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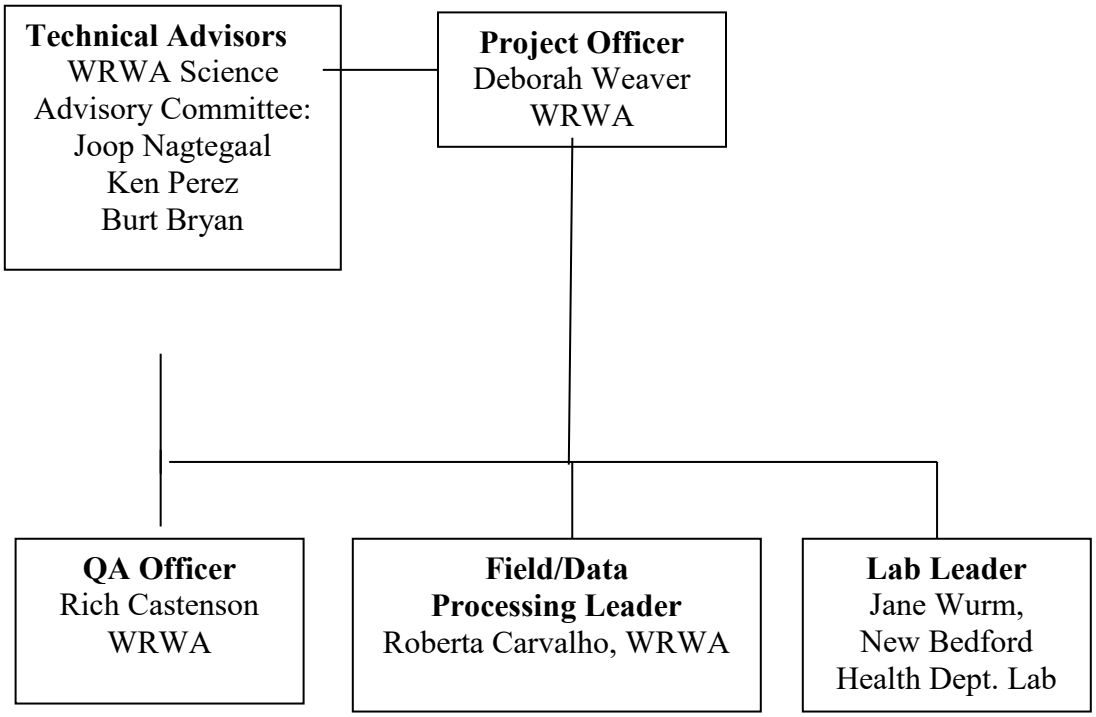


The monitoring program will be run solely by the Westport River Watershed Alliance (www.westportwatershed.org). The monitoring and data management will be the responsibility of the Field Leader and Data Processing Leader. In collaboration with the technical advisors, the QA officer will evaluate the reliability of the data during analysis for reporting. The QA officer will also evaluate the data periodically during the program to check for data quality assurance. The project officer as well as other office staff at WRWA will handle the administrative duties of the program. The role of the lab leader is to oversee or conduct all lab analyses and ensures that all QA procedures in the lab QAPP are followed by the City of New Bedford Health Department Laboratory.

The WRWA Science Committee has several goals: to review the water quality sampling undertaken by the Alliance and evaluate the value of that effort relative to the Alliance's goals of protecting and restoring the health of the Westport River; to commence a collaboration with Town boards and other interested groups about concerns with water quality within the Town; and to present recommendations to the Board on the future direction that WRWA's water monitoring program should take. The committee sought guidance from US EPA scientists who have worked and continue to work on water quality issues in the region.

Both the bacterial monitoring and the "Baywatchers" monitoring of nutrient levels have been effective in meeting the goals of monitoring the health of the river, of documenting both declines and recently, improvements in bacterial levels in parts of the system, and in providing a continuation of long-term, baseline data. Such long-term data sets have shown that improvements in water quality have occurred in the Westport River due to local management efforts. The bacterial data set also allows for evaluating the effectiveness of the constructed wetlands and raingardens built to treat storm water runoff from municipal buildings (elementary and middle school complex), from Old County Road into the Westport River at the Head of Westport as part of a 319 federal stormwater grant monitored by WRWA.

3. Problem I.D. and Background:

The Westport River faces two major problems associated with its water quality and status of habitat. Pathogen contamination and excessive nutrient loading are the two problems that will be addressed by the Westport River Watershed Alliance's monitoring programs. Pathogen contamination has led to closures of shellfish beds and increased health risks associated with river use for recreation. Excess nutrient and sediment loading has led to decreased water quality and increased eutrophication. The Westport River system is classified as 4A on the Massachusetts Integrated List of Waters. TMDLs are complete for pathogens and nutrients. This QAPP will focus on our bacteria-monitoring program because the nutrient monitoring on the River is explained in Buzzards Bay Coalition's QAPP, *The Buzzards Bay Coalition Citizens' Water Quality Monitoring Program, "Baywatchers"* approved by the United States Environmental Protection Agency (U.S.E.P.A.) and the Massachusetts Department of Environmental Protection (DEP). Pathogen and nutrient contamination is due to an array of similar sources primarily driven by stormwater including: agricultural runoff, poorly maintained and failing septic systems, pets, and waterfowl congregations.

The Westport River watershed consists mostly of upland forest area. However, growing development, poor agricultural practices, and seasonal aggregation of waterfowl have contributed to the degradation of the water quality. In addition, due to the lack of public sewering in most of Westport, many homes use onsite septic systems to dispose of wastes. These septic systems contribute to nutrient loading and, when not installed or maintained properly, to bacteria contamination of the River. Stormwater runoff is also a major contributor to the pathogen contamination of the River.

WRWA's bacteria-monitoring program started in 1991 and has continued through the present using the Fecal Coliform indicator organism. WRWA's program will continue to use the Fecal coliform indicator for pathogens in order to compare results to historical data. Also in 2009 the EPA TMDL 36170-36172 - Pathogen Total Maximum Daily Load for the Buzzards Bay Watershed (CN 251.1) was approved. The TMDL also uses fecal coliform as the pathogen indicator organism.

In 2001, WRWA's long term monitoring program began collecting samples using its *Westport River Watershed Alliance Quality Assurance Project Plan (QAPP) for Monitoring Salinity, Turbidity, Temperature, pH, and Fecal Coliform Parameters on the Westport River*, approved by the Commonwealth's Department of Environmental Protection (DEP). In the summer months the upper reaches of the both branches of the river are closed for swimming by the Westport Board of Health due to pathogen contamination.

In April 2004, both branches of the Westport River were listed on the proposed Massachusetts Integrated List of Waters as Category 5 "Waters requiring a Total Maximum Daily Load Study" for pathogen and nutrient pollution. In May 2009, the US EPA Region 1 approved pathogen Total Maximum Daily Loads (TMDLs) for 52 areas in the Buzzards Bay watershed including the Westport River and major tributaries. The Westport River is now listed as a Category 4a in the "Massachusetts Year 2018/20 Integrated List of Waters Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act". The DEP report lists the East and West Branches of the river as "impaired" in the Aquatic Life Use Assessment Summary. The East Branch of the river is also listed in the report as "impaired" in the Primary and Secondary Contact Recreational Use Summary. In this report one of the DEP recommendations for the Westport River is continued bacteria monitoring.

In January 2012, the Town of Westport received the results of the Massachusetts Estuaries Project (MEP) nutrient threshold analysis for the Westport River Estuary. The Westport River is polluted with nitrogen and drinking water wells in many areas of the town are unsafe due to high nitrogen levels as well as bacterial

contamination, the BOH said. Each new home built in town adds even more nitrogen to the town's overburdened resources.

In addition to the public health risk, excess nitrogen in the Westport River contributes to the growth of undesirable algae, reducing oxygen levels and water clarity and harming habitats like eelgrass and saltmarshes, and degrading the waters for shell fishing, recreation, and other public purposes.

In 2017, the US EPA established limits on how much nitrogen could be in the Westport Rivers and found that 71% of the nitrogen from existing on-site systems must be removed. The Town finalized the Targeted Integrated Water Resources Management Plan in an effort to address the nitrogen challenge.

WRWA continues to work with the Town committees and the consultants to insure scientifically valid approaches. WRWA will continue to follow the progress of this plan and take a position on individual elements as appropriate

4. Project/Task Description:

**Objective of Study**

The main goal of WRWA's monitoring program is to accurately identify regions of the Westport River and its tributaries that continue to suffer from high levels of contamination associated with fecal pathogens. Identifying these areas will help to establish the need for regulatory actions such as implementation of best management practices. WRWA wishes to establish a database of reliable and accurate data that can be used to address new and old problems and the actions taken to fix those problems. In addition, the need to continue baseline monitoring of the River and its tributaries is necessary, but at a lesser frequency than in the past. The data collected by WRWA's monitoring program will also be evaluated by comparisons to the DEP's Primary and Secondary Contact Recreational Use Standards and water chemistry parameters outlined by DEP's Aquatic Life Use assessment methodology.

Since 1991, WRWA's bacteria monitoring program has been effective in meeting its goals of monitoring the river, of documenting both declines and recently, improvements in bacterial levels in parts of the system, and in providing a continuation of long-term, baseline data. Such long-term data sets have shown that improvements in water quality have occurred in the River due to local management efforts. For instance, the bacterial monitoring both substantiated the negative effects of the intensive dairy feedlot operations and polluted runoff at the Pimental Farm and later detected improvements in river bacterial levels following the cessation of harmful cattle feedlot practices at the Pimental Farm. The bacterial data set also provides the basis for evaluating the effectiveness of the constructed wetlands and other municipal BMPs now being built to treat storm water runoff from Old County Road in the Head of Westport.

**Annual Project Timetable**

| MAJOR TASK CATEGORIES | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volunteer training | | | X | X | X | | | | | | | |
| New volunteer training/retraining | | | | | | X | | | | | | |
| Monthly testing | | | | X | X | | | | X | X | | |
| Weekly testing | | | | | | X | X | X | | | | |
| Data entry | X | X | | | | | | | | | X | X |
| Analysis report | | | | X | | | | | | | | |

**Data Usage**

The data collected from these programs will be utilized in a variety of ways. In partnership with the Westport Board of Health, WRWA will provide data necessary for notifying the public of health risks associated with swimming and boating in the River. This data will serve to educate the students in the Westport school system and the residents of Westport by being a part of our education program for the students and providing information to our residents in our electronic newsletter. Finally, our data will provide useful information to regulators (Commonwealth's DEP and Division of Marine Fisheries) and other advocacy groups when prioritizing areas of greatest need for remediation and when evaluating effectiveness of management practices. The data from all of the sampling events will be entered into a database using Microsoft Excel after analysis by and receipt from the lab. In addition, data will be provided to MADEP through its data portal.

5. Data Quality Objectives:

Table 1 shows objectives for precision and accuracy for each parameter tested. In each case the sampling matrix is water. Objectives for precision, accuracy, representativeness, comparability and completeness are also summarized below. These Data Quality Objectives (DQOs) have been established to ensure that WRWA meets its overall objectives as described in Section 4, above – establishing a basic water quality inventory and detecting significant changes and trends. Any changes in DQOs will be submitted to USEPA and DEP for approval before implementation.

**Completeness**

Completeness is the comparison between the amount of usable data collected versus the amount of data called for in the sampling plan. Completeness is measured as the percentage of total samples collected and analyzed as a whole and for individual parameters and sites as compared to the goals set out by the project design. Monitoring is currently being performed once monthly in April, May, September, and October. WRWA will attempt to collect samples for 18 unique monitoring events. Monitoring is performed weekly in June, July and August, totaling 17 samples (plus duplicate) per monitoring event. A complete data set has been initially set at 12 sampling events per year or 75% of the target number. At no time should two consecutive scheduled sampling events be missed for any one site. In this way the project can assure reasonable representativeness of conditions through seasonal and other variations over time. If less than 12 samples are taken from a site in a given year data from that site will be qualified when considering trend analysis in annual reports.

**Representativeness**

Representativeness is the extent to which measurements actually represent the true environmental condition. Representativeness of data collected by WRWA is considered in project design and sampling site selection. Representativeness will not be routinely monitored throughout the project, but is incorporated when necessary in interpreting the data. It is obvious that water flowing past a given location on land or in the water column, particularly in the Westport River, is constantly changing in response to dynamic inflow, tidal cycle, weather, etc. Collection of samples during ebb tide from any given tidally influenced location can help develop a better understanding of the variance associated with time series measurements of selected environmental variables. Information is collected by WRWA staff and volunteers and recorded on the field data sheets (sample of data sheet included in Appendix II. Such data collection can also provide increased resolution and sensitivity to localized and short-term effects of events within individual hydrologic units, along tributary margins and within the Westport River. Representativeness for any given location, area, and region within the Westport River will be more defined as historical water data is collected and compared at each site over time.

**Comparability**

Comparability is the degree to which data can be compared directly to similar studies. Using standardized sampling, analytical methods and units of reporting with comparable sensitivity helps ensure comparability. WRWA has selected testing methods that are EPA-approved and/or currently being employed by other water quality monitoring programs throughout the country. All volunteer monitors are trained to follow the same standard protocol for each parameter.

Precision, accuracy, reporting limits, and measurement range objectives are shown in the following table for the field and lab analyses.

**Table I: Data Quality Objectives:**

| Parameter | Precision (RPD) | ACCURACY | Minimum Reporting Limit | Measurement Range |
|---|---|---|---|---|
| Temperature (1) | 5% deviation or 2º F | 5% deviation or 2º F | N/A | -40-160º F |
| Salinity (1) | 8% deviation or 1 ppt | 1 ppt | 0 ppt | 0-35 ppt |
| Salinity (2) | 2% deviation | 95-105% | 0 ppt | 0-35 ppt |
| pH (2) | 2% deviation | 98-102% | N/A | 0.00-14.00 units |
| Turbidity (2) | 5% deviation | From 0-2.5 NTU the accuracy is ±0.05 NTU<br>From 2.5-100 NTU the accuracy is ±2%<br>From 100 NTU the accuracy is ±3% | 0 NTU | 0-4000 NTU |
| Fecal Coliform | 0.167 (3) | (5) | DF x 1 CFU per 100 ml (4) | 0-5 x $10^6$ CFU/ 100 mL |

1Field analysis with thermometer and refractometer
2Lab analysis with handheld meter
3 Laboratory precision criterion for New Bedford Health Department Laboratory for all membrane filtration bacterial analysis (based on range of logarithms of lab duplicate bacterial counts) The NBHD

does the reconciliation in-lab, and passes along to WRWA only those data that meet the precision criterion for overall precision and lab precision. Following the MassDEP overall precision for fecal coliform as RPD of the log10 of the results or an absolute difference to allow for low counts; these are the overall precision criteria: Within 50 CFUs, OR Relative Percent Difference for Log10 duplicate data: <20% (50-500 CFU), <10% (500-5000 CFU), < 5% (>5000 CFU)
4DF = dilution factor during membrane filtration; If DF = 1 then reporting limit is 0 colony forming units (CFU)/100 mL
5 New Bedford Health Department Laboratory uses positive and negative controls MFC Positive Control (*E. Coli*) and MFC Negative Control (*Enterobacter Aerogenes*) this information is noted on the data sheets (page 2) for each sampling event and analytical cycle.

Precision and accuracy data is provided in Appendix III for all analysis conducted at the Lab. Precision data for the field analyses are provided in Appendix II. The accuracy data for salinity, turbidity, and pH analyses at the Lab were attained through the analysis of standard reference materials (SRMs). Precision data for the parameters analyzed in the lab were attained through the analysis of lab duplicates at a frequency of 10% of the total amount of samples taken. The precision data for the field parameters, temperature and salinity, were attained by analyzing field duplicates. It is expected that the sites will be sampled on all of their planned sampling dates. However, if the tide is too low to reach the sites at the mouth to Snell Creek (18) or the Mouth to Kirby Brook (KB), those sites will not be sampled. Those sites that are tidally influenced are noted in Table II. In addition, samples will not be taken if weather conditions do not permit safe collection (lightning activity, extreme winds, flooding, high sea state, etc.).

6. Volunteer Training:

Because the volunteers will be accompanying the Field Leader during the sampling events, training will be conducted on site. At that time, the volunteer will receive instruction on the sampling methods and protocols. The volunteers will then be able to assist the Field Leader on subsequent sampling events after this hands-on training. Volunteer monitor training for WRWA involves extensive instructions on protocols for collecting samples and testing for each of the WRWA's parameters. This also includes an explanation of logistical, safety and other factors associated with volunteer involvement in the WRWA. Lectures, hand-outs, demonstrations and hands-on activities by participants are the primary tools used to train citizens in a laboratory setting. The Project QA Officer or Field/Data Leader (Trainers) will evaluates volunteer performance and offer additional instruction as necessary to ensure that each volunteer is capable of performing all testing protocols. Open discussions are encouraged during all training sessions.

Volunteer performance is evaluated during training and QC sessions. This phase entails hands-on training to ensure that each volunteer monitor is capable of conducting the relevant sampling and testing protocols whether working alone or in a monitoring group in a typical field environment. Volunteers practice sampling, testing, and safety procedures in a field setting. Trainers emphasize the importance of safety, standardization of testing procedures, and chain-of-custody protocols throughout this participatory session. Trainers make note of each volunteers testing methods and comment on overall understanding of monitoring procedures and the watershed concept. Each volunteer's training history is recorded on WRWA's Monitor Training Record forms (Appendix II) and kept on file at the WRWA office.

7. Documentation and Records:

The Field leader and volunteers begin each sample event with a blank field/lab data sheet and equipment checklist/field maintenance log sheet. Both are located in Appendix II of this document. All field data and lab data are collected on the same sampling event data sheet. The field data is recorded immediately in the field

at each site during a sampling event. The monitor's (s') name(s) are recorded on the sampling data sheet as well. When all the samples are collected, the monitor, usually the Field Leader, brings the samples along with the data sheet to the lab, where it is signed, dated and a copy is made of the sheet. The copy is taken back to the office where it remains until the completed data sheet arrives via fax or mail from the lab. Completed copies of the field data and lab data from the analysis of the samples are archived indefinitely at both the lab and the office. The sampling data sheet is also used as the chain of custody form and is signed and dated at each custody exchange. Upon receipt of the final data sheet at the office, the Data Processing Leader enters the data into a database using Microsoft Excel software. The chains of custody are archived in hardcopy at the WRWA office. WRWA QA Officer also scans each data sheet and archives the documents on WRWA computers, with one copy in house and one updated copy offsite.

An example of sample bottle labels is included in Appendix II. At each station 2 sterile bottles are collected. The data for station ID, date, time and person collecting the sample are all written on the label. One bottle is labeled for bacteria analysis by circling bacteria on the label. The other bottle is used for chemical parameter analysis (salinity, turbidity, temperature, and pH), and the word chemical is circled on the bottle label.

8. Sampling Design Process:

**Parameters to be Monitored**

The Westport River and its tributaries will be monitored for temperature, salinity, pH, turbidity, and fecal coliform bacteria indicators. WRWA's water quality monitoring program dates back to 1991 and uses fecal coliform as a pathogen indicator as does the 2009 EPA TMDL 36170-36172 - Pathogen Total Maximum Daily Load for the Buzzards Bay Watershed (CN 251.1) . For the period of the QAPP certification, WRWA plans to continue to use the fecal coliform indicator for trend analysis and other project purposes. WRWA has a Davis Weather Station to measure: wind speed, wind direction, temperature, barometric pressure, rainfall, and relative humidity. The system is located at the WRWA office at 493 Old County Road in Westport. Rainfall records will be used from the data collected at the WRWA office due to the fact that atmospheric and precipitation data are collected in 5 minute intervals. This integral period of data collection will be summed and compared to data collected by at the Westport Fire Department.

Air temperature is recorded on the data sheet at the beginning of each sampling event at the first station using the thermometer described in this plan. Atmospheric conditions recorded at the start of each sampling event include sky/weather conditions and estimated wind direction, both using a numbered index developed for our database and wind speed, using the Beaufort Wind Force Codes. The indices and Beaufort Scale are included Appendix II. Tide times and heights are recorded for each sampling event using tide charts for conditions at Charlton Wharf at the entrance to Westport Harbor. In addition, it will be denoted on the sampling data sheet whether the samples were collected during the ebb or flood of the tidal cycle.

**Sample Station Rationale**

The selection of sites for monitoring is based on knowledge of past fecal coliform contamination in potential "hot spots," hydrology of the river system and its tributaries, and relative contamination of the East Branch as compared to the West Branch. Past data shows that the East Branch experiences more problems with contamination than the West Branch. Therefore, our efforts to monitor are concentrated there. Daily tidal flushing of the river is more effective in the West and Lower East Branches (below Hixbridge). As illustrated in the maps of our sampling sites, sampling efforts are more concentrated above Hixbridge in the East Branch than below it or in the West Branch. This is so that the fluctuations in contamination due to decreased flushing will be closely monitored. With this in mind, the Lower East and West Branches must still be

monitored, but not as intensely as the Upper East Branch. In addition, the three main tributaries of the Upper East Branch, Bread and Cheese Brook, Kirby Brook, and Snell Creek, will be monitored. In the case of Snell Creek, two sites have been chosen because there was a farm with a NPDES Permit that was known to discharge into the creek. The NPDES permit for the farm has been withdrawn, as the property has been sold, and is now no longer used as a Concentrated Animal Feeding Operation (CAFO). Monitoring in this area has shown improvements in bacteria levels since the closure of the CAFO in 2002.

During the months of May and September and October, the River will be monitored monthly. During the months of June, July, and August, the River will be monitored weekly. The weekly samples will be conducted on Wednesdays between the times of 0600 and 1300. A starting time will be chosen so that sampling occurs during either the ebb or flood stage of the tide. If a holiday falls on a Wednesday, samples will be taken on the Thursday of that week and brought into the lab that day. During the monthly sampling, dates will be chosen so that there is an equal amount of days between samples. Samples that are not delivered to the laboratory with 6 hours of the first sample taken will be analyzed in these instances, flagged on the data sheet and then evaluated during programmatic data validation. Upon arrival at the lab, samples must be analyzed within 2 hours. The pH analysis must be done immediately upon the sample arriving at the lab.

**Sample Station Access**

Each sampling site has a unique I.D. number corresponding to its location. The site I.D.'s and locations are as In Table II. The Westport River Watershed Alliance Sample Stations latitude/longitude and NAD 83 MA State Plane Coordinates are shown in Appendix I

**Table II: Site Location and Identification**

| Site I.D. | Town | Tidal | Location |
|---|---|---|---|
| A-1 | Westport | No | Westport River at Rt. 177 |
| 2 | Westport | No | Bread and Cheese Brook at Rt. 177 |
| 3 | Westport | Yes | Head of the Westport River Bridge North on Old County Rd. |
| HS | Westport | Yes | Head of the Westport River Bridge South on Old County Rd. |
| 6 | Westport | Yes | West Branch of River Off of 448 River Road Dock |
| 7 | Westport | Yes | Harbor Entrance at Charlton Wharf |
| 11A | Westport | Yes | River Off of Westport Point |
| 14 | Westport | Yes | East Branch of River Off of Cummings Lane |
| 15 | Westport | Yes | East Branch of River Off of Cadman's Neck |
| 17 | Westport | Yes | East Branch of River at Doctor's Point |
| HIX | Westport | Yes | East Branch of River South of Hixbridge |
| 18 | Westport | Yes | East Branch of River at the Mouth of Snell Creek |
| 19 | Westport | Yes | East Branch of River Off of North Wall of Farm |
| KB | Westport | Yes | East Branch of River at the Mouth of Kirby Brook |
| K-4 | Westport | No | Kirby Brook at Drift Road (west side) |
| S-1 | Westport | No | Snell Creek at Drift Road (east side) |
| S-7 | Westport | No | Snell Creek at Marcus' Bridge (south side) |
| ANG | Westport | No | Angeline Brook at Cornell Road |
| A81 | Tiverton | No | Stream into Adamsville Pond and West Branch |
| ADM | Adamsville | No | Adamsville Pond outlet (Grays Mill Pond) |

The previous sites are also located on the maps in Appendix I along with their MA State Plane and GPS coordinates. All of the sites are accessible by car except for 17, 18, 19, and KB. Sites accessible by boat exclude the tributary sites of K4, S1, S7, and 2 and the River sites 3, HS, HIX and A-1. WRWA's boat will be in the water from April through October. All other sampling dates will only include sites accessible by car. The Project QA Officer will obtain the permission from property owners for access to sampling sites on private property. When river sites are reached by car, the sample will be taken as far out in to the river from the dock as possible with the sampling container placed in a sampling pole. Sampling methods are further discussed in the WRWA SOP in Appendix II. When reached by boat, the sites will be sampled in the main channel in line with the referenced point onshore. To compensate for currents and tides, a drifting buffer zone of approximately 30 feet is acceptable for samples taken in the main river from the boat.

9. Sampling Methods Requirements:

**Table III: Summary of Sampling Methods**

| Matrix | Parameter | Equipment/ Container | Sample Preservation | Holding Time prior to analysis |
|---|---|---|---|---|
| Water | Temperature | REOTEMP Bimetal Scientific Thermometer | None | Done immediately |
| Water | Salinity† | ATAGO Master alpha refractometer | None | Done immediately |
| Water | Salinity‡ | Plastic wide-mouth bottle | Stored on ice | 6 hours maximum |
| Water | Turbidity | Plastic wide-mouth bottle | Stored on ice | 48 hours maximum |
| Water | pH | Plastic wide-mouth bottle | Stored on ice | 6 hours maximum |
| Water | Fecal Coliform | Plastic wide-mouth bottle* | Stored on ice | 6 hours maximum |

†Salinity measured in the field
‡Salinity measured in the lab
*Sterile bottles provided by the City of New Bedford Health Department Laboratory

Procedures for sampling temperature and salinity in the field and collecting samples for pH, turbidity, salinity and microbiological analyses in the lab are included in the WRWA monitoring program's Sampling Protocols located in Appendix II. The lab measures salinity as a standard procedure for all samples that are analyzed there. This provides the project with an additional QA/QC check by comparing field and lab results for the salinity parameter. Laboratory salinities are used for all analytical reports and analysis for the project due to the greater precision for lab analysis. The lab analysis procedures as well as protocol for collecting samples for microbiological analysis are included in the lab Quality Assurance Manual and SOPs in Appendix III.

10. Sample Handling and Custody:

All samples collected during each event are labeled with the date, site I.D., and organization name (a sample bottle label is shown in Appendix II). Time of collection is noted on the sampling event data sheet, which serves as the chain of custody form (included in program's Sampling Protocols in Appendix II). The field

leader verifies proper sampling procedures and completes the field data sheet/chain of custody after collection of samples. The samples remain with the Field Leader until the collection is complete. The samples are then brought (on ice in an insulated cooler) to the lab for analysis where the laboratory leader records the date and time of receipt on the sheet before signing it. A copy is made so that one copy remains with the samples at the lab and the other is taken back to WRWA's office to remain on file. When the samples have been analyzed, the remainder of the information on the data sheet is filled out and the results are mailed and faxed to WRWA's office where the data will be processed. A copy of the finalized data sheet is also kept on file at the lab.

11. Analytical Methods:

**Table IV: Summary of Analytical Methods**

| Parameter | Lab/Field | Method/Equipment | Reference |
|---|---|---|---|
| Temperature | Field | REOTEMP bimetal scientific thermometer | WRWA SOP May 2021 |
| Salinity | Field | ATAGO Master Alpha Refractometer | WRWA SOP May 2021 |
| Salinity | Lab | YSI Model 30 Handheld Salinity, Conductivity, & Temperature Meter | NBHDL SOP #3.48(21) |
| pH | Lab | Orion SA 720 pH/ISE Direct Readout Meter | NBHDL SOP #3.15(21) |
| Turbidity | Lab | LaMotte 2020 Turbidimeter | NBHDL SOP #3.45(21) |
| Fecal Coliform | Lab | Section 9222D Subsection 1a-3b* | NBHDL SOP #4.27(21) |

*Standard Methods for the Examination of Water and Wastewater, 23rd Ed. 2017

The Westport River Watershed Alliance's Standard Operating Procedures are located in Appendix II. The New Bedford Health Department Laboratory's SOPs are located in Appendix III.

12. Quality Control:

Two bottles are used at each site to collect samples for lab analysis. One bottle will be used for bacteriological analyses and the other will be used for the remaining lab analyses. Field duplicates are collected randomly at a rate of 10% the total number of samples per event. Field duplicates are typically taken simultaneously and are co-located at the sample site location. These duplicates will be analyzed in the field for salinity and temperature and in the lab for pH, turbidity, salinity, and fecal coliform bacterial parameters. Lab duplicates are randomly chosen for 10% of each analytical batch and analyzed for the lab parameters (pH, turbidity, salinity, and bacterial parameters). The lab also uses two control series that are run before and after the analysis of the entire batch of samples. The lab Quality Assurance Manual and SOPs contain procedures for dealing with analytical and sampling problems and will notify WRWA if problems are suspected in the sampling procedures. The N New Bedford Health Department Laboratory's Quality Assurance Manual is attached in Appendix III.

Thermometer accuracy will be checked annually against a NIST certified precision thermometer (in the laboratory of Dr. Brian Howes, SMAST, UMASS Dartmouth). Field temperature and salinity QC checks are

performed weekly (June – August) by collecting field duplicates and assessing acceptable absolute differences (for temperature 2.0 degrees F; for salinity 1 PPT).

13. Instrument Inspection and Maintenance:

Equipment used in the field is maintained and tested by WRWA. The lab staff maintains the equipment and instruments that are used in the lab. These maintenance and testing procedures for the lab are available in their SOPs and Quality Assurance Manual in Appendix III. The New Bedford Health Department Laboratory (Lab #M-MA031) will provide the bottles to WRWA for the collection of bacteria, salinity, turbidity, and pH parameters. The refractometer used in the field is inspected for scratches on the prism and obvious signs of damage. The pocket thermometers are checked before every sampling event for bends in the probe, fracture of the casing, and other obvious signs of damage. A replacement thermometer is available at the office if needed. The Maintenance Record Log accompanies the field data sheet/chain of custody with the field/data leader during sampling events. If maintenance occurs on equipment, the field/data leader amends the Maintenance Record Log and the original document is stored at the WRWA office with the QA officer. WRWA staff monitor and maintain the weather station. Davis Instruments (manufacturer) has instructions on how to maintain accuracy with system checks and by thoroughly cleaning the rain collector several times a year.

**Maintenance Record Log:**

| **Supplies** | **Inspection Frequency** | **Type of Inspection** | **Available Parts** | **Maintenance** | **Maintenance Record/Date** |
|---|---|---|---|---|---|
| Field and Lab sample sheets | Before each sampling date | Visual | Additional copies | | |
| Thermometer | Before each sampling date | Integrity of column | Spare thermometer | Calibrate and replace as needed | |
| Refractometer | Before each sampling date | Visual , Integrity of lens, zero calibration check | Spare refractometer | Calibrate and replace as needed | |
| Life Preservers | Before each sampling date | Visual inspection for damage | Extra life preservers | As needed | |
| Sample Bottles | Before each sampling date | Integrity, verified sterility of bacterial sample bottles, | One set of spare bottles | | |
| Cooler | Before each sampling date | Cleanness, Ice | | Annually or as needed | |

14. Instrument Calibration and Checks:
Procedures and frequencies for the calibration of the lab instruments are discussed in the lab SOPs and Quality Assurance Manual in Appendix III. The field thermometers will be checked before every sampling

event at 0º C with an ice bath. The refractometer will be calibrated to 0 parts per thousand with distilled water before every sampling event. Both instruments are checked for calibration at the end of each sampling event, samples will be flagged if instruments are not calibrated. (see SOPs Appendix II) Field instruments are calibrated in accordance with manufacturer's instructions.

15. Inspection of Instruments and Supplies:

Sampling bottles are supplied from a state certified lab (#M-MA031), which ensures the quality and condition of the sampling bottles used in its microbiological analysis program. Refractometers and thermometers are reordered, if needed, through Forestry Suppliers, Inc. and inspected and tested upon arrival. If any defects are present, the materials are returned for repair or replacement. Equipment and reagents used in the lab are inspected when replaced or repaired in accordance with the lab SOPs and Quality Assurance Manual (Appendix III).

16. Data Acquisition Requirements:

Site locations and accesses are obtained by using U.S.G.S. 7.5-minute topographic maps and GPS coordintate assignment. In addition, during the analysis of the data, topographic maps and various data layers from the Mass GIS database are used to identify land uses, water resources, shellfish growing areas, land contours, and other information. Tide times and heights are obtained from nautical tide charts: (http://www.saltwatertides.com/dynamic.dir/massachusettssites.html#date). Precipitation data is obtained from a Davis weather station to measure: wind speed, wind direction, temperature, barometric pressure, rainfall, and relative humidity. The system is located at the WRWA office in Westport. Data is recorded daily for these parameters. Atmospheric and precipitation data has been collected for the monitoring program from the WRWA office since October 2019, when the system was fully installed.

17. Data Management:

The sampling event data sheet is signed by the Field leader after completion of the sampling event. The sheet travels with the samples to the lab, is signed by the lab leader when received, completed after analysis, and returned to the office via fax or mail. Copies of the sheet are made at each stage of custody. The completed sheet is kept on file at both the lab and the office. COC's/Data sheets are kept for 1 year by the laboratory and permanently archived by WRWA in digital and hardcopy. When received at the office, the results are reviewed as QC check and then entered into a Microsoft Access database using an entry form developed for the monitoring program by the WRWA QA Officer. Primary keys of "date" and "site" are used to ensure that accidental duplicate records are not entered into the database. Data entry QC to check for transcription errors is performed by the project QA officer.

18. Assessments and Response:

The Field leader will perform an evaluation of the sampling efforts at the end of each sampling effort. Replacement of the refractometers may be necessary if problems with calibration are occurring often. If the thermometers are constantly breaking or giving false readings a new brand will be purchased or the problems will be discussed with the manufacturer of the current models. Most of the sampling by the volunteers will not be conducted without direct supervision from the Field leader. Therefore retraining and evaluations of volunteers will not be needed. Evaluations of lab procedures are also part of standard operation procedures (SOPs).

19. Reporting:

WRWA maps and posts results weekly on our website. Annual reporting of the data will include a detailed evaluation of the bacterial concentrations in the river in relation to the previous years of data. The evaluation will discuss new problems identified during the year, areas in which conditions are improving, and remedial actions that should take or haven taken place. This report will be distributed in WRWA's newsletter *River News*. (www.westportwatershed.org). Smaller progress reports will also be parts of *River News* throughout the year, including a report at the end of the summer to discuss the weekly sampling event data. These reports will not be technical in nature due to the audience in the distributions. Technical reports will include an analysis of the data with graphs, charts, and tables showing contamination relationships with environmental factors and land uses. Relationships between rainfall, salinity, specific land uses and seasonal changes will be analyzed to determine if bacteria contamination in the River is affected by these factors. And if so, which one of these factors is dominant in affecting contamination. Similar land uses in different areas on the River will also be examined to determine if they have similar effects on contamination. Areas of common salinity ranges will be examined to determine the effects of flushing by Buzzards Bay or flooding by rainwater. Also, results from samples collected on the ebb and flood tidal stages will be compared to each other to analyze the influence of tides on contamination. This report also will include field and laboratory QC results and discussions. This report will be distributed to local town officials and agencies, WRWA Science Committee members, WRWA board members, and other selected officials in local and state government and organizations. Reports will also be generated as needed to report to granters on the status of the project.

20. Data Review and Validation:

All draft data are reviewed by the data processing leader and members of the Science committee. The data processing leader reviews data after each sampling event when being entered into the database. Questionable data is presented to technical advisors for further review. Decisions to discard the data are made at that time. In addition, when preparing reports, technical advisors and the data processing leader will also review the data further during its analysis and make decisions to reject any data. Data will be rejected if it is nonsensical, based on the past data from that site. This data will be deleted from the database table and placed in an alternate table for "deleted data" and saved. Comments referring to why and when each record was rejected will accompany the data in the "deleted data" table. Each datum should be reviewed and validated in context with related metadata and available QC information.

21. Validation Methods:

Chemical and biological analyses of samples can vary in results significantly due to a variety of circumstances. Therefore, results which appear to be outliers or nonsensical are very difficult to dismiss as errors. Data quality controls, such as using field duplicates, are used to assure data validity. If parameters collected in the field seem to be unexpected or not normal, the field leader will take a duplicate reading for that parameter. This duplicate reading will be taken directly after the questionable reading was taken, to assure the same environmental conditions during the collection. This procedure only refers to data that is acquired in the field (temperature and salinity). If the parameter is temperature, a second thermometer will be available to make the measurement and compare the results. If the parameter is salinity, both the Field leader and the volunteer present will take separate measurements with the refractometer. If these readings are the same, then they will be compared to the salinity values received from the lab analysis. If the readings are significantly different, then the volunteer will be retrained in using the refractometer and both results will be noted to compare with the lab results. Instruments will be re-calibrated if necessary. The validation of turbidity and pH occurs in the lab and is a function of the calibration of the analytical equipment. Errors and nonsensical data are dealt with at the lab and the procedures are available in the lab SOPs in Appendix III.

Data in the database will be recalled periodically in the entry form developed for the program. This allows each individual record to be compared to the data sheet records. Data entry errors will be corrected as needed by the data processing leader. It is also at this time that data outliers will be noted so that the data processing leader and the technical advisors may review them. Major problems with Field methods, lab methods, and data processing will be discussed in the annual reports.

22. Reconciliation with Data Quality Objectives:

When dealing with the duplicates for the microbiological samples, the acceptance criterion for fecal coliform is 0.167. This criterion refers to the maximum allowed difference between the logarithmic values of the lab-duplicated bacterial counts. Any deviations outside the limits of both precision and accuracy listed in Table I for the remaining lab analyses are dealt with according to the lab's SOPs. If errors are suspected to have occurred during the analysis of a batch of samples, those results will be discarded and the problems with procedure, equipment, or reagents/media will be addressed.

The precision data for the field parameters, temperature and salinity, are attained by analyzing field duplicates. Precision data for lab parameters can also be attained using field duplicates (overall deviation due to field and lab variability). Data quality acceptance criteria for thermometer readings are a 5% deviation, and for refractometer measurements it is 8%. Volunteer monitor accuracy for each parameter is determined by standard comparative analysis with results obtained by a Field Data Leader or the Project QA Officer. Variation of duplicate values for each parameter must not exceed the range of precision and accuracy specified in Table I. Data that do not meet project accuracy and precision objectives are not entered in the WRWA data system and will not be used in annual water quality analysis reports.

# Appendix I
# Westport River Watershed Alliance Sample Stations
# Coordinates and Maps

**Sampling Site Coordinates: GPS and NAD 83 MA State Plane Meters**

| Location | Site_ID | x coordinates | y coordinates | Latitude | Longitude |
|---|---|---|---|---|---|
| Bread and Cheese Brook @ Rt. 177 | 2 | 236410.400000 | 820523.910000 | -71.06302839830 | 41.63411179670 |
| Westport River @ Rt. 177 | A-1 | 237530.080000 | 820764.950000 | -71.04957576930 | 41.63622953640 |
| Head of Westport River @ Old County Road N | 3 | 236667.000000 | 819093.200000 | -71.06003748800 | 41.62121866080 |
| Head of Westport River @ Old County Road S | HS | 236696.000000 | 819018.000000 | -71.05969418470 | 41.62054025760 |
| Westport River at the Mouth of Kirby Brook | KB | 236130.480000 | 816270.680000 | -71.06664707190 | 41.59583110090 |
| Westport River Off of Farm North Wall | 19 | 235835.010000 | 815112.120000 | -71.07026092100 | 41.58541357400 |
| Westport River at the Mouth of Snell Creek | 18 | 235555.090000 | 814606.710000 | -71.07364800490 | 41.58087580950 |
| Westport River at Doctor's Point. | 17 | 235687.280000 | 813852.490000 | -71.07210827040 | 41.57407930000 |
| Westport River at Hixbridge | HIX | 235767.970000 | 813412.330000 | -71.07116734370 | 41.57011271250 |
| Westport River Off of Cadman's Neck | 15 | 236200.460000 | 811939.700000 | -71.06607200340 | 41.55683433820 |
| Westport River Off of Cummings Lane | 14 | 236970.240000 | 811900.820000 | -71.05684738330 | 41.55644865260 |
| Westport Harbor Off of Westport Point Town Wharf | 11A | 235819.460000 | 807359.900000 | -71.07091506020 | 41.51561793360 |
| Westport River Off of 448 River Rd. | 6 | 233354.610000 | 808813.930000 | -71.10035969160 | 41.52881695980 |
| Westport Harbor Entrance at Charlton Wharf | 7 | 234015.530000 | 806496.820000 | -71.09257356770 | 41.50792692310 |
| Snell Creek @ Drift Road. | S-1 | 235119.660000 | 815438.700000 | -71.07882003140 | 41.58838603350 |
| Snell Creek @ Marcus Bridge | S-7 | 235352.930000 | 815244.310000 | -71.07603412490 | 41.58662545550 |
| Kirby Brook @ Drift Road. | K-4 | 235547.320000 | 816814.970000 | -71.07360880490 | 41.60075802680 |
| Angeline Brook@ Cornell Rd | ANG | 232945.010000 | 811224.260000 | -71.105165 | 41.5511401 |
| Adamsville Pond outflow | ADM | 231170.800000 | 811790.560000 | -71.1274897 | 41.5551276 |
| Trib to Adamsville Pond | A81 | 230911.120000 | 812072.990000 | -71.129359 | 41.558967 |

INSERT MAPS

INSERT MAPS

Appendix II

# Westport River Watershed Alliance Standard Operating Procedures for Monitoring of the Westport River and its Tributaries, Volunteer Training and Evaluation Forms and Salinity and Temperature Precision Data WRWA Data Collection Sheet

Roberta Carvalho
WRWA Water Science Director
Westport River Watershed Alliance
February 2021

**Sampling Safety.**

Personal safety shall be a primary consideration in all activities, including selection of sampling sites, dates, and training programs. Safety procedures shall include, but not be limited to:

- No sampling shall occur when personal safety is thought to be compromised.
- The Field Coordinator will decide before each sampling event whether adverse weather or other conditions pose a threat to safety of field volunteers, and will cancel/postpone sampling when necessary.
- Sampling shall take place in teams of two or more.
- Samplers shall wear life vests when sampling from boats or wading in waters under difficult conditions.
- Samplers shall wear proper clothing to protect against the elements as applicable, especially footwear and raingear.

**Sampling Procedure:**
Before the sampling event, the tide times and heights at Charlton Wharf (Westport Harbor Inlet) for that day of sampling are to be recorded on the sampling sheets from a tide charts taken from http://www.saltwatertides.com/dynamic.dir/massachusettssites.html. The tidal stage (i.e. Ebb or Flood) during which the samples will be taken is then denoted on the sampling sheet. Also, the precipitation for the seven days prior to the sampling date is recorded on the sheet. This data is available at the office and will be collected daily by WRWA with the Davis weather station. When beginning the sampling event, the air temperature and atmospheric conditions are recorded on the data sheet.

At each site, the samples for the lab analyses are collected first. The temperature and salinity are then taken from the bottle for chemistry analysis marked on sample bottle label (See the following sections for instructions).

**Air Temperature:**

Using the REOTEMP Bimetal Scientific Thermometer provided with the sampling equipment, measure the air temperature at the start of the sampling event. Hold the thermometer in the air for at least 10 seconds (or until indicator stabilizes). Record the temperature on the data sheet indicating air temperature at beginning of sampling event (first station).

**Atmospheric Conditions:**

Sky condition, wind direction, and wind speed are all recorded at the start of the sampling event. Sky condition is recorded on the data sheet using a numeric index used in the database. Wind direction is estimated and recorded by using a numeric index also. Wind speed is estimated by using the Beaufort Wind Force Codes and their descriptions of conditions on the water and on land. Both indices and the Beaufort Scale are provided in the following pages.
Sample Collection: (for lab analyses)

**Sampling Procedures for Microbiological Samples (City of New Bedford Health Department Laboratory. Quality Assurance Manual. January 2021.)**

These samples will be analyzed in the lab for turbidity, salinity, pH, fecal coliform parameters. There are two sampling bottles per site. One bottle will be used for chemical and physical analyses (pH, salinity, and turbidity); the other bottle will be used for biological analyses (fecal

coliform). Temperature is measured in a temperture blank bottle separate from analytical bottles. Samples are collected in clean, sterilized bottles of non-toxic plastic, with screw-cap closures. Sample containers are sterilized by autoclaving for 30 minutes at 121 °C. Sterilization is done at the lab prior to sampling date.

Sample bottles are kept closed until ready to be filled and contamination of the inner surface of the cap or neck of the bottle is avoided. Sample containers are filled with no head space and immediately capped. During sampling from a boat, the boat is brought to a complete stop in the water. Samples should not be taken while the boat is in motion, nor at slow speeds. After the boat is brought to a stop, Put the bottle into the holder on the sampling pole and uncap. On the upstream side of the boat, place the holder with the bottle into the water and allow the bottle to fill. Remove the holder from the water when the bottle is full, cap the bottle and place it in the cooler. When sampling from a dock, bridge, or otherwise on foot, use the larger sampling pole with an extension arm to reach out from the dock or down to the water from a bridge. Use the smaller pole to sample other sites when the large extension pole is not needed. Samples taken from land are taken in the same way as samples taken from a boat. If you must stand in the stream to sample, make sure you take the sample upstream from where you are standing. Samples should be taken in streams near the center of the channel where there is maximum flow. Sample containers are labeled with an identifying number, date of collection, and organization name.

Other pertinent information is recorded on the data worksheet, such as time of sample collection. Microbiological examination of water samples is initiated as soon as possible after collection. Before each sample is put into a cooler to be transported to the lab, the field analyses in the next section are performed. The samples are kept in a cooler at 4º Celsius during the transport to the lab. The maximum holding time for the samples is 6 hours.

**Field Methods**

**Salinity**

ATAGO Master-alpha refractometer
Model # S-10e
Range: 0.0 – 32.0%

**Collection of the Salinity Sample**

Collect a sample using the pipette provided with the refractometer from the sample in the small bottle (chemical/physical sample). Proceed to measure the salinity of the sample as outlined in the next section.

Using a Refractometer

When using a refractometer with automatic temperature compensation, first open the daylight plate and apply one to two drops of sample from the pipette on to the prism surface. Then, close the daylight plate gently. The sample should then spread evenly into a thin film between the plate and the prism. Make sure that the prism is completely covered and that there are no air bubbles between the plate and prism. If there are, open the daylight plate, rinse the prism with sample solution, apply two or three drops, and close the plate again. If there are no air bubbles and the prism is completely covered, hold the refractometer with the daylight plate facing upward. Direct the plate toward a light source and observe the field of view through the

eyepiece. If the view is not clear, focus the image by turning the portion of the refractometer closest to your eye. The upper field of view appears blue and lower appears white. Read the scale where the boundary line of the two fields cross the scale. Record the salinity in parts per thousand (‰) on the sampling data sheet. After each use, rinse the prism, daylight plate, and eyedropper with distilled or fresh water and dry with a soft clean cloth. It is important not to scratch the prism or soil it with oil or grease. If the prism or plate does get dirty, clean it with weakened detergent, rinse and dry.

The refractometer will be calibrated to 0 parts per thousand with distilled water before every sampling event. Using the procedure for measuring salinity above, place drops of distilled water on the refractometer prism and read the salinity. The blue and white interface should be read at 0 parts per thousand. If not, use a small screwdriver to adjust the calibration knob located on the top of the refractometer. Adjust this knob until the interface is corrected to 0 parts per thousand.

**Temperature**

REOTEMP Bimetal Scientific Thermometer
Range: -40 - 160 ºF

Temperature measurements can be taken directly from the temperature only sample bottles (chemical/physical sample), immediately after the collection described in the first section. Place the thermometer into the sampling container and wait 10-15 seconds for temperature stabilization. Record the temperature in ºF on the data sheet. Rinse the probe on the thermometer with clean water and dry thoroughly.
Instrument Calibration

The field thermometers will be checked for bias before every sampling event in a 32º F ice bath. Prepare an ice bath by putting ice cubes and water in a container and mixing. Make sure that enough ice is added so that when mixed the temperature stabilizes and there is still a substantial amount of ice in the bath. This ice bath has a temperature of 32º F. Place the thermometer in the bath and wait 10 seconds for temperature stabilization. The thermometer should read 32º F. If not, record the bias, in positive or negative degrees during the sampling or check another thermometer for bias using the same procedure. If that thermometer is correct, use that one for the sampling event. If a "biased" thermometer is used, the data "shifted" during processing to account for estimated inaccuracy and this is noted on the data sheet.

**General Information**

All data is recorded on the sampling event data sheet for each site. If a site is inaccessible for any reason, record it in the "comments" column. Any other pertinent observations made while sampling (waterfowl/animal present in water, obvious pollution sources, etc.) should be recorded for each site if needed. A copy of the data sheet is included with these Standard Operating Procedures and also serves as the chain of custody form. All data sheets are signed upon completion before delivery to New Bedford Health Lab. All samples must be kept on ice until delivered to lab. When delivered, the sheet will be signed and a copy will be made at the lab. The copy will be brought back to the office and kept on file until the final data arrives from the lab after analysis.

**Sky (Weather) Conditions Index:**

1. Clear
2. Partly Cloudy
3. Overcast
4. Fog/Haze
5. Drizzle
6. Intermittent Rain
7. Rain
8. Snow

**Wind Direction Index:**

1. North
2. Northeast
3. East
4. Southeast
5. South
6. Southwest
7. West
8. Northwest

**Beaufort Wind Force Codes:**

| **Beaufort Number** | **Wind Speed** | | **World Meteorological** | **Estimating Wind Speed** |
|---|---|---|---|---|
| Force | knots | mph | Organization Description | Effects Observed |
| 0 | under 1 | under 1 | calm | Calm; smoke rises vertically |
| 1 | 1-3 | 1-3 | light air | Smoke drift indicates wind direction; vanes do not move |
| 2 | 4-6 | 4-7 | light breeze | Wind felt on face; leaves rustle; vanes begin to move |
| 3 | 7-10 | 8-12 | gentle breeze | Leaves and small twigs in constant motion; light flags extended |
| 4 | 11-16 | 13-18 | moderate breeze | Dust, leaves, and loose paper raised up; small branches move |
| 5 | 17-21 | 19-24 | fresh breeze | Small trees in leaf begin to sway |
| 6 | 22-27 | 25-31 | strong breeze | Larger branches of trees in motion; whistling heard in wires |
| 7 | 28-33 | 32-38 | near gale | Whole trees in motion; resistance felt in walking against wind |
| 8 | 34-40 | 39-46 | gale | Twigs and small branches broken off trees; progress generally impaired |
| 9 | 41-47 | 47-54 | strong gale | Slight structural damage occurs; slate blown from roofs |
| 10 | 48-55 | 55-63 | storm | Trees broken or uprooted; considerable structural damage occurs |
| 11 | 56-63 | 64-72 | violent storm | Usually accompanied by widespread damage |
| 12 | 64 and over | 73 and over | hurricane | |

**WRWA Volunteer Training Record**

VOLUNTEER NAME: _____
ADDRESS: _____
CITY: _____ ZIP: _____

TELEPHONE: HOME: _____ WORK: _____

EMAIL: _____

ORIENTATION DATE: _____ MEANS OF INITIAL CONTACT:_____

TRAINER OF VOLUNTEERS_____ Date: _____

| ACTIVITY | RATING (circle one)<br>(1=Great 5=Retest Needed) |
|---|---|
| Execution of Sampling & Testing Protocols | 1 2 3 4 5 |
| Knowledge & Execution of Safety Procedures | 1 2 3 4 5 |

Comments: _____
_____
Areas Needing Attention: _____
_____

Training Program Summary

| Task and Type of Volunteer Training | Frequency of Training/ and By Whom |
|---|---|
| Field sampling | |
| Water chemistry analysis | |
| Visual observation | |
| Data management | |
| Data interpretation | |

**Documentation and Records**

**Sample label**

Site I.D. Code: _____

WRWA _____ Sample for:_bacteria/ chemistry_____

am

Date: _____ Time: _____pm

Sampler's Name _____

**Equipment Checklist / Field Maintenance Log**

| Component | Check OFF | Condition | Calib Date | Pass Calibration (Y/N) | Date Replaced | Corrective Action |
|---|---|---|---|---|---|---|
| Data Sheet | | | | | | |
| REOTEMP Bimetal Scientific Thermometer | | | | | | |
| ATAGO Master alpha refractometer | | | | | | |
| Distilled Water/Wash Btl | | | | | | |
| 1 ml Pipets (2) | | | | | | |
| Sterile Wide Mouth bottles from NBDOH lab | | | | | | |
| Tide Tables | | | | | | |
| Marine Radio | | | | | | |
| Back-up Thermometer / Refractometer | | | | | | |

Equipment Inspection and Maintenance Log Form

| Equipment Type | Inspection Frequency | Type of Inspection | Available Parts | Maintenance, Corrective Action & Recordkeeping |
|---|---|---|---|---|
| | | | | |
| | | | | |
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# WRWA Boat

## Standard Operating Procedures

Specifications:

Boat- 2000 18'8" Carolina Skiff Semi-V Series
Engine- 2006 Evinrude ETech 50 HP

Equipment: (Located in bow storage)

1. First aid kit
2. Visual Distress Signals
3. Air horn
4. Engine manual and emergency tool kit
5. Life jackets (4)
6. Boat cushions/throwable PFDs (3)
7. Anchors (2)- 1 Danforth Type, 1 Navy Type
8. Anchor line (150')
9. Oars (2)- located on boat deck

Starting Procedures:

1. **Immediately** after boarding, place drain plugs(2) in drains at stern. They are located at the stern attached to the handrail by strings.
2. Turn on bilge pump to pump out any water from boat and turn off when finished pumping.
3. Lower engine using the Trim /Tilt button on the control handle. Make sure there is sufficient amount of water to lower the engine. To start the engine, the water intakes (located on the two sides of the engine) **must be submerged**. (*A warning alarm will sound if they are not!!)*
4. Key is located in the dry bag in the bow storage area. Put the key in the ignition and make sure the emergency stop device is in place (located to the left of the ignition). The stop device is attached to a red lanyard which should be attached to the operator in the case that he/she should fall overboard (will stop the engine).
5. Turn the key to start the engine. If it doesn't start right away, you may need to push the key in while turning to choke the engine. Be careful not to try turning the engine over for more than 5 seconds at a time, it may flood the engine or damage the starter. Wait 10-15 seconds between starting attempts. The engine may need to warm-up at a higher idle. To do this, press the black button on the lower end of the throttle until it releases. The engine is now in neutral and may be warmed up pushing the throttle up. When the throttle is moved back to the neutral position, it will again lock in place. Be careful not to put the engine in gear. The throttle needs to be released again to warm-up engine further.
6. When engine is warmed-up sufficiently, cast off the dock lines, put it in gear and navigate carefully out of docking space at headway speed and proceed at headway speed until out of no wake zone.

Docking and Securing Procedures:

1. Navigate carefully into docking space.
2. Leave the engine running until dock lines are secured.
3. Bow lines- lines go through the bowrails at the first section and are tied to the cleats at the green flags.

4. Stern lines- larger lines (w/ yellow flags) cross at the stern and are tied to the opposite cleats at the yellow flags;  smaller lines (w/ green flags) are tied to the stern handrail at the green flags.
5. Turn off engine, **make sure steering wheel is turned all the way to the left**, and raise engine fully out of the water with Trim/Tilt button on control handle. Adjust large stern lines so that they lay on top of engine. Take key out of ignition and put back in dry bag in bow storage.
6. Run bilge pump to remove any water and turn off when finished pumping.
7. If there is a fresh water supply available, use the hose to wash down the boat to remove any dirt, sand, or salt spray.
8. The **last** thing to do before leaving is to unplug the two drains at the stern and place plugs inside boat attached to the handrail.

**INSERT PDF of WRWA Field Data Sheet**

# Appendix III

City of New Bedford Department of Health Laboratory
Lab #M-MA031

Quality Assurance Manual and
Standard Operating Procedures for
pH
Turbidity
Salinity
Fecal Coliform