

Photo-identification of minke whales (*Balaenoptera acutorostrata*) in the coastal waters of Faxaflói and Skjálfandi Bays, Iceland

P08

Bertulli, C.G. (1) Bárðarson, H. (2) Rasmussen, M.H. (3) and Tetley, M.J. (4)

- (1) University of Iceland, Sturlugata 7, 107 Reykjavik, Iceland; Elding Whale-watching Company, Ægisgata 7, 101 Reykjavik, Iceland
 (2) Húsavík Whale Museum, P.O. Box 172, Hafnarstétt, 640 Húsavík, Iceland
 (3) Húsavík Research Centre, University of Iceland, Hafnarstétt 3, 640 Húsavík, Iceland
 (4) WDCCS, The Whale and Dolphin Conservation Society (WDCCS), Brookfield House, Chippenham, Wiltshire, SN15 1LJ



Bertulli



Introduction

Balaenoptera acutorostrata is endemic to the North Atlantic and present in Icelandic waters during mainly spring, summer and autumn months (Salo, 2004; Bertulli, 2010). The aims of this study are to calculate in both Faxaflói (FB) and Skjálfandi (SB) Bays:

1. minimum abundance
2. intra and inter-annual site fidelity
3. movements of whales between bays

Methods

Photographs were collected opportunistically from May to September from whale watching vessels operating out of Faxaflói Bay (2007-2010) and Skjálfandi Bay (2001-2010) located respectively in the south-west and north-east of Iceland (Fig 1). All photos were subject to a quality grading process (image size, focus, angle, clarity).

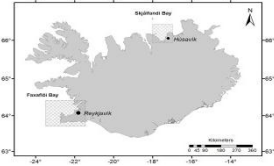


Fig 1. The two study areas off Iceland, as noted by cross-hatching (©Tetley)

Results

Between May 2007 to September 2010, minke whales were observed on 760 survey days in Faxaflói and Skjálfandi Bays. Among them, 1110 were the photographic surveys (n=594, 53.5% in FB, n=516, 46.5% in SB) when *B. acutorostrata* was sighted.

1) Minimum abundance

Table 1. Total number of identified *B. acutorostrata* divided per identification categories (DEM, dDES, nDEM), number of new identifications (in brackets) and number of identifying photographs (photo-ID images) per year in (a) Faxaflói and (b) Skjálfandi Bays. ND=no data collected.

Faxaflói Bay					
Survey year	DEM	dDES	nDEM	Total	No. Photo-ID images
2007	32(32)	25(25)	9(9)	66(66)	472
2008	79(68)	22(17)	23(23)	124(108)	679
2009	57(26)	15(10)	12(10)	84(46)	563
2010	69(33)	20(14)	25(25)	114(72)	1090
Min abundance	237(159)	82(66)	69(67)	388(292)	2804

Skjálfandi Bay					
Survey year	DEM	dDES	nDEM	Total	No. Photo-ID images
2001	1(1)	0(0)	1(1)	2(2)	4
2002	4(4)	0(0)	0(0)	4(4)	11
2003	ND	ND	ND	ND	ND
2004	3(3)	2(2)	0(0)	5(5)	22
2005	2(2)	0(0)	1(1)	3(3)	11
2006	4(3)	1(1)	0(0)	5(4)	36
2007	5(2)	2(2)	0(0)	7(4)	30
2008	9(4)	4(4)	2(2)	15(14)	108
2009	13(6)	3(3)	4(4)	20(13)	139
2010	17(9)	2(2)	5(5)	24(16)	165
Min abundance	58(34)	14(14)	13(13)	85(61)	526

A total of 292 individuals were identified in Faxaflói Bay (FB), and 61 in Skjálfandi Bay (SB), based on the presence of nicks or notches on their dorsal fins (DEM) and/or backridge, dorsal fin shape (dDES), and marks on their body (nDEM) (Fig 2). However, majority of minke whales in FB (54.5%, n=159) and SB (55.7%, n=34) were identified as DEMs.



Fig 2. Examples from left to right of individuals *B. acutorostrata* a) DEM03, dDES b) dDES59 and nDEM c) nDEM31 from Faxaflói Bay. Photos: ©Chiara G. Bertulli/Faxaflói Cetacean Research.

2) Site fidelity

Table 2. Minimum residency time expressed per year for (a) Faxaflói and (b) Skjálfandi Bays

Faxaflói Bay						Skjálfandi Bay					
Survey year	n	Range (days)	Mean	SD	95% CI	Survey year	n	Range (days)	Mean	SD	95% CI
Overall	169	1-117	19.96	22.43	16.58-23.34	Overall	73	1-100	13.04	19.18	8.64-17.44
2007	24	1-63	21.00	18.93	13.43-28.57	2002	1	63	63.00	0.00	63-63
2008	59	1-70	14.81	15.41	10.88-18.74	2004	2	5-6	5.50	0.71	4.52-6.48
2009	38	1-112	21.63	23.02	14.31-28.95	2005	2	6-18	12.00	8.49	0.23-23.77
2010	48	1-117	24.46	29.27	16.18-32.74	2006	2	3-14	8.50	7.78	-2.28-19.28
						2007	1	34	34.00	0.00	34-34
						2008	15	1-100	24.47	29.56	9.51-39.43
						2009	18	1-57	9.89	17.20	1.94-17.84
						2010	32	1-39	8.06	9.95	4.61-11.51

Confidence intervals: no statistical differences in FB ($p > 0.05$); 2002-2004 and 2006-2007 in SB statistically significant ($p < 0.05$)

3) Movement between bays

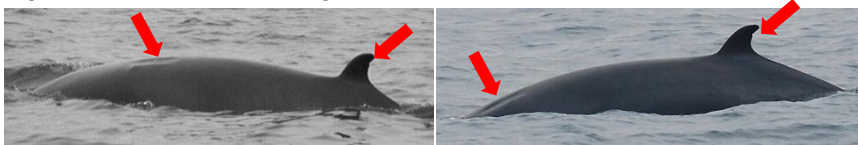


Fig 3. Photo of a minke whale (DEM24) sighted first in Skjálfandi Bay in July 2002, re-sighted in Faxaflói Bay (DEM162) in April 2010. Photos: ©Húsavík Whale Museum, ©Chiara G. Bertulli/Faxaflói Cetacean Research respectively

Table 3. Annual re-sighting rate between years for all photo-ID whales in (a) Faxaflói and (b) Skjálfandi Bays

Faxaflói Bay			Skjálfandi Bay		
Years sighted	No. animals	Percentage	Years sighted	No. animals	Percentage
1 year	224	76.7%	1 year	51	83.6%
2 years	53	18.2%	2 years	4	6.6%
3 years	9	3.1%	3 years	3	4.9%
≥4 years	6	2.1%	≥4 years	3	4.9%

Overall annual re-sighting rates of 23.3% (n=68) in Faxaflói Bay and 16.4% (n=10) in Skjálfandi.

Both photo-ID catalogues includes images of 353 individually recognizable whales of which 1 individual has been re-sighted in both areas. This equates to an overall proportion of re-sighting of 0.3%. This is the first documented wide-range distance movement from SW to NE of a minke whale along the Icelandic coastline using photo-identification.

Conclusions

- The most suitable identification criteria was based upon nicks, notches and indentations (DEM)
- Photo-identification is a feasible technique for the individual recognition of minke whales and to study their ecology and movements in Icelandic coastal waters
- Low annual re-sighting rate maybe due to small sample size of opportunistic nature, not confined topographically study areas, and correlated to spatial variability of prey patches in both our areas

References

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