Rewards, Challenges, Approaches and Solutions for Developing the Soos Creek Bioassessment TMDL

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Rewards, Challenges, and Approach for Developing the Soos Creek Bioassessment TMDL

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Stephanie Brock
Washington State Department of Ecology
Goal and Purpose

- Expand TMDLs to cover aquatic life beneficial uses and better incorporate stormwater pollutants and impacts
  - Benthic Macroinvertebrate Scores
  - Flow Metrics
  - Land Use
- Develop meaningful measures or targets for allocations/implementation requirements
TMDL Examples from Other States

- **Potash Brook, Vermont (7 mi²)**
  - Use an “attainment watershed” approach to set modeled flow reductions for land uses to meet state biocriteria.

- **Eagleville Brook, Connecticut (2.4 mi²)**
  - EPA Stressor ID Process indicated stormwater as primary stressor
  - Correlated aquatic life to impervious cover
    - TMDL Target is 12% impervious cover (IC)

- **Maine (7 watersheds) - *urban stream syndrome***
  - Combination of pollutants and non-pollutant aquatic life stressors related to stormwater runoff.
  - Loading capacity = greatest amount of impervious cover each watershed can support without violating stream segment’s assigned aquatic life criteria.

<table>
<thead>
<tr>
<th>Maine</th>
<th>Class AA/A</th>
<th>Class B</th>
<th>Class C</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC TMDL TARGETS</td>
<td>&lt; 5%</td>
<td>&lt; 9%</td>
<td>&lt; 16%</td>
</tr>
</tbody>
</table>
Soos Creek Pilot TMDL

- Originally, TMDL for temperature and DO (70-mi^2)
- Local flow and bug studies - became a pilot for using that data for stormwater allocation development (off critical period)

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>WATERBODY NAME</th>
<th>BASIS (B-IBI Scores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>BIG SOOS CREEK</td>
<td>24 - 28</td>
</tr>
<tr>
<td>5</td>
<td>UNNAMED CREEK (TRIB TO BIG SOOS CREEK)</td>
<td>14 - 16</td>
</tr>
<tr>
<td>5</td>
<td>LITTLE SOOS CREEK</td>
<td>18 – 36</td>
</tr>
<tr>
<td>2</td>
<td>BIG SOOS CREEK</td>
<td>26 – 32</td>
</tr>
<tr>
<td>2</td>
<td>BIG SOOS CREEK</td>
<td>24 – 46</td>
</tr>
<tr>
<td>1</td>
<td>BIG SOOS CREEK</td>
<td>32 – 44</td>
</tr>
</tbody>
</table>
Bioassessment to Support the Soos Creek TMDL

- Contractor collected BMI & periphyton at 6 sites in summer 2012
- B-IBI and RIVPACS scores calculated for each site
- Individual biometrics calculated and compared to determine if correlations exist for the following:
  - Measured physical features (temperature, DO, stream velocity)
  - Streamflow
  - Landuse
Bioassessment - Conclusions

- Statistically significant relationships were observed between a number of the biometrics and the following:
  - Water Quality
    - pH, DO, temperature
  - Stream Geomorphology
    - Gradient, velocity, flow, substrate composition, embeddedness, bank instability
  - Riparian Condition
    - Canopy cover
WRSA9 Retrofit Project – Flow Indicators and Targets

- Use an **indicator** (e.g., 2-year peak:mean winter base flow ratio) to link both watershed conditions and aquatic health and identification of **targets** (e.g., indicator value <10) necessary to meet a protection **goal** (e.g., B-IBI>90 percent of maximum).

\[
\text{Ln (\% Max. B-IBI Score)} = -0.066\times\text{HPC} + 4.50 \\
R^2 = 0.745
\]
Proposed Approach

- Select a protection **Goal**
  - BIBI score of 38
- Calculate the hydrologic **Indicators** developed by Horner for Soos Creek
  - High Pulse Count and High Pulse Range
- Use the HSPF model to calculate the corresponding **Target**
  - Stormwater Flow Reduction
Potential Allocations

- Effective shade
- Stormwater flow treatment or reductions
- Biological endpoint targets
Challenges

- First Washington TMDL with B-IBI (bioassessment)
  - Local target for the watershed?
- Policy decisions
  - Surrogates, standards...
- Pilot – 1st TMDL with surrogate hydrologic metric WLAs?
- Level of correlation is good between HPC:B-IBI, but there are other factors affecting aquatic health
  - Meeting the surrogate allocation may not be sufficient to meet the B-IBI target.
- New approach = learning curve
Rewards

- Address all three facets of the Clean Water Act
  - Biological, chemical, and physical
- 1st bioassessment TMDL in Washington state
- Address stressors and allocate meaningful targets contributing to “urban stream syndrome”
- Expand and utilize the bioassessment data collected by Ecology, King County and others
- Teach old TMDL dogs new tricks (expand the knowledge base)
Thanks!

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