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Report of the Norwegian 2020 survey for minke whales in the Small Management Area EW-Norwegian Sea

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ABSTRACT

As part of a six-year program over the period 2020-2025 with the aim to get a new estimate of minke whale abundance in the Northeast Atlantic in a timely manner with regard to *RMP*, the Norwegian Sea comprising the *Small Management Area* EW, was surveyed with one vessel during the summer 2020. Three blocks were surveyed and received a reasonably good coverage. A total of 3,638 nautical miles of primary search effort was conducted within the surveyed blocks. The most common species sighted were minke whales, fin whales and sperm whales. In addition, sightings were made of white-beaked dolphins, killer whales, humpback whales, harbour porpoises and white-sided dolphins. Compared to the previous survey of this area in 2015, increased presence of most species was seen. Minke whales had a five-fold increase in sighting rate from 2015 to 2020.

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 mosaic 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, 2002-2007, 2008-2013 and 2014-2019 is that the program has been quite successful (Skaug et al. 2004, Bøthun et al. 2009, Solvang et al. 2015, 2021) in the mentioned respects. Norway decided to continue with a new series of sighting surveys in the northeast Atlantic over the period 2020-2025 (Øien 2020) with the aim of presenting a new estimate of minke whale abundance in 2026. The survey conducted in the summer 2020 was the first one in this survey series.

AREAS SURVEYED IN 2020

When the survey plans for 2020-2025 were presented in 2020 (Øien 2020), we suggested to follow the approach used in previous survey cycles, that is, to preferably cover one *Small Management Area* for one year's survey as the preferred approach. As planned, the survey cycle started in 2020 with the coverage of the Norwegian Sea the *Small Management Area* EW. This area was last covered in 2015 and prior to that in 2011.

In 2008 we made a change to the block (stratum) definitions we had been using previously, as the number of blocks had increased to a number which made it difficult to distribute survey effort in an efficient way. Changes in the *Small Management Area* structure in 2003 (IWC 2004) also led to modifications which were motivated of the wish to keep some consistency throughout a survey period and make comparisons with previous surveys easier. All survey cycles starting with 2008 have followed the same stratum structure within the *Small Management Areas.* The four blocks EW1-EW4 used for the design in *SMA* EW are shown in Figure 1.

In recent years harbour porpoises have got much attention as a species vulnerable to bycatch. The Norwegian mosaic survey with minke whales as the target species is an offshore survey, however, we know that porpoises, at least at times of the year, are common inhabitants of the archipelagos and narrow fjord systems along the Norwegian coast lines. Therefore, we have conducted opportunistically additional feasibility surveys for porpoises within fjord systems along the Norwegian coast. During the 2020 summer survey period we were able to conduct harbour porpoise surveys within several fjord systems in western Norway and in the Vestfjord in northern Norway.

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, Solvang et al. 2015). The logistics were basically the same as were used in the NILS-95 survey, but some modifications and improvements have been made over the years both to software and equipment used. 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 (Øien 1995), and the observers are organised into teams of two persons. This has been consistent in all our surveys since 1997. Primary search effort is defined by the conditions Beaufort ≤ 4 and meteorological visibility ≥ 1000 m and this survey protocol requirements are determined by minke whales being the target species of the surveys.

CRUISE SUMMARIES

The survey in 2020 was conducted onboard the vessel '*Acc Mosby'* over the period 9 June to 3 August 2020. The survey period was divided into three parts: 9-29 June, 30 June-13 July and 14 July-3 August. On board the vessel Kjell-Arne Fagerheim and Nils Øien acted as team leaders.

During the first survey period transects were conducted in the blocks EW1, EW2 and EW3; in the second survey period exclusively in EW1, and in the third period mainly in EW3. Our attempts to cover the stratum EW4 were unsuccessful due to bad weather conditions. Vestfjorden and the fiords in western Norway were covered during the last period of the survey. The fjord surveys were conducted as ordinary symmetrical double platform surveys without tracking. Distance and angle estimation training and tests were conducted on 15 and 20 July 2020.

In total, "*Acc Mosby*" was able to survey about 3,638 nautical miles on the planned EW transects. The realised effort is shown in the Figures. The effort seems to have been reasonably well distributed over the survey blocks EW1-3. In addition, harbour porpoise surveys were conducted with 292 nmi within the Vestfjord, and 717 nmi within several western Norway fjords.

A summary of the number of groups of whales sighted during the ordinary 2020 survey when on primary search effort is shown in Table 1. The distribution of primary sightings of minke whales, fin whales, humpback whales, sperm whales, dolphins, killer whales and harbour porpoises are shown in Figures 2-8.

The realised survey effort and the distribution of primary sightings of harbour porpoise during the survey in Vestfjorden, northern Norway, are shown in Figure 9. The numbers of harbour porpoises observed there were 154 from platform 1 and 149 from platform 2. Other species were also seen during the survey in Vestfjorden; minke, fin, sei and humpback whales.

The abundance estimates of minke whales in EW (for the combination of the strata EW1-3) have shown a decrease over the three recent survey cycles from 27,152 to 12,595 (Solvang et al. 2021). However, the 2020 survey showed a very different situation; using sighting rate as an indicator there is more than a five-fold increase in this parameter from 2015 to 2020. The distribution of minke whales in 2020 was much more even over all survey blocks and especially in the coastal stratum EW1 when compared to the survey in 2015.

Most of the other species recorded also showed an increase in numbers when comparing the 2020 to the 2015 survey; this apply to fin, killer and sperm whales, and to the dolphins *Lagenorhynchus* spp. Fin whales and dolphins showed a similar distributional change with an increased essence in the north and expanding westwards in the Norwegian Sea. Sperm whales had expanded southwards and increased especially in stratum EW3. In 2015 humpback whales were concentrated in the north relatively close to the coast off northern Norway; in 2020 this concentration had disappeared, and the individuals spread sparsely over EW. It was also a notable increase of harbour porpoise observations in the coastal stratum EW1.

FUTURE SURVEY ACTIVITY

The survey in the Norwegian Sea in 2020 was the first one in the planned six-year cycle 2020-2025 of survey activity to provide a new minke whale abundance estimate in a timely manner (Øien 2020). In 2021, the plan is to survey the *Small Management Area* CM – the Jan Mayen area.

ACKNOWLEDGEMENTS

We are very grateful to the vessel *'Acc Mosby'*, the observers and the team leaders on the vessel for dedicated and pleasant cooperation in conducting the research. The hard work spent by K.A. Fagerheim and S. Hartvedt on validating and coding the survey data is much appreciated.

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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 2020surve of SMA EW.

		Survey block			
Species	***Platform***	**EW1**	**EW2**	**EW3**	**Total**
Minke whale	*Upper*	82	44	70	**196**
	Lower	64	22	66	**152**
Fin whale	*Upper*	48	28	7	**83**
	Lower	31	29	2	**62**
Humpback whale	*Upper*	7	1	2	**10**
	Lower	1	0	1	**2**
Harbour porpoise	*Upper*	43	0	0	**43**
	Lower	37	0	1	**38**
White-beaked dolphin	*Upper*	51	21	0	**72**
	Lower	41	14	0	**55**
White-sided dolphin	*Upper*	1	0	0	**1**
	Lower	2	0	0	**2**
Lagenorhynchus sp.	*Upper*	2	0	2	**4**
	Lower	2	0	0	**2**
Killer whale	*Upper*	6	14	10	**30**
	Lower	6	15	12	**33**
Sperm whale	*Upper*	23	33	16	**72**
	Lower	8	26	12	**46**
Large whales	*Upper*	1	5	4	**10**
	Lower	1	1	1	**3**
Total, groups	***Upper***	**264**	**146**	**111**	**521**
	Lower	**193**	**107**	**95**	**395**
Realised primary effort	***Nmi, T***	**1560**	**1005**	**1073**	**3638**

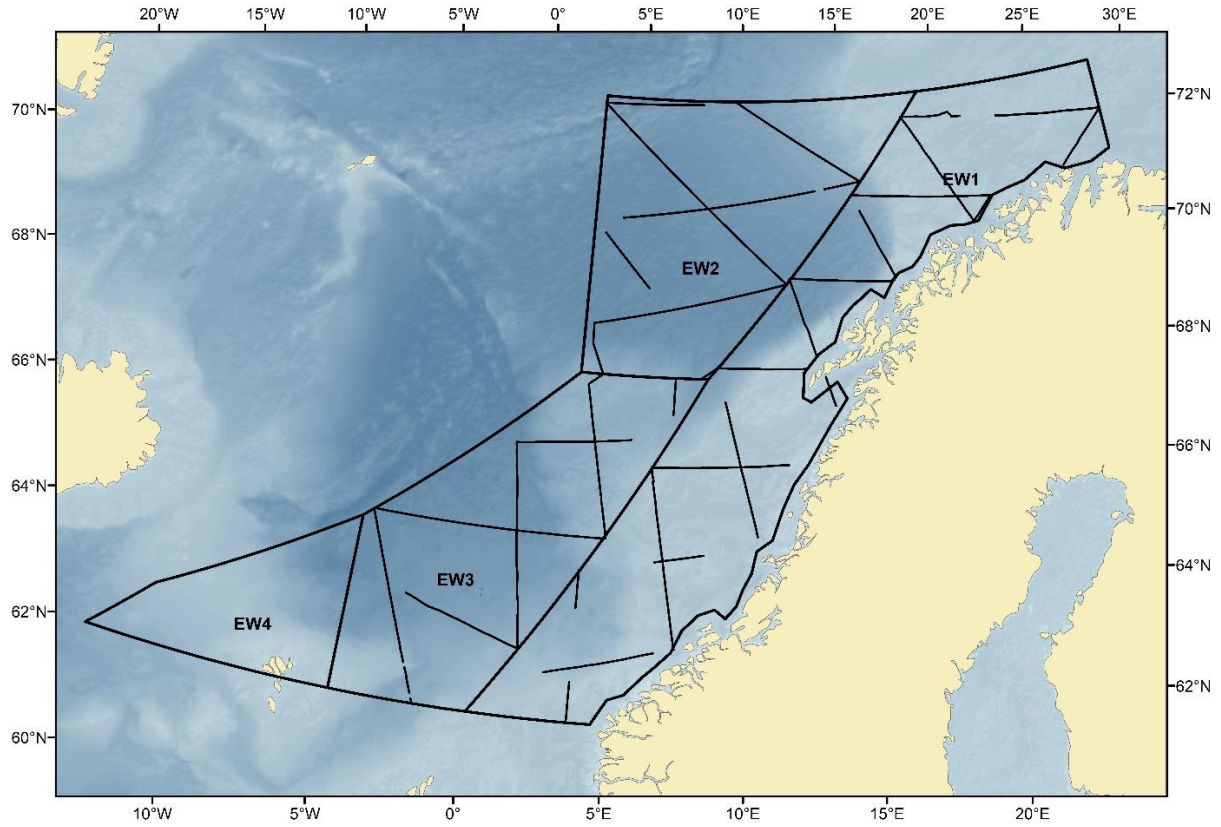

Figure 1. The EW *Small Management Area* with the block structure, EW1-EW4, adopted for the survey. Realised transects with primary search effort have been added as black lines.

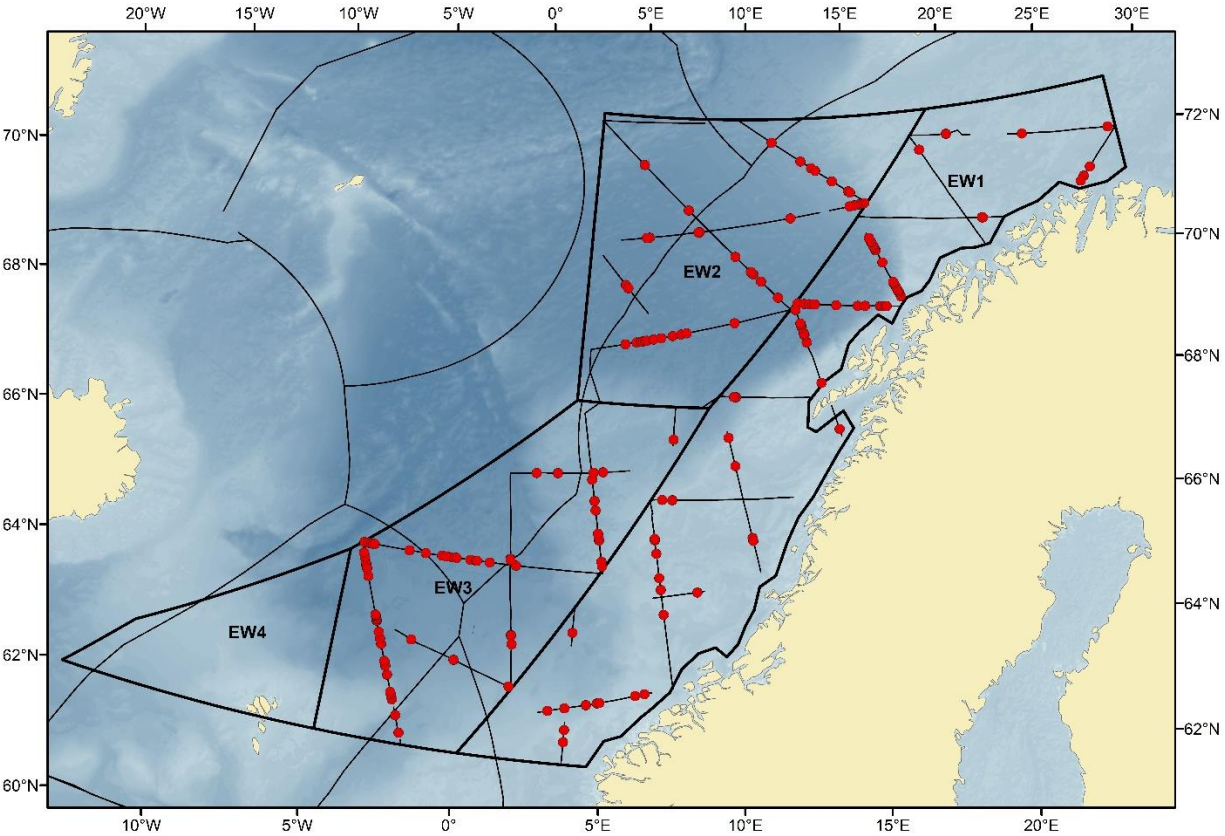

Figure 2. Primary sightings of minke whales (filled red circles).

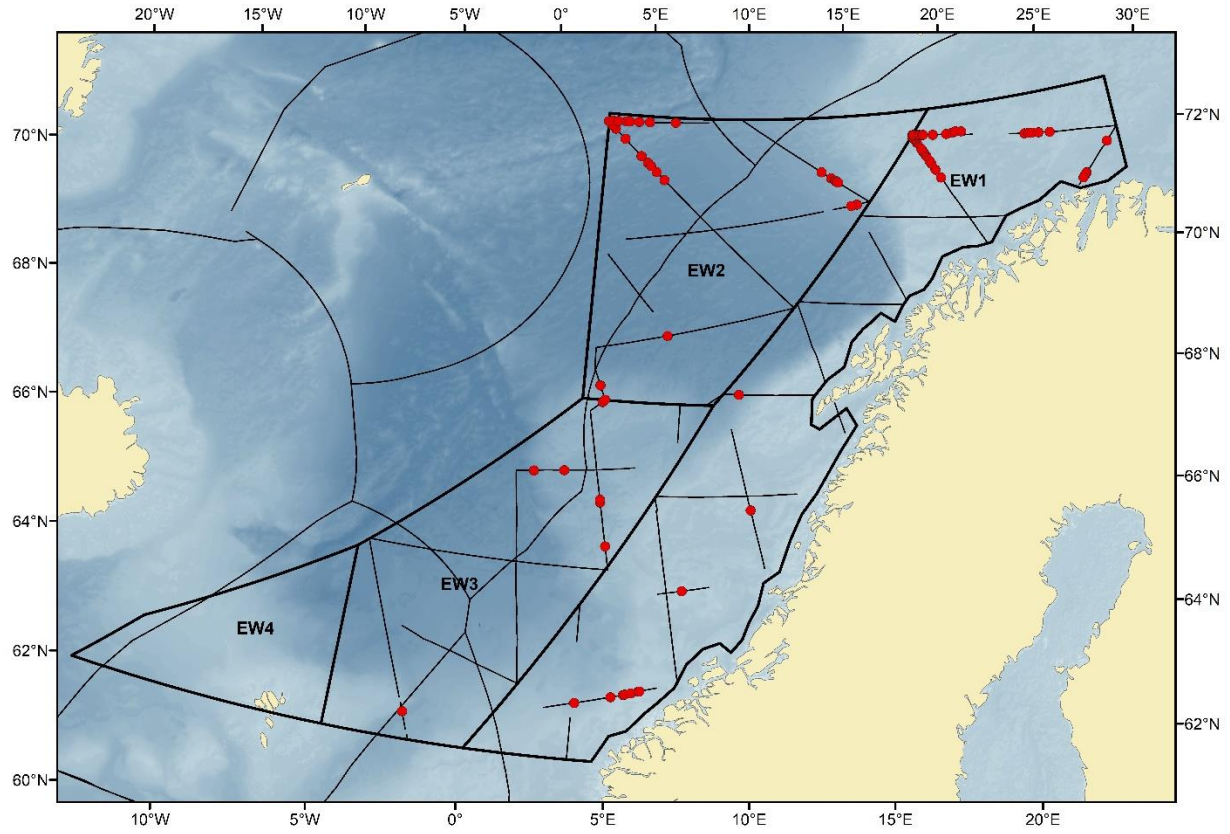

Figure 3. Primary sightings of fin whales (filled red circles).

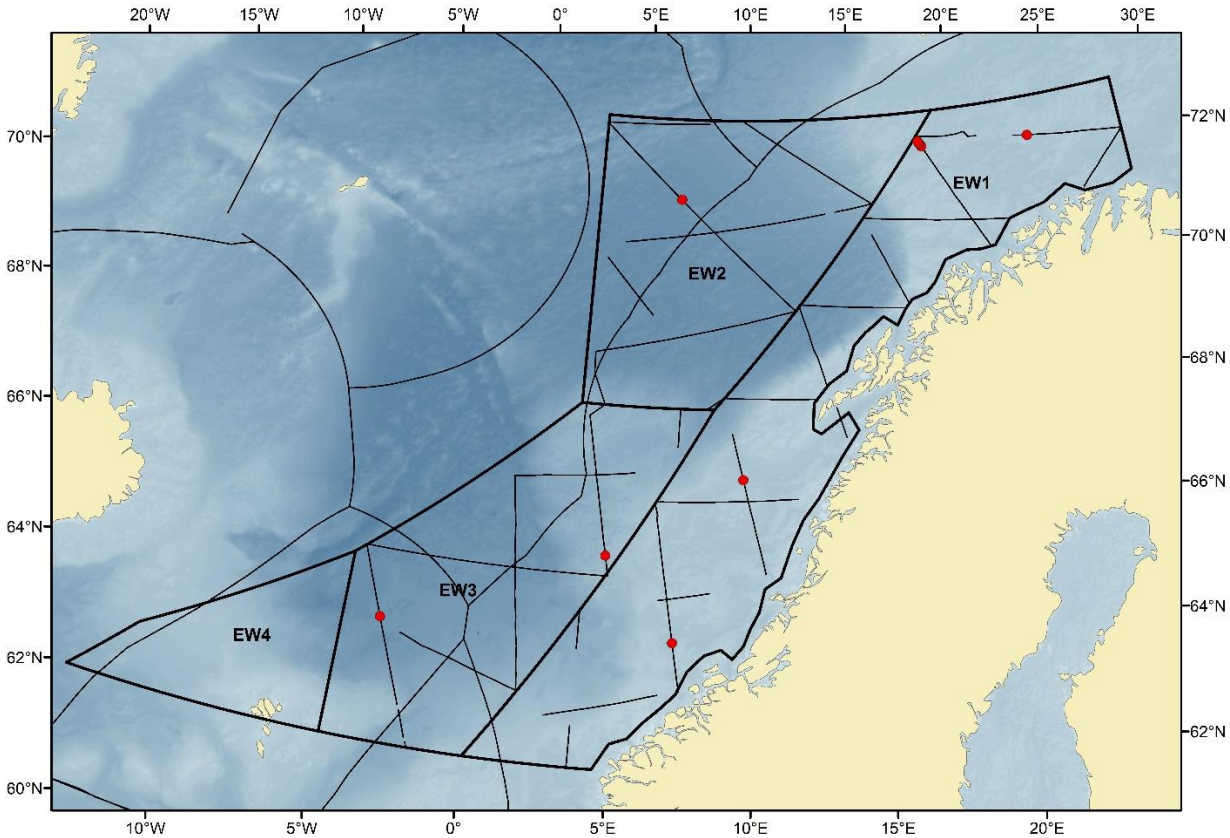

Figure 4. Primary sightings of humpback whales (filled red circles).

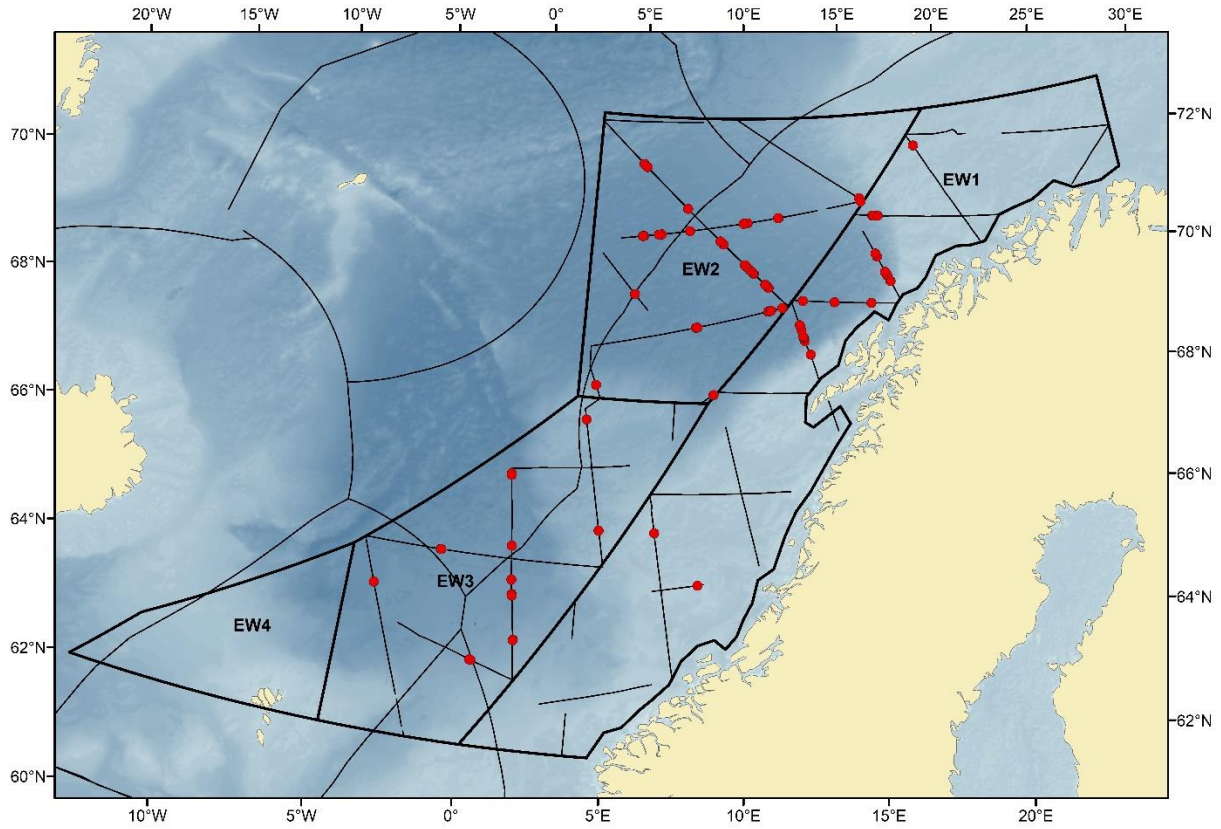

Figure 5. Primary sightings of sperm whales (filled red circles).

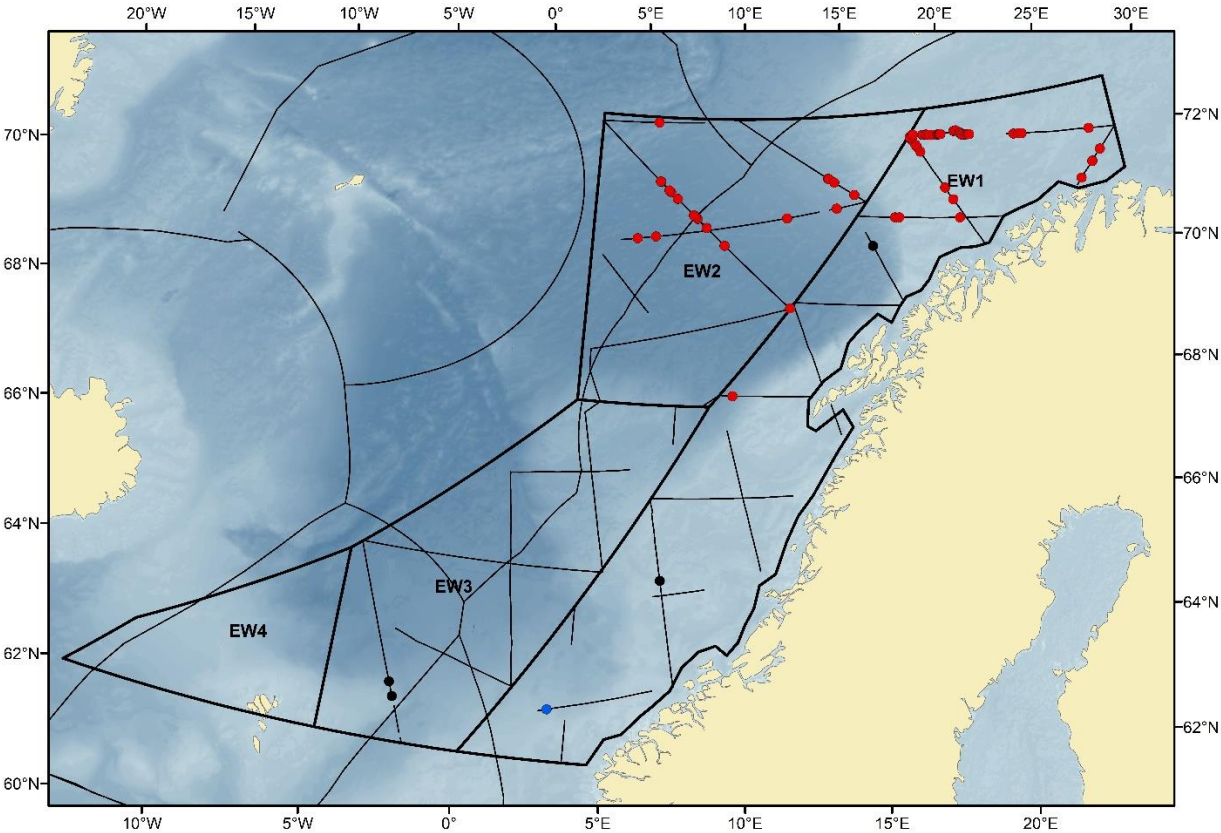

Figure 6. Primary sightings of white-beaked dolphins (filled red circles), white-sided dolphins (filled blue circles) and undetermined *Lagenorhynchus* spp. (filled black circles).

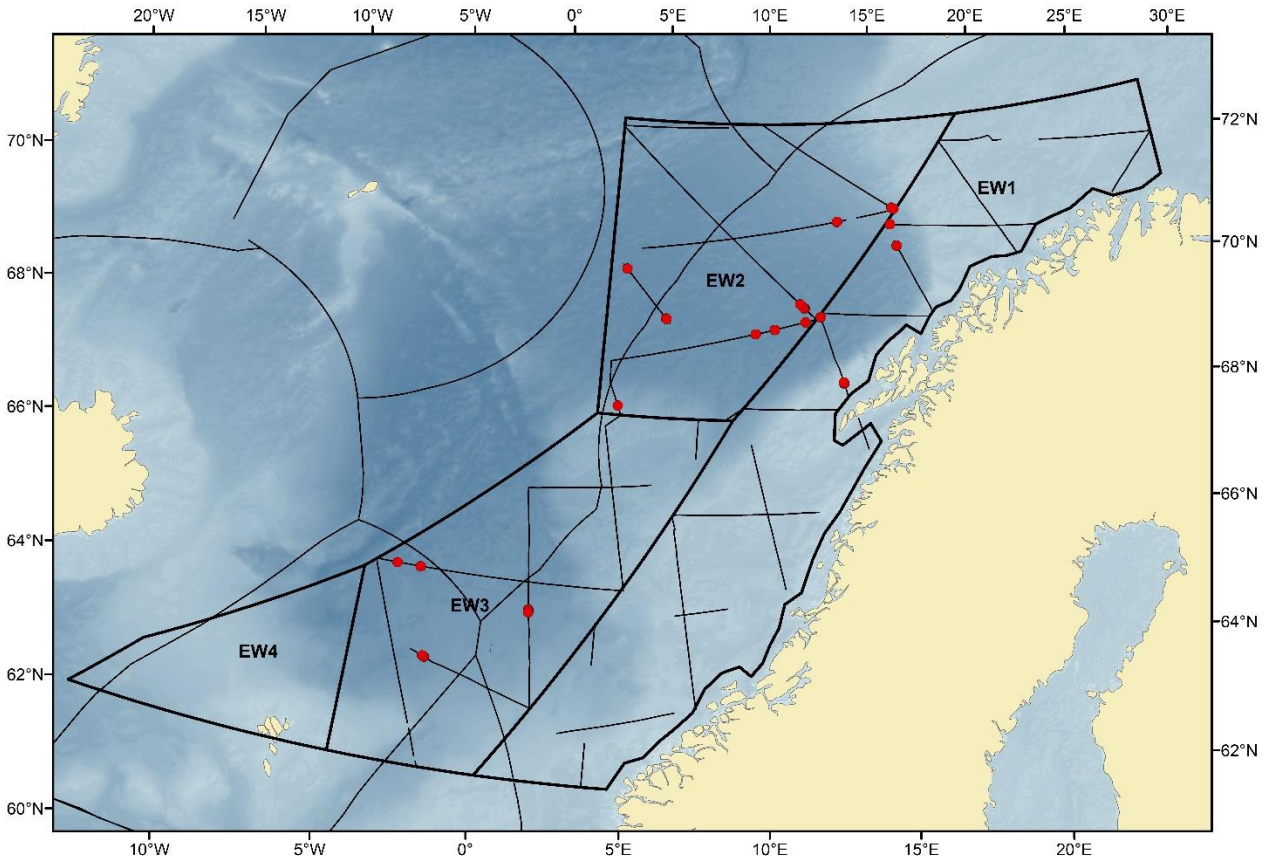

Figure 7. Primary sightings of killer whales (filled red circles).

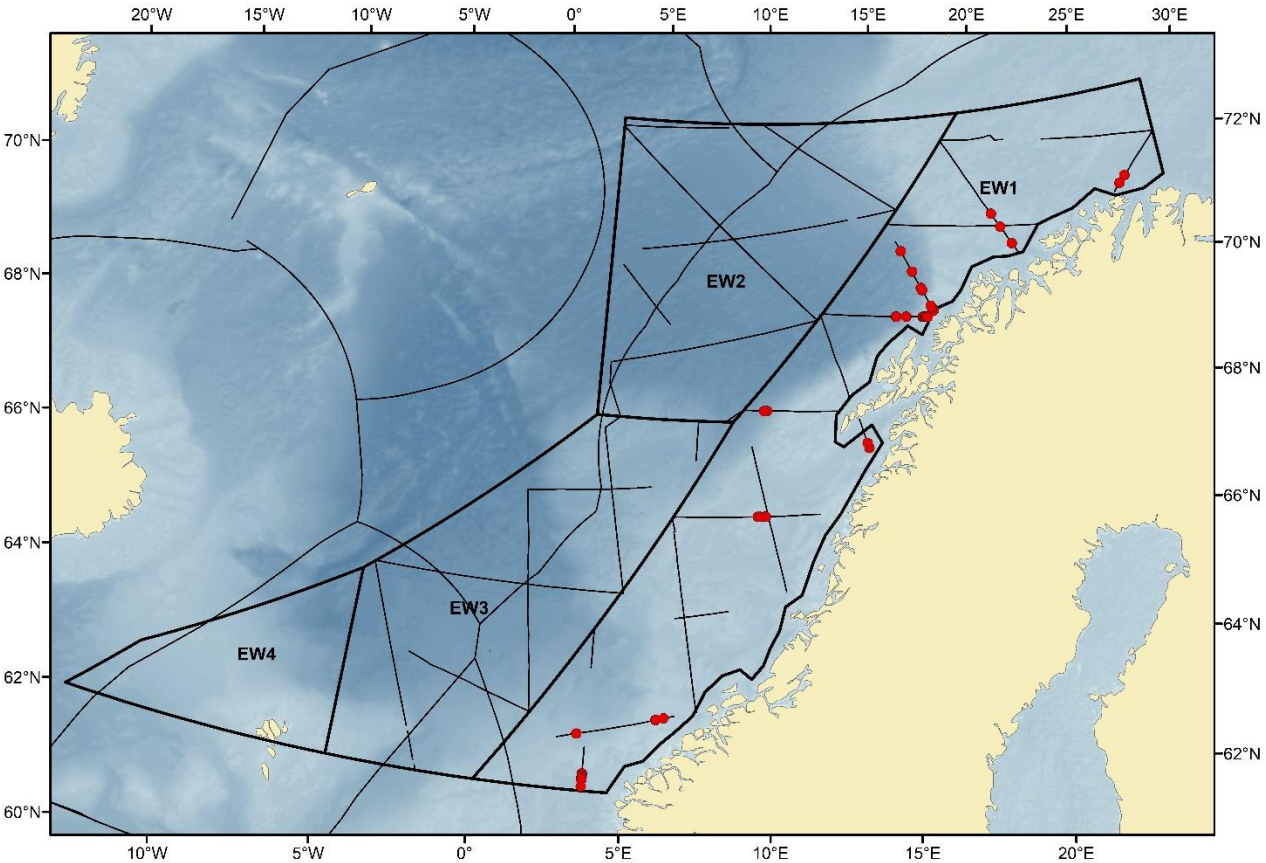

Figure 8. Primary sightings of harbour porpoises (filled red circles).

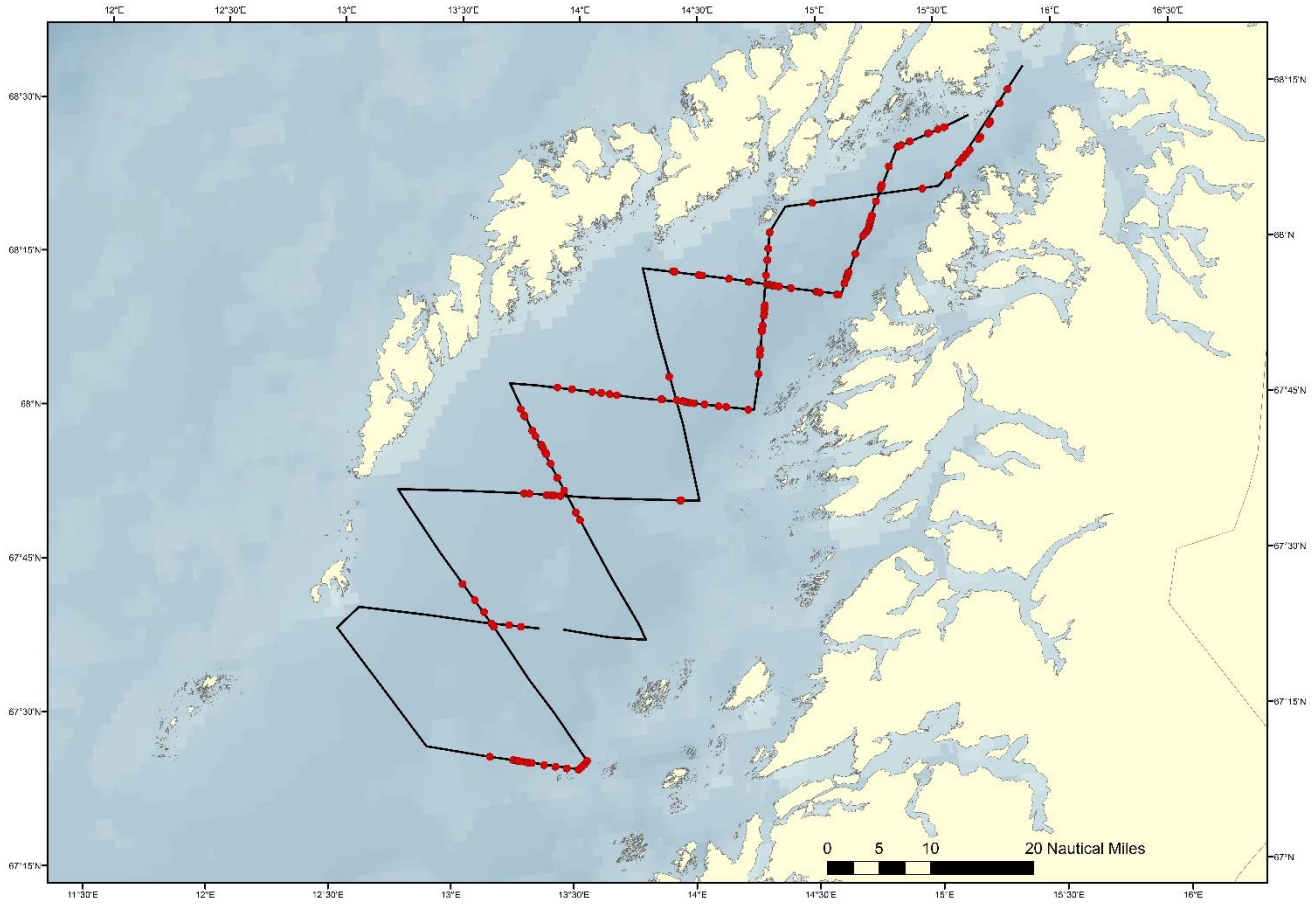

Figure 9. Primary sightings of harbour porpoises (filled red circles) in the Vestfjord.