Water Quality Sampling on Lake Mead, Arizona – Nevada: Interagency Sampling Events to Facilitate the Comparability of Data

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Participants in the Interagency Partnership

- City of Henderson
- City of Las Vegas
- Clark County Water Reclamation District
- Clark County Regional Flood Control District
- Lake Mead National Recreation Area (NPS)
- Nevada Department of Environmental Protection
- Nevada Department of Wildlife
- Southern Nevada Water Authority
- United States Bureau of Reclamation
- United States Geological Survey
Participants in Field Sampling

- City of Henderson
- City of Las Vegas
- Lake Mead National Recreation Area (NPS)
- Southern Nevada Water Authority
- United States Bureau of Reclamation
- United States Geological Survey
- Manufacturers
  - Hydrolab, Eureka Environmental, YSI, In-Situ*
    - In-Situ instruments were provided by the manufacturer and are not regularly used by any of the participating agencies
Measurements

- Variable, depending on the sampling event
  - Temperature
  - pH
  - Specific Conductance
  - Dissolved Oxygen
    - Clark cell and Optical (technology varied by manufacturer probes and date of sampling)
- Surface to bottom (5 m intervals frequently)
- Coordinated equilibration time
Calibration

- Variable, depending on sampling event
- All parameters except temperature every time
- Generally followed the manufacturer's instructions
  - Completely independent calibration; independent standards and locations
  - Some coordination; common lot of standards, independent locations
  - Complete coordination, common container of standard, common location
  - “Forced” calibration, setting previously calibrated instruments to an average reading for all instruments
Calibration Results

- Calibration practices matter
- The greatest benefit to the group has arisen from the focus on careful adherence to protocol and to instrument servicing
- Improvements can be made by sharing calibration solutions
- Improvements can be made by completely coordinated calibration
- “Forced” calibration procedures are extremely useful in trying to assess issues
  - Reduces the impact of independent calibration
  - Limits the ability to address the “right” value
Lake Test

- Over time ~20 coordinated sampling events have been held at Lake Mead (bi-annual)
- Iterative process
  - Sampling event
  - Data review
  - “Problem” identification
  - Suggested solution implemented at the next sampling event
February 2008

Dissolved Oxygen mg/L

Depth m
August 2011 Sampling
August 2011 Sampling

Dissolved Oxygen % Saturation

pH

Depth (m)
Tank Test

- **Basics**
  - Instruments put into the tank Thursday afternoon
  - Instruments set to collect data every 15 minutes
    - Temp, Sp Cond, pH, DO
    - Some instruments powered and on constantly (AC power), others came on to collect data (DC power)

- **This test should identify underlying instability, if it exists**
Tank Test Results
Pressure Test Set-Up

- Sonde put into test chamber
- Chamber sealed
- Pressure gradually increased to <180 psi ~125 m simulated depth with an air compressor
- Parameters recorded as pressure was increased and decreased in most cases
Data Presentation

Comparing instrument DO to Winkler DO

Comparing variability to tech specs
Conclusions

- We have made significant strides in data consistency through this process
  - Calibration and maintenance enhancements
  - Collaborative evaluation of shared results
  - Greater understanding of the sampling procedures and techniques of other agencies
  - Increased communication on sampling issues and data sharing
- Some issues have been resolved by improvements within and among the group
- Some issues have required the assistance of manufacturers
Still to Come

- Continued Interagency Sampling Events
  - Continue the exchange of data and ideas
  - Continue assurance that data from all agencies is equivalent
  - Assess changes that occur as new instrumentation is adopted
- We need to develop “confidence intervals” for the groups data based on the published specifications for the instruments