Observations of bowhead whales (*Balaena mysticetus)* in the Svalbard area 1940 - 2008

Øystein Wiig[1], Lutz Bachmann[1], Nils Øien[2], Kit M. Kovacs[3], and Christian Lydersen[3]

[1]Natural History Museum, University of Oslo, P.O. Box 1172 Blindern, N-0318 Oslo, Norway
[2]Institute of Marine Research, P.O. Box 1870 Nordnes, 5817 Bergen, Norway
[3]Norwegian Polar Institute, Polar Environmental Centre, 9296 Tromsø, Norway

ABSTRACT
Forty-two reported sightings of bowhead whales have taken place in the Svalbard area between 1940 and 2008. But, only three of these sightings are reported prior to 1980. Most observations involve only 1 or 2 whales, but groups of up to 7 individuals have been seen recently. Increased ship traffic in the north undoubtedly provides more opportunities for spotting this species, and the establishment of a structured cetacean sighting programme, as well as increased in effort in documenting sightings from a wider marine user-community, likely all play a role in more records being documented in recent years. A lack of control/documentation routines for sightings hampers firm conclusions about the trends in abundance of bowhead whales in the Svalbard area. Nevertheless, an apparent increase of bowhead whales in the area between East Greenland and Franz Josef Land is suggested by the sighting data in recent years. Currently, it is not known whether these sightings are animals that are stragglers from other areas or survivors of the authentic Spitsbergen stock.

INTRODUCTION
The Spitsbergen stock of bowhead whales (*Balaena mysticetus*) is believed to number in the tens (Christensen *et al*. 1992) and is considered Critically Endangered by the IUCN Cetacean Specialist Group (Reilly 2008). Records of bowhead whales have been sporadic, but persistent, for some time in the Svalbard area (Reeves 1980) and in the eastern part of the Barents Sea, particularly in the Franz Josef Land area (Wiig 1991, Moore and Reeves 1993, de Korte and Belikov 1994). There is also an apparent increase in the number of occasional observations of bowheads in Northeast Greenland during the last decades (Gilg and Born 2005). In 2006 and 2008 dedicated surveys for bowhead whales were performed in the Fram Strait between Svalbard and Greenland; eight sightings were made in the spring of 2006 (Wiig et al. 2007, 2008). Gilg and Born (2005) presented observations of bowhead whales in Northeast Greenland and the Greenland Sea between 1940 and 2004. They concluded that few observations were made before the mid 1980s and the number of observations increased after that, possibly as a result of increased passive search effort. In the present paper we report on and evaluate the observations of bowhead whales in the Svalbard area in the period 1940 to 2008.

MATERIAL AND METHODS
Since 1964 the Institute of Marine Research, Bergen, (IMR) has collected information on observations of marine mammals during whale sightings surveys as well as during other scientific cruises by the institute. In addition IMR collects information on observations made by whaling vessels and other incidental observers (Christensen et al. 1992). The Norwegian Polar Institute (NPI) has also recorded sightings of marine mammals over a period of many years, which are concentrated around Svalbard. Recently the NPI observation system has been intensified by concentrated efforts to bundle observations from all research programmes, local residents, and encounters with cruise ships and other summer, marine visitors in the area (Svalbard Visitors' Marine Mammal Sighting Database, see Kovacs et al. 2004). All observations from these combined sources from the area from the 0-meredian to 40° E are compiled here.

The reliability of the observations was assessed and put into three categories, a similar approach as used by Gilg and Born (2005). Only observations made by trained biologists or whalers as well as sightings supported by photographic documentation were considered as "confirmed observations". Observations that did not satisfy these strict criteria, but were considered likely to be real bowhead sightings according to the description details provided were classified as "probable observations". If a reported observation was not sufficiently detailed or unclear, it was characterized as "a possible" sighting.

In general, bowhead whales were identified by their large size and proportionally large head, dark coloured back, lack of dorsal fin and v-shaped blow. In addition, we assume that there are no northern right whales (*Eubalaena glacialis*) in the area that could be confused with bowhead whales.

RESULTS AND DISCUSSION

Forty-two observations of bowhead whales have taken place in the Svalbard area between 1940 and 2008 (Table 1, Fig. 1). Most of the observations are regarded as reliable. One observation (Obs # 13) of about 20 whales by the crew of a whaling vessel in 1997 is regarded as only a possible observation. This sighting was supposedly photographed, but the documentary material has not as yet been provided for verification. Prior to 1980, only three observations were reported (# 1, 2 and 3). The second possible observation was a carcass found on land at Barentsøya, eastern Svalbard. There was a notable increase in observations after 1979. In the period 1980 to 1989 eight observations were recorded. Three of these were from the coast of northern Norway (Obs # 4, 5 and 7) and one was a drifting carcass (Obs # 6). In the 1990s there were only two observations, one of which was the possible sighting of 20 whales, which remains unverified (Obs # 13). From 2000 to 2008, 29 observations have been recorded. Eight of 10 observations made in the year 2000 were more or less in the same area off north-western Svalbard and the Fram Strait; these sightings were reported by four different whaling vessels. The number of whales observed in these records varied between one and five. It is reasonable to assume that these observations reflect repeated sighting of the same group of whales. The same situation is likely for seven observations made in the Fram Strait in April 2006; the same group(s) might have been repeatedly seen several times. In July 2006 a bowhead whale spent some hours resting in the harbour of Longyearbyen, the main settlement on Svalbard (Obs # 36). Two observations, each of a single bowhead, were recorded the following days in the same area (Obs # 37 and 38). It is assumed that this was the same individual.

Several observations have been made off north-western Svalbard and in the Fram Strait in spring (Fig 2). The correlation between longitude at which sightings take place in this region and Julian day is very high ($R^2 = 0.48$, $P < 0.001$). Even when observations that are likely to be repeated sightings of one or several individuals are only counted as just a single sighting, (2000 and 2006), the correlation between longitude and Julian day remains significant ($R^2 = 0.18$, $P < 0.05$). Wiig et al. (2007, 2008) have noted that the distribution of bowheads in this area is well documented for the 17th and 18th century (Reeves 1980, Sanger 1991, Hacquebord 1999). There was a “bay” of ice free water in the area between Svalbard and Greenland that was maintained by the inflow of warm Atlantic Water from the West Spitsbergen Current moving northward. The location of the northern extension of this bay varied considerably inter-annually, but in some years reached as far north as 80°N in late April. It was thought that the bowhead whales moved from the southwest into this ice bay in spring. A huge number of whales were caught in this area, which whalers referred to as Whaler’s Bay or the Northern Whaling Ground. The spring ice conditions during the bowhead survey in 2006 (Wiig et al. 2007, 2008) differed dramatically from those in historical whaling reports; there was open water as far north as 82°N in April. But, the whales were found basically where they were expected according the old records. In 2008, the ice conditions were heavier than in 2006, presumably due at least in part to constant northerly winds (Wiig et al. 2008). The northern ice edge was at about 80° N. In this second survey effort, we searched the same general area approximately 3-4 weeks earlier than in 2006, but did not observe any bowhead whales in the area. Searches further south along and through the broken ice edge also failed to locate bowhead whales in 2008. In Disko Bay, Western Greenland, bowhead whales apparently still maintain their historical timing-patterns for seasonal migrations (Heide-Jørgensen et al. 2006). We suggest that this is also true for bowhead whales in the Greenland Sea and the Fram Strait. The whales come from an unknown wintering area (likely to the south and west) and move northward in April probably in response to seasonal changes in ice cover and marine productivity (Heide-Jørgensen et al. 2006, Wiig et al 2006). Alternatively, the reduced ice cover and ice thickness in the Polar Ocean may now allow bowheads to come from the north in to the Fram Strait. We speculate that thereafter they move in towards to shores of East Greenland (see Gilg and Born 2005) as well as spreading eastward into the Barents Sea.

The increasing number of observations reported here is very similar to what has been reported for the Greenland Sea and East Greenland in the same period by Gilg and Born (2005). During the period from 1940 to 1979 they recorded only three observations, while for the period from 1980 to 2004 they document 20 observations. Gilg and Born (2005) noted that the expedition activity, and thereby the passive survey effort, had increased during recent decades, which might well be the reason for increased numbers of sightings in recent years. However, they did not exclude the possibility that the high number of observations in recent years might reflect a real increase in the numbers of bowhead whales in the area. We currently do not have data on the total number of expeditions per year in the Svalbard area, though cruise tourism is well documented. Marine traffic in general has certainly increased after 1980, though the extensive summer fishery for minke whales (*Balaenoptera acutorostrata*) in the areas west of Spitsbergen that took place after WWII has been markedly reduced. Most of the observations that have taken place recently relate to the period April to August. This reflects the period of the year when ship activity is largest in the Svalbard area and when light conditions permit close to 24 hrs of observation. Nine of the 20 recent observations have been reported from cruise ships, which have definitively increased in number in recent years. Based on our data, in particular the lack of control/documentation of actual sighting “effort”, it is not possible to make conclusions regarding population trends of bowheads around Svalbard. Gilg and Born (2005) suggest that in addition to more sightings, which may or may not represent a population increase, there has been an increase in pod sizes of the observations off Greenland. The Svalbard data are yet not conclusive on this issue. Only 1 and 2 animals were sighted at a time before 1982, while pods larger

than this have certainly been sighted recently (e.g. a group of 7+ confirmed). But currently the data is too sparse to make a reasonable conclusion on group size trends for the Svalbard area.

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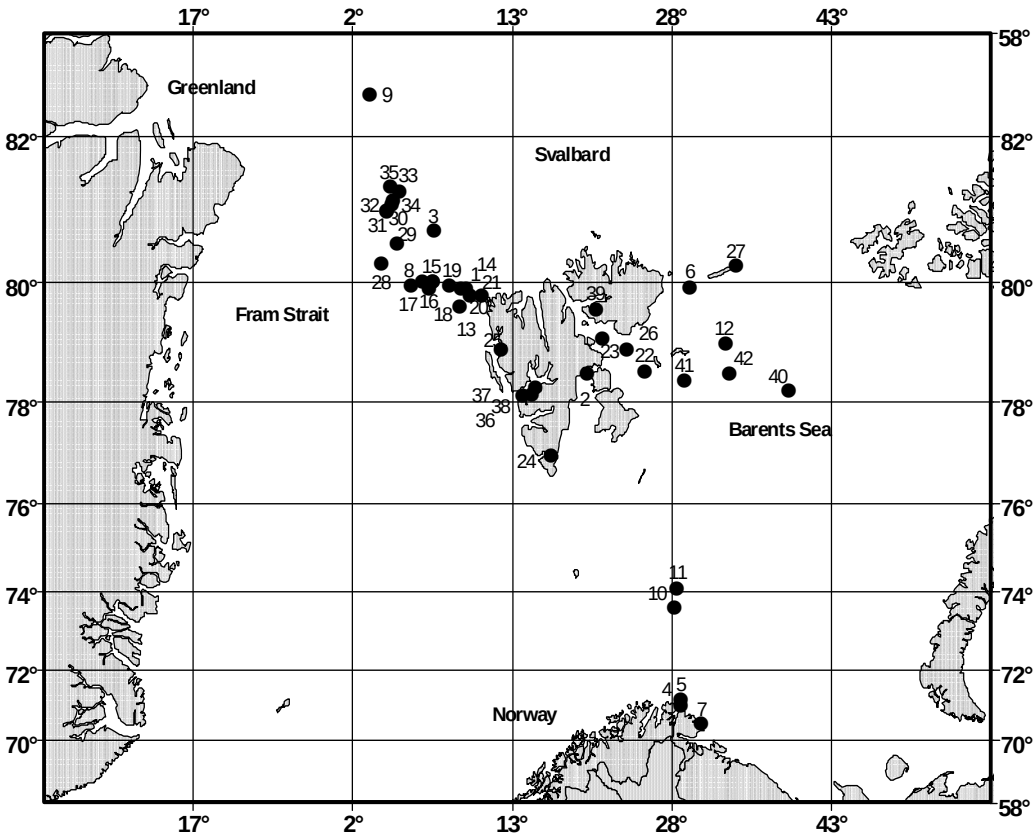

Figure 1. Locations of observations of bowhead whales in the Svalbard area 1940 – 2008. Numbers refer to Table 1.

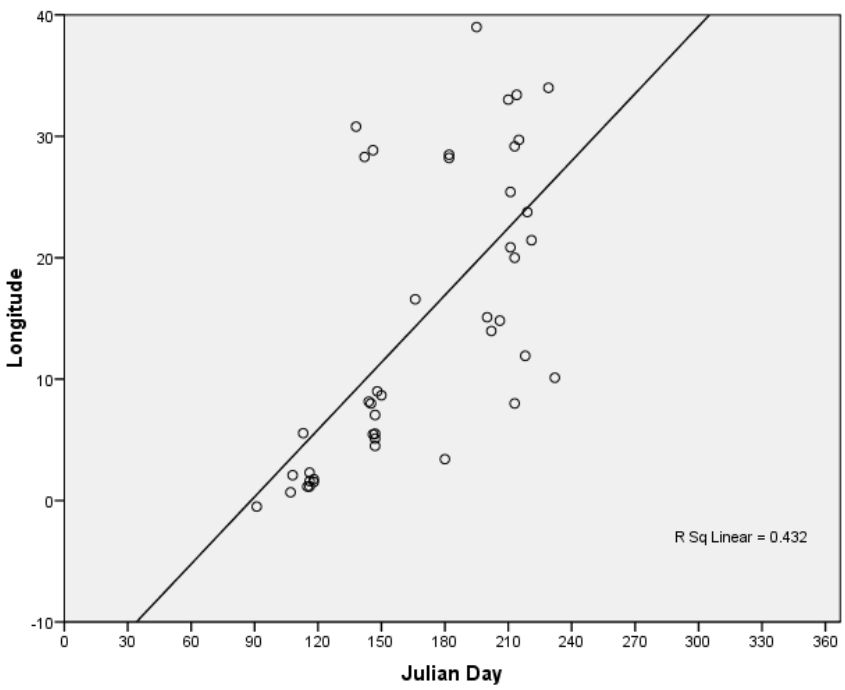

Figure 2. Relation between Julian day and longitude of locations of observations of bowhead whales in the Svalbard area 1940 – 2008.

Table 1. Observations of bowhead whales in the Svalbard area 1940 – 2008.

Obs.	Latitude N	Longitude E	Place name	Date	Number	Quality	Remarks	Source
1	79.80	10.12	NW Svalbard	20-Aug-1958	1	1	Research vessel Asterias	Jonsgård (1981), Christiansen (1962)
2	78.50	20.00	E Svalbard	1-Aug-1974	1	1	Carcass on land	Larsen (1976)
3	80.75	5.55	Fram Strait	23-Apr-1979	2	1	Denmark - Progress report	Anon (1981), Jonsgård (1981)
4	71.00	28.85	N Norway	21-May-1980	1	1	Whaling vessel	IMR
5	71.15	28.85	N Norway	25-May-1980	1	1	Observed by whaling vessel	Haug (1980)
6	79.93	29.71	NE Svalbard	2-Aug-1980	1	1	Dead in drifting ice	Christiansen (1981)
7	70.45	30.80	N Norway	18-May-1981	1	1		Anonymous (1983)
8	79.95	3.41	Fram Strait	29-Jun-1982	2	1	Research vessel Benjamin Bowring	McQuid (1986)
9	82.50	-0.50	Fram Strait	1-Apr-1989	4	1	Aqoustic registration	Clark et al. 1991
10	73.59	28.22	Barents Sea	1-Jul-1989	1	1	Whale survey IMR	IMR
11	74.07	28.49	Barents Sea	1-Jul-1989	1	1	Whale survey IMR	IMR
12	79.02	33.02	Barents Sea	29-Jul-1996	1	1	Whale survey IMR	Isaksen et al. (1998), Bogosloskaya and Haug (1998)
13	79.62	8.00	Fram Strait	25-May-1997	20	3	Whaling vessel	IMR
14	79.90	8.15	NW Svalbard/Fram Strait	23-May-2000	1	1	Whaling vessel	IMR
15	80.01	5.45	NW Svalbard/Fram Strait	25-May-2000	1	1	Whaling vessel	IMR
16	80.00	4.50	NW Svalbard/Fram Strait	26-May-2000	5	1	Whaling vessel	IMR
17	79.91	5.10	NW Svalbard/Fram Strait	26-May-2000	4	1	Whaling vessel	IMR
18	80.00	5.50	NW Svalbard/Fram Strait	26-May-2000	1	1	Whaling vessel	IMR
19	79.95	7.05	NW Svalbard/Fram Strait	26-May-2000	1	1	Whaling vessel	IMR
20	79.80	9.00	NW Svalbard/Fram Strait	27-May-2000	4	1	Whaling vessel	IMR
21	79.91	8.67	NW Svalbard/Fram Strait	29-May-2000	1	1	Whaling vessel	IMR
22	78.55	25.42	E Svalbard	29-Jul-2000	1	1	Cruise ship Prof Multanovskiy	NPI
23	79.12	21.44	E Svalbard	8-Aug-2000	1	1	Cruise ship Prof Multanovskiy	NPI
24	77.00	16.58	SW Svalbard	14-Jun-2004	1	2	Cruice ship MS Stockholm	NPI
25	78.93	11.92	Ny Ålesund, Svalbard	6-Aug-2005	1	1	Observed from land	NERC Ny Ålesund
26	78.93	23.76	Barents Sea	7-Aug-2005	1	2	Reported to the Governor of Svalbard	NPI
27	80.25	34.00	Barents Sea	17-Aug-2005	5	1	Cruise ship Prof Molchanov	Arjen Drost
28	80.27	0.68	Fram Strait	17-Apr-2006	1	1	Bowhead survey	Wiig et al. 2008
29	80.58	2.09	Fram Strait	18-Apr-2006	7+	1	Bowhead survey	Wiig et al. 2008
30	81.03	1.15	Fram Strait	25-Apr-2006	1	1	Bowhead survey	Wiig et al. 2008
31	81.04	1.16	Fram Strait	26-Apr-2006	1	1	Bowhead survey	Wiig et al. 2008
32	81.12	1.60	Fram Strait	26-Apr-2006	1	1	Bowhead survey	Wiig et al. 2008
33	81.31	2.30	Fram Strait	26-Apr-2006	3	1	Bowhead survey	Wiig et al. 2008
34	81.18	1.76	Fram Strait	28-Apr-2006	1	1	Bowhead survey	Wiig et al. 2008
35	81.35	1.53	Fram Strait	28-Apr-2006	3	1	Bowhead survey	Wiig et al. 2008
36	78.25	15.10	Longyearbyen, Svalbard	19-Jul-2006	1	1	In the harbour Longyearbyen	Ian Gjertz, personal communication
37	78.10	13.97	Isfjorden, Svalbard	21-Jul-2006	1	1	Cruise ship MV Polar Star	NPI
38	78.13	14.82	Isfjorden, Svalbard	25-Jul-2006	1	2	Cruise ship MS Langøysund	NPI
39	79.58	20.85	N Svalbard	30-Jul-2006	1	1	Cruise ship Prof Multanovskiy	NPI
40	78.20	39.00	Barents Sea	14-Jul-2007	1	1	Whale survey IMR	IMR
41	78.39	29.18	E Svalbard	31-Jul-2008	1	1	Cruise ship Prof Multanovskiy	NPI