

TMDLs

Who, what, when, where, why,
and how? With examples from
the Bear-Evans watershed

TMDL =

- **L**oad – mass of pollutant
 - Can include temperature, or bacteria
- **D**aily – expressed as daily total
- **M**aximum – for the whole waterbody
- **T**otal – from all sources
 - Allowed to enter a waterbody

Who?

- EPA has been provided the power to regulate waters in interstate commerce by Congress
- Ecology has been delegated the regulatory authority by EPA
- Ultimately all TMDLs must be approved by EPA, just like with a water quality standard

What?

- May be applied to any "Water of the State"
- **"Surface waters of the state"** includes lakes, rivers, ponds, streams, inland waters, saltwaters, wetlands and all other surface waters and water courses within the jurisdiction of the state of Washington. (WAC 173-201A-020)
- Does not include stormwaters, ditches, man-made ponds...

What? continued

1. EPA and States regulate point sources
2. Some water bodies fail to meet quality goals despite these regulations
3. TMDLs are a site specific mechanism to adjust point and non-point loadings to bring a WB into compliance

What? continued

- A TMDL estimates:
 - The amount of pollutant allowable from each source which cumulatively allows the waterbody as a whole to remain within water quality standards
 - Must account for seasonal variations
 - Must include a margin of safety accounting for lack of knowledge between effluent limits and water quality

What not?

- Ecology and EPA cannot address flow regime or quantity via a TMDL
 - The CWA does not supplant existing water rights or water law.
 - Ecology cannot alter existing water rights via a TMDL

When?

- Congressional delegation for site specific standards for impaired waters occurred in 1972 via the Clean Water Act (although similar provisions on point sources existed earlier)
- 198? – Ecology submits first TMDL to EPA
- 198? – EPA rejects TMDL because they are unprepared to address all of the “issues”
- Limited TMDL activities through the 1980s

When? continued

- 1991, NW Environmental Law Advocates and NW Environmental Defense sue EPA and Ecology for not addressing impaired waterbodies
- 1998, suit settled
- Establishes a 15-year schedule to develop TMDLs for 666 water segments not meeting or not expected to meet water quality standards
- Schedule based on 1998 303d list

When? continued

- Ecology has been tasked with compliance with the consent decree
- Provides EPA *30 days* to write their own TMDL if they disapprove of Ecology's
- Ecology typically addresses a few waterbodies in a basin on a 5 year rotation throughout the state

Where?

- 1st Waters must be identified as “impaired” per Section 303d(1)(A) of the CWA
- TMDLs can be applied to waters which are not listed but which meet criteria for listing
 - Discovery of new or additional impairments is common during a technical study

Why?

- To establish site specific effluent quality criteria which provide for attainment of applicable water quality standards.
- Develop an implementation plan to achieve standards based on the technical study

How?

1. Listing as impaired
2. Stakeholder outreach
3. Technical study
4. Technical Report
5. Detailed Implementation Plan
6. Follow-up?

What they aren't?

- NOT
 - new water quality standards
 - a "permit"
 - related to enforcement
 - fast

Listing process

- Call for data for next list ends today
- Data must meet new quality guidelines
- Assessment process
- List publication
- Public Comment
- Finalize list
- Repeat...

Potentially applicable standards

- WA water quality standards
 - New temperature revisions from EPA
 - Sept 15th drop for 16C to 13C to further protect spawning
- National Toxics Rule standards
 - Water
 - Tissue back-calculated to water
- WA sediment quality standards
 - Chemistry
 - Bioassay

Bear Creek

- Bear Impairments
 - Dissolved Oxygen
 - 3 listed segments
 - Temperature
 - 4 listed segments
 - Fecal coliforms
 - 4 listed segments
 - But not part of this study

Evans Creek

- Evans Impairments
 - Dissolved Oxygen
 - 2 listed segments
 - Temperature
 - 1 listed segments
 - Fecal coliforms
 - 2 listed segments
 - But not part of this study

Cottage Lake Creek

- Dissolved Oxygen
 - 1 listed segment
- Temperature
 - 1 listed segment

Technical Study of Loadings

- Uses the QUAL2Kw model to simulate river and stream conditions
 - One dimensional. The channel is well-mixed vertically and laterally.
 - Steady flow. Non-uniform, steady flow is simulated.
 - Diel heat budget. The heat budget and temperature are simulated as a function of meteorology on a diel time scale.
 - Diel water-quality kinetics. All water quality state variables are simulated on a diel time scale for biogeochemical processes.
 - Heat and mass inputs. Point and non-point loads and abstractions are simulated.
 - Phytoplankton and bottom algae in the water column, as well as sediment diagenesis, and heterotrophic metabolism in the hyporheic zone are simulated.
 - Variable stoichiometry. Luxury uptake of nutrients by the bottom algae (periphyton) is simulated with variable stoichiometry of N and P.
 - Automatic calibration. Includes a genetic algorithm to automatically calibrate the kinetic rate parameters.

Temperature and DO model inputs

Parameter	Type	Instrument	Bear-Cottage	Evans
Water temp	Continuous	Tidbit	14	10
Air temp	Continuous	Tidbit	4	2
Relative humidity	Continuous	RH probe	4	2
DO, pH, temp, conductivity	Continuous	YSI	8	5

Productivity model inputs

Parameter	Type	Instrument	Bear-Cottage	Evans
DO, pH, temp, conductivity	instantaneous	YSI plus hydrolab	15	10
Total N and P	Grab	Lab	15	10
Dissolved nitrate-nitrite, ammonia, orthoP	Grab	Lab	15	10

Productivity model inputs, cont'

Parameter	Type	Instrument	Bear-Cottage	Evans
Chlorophyll A	Grab	Lab	15	10
TOC, DOC, alkalinity	Grab	Lab	15	10
Periphyton	Grab	hybrid	8	5

Flow, travel, and shade, model inputs, cont'

Parameter	Type	Instrument	Bear-Cottage	Evans
Flow	Instantaneous	Flow meter + rod	15	10
Tracer	Continuous	Lab	3 release 4 monitor	3 release 3 monitor
Shade	Instantaneous	Hemiview camera	14	5

Current Status

- Data gathering finished
 - Summer 2006
- Modeling in 2007?
- Final Report in late 2007?
- Implementation plan in 2008?