Bear Creek Watershed
Jefferson, Clear Creek & Park Counties, Colorado

Total Phosphorus Wasteload Allocations, Effluent Limits, Monitoring, Alternatives & Watershed Control Measures

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The Bear Creek Watershed Association protects & restores water & environmental quality within the Bear Creek Watershed from the effects of land use.
What are the Nutrient Issues?

- Point Sources (Wastewater)
- Nonpoint Sources (Septic & General)
- High Quality Water Supplies (Direct Influent)
- Stormwater
- Atmospheric
- Public/Agency Perception of Problems

- Monitoring Based Program (64 sites)
  - Bear Creek Reservoir (input/output)
  - Bear Creek & Turkey Creek Drainages
    - By segments (Re-classifications)
    - Bracket wastewater treatment plants
    - Wilderness
    - Critical fisheries
    - Key habitat/Macroinvertebrate areas
- Annual Reporting
- Total Value = $91,000 per year
  - Cash $36,000; In-kind $55,000
Success in Wastewater Management

<table>
<thead>
<tr>
<th>Bear Creek Watershed Wastewater Treatment Plant</th>
<th>Phosphorus Pounds/ year</th>
<th>2010 Phosphorus Pounds/ year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evergreen Metropolitan District</td>
<td>1,500</td>
<td>274.23</td>
</tr>
<tr>
<td>West Jefferson County Metro District</td>
<td>1,500</td>
<td>278.69</td>
</tr>
<tr>
<td>Genesee Water and Sanitation District</td>
<td>1,015</td>
<td>506.83</td>
</tr>
<tr>
<td>Town of Morrison</td>
<td>600</td>
<td>143.41</td>
</tr>
<tr>
<td>Kittredge Sanitation and Water District</td>
<td>240</td>
<td>56.04</td>
</tr>
<tr>
<td>Forest Hills Metropolitan District</td>
<td>80</td>
<td>52.88</td>
</tr>
<tr>
<td>Conifer Metropolitan District</td>
<td>80</td>
<td>6</td>
</tr>
<tr>
<td>Aspen Park Metropolitan District</td>
<td>40</td>
<td>9.65</td>
</tr>
<tr>
<td>Jefferson County Schools – Mt. Evans Outdoor School</td>
<td>20</td>
<td>1.79</td>
</tr>
<tr>
<td>Jefferson County Schools - Conifer High School</td>
<td>110</td>
<td>1.12</td>
</tr>
<tr>
<td>Bear Creek Development Corp. - Tiny Town</td>
<td>5</td>
<td>0.81</td>
</tr>
<tr>
<td>Bear Creek Cabins (Bruce &amp; Jayne Hungate)</td>
<td>5</td>
<td>0.48</td>
</tr>
<tr>
<td>Brook Forest Inn</td>
<td>5</td>
<td>1.58</td>
</tr>
<tr>
<td>Geneva Glen</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Operational Facilities</strong></td>
<td></td>
<td><strong>1333.51</strong></td>
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<tr>
<td>The Fort</td>
<td>18</td>
<td>No Monitoring^2</td>
</tr>
<tr>
<td>Singing River Ranch</td>
<td>30</td>
<td>Not Operational</td>
</tr>
<tr>
<td>Reserve Pool</td>
<td>2</td>
<td>Not used 2010</td>
</tr>
<tr>
<td><strong>Total Phosphorus Wasteload</strong></td>
<td></td>
<td><strong>5,255 lbs/year</strong></td>
</tr>
</tbody>
</table>

Single-factor Adaptive Management based on a flexible, comprehensive and continuous data collection and management program coordinated by a watershed manager

- Control Regulation
  - 1 mg/l Total Phosphorus
- Wasteload Allocations
- Trading Program (active)
- County Erosion Control
- Project Development Review
- Increased Public Support
Bear Creek & Turkey Creek Above BCR Total Phosphorus (ug/l)

Turkey Creek Inflow  Bear Creek Inflow

Growing Season Average (July–September)
Total Phosphorus BCR @ ~1m

Growing Season
Average, 47; Median, 43

Control Regulation July 1992
Alternatives & Cost Considerations

- **Reservoir Narrative Standard** – Flexibility
  - Updated in 2009 to Chlorophyll (10 ug/l) and Total Phosphorus standards (32 ug/l)

- **Cost effectiveness of 1 mg/l effluent standard**
  - Much higher cost below 1 mg/l
  - Keep initial cost for small treatment systems below $20,000
  - Keep initial cost for bigger systems below one million dollars
    - Conversions – Evergreen Metro $435,000; West Jefferson Metro $1,202,000; Kittredge $700,000; Morrison $500,000; New – Aspen Park 2.2 million; Conifer 1.7 Million
    - Estimate for 16 plants to convert to 1 mg/l – $8.28 million (1994 Dollars)
    - Planned Upgrades & New Plant – $8.29 million (2010 Dollars)
    - Operations – 2.14 million (Over 16 years)
    - Cost for Wastewater Treatment Plants to meet Total Phosphorus (2011) = $18,710,100
    - Expectation for future effluent limit 0.2 mg/l

- **Make septic systems as point source or leave as nonpoint source?**
  - 27,000 systems generating over 25,000 Lbs Phosphorus

- **Focus on downstream reservoir or watershed monitoring** (Reservoir first, Now complete watershed)

- **Factor in water rights** (ditch diversions) and **Source Controls** (Drinking Water) ?

- **Factor in watershed nonpoint source controls** (County and/or watershed Association)

- **Leave Stormwater up to MS4s**

- **Factor in land use practices and development review**
What we learned

- Think watershed, not just bracketing treatment plants
  - Nutrient management starts at a watershed level
  - Total Phosphorus is manageable
  - Nitrogen looks more difficult

- Monitoring must be flexible & affordable
  - Data collection need not be scary

- Be careful, the data can surprise you

- Difficult to produce convincing data
  - Be adaptive – not everything will work
Making a Difference