

Report of the Norwegian 2011 survey for minke whales within the *Small Management Area EW* – the eastern Norwegian Sea

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ABSTRACT

As part of a six-year program over the period 2008-2013 with the aim to get a new estimate of minke whale abundance in the Northeast Atlantic, areas in the eastern Norwegian Sea, comprising the *Small Management Area EW*, was surveyed with two vessels in June-August 2011. Three blocks within the survey area received two independent coverages. About 2,822 nautical miles of primary search effort was conducted within the survey blocks. In addition, about 827 nautical miles were searched with “large whale effort” using one platform. The most common species sighted was the minke whale. While minke whales were recorded over all the surveyed areas, fin whales were observed in the northeast, sperm whales over the deep waters both in north and south, and killer whales along the slopes of the Norwegian Sea basin. The sighting rate of minke whales is the lowest recorded in this area over the survey period 1995-2011.

MONITORING, SURVEY - VESSEL, ATLANTIC OCEAN, COMMON MINKE WHALE

INTRODUCTION AND OBJECTIVES

The management of Norwegian minke whaling is based on the Revised Management Procedure (RMP) developed by the IWC Scientific Committee (IWC 1994). RMP requires a monitoring program, since input data for RMP include time series of annual catches and of absolute abundance estimates with associated variance statistics. Abundance estimates for use in this context have been based on sighting surveys. Large-scale synoptic sighting surveys to estimate the abundance of minke whales in the Northeast Atlantic were conducted in 1988, 1989 and 1995 (Schweder et al. 1997). Based on the experiences from the 1995 survey in which 11 vessels and 140 people were involved, it was chosen for the following years to cover the northeast Atlantic by small-scale annual surveys over six-year periods (Øien & Schweder 1996). One obvious problem associated with this approach is how to account for the additional variance introduced in multiyear sighting surveys relative to a synoptic survey (Skaug et al. 2004), a feature which they share in common with other surveys discussed in the Scientific Committee in recent years. The arguments for a multiyear sighting survey were that it would be more feasible to achieve common standards and better quality of data collection through more training of the observers and the scientists. Additional benefits were that the logistics would be simpler and costs could be shared over more years. Our experience from the six-year survey periods 1996-2001 and 2002-2007 is that the program has been quite successful (Skaug et al. 2004, Bøthun et al. 2009) in the mentioned respects. Norway therefore decided to continue with a new series of sighting surveys in the northeast Atlantic over the period 2008-2013 (Øien and Bøthun 2008) with the aim of presenting a new estimate of minke whale abundance in 2014. The survey conducted in the summer 2011 is the fourth one in this survey series.

AREAS SURVEYED IN 2011

When the survey plans 2008-2013 were presented in 2008 (Øien and Bøthun 2008), we suggested to preferably cover one *Small Management Area* during one year's survey as the basic approach. In 2008 the survey cycle started by covering the Svalbard area (*Small Management Area ES*); in 2009 the North Sea area of the *Small Management Area EN* was covered; in 2010 the areas around Jan Mayen, the *Small Management Area CM*, was covered; and in 2011 the eastern Norwegian Sea, the *Small Management Area EW*, was covered. This area was last covered in 2006 (Øien 2007).

The stratum definitions we have been using up to and including the survey period 2002-2007, have changed over time due to increased experience. Changes in the *Small Management Area* structure in 2003 (IWC 2004) also led to block modifications which were motivated of the wish to keep some consistency throughout a survey period and make comparisons with previous surveys easier. However, these adaptations have made it difficult to distribute survey effort in an efficient manner as many of the survey blocks have been small with impractical shapes. In the ongoing survey cycle the block structure has been evaluated and redesigned to achieve a better total effort distribution over the covered area. The new implemented block structure for the eastern Norwegian Sea, comprising of the four strata EW1-EW4, is shown in Figure 1. However, the block EW4 was not covered as the available effort was not considered sufficient to include it in the coverage, and earlier surveys had covered the area east of 5°W only.

CRUISE SUMMARIES

The original cruise plans involved an effort of 10 boat weeks each year. Due to economic constraints, the effort has been less than that in recent years, and for the 2011 survey six weeks were allocated altogether; first three weeks from 28 June to 18 July 2011 with the chartered vessel *M/S Båragutt*, and then for three weeks from 26 July to 16 August 2011 with the institute

research vessel F/F *Johan Hjort*. The distribution of effort into two quite separate periods made an extra challenge to the synoptic aspect of the survey. In earlier surveys July has been the target month for coverage to keep consistency and comparability throughout the years. Therefore we decided to run a full coverage of the blocks EW1-EW3 in each of the two survey periods to handle eventual seasonal factors. The available survey effort was also too sparse to allow for the usual construction of transects with a primary transect with intended full coverage. The construction of transects was instead based on a continuous 18 hour run per day and setting the usual full watch when sighting conditions were according to the survey protocol. In addition some effort, “large whale effort”, was run under conditions beyond those acceptable by the survey protocol for minke whales; on those occasions only the upper platform was manned. On board the vessels, K.A. Fagerheim, G. McCallum and N. Øien acted as team leaders.

The established sightings procedures (Øien 1995), including tracking of minke whales, were followed as in previous surveys in which the minke whale has been the primary target species.

The survey vessels were able to survey about 2,822 nautical miles altogether in primary search mode in the assigned survey blocks (Table 1), which were about 20 % more than achieved in the same area in 2006. In addition, 798 nautical miles were conducted with “large whale effort”. Realised primary search effort, as well as the additional “large whale effort”, in the three blocks surveyed in 2011 are shown in Figure 1. In Figure 2 is shown the realised primary search effort separately for the two vessels. Nearly 30 % more primary effort was realised onboard F/F *Johan Hjort* than onboard M/S *Båragutt*, however, the geographical distribution of the effort turned out to be quite similar. The northwestern part of the EW SMA received the least coverage – this was also the area with the most difficult weather conditions. On both coverages most sightings were made in the northern part of the survey area EW (Figure 2).

A summary of the number of groups of whales sighted during the 2011 survey when on primary search effort is shown in Table 1.

Distributions of primary sightings of some of the recorded species are shown in Figs 3-4; minke whales and fin whales in Figure 3, and sperm whales and killer whales in Figure 4.

The eastern Norwegian Sea area was last surveyed during the NILS surveys in 2006. Norwegian surveys have covered this area or parts of it in 1995, 1997, 2002, 2006 and most recently in 2011. Sighting rates for minke whales from these surveys have been plotted in Figure 5. The 2011 sighting rate is the lowest recorded over the survey period.

Distance and angle estimation training was conducted on several occasions and experimental tests were conducted on 17 July and 12 August 2011.

SURVEY DESIGN, SIGHTING PROCEDURES AND DATA COLLECTION

The survey procedures followed were the same as in NILS-95 (Øien 1995, Schweder et al. 1997, Skaug et al. 2004, Bøthun et al. 2009). The equipment was basically the same as was used in the NILS-95 survey, but some modifications have been made since then to the software to make relevant data recording of especially weather covariates easier. Digital recording of speech is made directly to disk. This system has proved useful and easy for transcription and checking. Double platform effort is used exclusively during primary search following the defined protocol, and the observers are organised into teams of two persons. This has been consistent in all our surveys since 1997.

During the sighting survey in 2011, identification photos were collected from about 10 humpbacks. No new dive time data series were collected in 2011.

FUTURE SURVEY ACTIVITY

Within the on-going survey program for the six-year cycle 2008-2013, the Svalbard area was covered in 2008, the North Sea area in 2009, the Jan Mayen area in 2010 and the Norwegian Sea in 2011. No survey is planned for this summer (2012). The future survey plans are uncertain due to economic constraints, but the *Small Management Area* EB, which includes the Barents Sea proper, still remains to be covered but will probably be on the schedule for 2013.

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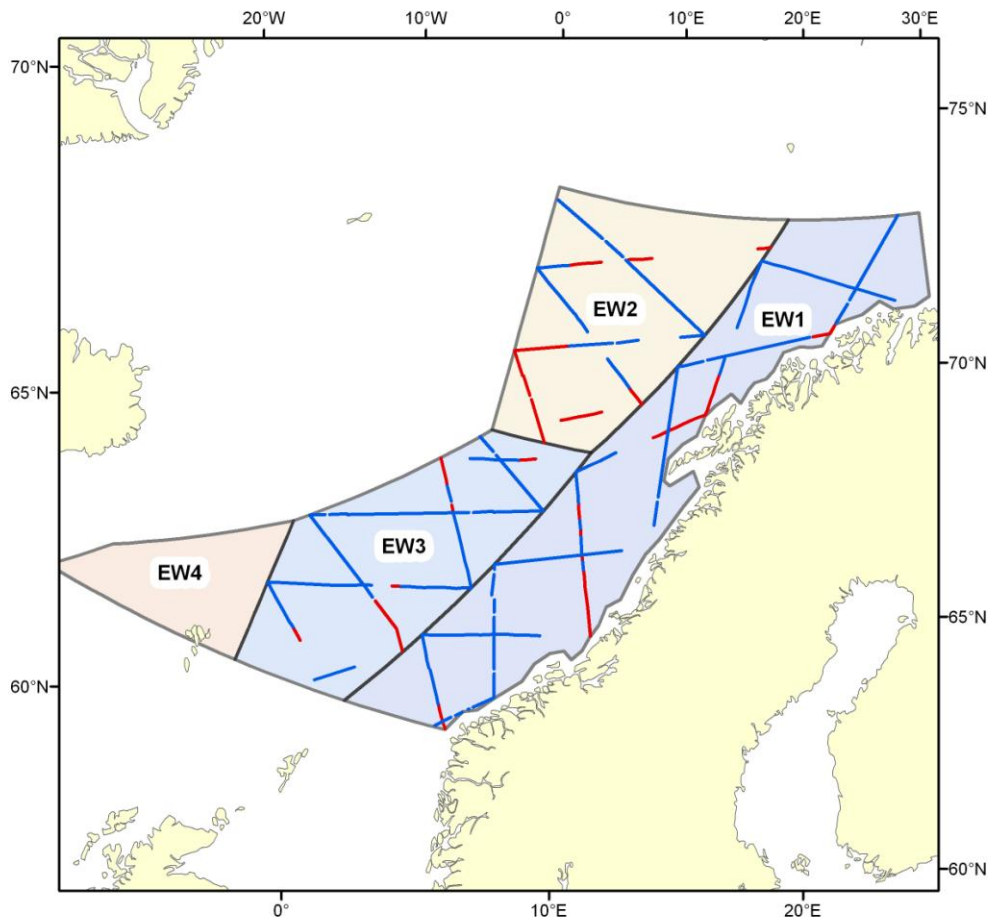


Figure 1. The EW Small Management Area with the block structure, EW1-EW4, adopted for the survey. Realised transects with primary search effort within these survey blocks have been added. The blue lines represent search effort conducted within the limits of the acceptable weather conditions defined by the survey protocol, while the red lines represent search effort in extended conditions and with single platform mode.

Table 1

Number of groups of whales seen from the upper and lower platforms during primary search, and realised primary search effort (nautical miles) by survey stratum, during the 2011 survey. The 'F' effort is search conducted in conditions not acceptable for minke whale search and observations during that effort are given in parentheses.

Species	Platform	Survey block			Total
		EW1	EW2	EW3	
<i>Minke whale</i>	<i>Upper</i>	39 (+2)	18	11 (+2)	68 (+4)
	<i>Lower</i>	27	20	8	55
<i>Fin whale</i>	<i>Upper</i>	26	0 (+3)	0	26 (+3)
	<i>Lower</i>	18	0	0	18
<i>Humpback whale</i>	<i>Upper</i>	0	0	0	0
	<i>Lower</i>	4	0	0	4
<i>Harbour porpoise</i>	<i>Upper</i>	10	0	0	10
	<i>Lower</i>	3	0	0	3
<i>White-beaked dolphin</i>	<i>Upper</i>	14 (+1)	0 (+1)	0	14 (+2)
	<i>Lower</i>	18	0	0	18
<i>Lagenorhynchus sp.</i>	<i>Upper</i>	1	0	0	1
	<i>Lower</i>	3	0	0	3
<i>Killer whale</i>	<i>Upper</i>	6 (+1)	5 (+8)	4 (+1)	15 (+10)
	<i>Lower</i>	7	2	4	13
<i>Long-finned pilot whale</i>	<i>Upper</i>	0	0	0	0
	<i>Lower</i>	(+6)	0	0	(+6)
<i>Northern bottlenose whale</i>	<i>Upper</i>	0	1	0	1
	<i>Lower</i>	0	0	0	0
<i>Sperm whale</i>	<i>Upper</i>	22 (+3)	7 (+7)	7 (+1)	36 (+11)
	<i>Lower</i>	23	6	6 (+4)	35 (+4)
<i>Large whales</i>	<i>Upper</i>	4 (+2)	2	1	7 (+2)
	<i>Lower</i>	3	0	1	4
Total, groups	<i>Upper</i>	58 (+15)	95 (+19)	25 (+8)	178 (+42)
	<i>Lower</i>	45	72	20	137
Realised primary effort	<i>Nmi, T</i>	1391	493	938	2,822
	<i>Nmi, F</i>	298	327	173	798

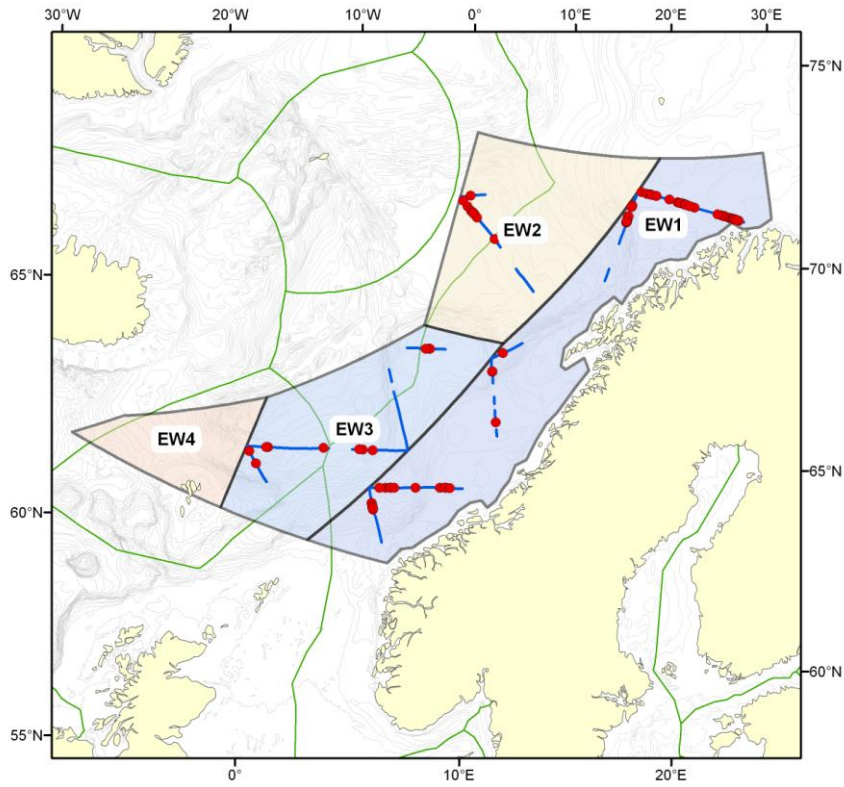
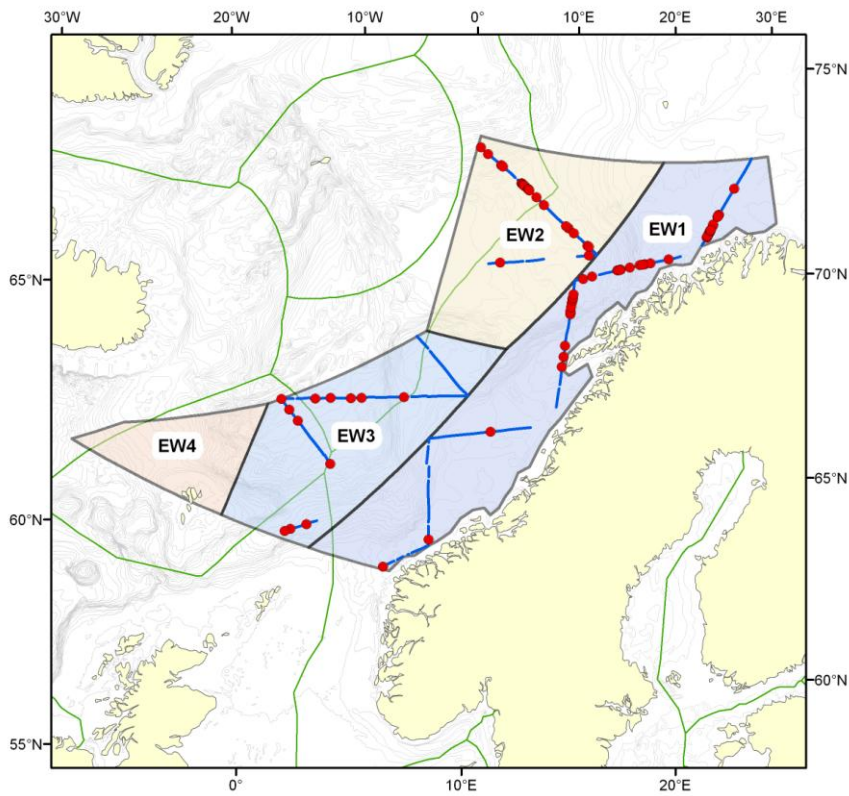


Figure 2. Primary transect effort in the 2011 survey by M/S 'Båragutt' (upper left) and by F/F 'Johan Hjort' (lower left). The red dots are sightings of all species made within the limits of acceptable weather conditions set for primary search for minke whales by the survey protocol.



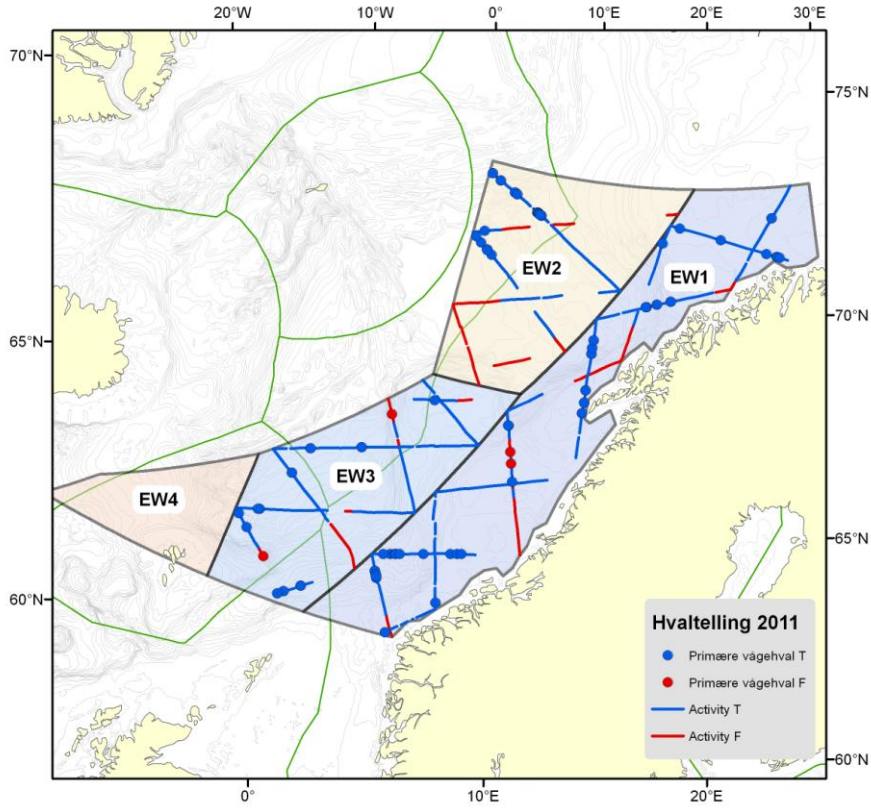
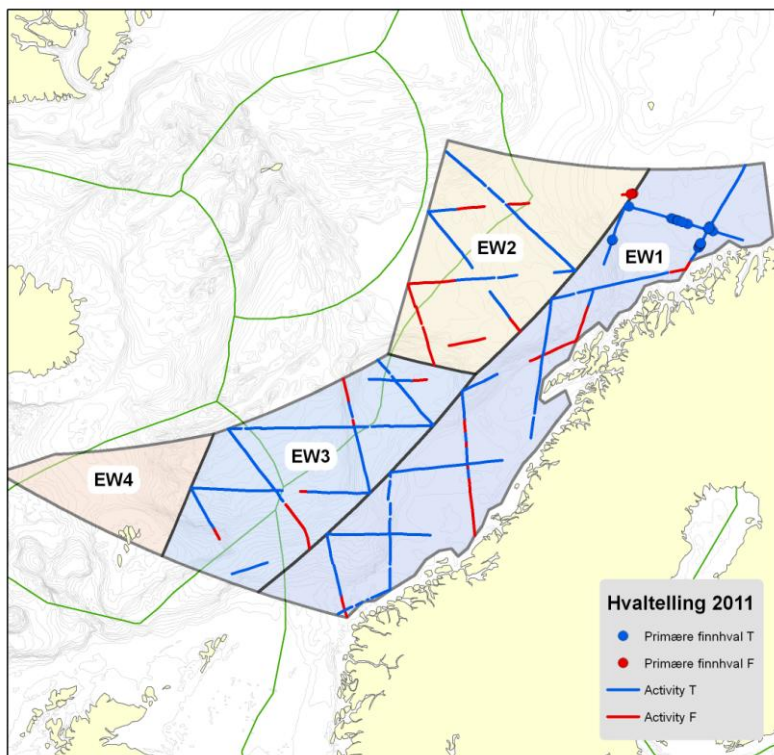


Figure 3. Primary sightings of minke whales (upper left) and fin whales (lower left). The blue dots are sightings made within the limits of acceptable weather conditions set for primary search for minke whales by the survey protocol, while red dots are sightings made under extended conditions.



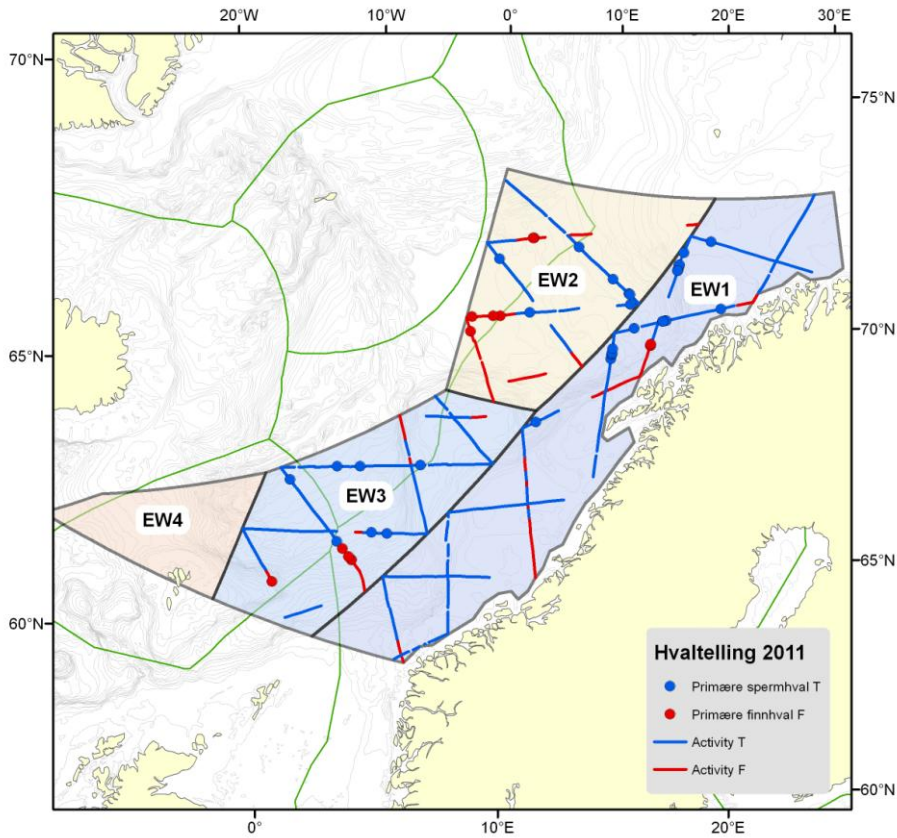
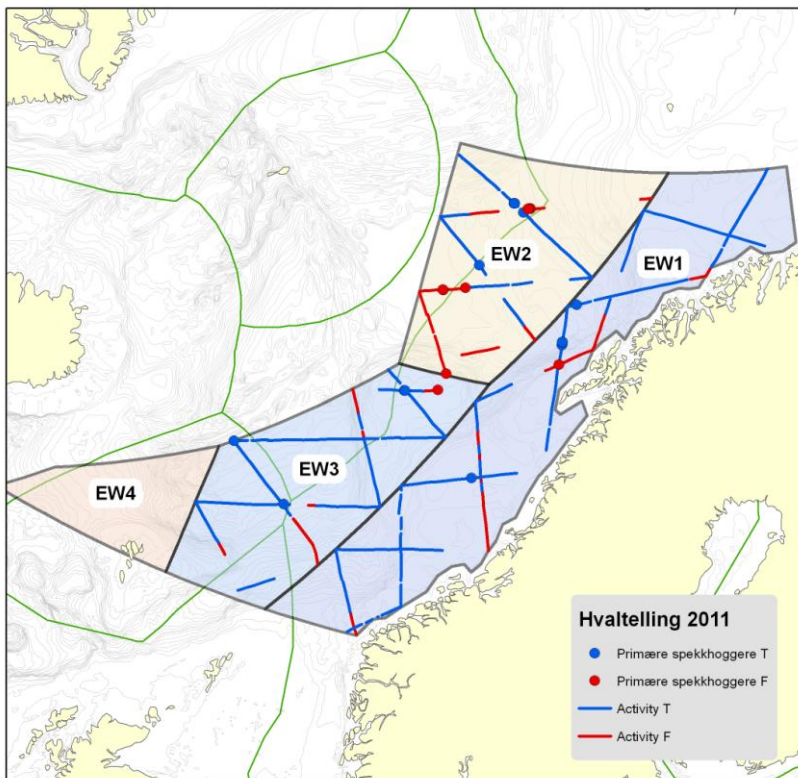


Figure 4. Primary sightings of sperm whales (upper left) and killer whales (lower left). The blue dots are sightings made within the limits of acceptable weather conditions set for primary search for minke whales by the survey protocol, while red dots are sightings made under extended conditions.



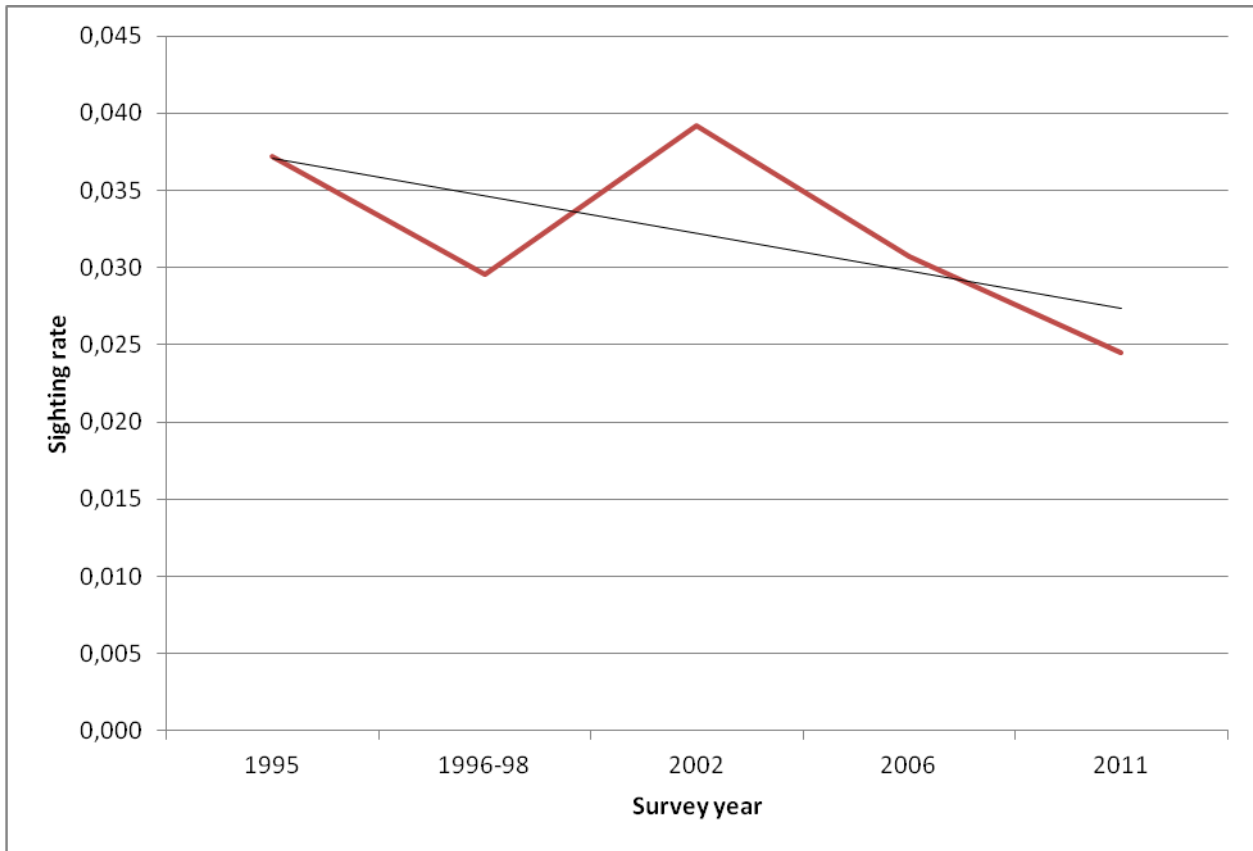


Figure 5. Sighting rates for minke whales derived from Norwegian survey data from the eastern Norwegian Sea area (the Small Area EW) over the period 1995-2011. See text for details.