EPA’s River Real Time Monitoring Buoy in the Charles and Mystic Watersheds

- Access to the data has been through a password protected site [http://www.ysieconet.com/](http://www.ysieconet.com/)

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Purpose:
The Environmental Protection Agency (EPA) has established monitoring buoys in the Charles and Mystic Watersheds. These buoys collect and transmit water quality data that is available to the public. EPA has established these buoys to help with the tracking of cyanobacteria blooms and water quality conditions.

Note: All water quality measurements are collected 1 meter below the water's surface.

Last Sonde Verification: 9/30/2010

Disclaimer:
The data presented on this website is considered preliminary data and may be subject to future revision or qualifiers. The data from this site is transmitted directly from the instrument with no or little review. Inaccuracies may be presented because instrument malfunction or physical changes at buoy location.
Sonde Measurements

- Recorded every 15 minutes
- Charles measurement period 5/27-9/30/10
- Wedge Pond measurement period 6/15-9/30/10
- Measurements collected at 1 meter depth
- Parameters
  - Temperature,
  - Conductivity
  - pH
  - Dissolved oxygen
  - Turbidity (Charles only)
  - Chlorophyll
  - Phycocyanin
Buoy chlorophyll and phycocyanin correlated with Lab data
Buoy chlorophyll and phycocyanin correlated with Lab data

- Chlorophyll a
  - EPA Contract lab
  - DPH data (Charles only)
- Cyanobacteria cell counts
  - EPA Contract lab
  - DPH data (Charles only)
  - Roger Frymire
Chlorophyll probe had poor correlation with Laboratory data

Chlorophyll a (EPA contract Lab) Vs. Chlorophyll Probe
(with one outlier and data not meeting QC removed)
Charles and Mystic data

\[ y = 0.3243x + 3.2892 \]
\[ R^2 = 0.2182 \]

Chlorophyll a (DPH contract lab) Vs. Chlorophyll probe
Charles River data

\[ y = 0.0341x + 12.98 \]
\[ R^2 = 0.003 \]
Phycocyanin probe correlation with Laboratory Cyanobacteria cell counts

LSSU (EPA contract lab) cyanobacteria cell counts Vs Phycocyanin Probe
With two outlier removed (Charles and Mystic data)

\[ y = 0.353x + 2752.8 \]
\[ R^2 = 0.4679 \]

Roger Frymire cyanobacteria cell counts Vs Phycocyanin Probe
(Charles and Mystic data)

\[ y = 0.0609x + 2404.5 \]
\[ R^2 = 0.983 \]

DPH contract lab cyanobacteria cell counts Vs Phycocyanin probe
Charles River data

\[ y = 0.1364x + 2463.9 \]
\[ R^2 = 0.7417 \]

Note: DPH samples collected ~35 feet away at dock 6” deep
Mystic RTM Buoy Phycyanin Concentrations

Phycocyanin (cells/mL) vs Date

Dates:
- 6/15/2010
- 6/22/2010
- 6/29/2010
- 7/6/2010
- 7/13/2010
- 7/20/2010
- 7/27/2010
- 8/3/2010
- 8/10/2010
- 8/17/2010
- 8/24/2010
- 8/31/2010
- 9/7/2010
- 9/14/2010
- 9/21/2010
- 9/28/2010

Concentration Levels:
- Phycocyanin (cells/mL)
RTM Buoy Phycocyanin Concentrations
(Mystic Data)
Charles RTM Buoy Phycocyanin Corrected (w/DPH values)

Concentrations

Phycocyanin (cells/mL)

Date

5/27/10  6/1/10  6/17/10  6/24/10  7/1/10  7/8/10  7/15/10  7/22/10  7/29/10  8/5/10  8/12/10  8/19/10  8/26/10  9/2/10  9/9/10  9/16/10  9/23/10  9/30/10

0  50000  100000  150000  200000  250000  300000  350000

RTM Buoy Corrected

DPH cell counts
Charles RTM Buoy Daily Max Phycocyanin corrected (DPH) values

72 days above 70,000
55 days equal to or below 70,000
Other parameter comparisons with DPH and RTM Buoy

- **DPH Dissolved Oxygen Vs. Optical Dissolved Oxygen Probe**
  - Equation: $y = 0.3242x + 6.678$
  - $R^2 = 0.1519$

- **DPH pH Vs. pH Probe**
  - Equation: $y = 1.3309x - 3.2119$
  - $R^2 = 0.8501$

- **DPH Water Temperature Vs. Probe Water Temperature**
  - Equation: $y = 0.8791x + 321.35$
  - $R^2 = 0.9123$

- **DPH Conductivity Vs. Probe Conductivity**
  - Equation: $y = 0.2436x + 2.7786$
  - $R^2 = 0.0847$

- **DPH Turbidity Vs. Probe Turbidity**
  - Equation: $y = 1.0036x - 0.2064$
  - $R^2 = 0.9792$
Charles Maximum Phycocyanin Concentrations

70% of the Maximum daily values occurred between 6:00 pm and 6:00 am
Post deployment probe verification with Rhodamine dye

Phycocyanin Probe Performance (w/ dye)
Charles & Mystic

Chlorophyll Probe Performance (w/ dye)
Charles & Mystic
Side by Sonde measurement during sonde swap

**Phycocyanin side by side Probe Performance - Charles & Mystic**

**Chlorophyll side by side Probe Performance - Charles & Mystic**
Next steps for RTM Buoy Project

- Evaluation user feedback was positive
  - Most interest in tracking cyanobacteria blooms
  - Relocating Mystic Buoy
- Plan on deploying again in the Charles and Mystic next summer
- Investigate Public website
- Exchange Sondes every 2 weeks instead of weekly
Next steps for RTM Buoy Project

Continued

• Investigate different calibration methods for chlorophyll and phycocyanin probes
  - Use single dye standard for both probes
  - Phycocyanin
    • Develop in-house (Microcystis aeruginosa) culture
    • Initially correlated culture cell counts with dye concentration probe response
    • Adjust probe calibration from most recent field sample counts
  - Chlorophyll
    • Develop in-house fluorometric method for chlorophyll a (EPA Ref. method 445)
    • Correlate chlorophyll a concentrations with dye concentration probe response
    • Adjust probe calibration from most recent field sample chlorophyll a concentration
Questions?