Summary of marine mammal observations during 2000 surveys

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SUMMARY OF MARINE MAMMAL OBSERVATIONS DURING 2000 SURVEYS

for

MWRA Harbor and Outfall Monitoring Project

submitted to

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 Introduction

Several endangered and threatened species of whales and turtles 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. The turtles include the Kemp's ridley, leatherback, hawksbill, loggerhead, and green turtle. 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 endangered species 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 and sea turtles.

Marine mammal observers were present on 18 of the 22 water quality surveys conducted during 2000. Observers were present on all of the Nearfield water column surveys except WN007 to document throughout the year the occasional presence as well as the general absence of right whales in the Nearfield. Observers were also placed on the vessel during three (WF001, WF002, and WF004) of the six Farfield water column surveys, one (AV006) of the six Anthropogenic Virus surveys, and two (PC00B and PC00C) of the twelve fecal coliform surveys.

2.0 Background

A brief description of when marine mammals and sea turtles 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 too 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).

The leatherback turtle (*Dermochelys coriacea*) is a temperate, pelagic species that occasionally wanders into Cape Cod/Massachusetts Bays in small numbers to feed on gelatinous zooplankton (jellyfish, salps, ctenophores) (Katona *et al*. 1993). Leatherback turtles are sighted in Cape Cod and Massachusetts Bays most frequently in July through September (Pett and McKay 1990).

Kemp's ridley turtles (*Lepidochelys kempi*) are infrequent visitors to the bays, probably wandering into Cape Cod Bay during a slow migration up the coast during the summer in search of their preferred benthic prey (NOAA 1991). Often, they become trapped by the hook of Cape Cod during their southward migration and are killed by the rapidly declining water temperature (NOAA 1991).

Loggerhead turtles (*Caretta caretta*) also are infrequent visitors to the bays, probably wandering into Cape Cod Bay during a slow migration up the coast during the summer in search of their preferred benthic prey (NOAA 1991). Like the Kemp ridley turtle they, often become trapped by the hook of Cape Cod during their southward migration and are killed by the rapidly declining water temperature (NOAA 1991).

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

Giant Ocean Sunfish (*Mola mola*) are a non-endangered species of fish found in the New England area normally during the summer months (Massachusetts Audubon Society 1988). The ocean sunfish are normally seen basking along the surface of the water (Massachusetts Audubon Society 1988).

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), one winter Anthropogenic Virus survey (Figure 2) and two winter Fecal Coliform Conditional surveys (Figure 2), during the 2000 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. Two survey vessels were used as observation platforms during the course of the year. The *F/V Isabel S* was used on surveys WN001, WF001, WN002, and WF002. The *R/V Aquamonitor* was used for surveys WN003, WN004, WF004, WN005, WN006, WN007, WF007, WN008, WN009, WN00A, WN00B, WF00B, WN00C, WN00D, WN00E, WF00E, WN00F, WN00G, PC00B, AV006, PC00C, and WN00H. The observer's eye-height above the sea surface was approximately 5 meters on the *F/V Isabel S* 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 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 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 2000 monitoring year, 55 individual whales, 11 Atlantic White-sided dolphins, 21 Pilot whales, and over 50 unidentified dolphins were directly observed by the marine mammal observers or Battelle survey team members. Included in these sightings were 29 humpback whales, 4 finback whales, 3 minke whales, and 19 instances of unidentifiable whale(s). As seen in Figure 3, the whale sightings were distributed throughout Massachusetts and Cape Cod Bay area. Forty-seven of the sightings were within the boundary of the Stellwagen Bank National Marine Sanctuary and one whale was sighted in the vicinity of the Nearfield. These data are consistent with last year's findings where 49 whales were sighted within Stellwagen Bank and two whales were sighted in the Nearfield area (McLeod *et al.* 2000). Unlike 1998 and 1999, no right whales were sighted during the surveys.

In addition to the whales, marine mammal observers on the surveys observed 65 harbor seals during the winter and spring seasons. In one instance a giant ocean sunfish was also observed and recorded.

All sightings recorded by a dedicated marine mammal observer are summarized in Table 1. Incidental sightings of marine mammals and sea turtles 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 comparable in 1998 (n∃28), 1999 (n= 27) and 2000 (n=31). Large changes in Pinniped and dolphin sightings were noted in 2000. In 1998, 20 pinnipeds were sighted, in 1999, 21 pinnepeds were sighted, but in 2000 62 sightings were made throughout the survey area. For dolphins, 1998 sightings included more than 32 dolphins and more than 56 dolphins were noted in 1999, but only 10 were noted in 2000. Observations of large baleen whales by the survey staff show that during the February and April surveys, most of the whales were located in Cape Cod Bay and the lower portion of Stellwagen Bank (from station F32 to around station F29). Sightings made during the June through October surveys indicated that most of the large baleen whales occurred around stations F12 and F28. No whale sightings by the survey staff were made in the area of the Nearfield from February to November of 2000. In December 2000, one minke whale was sighted in the Nearfield area. Included in the previous data were 3 right whale sightings in 1998 and 2 right whale sightings in 1999. The survey team noted no right whale sightings in 2000.

General observations of large baleen whales in the Stellwagen Bank region, noted by the Whale Center of New England during 2000, indicated low usage of the area by humpback and fin whales during May. From June through September whales were abundant on the southern half of the bank, and in October whales were present throughout the Bank. Also noted was the unusual presence of two juvenile humpback whales that spent over a week within a mile of the coast between Nahant and Boston, at one point entering Boston

Harbor. One of these whales maintained its coastal residency through at least the end of December, often being sighted feeding at the surface inside Salem, Beverly, or Gloucester harbor. (pers. comm. from Mason Weinrich). Although Battelle's surveys did not sight these same humpback whales, there presence was noteworthy.

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Table 1. Marine Mammal Observer Sightings During MWRA 2000 Water Quality Monitoring Program[1]

Survey ID	Date\Time	Number	Mammal	Location	Sighting Comments
WN001/WF001 *F/V Isabel S.*	2/2/00		No Sightings		
	2/3/00		No Sightings		
	2/4/00	1	Harbor Seal	75 feet in Gloucester Harbor	Snow and fog obscured visibility between 1230 - 1350
WN002/WF002 *F/V Isabel S.*	2/23/00 0825	4	Harbor Seals	41°46.81N/70°29.11W	
	2/23/00 1030	2	Unidentified Baleen Whales	41°53.76N/70°16.42W	The marine mammal observer noted that these 3 sightings appeared to be the same 2 whales.
	2/23/00 1040	2	Unidentified Baleen Whales	41°54.43N/70°13.82W	
	2/23/00 1050	2	Unidentified Baleen Whales	41°54.47N/70°13.67W	
	2/24/00 1140	1	Harbor Seal	42°19.87N/70°25.35W	Visibility < 3 miles from 0600 - 0640
	2/24/00 1200	2	Humpback Whales	42°20.12N/70°29.02W	
	2/25/00		No Sightings		Fog/rain reported between 0640 - 0740 and between 1450 - 1710
	2/27/00		No Sightings		Fog between 0600 - 1220 and 1610 - 1800 obscured visibility
WN003 *R/V Aquamonitor*	3/14/00		No Sightings		Sea states above 3 feet between 1440 and 1550 and between 1630 and 1800 obscured visibility
WN004/WF004 *R/V Aquamonitor*	3/30/00 1245	25	Harbor seals	On rocks next to Duxbury Pier Lighthouse	
	4/1/00		No Sightings		
	4/3/00 0750	1	Harbor Seal	42°19.14N/70°56.35W	
	4/3/00 1440	4	Humpback Whales	42°25.21N/70°26.04W	The marine mammal observer noted that these were all or part of the same set of whales.
	4/3/00 1450	7	Humpback Whales	42°24.62N/70°25.97W	
	4/3/00 1500	3	Humpback Whales	42°24.61N/70°26.00W	
	4/3/00 1500	1	Humpback Whale	42°24.61N/70°26.00W	
	4/7/00 0750	2	Harbor Seals	42°16.57N/70°55.82W	
	4/7/00 0800	6	Harbor Seals	42°18.93N/70°54.11W	
	4/7/00 0805	1	Harbor Seal	42°19.30N/70°52.55W	
	4/7/00 0810	1	Harbor Seal	42°19.30N/70°52.55W	
	4/7/00 1340	2	Unidentified Odontocetes	42°18.42N/70°49.79W	
	4/7/00 1540	1	Humpback Whale	42°08.73N/70°20.98W	
	4/7/00 1546	3	Humpback Whales	42°08.73N/70°20.98W	
	4/7/00 1547	1	Humpback Whale	42°07.38N/70°18.35W	
	4/7/00 1620	1	Harbor Seal	42°04.08N/70°16.66W	
	4/7/00 1728	1	Minke Whale	41°54.68N/70°13.77W	
	4/7/00 1800	1	Harbor Seal	41°53.87N/70°16.43W	
WN005 *R/V Aquamonitor*	4/28/00 0945	1	Harbor Seal	42°18.82N/70°55.21W	
	5/1/00		No Sightings		
WN006 *R/V Aquamonitor*	5/17/00 0920	1	Unidentified Marine Mammal	42°26.14N/70°47.75W	Described as black and larger than a dolphin.
WN008 *R/V Aquamonitor*	7/6/00 0730	1	Harbor Seal	42°16.87N/70°56.59W	

Table 1. Marine Mammal Observer Sightings During MWRA 2000 Water Quality Monitoring Program[1]
(Con't)

Survey ID	Date\Time	Number	Mammal	Location	Sighting Comments
WN009 *R/V Aquamonitor*	7/19/00		No Sightings		
WN00A *R/V Aquamonitor*	8/2/00 0730	1	Harbor Seal	42°18.71N/70°55.82W	
	8/2/00 0900	1	Harbor Seal	42°25.65N/70°49.30W	
	8/2/00 1510	1	Harbor Seal	42°24.58N/70°47.57W	
	8/2/00 1550	1	Ocean Sunfish	42°22.38N/70°49.63W	
WN00B *R/V Aquamonitor*	8/17/00		No Sightings		Sea states above 3 feet occurred from 1010 to 1240 and spray from 1600 to 1630 obscured visibility
WN00C *R/V Aquamonitor*	9/1/00		No Sightings		Visibility to 1 to 3 miles and occasional spray obscured visibility from 0710 to 0810 and 1310 to 1330
WN00D *R/V Aquamonitor*	9/22/00		No Sightings		
WN00E *R/V Aquamonitor*	10/5/00 0720	1	Harbor Seal	42°15.60N/70°55.15W	
	10/5/00 1520	1	Unidentified Marine Mammal	42°23.40N/70°51.22W	Described as either a harbor seal or harbor porpoise.
WN00F *R/V Aquamonitor*	10/24/00 1630	5	Harbor Seals	42°18.62N/70°55.31W	
	10/24/00 1642	1	Harbor Seal	42°16.08N/70°55.95W	
WN00G *R/V Aquamonitor*	11/29/00 0725	2	Harbor Seals	42°16.29N/70°55.86W	
	11/29/00 0735	3	Harbor Seals	42°18.92N/70°56.18W	
PC00B *R/V Aquamonitor*	12/04/00 0928	1	Harbor Seal	42°16.04N/70°43.98W	
	12/04/00 1150	1	Unidentified Baleen Whale	42°28.79N/70°37.06W	
	12/04/00 1220	5	Atlantic Whitesided Dolphins	42°25.51N/70°42.59W	
	12/04/00 1225	4-6	Atlantic Whitesided Dolphins	42°24.97N/70°43.31W	
AV006/PC00C *R/V Aquamonitor*	12/19/00		No Sightings		
WN00H *R/V Aquamonitor*	12/21/00 1435	1	Minke Whale	42°24.04N/70°50.10W	

[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 2000 Water Quality Monitoring Program[a]

Survey ID	Date\Time	Number	Mammal	Location	Sighting Comments
WF001 *F/V Isabel S.*	2/5/00 0845	1	Unidentified Baleen Whale	42°25.28N/70°25.99W	
	2/5/00 1045	1	Unidentified Baleen Whale	42°11.82N/70°20.28W	
	2/5/00 1055	1	Unidentified Baleen Whale	42°10.79N/70°19.73W	
	2/5/00 1145	1-2	Unidentified Baleen Whale	42°04.56N/70°16.53W	
	2/5/00 1205	1	Unidentified seal	42°01.28N/70°15.70W	
	2/5/00 1225	1	Unidentified seal	42°00.06N/70°15.35W	
	2/5/00 1235	1	Unidentified seal	41°58.39N/70°14.92W	
	2/5/00 1240	1	Unidentified Baleen Whale	41°57.28N/70°14.61W	
	2/5/00 1345	3	Unidentified Baleen Whale	41°52.71N/70°20.41W	
WF007 *R/V Aquamonitor*	6/13/00 1212	1	Unidentified Whale	42°20.63N/70°26.24W	
	6/13/00 1237	1	Minke Whale	42°24.21N/70°25.92W	
	6/13/00 1239	2	Humpback and Finback Whales	42°24.00N/70°25.58W	
	6/13/00 1348	3	Finback Whales	42°09.82N/70°18.77W	
WF00B *R/V Aquamonitor*	8/18/00 1225	1	Humpback Whale	42°20.26N/70°27.20W	
	8/18/00 1240	2 or more	Humpback Whales	42°19.74N/70°25.43W	
	8/18/00 1320	3 or more	Humpback Whales	42°24.60N/70°25.98W	
WF00E *R/V Aquamonitor*	10/4/00 1311	1	Unidentified Whale	42°26.14N/70°26.28W	
	10/4/00 1400	2 pods	Pilot Whales	42°21.25N/70°29.39W	1 with 6 whales and 1 with 15 whales
	10/12/00 1108	1 pod	Common Dolphin	42°10.09N/70°26.52W	50 – 60 mammals in the pod

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.

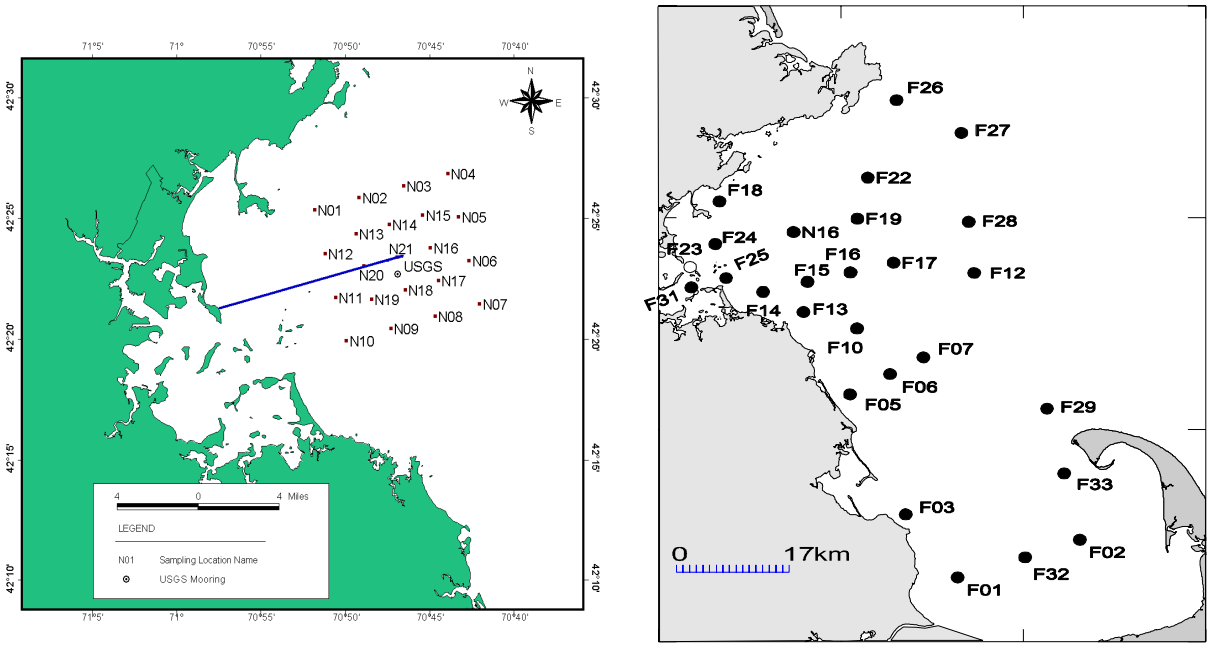


Figure 1. Location of Nearfield (Left) and Farfield Stations (Right)

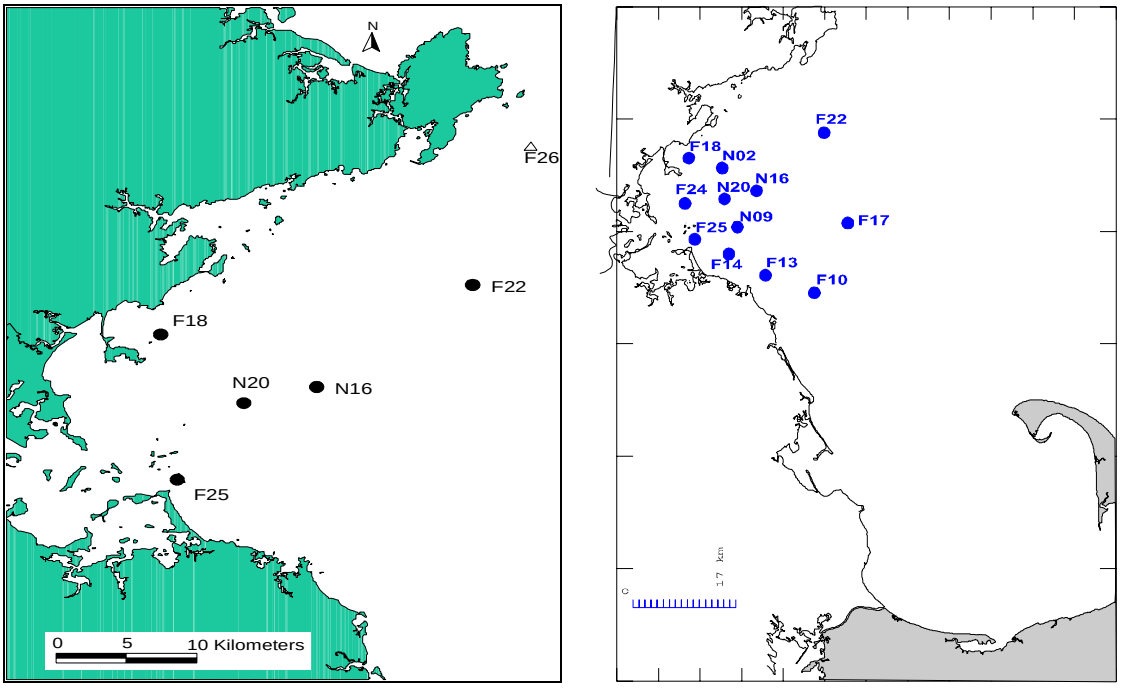


Figure 2. Location of Anthropogenic Virus (Left) and Fecal Coliform Conditional Stations (Right)

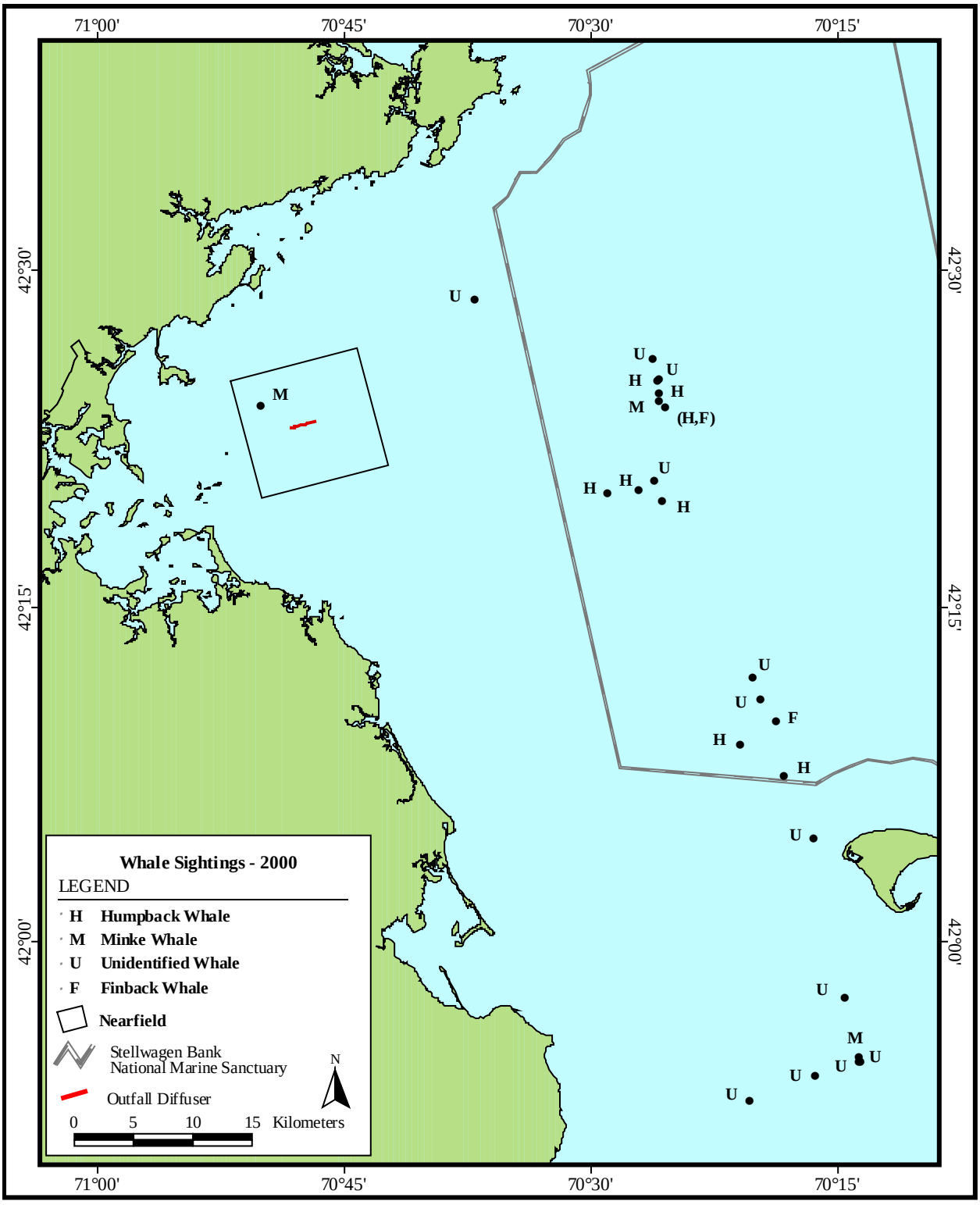
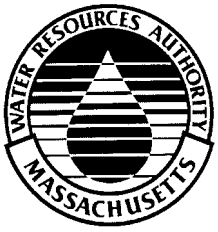


Figure 3. Approximate Locations of Whale Sightings during 2000 MWRA Water Quality Surveys

Note: The data displayed in this figure comes from Tables 1 and 2 of this report. Letters in parentheses [*i.e.*, (H,F)] indicate that two different species were noted at the same latitude and longitude position during the year.



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