Lake Fork Valley Land and Water Workshop

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Water Resource Specialist
Colorado Div Wildlife
Goals

• Why monitoring water quality?

• How Clean Water Act works in Colorado to protect and restore waters.

• What happens to waters that are “impaired” for desired uses?
Outcome is
- Information
- Decisions
- Action
- Restore/Protect
What Are Your Expectations (Reference Conditions)?

What Are Current Conditions?

How Do Current Conditions Compare with Expectation?

Typical Assessment Monitoring Design

Impairment

Restoration

High Quality

Protection
What Is “Healthy”?  

What is “Restore”?  

What is “Impaired”?  

What is natural or possible?
How get at information needed from monitoring?

ID Unique Combinations of

Uses/Purposes + Users/People = Information needed
<table>
<thead>
<tr>
<th>Reason or Data Use(s) Or Study Reason(s)</th>
<th>Evolution Overlap</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Condition and Trend Investigation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>B. Impact Investigation</strong></td>
<td></td>
</tr>
<tr>
<td>Non Point Source</td>
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<td></td>
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<tr>
<td><strong>D. Use Support Investigation</strong></td>
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</table>
Possible Monitoring Users

- Education target?
- Advocacy target?
- Local decision and policy makers
- Agency partners
- Industrial water users
- Recreational water users
- Recreational businesses
- Retailers of water recreation equipment
- Agricultural commodity groups
- Landowners

- Households
- Homeowners, associations
- Neighborhood associations
- Service clubs
- Environmental / Conservation organizations
- Non governmental organizations
- Soil or water conservation districts
- Watershed associations or groups
- Professional Organizations (construction, etc.)
- Specific socio-economic, age, gender, etc.
<table>
<thead>
<tr>
<th>Data User(s)</th>
<th>Are people that use the data these ways</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>Education/Community Inquiry</td>
</tr>
<tr>
<td>II</td>
<td>Community or Agency Advocacy/Planning</td>
</tr>
<tr>
<td>III</td>
<td>Regulatory/Legal</td>
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### Rigor
More than one target audience for each use
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<tr>
<td><strong>A. Condition and Trend Investigation</strong></td>
<td><strong>Assessment A-I</strong> General background information</td>
<td><strong>Assessment A-II</strong> Watershed Management Planning; 305(b) report</td>
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<td><strong>Assessment B-I</strong> Educate community or students about pollution impacts</td>
<td><strong>Assessment B-II</strong> Identify impacts for remediation</td>
<td><strong>Assessment B-III</strong> CWA Violations</td>
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<td><strong>Assessment B-IV</strong> Educate community or students about pollution impacts</td>
<td><strong>Assessment B-V</strong> Identify impacts for remediation</td>
<td><strong>Assessment B-VI</strong> CWA Violations</td>
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<td>C. Effectiveness Investigation</td>
<td><strong>Assessment C-I</strong> Educate students about effectiveness of BMPs, restoration projects</td>
<td><strong>Assessment C-II</strong> Evaluation of effectiveness of BMPs, restoration projects</td>
<td>N/A</td>
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<td>D. Use Support Investigation</td>
<td><strong>Assessment D-I</strong> Community or student education about use impacts</td>
<td><strong>Assessment D-II</strong> Watershed Management Planning; 303(d) report</td>
<td><strong>Assessment D-III</strong> CWA violations</td>
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Clean Water Act Federal and State
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Clean Water Act Federal and State
Colorado CWA Uses

Agriculture

Recreation

Aquatic Life

Drinking Water
Assigning Uses

Protecting Uses - Criteria

• Numeric / Narrative
• Chemical (#)
• Physical (Narrative)
• Biological (both?)
Uses become Administrative Segments to manage pollutants

- WBID = Water Body ID
- CO = Colorado
- GU = Major Basin
- UG = Sub-basin
- 03 = segment

WBID = COGUUG01
WBID = COGUUG02
WBID = COGUUG03
Numeric Standards

- Physical and Biological Indicators
- Inorganic (nutrients)
- Metals

- Default Table Values
- Site Specific
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<tr>
<th>Stress</th>
<th>Exposure</th>
<th>Response</th>
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<td>Pollution</td>
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<td>Critter Community</td>
</tr>
<tr>
<td>Loading (lbs./day)</td>
<td>(Levels mg/L)</td>
<td>Health</td>
</tr>
<tr>
<td>Land Use Patterns (% Impervious)</td>
<td>Sediment Movement</td>
<td>Geomorphology</td>
</tr>
<tr>
<td></td>
<td>Particle Distribution</td>
<td>(stability or habitat quality)</td>
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Exposure to Numeric Chemical Stds

Exceedances
• Acute
• Chronic

Exposure
• Magnitude
• Frequency
• Duration

Metal Result
Metal Standard
Stress, Exposure, and Response Indicators

**Stress**
- Pollution Loading (lbs./day)
- Land Use Patterns (% Impervious)

**Exposure**
- Pollution (Levels mg/L)
- Sediment Movement
- Particle Distribution

**Response**
- Critter Community Health (biometrics)
- Geomorphology (stability or habitat quality)
Numeric Standards

• Community structure and function
• Macroinvertebrate metrics
• Aquatic Vegetation metrics
• Fisheries metrics
• Statistical or not (species list vs diversity index)
Healthy vs Impaired Segments

- 305(b) Report status of monitoring and which segments met uses and those that did not go on a list--

- Called the impaired list or 303d list

Aquatic Life
Impaired for Zn

Aquatic Life
Recreation
Drinking Water
Agriculture

Aquatic Life
Drinking Water
Once a segment on 303d list

PROCESS
• Determine extent Zn Exc
• Sources of Zn
• “treatments” for sources that would
• Reduce Zn load to level that meets standard-protects uses
• Implement Plan

Aquatic Life Impaired for Zn

Total Maximum Daily Load TMDL
Once a segment on 303d list

PROCESS

• Once have a TMDL or restoration plan

• Monitoring implementation of plan to see if reducing Zn levels to protect uses

Standard Exceedances measured in concentration like mg/l of Zn – toxicity indicator

TMDL’s measured in loading, like pounds of zinc per day- use quantity of water Zn is floating in

Analyses goes back and forth between concentration and loading
Thank You

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