**STORMWATER WORK GROUP**

# Regional Workshop Summary Report

May 19, 2009

Prepared for:
Stormwater Work Group

Prepared on:
June 30, 2009

Prepared by:
Norton-Arnold & Company

# Workshop Summary Report

Approximately 160 stormwater professionals gathered for a regional workshop on Tuesday, May 19, 2009 at the Renton Community Center. This all-day event was designed to share new information about statistics, research, and approaches to stormwater monitoring. In addition, the workshop was designed to gather feedback from attendees regarding the key assessment questions a stormwater monitoring program might address, and especially as those questions relate to the ongoing work and anticipated products from the Stormwater Work Group. The workshop was also designed to allow for participants to highlight key concerns and issues to consider when developing an integrated stormwater monitoring and assessment strategy.

The information gathered at this event will be used to shape and influence the draft Regional Stormwater Monitoring and Assessment Strategy, which is due to be completed in October 2009. A second workshop will then be held to receive comments, feedback, and advice on the draft monitoring and assessment strategy. This feedback will, in turn, be used to shape and influence the final strategy.

## *Workshop Format*

The workshop included a number of presentations, but much of the day was also devoted to small-group discussions that enabled attendees to share their thoughts, perspectives, and ideas directly with Work Group members. The agenda for the workshop is included in Appendix A. During the breakout sessions, seven discussion groups were conducted at the same time, with each discussion group working through the same list of topics. The discussion guides used for these sessions are included in Appendix B to this report. Workshop participants are listed in Appendix C.

The first discussion session was focused on a review of key assessment questions associated with "Monitoring the Efficacy of Management Actions." Each group was asked to comment on the list of questions that the Work Group is currently wrestling with in the development of the Regional Monitoring Plan – are they the right questions, and, if not, what should be added to them? And, they were asked to share any additional ideas for the Work Group in relation to the efficacy of management actions. The discussion questions and small group format was similar for the second discussion session, which was focused on "Impacts to Beneficial Uses, Characterization and Pollutant Loadings." The "raw notes" from each session are attached as Appendix D to this report.

## *Workshop Findings*

Although each of the discussion groups worked through their own major themes and questions, there was a remarkable degree of consistency between the various groups as they answered the questions posed. In general, workshop participants agreed that the Work Group was on the right track. They thought the questions and issues posed by the Work Group were the right questions. However, they also had numerous additions, nuances, and new ideas to suggest to the Work Group as it continues on its task of developing a Regional Stormwater Monitoring and Assessment Strategy.

Here are the 21 most common themes that workshop participants wanted to convey to Work Group members:

## Overarching Assessment

1) ***The Stormwater Work Group is on the right track.***

There appeared to be widespread consensus among workshop participants that the Work Group is on the right track in developing a regional stormwater monitoring and assessment strategy. There was a high degree of energy and enthusiasm surrounding this topic, a willingness to continue to stay involved, an eagerness to review the draft strategy when it is completed, and a willingness to attend the next workshop in November.

## Issues to Consider When Developing the Monitoring and Assessment Strategy

2) ***Define the goal of the monitoring strategy.***

There is widespread concern about the ultimate goal of the regional stormwater monitoring plan. Many participants asked what the Work Group, and the region, was trying to achieve, and how "effectiveness" would ultimately be measured. For a number of people, the overarching "Puget Sound" goal was too broad, and they worried that it would not serve to motivate action within their local jurisdictions. But more importantly, there was concern that an actual monitoring goal had not been clearly articulated, and that this goal did need to be well-defined up front. After the goal is defined, they said, all of these study questions you are wrestling with can be tied to a specific goal.

3) ***Utilize existing data.***

There was a widely-held view that a great deal of data had already been generated and that the Work Group should not reinvent the wheel. Participants wanted to make sure the Work Group was capitalizing on all existing data, and that it was looking elsewhere in the country (Chesapeake Bay, for example) and even throughout the world (Europe was noted) to get new ideas for both monitoring and management.

4) ***Broadly share data about management and BMP effectiveness.***

On a related note, virtually all of the discussion groups wanted to make certain the Work Group clearly understood the types of management/monitoring actions that are being used now throughout the region, as well as the level of effectiveness of those actions. Participants were eager to have reliable information and data broadly shared among all jurisdictions, so everyone can take advantage of information generated about approaches, strategies, tools and techniques. Key questions participants appeared interested in include what has worked, what hasn't worked, and what might we do differently in the future?

5) ***Establish consistent methods and protocols for data collection and data management.***

There was a general consensus on the need for consistency in monitoring methods and data gathering. Many participants expressed frustration about

the different approaches jurisdictions take to monitoring techniques, data assembly and evaluation. Most everyone attending believed that the establishment of consistent tools and approaches would make a very significant difference in implementing a regional approach.

6) ***Encourage cooperation and data sharing to maximize value.***

Virtually all of the discussion groups acknowledged that there was not enough information sharing among jurisdictions and they want this situation to improve. There was a great deal of interest in pooling resources, in joining forces, and in benefiting from shared, consistent data.

7) ***Ensure that conclusions and lessons learned are transferable between basins.***

People are enthusiastic about implementing a monitoring strategy that will allow them to transfer basin statistics between jurisdictions, and they want to be able to apply basin "lessons learned" to an entire watershed. There was a strong interest in putting an end to ongoing arguments about the data, and in moving forward with the monitoring and management strategies can make a real difference.

8) ***Include water quantity measures.***

Several of the groups felt that questions of water quantity were missing from the discussion. They wanted to make certain that water quantity impacts are just as thoroughly evaluated as water quality.

9) ***Source control is very important.***

The concept of implementing, and monitoring the effectiveness of source control was emphasized among a number of the groups. Is this issue being sufficiently evaluated and addressed? How can you create a regional stormwater monitoring plan without highlighting the importance of source control?

10) ***Ensure that land use and future development impacts on stormwater are addressed in the monitoring design.***

A number of the groups raised questions related to land use and future development densities. Are land use patterns being sufficiently factored into the equation? How much do we know about future development and the degree to which it will influence stormwater runoff?

11) ***Ensure that climate change impacts on stormwater are addressed in the monitoring design.***

Likewise, the question of climate change was raised. Where does climate change factor into the Work Group's questions, and how will those future anticipated impacts be addressed?

## Stormwater Management Issues that Might Influence Monitoring Strategies

12) ***Municipality-based permitting does not match watershed-wide needs.***

There was widespread frustration about the current permitting process, with most groups noting that the NPDES system does not address watershed-wide

needs, being too strictly focused on relatively narrow geographical components of the watershed. There was broad agreement that watershed based coordination would be a much more effective approach.

13) ***Flexibility in permit implementation is desirable.***

Representatives from several jurisdictions expressed the hope that any new permitting system would allow for some level of flexibility at the local level. The current permitting process demands too much of a "one size fits all" approach. Jurisdictions want to be able to meet broad goals by determining what works best in their local areas and by partnering with other agencies in the watershed to meet those goals.

14) ***Urban and rural areas have different issues.***

Workshop participants wanted to make sure the Work Group clearly understood, and was accounting for, the differences between rural and urban jurisdictions. Pollution sources are different, water quality/quantity issues can be very different, and management techniques must be sized and designed accordingly.

15) ***Long-term maintenance of stormwater systems is very important.***

A comment heard frequently from the groups had to do with ongoing maintenance of stormwater systems. It was noted that it isn't enough to just design stormwater systems, we need to understand how they are maintained and how effectively they operate over the long term. Some attendees felt this important component had been lost in the discussions to date.

16) ***There is a need for action to improve stormwater management.***

There was broad and eager consensus on the need for action. Participants want to stop studying and move forward. For example, in a discussion about Best Management Practices, some of the groups wondered how the process/speed of approving BMPs might be improved. How do we experiment with BMPs not yet approved? How can we speed up the process of translating current research into new BMPs? Where does the ultimate authority lie for BMP approvals?

## Universal Themes

Although implementation, funding and political support are theoretically supposed to come later in the Work Group process, virtually everyone participating in the workshop felt that these very important elements could not be separated out for a "future" evaluation. Every group offered the following:

17) ***Funding is key.***

And we cannot get funding without public and political support. Make sure the Work Group is focused on this as an ultimate goal; it can't be viewed as a side issue.

18) ***Economic realities must be considered.***

We have to determine how we can get the most bang for the buck – that is, those monitoring and management strategies that can get us the most for the

least amount of money spent. We need to make sure we are spending wisely and getting real results for those expenditures.

19) ***Public and political support is crucial.***

And public education is a big part of gaining broader support. We should monitor our public education efforts in the same way we monitor stormwater management strategies. Who is paying attention, where are we making a difference with our efforts, and how are we measuring the success of our public education programs?

20) ***Implementation is more important than anything else.***

Participants generally felt that any new ideas related to monitoring had to be closely aligned with an implementation strategy for these ideas. Many participants expressed interest in an independent regional authority that would provide consistency for research efforts and data reporting, enable jurisdictions to broadly share information and create partnerships, and allow the region to transfer the lessons learned in one basin to far greater applicability in other basins and throughout the watersheds as a whole.

21) ***Local and site-scale issues are very important.***

Although the protection of Puget Sound is a broad and notable goal, it is very important to understand local "drivers" and motivations for jurisdictional participation. Provide consistency, provide us with reliable data and tools, but then give us the flexibility to determine how we can best meet the permit requirements within our local areas, with our own local partners, and with the support of our local public constituencies and political leadership.

# Appendices

Appendix A - Agenda
Appendix B - Discussion Guide
Appendix C - Participants
Appendix D - Workshop Notes

# Appendix A – Agenda

# PUGET SOUND STORMWATER MONITORING WORKSHOP: DESIGNING A MONITORING PROGRAM FOR THE FUTURE

**SPONSORED BY THE STORMWATER WORK GROUP**
http://www.ecy.wa.gov/programs/wq/psmonitoring/swworkgroup.html

**Tuesday, May 19, 2009**
**9:00 a.m. – 3:00 p.m.**
**Renton Community Center**
**1715 SE Maple Valley Highway**

# Agenda

*05.12.09 version*

Thank you for being willing to share your collective wisdom, ideas, comments, and perspectives with the Stormwater Work Group. We appreciate your willingness to help us develop a new regional stormwater monitoring and assessment strategy. We hope to accomplish three things today:

1) Share information about the Stormwater Work Group – our mission, schedule, and process.

2) Learn from experts about ideas and approaches to stormwater monitoring and assessment.

3) Get your advice on how we can best develop a regional stormwater monitoring and assessment strategy.

Please listen to the presentations and review the questions we are wrestling with. Use the new ideas combined with your own experiences to inspire your discussions in the two breakout sessions.

And thank you again for coming today!

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| 8:30 | Coffee and Networking | Everyone |
| 9:00 | Welcome, Introductions: Overview of the Day | Margaret Norton Arnold<br>*Primary Workshop Facilitator* |
| 9:15 | Stormwater Work Group: Overview, Process, Schedule<br>*Questions and discussion from participants* | Jim Simmonds, *Work Group Chair*<br>& Karen Dinicola, *Project Manager* |

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|---|---|---|
| 10:00 | ENVVEST: Approach, Results, and Lessons Learned<br>*Questions and discussion from participants* | Bob Johnston, U.S. Navy |
| 10:30 | Proposed Statewide Status and Trends Monitoring<br>*Questions and discussion from participants* | Bob Cusimano, Dept. of Ecology |
| 11:00 | *Break and First Breakout Session:*<br>Efficacy of Management Actions | **Everyone** |
| 12:00 | *Lunch and Lunchtime Speaker:* Aquatic Monitoring for the Puget Sound Region: Recommendations from the Natural Research Council's Stormwater Committee<br>*Questions and discussion from participants* | Rich Horner, Univ. of Washington |
| 1:00 | *Second Breakout Session:*<br>Characterization of Stormwater/Impacts to Beneficial Uses | **Everyone** |
| 2:00 | Recent Toxics Loadings Study Findings and Implications for Regional Stormwater Monitoring<br>*Questions and discussion from participants* | Randy Shuman, King County |
| 2:30 | Report Out from Breakout Sessions | All Facilitators |
| 2:50 | Next Steps and Closing | Jim Simmonds and Karen Dinicola |
| 3:00 | Adjourn | |

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**Directions to the Renton Community Center**

**From the North:** Take I-405 southbound to Exit #4 (Renton-Enumclaw). Go through the first stop light, turn left on Maple Valley Highway (South 169). This will take you under I-405. Continue about 500 feet and turn right at the second stop light and follow the entrance driveway to the large parking lot area. The Renton Community Center, Carco Theatre, and the Henry Moses Aquatic Center share the parking lot.

**From the South:** Take I-405 northbound to Exit #4 (Maple Valley-Enumclaw). This exit will divide, take the first exit to Maple Valley-Enumclaw (South 169). At the end of the off ramp, turn right. Turn right at the second stop light and follow the entrance driveway to the large parking lot area. The Renton Community Center, Carco Theatre, and the Henry Moses Aquatic Center share the parking lot.

# Appendix B – Discussion Guide

# Stormwater Work Group

## 2008 - 2010 Work Plan

| October - April | May | June - October | November | June 2010 |
|---|---|---|---|---|
| **Convene Work Group.**<br>• Adopt a work plan<br>• Brainstorm assessment questions and narrow down the list | **First regional workshop to get early feedback.**<br> <br>**We are here** | **Task groups at work.**<br>• Efficacy of Management Actions<br>• Impacts to Beneficial Uses/Characterization<br>1. Review questions/develop hypothesis<br>2. Develop a peer review strategy<br>3. Write a draft "Stormwater Impacts and Characterization Monitoring and Assessment Strategy Plan" for the region as a whole. | **Second regional workshop to get feedback on the draft strategy plan.** | **Strategy and implementation plans completed.** |

# Breakout Session #1
# Efficacy of Management Actions

## The Big Questions for the Stormwater Work Group:

1. What are we doing now that is most effective?
2. How do we know when we are being effective?
3. How can we be most effective, in the future, for the region as a whole?

## What We're Wrestling With:

1. Among the most widely used practices and promising new practices that are available, what specific retrofits or restoration practices are most effective in reducing pollutant loads, restoring hydrologic function, and recovering damaged habitat?
   - To what extent can retrofits and application of BMPs at redevelopment sites reverse past impacts? To what extent can the water and sediment quality and hydrologic conditions necessary to support beneficial uses of water bodies be restored in sub-basins that already have some degree of development? At what degree of development, or under what other specific conditions, is a particular retrofit strategy most likely to be successful?
2. Are our stormwater management actions preventing and reducing future disruption of natural hydrologic conditions and minimizing pollutant loads in areas of new development in Puget Sound?
   - What is the effectiveness of subbasin-scale to watershed-scale combinations of stormwater management actions (techniques) at reducing impacts?
3. How effective are source control and other programmatic stormwater management practices in reducing pollutant loads from existing development and from other specific land use activities such as agriculture?
4. How can we use/transfer knowledge from one basin to another in order to develop a regional approach?

## The Big Questions for You:

1. Are we wrestling with the most important questions/issues? if not, what are we missing?
2. What ideas do you think we should explore as we create a regional approach to monitoring the effectiveness of stormwater management actions?

# Breakout Session #2
# Impacts to Beneficial Uses, Characterization and Pollutant Loadings

## The Big Questions for the Stormwater Work Group:

1. Where is stormwater doing the most damage now?
2. What is the best way to characterize stormwater on a regional basis?
3. How should a regional monitoring strategy address local to watershed scales of interest?
4. Where should we prioritize and target our regional protection efforts in the future?

## What We're Wrestling With:

1. Where does stormwater significantly impact receiving waters, resources, species, or beneficial uses in the lowland streams, lakes, rivers, ground, and marine waters of the Puget Sound basin?
   - What is the current condition of streams, lakes, rivers, and nearshore marine waters, by representative land use?
     - What are the worst spots, when, and why?
     - What areas should be targeted for protection?
2. Over time, how effective are source control, prevention, and retrofit efforts: are beneficial uses improving in response to our stormwater management actions?
3. How does land use influence pollutant concentrations, flow volumes, and loadings? What land uses or land use combinations are of greatest interest?
   - What is the variability in stormwater pollutant concentrations and flow volumes by land use and geographic area?
   - What is the variability within and among WRIA level basins for similar land uses?
   - What factors within a land use control pollutant concentrations and flow volumes?
     - How do differences in stormwater infrastructure (i.e., pipes versus ditches, developments built at different times under different standards) affect pollutant loads and flows from similar land uses?
     - What proportion of the pollutant loads reach receiving waters and what are the explanations for the differences (i.e., due to losses)?
   - What proportions of the pollutants in stormwater are from various sources such as air deposition and transport, spills, erosion and resuspension?
4. What variables influence the seasonal distribution and trends of pollutant loads?
5. How can we use/transfer knowledge from one basin to another in order to develop a regional approach?

## The Big Questions for You:

1. Are we wrestling with the most important questions/issues? if not, what are we missing?
2. What ideas do you think we should explore as we create a regional approach to stormwater characterization and assessing impacts to beneficial uses?

# Appendix C – Workshop Participants

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# Appendix D - Workshop Notes

# Appendix D – Workshop Notes

# Red Group

## *Session #1 Summary*

### Are these the right questions?

The group generally felt that these were the right questions with which to be wrestling. They indicated that question #1 should be more specific about what they want to monitor and suggested that land use cover and the effectiveness of natural systems to engineered systems, and their costs, be monitored. They also cautioned to consider land use development patterns and the Growth Management Act. Finally, they encouraged the Work Group to be holistic – monitor the entire watershed and the activities within them.

### What are the priorities?

The group indicated that retrofits and source control are priorities in the urban environment, while noting that retrofits are expensive and that monitoring in the urban environment is difficult. In less developed areas, they said that the priority should be preservation as it is easier than fixing problems after they occur. They also suggested monitoring public buy in to stormwater management and the amount spent on it. Finally, they said that finding actions that are effective on hydrology and pollutants will help get the most bang for the buck.

### Ideas

The group had a number of ideas, a number of which focused on finding ways to monitor and manage in ways that use combinations of activities and efforts to maximize results and accomplish multiple goals. The group also cautioned that stormwater actions may affect stream flows which could in turn impact salmon. They also said that outputs should be measured to determine which actions are most effective.

## *Session #1 Notes*

### Are these the right questions?

- Questions are more about how to manage stormwater than monitoring
- How do you measure success?
- Need to integrate these with the GMA
- Enforcement of NPDES is lacking
- What do you want to monitor? That should be a question
    - Land use cover
    - How much better are natural systems that engineered systems and what are the costs of the two
- Question #1: needs to be more specific

- Question #1: Outline specific examples of things to monitor and add site specific goals for monitoring program – know problems and goals
- How will improvements in BMPs be factored in if data mining is part of this process?
- Have to verify that BMPs are actually being implemented and whether or not they are having a positive effect
- Assess effectiveness: remove things from the tool box if they are not working
- Need to figure out where to focus on BMPs and monitor source control
- Monitor higher up in watersheds
- Determine impacts of restoration activities
- Look at zoning and land development patterns
- Differentiate between how we develop new land and how we deal with developed areas
- Can't look at stormwater in a limited way – look at entire watersheds and activities in them
- Source control and education are cheaper and easier than engineered solutions
- What are the new tools and how do we build them into monitoring?

## What are the priority questions?

- Urban environment: retrofits, source control
- Underdeveloped areas: preservation is cheaper than fixing problems
- Need adequate resources
- Opportunity to regulate Phase 2 jurisdictions
- Need to improve education about individuals' impacts/contributions to stormwater problems and solutions
- Difficult to monitor in the urban environment
- Remove roadblocks to getting LIDs in place
- Test effectiveness of tools in a test facility
- More tools in the toolbox
- ACART approval
- Monitor public buy in and funds spent on stormwater management
- Determine actions that are effective on hydrology and pollutions to maximize bang for the buck
- Better understanding of source control to avoid expensive retrofits

## Ideas

- Have to understand that stormwater management actions may affect stream flows which may impact salmon
- Basins have many different issues so it is difficult to do a region-wide plan – many challenges with such variation within the region
- Seek out broad applications of combined efforts

- Figure out which “cocktail” of actions was most effective – what combination of activities are successful and how much do they cost
- Monitoring is both physical and theoretical; use modeling to help design monitoring program
- Unable to say which water quality and quantity programs are effective: to do this you must measure outputs, e.g. which things work
- Important to monitor a wide range of things at the local level
- How do you deal with controlled environments where you know exactly what your are releasing and your monitoring still shows you have problems (prison example)
- Have to clean up, not just monitor
- Put monitoring on top of budget, last thing to cut. It is the first priority for informed decision-making
- Understand the level of contamination that gets into groundwater as a result of stormwater runoff

## *Session #2 Summary*

### Are these the right questions?

There was less of a sense within the group that these where the right questions when compared to Session #1. In general they felt that Question #1 was too broad and that it was going beyond the scope of stormwater management. Among all questions, the group felt that the answers to the questions were readily available from other sources and that the Work Group should utilize the information as not to duplicate efforts. Other comments indicated that the group felt there was too much emphasis in the questions on water quality and not enough on hydrology and that the Work Group needs to address the fact that projections indicate a million people will be moving to the Puget Sound over the next 20-30 years.

### What are the priorities?

The group said that questions #3 and #2 are the priorities, but indicated that the sub-questions in #3 meandered a bit and that all questions could be better focused.

### Ideas

The group identified a number of issues for the work group to consider, including: the cumulative impacts of stormwater; the difficulty of accurately measuring when so many variables are in play; finding opportunities for paired-basin studies; and dealing with legacy pollutants. Finally, the group noted that current regulations are not enforced and that jurisdictions should be monitored to see how well they follow their own regulations.

## *Session #2 Notes*

### Are these the right questions?

- Add a modeling-oriented questions – what would be projected conditions – to project forward
    - Sensitivity analysis
    - What could conditions be
- Need to address climate change: projections for bigger storms and their impact on stormwater, also acidification
- Question #1: Seems like an ambient monitoring question, which needs to be asked, but that is not part of this program. Instead, you should coordinate with the ambient monitoring program; focus more on stormwater
- Question #1: You would exhaust budget with this questions; someone else is doing this
- Question #1: the data should be available and needs to be used
- Question #2: How do you factor cumulative impacts back into stormwater? Will cumulative impacts be addressed?
- How do you measure accurately when there are so many variables in play? How do you isolate factors?
- Compliance and enforcement need to go together. Current laws and regulations are not adequately enforced
- Monitor how often jurisdictions enforce their own regulations?
- Have to have a study: paired basins with treatments, controlled study
- What is the metric: toxicity, copper?
- Question #3: Phase 1 permit on a more regional basis?
- Question #3: Can we extrapolate Phase 1 to the region
- Question #3: a lot of the information already exists
- Need to pull together information that we have before we move ahead – look at the Bellevue stormwater study; these questions have been asked and answered
- Question #3: Need to consider the variability from place to place
- Can't avoid the GMA – one million people will be moving to the region
- In general, there is too much focus on water quality and not enough on hydrology
- Look at passive sediment transfers – what are we looking at – water, tissue, and sediment?
- Missing piece: legacy pollutants, and what do you do about them?
- In general, focus scope of work of the group

### Priorities

- Question #3: tied to land use, sub-questions seem to meander a bit
- Question #2
- Need to focus them all in a bit more

# Brown Group

## *Session #1*

### Question #1:

- Appears SWWG is asking right questions
- Edit #3: How effective do we need to be?

### Additional Questions:

- BMPS – evaluate in terms of "big picture"
- How do we improve/speed up process of approving them?
- How do we experiment with BMPS not yet approved?
- How do we prioritize them?
- What process do we use to improve and approve them? Who has authority? How are they evaluated? Who decides results of evaluation?
- How do we translate current research in to BMPS, and speed up that process?

### "Natural BMPS"

- How do we incorporate lessons about/from the capacity of the natural systems to handle or address runoff?

### Stormwater Runoff

- How do we ensure we are defining "runoff" and, more specifically, "stormwater runoff," appropriately?

### Technology

- What processes are needed to test and approve new technology, including for pre-treatment and treatment.

### Relationship/Coordination

- Who has, will have authority over stormwater?
- How can we capture, use information from across the nation and around the world? (expand focus of question #4)
- Are universities, labs sufficiently involved in this effort?
- How can we get all government agencies on the same "sheet of music?" And sharing burden equitably?
- How do we get them to agree on priorities? Take equitable responsibility for implementation?

### Others

- How do we prioritize for sensitive areas? Establish criteria to prioritize?
- How can we be sure to look at issues and numbers in proper context so heroic effort is not irrelevant, wasted?
- Can we use permits to implement achievement of goals?
- What is relationship of industrial stormwater permit to local government permit?

### Question #1A: Priorities

- No consensus on which questions are essential to answer – thus, highest priorities – but #4 is overarching and important for resource efficiency.

### Question #2: Approaches

- Look nation-wide, internationally to avoid reinventing wheel, save costs
- Look to areas with similar climates, conditions
- Learn from Canada which, for example, has lessons to teach us re: testing BMPS
- Acknowledge what works, doesn't work
- Look for ways to consistently manage stormwater facilities
- How do we reduce volume of stormwater coming down through watershed?
- Use permits' process for cost-sharing
- How do we in "trenches" influence management decisions about conducting effectiveness monitoring (management seems to prefer characterization)
- How do we keep moving forward, making progress, working together in sharing info and costs and efforts?
- Use permitting to save costs
- Will effort to provide more controls over stormwater affect (overwhelm) GMA?

## *Session #2*

### Question #1:

- These are important questions
- Some concerns about 3rd led to consensus that cost/benefit analysis for establishing priorities would be wise
- Lost of pieces to question 3. Don't reinvent wheel: learn from others to save some steps, costs
- How do we define damaged or impaired? What metrics do we use to define them?
- Urban areas should rise in terms of priority areas to be studied
- What's baseline condition?

### Question #1A: Priorities

- All very important. 1, 3, 4 attracted lots of attention.

## Question #2: Approaches

- Tie questions to goals
- Take politics and economics (costs) into account
- What % of problem caused by stormwater? Mass balance to get relative proportion
- Discuss measurement/metric of biodiversity, biota
- Be careful about considering what we have no control over
- Prevention is important; emphasize it to balance strategies, actions that react, respond (retrofit is harder than prevention)

# Pink Group

## *Session #1 Summary*

### Efficacy of Management Actions

High Priorities for a Regional Stormwater Monitoring System:

- Clearly defined goals
- Indicators to measure progress
- Communication with the public about clean water goals and the role of monitoring in achieving these goals
- Consistent monitoring protocols
- Involvement from the outset of diverse stakeholders with emphasis on Phase 2 jurisdictions.

Other questions/issues the Work Group should address:

- Measure the effect of maintenance (e.g. infrastructure maintenance, Vactor operation) on stormwater quality
- The role of citizens in monitoring
- Lessons learned from past monitoring efforts – what's worked; what hasn't.

Advice for the Work Group:

- Securing stable funding for monitoring is imperative
- Take advantage of the work done in Chesapeake and San Francisco bays, the Great Lakes and elsewhere.

## *Session #1 Notes*

### Question 1

- What are we doing that is less effective or not effective?
- We should assess where we've been in terms of monitoring
- How are standards for redevelopment being defined, developed and applied?
- Are we adequately preparing to meet redevelopment standards
- What ecosystem goals are we trying to achieve with improvements in stormwater quality?
- What impact is storm water having on ecosystem goals?
- What benchmarks are we using to measure progress?
- The current NPDES doesn't take an ecosystem perspective
- Use as models for goal setting the Chesapeake and San Francisco bays and Great Lakes programs
- What is the place for citizen science in a regional monitoring program?
- Identify and take advantage of good examples of citizen monitoring and involvement

- What are direct impacts to the attainment of goals for beneficial uses?
- How to implement and enforce monitoring requirements.

### Question 2

- Setting key indicators
- Defining benchmarks ("measurables") to gauge progress
- Determining that we are using indicators effectively
- Establishing clear, achievable, fundable goals
- Source control
- The public's understanding of the importance of water quality and monitoring's role in achieving it
- Measuring the effect of maintenance on stormwater quality
- Across the board baseline monitoring and consistent protocols.

### Question 3

- We need to move forward in initiating a regional monitoring system even though we do not have complete data. It is inevitable that we will have to make decisions based on incomplete data. Find a balance between gathering more data and moving forward
- Learn from the example of Chesapeake Bay. Refer to the book "Chesapeake Bay Blues" by Ernst
- Consider how to present and "sell" a regional stormwater monitoring program to policy makers
- Involve Phase 2 jurisdictions early on
- Involve a broad range of stakeholders, including possible adversaries
- Determine where and when which kind of information is needed in terms of priorities and timing
- Make the necessity of monitoring clear; that monitoring is necessary to determine if we are progressing toward reaching our clean water goals
- Take a watershed-based approach
- Funding for monitoring is imperative

## *Session #2 Summary*

### Impacts to Beneficial Uses, Characterization and Pollutant Loadings

Other important issues and questions:

- Determine how (in addition to where) stormwater impacts receiving waters
- Prioritize conservation/restoration locations based on greatest potential for improvement not just on the greatest problems
- Monitor public perception and education as monitoring programs progress.

Ideas to explore in creating a regional approach to stormwater characterization and assessing impacts to beneficial uses:

- The synergistic effects of pollutants
- The effect of climate change
- Organizing data in easily accessible ways
- Public education starting an early age
- Be clear about the roles of federal, state and local governments. State and federal government sets goals and provides support; local government and citizens carry out water quality programs.

## *Session #2 Notes*

### Question 1

- Synergistic effects of pollutants
- What are the best measures for characterizing impacts?
- Determine the relationship of flow to water quality
- How does stormwater impact receiving waters?
- Provide more specificity concerning the impact of land use practices and activities on stormwater quality
- Quantify the sources of pollution with the greatest deleterious effects on stormwater/water quality. Compare these findings with the public's perception of the threats to stormwater/water quality
- Determine where conservation/restoration can have the greatest environmental benefit. These locations may not be the sites of the biggest problems. Shift resources to creating the greatest benefit
- Track temporal patterns corresponding to stormwater quality
- Track social/public perception and acceptance of stormwater quality monitoring
- Weigh the costs of programs that approach the problem variously (e.g. education vs. structural BMPs)
- In informing the public about regional stormwater monitoring, learn from the success of "social marketing" in encouraging participation, for example, in recycling.
- Be clear in making the distinction between pollutant "concentrations" and "loads".

### Question 2

- The impacts of climate change on stormwater quality in terms of both human and ecosystem beneficial uses
- Develop a widely accepted tool kit including mechanisms for translating data into useable information for policy makers and the public
- Secure stable, long-term funding for policy dialogue, for technical assistance with jurisdictions and for implementation

- Provide public school education on the importance of clean water to environmental quality. One good example is the “Clean Water, Streams and Fish” curriculum
- Be clear about the roles of levels of government. The state needs to define goals and provide financial and political support to enable local government and citizens to carry out water quality programs.

# Yellow Group

## *Session #1 Summary*

In Breakout 1, the yellow group was concerned that the question of **funding** was not being addressed by the Stormwater Work Group. They asked that the Work Group consider **different models for funding** when planning a regional stormwater monitoring program. One participant recommended a fee based system garnered from permits. Others thought that there should be a monitoring checklist that had certain requirements while allowing entities of varying sizes to opt in or out of certain elective monitoring strategies. Among there concerns was the question of how effectively funds would be used for overlapping services or whether there would be an **opportunity to streamline budgets i**n order to get "the most bang for your buck." One participant cited the example of street sweeping as a Department of Transportation service that benefits stormwater management. Therefore, whose budget should pay for this type of best management practice? Should transportation or a public agency pay for this type of stormwater management strategy?

The group insisted that the Stormwater Work group needed to address what method of source control would be most effective at improving and maintaining stormwater quality. They asked what **level of "proof" or proven effectiveness** would determine what Best Management Practices could be put to use? Would qualitative and quantitative data be equally valid?

Other questions the yellow group thought were missing pertained to **political will** and **program coordination**. They were uncertain how management actions would be applied over and between multiple jurisdictions. As a result, they were also uncertain as to how they could support broad, sub basin implementation of monitoring programs as stand alone organizations. Many participants were puzzled over how jurisdictions could work together and create innovative monitoring techniques when the geographic scope of an impact is often unknown. They wanted to know **how new and innovative best management practices would be tested and validated** for broader use. They were also unclear how local jurisdictions and state agencies would effectively communicate, share resources, and ensure accurate, representative data.

When prioritizing the questions, the group agreed that p**roof of effectiveness** for best management practices was critical. They discussed the effect **of geography and proximity of a pollutant source** on the effectiveness of a management action. They also asked how new and innovative stormwater management actions would receive **validation** by the Department of Ecology for use. Being sure to get the greatest impact per dollar spent topped their list along with how to ensure the **accuracy of quality data**. The group thought that **regulating and improving existing retrofits** mentioned in Question 3 would be more effective than regulating stormwater management practices for new developments referenced in Question 2. They thought reviewing existing development retrofits would provide valuable data worth tracking for "proof" of effective best management practices. They also mentioned that the sc**ale of a development** had to be a consideration when determining best management practices.

## *Session #1 Notes*

### Question 1

- What is the definition of effectiveness?
- How can new & innovative BMPs be validated for use?
- How can we get the greatest impact per dollar spent?
- Accurate data?
- Don't ignore funding
    - How will we fund?
        - Fee based
- Politics – how do we summon political will?
- Efficacy of funds used for overlapping services?
- Streamlining (i.e. transportation budget)
- What method of source control is most cost-effective? (i.e. what source control measure will have the biggest impact on SW quality (show the most improvement?)) Best "bang for your buck"
- What level of proven effectiveness ("proof") do we need before using new BMP's?
    - Quantitative vs. qualitative
- Efficacy with inter-jurisdictional overlay?
- How do we implement large scale pilot projects?
- How can we support & implement new/innovative methods?
- Bullet 2: how do we support broad, bus-basin implementation?
- Geographic scope of a local impact?
- How do we get jurisdictions to work together?
- How do construction projects effect monitoring
    - Communication between local jurisdictions & state
- How do we ensure accurate, representative data?

### Ordering

- Regulating & improving older development (existing) can be more effective than regulating new
- Which retrofits are most effective?
- Effect of geography/proximity on effectiveness?
- Scale of development
- Validation of BMPs by Ecology

### Ideas

- Incorporate BMPs into Ecology's database to i.d. based on monitoring data/effectiveness. (see GIS0
- Formalizing watersheds – work groups
- Integration of jurisdictions resources

- Monitoring through independent institute
- Results need to be flexible as well as scalable
- Use GIS system to incorporate existing ECY data to learn what worked where.

## *Session #2 Summary*

For Breakout 2, the yellow group thought the questions were comprehensive with a few minor additions. Amongst their ideas was attributing an identification number to best management practices via GIS to record the effectiveness of monitoring data. They suggested a **GIS-based system** as a way to learn what has worked and where with regards to stormwater management. They saw value in **establishing work groups by watershed** as a first step towards capturing meaningful data for analysis. By forming a collective, or "work group," the yellow group saw an opportunity to integrate **and share jurisdictional resources**. They asked that the Work Group build a database **where results could be scalable as well as flexible** to accommodate all sizes of monitoring projects.

The yellow group asked for the Stormwater Work Group to report if data can be collected from local jurisdictions. They also asked that an **inventory of existing monitoring programs** be done as a baseline. They insisted that the **source control data should have indicators** that include a temporal factor, type of pollutant, as well as storm duration. As a region, we need to determine what should be monitored and how is should be sampled. They considered representative sampling or random samplings as possible monitoring methods. They asked: Where in the system do we begin monitoring per pollutant, at the receiving waters or at the source? Most participants agreed testing at the receiving waters needs to be rigorous enough to detect change. And what will be the characterization of the diagnostic testing?

The yellow group also agreed that members of the Stormwater Work Group should do more outreach to the stormwater community through the listservs used by the Department of Ecology. They also supported the idea of an **independent institution providing oversight between jurisdictions**. They proposed that the best approach to determine pollutant loadings is to begin by monitoring known sources especially the "worst first." With representatives from both urban and rural environments, they admitted that there are challenges to characterizing sources since the differences are so vast. Therefore, they ended with the recommendation that the Stormwater Work Group try and **quantify or prioritize damage** as a way to create an appropriate strategy to monitoring stormwater in the Puget Sound region.

## *Session #2 Notes*

### Questions

- Can data be collected from local jurisdictions?
    - First, inventory of monitoring programs needs to be done.
- Timing
    - (3) add: temporal factor, type of pollutant, storm duration

## Ideas

- Source control study: timeframe, indicators
- What will be monitored?
- What should be monitored?
- Representative vs. random sampling?
- Characterization – diagnostic
- Start at the appropriate place – where (in the system) do we begin monitoring per pollutant?
- Is the SWG representative – can the group do more outreach?
- The independent inst. should have official oversight on inter-jurisdictional projects
- Biggest bang for buck – monitoring (known) sources
- Work in receiving waters must be rigorous enough to detect change
- Urban & rural environments necessitate a different approach – different challenges to indent. Sources
- "Worst first"
- How do we prioritize damage? (quantify)

# Blue Group

## *Discussion Themes*

- Yes, these are generally the right questions, but more need to be added, and tweaks to the questions are necessary.
- It's not just stormwater treatment, source control is also important. We have to use a combination of both. Where is zinc/copper coming from – and what are the options for stopping those pollutants at their source? Europe has a lot of lessons to offer in this regard.
- The work can't stop at the design of a stormwater treatment system, those facilities also must be maintained. We can't lose track of the longer-term maintenance of these systems and facilities. Implementation can't be sustained unless we stay on top of this.
- Questions about economics are missing from this list. Solutions have to be practical, feasible, and cost effective. Solutions also have to be prioritized, so we are achieving the "biggest bang for the buck" for the most cost-effective possible price.
- There needs to be an acknowledgement of the impacts of land use. Urban vs. agricultural – very different land uses and should have different approaches, as well.
- Somewhere we need to acknowledge and stress the "drivers" for stormwater monitoring. What gets people/jurisdictions motivated to participate? How can we keep them motivated? You have to identify those drivers – what tickles a local government's fancy? That's the only way to keep them motivated/involved.
- Of course, the permit itself is also a driver.
- Every municipality has different needs, drivers, and situations. The new permit has to be flexible enough to deal with these differences.
- So far, public education is missing from the list of questions. Without a strong education program and political consensus, stormwater management will fail. We should monitor the effectiveness of our public education/communication programs just as extensively as we monitor stormwater itself.
- There are concerns about higher density – future growth. Are our monitoring methods adequate for the higher densities of the future? What happens if/when the character of our region changes – how will we adapt to those changes?
- We should prioritize the biggest pollution problems in each area – focus on the fixes for those big problems first. We can't be doing everything everywhere all of the time.
- Every area of the region should ask – is the model we are using for stormwater a sound and reliable predictor of water quality?
- Water quantity doesn't get enough consideration. It is just as important as water quality. What do we know, for example, about the effects of extremely low flows on the overall health of the stream?

- Do we have a clear goal/desired outcome in mind for our programs? Do we have a clarity of purpose -- yes, our waters should be swimmable/fishable/diggable -- but is that enough of a specific goal?
- Are development impact fees the right way to go?
- It's expensive to collect good data, so we should be thinking about ways to use it that go beyond just one location/basin. What are the lessons learned from various jurisdictions that can be applied to the region as a whole? We need to work toward "scalability" in using our data for various areas.
- We have to be consistent in how we design studies/monitor/collect data, and in how we use it.
- There needs to be more coordination between monitoring and the data that is collected and used.
- Let's stop fighting about data!!
- There are tensions, now, between the local level and more region wide goals/concerns. The "Protecting Puget Sound" goal is too big – too amorphous. We need to bring it down to the local stream – be more specific. People want to focus on their own backyards.
- I'm not sure the general Puget Sound goal will really serve as a motivator for the general public…we have to get more local in our messages.
- Don't forget about the tribal authorities in all of this – they are very important.
- The Permit does not work to our advantage when it really comes to stormwater. The Permit should be based on hydrological units rather than jurisdictional units. That will greatly enable the various jurisdictions to work more holistically together. Jurisdictions should be able to pool their resources to do what's best for the whole watershed.
- The Puget Sound Action Team identified a number of very good projects for implementation several years ago. Why do we keep reinventing the wheel on this?
- Another way to encourage greater jurisdictional cooperation would be to establish a baseline – what is the water quality in any given area now, both upstream and downstream? Then, if we had that baseline, we could all work together more effectively to improve water quality.
- Temperature is another really important factor when reviewing water quality, and it's not something we currently measure. But we should.
- Where is climate change in our discussion? It needs to be recognized, accounted for, and planned for.
- We should be concentrating our efforts where we can get the highest rate of pollutant removal. Concentrate where the pollution concentrations are the greatest.
- Do our current regulatory requirements really mesh with what we want to accomplish? That's not clear.
- We should establish smaller benchmarks along the way to begin to measure effectiveness. We don't have to wait until a system is fully designed and in place to start measuring.

- We should expand our horizons – look nationally and internationally at stormwater monitoring and management. We don't need to reinvent the wheel; there are a lot of good sources of information and Best Management Practices out there to draw from.

# Green Group

## *Session #1 Summary*

### Efficacy of Management Actions

There was a general sense within the group that the assessment questions were the right ones. However, with respect to the "Big Questions for the Stormwater Work Group," the green group felt that questions 1. and 2. should be switched i.e., that we must understand how we can know we're being effective before we can understand if what we are doing that is most effective.

Other high priorities included the need to consider stormwater quality impacts to groundwater and contribution to pollutant loading from groundwater. Wells and drinking water need to be considered as important beneficial uses that can be impacted by stormwater management. The group also felt it important to monitor habitat conditions as well as water quality parameters.

Discussion surrounding the proposed assessment questions included the need to define "effectiveness" and desired "endpoints" or biological thresholds. A good handle on all available stormwater management tools is needed as well as a look at new and additional treatment methods and processes.

We need to assess what management activities have been and are being done and understand the monitoring that has occurred or is in progress. A regional approach makes sense in order to get goods data and management information. It is important to make use of the data we have, keeping a good scientific basis for our assessments. At the same time we must consider the quality of the available data e.g., information collected for industrial permits or smaller jurisdiction stormwater management purposes may not be adequate to efficacy assessment needs.

Monitoring from smaller jurisdictions is needed to avoid the "Swiss cheese" problem of having "data holes" across the landscape. Watershed-wide coordination makes more sense than a discreet permit-by-permit monitoring approach. Both the space and time scales for measuring efficacy need to be long. An integrated water resources approach going beyond just stormwater management is needed.

We should be aware of the difficulties inherent in monitoring management strategies and actions as opposed to specific facilities or projects. Monitoring strategies must address how to deal with variable in assessing effectiveness. There is a specific need to monitor the effectiveness of retrofits. We should be working toward models that can predict efficacy of management actions.

In response to the invitation to "tell the Stormwater Work Group what you'd like them to know," the green group felt it important to pool resources to achieve monitoring goals. Rural areas will need a "heads up" to raise local elected official awareness of

monitoring importance, needs and costs. The importance of "product control" to limit pollutants and other source controls was noted.

The group discussed pursuing "low hanging fruit, getting "bang for the buck," and using adaptive management in the overall monitoring strategy. We should consider models from other parts of the country in determining how to achieve monitoring goals. The NCHRP (Highways) model for monitoring and research should be considered.

The group wondered if a monitoring cost benefit analysis might be useful and noted that a 'triage" process to allocate limited resources may be needed. Grant or other funding mechanisms will be needed and a state commitment to resources is necessary. An independent monitoring institute would be advantageous.

## *Session #2 Summary*

### Impacts to Beneficial Uses, Characterization and Pollutant Loadings

The main assessment question priorities for the green group included:

1. Defining beneficial uses and deciding how to relate monitoring to those uses.
2. Defining how we are measuring 'damage."
3. Determining what kind of data quality is necessary.

The group also thought it important to add the 'when' to the 'where' of stormwater damage given the episodic (event based) nature of stormwater runoff.

Problems with pollutant detection limit issues were discussed. With both flow and water quality issues important, more ecological/biocriteria might be useful in monitoring impacts. It was recognized that different watersheds might be important for different reasons e.g. Endangered Species Act versus Clean Water Act considerations.

Monitoring strategies should take into account that some facilities perform differently; performance changes as conditions vary. We may need to rethink our monitoring priorities when we compare stormwater to other impact sources – stormwater may not be the most important. The group noted the importance of land use on stormwater impacts (see assessment question 3 on the handout), noting that variables go way beyond just effective impervious surface. It is hard to measure ecological interactions.

In response to the invitation to "tell the Stormwater Work Group what you'd like them to know," the group agreed that impairment factors might not be measurable or even detectable by Clean Water Act criteria. We may "fix" stormwater, but the problems may still exist. The discussion questioned whether stormwater really does contribute more toxics that all other sources.

Lots of data will be needed over a long time. We need to look at the efficiency of how we collect the data and consider use of estimation techniques. The monitoring strategy should pay attention to high loading unit land uses.

We must prioritize beneficial uses, recognizing that they may be different for different areas. We need a better understanding of “older baselines” like the salt marsh beaver impact on Chinook abundance that is just recently being noticed with increased beaver population. Anti degradation is key and we must recognize that urban standard may need to be different from rural standards.

We should look for “no brainers” to limit the courses of action on which we expend energy. Management/cost scenarios together with values achieved and costs of inaction will give us direction in stormwater management actions.

Human values, community values and priorities should inform the process early on. Resources may be needed to change public perceptions and community values. It was suggested that members of the Puget Sound Partnership read John Lombard’s "Saving Puget Sound: A Conservation Strategy for the 21st Century."

# Light Blue Group

## *Session #1 Summary*

### Understanding what makes the management action effective (questions need more detail)

As the group initially considered the "what we're wrestling with" questions, many people asked the question "effective at what?" These people said it was important to identify a goal so effectiveness could be adequately measured. The group agreed that the goal of these management actions should be identified as "protecting the quality and use of receiving waters." Some participants also said that in addition to asking which actions are most effective, the questions should also consider "how much" of that action needs to be implemented to be effective (eg. How many of a particular kind of restoration project?). Lastly, Question 3 would be improved by asking "why" as well as "how?" It was suggested that the monitoring plan needs tools that address the problems at the scale at which the problems occur.

### Emerging Issues

The group agreed that it was important for a monitoring program to address or consider emerging issues and to be flexible enough to adapt when new issues arise?

### Land use

The issue of land use came up often during this discussion. One person said that Question 1 needs to address land use density more completely. Others suggested that more coordination between stormwater managers and land use planners is needed to improve stormwater management and monitoring. It was also recommended that a monitoring program should consider large-scale/long-term impacts (traffic, land use, development) vs. small-scale/interim impacts (eg. road cleaning, effective retrofitting).

### Implementation

The issue of implementation of these actions came up frequently during the discussion. Participants wonder how areas not under permits will be addressed if permits are the only tool for managers to use. Some also said the monitoring program needs to address sources of long-term adequate funding. Others questioned how management actions will be monitored to insure long-term sustainability.

### Prioritization

In regards to prioritizing the questions, the group was in agreement that a linear ranking was not appropriate for this set of questions, rather all the questions need to be addressed. One action cannot be done without the other.

## *Session #2 Summary*

### Questions need more detail

Overall the group indicated that the questions need more detail. For example, the group was in agreement that the focus of the effort (and questions) should be on a goal. They identified that goal as "the quality of the receiving waters" including the addition of wetlands to Question 1. Some also said that Question1 should address "what" in addition to "where" because one cannot be considered without the other.

### Implementation

Similar to the first Breakout Session, the group talked about the challenges of and needs for implementation of a region-wide monitoring program. The challenge of managing areas not under permit if regulations are only under permits was discussed. Some said that permit requirements should be redefined if work could not be done outside the boundaries of permits. Some also suggested that in-pipe and ambient monitoring should be more coordinated regardless of permit requirements. As part of the implementation of any monitoring program, the group indicated that the source of long-term adequate funding to make this process successful needs attentions.

### Prioritization

The group had a variety of opinions on how to prioritize the questions. One person supported placing priority of what needs to be known early on. There was also support for implementing some actions that could be accomplished easily and quickly to achieve some success early on in the monitoring program. Otherwise, there was not any consensus on prioritizing questions. One person said Questions 1 and 3 need immediate attention and that Question 2 will come out over time. Another person insisted Question 2 needs priority efforts. Another suggested a lot of work has already been done on Question 3 and so Questions 1 and 2 need the immediate attention.

As part of the prioritization exercise, one of the Stormwater Work Group members asked the group the following question: "If you were to do status and trends monitoring, where would you do it and what would you do?" A number of issues were discussed and are reflected in the raw notes. However, the topic that received the most discussion and overall group consensus was the suggestion to implement a caged mussel monitoring program. Looking at mussels and bivalves would provide spatial trends, detection early on and is a biological indicator (gradient response). It would address local issues and would cumulatively address landscape scale issues. Another idea that received group support was to design the monitoring plan to monitor different things at different locations and times of year. This tiered monitoring would prioritize and save money.