Water and Sediment Quality in the Sammamish River

Results of a 3 Year Study

Jenée Colton, Risk Group
Today

- Sammamish River background
- Study objectives
- Study design
- Data analysis
- Results
  - metals and organics only
  - no EDCs
- Summary and Conclusions
The Sammamish River

- Heavily modified system
- Slow-moving river
- Migration corridor for fish and wildlife
- Increasing human development
- Surrounded by cities of Redmond, Woodinville, Bothell
- Very little chemistry data exist
Study Objectives

- Collect baseline chemistry and benthic macroinvertebrate community data for the river
- Provide baseline data for water reuse project
- Provide information for use by other programs (e.g., salmon recovery)
Sampling Stations

- Bothell Landing Park Bridge
- Below Little Bear Creek
- Below Woodin Creek
- Unnamed Tributary at 145th Street Bridge
- Unnamed Tributary at 124th Street Bridge
- 116th Street Bridge
- Bear Creek
- 90th Street Bridge
- Below Bear Creek
- Marymoor Park Bridge
- WDFW Boat Launch
- L. Washington
- L. Sammamish
- Little Bear Creek
- North Creek
- Swamp Creek
Study Design

- Sediment
  - Collected each fall in 2001, 2003
  - Surface grab samples
  - Nutrients, conventionals, metals, SEM/AVS, organics analyses

- Benthic macroinvertebrate community
  - Results not complete
Study Design (continued)

Water

- Nutrients, bacteria, conventionals, total and dissolved metals, organics, and EDC analyses
- USGS
  - EDC analysis for 2001
  - Wastewater Method

Presenting only metals and organics results
Data Evaluation

- Average duplicates
- Determine maximum for each station
- Comparison to thresholds
  - Aquatic life thresholds for sediment and water
  - Human health thresholds for water
Ecological Thresholds

Sediment
- TELs/PELs (Smith et al. 1996)
- New Floating Percentile Values (Michelson 2003) - SQS, CSL, STAT

Water - Prioritized
- WAC
- AWQC
- ECOTOX database sources
Human Health Thresholds

- National Toxics Rule - mandated by EPA
- National Recommended Quality Criteria - guidelines by EPA
- Sediment quality not assessed for human health
Results

_detected in sediment_
- 10 metals, TBT and its derivatives,
- 11 PAHs,
- 2 phthalates,
- 6 other organics

_detected in water_
- 14 metals,
- 6 pesticides,
- 8 PAHs,
- 3 phthalates,
- 2 other organics
# Results - Metals in Sediment

<table>
<thead>
<tr>
<th>Station</th>
<th>Arsenic</th>
<th>Nickel</th>
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<tbody>
<tr>
<td></td>
<td>TEL</td>
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## Results - Organics in Sediment

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<tr>
<th>Station</th>
<th>Di-N-Octyl Phthalate</th>
<th>Benzo(a)-anthracene</th>
<th>Benzo(a)-pyrene</th>
<th>Fluoranthene</th>
<th>Phenanthrene</th>
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## Results - Metals in Water

<table>
<thead>
<tr>
<th>Station</th>
<th>Dissolved Iron Acute</th>
<th>Total Arsenic NTR/NRHH</th>
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## Results - Organics in Water

<table>
<thead>
<tr>
<th>Station</th>
<th>Benzo(a)-anthracene</th>
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</table>
Results - Water by USGS lab

- 13 detected organics
- 3 with aquatic life or human health thresholds
- No exceedances
- EDCs being evaluated - some detected
Spatial differences

Unnamed Tributary at 124th Street
- Most exceedances for water (PAHs)
- All exceedances < 2

Below Woodin Creek
- Most exceedances for sediment
- Consistently largest ratios for sediment
- Blank contamination for some PAHs
Summary - Sediment

Arsenic in sediment
- Exceeds TEL and PEL
- Localized
- Not speciated - proportion inorganic?

Nickel in sediment
- Natural element
- Exceedances are all slight (< 2); only TEL
Summary - Sediment

❖ PAHs in sediment
  ◆ Only TEL exceeded
  ◆ Blank contamination in 2001 BAP data
  ◆ PAHs are ubiquitous; sources may not be local

❖ Di-N-Octyl Phthalate
  ◆ Only detected at 90th Street Bridge
  ◆ Exceedance is slight (Ratio = 1.5)
Summary - Water

Iron in Water (Aquatic Life)
- No Washington or EPA acute standard for iron
- Iron threshold for water based on a single toxicity study

PAHs in water (Human health)
- Exceedances slight
- Mainly at one station (Unnamed trib. At 124th)

Bis(2-ethylhexyl)phthalate in water (Human health)
- Exceeds both criteria at three stations
- Blank contamination may be a factor
Summary - Water

❖ Arsenic in water (Human health)
  - Consistent across stations
  - Within range measured in WA lakes (Jack 2003)
  - Below range of anthropogenic input for WA streams (Johnson and Golding 2002)

❖ USGS
  - No exceedances
  - EDCs - work in progress
Conclusions

- Water quality is very good
- Sediment quality is good
- Investigate source of discharge water at 124th Street?
- Examine possible sources of elevated PAHs in sediment below Woodin Creek