

ESTIMATES OF CETACEAN ABUNDANCE IN THE NORTH ATLANTIC OF RELEVANCE TO NAMMCO

North Atlantic Marine Mammal Commission¹

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INTRODUCTION

The purpose of this table is to present the best available abundance estimates for cetacean species in areas of relevance to the work of NAMMCO. It is intended to be used as a starting point for researchers, and the original sources are provided if additional information is required.

The Scientific Committee of NAMMCO maintains a Working Group on Abundance Estimates, composed of invited experts in the field as well as some Committee members. This Working Group meets periodically to review new abundance estimates from recent surveys or, in some cases, re-analyses of older data. The [reports](#) of the Working Group are brought to the Scientific Committee at their annual meetings, and used to formulate advice on stock status, allowable removals or other matters. In most cases, the Scientific Committee will formally endorse estimates approved by the Working Group, and if so, this is indicated on the Table. Some estimates have been endorsed by the Scientific Committee of the International Whaling Commission (IWC).

In some cases, estimates have been revised subsequent to their endorsement by the Scientific Committee. Publication of estimates generally occurs after their presentation to the Committee, and estimates may be revised due to reviewer suggestions, advances in analytical techniques or errors detected in the original analysis. In these cases, the published estimate is considered the most reliable and is presented even if it differs from the originally endorsed estimate. In most cases these differences are small. It is anticipated that these revised estimates will be endorsed by the Scientific Committee at some point.

A more complete version of the table, published and regularly updated on the NAMMCO website, includes all estimates which have been endorsed and used at some point by NAMMCO working groups. Some estimates have been superseded by newer estimates, as the analytical procedures have evolved and improved. This online table includes older estimates that have been superseded, newer analyses and published estimates. Reasons for the differences between estimates for the same species, year and area are explained under Comments. This "live" table, "North Atlantic - Abundance Estimates of relevance to NAMMCO // All cetacean species - All surveys", can be found at <https://nammco.no/marinemammals/whales/>.

In most cases, the survey areas vary between surveys, and estimates cannot be directly compared between survey years. Informed comparisons can usually be found in the published

articles. Survey areas can be found [here](#) under the different survey headings.

When no abundance estimate for a species has ever been generated for an area because of paucity of sightings, this area is not included in this table for that species, even when a few sightings may have been made. For example, the NASS/TNASS series does not survey properly the geographical distribution of bowhead whales, i.e., does not cover a large enough area of their distribution range to generate any abundance estimate. Therefore, they are not indicated in this table for that species, although some bowhead whale sightings have been made during the surveys. These are indicated on the online table though. A lack of sightings for a species in an area is only indicated when other abundance estimates exist for that species in that area, e.g., for blue whales in 2007 in the Iceland + Faroes area.

Narwhals are at present not included in the tables. The way abundance estimates for narwhal have been corrected for perception and availability biases has varied between surveys and raised concerns. The Joint NAMMCO/JCNB Working Group on Narwhal and Beluga, which is the scientific body providing advice to NAMMCO and the Canada-Greenland Joint Commission on Narwhal and Beluga (JCNB), decided at its last meeting in October 2020 (the report will become available [here](#)), that it needed to review these corrections and to agree on corrected estimates. Abundance estimates for narwhal, past and recent, will then become available on the updated online table, with associated comments and, if necessary, recalculated estimates.

Column definitions and abbreviations

Some columns require no explanation (e.g., species) and are not included below.

Regions

Species-specific regions, management areas and sub-areas of relevance to NAMMCO were defined by the 26th meeting of the Scientific Committee in 2019 (NAMMCO 2019). Note that a survey may cover all or part of a region, management area or sub-area, so comparisons between surveys must take this into consideration.

A - Atlantic; N - North; E - East; and a combination of those abbreviations.

Management area/sub-area - see above.

CA - Canada; FO - Faroe Islands; GL - Greenland; IS - Iceland; NO - Norway.

SurveyArea

Usually, the stratum name from the survey.

As above for regions and management area/sub-area.

CIC - Iceland Coastal Area, as delimited for aerial surveys. Note that the IS+FO area for ship surveys also includes the CIC aerial survey area.

ECA - Eastern Canada; W - west.

NO mosaic - the area covered changes every year, as Norway covers its huge area by conducting partial surveys every year on a six-year cycle.

Name

Survey series: NASS, North Atlantic Sightings Surveys, TNASS Trans-North Atlantic sightings surveys (in 2007), NILS, Norwegian Independent Line-Transsect Surveys.

Or name of the country organising the survey for national surveys.

A/S

Survey platform: A – aerial survey, S – ship-based survey

M

Survey mode: SP - single platform; IO - double platform, independent observers; B-T - double platform, Buckland-Turnock mode (Buckland & Turnock 1992).

Uncorrected Abundance Estimate (UAE)

Does not include corrections for perception or availability biases unless otherwise noted with a (a), corrected for availability bias, or a (p), corrected for perception bias.

CV

Coefficient of variation.

95% CI

95% confidence interval.

Tfs

Too few sightings for generating an abundance estimate.

0s

Zero sightings

Corrected Abundance Estimate (CAE)

Includes corrections for perception bias (p), availability bias (a) or both as indicated by a 1.

Endorsed by

Organisational endorsement, usually NAMMCO or the International Whaling Commission (IWC). Committee meeting number and working group acronym are provided, the latest in '{...}'.

Square brackets around the organisational endorsement mean that an initial estimate has been previously endorsed by an organisation and subsequently revised and re-presented and/or published.

In most cases, the published estimate is presented even if an earlier accepted estimate exists, as earlier estimates in working papers have been improved and adjustments made post review in the published versions. These changes are consistent with the advice provided.

On the NAMMCO [live online version of the table](#), the comments include the explanation of the revisions made.

Publications

Citation for peer-reviewed publication if available. Citations of non-peer reviewed publications, generally meeting documents, are given in square brackets.

ACKNOWLEDGEMENTS

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CORRIGENDUM

The species white-beaked dolphin (*Lagenorhynchus albirostris*) was accidentally excluded from the table presented in the original technical note:

North Atlantic Marine Mammal Commission. (2020). Estimates of Cetacean Abundance in the North Atlantic of Relevance to NAMMCO. *NAMMCO Scientific Publications* 11. <https://doi.org/10.7557/3.5732>.

This error has now been corrected and there has been some minor reformatting following the inclusion of information on this species.

Species	Regions	Management areas/sub-areas	Survey					Uncorrected Abundance Estimate (p) (a): corrected for bias			Corrected Abundance Estimate			Bias		Endorsed by [Initial estimate]	Comments	Publications [Unpublished document]	
			Area	Name	Year	A/S	M	UAE	CV	95% CI	CAE	CV	95% CI	p	a				
Bowhead whale	Arctic	Baffin Bay - Davis Strait	ECA - WGL	CA	2013	A	IO				6,446	0.26	3,838-10,827	1	1	Canadian Science Advisory Secretariat	High Arctic Cetacean Survey.	Doniol-Valcroze et al. 2020	
			West GL	GL	2012	A	IO				744	0.34	357-1,461					Rekdal et al. 2015	
				GL	2006	A	IO	294(p)	0.47	129-708	1,229	0.47	495-2,939	1	1	Heide-Jørgensen et al. 2007a			
				GL	1998	A	IO	49		13-188	246		62-978	0	1	Heide-Jørgensen & Acquarone 2002			
		Spitsbergen	NEGL	GL	2017	A	IO				318	0.60	110-956	1	1		Spring survey.	Hansen et al. 2018b	
			NE Water polynya	GL	2017	A	IO				301	0.54	127-769	1	1		Strategic Environmental Study Program for NEGL Summer survey.	Boertmann et al. 2020	
Svalbard	NO		2015	A	SP	69	0.45	29-160	343	0.49	136-862	0	1			Vacquie-Garcia et al. 2017			
Blue whale	NA	Eastern NA	IS + FO	NASS	2015	S	IO	2,490	0.36	1,234-5,022	3,000	0.40	1,377-6,534	1	0	NAMMCO SC/26 (AEWG 2019)		Pike et al. 2019a	
				NASS	2007	S	BT	tfs											Pike et al. 2020a
				NASS	2001	S	BT	855	0.35	358-1,419							[NAMMCO SC/11 (AEWG 2003)]		Pike et al. 2009a
				NASS	1995	S	SP/BT	979	0.64	137-2,542									
				NASS	1989	S	SP	531	0.24	288-759									
				NASS	1987	S	SP	222	0.35	115-440									
Sei whale	NA	Iceland - Danmark Strait	IS + FO	All estimates of sei whales reported below are considered as partial estimates as the entire summer distribution and peak season are not covered by these surveys. The 1989 survey is considered the best survey for sei whales in terms of coverage and timing, as its range extended far South and it was conducted on July and August, i.e., later in the summer compared with other NASS surveys.															
				NASS	2015	S	IO	3,127	0.51	964-10,142	3,767	0.54	1,156-12,270	1	0	NAMMCO SC/26 (AEWG 2019)		Pike et al. 2019a	
				TNASS	2007	S	BT	9,737	0.38	4,189-19,665									Pike et al. 2020b
						S	BT	5,159	0.47	1,983-13,423									
				NASS	2001	S	BT	1,494	0.24	843-2,245	2,716	0.61	851-8,668	1	0	NAMMCO SC/18 (AEWG 2011)		[Pike et al. 2011]	
				NASS	1995	S	SP/BT	9,249	0.49	3,700-23,116						NAMMCO SC/05 (AEWG 1997)	High estimate for season and coverage, maybe a "sei whale year".	[Borchers and Burt 1997]	
				NASS	1989	S	SP	10,300	0.27	6,150-17,260						IWC SC/44	Good survey timing and coverage for sei whales.	Cattanach et al. 1993	
				IS	NASS	1987	S	SP	1,293	0.6	434-3,853						Partial estimate, species summer range and peak season not covered.		
				FO	NASS	1987	S	SP	0s										Gunnlaugsson & Sigurjónsson 1990

Species	Regions	Management areas/sub-areas	Survey					Uncorrected Abundance Estimate (p) (a): corrected for bias			Corrected Abundance Estimate			Bias		Endorsed by [Initial estimate]	Comments	Publications [Unpublished document]
			Area	Name	Year	A / S	M	UAE	CV	95% CI	CAE	CV	95% CI	p	a			
Fin whale	Western NA	West GL	West GL	NASS	2015	A	IO	465(p)	0.35	233-929	2,215	0.41	1,017-4,823	1	1	IWC SC/66a, [NAMMCO SC 23 (AEWG 2016)]		Hansen et al. 2018a
				TNASS	2007	A	IO	4,359 ^a	0.45	1,879-10,114	15,957 ^b	0.72	4,531-56,202	1	1	blWC SC/59, aNAMMCO SC/17 (AEWG 2009)		
				GL	2005	A	IO	1,660	0.38	799-3,450	9,800	0.62	3,228-29,751	1	1			
				GL	1993	A	IO				178		26-382	0	1		Partial survey coverage, high area of abundance not covered.	Larsen 1995
				NASS	1987/88	A	IO				1,096	0.35	520-2,106	0	1	IWC SC/43		IWC 1992
				NASS	1987	A	IO				1,985	0.46		0	1	IWC SC/40		Hiby et al. 1989
		East GL coastal	East GL	NASS	2015	A	IO	1,932(p)	0.24	1,204-3,100	6,440	0.26	3,901-10,632	1	1	IWC SC/66a, [NAMMCO SC/23 (AEWG 2016)]		Hansen et al. 2018a
				GL	2005	S	SP	3,214	0.48	980-10,547								Heide-Jørgensen et al. 2007b
		East GL - West IS + East IS - FO	IS + FO	NASS	2015	S	IO	31,953	0.17	22,536-45,306	36,773	0.17	25,811-52,392	1	0	NAMMCO SC/25 (AEWG 2018)		Pike et al. 2019a
				TNASS	2007	S	BT	24,824	0.15	18,347-33,589	30,777	0.19	21,153-44,779	1	0			Pike et al. 2020a
	NASS			2001	S	BT	24,887	0.13	18,186-30,214						NAMMCO SC/11 (AEWG 2003)		Vikingsson et al. 2009	
	NASS			1995	S	SP/BT	19,136	0.21	12,235-27,497						NAMMCO SC/14 & IWC SC/58	Joint NAMMCO-IWC NAFW WS 2006		
	NASS			1989	S	SP	10,378	0.16	7,600-14,200							IWC SC/43		Buckland et al. 1992
	NASS			1987	S	SP	5,479	0.10	3,380-7,830									
	Eastern NA	Norwegian and Barents Seas	CM extra	NILS-NASS	2015	S	IO	3,147	0.44	1,290-7,673	3,729	0.44	1,531-9,081	1	0	NAMMCO SC/26 (AEWG 2019)	Area CM1a,3a + EW1,2,3.	Leonard & Øien 2020a
			NO mosaic	NILS	2014-18	S	IO	9,494	0.17	6,800-13,256	11,387	0.17	8,072-16,063	1	0			
				NILS	2008-13	S	IO	8,047	0.23	5,043-12,824	10,861	0.26	6,433-18,339	1	0			
				NILS	2002-07	S	IO	7,094	0.15	5,219-9,1614	10,004	0.18	6,937-14,426	1	0			
			NO	NILS	1996-01	S	IO	10,369	0.24	6,277-17,128						[NAMMCO SC/14 & IWC SC/58 (Joint NAFW WS 2006)]		Øien 2009
				NASS	1995	S	IO	5,034	0.21	3,314-7,647								
NASS				1989	S	SP	2,245	0.33									Christensen et al. 1992	
NO				1988	S	SP	2,309	0.31									Øien 1990	
NASS	1987	S	SP	5,806	0.50								IWC SC/41	Jan Mayen - Norwegian Sea area.	IWC 1990b			

Species	Regions	Management areas/sub-areas	Survey					Uncorrected Abundance Estimate (p) (a): corrected for bias			Corrected Abundance Estimate			Bias		Endorsed by [Initial estimate]	Comments	Publications [Unpublished document]	
			Area	Name	Year	A / S	M	UAE	CV	95% CI	CAE	CV	95% CI	p	a				
Humpback whale	NA	West GL	West GL	NASS	2015	A	IO	427	0.35	219-831	993	0.44	434-2,272	1	1	IWC SC/66a, [NAMMCO SC/23 (AEWG 2016)]		Hansen et al. 2018a	
				NASS	2007	A	IO	1,505(p)	0.49		4,090	0.5	1,620-10,324	1	1	NAMMCO SC/17 (AEWG 2009)	Mark recapture distance sampling.	Heide-Jørgensen & Lairde 2015	
								995(p)	0.33		2,704	0.34	1,402-5,215	1	1		Strip census.		
				GL	2005	S	SP	1,306	0.42	570-2,989							Incomplete survey coverage.	Heide-Jørgensen et al. 2007b	
						A	IO	1,158	0.35	595-2,255							Small groups and large groups abundance estimated separately.	Heide-Jørgensen et al. S54 2008	
				GL	1993	A	IO	599		237-1,512								Kingsley & Witting 2001	
				NASS	1989	A	IO	272	0.75										
				GL	1988	A	IO	200	0.74									Heide-Jørgensen et al. 2012	
		NASS	1987	A	IO	220	0.62												
		East GL coastal	East GL	NASS	2015	A	IO	1,816	0.35	933-3,536	4,223	0.44	1,845-9,666	1	1	IWC SC/66a, [NAMMCO SC/23 (AEWG 2016)]		Hansen et al. 2018a	
				GL	2005	S	SP	347	0.85	48-2,515							Incomplete survey coverage.	Heide-Jørgensen et al. 2007b	
		IS - FO	CIC	IS	2016	A	IO	tfs										Block 5 (NW & NE corners with large numbers expected) not covered.	Pike et al. 2020b
				IS	2009	A	IO	2,002	0.30	1,096-3,655	2,261	0.35	1,142-4,477	1	0	NAMMCO SC/26 (AEWG 2019)			
				TNASS	2007	A	IO	1,138		565-2,039	1,242		632-2,445	1	0	NAMMCO SC/17 (AEWG 2009)			
				NASS	2001	A	IO	6,242		3,238-11,580							Line transect analysis and density surface fit.	Paxton et al. 2009	
								2,937	0.27	1,665-5,182	4,928	0.46	1,926-12,611	1	0	[NAMMCO SC/10 (AEWG 2002)]	Line transect analysis.	Pike et al. 2009c	
				NASS	1995	A	IO	1,674	0.45	656-4,269									
				NASS	1987	A	SP	tfs										Donovan & Gunnlaugsson 1989	
				IS + FO	NASS	2015	S	IO	6,643	0.32	3,543-12,456	9,867	0.37	4,854-20,058	1	0	NAMMCO SC/25 (AEWG 2018)		Pike et al. 2019a
					TNASS	2007	S	BT	12,078	0.34	5,879-24,814	18,105	0.43	7,226-45,360	1	0	[NAMMCO SC/17 (AEWG 2009)]		Pike et al. 2020a
					NASS	2001	A+S	SP	14,662		9,441-29,879							Density surface fitting, using generalised additive models (GAMs).	Paxton et al. 2009
		NASS	1995		A+S	SP	10,521		3,716-24,636										
		NASS	1987		S	SP	1,722	0.25	1,061-2,795							Tfs in 1989	[Pike et al. 2005]		
		Norwegian & Barents Seas	CM extra	NILS-NASS	2015	S	IO	1,164	0.39	395-1,994	1,711	0.41	604-3,631	1	0		Area CM1a,3a + EW1,2,3.	Leonard & Øien 2020a	
				NILS	2014-18	S	IO	8,150	0.38	3,765-17,646	10,708	0.38	4,906-23,370	1	0	NAMMCO SC/26 (AEWG 2019)			
			NO mosaic	NILS	2008-13	S	IO	9,631	0.30	5,294-17,521	12,411	0.30	6,847-22,497	1	0			Leonard & Øien 2020b	
				NILS	2002-07	S	IO	7,388	0.30	3,909-13,963	9,749	0.34	4,947-19,210	1	0				
				NILS	1996-01	S	IO	4,695	0.39	2,124-10,378						NAMMCO SC/12		Øien 2009	
			NO	NILS	1995	S	IO	1,059	0.25	645-1,738						[NAMMCO SC/11 (MFWG 2003)]			
				NASS	1989	S	SP	698	0.59									Christensen et al. 1992	
NO	1988	S		SP	1,126	0.31								IWC SC/41	Tfs in 1987, Øristland et al. 1989	Øien 1990			

Species	Regions	Management areas/sub-areas	Survey					Uncorrected Abundance Estimate (p) (a): corrected for bias			Corrected Abundance Estimate			Bias		Endorsed by [Initial estimate]	Comments	Publications [Unpublished document]	
			Area	Name	Year	A/S	M	UAE	CV	95% CI	CAE	CV	95% CI	p	a				
Common minke whale	Western Atlantic	West GL	West GL	NASS	2015	A	IO	963	0.37		5,095	0.46	2,171-11,961	1	1	IWC SC/66a	Strip census. Availability correction based on 5 minke whales tagged in 2013-17 off GL.	Hansen et al. 2018a	
				NASS	2007	A	IO				9,066	0.39	4,333-18,973	1	1				
				GL	2005	A	IO	4,856(a)	0.49	1,910-12,348	10,792	0.59	3,594-32,407	1	1				Heide-Jørgensen et al. 2008
						S	SP	4,479	0.46	1,760-11,394								Incomplete survey coverage.	Heide-Jørgensen et al 2007b
				GL	1993	A	IO				8,371	0.43		0	1	IWC SC/46		Larsen 1995	
				GL	1987-88	A	IO				3,266	0.31	1,702-5,718	0	1	IWC SC/41		IWC 1990a	
				NASS	1987	A	IO				1,930	0.44		0	1				
	Central Atlantic	East GL coastal	East GL	NASS	2015	A	IO	523	0.38	238-1,145	2,762	0.47	1,160-6,574	1	1	[NAMMCO SC/23 (AEWG 2016)]	Availability correction based on 5 minke whales tagged in 2013-17 off GL.	Hansen et al. 2018	
				GL	2005	S	SP	1,848	1.24	197-17,348								Heide-Jørgensen et al. 2007b	
		IS coastal	CIC	IS	2016	A	IO	12,966	0.47	3,384-49,688	13,497	0.50	3,312-55,007	1	1	NAMMCO SC/26 (AEWG 2019)		Pike et al. 2020b	
				NASS	2015	S	IO				12,710	0.52	4,498-35,912	1	0	NAMMCO SC/23 (AEWG 2016)	Shipboard estimate for the CIC area.		
				IS	2009	A	IO	5,284	0.24	2,915-7,822	9,588	0.24	5,274-14,420	1	1	[NAMMCO SC/17 (ASWG 2010)]	Corrected using data from both platforms.	Pike et al. 2020b	
				TNASS	2007	A	IO	15,055	0.36	6,357-27,278	20,834	0.35	(9,808-37,042)	1	1	NAMMCO SC/18 (AEWG 2011)	Using only the most effective primary observer (much higher sighting rate).		
				NASS	2001	A	IO	38,071(a)		25,908-55,945	43,633	0.19	30,148-63,149	1	1	NAMMCO SC/11 (AEWG 2003)	The UAE is corrected for availability bias	Borchers et al. 2009	
				NASS	1995	S	SP	5,977	0.39	2,671-13,376								Pike et al. 2009b	
				NASS	1989	S	SP	13,487	0.44	4,779-38,060									
				NASS	1987	A	SP				24,532	0.32	13,399-44,916	0	1	[NAMMCO SC/11 (AEWG 2003)]	Estimate corrected for measurement errors.	Borchers et al. 2009	
		S	SP			9,809	0.25	5,979-16,104									Pike et al. 2009b		
		W Norwegian Sea - Jan Mayen	CMA	NASS+NILS	2015	S	IO	28,407	0.28	13,035-42,032	48,016	0.23	30,709-75,078	1	0	NAMMCO SC/25 (AEWG 2018)	IWC Central Medium Area. Stock boundaries putative and dynamic distribution: not biologically meaningful unit.	[Pike 2018]	
				NASS	2015	S	IO	23,407	0.28	13,035-42,032	42,515	0.31	22,896-78,942	1	0				
		Iceland pelagic (including CIC area)	IS + FO	TNASS	2007	S	BT	12,427	0.27	7,205-21,443						[NAMMCO SC/17 (ASWG 2010)]		Pike et al. 2020a	
				NASS	2001	S	BT	25,929	0.29	14,747-45,590						[NAMMCO SC/11 (AEWG 2003)]		Pike et al. 2009b	
				NASS	1995	S	SP/BT	19,042	0.20	12,801-28,325									
				NASS	1989	S	SP	27,184	0.26	14,956-49,410									
				NASS	1987	S	SP	21,984	0.15	16,310-29,632									
		NEA	Svalbard- Bear Island West + Eastern Barents Sea + Eastern Norwegian Sea + North Sea/West UK	NO	NILS	2008-13	S	IO				100,615	0.11	81,154-124,743	1	1	IWC SC/66a		Solvang et al. 2015
					NILS	2002-07	S	IO				108,140	0.23	69,299-168,752	1	1	IWC SC/61		Bøthun et al. 2009
NILS	1996-01				S	IO				107,205	0.13	83,180-138,169	1	1	IWC SC/55		Skaug et al. 2004		
NILS	1995				S	IO				118,299	0.10	91,000-137,000	1	1	IWC SC/48	In 1988 & 1989, SP surveys including g(0) experiments. Data from a double platform survey experiment in 1990, made it possible to calculate a g(0) corrected estimate.	Schweder et al. 1997		
NASS	1988-89				S	SP	34,600	0.16		67,380	0.19	44,000-94,000	1	0					
NO	1988				S	SP	25,599	0.14							IWC SC/41		Øien 1990		
NASS	1987				S	SP	17,918	0.23							IWC 39		Øien 1989		

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			Area	Name	Year	A / S	M	UAE	CV	95% CI	CAE	CV	95% CI	p	a					
Sperm whale	NA	NA	IS + FO	NASS	2015	S	IO	7,257	0.35	3,461-15,215	23,166	0.59	7,699-69,709	1	0	NAMMCO SC/25 (AEWG 2018)		Pike et al. 2019a		
				TNASS	2007	S	BT	6,429	0.28	3,412-10,007	12,268	0.33	6,386-23,568	1	0	[NAMMCO SC/25 (AEWG 2018)]	A left truncation used in the primary platform detection function because of a paucity of sightings near the trackline.	Pike et al. 2020a		
				NASS	2001	S	BT	6,726	0.40		11,185	0.34		1	1	NAMMCO SC/10 (AEWG 2002)	Best estimate so far. Tagging in NA waters needed to provide more reliable correction. The present correction is based on cue counting.	Gunnlaugsson et al. 2009		
				NASS	1989, 95	S	SP/BT	na												
			IS	NASS	1987	S	SP	1,234	0.17										Used what is now not considered standard line transect methodology, with Effective Strip Half-Width (esw) estimated as twice the median perpendicular sighting distance, rather than modelled from the perpendicular distance distribution.	Gunnlaugsson & Sigurjónsson 1990
			FO			S	SP	308	0.38											
			CM extra	NILS-NASS	2015	S	IO	2,692	0.25		3,828	0.33	1,994-7,595	1	0	NAMMCO SC/26 (AEWG 2019)	Area CM1a,3a + EW1,2,3.	Leonard & Øien 2020a		
			NO mosaic	NILS	2014-18	S	IO	3,822	0.21	2,479-5,891	5,704	0.26	3,374-9,643	1	0			Leonard & Øien 2020b		
				NILS	2008-13	S	IO	3,649	0.28	2,051-6,490	3,962	0.29	2,218-7,079	1	0					
				NILS	2002-07	S	IO	6,697	0.17	4,712-9,234	8,134	0.18	5,695-11,617	1	0					
			NO	NILS	1996-01	S	IO	6,375	0.22	4,163-9,762							NAMMCO SC/12		Øien 2009	
				NILS	1995	S	IO	4,319	0.20	2,903-6,424							NAMMCO SC/11		Christensen et al. 1992	
				NASS	1989	S	SP	5,231	0.31										Øien 1990	
				NASS	1988	S	SP	2,548	0.27										Øristland et al. 1989	
			Northern bottlenose whale	NA	NEA	IS + FO	NASS	2015	S	IO	18,375	0.59	5,128-65,834	19,975	0.6	5,562-71,737	1	0	NAMMCO SC/26 (AEWG 2019)	
TNASS	2007	S					BT	tfs											Pike et al. 2020a	
NASS	2001	S					BT	24,561	0.23	15,261-39,528							NAMMCO SC/11 (AEWG 2003)		[Pike et al. 2003]	
NASS	1995	S					SP/BT	27,879	0.67	12,396-62,700										
NASS	1987/89	S					SP	8,827	0.32									NAMMCO SC/03 (NBKW/MPWG 2003)		
IS	NASS	1987				S	SP	4,925	0.16								IWC SC/41, NAMMCO SC/02 (NBKWG 1993)	Used what is now not considered standard line transect methodology, with Effective Strip Half-Width (esw) estimated as twice the median perpendicular sighting distance, rather than modelled from the perpendicular distance distribution.	Gunnlaugsson & Sigurjónsson 1990	
FO						S	SP	902	0.45											
NO mosaic	NILS	2014-18				S	IO				7,800	0.20	4,373-13,913	1	0	NAMMCO/SC/27		Leonard & Øien 2020a		
	NILS	1996-13				S	IO	tfs										Leonard & Øien 2020b, Øien & Hartvedt 2011		
	NASS/NILS	87, 88, 89, 95				S	IO	tfs										Øien 1990, 1991, Øristland et al. 1989, Øien & Hartvedt 2011		

Species	Regions	Management areas/sub-areas	Survey					Uncorrected Abundance Estimate (p) (a): corrected for bias			Corrected Abundance Estimate			Bias		Endorsed by (Initial estimate)	Comments	Publications (Unpublished document)		
			Area	Name	Year	A / S	M	UAE	CV	95% CI	CAE	CV	95% CI	p	a					
Killer whale	NA	Western A	West GL	NASS	87, 15	A	IO	tfs											[NBKWG 1993], Heide-Jørgensen et al. 2007b, Hansen et al. 2018a	
		Central Atlantic	East GL	GL/NASS	05, 15	S/A	SP/IO	tfs												
			IS + FO + NO	NASS+ NILS	2015	S	IO				22,100	0.28	15,282-32,023	1	0	NAMMCO/SC/27	IS & FO strata post-stratified to eliminate overlap with NO strata. Variance underestimated as Norwegian survey conducted over 6 years.	Pike et al. 2020c		
			IS + FO	NASS	2015	S	IO	14,611	0.55	4,055-52,773	30,540	0.63	8,316-112,120	1	0					
			IS + FO + Extension	TNASS	2007	S	BT	57,460	0.50	22,385-147,494									Extension strata, particularly to the NE of the IS/FO survey area, accounted for 71% of the estimated abundance.	
			IS + FO	NASS	2001	S	BT	15,142	0.47	6,003-38,190	20,345	0.63	6,317-65,523	1	0					
				NASS	1995	S	SP/BT	4,736	0.48	1,842-12,176										
				NASS	1989	S	SP	10,316	0.37	4,960-21,456										
				NASS	1987	S	SP	8,899	0.46	3,621-21,870										
		NEA (NO)	NO mosaïc	NILS	2014-18	S	IO	12,714	0.29	7,162-22,568	15,056	0.29	8,423-26,914	1	0				[NAMMCO SC/26 (AEWG 2019)]	
				NILS	2008-13	S	IO	7,628	0.28	4,397-13,023	9,563	0.36	4,713-19,403	1	0	Leonard & Øien 2020b				
				NILS	2002-07	S	IO	16,462	0.2	13,234-27,798	18,821	0.24	11,525-30,735	1	0					
				NILS	1996-01	S	IO	na												
			NO	NASS	1989	S	SP	7,057	0.38	3,400-14,400						NAMMCO SC/02 (NBKWG 1993)	Øien 1991, [Øien 1993]			
				NO	1988	S	SP	3,100	0.63								Øien 1990			
NASS	1987			S	SP	tfs									Øristland et al. 1989					
Long-finned pilot whale	NA	West GL	West GL	NASS	2015	A	IO	4,797(p)	0.50		9,180	0.50	3,635-23,234	1	1	[NAMMCO SC/23 (AEWG 2016)]	Minimum estimate, incomplete coverage of WGL stock, conservative availability correction, and based on 3 pilot whales tagged off the Faroes.	Hansen et al. 2018		
				TNASS	2007	A	IO	3,253(p)	0.38		8,133	0.41	3,765-17,565	1	1	[NAMMCO SC/17 (AEWG 2009)]	First abundance estimate for WGL.	Hansen & Heide-Jørgensen 2013		
				NASS	1987	A	SP	tfs									Larsen et al. 1989			
		East GL	East GL	NASS	2015	A	IO	135(p)	1.02		258	1.02	50-1,354	1	1	[NAMMCO SC/23 (AEWG 2016)]	Availability correction considered conservative.	Hansen et al. 2018		
		NEA	IS + FO	NASS	2015	S	IO	278,153	0.35	128,948-600,002	344,148	0.35	162,795-727,527	1	0	NAMMCO SC/25 (AEWG 2018)		Pike et al. 2019a		
				TNASS	2007	S	BT	92,980	0.24	57,226-150,747	87,417	0.38	41,783-182,891	1	0		Combined platforms.	Pike et al. 2020a		
				NASS	2001	S	BT	65,315	0.39	30,122-141,620						NAMMCO SC/11 (AEWG 2003)	Not adequate spatial coverage for species. Estimate should not be used for assessment purposes.	[Pike et al. 2003]		
				NASS	1995	S	SP/BT	214,840	0.26	130,054-354,899						NAMMCO SC/05 (AEWG 1997), ICES 1996	The Icelandic survey conducted in SP mode, Faroese survey conducted for the first time in BT mode.	[Burt and Borchers 1997]		
				NASS	1989	S	SP	660,387	0.33	351,099-1,242,131						ICES 1996	Total abundance 1989 IS+FR+Spain= 778,000 (CV=0.30). Best abundance in terms of distribution coverage.	Buckland et al. 1993		
				NASS	1987	S	SP	122,643	0.29	65,591-220,253										
NO	All	All	S	SP	tfs										Leonard & Øien 2020ab					

Species	Regions	Management areas/sub-areas	Survey					Uncorrected Abundance Estimate (p) (a): corrected for bias			Corrected Abundance Estimate			Bias		Endorsed by [Initial estimate]	Comments	Publications [Unpublished document]	
			Area	Name	Year	A / S	M	UAE	CV	95% CI	CAE	CV	95% CI	p	a				
Lagenorhynchus spp	NA	IS	CIC	NASS	1995	A	IO	29,444	0.24	12,714-32,874						NAMMCO SC/10 (AEWG 2002)		[Pike et al 2002a]	
			IS	NASS	1987	S	SP	c. 52,000										Sigurjónsson & Víkingsson 1997	
		NO mosaic	NILS	2014-18	S	IO	164,059	0.24	98,367-273,620	187,482	0.24	112,434-312,624	1	0	NAMMCO SC/26 (AEWG 2019)	94% of identified sightings are of white beaked dolphins.	Leonard & Øien 2020b		
			NILS	2008-13	S	IO	137,040	0.18	94,997-197,690	163,688	0.18	112,673-237,800	1	0	[NAMMCO SC/26 (AEWG 2019)]		Leonard & Øien 2020a		
			NILS	2002-07	S	IO	213,070	0.18	144,720-313,690										
			NILS	1996-01	S	IO	na												
		NO	NILS	1995	S	IO	91,216	0.59	31,000-265,000								Likely over 90% are white beaked dolphins. Identified as "springers" only, i.e., delphinids species. Could also include few sightings of common dolphins and bottlenose dolphins, considering the distribution of the species.	[Øien 1996]	
			NASS	1989	S	SP	131,592	0.27	79,000-220,000										
			NO	1988	S	SP	21,082	0.32									See comments above. Tentative & minimum estimate.	Øien 1990	
			NASS	1987	S	SP	tfs										21 sightings of white beaked dolphins.	Øristland et al. 1989	
White-beaked dolphin	NA	GL	West GL	NASS	2015	A	IO	2,747(p)	0.41	1,257-6,002	15,261	0.41	7,048-33,046	1	1	NAMMCO SC 23 (AEWG 2016)	Full correction based on 1 animal tagged off Iceland. The AEWG considers the fully corrected abundance as provisional.	Hansen et al. 2018	
				TNASS	2007	A	IO	9,827(p)	0.19	6,723-14,365	11,984	0.19	8,285-17,334	1	1	NAMMCO SC/17 (AEWG 2009)		Hansen & Heide-Jørgensen 2013	
				NASS	1987	A	SP	na											
		IS - FO	East GL	NASS	2015	A	IO	2,140(p)	0.5	825-5,547	11,899	0.50	4,710-30,008	1	1	NAMMCO SC/23 (AEWG 2016)	Same as above for West GL.	Hansen et al. 2018	
				CIC	IS	2016	A	IO	42,908	0.42	18,536-99,328	59,966	0.44	24,907-144,377	1	0	NAMMCO SC/26 (AEWG 2019)		Pike et al. 2020b
					IS	2009	A	IO	38,136	0.44	15,499-93,831	75,959	0.56	26,366-218,834	1	0			
					TNASS	2007	A	IO	45,497	0.37	21,966-94,237	46,683	0.37	22,409-97,251	1	0			
					NASS	2001	A	IO	18,706	0.23	11,936-29,317	31,653	0.3	17,679-56,672	1	0			Pike et al. 2009c
					NASS	1995	A	IO	11,717	0.22	7,684-17,864								
					NASS	1987	A	SP	na										Donovan & Gunnlaugsson 1989, Pike et al. 2020b
				IS + FO	IS	1986	A	SP	16,484	0.21	10,838-25,070							Pike et al. 2009c	
					NASS	2015	S	IO	48,752	0.31	26,562-89,478	159,000	0.63	49,957-506,054	1	0	NAMMCO SC/25 (AEWG 2018)		Pike et al. 2019a
					TNASS	2007	S	BT	86,255	0.47	30,512-243,835	91,277	0.53	32,351-257,537	1	0	NAMMCO SC/26 (AEWG 2019)		Pike et al. 2020a
	NASS	87-01	S	SP/BT	na									Mode depending on survey and area.					
Atlantic white-sided dolphins	NA	IS - FO	IS + FO	NASS	2015	S	IO	40,173	0.48	15,334-105,248	131,022	0.73	35,251-486,981	1	0	NAMMCO SC/25 (AE 2018)		Pike et al. 2019a	
				TNASS	2007	S	BT	32,296	0.4	14,609-71,838	81,008	0.54	27,993-234,429	1	0	NAMMCO SC/26 (AE 2019)		Pike et al. 2020a	

Species	Regions	Management areas/sub-areas	Survey					Uncorrected Abundance Estimate (p) (a): corrected for bias			Corrected Abundance Estimate			Bias		Endorsed by [Initial estimate]	Comments	Publications [Unpublished document]			
			Area	Name	Year	A / S	M	UAE	CV	95% CI	CAE	CV	95% CI	p	a						
Short-beaked common dolphin	Common dolphins are usually not observed in NASS surveys, no sightings have been made north of 57° (Cañadas et al. 2009). The Faorese blocks of the 1995 NASS survey went south of this limit and had many sightings.																				
	NEA	NEA	IS + FO	NASS	2015	S	IO	69s											Pike et al. 2020b		
			FO	NASS	1995	S	BT					350,696	0.24	210,958-539,926	1	0		Corrected both for perception bias & responsive movements.	Cañadas et al. 2009		
Harbour porpoise	NEA	GL	West GL	NASS	2015	A	IO	15,831(p)	0.34	8,514-31,202	106,822	0.35	55,149-206,909	1	1+	NAMMCO SC/26 (HPWG 2019)	Abundance also corrected for hp outside the survey strata. Availability bias corrected with data collected from 9 hp satellite tagged off Greenland, using a 19% availability factor.				
				TNASS	2007	A	IO	10,314(p)	0.35	5,193-20,484	69,595	0.37	34,689-139,624	1	1+	NAMMCO SC/26 (HPWG 2019)					
				NASS	1987	A	SP	tfs											Larsen et al. 1989		
			East GL	NASS	2015	A	IO	312	1.00				1,642	1.00	318-8,464	1	1	NAMMCO SC/23 (AEWG 2016)		Hansen et al. 2018	
		IS	CIC	NASS	2016	A	IO	10,506	0.26	6,120-18,036			22,806	0.48	9,166-56,746	1	0	NAMMCO SC/26 (AEWG 2019)	Potential for substantial negative bias, as no availability correction and incomplete coverage.	Pike et al. 2020b	
				NASS	2009	A	IO	na										Data quality, incl. realised coverage not appropriate.			
				TNASS	2007	A	IO						43,179	0.45	31,755-161,899	1	1	NAMMCO SC/18 (AEWG 2011)	SCANS-II esw and g(0) applied for bias correction.	Gilles et al. 2020	
				NASS	2001	A	IO	tfs											Pike et al. 2009c		
				NASS	1995	A	IO	5,156	0.42	3,027-8,783											
				NASS	1987	A	SP	na												30 sightings but no perpendicular distance recorded.	Donovan & Gunnlaugsson 1987
					IS	1986	A	SP	4,239	0.35	2,724-6,599										
				FO	FO coastal	FO	2010	A	IO					5,175	0.44	3,457-17,637	1	1	NAMMCO SC/18 (AEWG 2011)	SCANS-II esw and g(0) applied for bias correction.	Gilles et al. 2020
		NO	NO mosaic	NILS	2014-18	S	IO	129,723	0.18	89,018-189,038			255,929	0.20	172,742-379,175	1	0	NAMMCO SC/26 (AEWG 2019)		Leonard & Øien 2020a	
				NILS	2008-13	S	IO	14,500	0.31	7,868-26,721			38,351	0.58	10,502-88,907	1	0	[NAMMCO SC/26 (AEWG 2019)]	Comparatively anomalously low and inconsistent abundance estimate. On WG advice, distance was removed from the conditional detection function	Leonard & Øien 2020b	
				NILS	2002-07	S	IO	98,205	0.13	75,081-128,450			189,604	0.19	129,437-277,738	1	0	NAMMCO SC/26 (AEWG 2019)			
				NILS	1996-01	S	IO	na													
NILS	1995			S	IO	na															
NASS	1989			S	SP	93,612	0.22											Only partial coverage of the area.	Bjørge & Øien 1995		
			NO	NASS	1987	S	SP	tfs										Øristland et al. 1989			

Species	Regions	Management areas/sub-areas	Survey					Uncorrected Abundance Estimate (p) (a): corrected for bias			Corrected Abundance Estimate			Bias		Endorsed by [Initial estimate]	Comments	Publications [Unpublished document]
			Area	Name	Year	A / S	M	UAE	CV	95% CI	CAE	CV	95% CI	p	a			
Beluga	Eastern High Arctic - Baffin Bay	North Water + WGL	North Water	GI	2018	A	IO				2,063	0.81	513-8,289	1	1	NAMMCO SC/27 (JWG 2020)	Spring (April) surveys. Combined line-transect and strip census analysis.	[Heide-Jørgensen and Hansen 2020]
				GL	2014	A	IO				2,324	0.27	968-5,575			NAMMCO SC/22 (JWG 2015)	Spring (April) surveys. Partial coverage of potential habitat.	Heide-Jørgensen et al. 2016b
				GL	2010	A	IO	1,067(p)	0.27	636-1,792	2,482	0.28		1	1	NAMMCO SC/21 (JWG 2012)	Abundance for 2009-10 is 2,245 (CV=0.11, 95% CI 1,811-2,783).	Heide-Jørgensen et al. 2013
				GI	2009	A	IO	863(p)	0.33	460-1,620	2,008	0.34		1	1		Spring (May) surveys.	
			GL	2012	A	IO				9,072	0.32	4,895-16,815	1	1	NAMMCO SC/22 (JWG 2015)	MRDS estimate.	Heide-Jørgensen et al. 2016a	
			GL	2006	A	IO				10,595	0.43				NAMMCO SC/16 (JWG 2009)		Heide-Jørgensen et al. 2010c	
			GL	1998-99	A	IO				7,941	0.41	3,650-17,278	1	1	NAMMCO SC/8 (PSBNWG 2000)		Heide-Jørgensen & Acquarone 2002	
			GL	1998	A	IO				6,722		3,562-12,688	1	1	NAMMCO SC/7 (PSBNWG 1999)			
			GL	1993-94	A	IO				11,563		8,560-15,621	1	1				
		Svalbard-Barents Sea	Svalbard	Svalbard	NO	2018	A	SP				549		436-723	0	1		
Narwhal	The narwhal is at present not included in this table. Abundance estimates for narwhal have been corrected for perception and availability biases in different ways for different surveys. The Joint NAMMCO/JCNB Working Group on Narwhal and Beluga, which is the scientific body providing advice to NAMMCO and the Canada-Greenland Joint Commission on Narwhal and Beluga (JCNB), decided at its last meeting in October 2020, that it needed to review these corrections and to agree on best corrected estimates before they be made available.																	

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