

STORMWATER WORK GROUP

PROPOSED **WORK PLAN**

To be discussed at the Oversight Committee meeting on October 9, 2008

PURPOSE AND OBJECTIVES

A broad, comprehensive regional monitoring and assessment strategy and plan are needed for Puget Sound to provide a better understanding of the relative magnitudes of the sources, inputs, and impacts of pollution into fresh and marine waters from all land uses and human activities. The purpose of the Stormwater Work Group is to develop a regional, cooperative monitoring and assessment strategy that is focused on enabling us to know whether or not our management actions are successfully reducing harm caused to Puget Sound by stormwater. Our approach will be to develop a comprehensive program in steps, starting with priority questions and data needs and building from existing, ongoing monitoring and assessment efforts. This document is intended to implement the processes and create the documents and other products and processes that are described in the charter and bylaws of the Stormwater Work Group.

The near-term objective of the Stormwater Work Group is to develop a regional stormwater monitoring and assessment program that can begin after June 2010. (This deadline was established by the Department of Ecology as necessary if the strategy is to order to inform the requirements included in the next round of municipal stormwater NPDES permits.) The program that is developed will have a coordinated implementation plan for three basic study design components:

1. Long-term status and trends monitoring to assess stormwater impacts. This component of the monitoring and assessment strategy is likely to include sampling of various media (water, sediment, biota) for analysis of contamination from stormwater.
2. Characterizing stormwater pollutant concentrations and loadings from the full spectrum of urbanization in the Puget Sound basin, as well as various activities, land uses, and other associated variables that contribute to contaminant loading rates
3. Effectiveness of management actions that are specifically intended to better control stormwater volumes and/or reduce pollutant loadings.

This draft work plan lays out the proposed tasks that need to be completed, their timelines, and the roles and responsibilities of various parties in completing the work. This work plan is meant to be a starting point for work planning discussions of the Oversight Committee and will be modified based upon their input.

WORK TASKS

The following six tasks (and subtasks) are proposed to be completed before June 30, 2010. A potential seventh task is also listed.

Task 1: Convene an Oversight Committee to provide direction and input for the development of the regional stormwater monitoring and assessment program

A “core team” has been established to get the Stormwater Work Group started and plan an approach to developing a regional and assessment program. A broader oversight committee is needed to engage more regional stakeholders in the process and to use their perspectives to

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develop the most functional regional and assessment program possible. The membership composition of the Oversight Committee is outlined in the draft charter and bylaws of the Stormwater Work Group. Invitations to participate in the Oversight Committee will be sent no later than September 4, 2008.

The first Oversight Committee meeting on October 9, 2008 will orient members to the proposed goals of the Stormwater Work Group, the draft charter, bylaws and work plan, and the desired outcomes. The oversight committee will adopt a work plan that lays out tasks, timelines, deliverables, and responsible parties for developing the monitoring and assessment program. This document represents a straw dog work plan for the oversight committee to work from, since they will be asked at their first meeting to keep the process moving steadily forward. Adopting a work plan will be the first key task for the group in order for the monitoring and assessment program development to get meaningfully and productively started.

At some point, but probably not before its meeting in April 2009, the Oversight Committee should discuss the desire/need for a “core team” or similar subcommittee to continue. In the short-term it may be necessary for a core team to keep the work moving forward on the aggressive timelines proposed in the work plan. Once the development of the monitoring and assessment program is underway, the group could revisit the need for a “core team” or some other steering committee; it might be considered preferable to establish subcommittees to address specific issues as they arise.

Deliverables: Approved charter, bylaws, and work plan

Timeline: Introduce at the first meeting Oversight Committee meeting on October 9, 2008.
Approve founding documents at the second meeting on December 11, 2008.

Task 2: Review and refine preliminary assessment questions within each component of the monitoring and assessment program

The “Core Team” developed a draft list of assessment questions (see Appendix 1) in August 2008 at the request of the Puget Sound Partnership’s Science Panel. The draft list represented the views of the Core Team members as a group, but did not receive broader perspectives given the time constraints. The stormwater-related assessment questions are a subset of broader ecosystem recovery assessment questions and should also be considered in that context. This task should include a strategy for exchanging ideas with other work groups in Puget Sound.

Many of these preliminary assessment questions are redundant, or overlap; some are all-encompassing or vague and need to be broken down into more focused questions. A subcommittee can refine the assessment questions, categorizing them into elements and focusing them into smaller pieces so that questions are manageable and answerable with a particular strategy and reasonable to fund and implement.

At its first meeting on October 9, 2008 the Oversight Committee will review the draft list and task the Core Team – or an expanded or reformulated Core Team, or another subcommittee that is created by the Oversight Committee at its first meeting – with providing a first cut at prioritizing the questions for environmental impacts, characterization, and management

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effectiveness. Oversight Committee members will provide the Core Team with additional input from the parties they represent in advance of the Core Team meeting on November 13, 2008. The Oversight Committee will review the revisions and complete prioritization for one component of the monitoring and assessment strategy at its second meeting on December 11, 2008 (see next task). The Oversight Committee will continue this prioritization exercise for the other two components at subsequent meetings.

Deliverables: Master list of stormwater assessment questions, categorized by the three basic elements (see above) and reduced into manageable and fundable pieces.

Timeline: Core Team meetings on October 15, 2008 and November 13, 2008: complete and deliver revised list to Oversight Committee no later than December 4, 2008.
Core Team meeting on December 10, 2008: finalize recommended process and criteria by which the Oversight Committee should make its decision.

Task 3: Identify priority assessment questions for each component of the monitoring and assessment strategy

The Core Team or other subcommittee authorized by the Oversight Committee will, assisted by the facilitator, propose criteria by which the Oversight Committee can prioritize assessment questions and provide transparency in the decision making. Criteria for prioritization could include: scale of problem, connection to regional science issues, need for information or certainty to developing and/or implementing actions to address stormwater impacts, urgency, and others.

The Oversight Committee will apply those criteria to select priority assessment questions, or monitoring objectives, for 1) ambient status and trends, 2) stormwater characterization, and 3) management action effectiveness – but not necessarily in this order. The priorities might include both short-term needs that could be the basis for the strategies and designs developed first, and equally important questions or objectives that could be addressed over a longer time frame.

This task should include a strategy to exchange ideas with other work groups in Puget Sound as priorities are identified and the tasks are set forth for the next two years. It is important from the beginning to create ways to break down the “silos” that characterize current monitoring efforts.

Deliverables: Priority stormwater assessment questions that will be used as the basis for developing the components of the stormwater monitoring and assessment strategy and design.

Timeline:

- 1) Monitoring objectives identified for tasking a group to develop the first component: Tee up in October 2008 and Prioritize in December 2008
- 2) Monitoring objectives identified for tasking a group to develop the second component: Tee up in December 2008 and Prioritize in February 2009
- 3) Monitoring objectives identified for tasking a group to develop the third component: Tee up in April 2009 and Prioritize in June 2009

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Task 4: Direct three Task Groups to develop monitoring and assessment strategies, one for each of the three basic components of the and assessment program, based on the highest priority assessment questions identified by the Oversight Committee

Monitoring and assessment strategies will be developed for 1) ambient status and trends, 2) stormwater characterization, and 3) management action effectiveness. The strategies will include: hypotheses to be tested, data collection and methods and protocols, laboratory and other data analysis methods, timelines, numbers and locations or other descriptions of sampling sites, total and itemized budget, etc.

The strategies will be developed through Task Groups. The Oversight Committee will, in officially launching each Task Group, identify a recommended set of members for the Task Group, including people that are not members of the Oversight Committee. Each Task Group will include technically knowledgeable agency staff and specific subject experts appropriate to the component being designed, and may be led by a consultant.

The Project Manager will ensure coordination and facilitate communication between and among the Task Groups and other related monitoring and assessment programs. The Oversight Committee will identify one or more official liaisons to participate in each Task Group. Each Task Group will explicitly involve representatives of current monitoring and assessment efforts.

For example:

- ◇ The Characterization Task Group will involve Ecology, the municipal stormwater permittees, and others and will build from the lessons learned in implementing the current Phase I permit and the EPA-funded toxics reduction strategy effort.
- ◇ The Status and Trends Task Group will likely involve scientists involved in the Chinook Recovery Plan, Ecology's regional status and trends monitoring, PSAMP, PNAMP, NAWQA, and other ongoing monitoring and assessment efforts.

The monitoring and assessment strategies may offer specific ideas about implementation, especially by highlighting opportunities to work with and build from existing programs that might be able to include stormwater-related sampling in their ongoing program or otherwise have capacity to do the work, as well as including ideas for new collaborative efforts. To this end, each Task Group will identify existing capacity that could be available and provide a general idea of what additional funds, staffing, equipment and other resources would be necessary to guarantee full implementation of the strategy. This information will be the starting point for the Task Group responsible for developing the implementation plan.

Deliverables: 1) Stormwater characterization monitoring and assessment strategy
2) Management action effectiveness monitoring and assessment strategy
3) Ambient status and trends monitoring and assessment strategy

Timeline: 1) Characterization: Begin in January 2009 and complete in June 2009
2) Effectiveness: Begin in March 2009 and complete in September 2009
3) Status and trends: Begin in July 2009 and complete in December 2009

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Task 5: Direct a single Task Group that will develop a coordinated implementation plan for the three strategies

The implementation plan will be developed through a Task Group comprised of key implementers of a regional study, including government agencies, universities, and consultants (including consultants to the study design Task Groups), and others. Task Group members will need to be knowledgeable about their organizations' monitoring and assessment programs and ably represent their capacities and interests in coordinating and implementing a regional program. The Stormwater Work Group's facilitator will assist this Task Group.

The implementation plan will begin with recommendations from each of the Task Groups that developed the strategies, especially regarding existing capacity and additional resources needed. From there the group will consider what additional public and private resources might be available and how to ensure that they are procured and deployed.

This Task Group may include specific recommendation to the Department of Ecology as to how the municipal stormwater NPDES permittees should be required to participate in and/or contribute to implementing the monitoring and assessment program as a whole.

Deliverables: Detailed implementation plan with responsible parties, funding needs and sources, and draft MOAs, etc.

Timeline: Begin in June 2009 and complete in April 2010

Task 6: Oversight Committee review and approval of the monitoring and assessment strategies and the implementation plan

The Oversight Committee will review the proposed monitoring and assessment strategies and the implementation plan, and may suggest revisions. The committee will discuss substantial revisions and decide how best to move forward. After adequate review and input, the plans will be approved. The Oversight Committee will similarly review, discuss and approve the implementation plan.

Deliverables:

- 1) Approved stormwater characterization strategy
- 2) Approved management action effectiveness strategy
- 3) Approved ambient status and trends strategy
- 4) Approved implementation plan

Timeline:

- 1) Review and discuss stormwater characterization strategy at June 2009 meeting and approve at August 2009 meeting
- 2) Review and discuss management action effectiveness strategy at October 2009 meeting and approve at December 2009* meeting
- 3) Review and discuss status and trends strategy at December 2009* meeting and approve at February 2010 meeting
- 4) Review and discuss implementation plan at April 2010 meeting and approve at June 2010 meeting

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5) Complete package delivered to the Department of Ecology, the Puget Sound Partnership, and other interested parties no later than June 30, 2010

** Note: the December 2009 meeting needs to be longer (all day?) to meet this timeline*

Task 7: Host a public forum to discuss the regional stormwater monitoring and assessment program

The purpose and outcomes of this workshop -- this potential task -- need to be developed further.

Deliverable: Opportunity for technically engaged people to comment on initial stages of developing the regional stormwater monitoring and assessment program, including assessment questions and preliminary tasks.

Timeline: Hold workshop in March 2009

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TASKS, TIMELINE AND STAFFING:

Task	Start Date and Deadline	Committee	Staffing
0.0 Project Start	June 2008	Puget Sound Monitoring Consortium Governance Committee	Project Manager and Consortium Facilitator
0.1 Draft Charter, Bylaws and Work Plan	June 2008 - September 2008	Core Team	Project Manager
0.2 Preliminary Assessment Questions	July 2008 - August 2008	Core Team	Project Manager
1.0 Convene Oversight Committee	August 2008 - October 2008	Core Team	Project Manager
1.1 Adopt Charter, Bylaws and Work Plan	October 2008 - December 2008	Oversight Committee	Facilitator and Project Manager
2.0 Refine preliminary stormwater assessment questions	October 2008 - December 2008	Core Team or other subcommittee identified by the Oversight Committee	Facilitator and Project Manager
3.1 Prioritize assessment questions for characterization	October 2008 - December 2008	Oversight Committee	Facilitator and Project Manager
3.2 Prioritize assessment questions for efficacy	December 2008 - February 2009	Oversight Committee	Facilitator and Project Manager
4.1 Develop strategy for characterization	January 2009 - June 2009	Task Group 1	Consultant and Project Manager
4.2 Develop strategy for efficacy	March 2009 - September 2009	Task Group 2	Consultant and Project Manager
7.0 Public workshop (?)	March 2009	Oversight Committee	Facilitator and Project Manager
3.3 Prioritize assessment questions for status and trends	April 2009 - June 2009	Oversight Committee	Facilitator and Project Manager
4.3 Develop strategy for status and trends	June 2009 - December 2009	Task Group 3	Consultant and Project Manager
5.0 Develop coordinated implementation plan	June 2009 - April 2010	Task Group 4	Facilitator and Project Manager; three consultants?
6.0 Approve plans	June 2009 - June 2010	Oversight Committee	Facilitator and Project Manager

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DETAILED SCHEDULE FOR YEAR ONE

The following meeting dates and activities are scheduled through June 2009:

July 2008

Core Team meeting on July 9

- Discuss draft charter, bylaws and work plan (Task 0.1)

Core Team meeting on July 22

- Identify preliminary assessment questions (Task 0.2)

Puget Sound Monitoring Consortium Governance Committee meets July 9

Puget Sound Partnership Leadership Council meets July 23-24

August 2008

Core Team meeting on August 13

- Select interim chair (Task 0.0)
- Agree to draft charter, bylaws and work plan to forward to Oversight Committee (Task 0.2)
- Plan first Oversight Committee meeting (Task 1.0)

Science Panel meets August 6-7

Puget Sound Monitoring Consortium Governance Committee meets August 13

Partnership staff will release Assessment Questions document for review beginning August 15 and discussion at a workshop to be held on September 15

September 2008

Core Team meets September 18

- Finalize Proposed Work Plan and agenda for first Oversight Committee meeting (Tasks 0.1 and 1.0)

Leadership Council meets September 4-5

Monitoring Consortium and Science Panel “Conversation” on Assessment Questions and Regional Monitoring Framework will be held on September 15 (the Partnership postponed this workshop indefinitely)

Science Panel meets September 16-17

Puget Sound Monitoring Consortium Governance Committee meets September 18

October 2008

Oversight Committee meets October 9

- High-level discussion of founding documents: charter, bylaws, and work plan (Task 1.2)
- Agree to process and subcommittee for prioritizing assessment questions (Task 2.0)

Core Team meets October 15

- Respond to direction from Oversight Committee
- Identify prioritization criteria and begin further organization of preliminary assessment questions (Task 2.0)

Science Panel meets October 6-7

Puget Sound Monitoring Consortium Governance Committee meets October 15

Leadership Council meets October 22-23

November 2008

Core Team meets November 12

- Finalize organization of preliminary assessment questions and propose starting point for refining and prioritization (Tasks 2.0, 3.1)

Puget Sound Monitoring Consortium Governance Committee meets November 12

Science Panel meets November 18-19

December 2008

Core Team meets December 10

- Confirm process and criteria for Oversight Committee decision the following day (Tasks 2.0, 3.1)
- Draft RFP for consultant to lead first Task Group (Task 4.1)

Oversight Committee meets December 11

- Adopt “living” documents: charter, bylaws and work plan; discuss future staffing needs (Task 1.2)
- Identify the objectives for the first monitoring and assessment strategy component (Task 3.1)
- Agree on topic and assignment for the first Task Group; identify subcommittee to work with Core Team to launch the Task Group in January (Task 4.1)

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Leadership Council meets December 1-2

Puget Sound Monitoring Consortium Governance Committee meets December 10

Science Panel meets December 16-17

January 2009

Core Team meets January ____

- Plan first meeting of the first Task Group: finalize RFP for consultant to lead; approve invitation letter; set first meeting agenda; draft work plan that identifies a schedule with interim and final deliverables (Task 4.1)

Science Panel meets January 13-14

February 2009

Core Team meets February ____

- Refine assessment questions for second monitoring and assessment strategy component (Task 3.2)
- Draft RFP for consultant to lead second Task Group (Task 4.2)
- Plan Public workshop – location, invitations/announcement, meeting agenda (Task 7.0)

Oversight Committee meets February ____

- Identify the objectives for the second monitoring and assessment strategy component (Task 3.2)
- Agree on topic and assignment for the second Task Group; identify subcommittee to work with Core Team to launch the Task Group in March (Task 4.2)

Puget Sound Georgia Basin Research Conference February 8-11

March 2009

Core Team meets March ____

- Plan first meeting of the second Task Group: finalize RFP for consultant to lead; approve invitation letter; set first meeting agenda; draft work plan that identifies a schedule with interim and final deliverables (Task 4.2)
- Finalize plans for public workshop (Task 7.0)

Public Workshop (?) March ____

- Purpose is to update technical community and gather input for Oversight Committee and Task Groups developing the regional stormwater monitoring and assessment program (Task 7.0)

Science Panel meets March 10-11

April 2009

Oversight Committee meets April ____

- Discuss input received from public workshop (Task 7.0)
- Agree on assignments for and composition of the Implementation Task Group (Task 5.0)
- Direct the Core Team or another subcommittee to launch the Implementation Task Group in June (Task 5.0)

Core Team meets April ____

- Plan first meeting of the Implementation Task Group: finalize RFP for consultant to lead; approve invitation letter; set first meeting agenda; draft work plan that identifies a schedule with interim and final deliverables (Task 5.0)

May 2009

Core Team meets May ____

- Refine assessment questions for third monitoring and assessment strategy component (Task 3.3)
- Draft RFP for consultant to lead third Task Group (Task 4.3)

Science Panel meets May 12-13

June 2009

Oversight Committee meets June ____

- The first Task Group presents its completed monitoring and assessment strategy for review and discussion (Task 6.1)
- Identify the objectives for the third study component (Task 3.3)
- Agree on topic and assignment for the third monitoring and assessment strategy Task Group; direct Core Team or other subcommittee to launch the Task Group (Task 4.3)

Core Team meets June ____

- Plan first meeting of the third Task Group: finalize RFP for consultant to lead; approve invitation letter; set first meeting agenda; draft work plan that identifies a schedule with interim and final deliverables (Task 4.3)

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Appendix 1 – Preliminary Assessment Questions

INTRODUCTION

This set of preliminary assessment questions for stormwater is the result of a two-step brainstorming activity by the “Core Team” of the Stormwater Work Group at the request of the Puget Sound Science Panel. It is a quick snapshot from a limited group of people that is intended to inform future discussions of priorities for stormwater monitoring and assessment activities. Identification of data needs and appropriate study designs will be done in future steps.

The prioritization and refinement of these questions will be critical in the development of focused, management-driven actions at the federal, tribal, state and local levels. The Oversight Committee should discuss more specifically:

- Which of these questions are priorities?
- What are the testable hypotheses for the priority questions?
- Which questions should a Task Group “flesh out” first?
- What level of certainty is needed now and in the future for adapting policies and actions?

DEFINITIONS

Ambient: means in the receiving water, sediments, biota or other media

Characterization: means quantifying pollutant loads, concentrations, and mitigating factors

Effectiveness: includes evaluation of a variety of types of management activities at multiple scales and in multiple combinations, e.g. at the project, watershed, and basin scales and for cumulative projects and/or approaches at each of those scales.

Pathway: a mechanism by which pollutants move through the ecosystem. For this discussion, we consider stormwater to be a pathway for pollutants rather than a source.

Pollutants/stressors: toxics, nutrients, pathogens, temperature, sediment, and flow volume.

Source control: various means of preventing pollutants from entering stormwater and other pathways, including structural and operational practices, product substitutions, and behavior changes.

Status and Trends: means assessing the temporal and spatial distribution of both (1) the effects of pollutants in stormwater on biota and other beneficial uses and (2) the characteristics of stormwater runoff, including quantification of pollutant loads.

Stormwater: a definition appropriate for the Stormwater Work Group will be determined.

Toxic chemicals: include metals [Cu, Cd, Hg, Pb, Zn, others]; PAHs; oil; pesticides; phthalates; flame retardants; legacy chemicals; and other chemicals and categories of concern such as personal care products, pharmaceuticals, and emerging contaminants.

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AMBIENT STATUS AND TRENDS

What are the effects of pollutants in stormwater on receiving waters and beneficial uses?

- To what extent can we quantify the effects/potential impacts of pollutants in stormwater on the quality of our marine, lake, stream and other receiving waters? On habitat? On biota? On human health?
- Which pollutants/stressors most influence biota or human health? Where or under what conditions?
- Where does stormwater significantly impact receiving waters, resources, species, or beneficial uses in the Puget Sound basin? Where is stormwater *currently* a problem, and where is stormwater *becoming* a problem?
- To what extent does the type, size, or location of a stormwater discharge matter?
- What are the best indicators of stormwater impacts on receiving waters?
- What are the differences in magnitude and timing of peak and low flow by basin (WRIA) and over time? Do these changes have significant impact on the biota and habitat?

STORMWATER CHARACTERIZATION

What are the relative contributions of stormwater to harm compared with other pathways in the Puget Sound basin? How do these relative contributions vary geographically and how are they changing over time?

- What proportion of toxics, nutrients and pathogens entering Puget Sound and the food chain are via stormwater?
- What are stormwater pollutant concentrations and loads? What proportions of the pollutants in stormwater are via: air deposition, specific land uses, groundwater, spills, permitted point sources, and decay of biota?
- What pollutants are coming from each land use type and what are the primary and secondary sources of those pollutants? What land uses or land use combinations are of greatest interest?
- What is the variability in stormwater pollutant loads by land use or geographic area? What other variables influence the spatial and temporal distribution of pollutant loads?
- What does the seasonal first flush of toxics look like throughout the Puget Sound basin?

How does stormwater in one part of the basin affect other parts?

- Where did the pollutants in each part of the Puget Sound marine system come from? What proportion came from outside the basin or subbasin?
- What pollutant loads, measured at small scales or upstream locations, do not "add up" to loads for the Puget Sound basin?
- What factors affect fate and transport of stormwater pollutants? How do differences in stormwater conveyance systems (infrastructure) affect pollutant loads from similar land uses?
- What is the relationship between stormwater discharges and conditions in nearshore and deepwater Puget Sound?

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MANAGEMENT EFFECTIVENESS

Are our stormwater management actions effective at reducing harm in Puget Sound?

- How effective are the current suite of BMPs in preventing future harm? To what extent can retrofits reverse past harm? What techniques are most effective and under what conditions?
At the Collective or Regional Scale
 - How effective are cumulative BMPs, or targeted suites of BMPs, in reducing pollutant loads at a watershed scale? At the Puget Sound basin scale?
 - To reduce pollutant loads, is it most effective to target new development, retrofit existing development, or a combination of both?
 - How effective are changes in land use practices in reducing pollutant loads?*At the BMP, Site, or Local Scale*
 - Among the most widely used practices and promising new practices that are available, what specific individual BMPs are most effective in reducing pollutant loads? At new sites? In retrofits?
 - How effective are structural treatment BMPs in reducing pollutant loads?
 - How effective are source control practices in reducing pollutant loads?
 - How effective are site-specific or targeted land use practices?
 - How effective are public education and outreach in achieving behavior changes that result in reduced pollutant loads?
 - How much will new practices, products, or product substitutions used on the landscape reduce pollutant loads? Are they better or worse than existing practices/products for pollutants of concern?
 - How effective are infiltration practices in reducing pollutant loads?
- Are there unintended effects of BMPs?
 - To what extent are BMPs for flow control reducing particulate pollution and exacerbating temperature problems?
 - Can stormwater be infiltrated into the ground without creating a soil or shallow groundwater pollution problem?
- To what extent are low impact development and other flow reduction approaches effective in preventing future harm? Is there a significant difference in stream flows in basins where LID is encouraged and practiced?
- What are the most effective land use planning tools to protect existing high-functioning habitat from harm caused by stormwater?
- To what extent can we restore beneficial uses of water bodies in subbasins with varying degrees of development?
- How can we most effectively target and prioritize retrofit projects throughout the Puget Sound basin?

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Appendix 2 – Puget Sound Science Panel Strategic Priorities for Stormwater

*From p. 13 of the 9/15/08 Draft of the Biennial Science Work Plan
(One of four topics of priority interest, subject to the Panel's revision)*

Watershed-scale study of changes in land use patterns or stormwater management strategies on pollutant loads in stormwater and biological effects

Seeking projects that address the four Partnership strategic priorities in watersheds of approximately 100 square miles in size:

1. Focus on most important/urgent problems

Measure/define the effects of stormwater on receiving waters, habitat, biota or human health in a watershed: what size, location, or other variable makes a particular stormwater discharge more or less likely to cause harm?

2. Protect intact ecosystems

Does watershed-scale application of LID maintain the hydrologic regime in a stream?

3. Restore ecosystem processes

To what extent can retrofits reverse past harm? Measure benefits of retrofitting a basin to:

- (a) restore hydrologic equilibrium to an urban stream, but not return to its historic condition
- (b) reduce toxics in an urban watershed
- (c) reduce nutrients/pathogens in a suburban or rural watershed

4. Reduce pollution at the source

Evaluate the effectiveness of watershed-scale combinations of stormwater management actions/techniques at reducing harm in Puget Sound and identify under what conditions these findings are likely to be transferable to other watersheds.