Lunch Break

We’ll resume at 1:00
Welcome to the SAM Priorities Workshop for Receiving Waters

Dana de Leon, City of Tacoma
SWG Chair
February 27, 2019
Stormwater Action Monitoring (SAM) is

Collaborative
Regional

Funded by permittees in Western Washington: 91 cities, towns, counties; 2 ports; WSDOT

Funded in-kind by Ecology, WSDA, USGS, Redmond, Penn Cove Shellfish, Cedar Grove, hundreds of mussel monitoring volunteers

SAM’s goals:
To improve stormwater management, reduce pollution, improve water quality, and reduce flooding by measuring stormwater impacts on the environment and evaluating the effectiveness of stormwater management actions
Regulatory Context for SAM and How SAM Works

Karen Dinicola, SWG Project Manager
Ecology’s Policy and Technical Lead Stormwater Adaptive Management
February 27, 2019
SAM is a new approach

• Replaces monitoring by individual MS4 permittees that was
  • Compliance focused
  • Complicated and expensive
• Permittees requested a different approach
• PCHB agreed
• Huge effort to launch and maintain
Investigations to answer key questions

- Are we protecting receiving waters?
- Are conditions getting better or worse?
- What works and under what conditions?
- How can we better address common problems?
So many things we might monitor…

Who gets to decide?
Everyone gets to weigh in

- Stormwater Work Group is SAM’s Steering Committee
  - Sets priorities
    - Sends recommendations to Ecology
  - Selects and approves studies
  - Formal oversight process
Permittees choose to either:

- Pay into the cost-share fund for SAM, or
- Conduct individual monitoring

Decisions about SAM’s priorities and study selection take place outside of the permit.

Annual SAM payments completely fulfill permit monitoring requirements in S8.
Freedom from the shackles!

- Diversity of topics
- Mix of short- and long-term projects
- No timeframes or ceilings
- Many studies are longer, larger than typical grant projects
- Multi-year studies can be done in phases
- Share interim findings
Context for Future
SAM Receiving Water Monitoring

Brandi Lubliner, SAM Coordinator
February 27, 2019
Status and Trends in receiving waters 2013-2018

- Environments monitored:
  - Puget Lowland streams
  - Puget Sound nearshore

- What’s measured:
  - Water quality
  - Sediment quality
  - Biotic endpoints
Puget Lowland Ecoregion Streams (PLES)

• EPA’s randomized site design
  • 100 sites sampled year of 2015
• 20 agreements
  • 100s of parameters: chemistry, biology, habitat, watershed landuse
• Team: USGS, King Co, San Juan Island CD, Snohomish Co, Ecology-EAP, & 13 labs
PLES design variables:

- Within and outside urban growth area (UGAs)
- Whole year of monthly water quality
  - Conventional parameters, metals, PAHs, stream flow
- Single summer watershed health monitoring
  - Water quality (conventional parameters)
  - Benthic macroinvertebrates
  - Periphyton
  - Sediment chemistry (TOC, metals, phthalates, PAHs, PCBs, PBDEs, common roadside-use pesticides)
PLES Findings - comparison to standards

- Criteria exceedances were not a widespread problem.
  - Within UGAs: streams in poorer condition for fecal coliform and total phosphorus
  - Within UGA = Outside UGA
    - similar rate of exceedance of temperature, pH, and dissolved oxygen
    - Sediment quality standards not typically exceeded
  - Outside UGA: metals typically below acute or chronic standards for aquatic life.

Fecal Coliform Bacteria

<table>
<thead>
<tr>
<th>Percent of Stream Length</th>
<th>Outside UGA</th>
<th>Within UGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;100 FC/100 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;100 FC/100 mL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PLES Findings - important stressors for B-IBI scores

<table>
<thead>
<tr>
<th>Stream Health Category</th>
<th>Significant Stressors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land cover</td>
<td>• Watershed Canopy Cover</td>
</tr>
<tr>
<td></td>
<td>• Riparian Canopy Cover</td>
</tr>
<tr>
<td></td>
<td>• Percent Urban Development</td>
</tr>
<tr>
<td>Water</td>
<td>• Total Nitrogen</td>
</tr>
<tr>
<td></td>
<td>• Total Phosphorus</td>
</tr>
<tr>
<td>Sediment</td>
<td>• Total Zinc</td>
</tr>
<tr>
<td></td>
<td>• Substrate Embeddedness</td>
</tr>
<tr>
<td></td>
<td>• Substrate Particle Diameter</td>
</tr>
</tbody>
</table>
Puget Sound nearshore

- Mussels (WDFW) sampled winter 15-16 and 17-18
- Sediment chemistry (USGS, WDNR, King Co), summer 2016
- Bacteria (Ecology, DOH)
  - No sampling, data compiled from 27 entities, 2010-15
Mussel cages deployed & retrieved by 100+ volunteers.
Nearshore Mussels Findings

- Mussels are effective biotic endpoint in the nearshore environment and are a good tool for the randomized study design.
- PAHs, PCBs, PBDEs, and DDTs were the most abundant organic contaminants in mussel tissue.
- Concentrations significantly higher in urbanized areas as measured by -
  - Municipal Land-Use Classification (City vs. Unincorporated-UGA)
  - Impervious Surface in Adjacent Watersheds
- Concentrations of metals in mussel tissue were relatively low.
Nearshore Sediment Findings

• Sediment chemical concentrations are generally low and below current State criteria.

• Sediment chemical concentrations not related to land cover, like mussels data showed.

• Current randomized probabilistic design appropriate for Puget Sound status and trends as a whole, but future sampling of nearshore sediment will need to take into consideration the effects of drift cells to examine specific stormwater management actions.
Nearshore bacterial data review – Recommendations to SWG

• A new regional sampling program does not appear to be needed.
  • Puget Sound is too large for a storm chasing focus, and ambient bacteria levels tracked by BEACH and DOH Shellfish sound-wide.

• IF a new stormwater bacteria focus, then:
  • Find sites co-located with outfalls or mouths of rivers and streams that drain densely populated urban areas.
  • Standardize method of collection. BEACH or DOH Shellfish differ (boat vs wade in)
  • Consider effectiveness study objectives where changes may be measured due to source control and treatment activities in draining watershed. Need more specific questions.
“Add-on” to SAM Receiving Water Studies

- Leveraging the SAM sites is cost effective - ideal for exploratory work.
- WSDA added to PLES
  - pesticides in stream sediments
- USGS & WDFW added to nearshore
  - micro plastics methodology in sediments and mussels
  - pharmaceuticals in mussels
Adjustments to the Core Design for SAM Status and Trends

Keunyea Song, SAM Scientist
February 27, 2019
Receiving Water Monitoring Design

Status and Trend Scientists
Abby Barnes, Bob Black, Curtis DeGasperi, Karen Dinicola, Leska Fore, Mariko Langness, Jennifer Lanksbury, Chad Larson, Brandi Lubliner, Rich Sheibley, Keunyea Song
Monitoring Design Adjustment

• **One-year process** for determining overall scientific framework
  - **Review** previous studies (Jan-April 2018)
  - **Eight** team meetings (April-Dec 2018)
  - **One** consultation meeting with Tony Olsen (May 14, 2018)
  - **Two days training** session in EPA (Jun 23-24, 2018)
  - Spatial design & analysis **workshop** (Oct 23-24, 2018)
  - Joint PSEMP workgroup meeting (Feb 6, 2019)
  - **SAM public workshop** (Feb 27, 2019)
Confirming the questions

Are we protecting receiving waters?

Q.1. What is the current condition of receiving waters in Puget Sound?

Q.2. How does the condition of receiving waters change over time in relation to urban growth and stormwater management efforts in the region?
Monitoring Design
GRTS probabilistic spatial design
Monitoring Design
GRTS probabilistic spatial design

Generalized Random Tessellation Stratified Design (GRTS)

Random Site selection
Monitoring Design Adjustment 1: Receiving water identification
Monitoring Design Adjustment 2: Study area-Small streams

Target: watershed size within 2.5-50 km²

NHD high res layer
Monitoring Design Adjustment 3: Study area-Nearshore

NHD high res layer
Monitoring Design Adjustment 4: Stratification by percent impervious

More sites in urban areas
Monitoring Design Adjustment 5: Focus of Integrated Indicators

- **Integrated health indicators**
  - Sediment chemistry (streams)
    - ✔ metals,
    - ✔ organic chemicals,
    - ✔ nutrients and
    - ✔ basic conventional parameters
  - Biotic endpoints
    - ✔ benthic macroinvertebrates, periphyton, & mussels

- **Add** continuous stage monitoring for water flow information

- **Water sampling:** **Drop** monthly sampling
## Index period water sampling?

<table>
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<th>Index period</th>
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<td>Pesticides</td>
<td>Spring</td>
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<td>1-2 months prior to B-IBI sampling</td>
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Monitoring Design Adjustment 6: Frequency of Monitoring

**Objects**
- Strong trend power (Revisit the same sites)
- Strong regional status power (New site visits)
- Captures annual climate variations

**S&T team meetings**
- Before: Streams-
  - Once (105 sites)
  - Every 5 years
- Before: Mussels-
  - Once (40 sites)
  - In 2 years - same
- Before: Nearshore sediment-
  - Once (40 sites)
  - In 5 years

**New**
- Streams-
  - New + Revisit sites
  - Every year (~30 sites)
- Mussels-
  - New + Revisit sites
  - Every 2 years (~30 sites)
- Nearshore sediment-
  - Less frequently
  - (every 10 years)
Monitoring Design Adjustments

Summary

• Streams and nearshore sites selected probabilistically on updated NHD high-res, extended nearshore study area.

• Stratification of region using impervious cover (%) gradient

• Focus on integrated response to stormwater on receiving water

• Continuous monitoring of stage

• Combination of new sites and revisited sites to improve status and trend power

• Streams every year, mussels every 2 years, nearshore sediment every 10 years
Table Discussions

1) Feedback on the adjustments to the core design (10 min)

2) Priorities for an “index period” for stream water quality sampling (15 min)

3) Priorities for questions to answer with other receiving water studies (20 min)
Table Discussion #1

10 minutes for this discussion
## Index period water sampling?

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Table Discussion #2

15 minutes for this discussion
“Add-on” studies?

- Special studies could answer any number of questions
- Not likely SAM can do more than 1 or 2 this permit term
  
  OR

- SAM could do more analysis of the data already collected
Table Discussion #3

20 minutes for this discussion
Report out
What’s Next?

• SWG will use feedback from today to compile a set of draft recommendations
  • Draft package will be completed at March 20 meeting
  • SWG Caucuses will discuss
• Final decisions at June 5 SWG meeting
• Next round of mussel monitoring this winter
• Next round of stream monitoring next year
More information

SWG webpages sites.google.com/site/pugetsoundstormwaterworkgroup
  • SWG meeting dates, agendas, and materials
  • SWG and SAM listserv signup links

SAM webpages ecology.wa.gov/SAM
  • Final project reports and Fact Sheets for each finished project
  • SAM annual reports and quarterly budget reports
Thank you!!