

**Curation of the North Atlantic Humpback Whale Catalogue
and Associated Databases**

Progress Report to Northeast Fisheries Science Center (NEFSC)
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Submitted by

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This report covers research done during the performance period ending September 25, 2002, partially funded under contract 43EANF030134. Objectives during the performance period were to conduct photographic analysis for catalogue maintenance, maintain photographic archives and upgrade computer databases from the North Atlantic Humpback Whale Catalogue (NAHWC); and to create digital scans of the primary photos for the existing NAHWC. Results described below include all progress between September 26, 2001 and September 25, 2002.

Introduction

In the late 1960's, researchers discovered that there was enough variation in natural markings of humpback whale (*Megaptera novaeangliae*) tail flukes to distinguish between individuals, and began collecting photographs of individual whales and tracking those individuals over time (Kraus and Katona, 1977; Katona et al., 1979). College of the Atlantic (COA) personnel pioneered the development and testing of this method and coordinated the development of a collaborative network throughout the North Atlantic region for gathering fluke photographs from different regions into the North Atlantic Humpback Whale Catalogue (NAHWC) and master database. Scientists throughout the world now rely on photographic re-sightings of individually identified whales to study the biology, life history, migrations, and population structure of many species (see Hammond, Mizroch and Donovan, 1990). Identification of individual whales by means of fluke patterns has led to rapid scientific progress in detailing humpback distribution, population size, behavior, ecology, and reproduction as shown in the results of Whitehead, Silver and Harcourt (1982); Darling and Jurasz (1983); Glockner-Ferrari and Ferrari (1984); Martin et al. (1984); Baker et al. (1986); Katona and Beard (1991); Clapham et al. (1992); Clapham (1993); and Calambokidis et al. (1996). The results of these efforts have been used to monitor the recovery of humpback whale populations (Whitehead, 1987; NMFS, 1991; Katona, 1991; Smith et al, 1999).

This report covers photographic analysis, database management and analysis and catalogue maintenance conducted between September 26, 2001 and September 25, 2002 under contract 43EANF030134.

Catalogue Maintenance

The NAHWC now contains a total of 19,305 fluke photographs of 5,380 individual humpback whales. Of this number, 1,859 individuals have been sighted in the same region in more than one year, and 815 individuals have been sighted in more than one region. The distribution of individuals between regions, and the number sighted in more than one year or region is shown below in Table 1. Note that the Eastern North Atlantic region includes whales sighted off Norway, the Finmark coast, Jan Mayan, Bear Island, and the Barents Sea. Europe includes whales sighted off the Faeroes, the Azores, the northwest coast of Spain, Ireland, Scotland, and the Mediterranean. The distribution of resightings between regions is shown below in Table 2.

Region	Total Number Photos	Total Number Whales	No. Re-sighted in More Than One Year	No. Re-sighted in More Than One Region
Eastern Caribbean	207	140	3	55
Puerto Rico	600	466	25	172
Dominican Republic	2,675	1,719	168	535
Bermuda	280	136	5	55
US So. of Cape Cod	197	70	4	30
Gulf of Maine	8,405	1,115	646	197
Gulf of St. Lawrence	1,223	347	145	179
Newfoundland	4,255	1,755	378	478
Greenland	1,181	410	211	85
Iceland	57	40	1	12
Eastern North Atlantic	182	118	0	14
Europe	15	6	0	0
Cape Verde Islands	28	23	0	1
TOTAL NAHWC	19,305	5,380	1,859	815

Table 1. Distribution of individuals between regions, and the number of individuals sighted in more than one year or region.

Region	EC	PR	DR	B	US	GOM	GSL	NFLD	ICLD
Eastern Caribbean									
Puerto Rico	12								
Dominican Republic	23	66							
Bermuda	4	7	21						
US So. of Cape Cod	0	0	3	0					
Gulf of Maine	7	21	118	12	24				
Gulf of St. Lawrence	2	20	49	4	1	23			
Newfoundland	15	83	272	17	6	23	142		
Greenland	7	7	62	3	0	1	3	13	
Iceland	0	4	3	1	0	0	0	0	
Eastern North Atlantic	0	2	8	0	0	0	0	0	5
Europe	0	0	0	0	0	0	0	0	0
Cape Verde Islands	0	0	0	0	0	0	0	0	1

Table 2. The distribution of re-sightings between regions.

During the performance period a total of 873 images representing 366 individual whales were added to the NAHWC. One hundred and twenty-eight of these animals were new whales. Further, we continued our cataloguing of individuals from the YoNAH project. YoNAH records added to the NAHWC included 188 photos of 65 whales. These records are included in the numbers for Pre-1993 and 1993 in Table 3. This brings the number of YoNAH whales that have been matched to the NAHWC to 796. The number of catalogued photographs by year is shown in Table 3 and by region in Table 4.

Cataloguing efforts once again strived to balance the photo analysis of newly received images and backlogs of older collections put on hold during the Yonah Project. The past year concentrated on Atlantic Canada photographs; three hundred and eighty-two photographs from this region were taken through the NAHWC.

	Pre- '93	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	Total
Number of photographs	214	97	25	32	17	141	5	56	133	147	6	873
Number of whales	76	40	12	10	11	58	5	37	98	94	5	366

Table 3. Number of photographs and the number of individual humpback whales by year catalogued during the contract period, Sept. 26, 2001 - Sept. 25, 2002.

Region	Number of Photographs	Number of new whales	Number of known whales	Total number of whales
Virgin Islands	1	1	0	1
Puerto Rico	4	0	2	2
Dominican Republic	36	1	20	21
Bermuda	4	1	1	2
US So. of Cape Cod	42	18	1	19
Gulf of Maine	350	48	88	136
Gulf of St. Lawrence	106	1	73	74
Newfoundland	276	25	60	85
Greenland	2	0	1	1
Iceland	20	15	1	16
Eastern North Atlantic	6	6	0	6
Europe	9	2	1	3
Cape Verde Islands	17	13	1	14
TOTAL	873	128	238	366

Table 4. Number of photographs and individually identified (previously known and new) humpback whales by region catalogued during contract period, Sept. 26, 2001 - Sept. 25, 2002.

Photographic Contributions Received During the Contract Period

During the contract period, a total of 335 photographs of 259 individual whales were received from 29 organizations and individuals. The total number of regions represented was 11. Sub-regions included the Bay of Fundy, George's Bank, Bequia, Bermuda, Gulf of Mexico, and Ireland. Nearly all photographs were taken in 2001 or 2002. Submissions are detailed in Table 5 below.

Name of Organization	No. Photographs	No. Whales	Year(s)	Region
Brier Island Whale and Seabird Cruises	72	72	2001	Gulf of Maine (Bay of Fundy)
Mingan Island Cetacean Study	66	66	2001	Gulf of St. Lawrence
New England Aquarium	11	5	2001	Gulf of Maine (Bay of Fundy)
Beatrice Jann	32	19	1999, 2002	Cape Verde Islands
Wildland Tours	46	22	2001	Newfoundland
Caribbean Center for Marine Studies	4	2	2001	Puerto Rico
Dianna Schulte	13	13	2002	Gulf of Maine
The Irish Whale and Dolphin Group (Simon Berrow)	7	2	2002	Ireland (Cork)
Husavik Whale Centre	2	2	2001	Iceland
Tony Soper	1	1	2001	Iceland
Mark Carwardine	1	1	2001	Iceland
Marine Animal Lifeline	8	1 (Dead)	2002	Gulf of Maine
Center for Coastal Studies	1	1 (Dead)	2001	Gulf of Maine
International Wildlife Coalition (Regina Asmutis-Silvia)	6	1 (Dead)	2002	Gulf of Maine (George's Bank)
Virginia Marine Science Museum	6	1 (Dead)	2002	Mid US States (Virginia)
Fisheries Division, St. Vincent and the Grenadines	1	1 (Dead)	2001	Eastern Caribbean (Bequia)
Various individuals	58	47	2001, 2002	Gulf of Maine, Newfoundland, Dominican Republic (Samana Bay, Silver Bank), Bermuda, Gulf of Mexico (Florida)
TOTAL	335	259		

Table 5. Number of photos received during the contract period, names of contributing organizations and individuals, the season and year where the photos were taken and the regions/sub-regions where the animals were photographed.

Collections of Interest

The Cape Verde Islands have been a region of great interest and during the contract period produced the most significant finding. Seventeen photos of 14 individuals, photographed in this region during 1999 and submitted by Beatrice Jann, were catalogued. There were no matches in this collection. A second collection of 32 images was submitted by Jann during the contract period: three from 1999, the remainder from the 2002 season. (See Table 5.) One of the 1999 photos in the latter collection matched to a whale photographed in 1982 (HWC# 4504) off the coast of Iceland by Tony Martin of the British Antarctic Survey. Interestingly, two other humpback whales photographed during the 1982 Icelandic cruise were subsequently re-sighted - one off Puerto Rico in 1983, and another off Bermuda in 1985.

The Cape Verde to Iceland match is the first match of a Cape Verde Islands whale to a North Atlantic feeding area. Beatrice Jann and Fred Wenzel et al. are writing up the results. The analysis of the remaining Cape Verde whales is nearly completed; there have been no further matches.

Analyses of a humpback whale sighted in the Moray Firth, Scotland in 2001 and another photographed off Cork, Ireland in 1997 were completed. They did not match to the catalogue. Two more Irish whales from 1999 wait to be catalogued

Photographs of six whales from Norway were catalogued during the contract period; no matches were found.

Several Icelandic whale photographs were submitted to the NAHWC. Two were designated new animals and catalogued. Two more are almost completed; and an additional two await analysis.

One photograph was received from the Fisheries Division of St. Vincent and the Grenadines of the whale killed in the 2001 local humpback whale hunt off Bequia. The animal did not match to the NAHWC. Another southern sighting of interest came from the Gulf of Mexico, off Florida. The comparison did not provide a match; it awaits final cataloguing.

Contributor Letters

In keeping with maintenance protocol, once photographic submissions were catalogued, a contributor letter was sent to the contributing individual or organization summarizing the results.

Number of Fluke Photographs To Be Catalogued

The number of flukes photographs waiting to be catalogued numbers 1,442. This number represents the total number of photographs not the number of individual animals. A large collection of Newfoundland photographs taken in 1994 was submitted during the contract period inflating the numbers for that region. Several considerably large Gulf of Maine collections

representing 10 consecutive years and received only last year, still await analysis. Table 6 summarizes the photographic holdings to be catalogued by year and region.

Region	Pre-1993	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	TOTAL
Gulf of Maine	68	18	30	22	15	81	76	43	44	85	24	506
Mid-Atlantic States		2		1							1	4
Nfld., incl. St. Pierre & Miquelon	132	2	190	158	14	4	15	17	32	59	33	656
Gulf of St. Lawrence	1			1				1	36	23		62
Northern Labrador and Northern Baffin Island					4				6			10
Greenland	1											1
Iceland											4	4
Ireland								2				2
West Indies	20	65	1	2	27	8		3	30	1	9	166
Gulf of Mexico											1	1
Cape Verde Islands								2		1	27	30
TOTAL	222	87	221	184	60	93	91	68	148	169	99	1,442

Table 6. Number of fluke photographs to be catalogued as of September 25, 2002.

Digital Scanning

New catalogue photographs were digitally scanned upon inclusion into the NAHWC as per maintenance protocol. The scanning of the primary catalogue photographs is still in progress. To date, approximately 4,518 images have been scanned into the computer database.

Summary

During the performance period a total of 873 images representing 366 individual whales were added to the NAHWC. One hundred and twenty-eight of these animals were new whales. A critical find was the match of a Cape Verde Islands whale to one photographed in Icelandic waters. Contributions received during the contract period totaled 335 photographs of 259 individuals. The number of fluke photographs awaiting analysis is 1,442 and represents eleven regions.

Publications

- Barco, S., W. McLellan, J. Allen, R. Asmutis-Silvia, R. Mallon-Day, E.M. Meagher, D.A. Pabst, J. Robbins, R.E. Seton, W.M Swingle, M.T. Weinrich, and P.J. Clapham. 2002. Population identity of humpback whales (*Megaptera novaeangliae*) in the waters of the US mid-Atlantic states. *Journal of Cetacean Research Management*. Vol. 4(2): 135-141.
- Clapham, P., J. Barlow, M. Bessinger, T. Cole, D. D. Mattila, R. Pace, D. Polka., J. Robbins., and R. Seton. 2003. Abundance and demographic parameters of humpback whales from the Gulf of Maine, and stock definition relative to the Scotian Shelf. *Journal of Cetacean Research Management*. In press.

Papers In progress

- Jann, B., J. Allen , M. Carrillo , S. Hanquet , S. K. Katona , T. Martin, R. Reeves, R. E. Seton, P.T. Stevick , and F. W. Wenzel. Migration of a humpback whale between the Cape Verde Islands and Iceland. In progress.
- Stevick, P.T., J. Allen, P.J. Clapham, N. Friday, S.K. Katona, F. Larsen, J. Lien, D.K. Mattila, P.J. Palsbøll, J. Sigurjónsson, T.D. Smith, N. Øien, and P.S. Hammond. Trends in abundance of North Atlantic Humpback Whales, 1979-1993. In progress.

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