Summary of marine mammal observations during 2001 surveys

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SUMMARY OF MARINE MAMMAL OBSERVATIONS DURING 2001 SURVEYS

for

MWRA Harbor and Outfall Monitoring Project

submitted to

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1.0 Introduction

Several endangered and threatened species of whales are known to visit or inhabit the Massachusetts and Cape Cod Bay area (EPA 1993). The whales include the right whale, humpback whale, finback whale, sei whale and blue whale. Although not presently on the endangered or threatened species list minke whales, harbor porpoise, several dolphin species, gray seals, and harbor seals are also found in Massachusetts and Cape Cod Bays.

Since 1995, Massachusetts Water Resources Authority (MWRA) has included marine mammal observers on monitoring surveys to verify the presence and absence of right whales in the vicinity of the outfall. The MWRA surveys are being conducted as part of the long-term Harbor and Outfall Monitoring Project designed to verify compliance with the discharge permit and to assess the potential environmental impact of treated sewage effluent discharge into Massachusetts Bay. These observers were included in response to a National Marine Fisheries Service (NMFS) request that MWRA provide observational data and set a positive example by using observers to minimize the chances of collision with a right whale. In addition to looking for right whales, observers conducted observations for other marine mammals. On surveys where observers were not present, the chief scientist and field crew documented any incidental sightings of marine mammals.

Marine mammal observers were present on 29 water quality surveys conducted during 2001. Observers were present on all of the Nearfield water column surveys (n=17) to document throughout the year the occasional presence as well as the general absence of right whales in the Nearfield. In addition, observers were also placed on the vessel during other water quality surveys conducted between January to mid-May and in December. Included in these additional surveys were three (WF001, WF002, and WF004) of the six Farfield water column surveys, three (AV011, AV012, and AV016) of the six Anthropogenic Virus surveys, and six (PT011, PC012, PA011, PC013, PC014, and PC01C) of the twenty fecal coliform surveys.

2.0 Background

A brief description of when marine mammals are expected to be found in Massachusetts and Cape Cod Bays is presented and discussed below.

Right whales (*Eubalaena glacialis*) are critically endangered and can be expected to visit Massachusetts and Cape Cod Bays during December through July, with peak abundance in February, March and early April (Hamilton and Mayo 1990). Recent studies indicate that 42% of the catalogued population visit Cape Cod Bay (Brown and Marx 1999). 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, the presence of a right whale was documented near Boston Harbor on April 5, 1996 (Wennemer *et al.* 1998).

Humpback Whales (*Megaptera novaeangliae*) are an endangered species of whale known to feed within the Gulf of Maine in the spring, summer and fall (Waring *et al.* 1999). Historic records indicate that humpbacks have been documented on Stellwagen Bank from mid-April through November, with a peak abundance in May and June (CeTap 1982; NMFS 1991). However, distribution appears to correlate with prey densities (Waring *et al.* 1999). In 1992-1993, humpbacks were most 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). In 1996-1997, an increase in humpback whale sightings correlated with an abundance of sandlance (*Ammodytes dubius*) in the Stellwagen Bank area (Waring *et al.* 1999).

Finback whales (*Balaenoptera physalus*) are considered to be an endangered species and are the most abundant and frequently sighted of the endangered whales that visit Massachusetts and Cape Cod Bays (EPA 1993). They are sighted year round in the Stellwagen Bank area with a peak abundance occurring between the spring and fall (Pett and McKay 1990).

Sei whales (*Balaenoptera borealis*) and blue whales (*Balaenoptera musculus*) are endangered species which are rarely sighted in Massachusetts and Cape Cod Bays (EPA 1993). Both blue and sei whales typically remain in deeper water (more than 100 meters) and further offshore (CeTap 1982). However, sightings of these species in coastal areas may correspond to changes in prey distribution (Payne *et al.* 1990, Wenzel *et al.* 1988).

Minke whales (*Balaenoptera acutorostrata*) are a non-endangered species of whale that are typically seen in the Stellwagen Bank area during the spring, summer and fall (CeTap 1982; Pett and McKay 1990). During the winter, minke whale sightings in New England appear to decline dramatically (Waring *et al.* 1999).

Atlantic White-sided dolphins (*Lagenorhynchus acutus*) is a species of dolphin found from central west Greenland to North Carolina (Waring *et al.* 1999). The Gulf of Maine stock of Atlantic White-sided dolphins is classified as strategic by the National Marine Fisheries Service (Waring *et al.* 1999). Sightings of these dolphins in the Stellwagen Bank and Cape Cod Bay areas are common in the spring and, to a lesser extent, the fall (Pett and McKay 1990).

Harbor porpoises (*Phocoena phocoena*) in the Gulf of Main/Bay of Fundy stock are classified as strategic by the National Marine Fisheries Service (Waring *et al.* 1999). Historic data indicate that harbor porpoise can be found in the Stellwagen Bank area and Cape Cod Bay from December through June (Pett and McKay 1990).

The Atlantic Pilot whale or Long-finned Pilot whale (*Globicephala melaena)* is the largest species of dolphin found in cool temperate waters off Labrador, Newfoundland, and in the St. Lawrence River with sporadic sightings as far south as Maryland and Virginia (Bulloch 1993). They form schools of a few to many hundreds of individuals and are mainly found relatively close to shore. Pilot Whale distribution and abundance appear to be linked to the topography of the sea floor and the abundance of their primary food source, squid (Harrison and Bryden 1989).

Gray seals (*Halichoerus grypus*) are a non-endangered species of pinniped found from Maine to Long Island Sound (Rough 1995). A small, year round breeding population is known to occur on outer Cape Cod and Nantucket Island (Waring *et al.* 1999).

Harbor seals (*Phoca vitulina*) are a non-endangered species of pinniped commonly found in the near shore waters around New England (Katona *et al.* 1993). They are most frequently seen in the Stellwagen Bank and Cape Cod Bay areas in the winter and early spring with sightings beginning in late September (Pett and McKay 1990).

3.0 Methods

Observations were performed for marine mammals during all day light hours while transiting Nearfield water column surveys (Figure 1), and while the vessel was on-station for sampling operations. Additionally, NMFS requested additional information be collected on surveys between December and May 15th of each year when right whales usually visit Massachusetts Bay. This request resulted in marine mammal observers being present during three winter/spring Farfield surveys (Figure 1), three Anthropogenic Virus surveys (Figure 2) and six Fecal Coliform surveys (Figure 3), during the 2001 survey year. Observations were also performed as above for these additional surveys. 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 made by eye with confirmation and identification aided by binoculars. While on-station, the observer scanned 360 degrees around the vessel. The observer was typically positioned at the highest and most secure vantage point of the survey vessel. Weather conditions, safety of the observer, and limiting interference with the operation of the vessel and sampling team were all factors which influenced the position of the observer on board the vessel. Three survey vessels were used as observation platforms during the course of the year. The *F/V Isabel S* was used on surveys WN011, WF011, WN012, WF012, AV011, and PC012. The *R/V Aquamonitor* was used for surveys WN013, WN014, WF014, WN015, WN016, WN017, WF017, WN018, WN019, WN01A, WN01B, WF01B, WN01E, WF01E, WN01G, WN01H, PC013, PC014, PC01B, PC01C, PT011, AV012 and AV016. The *F/V Andrea* J was used on surveys WN01C, WN01D, WN01F, PA011, and PC019. The observer's eye-height above the sea surface was approximately 5 meters on the *F/V Isabel S* and *F/V Andrea J* and 2.5 meters aboard the *R/V Aquamonitor*. Observations were conducted 40 minutes out of every hour and were suspended when visibility was reduced to zero or when darkness occurred.

Vessel track, station sequence, and number of stations varied among cruises due to the constraints of weather, special survey requirements or both.

4.0 Results

Observation of marine mammals 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 three 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 is thus limited to documentation of the time, location and particulars for each individual occurrence of a sighting and provides useful qualitative information concerning seasonal patterns and relative abundance within the same study area.

During the 2001 monitoring year, 20 individual whales, 30 Harbor porpoise, and over 100 Atlantic White-sided dolphins were directly observed by the marine mammal observers or Battelle survey team members. Included in these sightings were 7 right whales, 4 humpback whales, 4 minke whales, and 5 instances of unidentifiable whale(s). As seen in Figure 4, the whale sightings were concentrated mainly in Cape Cod Bay but other sightings were noted Massachusetts Bay. Two of the sightings were within the boundary of the Stellwagen Bank National Marine Sanctuary and two whales were sighted in the vicinity of the Nearfield. The total number of whales sighted during 2001 (20 individuals) is considerably less than the sightings noted during the previous two years (2000 – 55 sightings; 1999 – 49 sightings) (McLeod *et al.* 2000, McLeod 2001). This may be due in part to changes in sampling routes, which have resulted in less observation time in the Stellwagen Bank National Marine Sanctuary area where most whales have been noted in previous years. In 2001, two minke whales were sighted in the Nearfield area, which is consistent

with findings from previous years. Although no right whales were sighted last year (2000), seven were noted in Cape Cod Bay during the April 2001 water column survey. This is the greatest number of right whales sighted during the last three years (1998 – 2000) and along with a couple of unidentifiable baleen whales, the largest number of whales noted in Cape Cod Bay.

In addition to the whales, marine mammal observers on the surveys observed 138 harbor seals throughout the entire year.

All sightings recorded by a dedicated marine mammal observer are summarized in Table 1. Incidental sightings of marine mammals by other survey personnel are summarized in Table 2. Whale sighting distributions are presented in Figure 3.

5.0 Discussion

There are a number of problems when trying to make a determination whether in any given year marine mammal sightings are typical. First of all, sightings obtained during water quality sampling cruises are opportunistic, and do not follow dedicated and systematic line transect methodology. Secondly, whale distribution is known to fluctuate between years in response to prey density and distribution (Payne *et al.* 1990). However, some generalizations can be made.

Dedicated observer sightings of large baleen whales were considerably less in 2001 (n=16) than noted during the previous three years 1998 – 2000 (n between 27 and 31). Increases in the number of Pinniped and dolphin sightings were noted in 2001. In 2001, 138 Pinnipeds were sighted. During previous years, 20 to 60 sightings were made throughout the survey area. For dolphins, 2001 sightings included more than 100 dolphins, which more than doubled those noted in 1998, 1999 and 2000. Observations of large baleen whales by the survey staff were made mainly during the February, March, and April surveys. Only four of the whales were sighted in the area during the later portion of the year (October – November). Most of the whales were located in Cape Cod Bay (from station F01 to around station F02). No whale sightings by the survey staff were made in the area of the Nearfield from May to December of 2001. In 1998 and 1999, 3 and 2 right whale sightings, respectively were made by the survey team. The survey team noted no right whale sightings in 2000 but noted seven sightings in the Cape Cod Bay area in April of 2001.

General observations of large baleen whales in the Stellwagen Bank region, noted by the Whale Center of New England during 2001, indicated low usage of the area by humpback and fin whales during May and June, while from July through November humpback whales were abundant on the southern half of the bank. Fin and minke whales were more evenly spread throughout the Stellwagen Bank region. The consistent presence of near-shore humpback whales noted in 2000 was not repeated. However, the young humpback which spent almost four months in harbors from Boston north to Gloucester in 2000 died after entangling in a gill net off of Virginia Beach, VA. A necropsy of that whale indicated that it had been in good health with both a thick external fat layer and heavy visceral fat throughout. This indicates that feeding in near shore Massachusetts waters can be a successful growth strategy for young whales, and we may see more cases of similar residency in the future. Contaminant levels in the animal's tissues have yet to be analyzed (Weinrich 2002).

Over the last four years, the Center for Coastal Studies has conducted systematic surveys of Cape Cod Bay from January through mid May. In 2001, right whales were present in 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 134 days from December 19, 2000 to May 1, 2001. A total of 87 right whales were seen in Cape Cod Bay and adjacent waters (Brown *et al*. 2001). These results in terms of

number of whales and season of occupancy were similar to those obtained over the last four years. A highlight of the season was the observation of seven mother calf pairs, the first year since 1997 that calves have taken up spring residency again in Cape Cod Bay.

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Table 1. Marine Mammal Observer Sightings During MWRA 2001 Water Quality Monitoring Program[1]

Survey ID	Date\Time	Number	Mammal	Location	Sighting Comments
WN011/WF011	02/07/01		No Sightings		
F/V Isabelle S.	02/08/01		No Sightings		
	02/09/01		No Sightings		
	02/12/01		No Sightings		
PT011	02/20/01 1635	3	Harbor Seals	42'15.87N/070'55.64W	
R/V Aquamonitor					
WN012/WF012/ AV011/PC012	02/27/01 1105	1	Unidentified Baleen Whale	41'53.09N/070'19.96W	
F/V Isabelle S.	02/27/01 1340	1	Unidentified Baleen Whale	42'07.03N/070'17.35W	
	02/28/01 0600	2	Harbor Seals	42'35.99N/070'40.39W	
	03/01/01 0700	2	Harbor Seals	42'20.40N/070'56.35W	
	03/01/01 0710	3	Harbor Seals	42'20.35N/070'52.42W	Outgoing tide, same group of seals
	03/01/01 0720	4	Harbor Seals	42'20.36N/070'56.57W	
	03/02/01 0645	1	Harbor Seal	42'20.56N/070'01.36W	
	03/02/01 1310	2	Unidentified Baleen Whales	41'51.79N/070'29.85W	Fog was reported at the time of sighting, black flukes and black back were visible and a possible right whale sighting was reported to the NOAA Fisheries Early Warning System. A Center for Coastal Studies vessel confirmed a right whale sighting in the same area.
WN013	03/26/01 0750	2	Harbor Seals	42'16.50N/070'55.83W	
R/V Aquamonitor	03/26/01 0800	6	Harbor Seals	42'18.90N/070'56.02W	
	03/26/01 0805	2	Harbor Seals	42'19.84N/070'56.96W	
PA011	03/26/01 0805	1	Harbor Porpoise	42'21.13N/071'02.14W	
F/V Andrea J	03/26/01 0835	3	Harbor Seals	42'19.95N/070'57.87W	
	03/26/01 1213	1	Unidentified Baleen Whale	42°15.27N/70°40.56W	
	03/26/01 1540	1	Minke Whale	42°23.82N/70°44.63 W	
WN014/WF014/	04/04/01		No Sightings		
PC013	04/05/01 1520	2	Minke Whales	42'24.72N/070'53.20W	
R/V Aquamonitor	04/05/01 1620	5	Harbor Seals	42'19.39N/070'56.55W	All harbor seals hauled out at low tide.
	04/05/01 1625	8	Harbor Seals	42'18.28N/070'55.51W	All harbor seals hauled out at low tide.
	04/05/01 1635	4	Harbor Seals	42'16.81N/070'55.65W	All harbor seals hauled out at low tide.
	04/06/01 0720	2	Harbor Seals	42'18.48N/070'55.19W	
	04/06/01 0750	2	Harbor Porpoise	42'19.18N/070'45.23W	
	04/06/01 0810	3	Harbor Porpoise	42'19.34N/070'40.47W	
	04/06/01 0820	3	Harbor Porpoise	42'19.34N/070'40.47W	
	04/06/01 0830	10	Harbor Porpoise	42'19.50N/070'35.12W	
	04/06/01 1035	1	Humpback Whale	42'24.65N/070'26.05W	
	04/06/01 1320	4	Harbor Porpoise	42'25.23N/070'38.14W	
	04/06/01 1500	2	Harbor Porpoise	42'20.50N/070'01.44W	
	04/06/01 1510	1	Harbor Seal	42'18.95N/070'59.26W	
	04/06/01 1530	1	Harbor Seal	42'18.32N/070'56.48W	
	04/06/01 1540	1	Harbor Seal	42'18.11N/070'56.45W	
WN014/WF014/	04/06/01 1550	1	Harbor Seal	42'16.30N/070'56.00W	

Table 1. Marine Mammal Observer Sightings During MWRA 2001 Water Quality Monitoring Program[1]

Survey ID	Date\Time	Number	Mammal	Location	Sighting Comments
PC013 (con't)	04/09/01 0745	5	Harbor Seals	42'16.29N/070'55.82W	Seals hauled out on rocks
	04/09/01 0755	15	Harbor Seals	42'18.63N/070'54.92W	Seals hauled out on rocks
	04/09/01 0935	3	Harbor Porpoise	42'08.31N/070'39.00W to 42'10.24N/ 070'34.58W	Between Station F05 and F06
	04/09/01 1010	1	Harbor Porpoise	42'10.23N/070'34.58W to 42'11.03N/ 070'38.63W	Between Station F06 and F07
	04/09/01 1112	1	Harbor Porpoise	42'09.28N/070'23.66W	
	04/09/01 1205	3	Atlantic white-sided dolphins	42'06.98N/070'17.38W	
	04/09/01 1355	2	North Atlantic right whales	41'52.89N/070'20.76W	At least seven different right whales were sighted. Right whale sightings were called to Pat Gerrior (NMFS) for the Early Warning System.
	04/09/01 1405	4	North Atlantic right whales	41'52.70N/070'20.48W	
	04/09/01 1415	1	North Atlantic right whale	41'52.78N/070'20.61W	
	04/09/01 1435	1	North Atlantic right whale	41'51.80N/070'24.53W	
	04/09/01 1455	1	North Atlantic right whale	41'51.20N/070'27.19W	
	04/09/01 1605	1	Harbor Seal		Hauled out on rocks at Duxbury Pier/Bug Light.
PC014/AV012	04/24/01 0740	2	Harbor Seals	42'16.31N/070'55.84W	Same group of seals.
R/V Aquamonitor	04/24/01 0750	8	Harbor Seals	42'18.89N/070'54.44W	
	04/24/01 0800	8	Harbor Seals	42'18.84N/070'54.63W	
	04/24/01 1130	4	Atlantic white-sided dolphins	42'17.19N/070'36.09W	
WN015	04/26/01 0725	10	Harbor Seals	42'18.00N/070'55.25W	
R/V Aquamonitor	04/26/01 1720	1	Harbor Seal	42'15.33N/070'55.18W	
WN016	05/18/01		No Sightings		
R/V Aquamonitor					
WN017	06/25/01		No Sightings		
R/V Aquamonitor					
WN018 *R/V Aquamonitor*	07/12/01		No Sightings		
WN019 *R/V Aquamonitor*	07/25/01 0748	1	Harbor Seal	42'21.22N/070'55.54W	
WN01A *R/V Aquamonitor*	08/09/01 0745	1	Harbor Seal	42'20.31N/070'56.33W	
WN01B *R/V Aquamonitor*	08/29/01 1403	1	Harbor Seal	42'23.55N/070'49.24W	
WN01C *F/V Andrea J*	09/17/01		No Sightings		
WN01D	10/05/01 0825	3	Harbor Seals	42'20.72N/070'56.32W	
F/V Andrea J	10/09/01		No Sightings		
WF01E	10/20/01 0725	3	Harbor Seals	42'16.66N/070'55.87W	
R/V Aquamonitor	10/20/01 0740	4	Harbor Seals	42'18.63N/070'55.82W	

Table 1. Marine Mammal Observer Sightings During MWRA 2001 Water Quality Monitoring Program[1]

Survey ID	Date\Time	Number	Mammal	Location	Sighting Comments
	10/20/01 0750	5	Harbor Seals	42'20.36N/070'56.50W	
	10/20/01 0800	5	Harbor Seals	42'20.44N/070'56.46W	
	10/20/01 0810	5	Harbor Seals	42'20.44N/070'56.41W	
WN01F	10/29/01		No Sightings		
F/V Andrea J					
WN01G	12/07/01 0700	1	Harbor Seal	42'15.23N/070'55.28W	
R/V Aquamonitor	12/07/01 1345	10-30	Atlantic white-sided dolphins	42'22.04N/070'42.57W	
PC01C/AV016	12/17/01 0715	1	Harbor Seal	42'15.23N/070'55.32W	
R/V Aquamonitor	12/17/01 0725	4	Harbor Seals	42'16.19N/070'55.82W	
	12/17/01 0735	1	Harbor Seal	42'17.32N/070'55.56W	
	12/17/01 1015	1	Harbor Seal	42'20.39N/070'47.46W	
WN01H	12/19/01 0735	1	Harbor Seal	42'15.88N/070'55.57W	
R/V Aquamonitor	12/19/01 0855	101+	Atlantic white-sided dolphins	42'25.11N/070'51.11W	

[1] - A dedicated marine mammal observer was present during these surveys. "No sightings" means that the marine mammal observer did not see any animals on that day.

Table 2. Incidental Sightings During MWRA 2001 Water Quality Monitoring Program[a]

Survey ID	Date\Time	Number	Mammal	Location	Sighting Comments
PC019 F/V *Andrea J*	10/4/201	3	Humpback whales	42’28.30’N/70’37.01’W	
PC01B R/V *Aquamonitor*	11/27/01	1	Minke whale	42’14.90’N/70’38.30’W	Blow spotted

a – Dedicated marine mammal observers were not present on these surveys. Sightings were incidental observations by field staff. Therefore, all marine mammals may not have been sighted during the survey.

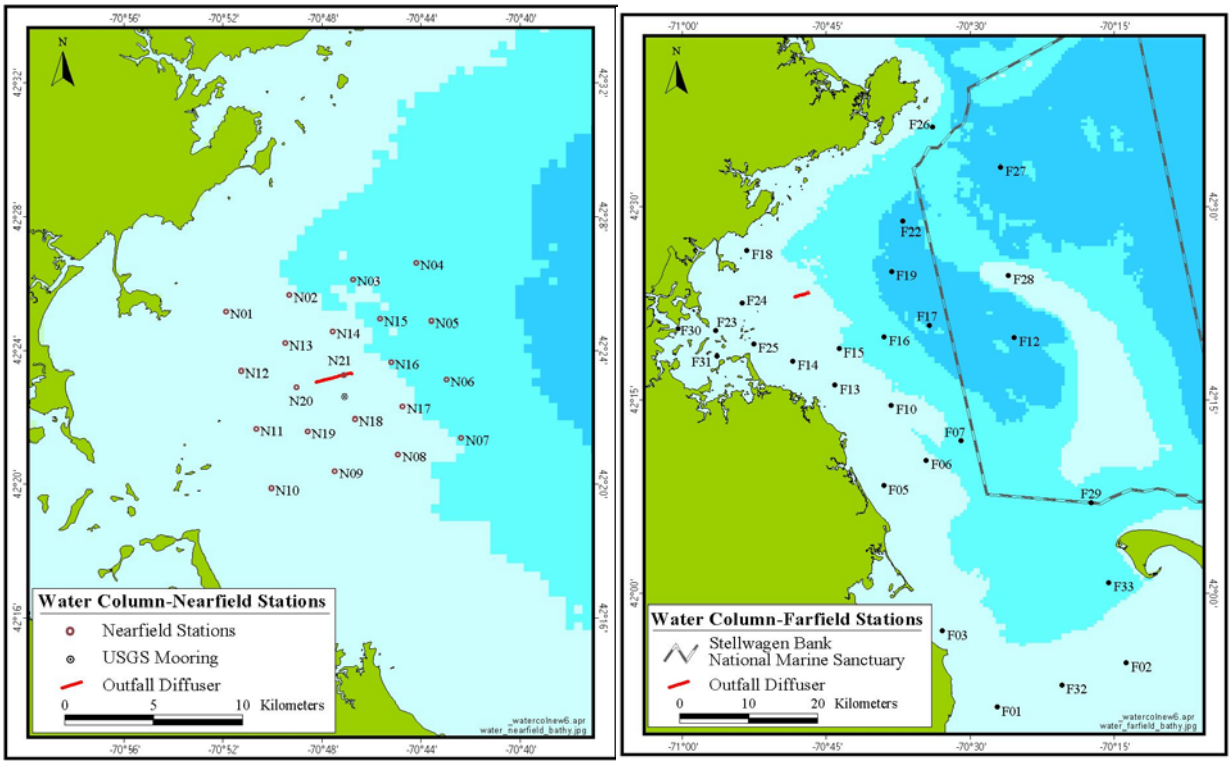

Figure 1. Location of Nearfield (Left) and Farfield Stations (Right)

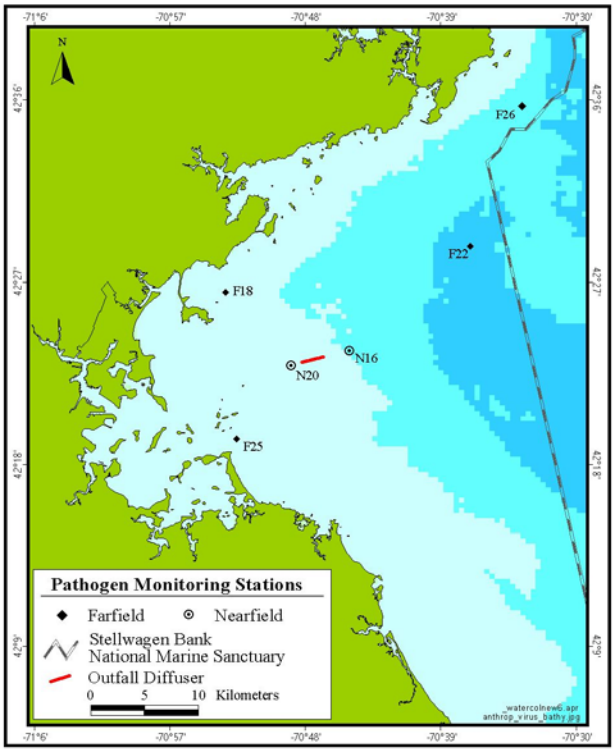

Figure 2. Location of Anthropogenic Virus Stations

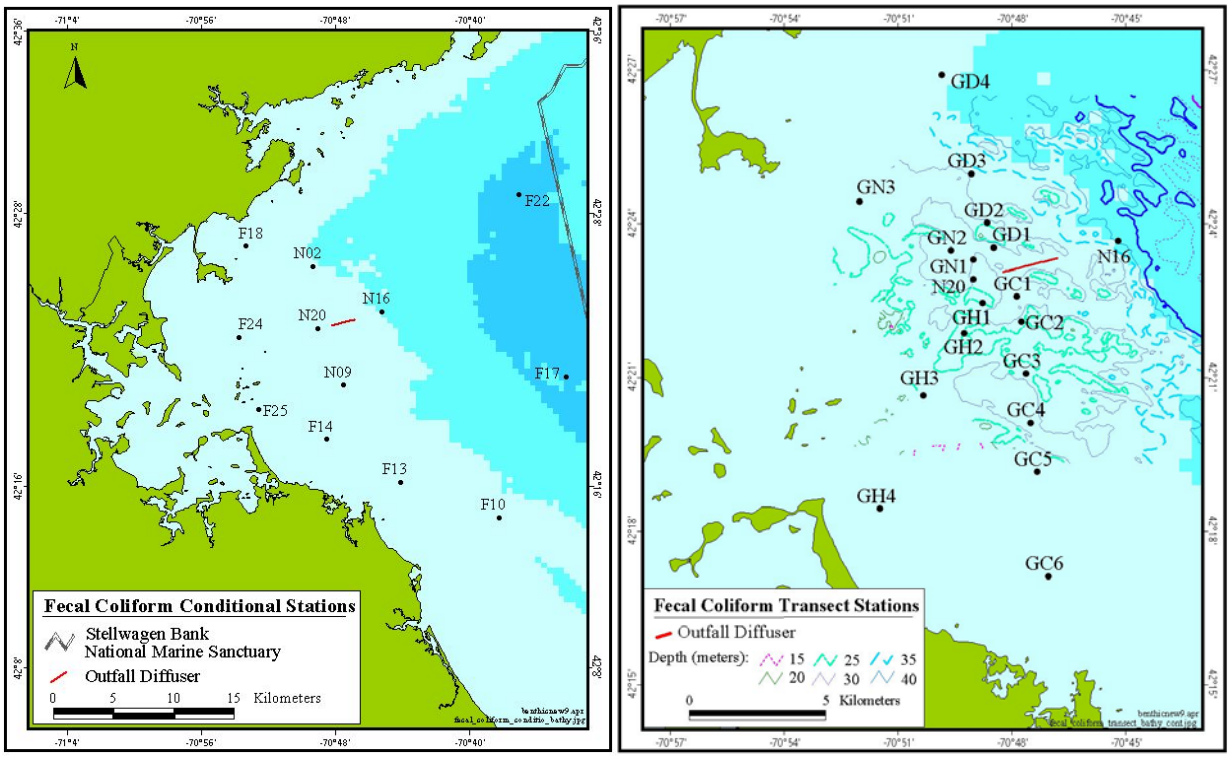

Figure 3. Location of Fecal Coliform Conditional Stations (Left) and Fecal Coliform Transect Stations (Right)

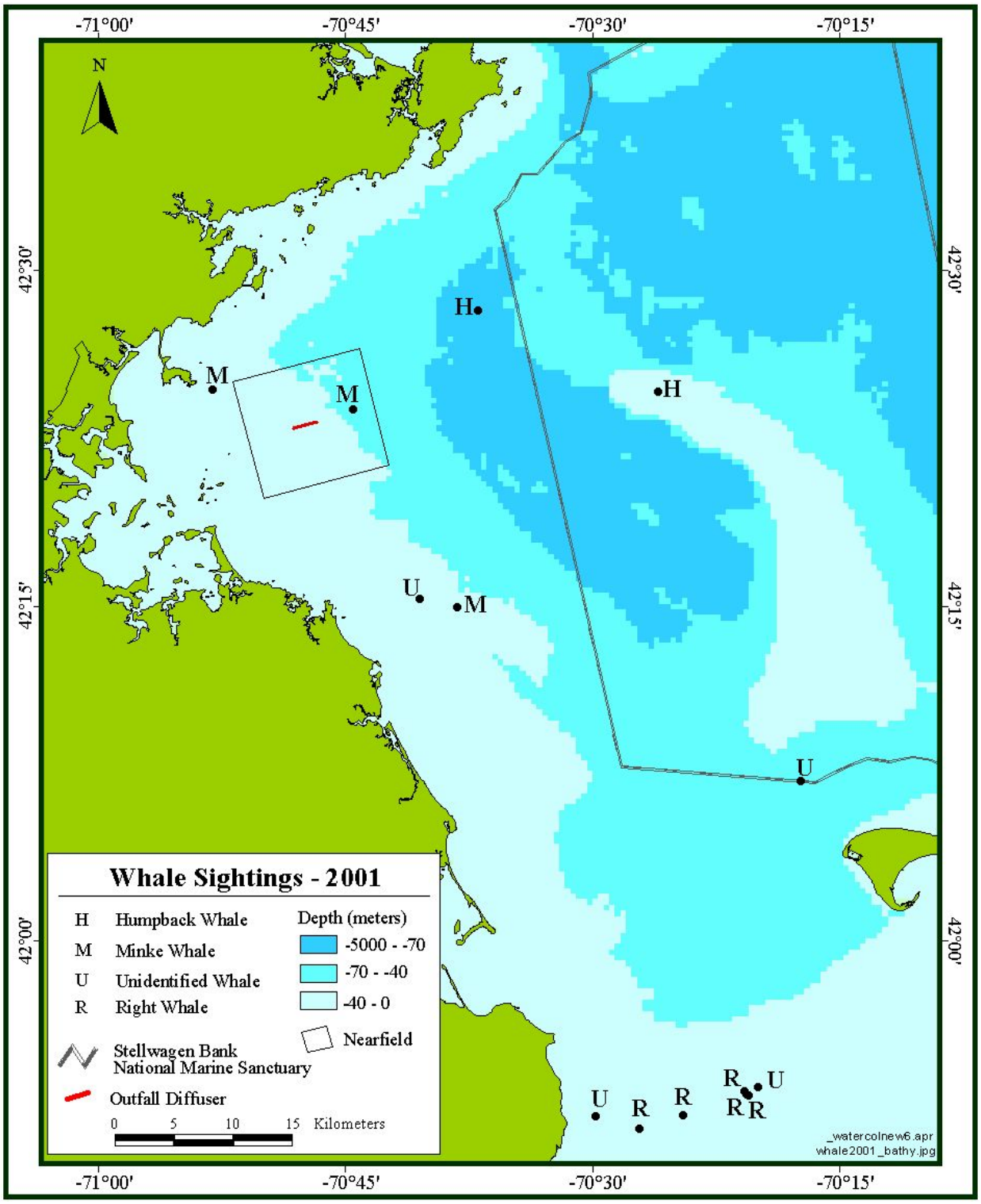

Figure 4. Approximate Locations of Whale Sightings during 2001 MWRA Water Quality Surveys

Note: The data displayed in this figure comes from Tables 1 and 2 of this report.

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