Supplement to 2017 Water-Quality Report

Data Usability Assessment

(November 26, 2019)

Hempstead Harbor Water-Quality Monitoring
Data Usability Review
2017 Monitoring Season

1.1 Background

The Coalition to Save Hempstead Harbor (CSHH) oversees a routine water-quality monitoring program for 21 stations, including 10 “in-harbor stations” and 11 “outfall stations,” to document water-quality conditions and pollutant sources in Hempstead Harbor and its watershed and to support local municipal, county, and state-level water-resource management decisions. In-harbor water-quality monitoring includes measuring parameters related to the ecological health of the harbor and sample collection to measure bacteria levels. The outfall-monitoring program involves identifying critical areas of pathogen loading in the harbor. Sampling begins in May and continues until the end of October.

The monitoring data are used by the Coalition to Save Hempstead Harbor, Hempstead Harbor Protection Committee, Nassau County Department of Health, Nassau County Department of Public Works, the Interstate Environmental Commission, the New York State Department of Environmental Conservation, the Connecticut Department of Energy and Environmental Protection, Long Island Sound Study, other nongovernmental/environmental organizations, and the communities surrounding Hempstead Harbor.

The monitoring program helps assess the impact of watershed management improvements on the harbor, collects data for beach closure and shellfish monitoring, and tracks the impact of environmental policy in the watershed communities. The data are used to produce an annual report for CSHH and local municipal members of the Hempstead Harbor Protection Committee to:

- Identify and study seasonal-scale trends in water quality
- Monitor aquatic habitats
- Identify causes for negative events (e.g., algal blooms and fish kills)
- Investigate long-term trends in water-quality parameter levels
- Guide municipal, county, and state-level environmental planning, policy, and compliance efforts (e.g., Phase II Stormwater Program and TMDL development)
- Measure progress towards meeting water-quality goals in the watershed
- Determine whether the opening of additional shellfish-harvesting areas within the harbor is feasible
- Identify pathogen sources for targeting pathogen-load reduction efforts

1.2 Planning – Quality Assurance Project Plan

CSHH conducted water-quality monitoring under an EPA-approved Quality Assurance Project Plan (QAPP) for the 2017 water-quality monitoring season, which served as the main quality assurance planning project document. The QAPP was originally prepared in 2011 and last revised in 2014. The QAPP and its appendices (equipment calibration procedures, standard operating procedures, etc.) were made available to all project personnel, including the Quality

Assurance (QA) Manager, QA Officer, Project Manager/Field Team Leader, and Field Samplers. Copies of the QAPP and related quality assurance documentation are retained for recordkeeping and for future reference.

1.3 Sampling

Prospective Field Samplers (staff, volunteers, and/or municipal employees) met with the Program Manager regarding the monitoring program. Individuals that conducted sampling received formal training, which included review and discussion of the QAPP and sampling SOPs (sample collection procedures, sample handling and labeling, potential safety hazards, and equipment maintenance, inspection, and calibration) before collecting water-quality samples.
These individuals adhered to the sampling design outlined in the sampling SOPs throughout the duration of sample collection. The Project Manager/Team Leader periodically monitored field activities, which included reviewing sampling procedures and field data sheets, to ensure compliance with sampling SOPs.

Any deviations from typical sampling (e.g., missed samples due to weather or tidal conditions) were recorded in field notes. Aside from missing sampling events due to weather or other events, there were no deviations of consequence. Information from field data sheets was recorded electronically following sampling events – two CSHH members conducted and verified data entry while the Quality Assurance Officer also compared field data forms with electronic records to ensure accuracy. Physical copies of the field data sheets are kept for at least five years in the annual logbook at the CSHH office. Equipment and instruments were calibrated the day before sampling based on user manual guidelines – calibration records for field equipment were also maintained and kept for future reference. Post-checks of equipment were also conducted immediately following sampling events.

Both vertical profiles and grab samples were collected. Grab samples were taken at up to 21 stations weekly and were used to analyze fecal coliform and enterococci. The samples were analyzed by a NYS DOH ELAP certified laboratory – the Nassau County Department of Health. Prior to collection, laboratory quality-control protocols were discussed with CSHH to ensure sample usability. Samples for analyzing nitrogen parameters were not collected – the laboratory that CSHH used up until 2016 (Town of Oyster Bay lab) closed. Vertical profiles were taken at applicable stations to measure the following field parameters: dissolved oxygen, water temperature, salinity, pH, water clarity, chl a (for frame of reference only), and turbidity. Results were not confirmed by a fixed laboratory but a LaMotte 7414 kit (Winkler Titration), a LaMotte 2218 reagent kit, and a calibrated thermometer were used at one location per sampling event to confirm the validity of the Eureka Manta+ 35 results for dissolved oxygen (bottom), pH, and water temperature, respectively.

1.4 Analysis

Analytical procedures were adhered to as outlined in the project planning documents. The Quality Assurance Officer completed data review during or soon after monitoring events and unusual values were flagged (e.g., missing values, unexpectedly large or small values) in the data. The cause of the data deficiency was determined and a decision was made on the usability of the data, which was then accepted, marked as conditional, or discarded. The Project Manager/Field Team Leader was also responsible for validating results from field

monitoring, including field monitoring sheets and laboratory results. Additionally, laboratory deliverables were reviewed by the Project Manager/Field Team Leader and met the project requirements outlined in the QAPP.

1.5 Review of Data and Data Deliverables

The QAPP outlined data quality indicators, including precision, bias/accuracy, representativeness, comparability, completeness, and sensitivity for each parameter measured. The results of data collection were reviewed periodically by the Quality Assurance Officer to ensure accuracy. Laboratory data deliverables were reviewed by the Project Manager/Field Team Leader for adherence to the project measurement quality objectives outlined in the QAPP. Data were reviewed and validated as outlined in the QAPP. In lieu of data review or validation reports, notes on the validity of the data were included in comments in the data sheet (e.g., marking data as conditional or flagging seemingly high values that were still deemed accurate).

1.6 Project Oversight

Performance evaluation or split samples were not required for this project. However, split samples were performed by the participating laboratory, which followed lab-specified QC procedures. Proper sample handling and custody procedures were followed for delivery of samples to the lab. Laboratory-reported results for primary QC samples were within project acceptance limits.

1.7 Data Usability Assessment

Table 1 and **Table 2** summarize acceptance criteria for accuracy, precision, and sensitivity of specific field and laboratory monitoring parameters.

Table 1: Acceptance Criteria for Field Monitoring Parameters

Parameter	Units	Accuracy	Precision (allowable RPD)	Approximate Expected Range	Sensitivity
Depth (calibrated line)	meters (m)	± 0.1 m	10%	0 – 12 m	0.1 m
Depth (Eureka Manta+ 35)	meters (m)	0 to 10 m ±0.02 (±0.2% of FS) 0 to 25 m ±0.05 (±0.2% of FS) 0 to 50 m ±0.1 (±0.2% of FS)	10%	0 – 12 m	0.01m 0.01m 0.1 m
Air/Water Temperature (digital thermometer)	degrees Celsius (°C)	± 1 °C	10%	-15 - 36 °C	0.1°C

Parameter	Units	Accuracy	Precision (allowable RPD)	Approximate Expected Range	Sensitivity
Water Temperature (Eureka Manta+ 35)	degrees Celsius (°C)	± 0.1 °C	10%	4 – 26 °C	0.01 °C
Salinity (Eureka Manta+ 35)	pss/ppt	±1% of reading ±0.1 ppt	10%	5 – 30 ppt	4 digits
Dissolved Oxygen (Winkler titration method)	milligrams per liter (mg/L) = parts per million (ppm)	0.2 ppm	10%	0 -14 ppm	0 ppm
Dissolved Oxygen (Eureka Manta+ 35)	milligrams per liter (mg/L) = parts per million (ppm); percent saturation (% sat.)	0 to 20 mg/l ± 0.2 mg/l 20 to 50 mg/l ± 10% reading 0 to 200% sat. ±1% of reading or ±0.1 % sat. 200 to 500% sat. ±10% of reading	10%	0 – 14 ppm 0 – 120 % sat.	0.1 ppm 0.1 % sat.
Turbidity (Eureka Manta+ 35)	NTU	0 to 400 NTU ± 1% of reading ± 1 count 400 to 3000 NTU ± 3% of reading	10%	0 – 30 NTU	4 digits 4 digits
Water Clarity (Secchi disk)	m	0.1	10%	0 - 4 m	0.1 m
Ammonia (LaMotte 3304, salicylate method)	ppm	0.0, 0.05, 0.1, 0.25, 0.5, 1.0, 1.5, 2.0 ppm	(color metric)	0 - 1.0 ppm	0 ppm
pH (LaMotte 2218 wide-range indicator)		5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10.0, 10.5	(color metric)	6.5 - 8.5 ppm	5.0 ppm

Parameter	Units	Accuracy	Precision (allowable RPD)	Approximate Expected Range	Sensitivity
pH (Eureka Manta+ 35)		± 0.2	5%	6.5 - 8.5 ppm	.01

Table 2:
Acceptance Criteria for Laboratory Monitoring Parameters

Parameter	Method	Reporting limit	Accuracy	Precision
Fecal Coliform	Membrane Filter, SM9222D-2006	< 1 CFU/100mL	+/- 20%	+/- 5%
Enterococci	Membrane Filter, EPA 1600	< 1 CFU/100mL	+/- 20%	+/- 5%

Precision

- Acceptance limits for precision criteria are outlined in **Table 1** and **Table 2.**
- Laboratory QA/QC was reviewed by CSHH as lab results were received to ensure that all results fell within the acceptable limits defined for precision criteria.

Accuracy

- Field measurement accuracy was assessed by performing pre-checks, calibration checks, and post-checks of the field monitoring equipment the day prior and the day following monitoring events. The Eureka Manta+ 35 was calibrated for each measurement parameter the day prior to each monitoring event according to procedures outlined in the user manual. For parameters that have a system response factor (SRF), this number is recorded in the calibration log. Calibration records were logged and maintained by CSHH and are available upon request. The calibrations were checked for each sampling event by completing the following checks at CSHH #1 (the first monitoring station visited):
    - Comparing DO results from the Eureka Manta+ 35 to a result obtained via Winkler titration.
    - Comparing pH results from the Eureka Manta+ 35 for one location to a result obtained via LaMotte field test.

- Laboratory accuracy was evaluated from laboratory control samples (trip blanks) and surrogate samples, published historical data, method validation studies, and experience with similar samples.
- Parameter-specific acceptance criteria for accuracy are summarized in **Table 1** and **Table 2.**

Representativeness of the Data

- Sampling sites were selected to be representative of the conditions for a specific area of the water body (or a specific pollution source).
- Outfall pathogen monitoring stations were not representative of estuarine water-quality but are considered representative of conditions in areas within close proximity to fresh water inflow and/or similar pollutant loadings.
- Sample-collection timing and frequency at in-harbor stations were chosen to capture data that were representative of a range of conditions (e.g., wet/dry weather, rising/ebb tide, and seasonal variability).

Comparability of the Data

Established field protocols were used for sample collection, and standard laboratory analytical methods were used for sample analysis, consistent with previous CSHH water-quality monitoring events. Samples were collected generally on the same day of the week and at the same time of day.

Completeness of the Data

Data was collected on 24 sampling events with the goal of collecting at least 70% of the anticipated number of samples on that day to analyze for both in-harbor and outfall pathogen monitoring and for the vertical profiles. The overall goal for all sampling events for the season was 75%, which was met.

- Six stations (#4-7, #14, and #15) were difficult to consistently access due to varying tidal cycles. Failure to collect sampling data at these sites does not affect the completeness of the data. It was anticipated that the monitoring sites would be accessible a minimum of once every three to four weeks over the 24 week sampling period (a minimum of six monitoring events). All sites were accessed for at least seven monitoring events.
- Data collection for stations #1-3, #8, #13, and, #16-17 was evaluated for completeness for the following parameters: water temperature, salinity, dissolved oxygen, pH, air temperature, water clarity, and turbidity. All sampling days met or exceeded the 70% performance criterion for sample collection except for 5/24/2017 (43% of samples collected), 6/14/2017 (57%), 7/19/2017 (0%), 8/30/17 (57%), and 9/28/17 (57%). Weather conditions limited sample collection on these dates.
- Data collection for stations #1-3, #8-13, #14A, #15A, #15B, #16-17, and #17A was evaluated for completeness for the following parameters: fecal coliform and enterococci. All monitoring events exceeded the 70% performance criterion except for 5/24/17 (40%of samples collected), 6/14/17 (60%), and 7/19/17 (40%). Weather conditions limited sample collection on these monitoring events.

Sensitivity of the Data

- Sensitivity limits were determined by the laboratory analytical method or the field instrument (from published specifications). The sensitivity limits for each parameter measured in the field are outlined in **Table 1.**
- Laboratory analytical methods have preset limits of detection for fecal coliform and enterococci bacteria, as outlined in **Table 2.**

Conclusion: A majority of sampling events met the completeness goal outlined in the QAPP and the overall completeness goal of 75% for the monitoring season. Procedures were in place to ensure accuracy, precision, representativeness, and comparability of the data. Additionally, there are annotations in the data—color-coded notes indicating data where values appear low/high but have been validated for accuracy, as well as field notes indicating reasons for missing data—which provide additional detail on data quality for consideration when analyzing the data. Although deviations from the precision acceptance criteria should be noted and considered when analyzing the data, the data collected by the Coalition to Save Hempstead Harbor during the 2017 water-quality monitoring season can be considered appropriate for use for its intended purposes.