Aquatic Sensor Workgroup
methods and data comparability board

Field Deployment Guide

- or -

It really does matter where you deploy your sonde

Dan Sullivan (USGS)

- Mike Cook (SonTek/YSI)

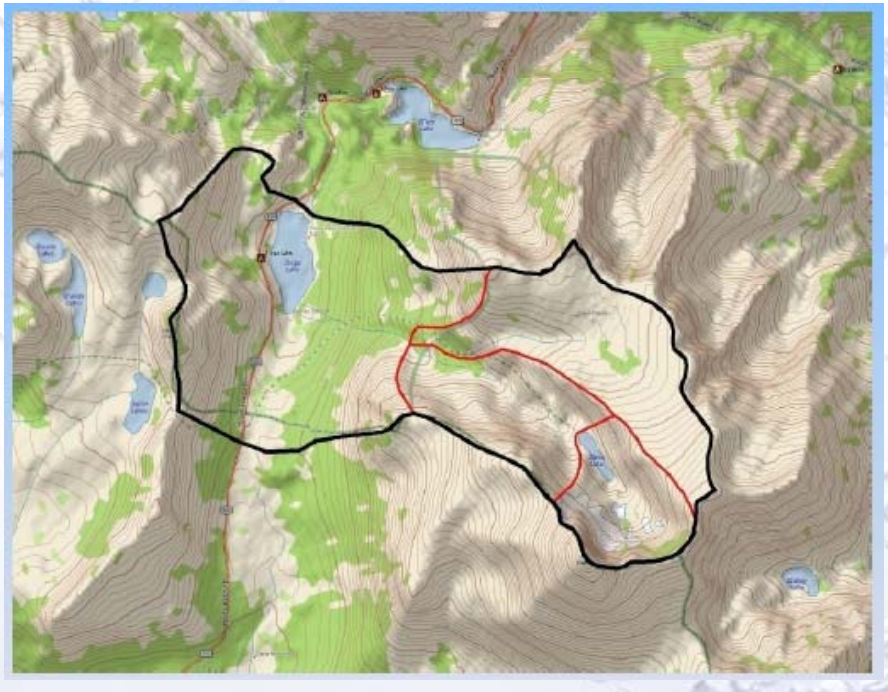
Methods and Data Comparability Board of the National Water Quality Monitoring Council

ASW Deployment Guide

- Informative tool
  - New users
  - Experienced users
  - Focus monitoring goals
- Aid to system and site selection
  - Get it right the first time
  - Present important considerations
  - Use as a checklist to evaluate site conditions
- Data quality considerations
  - Representative of conditions
  - Maintain site through changing conditions
  - Ensure high-quality data – useful for decision-making

Does it matter where you deploy your sonde?

- Your sampling plans call for a site to be established at a given point along a stream
- The measurements you take at that point are supposed to represent that stream
- How do you ensure that your data are representative of your stream?



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Representativeness

- A measurement is taken at one point in a stream: one point in time & space
- Water quality varies in time & space
- What does that measurement represent?
- Where you put the sensor is very important!

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Variability

- Variability is inherent in the aquatic environment is a given (otherwise, why bother to monitor?)
- How do you separate inherent variability from sampling error?
- Cross-section surveys
- It does matter where you deploy your sonde…

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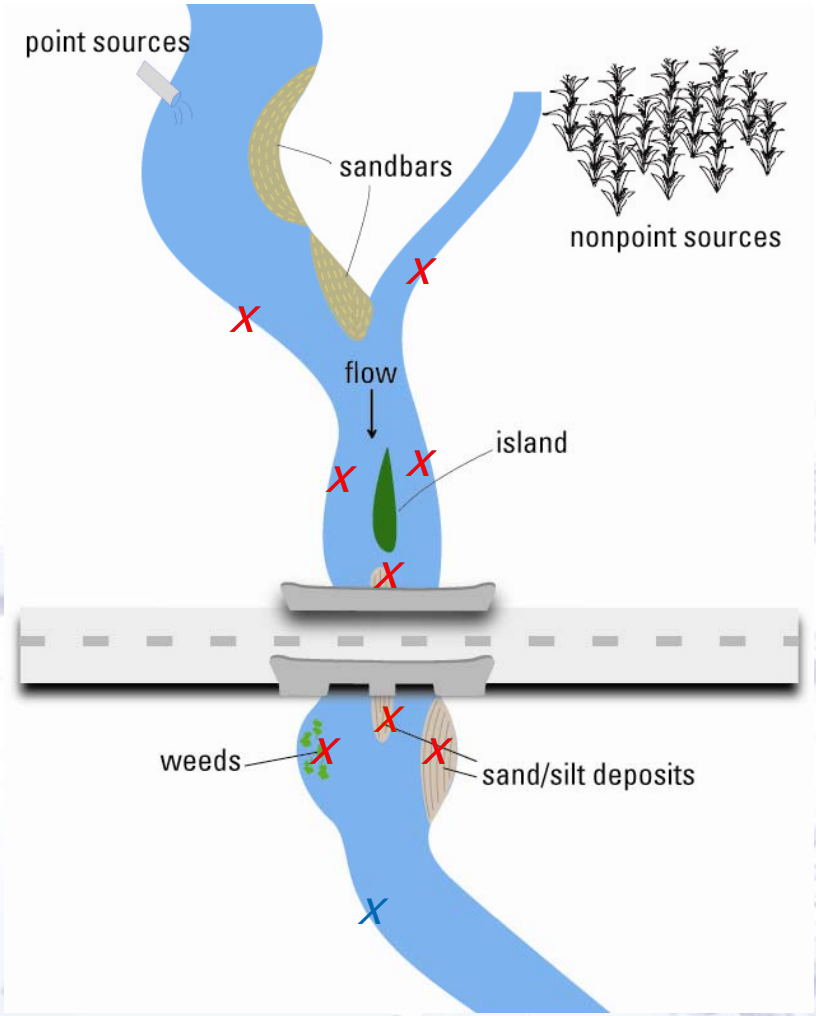
Variability



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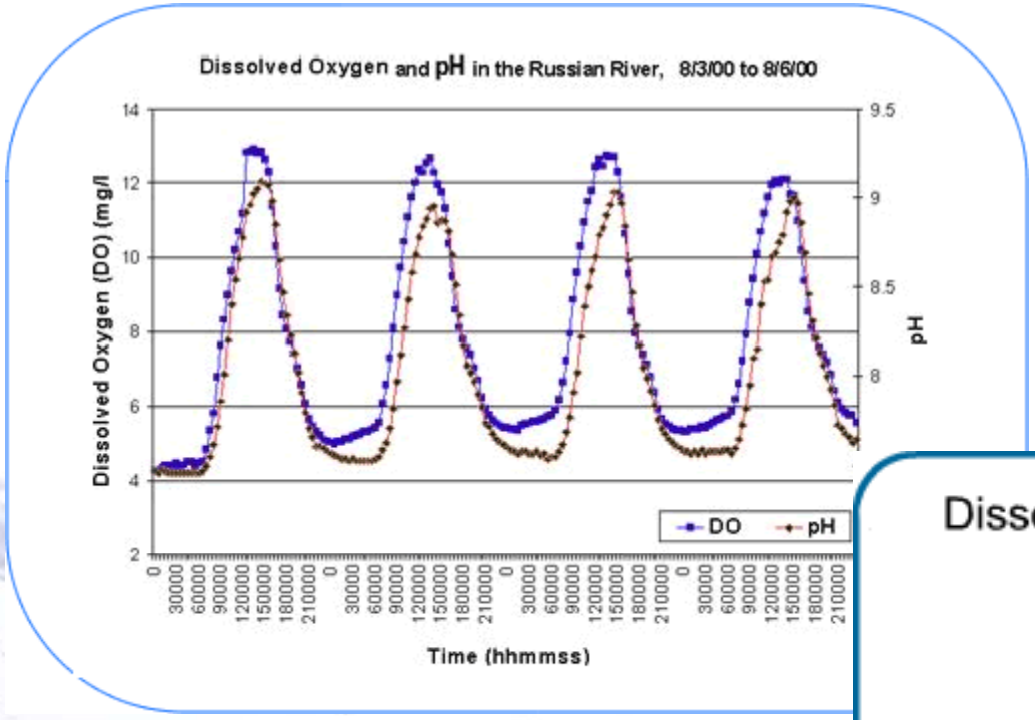
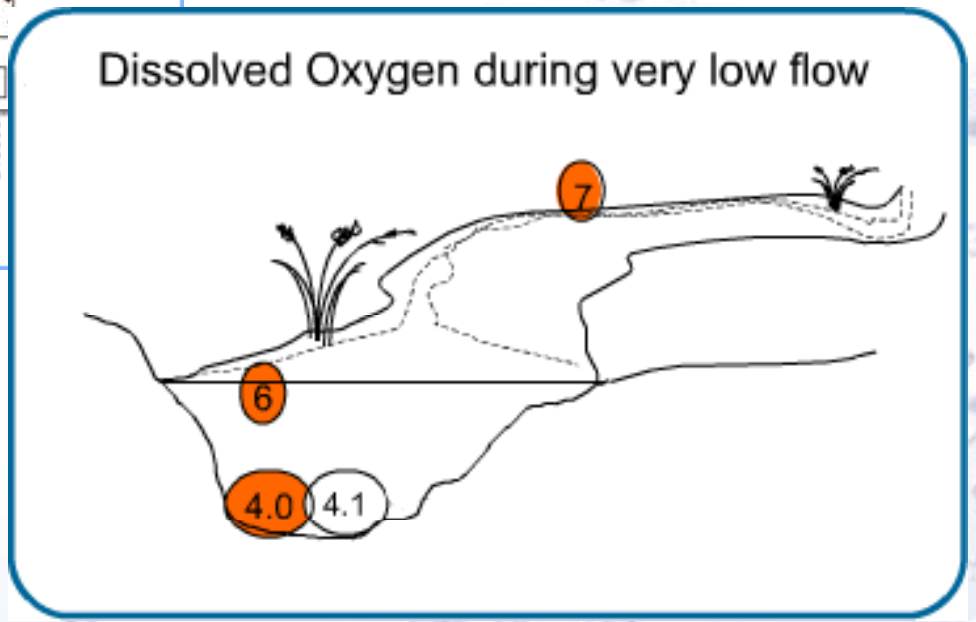
Variability





Modified from SWAMP, 2010

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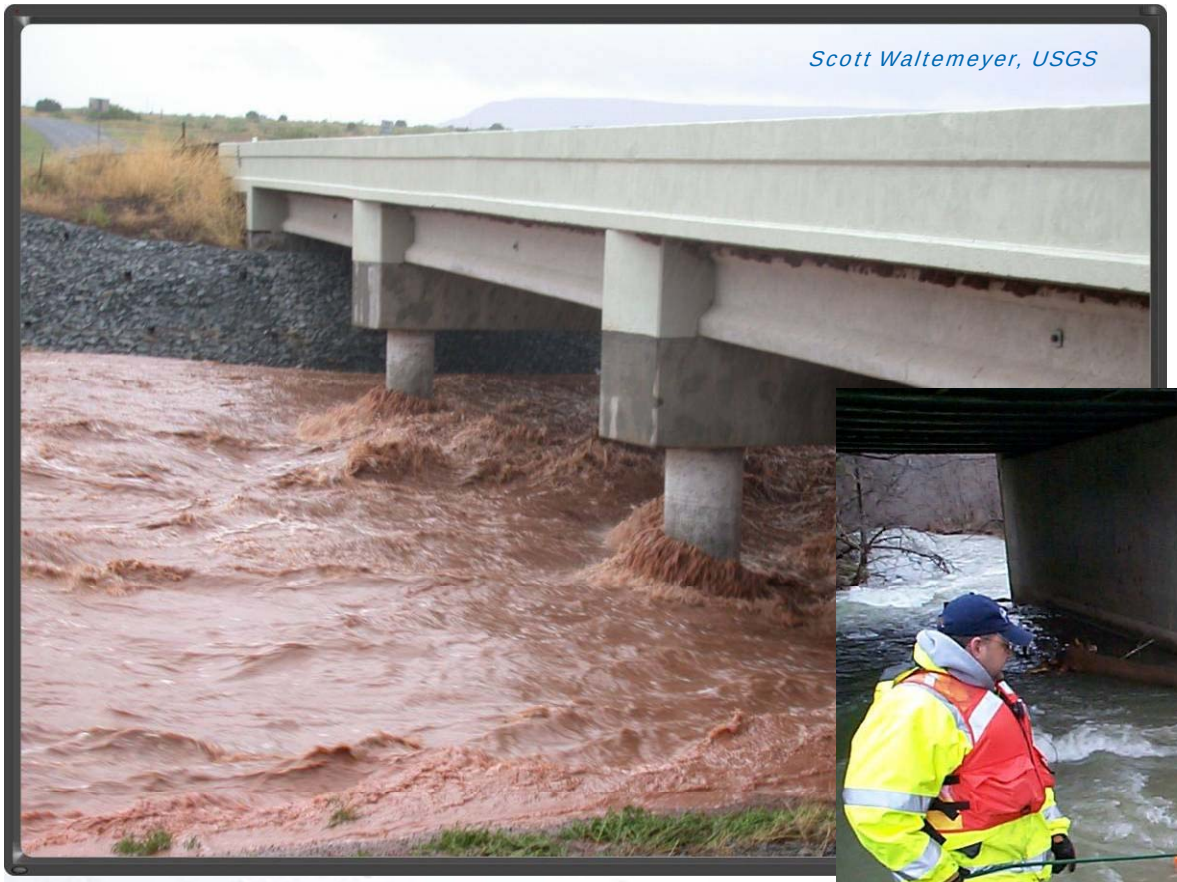
Variability



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Variability

Fitzpatrick, USGS

Deployment Guide Outline

1) System Selection
   - Attended Monitoring (Green dot)
   - Unattended Monitoring (Orange dot)
   - Flow-through systems (Blue dot)
2) Site Selection
   - Location within the channel
   - Flow and Stage
3) Installation and Maintenance
   - Access and safety
   - Equipment location
   - Infrastructure
   - Extreme conditions
   - Service intervals
4) Documentation
   - Installation
   - On-going site visits

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1. System Selection

- Budgets
  - Site visits
  - Maintenance
  - Calibrations
  - Instrument type
- Monitoring goals
  - Data frequency
  - Installation
- Power requirements
  - AC/DC/Solar panel
- Telemetry requirements
  - Background study
  - Alerts/Decision making

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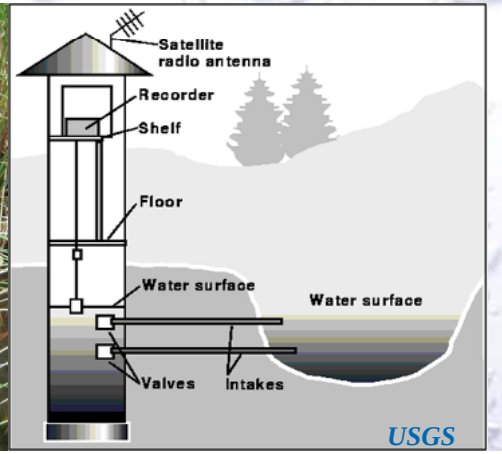
1. System Selection

- Attended monitoring
  - Infrequent discrete samples
  - Multiple points in the cross section
- Unattended monitoring
  - Continuous data from a fixed point
  - Low power requirements - internal-logging systems
- Flow-through monitoring system
  - High power requirements
  - Typically tied to telemetry



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2. Site Selection

Cross-section variation

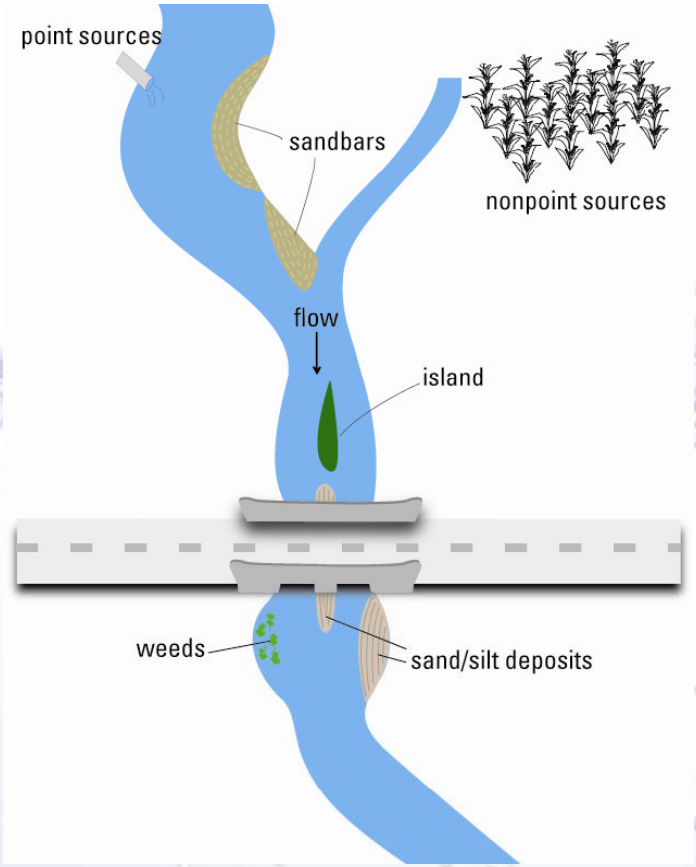

Photo: Jerrod Wheeler, USGS

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2. Site selection

Channel stability and uniformity

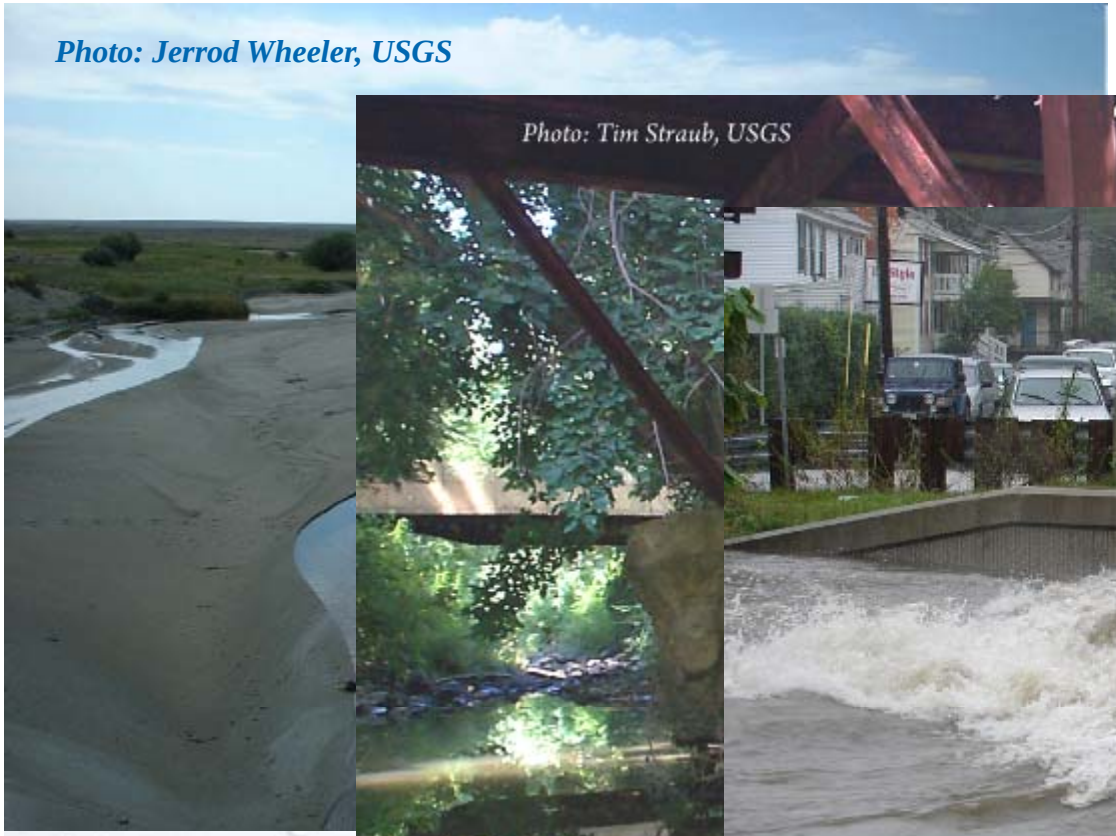

Photo: Jerrod Wheeler, USGS

Photo: Tim Straub, USGS

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2. Site selection
Distance from tributaries

Faith Fitzpatrick, USGS

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2. Site selection
Flow regime

USGS, GA WSC

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3. Installations
Access and Safety

Safety first!

Site vehicle access & access in varying conditions

Vandalism – "easy" access is not always the best

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3. Installations
Equipment Location

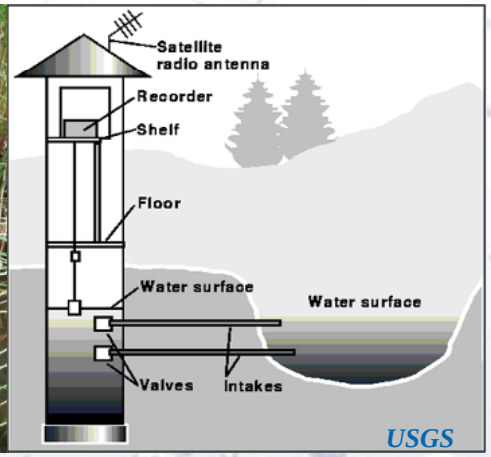
Laura Flight, USGS

Shelters, sondes, intakes

Flood & debris damage

3. Installations
Available Infrastructure

- Power source
  - Unattended – AC or DC
  - Flow-through - AC
- Telemetry
  - Telephone/Internet/Satellite



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3. Installations
Extreme Conditions

Photo: Joe Zanka, USGS

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3. Installations
Service Intervals

- Vegetation
  - Aquatic
  - Terrestrial
- Fouling rate
  - Site/Season dependent
- Duty cycle
  - Batteries

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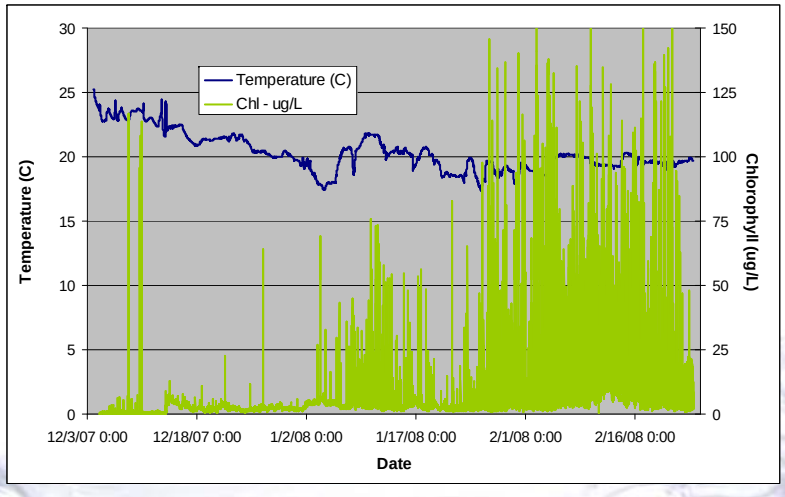
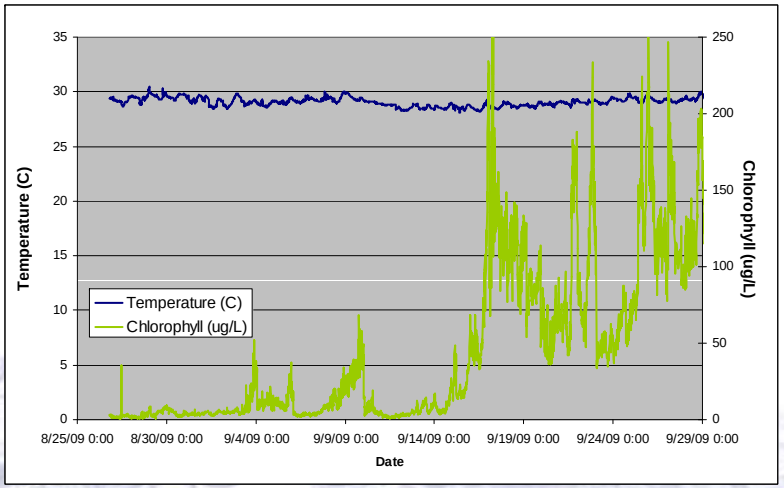
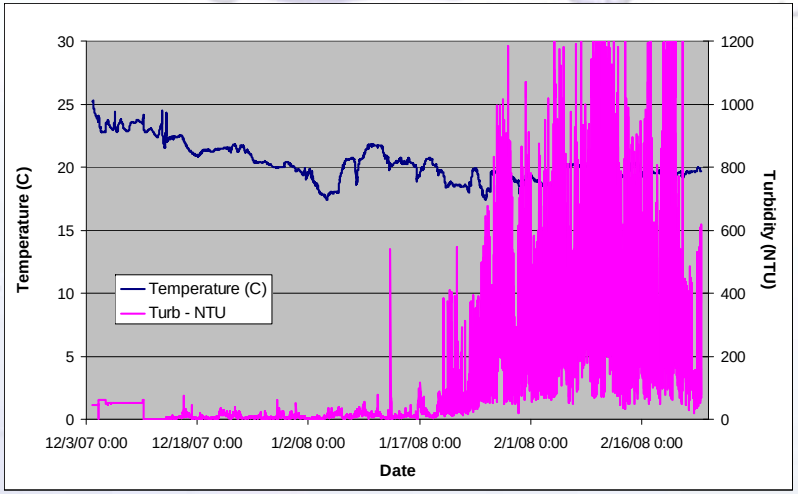
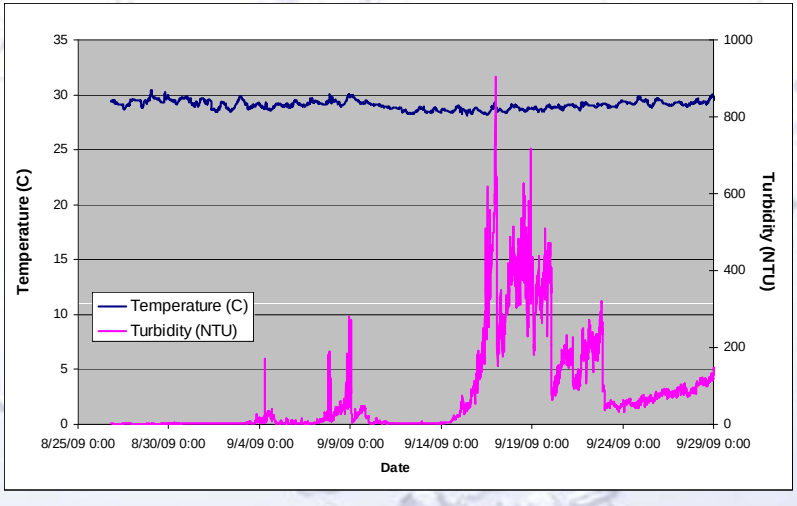
3. Installations
Fouling









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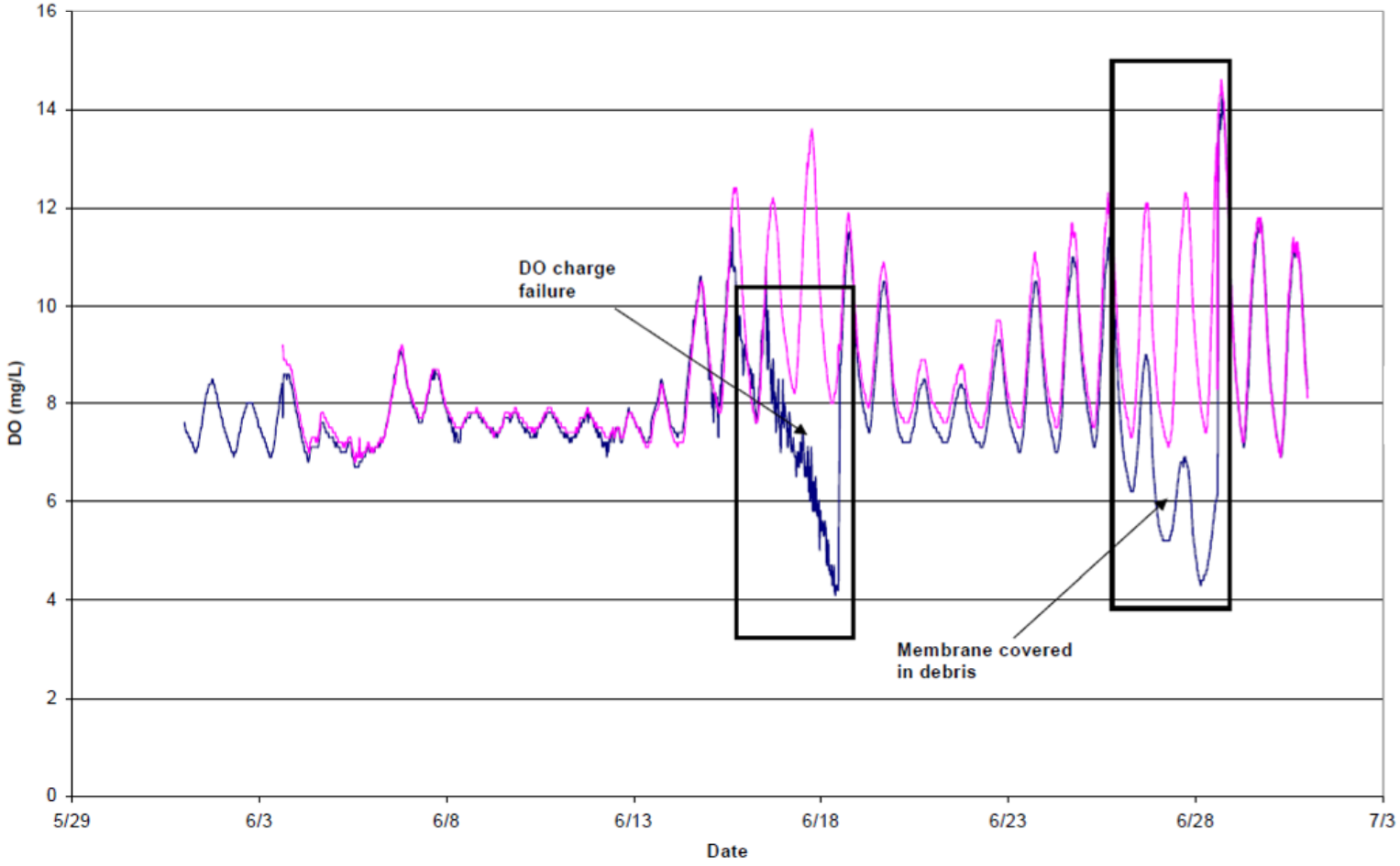
3. Installations



Rasmussen, USGS

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4. Documentation

- Written documentation
  - USGS National Field Manual Chapter 6 (online)
  - Record every field visit
  - Log books/electronic files for every instrument
- Photo documentation
  - A picture says a thousand words
  - Pictures provide perspective

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Summary

- Guide can be used as a checklist
- Important to know site details
- Think extremes to be prepared
- Wide range of monitoring solutions – depends on budget
- Maintenance intervals – data quality
- Document everything

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Questions and Comments