King County’s Remote Automated Marine Water Quality Program

The Sonde and the Fury
Presentation Outline

• Program Goals
• Equipment/Sensors
• Water Quality Station Locations/Installation
  – Seattle Aquarium
  – QMHYC/Dockton Park
  – Quartermaster Harbor Entrance Buoy
  – Dredging/Construction Monitoring
• Quality Control
  – Monthly Routine Maintenance/Calibration
  – Biofouling
Project Goals

• Collect high-frequency water quality data in Puget Sound for the evaluation of natural variability on tidal, daily, and monthly time scales.
• Supplement King County’s monthly Marine Ambient Offshore Program.
• Water quality monitoring during construction projects.
• Provide near real-time water quality and meteorological data to the scientific community/public.
Capital Purchase

- Four YSI Econet Data Systems
  - Includes datalogger, cell phone modem and antenna, all SDI-12 communications.

- Four Visala Weather Stations
  - air temperature
  - relative humidity
  - barometric pressure
  - wind speed and direction
  - rainfall

- 18 YSI 6600 V2 Sondes
  - Includes temperature and conductivity and depth sensors

- 18 Optical Probes for each parameter
  - dissolved oxygen
  - fluorescence (chlorophyll)
  - turbidity

- 18 pH Probes

- 5-50’ Cables, 3-100’ Cables

- Some installation hardware
## YSI 6600 V2 EDS Sensor Specifications

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°C)</td>
<td>-5 to 50</td>
<td>0.01</td>
<td>+/- 0.15</td>
</tr>
<tr>
<td>Conductivity (mS/cm)</td>
<td>0 to 100</td>
<td>0.001 to 0.1</td>
<td>+/- 0.5% of reading</td>
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<tr>
<td>Salinity (PSS)</td>
<td>0 to 70</td>
<td>0.01</td>
<td>0.1</td>
</tr>
<tr>
<td>Depth (m)</td>
<td>0 to 61</td>
<td>0.001</td>
<td>+/- 0.12</td>
</tr>
<tr>
<td>Dissolved Oxygen (mg/L)</td>
<td>0 to 50</td>
<td>0.01</td>
<td>+/- 0.1</td>
</tr>
<tr>
<td>Turbidity (NTU)</td>
<td>0 to 1,000</td>
<td>0.1</td>
<td>0.3</td>
</tr>
<tr>
<td>pH</td>
<td>0 to 14</td>
<td>0.01</td>
<td>+/- 0.2</td>
</tr>
<tr>
<td>Chlorophyll (µg/L)</td>
<td>0 to 400</td>
<td>0.1</td>
<td>Detection Limit - 0.1</td>
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</table>
Locations
Seattle Aquarium YSI Buoy Design
at Low Tide
~King Co. Environmental Lab~
Seattle Aquarium YSI Buoy Design
at High Tide
~King Co. Environmental Lab~

Met tower
EcoNet box

AC in

Fixed pulley guides

Lower pulley moves down as tide comes in

Sonde cable

50 lb. lead ball

Seattle Aquarium pump house

¾" braided Spectra strength member

Surface float

Upper YSI Sonde
1 m depth

Lower YSI Sonde
10 m depth

20 lb. lead ball
Quality Control

• Bi-annual
  – Temperature and Salinity Calibration using in-Situ Seabird CTD

• Monthly
  – Pre-deployment in-house pH, dissolved oxygen, turbidity, chlorophyll and depth calibration and check standards.
  – Post-deployment end checks of all parameters.
Caprellidae amphipods