



AMBIENT COASTAL LAKES MONITORING

2017/2018

Project Results

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DATE

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Purpose and Objectives:

The 2017-2018 Monmouth County Health Department's Ambient Program performs tests and collects samples that are necessary to determine Surface Water Quality Standards (SWQS) compliance and that most correctly and adequately characterized selected coastal lakes of Monmouth County, which have suspected sedimentation and nutrient loading. The site locations were selected to best determine areas of concern, such as feeder streams and storm water discharges. The analysis performed is aimed to locate point and non-point sources of nutrients and bacteria.

Further objectives of this ambient surface water quality monitoring program is to (1) Support local watershed initiatives; (2) track water quality trends through time; (3) establish background water quality; (4) obtain water quality data which can be correlated with specific land uses; (5) provide data to NJDEP in support of NJDEP's division of Water Monitoring and Standards-Deal Lake Harmful Algae Bloom investigations (6) coordinate the collection of bacterial data with the Cooperative Coastal Monitoring Program.

The data submitted for this project will be as per New Jersey Register Notice (March 16, 2020) Water Quality Data Submittal to develop the Water Quality Limited Segments List. Data was submitted to the NJDEP using the Water Quality Data Exchange to be included in NJDEP 2020 (303d) integrated list.

Data is available to the public on the County's website at <http://co.monmouth.nj.us/ambients.asp>. and at <https://www.waterqualitydata.us/>

Each individual site's data was compiled tabulated and charted in order to assist in establishing background water quality data and to denote possible areas of concern. Averages of all the site's parameters were graphed for comparison analysis.

A land use map was created to assist with locating possible point sources for pollution.

The coastal lakes in this project periodically experiences Harmful Algae blooms. Additional samples were collected at each site in Deal Lake and sent to NJDEP Leeds Point lab to aid in identifying the yearly nutrient cycle and perform chlorophyll and phycocyanin analysis as part of a cooperative study of cyanobacteria. These additional sampling results will be provided by [NJDEP Water Monitoring and Standards](#)

During the 2017 and 2018 recreational bathing seasons Monmouth County sampled the recreational beaches adjacent to the coastal lake outfalls for indicator bacteria weekly. A review of exceedances of Geometric Means and Single Threshold Values in indicator bacteria results for the 2017 and 2018 bathing seasons is included in this report. Full results for NJDEP Cooperative Coastal Monitoring Program can be found at njbeaches.org

Table 1. Ambient Monitoring Program Sampling Sites 2017-2018

| BOTTLE | SITE | STREET | TOWN | WATERSHED | Area | Type | SWQS_Cat | LAT27 | LONG27 |
|--------|-----------------|------------------------------|---------------|------------------------|------|---------|----------|----------------|----------------|
| 101a | Deal Lake | Wanamassa Rd. | Ocean | Deal Lake | 12 | Lake(3) | FW2NT | 40 13' 54.18"N | 74 01' 9.44"W |
| 102a | Deal Lake | Sunset Ave. | Asbury Park | Deal Lake | 12 | Lake(5) | FW2NT | 40 13' 45.72"N | 74 01' 6.28"W |
| 103a | Deal Lake | Westra St. | Interlaken | Deal Lake | 12 | Lake(5) | FW2NT | 40 14' 12.52"N | 74 00' 49.49"W |
| 104a | Deal Lake | Corlies Rd. | Allenhurst | Deal Lake | 12 | Lake(5) | FW2NT | 40 14' 14.80"N | 74 00' 30.24"W |
| 105a | Deal Lake | Main St. | Loch Arbor | Deal Lake | 12 | Lake(5) | FW2NT | 40 13' 50.74"N | 74 00' 29.52"W |
| 1a | Deal Lake | Ocean Ave | Asbury Park | Deal Lake | 12 | Lake(2) | FW2NT | 40 13' 49.65"N | 74 59' 52.38"W |
| 106a | Wesley Lake | Emory St. (Footbridge) | Asbury Park | Wesley,Fletcher,Sylvan | 12 | Lake(5) | FW2NT | 40 12' 54.00"N | 74 00' 35.34"W |
| 107a | Fletcher Lake | Pilgrim Pathway (footbridge) | Ocean Grove | Wesley,Fletcher,Sylvan | 12 | Lake(5) | FW2NT | 40 12' 24.54"N | 74 00' 34.35"W |
| 108a | Sylvan Lake | Bradley Blvd. | Bradley Beach | Wesley,Fletcher,Sylvan | 12 | Lake(2) | FW2NT | 40 11' 43.88"N | 74 01' 2.69"W |
| 50a | Lake Takanassee | Lake Drive | Long Branch | Whale Pond Brook | 12 | Lake(5) | FW2NT | 40°16' 37.70"N | 73°59' 30.56"W |



Ambient Site

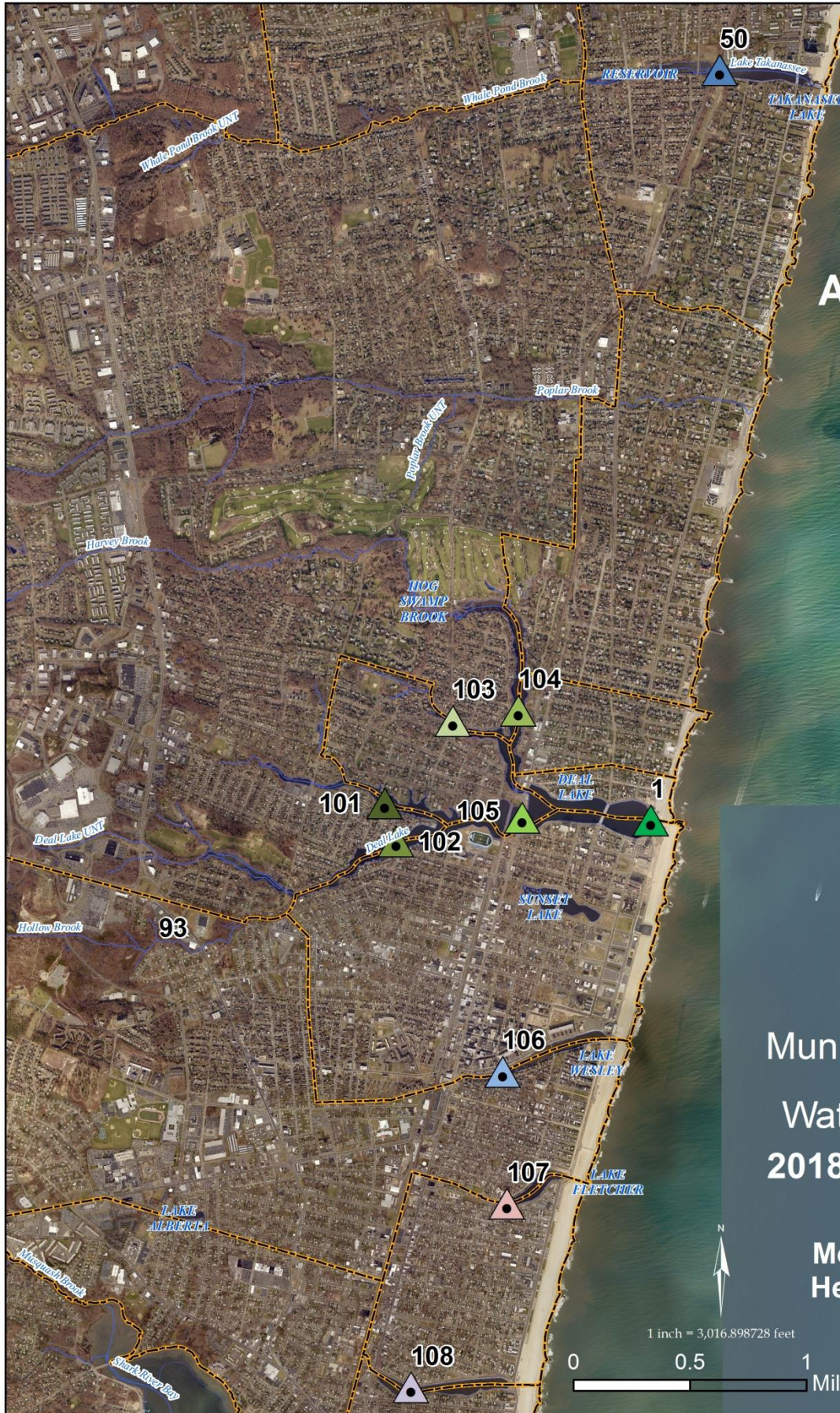
- 1
- 50
- 101
- 102
- 103
- 104
- 105
- 106
- 107
- 108

Municipality

Waterbody

2018 Ambient Site Locations

Monmouth County Health Department



1 inch = 3,016.898728 feet



Miles

Monmouth County Health Department
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Methodology

Monitoring Program Design

The bacteriological component was designed by the NJDEP under the County Environmental Health Act (CEHA), NJSA 26:3 AZ-21 et seq. Parties entered into the agreement in 1987. The Monmouth County Health Department parameters are Enterococcus, *E. coli*, pH, Total phosphorous, Turbidity, Total Ammonia, Nitrate-Nitrogen, Dissolved Oxygen and Specific Conductance, . Temperature will be taken with bacteria samples.

Lake samples for water quality monitoring were obtained at several in-lake stations that best represent the limnological aspects of the lake. If the lake is expected to exhibit relatively uniform water quality characteristics, then one sample station will be located approximately in the center of the lake. Other stations will be located in sections of the lake which may be expected to exhibit differing water quality. In the event an existing lake station must be eliminated (e.g. access issues), alternate water quality monitoring stations will be selected in the same manner.

Sampling events are not biased on weather or flow conditions. All data obtained are considered representative of ambient “grab” samples. However, sites may be affected by drought, construction, or other factors beyond our control. In these instances, the reason a sample was not collected will be documented on the field sheet.

Sampling location data are gathered using Global Positioning System (GPS) instrumentation.

Monitoring Parameters and Frequency of Collection

Chemical/physical parameters:

Monitoring occurred during four sampling periods annually. The 8 week periods for sampling were February-March, May-June, August-September and November-December. NOTE:

During 2017-2018 a total of 10 sites were sampled during each monitoring period (4 times). Ambient sampling sites were categorized according to their classification in 2009 Surface Water Quality Criteria, 7:9B, Amended 2011. See Table 4.

Parameters and frequency are indicated in Table 2.

Table 2.

| | Lakes |
|----------------------|-------------------------|
| # SITES | 10 |
| <u>PARAMETER</u> | <u>FREQUENCY</u> |
| SALINITY | 8X/year-MCHD |
| PH | 8x/year- MCHD |
| DISSOLVED OXYGEN | 8x/year- MCHD |
| SPECIFIC CONDUCTANCE | 8x/year- MCHD |
| TURBIDITY | 8x/year- MCHD |
| NITRATE NITROGEN | 4x/year-Contract Lab |
| TOTAL NITROGEN | 4x/year-Contract Lab |
| TOTAL AMMONIA | 4x/year-Contract Lab |
| TOTAL PHOSPHOROUS | 4x/year-Contract Lab |
| PHYTOPLANKTON | Optional-MCHD |
| CHLOROPHYLL | As possible field test |

Visual observations and information on current precipitation, precipitation in the last 48 hours, wind speed, wind direction, last high and low tides, and ambient temperature were also collected.

Precipitation, wind speed and wind direction data were obtained from the station in closest proximity to the sampling site at Rutgers NJ Climate & Weather network at <http://climate.rutgers.edu/njwxnet/dataviewer-stnpt.php>.

Tide data was obtained using [NOAA Tides and Currents](#) , again using the station in closest proximity to the sampling site.

Sampling location data was gathered using Global Positioning System (GPS) instrumentation.

Bacteriological/physical parameters:

Monitoring occurred over a 5 week timeframe, with 50 samples collected during the Cooperative Coastal Monitoring Program season per year.

Freshwater sites were sampled for *E. coli* and saline/estuary sites (salinity \geq 3.5 ppt) were sampled for enterococcus.

Visual observations and information on current precipitation, precipitation in the last 48 hours, wind speed, wind direction, last high and low tides in saline/estuary sites, and ambient temperature were also be collected as above.

Precipitation, wind speed and wind direction data was obtained from the station in closest proximity to the sampling site at Rutgers NJ Climate & Weather network at <http://climate.rutgers.edu/njwxnet/dataviewer-stnpt.php>.

Tide data was obtained at [NOAA Tides and Currents](#), again using the station in closest proximity to the sampling site.

Specific conductivity/salinity, temperature and dissolved oxygen were also recorded with bacteria sampling.

Field Sampling Procedures

Sample Collection:

All sampling and measurement of field parameters were conducted by trained staff of the MCHD. Training records for use of meters and recording of measurements are kept by the laboratory.

All microbiological samples were “grab samples” collected in accordance with [NJDEP Field Sampling Procedures Manual](#) (2005) Chapter 6D, and were collected upstream of any obstructions, such as bridges. There were no intermediate sampling devices for bacteria sampling.

Samples for pH were collected in a churn splitter (Bel-Art 4-Liter), unless they could be directly collected from the waterbody. If the water flow was very fast, collected from a bridge or not easily accessible, the sample was withdrawn from a sample churn into a field rinsed collection vessel for the pH measurement. The procedure for use and cleaning of the churn splitter is detailed in LABSOP0103, which is attached as Appendix A. Field measurements have the time recorded for each discrete measurement (not just one time to cover all tests at that site).

Sample Handling and Custody Requirements:

Samples were labeled with sampler’s name, sample location, date, time, and analysis requested. They were then placed into coolers in the field with ice to keep the temperature near 4 degrees C. Chain of Custody forms were generated by the sampler and completed by the laboratory. Samples were transported directly to the Monmouth County Health Department Environmental Laboratory for transport to contract laboratories. A temperature control container was placed in each cooler and accompanied the samples. The temperature of this container was measured immediately upon return to the MCHD laboratory. The contract laboratory verified that the sample was properly preserved upon sample delivery.

Total phosphorous, Total Ammonia Nitrate-Nitrogen, and Total Nitrogen were subcontracted to Leeds Point Laboratory in 2017. Bacteria was subcontracted to Leeds Point Laboratory.

The laboratories were NJ State Certified for the parameters they were contracted to analyze.

Field Measurements:

Specific Conductance: EPA 120.1 Wheatstone Bridge. Use YSI Model 85 and YSI Pro 2030 probe with 25 ft. cable or 50 ft. cable. Specific Conductance was measured using instruments that were calibrated daily: before deployment, using Conductivity Standard in the appropriate range. Sample measurements were recorded on field sheets with time measured and inputted into a database.

Temperature:

Is measured using YSI 85 or YSI Pro2030 digital probes that were checked quarterly against a NIST traceable thermometer. (SOP0060A Dissolved Oxygen, Salinity, Temperature, and Conductance.) The YSI probes have 25 and 50 foot cables to allow for measurements from a bridge or used with a sampling pole so that the probe dangled into the stream. Temperature measurements that are representative of the entire waterway are difficult to collect. At some sampling locations the temperature can be stratified and it was not be possible to reach the deeper center regions of some waterbodies. The temperature measurements represent the general area of the sampling location.

pH:

Measurements for pH were made in the field using Oakton pH Testr 3 units, which were calibrated at the Monmouth County Health Department Environmental Laboratory on the morning of use. The units are individually numbered and the unit number was recorded on field sheets or sampling tablets. Calibration checks of pH buffer 7.0 were performed in the field prior to taking a pH reading at each site. Following 3 hours of field usage a calibration check of pH buffer 4.0 was performed and recorded on the field sampling tablet. Duplicate samples were performed in the field at a rate of 2 per 20 or fewer samples.

Oxygen (dissolved):

Dissolved oxygen was measured using Standard Method 18/19ed 4500-O G Electrode with YSI Model 85 or YSI Model Pro2030 probe with 25 ft. cable or 50 ft. cable. The dissolved oxygen probe was calibrated against the Winkler Titration weekly before deployment. A saturated air check was performed daily in the field and recorded on field sheets.

Turbidity:

Turbidity is measured using SM 2130 B-11 Nephelometric HACH Model 2100P, the meter was calibrated once per sampling event (day) as recommended in the instrument manual for this meter. Diluting samples that were >40NTU was performed as necessary as per instructions in

LABSOP 0100 Procedure for using Hach Model 2100P Portable Turbidimeter. 3 to 5 turbidity measurements were recorded on Field Data Reporting Sheet. Measurements were made from the first draws of the churn splitter. The median value of the 3 sequential values that fell within 10% of each other is the final value recorded. A Blank was measured and recorded after each sample.

Field Sampling Table 3:

Field Sample Matrix: Water

Total number of sample stations: 10

Table 2.

| Parameter | Container/volume | Preservation | Holding time |
|--|----------------------------|------------------------|---------------------|
| E. coli | 250 ml HDPE, Sterilized | Cool 4C | 6 hours |
| Total Ammonia(mg NH ₃ + NH ₄ /L) | 50 ml centrifuge tubes | 2 ml 3.5% Phenol | 14 days |
| Total Phosphorus(mg/L) | 50 ml centrifuge tubes | Cool 4C | 28 days |
| pH, standard units | — | Analyze immediately | Determined in field |
| Specific Conductance: Wheatstone Bridge umhos/cm | — | Analyze immediately | Determined in field |
| Nitrate-Nitrogen as N: Colorimetric, Cadmium Reduction | 50 ml centrifuge tubes | Cool 4C | 28 days |
| Nitrogen, Total (mg/L) | 50 ml centrifuge tubes | Cool 4C | 28 days |
| Oxygen (dissolved): Electrode (mg/L) | Determined in field | Analyze immediately | Determined in field |
| Temperature, C | Determined in field | Analyze immediately | Determined in field |
| Turbidity, NTU | Determined in field | Analyze immediately | Determined in field |
| Salinity, parts per thousand | Determined in field | Analyze immediately | Determined in field |

Data Quality Requirements:

Field Measurement:

NJDEP Field Sampling Procedures Manual (2005)

Field duplicates were collected at a rate of 2 per 20 or fewer samples, for the parameters of specific conductance, DO, temperature, salinity and pH in the field and recorded on data forms.

Laboratory Measurements:

Total phosphorous, Total Ammonia Nitrate-Nitrogen, and TN was subcontracted to Leeds Point Laboratory.

Bacteria analysis was performed by Leeds Point Laboratory

The laboratory is NJ State Certified for the parameters they were contracted to analyze.

Data Representativeness:

The Lake site samples were collected quarterly for physical/chemical parameters.

Bacteria, specific conductance or dissolved oxygen and temperature were collected weekly during a 5 week time span within the Coastal Cooperative Monitoring Program duration.

Data Comparability:

Results are comparable because the same field techniques, analytical methods, quality control and data reporting techniques were used throughout the project. Any changes to the sampling or analysis were evaluated thoroughly by project supervisors so that the comparability was not affected.

Data Completeness:

All samples required to complete the project were obtained.

Data Validation:

Laboratory Data:

Validation of Laboratory data occurred within the laboratory in accordance with procedures set forth in each Laboratory Standard Operating Procedure. Additional samples were analyzed when results indicate that further sampling was required.

Each laboratory manager was responsible for determining if the data was acceptable.

Field Data:

Field data validation is in accordance with:

NJDEP, Office of Quality Assurance. Guidance for Review of Environmental Measurement QC Data for Water Monitoring Projects (Procedure 2.0). Trenton, NJ Revised December 1984.

The Project and Quality Assurance Officers rejected data with improper units or improbable values.

Data Storage:

In-Lake Data was stored and managed by NJDEP Bureau Marine Water Monitoring (BMWM) in electronic format (MS Access) until it was ready for WQDE data submission. BMWM was responsible for entering, maintaining, and supporting the MS Access database system that holds this data. Data maintained included water chemistry, nutrients, chlorophyll and other related parameters. Data not maintained will be any metric or indices related data. BMWM provided MCHD, WQDE compatible data files based on templates created by BMWM for WQDE submission. These files were sent to MCHD for WQDE upload. MCHD will be responsible for verification that data uploaded correctly. Water quality

data will be entered into New Jersey's Water Quality Data Exchange (WQDE) and USEPA STORET Data Warehouse by June of the following year it is received from the analytical laboratory. All raw data records shall be maintained for a period of no less than five years.

Data Reports:

This Ambient Monitoring Report was generated by the Water Pollution Control Program. Results will be forwarded electronically to local health agencies only if requested.

Data is available on the Monmouth County Health Department's webpage at <http://co.monmouth.nj.us/ambients.asp> within 30 days of this publication.

Data is submitted to the NJDEP using the Water Quality Data Exchange within 30 days of this publication.

Data Usage:

Data was evaluated against N.J.A.C. 7:9B, 2009 (amended April 2011) Surface Water Quality Standards. Exceedances of standards resulted in additional investigations of the waterway by conducting "stream walks", sanitary surveys and additional sampling.

Data will be stored in NJDEP's Compass database and will be available through NJDEP's Data Miner (<http://www.nj.gov/dep/opra/online.html>). Data will also be available through USEPA's STORET database accessed through <http://www.epa.gov/storet/dbtop.html>.

Project Plan Audits:

Field sampling audits were conducted on an in-house basis, following initial field training technique training by NJDEP at the conception of the CEHA contract.

Laboratory audits are performed by NJDEP Office of Quality Assurance as part of laboratory certification program.

Sample Custody and Label Procedures:

A Chain of Custody form was used in this project for all samples. Field sheets were used to record the field parameters and the time of each individual test measurement was performed. The field test meter identification is recorded on the field sheet to link the measurements with calibration records.

Analytical method requirements:

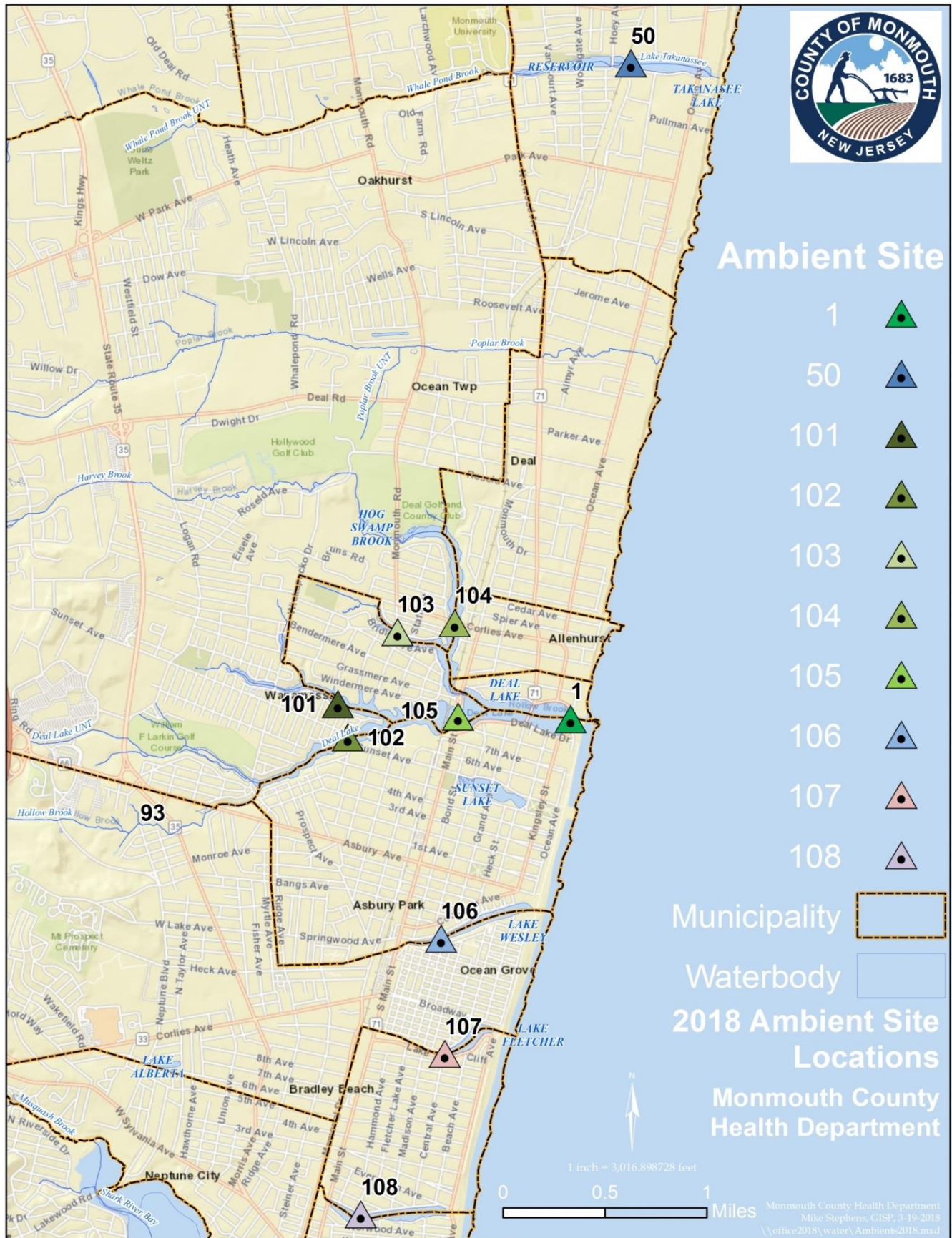
All field methods referenced are available from The Monmouth County Department of Health Environmental Laboratory. Laboratory analytical methods are specified in our annual contracts with laboratories. Laboratory method detection limits, estimated accuracy and precision are received from the laboratory at the beginning of each contract year.

Table 4. Microbiological parameters

| Analyte/ Parameter | Sample Matrix | Analytical Method Reference | Reporting Limit | Estimated Accuracy | Estimated Precision | Required Action Levels or Standards |
|--------------------|---------------|--|-----------------|--------------------|-------------------------------|--|
| E. coli | Surface water | Modified Thermo-tolerant E. coli USEAP 1603-09 | 3 cfu/100ml | NA | False pos <1% False neg 4% | E. Coli levels shall not exceed a geometric mean of 126/100 ml or a single sample maximum of 235/100 ml. for FW2 |

Table 5. Chemical/physical parameters

| Analyte/ Parameter | Sample Matrix | Analytical Method Reference | Method Detection Limit | Estimated Accuracy | Estimated Precision | Required Action Levels or Standards |
|---|---------------|---|------------------------|-----------------------|-----------------------|---|
| pH, (SU) | Surface water | SM 4500 H B | | NA | +/- 0.16 SU | 6.5 - 8.5 for FW2 and all SE |
| Temperature | Surface water | SM 2550 B | NA | +/- 0.1 C | NA | No thermal alterations that cause temp to exceed 20° C (68° F). Daily max 31° C or 7-day max average 28° C for FW2-NT |
| Salinity | Surface water | Standard Method 20th 2520B | NA | +/- 0.1 ppt | NA | NA |
| Total Ammonia(mg NH3 + NH4/L) | Surface water | 350.1 MOD | 0.01 mg/L | +/- 10% | +/- 10% | NA |
| Phosphorus-total (mg/L) | Surface water | <u>USGS I-4650-03</u> | 0.01 mg/L | +/- 10% | +/- 10% | 0.05 mg/L |
| Specific Conductance: Wheatstone Bridge umhos/cm | Surface water | SM 2510 B | NA | 99% REC (Multi Lab) | 3.9 RSD (Multi Lab) | |
| Nitrate-Nitrogen as N: Colorimetric, Cadmium Reduction_(mg/L) | Surface water | <u>EPA 353.4</u> | 0.01 mg/L nitrate-N/L. | +/- 10% | +/- 10% | 10 mg/L |
| Nitrogen, Total (mg/L) | Surface water | <u>USGS I-4650-03</u> | 0.1 mg/l | +/- 10% | +/- 10% | NA |
| Oxygen (dissolved): Electrode (mg/L) | Surface water | <u>Standard Method 18/19ed 4500-O G Electrode</u> | NA | TO WITHIN 0.2 mg DO/L | TO WITHIN 0.2 mg DO/L | 24 hr. average not less than 5.0 mg/l and not less than 4.0 mg/l at any time for FW2-NT |
| Turbidity (NTU) | Surface water | <u>Standard Method</u> | NA | 0.03-1.26 NTU | NA | Max 30 day avg 15 ntu, max 50 NTU at any time FW2, |



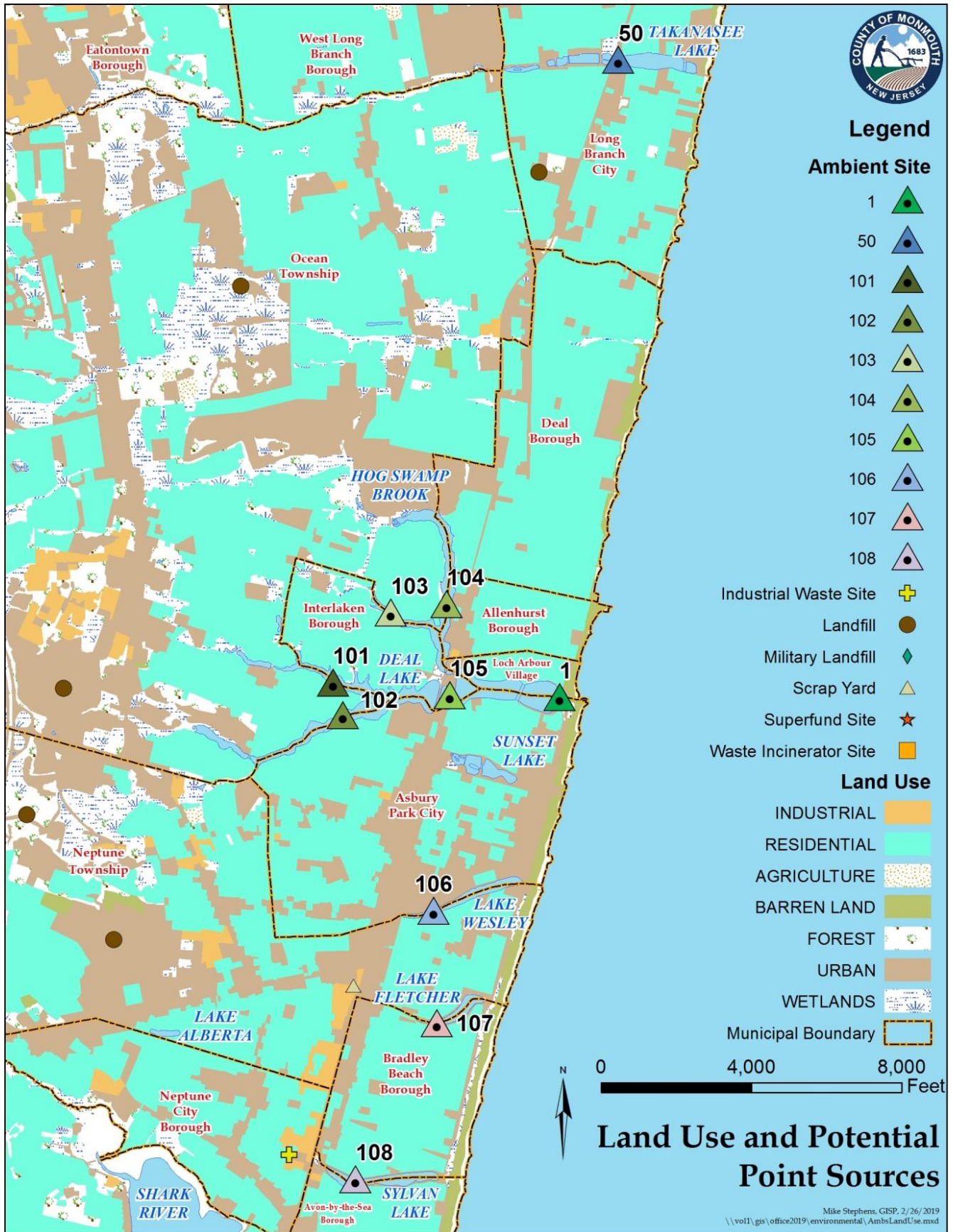
Ambient Site

- 1
- 50
- 101
- 102
- 103
- 104
- 105
- 106
- 107
- 108

Municipality

Waterbody

Land Use Map



| BOTTLE | SITE | STREET | TOWN |
|--------|-----------|---------------|-------------|
| 101a | Deal Lake | Wanamassa Rd. | Ocean |
| 102a | Deal Lake | Sunset Ave. | Asbury Park |
| 103a | Deal Lake | Westra St. | Interlaken |
| 104a | Deal Lake | Corlies Rd. | Allenhurst |
| 105a | Deal Lake | Main St. | Loch Arbour |
| 1a | Deal Lake | Ocean Ave | Asbury Park |



Legend

- Ambient Site (Green triangle)
- CCMP Site (Blue triangle)
- Road (Yellow line)
- Municipal Boundary (Dashed yellow line)
- Waterbody (Blue area)

Site numbers 1, 50, 101, 102, 103, 104, 105 are listed next to their respective symbols.



Deal Lake Site Locations

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Table 6.

Deal Lake sites results

101A Deal Lake Sunset Ave Asbury Park

| SampleDate | Time | E Coli | Units | DO | Units | pH | Temperature | Units | Conductivity | Units | Turbidity | Units | Total P | Total N | Ammonia | Nitrate | Units |
|------------|----------|--------|-----------|-------|-------|------|-------------|-------|--------------|----------|-----------|-------|---------|---------|---------|---------|-------|
| 3/27/17 | 11:19 AM | | | 10.30 | mg/l | 7.45 | 8.3 | C | 861.0 | umhos/cm | 7.53 | ntu | 0.04 | 1.13 | 0.10 | 0.39 | mg/l |
| 6/15/17 | 12:00 PM | | | 6.03 | mg/l | 7.15 | 25.7 | C | 1918.0 | umhos/cm | 15.2 | ntu | 0.09 | 1.12 | 0.05 | 0.05 | mg/l |
| 8/10/17 | 9:25 AM | 27 | cfu/100ml | 8.84 | mg/l | 8.27 | 25.2 | C | 2249.0 | umhos/cm | 16.7 | ntu | | | | | |
| 8/17/17 | 9:25 AM | 150 | cfu/100ml | 8.02 | mg/l | 7.67 | 25.6 | C | 2505.0 | umhos/cm | 19 | ntu | | | | | |
| 8/24/17 | 9:10 AM | 180 | cfu/100ml | 4.63 | mg/l | 7.22 | 25.5 | C | 2098.0 | umhos/cm | 18.3 | ntu | | | | | |
| 8/31/17 | 9:10 AM | 720 | cfu/100ml | 7.22 | mg/l | 7.60 | 21.6 | C | 2176.0 | umhos/cm | 19.6 | ntu | 0.18 | 2.00 | 0.02 | 0.01 | mg/l |
| 9/7/17 | 9:15 AM | 970 | cfu/100ml | 8.32 | mg/l | 7.34 | 21.7 | C | 1171.0 | umhos/cm | 16.2 | ntu | | | | | |
| 11/14/17 | 11:08 AM | | | 12.26 | mg/l | 7.02 | 7.9 | C | 2768.0 | umhos/cm | 6.22 | ntu | 0.05 | 0.84 | 0.12 | 0.14 | mg/l |
| 3/14/18 | 9:15 AM | | | 11.62 | mg/l | 7.08 | 4.7 | C | 928.0 | umhos/cm | 21.7 | ntu | 0.08 | 1.49 | 0.50 | 0.31 | mg/l |
| 5/16/18 | 9:40 AM | | | 5.13 | mg/l | 6.75 | 20.4 | C | 612.0 | umhos/cm | 12.4 | ntu | 0.18 | 1.34 | 0.13 | 0.60 | mg/l |
| 8/2/18 | 9:37 AM | 170 | cfu/100ml | 4.25 | mg/l | 7.02 | 28.0 | C | 219.0 | umhos/cm | 18.3 | ntu | | | | | |
| 8/9/18 | 9:44 AM | 150 | cfu/100ml | 5.39 | mg/l | 7.26 | 29.4 | C | 488.0 | umhos/cm | 20.3 | ntu | | | | | |
| 8/16/18 | 9:35 AM | 400 | cfu/100ml | 4.41 | mg/l | 6.98 | 26.2 | C | 250.6 | umhos/cm | 13.7 | ntu | 0.10 | 1.16 | 0.02 | 0.12 | mg/l |
| 8/23/18 | 9:37 AM | 10 | cfu/100ml | 4.80 | mg/l | 6.85 | 23.8 | C | 238.7 | umhos/cm | 14.6 | ntu | | | | | |
| 8/30/18 | 9:30 AM | 1100 | cfu/100ml | 4.84 | mg/l | 6.90 | 28.1 | C | 393.4 | umhos/cm | 12.2 | ntu | | | | | |
| 11/29/18 | 9:21 AM | | | 7.78 | mg/l | 7.11 | 6.7 | C | 213.6 | umhos/cm | 17.4 | ntu | 0.12 | 1.02 | 0.05 | 0.38 | mg/l |

102A Deal Lake Sunset Ave Asbury Park

| SampleDate | Time | E Coli | Units | DO | Units | pH | Temperature | Units | Conductivity | units | Turbidity | Units | Total P | Total N | Ammonia | Nitrate | Units |
|------------|----------|--------|-----------|-------|-------|------|-------------|-------|--------------|----------|-----------|-------|---------|---------|---------|---------|-------|
| 3/27/17 | 11:08 AM | | | 10.18 | mg/l | 7.33 | 7.7 | C | 896.0 | umhos/cm | 9.91 | ntu | 0.05 | 1.83 | 0.68 | 0.47 | mg/l |
| 6/15/17 | 11:00 AM | | | 6.34 | mg/l | 7.67 | 26.6 | C | 1990.0 | umhos/cm | 13.6 | ntu | 0.10 | 1.53 | 0.11 | 0.18 | mg/l |
| 8/10/17 | 10:35 AM | 710 | cfu/100ml | 10.31 | mg/l | 8.81 | 26.5 | C | 1958.0 | umhos/cm | 20.1 | ntu | | | | | |
| 8/17/17 | 10:30 AM | 770 | cfu/100ml | 10.63 | mg/l | 8.65 | 26.0 | C | 2061.0 | umhos/cm | 22.7 | ntu | | | | | |
| 8/24/17 | 9:50 AM | 390 | cfu/100ml | 9.55 | mg/l | 8.09 | 26.8 | C | 2053.0 | umhos/cm | 21.3 | ntu | | | | | |
| 8/31/17 | 11:05 AM | 2900 | cfu/100ml | 9.19 | mg/l | 7.39 | 21.7 | C | 1343.0 | umhos/cm | 19.5 | ntu | 0.12 | 2.00 | 0.02 | 0.16 | mg/l |
| 9/7/17 | 10:23 AM | 500 | cfu/100ml | 7.40 | mg/l | 6.73 | 20.9 | C | 552.0 | umhos/cm | 16.1 | ntu | | | | | |
| 11/14/17 | 10:54 AM | | | 12.53 | mg/l | 7.18 | 7.1 | C | 2033.0 | umhos/cm | 6.45 | ntu | 0.03 | 1.12 | 0.47 | 0.22 | mg/l |
| 3/14/18 | 10:25 AM | | | 12.10 | mg/l | 6.84 | 4.1 | C | 3003.0 | umhos/cm | 13.6 | ntu | 0.03 | 1.70 | 0.92 | 0.44 | mg/l |
| 5/16/18 | 10:20 AM | | | 6.85 | mg/l | 6.52 | 19.2 | C | 539.0 | umhos/cm | 13.3 | ntu | 0.17 | 2.09 | 1.02 | 0.27 | mg/l |
| 8/2/18 | 10:50 AM | 73 | cfu/100ml | 6.70 | mg/l | 7.26 | 27.6 | C | 388.8 | umhos/cm | 14.6 | ntu | | | | | |
| 8/9/18 | 10:42 AM | 110 | cfu/100ml | 10.15 | mg/l | 9.24 | 29.9 | C | 445.9 | umhos/cm | 22.7 | ntu | | | | | |
| 8/16/18 | 10:40 AM | 550 | cfu/100ml | 5.10 | mg/l | 6.89 | 26.7 | C | 203.6 | umhos/cm | 14.1 | ntu | 0.08 | 1.17 | 0.17 | 0.19 | mg/l |
| 8/23/18 | 10:30 AM | 240 | cfu/100ml | 7.10 | mg/l | 7.81 | 25.4 | C | 345.6 | umhos/cm | 12.5 | ntu | | | | | |
| 8/30/18 | 10:25 AM | 270 | cfu/100ml | 7.35 | mg/l | 8.03 | 29.4 | C | 414.5 | umhos/cm | 11.9 | ntu | | | | | |
| 11/29/18 | 10:49 AM | | | 8.81 | mg/l | 6.84 | 6.2 | C | 230.3 | umhos/cm | 20.5 | ntu | 0.08 | 1.25 | 0.33 | 0.36 | mg/l |

103A Deal Lake Westra Interlaken

| SampleDate | Time | E Coli | Units | DO | Units | pH | Temperature | Units | cific Conduct | Units | Turbidity | Units | Total P | Total N | Ammonia | Nitrate | Units |
|------------|----------|--------|-----------|-------|-------|------|-------------|-------|---------------|----------|-----------|-------|---------|---------|---------|---------|-------|
| 3/27/17 | 11:35 AM | | | 9.43 | mg/l | 7.26 | 8.2 | C | 517.0 | umhos/cm | 9.9 | ntu | 0.10 | 1.14 | 0.11 | 0.41 | mg/l |
| 6/15/17 | 12:20 PM | | | 5.76 | mg/l | 7.02 | 26.0 | C | 1472.0 | umhos/cm | 15.4 | ntu | 0.22 | 2.10 | 0.03 | 0.01 | mg/l |
| 8/10/17 | 10:26 AM | 55 | cfu/100ml | 10.34 | mg/l | 8.32 | 25.6 | C | 2017.0 | umhos/cm | 17.2 | ntu | | | | | |
| 8/17/17 | 10:18 AM | 200 | cfu/100ml | 9.58 | mg/l | 8.29 | 25.8 | C | 1869.0 | umhos/cm | 20.2 | ntu | | | | | |
| 8/24/17 | 10:05 AM | 230 | cfu/100ml | 7.32 | mg/l | 7.21 | 24.6 | C | 2041.0 | umhos/cm | 22.4 | ntu | | | | | |
| 8/31/17 | 10:00 AM | 330 | cfu/100ml | 6.45 | mg/l | 7.75 | 21.7 | C | 1921.0 | umhos/cm | 18.8 | ntu | 0.38 | 1.90 | 0.02 | 0.01 | mg/l |
| 9/7/17 | 10:10 AM | 860 | cfu/100ml | 5.02 | mg/l | 6.90 | 21.3 | C | 11.8 | umhos/cm | 15 | ntu | | | | | |
| 11/14/17 | 12:01 PM | | | 12.57 | mg/l | 6.93 | 8.3 | C | 3194.0 | umhos/cm | 6.95 | ntu | 0.09 | 0.89 | 0.04 | 0.15 | mg/l |
| 3/14/18 | 10:15 AM | | | 12.30 | mg/l | 7.27 | 4.9 | C | 822.0 | umhos/cm | 12.5 | ntu | 0.08 | 1.18 | 0.11 | 0.62 | mg/l |
| 5/16/18 | 10:30 AM | | | 4.62 | mg/l | 6.63 | 19.9 | C | 371.0 | umhos/cm | 17.5 | ntu | 0.22 | 1.38 | 0.09 | 0.08 | mg/l |
| 8/2/18 | 10:42 AM | 27 | cfu/100ml | 4.15 | mg/l | 6.92 | 28.1 | C | 346.4 | umhos/cm | 12.4 | ntu | | | | | |
| 8/9/18 | 10:30 AM | 190 | cfu/100ml | 4.40 | mg/l | 6.96 | 29.1 | C | 363.5 | umhos/cm | 15.8 | ntu | | | | | |
| 8/16/18 | 10:20 AM | 120 | cfu/100ml | 5.02 | mg/l | 6.87 | 25.7 | C | 206.1 | umhos/cm | 13.9 | ntu | 0.14 | 1.11 | 0.01 | 0.04 | mg/l |
| 8/23/18 | 10:15 AM | 90 | cfu/100ml | 5.12 | mg/l | 6.86 | 23.2 | C | 217.2 | umhos/cm | 12.2 | ntu | | | | | |
| 8/30/18 | 10:06 AM | 100 | cfu/100ml | 4.39 | mg/l | 6.92 | 27.5 | C | 284.8 | umhos/cm | 13.8 | ntu | | | | | |
| 11/29/18 | 10:10 AM | | | 7.52 | mg/l | 7.02 | 6.1 | C | 186.2 | umhos/cm | 22.5 | ntu | 0.15 | 1.05 | 0.06 | 0.50 | mg/l |

104A Deal Lake Corlies Rd Allenhurst

| SampleDate | Time | E Coli | Units | DO | Units | pH | Temperature | Units | Specific Conduct | Units | Turbidity | Units | Total P | Total N | Ammonia | Nitrate | Units |
|------------|----------|--------|-----------|-------|-------|------|-------------|-------|------------------|----------|-----------|-------|---------|---------|---------|---------|-------|
| 3/27/17 | 11:50 AM | | | 9.77 | mg/l | 7.20 | 8.4 | C | 535.0 | umhos/cm | 14.6 | ntu | 0.07 | 1.30 | 0.15 | 0.58 | mg/l |
| 6/15/17 | 12:35 PM | | | 5.29 | mg/l | 6.87 | 26.9 | C | 1337.0 | umhos/cm | 12.9 | ntu | 0.14 | 1.25 | 0.03 | 0.01 | mg/l |
| 8/10/17 | 10:40 AM | 55 | cfu/100ml | 10.36 | mg/l | 8.27 | 26.1 | C | 1788.0 | umhos/cm | 16.4 | ntu | | | | | |
| 8/17/17 | 10:36 AM | 27 | cfu/100ml | 8.85 | mg/l | 7.72 | 26.4 | C | 1606.0 | umhos/cm | 19.2 | ntu | | | | | |
| 8/24/17 | 10:20 AM | 140 | cfu/100ml | 8.14 | mg/l | 7.95 | 25.7 | C | 18080.0 | umhos/cm | 26.2 | ntu | | | | | |
| 8/31/17 | 10:20 AM | 790 | cfu/100ml | 7.19 | mg/l | 8.22 | 22.2 | C | 1164.0 | umhos/cm | 18.5 | ntu | 0.24 | 1.48 | 0.02 | 0.01 | mg/l |
| 9/7/17 | 10:30 AM | 420 | cfu/100ml | 5.65 | mg/l | 7.10 | 22.1 | C | 809.0 | umhos/cm | 19.7 | ntu | | | | | |
| 11/14/17 | 12:14 PM | | | 11.72 | mg/l | 7.09 | 7.1 | C | 3181.0 | umhos/cm | 8.35 | ntu | 0.07 | 0.99 | 0.06 | 0.25 | mg/l |
| 3/14/18 | 10:30 AM | | | 12.20 | mg/l | 7.25 | 4.5 | C | 770.0 | umhos/cm | 19 | ntu | 0.09 | 1.47 | 0.26 | 0.74 | mg/l |
| 5/16/18 | 10:45 AM | | | 5.67 | mg/l | 6.59 | 20.1 | C | 310.9 | umhos/cm | 13.3 | ntu | 0.19 | 1.40 | 0.13 | 0.22 | mg/l |
| 8/2/18 | 11:04 AM | 27 | cfu/100ml | 6.10 | mg/l | 7.17 | 28.6 | C | 337.5 | umhos/cm | 13.2 | ntu | | | | | |
| 8/9/18 | 10:48 AM | 60 | cfu/100ml | 6.30 | mg/l | 7.31 | 29.8 | C | 352.2 | umhos/cm | 14.3 | ntu | | | | | |
| 8/16/18 | 10:35 AM | 140 | cfu/100ml | 5.45 | mg/l | 7.00 | 27.3 | C | 203.6 | umhos/cm | 14.6 | ntu | 0.09 | 1.12 | 0.01 | 0.32 | mg/l |
| 8/23/18 | 10:28 AM | 50 | cfu/100ml | 6.03 | mg/l | 6.96 | 24.4 | C | 227.0 | umhos/cm | 12.4 | ntu | | | | | |
| 8/30/18 | 10:17 AM | 10 | cfu/100ml | 5.23 | mg/l | 7.03 | 29.0 | C | 306.5 | umhos/cm | 11.8 | ntu | | | | | |
| 11/29/18 | 10:22 AM | | | 7.44 | mg/l | 7.07 | 7.2 | C | 111.7 | umhos/cm | 42.7 | ntu | 0.22 | 1.42 | 0.08 | 0.60 | mg/l |

105A Deal Lake Main St Loch Arbor

| SampleDate | Time | E Coli | Units | DO | Units | pH | Temperature | Units | Conductivity | Units | Turbidity | Units | Total P | Total N | Ammonia | Nitrate | Units |
|------------|----------|--------|-----------|-------|-------|------|-------------|-------|--------------|----------|-----------|-------|---------|---------|---------|---------|-------|
| 3/27/17 | 10:55 AM | | | 10.10 | mg/l | 7.38 | 7.7 | C | 1198.0 | umhos/cm | 5.92 | ntu | 0.05 | 1.20 | 0.30 | 0.40 | mg/l |
| 6/15/17 | 10:45 AM | | | 5.10 | mg/l | 7.52 | 25.4 | C | 1701.0 | umhos/cm | 12 | ntu | 0.12 | 1.24 | 0.03 | 0.01 | mg/l |
| 8/10/17 | 10:20 AM | 173 | cfu/100ml | 8.44 | mg/l | 7.72 | 25.8 | C | 3500.0 | umhos/cm | 16.3 | ntu | | | | | |
| 8/17/17 | 10:16 AM | 18 | cfu/100ml | 10.05 | mg/l | 8.78 | 25.5 | C | 3763.0 | umhos/cm | 18.6 | ntu | | | | | |
| 8/24/17 | 9:36 AM | 100 | cfu/100ml | 9.50 | mg/l | 8.09 | 26.1 | C | 3645.0 | umhos/cm | 18 | ntu | | | | | |
| 8/31/17 | 10:47 AM | 500 | cfu/100ml | 9.75 | mg/l | 7.99 | 22.0 | C | 2847.0 | umhos/cm | 18.8 | ntu | 0.16 | 2.15 | 0.02 | 0.01 | mg/l |
| 9/7/17 | 10:11 AM | 1100 | cfu/100ml | 7.63 | mg/l | 6.90 | 21.6 | C | 12.5 | umhos/cm | 15.5 | ntu | | | | | |
| 11/14/17 | 10:39 AM | | | 14.62 | mg/l | 7.20 | 5.8 | C | 2243.0 | umhos/cm | 5.73 | ntu | 0.05 | 0.97 | 0.24 | 0.18 | mg/l |
| 3/14/18 | 10:55 AM | | | 13.25 | mg/l | 7.13 | 4.0 | C | 4220.0 | umhos/cm | 11.6 | ntu | 0.04 | 1.42 | 0.61 | 0.51 | mg/l |
| 5/16/18 | 10:10 AM | | | 7.02 | mg/l | 6.76 | 19.7 | C | 689.0 | umhos/cm | 13.9 | ntu | 0.13 | 1.69 | 0.22 | 0.13 | mg/l |
| 8/2/18 | 10:30 AM | 73 | cfu/100ml | 6.97 | mg/l | 9.00 | 28.1 | C | 874.0 | umhos/cm | 17.9 | ntu | | | | | |
| 8/9/18 | 10:29 AM | 170 | cfu/100ml | 6.14 | mg/l | 8.88 | 29.1 | C | 850.0 | umhos/cm | 19.1 | ntu | | | | | |
| 8/16/18 | 10:30 AM | 190 | cfu/100ml | 8.33 | mg/l | 7.91 | 26.9 | C | 902.0 | umhos/cm | 13.3 | ntu | 0.10 | 1.14 | 0.01 | 0.04 | mg/l |
| 8/23/18 | 10:18 AM | 460 | cfu/100ml | 6.96 | mg/l | 7.88 | 24.2 | C | 620.0 | umhos/cm | 12.1 | ntu | | | | | |
| 8/30/18 | 10:17 AM | 290 | cfu/100ml | 6.84 | mg/l | 8.47 | 28.7 | C | 719.0 | umhos/cm | 12.8 | ntu | | | | | |
| 11/29/18 | 10:31 AM | | | 8.84 | mg/l | 7.12 | 5.4 | C | 889.0 | umhos/cm | 17 | ntu | 0.10 | 1.14 | 0.25 | 0.37 | mg/l |

1A Deal Lake Ocean Ave Asbury Park

| SampleDate | Time | E Coli | Units | DO | Units | pH | Temperature | Specific Conduct | Units | Turbidity | Units | Total P | Total N | Ammonia | Nitrate | Units | |
|------------|----------|--------|-----------|-------|-------|------|-------------|------------------|--------|-----------|-------|---------|---------|---------|---------|-------|------|
| 3/27/17 | 10:37 AM | | | 10.80 | mg/l | 7.26 | 7.4 | C | 2040.0 | umhos/cm | 6.17 | ntu | 0.05 | 0.94 | 0.13 | 0.34 | mg/l |
| 6/15/17 | 10:35 AM | | | 5.22 | mg/l | 8.19 | 25.5 | C | 4414.0 | umhos/cm | 10.7 | ntu | 0.10 | 1.04 | 0.03 | 0.01 | mg/l |
| 8/10/17 | 10:05 AM | 9 | cfu/100ml | 10.80 | mg/l | 9.06 | 24.6 | C | 4436.0 | umhos/cm | 14.7 | ntu | | | | | |
| 8/17/17 | 10:02 AM | 73 | cfu/100ml | 10.26 | mg/l | 9.11 | 25.2 | C | 4225.2 | umhos/cm | 17.7 | ntu | | | | | |
| 8/24/17 | 9:15 AM | 18 | cfu/100ml | 11.13 | mg/l | 8.99 | 25.3 | C | 5.6 | umhos/cm | 17.5 | ntu | | | | | |
| 8/31/17 | 10:20 AM | 140 | cfu/100ml | 11.40 | mg/l | 8.99 | 21.7 | C | 1765.0 | umhos/cm | 20.2 | ntu | 0.17 | 2.23 | 0.02 | 0.01 | mg/l |
| 9/7/17 | 9:58 AM | 360 | cfu/100ml | 8.33 | mg/l | 7.01 | 21.3 | C | 2015.0 | umhos/cm | 13.5 | ntu | | | | | |
| 11/14/17 | 10:26 AM | | | 14.16 | mg/l | 7.57 | 5.9 | C | 3299.0 | umhos/cm | 5.67 | ntu | 0.04 | 0.76 | 0.07 | 0.14 | mg/l |
| 3/14/18 | 11:05 AM | | | 12.61 | mg/l | 7.40 | 3.7 | C | 4930.0 | umhos/cm | 12 | ntu | 0.05 | 1.43 | 0.47 | 0.70 | mg/l |
| 5/16/18 | 10:00 AM | | | 8.30 | mg/l | 7.12 | 19.7 | C | 976.0 | umhos/cm | 12.2 | ntu | 0.12 | 1.28 | 0.16 | 0.01 | mg/l |
| 8/2/18 | 10:15 AM | 45 | cfu/100ml | 8.57 | mg/l | 9.23 | 27.7 | C | 1022.0 | umhos/cm | 18.5 | ntu | | | | | |
| 8/9/18 | 10:15 AM | 9 | cfu/100ml | 6.54 | mg/l | 9.47 | 28.2 | C | 1076.0 | umhos/cm | 15.8 | ntu | | | | | |
| 8/16/18 | 10:16 AM | 30 | cfu/100ml | 9.29 | mg/l | 9.08 | 26.5 | C | 1625.0 | umhos/cm | 13.4 | ntu | 0.11 | 1.07 | 0.01 | 0.10 | mg/l |
| 8/23/18 | 10:05 AM | 30 | cfu/100ml | 6.67 | mg/l | 8.89 | 24.1 | C | 1422.0 | umhos/cm | 9.58 | ntu | | | | | |
| 8/30/18 | 10:05 AM | 20 | cfu/100ml | 7.33 | mg/l | 9.23 | 28.4 | C | 990.0 | umhos/cm | 13.9 | ntu | | | | | |
| 11/29/18 | 10:15 AM | | | 10.31 | mg/l | 7.00 | 5.3 | C | 1641.0 | umhos/cm | 20.9 | ntu | 0.15 | 1.33 | 0.24 | 0.38 | mg/l |

Table 7.

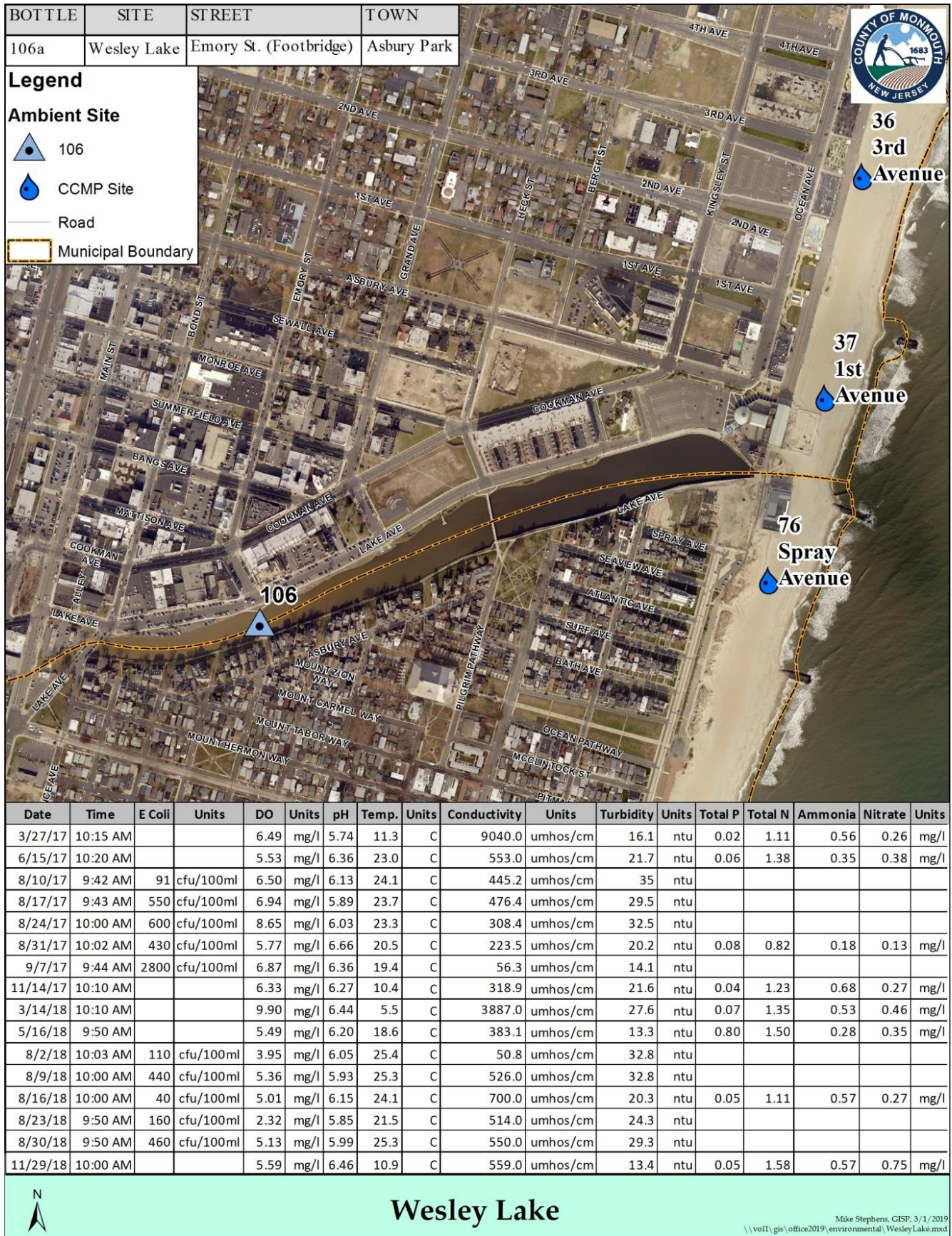


Table 7.



Table 8.



Table 9.

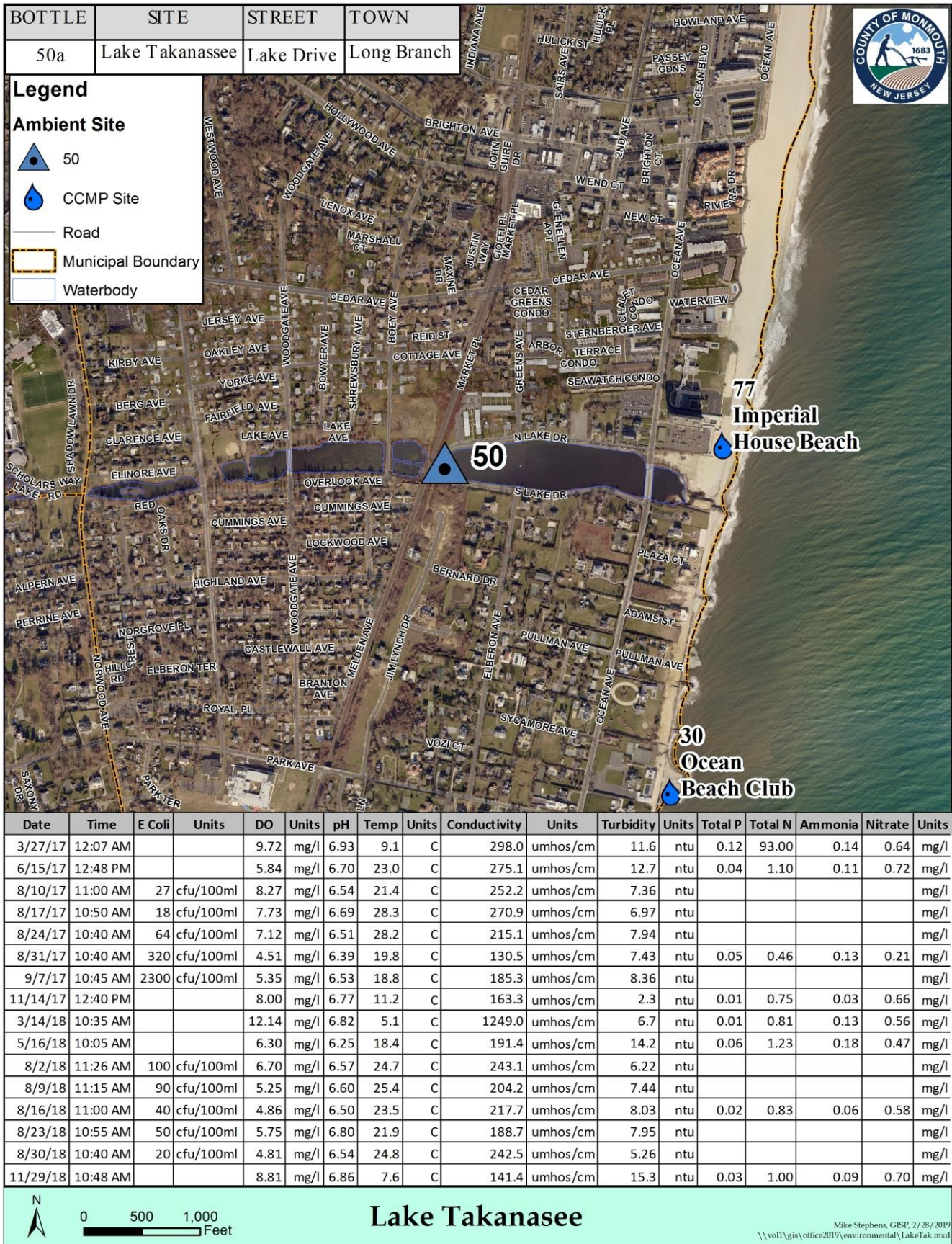


Table 10.

Averages of parameters
(Geo Metric Mean used for E-coli)

| Name/ Bottle Number | E-coli Geomean | Units | DO | Units | pH | temperatu | Units | Conductivity | Units | turbidity | Units | Total P | Total N | Ammonia | Nitrate | Units |
|--|----------------|-----------|------|-------|------|-----------|-------|--------------|----------|-----------|-------|---------|---------|---------|---------|-------|
| 101A Deal Lake Wannamassa Dr Ocean | 188 | cfu/100ml | 7.12 | mg/l | 7.23 | 20.55 | C | 1193.1 | umhos/cm | 15.58 | ntu | 0.10 | 1.26 | 0.12 | 0.21 | mg/l |
| 102A Deal Lake Sunset Ave Asbury Park | 393 | cfu/100ml | 8.77 | mg/l | 7.58 | 20.74 | C | 1153.5 | umhos/cm | 15.80 | ntu | 0.08 | 1.26 | 0.47 | 0.29 | mg/l |
| 103A Deal Lake Westra Interlaken | 144 | cfu/100ml | 6.89 | mg/l | 7.16 | 20.35 | C | 953.6 | umhos/cm | 15.53 | ntu | 0.18 | 1.26 | 0.06 | 0.23 | mg/l |
| 104A Deal Lake Corlies Rd Allenhurst | 77 | cfu/100ml | 7.59 | mg/l | 7.30 | 20.99 | C | 1945.0 | umhos/cm | 17.32 | ntu | 0.14 | 1.30 | 0.09 | 0.34 | mg/l |
| 105A Deal Lake Main St Loch Arbour | 187 | cfu/100ml | 8.72 | mg/l | 7.80 | 20.38 | C | 1792.0 | umhos/cm | 14.28 | ntu | 0.09 | 1.37 | 0.21 | 0.21 | mg/l |
| 1A Deal Lake Ocean Ave Asbury Park | 37 | cfu/100ml | 9.48 | mg/l | 8.35 | 20.03 | C | 2242.6 | umhos/cm | 13.90 | ntu | 0.10 | 1.26 | 0.14 | 0.21 | mg/l |
| 106A Wesley Lake Emory St Asbury Park | 295 | cfu/100ml | 5.99 | mg/l | 6.16 | 19.52 | C | 1162.0 | umhos/cm | 24.03 | ntu | 0.15 | 1.26 | 0.46 | 0.36 | mg/l |
| 107A Fletcher Lake Ocean Grove | 403 | cfu/100ml | 8.28 | mg/l | 7.25 | 19.93 | C | 677.3 | umhos/cm | 25.12 | ntu | 0.12 | 1.72 | 0.06 | 0.68 | mg/l |
| 108A Sylvan Lake Bradley Blvd Bradley | 322 | cfu/100ml | 6.77 | mg/l | 6.77 | 20.08 | C | 1037.8 | umhos/cm | 19.42 | ntu | 0.08 | 1.46 | 0.31 | 0.33 | mg/l |
| 50A Lake Takanassee Lake Drive Long Branch | 78 | cfu/100ml | 6.88 | mg/l | 6.63 | 19.65 | C | 278.7 | umhos/cm | 8.72 | ntu | 0.07 | 0.91 | 0.11 | 0.57 | mg/l |

Averages graphs

Table 11.

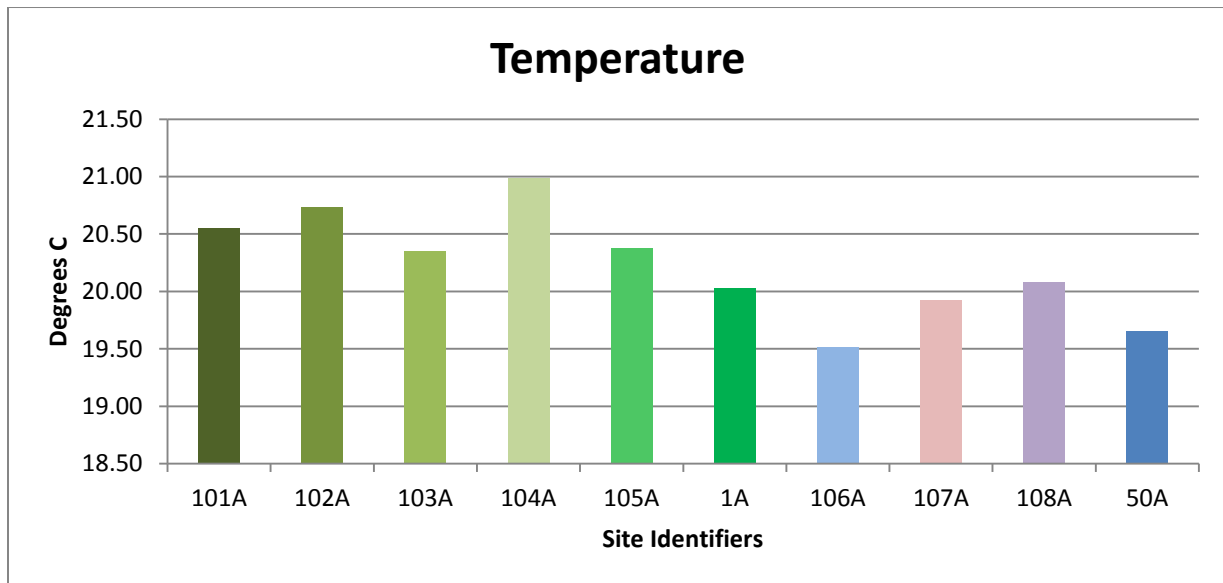
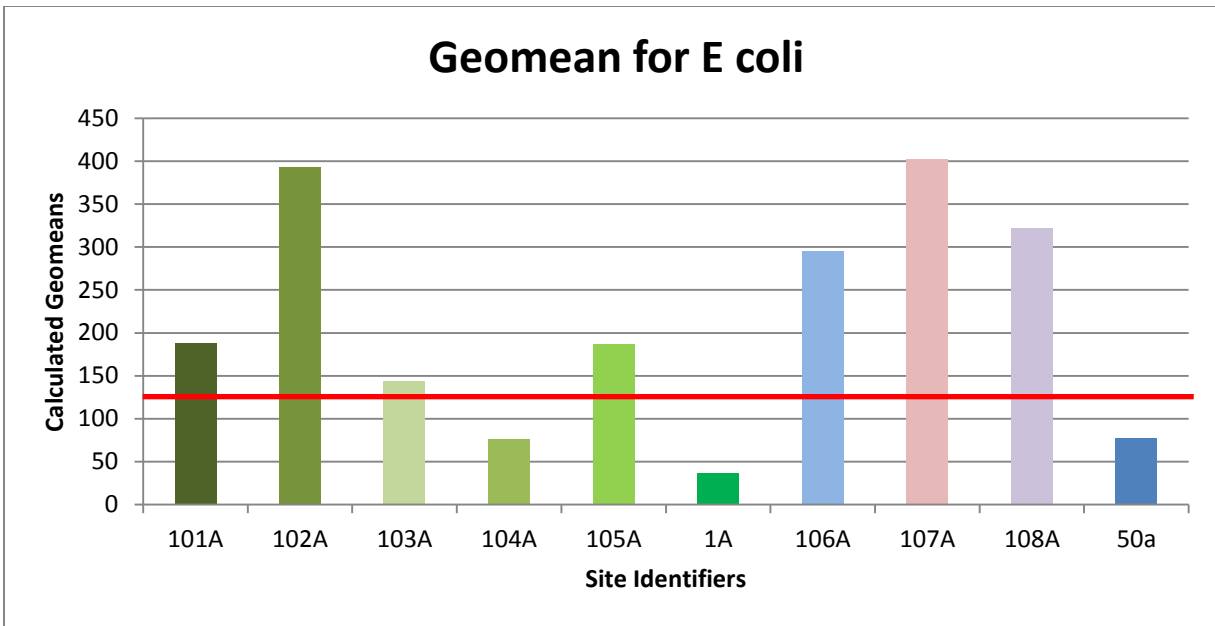
Each Parameter site average (color coded) graphed at all sites.

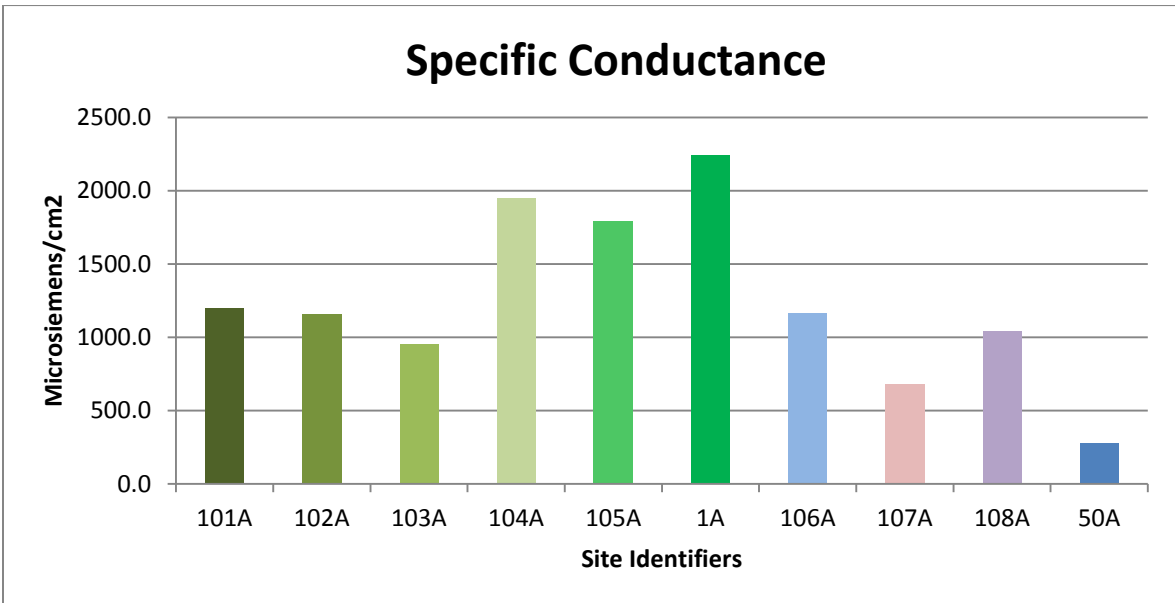
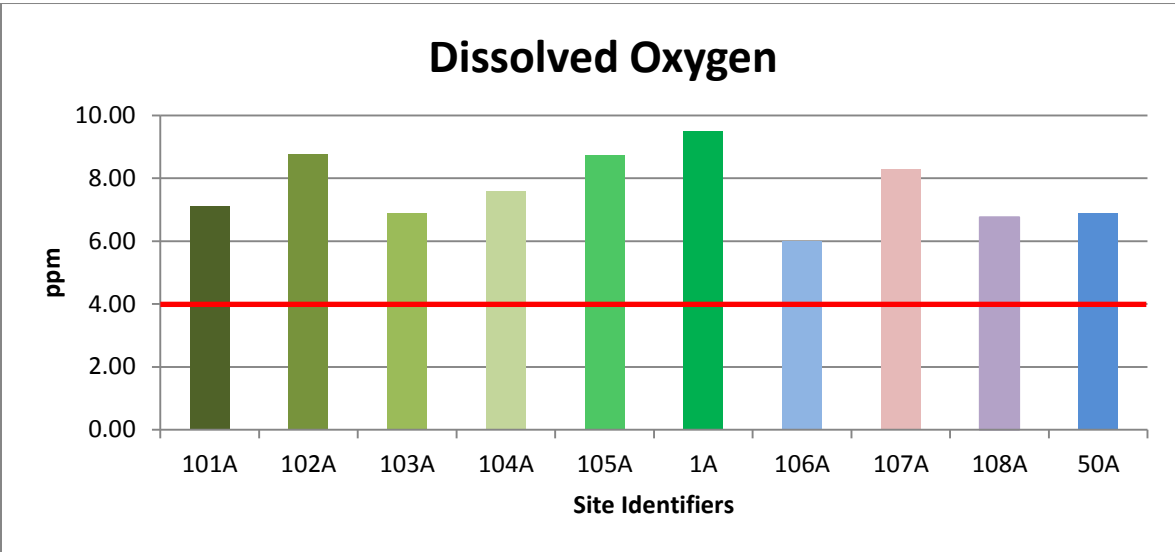
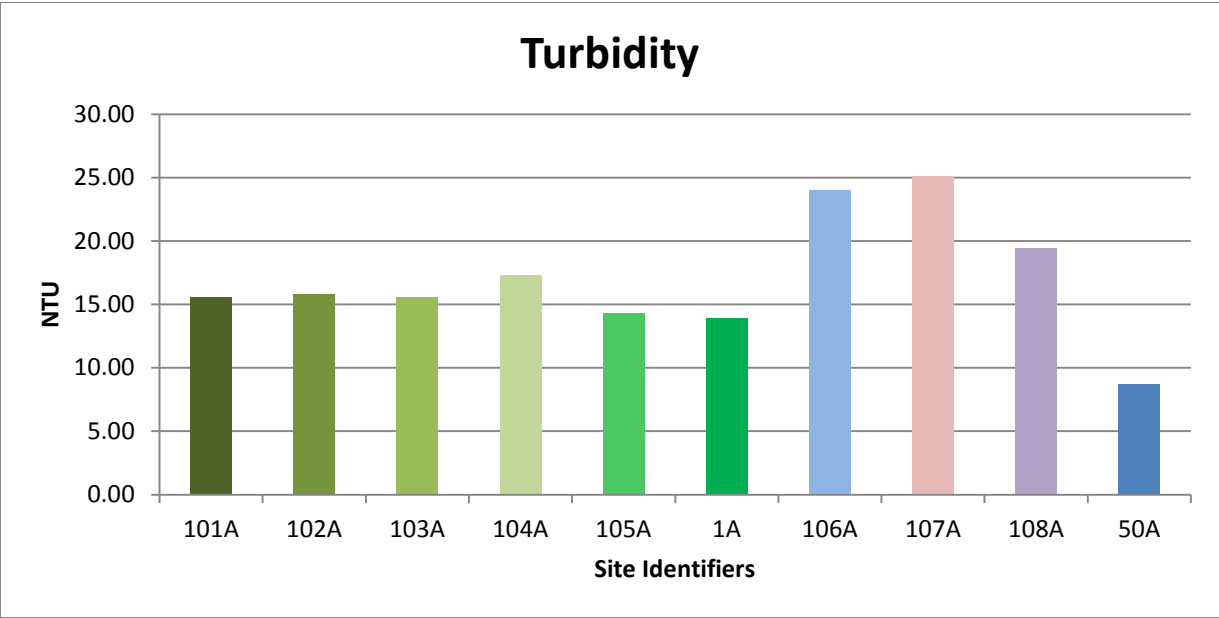
| BOTTLE | SITE | STREET | TOWN |
|--------|-----------------|------------------------------|---------------|
| 101a | Deal Lake | Wanamassa Rd. | Ocean |
| 102a | Deal Lake | Sunset Ave. | Asbury Park |
| 103a | Deal Lake | Westra St. | Interlaken |
| 104a | Deal Lake | Corlies Rd. | Allenhurst |
| 105a | Deal Lake | Main St. | Loch Arbor |
| 1a | Deal Lake | Ocean Ave | Asbury Park |
| 106a | Wesley Lake | Emory St. (Footbridge) | Asbury Park |
| 107a | Fletcher Lake | Pilgrim Pathway (footbridge) | Ocean Grove |
| 108a | Sylvan Lake | Bradley Blvd. | Bradley Beach |
| 50a | Lake Takanassee | Lake Drive | Long Branch |

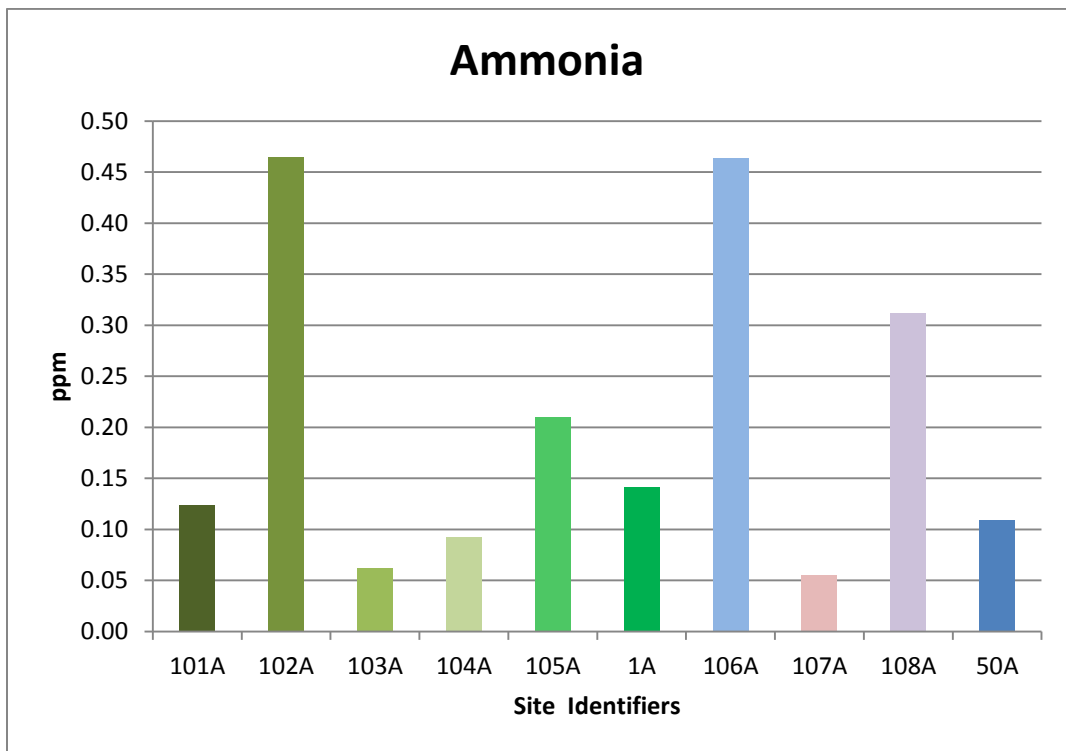
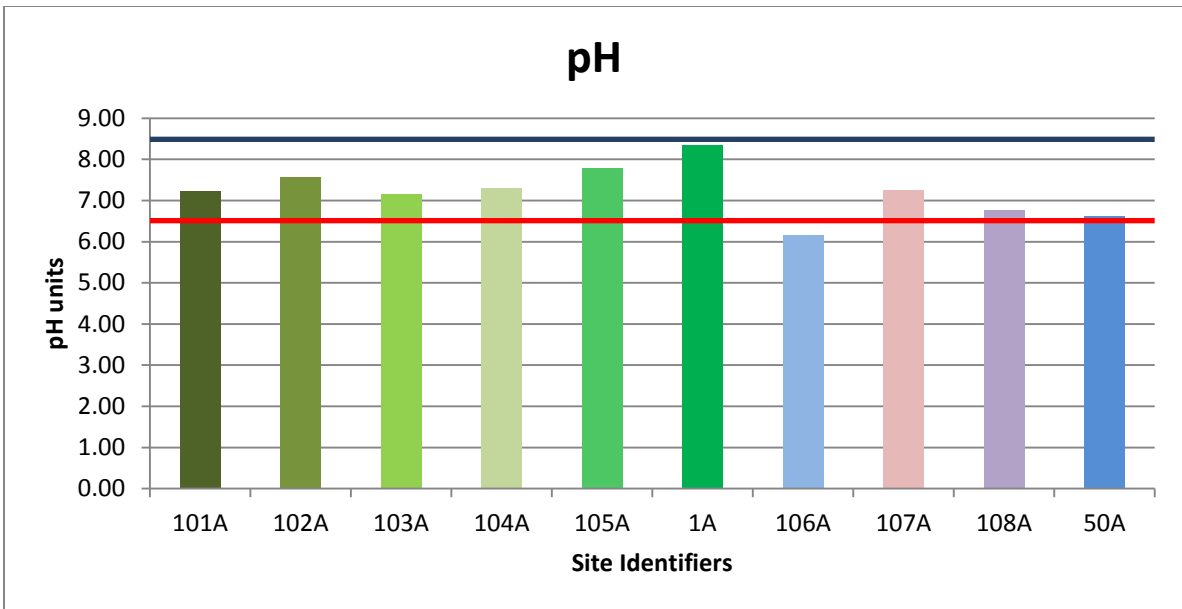
Table 12.

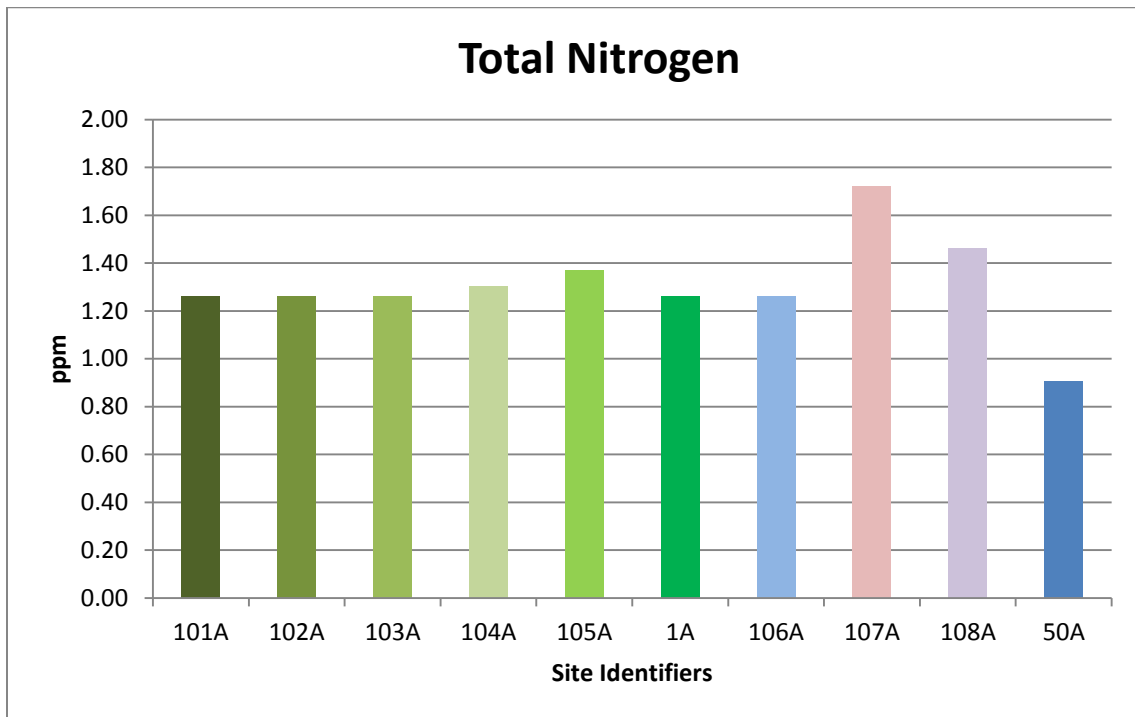
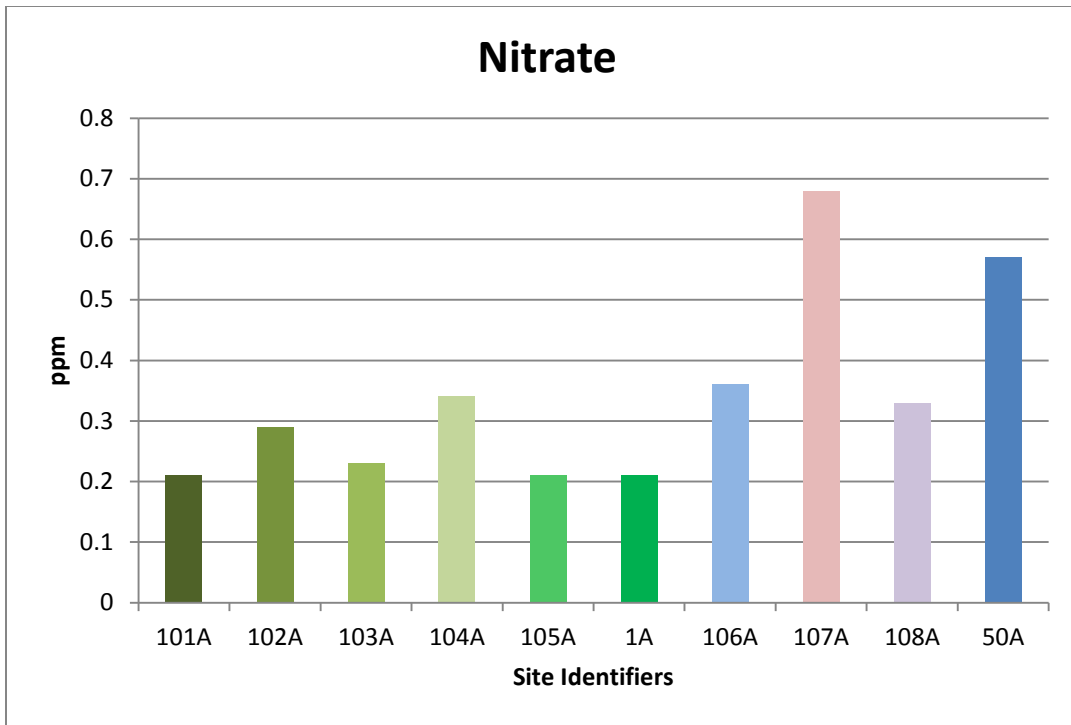
Surface Water Quality Standards for graph reference

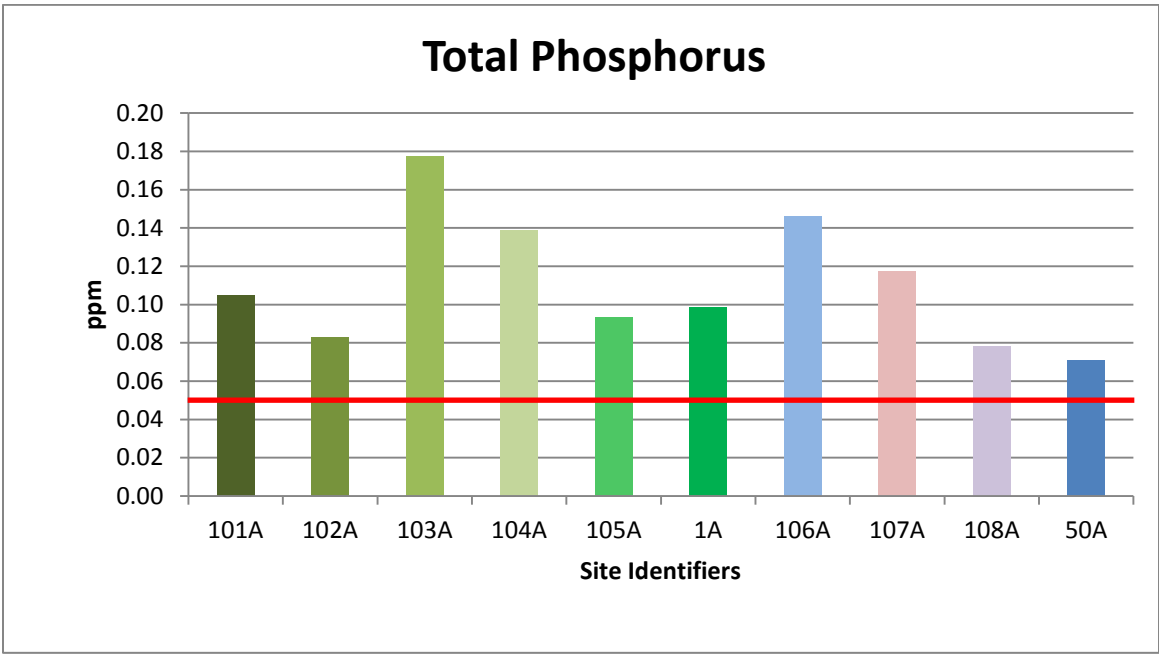
| Analyte/ Parameter | Surface Water Quality Standards (SWQS) |
|-----------------------------|--|
| E- Coli cfu/100ml | E. Coli levels shall not exceed a geometric mean of 126/100 ml or a single sample maximum of 235/100 ml. for FW2 |
| pH, (SU) | 6.5 - 8.5 for FW2 and all SE |
| Temperature degrees C | Daily max 31 ° C or 7-day max average 28 ° C for FW2-NT |
| Salinity uhmos/cm | NA |
| Total Ammonia (mg/l) | NA |
| Phosphorus-total (mg/L) | 0.05 mg/L |
| Specific Conductance | NA |
| Nitrate-Nitrogen as N(mg/L) | 10 mg/L |
| Dissolved Oxygen (mg/L) | not less than 4.0 mg/l at any time for FW2-NT |
| Turbidity (NTU) | Max 30 day avg 15 ntu, max 50 NTU at any time FW2, |











Result analysis;

Surface Water Quality Standards:

Bacteria- The surface water standards for E-coli bacteria are 1. A geometric mean of 126/cfu/100ml E-coli 2. A single sample maximum of 235/cfu/100ml E-coli.

Deal Lake Sites

101A -exceeded the geometric mean of 126/cfu/100ml E-coli. The single sample maximum of 235/cfu/100ml E-coli was exceeded 4 out 10 samples.

102A -exceeded the geometric mean of 126/cfu/100ml E-coli. The single sample maximum of 235/cfu/100ml E-coli was exceeded 8 out 10 samples.

103A- exceeded the geometric mean of 126/cfu/100ml E-coli. The single sample maximum of 235/cfu/100ml E-coli was exceeded 2 out 10 samples.

104A- did not exceed the geometric mean of 126/cfu/100ml E-coli. The single sample maximum of 235/cfu/100ml E-coli was exceeded 2 out 10 samples.

105A- exceeded the geometric mean of 126/cfu/100ml E-coli. The single sample maximum of 235/cfu/100ml E-coli was exceeded 4 out 10 samples.

Wesley Lake

106A- exceeded the geometric mean of 126/cfu/100ml E-coli. The single sample maximum of 235/cfu/100ml E-coli was exceeded 6 out 10 samples.

Fletcher Lake

107A- exceeded the geometric mean of 126/cfu/100ml E-coli. The single sample maximum of 235/cfu/100ml E-coli was exceeded 9 out 10 samples.

Sylvan Lake

108A- exceeded the geometric mean of 126/cfu/100ml E-coli. The single sample maximum of 235/cfu/100ml E-coli was exceeded 6 out 10 samples.

Lake Takanassee site

50A - did not exceed the geometric mean of 126/cfu/100ml E-coli. The single sample maximum of 235/cfu/100ml E-coli was exceeded 2 out 10 samples.

pH- at all sites was within the surface water standard of 6.5-8.5 pH units.

Phosphorous-The averages for Phosphorous exceeded the surface water standard of 0.05 mg/l at every site of this project. Seasonal fluctuations may need to be further investigated.

Nitrate- The surface water standard of 10mg/l for Nitrate-Nitrogen was not exceeded at any sites during this project.

Oxygen- The oxygen did not go below the surface water standard of 4.0 mg/l at any sites during this project.

Turbidity- The turbidity surface water standard of 50 ntu at any time was not exceeded at any sites during this project. However the turbidity surface water standard of 15ntu as an average was exceeded at Deal Lake sites 101A, 102A, 103A104A, Wesley Lake106A, Fletcher Lake 107A, and Sylvan Lake 108A.

Further analysis;

Ammonia levels at Deal Lake site 102A and Wesley Lake 106A are elevated, further investigation may be needed.

Specific conductivity was not easily analyzed because of the tidal influences at most sites. It was discovered that the tidal influence on Deal Lake was much further inland than anticipated. There are some seasonal fluctuations in conductivity that may be attributed to road deicing operations.