

North Atlantic Marine Mammal Commission

Report of the Scientific Committee Working Group on Northern Bottlenose and Killer Whales¹

Reykjavik, 25 November 1993

¹ This report of the NAMMCO Scientific Committee Working Group on Northern Bottlenose and Killer Whales should not be quoted without consultation with the Secretary.

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1. Terms of reference

The Chairman, Tore Haug, welcomed participants (listed in Appendix 1) and gave a brief account of the rationale for the Working Group and its terms of reference for this meeting. Following a request from the Council of NAMMCO, the Scientific Committee of NAMMCO decided to establish a Working Group on Northern Bottlenose (*Hyperoodon ampullatus*) and Killer Whales (*Orcinus orca*) at its January 1993 meeting in Tromsø. The request from the Council resulted in the following terms of reference for the present meeting, where the WG is requested to:

for the northern bottlenose whale -

- undertake an assessment of the status of the northern bottlenose whale (*Hyperoodon ampullatus*) stock in the North Atlantic;

and for the killer whale (*Orcinus orca*) -

- advise on stock identity for management purposes;
- assess abundance in each stock area;
- assess effects of recent environmental changes, changes in food supply and interactions with other marine living resources in each stock area.

2. Adoption of agenda

The Agenda as contained in Appendix 2 was adopted.

3. Appointment of rapporteur

Geneviève Desportes was appointed rapporteur.

4. Review of available documents and reports

The documents listed in Appendix 3 were presented briefly by their authors.

The Chairman also noted that a paper (Faucher and Whitehead) on the live study of northern bottlenose whales in Canadian waters was available for information.

5. Northern bottlenose whales

5.1 *Stock identity*

In 1976 the Scientific Committee of the IWC decided that "in the absence of clear evidence to the contrary, the bottlenose whale throughout the North Atlantic should be regarded as one stock" (Anon 1977).

It was noted that apparent feeding aggregations existed in the Davis Strait, the Denmark Strait and the Norwegian Sea although these did not necessarily provide evidence of separate stocks.

Regional differences in age at sexual maturity provided by paper SC-WG/NBK1/5 could indicate a low mixing rate of animals between the different feeding areas.

Some insight on stock identity might come from morphometric analysis of existing Norwegian material. Genetic analysis might also help provide some understanding of stock identity, and it was noted that a few tissue samples are being kept in the Faroes and Iceland.

The group was unable at this stage to reach a conclusion on stock identity, i.e., to decide on the existence of one or more stocks of bottlenose whales in the North Atlantic.

5.2 *Catch history*

There has been no local hunting of bottlenose whales in Greenland in this century. A total of five animals were taken by whaling vessels in 1950 and 1958 (SC-WG/NBK1/2). This might reflect low abundance but also the low esteem in which bottlenose products are held in Greenland.

There has been no commercial hunting of bottlenose whales by Icelanders while the catch history off Iceland by Norwegians is documented in paper SC-WG/NBK1/5.

Catch history data exist for Norway and the Faroes, although they are not of the same kind in both areas.

In the Faroes, both a limited-scale drive fishery and a limited-scale commercial offshore whaling have been conducted. Reports exist of offshore catches between 1894 and 1935 (SC-WG/NBK1/1). Catches were maximum 11 animals per year, totalling 92 animals, and occurred mostly between May and July. These are shown in Appendix 4, Table 1 (revised from SC-WG/NBK1/1). Reports of drive fishery catches and strandings exist mainly from 1709 to the present. The annual catch increased from 1820 and peaked in 1890, whereafter it declined and reached its lowest concurrently with the decline of the Norwegian catches. These catches are presented in Appendix 4, Figure 1 (from SC-WG/NBK1/1). Drive fishery catches peaked at the end of August and during the first half of September. A total of 646 bottlenose whales have been caught in the Faroes from 1584 up to and including 1993.

Scottish sealers and bowhead whalers took a total of approximately 1961 bottlenose whales from 1856 to 1974 including catches in both the Davis Strait and the Greenland Sea (Table 2, from SC-WG/NBK1/5). Of these, 1,787 were taken in the period 1877-1892.

Northern bottlenose whales have been hunted by Norwegian whalers in the North Atlantic during two separate periods (SC-WG/NBK1/5). During the first period, which lasted from 1882 to the late 1920s, a total of about 60,000 bottlenose whales were caught. The second period started with modern Norwegian whaling for small whales (mainly directed at minke whales) and commenced around 1930. Some bottlenose whales were included in the catches, and when the second period stopped in 1973, approximately 5,800 bottlenose whales had been caught in total. Figures 2-4 in Appendix 4 (from SC-WG/NBK1/5) show: the allocation of catch areas (fig. 2); the magnitude of catches (fig. 3); and the distribution of catches by area and time period (fig. 4).

5.3 *Estimation of abundance*

According to SC-WG/NBK1/5, modelling of catch series indicate that from an initial size of approximately 100,000 animals, a stock of approximately 60,000 animals remained in 1976. Due to time constraints the Working Group was unable to evaluate these results.

The Norwegian vessels made very few sightings of bottlenose whales during the NASS 1987 (Øien 1989), 1988 (Øien 1990) and 1989 (Øien 1991) surveys. This might reflect the fact that at the time of the survey, i.e. in July-August, the bottlenose whales have already left the area surveyed by Norwegian vessels. The Working Group noted that a southward migration out of the Norwegian Sea in mid summer could be inferred from historical catch data given in SC-WG/NBK1/1 and 5.

A direct estimate of abundance comes from analysis of the Icelandic and Faroese data from the 1987 NASS survey (Gunnlaugsson & Sigurjónsson 1990). Most of the sightings recorded on board Icelandic vessels (59 of 86, i.e. 69% representing 141 animals of 221 in total) were sighted between 4-20 July in the eastern part of the area, from Jan Mayen Ridge in the north, southward along the continental shelf edge east of Iceland towards the Iceland-Faroe Islands ridge to the Faroes in the South (i.e. in the area bounded by 70 N-58 N and 7-20 W) (Sigurjónsson, unpubl.). A surface estimate (no correction for submerged animals) of abundance gave 4,900 (CV=0.16) whales for the Icelandic survey vessels. An estimate for the Faroese survey vessel was 900 (CV=0.45) animals (Gunnlaugsson & Sigurjónsson 1990).

It was pointed out that the sightings estimate is undoubtedly seriously biased downwards due to the long dive time of the species. A correction for this might result in estimates 5-10 times higher on the assumption that the mean dive time is some 30 minutes (based on measurements from ten individuals given by Benjaminsen & Christensen 1979).

The Working Group agreed that an order of magnitude of some tens of thousands was a reasonable estimate for the North Atlantic population of bottlenose whales.

5.4 *Biological parameters*

Some limited data on biological parameters are available for Northern bottlenose whales. Paper SC-WG/NBK1/5 reviewed data on reproduction and age at sexual maturity of bottlenose whales caught in waters off both Iceland and Labrador. The gestation period lasts for about one year, pairing and calving take place at the end of the year, and there is a two-year breeding cycle. The length at birth is about 300cm. Both females and males become sexually mature between the ages of 7 and 9 years off Iceland, and between the ages of 8 and 12 years off Labrador. It was noted that the takes from Labrador are from a stock not previously exploited, while the takes from Iceland are from a stock that was heavily hunted in previous years.

A limited amount of data on reproductive parameters and growth will also become available from the Faroes.

5.5 *Assessment*

The Working Group was not able to conduct an assessment at this meeting. However, it was agreed that the possibilities of modelling population trajectories using catch series and estimates of abundance could be explored.

5.6 *Management advice*

No management advice based on a full assessment could be given. However, it was noted that a reasonable crude estimate of the population in the Northeast Atlantic was in the tens of thousands and that the total known removals from the population during the past 15 years represent less than 0.1% of the population.

6. **Killer whales**

6.1 *Stock identity*

The Working Group acknowledged that there was no conclusive evidence on stock identity of killer whales in the North Atlantic. There are some indications that killer whales exhibit aggregating behaviour which may provide useful independent units for management purposes. Some groups show long-term site fidelity and, although they are not present all year round in an area, come back year after year. Thus far no matches have been found between Icelandic and Norwegian photo-ID catalogues (SC-WG/NBK1/6 and 8). Most of the vocalizations are different between groups off Norway and groups off Iceland. However one group of Norwegian killer whales (out of 10 studied) has been shown to share a call with a group of Icelandic killer whales (SC-WG/NBK1/6).

6.2 *Stock abundance*

Since no conclusive data on stock identity could be put forward, it was considered preferable to discuss abundance in different areas. The Working Group had two types of recent abundance data available at the meeting, i.e. estimates based on sightings surveys and estimates based on questionnaire censuses conducted mainly on board fishing vessels in the coastal waters.

Sightings surveys conducted in the northern North Sea and the eastern Norwegian Sea northwards to Bear Island during July 1989 (SC-WG/NBK1/4) gave an estimate of 7,000 whales (95% c.i. 3,400-14,400). Surveys conducted during June-August 1987 by Icelandic survey vessels (Icelandic and adjacent waters) (SC-WG/NBK1/8) gave an estimate of 5,500 (CV=0.36) whales, while the survey conducted by and around the Faroe Islands provides an estimate of 1,100 (CV=0.62) whales. The two latter surveys combined gave an estimate of 6,600 whales (CV=0.32) with a lower 95% bound of 3,900 animals.

A questionnaire census conducted in the period 1982-1987 indicated a maximum of 1,500 killer whales in the near-coastal waters of Norway (Christensen 1988). This is compatible with the sightings survey results above since it pertains only to the coastal waters. A minimum of 284 killer whales were estimated from the questionnaire census at the herring grounds off Iceland

which seems rather low in light of the fact that a similar number of animals have already been photo-identified in the area (SC-WG/NBK1/8).

No abundance estimates are available for West Greenland. However, very few observations of killer whales have been recorded, despite considerable survey effort since 1984, suggesting that killer whales are not abundant in this area.

6.3 Ecosystem and habitat considerations

Killer whales in the North Atlantic are known to feed on squid, fish, birds and marine mammals.

Working paper SC-WG/NBK1/6 summarises the situation in Norwegian coastal waters: Herring (*Clupea harengus*) has been listed as the main type of prey of killer whales, at least in the coastal waters from Lofoten to Møre. Other known types of prey are squid, cod (*Gadus morhua*), little auk (*Alle alle*), eider duck (*Somateria mollissima*), northern fulmar (*Fulmarus glacialis*), and mackerel (*Scomber scombrus*) in the Lofoten area, bottlenose whales in Spitsbergen and seals at the Møre coast. Stomach samples and non-lethal studies show that killer whales feed on herring in the Lofoten and Vesterålen area in October-January. The type of prey consumed by killer whales in this area in June-August 1989-1993 has been identified during 15 encounters. In 13 of these encounters the prey was herring, once mackerel and once northern fulmar. Killer whales have been seen trying to catch a young harbour seal (*Phoca vitulina*) in Røst in Lofoten (without succeeding). The next day these whales were seen feeding on herring. The results indicate that herring is an important part of the prey also during summer months in northern Norway. This observation is supported by the fact that the summer distribution area of killer whales coincides well with the area where herring might be present, and that fishing boats often report the presence of herring in areas where killer whales are sighted.

Animals caught in Icelandic waters in 1967 contained remains of squid, fish (including herring) and seals (Jonsgård & Lyshoel 1970). According to SC-WG/NBK1/8, it is evident that at least part of the killer whale population around Iceland feeds on herring, but also halibut (*Hippoglossus hippoglossus*) (taken from longlines while these were hauled), and possibly also bottlenose dolphins (*Tursiops truncatus*) and long-finned pilot whales (*Globicephala melas*), as some reports indicate.

In Denmark a stranded whale was reported by Eschricht (1863) to include remains of 14 seals and 13 harbour porpoises (*Phocoena phocoena*). Seals (including grey seals (*Halichoerus grypus*)) and whales (including harbour porpoises, pilot whales and fin whales (*Balaenoptera physalus*)) are also reported (Bloch and Lockyer 1988) to have been consumed by killer whales in Faroese waters, where also seabirds (eiders, kittiwakes (*Rissa tridactyla*), guillemots (*Cephus grylle*) and puffins (*Fratercula arctica*)) are taken. Bloch & Lockyer (loc.cit.) emphasise, however, that fish is probably the main food item for killer whales, and they list mackerel, herring, halibut and Greenland halibut (*Reinhardtius hippoglossoides*) (the two latter usually taken from gill-nets or longlines while these are hauled) as particularly important species.

In Greenland waters Eschricht (1863) listed porpoises, white whales (*Delphinapterus leucas*), bowhead whales (*Balaena mysticetus*), humpback whales (*Megaptera novaeangliae*), walrus (*Odobenus rosmarus*) and seals as known killer whale food items. Killer whales use almost all other species of whales and several species of seals as food items in Greenland, and sometimes fish and squid are also found (Heide-Jørgensen 1988). A killer whale diet comprising exclusively marine mammals is confirmed in working paper SC-WG/NBK1/3, in which narwhals are indicated to be of particular importance.

Before the collapse of the Norwegian spring-spawning herring stock at the end of the 1960s, the herring migrated between feeding areas in the Norwegian Sea (between Iceland and Jan Mayen) and spawning grounds on the coast of Norway. Young and adolescent herring dispersed along the coast, mainly of northern Norway and in the Barents Sea. It has been suggested that killer whale migrations depended largely on the herring migrations (Jonsgård & Lyshoel 1970). After the herring stocks collapsed, the herring no longer migrated into the Norwegian Sea, remaining instead in the fjords and coastal waters of Norway until maturity and spawning. This change in herring migration patterns may explain an observed reduction in killer whale abundance in the Norwegian Sea and a corresponding increase in abundance of the species in Norwegian coastal and inshore waters since the early 1970s (Christensen 1988).

Apart from the possible effect of changes in the herring stocks, the Working Group was not able, with its present knowledge, to identify other environmental changes that could be said to have had any possible effect on killer whales.

6.4 *Management advice*

There was no conclusive evidence on stock identity, although local aggregations with long-term site fidelity may provide provisional management units.

The remaining requests for advice on 'abundance in each stock area' and 'effect of recent environmental changes in the food supply, and interactions with other marine living resources in each stock area' are referred to paragraphs 6.2 and 6.3 respectively.

7. **Other business: recommendations for future research**

7.1 *Northern bottlenose whales*

The Working Group recommended the following as priorities for future research:

- a) compilation of catch data, with a yearly breakdown by sex and areas, including Scottish material;
- b) examination of catch history including effort data in Norway, Faroes and Scotland;
- c) analysis of Norwegian morphometric data and collection of similar data for the Faroes (and other areas, if possible);
- d) collection of tissue samples for analysis of genetic material in relation to stock identity and for pollutant studies;
- e) collection and analysis of dive times and behaviour to be incorporated in sightings survey analysis; and
- f) stomach analysis should be conducted whenever possible.

7.2 *Killer whales*

The Working Group recommended the following as priorities for future research:

- a) the continuation and expansion of photo-identification studies;
- b) the continued documentation of vocal dialects;
- c) the comparison of Norwegian and Icelandic photo-ID databases;
- d) tissue sampling for genetic analysis with regard to stock identity;
- e) satellite tracking to detect the range of movement of individuals and groups of whales;
- f) the establishment of a central photo-ID catalogue;

- g) the full registration and reporting of Greenland catches and their comprehensive sampling;
- h) further studies of feeding ecology; and
- i) studies of pollutant effects on killer whale stocks.

8. Adoption of report

The Working Group adopted the final report by correspondence in December 1993.

9. References

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- Christensen, I. 1988. Distribution, movements and abundance of killer whales (*Orcinus orca*) in Norwegian coastal waters, 1982-1987, based on questionnaire surveys. *Rit Fiskideildar* 11: 79-88.
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- Øien, N. 1991. Abundance of the northeastern Atlantic stock of minke whales based on shipboard surveys conducted in July 1989. *Rep. int. Whal. Commn* 41: 433-437.

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Agenda

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List of documents

1. Documents presented at the meeting

SC-WG/NBK1/1 - Bloch, D. and Desportes, G., The Northern Bottlenose Whale in the Faroe Islands, 1584-1984.

SC-WG/NBK1/2 - Jensen, J. and Heide-Jørgensen, M.P., Bottlenose Whales, *Hyperoodon ampullatus*, in Greenland.

SC-WG/NBK1/3 - Heide-Jørgensen, M.P., A Note on Killer Whales in Greenland.

SC-WG/NBK1/4 - Öien, N., Abundance of Killer Whales (*Orcinus orca*) in Waters off Norway.

SC-WG/NBK1/5 - Christensen, I., The North Atlantic Bottlenose Whale (*Hyperoodon ampullatus*).

SC-WG/NBK1/6 - Similä, T., Present Knowledge and Research on Killer Whales in Norway.

SC-WG/NBK1/7- Vikingsson, G. and Sigurjónsson, J., Northern Bottlenose Whale (*Hyperoodon ampullatus*) -Availability of Data and Status of Research in Iceland.

SC-WG/NBK1/8 - Sigurjónsson, J. and Vikingsson, G., Availability of Data and Status of Research on Killer Whales (*Orcinus orca*) in Icelandic Waters.

2. Unpublished background documents

Faucher, A. and Whitehead, H., The bottlenose whales of 'The Gully', Final report for 1988-91 project for WWF- Canada, Toronto.

Reeves, R.R., Mitchell, E. and Whitehead, H., Current status of the northern bottlenose whale, *Hyperoodon ampullatus* (in press - *Canadian Field Naturalist*).

Tables and Figures

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Table 1 (Revised from SC-WG/NBK1/1)

Total annual numbers of bottlenose whales recorded in the Faroes from 1584 - 1993, and divided according to whether driven, found stranded, or hunted offshore.

Year	No. driven	No. dead	No. shot	Total	Year	No. driven	No. dead	No. shot	Total
1584	3			3	1803	2			2
1618	2			2	1807	1			1
1622	6			6	1814	2			2
1623	2			2	1815	1			1
1626	1			1	1816	5			5
1631	3			3	1817	4			4
1633	1			1	1819	7			7
1634	1			1	1821	3			3
1737	2			2	1822	3			3
1709	3	2		5	1825	2			2
1711	3	1		4	1826	6			6
1713	1			1	1829	2			2
1715	3			3	1830	2			2
1716	3			3	1831	2			2
1717		2		2	1833	2			2
1719	5	2		7	1834	2			2
1720	5			5	1835	8			8
1721	3			3	1836	2			2
1722		2		2	1838	2			2
1723	6			6	1839	7			7
1724		1		1	1841	5			5
1725	2			2	1842		1		1
1726	4			4	1843	3	1		4
1728	2	2		4	1844	2			2
1729	2			2	1845	6			6
1732	3			3	1846	5	1		6
1734	2	1		3	1847	3	1		4
1735	1			1	1848	1			1
1737	3			3	1849	2	1		3
1738	3			3	1850	4	1		5
1741	1			1	1851		1		1
1742		2		2	1852	6			6
1746	6			6	1853	14			14
1748	3			3	1855	6	3		9
1750	1			1	1856	6	1		7
1752	2			2	1857	5	1		6
1754	3			3	1858	6			6
1755		1		1	1859	3			3
1763		1		1	1860	9			9
1767	3			3	1861	12			12
1771		1		1	1862	6			6
1777	1			1	1863	8			8
1778	3			3	1864	13	1		14
1782	2			2	1865	2	2		4
1796	3			3	1866		4		4
1802		1		1	1867	2			2

Year	No. driven	No. dead	No. shot	Total
1868	10			10
1869	6			6
1870	6			6
1871	7			7
1872	12			12
1873	2			2
1874	16			16
1875	2			2
1876	9	1		10
1877	7			7
1878	3			3
1879	8	1		9
1880	11			11
1881	6	1		7
1882	14			14
1883	11	1		12
1884	7			7
1885	2			2
1886	9			9
1887	12			12
1888	23	6		29
1889		1		1
1890	4	1		5
1891	1	3		4
1892	7	2		9
1893	11			11
1894	7		5	12
1895	1		7	8
1896	19			19
1897	2	2		4
1898	2		4	6
1899	4	1		5
1900	6	2		8
1901	2			2
1902	4			4
1903	4		5	9
1904			6	6
1905	11		6	17
1906			11	11
1907	2	2	4	8
1908			1	1
1909	5		2	7
1910	3	1	4	8
1911			1	1
1913	2		8	10
1914			8	8
1915	1		2	3
1916			2	2
1918	2			2

Year	No. driven	No. dead	No. shot	Total
1920			8	8
1923			2	2
1926	3			3
1927	1			1
1928	2			2
1929	2			2
1930			2	2
1931	2		2	4
1934		1		1
1935	2		2	4
1937	5			5
1940	3			3
1942	1			1
1943	2			2
1946	4			4
1947	3			3
1954	1			1
1963	3			3
1964	3			3
1966	4			4
1967	3			3
1970	1			1
1974	4			4
1978	2			2
1981	3			3
1982	2	1		3
1988	3			3
1989	2			2
1992		2		2
1993	5			5
<hr/>				
Total	646	67	92	805

Table 2 (From SC-WG/NBK1/1)

Catches of bottlenose whales in the North Atlantic by nations other than Norway. (Note that some of the records from the Faroes include stranded animals (see Table 1)).

Year	Nation	No of bottlenose	Catch area	Sources
1856	UK (Scotland)	28	Frobisher Strait	4, 6
1877	"	10		1, 6
1878	"	9		1
1879	"	8		1, 6
1880	"	32		1, 6
1881	"	111		1, 6
1882	"	413		1, 6
1883	"	535		1, 4
1884	"	283	Greenland and Davis strait	1
1885	"	(55) 84	Jan Mayen and Davis Strait	1, 4
1886	"	23	Greenland	4
1887	"	20	Greenland and Davis Strait	4
1889	"	10	Greenland	4
1890	"	22		4
1891	"	3		5
1892	"	224		7
1905	UK (Shetland)	1		II (9), 2
1906	"	1		II (9), 2
1907	UK (Shetland & Hebrides)	2		II (9), 2
1909	UK (Shetland)	2		2, 8
1910	"	1		2, 8
1911	"	2		2, 8
1912	"	8		2, 8
1913	"	8 (7)		II (37), 8
1913	Iceland	2		II (32)
1913	Denmark (Farøe Islands)	8		II (37), 2

Year	Nation	No of bottlenose	Catch area	Sources
1914	Denmark (Faroe Islands)	8		II (38)
1916	"	1		II (39)
1920	UK (Scotland)	5		8
1920	Denmark (Faroe Islands)	8		II (40)
1923	"	2		II (41)
1925	UK (Scotland)	1		8
1950	Denmark (W. Greenland)	2		XXXV (21)
1953	Canada (Newfoundland)	1		XXXI (21)
1958	Denmark (W. Greenland)	3		XXXV (25)
1962	Canada (Nova Scotia)	40		LI (33)
1963	"	22		LII (34)
1963	Denmark (Faroe Islands)	3		LIII (33)
1964	"	3		LX (34)
1964	Canada (Nova Scotia)	6		LVII (34)
1967	"	5		LXI (32)
1970	Denmark (W. Greenland)	1		LXX (21)
Total	1856-1974	1961		

Sources: 1 = Norsk Fiskeritid. 1883-1924, 2 = Risting, 1922, 4 = Lubbock, 1937, 5 = Lindeman, 1899, 6 = Southwell, 1884, 7 = Mitchell, 1975, 8 = Thompson, 1928. International whaling statistics IWS are specified with volume no. in Roman numeral, and page no. in brackets.

Figure 1 (From SC-WG/NBK1/1)

Bottlenose whales in the Faroe Islands, 1709 -1993 (caught and found dead).

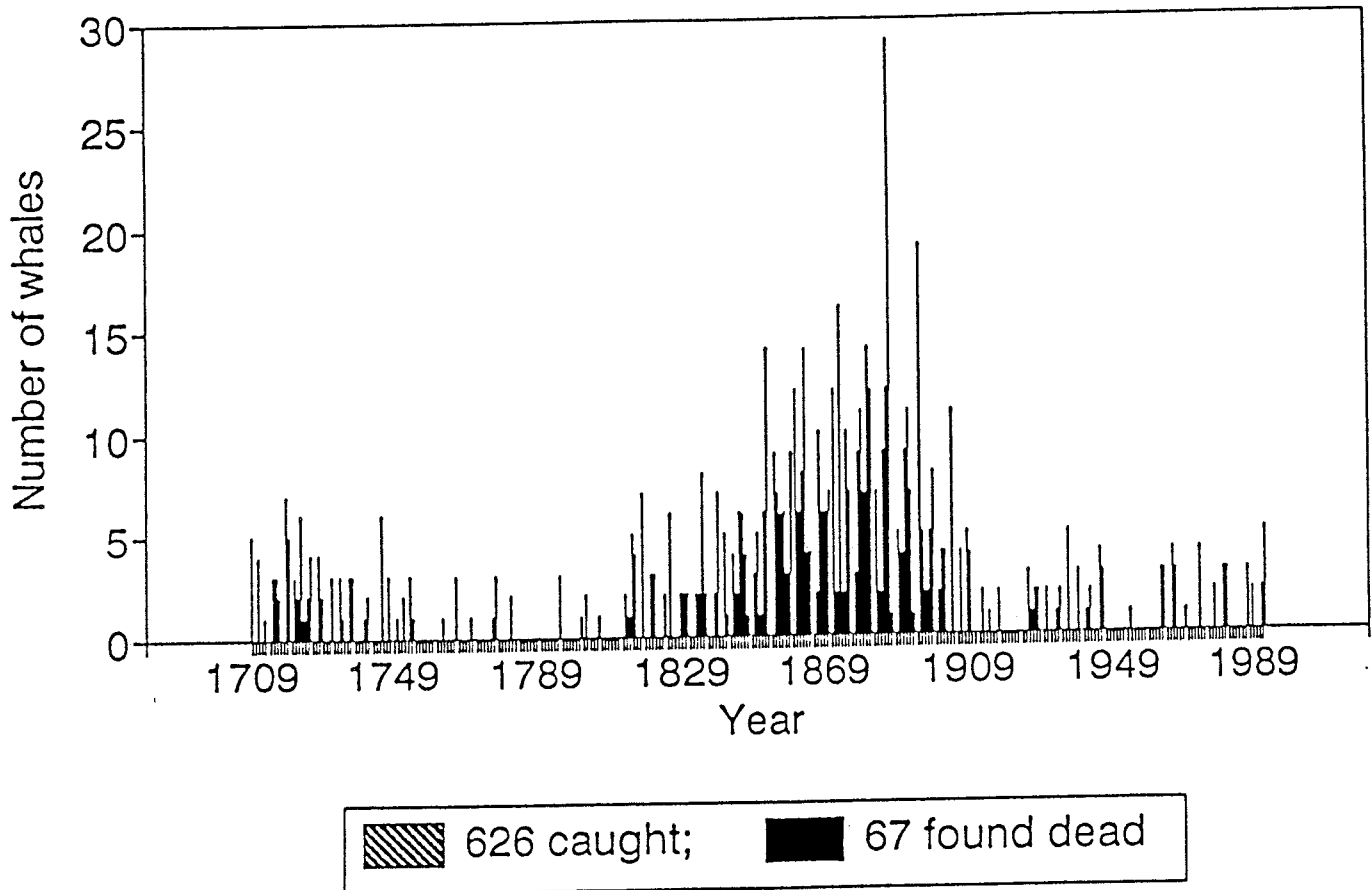


Figure 2 (from SC-WG/NBK1/5)

Position where bottlenose whales have been caught by Norwegian whalers in the period 1938-72. The number of whales taken at each position is indicated in the legend.

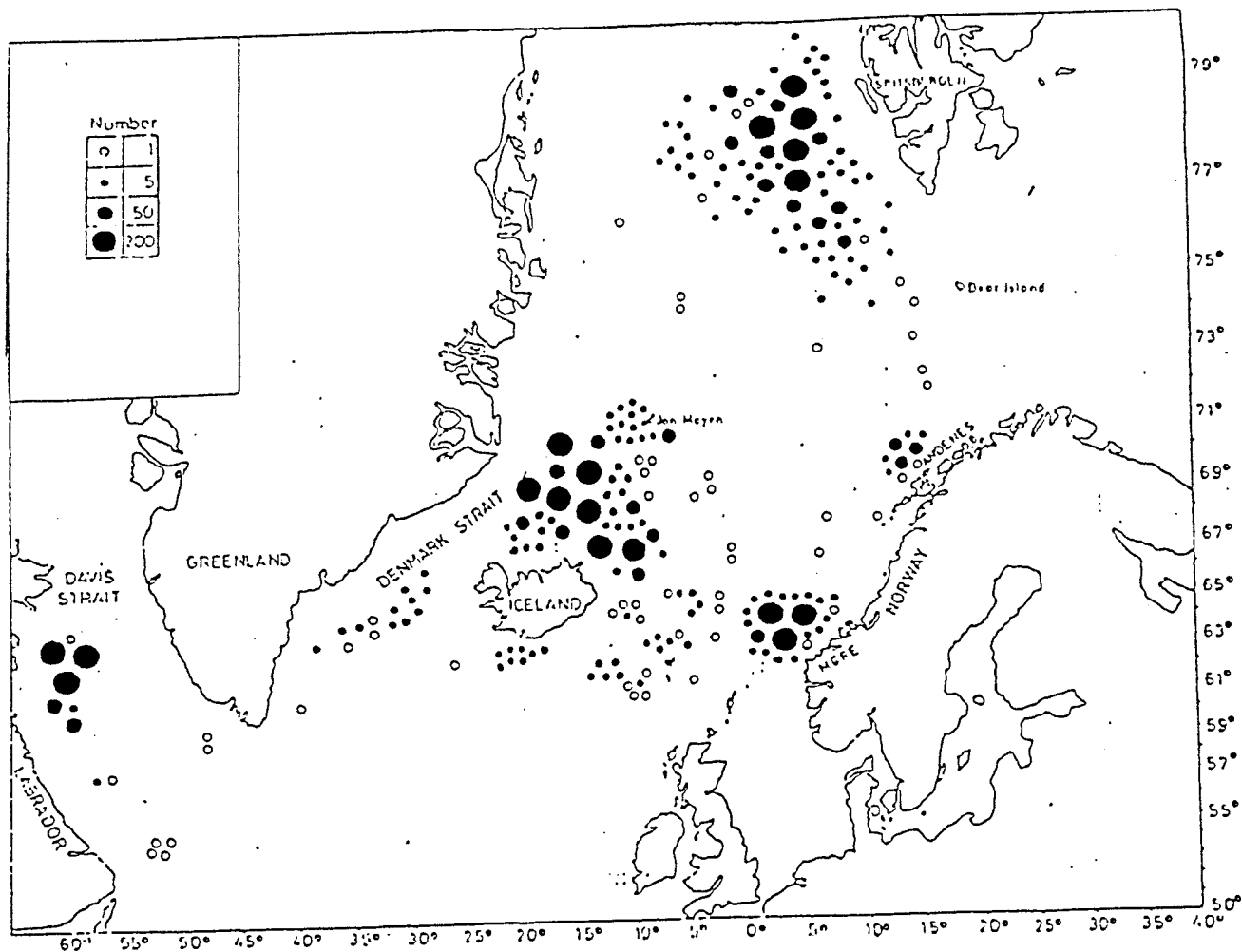


Figure 3 (from SC-WG/NBK1/5)

Norwegian catches of bottlenose whales 1882-1974 (—), the sealers share of total (.....) and the number of bottlenose whaling ships (-----).

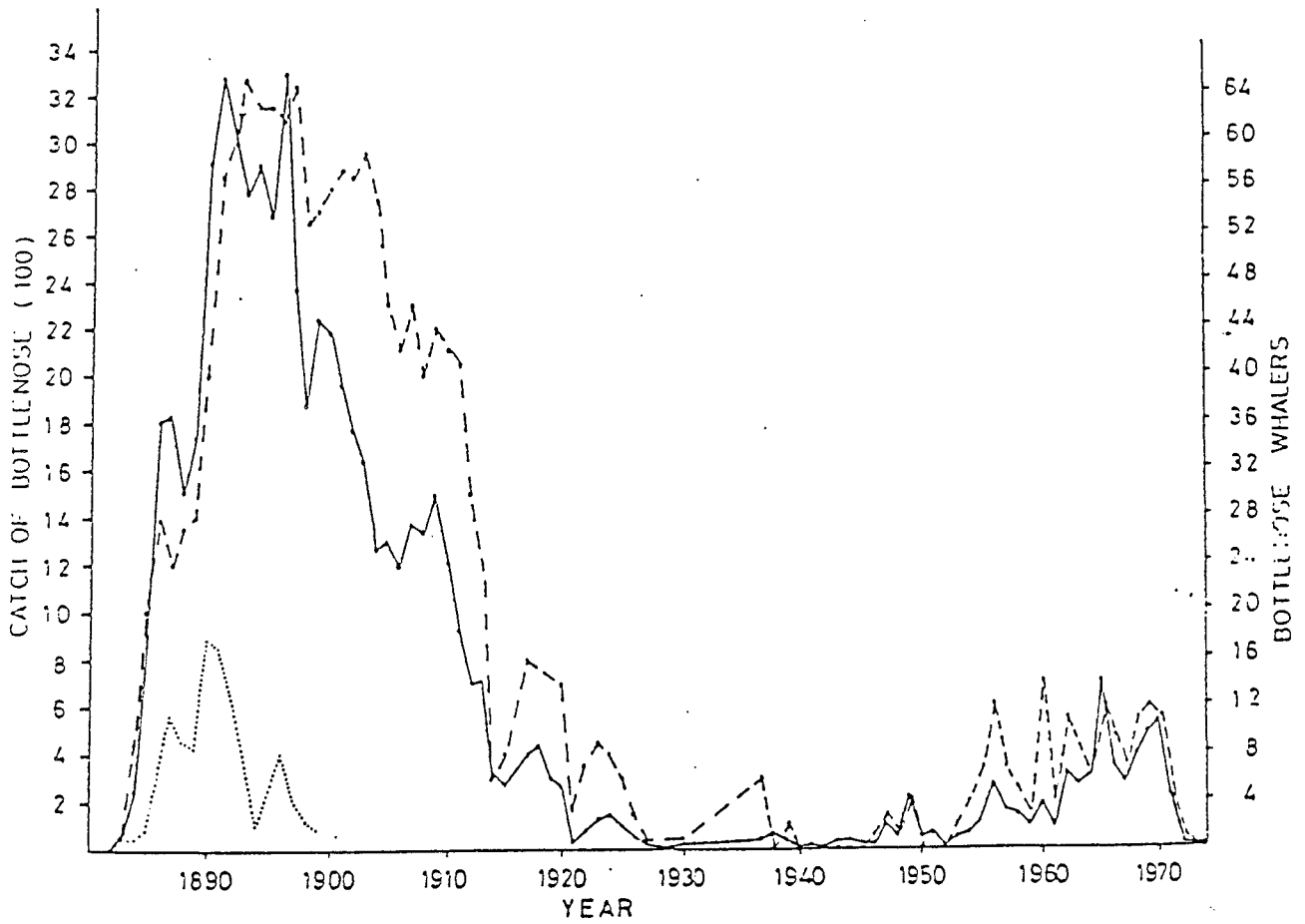


Figure 4 (from SC-WG/NBK1/5)

Number of bottlenose whales caught in the areas Iceland, Svalbard, Andenes and Møre in eight successive periods covering the season 1938-69.

