

**Data Usability Assessment Report for
Manhasset Bay Bacteriological Assessment for Summers
2016 through 2021
November 25, 2022**

Manhasset Bay Protection Committee

Prepared by:

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Abstract:

This document provides a summary of environmental data collected, a review of the quality objectives (DQO) and indicators (DQI), and evaluations required to assess the usability of data to support the use of data collected in years 2016 through 2021.

Section 1 PROJECT MANAGEMENT**1.1. Approval Sheet**

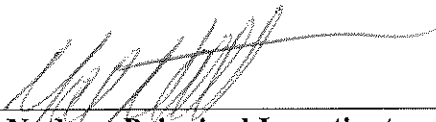
Managers and Participants: The undersigned parties certify that the Data Usability Assessment Report (DUAR) presented herein accurately represents their planning and execution efforts with regard to the aforementioned completed.



sign here

12/6/2022
Date**Project Manager****Sarah Deonarine, Manhasset Bay Protection Committee**

I certify that I have personally examined and am familiar with the environmental information being submitted. Based on my inquiry of those persons immediately responsible for the sample collection, handling and data management of the environmental information being submitted, I believe the information to be true, accurate and complete.



sign here

12/15/22
Date**Mal Nathan, Principal Investigator, Town of North Hempstead Bay Constables**

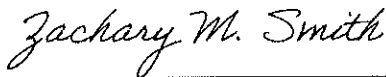
sign here

12/6/2022
Date**Kevin Braun, Town of North Hempstead Planning
Department**

sign here

**Andrew Wendolovski, Laboratory Director, Nassau County
Department of Health**

Date



11-25-2022

Zachary Smith, Assistant QA Reviewer, NYSDEC Division of Water Date

Any work products from a NYSDEC funded or required project, including but not limited to water quality data or environmental information; measured, generated, or developed under this project cannot be released, published, cited, or shared in draft or final form without the prior written authorization of the NYSDEC DOW Project Manager.

Section 1 PROJECT MANAGEMENT

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Project Manager	Date
Sarah Deonarine, Manhasset Bay Protection Committee	
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Mal Nathan, Principal Investigator, Town of North Hempstead Bay Constables	Date
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Kevin Braun, Town of North Hempstead Planning Department	Date
 David Tamayev, MD, Microbiology Technical Director, Nassau County Department of Health	 Date

 Zachary Smith, Assistant QA Reviewer, NYSDEC Division of Water	11-25-2022 Date
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1.3. Project Background/Problem Definition

The Manhasset Bay Protection Committee (henceforth “MBPC”) is an inter-municipal organization formed in 1998, focused on addressing water quality and coastal issues in Manhasset Bay with a coordinated, watershed-level approach. The 15 member municipalities are: Nassau County, the Town of North Hempstead, and the villages of Baxter Estates, Flower Hill, Great Neck, Kensington, Kings Point, Manorhaven, Munsey Park, Plandome, Plandome Heights, Plandome Manor, Port Washington North,

Sands Point, and Thomaston. More information on the Committee is available at manhassetbay.net. The Committee's goals are to protect, restore, and enhance Manhasset Bay so as to insure a healthy and diverse marine ecosystem while balancing and maintaining recreational and commercial uses. Tasks that help toward these goals include the annual water quality monitoring and regular assessment of Manhasset Bay.

According to the New York State Department of Environmental Conservation's (the State regulatory agency concerned with environmental issues both on the land and in the water) Waterbody Inventory/Priority Waterbodies List, Manhasset Bay is impaired by pathogens (as indicated by the bacteria fecal coliform and enterococcus) from stormwater runoff, which is the focus of this analysis and report.

Manhasset Bay is broken into three portions ([Fig. 1](#)) according to the New York State Department of Environmental Conservation (henceforth DEC) Waterbody Inventory/Priority Waterbodies List. These portions, their descriptions, and other details are summarized in [Table 1](#). Portions 1 and 2 of Manhasset Bay are also on the NYS Section 303(d) List of Impaired Waters Requiring a TMDL¹ or Other Strategy². Portion 1 is listed as a shellfishing restricted impairment for pathogens from urban/stormwater runoff requiring TMDL development. Portion 2 is listed as an individual waterbody segment with pathogen impairment from urban/stormwater runoff requiring TMDL development.

Table 1. Portions of Manhasset Bay, their class, and their impairments from the 2016 DEC Waterbody Inventory/Priority Waterbodies List³

	Class	Known Major pollutant	Source	Portion description
Portion 1	SA ⁴	DO/Oxygen Demand, Nutrients, Pathogens	STPs, Urban/stormwater runoff	Bay waters southwest of a line from Hewlett Point to Barker Point, southwest of a line from Plum Point to Port Washington Yacht Club dock, and north of a line running east of Harbor Way dock.
Portion 2	SB ⁵	Pathogens	Urban/stormwater runoff	Bay waters northeast of a line from Plum Point to Port Washington Yacht Club dock.
Portion 3	SC ⁶	Pathogens	Urban/stormwater runoff	Bay waters south of a line running east from Harbor Way dock.

These portions are important, because it determines what bacteriological standards each station's data is compared against. The monitoring stations and their associated portion are given in [Table 2](#).

¹ Total Maximum Daily Loads (TMDL) are defined by the EPA as "the calculation of the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet water quality standards. A TMDL determines a pollutant reduction target and allocates load reductions necessary." From: <https://www.epa.gov/tmdl/overview-total-maximum-daily-loads-tmdls>

² November 2016 https://www.dec.ny.gov/docs/water_pdf/303dListfinal2016.pdf

³ <https://www.dec.ny.gov/chemical/36730.html>

⁴ The best usages of **Class SA** waters are shellfishing for market purposes, primary and secondary contact recreation and fishing. These waters shall be suitable for fish, shellfish and wildlife propagation and survival.

⁵ The best usages of **Class SB** waters are primary and secondary contact recreation and fishing. They shall be suitable for fish, shellfish and wildlife propagation and survival.

⁶ The best usage of **Class SC** waters is fishing. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

Table 2. The site abbreviation, site name, portion it is located in, and corresponding classification for each water quality monitoring site in Manhasset Bay.

Abbrev.	Site Name	Portion	Class	Location Description
MB-1	Leeds Pond	1	SA	Eastern shore of the Bay near the outlet of one of the major freshwater sources
MB-2	Kennelworth	1	SA	Northwestern shore near the mouth; this station experiences a lot of flushing with Long Island Sound
MB-3	Manorhaven	2	SB	Northern shore near Sheetz Creek
MB-4	NUN 4	On the line between 1 & 2	SA/SB	Aide to navigation buoy in the central channel of the Bay. Likely experiences a lot of flushing.
MB-5	Baxter Beach	2	SB	Northeastern shore near a lot of development and the outfall for the Port Washington STP
MB-6	Manorhaven Beach	2	SB	Northern shore near a Town recreational facility
MB-7	Great Neck ⁷	3	SC	Southern shore where the Bay gets extremely shallow and more exposed to freshwater inputs. Site is near the outfall for the Great Neck STP, as tidal stage allows.

The MBPC Water Quality Monitoring Program consists of routine water-monitoring of seven (7) stations to document water quality conditions (particularly bacteria) in Manhasset Bay. The monitoring program involves taking bacteria samples and measuring for water clarity with a secchi disk. Sampling generally begins the first Monday in June (first Monday after Memorial Day) and continues until the last Monday in August (last Monday before Labor Day). Data collected each year is available for use by Nassau County Department of Health and other federal, state, and local government agencies and organizations, researchers and other interested parties by request (or pdfs of data are available on our website: https://manhassetbayprotectioncommittee.org/PDF_PUBLIC/Water_Quality_Data/).

This water quality monitoring program is meant to:

1. Screen for water quality impairments;
2. Determine long-term water quality trends;
3. Demonstrate a correlation between bacteria trends and environmental factors (such as rainfall);
4. Educate citizens and public officials;
5. Promote involvement of the public in water quality protection; and,
6. Assist local agencies in Bay management.

⁷ This station was not sampled in 2016. Sampling of this station began in 2017.



Figure 1. Nassau County Geographic Information System map of Manhasset Bay and vicinity (2009) with approximate boundaries for DEC's Waterbody Portions superimposed on top. For general informational purposes only.

1.4 Planning

Manhasset Bay Protection Committee (MBPC) water quality monitoring was performed without a DEC-approved QAPP⁸. However, the NYS Department of Health maintains an EPA-approved QAPP for beach water quality sampling performed throughout the State. The bacteria data was collected in conformance with that, as outlined by the Nassau County Department of Health in previous reporting years.

When the YSI multiparameter probe(s) were introduced, standard operating procedures were developed (modified from ones provided by EPA and the manufacturer) and shared with collectors. The Project Manager received training from EPA Region 2 staff on YSI procedures and then trained the Bay Constables and intern in its operation, calibration, and maintenance. The Project Manager and intern also utilized on-line training provided by Xylem. A YSI 556-01 MPS was used in 2017 and a YSI ProDSS was used in 2019.

1.4a Special Training/Certification

The Project Manager was trained on the use of the YSI Handheld Multiparameter Probe by EPA Region 2 staff. Additionally, the Project Manager has past educational and scientific water quality monitoring experience and experience specifically using a YSI Handheld Multiparameter Probe and secchi disk. Bay Constables who collected bacteria samples were trained by Nassau County Department of Health following their procedures established by a QAPP maintained by the New York State Department of State. Additionally, many of the Bay Constables have done this sampling for many years now. The Project Manager trained the Bay Constables and summer intern on calibrating, operating, and maintaining the YSI Handheld Multiparameter Probe and secchi disk. The Project Manager and summer intern also utilized on-line training maintained by YSI University. Training topics also included:

- Monitoring-program background and purpose;
- The QAPP and SOPs;
- Field equipment care and maintenance;
- Sample collection procedures;
- Sample Handling and labeling; and
- Potential safety hazards as listed in the Sampling Plan SOP and safety plan.

1.5. Data Usability Assessment Summary

The goal of the data usability assessment is to document the procedures used to collect and compile environmental data from a completed project. The goal of this project is to compile Manhasset Bay bacteriological and water quality data collected during the summers of 2016 through 2021, Memorial Day to Labor Day, correlate that data with any weather or environmental variables present, and assess the water quality relative to applicable standards. Unfortunately, this monitoring was not completed under a DEC-approved Quality Assurance Project Plan (QAPP). It is the goal of this Data Usability Assessment to demonstrate that this data is still valid for public use.

Bacteria data for this project was collected under a NYS Department of Health (NYSDOH) approved QAPP and analyzed by an NYSDOH ELAP-certified laboratory. The bacteria sampling and analysis

⁸ Quality Assurance Project Plan

followed approved quality assurance measures. As such, this data meets the data quality objectives (DQO) and indicators (DQI) and is usable.

YSI data was inconsistently collected from year-to-year, such that YSI data cannot be compared over the course of years, but only within each sampling season.

Manhasset Bay experiences a large tidal range and some portions of the Bay are getting shallower. As such, some sites are not accessible during sampling, since sampling is set on a fixed schedule (Monday mornings, except holidays, through the summer). Samplers made every attempt to get as close to the sampling location as possible and took their GPS coordinates. Tidal stage had the biggest impact on sampling at the Great Neck (MB-7) site, but also affected the Baxter Beach (MB-5) and Leeds Pond (MB-1) sites.

Daily weather data for this report was acquired from the NOAA Weather Station at LaGuardia airport (this is made available in both tab-delimited format and pdf). In the raw data set, a “T” denotes a rainfall amount that is “Trace” (not measurable, < 0.01”). Since this is nominal, all “T”s in the data set were made “0.” There are some additional limitations for this data: given time constraints, only daily weather logs were used, forcing the assumption that all rainfall the day-of sampling occurs prior to the sampling. Additionally, this weather data was used as representative of the whole Bay, which is not true.

1.6 Sampling

1.6a Sampling Methods

Once per week (Mondays) between Memorial Day and Labor Day⁹ of each year, the Town of North Hempstead (henceforth Town) Bay Constables (generally the same two every sampling day for the summer) collected data at seven (7; [Table 2](#))¹⁰ disparate sites around Manhasset Bay on the site conditions (air and water temperature, wind speed and direction, weather, and wave height) as well as surface water samples for bacteria counts. The Nassau County Department of Health then analyzed the water samples for *Fecal coliform* and *Enterococci* (CFU/100mL) in their NYSDOH ELAP-certified laboratory according to a QAPP maintained by the New York State Department of Health. The data from these efforts are provided to the MBPC Executive Director (henceforth Director) in Microsoft Excel¹¹.

For the summer of 2017, the MBPC was successful in securing an equipment loan from the US Environmental Protection Agency’s Region 2 Equipment Loan Program. This equipment, known as a YSI Handheld Multiparameter probe, displays data (temperature, dissolved oxygen, pH, and salinity) on a handheld meter when the probe is lowered into the water column (the two are attached by a cable). These measurements were taken at the surface (approximately one foot depth to top of probe). This equipment

⁹ Memorial Day is the last Monday of May and Labor Day is the first Monday of September, sampling occurred between these dates, but does not include these dates.

¹⁰ This was increased in the summer of 2017; previously only six (6) sites were collected, including the summer of 2016.

¹¹ PDF versions of this data are available by year (starting in 2009) on the MBPC website at <http://www.manhassetbayprotectioncommittee.org/waterquality.htm>. The Microsoft Excel versions of this data are available by contacting the ED at mbpcExec@gmail.com.

added much more diverse data collection, without much more effort. Adding this information was in direct response to a recommendation of the 2017 Water Quality Report produced for the MBPC by Fuss & O'Neill. Summer 2017 also saw the beginning of the MBPC collecting secchi disk depths at each station. The 78-010 Fieldmaster Secchi Disk is a weighted 200 mm diameter plastic disk with two white quadrants and two black quadrants. It is lowered into the water column until it can no longer be seen by the observer. This depth gives a relative measure of turbidity (i.e., how much material (e.g., dirt, algae, etc.) is suspended in the water column so that it limits sunlight reaching the bottom), which is important to note, because marine plants and algae need sunlight to grow. The parameters that were analyzed and the sampling methodology are given in [Table 3](#).

Sampling information for each year is listed below:

- 2016: June through August, 12 sampling events at 6 sampling locations
- 2017: June through August, 13 sampling events at 7 sampling locations
- 2018: June through August, 13 sampling events at 7 sampling locations
- 2019: June through August, 13 sampling events at 7 sampling locations
- 2020: June through August, 10 sampling events at 7 sampling locations
- 2021: June through August, 13 sampling events at 7 sampling locations

Table 3. Summary of Water Quality Parameters and Sampling Methodology

Parameter	Sampling Methodology Description
Temperature Salinity Dissolved Oxygen pH GPS Coordinates	YSI 556-01 MPS (2017) YSI ProDSS (2019)
Enterococci	Membrane Filter, SM 9222 D-2006
Fecal coliform	Membrane Filter, EPA 1600
Water Clarity	Secchi Disk
Water Depth	Onboard depth sounder

1.6.b Summer of 2016

Sampling was performed once per week on Monday mornings from June 2016 through August 2016 at six (6) locations around the Bay by Town Bay Constables. Bacteria samples were collected using a simple dip method at the surface. Depth was determined using a depth sounder on the boat, when available. Site conditions and other information were recorded on a chain of custody data sheet and labeled with the Station ID (MB-1, -2, etc). These chain of custody sheets are provided by, transcribed by, and maintained by the Nassau County Department of Health. The Town Bay Constables store other original data sheets, where applicable. Every morning after sampling, Nassau County Department of

Health personnel collected the refrigerated bacteria samples (and chain of custody forms) from Town Dock and performed the analysis at their NYSDOH ELAP-certified lab. Data is supplied to the Executive Director in Microsoft Excel. Water depth, secchi depth, dissolved oxygen, conductivity/salinity, and pH were not collected in 2016. Additionally, sampling was not done the week of July 4th, due to the holiday.

1.6.c Summer of 2017

Sampling was performed once per week on Monday mornings from June 2017 through August 2017 at seven (7) locations around the Bay by Town Bay Constables. Sampling was performed as it was in 2016, with the addition of: temperature, dissolved oxygen, pH, and salinity readings taken at the surface (approximately one foot depth to top of probe) using the YSI 556-01 MPS multiparameter probe and turbidity measurements taken via secchi disk with half-meter markings on the line. The YSI multiparameter probe was calibrated before every sampling at Town Dock. Data measurements, site conditions, and other information were recorded on chain of custody data sheets and labeled with the Station ID (MB-1, -2, etc). These chain of custody sheets are provided by, transcribed by, and maintained by the Nassau County Department of Health. The Town Bay Constables store other original data sheets, where applicable. Duplicate measurements were taken at one station chosen at random per sampling event. Typically, two bay constables performed the sampling; the MBPC Director participated in sampling at least once per month for Quality Assurance purposes. The Committee maintains and provided Bay Constables with SOPs for the operation of the YSI. YSI data was entered into Microsoft Excel by the Director. The Town Bay Constables store the original data sheets. All parameters were sampled in 2017, except for during the first three (3) weeks.

1.6.d Summer of 2018

Sampling was performed once per week on Monday mornings from June 2018 through August 2018 at seven (7) locations around the Bay by Town Bay Constables. Sampling was performed as it was in 2016, with the addition of: turbidity measurements taken via secchi disk with half-meter markings on the line. The YSI multiparameter probe equipment loan from the EPA was not pursued for a second year in a row as the Committee decided to purchase their own newer, more advanced YSI probe, but this instrument was not available until the end of the sampling season. A few sampling dates in August were done with the YSI, but this data is not included as it does not offer a useful data record. No data was collected for dissolved oxygen, conductivity/salinity, and pH in 2018. Additionally, no QA measurements were taken for water depth and secchi depth.

Data measurements, site conditions, and other information were recorded on chain of custody data sheets and labeled with the Station ID (MB-1, -2, etc). These chain of custody sheets are provided by, transcribed by, and maintained by the Nassau County Department of Health. The Town Bay Constables store other original data sheets, where applicable. Typically, two bay constables performed the sampling; the Executive Director participated in sampling at least once per month for Quality Assurance purposes.

1.6.e Summer of 2019

Sampling was performed once per week on Monday mornings from June 2019 through August 2019 at seven (7) locations around the Bay by Town Bay Constables and the Committee's summer intern. Sampling was performed as it was in 2016, with the addition of: GPS coordinates, temperature, dissolved oxygen, pH, and salinity readings taken at the surface (approximately one foot depth to top of probe) using the Committee's new YSI ProDSS (Professional Digital Sampling System) Multiparameter probe and turbidity measurements taken via 78-010 Fieldmaster Secchi Disk with half-meter markings on the

line. The YSI multiparameter probe was calibrated before every sampling at Town Dock. The Committee maintains and provided the intern and Bay Constables with SOPs for the operation of the YSI. This was the first summer the intern joined sampling. Data was downloaded by the intern using Xylem's Korr software. Water depth was collected via a sounder onboard the boat, which wasn't always working.

Data measurements, site conditions, date, time, and other information were recorded on chain of custody data sheets and labeled with the Station ID (MB-1, -2, etc). These chain of custody sheets are provided by, transcribed by, and maintained by the Nassau County Department of Health. The Town Bay Constables store other original data sheets, where applicable.

1.6.f Summer of 2020

Summer 2020 saw the full impact of the Novel Coronavirus pandemic. Sampling was scaled back in that YSI readings were not performed in order to keep sampling staff levels at a minimum to control the spread of the virus. Additionally, the start of sampling was delayed until the end of June.

Sampling was performed once per week on Monday mornings from June 2020 through August 2020 at seven (7) locations around the Bay by Town Bay Constables. Sampling was performed as it was in 2016. Site conditions, date, time, and other information were recorded on chain of custody data sheets and labeled with the Station ID (MB-1, -2, etc). These chain of custody sheets were provided by, transcribed by, and maintained by the Nassau County Department of Health. The Town Bay Constables store other original data sheets, where applicable.

1.6.g Summer of 2021

Summer 2021 still saw the lingering impact of the Novel Coronavirus pandemic. Sampling was scaled back in that YSI readings AND secchi depths were not performed in order to keep sampling staff levels at a minimum to control the spread of the virus.

Sampling was performed once per week on Monday mornings from June 2021 through August 2021 at seven (7) locations around the Bay by Town Bay Constables. Sampling was performed as it was in 2016. Site conditions, date, time, and other information were recorded on chain of custody data sheets and labeled with the Station ID (MB-1, -2, etc). These chain of custody sheets are provided by, transcribed by, and maintained by the Nassau County Department of Health. The Town Bay Constables store other original data sheets, where applicable.

1.7 Analysis

The data was entered into spreadsheets as outlined by year above. The Project Coordinator and/or Quality Assurance officer reviewed if the data was transferred correctly and any errors were corrected. Physical copies are kept by the Nassau County Department of Health and, when appropriate, by the Town Bay Constables. Additionally, scanned copies were sent to the Project Coordinator for all years, except 2016.

With unusually high or low measurements, the cause of the data deficiency was determined and a decision was made on the usability of the data before data analysis. Additionally, the Project Coordinator requested QA/QC from the Nassau County Department of Health to check for any deviations. No deficiencies were found in the bacteria data for 2016 through 2021.

In 2017, water depth, secchi depth, dissolved oxygen, conductivity/salinity, and pH were not collected until June 26th. All YSI calibration checks were in the acceptable range, except for 7/17 (but this is noted in the data and this YSI data will not be used) and 8/21, the only date for which a calibration sheet is missing. Additionally, the YSI broke on 7/10, rendering that data unusable.

2019 was the first year that the YSI ProDSS multiparameter probe was used. Unfortunately, the calibration data for 2019 is missing, making this data questionable, despite being within the acceptable precision range ([Table 7](#)).

Secchi disk depth data, when collected, generally fell within the accepted range, except for a few instances (noted below). As this is likely due to movement of the boat, this data can be used, as long as it is noted in the analysis.

1.8 Review of Data and Data Deliverables

The Project Coordinator used the 2022 QAPP as well as the Friends of the Bay 2020 – 2021 Data Usability Assessment to assist in determining the data quality indicators.

1.9 Project Oversight

Performance evaluations were only required for laboratory personnel and were entirely handled by the Nassau County Department of Health. Split samples were not collected for this project. Proper sample handling and custody procedures were followed for storage and delivery of the bacteria samples to the lab.

Field blanks were stored in the same cooler as the bacteria samples for analysis by the Lab. The results from the Field Blanks were used to identify contamination at the Lab or sample bottles and to determine if the bacteria samples were stored within the appropriate temperature range. Duplicate bacteria samples were not collected during the 2016—2021 monitoring seasons.

If any issues were found, the lab would produce an incident report and keep it on file for review during the lab inspection. If needed, the lab would send out amended sample results. No amended sample results were produced for the years covered by this report.

1.10 Data Usability Assessment

[Tables 4 – 9](#) summarize acceptance criteria for precision and accuracy of specific field and lab-analyzed parameters by year. Information on diversions from any criteria is given after the applicable table.

Table 4. 2016 Parameter Specific Measurement Performance Criteria

Matrix	Parameter	Units	Actual Measurement Range	Precision (RPD ¹²)	Sensitivity	Accuracy (CAC ¹³)
Water &	Temperature	Degrees	64 – 86	N/A	1°F	N/A

¹² Relative Percent Difference; calculated as $RPD = (Final\ result - Initial\ result) / ((Initial\ result + Final\ result) / 2)$

¹³ Calibration Acceptance Criteria

Air		Farenheit (°F)				
Water	Enterococci	CFU/100 mL	0.10 – 360	20%	1 CFU/100mL	N/A
Water	Fecal Coliform	CFU/100 mL	0.10 – 10,100.00	20%	1 CFU/100mL	N/A

Depth, secchi depth, DO, conductivity/salinity, and pH were not collected in 2016. Bacteria samples were not collected on July 4, 2016, making comparisons to applicable standards for the first part of the summer less robust.

Table 5. 2017 Parameter Specific Measurement Performance Criteria

Matrix	Parameter	Units	Actual Measurement Range	Precision (RPD ¹⁴)	Sensitivity	Accuracy (CAC ¹⁵)
Water	Depth & Water Clarity	Meters (m)	0.25 – 7	<20%	0.25m	±0.25m
Water & Air	Temperature	Degrees Celsius (°C)	17.77 – 26.7	<7.0%	0.01	±1°C
Water	Dissolved Oxygen	mg/L = ppm	3.04 – 12.57	20%	0.01ppm	±0.2ppm
Water	Conductivity	mS/cm	34.21 – 40.57	<4.0%	0.01	±1
Water	pH	SU	7.15 – 8.28	<4.0%	0.5 units	0.5 units
Water	Enterococci	CFU/100 mL	0.10 – 310	20%	1 CFU/100mL	N/A
Water	Fecal Coliform	CFU/100 mL	0.1 – 700	20%	1 CFU/100mL	N/A

There were excursions from the Relative Percent Difference (RPD) in 2017 as noted below. These data points should not be used:

- The 8/7/2017 water depth RPD was 60%;
- The 7/31/2017 DO RPD was 46%; and,
- No DO data was collected on 8/21/2017.

¹⁴ Relative Percent Difference

¹⁵ Calibration Acceptance Criteria

Table 6. 2018 Parameter Specific Measurement Performance Criteria

Matrix	Parameter	Units	Actual Measurement Range	Precision (RPD ¹⁶)	Sensitivity	Accuracy (CAC ¹⁷)
Water	Depth & Water Clarity	Meters (m)	0.5 – 6		0.25m	±0.25m
Water & Air	Temperature	Degrees Fahrenheit (°F)	54 – 78.3	N/A		±1°C
Water	Enterococci	CFU/100 mL	0.1 – 370	20%	1 CFU/100mL	N/A
Water	Fecal Coliform	CFU/100 mL	0.1 – 870	20%	1 CFU/100mL	N/A

No QA measurements were taken for water depth and secchi depth. DO, conductivity/salinity, and pH were not collected in 2018.

Table 7. 2019 Parameter Specific Measurement Performance Criteria

Matrix	Parameter	Units	Actual Measurement Range	Precision (RPD ¹⁸)	Sensitivity	Accuracy (CAC ¹⁹)
Water	Water Depth & Water Clarity	Meters (m)	0.5 – 7.6	10%	0.25m	±0.25m
Water & Air	Temperature	Degrees Celsius (°C)	15 – 27	≤10%	0.1°C	±1°C
Water	Dissolved Oxygen	mg/L = ppm	1.81 – 13.31	10%	0.01ppm	±0.2ppm
Water	Conductivity	mS/cm	29,339.7 – 40,125.3	2%	4 digits	±1
Water	pH	SU	7 – 8.29	6%	0.5 units	0.5 units
Water	Enterococci	CFU/100 mL	0.1 – 214.0	20%	1 CFU/100mL	N/A
Water	Fecal	CFU/100	0.1 – 370.0	20%	1	N/A

¹⁶ Relative Percent Difference

¹⁷ Calibration Acceptance Criteria

¹⁸ Relative Percent Difference

¹⁹ Calibration Acceptance Criteria

Matrix	Parameter	Units	Actual Measurement Range	Precision (RPD ¹⁸)	Sensitivity	Accuracy (CAC ¹⁹)
	Coliform	mL			CFU/100mL	

Water depth was collected via a sounder on the boat, which wasn't always working. As such, water depth was not collected on 6/10/2019 and 6/17/2019.

No QA was done on 8/12/2019.

There were excursions from the Relative Percent Difference (RPD) in 2019 as noted below. However, as these excursions were in depth data and the boat moves, it may not be necessary to throw out these data points, but to make a note of the issue.

- Secchi depth QA measurements on 6/24/2019 and 8/5/2019 were above RPD threshold.
- Water depth measurement on 6/24/2019 was above RPD threshold.

Table 8. 2020 Parameter Specific Measurement Performance Criteria

Matrix	Parameter	Units	Actual Measurement Range	Precision (RPD ²⁰)	Sensitivity	Accuracy (CAC ²¹)
Water	Depth & Water Clarity	Feet (ft)	1 – 18		0.25m	±0.25m
Water & Air	Temperature	Degrees Farenheit (°F)	66 – 84		1°F	±1°F
Water	Enterococci	CFU/100 mL	0.1 – 2,600.0	20%	1 CFU/100mL	N/A
Water	Fecal Coliform	CFU/100 mL	3.0 – 7,100.0	20%	1 CFU/100mL	N/A

No QA sampling was done in 2020, but this would only pertain to depth and secchi depth measurements. This should be noted in any analysis that is done. DO, conductivity/salinity, and pH were not collected in 2020.

Table 9. 2021 Parameter Specific Measurement Performance Criteria

Matrix	Parameter	Units	Actual Measurement	Precision (RPD ²²)	Sensitivity	Accuracy (CAC ²³)
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²⁰ Relative Percent Difference

²¹ Calibration Acceptance Criteria

			Range			
Water & Air	Temperature	Degrees Fahrenheit (°F)	64 – 82	10%		±1°C
Water	Enterococci	CFU/100 mL	0.1 – 6,200.0	20%	1 CFU/100mL	N/A
Water	Fecal Coliform	CFU/100 mL	1.0 – 6,001.0	20%	1 CFU/100mL	N/A

Water depth, secchi depth, DO, conductivity/salinity, and pH were not collected in 2021.

Precision

The Relative Percent Difference (RPD) was $\leq 20\%$ on Field Duplicates, except for:

- Water depth on 8/7/2017
- Dissolved Oxygen on 7/31/2017
- Secchi depth on 6/24/2019 and 8/5/2019
- Water depth on 6/24/2019

Because of this, these data points are to be removed from analysis.

RPD could not be calculated for the following due to no QA measurements being taken:

- 2018 water depth or secchi depth
- No QA was done on 8/12/2019
- 2020 water depth or secchi depth

This will be noted in subsequent analysis.

Accuracy

Field measurement accuracy (2017 and 2019) of the YSI probe in use was assessed by performing calibration checks on the day of each monitoring event after returning to Dock after sampling. The probe was calibrated immediately before every sampling event. The Nassau County Department of Health handled all bacteria samples and did not report any blank samples being out of range.

Representativeness of the Data

The water quality monitoring encompasses seven (7) sites ([Table 2](#)) spread throughout Manhasset Bay (the Bay tidally exchanges water with Long Island Sound). A map is provided in Fig. 2. These locations were chosen based on the need to get full coverage of the Bay in areas experiencing different stressors. Most of the sampling sites are located along the perimeter of the Bay and, as such, may miss some water quality dynamics of the central Bay, but, given the screening level nature of this monitoring, these sampling locations are sufficient. Additionally, it is anticipated that the largest water quality impacts will

²² Relative Percent Difference

²³ Calibration Acceptance Criteria

be close to shore and, therefore, these sites can serve as a proxy for what is happening in the central Bay²⁴.

²⁴ This data is only meant to be representative of what is happening within the Bay during June – August. Therefore, this data is not meant to be representative of conditions outside the Bay nor during winter months.



Figure 2. Map of sample locations in Manhasset Bay and their respective abbreviated labels. Map was produced by D&B Engineers and Architects, P.C. for the Manhasset Bay Protection Committee using the same funding from NYSDEC as this project.

Comparability of the Data

Manhasset Bay Protection Committee has monitored the same six stations for bacteria annually for more than a decade. This continuity of sampling locations and parameters allows for analysis and comparison of results across years. Additionally, all samples are collected on the same day (Monday) and the same time period (between 7am and 11am).

The use of the YSI for temperature, salinity, dissolved oxygen, and pH was a result of an equipment loan program from EPA Region 2 and was recommended by Fuss & O'Neill in their 2018 water quality report for the Committee. The use of a Secchi Disk for water clarity is a widely accepted method for measuring this parameter.

Completeness of the Data

There is no completeness objective for the data collected over this timeline. The data is used primarily for basic informational purposes and is not intended to be used for legal or compliance issues. Sampling was completed for all planned sampling dates, except for 7/4/2016, due to the holiday, and 2020, due to a late start caused by the Novel Coronavirus.

Bacteria samples were collected for all scheduled sites on all sampling dates (100% completeness) for the years 2017, 2018, 2020, and 2021. In 2016, bacteria samples were not collected the week of July 4, 2016, giving this year's data set a 92% completeness. In 2019, for unknown reasons, Manorhaven Beach (MB-6) was not sampled on July 29, 2019.

During the monitoring season, the sites were monitored the same day (Mondays) at approximately the same time each week for all sampling events. The 4th of July holiday, unfortunately, canceled sampling for that week in 2016, making it difficult to compare the June 2016 data against applicable standards. This issue has been rectified in the current sampling year (not covered by this report) by moving the sampling to Wednesday. 2020 saw a delayed start to the sampling year, meaning that data was not collected for June, either.

YSI data was inconsistently collected from year-to-year, due to it being a new set of parameters that wasn't first collected until 2017, then the delayed purchase of the Committee's own YSI meant it was not continued in 2018. It was picked up again in 2019, only to be removed from collection in 2020 and 2021 due to the Novel Coronavirus Pandemic. For this reason, we cannot compare YSI data over the course of years, but only within each sampling season.

[Tables 10](#) through [15](#) detail the completeness of data collected at each site for each sampling event for each sampling year.

In 2016, samples were collected at six (6) sites over 12 sampling events. Samples were not collected on the July 4th holiday. Measurements were only taken for water and air temperature (in degrees Fahrenheit). The MB-7 station was not added until the following year ([Table 10](#)).

Table 10. Completeness for the 2016 Monitoring Season (only bacteria data was collected)

Date	Sites with Complete Data Collection	Sites with Partial Data Collection	Sites with No Data Collection
6/6/2016	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6		MB-7
6/13/2016	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6		MB-7
6/20/2016	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6		MB-7
6/27/2016	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6		MB-7
7/4/2016			MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7
7/11/2016	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6		MB-7
7/18/2016	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6		MB-7
7/25/2016	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6		MB-7
8/1/2016	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6		MB-7
8/8/2016	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6		MB-7
8/15/2016	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6		MB-7
8/22/2016	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6		MB-7
8/29/2016	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		

In 2017, samples were collected at seven (7) sites over 13 sampling events. Measurements were taken for all parameters (water depth, water clarity, water and air temperature, dissolved oxygen, conductivity/salinity, and pH) for all days except for:

1. The first three weeks, when there was a delay in implementing the new sampling parameters. These dates are: 6/5, 6/12, and 6/19; and,
2. When the YSI probe was broken (7/10/2017 and 7/17/2017). Secchi depth measurements were still taken for these dates.

A calibration check sheet is missing for 8/21/2017 ([Table 11](#)).

Table 11. Completeness for the 2017 Monitoring Season (bacteria, secchi depth, and YSI data was collected)

Date	Sites with Complete Data Collection	Sites with Partial Data Collection ²⁵	Sites with No Data Collection
6/5/2017		MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7	
6/12/2017		MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7	
6/19/2017		MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7	
6/26/2017	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/3/2017	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/10/2017	MB-5 ²⁶	MB-1, MB-2, MB-3, MB-4, MB-6, MB-7	
7/17/2017		MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7	
7/24/2017	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7 ²⁷		
7/31/2017	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/7/2017	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/14/2017	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/21/2017	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/28/2017	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		

In 2018, samples were collected at seven (7) sites over 13 sampling events. Measurements were only taken for water and air temperature (in degrees Fahrenheit), water depth, and secchi depth. No QA measurements were taken for water and secchi depth ([Table 12](#)).

Table 12. Completeness for the 2018 Monitoring Season (only bacteria and secchi depth was collected)

Date	Sites with Complete Data Collection	Sites with Partial Data Collection ²⁸	Sites with No Data Collection
6/4/2018		MB-1, MB-2, MB-3, MB-4,	

²⁵ This is due to a broken YSI probe. Bacteria data was still collected.

²⁶ Screen on the YSI Multiparameter Probe broke after sampling site MB-5 on 7/10/2017.

²⁷ A replacement handheld was received to complete sampling.

²⁸ Secchi depth data was not collected on the first day of sampling in 2018.

		MB-5, MB-6, MB-7	
6/11/2018	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
6/18/2018	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
6/25/2018	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/2/2018	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/9/2018	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/16/2018	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/23/2018	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/30/2018	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/6/2018	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/13/2018	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/20/2018	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/27/2018	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		

In 2019, samples were collected at seven (7) sites over 13 sampling events. Measurements were taken for all parameters (water depth, water clarity, water and air temperature, dissolved oxygen, conductivity/salinity, and pH) for all days, except for water depth on 6/10/2019 and 6/17/2019. Water depth was collected via a sounder on the boat, which wasn't always working. Additionally, RPD was above threshold for water and secchi depth on 6/24/2019 and secchi depth on 8/5/2019. No QA was done on 8/12/2019 ([Table 13](#)).

Table 13. Completeness for the 2019 Monitoring Season (bacteria, secchi depth, and YSI data was collected)

Date	Sites with Complete Data Collection	Sites with Partial Data Collection ²⁹	Sites with No Data Collection
6/03/2019		MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7	

²⁹ Water depth measurements were not taken.

6/10/2019		MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7	
6/17/2019		MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7	
6/24/2019	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/01/2019	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/8/2019	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/15/2019	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/22/2019	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/29/2019	MB-1, MB-2, MB-3, MB-4, MB-5, MB-7		MB-6
8/5/2019	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/12/2019	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/19/2019	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/26/2019	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		

In 2020, samples were collected at seven (7) sites over ten (10) sampling events. The start to the sampling season was delayed due to the Novel Coronavirus. Additionally, no YSI measurements were taken this year. Measurements were only taken for water and air temperature (in degrees Fahrenheit) and water and secchi depth (feet). No QA measurements were taken for water and secchi depth ([Table 14](#)).

Table 14. Completeness for the 2020 Monitoring Season (only bacteria data was collected)

Date	Sites with Complete Data Collection	Sites with Partial Data Collection	Sites with No Data Collection ³⁰
6/1/2020; 6/8/2020; 6/15/2020; 6/22/2020			MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7
6/29/2020	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/6/2020	MB-1, MB-2, MB-3, MB-4, MB-5,		

³⁰ The start of the sampling season was delayed due to the Novel Coronavirus Pandemic.

	MB-6, MB-7		
7/13/2020	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/20/2020	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/27/2020	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/3/2020	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/10/2020	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/17/2020	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/24/2020	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/31/2020	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		

In 2021, samples were collected at seven (7) sites over 13 sampling events. Measurements were only taken for water and air temperature (in degrees Fahrenheit; [Table 15](#)).

Table 15. Completeness for the 2021 Monitoring Season (only bacteria data was collected)

Date	Sites with Complete Data Collection	Sites with Partial Data Collection	Sites with No Data Collection
6/7/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
6/14/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
6/21/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
6/28/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/5/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/12/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/19/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
7/26/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/2/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/9/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		

Date	Sites with Complete Data Collection	Sites with Partial Data Collection	Sites with No Data Collection
8/16/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/23/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		
8/30/2021	MB-1, MB-2, MB-3, MB-4, MB-5, MB-6, MB-7		

Sensitivity of the Data

Sensitivity limits were determined by the lab analytical method of the field instrument (based on published specifications). [Table 16](#) summarizes the reporting limits for water quality parameters measured in this study. Lab analyses have preset limits of detection for the analysis of fecal coliform and enterococci.

Table 16. Methods and Reporting Limits for Parameters Measured

Parameter	Units	Method	Reporting Limit
Salinity	N/A	Electrometric	0
Temperature	Degrees Celsius	Electrometric	-5 C
Dissolved Oxygen	mg/L	Electrometric	0 mg/L
Fecal Coliform	CFU/ 100 mL	Membrane Filter, SM 9222 D-2006	0 cfu/100 mL
Enterococci	CFU/100 mL	Membrane Filter, EPA1600	0 cfu/100 mL
Water Clarity	Meters (m)	Secchi Disk with calibrated rope	N/A

1.11 Conclusion

The results of the 2016 – 2021 Manhasset Bay monitoring seasons, less the 2019 YSI-collected data, can be considered appropriate for their intended purposes. To improve data usability for future sampling events, the Committee will work to implement the following recommendations:

- Train field personnel in the importance of maintaining notes and paperwork
- Hire a part-time Water Quality Coordinator to oversee data and equipment handling

Section 2. Data Usability Assessment Checklist

For projects involving use of data from external or existing data or projects completed without a NYSDEC DOW approved QAPP

Project Name	Manhasset Bay Bacteriological Assessment for Summers 2016 through 2021
Description	Data collection at 6 to 7 sites on Manhasset Bay

Checklist prepared by	Sarah Deonarine	Date
Organization/Affiliation	Manhasset Bay Protection Committee	
Project Manager review	Sarah Deonarine	Date
Quality Assurance Office review		Date

Purpose

Purpose	1. Briefly state the purpose of the project.
	The MBPC Water Quality Monitoring Program consists of routine water-monitoring of seven (7) stations to document water quality conditions (particularly bacteria) in Manhasset Bay. Data collected each year is available for use by Nassau County Department of Health and other federal, state, and local government agencies and organizations, researchers and other interested parties by request (or pdfs of data are available on our website:

https://manhassetbayprotectioncommittee.org/PDF_PUBLIC/Water_Quality_Data/).

2. Briefly describe the type(s) of sampling design(s) used.

Sampling began the first Monday in June (first Monday after Memorial Day) and continued until the last Monday in August (last Monday before Labor Day). Samples were collected weekly (except in 2016 due to the July 4th holiday being on a Monday). Samples were collected at six (6) sites in 2016 and seven (7) sites for 2017 – 2021. In 2016, there were 12 monitoring events; in 2020, there were 10 monitoring events; and, for all other years (2017 – 2019, 2021), there were 13 monitoring events; for a total of 74 summer monitoring events.

For all of these 74 events, data was collected on the site conditions (air and water temperature, wind speed and direction, weather, and wave height) as well as surface water samples for bacteria counts. The Nassau County Department of Health then analyzed the water samples for *Fecal coliform* and *Enterococci* (CFU/100mL) in their NYSDOH ELAP-certified laboratory according to a QAPP maintained by the New York State Department of Health.

In 2017, water quality parameter data (DO, salinity, conductivity, and pH) were collected using a YSI Multiparameter Probe borrowed from EPA Region 2. And turbidity was measured using a 78-010 Fieldmaster Secchi Disk in 2017 – 2019. Secchi data was also collected in 2020, but the data is unreliable and will not be used.

The committee purchased a YSI ProDSS Multiparameter probe in 2018 (but not in time for summer sampling) and it was used in

3. Briefly provide supporting rationale justifying the appropriateness of the sampling design(s) for the project.

Six (6) of the seven (7) monitoring stations have been monitored long term, giving the ability to assess trends over time. All of the monitoring stations (7) are spread out across Manhasset Bay as to capture the differences of watershed inputs around the Bay.

The United States Environmental Protection Agency (EPA) recognizes enterococci as the indicator of the presence of fecal material in

water, which could also indicate the presence of disease-causing bacteria, viruses, and protozoa (cumulatively, pathogens). Enterococci are not themselves harmful to humans³¹. New York State recognizes both enterococci and fecal coliform as indicators of the presence of disease-causing organisms.

Adding water quality parameters (as collected by the YSI and secchi disk) was in direct response to a recommendation of the 2017 Water Quality Report produced for the Committee by Fuss & O'Neill. Secchi disk depth gives a relative measure of turbidity (i.e., how much material (e.g., dirt, algae, etc) is suspended in the water column so that it limits sunlight reaching the bottom), which is important to note, because marine plants and algae need sunlight to grow.

Temperature is important as it affects dissolved oxygen, salinity, and species mortality. Dissolved Oxygen (DO) is vital for the survival of marine species and, as such, is an important indicator of Bay health. Salinity is important as a proxy for how much flushing different areas of the Bay receives, it is also important to determine the survivability of various marine species. As Earth's surface waters absorb carbon dioxide (CO₂) due to its overabundance in Earth's atmosphere, because of industrialization, the pH of those waters lowers or becomes more acidic which has been shown to affect the lifecycle of shellfish. Therefore, pH was measured as an indication of whether Bay waters were experiencing climate-induced acidification.

Planning

Answer the following questions by placing a X in the appropriate column to the right.		Yes	No	N/A	Comments
Planning	4. Were project planning documents fully approved by the Quality Assurance Office (QAO) before this data collection or use event occurred? If not, explain under Comments.		X		At the time, the Committee did not have a DEC-funded grant and, therefore, did not pursue a DEC-approved QAPP. Bacteria samples are collected following a QAPP maintained

³¹ Based on information taken from <https://www.epa.gov/national-aquatic-resource-surveys/indicators-enterococci> accessed on July 30, 2018.

					by the NYS Department of Health.
	5. Were project planning documents made available to all project personnel involved with the planning, sampling, analyses, review, and assessment portions of the project?	X			
	6. Were copies of project planning documents filed so that they are available for future reference?	X			

Sampling

Answer the following questions by placing a X in the appropriate column to the right.		Yes	No	N/A	Comments
Sampling	7. Were sampling SOPs adhered to as outlined in the project planning documents?	X			
	8. Was the sampling design followed? Were deviation reports prepared to capture deviations or variances?	X			Deviation reports were not generated.
	9. Were sampler's field notes and documentation filed so that they are available for future reference?	X			

Analysis

Answer the following questions by placing a X in the appropriate column to the right.		Yes	No	N/A	Comments
Analysis	10. Were NYS DOH ELAP certified laboratories used to support this project?	X			The Nassau County Department of Health Laboratory did the bacteria sample analysis and they are ELAP-certified.
	11. For non NYS DOH ELAP laboratories: Were laboratory standard operating procedures (SOPs), Quality Management Plans (QMPs) and on-site evaluations made to ensure demonstration of competency?			X	
	12. Were field based analytical procedures or a mobile laboratory used? If yes, note under Comments what percentage of samples were confirmed by a fixed laboratory.		X		The accuracy of YSI sampling results were reviewed by frequent calibration (immediately before every monitoring event) and calibration checks (immediately after every monitoring event).
	13. If any problems were encountered, were they documented by the laboratory and communicated to project management?			X	They would have been, but no problems were encountered by the laboratory.
	14. Were analytical procedures adhered to as outlined in the project planning documents? If not, explain under Comments.	X			
	15. Did laboratory deliverables meet the project requirements?	X			

	16. For non NYSDOH ELAP laboratories: was data backed-up and retained? Is data available if needed?			X	
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Review

Review	17. Did planning documents have data review/validation criteria?	X			This is maintained by the lab.
	18. Were laboratory data deliverables reviewed for quality control exceedances?	X			
	19. Were laboratory data deliverables reviewed for adherence to project measurement quality objectives?	X			
	20. Were data reviewed/validated as outlined in the project planning documents? If not, explain under Comments.	X	X		Yes, for bacteria data. Other water quality parameters were not collected according to a QAPP. Duplicate field measurements were taken of these parameters in 2017 and 2019.
	21. Were data review/validation reports generated?	X	X		Yes, for bacteria data.

Corrective Actions

Answer the following questions by placing a X in the appropriate column to the right.		Yes	No	N/A	Comments
Corrective Actions	22. Were sampling and/or analytical corrective actions necessary?		X		
	23. Were sampling and/or analytical corrective actions approved by the DOW Project Manager before implementation, documented, and distributed to all involved personnel?			X	
	24. Were sampling and/or analytical corrective actions successful in remediating the identified problems?			X	
	25. Were sampling and/or analytical corrective actions documented and filed so that they are available for future reference?			X	

Secondary Use of Data Assessment

Secondary Use of Data	26. Did the planning documents for this project account for the use of existing data, including the specification of measurement quality objectives (MQOs) and other relevant data quality considerations (such as spatial and temporal representativeness)?		X		Planning documents did not account for this, but reports generated will (a previous draft version included this accounting).
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Answer the following questions by placing a X in the appropriate column to the right.		Yes	No	N/A	Comments
Secondary Use of Data, Cont.	27. Was sufficient documentation of the quality of the existing data available for assessing conformance to the MQOs for this project?	X			
	28. Was an assessment of the acceptability of the existing data performed for this project?	X			NOAA is a federal agency that serves as a widely accepted source of ambient data.
	29. Were standard sampling methods cited and used as documented for the original project? If non-standard (or innovative) sampling methods were used, describe under Comments.			X	
	30. Were standard analytical methods cited and used as documented for the original project? If non-standard (or innovative) analytical methods were used, describe under Comments.			X	
	31. 31. Were any changes to the sampling and/or analytical methods in the original project documented?			X	There were no changes.

Project Oversight

Oversight	32. Did project planning documents require submission of		X		PE was only of laboratory personnel and that was
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	performance evaluation (PE) samples during this event? If yes, explain what PE samples and results of analysis.				handled by Nassau County DOH.
	33. Were split samples collected during this event?		X		

Answer the following questions by placing a X in the appropriate column to the right.		Yes	No	N/A	Comments
Additional Project Oversight Activities, Cont.	34. Did results reported by laboratories agree within project acceptance limits? If not, describe under Comments.	X			
	35. Were split sample evaluations filed so that they are available for future reference?			X	
	36. Were collection of Field quality control (QC) samples required in the project planning documents?	X			
	37. Were Field QC samples collected and submitted to the laboratories during this event?	X			
	38. Were laboratory reported results for Field QC samples within project acceptance limits? If not, describe under Comments.	X			

Data Usability Assessment

Data Usability Assessment	39. Were any sampling issues determined to have negatively impacted data usability? If so, describe under Comments.	X			Novel coronavirus was an issue in 2020 and 2021. The boat depth sounder was an issue for the years water depth was recorded. Duplicate samples were not taken in years that the YSI was not used.
	40. Were any analytical issues determined to have negatively impacted data usability? If so, describe under Comments.		X		
	41. Did data meet measurement performance criteria (MPC) for precision? If not, describe under Comments.				<u>Yes, except for:</u> • Water depth on 8/7/2017 • Dissolved Oxygen on 7/31/2017 • Secchi depth on 6/24/2019 and 8/5/2019 • Water depth on 6/24/2019
	42. Did data meet MPC for accuracy? If not, describe under Comments.	<u>X</u>			
	43. Did data meet MPC for representativeness? If not, describe under	<u>X</u>			

Comments.					
Answer the following questions by placing a X in the appropriate column to the right.		Yes	No	N/A	Comments
Data Usability Assessment Cont	44. Did data meet MPC for comparability? If not, describe under Comments.				Yes for bacteria data. However, other parameters may not be able to be compared across years, only within the year it was collected.
	45. Did data meet MPC for completeness? If not, describe under Comments.	X			
	46. Did data meet MPC for sensitivity? If not, describe under Comments.	X			
	47. Were project measurement quality objectives met? If not, describe under Comments.			X	There were no measurement quality objectives.
	48. Were project data quality objectives met? If not, describe under Comments.	X			
	49. For all non-attainments, exceedances, data flags, etc., provide estimates on: a. the usability of the data.		X		Refer to the Accuracy , Comparability of Data , and Completeness of Data sections above.

	b. on the end use of the data (such as qualifiers on or uncertainty in the decision to be made, or limitations on the types of decisions that can be made with the data). This information can be provided either under Comments or as an attachment to the checklist.				Data is available for use by federal, state, and local government agencies, researchers, and other interested parties.
DUA, cont	50. Were usable (acceptable) sample results found to be above action or regulatory levels?	X			Results to be outlined in a forthcoming Water Quality Monitoring Report.

Answer the following questions by placing a X in the appropriate column to the right.		Yes	No	N/A	Comments
	Conclusions on Data Usability:				Described in document body.

	51. Will more samples need to be collected to address resulting data gaps? If yes, describe under Comments.		X		
	52. Will there be any further action(s) on this project that may involve collection and analysis of site samples? If yes, describe under Comments.		X		This is an on-going annual water quality monitoring program. However, nothing else needs to be done in regards to this data collection.