of the distance of sightings, group size and may also record animals before they react to the survey vessel. Also, the helikite may serve as independent platform, setting up trials for the observers. Therefore, introducing the helikite could improve the robustness of the abundance estimate.

Budget and timing

Overview of budget and timing of the Faroese extension project of TNASS 2015.

Action	Timing	Budget
A) Survey design **Allocate effort to areas with highest abundance and intensify effort in these areas**	The survey will be designed just before survey start.	600.000 NOK
B) Satellite tagging **Track animals from as many groups as possible for identifying the areas with highest abundance**	Preparations start in spring 2014 and tagging effort continue until survey start.	200.000 NOK
C) Estimation of group size **Independent group size estimation from aerial video and photo records, collected by a drone.** **Investigate if a helikite is useful for group size estimation**	Development starts in spring 2014 and continues to survey start. A testing and training survey will be conducted in late spring 2015.	200.000 NOK
TOTAL		1.000.000 NOK

Deliveries

A) By allocating an extra 600.000 DKr. to the sightings survey, effort, in terms of vessel days at sea, increases from 28 to 42 days. The increased effort will be used in areas with higher abundance of pilot whales, and for intensifying the survey in these areas. The high abundance areas will be identified by tracking of a suitable number of pilot whale groups with satellite tags. This design will produce a robust low variance abundance estimate of pilot whales, from an area where the hunt is recruited. This is vital information for managers that ensure that the pilot whale is harvested on a sustainable basis.

B) 20 satellite tags will be deployed on two to three animals from 7 to 10 groups of pilot whales in total. This is considered an adequate number of groups to track in order to identify areas with higher abundance of pilot whale, and reveal the area from where the hunt is recruited.

C) A drone will be purchased (100.000 DKr.), that will be used for independent precise estimation of group sizes of pilot whales, a notorious problem in past surveys. Also, the usefulness of purchasing a helikite (20.000 DKr.) for monitoring the track line by video, will be investigated. A two day testing and training survey (80.000 DKr.) will be conducted in early summer in 2015, in order to test equipment and survey setup of TNASS 2015.

Proposal for a survey of the Jan Mayen area during TNASS-2015

Contact: Nils Øien, Institute of Marine Research, Norway; nils@imr.no

Summary

This application is for a ship visual sighting survey of the Jan Mayen area CM in summer 2015. The area, about 770,000 km² in total area, will be covered by one ship for six weeks following a line transetc procedure with symmetrical double platforms.

Introduction

Present management of cetacean harvests are dependent on abundance estimates generated at regular intervals. While national surveys provide data for their own needs, the year 2015 offers an opportunity to cover larger areas of the North Atlantic synoptically, as several countries have planned national surveys in their waters.

Geographical areas

As Iceland intends to cover their coastal areas to the north and the east, and Norway has planned to cover the eastern part of the Norwegian Sea in summer 2015, a large gap remains with the Jan Mayen area uncovered. This area constitutes a potential feeding and migration area for several species like the baleen whales minke, fin, sei, humpback and blue, and the odontocetes like sperm and Northern bottlenose whales. In the minke whale RMP context, this area has been described as the *Small Area CM*, about 770,000 km², grossly bounded to the north and east by 74°N and 3°E and the Icelandic coastal shelf area to the south. *See Figure*. This proposal is to survey this area in summer 2015.

Historically, large parts of the western sector of this area CM have been clotted with pack ice and drifting sea ice. However, in recent years the ice extension has decreased considerably. When this area was last surveyed by Norway in 2010, no ice problems were experienced there. These circumstances may also influence the abundance and distribution of cetaceans within the area.

Methodology

The methodology and survey protocol (**Øien, N. 1995**. Norwegian Independent Linetransect Survey 1995. *Interne notat, nr. 8 - 1995*, Havforskningsinstituttet, 58 pp (internal report)) to be used have been applied in the Norwegian surveys since 1995. Basically, a two-platform symmetric configuration is being used and visual detections are made by naked eye search, collecting information on the relative positions of sightings from the vessel. Observations assumed to be of minke whales, will be tracked until abeam. Sightings are recorded digitally on laptops together with information like species, group sizes, GPS positions, sightings and weather conditions. Training and experiments with respect to visual distance estimation and use of angle boards will be conducted midway.

The survey area will be divided into 3 survey strata (*see Figure*), and transects constructed following established standard methods.

Project organisation and management

The project will be managed by the Institute of Marine Research, Bergen, but the planning and the implementation of the survey will be done in cooperation with the Icelandic Marine

Research Institute. Project leader will be Nils Øien and Icelandic contact Þorvaldur Gunnlaugsson.

Personnel

The methodology and sighting procedures suggested here require 2 team leaders and 8 whale observers. Personell with the necessary experience will be hired for these positions.

Timing

In line with earlier surveys, the kernel month for conducting the survey will be July. The Norwegian survey covering the eastern part of the Norwegian Sea and adjacent offshore northern Norway will also be conducted in the same time period, which will take care of the synoptic aspects with regard to possible migrational shifts between areas.

Products

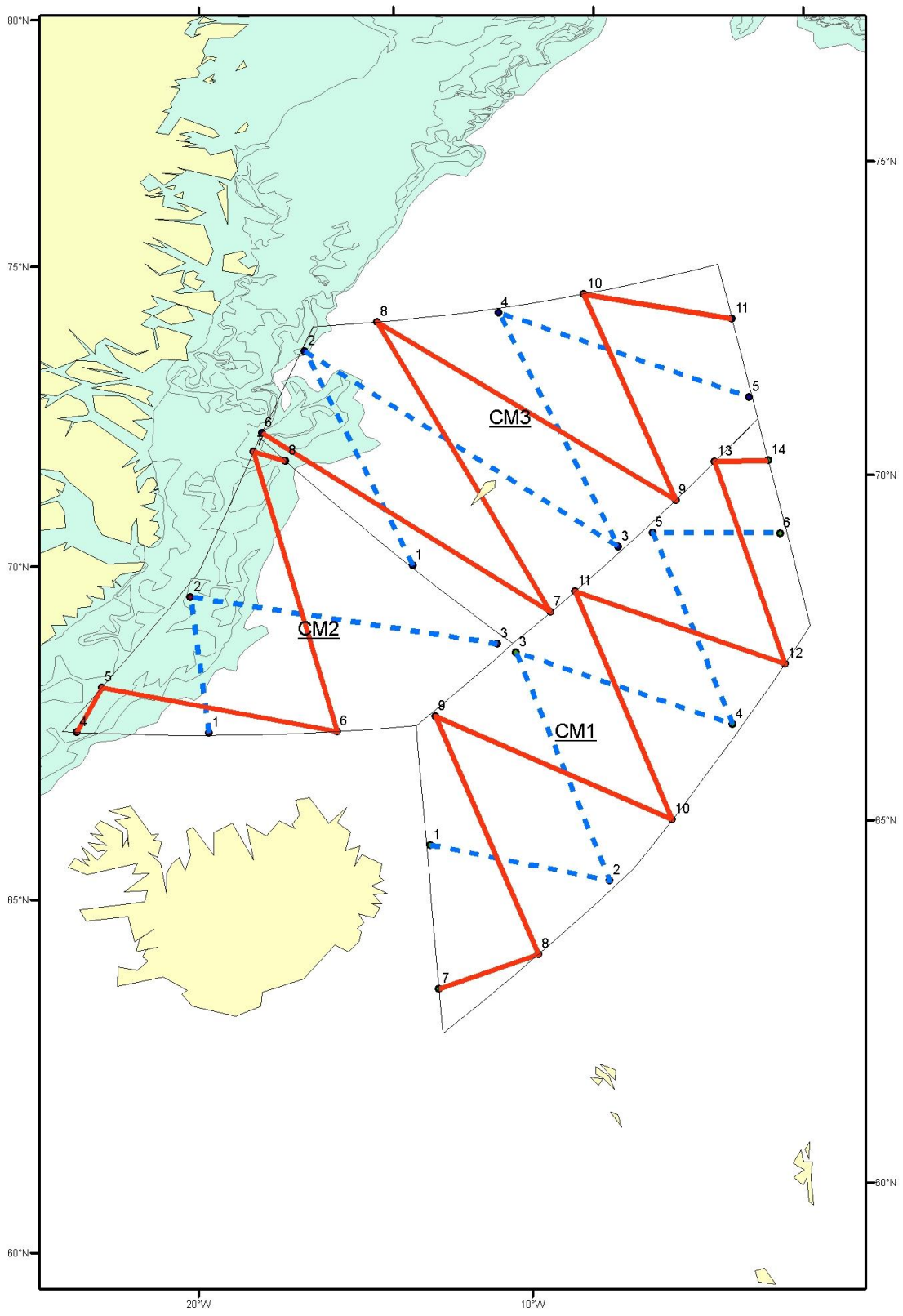
The data collected on the survey will be handled and analysed in parallell with those collected at the Norwegian national survey. A first report from the survey will be avialable by 1 March 2016.

Budget

The budget (*in NOK*) given below covers the field work only, as planning, equipment and data handling following the survey will be provided by the Institute of Marine Research, Bergen, in cooperation with the Marine Research Institute, Reykjavik.
The intention is to conduct a six-week survey (42 days) which is considered to be at the lower end of a desirable coverage. However, the expenses are proportional to the length of the survey and has to be scaled to the amount of money made available at the end.

Vessel survey of the jan Mayen area (CM Small area) ***NOK***

	Rate (per day/unit)	Days/units	Total
Chartered vessel, fuel inclusive	100 000	42	4 200 000
Whale observers and team leaders	2 300	420	966 000
Travel	3 000	10	30 000
Subsistence	350	420	147 000
GRAND TOTAL			***5 343 000***



Map of the survey area with survey blocks and an example of transect design.