Right Whales aerial sightings in Cape Cod Bay and adjacent waters from the R/V Shearwater NEC-MB2002-1, 2002 (NEC-CoopRes project)

Website: https://www.bco-dmo.org/dataset/2988
Data Type: Other Field Results
Version: 1
Version Date: 2009-03-17

Project
» Northeast Consortium: Cooperative Research (NEC-CoopRes)

Program
» NorthEast Consortium (NEC)

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Abstract
Right Whales aerial sightings in Cape Cod Bay and adjacent waters from the R/V Shearwater NEC-MB2002-1, 2002 (Northeast Consortium Cooperative Research project).

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Coverage

Spatial Extent: **N**:42.5 **E**:-69.5 **S**:41.5 **W**:-71
Temporal Extent: 2002-01-06 - 2002-05-21

Dataset Description

Surveillance, Monitoring, and Management of Right Whales and Habitat of Cape Cod Bay: 2002

Number of opportunistic marine mammal sightings and hours at sea during vessel-based habitat sampling cruises of Cape Cod Bay and adjacent waters, 2002

report: Surveillance, Monitoring and Management of North Atlantic Right Whales in Cape Cod Bay and Adjacent Waters - 2002 Final Report by Moira W. Brown, Owen C. Nichols, Marilyn K. Marx, and Jacqueline N. Ciano, Charles Mayo, Moriah Bessinger.

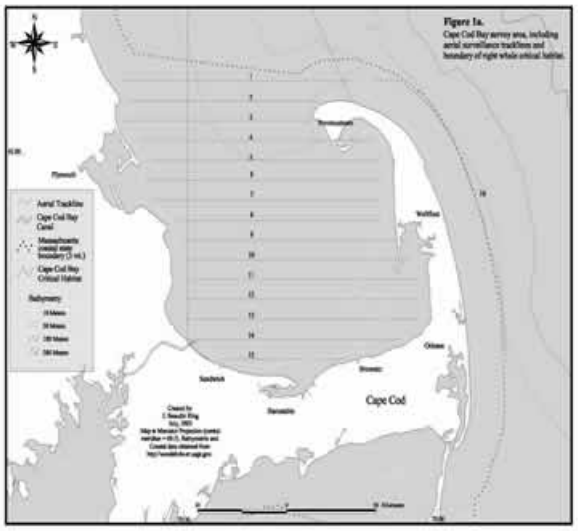
Executive Summary:

In 2002, from aerial and shipboard efforts in all areas combined, there were 139 sightings of right whales, of which 135 right whales were photographed and analyzed for this report. Of those 135 photographed sightings, 54 were from Cape Cod Bay and state waters along the outer coast of Cape Cod between Chatham and Provincetown (39 from aerial surveys and 15 from vessel cruises), 30 were from aerial surveys of Stellwagen Bank/Wildcat Knoll and 51 were from the Great South Channel.

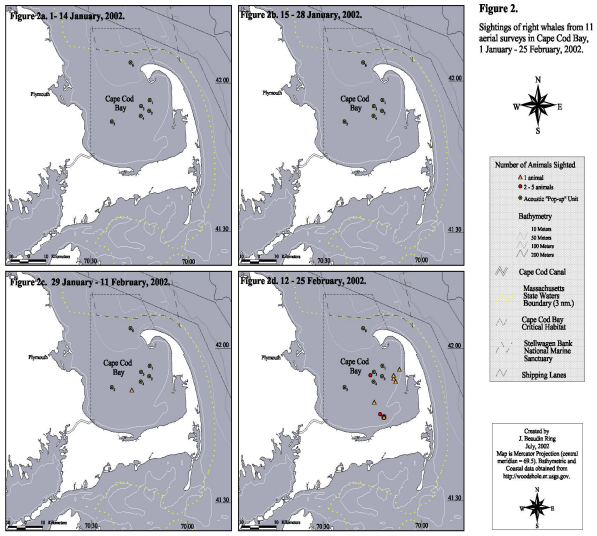
To date, of the 135 photographed sightings, 48 of 54 (88%) in Cape Cod Bay and adjacent state waters and 21 of 30 (70%) in Stellwagen Bank/Wildcat Knoll have been matched to an individual right whale. The 54 sightings from Cape Cod Bay consisted of at least 24 different right whales. There were 18 right whales identified from aerial and vessel surveys and five additional whales that have yet to be matched, but that do not match any of the 18 animals plus one right whale photographed in the Cape Cod Canal on 15 April that was not seen during surveys. The 30 photographed sightings on Stellwagen Bank/Wildcat Knoll represent 29 different right whales of which 21 have been matched to an individual in the catalogue. Of note is one of the identified whales (# 1145), an adult female, which was seen with a calf. This mother calf pair was not recorded during any other surveys or on the calving ground in the southeast US. Our sighting of the calf brings the annual reproduction total for 2002 to 22 calves. Only one whale was seen on more than one occasion (#1424, an entangled right whale) and there remain eight individuals to be matched. There were 51 photographed sightings obtained in the two Great South Channel aerial surveys. Of those, only four whales, two mother calf pairs also seen on the calving, have been matched. The photographic matching process for the remaining sightings is still underway. None of the matches has undergone final confirmation by researchers the New England Aquarium. This will take place in the autumn of 2002. All sightings were reported upon completion of each survey to the National Marine Fisheries Service Sighting Advisory System. These aerial and vessel surveys are the principal source of right whale sightings for the NMFA/SAS in the winter months for waters in the northeast north of latitude 41°N.

Right whales were documented during aerial surveys of the Cape Cod Bay Critical Habitat area, in state waters west of the critical habitat and along the outer coast of Cape Cod between Chatham and Race Point for 37 days from 7 February to 15 March 2002. These visual sightings were augmented with passive acoustic monitoring in Cape Cod Bay. The bottom-mounted hydrophones recorded low levels of right whale calls from 24 December 2001 through April and early May. The results of the combined research efforts document right whale presence in Cape Cod Bay from late December through April into early May consistent with the results of the past four years. These data support the timing of existing management actions regarding gear restrictions.

The presence of right whales in nearby areas outside of the critical habitats of either Cape Cod Bay or the Great South Channel in 2002 and in past years suggests that a re-evaluation of the area protected by ESA Critical Habitat designation is needed and timely to adequately reflect the distribution and movements of right whales. The use of these areas such as the eastern portion of Stellwagen Bank and Wildcat Knoll has only come to light with the expanded survey efforts of the last five years. Since these areas are used for fishing activity and are transected by a major shipping lane between Boston and New York, consideration should be given to changing the boundaries of the neighboring Cape Cod Bay and Great South Channel Critical Habitats to include these areas of seasonal importance to right whales. We recommend that the data collected in the Stellwagen Bank/Wildcat Knoll area over the last five years be assessed using sightings-per-unit-of-effort analysis to determine the density and seasonality of right whale use and that the area be considered as a target for habitat sampling to assess the conditions of the food resource and for passive acoustic monitoring equipment to augment visual sightings.



(click maps to enlarge)



Division of Marine Fisheries News article

Methods & Sampling

Methods

I) Aerial Surveys

Aerial surveys were conducted from January through mid-May 2002 in the Cape Cod Bay Critical Habitat and adjacent waters (Figures 1a-e, Tables 1a-e). The aerial survey protocol for Cape Cod Bay, as described in Kraus et al (1997), was adopted with some modifications. Fifteen tracklines were flown latitudinally (east - west) at 1.5 nautical mile (nm) intervals from the mainland to the Cape Cod Bay shoreline (Figure 1a). An additional trackline, 25 nm in length, paralleled the outer coast of Cape Cod from east of Chatham to the eastern end of trackline one at a distance of about three nm from shore (Figure 1a, trackline number 16). The east-west flight pattern in Cape Cod Bay was chosen for scientific and safety reasons. In these latitudes, winter aerial surveys are hampered by low sun angles in the early and late hours of a survey day and glare is a significant factor in sightability of marine mammals. On east-west tracklines, although glare was a factor in one of the forward quadrants, there was always a section of the survey swath that could be observed without being compromised by glare. It was also safer to have the aerial survey tracklines begin and end near land. A total of 320 nm of 'on-trackline' miles were flown during each completed survey (Table 1a). "On-trackline" miles were those miles flown while surveying due east or due west in Cape Cod Bay and along the outer coast of Cape Cod, but excludes all miles flown between tracklines (cross legs) or while circling.

The surveys were flown under VFR (visual flight rules) conditions up to and including Beaufort sea state four. Surveys were aborted in Beaufort sea state five and/or when visibility decreased below two miles in fog, rain or snow. All aerial surveys originated at Chatham Airport, Chatham, MA. They were conducted in a Cessna 337 Skymaster (5382S), a twin engine, high-wing aircraft with retractable landing gear. The aircraft was equipped with two GPS (global positioning system) navigation systems, full IFR (instrument flight rules) instrumentation, marine VHF radio with external antenna, and wing-tip mounted VHF tracking antennas. Safety equipment included a life raft, four survival suits, signal flares, a medical kit, a waterproof VHF radio, a portable EPIRB, and an aircraft mounted ELT (emergency locator transmitter). All occupants wore aircraft approved PFDs (personal floatation device) during the entire flight.

Surveys were conducted at a standard altitude of 750 feet (229 meters) and a ground speed of approximately 100 knots, using methodology developed by CeTAP (Scott and Gilbert 1982, CeTAP 1982). The survey team consisted of a pilot, data recorder, and two observers positioned on each side of the aircraft in the rear seats. The two rear seat observers scanned the water surface from 0° - 90°, out to at least two nautical miles and reported sightings when they were abeam of the aircraft. In order to maintain a standardized sighting effort, the pilot and data recorder were instructed not to alert the observers to any sightings of marine mammals until after it had been passed by the aircraft and clearly missed by the observers. The turn at the end of each trackline was initiated and completed about 1.5 nm from shore in Cape Cod Bay to maximize the opportunity to observe any whales near shore.

All sightings of marine animals except birds were recorded. Sightings identified as species other than right whales were counted, logged and passed without breaking the trackline and circling in order to maximize flight time available for investigating right whale sightings. Sightings of all vessels in the area were recorded by location and type. At sightings identified as right whales, as well as sightings of large whales, which were not immediately identified by species, the aircraft broke track at right angles to the sighting and circled over the animal to obtain photographs. Photographs were obtained of as many individual right whales within a given aggregation as possible. For each right whale, behavior and interaction with other whales or any nearby vessels or fishing gear was noted. In a few instances, when right whales were spotted from the plane in close from the vessel so that the plane could devote more time to surveying. The right angle distance of each sighting from the flight track was determined from GPS positions.

At the conclusion of photographic effort at each sighting, the aircraft returned to the trackline at the point of departure using the GPS position recorded in the log. These methods conform to research protocols followed by the North Atlantic Right Whale Consortium (CCS, NEAq, URI, and WHOI) and approved by the US NMFS. Trackline and sighting data from the daily logs were entered into the Right Whale Initiative DBase program designed for compatibility with the Right Whale Consortium database. Copies of the daily logs from the aerial surveys are on file at CCS and URI.

Photographic Methods
i) Identification Photographs:
During aerial and shipboard surveys, photographs were taken on Kodak Kodachrome 200ASA color slide film, using hand-held 35-mm cameras equipped with 300-mm telephoto lenses and motor drives. From the air, photographers attempted to obtain good perpendicular photographs of the entire rostral callosity pattern and back of every right whale encountered as well as any other scars or markings. From the boat, photographers attempted to collect good oblique photographs of both sides of the head and chin, the body and the flukes. The data recorder on both platforms was responsible for keeping a written record of the roll and frame numbers shot by each photographer in the daily log.

ii) Photo-analysis and Matching:
Photographs of right whale callosity patterns are used as a basis for identification and cataloging of individuals, following methods developed by Payne et al (1983) and Kraus et al (1986). The cataloging of individually identified animals is based on using high quality photographs of distinctive callosity patterns (raised patches of roughened skin on the top and sides of the head), ventral pigmentation, lip ridges, and scars (Kraus et al 1986). NEAq has curated the catalogue since 1980 and to the best of their knowledge, all photographs of right whales taken in the North Atlantic since 1935 have been included in NEAq's files. This catalogue allows scientists to enumerate the population, and, from resightings of known individuals, to monitor the animals' reproductive status, births, deaths, scarring, distribution and migrations. Since 1980, a total of 26,275 sightings of 436 individual right whales have been archived, of which 327 are thought to be alive, as of December 2001 (A. Knowlton, NEAq, pers. comm.)

The matching process consists of separating photographs of right whales into individuals and inter-matching between days within the season. To match different sightings of the same whale, composite drawings and photographs of the callosity patterns of individual right whales are compared to a limited subset of the catalogue that includes animals with a similar appearance. For whales that look alike in the first sort, the original

photographs of all probable matches are examined for callosity similarities and supplementary features, including scars, pigmentation, lip crenulations, and morphometric ratios. A match between different sightings is considered positive when the callosity pattern and at least one other feature can be independently matched by at least two experienced researchers (Kraus et al 1986). Exceptions to this multiple identifying feature requirement include whales that have unusual callosity patterns, large scars or birthmarks, or deformities so unique that matches from clear photographs can be based on only one feature. Preliminary photo-analysis and inter-matching was carried out at CCS, with matches confirmed using original photographs cataloged and archived at NEAq.

iii) Photographic Data Archiving
Upon completion of the matching process, all original slides were returned to CCS and incorporated into the CCS catalogue of identified right whales to update existing files, using the same numbering system as NEAq, in archival quality slide sheets. New England Aquarium (NEAq) archives copies of photographs representing each sighting. Copies of photographs of individuals that are better than existing records, and photographs of newly identified whales, will be included in the NEAq master files as "type specimens" for future reference. The master files are maintained in fireproof safes at NEAq. All catalogue files are available for inspection and on-site use by contributors and collaborators.

Data Processing Description

Results

Aerial Surveys

In 2002, the right whale aerial surveillance team was in position to survey for 135 days from 1 January through 15 May. There were a total of 23 aerial surveys conducted for the season in the Cape Cod Bay Critical Habitat Area (Figures 1-4, Table 2) plus six aerial surveys conducted in adjacent waters including Stellwagen Basin, Stellwagen Bank, Wildcat Knoll and the Great South Channel (Figures 1, 3-4, Table 2) and one flight to support a disentanglement effort for a total of 30 flights.

Our first flight over Cape Cod Bay was conducted on 6 January, no right whales were observed (Figure 2a, Table 2). Five flights later, the first right whale was documented from the aircraft on 7 February (Figure 2a-2c, Table 2). The last day on which we saw right whales in Cape Cod Bay was 15 March, for a minimum residency time from aerial survey efforts of 37 days (7 February to 15 March). This year marked the shortest residency time of right whales in Cape Cod Bay since aerial surveys began in 1998.

Despite the lack of right whales sightings after 15 March, we maintained our survey effort in Cape Cod Bay and nearby waters. On 25 March, one right whale was seen along the outer coast east of Truro. On 2, 11, 17 and 24 April, additional tracklines were flown north of Race Point and east of Truro, resulting in a few more sightings. There were however, more right whales in nearby waters. Two flights on 29 March and 5 April located a total of 25 right whales over the Stellwagen Bank/Wildcat Knoll area (Figures 1c, 1d, 3c, 3d, Tables 1c, 1d, 2 adjacent waters).

On one day (7 March) during the season, additional tracklines were flown the same day as a survey of Cape Cod Bay to cover areas adjacent to the main survey area on Stellwagen Bank (Figures 1b, 3a, Tables 1a, 2 adjacent waters). This was directed to an area from where a dozen right whales had been reported in February from Dave Wiley, Studds-Stellwagen Bank National Marine Sanctuary, but no right whales were seen. On 12 April we flew tracklines south of Nantucket Island to Block Island in response to a report of right whales south of the runway on Nantucket, but no right whales were seen.

Two surveys were conducted in the Great South Channel (Figures 2e, 4, Tables 1e, 2 adjacent waters,). Both flights observed right whales in greater numbers than had been seen in Cape Cod Bay all winter (Table 2 adjacent waters). This last flight on 12 May brought the flight total for the season to a total of 29 days and 105.5 hours in the air to cover about 8725 nautical miles of ontrackline survey effort (Table 2).

The systematic pre-set tracklines in the Cape Cod Bay Critical Habitat area (Figure 1, Table 1a) were surveyed on average in approximately 3.6 hours for those surveys that were not aborted due to an increase in wind speed, sea state (above Beaufort 4) or decrease in sighting conditions (to visibility less than two nm). Completed surveys ranged in duration from about three to five hours depending on the number of right whales encountered and the amount of circling required to obtain photographs.

The DMF provided two state biologists to fill one of the observer positions on some of the flights during the

season. These biologists have flown in previous years of this program and have been trained in aerial observation techniques for marine mammals, aerial photography techniques for right whales and data collection. Annual participation maintains those skills. In addition CCS naturalist Joanne Jarzobski started training as an aerial observer. The following table provides the number of flights and accumulated hours during the season in 2002.

State biologist	Number of flights	Hours flown
B. Hoffman	2	10.3
B. Kelly	1	3.5
CCS		
J. Jarzobski	2	6.3
Total	5	19.8

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Data Files

File
whales_air.csv(Comma Separated Values (.csv), 50.04 KB) MD5:1ea8972bf7a153e26c6a0f6bad1bfb70 Primary data file for dataset ID 2988

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Related Publications

Cape Cod Bay Right Whale Update, Massachusetts Division of Marine Fisheries (pub.), DMF News Second Quarter April - June 2001, vol 21, page 5. https://www.mass.gov/files/documents/2016/08/uv/dmfnq201.pdf
General

Moira W. Brown, Owen C. Nichols, Marilyn K. Marx, and Jacqueline N. Ciano (2002) Surveillance, Monitoring and Management of North Atlantic Right Whales in Cape Cod Bay and Adjacent Waters - 2002 - Final Report, Center for Coastal Studies and New England Aquarium, submitted to Division of Marine Fisheries, Commonwealth of Massachusetts. https://www.mass.gov/files/documents/2016/08/wh/rwhale02.pdf
Results

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Parameters

Parameter	Description	Units
region	Cape Cod Bay or waters adjacent to Cape Cod Bay	
yrday_local	local year day	
year	year	
month_local	local month	
day_local	local day	
survey_id	code descriptor for a survey	
duration	duration of survey	hours
distance_nm	distance covered in survey	nautical miles
tracks_completed	trackline numbers completed on survey (see map)	
taxon	taxonomic description of animals	
count	number of animals sighted	
comments	free text comments	

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Instruments

Dataset-specific Instrument Name	Camera
Generic Instrument Name	Camera
Dataset-specific Description	35mm camera
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

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Deployments

NEC-MB2002-1

Website	https://www.bco-dmo.org/deployment/57856
Platform	R/V Shearwater
Report	http://nec.whoi.edu/pdf/Rwhale02.pdf
Start Date	2002-01-06
End Date	2002-06-21

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Project Information

Northeast Consortium: Cooperative Research (NEC-CoopRes)

Website: http://northeastconsortium.org/

Coverage: Georges Bank, Gulf of Maine

The Northeast Consortium encourages and funds cooperative research and monitoring projects in the Gulf of Maine and Georges Bank that have effective, equal partnerships among fishermen, scientists, educators, and marine resource managers.

The Northeast Consortium seeks to fund projects that will be conducted in a responsible manner. Cooperative research projects are designed to minimize any negative impacts to ecosystems or marine organisms, and be consistent with accepted ethical research practices, including the use of animals and human subjects in research, scrutiny of research protocols by an institutional board of review, etc.

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Program Information

NorthEast Consortium (NEC)

Website: http://northeastconsortium.org/

Coverage: Georges Bank, Gulf of Maine

The Northeast Consortium encourages and funds
cooperative research and monitoring projects in the Gulf of Maine and Georges Bank that have effective, **equal partnerships** among fishermen, scientists, educators, and marine resource managers.

At the 2008 Maine Fisheremen's Forum, the Northeast Consortium organized a session on data collection and availability. Participants included several key organizations in the Gulf of Maine area, sharing what data are out there and how you can find them.

The Northeast Consortium has joined the Gulf of Maine Ocean Data Partnership. The purpose of the GoMODP is to promote and coordinate the sharing, linking, electronic dissemination, and use of data on the Gulf of Maine region.

The Northeast Consortium was created in 1999 to encourage and fund effective, equal partnerships among commercial fishermen, scientists, and other stakeholders to engage in cooperative research and monitoring projects in the Gulf of Maine and Georges Bank. The Northeast Consortium consists of four research institutions (University of New Hampshire, University of Maine, Massachusetts Institute of Technology, and Woods Hole Oceanographic Institution), which are working together to foster this initiative.

The Northeast Consortium administers nearly $5M annually from the National Oceanic and Atmospheric Administration for cooperative research on a broad range of topics including gear selectivity, fish habitat, stock assessments, and socioeconomics. The funding is appropriated to the National Marine Fisheries Service and administered by the University of New Hampshire on behalf of the Northeast Consortium. Funds are distributed through an annual open competition, which is announced via a Request for Proposals (RFP). All projects must involve partnership between commercial fishermen and scientists.

The Northeast Consortium seeks to fund projects that will be conducted in a responsible manner. Cooperative research projects should be designed to minimize any negative impacts to ecosystems or marine organisms, and be consistent with accepted ethical research practices, including the use of animals and human subjects in research, scrutiny of research protocols by an institutional board of review, etc.

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Funding

Funding Source	Award
National Oceanic and Atmospheric Administration (NOAA)	unknown NEC-CoopRes NOAA

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