Summary of marine mammal and turtle observations during the 1997 nearfield water quality surveys

Massachusetts Water Resources Authority

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SUMMARY OF MARINE MAMMAL AND TURTLE OBSERVATIONS DURING THE 1997 NEARFIELD WATER QUALITY SURVEYS

AS PART OF

BASELINE WATER QUALITY MONITORING
Tasks 9 through 15
MWRA Harbor and Outfall Monitoring Project

submitted to

MASSACHUSETTS WATER RESOURCES AUTHORITY
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1.0 INTRODUCTION

Marine mammal and turtle observations were performed during 17 water quality surveys in 1997 covering an area near the future Massachusetts Water Resources Authority (MWRA) outfall site in Massachusetts Bay (Figure 1). The water quality surveys are part of the MWRA's Harbor and Outfall Monitoring Program (MWRA, 1991), a long-term monitoring plan designed to verify compliance with the discharge permit and to assess the potential environmental impact of treated sewage effluent discharge into Massachusetts Bay.

Several endangered or threatened whales and turtles have been known to visit or inhabit the area of the future outfall site and adjacent waters (US EPA, 1993). The whales include the right whale, humpback whale, fin whale, sei whale, and blue whale. The turtles include the Kemp's ridley, leatherback, hawksbill, loggerhead, and green turtle. The objective of the 1997 observations was to collect baseline marine mammal and turtle sightings data for future comparison to observational data collected after the MWRA outfall is on-line. Comparison of these data will assist in the assessment of potential impacts of the MWRA outfall on endangered and threatened mammal and turtle species and on the overall large pelagic food web in Massachusetts Bay.

Manomet Observatory was contracted by ENSR to provide an on-board observer during nearfield water quality surveys, conducted at designated stations in the vicinity of the future outfall site, to document any sightings of marine mammals and sea turtles. Manomet personnel participated in 17 nearfield surveys in 1997, beginning in February and continuing through December. A summary of the observations recorded during the course of these surveys is contained herein.

Manomet Observatory was also contracted by ENSR to participate in a comprehensive whale observation program to support explosive blasting operations that were performed in the Deer Island effluent outfall tunnel by the MWRA during the period of 17 November 1996 through 23 February 1997. The purpose of these efforts was to prevent injury to endangered right, fin, or humpback whales, during the course of explosive blasting by assuring that an area encompassed by a two-mile radius around the blast epicenter was clear of these sensitive marine mammals prior to detonations. The results of these aerial and shipboard surveys conducted in Massachusetts Bay in the vicinity of the outfall are contained in the Appendix, ENSR Summary Report of Marine Mammal Observations during Blasting Operations Conducted at the Deer Island Effluent Outfall Site (17 November 1996 - 23 February 1997) dated 19 March 1997

2.0 BACKGROUND

Marine mammals and sea turtles that may be expected in the nearfield survey area based on previous studies and sightings are presented and discussed below.

Right whales (*Eubalaena glacialis*) can be expected to visit Massachusetts Bay during March through July, with peak abundance in March and April. Nearly half of the total known population of northern right whales may visit Cape Cod and Massachusetts Bay each spring (Schevill et al.,

1986; Hamilton and Mayo, 1990). Although sightings of right whales by Kraus et al. (1987) for the years 1975-1986, and by Hamilton and Mayo (1990) for the year 1986 show general distribution patterns along Stellwagen Bank, Race Point, Provincetown, and central Cape Cod Bay, this study documented the presence of a right whale near the Boston Harbor islands on 4/5/96.

Humpback whales (*Megaptera novaeangliae*) visit the Stellwagen Bank, Cape Cod Bay, and Jeffries Ledge areas from mid-April through November, with peak abundance in May and June (CeTAP, 1982; NMFS, 1991b). In these areas, humpbacks are most abundant along the 100-meter depth contour and over Stellwagen Bank (CeTAP, 1982; Payne, 1991), and are often found in Massachusetts Bay. However, in 1992-1993, humpbacks were more abundant in offshore waters of Cultivator Shoals and the Northeast Peak of Georges Bank and less abundant in the nearshore areas (Langton et al., 1994).

Finback whales (*Balaenoptera physalus*) are present in large numbers during the spring and summer from Provincetown across Stellwagen Bank, Jeffries Ledge, and off Cape Ann (Hain et al., 1992). During the winter, nearly as many remain in the area from Cape Ann, across Stellwagen Bank, to Cape Cod, although their numbers are much reduced in other waters of New England (CeTAP, 1982). Fin whales are not as numerous in Massachusetts Bay but are commonly seen.

Sei whales (*Balaenoptera borealis*) and blue whales (*Balaenoptera musculus*) are rarely sighted in Massachusetts and Cape Cod Bays (EPA, 1993). Both sei and blue whales typically remain in deeper waters (more than 100 meters) and further offshore (CeTAP, 1982).

Leatherback turtles (*Dermochelys coreacea*) are sighted in Cape Cod and Massachusetts Bays most frequently in late summer (Shoop et al., 1981; CeTAP, 1982).

Kemp's ridley turtles (*Lepidochelys kempi*) are found occasionally in Cape Cod and Massachusetts Bays in the summer (Hildebrand, 1982). Each fall and winter, some ridley turtles are stranded on Cape Cod due to cold stunning (NOAA, 1991).

Loggerhead turtles (*Caretta caretta*) are occasionally sighted in Cape Cod and Massachusetts Bays in summer (Lazell, 1980).

Hawksbill (*Eretmochelys imbricata*) and green turtles (*Chelonia mydas*) are not frequently sighted in Massachusetts Bay (EPA, 1993).

3.0 METHODS

Observations were performed for marine mammals and sea turtles both during transits between nearfield water quality sampling stations (Figure 1) and while the vessel was on-station for sampling operations. During vessel transits the observer continuously scanned the sea surface from directly ahead to 90 degrees abeam on either side of the vessel. Initial sightings are by eye with confirmation and identification aided by binoculars. While on-station for the collection of water quality data, the

observer scanned 360 degrees around the vessel. The observer was typically positioned near the bow of the vessel at the highest and secure vantage point. On several occasions, observations were conducted from within the wheelhouse due to inclement weather. Two survey vessels were used as observation platforms during the course of the year. The F/V *Isabel S* was used on 2/4/97, 2/28/97 and 10/8/97. The F/V *Christopher Andrew* was used on 3/18/97, 4/4/97, 4/23/97, 5/13/97, 6/17/97, 7/1/97, 7/22/97, 8/6/97, 8/19/97, 9/5/97, 9/25/97, 10/30/97, 12/4/97 and 12/16/97. The observer's eye-height above the sea surface was approximately 5 meters on the F/V *Isabel S*, and at 3.5 meters aboard the F/V *Christopher Andrew*. Observations were suspended whenever visibility diminished below 50 meters or when darkness occurred.

Vessel track, station sequence, and number of stations surveyed are variable from one cruise to another, due to the constraints of weather and/or special survey requirements.

4.0 RESULTS

All marine mammal sightings recorded during the course of MWRA's 1997 Water Quality Monitoring Program are summarized in Table 1. This observation record includes sightings by Manomet observers during nearfield survey efforts and incidental sightings recorded by ENSR personnel during the course of operations in the farfield survey area. Sighting distributions are presented in Figures 2 and 3.

4.1 Whales

One unidentified whale was observed on 4/4/97 on station N16 and on transit from N15 to N14.

One unidentified whale was observed on 12/4/97, 1.5 miles west of the vessel while transiting from N07 to N06.

One Minke whale (*Balaenoptera physalus*) was observed on 8/19/97 on the transit from station N15 to N16.

4.2 Other Marine Mammals

Two Harbor porpoise (*Phocoena phocoena*) were observed on 2/28/97 while transiting from station N04 to N17.

Seals (species not known) were observed on two surveys: one during the transit between survey stations N20 to N21 on 2/28/97, and two during the transit between stations N20 to F23 on 12/16/97.

Four unidentified dolphins were observed on 8/19/97 near station N04.

4.3 Turtles

No sea turtles were observed during any of the surveys.

5.0 DISCUSSION

Observation of marine mammals and turtles on surveys designed and operated for the collection of water quality data places limitations and constraints on the method of observation and on the conclusions that may be drawn from the data. Standard line transect methodology is not possible on such surveys, and two different vessels were used during the year which vary the characteristics of the survey platform. Based on these factors, the ability to extrapolate from observation data to abundance estimates is severely limited and is not advisable. The utility of this data set should be limited to the documentation of the time, location and particulars for each individual occurrence of a sighting. This sort of data set may provide useful qualitative information concerning seasonal patterns and relative abundances within the same study area.

5.1 Whales

Unidentified whales were sighted on 4/4/97 and on 12/4/97. Both sightings were at a distance that prevented identification.

A Minke whale was sighted in August near the most easterly of the nearfield stations. Minkes have been commonly observed in Massachusetts and Cape Cod Bays in recent years (Dave Wiley, personal communication, IWC, unpublished data) and can be expected in the vicinity of the nearfield stations.

5.2 Other Marine Mammals

Harbor porpoise were sighted on one cruise in February. This porpoise is abundant in the Gulf of Maine's shallower waters where it is the most commonly observed cetacean. Its small size (1.5m) and undemonstrative nature make it difficult to observe in sea states greater than a large ripple (Katona, et al., 1993).

Unidentified seals were observed on two surveys, one in February and two in December. Harbor Seals have been documented in most New England harbors (personal observations, Fisheries Observer Program sightings) and Harp seals have become more numerous in New England waters.

5.3 Turtles

Sea turtles are very difficult to spot even when present. The lack of sightings of turtles during the surveys should in no way be regarded as an indication that none were present in the study area.

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Table 1.
Sightings of Marine Mammals during MWRA 1997 Water Quality Monitoring Program

Nearfield Survey Area (Manomet)

Date	Number	Mammal	Location
2/28/97	2	Harbor porpoise	between stations N04 and N17
	1	Seal (sp. not known)	between stations N20 and N21
4/4/97	1	unidentified whale	near station N16
	1	unidentified whale	between stations N15 and N14
8/19/97	4	unidentified dolphins	200 m southeast of station N04
	1	Minke whale	500 m east of transit from N15 to N16
12/4/97	1	unidentified whale	between stations N07 to N06
	2	Seal (sp. not known)	between stations N20 and F23

Farfield Survey Area (ENSR)

Date	Number	Mammal	Location
6/18/97	1	unidentified whale	42^o 28.8N 70^o 37.1W (near F22)
	1	Minke whale	42^o 32.2N 70^o 35.5W (F22 to F26)
	3-5	Fin whale	42^o 34.2N 70^o 29.4W (F26 to F27)
8/20/97	1	Minke whale	42^o 28.8N 70^o 37.1W (near F19)
	2-3	Humpback whale (unconfirmed)	42^o 24.6N 70^o 25.9W (near F28)
10/9/97	1	Harbor seal	Boston Harbor (Deer Island near F23)

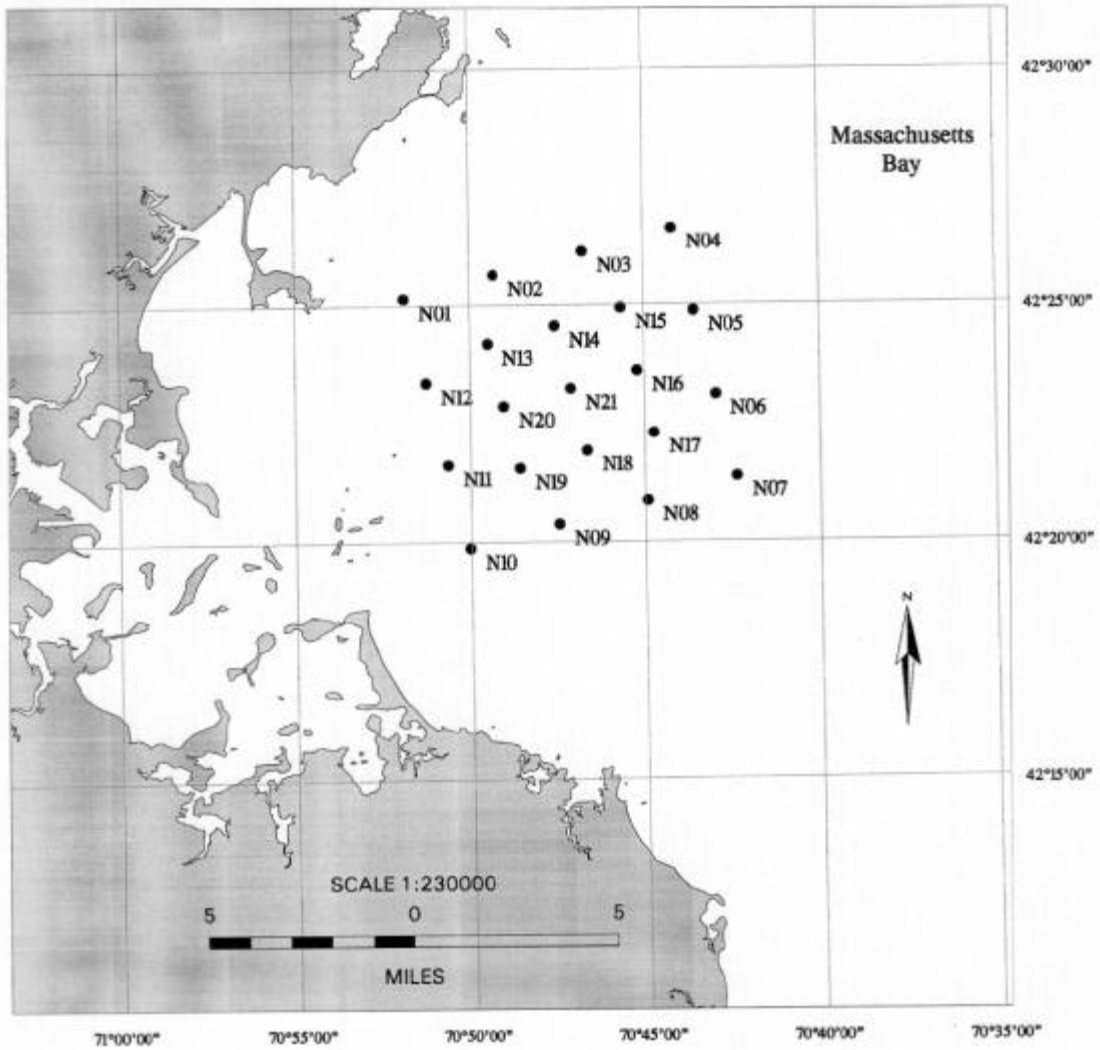

Figure 1
Location of Sampling Stations for
1997 MWRA Nearfield Water Quality Surveys

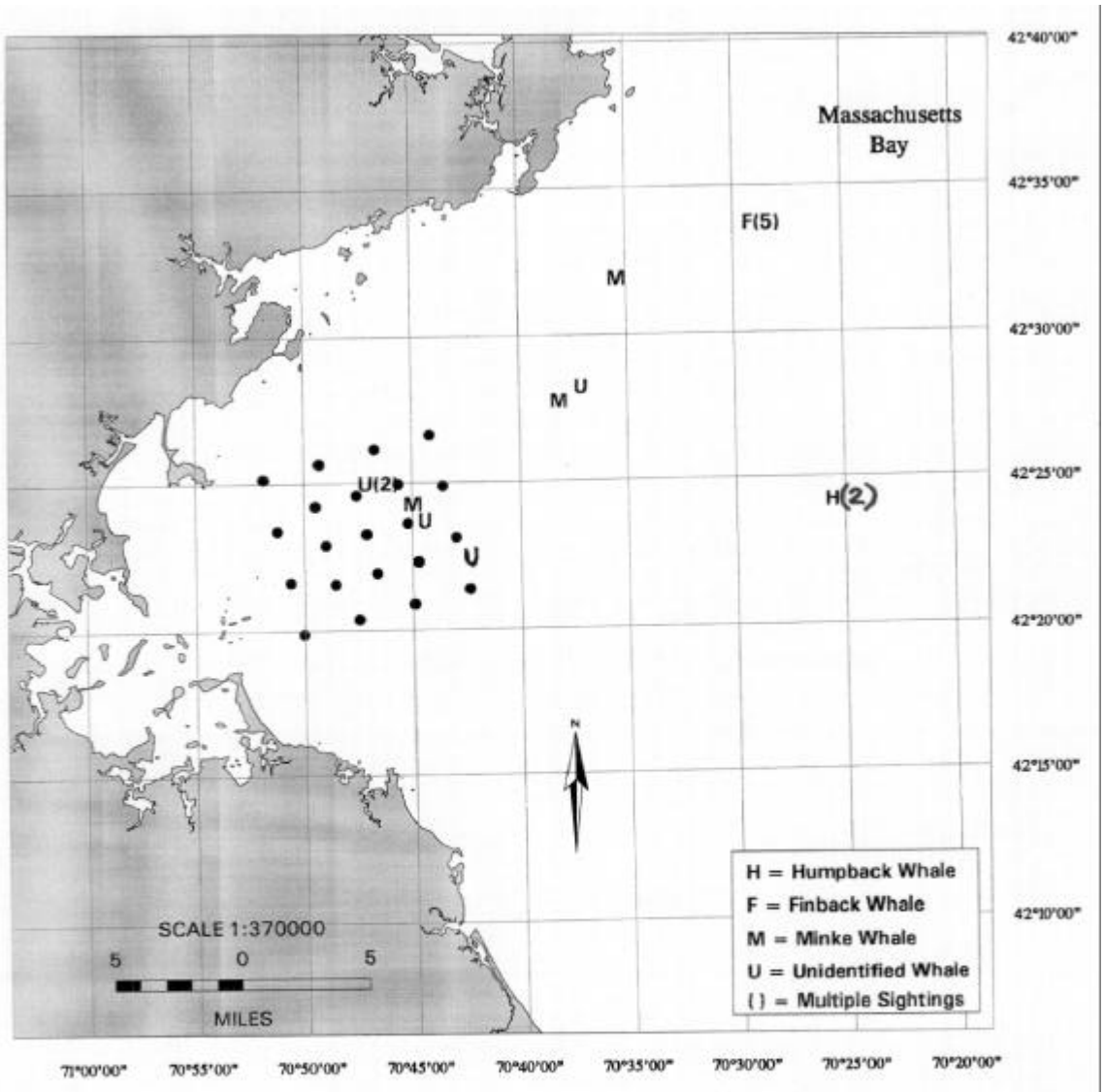

Figure 2
Approximate Locations of Whale Sightings
during 1997 MWRA Nearfield Water Quality Surveys

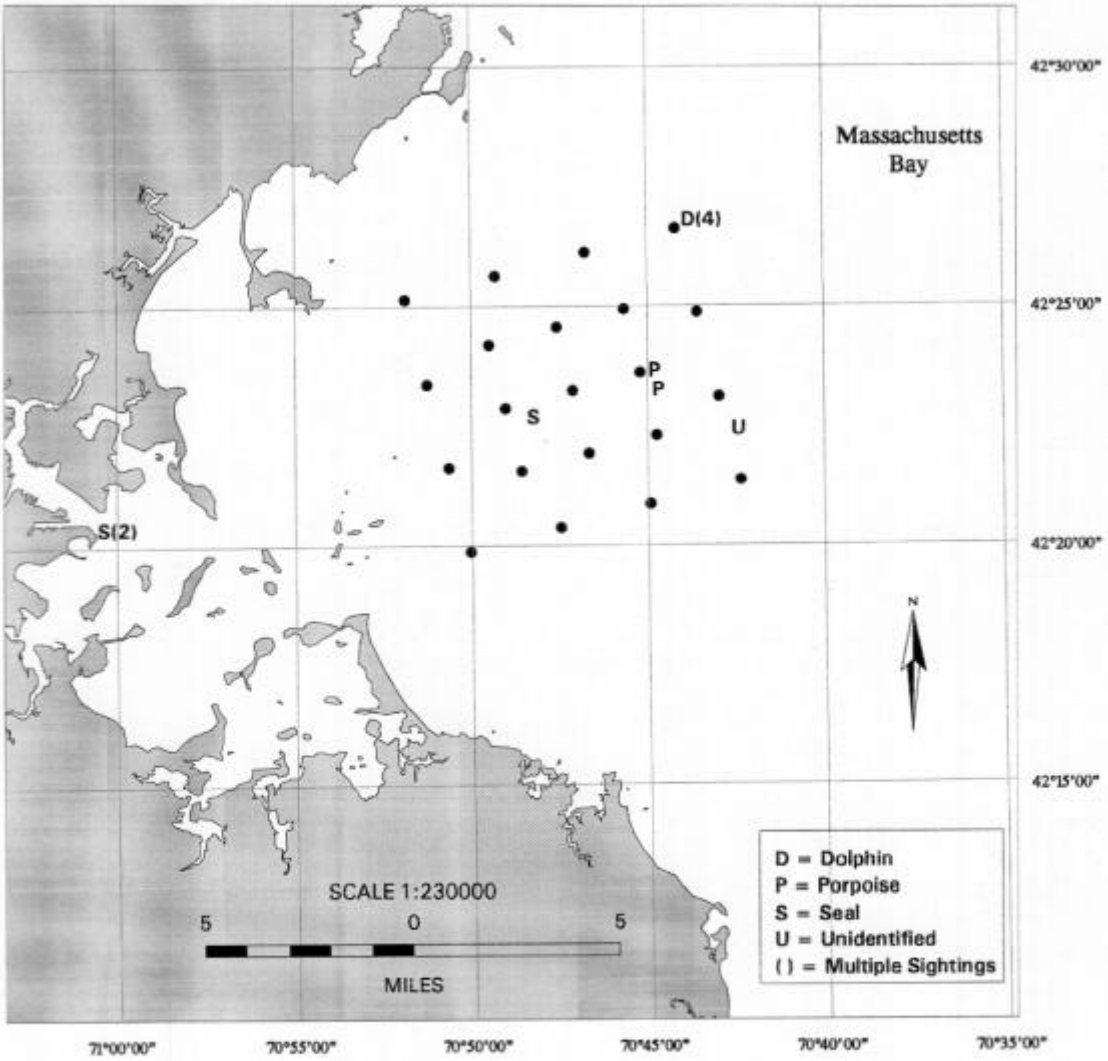

Figure 3
Approximate Locations of Harbor Porpoise and Harbor Seal Sightings
during 1997 MWRA Nearfield Water Quality Surveys

APPENDIX

ENSR Summary Report of Marine Mammal Observations during Blasting Operations Conducted at the Deer Island Effluent Outfall Site (17 November 1996 - 23 February 1997) dated 19 March 1997

SUMMARY REPORT
of

Marine Mammal Observations during Blasting Operations Conducted at the Deer Island Effluent Outfall Site (17 November 1996 - 23 February 1997)

submitted to

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INTRODUCTION

ENSR and its participating subcontractors, Manomet Observatory and CR Environmental Inc., were awarded a Task Order by the Massachusetts Water Resources Authority (MWRA) on 29 October 1996 to provide a network of NMFS-certified whale observers during any construction activity in the Deer Island Effluent Outfall Tunnel which required the use of explosive blasting.

The effluent outfall tunnel from the Deer Island Sewage Treatment Plant, which extends roughly nine miles out into Massachusetts Bay, terminates in a diffuser field approximately 6000 ft long. The diffuser field runs in a ENE direction from the western end at 42.3843°N 70.8038°W to the eastern terminus at 42.3887°N 70.7801°W. The diffuser field is comprised of 55 independent diffuser caps on the seafloor which are connected to the main outfall tunnel through a vertical riser pipe. Based on the local geologic conditions encountered in the effluent outfall tunnel at some of the vertical riser connection sites, it was decided by the MWRA Construction Supervisor, that explosive blasting would be the method of choice to facilitate the connection.

In order to conduct any explosive blasting in areas of Massachusetts Bay known to have concurrent endangered whale activity, it was stipulated by the National Marine Fisheries Service (NMFS) to extend every measure possible to prevent injury to any sensitive marine mammals in the area during blasting operations. To satisfy these concerns, a comprehensive whale observation program was assembled to support blasting operations. The purpose of these efforts was to assure that an area encompassed by a two-mile radius around the blast epicenter was clear of endangered right, fin, or humpback whales prior to detonations. This report is a summary of the whale observation surveys conducted during the period of the 17 November 1996 through 23 February 1997.

OPERATIONS

To accomplish the task of protecting any endangered marine mammals in the vicinity of blasting operations, Manomet observers were stationed aboard survey vessels stationed in Massachusetts Bay, and in fixed winged aircraft. The surface and/or airborne whale observation efforts were concentrated in an area encompassed by a two mile radius centered at the location directly above the designated blasting site.

During the initial phase of the operation, 17 November through the end of 1996, seasonal weather patterns and prevailing sea conditions in Massachusetts Bay permitted the use of only one survey vessel to accomplish the task. This survey vessel was generally the 65’ F/V *Tracy Ann* hailing out of Scituate, Ma. As the season progressed and weather patterns became increasingly unpredictable and more severe, it was decided to use larger, more seaworthy vessels to stabilize the observation platform and increase their operational range. In addition, all observation surveys conducted after 01 January 1997 were completed with two survey vessels to increase the effectiveness of survey operations in rough weather. The survey vessels used during the latter part of the program were the 90’ F/V *Capt. Sam II*, the 85’ F/V *Navigator*, the 85’ F/V *Tripolina*, and the 72’ F/V *Andrea J*, all stationed out of Boston Harbor, and the 80’ F/V *Elizabeth* out of

Provincetown on Cape Cod. On occasion the 65' F/V *Tracy Ann* was also used depending on weather and sea conditions. The most cost effective platforms were generally selected to support a particular operation based on projected weather and sea-state criteria in an effort to reduce survey costs.

Each vessel was required to carry two NMFS-approved Manomet observers on each survey. To effectively cover the designated survey area, the vessels completed two circular tracks around the epicenter of the blast; one at 0.5 miles and another at 1.5 miles out from the epicenter. Each vessel was assigned one of these tracks to monitor during the course of the survey in order to efficiently survey the area for mammal activity. Each vessel was able to strictly adhere to their assigned survey track by following predetermined waypoints entered into the vessel's navigation system. With a conservative effective search range of 0.5 miles, one observer scanned an area from ahead of the vessel, and in toward the blast center, the second observer scanned an area from ahead of the vessel and out away from the blast center. This methodology was used for at least two hours prior to the blast in order to confirm the clearance of the blasting area, and for a suitable period after the blast to characterize any endangered whale or mammal activity in the area.

A survey plane with an additional NMFS-approved Manomet observer performed an aerial survey over the blast site in conjunction with vessel operations. The aircraft departing out of Plymouth Airfield, arrived on-station to perform a 30-minute aerial flyover no more than one hour prior to detonation of the explosives. The responsibility of the airborne surveyor was to continuously criss-cross the survey area in an asterisk-shaped or spokes-of-a-wheel shaped pattern. The flight pattern selected crossed through the blast center and out beyond the 2 mile perimeter, then back in toward the center, at a normal altitude of 700 to 1000 feet. The surface vessels operating over the blast site, along with GPS positioning were used as a means of referencing the blast epicenter from the air. The flight plan also included exchanging potential target information with the surface vessels, and circling over any point of interest at an altitude of 500 feet whenever required. A second aerial flyover was conducted after detonation in order to document and characterize any endangered whale or mammal activity in the area.

OVERVIEW

During the period of performance for this Task Order, ENSR effectively mobilized marine operations to support twelve adit blasts in the Deer Island Effluent Outfall Tunnel. During this period ENSR was also responsible for providing weather forecast information and sea-state criteria for the scheduled blasting date; this information was obtained from Weather Services Corporation and NOAA Oceanographic Data Buoy No. 44013 in Massachusetts Bay. This information proved invaluable in selecting the proper date and time for a scheduled blasting event in order that Manomet observers could proceed safely to the survey area and conduct a defensible survey, i.e., one where weather and sea-state criteria did not limit or hamper survey operations. This objective was satisfied on all surveys, except the event scheduled for December 14th 1996, where rapidly deteriorating weather conditions prevented air operations, and severely limited the duration and overall effectiveness of the survey. Although the survey was severely curtailed for personnel safety reasons, 12 foot breaking seas, the survey vessel F/V *Andrea J* was able to reach the designated blasting site and perform a 75 minute sweep around the epicenter. The vessel discontinued operations 10 minutes

prior to the scheduled blast time, no sightings were made. The remaining 11 whale observation surveys were completed in conditions which allowed the Manomet observers to properly ascertain the safe clearance of the survey area prior to giving the all clear to blast signal. On several occasions, scheduled blasting operations were suitably delayed, either later in the day or to the following day, in an effort to obtain the proper weather and sea-state conditions which would allow for an effective survey. Four scheduled blasting operations were canceled and delayed to the following weekend due to poor weather conditions, which would have prevented adequate resources from safely reaching the blast site, or limited the surveyors ability to scout for potential sightings.

The Manomet observers recorded the presence of, and attempted to identify all marine mammals sighted during the course of each survey, the results of which were summarized in a Survey Report submitted for each blasting event. The overview summary for the entire whale observation program is shown in Table 1, which delineates scheduled blast dates, epicenter and time for each blast event, along with any marine mammals sighted during the survey. Of the 12 scheduled blasting events which were surveyed, 5 resulted in no marine mammal sightings, 3 resulted in sightings of Harbor Seals alone, and 1 resulted in sightings of Harbor Seals and an unidentified whale. Minke or Finback whales were positively identified on the three remaining surveys. The most productive whale observation survey occurred on 04 January 1997, Minke and Finback whales, numerous Whitesided Dolphins, Harbor Porpoises, and Harbor Seals. The location for all marine mammals sighted during the course of this operation are depicted in Figure 1. The orientation of the Deer Island Effluent Outfall Tunnel and Diffuser Field, along with the blast epicenters used for each blasting event are also presented in Figure 1 for reference.

TABLE 1 - MARINE MAMMAL OBSERVATION SUMMARY DURING THE COURSE OF BLASTING OPERATIONS CONDUCTED AT THE DEER ISLAND EFFLUENT OUTFALL

Scheduled Blast Date	Coordinates of Epicenter		Time of Blast Events	Marine Mammals Sighted	Time of Sighting	Approximate Range/Bearing Epicenter to Sighting	Observation Platforms
17-Nov-96	42-23'-19.7"N	70-46'-48.5"W	13:15	unidentified whale	10:00	3 miles SSE	F/V Andrea J
				(3) Harbor Seals	11:30	5.5 miles SSE	Aircraft
				(1) Harbor Seal	11:40	4.5 miles E	
23-Nov-96	42-23'-19.7"N	70-46'-48.5"W	13:51	(1) Harbor Seal	14:05	2.7 miles WSW	F/V Tracy Ann
				(1) Minke whale	15:35	10 miles SSE	Aircraft
30-Nov-96	42-23'-19.7"N	70-46'-48.5"W	12:45	(1) Minke whale	13:09	2.7 miles NE	F/V Andrea J Aircraft
7-Dec-96	42-23'-19.7"N	70-46'-48.5"W	12:25	No Sightings were made	N/A	N/A	F/V Elizabeth Aircraft
14-Dec-96	42-23'-19.7"N	70-46'-48.5"W	13:30	No Sightings were made	N/A	N/A	F/V Andrea J
21-Dec-96	42-23'-19.7"N	70-46'-48.5"W	12:47	No Sightings were made	N/A	N/A	F/V Tracy Ann Aircraft

4-Jan-97	42-23'-17"N	70-46'-59"W	14:46	unidentified whale	9:53	1.5 miles from blast center	F/V Andrea J
				(5) Harbor Porpoises	11:57	1.5 miles from blast center	F/V Tracy Ann
				(1) Minke whale	12:03	1.5 miles from blast center	Aircraft
				150 whitesided dolphins	12:15	2.75 miles WNW	
				(3) Finback whales	12:18	1.75 miles WNW	
				250 whitesided dolphins	12:37	3.25 miles WNW	
				(3) Finback whales	13:27	0.75 miles ESE	
				unidentified whale	13:00	3.25 miles from blast center	
				(1) Harbor Seal	15:38	1.5 miles from blast center	
19-Jan-97	42-23'-19.7"N	70-46'-48.5"W	13:28	Harbor Seals	8:45	Boston Harbor	F/V Navigator F/V Andrea J Aircraft
1-Feb-97	42-23'-16"N	70-47'-07"W	16:24	Harbor Seal	15:52	0.75 miles NNE	F/V Capt. Sam II
				Harbor Seals	10:30	Boston Harbor	F/V Andrea J Aircraft
8-Feb-97	42-23'-15"N	70-47'-12"W	13:49	Harbor Seal	12:31	1.7 miles S	F/V Tripolina F/V Tracy Ann Aircraft
16-Feb-97	42-23'-15"N	70-47'-12"W	13:16	No Sightings were made	N/A	N/A	F/V Navigator F/V Andrea J Aircraft
23-Feb-97	42-23'-13"N	70-47'-21"W	13:25	No Sightings were made	N/A	N/A	F/V Tripolina F/V Andrea J Aircraft

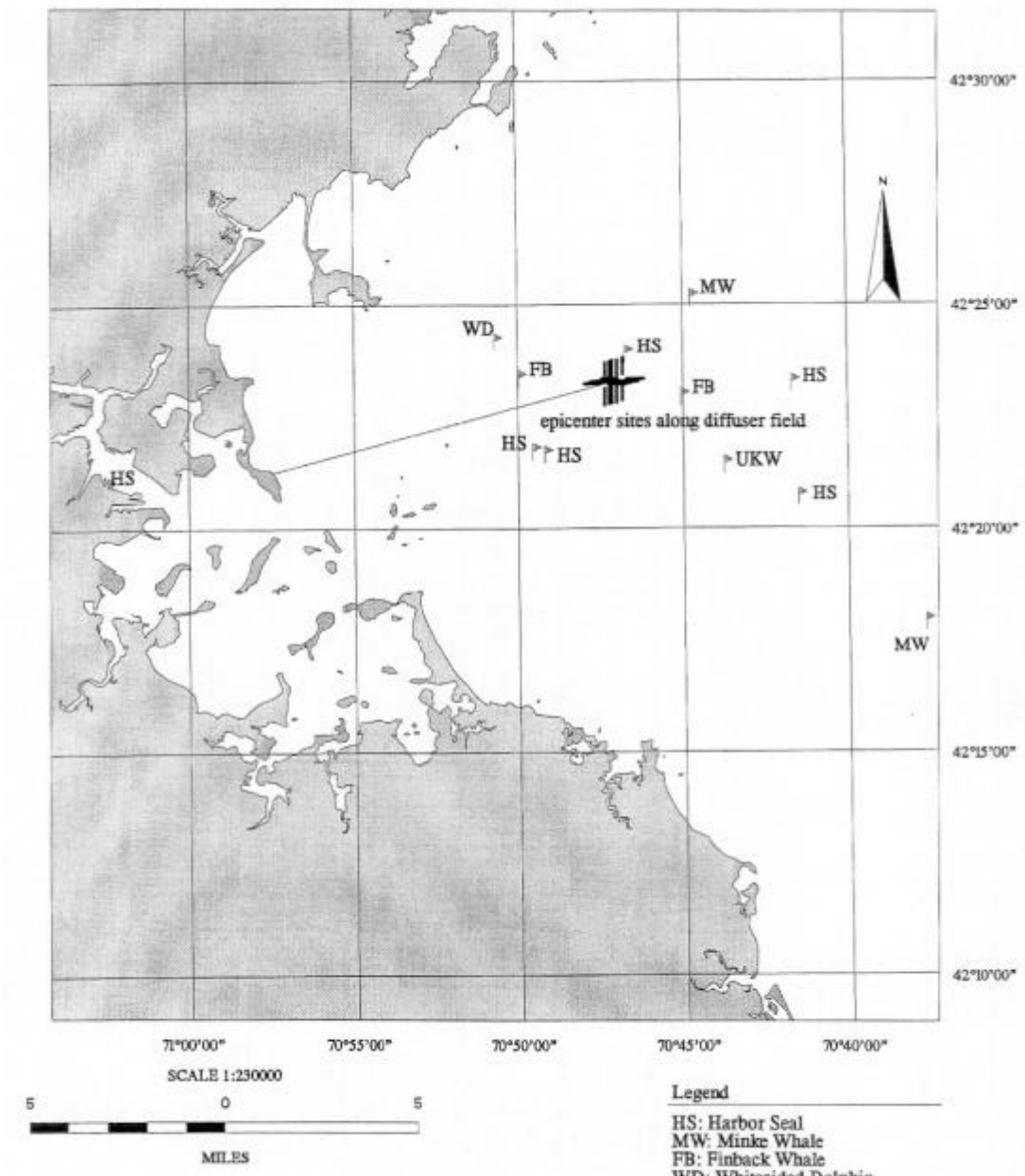

FIGURE 1

Marine Mammal Observation Summary
17 November 1996 - 23 February 1997

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