YSI SONDE DEPLOYMENT IN TWO OF THE CITY OF NEWPORT'S WATER SUPPLY RESERVOIRS

This Monitoring Plan was written as an addendum to the RIDEM Sampling Plan for Surface Water Monitoring in the City of Newport's Nine Water Supply Reservoirs (2015)[1]. In addition to the biweekly monitoring described in the above-reference Quality Assurance Plan, RIDEM will deploy YSI sondes in two of the Newport Water Supply reservoirs during the May through October sampling season. The deployment of the sondes will generally follow the Quality Assurance Plan developed by the Narragansett Bay Fixed-Site Monitoring Network (NBFSMN QAPP)[2]. This April 11, 2014 QA Plan includes SOPs and other general information about the operating the YSI sondes.

2.0 Project Organization/Management

The sonde project will follow the organizational chart of the Newport Sampling QA Plan with Heidi Travers added as the manager of this component of the monitoring.

2.3 Problem Definition/Background

RIDEM has to develop TMDLs to address nutrient related water quality impairments in the nine water supply reservoirs operated by the City of Newport. Elevated levels of phosphorus and nitrogen contribute to excessive algal growth and cyanobacteria blooms in all nine reservoirs and ponds. The nine reservoirs and ponds are interconnected through a complex network of piping and pump stations with Lawton Valley Reservoir and North Easton Pond serving as the intake locations for the two water treatment facilities operated and maintained by the Newport Water Department.

Low oxygen can be linked to nutrient over-enrichment, which contributes to over-production of phytoplankton (algae). In turn, the excess algae die, sink to the bottom, and decompose, a process that consumes a lot of oxygen. In deeper waters, as ambient temperatures increase, the surface waters become less dense than the cooler bottom waters. This stratification prevents the oxygen in the air from reaching the bottom waters. During times with stratification, bottom waters are not readily re-oxygenated.

RIDEM is interested in collecting continuous chlorophyll and oxygen data from Lawton Valley Reservoir and North Easton Pond because they are the intakes for the two water treatment plants. While the limited oxygen data available from these two ponds show no oxygen impairments, they both have some of the highest chlorophyll-a levels of all nine reservoirs and ponds. Continuous monitoring provides information needed to define the temporal variability of water quality. This level of observation will capture events that occur on short time scales (hours to days). Continuous monitoring captures the daily variability in water quality to provide scientists with the information necessary to fully assess criteria attainment throughout the bay.

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[1] RIDEM. 2015. *Surface Water Monitoring in the City of Newport's Nine Water Supply Reservoirs*, Sampling Plan Prepared by Rhode Island Department of Environmental Management, Office of Water Resources, Providence, RI.

[2] RIDEM. 2014. Quality Assurance Project Plan: Narragansett Bay Fixed-Site Monitoring Network (NBFSMN), Report Prepared by Rhode Island Department of Environmental Management, Office of Water Resources, Providence, RI. http://www.dem.ri.gov/pubs/qapp/nbfsmn.pdf

Site Location

RIDEM will deploy two surface sondes during the 2015 sampling season. One sonde will be located at the deepest point of North Easton Pond with the other sonde deployed in deepest point of the Lawton Valley Reservoir. Each sonde will be located within one meter of the surface. Sondes will be connected to a line that is anchored with a Danforth anchor. The sonde location will be marked with an orange mooring float ball attached to the line. Each sonde will collect continuous (i.e. fifteen minute intervals) depth, temperature, conductivity, dissolved oxygen, chlorophyll, and pH data.

Task 1 Site Preparation

Prior to the sonde deployment, RIDEM will prepare the prepare equipment for deployment. Preparation activities include:

- Replace old/damaged equipment or order new site setups
- Program equipment to meet monitoring SOP (i.e. standard time, 15-min. sampling intervals)
- Setup mooring systems
- Prepare equipment (calibrations, painting, cleaning, etc)
- Conduct function tests prior to deployment

Task 2 Monitoring

Routine maintenance will be conducted at each site by lab/field technicians. Sonde maintenance (calibrated and field maintenance) will be conducted on a bi-weekly basis during the May through October deployment period. A longer deployment period may be used when applicable (i.e. cooler months when fouling is minimal). Calibrations procedures are conducted using the same protocols based on the YSI manual (see appendix B of 2014 NBFSM QAPP).

During the sonde swap or field maintenance, all components should be checked and confirmed to be operational. In addition, moorings are cleaned to remove bio-fouling. Once everything has been cleaned, the new sonde is deployed (see appendix B of 2014 NBFSM QAPP).

In the field, during the sonde swap process, a three-way *in situ* match-up is conducted. The new (freshly calibrated) sonde reading will be checked against the old (retrieved) sonde reading and a third reading using a profiler sonde at the same depth. The last reading of the retrieved sonde is compared to the profile results and the first reading of the newly deployed sonde. This three-way comparison assures that the new and old sondes are both reading each parameter within a certain tolerance. This triple sonde check also allows for notation on whether or not the parameters are normal, fluctuating, or stable.

For more information and guidance with monitoring, see Appendices B and C of 2014 NBFSM QAPP.

Task 2A Laboratory Analysis

Chlorophyll and other nutrient samples will be collected throughout the field season. The designated labs are to report the results to the respective site managers before or during the year-end review period.

Task 3 Year End Review

At the end of each field season, the data gathered is processed using QA/QC guidance adapted from the NERRS CDMO manual. Each site is responsible for quality controlling its own data. Any problems or concerns about the data processing will be discussed with the QA officer for the NBFSMN and the Newport Project.

For more information and guidance with QA/QC procedures see appendix C.