

Cruise Results  
NOAA Fisheries Research Vessel Delaware II  
Cruise No. DE - 0404, Parts I & II  
Marine Mammal Survey (Part I) & Passive Acoustic Testing (Part II)



### Cruise Period and Area

**Part I** of the survey was conducted aboard the NOAA RV Delaware II from 1- 9 March, 2004. The primary area of operations was in slope/shelf and oceanic waters around to Baltimore Canyon (Figure 1). Secondly, operations were also conducted in near shore waters off Block Island.

**Part II** of the survey was conducted on March 15, 2004 in waters between Woods Hole, MA and Block Island.

### Objectives

**Part I** - The primary objectives were to: (1) collect information on the relationship between cetaceans, particularly pilot whales and common dolphins, and oceanographic features using sea surface temperature and CTD data; (2) collecting data on group size; and (3) collecting biopsy samples, principally from bow riding animals.

**Part II** - The objective was to sea trial a passive acoustic array by towing it for a day.

### Methods

**Part I:** The marine mammal survey was conducted at a speed of 9.0 - 10.0 knots. Survey operations were conducted during daylight hours (~0730 to 1630), weather conditions permitting. The survey was conducted along predetermined track lines that primarily encompassed shelf/slope and oceanic water. This region was assumed to be late winter / early spring habitat for the target species. Secondly, some opportunistic surveying was conducted in near shore waters.

During survey operations scientific personnel formed a single sighting team of three observers. The survey team followed standard line transect procedures similar to that described in Palka (1995)<sup>a</sup>. The team was located on the flying bridge, 7.9 m above the water line. The scientists rotated through three observation positions where the center person was the recorder and surveyed using the naked eye, while the starboard and port observer searched through 25x150 power binoculars. Every 30 minutes people rotated positions from port to center to starboard to rest to port again.

The starboard observer searched waters on the starboard side and a small overlap area on the port side, that is, from 10° port of the track line to 90° starboard, where 0° is on the track line. The port-side observer searched waters on the port side and a small overlap area on the starboard side, that is, from 10° to starboard of the track line to 90° port. The recorder sat in between the two binocular observers and concentrated searching close to the ship and on the track line, that is, they searched from 30° port to 30° starboard of the track line.

When an animal group (dolphin, whale, or turtle) was detected the following factors were recorded onto a computerized data entry device:

- 1) time of sighting, recorded to the nearest second,
- 2) species composition of the group,
- 3) radial distance between the team's platform and where the sighting was initially detected, estimated either visually when not using the binoculars or by reticles when using binoculars,
- 4) bearing between the line of sight to the group and the track line; measured by a polarus mounted on the binoculars,
- 5) best, high and low estimate of group size,
- 6) initial direction of swim,
- 7) number of calves,
- 8) initial sighting cue,
- 9) initial behavior of the group, and
- 10) any comments on unusual markings or behavior.

The location (latitude and longitude) of a sighting was determined subsequently using an algorithm which used dead reckonings between recorded positions of the ship (see below). Ship's position was recorded every minute.

In addition to the above sighting data, effort data were logged by the recorder, and environmental data were obtained every minute on the ship's fishery scientific computer system (FSCS). Effort

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<sup>a</sup> Palka, D. 1995. Abundance estimate of the Gulf of Maine harbor porpoise. Pp. 27-50 In: A. Bjørge and G.P. Donovan (eds.) Biology of the Phocoenids. Rep. int Whal. Commn Special Issue 16.

data was updated every time one of them changed, and included:

- 1) time of recording,
- 2) position of each observer, and
- 3) weather conditions: swell direction and height, Beaufort sea state, presence of rain or fog, percentage of cloud coverage, visibility (i.e., approximate distance to the horizon), vertical and horizontal position of the sun, and glare width and strength.

Environmental data included:

- 1) time of recording,
- 2) latitude and longitude of ship's position,
- 3) ship's bearing,
- 4) ship's speed over the ground,
- 5) wind speed and direction,
- 6) bottom depth,
- 7) surface water temperature, and
- 8) EK500 (18, 38, 120 kHz) acoustic data.

### **Oceanographic sampling methods**

At approximately 0700, 1200 and 1800 hrs, a SEACAT<sup>1</sup> 19 Profiler (CTD) was used to measure temperature, depth, and salinity of the water column. The 1800 hr cast was made in association with plankton sampling using bongo nets. Plankton sampling was conducted using a 0.505 mesh bongo that was lowered obliquely while traveling at 1.5 to 2.0 knots to 270 m or to within 10 m of the bottom, whichever was shallower. The samples collected by both bongo nets were stored in a jar containing sea water and 5% formalin. Later the species composition and density will be determined and then correlated with marine mammal distribution and trawl catches.

### **Data Management**

Sightings and oceanographic data will be processed and computerized at the NEFSC Laboratory at Woods Hole, Massachusetts.

Part II:

After setting up the array and the computer recording equipment, the array was tested while it was still on the deck of the ship that was still at the dock. The array worked fine at this point, so the RV *Delaware II* set off for deeper waters heading towards Block Island. Up to 300 meters of the array were deployed from the stern of the ship. The ship steamed at speeds varying from 3 to 10 knots and scientists listen to the information being collected on both the mid- and high-range hydrophones that were on the array.

## **Results**

### **Part I - Relative abundance estimate and spatial distributions**

The sighting survey covered approximately 117.8 nautical miles of track line (Figure 1). Effort also includes several transect lines (21 nm) in near shore waters off Block Island. Most of the

survey transects (110.8 nm; 94.1%) were in Beaufort sea state 3 or less (Table 1).

There were six species of identifiable cetaceans seen during the survey of offshore waters: fin whale (*Balaenoptera physalus*), Bryde's whale (*B. edeni*), and sperm whale (*Physeter macrocephalus*), common dolphin (*Delphinus delphis*) striped dolphin (*Stenella coeruleoalba*) and Risso's dolphin (*Grampus griseus*). Number of groups and individuals of each species that were detected are found in Table 2. Locations of the cetacean sightings are displayed in Figure 1.

No sea turtles were detected during the survey, and no marine mammals were detected in the cold (SST = 3.1<sup>0</sup>C) near-shore waters.

### **Biopsy sampling**

Five attempts were made to obtain biopsy samples from a group of bow riding common dolphins. There were four hits but no tissue samples were obtained.

### **Hydrographic Characteristics**

Fifteen CTD casts were made (Figure 1), including four paired CTD and bongo stations, at which water temperature, depth and salinity were measured from the surface to within 10 m of the bottom or 270 m, whichever were shallower.

### **Bongo Samples**

There were four bongo stations at which zooplankton samples were collected. At a later time, the species composition and density will be determined and correlated with marine mammal distribution.

### **Part II – Sea trial of passive acoustic array**

While 100 to 300 m of the array was deployed and while traveling at 3 to 10 knots, the passive acoustic array functioned perfectly. Though there were no marine mammals detected, the equipment performed as desired. Because this was a sea trial, no data will be archived.

### **Personnel List (Scientific): Part I:**

<u>Name</u>	<u>Title</u>	<u>Organization</u>
Gordon T. Waring	Chief Scientist	NMFS, NEFSC, PSB, Woods Hole, MA
John Nicolas	Mar. Mammal Spec.	NMFS, NEFSC, PSB, Woods Hole, MA
Beth Josephson	Contract Researcher	NMFS, NEFSC, PSB, Woods Hole, MA
Virginie Chadenet	Contract Researcher	
Dana Belden	GIS Specialist	NMFS, NERO, PSD, Gloucester, MA

### **Part II:**

Debra Palka	Chief Scientist	NMFS, NEFSC, PSB, Woods Hole, MA
Ricardo Antunes	Acoustic Expert	Torres Novas, Portugal

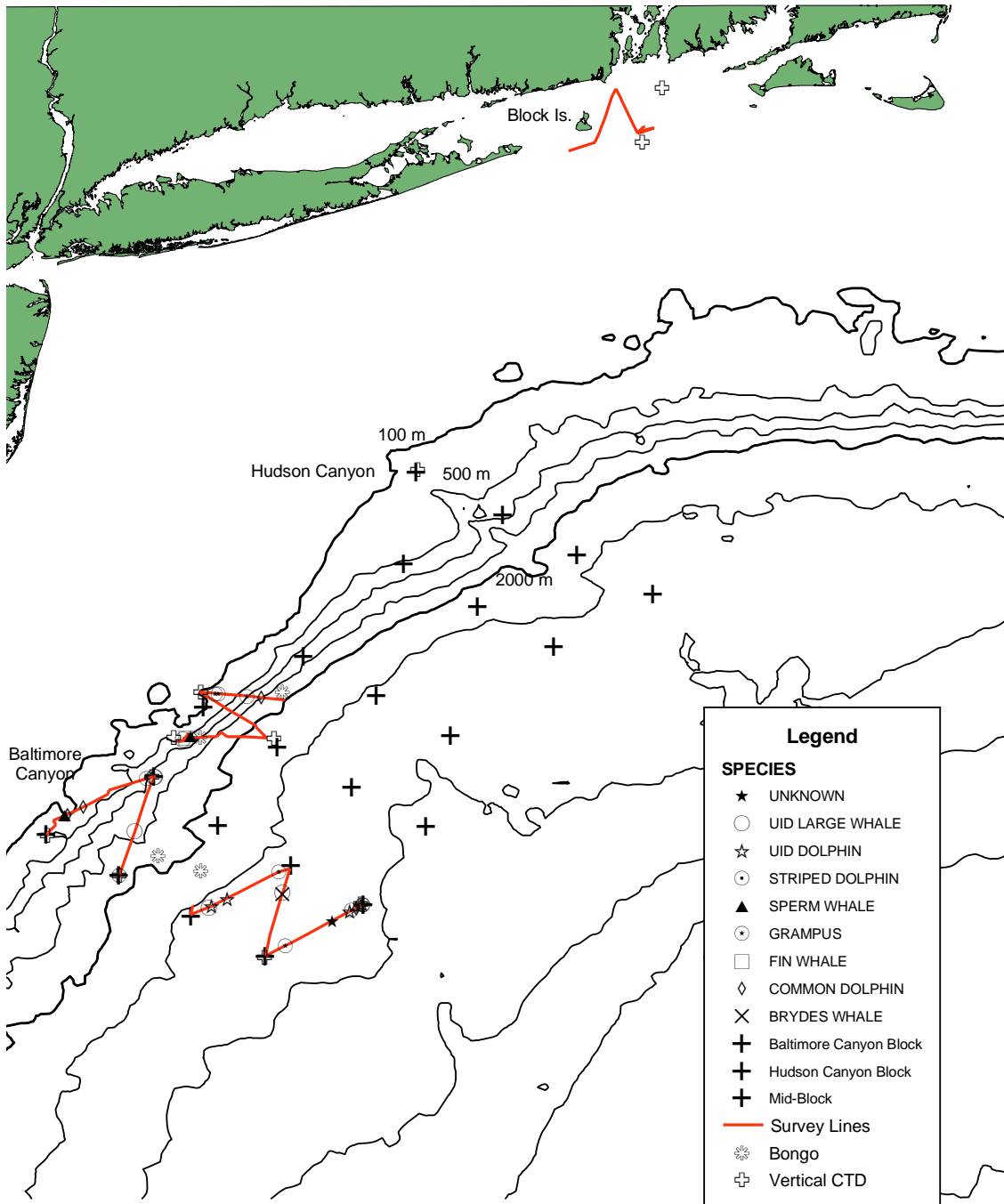


Figure 1. Survey region, transect lines, animal sightings, and oceanographic stations from DE-0404 marine mammal survey.

Table 1. Length (and percentage) of track line (nm) surveyed during primary mode in Beaufort sea state conditions 0-4.		
Beaufort sea state	Track line length	% of total
0	11.3	9.6
1	12.2	10.4
2	69.0	58.6
3	18.4	15.6
4	6.9	5.8
total	117.8	100.0

Table 2. List of species detected during the R/V DELAWARE II Marine Mammal Survey, 1-9 March 2004. Included are 1) number of sightings of groups of each species, and 2) best estimates of total number of individual animals seen for each species.

Sperm whale	<i>Physeter macrocephalus</i>	2	3
Fin whale	<i>Balaenoptera acutorostrata</i>	1	2
Bryde's whale	<i>B. edeni</i>	1	1
Unidentified large whales		6	8
Common dolphin	<i>Delphinus delphis</i>	4	186
Risso's dolphin	<i>Grampus griseus</i>	9	25
Striped dolphin	<i>Stenella coeruleoalba</i>	1	25
Unidentified dolphins		5	23