Incorporating Citizen Volunteer Monitoring into Regional Water Quality Management

Strengthening Monitoring Collaboration and Partnerships

Thomas Herron DEQ Coeur d’Alene
Janet Conlin Cocolalla Lake Association
Oh, crap! Was that TODAY?
Coeur d’Alene Regional Office
Water Quality Related Groups

Coeur d’Alene Regional Office
Surface Water Tidbits

14 Fourth Field Hydrologic Unit Codes
6,000 Perennial Stream Miles
154,700 Acres of Lakes
119 Total Lakes
50 Lakes Greater Than 30 Acres

DEQ’s Organization

Six Regional Offices
- Service providers of the agency.
- Closest to the agency’s customers.
- Implement environmental programs and policies.
DEQ’s Work

Water Quality

To protect the quality of the state’s water resources, DEQ:

- monitors, collects, and analyzes water quality data
- develops plans to improve degraded waters
- protects the quality of public drinking water
- provides grants and loans for drinking water and wastewater infrastructure projects
- provides technical assistance
- issues wastewater permits
Why Do I Need Volunteer Monitoring

• Cost Effective
• Comprehensive
• Long Term Trends
• Communication Forum
• Information Exchange
• Continual Vigilance
• Unified Advocacy
• Public Education
Citizen Volunteer Monitoring

Background

• In the Coeur d’Alene DEQ office, CVMP began in 1987. Initiated as an EPA §314 Clean Lakes program.

• IdaH₂O began in 2011 through the University of Idaho and ultimately led to the Community Water Resource Center.

• Pend Oreille Waterkeeper began in Sandpoint in 2009 and initiated volunteer monitoring in 2012 on Lake Pend Oreille.
CVMP Monitoring Parameters

- For a typical medium sized lake, 300 - 1,500 surface acres, with maximum depths from 10 - 30 meters: 1 or 2 lake stations, and the routine is -
  - Measure Secchi disc depth.
  - Take sample at Secchi depth for Total P and Chlorophyll a.
  - Take sample 1 meter off bottom for Total P.
  - Do a temperature and dissolved oxygen profile at 1 meter increments.
IdaH₂O Physical Monitoring Parameters

• 8 participants and 12 sites in Fall 2013 event.
• Nitrate-N (HACH kit) Detection: 0.23-13.5 mg/L
• Total P (HACH kit) (CWRC lab) 0.05-1.5 mg/L
• Total coliform, E. coli: Quanti-trays MPN/100mL
• DO mg/L (Colorimetric: CHEMets by CHEMetrics)
• pH Colorimetric: AquaChek
• Temperature: Bulb Thermometer
• Physical characteristics: dry, weather, color, odor, clarity, width m, depth (15 cells) m
• Wolman Pebble Count Annually
• Velocity: 15 samples on discretion of sampler
IdaH₂O Biological Monitoring Parameters (3X/Yr)

• Macroinvertebrates #/Sample
  – Quality Group (High/Middle/Low)
  – Algae Mats
  – Habitat Parameters: Reach Length, Riffle/Run/Pool
  – Microhabitats: Algae mats, root wads, silt/muck/sand, leaf packs, rocks, weed beds (% cover), undercut banks, overhanging vegetation
  – Fish Presence
Pend Oreille Waterkeeper Monitoring Parameters

- 11 (15 in 2013) locations in LPO and POR; monthly events
- Secchi Depth, Chlorophyll a
- Dissolved Oxygen at surface: Colorimetry from HACH titration
- Temperature at 1 meter
- Total P, Ortho P, Total N, TKN, at Secchi depth
- Total Coliform Bacteria/e-coli (Quantitray)
LPOW Sample Locations
Reports

• CVMP Reports are generated using LakeWatch annually and presented and discussed at a Rathdrum Prairie Lakes Watershed Council Mtg.

• IdaH₂O Reports are posted online and summarized in newsletters.

• LPOW Annual Reports are shared with DEQ and LPOW BODs
Data Management

• CVMP data is submitted to DEQ CRO for LakeWatch entry
• IdaH₂O Data Manager enters data after review with Project Manager into spreadsheets and reports on website and Snapshot reports
• LPOW DM enters into Google Docs, summarizes and reports annually as well as interactive website.
Water Body Assessment

• EPA Tracking Database to determine Beneficial Use Support Status of surface waters
• External Data Quality is assessed by DEQ before utilizing in decision processes
• Same Quality Management System Requirements as DEQ Contractors; SOPs
• Data Not gathered under a DEQ-approved QAPP is considered Existing or Secondary data
  – Nondirect measurements
  – Define problem statement, data quality needs and criteria used to assess quality of data
LakeWatch

• Limnology Database produced by SevenO, a New Zealand limnology software group
  – Uses Burns and Carlson Trophic State Calculators to track trophic status
  – Evaluates Hypolimnetic Oxygen Depletion to evaluate O2 Demand
  – Query parameters are adjustable to annual, seasonal and total measured parameters with graphic display
## Fernan L2

### full record (1 Jan 1981 - 15 Apr 2013)

#### Percent Annual Change (PAC)

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<th>Chla (mg/m³)</th>
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#### Burns Trophic Level Index Values and Trends

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**Fernan Lake Trophic Trend Analysis**

Trend shows increasing eutrophication
Fernan TMDL Utilized CVMP Data for Nutrient TMDL

### Annual Averages

#### Epilimnion

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Application of CVMP Data

Suggested index periods for TMDL development on Fernan Lake.

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<td>April – May</td>
<td>June -Aug</td>
<td>Sept - Oct</td>
<td>Nov - Dec</td>
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1. Establish reasonable existing nutrient concentrations for the lake. This will be done using CVMP and any other physical and chemical data collected on Fernan Lake. Average nutrient concentrations will be estimated for each index period.
Target development based on trophic state and algal blooms of reference lakes.

- Available total phosphorus (TP) data show an annual period of elevated TP concentrations between August 15 and September 15, with a typical concentration of 31 micrograms per liter (μg/L). This equates to an existing TP load in Fernan Lake of 250 kilograms (kg) (550 pounds [lb]) at any time during the critical period.

- After evaluating different data sources (using a DEQ nutrient data analysis of regionally similar lakes, TMDLs for Black Lake and a shallow mesotrophic lake in eastern Washington, and other sources), DEQ concluded that it was reasonable to establish a water quality target for Fernan Lake that would be within the range that represented other mesotrophic lakes with infrequent blue-green algae blooms.

- As such, the TP water quality target established for the Fernan Lake TMDL is 20 μg/L. With a target concentration of 20 μg/L, the load capacity of Fernan Lake is 160 kg (350 lb) at any time during the critical period of August 15–September 15.
Williams Lake TMDL Targets included
Williams Lake Citizens Monitoring Committee Data

Figure 12 Trophic State Indices (from Carlson 1977).
Phosphorus TSI Target

• These load reductions are designed to eventually meet the established in-lake water quality target of 0.22 mg/L mean seasonal epilimnetic phosphorus that equates to TSI TP of 45.

• The Margin of Safety (MOS) factored into load reductions for phosphorus is explicit by identifying the end-point target of 0.22 mg/L which is 10% below the eutrophic threshold identified by Cooke et al. (1986). This represents an eventual reduction of 33% in mean total epilimnetic phosphorus sampled between June and September.
Winter Monitoring
Oxygen Depletion and Phosphorus Loading on Lakes

- Volumetric Oxygen Depletion uses depletion curve through summing DO in vertical column and comparing at 2 week intervals g/m2
- Internal loading from anoxic sediment interface accumulates through winter ice period and manifests with green algae bloom a couple weeks after ice-out.
- Gives a vision of available nutrients for the season and available oxygen=> days to potential winterkill or winter stress.
Summary of CVMP Monitoring

• Identifies trends over time
• Identifies potential anomalous years
• Guides Implementation planning
• Guides more detailed and complex monitoring
• Allows a community ownership of management of water quality and fisheries
• Excellent forum for information exchange
Potential Pitfalls to CVMP

- Misunderstanding of the use of data can lead to frustration and conflict based on expectations
- Organizational agendas may not be compatible with collective data needs
- Budget constraints lead to lowered priority for CVMP data
- Shift of volunteer group priorities
Is CVMP Important to Water Quality Management

- Networking, Information and Education, Outreach
- Awareness of water quality concerns and needs
- Collective ownership of management is more successful
- Resources are obtained through multiple sources increasing the sustainability of monitoring
Questions?

• Will volunteer data collection be washed out by the technical and legal needs of TMDLs?
• Are we able to manage water quality outside of the TMDL framework?
  – Only if waters remain full support
  – Only if permitting is possible to sustain water quality and hold the line against degradation
Other Questions?