Summary of marine mammal observations during 1999 surveys

Massachusetts Water Resources Authority

Environmental Quality Department
Report ENQUAD 00-01

SUMMARY OF MARINE MAMMAL OBSERVATIONS DURING 1999 SURVEYS

for

MWRA Harbor and Outfall Monitoring Project

submitted to

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Cover Photo: Carlton D. Hunt, 1998. Photograph taken August 1998 in Stellwagen Bank National Marine Sanctuary during a commercial whale watch cruise.

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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 document any incidental sightings of marine mammals and sea turtles.

Marine mammal observers were present on 18 of the 22 water quality surveys conducted during 1999. As in previous years, observers were present on all of the Nearfield water column surveys 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 (WF991, WF992, and WF994) of the six Farfield water column surveys, and two (PT991 and PC994) of the three 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). Although, 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 correlate 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 whales 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).

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 Nearfield water column surveys (Figure 1), and while the vessel was on-station for sampling operations. Additionally, during three winter/spring Farfield surveys (Figures 1 and 2) and two winter/spring Fecal coliform surveys (Figure 3), observations were also performed as above. 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 vantagepoint 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 WN991, WF991, WN992, WF992, and AV991. The *R/V Aquamonitor* was used for PT991, WN993, WN994, WF994, WN995, WN996, PC994, WN998, WN999, WN99A, WN99B, WF99B, WN99C, WN99D, WN99E, WF99E, WN99F, WN99G, and WN99H. The *F/V Christopher Andrews* was used for WN997 and WF997. The observer's eye-height above the sea surface was approximately 5 meters on the *F/V Isabel S*, 2.5 meters aboard the R/V *Aquamonitor*, and 3.5 meters aboard the *F/V Christopher Andrews*. 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 1999 monitoring year, 59 individual whales, 10 harbor porpoises, and over 56 Atlantic White-sided dolphins were directly observed by the marine mammal observers or Battelle survey team members. Included in these sightings were 2 right whales, 12 humpback whales, 27 finback whales, 4 minke whales, and 14 instances of unidentifiable whale(s). As seen in Figure 4, the whale sightings were distributed throughout Massachusetts and Cape Cod Bay area. Forty-nine 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. In one instance a right whale, sighted in April, was observed skim feeding along the surface.

In addition to the whales, marine mammal observers on the surveys observed 25 harbor seals during the winter and spring seasons. In two instances, giant ocean sunfish were also observed and recorded.

All sightings recorded by a dedicated marine mammal and sea turtle 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 4.

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 obtained of large baleen whales were comparable in 1998 ($n \geq 28$) and 1999 ($n=27$). Additionally, pinniped and dolphin sightings were also similar between years. In 1998, 20 pinnipeds were sighted and in 1999, there were 21 sightings. For dolphins, 1998 sightings included more than 32 dolphins and more than 56 were noted in 1999. Although no conclusions can be drawn, it is noteworthy to mention that harbor porpoises were sighted only in 1999, and at least one large baleen whale was sighted in the vicinity of the outfall diffuser during each of the 2 years. General observations of large baleen whales in the Stellwagen Bank area during 1999 indicated that some shifting in humpback whale distribution did occur. After late June to early July, humpback whales were more prevalent in the middle and southern portions of Stellwagen Bank, while fin whales and minke whales were present throughout the Stellwagen Bank area (Weinrich, personal communication).

Included in the previous data were 3 right whale sightings in 1998 and 2 right whale sightings in 1999. As stated in the introduction, the focus of onboard dedicated marine mammal observers is to document the presence of right whales in the vicinity of the outfall. During each of the last 2 years, right whales have been documented in Cape Cod Bay during the MaDMF winter and spring surveillance program from December through May with up to 100 individuals sighted each year (Brown and Marx, 1999). However, it is unclear if this is typical since, in at least one year in the late 1980's, sightings dropped as low as 19 individuals, although the survey effort was restricted to vessels (Brown, personal communication). Although no conclusions can be drawn regarding the range in variability of sightings from year to year, it is noteworthy to mention that, for the third time since 1984, no mother-calf pairs were sighted in Cape Cod Bay during the 1999 winter/spring field season (Brown and Marx, 1999).

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Table 1. Marine Mammal Observer Sightings During MWRA 1999 Water Quality Monitoring Program[1]

Survey ID	Date\Time	Number	Mammal	Location	Sighting Comments
WN991/WF991 *F/V Isabel S.*	2/2/99		No Sightings		
	2/3/99 0845	5	Harbor Seals	42°34.88 N/70°49.83W	
	2/3/99 1515	1	Unidentified Baleen Whale	42°24.30N/70°25.28W	
	2/3/99 1528	1	Unidentified Baleen Whale	42°23.21N/70°25.70W	
	2/4/99 0942	1	Harbor Seal	42°24.20N/70°53.30W	
	2/7/99		No Sightings		
	2/8/99		No Sightings		
PT991 *R/V Aquamonitor*	2/16/99		No Sightings		
WN992/WF992/ AV991 *F/V Isabel S.*	2/23/99 1200	1	Unidentified Baleen Whale	41°52.74N/70°20.41W	Blow seen
	2/23/99 1209	1	Right Whale	41°52.08/70°20.01W	Sighting reported to Pat Gerrior at 1320
	2/23/99 1444	1	Unidentified Baleen Whale	42°05.07N/70°17.01W	
	2/23/99 1451	1	Unidentified Baleen Whale	42°06.60N/70°17.01W	Possibly the same Unidentified Baleen Whale seen at 1444
	2/24/99 0821	1	Minke Whale	42°28.70N/70°37.10W	
	2/24/99 1313	1	Harbor Seal	42°18.26N/70°47.32W	
	2/27/99		No Sightings		
	2/28/99 0657	2	Harbor Seals		Boston Inner harbor
WN993 *R/V Aquamonitor*	3/20/99		No Sightings		
WN994/WF994 *R/V Aquamonitor*	4/1/99 0735	3	Harbor Seals		On rocks around Bug Light
	4/1/99 1115	1	Harbor Seal	41°57.83N/70°14.75W	
	4/1/99 1305	6 or 7	Atlantic Whitesided Dolphins	42°14.65N/70°21.56W	
	4/1/99 1305	1	Unidentified Baleen Whale	42°14.65N/70°21.56W	Blow seen
	4/1/99 1310	50+	Atlantic Whitesided Dolphin	42°15.49N/70°22.61W	
	4/1/99 1310	1	Finback Whale	42°15.49N/70°22.61W	
	4/6/99 0710	1	Harbor Seal	42°18.30N/70°55.49W	
	4/6/99 0810	1	Harbor Seal	42°19.45N/70°59.77W	
	4/6/99 1101	1	Unidentified Baleen Whale	42°30.12N/70°36.44W	
	4/6/99 1245	2	Finback Whales	42°30.65N/70°26.29W	
	4/6/99 1245	2	Minke Whales	42°30.65N/70°26.29W	
	4/6/99 1300	2	Finback Whales	42°29.91N/70°26.81W	
	4/6/99 1305-1330	6	Humpback Whales	42°27.64N/70°26.51W	One mother, calf pair. active open mouth feeding observed
	4/6/99 1330	1	Right Whale	42°26.27N/70°26.80W	Skim feeding. Sighting reported to Pat Gerrior at 1545
	4/6/99 1342	1	Humpback Whale	42°24.60N/70°26.00W	Bearing 0°
	4/6/99 1406	1	Unidentified Baleen Whale	42°23.51N/70°31.14w	Bearing 100°
	4/7/99		No Sightings		Survey aborted due to bad weather

Table 1. Marine Mammal Observer Sightings During MWRA 1999 Water Quality Monitoring Program[1]
(Continued)

Survey ID	Date\Time	Number	Mammal	Location	Sighting Comments
WN994/WF994 *R/V Aquamonitor (continued)*	4/11/99 0820	3	Harbor Porpoises	42°20.01N/70°57.34W	
	4/11/99 0849	1	Harbor Porpoise	42°20.36N/70°56.50W	At station F23
	4/11/99 0907	1	Harbor Porpoise	42°20.36N/70°56.43W	At station F23
	4/11/99 0945	3	Harbor Porpoises	42°20.35N/70°56.47W	At station F23
	4/11/99 0949	2	Harbor Porpoises	42°20.37N/70°56.42W	At station F23
	4/15/99		No Sightings		Survey aborted due to equipment problems
	5/6/99		No Sightings		Visibility 0-3 miles for duration of survey.
WN995 *R/V Aquamonitor*	4/29/99		No Sightings		Survey aborted due to bad weather.
	5/5/99		No Sightings		Visibility was < 0.25-5 miles for the duration of the survey
WN996 *R/V Aquamonitor*	5/12/99		No Sightings		
PC994 *R/V Aquamonitor*	5/13/99		No Sightings		Survey aborted due to bad weather. Visibility obscured by spray.
	5/14/99 0815	1	Harbor Seal	42°15.45N/70°55.85W	
WN997 *F/V Christopher Andrews*	6/19/99		No Sightings		
WN998 *R/V Aquamonitor*	7/7/99		No Sightings		
WN999 *R/V Aquamonitor*	7/20/99		No Sightings		
WN99A *R/V Aquamonitor*	8/2/99		No Sightings		
WN99B *R/V Aquamonitor*	8/18/99 1310	1	Giant Ocean Sunfish		At station N17; Visibility was less than 4.0 miles until 11:00 A.M.
WN99C *R/V Aquamonitor*	9/8/99 0900	1	Minke Whale	42°26.76N/70°46.72W	
	9/8/99 1322	1	Unidentified Baleen Whale	42°22.33N/70°44.76W	
WN99D *R/V Aquamonitor*	9/24/99 1526	1	Giant Ocean Sunfish	42°22.23N/70°49.77W	At station N11
WN99E *R/V Aquamonitor*	10/8/99		No Sightings		
WN99F *R/V Aquamonitor*	10/27/99 0720	3	Harbor Seals	42°16.69N/70°55.85W	
WN99G *R/V Aquamonitor*	11/23/99		No Sightings		Visibility was < 1.0 miles from 0735 to 1025.
WN99H *R/V Aquamonitor*	12/20/99 0710	2	Harbor Seals	42°16.09N/70°55.86W	

[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 1999 Water Quality Monitoring Program[a]

Survey ID	Date\Time	Number	Mammal	Location	Sighting Comments
HT991 *R/V Aquamonitor*	4/20/99 0740	1	Harbor Seal		Off starboard between Hewitts Cove Marina and station T08
	4/20/99 0750	1	Harbor Seal		Off starboard ½ mile from station T08
WF997 *F/V Christopher Andrews*	6/14/99 1630	2	Unidentified Whales	42° 24.60N/70° 26.10W	
WF99B *R/V Aquamonitor*	8/16/99 1315	20	Finback Whales	42° 10.63N/70° 19.74W	
	8/16/99 1321	1	Humpback Whale	42° 11.02N/70° 19.76W	Bubble feeding
	8/16/99 1332	1	Humpback Whale	42° 12.85N/70° 21.28W	
	8/16/99 1332	2	Finback Whales	42° 12.85N/70° 21.28W	
	8/16/99 1507	3	Humpback Whales	42° 26.64N/70° 26.01W	
BF991/BN991/BC991 *R/V Aquamonitor*	8/12/99 0817	1	Harbor Seal	42° 23.27N/70° 53.64W	
WF99E *R/V Aquamonitor*	10/6/99 1001	1	Unidentified Whale	41° 54.52N/70° 13.68W	Within 1/10 mile of station F02
	10/6/99 1308	1	Unidentified Whale	42° 24.59N/70° 26.06W	
	10/6/99 1323	1	Unidentified Whale	42° 24.61N/70° 25.97W	At station F28
	10/28/99 1229	1	Unidentified Seal	42° 18.91N/70° 43.69W	At station F15

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.

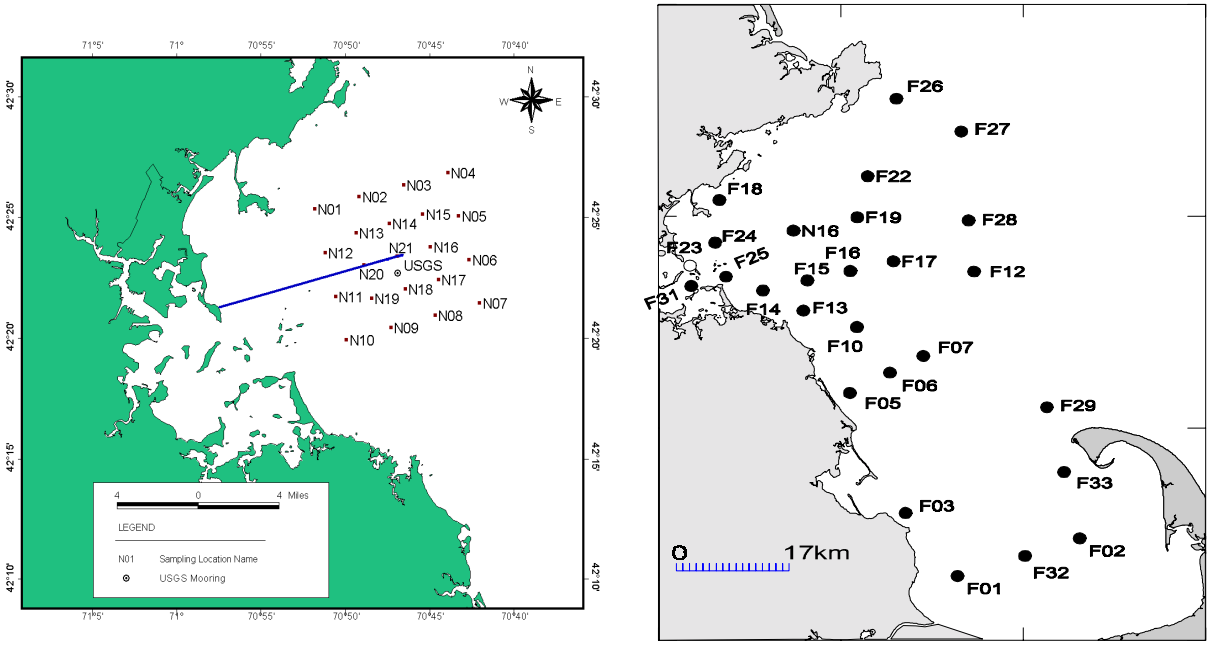

Figure 1. Location of Nearfield (Left) and Farfield Stations (Right)

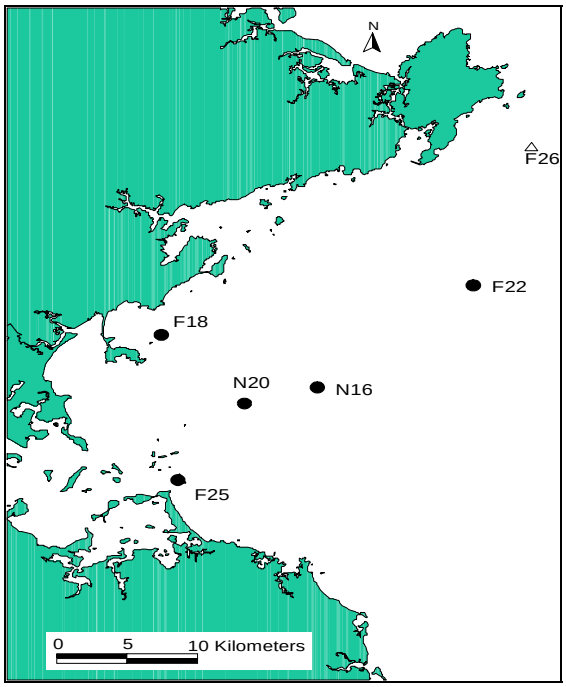

Figure 2. Location of Anthropogenic Virus Stations

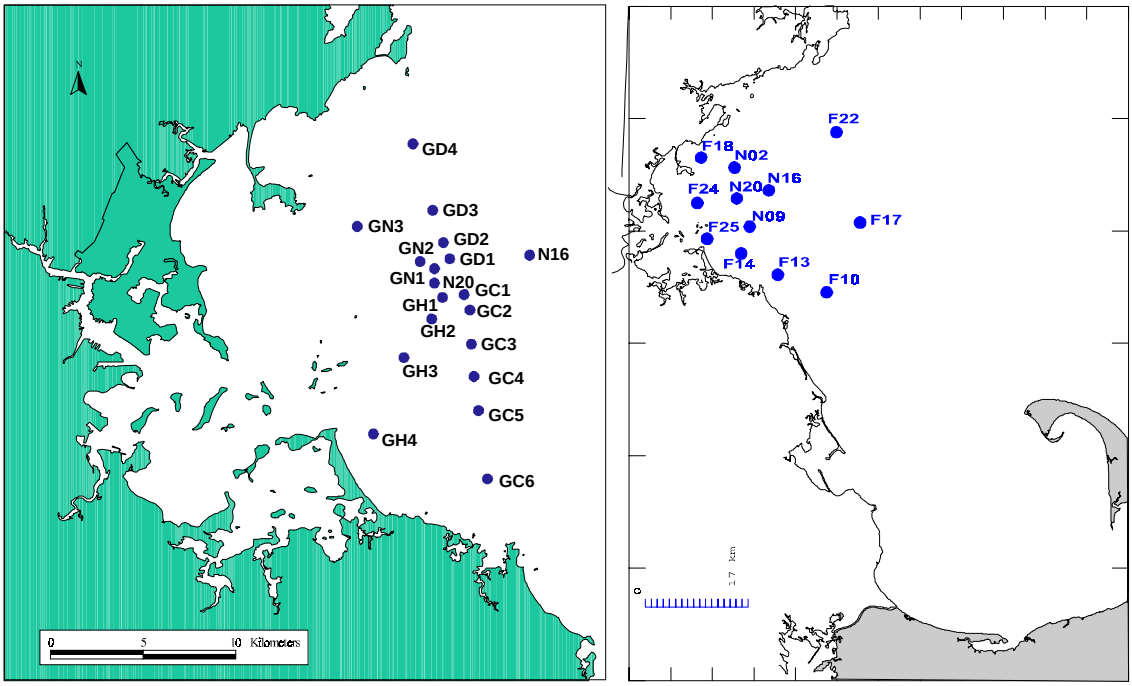

Figure 3. Location of Fecal Coliform Transect (Left) and Fecal Coliform Conditional Stations (Right)

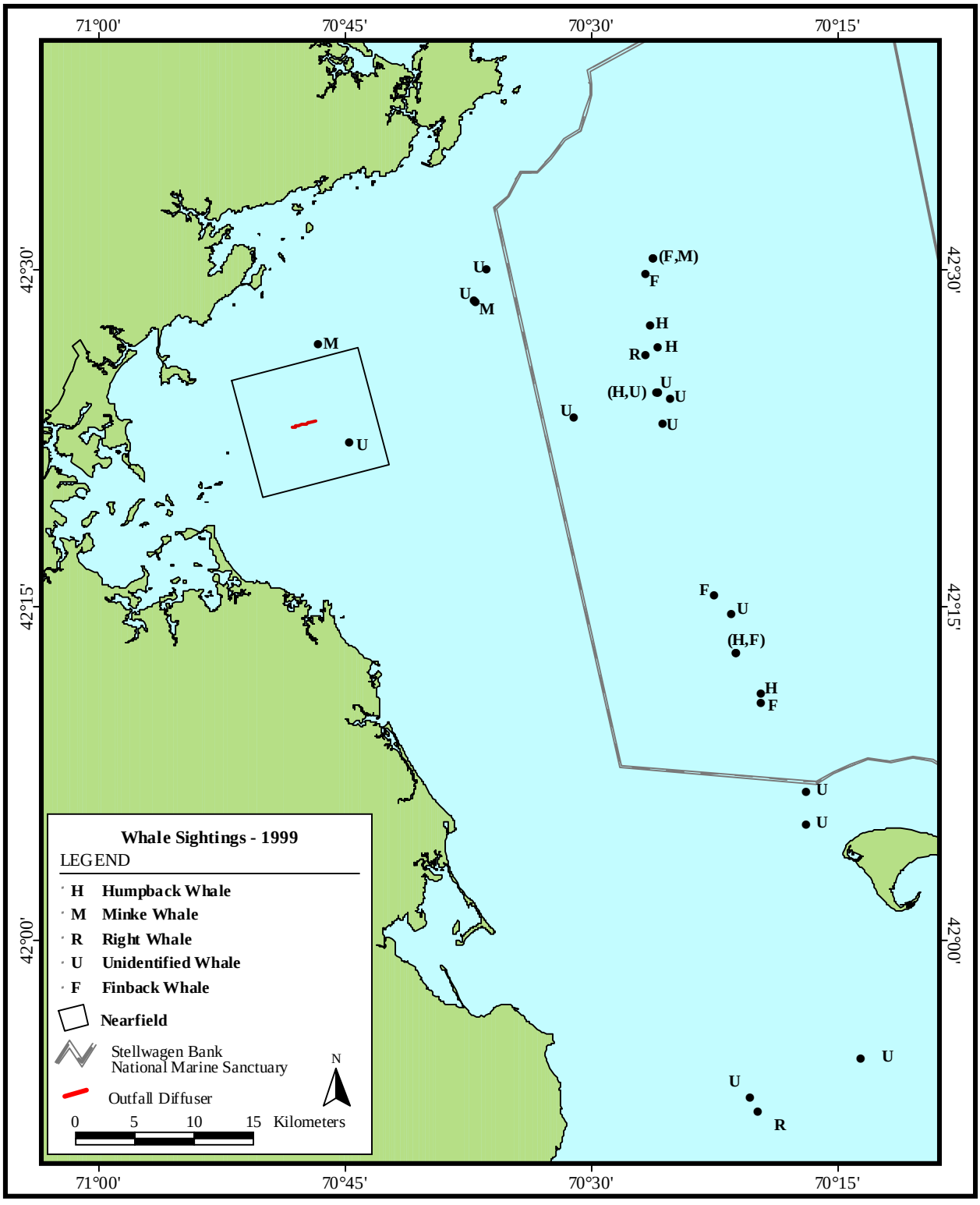

Figure 4. Approximate Locations of Whale Sightings during 1999 MWRA Water Quality Surveys

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

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