

# **PugetSoundPartnership**

our sound, our community, our chance

## **SUMMARY OF COMMENTS AND RESPONSES WATER QUALITY**

**August 1, 2008**

**Water Quality**  
**Comment Summary**  
August 1, 2008

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## Key Themes

The following themes were repeated often in comments received. They are listed here in no particular order.

1. The paper needs more discussion about source control approaches / measures / applications. *Section 3.2.1 was added to address source control for urban, transportation and rural general land use categories.*
2. The major conclusions/findings of the paper need to be more clearly presented. A sense of context and priority of the issues is needed. *Top priority actions were identified in Section 4.2.*
3. The discussion needs more focus on building from previous work / conceptual models. *The paper provides over 21 pages of references from which were drawn.*
4. The paper displays an urban centric approach - not enough is mentioned about rural impacts to Water Quality. *Additional detail has been added on rural impacts.*
5. The paper needs to maintain an integrated perspective that works to meet the needs for human as well as ecological uses. *Efforts were made to incorporate recognition that water quality is, at its core, not only about ecosystem but certainly about human health as well and that judgments will need to be made that take into account a broader policy perspective than water quality does.*
6. The paper needs greater synthesis with other topic areas. Declining water quality has repercussions in all other topic areas. *Paragraphs were added to the introduction, acknowledging that this paper is just one part of the greater whole being addressed by the partnership.*
7. Existing water quality regulations are not protective of beneficial uses, need an understanding of emerging chemicals, synergistic effects, cumulative effects. *Section 3.1.1.3 provides additional emphasis in this area.*
8. Enforcement of existing regulations needs to be strengthened. *This paper briefly notes enforcement challenges in Section 3.1.3.2. However, in terms of top priority for action, emphasis is placed on developing measurable hypotheses of Sound health against which to gauge the effectiveness of actions taken.*
9. Water quality management needs incentive-based as well as regulatory approaches. *This topic is taken up in detail in the Partnership financial approaches effort underway separately from this paper. However, additional discussion about incentives is included in this paper, as well as the Habitat and Land Use paper.*

10. Low impact development should be identified as a key strategy in the reduction of existing and new stormwater-related sources of pollution into Puget Sound going forward; retrofits should be implemented in existing areas of development. *Additional references to LID were added throughout the paper.*
11. We must minimize the impact [increased pressure from population growth] by requiring low impact development, storm water runoff mitigation, sewage treatment (replacement of failing septic systems), effective enforcement of environmental regulations. *See comment in response to 8.*
12. Education needs to be emphasized, incorporating education of the public, private entities, and agencies. *While this is a very important area of effort, this paper emphasizes the top priority need to gain much sharper clarity on the hypotheses for measuring progress towards Sound health against which action can be prioritized and results measured. The Partnership is undertaking a comprehensive education and outreach program as part of a separate, ongoing process.*

## Topics Missing/Underemphasized

### Threats (Contaminants)

Comment #	Comments	Response
1	Need more explicit discussion on the impact of fertilizers on water quality <ul style="list-style-type: none"> <li>• Need to also discuss sludge and industrial wastes used as fertilizers.</li> </ul>	Comments have been incorporated into the Topic Forum paper in Section 2, under sources (including biosolids). Industrial wastes used to manufacture fertilizers were not discussed in this paper; that is a level of detail beyond the scope of the topic forum papers.
2	Need more explicit discussion on the impact of pesticides to water quality: <ul style="list-style-type: none"> <li>• Pesticides should be addressed in freshwater systems as well. The USGS Fact Sheet titled “Pesticides detected in urban streams during rainstorms and relations to retail sales of pesticides in King County, Washington” (USGS 097-99, April 1999) documents 23 pesticides detected in water from urban streams and their potential sources including lawns and gardens and nonresidential areas.</li> </ul>	This comment has been addressed in the Topic Forum paper, Section 2, under the discussion about pollutant fate in the environment, with a reference to the King County study.
3	Need more explicit discussion on the impact of phthalates to water quality: <ul style="list-style-type: none"> <li>• What was learned and summarized by the Work Group regarding this pathway (air-storm water-sediment pathway) is likely relevant for understanding other chemicals of concern that behave similarly (e.g., PBDEs) and guiding additional studies or evaluations.</li> </ul>	Requested further information from commenter, however, did not receive a response. This comment is generally discussed in the paper, under chemicals of concern.

4	<p>Need more focus on industrial chemicals:</p> <ul style="list-style-type: none"> <li>• More focus and additional information is needed on emerging POPs such as polybrominated diphenyl ethers and perfluorinated compounds</li> <li>• Clarification is needed so that the reader is not confused about the identity of many of these compounds – i.e. PCBs / PAHs are not PBDEs, which in turn are not PFOA / PFOS and related perfluorinated compounds.</li> </ul>	<p>Requested further information from commenter, however, did not receive a response. Further detail on emerging contaminants has been provided throughout the report and it is recommended that the Partnership look at issues related to these chemicals in more detail in the future.</p>
5	<p>Need to address bioaccumulation / biomagnifications</p>	<p>This comment has been addressed in the Biodiversity topic paper, but is referenced in Section 2 under fate of pollutants. The topic forum core team recommends that this issue be addressed by Partnership in future phases of the Action Agenda.</p>
6	<p>Need more information on the effects of eutrophication:</p> <ul style="list-style-type: none"> <li>• Include references to and discussion of green tides (macroalgae) and shifts in biota, (i.e., work by Ron Thom, Tim Nelson) and the literature on bottom-up control of food webs</li> </ul>	<p>This comment has been addressed in part in section 2 “Water Quality in the Context of...” and in the Biodiversity Topic Forum paper.</p>
7	<p>Need more emphasis on red tides as an ongoing urgent and high priority issue.</p>	<p>This comment has been addressed in part in the Topic Forum paper S1, under III “Water Quality in the Context of...” and “Algal Blooms”</p>
8	<p>Need to mention the role of forest removal in water quality impacts.</p>	<p>This is mentioned under discussions of land conversion and development in Section 2.</p>
9	<p>Include a discussion of sediment inputs from soil disruption:</p> <ul style="list-style-type: none"> <li>• Inclusion of a discussion of sediment inputs is important because it would lead to a discussion of management programs that are in place to address this issue</li> </ul>	<p>Added information about sediment as a water quality issue in Section 2.</p>

10	Need to address contamination from metals like copper, zinc and lead.	This comment is discussed in Section 2.
11	Need to explore the role of climate change and potential sea-level rise in impacting water quality	This comment is discussed in introductory paragraph in Section 2.
12	Need to describe the contribution of pollution from Canada: <ul style="list-style-type: none"> <li>• Forty billion liters of untreated sewage is dumped into Puget Sound every year from a single source: the city of Victoria, BC.</li> </ul>	The paper purposefully did not address sources from Canada (air deposition or water borne pollutants) or from the open ocean. This issue is being addressed as part of other efforts currently being undertaken by the Partnership.
13	Include a discussion of sea-surface microlayer regarding the fate and transport of toxics in Puget Sound	This comment is discussed generally in the paper The authors requested additional information from commenter regarding this comment, however, did not receive a response.

## Sources and Pathways

### General Comments

Comment #	Comment	Response
14	Address all sources of pollution, but be clear on the primary drivers for poor water quality: <ul style="list-style-type: none"> <li>• i.e., Impacts from stormwater and combined sewer overflows remain one of the primary drivers for poor water quality.</li> </ul>	Sources of pollution are addressed; while there is no conclusive evidence that stormwater and CSOs are the primary drivers of poor water quality, and it is known that there are many factors that contribute to poor water quality, the paper acknowledges the important role of nonpoint source surface runoff in pollutant loads to the Sound. These comments were discussed in Sections 2 and 4.
15	Need to place more emphasis on groundwater as a source of contamination (particularly from industrial sites).	Groundwater sections were added to the paper in Sections 2 and 3.
16	Find opportunities to tie pollutants to large scale or widespread chosen practices, when this is more instructive than a less direct tie to demographics: <ul style="list-style-type: none"> <li>• i.e., The Water Quality paper reports that in recent years PAHs have increased. PAH deposition rates dropped precipitously in the 1950s as coal burning was replaced with other home heating systems. The recent increase (still far below historic levels?) must be presented in this larger context, and then traced to correctible sources.</li> <li>• As a second example, the Interstate 405 Corridor Program and the earlier I-90 bridge crossing claim a net decrease in runoff even as</li> </ul>	PAHs are discussed in Section 4 and throughout the paper. Land use practices and other practices by humans and their effects on water quality are discussed throughout this paper, as well as the Habitat and Land Use paper.

	transportation capacity is increased. This outcome is due to design improvements such as culvert improvements for both old and new facilities (case study for retrofit discussion, pp. 16, 29).	
17	Paper needs to describe the amount of pollution that is legally discharged to the Sound (i.e., through the NPDES programs)	Discussion of this topic was added (mixing zones) in Sections 3.

**Stormwater**

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
18	The paper needs to address stormwater from the full spectrum of uses and activities: <ul style="list-style-type: none"> <li>• Boatyards</li> <li>• Construction sites</li> <li>• Agency practices (WSDOT)</li> <li>• Farm practices,</li> <li>• Unpermitted sites</li> </ul>	More information was added on the full spectrum of pollutants in Sections 2 and 3.
19	Add copper to the list of toxic chemicals entering marine waters due to stormwater runoff.	Copper is included generally (metals) in the list of toxic pollutants that are transported by surface water runoff in Sections 2 and 3.
20	Recognize that EDCs have been found in stormwater, in some cases at higher levels than in wastewater.	Section 2 provides an overview of literature pertaining to EDC and stormwater based on sources known to contributors. No additional citations were provided by commenters.

**Air Deposition**

Comment #	Comment	Response
21	Include discussion of air deposition and sources of air pollutants of concern: <ul style="list-style-type: none"> <li>• i.e., Aerial deposition of zinc has been individually documented by a number of industrial facilities. These reports appear to indicate that close to 50% of the zinc in stormwater runoff may come from aerial deposition.</li> </ul>	Air deposition is discussed generally in the paper in Section 2. Additional citations are needed to discuss this comment in greater detail. The authors requested further information from the commenter; however, they did not receive a response. The topic forum core team recommends that the Partnership address this comment in future phases of the Action Agenda.
22	Recognize that in some cases, deposition rates for Puget Sound as a whole (not from localized sources) for several contaminants were reported to have declined in recent years. Examples (affects p. 32): <ul style="list-style-type: none"> <li>• Hydrocarbons reduced by 50 percent since 1950,</li> <li>• Chlorinated compounds by 30 to 50 percent since 1960,</li> <li>• Mercury by 20 percent since 1960 (The Habitat – Species Diversity paper reports that airborne mercury is on the rise due to emissions in Asia, p. 5),</li> <li>• Arsenic by 15 percent since 1960 (Tacoma Asarco Plant closure);</li> <li>• Lead by 10 percent since 1960.</li> <li>• Holding constant in 1983 were silver, copper, cadmium.</li> </ul>	Discussion of this comment was added to Section 2.

**Wastewater and Septic**

Comment #	Comment	Response
23	Explore more thoroughly the role of septic as a source of pollution: <ul style="list-style-type: none"> <li>• Need data on geographic concentration and magnitude of septic tank locations/impacts.</li> </ul>	Geographic-specific data was not incorporated into the Paper at this time. The level of detail requested is beyond the scope of the Topic Forum, however, the topic forum core team agrees that this information would be useful information for future phases of the Action Agenda.
24	Don't overstate the contribution of pollution from failing septic systems to Puget Sound. <ul style="list-style-type: none"> <li>• PSPs color brochure propagated the urban myth that failing septic systems are a significant cause of pollution to Puget Sound.</li> </ul>	This comment was not incorporated into the Topic Forum paper at this time. However, contributors recognize the need for additional work in this area.
25	Need to address chlorine from drinking water and household cleaners in treated wastewater.	This comment was not incorporated into the Topic Forum paper at this time. This comment requests a level of detailed analysis that is beyond the scope of the Topic Forum paper.

**Marine Traffic**

Comment #	Comment	Response
26	Need more discussion of oil spills / ship-based threats and marine debris. <ul style="list-style-type: none"> <li>• How often should we expect serious spills and in what volume?</li> <li>• How long do oil spill toxics persist in the environment?</li> <li>• What are the sources of toxic oil spills to Puget Sound water bodies?</li> <li>• Describe variability between catastrophic and chronic small spills.</li> </ul>	More discussion on oil spills and marine-based threats were incorporated into the Topic Forum Paper in Sections 2 and 3.
27	Paper underestimates the threat from oil spills, especially the cumulative effects from chronic inputs of PAHs to the Sound via small, unreported spills.	This comment was incorporated into Sections 2 and 3.
28	A CD ROM of selected references on ship-based pollution was provided at the first round of workshops in Seattle but found no reference to them here. There are three in particular that should be included in the next draft: <ul style="list-style-type: none"> <li>• Ecology's annual report on the spills program - the funding of this entire program is in jeopardy due to the rebates the oil companies get on the barrel tax when they export refined products.</li> <li>• EPA 2007 Draft Cruise Ship Assessment Report (EPA 842-R-07-005) It is also worth noting that Senator Durban has introduced the Clean Cruise Ship Act of 2008 (S. 2881).</li> <li>• 2007 Puget Sound Maritime Air Emissions Inventory quantifies the pollutants associated with vessel and port activities.</li> </ul>	Ship based pollution is generally discussed in the paper in Section 2, Table 3.
	There are a number of additional spill prevention programs that should be addressed in the paper, including the Emergency Response Tug and Neah Bay, enhanced oil transfer inspections, a waste oil reception program, and an expanded spill prevention education program targeting small vessels and marinas.	The contributors acknowledge the importance of this topic and have briefly noted strategies in Section 4, Table 11.
	Efforts in spill readiness and response should be expanded dramatically, including enhanced operational readiness, increased community based spill response and containment capabilities, volunteer management programs, and expanded training for response.	Measures to address oil spill prevention are discussed in Section 4.

29	Gray water discharges (from sinks and onboard washing machines) are also sources of an undocumented amount of pollution to the Sound.	The discussion of marine boat discharges was expanded, see Section 2 and 4.
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**Industrial and Commercial Dischargers**

Comment #	Comment	Response
30	The contribution of wastewater (both from past and current industrial uses) from industrial sites to Puget Sound pollution was not mentioned or significantly understated: <ul style="list-style-type: none"> <li>• Paper needs to address sites contributing industrial wastewater into the Duwamish River or Commencement Bay</li> <li>• The paper also overlooks Lake Union and the Lake Washington Ship Canal and Bellingham Bay as industrial areas of the Puget Sound Basin.</li> </ul>	Industrial wastewater has been added to Section 2. Geographic specificity has not been added and will be generally covered by the action area profiles.
31	Include a discussion of the numbers of, distribution of, and pollutants associated with the industrial facilities in the Puget Sound Basin: <ul style="list-style-type: none"> <li>• Refer to EPA’s TRI (Toxic Release Inventory) database and Ecology’s permit database</li> </ul>	This comment was not addressed in the Topic Forum paper at this time, because it requests a level of detailed evaluation that is beyond the scope of the Topic Forum paper. The core team agrees that this would be a good exercise to do as a future analysis of pollution sources, and recommends that the Partnership consider this as part of future phases of the Action Agenda.

**Contaminated Sediments**

Comment #	Comment	Response
32	Add a section on sediments, including strategies for dredged material management: <ul style="list-style-type: none"> <li>• Identify the desired future conditions (DFCs) for water and sediment quality.</li> </ul>	Sediments are discussed in the paper in Section 2, 3, and 4. This comment requests a level of detail for DFC identification that is beyond the scope for this Topic Forum paper.
33	Strategies for rapid improvement of sediment quality could include: <ul style="list-style-type: none"> <li>• Accelerated cleanup of known contaminated sediment sites.</li> <li>• New programs for use of clean dredged material for enhanced natural recovery.</li> </ul>	The issue of sediment clean up as a method of enhancing water quality is addressed in P2
34	More emphasis needs to be placed on controlling suspended solids in freshwater environments: <ul style="list-style-type: none"> <li>• There has not been enough emphasis on understanding the loadings of sediments in Puget Sound relative to the sedimentation in Puget Sound.</li> <li>• We must know where particles in the sediments of Puget Sound came from if we are going to understand the relative impact of toxics on particles discharging from various watersheds.</li> <li>• Clean sediment is considered to be a pollutant (in Idaho) under the CWA, and if it is impairing beneficial uses or otherwise causing violations of WQS, it should be listed under 303(d).</li> <li>• High variability for freshwater sediments prevents status assessment</li> <li>• Existing data from cores can be used to forecast what contaminant levels might be like in 2020</li> <li>• PSP needs to take a deeper look at this information and use it to help prioritize contaminants of most concern, evaluate fate and transport models and make projections of trends</li> </ul>	The paper recommends as a top priority, the development of a model for the Sound that could be used for this and related analyses. See Section 4.

**Aquaculture**

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
35	<p>Paper needs to address the harm to water quality caused by aquaculture:</p> <ul style="list-style-type: none"> <li>• SARC is an instrument for further harming Puget Sound.</li> </ul>	This comment has been touched on into Topic Forum Paper Sections 2 and 3.

**Current Strategies / Effective Programs**

**General Comments**

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
36	<p>The paper needs to better summarize and evaluate the range of activities occurring in the Puget Sound basin:</p> <ul style="list-style-type: none"> <li>• Municipalities and other entities are engaged in many different activities intended to improve surface water and sediment quality: the information available on the scope and effectiveness of these activities should be assembled and carefully assessed—produce Puget Sound-focused “white papers” or summary documents</li> </ul>	This comment has been incorporated into Topic Forum Paper in Section 3.

**Programs**

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
37	<p>Include discussion of incentive and non-regulatory programs to address water quality.</p>	This comment has been incorporated into Topic Forum Paper in Section 3. .
38	<p>Some programs were not mentioned that should have been:</p> <ul style="list-style-type: none"> <li>• BEACH Program</li> <li>• DOH Shellfish Programs</li> </ul>	These programs are discussed in the Human Health Topic Forum paper.
39	<p>For a good agricultural model, look at Sno-Valley Tilth’s support of a measure requesting King County to designate their APD as an “Eco-APD.”</p> <ul style="list-style-type: none"> <li>• Eco-APD designation will serve as a constructive model for how other farming communities in the Puget Sound watershed can address their impacts of water quality in the Puget Sound.</li> </ul>	This comment has been incorporated into the Topic Forum Paper in Section 3

40	<p>Include discussion of the Conservation Reserve Enhancement Program, or CREP, implemented by local conservation districts with financial support from the state Conservation Commission:</p> <ul style="list-style-type: none"> <li>• Provides landowners with technical resources and financial assistance to install best management practices to improve stream buffers that will reduce sediment, bacterial and nutrient pollution, and eventually reduce stream temperatures by shading, while restoring other important stream conditions.</li> </ul>	This comment has been incorporated into the Topic Forum Paper in Section 3.
41	<p>Some suggested language (per comment above):                  [New Subsection under P1] Influencing Human Activities: Incentives, Education, Stewardship and Restoration Programs</p> <ul style="list-style-type: none"> <li>• The 12 conservation districts in the Puget Sound basin implement a number of incentive based programs for landowners to reduce inputs into fresh and marine waters. Supported by funding from the state Conservation Commission, local assessments, federal grants, and other sources, districts implement the following programs that support the protection of fresh and marine waters.</li> <li>• Livestock Grants: The Washington State Legislature appropriates funding to WSCC to distribute Livestock Grants to conservation districts. The Livestock Grant is used to assist owners and operators of animal feeding operations in developing nutrient management plans as well as providing information to smaller scale livestock producers. In addition, the Livestock Grant provides cost-share funding for implementation of Best Management Practices (BMPs) such as roof runoff management, livestock exclusion fencing, and manure management facilities.</li> <li>• Conservation Resource Enhancement Program (CREP): WSCC administers CREP to provide funding for private landowners who enroll land located along water bodies with priority salmonid stocks. Eligible land is planted – and where necessary, and fenced – to create forested streamside buffers that are protected for 10-15 years, providing cooler streams, more diverse aquatic habitats, and a reduction in sediments. Participants are reimbursed for 100% of eligible costs and receive an annual rental payment per acre enrolled. FSA provides 80% of the</li> </ul>	These comments have been generally incorporated into the Topic Forum Paper in Section 3.

	<p>funding for CREP.</p> <ul style="list-style-type: none"> <li>• Farm Plan Implementation Grant (FPIG): WSCC administers FPIG funding, appropriated by the Legislature, to conservation districts in Washington State. Based on local long-range and annual planning, districts use the funding to conduct outreach activities, provide technical and financial assistance for BMP implementation, participate in watershed planning, and coordinate water quality monitoring activities. Districts also engage in water quality monitoring, projects for shoreline erosion protection, stormwater management and LID planning, land and water stewardship education, forestry management planning with landowners, and coordinate volunteer monitoring.</li> </ul>	
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**LID / BMPs / Infiltration**

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
42	<p>Paper needs to emphasize LID more strongly:</p> <ul style="list-style-type: none"> <li>• Low impact development provides one of the best design and implementation strategies for the site level. Better design, and water quality and quantity management at the site level is necessary to realize goals at the watershed scale.</li> <li>• LID has been shown to be effective, but the definition of LID changes rapidly as do the methods employed to implement LID. While we do know that LID is effective, and can be more effective, we are unable to fully quantify all the LID methods and materials available, and more importantly, the results of these methods and materials due to the short lifespan of their use in this region. If change is to be made in the short time frame identified, new strategies, such as LID, must be employed, if for no other reason than LID is effective and can be implemented immediately, with little or no direct cost to the Partnership, or to the State.</li> <li>• Pollution Control Hearing Board Hearing: Once the hearing is completed, PSA’s attorney’s can provide copies of documents used by its expert witnesses to testify that low impact development can improve water quality.</li> </ul>	<p>These comments have been incorporated into the Topic Forum Paper in Sections 3 and 4.</p>

	<ul style="list-style-type: none"> <li>• Provide more references, modeling, Low Impact Development is arguably the best set of tools we have for managing stormwater at the site scale is omitted from a document that is central to policy and action development</li> <li>• Over 70 research papers on water quality and permeable paving (this is a short list of research on the subject) have been submitted to PSP and should be referenced.</li> </ul>	
43	<p>LID needs to be better understood before promoting for wide scale use:</p> <ul style="list-style-type: none"> <li>• There is a need for a better understanding of local factors influencing LID and storm water runoff in general. This should be a high priority for the future.</li> <li>• There is a need for more local studies documenting LID benefits under regional weather and climatic conditions.</li> <li>• MBA strongly disagree with taking a mandatory approach to low impact development and cannot support an Action Agenda that contains this recommendation.</li> <li>• Infiltrative LID techniques do not work well over till soils or where water may be delivered to steep slopes subject to landslides Puget Sound region is heavily dominated by till soils, often in combination with slopes. As a result, many of the more effective LID measures to reduce stormwater runoff are not feasible in much of the Puget Sound basin. Also, some LID features too expensive, not maintained by the owner, or fire districts do not like (narrower roads).</li> <li>• Is unclear whether LID benefits in urban areas could be of a scale capable of having meaningful impact on Puget Sound</li> </ul>	<p>These comments have been incorporated into the Topic Forum Paper in Sections 3 and 4.</p>

## **Regulatory Effectiveness**

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
44	Paper needs to provide more information on regulatory effectiveness: <ul style="list-style-type: none"> <li>• Are the current regulations consistent and well applied?</li> <li>• Where has there been success?</li> <li>• Where is more work needed?</li> <li>• What new regulations need to be set?</li> </ul>	These comments have been incorporated into the Topic Forum Paper in Section 3 and 4.
45	Need to address additional sections of the Clean Water Act as they provided both regulatory and non-regulatory tools for Puget Sound protection. <ul style="list-style-type: none"> <li>• Section 404</li> <li>• Section 319</li> <li>• Section 320</li> </ul>	This comment has been incorporated into the Topic Forum Paper in Sections 3 and 4.
46	The paper did not address coordination of government jurisdictions at multiple levels, with multiple programs	This comment has been incorporated into the Topic Forum Paper in Section 4.
47	The paper needs to address the cost of improvement efforts, including public and private funding sources.	These comments were not incorporated into the Topic Forum Paper at this time. Cost and funding are being discussed as part of separate efforts currently being conducted by the Partnership
48	Paper needs to address failings of the NPDES Industrial General Stormwater Permit: <ul style="list-style-type: none"> <li>• Ecology estimates that 90% of industrial stormwater dischargers are not in compliance with the Industrial General Stormwater Permit</li> <li>• PSA has initiated over 65 enforcement actions under the Industrial and Boatyard General Stormwater Permits to improve compliance.</li> </ul>	This comment was not incorporated into the Topic Forum paper at this time. A citation was requested from the commenter, but no documentation was subsequently received. The effectiveness of existing regulatory programs is generally discussed in Section 3.

<p>49</p>	<p>Paper should acknowledge that current stormwater regulations are not effective:</p> <ul style="list-style-type: none"> <li>• Current and proposed stormwater systems designed to current code at best will provide no more than 1/3 of the desired protection under 100-year storm conditions. Massive flooding and stormwater overrun of the installed retention/treatment facilities must result.</li> <li>• To achieve the desired clean-up of Puget Sound, major improvements in the requirements for retention, control and treatment of urban stormwater is needed.</li> </ul>	<p>This comment has been incorporated into the topic Forum Paper in Sections 3 and 4.</p>
<p>50</p>	<p>Need to state what the effect is, and will be, of Ecology not requiring stormwater discharges to comply with numeric effluent limits based on water quality standards.</p> <ul style="list-style-type: none"> <li>• Can Puget Sound be recovered if the largest source of pollution is not required to comply with water quality standards?</li> </ul>	<p>This comment has not been specifically incorporated into the Topic Forum Paper, however, it is generally discussed in the discussion of the effectiveness of current programs. The comment addresses a level of detail that is beyond the scope of the topic forum discussion draft. The issue of permitting and water quality regulations is discussed in Section 3.</p>
<p>51</p>	<p>Include regulatory programs that address sediment inputs, such as the state Forest Practices Act and local clearing and grading ordinances.</p> <ul style="list-style-type: none"> <li>• These two regulatory programs play a key role in preventing sediment delivery into fresh and marine waters</li> <li>• We do not know whether the current forest practice rules will attain water quality standards, including numeric water quality criteria as well as biological integrity</li> <li>• Final issue papers need to point out that water quality and habitat may still be adversely affected by ongoing forest practices</li> </ul>	<p>Part of the comment was incorporated into the Topic Forum Paper in Section 3.</p>

52	<p>Provide more information on the effectiveness of regulatory enforcement, and the need to more stringently enforce regulatory measures:</p> <ul style="list-style-type: none"> <li>• i.e., in a recent study, Pierce County was not effectively enforcing regulations designed to protect critical natural resources, like wetlands, streams, and associated buffers. These resources protect drinking water, minimize flooding and shelter wildlife.</li> </ul>	The comment was generally incorporated into the Topic Forum Paper in Section 3.
53	Provide a discussion of the current regulatory structure for on-site septic systems between the state departments of Health and Ecology, and local health districts.	The comment was incorporated into the Topic Forum Paper in Sections 3.

### ***Water Quality and Sediment Standards***

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
54	<p>Need more discussion on water quality standards:</p> <ul style="list-style-type: none"> <li>• What standards are applicable/working?</li> <li>• Will compliance with existing water quality standards ensure the recovery of Puget Sound by 2020 or is more needed?</li> <li>• If water quality standards are sufficient to recover Puget Sound then require all pollution dischargers a timeline for coming into compliance.</li> <li>• Work on developing new standards and criteria are warranted: we are currently facing several emerging pollutants where criteria do not exist: we need criteria to compare to for monitoring projects: Modification of existing criteria are needed: metals and nutrients guidelines for rivers, streams, stormwater and wastewater.</li> <li>• Need to address how water quality standards might be updated to address toxicity associated with complex mixtures such as stormwater</li> <li>• There is a program in Sinclair/Dyes Inlet that can inform the management of stormwater. The program (ENVVEST) has not been referenced in the paper.</li> <li>• The paper states that sediments found in Puget Sound water fall below sediment quality standards, but those that bioaccumulate like Hg, pose risk well below the state sediment quality standards.</li> <li>• TMDLs are an important water quality management tool that can direct</li> </ul>	The discussion of water quality standards was expanded in the Revised Topic Forum Paper in Section 3. The paper also suggests sufficient funding for existing standards and regulatory efforts to determine their efficacy; the core team members are not aware of a current regulatory program that is adequately staffed and funded at this time. Also, the development of hypotheses against which to prioritize the development of new standards (or any other PSP sponsored action) is recommended in Section 4.

	<p>remediation efforts for water bodies that fail to meet water quality standards; TMDLs are not discussed as such in the paper.</p> <ul style="list-style-type: none"> <li>Standards to protect biota health do not exist for most toxics, and the ones that exist are inadequate.</li> </ul>	
55	<p>If there are weaknesses in the 303d program, the paper should acknowledge and recognize those weaknesses, and make recommendations on how the 303(d) program could be improved to more accurately characterize water quality conditions in the Puget Sound basin.</p> <ul style="list-style-type: none"> <li>Paper mentions that “there have been an increasing number of impaired water body listings on the State’s 303(d) lists...” there is no detail provided on these listing.</li> <li>Include department Ecology recently released a proposed 303(d) list for 2008. See appendix 1 from Ron Shultz.</li> </ul>	<p>Discussion of the 303(d) program was incorporated into Section 3, however, a more detailed discussion on the 303(d) list is beyond the scope of the topic forum discussion paper.</p>
56	<p>Need to better address mixing zones:</p> <ul style="list-style-type: none"> <li>Are mixing zones protecting water quality, particularly for bioaccumulative toxins, in Puget Sound? Should they be phased out? The failure to address this issue is a significant oversight.</li> </ul>	<p>The comment was generally addressed in revised topic forum paper, Section 3.</p>

## Principles/Criteria that should be reflected in the strategies to address threats

### Management Approaches

Comment #	Comment	Response
57	<p>Management should be holistic from a process perspective and encompassing (watershed-scale) geographically.</p> <ul style="list-style-type: none"> <li>• Develop new and innovative management approaches, i.e. need more information on the use of watershed based management and planning as a tool for improving water quality.</li> </ul>	<p>This comment is addressed in Table 11 under Proposed Strategies, in addition to being mentioned throughout Section 4.</p>
58	<p>Set regional policy that fosters local corrective actions:</p> <ul style="list-style-type: none"> <li>• Given the difficulty of tracing pollutants to sources, and given local conditions (e.g. the direct effects of marine recreation on endangered embayments with low circulation), a regional policy fostering a myriad of local corrective actions is imperative.</li> </ul>	<p>This comment is addressed in Section 4, with emphasis given to the development of scientific hypotheses to provide a basis for building defensible regional policies.</p>
59	<p>Need significant new actions that can be readily enforced and make polluters directly held accountable.</p>	<p>Emphasis has been placed primarily on enforcing existing laws rather than developing new regulations see Section 4.</p>
60	<p>Need to more clearly identify the linkage between threats / risks and management controls / solutions.</p>	<p>This has been accomplished through restructuring the format of the paper.</p>
61	<p>Create linkages between threats and implementation (cross-connect problem formulations to real implementation options):</p> <ul style="list-style-type: none"> <li>• For each sub-basin; the Geographic Information System (GIS) capability must be transparent to GIS for Water Resource Inventory Areas (WRIAS) and to stormwater (Water Quality, p. 30).</li> <li>• The logic of realistic and effective implementation requires that the Sound be treated equally as a basin unit and as a collage of sub-basins, rather than as a unity nuanced only a bit with local detail. For example,</li> </ul>	<p>The suggestions for display and GIS tools are beyond the scope of this paper but would serve as useful tools in the future. As noted in the response to comment 60, the paper now more clearly links issues with solutions.</p>

	<p>what do we know about tidal circulation patterns and basin and sub-basin flushing cycle?</p> <ul style="list-style-type: none"> <li>• An excellent display would be a view of future land uses, showing those small sub-basins where future growth will violate the general thresholds of more than 12 percent impervious surface, or less than 65 percent forest cover (p. 8).</li> <li>• The regional agenda must consist mostly of a fabric of sub-regional actions. GIS transparency is encouraged; however this technical tool must not take on a life of its own, obscuring critical caution contained in the Water Quality text, namely, that pollutant runoff is highly variable within land use classifications (p. 7). A focus on clear performance measures is probably more consistent with the state Growth Management Act and more to the point than a population lid.</li> </ul>	
62	<p>Complete a thorough analysis of institutional barriers (laws, standards, regulations) is needed from identification of the problem to implementation of solutions:</p> <ul style="list-style-type: none"> <li>• These barriers include funding to: monitor water quality in general, and implementing and enforcing regulations; and getting the right people talking to each other.</li> </ul>	<p>Both the benefits of and issues with existing regulations have been tabulated in Sections 3 and 4. The Partnership is currently evaluating barriers to existing regulations and institutions as part of a separate ongoing evaluation.</p>
63	<p>Solutions need to be embraced by open market / economy (incentive-based approaches).</p>	<p>Market-based approaches have been addressed in both Sections 3 and 4 and are being more thoroughly treated in the Partnership's separate financial options analysis.</p>

64	Criteria for measuring condition need to be reproducible Sound-wide.	The need for coordinated, Sound-wide solutions, criteria, and measurement are addressed throughout the paper.
65	Need to establish a level playing field where all known sources of pollution are being regulated on a similar basis: <ul style="list-style-type: none"> <li>• Water quality improvements must be made by all pollution contributors.</li> </ul>	Improved regulatory enforcement is addressed in Section 4.
66	Set priorities: <ul style="list-style-type: none"> <li>• Identify existing projects or projects that can be implemented confidently early on that will generate useful information on a schedule that can then feed back into the action agenda and guide more comprehensive projects:</li> <li>• Identify now what types of actions might be most appropriate for a pilot project to assess and where the pilot project(s) would best be implemented</li> <li>• Complete an analysis of cost-implications vs. direct water quality gains, helping to prioritize possible actions and provide guidance for the entire Puget Sound.</li> <li>• Set priorities based on risk drivers - this would be of great value to local governments and regional entities in focusing funding efforts for maximum return on water quality investments</li> </ul>	There is a discussion of suggested top priority actions and principles to guide projects supported by the Partnerships in Section 4.
67	Solutions to water quality problems, and the devotion of funds, should seriously examine the trade-off between the precautionary principle and late stage cleanup.	While a detailed cost-benefit analysis comparing prevention to clean-up is outside the scope of this paper, general discussion of this issue can be found in Section 4.
68	Start where the existing State of the Sound and Recovery Plan left off.	Efforts were made to draw from a wide range of references including the document mentioned.

### Source Control

Comment #	Comment	Response
69	Source control should be a prominent management goal.	The need for improved source control figures prominently throughout the paper.
70	Stress adaptive management approaches for source controls.	This comment has been addressed in Section 4.

### Science Needs

Comment #	Comment	Response
71	<p>Need more effective and consistent monitoring programs:</p> <ul style="list-style-type: none"> <li>• Focus on reproducibility and adaptability</li> <li>• Paper should mention B-IBI as a method for monitoring receiving waters and comment on the limitations of water chemistry as a means to characterize water quality.</li> <li>• Need to assess the effectiveness of management efforts and whether those efforts are in compliance with the applicable laws, rules and management guidelines</li> <li>• Monitoring and adaptive management program that came out of the Forests and Fish negotiations should be looked at. This may be used as a model for a Puget Sound monitoring/AM program (some serious flaws that must be investigated and considered before adopting this same approach for Puget Sound restoration)</li> <li>• Need an improved water and sediment monitoring program to evaluate recovery progress. Need to compile existing data, id gaps and collect data to fill gaps</li> </ul>	A brief discussion of improving the efficacy of monitoring programs and their linkage to hypotheses surrounding Puget Sound health is included in Section 4 as a top priority. Specific monitoring program (e.g., B-IBI) recommendations are beyond the level of detail of this paper.
72	<p>Any discussion of polluted waters in Puget Sound should include an estimate of how many of the water bodies have actually been sampled for impairment by all relevant parameters:</p> <ul style="list-style-type: none"> <li>• Since 303 d is voluntary, additional sampling is needed to get a more comprehensive estimate of impairment in the Puget Sound Basin</li> </ul>	Sampled water bodies are referenced throughout the paper, and approximate numbers for impaired water bodies are provided in Section 2.

73	<p>Compile local data for different land use types to design and implement treatment technologies, as well and manage sources of important pollutants.</p> <ul style="list-style-type: none"> <li>Some work has been completed locally and should be compiled. For example, the city of Seattle recently completed a street sweeping pilot study and their results should now be available</li> </ul>	<p>In Section 4, this is suggested as a follow up study; the details are not incorporated into this paper as it is beyond the scope of the topic forum papers..</p>
74	<p>Need to understand what factors are currently controlling pollutants in storm water runoff in the area in order to develop appropriate clean up strategies</p>	<p>Both known factors and gaps are outlined in Sections 2 and 4.</p>
75	<p>Establish baseline conditions for both water and sediment quality</p> <ul style="list-style-type: none"> <li>Deciding whether the existing database for water and sediment quality together with ongoing regional monitoring programs is enough to establish a baseline needs to be a high priority. This evaluation should address both the area and density of coverage and the list of constituents evaluated</li> </ul>	<p>Developing baseline conditions is beyond the scope of this paper, although the necessity for this evaluation is established in the document in Sections 2 and 4.</p>
76	<p>Need to track chemical manufacturing and use with a REACH type database</p>	<p>The benefits of implementing a program similar to REACH are addressed in Section 4.</p>
77	<p>Need more research on the toxic nature of pollutant mixtures.</p>	<p>Throughout the paper are mentions of the need for more research regarding the impacts of pollutants.</p>
78	<p>Need more information on fate of pathogens / toxins in sediments:</p> <ul style="list-style-type: none"> <li>Important for assessing the transport and fate of sediment bound pollutants, freshwater standards.</li> <li>For locations where bacterial violations are a common occurrence, a MST study should be initiated in order to determine management options.</li> </ul>	<p>Sediment research is called for in Section 4.</p>

79	<p>Develop scientific studies that work to make direct linkages between water quality and impacts; i.e. measure toxic levels and effects on biota:</p> <ul style="list-style-type: none"> <li>• Develop a water quality standard for biological integrity</li> <li>• Need monitoring info on phytoplankton and zooplankton as parts of food web</li> <li>• Biomonitoring needs to be emphasized in order to bridge the knowledge gap Between the limits of direct analytical measurement and actual release &amp; Exposure (EDCs)</li> <li>• Recommend including an emphasis on biomonitoring linked to specific biomarkers that are indicative of EDC (and other contaminant classes) exposure</li> <li>• Increased use of biomonitoring / biomarkers would complement ongoing monitoring efforts for levels of select POPs. Many toxicologically important EDCs / pharmaceutical agents (ethynylestradiol [EE2] for example) do not bioaccumulate appreciably; without the use of biomarkers, thus overlooked</li> <li>• Impacts of metals on the marine environment and biota of Puget Sound can best be assessed by creating loading estimates using a mass balance framework.</li> <li>• Understanding the natural recovery rates for metals in Puget Sound will help assess current and project future contaminant levels</li> </ul>	<p>There is a general discussion of the issue of cause-and-effect linkages in Section 4 and the top priority need to set out hypotheses for Sound health against which research and actions can be prioritized.</p>
80	<p>Need more information on fate of pathogens / toxins in sediments</p> <ul style="list-style-type: none"> <li>• Marine mapping. Show what we can about Puget Sound tidal behavior and sedimentation issues.</li> </ul>	<p>Sediment research is called for in Section 4.</p>
81	<p>Need inter jurisdictional map of storm water networks.</p>	<p>The need for this map is addressed in Section 4</p>

82	<p>Use a hydrodynamic model:</p> <ul style="list-style-type: none"> <li>• A high resolution hydrodynamic model is highly desirable with the ability to predict (complex nearshore coastal and estuarine regions) hydrodynamic circulation, effluent toxics and sediment fate and transport, and simulation of water quality variables</li> <li>• The model should simulate tidal circulation, wetting and drying of marshlands and mudflats, and the transport process of freshwater river plumes, sediment, and water quality in the Puget Sound nearshore environment.</li> <li>• With a detailed hydrodynamic component as described above, a water quality and sediment transport model simulating basic eutrophication kinetics and nutrient balance may be developed</li> <li>• Water quality model set up should include the primary eutrophication constituents that affect dissolved oxygen in the nearshore environment: temperature, ammonium, nitrite, nitrate, organic nitrogen, soluble reactive phosphorus, total phosphorus, chlorophyll a (phytoplankton), biochemical and sediment oxygen demand, and sediment nutrient releases.</li> </ul>	The need for such a model is identified as a top priority in Section 4.
83	<p>Need more LID studies:</p> <ul style="list-style-type: none"> <li>• There is a need for a better understanding of local factors influencing LID and storm water runoff in general. This should be a high priority for the future</li> <li>• There is a need for more local studies documenting LID benefits under regional conditions</li> </ul>	LID is addressed in more detail in Sections 3 and 4.

## Actions that should be continued, added, changed, stopped

### *Stormwater Programs*

Comment #	Comment	Response
84	LID Programs that should be used: <ul style="list-style-type: none"> <li>• flow credits, education, rainwater harvesting, maintenance, and explore whether it should be Voluntary or Required.</li> <li>• Provide incentives for the implementation of LID, development of new treatment technologies and source control or product bans</li> <li>• best way to promote LID is to remove regulatory barriers to it, create incentives for commercial and residential builders to use it and to educate the public about LID features they could employ</li> <li>• Promote rainwater collection as an important voluntary tool for addressing urban stormwater issues. Eliminate any regulatory barriers to this.</li> </ul>	LID is addressed in more detail in Sections 3 and 4.
85	Prevent spills from vehicles: <ul style="list-style-type: none"> <li>• Require pre-deployment checks for utility vehicles with major hydraulic equipment.</li> <li>• Require an absorbent mat to be under vehicles that are in long term storage (over 30 days without being moved).</li> <li>• Issue environmental abuse citations to vehicles showing evidence of leaks while operating or parked upon public roads or parking areas.</li> <li>• Train, equip, and deploy Environmental Protection Teams composed of volunteers to frequently survey public areas for environmental abusers, evidence of spills requiring cleanup, or conditions with potential for future contamination (improperly stored or unattended presence of containers of environmentally hazardous materials).</li> </ul>	Suggestions for regulations and actions are included in Section 4.
86	Support the Seattle Public Utilities’ (SPU) recent street sweeping pilot study and perhaps encourage replication in other jurisdictions around the Sound	The study and its results are discussed in Sections 3 and 4.
87	Support mass transit: <ul style="list-style-type: none"> <li>• Get people out of their cars to reduce toxics in water.</li> </ul>	Suggestions for regulations and actions are included in Section 4.

88	Collect and filter run off of gasoline/oil residue at all storm drains on city streets.	Suggestions for regulations and actions are included in Section 4, particularly as a part of the retrofit recommendation.
89	Developers should not be allowed to discharge stormwater outflow directly to the Sound (i.e. near Illahee).	Suggestions for regulations and actions are included in Section 4.
90	Retrofit existing developments. <ul style="list-style-type: none"> <li>• Development in Puget Sound prior to the mid-1990's is playing a significant and ongoing role in terms of untreated stormwater discharge</li> <li>• Apply current regulations and practices to retrofit untreated stormwater runoff coming from public and private development predating current stormwater management requirements should be a top priority, particularly in watersheds with significant existing development.</li> </ul>	Retrofit is called out as a recommended effort in Section 4.

**Wastewater / Septic Programs**

Comment #	Comment	Response
91	Clean up or replace failing septic systems and require new systems to remove nutrients. <ul style="list-style-type: none"> <li>• Require periodic examinations of septic systems.</li> </ul>	This comment is addressed in suggestions for regulations and actions included in Section 4.
92	Reuse wastewater for industrial/nonpotable uses.	This comment is addressed in suggestions for regulations and actions included in Section 4.
93	Focus on setting nutrient reduction goals/targets/or requirements, and allow the local jurisdiction to figure out the best solution. <ul style="list-style-type: none"> <li>• Overall, focus on the benefits to achieve, not the methods.</li> </ul>	Suggestions for setting out Sound health hypotheses and analysis as a means to establish this kind of guidance for local agencies

		is promoted in Section 4.
94	<p>Look at the relative merits of upstream source removal as compared to wastewater treatment.</p> <ul style="list-style-type: none"> <li>• A case in point is the reported increase in pharmaceuticals in the marine environment. How much of this is due to the required in-home garbage disposal of surplus drugs under the protocols of the growing home hospice programs?</li> </ul>	This comment is addressed in suggestions for regulations and actions included in Section 4.
95	Need more research and focus on issues of our own wastewater treatment plants and, if possible, removal of all outfalls as soon as possible.	The paper suggests examination of opportunities to reduce the number of outfalls in Section 4.
96	<p>Examine carefully the in-place current wastewater treatment and conversion into a natural wastewater (living machine or bio-remediation system for the existing service area)</p> <ul style="list-style-type: none"> <li>• See Woods Hole <a href="http://www.toddecological.com/ecomachines.html">http://www.toddecological.com/ecomachines.html</a></li> <li>• Locate the living system away from wells, aquifers and wetlands.</li> </ul>	Examination of WWTPs and on-site methodologies are addressed in Section 4..

**Regulatory**

Comment #	Comment	Response
97	<p>Need effective enforcement of environmental regulations.</p> <ul style="list-style-type: none"> <li>• Increase enforcement capacity of agencies (i.e. Ecology)</li> </ul>	The need for increased enforcement capacity is discussed in Sections 3 and 4.
98	<p>Ban more toxins</p> <ul style="list-style-type: none"> <li>• Lawn fertilizers and moss chemicals</li> <li>• Particularly known carcinogens</li> <li>• Prohibit the discharge of bioaccumulative toxins</li> </ul>	Source controls are discussed in Sections 3 and 4.
99	<p>Revamp water quality standards:</p> <ul style="list-style-type: none"> <li>• Ban “mixing zones” for toxic chemicals.</li> </ul>	A discussion of mixing zones is included in Section 3 and 4.

100	Regulate the whole of Puget Sound for stormwater and wastewater pollution now rather than waiting for new waterways to be listed under the 303 (d) list.	Concepts for Sound-wide regulation are suggested in Section 4.
101	Restrict aquaculture and make shellfish growers responsible: <ul style="list-style-type: none"> <li>• Follow British Columbia’s lead and impose a moratorium on new industrial aquaculture until its damage is understood.</li> <li>• Shellfish growers should pay to mitigate water quality issues.</li> </ul>	Aquaculture was briefly noted in Section 3; principles for future actions are suggested in Section 4 that would help provide a scientific construct in Puget Sound for taking actions such as suggested by the commenter.
102	‘Grandfathering’ with respect to the regulations should be stopped altogether. This was a loop hole that should be fixed as soon as possible.	Suggestions for regulations and actions are included in Sections 3 and 4.
103	Revamp fees, fines, levies: <ul style="list-style-type: none"> <li>• Appropriate fines should be levied. Companies that need water (NPDES) permits to pollute should put up significant funding for potential cleanup purposes. These monies can be banked by Ecology for future need.</li> <li>• Legislation that lets polluting companies decide the type of guarantee it will give the agency should be done away with and proactive legislation should be written that protects the public good.</li> </ul>	Suggestions for regulations and actions are included in Section 4; fees, fines and levies were not specifically addressed here but may be taken up in the Partnership’s financing analysis.
104	Expand / lower threshold for needing NPDES Permits: <ul style="list-style-type: none"> <li>• Rather than coverage under a general permit some industrial sites like scrap metal yards and other high metals dischargers should be covered under an individual NPDES permit</li> <li>• Regulate cruise ship waste under an NPDES permit with resultant effluent limits and monitoring</li> </ul>	This was not specifically discussed as part of this paper. The effectiveness of existing programs is discussed in Section 3, and suggested modifications to the program are included in Section 4.

105	<p>Consider industrial stormwater district permits that combine permit holders in appropriate geographic areas might be more efficient and effective.</p> <ul style="list-style-type: none"> <li>Combining financial resources to manage and treat stormwater from large districts might be an effective approach</li> </ul>	<p>This concept was not specifically addressed in this paper but may be considered in the financial options effort of the Partnership.</p>
106	<p>Streamline stormwater regulatory process.</p> <ul style="list-style-type: none"> <li>Existing stormwater permits are difficult to understand and implement.</li> </ul>	<p>Regulatory improvements are addressed in Section 4.</p>
107	<p>WA State Legislature should implement and enforce laws that disallow state or any municipal agency staff from going to work for industry upon leaving their jobs; that former state employees involved in regulations of industry would have to wait two (2) years prior to accepting employment with any business/business industry they helped regulate.</p>	<p>This was not discussed as part of this paper, although the core team suggests that to the extent basic ethics are embraced and professional codes of conduct upheld, both government and industry are strengthened by the exchange of professionals between different sectors, and the mutual understandings that may accrue.</p>

### ***Training and Education Programs***

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
108	<p>Suggest a decision making protocol with an accompanying training program be developed that counties can use to make good decisions with regard to suitability for development -septics as well as other things.</p> <ul style="list-style-type: none"> <li>Many counties don't have the resources to hire qualified staff for soils, wetlands, etc., but are in need of those types of expertise. There should be a more appropriate way to make those determinations than to ask a developer to hire consultants.</li> </ul>	<p>This is discussed in general terms in Section 4.</p>
109	<p>Need more information and education on what is put down the sink and the impacts to Puget Sound...remember many believe the treatment plants fix it all.</p>	<p>This is discussed in general terms in Sections 3 and 4.</p>

110	<p>Consider education programs to reduce and discourage fertilizer/pesticide application to lawns, landscaped areas, transmission corridors, etc..</p> <ul style="list-style-type: none"> <li>• Work with organizations like the WA Toxics Coalition, the Eugene OR based NW Coalition for Alternatives to Pesticides (NCAP), and the WA D.C. based Beyond Pesticides to plan a strategy to do this</li> </ul>	<p>This is discussed in general terms regarding source controls in Section 4. A comprehensive education and outreach program is being developed and implemented by the Partnership as part of a separate ongoing effort.</p>
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***Incentive – Based Programs***

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
111	<p>Solutions need to be embraced by open market / economy (incentive-based approaches)</p> <ul style="list-style-type: none"> <li>• Look at the possible merits, if any, of reducing contaminant discharges through a “bubble concept” involving marketed offsets, as is done with air quality emissions.</li> <li>• Look at building a coalition with all the ports on the west coast to enact the same pollution control and spill control measures so no port has an "economic advantage"</li> <li>• Create incentives to use public transportation, carpooling, riding bikes or walking to work. Incentives for conversion to green energy.</li> </ul>	<p>Market incentives are discussed generally in Section 4 and will receive more in-depth treatment in the Partnership’s separate effort to analyze financial options.</p>

**Ship-Based Regulatory or Programs**

Comment #	Comment	Response
112	Boats / Vessels: <ul style="list-style-type: none"> <li>• Require tugs for shippers of hazardous materials in state waters.</li> <li>• Insist upon ship to shore electrical connections at every port in Puget Sound.</li> </ul>	This was not discussed as part of this paper, but the responders acknowledge that significant effort on this issue has been underway in the state.
	<ul style="list-style-type: none"> <li>• Make the Sound a no discharge zone at least during the peak boater and cruise ship season. Mobile dischargers have the flexibility to hold or pump out.</li> <li>• This idea needs further exploration as we work to reduce the inputs into the Sound from all sources.</li> </ul>	Discussion regarding improvements and further regulations is included in Section 3.
113	Expanded emergency response and prevention of oil and other toxic chemical spills needs to be a priority <ul style="list-style-type: none"> <li>• Include in the Action Agenda the goal of preventing all oil spills, small and large and rapidly and effectively responding to oil spills.</li> <li>• Bring the state agencies with responsibility for preventing spills and/or effectively responding to spills into the Partnership's accountability structure. This should also include state agencies' cooperative interactions with other entities, including federal agencies, facility operators, oil industries, and transportation industries.</li> <li>• Fully fund a year-round dedicated rescue tug at Neah Bay</li> <li>• Identify locations where we may need other rescue tugs and fund them</li> <li>• Better deal with issue of derelict vessels that leak oil</li> <li>• Adequately fund the Oil Spill Advisory Council</li> <li>• Move forward on a much-needed overhaul to funding for oil spill programs</li> </ul> Other important elements to spill prevention and rapid assessment and Response <ul style="list-style-type: none"> <li>• Council studies and activities to explore needed improvements.</li> </ul>	There is a general discussion of this topic in Section 4 and general recommendations in Table 11 of Section 4.

	<ul style="list-style-type: none"> <li>• Education and outreach about oil spill issues to prevent small, chronic spills from recreational and fishing activities.</li> <li>• Work with Recreation and Conservation Office and the Washington State Parks to pursue small vessel objectives.</li> <li>• Increase number of oil and bilge receptacles at ports and marinas; petition for Puget Sound to be a federal "no discharge zone."</li> <li>• Increase investigations of small spills.</li> <li>• Department of Ecology's oil spill program. (Prevention from vessels and oil-handling facilities, Response preparedness, Rapid response, Areas needing further development)</li> </ul>	
114	<p>We do need to find a way to 'better deal' with derelict vessels:</p> <ul style="list-style-type: none"> <li>• Find a way to make a dry docking facility available to those contractors who can dismantle and recycle derelict vessels, or</li> <li>• Find protocols for ship breaking that do not require dry docking and still protect water quality during the process of ship breaking</li> </ul>	General suggestions for regulations are found in Section 4.

### ***Conservation / Restoration Programs***

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
115	Restoration of estuaries and associated habitats would dramatically improve DO levels in areas of the Sound (particularly in south sound areas such as Budd Inlet)	The value of conservation & restoration is discussed in Section 4.

### ***Measures / Progress***

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
116	<p>Agree to a set benchmarks and compare progress against them in the next 12 years in the areas of:</p> <ul style="list-style-type: none"> <li>• Number of gallons of stormwater flow to the Sound each year;</li> <li>• Number of tons of toxic chemicals entering the Sound reduced each year;</li> <li>• Number of acres of dead zones in Puget Sound.</li> </ul>	The need for the establishment of clear hypotheses, aligned models and monitoring against which to predict and measure progress are discussed in Sections 3 and 4.

117	Need to detail by watershed of the threats and metrics that will be measured to show how the Sound’s health is being maintained, degraded or improved.	See response to comment 116.
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## Paper Organization / Content

Comment #	Comment	Response
118	A list of traceable citations is needed, to allow an assessment of the underlying information.	A reference list has been added to the document
119	Identify the authors of the paper and their affiliations.	The major contributors have been listed.
120	<p>Include more summary information:</p> <ul style="list-style-type: none"> <li>• i.e., include more tables and charts that summarize chemicals of concern, effects, types of sources.</li> <li>• Include a table of the relative loads of these chemicals in 10 pathways to give readers a relative sense of the problems we face</li> <li>• Highlight conclusions.</li> </ul>	This comment requests a level of detailed analysis that is outside the scope of this paper. The topic forum papers were intended to provide an overview of the water quality issues in Puget Sound. Additional maps and illustrations of chemical and water quality “hot spots” are included in the paper. More information has been summarized in tables.
121	Focus on building from previous work / conceptual models.	Discussions regarding the need for a comprehensive conceptual model were highlighted in Section 4.
122	<p>Expand the view of the paper to include examples and data from elsewhere in the region:</p> <ul style="list-style-type: none"> <li>• Paper uses data and examples that are limited almost exclusively to the Seattle-King County area.</li> </ul>	As appropriate, all readily available data were used. As noted in the paper, there are more data for some geographic areas than others. There are more data available

		<p>from counties, advocacy groups, and industry, but the level of effort to retrieve them all was beyond the scope of the topic forum paper, which was intended to provide an overview of water quality issues in Puget Sound.</p>
<p>123</p>	<p>Provide consistent organization:</p> <ul style="list-style-type: none"> <li>• The current structure of the WQ Paper leaves out many pollutant sources and pollutants. We suggest that the remainder of the paper cover the policy questions related to each of the pollutant sources and pathways in a similar systematic manner so as to highlight which are addressed and which are partially or inadequately addressed.</li> </ul>	<p>The paper has been completely reorganized into what is hoped will be a more accessible logic to readers.</p>
<p>124</p>	<p>Reorganize the paper to match the Indicator Group’s Water Quality Conceptual Model and carry them through to the Policy Questions (as follows):</p> <ul style="list-style-type: none"> <li>• Use the following framework as is outlined in the conceptual model developed by the team of scientists working with Sandie O’Neill and Tracy Collier (The Provisional Indicators Workgroup) in this order:             <ul style="list-style-type: none"> <li>• Sources: Currently mixed with pathways in the section titled: “Sources and pathways for nutrients, pathogens, and toxics entering Puget Sound water bodies”</li> <li>• Pathway: See above</li> <li>• State and Impacts: Currently section titled: “Documented threats to fresh water and marine water quality in Puget Sound.”</li> <li>• Management Response: Science Question #2, Policy Questions #1 and #2</li> </ul> </li> </ul>	<p>An organization similar to this recommendation was incorporated into the revised draft.</p>

125	<p>Separate out the discussion of Natural Drivers into its own section of the WQ Paper:</p> <ul style="list-style-type: none"> <li>This section could include a brief discussion of how natural processes influence pollution conditions, such as the role of wind in areas with dissolved oxygen problems.</li> </ul>	Natural drivers are addressed in Sections 2 and 3.
126	<p>Separate out Policy Question 1 “Policy Approaches to Address Water Quality in Puget Sound” into two subsections, the first covering regulatory programs and the second discussing incentive programs.</p>	Policies are addressed in Sections 3 and 4; organization of the discussion has been revised.
127	<p>Include the references in a bibliography:</p> <ul style="list-style-type: none"> <li>The paper should switch from the citation approach and use the method in the Initial Discussion Draft Paper on Human Health that included footnotes that provided the details of the reference, as well as a web link to the reference where possible.</li> </ul>	The reference list has been expanded and also includes documents reviewed but not specifically referenced in the paper.
128	<p>Paper needs to more effectively incorporate quantitative findings:</p> <ul style="list-style-type: none"> <li>The paper does not appear to be a strategy, but rather an inventory of existing conditions and a list of currently known and inventoried methods to address pieces of the inventoried conditions. (The bibliography is 133 items, 9 pages long for a paper, the body of which in only 34 pages)</li> </ul>	As a consequence of the paper’s reorganization, recommended water quality strategies are now primarily in Section 4.

**Definitions**

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
129	Clarify a concise definition of the integrated concept of “water quality;”	The contributors have provided a discussion of water quality in Sections 1,2 and 4 and note the challenges of looking narrowly or more expansively at the topic.

130	Clarify the terms “stormwater” and “stormwater runoff” and use consistently across all of the PSP documents to clarify whether they include all surface runoff or are limited to urban runoff (as defined in the 2000 Puget Sound Management Plan), and whether they encompass all nonpoint pollution sources or are limited to urban runoff sources.	A definition for surface water runoff has been provided.
131	Clarify the interface, and differences between fresh water and marine water quality issues.	An enhanced discussion of the integrated nature of these two types of water is included in Section 2.
132	Use the terms “onsite sewage system” and “large onsite sewage system” in this and other PSP documents, or you might want to hyphenate the word on-site.	The core team members agree clarity of definition is important. Because of the common use of the words “septic systems,” we have not made the clarification you suggest in this paper. The Partnership may want to assert the proposed term in their overarching document.

***Scope of Water Quality***

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
133	Acknowledge and address the full range of environment: <ul style="list-style-type: none"> <li>• (urban and rural),</li> <li>• Pollution sources (point and nonpoint), and</li> <li>• Management approaches (e.g., watershed management plans, shellfish protection districts) that affect water quality.</li> </ul>	This was done in Sections 2 and 3.

## Synthesis

Comment #	Comment	Response
134	<p>Paper needs greater synthesis with other topic areas. Greater attention needs to be paid to making connections / establishing relationships with other topic areas, i.e. Human Health, Species/Biota &amp; Land Use (primary examples):</p> <ul style="list-style-type: none"> <li>• There should be attention paid to the direct link regarding to the significance of land use planning, controls and permitting as a way of improving water quality in Puget Sound.</li> <li>• The role of land-use and development should be examined for potential implications on future water quality for local jurisdictions.</li> <li>• The health issues (toxicological concerns) surrounding the various POPs are different.</li> <li>• Potential exists for synergistic interactions with POPs and EDCs / pharmaceuticals</li> <li>• Declining water quality has repercussions in all other topic areas.</li> </ul>	<p>Linkages to other Topic Forum papers have been added in Sections 2 and 3, however, the comprehensive synthesis effort will be occurring by the Partnership separately from these topic forum papers, as part of developing the Action Agenda.</p>

## General Partnership Comments

Comment #	Comment	Response
135	The time frame to review the paper was too short, and the entire process is too condensed. A more detailed and lengthy process is needed.	The development of the Action Agenda has been set by the legislature, and necessitated a condensed process. There are continued opportunities for comments through the Action Area meetings, and other commenting options identified on the Partnership web page. The Action Agenda will be a living and evolving document and revised in the future.
136	Information provided needs to be more topically and spatially explicit. <ul style="list-style-type: none"> <li>• The Action Agenda should be a “rolling plan,” fostered in ongoing partnership with the multiple co-sponsoring lead agencies, and producing separable “action packages”</li> </ul>	The comment cannot be addressed through changing paper format or content. The Action Agenda is envisioned as a living plan that will be adapted in accordance with feedback and data received following implementation.

137	<p>Management / Action Successes should be mentioned / highlighted - What is in place that is working?</p> <ul style="list-style-type: none"> <li>• No amount of references or white papers or testimony is going to change the “corporate culture” that seems to permeate PSP There is real cynicism out there. I hope that PSP will show us that our cynicism is baseless.</li> <li>• The Action Agenda should include as an essential “action” a commitment for ongoing dialogue between policy and science.</li> </ul>	<p>Calls for interaction between the scientific and political communities are highlighted throughout the paper.</p>
138	<p>Look at other models (Great Lakes, Chesapeake Bay, Gulf Coast) and consider creating a PS office here.</p>	<p>A brief discussion of other institutional models was incorporated into Section 3.</p>
139	<p>Bring together all relevant Federal (or Federal/State) partners for the purpose of helping with the implementation the Action Agenda PSP needs to engage the private sector in a big way; funding.</p>	<p>This comment is generally discussed in Section 4. The Partnership is actively engaging public sector and private sector partners in all aspects of the Action Agenda development.</p>
140	<p>Require the active involvement of the Governor, the Leadership Committee, lead PSP staff and our members of Congress.. There is a model for this in Coastal America's Corporate Wetlands Restoration Partnership.</p>	<p>See response to comment 139.</p>
141	<p>Projected population growth and its effects should be qualitatively and quantitatively discussed and brought to the forefront in conversations with the public and policy makers.</p>	<p>Sections 1 and 2 note the importance of addressing growth in addressing Puget Sound health.</p>
142	<p>Partnership must increase efforts to maintain clear objectivity in its written Products.</p>	<p>Every effort has been made to remove bias from the paper, except at the points where opinion is called for.</p>

## Document Specific Items

### *Available Data Referenced by Comments*

<b>Comment #</b>	<b>Comment</b>	<b>Response</b>
143	NOAA budget cuts threaten to terminate sediment and mussel monitoring programs this year. Therefore, the PSP and the State of Washington should seriously consider urging NOAA to continue the program OR take over this monitoring program through 2020, and enhance it with carefully selected sites, adding emerging contaminants and using the data to validate models. NOAA’s National Mussel Watch Program that now includes 15 sites in Washington marine waters, in addition to over 200 sites around the rest of the US-many years of data on many pollutants.	The paper notes the importance of monitoring programs aligned with hypotheses and models aimed towards predicting and measuring improvements in Sound health in Section 4.
144	There is sampling data available in WPLCS from boatyard and industrial stormwater monitoring that documents high copper discharges. Boatyard Stormwater Treatment Technology Study” (Taylor Associates, Inc. March 2008) information regarding treatment of copper, lead and zinc should be discussed.	There is a general discussion regarding this issue in Sections 2 and 3.
145	There is sampling data available in WPLCS and Herrera documenting the metals found in stormwater including copper, lead and zinc.	See comment 144.
146	Information is available from USGS on groundwater discharge (estimate 10-15% of water entering Puget Sound comes from groundwater seeps/springs. For example, see Tony Paulson’s report to the PSAT.	While this specific information has not been included in the final paper, the core team suggests this as an important area for followup by the Partnership.
147	The paper should reference the work on stormwater research done by May / Horner / Booth / Karr.	The reference list has been expanded to include this source.

148	A GeoSyntec report is cited, however there is a more recent analysis by Herrera 2006 (cited earlier) that evaluates industrial stormwater discharges based on meeting water quality standards.	The reference list has been expanded to include this reference.
149	Under the section titled Range and Variability of Pollutants, Herrera’s report on industrial stormwater monitoring data should be referenced (“Evaluation of Monitoring Data from General NPDES Permits for Industrial and Construction Stormwater, Herrera Environmental Consultants, October 2006) because it includes an assessment of industrial stormwater violating water quality standards for copper, lead and zinc.	See comment 148.
150	Department of Ecology (Ecology) requires all NPDES permit holders to sample stormwater and wastewater. Some permit holders are also required to sample flow and receiving water quality.	NPDES permit requirements and stipulations are briefly addressed in Section 3.
151	Ecology’s Water Quality Permit Life Cycle System (WPLCS) data base summarizes pollution permit data: <a href="http://www.ecy.wa.gov/programs/wq/permits/wplcs/index.html">http://www.ecy.wa.gov/programs/wq/permits/wplcs/index.html</a>	The responders note the value of this data, the inclusion of which was beyond the scope of this effort.
152	“The Chemicals in Washington State Summary Report 2004 – Toxics Release Inventory and Tier Two Emergency and Hazardous Chemical Inventory” (Department of Ecology, Publication 06-04-020, September 2006) provides information on the discharge of pollutants by the top industrial dischargers of pollutants in Washington State.	The responders note the value of this data, the inclusion of which was beyond the scope of this effort.

### ***Water Quality References (included in comments)***

Puget Sound-wide sediment quality monitoring has been conducted by the Washington State Department of Ecology for the Puget Sound Assessment and Monitoring Program (PSAMP) since 1989. Relevant data summaries include the following:

Long, E., M. Dutch, S. Aasen, K. Welch, and M.J. Hameedi. 2003. Chemical Contamination, Acute Toxicity in Laboratory Tests, and Benthic Impacts in Sediments of Puget Sound: A summary of results of the joint 1997-1999 Ecology/NOAA survey. Washington State Dept. of Ecology Publication No. 03-03-049, Olympia, WA and National Oceanic and Atmospheric Administration, Technical Memo No. 163, Silver Spring, MD. 101 pp. + appendix.\*

Long, E., M. Dutch, S. Aasen, K. Welch and M.J. Hameed. 2005. Spatial extent of degraded sediment quality in Puget Sound (Washington State, U.S.A.) based upon measures of the sediment quality triad. *Environmental Monitoring and Assessment* 111: 173-222.

Long, E., M. Dutch, S. Aasen, and K. Welch. 2004. Sediment Quality Triad Index in Puget Sound. Washington State Dept. of Ecology Publication No. 04-03-008, Olympia, WA.

Llansó, R.L., S. Aasen, and K. Welch. 1998. Marine Sediment Monitoring Program - I. Chemistry and Toxicity Testing, 1989-1995. Washington State Department of Ecology, Olympia, WA. Publication No. 98-323. 101 pp. + appendices.

Llansó, R.L., S. Aasen, and K. Welch. 1998. Marine Sediment Monitoring Program - II. Distribution and Structure of Benthic Communities in Puget Sound, 1989-1993. Washington State Department of Ecology, Olympia, WA. Publication No. 98-328. 114 pp. + appendices.

Partridge, V., K. Welch, S. Aasen, and M. Dutch. 2005. Temporal Monitoring of Puget Sound Sediments: Results of the Puget Sound Ambient Monitoring Program, 1989-2000. Washington state Department of Ecology Publication 05-03-016.

Dutch, M., V. Partridge, S. Aasen, and K. Welch. 2005. Changes and Trends in Puget Sound Sediments: Results of the Puget Sound Ambient Monitoring Program, 1989-2000. Washington State Department of Ecology Publication 05-03-024.

Other sediment quality reports generated by Ecology for the PSAMP can be found at <http://www.ecy.wa.gov/programs/eap/psamp/index.htm>.

Ecology also periodically prepares a Sediment Cleanup Status Report (<http://www.ecy.wa.gov/programs/tcp/smu/sediment.html>) which provides information on the extent of contaminated sediments in urban waterbodies, and progress on cleanup efforts.

Other Puget Sound sediment monitoring reports have been generated by King County DNR and can be found at <http://dnr.metrokc.gov/wlr/waterres/marine/index.htm>.

Roberts and Pelletier. 2007. Interim Results from the Budd Inlet, Capitol Lake, and Deschutes River Dissolved Oxygen and Nutrient Study. Georgia Basin/Puget Sound Research Conference, Vancouver, BC

BenjaminH. Grumbles, Assistant Administrator to Regional Administrators dated July 13, 2006 regarding Mixing Zones; EPA's Compilation of EPA Mixing Zone Documents, EPA 823-R-06-003, July 2006; the state's mixing zone regulations WAC 173-201A-400,

<http://pubs.usgs.gov/sir/2008/5025/pdf/sir20085025.pdf>

[www.doh.wa.gov/ehp/sf/Pubs/cruise-ship-report.pdf](http://www.doh.wa.gov/ehp/sf/Pubs/cruise-ship-report.pdf)

[www.epa.gov/owow/oceans/cruise\\_ships/disch\\_assess\\_draft.html](http://www.epa.gov/owow/oceans/cruise_ships/disch_assess_draft.html)

<http://www.fish.washington.edu/people/kocan/publications.html>).

Category Definitions: Department of Ecology, Water Quality Program Policy 1-11, Assessment of Water Quality for the Clean Water Act Sections 303(d) and 305(b) Integrated Report, September 2006.

Action Area Listing: Department of Ecology, Proposed 2008 Water Quality Assessment, April 16, 2008.

The Chelan Agreement: Co-responsibility in Water Resources Management," for the 33rd Annual Conference of the Western Social Science Association, Reno, Nevada, April 24-7, 1991 (18 pages).

Comments before the Puget Sound Water Quality Authority Review Committee," October 17, 1989 (8 pages).

Shupe, Steven and Heidi Sherk, Washington's Water Future: The Report of the Independent Fact Finder to the Joint Select Committee on Water Resources Policy, July 1988.

"Pesticides detected in urban streams during rainstorms and relations to retail sales of pesticides in King County, Washington" (USGS 097-99, April 1999

Brandenberger, J.M., E.A. Crecelius, P. Louchouart, S. Cooper, E. Leopold, and K. McDougall. 2008. "Natural Fluctuations in Coastal Hypoxia: Relationships between Large-Scale Climate Drivers and Deep Water

Oxygen Levels Recorded in Sediment Core from Puget Sound, WA”.  
Presented at 2008 ASLO Ocean Sciences Meeting, Orlando, FL March 2-7,  
2008, PNWD-SA-8013.

Cooper, S. J. M. Brandenberger, E.A. Crecelius, P. Louchouart, E. Leopold,  
and K. McDougall. 2008. “Reconstructing Trends in Hypoxia using Multiple  
Paleoecological Indicators Recorded in Sediment Cores from Puget Sound,  
WA”. Presented at 2008 ASLO Ocean Sciences Meeting, Orlando, FL  
March 2-7, 2008, PNWD-SA-8012.

[http://www.ecy.wa.gov/programs/tcp/smu/phthalates/phthalates\\_hp.htm](http://www.ecy.wa.gov/programs/tcp/smu/phthalates/phthalates_hp.htm)

Bricker, S., B. Longstaff, W.  
Dennison, A. Jones, K. Boicourt, C. Wicks, and J. Woerner. 2007. Effects of  
Nutrient Enrichment In the Nation’s Estuaries: A Decade of Change. NOAA  
Coastal Ocean Program Decision Analysis Series No. 26. National Centers  
for Coastal Ocean Science, Silver Spring, MD. 328 pp.  
<http://ccma.nos.noaa.gov/publications/eutroudate/>

O'Connor, T.P. and G.G.Lauenstein. 2006. Trends in chemical  
concentrations in mussels and oysters collected along the US coast: Update  
to 2003. *Marine Environmental Research* 62(2006): 261-285.

Mearns, A.J. 2001. Long-term trends and patterns in Puget Sound, the Straits  
of Juan de Fuca and the Pacific Coast. Paper 5A. Proceedings of Puget  
Sound Research 2001: The Fifth Puget Sound Conference. Puget Sound  
Water Quality Action Team, Olympia, WA.

Lefkovitz, L.F., V.I. Cullinan and E.A. Crecelius. 1997. Historical trends in  
the accumulation of chemicals in Puget Sound: NOAA Technical  
memorandum NOS ORCA 111. National Ocean Service, National Oceanic  
and Atmospheric Administration, Silver Spring, MD. 60 pp+ append.

<http://www.ecy.wa.gov/programs/wq/permits/wplcs/index.html>

“The Chemicals in Washington State Summary Report 2004 – Toxics Release Inventory  
and Tier Two Emergency and Hazardous Chemical Inventory” (Department of Ecology,  
Publication 06-04-020, September 2006)

The most important citations for the ENVVEST program are:  
[http://www.ecy.wa.gov/programs/wq/tmdl/sinclair-dyes\\_inlets/index.html](http://www.ecy.wa.gov/programs/wq/tmdl/sinclair-dyes_inlets/index.html) or  
[http://www.ecy.wa.gov/programs/wq/tmdl/sinclairdyes\\_inlets/sinclair\\_cd/DATA/Data\\_Directory.html](http://www.ecy.wa.gov/programs/wq/tmdl/sinclairdyes_inlets/sinclair_cd/DATA/Data_Directory.html)

ENVVEST Citations:

Brandenberger JM, CW May, VI Cullinan, RK Johnston, DE Leisle, B

Beckwith, G Sherrell, D Mettallo, and R Pingree. 2007. "Contaminant Concentrations in Storm Water Entering the Sinclair/Dyes Inlet Subbasin of the Puget Sound, USA, During Storm Event and Baseflow Conditions." Presented by Jill Brandenberger at 2007 Georgia Basin Puget Sound Conference, Vancouver, BC, Canada on March 27, 2007. Manuscript published in the proceedings, PNNL-SA-55447.

May CW, VI Cullinan, JM Brandenberger, C Judd, and RK Johnston. 2007. "Development of an Empirical Water Quality Model for Stormwater and Watershed Land-Use in Puget Sound." Presented by Valerie I. Cullinan at 2007 Georgia Basin Puget Sound Research Conference, Vancouver, BC, Canada on March 27, 2007. Manuscript published in the proceedings PNNLSA-54936.

Johnston RK, DE Leisle, JM Brandenberger, SA Steinert, M Salazar, and SM Salazar. 2007. "Contaminate Residues in Demersal Fish, Invertebrates, and Deployed Mussels in Selected Areas of The Puget Sound, WA ." Presented by Robert K. Johnston at 2007 Georgia Basin Puget Sound Conference, Vancouver, BC, Canada on March 29, 2007. Manuscript published in the proceedings PNNL-SA-55152.

Brandenberger, J. M., C.W. May, V.I Cullinan, and R. K. Johnston. 2007. Surface and Stormwater Quality Assessment for Sinclair and Dyes Inlet, Washington. Technical Report PNNL, In final review

May, C. W. and V. I. Cullinan (2005). An Analysis of Microbial Pollution in the Sinclair-Dyes Inlet Watershed. Richland, WA, Pacific Northwest National Laboratory. [http://www.ecy.wa.gov/programs/wq/tmdl/sinclairdyes\\_inlets/reports-documents.html](http://www.ecy.wa.gov/programs/wq/tmdl/sinclairdyes_inlets/reports-documents.html)

Brandenberger, J.M., E.A. Crecelius, and R.K. Johnston. 2008. Contaminant Mass Balance for Sinclair and Dyes Inlets, Puget Sound, Washington. In review, PNNL 17499.

<http://www.doh.wa.gov/ehp/oehas/fish/farmedsalmon.htm>

<http://query.nytimes.com/gst/fullpage.html?res=9A01E3D81031F93BA15756C0A9659C8B63&sec=&spon=&pagewanted=all>

<http://www.fluoridealert.org/pesticides/epage.teflubenzuron.htm>

<http://www.youtube.com/watch?v=of3URNIMLMk>

[http://www.ProtectOurShoreline.org/legal/080326\\_PierceCnty\\_TaylorShellfishDecision.pdf](http://www.ProtectOurShoreline.org/legal/080326_PierceCnty_TaylorShellfishDecision.pdf)

[http://www.protectourshoreline.com/slideshow/POS\\_ShellfishAquacultureConcerns.pdf](http://www.protectourshoreline.com/slideshow/POS_ShellfishAquacultureConcerns.pdf)

Duff Wilson's nonfiction book, *Fateful Harvest: The True Story of a Small Town, a Global Industry, and a Toxic Secret* (HarperCollins, Sept. 4, 2001),

<http://www.bioethicscourse.info/onlinetextsite/fearinfields.html>

<http://www.mabiosolids.org/docs/peotprotocols%20for%20timely%20response%20project.pdf>

[http://www.zwire.com/site/news.cfm?newsid=19446417&BRD=1395&PA G=461&dept\\_id=216620&rfi=6](http://www.zwire.com/site/news.cfm?newsid=19446417&BRD=1395&PA G=461&dept_id=216620&rfi=6)

<http://www.baltimoresun.com:80/news/local/balmd.sludge15apr15,0,3970131.story>

[http://ap.google.com/article/ALeqM5gbpCMPX9\\_kRtYkL1Yv9-OzuVxFfQD901UF900](http://ap.google.com/article/ALeqM5gbpCMPX9_kRtYkL1Yv9-OzuVxFfQD901UF900)

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[http://seattletimes.nwsourc.com/html/localnews/2004189039\\_mill19m.html](http://seattletimes.nwsourc.com/html/localnews/2004189039_mill19m.html)

<http://pwp.lincs.net/sanjour/> Collected Papers of William Sanjour

Toxic Sludge is Good for You, by John Stauber and Sheldon Rampton, Chapter 8. *The Sludge Hits the Fan* Publisher: Common Courage Press, Monroe, ISBN 1-56751-060-4  
The lead EPA scientist, William Sanjour, refused to go along with giving EPA approval to "recycle" it and call it "biosolids" and lost his position.

Johnson, L. L., D. P. Lomax, M. S. Myers, O. P. Olson, S. Y. Sol, S. M. O'Neill, J. E. West, T. K. Collier. (2008). In press. *Xenoestrogen Exposure and Effects in English Sole (Parophrys vetulus) from Puget Sound, WA*. *Aquatic Toxicology*

Brandenberger J.M., EA Crecelius, and P. Louchouart. 2008. "Historical Inputs and Natural Recovery Rates for Heavy Metals and Organic Biomarkers in Puget Sound during the 20th Century", *Environ. Sci. Tech.* September 15 issue.

Sources of Air Pollutants of Concern to Great Waters and Coastal Areas  
From: U. S. Environmental Protection Agency, Office of Wetlands, Oceans  
and Watersheds; U. S. Environmental Protection Agency, Office of Air  
Quality Planning and Standards. 2001. Frequently Asked Questions about  
Atmospheric Deposition: A Handbook for Watershed Managers. EPA-  
453/R-01-009  
After: Third Report to Congress, 2000, Deposition of Air Pollutants to the  
Great Waters (U.S. EPA 2000).

The State of Puget Sound 2007” should be integrated into the final document.

## ***Document Specific Comments***

The comment summary matrix was intended to capture the intent and substance of related comments to reduce redundancy in comment responses. The following more specific comments have been reviewed and considered by the topic forum core team, though not responded to individually. Many of these comments were captured in the summary matrix, others are editorial in nature. They are included here to ensure that they remain a part of the record available to the Partnership.

- "Mixed findings on sediment contamination in freshwater". Section underemphasizes risk associated with exposure of organisms to contaminants in freshwater sediments
- "Emerging Contaminants (Endocrine Disruptors, Pharmaceuticals and Personal Care Products)". We still have virtually no knowledge of their presence or potential effects on benthic or higher trophic organisms. So the text herein needs to better highlight these uncertainties
- "Endocrine Disrupting Chemicals". While there is beginning to be a systematic search for these compounds in waters , especially those likely to receive discharges from municipal wastewater treatment plants, the same has not occurred in sediments where these compounds may be expected to accumulate and have consequences on a variety of aquatic biota
- "Sediment Quality. The available scientific evidence..."This is an understatement of current knowledge of and uncertainties about sediment quality in Puget Sound
- "Authors/Reviewers request more information on the contribution of existing contaminated sites to the overall loading." Knowing the answer to this question would be extremely useful to regulators, policy makers and the general public
- "Stormwater Runoff ..."There is no discussion of why we know relatively little about how stormwater loading of toxics impacts localized sediments.
- "Sediment cleanup: Numerous water and lands recorded as contaminated are requiring cleanup under CERCLA regulations (USEPA, 2008a)." Could mention that few if any cleanup actions have been taken primarily because of stormwater loading, and that stormwater loading is recontaminating more than one major cleanup site.
- "Gaps in knowledge" How to evaluate sediment quality, and risks associated with it, are not even mentioned here
- "Contaminated Sediments" Could summarize successful cleanup actions along with costs/benefits (information is available).

- Gaps in our understanding. Bullets 1 and 2 can easily be applied to sediment quality too.
- "Sediments. Federal and state cleanup programs..."Text does not mention Sediment Management Standards as important to effecting many sediment cleanup actions. Also does not mention SMS in context of providing authority to conduct sediment investigations to help control sources of contamination
- "Limitations of existing programs".Bullets 1 and 5 apply well to sediment management programs too. There is no discussion herein of limitations of existing sediment cleanup programs. Many experts would claim there are many limitations
- "The goal of improving water quality..."How will regulatory program and more regional/local program activities be prioritized? The preliminary principles are good ones but they don't seem to address how priorities will be set.
- Preliminary recommended near-term strategies. - Stormwater. I would add to this section the funding major urban jurisdictions to implement rigorous street sweeping/vacuuming programs. Preventing particulate-phase contaminants from entering stormwater is much more costeffective than any treatment strategy. would add that there are also many near-term strategies that would improve the effectiveness of sediment cleanup program activities
- Regulatory strategies. Stormwater, wastewater, and land use. Source Control would add serious consideration of a more meaningful (if still carefully prioritized) implementation of the source control provisions in the SMS rule.
- Recommendations for further assessment: gaps in our current understanding of the nature and transport of pollutants that cause water quality impairments and ecological harm. Evaluate the role of sediment in water quality issues to better define the relative contribution of previously contaminated sediment to the overall health of Puget Sound, including the effectiveness of sediment cleanup programs, recontamination issues, and source control program effectiveness. Focus of the analysis would include the mechanisms for contaminated sediments presenting threats to the ecosystem and related risks, and the relative effectiveness of current regulatory programs in effecting cleanups opposite the cost of arriving at cleanup agreements. In addition, this analysis would include an evaluation of sediment cleanup standards for protectiveness of aquatic ecosystems, and development of protective freshwater sediment standards. In particular, there may be opportunities for expediting cleanup efforts that move public funds from contentious to cooperative efforts."
- How will we know when we're making progress? Periodically measuring (monitoring) the body burden (tissue contaminant levels) in a suite of aquatic organisms could be very key here. Reducing the number of highly contaminated sites may be one indicator of progress

- Page 6 – Sediment Quality

This information on the status of sediment quality is a poor summary of the body of existing work. It is vague (e.g., “a conclusion that marine sediments in localized areas of Puget Sound are contaminated.”), contains incorrect information (e.g., “A large-scale survey undertaken by NOAA and Ecology in 2005 showed widespread contamination but at levels less than regulatory criteria...”), and does not include most of the relevant literature available on this subject.

I would augment the information in this section with the following information:

Ecology’s use of the Sediment Quality Triad Index in interpreting PSAMP baseline sediment data has indicated that: Approximately 33% of Puget Sound sediments show intermediate degradation in either one or two of three measured sediment quality parameters (i.e, chemical contamination and/or toxicity above WA State Sediment Management Standards, or degraded benthic community structure), while approximately 1% shows degradation of all three sediment quality parameters.

The majority of degraded sediments (based on the Sediment Quality Triad Index) are located in Central Puget Sound and the Whidbey Basin, and are concentrated in the urban embayments and harbors.

Long-term sentinel stations monitored annually throughout Puget Sound from 1989-2000 displayed an increase in levels of PAH contamination and a decrease in levels of metals contamination in some locations.

## **Science Question 2 (S2): Management Approaches Addressing Water Quality**

- Page 18 – Contaminated Sediments

I would agree that the effectiveness of cleaning up contaminated sediments relative to cost should be analyzed. Recontamination of sites after clean up should be included in this analysis. In the future, emphasis should be given to pollution prevention and source control as well as cleanup of contaminated sediments.

## **Policy Question 1 (P1): Policy Approaches to Address Water Quality in Puget Sound**

- Page 21 – Sediments In addition to listing the currently mandated sediment cleanup programs, the current sediment monitoring programs should also be listed. These would include the PSAMP Sediment Monitoring Component, which is providing a picture of both the spatial extent (km<sup>2</sup>) of sediment contamination throughout Puget Sound, and an indication of change in sediment quality over time (i.e., is sediment contamination getting better, worse, or remaining unchanged?). The Department of Ecology is also currently conducting its Urban Waters Initiative, including a monitoring program to determine whether sediments

in Elliott Bay/Lower Duwamish and Commencement Bay are getting better, worse, or remaining unchanged over time on a bay-wide scale.

- Page 22 – B. Limitations of existing programs, last bullet Washington State Sediment Management Standards were adopted in 1995. It is widely recognized amongst the scientific community that sediment quality standards for various chemical contaminants are in need of revision based on newly acquired data. It is also recognized that the Benthic Infaunal Index in these standards is inadequate. Development of an accepted Benthic Infaunal Index is critical for adequate evaluation of the health of invertebrate communities that live in Puget Sound sediments. Puget Sound is one of the few large estuaries in the nation without such an index.

**Policy Question 2 (P2): Strategies to Improve Water Quality in Puget Sound**

- Page 32 – D. Recommendations for further assessment  
Evaluate the role of sediment in water quality issues – I would expand this paragraph to include examination of sediment quality conditions at the “urban bay-scale”.

I am in complete agreement that an evaluation of current sediment cleanup standards for protectiveness of aquatic ecosystems is needed, as indicated above. Washington State Sediment Management Standards were adopted in 1995. It is widely recognized amongst the scientific community that sediment quality standards for various chemical contaminants are in need of revision based on newly acquired data. It is also recognized that the Benthic Infaunal Index in these standards is inadequate. Development of an accepted Benthic Infaunal Index is critical for adequate evaluation of the health of invertebrate communities that live in Puget Sound sediments. Puget Sound is one of the few large estuaries in the nation without such an index.

- Page 34 – How will we know when we’re making progress?  
I am in complete agreement that “The only way we will know that progress is being made to improve water quality in Puget Sound is to measure it against baseline conditions.”

This section should acknowledge that the Puget Sound Assessment and Monitoring Program (PSAMP) provides extensive water and sediment quality data throughout Puget Sound. This program, which has existed since 1989, should be expanded upon and adequately funded. The PSAMP Sediment Monitoring Program currently has long-term monitoring in place throughout Puget Sound, is capable of indicating the spatial extent (km<sup>2</sup>) of sediment quality both regionally and Puget Sound-wide, and can assess change over time. This program can also be expanded to include assessment at the bay-wide scale.

- Page 4 says "Three general categories...affect water quality..." These are listed as nutrients, pathogens, and toxics. This phrasing implies that these three categories

- are the major ones, if not the only ones. Categories arguably even more critical in freshwater systems have been omitted (sediment and temperature, in particular). My understanding is that these were to be covered by the "habitat" report, but the water quality report should acknowledge them and explain why they were not included.
- Page 4 also states "Overall trends in water quality for freshwater systems in Puget Sound are difficult to determine due to the lack of consistent data at the same sampling locations over long enough periods of time." We have many years of consistent data from all major streams entering the Sound. Two important water quality components we are lacking, however, are stormwater/runoff event monitoring, which are necessary for accurate load calculations, and a randomized design monitoring program necessary for an overall assessment of water quality of smaller streams.
  - There are numerous references to Class A standards, usually in relation to wastewater treatment. The authors should be aware that technically, those standards no longer apply. Washington's water quality standards are now "use based" and the relevant terms would be something like "suitable for 'core summer habitat' and 'primary contact recreation.'" However, "Class A" is widely understood, and it's sure easier to say.
  - Page 33 recommends evaluation of water quality standards and defining site-specific criteria. By statute, Ecology reviews standards every 3 years ("The Triennial Review") and the new use-based standards are more amenable to site-specific criteria. The next review should begin within a year. It's a public process and PSP players are encouraged to provide specific recommendations.
  - Page 4, second paragraph from bottom: "Overall trends in water quality for freshwater systems in Puget Sound are difficult to determine due to the lack of consistent data at the sampling locations over long enough periods of time." This is not true, since Ecology has over 20 years of consistent monitoring data at some key locations, including the mouth of the Deschutes River. As an example, the increasing trend in summer dissolved inorganic nitrogen concentrations was included in a paper done last year--. We can fix this in the topic forum paper, but it's interesting that the rest of the water quality community doesn't know what we have done. See final bullet.
  - Page 18, first paragraph under Wastewater: "Most larger facilities are operated to remove some nutrients, primarily nitrogen...." Not true—nutrient removal is specifically designed to do just that, and secondary treatment and disinfection do not reduce effluent concentrations to levels considered "low" by ambient environmental standards.
  - Page 23, first paragraph under Wastewater: "(removal of nutrients) has become fairly standard practice...." Not true-- while we know technically how to do this, there is no mandate to institute nutrient removal everywhere, and LOTT is the

- only direct discharge plant that has it. Also, second-to-last bullet says that funding has been generous in the past, but I do not think there is or has been a sizable state revolving fund program available for some time and gives the false impression that money was lush.
- Page 25, top paragraph: Is DNR really driving the use of advanced wastewater treatment? This doesn't seem correct.
  - It does not appear that Ecology was part of the development of this document, and several of our programs are not mentioned at all but really add to the overall understanding. For example, the BEACH program is missing from the overall "what do we know" section, as is the DOH shellfish water quality monitoring program. Much information from the South Sound study will fill in gaps noted in the draft; I'll bring these to the forum. Our understanding of wastewater treatment plant nutrient levels, both nitrogen and phosphorus, is entirely glossed over, and the document drills into stormwater instead. Big picture message is that we ought to work hard to be part of the development of these products in the future rather than held at arm's length.
  - Science Question 2: Management Approaches Addressing Water Quality”, there is no discussion of the Ecology TMDL process this program should be described as a critical management approach to addressing water quality impairments.
  - Water supply planning is not required to include reuse as a significant component. Nonpotable demand is not adequately accounted for as a separate demand in water supply planning. This is not correct, WSP are required to evaluate reclaimed water as a potential source.
  - Wastewater S2 A. p. 18. The statement “Most larger facilities are operated to remove some nutrients, primarily nitrogen,..” may be true generally but does not apply to the two largest POTWs in the Puget Sound area, KC South Plant and KC West Point. These facilities do not substantially remove nitrogen in their treatment processes. This may result in a gap in understanding concerning the relative ranking of total nitrogen loadings from point and non-point sources.
  - Wastewater P1 p. 24. The reuse of treated wastewater has been developed as an alternative to marine and freshwater discharge. In the majority of cases, reclaimed water does not serve as an alternative to discharge especially in the Puget Sound area with low demand for reclaimed water.
  - Policy Question 2 (P2): The end of paragraph 1 includes a statement that offers an opinion that stormwater permits are not the reason that there are more 303 (d) listed waters now than in 1995 when stormwater was first regulated. If the original stormwater permits had included a compliance schedule for compliance with water quality standards and full permit coverage by all stormwater

dischargers the state of Puget Sound may be different that it is today-modify statement

- Under the section titled Wastewater and Septic Systems wastewater treatment system bypass during periods of heavy rain should also be mentioned as a source of untreated or partially treated sewage
- The section on Impaired lakes, rivers and streams should reference the 2004 Integrated Water Quality Assessment (Department of Ecology) and the status and preliminary conclusions of the 2008 Water Quality Assessment (Department of Ecology) process to make sure data more recent than the 2000 and 2002 reports cited in this paragraph.
- Documented threats to freshwater and marine water quality in Puget Sound The first paragraph of this discussion only mentions threats from “increasing amounts of chemicals entering aquatic ecosystems.” Stormwater sampling from industrial and boatyard sites have documented high levels of metals discharges (see WPLCS data base) into freshwater.
- Page 1 (should be page 3), second sentence in paragraph 5 asserts that “over 1,000 freshwater bodies around Puget Sound are listed as Category 5 impaired water bodies on the 303(d) list....”

It is incorrect that there are over 1,000 freshwater bodies around Puget Sound that are listed as Category 5. The listings are for individual parameters and for individual segments of waterbodies. For example, in one waterbody, Woodland Creek in WRIA 15, there are 9 separate listings (1 segment for pH, 1 segment for bacteria, 3 segments for temperature, and 4 segments for dissolved oxygen) yet it is just one waterbody. Therefore, the actual number of water bodies listed is substantially less.

Instead of saying that over 1,000 freshwater bodies are impaired, you should say that there are over 1,000 listings specific to individual parameters and specific segments of freshwater bodies.

- Page 1 (should be page 3), last sentence in Paragraph 5 asserts that PAHs appear to be increasing. Are they? Based on what? National Mussel Watch data showed increases several years ago, and decreases more recently in Puget Sound. (Dr. Alan Mearns, NOAA, personal communication)
- Page 4, paragraph on nutrients only describes nutrients in terms of being a threat. Yes, excessive loadings can be harmful, but excessive is very much dependent on the amount of loadings, where the loadings occur, and site specific characteristics. Nutrients can also be inconsequential or even beneficial. For that matter, organic matter can also be beneficial in somecases and harmful in others if in excess.
- Page 4, paragraph that says, “The fjord-like structure and underwater sills of Puget Sound restrict the circulation of marine water in several locations, and

reduce the flushing exchange with the ocean water entering from the Pacific. This hydrologic isolation puts Puget Sound at greater risk from all three categories of pollutants than other estuaries in North America.” The quote is attributed to the Puget Sound Action Team, 2007).

The paragraph is incorrect. There is nothing about the hydrologic condition of Puget Sound that puts it at greater risk from nutrients, pathogens, or toxics than other estuaries in North America. The sills influence the flushing exchanges, but in some cases, such as Admiralty Inlet, they serve to oxygenate the mix of water that then flows into the deep water of Puget Sound, such that in the main basin, dissolved oxygen concentrations at 600 feet are considerably higher than in the Pacific or in the Strait of Juan de Fuca at the same depth. Pathogen issues generally are localized, associated with local sources, be they septic systems, stormwater runoff, pets, farm animals or natural wildlife, and there is nothing about Puget Sound’s hydrology that puts it at greater risk from pathogens than other estuaries in North America. Similarly, there is nothing about Puget Sound’s hydrology that should put it at greater risk from toxics than other estuaries in North America, especially those with comparable or greater populations around them. With nutrients, the issue is nutrient addition to surface waters that would otherwise be naturally depleted of nutrients, and many other estuaries in the country have the same concern.

- Page 4, second to last sentence in paragraph on water quality in Puget Sound freshwater systems states that “there have been an increasing number of impaired water body listings over the last 10 years.” An implication of such a statement is that things are getting worse. However, it may simply represent more observations have been made.
- Page 4, paragraph on impaired lakes, rivers and streams. The last two sentences describe documented impairments based on the 2002 305(b) report and the 2004 303(d) list. These sentences should be deleted. The 2002 305(b) report is incomprehensible as to how they calculated anything. There is no basis for the assertion that 50% (plus or minus 25%) of the Puget lowlands freshwater stream miles exceeded metals standards. The footnote itself refutes the claim, as does the discussion of metals on page 12 (“only 8 sites out of 639 where dissolved metals and mercury results were reported exceeded 2006 Washington State water quality standards chronic criteria [this is statewide], and none were in the Puget Sound basins.” The last sentence makes the mistake of implying 151 waterbodies in WRIA 9 were impaired, which is a problem of confusing the number of waterbodies with the number of listings specific to particular parameters and particular segments of waterbodies. The number of waterbodies impaired will be substantially less than 151.
- Page 5, second paragraph from the bottom says that “most impairments of existing water quality standards for marine waters in the main Puget Sound basin are for fecal coliform bacteria and low dissolved oxygen. It also describes 704

listings for pathogens in 2004. There is a problem in terminology. What is meant by the “main Puget Sound basin”? The usual description of the main basin of Puget Sound is from Admiralty Inlet to the Tacoma Narrows. As used here, it must be including Hood Canal and Southern Puget Sound and more. It is confusing. The 704 listings attributed to pathogens are actually for bacteria. The bacteria measured are not pathogens. They are an indicator that pathogens could also be present, but they are not measures of pathogens. Some observations could be entirely due to birds, seals, or other wildlife and may be entirely free of pathogens.

- Page 5, last paragraph describes over 30,000 acres of commercial shellfish beds closed due to water pollution, including fecal contamination. It then attributes it entirely to human related sources, septic systems, stormwater, and agriculture. Change to read, “.....closed to harvesting due primarily to fecal coliform bacteria contamination.” and then also acknowledge that birds and other wildlife can also be sources of fecal coliform bacteria.
- Page 6, paragraph on Metals. Pertaining to marine waters, it says that widespread impairment from metals is uncertain. This should be changed to read, “There is no widespread impairment from metals.” Existing observations support that there is no metals impairment of marine waters with the possible exception of mercury for which there are some fish consumption advisories. There are localized areas with impairment of sediments from metals from historical sources of contamination.
- Page 6, paragraph on endocrine disrupting chemicals. The paragraph asserts that a survey of marine waters in King County obtained results similar to those for freshwater lakes, rivers, and streams. Does that just mean similar in what was detected, or does it also mean similar in the concentrations of what was detected? If the concentrations in marine waters are lower, then the results are not similar.
- Page 9, paragraph on wastewater and septic systems. This paragraph notes that combined sewer overflow outfalls sometimes discharge mixed stormwater and untreated wastewater to Puget Sound. The implication of course is that combined sewer overflows are bad. However, cities that have combined storm and sewer systems are also treating much of their rainwater at sewage treatment plants, which is good, and which is not accomplished with cities that have separate storm sewer systems. So there is both an upside and a downside, and probably a net upside.
- Page 10, paragraph on Pathogens, last two sentences. Second to last sentence add “and birds” after “including marine mammals”. Last sentence: change the term “pathogens” to “indicator organisms. This better matches the first sentence, and is a truer statement as well. Page 10, paragraph on Wastewater discharges. The statement incorrectly paraphrases from page 3 of the Hart Crowser et al., 2007 report. The study did not find a total load and work backwards as is implied.

- Page 10, paragraph on combined sewer overflows. It is correct to note that CSO's contribute relatively little to the total loadings. Combined storm sewer systems should actually be credited with providing treatment to more stormwater and therefore reducing loadings compared to separated systems.
- Page 11, paragraph on Effects on lakes. It is worth mentioning that Lake Washington is now less productive than it was in the 1950's and 1960's which demonstrates that nutrients had a beneficial side, as well as a detrimental side.
- Page 12, paragraph on Sediment cleanup. This one sentence paragraph should be expanded some. It should note the cleanups that have occurred.
- Page 13, paragraph on Creosote-Treated Timber Piles. The paragraph should note that DNR and Ports and other groups have been actively removing substantial numbers of creosote-treated pilings in the last decade. The paragraph should also note that rail ties are creosote-treated and are located on rail right-of-ways close to marine and freshwaters.
- Page 13, the last paragraph has a sentence that says marine water temperatures are expected to increase in Puget Sound due to increases in air temperature and changes to freshwater inflows. I think that marine water temperatures will not be likely to increase due to changes in freshwater inflows, so the sentence should be changed to only attribute possible increases to increases in air temperature.
- Page 15, paragraph on stormwater. Second sentence refers to an attached map reflecting an analysis of pre-1995 development in King County. The map actually presents an analysis of pre- 1990 development.
- Page 15, paragraph on Source control measures. Second sentence refers to "surface water pollution prevention plans" and should say "storm water pollution prevention plans" instead. The third bullet is awkward and needs to be revised. The following additional bullets could be added.
  - Switch from leaded to unleaded gasoline,
  - Industrial source control programs administered by municipal dischargers and by Ecology.
  - Case-by-case implementation of water quality-based effluent limits in the NPDES permits, when technology based limits were not enough.
  - Addition of hardness, or other measures to municipal water supplies to reduce corrosion and release of metals from metal plumbing.
  - Cleanups of impacted sediments, and source control measures at upland sites associated with those sediment sites.
- Page 18, section on Wastewater. The first paragraph says that secondary treatment is effective in reducing loads of fecal coliform bacteria. Actually, the bacteria are controlled by disinfection, and not secondary treatment. The same paragraph says

that most larger facilities are operated to remove some nutrient. This would be true only to the extent that secondary treatment removes some nutrients, but secondary treatment is not designed for nutrient removal, so the sentence may be misleading. The first sentence in the second paragraph says that well sited, well designed and constructed on-site wastewater systems are effective in removing pathogens... Probably better to say effective in removing indicator bacteria. The end of the section notes that a discussion of findings on mixing zones and their effectiveness or limitations could be added here. The following is a suggested input. Our state's water quality criteria are recommended on concentrations of analytes in a waterbody that are intended to protect human health and aquatic organisms and their uses from unacceptable effects from exposures to these pollutants. The state's criteria are mostly based on EPA's water quality criteria. The criteria are not directly comparable to concentrations in a discharge because the criteria not only have a concentration component, but also duration and frequency of exposure components. Mixing zones provide a useful link between water quality criteria and discharge permits. Both EPA and the state recognize that water quality-based effluent limits are derived from and comply with water quality criteria and may incorporate dilution based on the state's mixing zone regulations. The size limitations of mixing zones in Washington state assure that durations of exposure for organisms are substantially less than the duration of exposure component of the acute, chronic, or human health water quality criteria. The use of mixing zones allows implementation of water quality criteria in discharge permitting in a manner that is consistent with the exposure assumptions that the criteria are based on.

For more information on mixing zones see the EPA Memo from BenjaminH. Grumbles and related implementation guidance in the Permit Writer's Manual.

Page 18, the discussion about management approaches addressing water applicable water quality criteria and if found to exceed, then a water qualitybased effluent limit is imposed. Imposition of water quality-based effluent limits drive additional actions, be they source control or treatment, in order to meet the limit. Permits also evaluate the need for limits of the toxicity of an effluent, and may require other studies, such as sediment studies, dilution studies, and verification that the underwater outfalls are intact and functioning properly. For stormwater permits, the general permits focus on stormwater pollution prevention plans and implementation of best management practices. Some include monitoring requirements. Some individual stormwater permits include specific effluent limits, while the general industrial stormwater permit includes monitoring and comparison of results to benchmarks, which if exceeded require facilities to take additional actions to improve the stormwater quality. Ecology's Permit Writer's Manual provides more details regarding the NPDES permitting program.

- Page 19, second paragraph. Change the first two sentences to read: In general, municipal and industrial wastewater treatment plant operators routinely monitor effluent quality to document compliance with NPDES permit conditions. Monthly

Discharge Monitoring Reports are submitted to the Washington State Department of Ecology.

- Page 20, first paragraph. The last sentence needs to also note that the CWA establishes requirements for measuring and limiting the toxicity of effluents, and that the State has established and implemented a means for doing so.
- Page 20, second bullet under stormwater heading, should say “municipal separate storm sewer system (MS4) permits.”
- Pages 20-21, third bullet under Stormwater heading, add to the end of the sentence “as well as stormwater permitting in individual industrial permits.”
- Page 21, third bullet under Wastewater heading, change last sentence to read, these permits outline requirements for discharge limits and require effluent monitoring to document compliance with the limits.
- Page 22, first paragraph under Stormwater heading. Change last sentence and add a sentence as follows, to date, Phase 1 and Phase II municipal stormwater NPDES permits have not required monitoring. Stormwater monitoring is required in the industrial general stormwater permit, and a number of industries with individual permits include monitoring of stormwater.
- Page 23, last bullet under Stormwater heading. This bullet says that there is no area-wide application of CWA NPDES for stormwater in watersheds or areas with known water quality problems. The industrial general stormwater permit does have additional requirements when a stormwater discharge is to a 303(d) category 5 listed receiving water.
- Page 23, first paragraph under Wastewater heading, there are significant errors and shortcomings in this paragraph, specifically, it fails to acknowledge that toxics water quality of the effluent is evaluated and water quality-based effluent limits are imposed when needed, and whole effluent toxicity is similarly evaluated. For some, sediment quality is also evaluated. Larger municipal facilities also implement an industrial pretreatment source control program and household hazardous waste turn in facilities. The state implements the industrial pretreatment programs for smaller facilities. Municipal facilities conduct regular effluent quality monitoring, but generally do not conduct receiving water monitoring.
- Page 23, first sub-bullet under bullet under Wastewater heading, The sub bullet talks about the generous funding of 75% federal in the early days of implementation of the CWA. The reality is that much of the country received that level of funding, but the discharges to marine waters were a lower concern and most did not get the 75% federal funding, thereby paying much greater percentages out of pocket.

- Page 24, second bullet under Wastewater. This bullet focuses on reuse of treated wastewater as an alternative to marine and freshwater discharge. This section is problematic because it is pushing for reuse even to the extent of minimizing its cost as a water source by throwing the costs of treatment on the discharger, regardless of consideration for whether there is an environmental need to treat to such a level in order to protect surface waters. Reuse makes sense on a case-by-case basis, where a local water quality concern necessitates reducing discharge, or a benefit is derived from the local ability to reuse the water. Reuse, as a means of increasing effective water supply does not make sense on a broad scale because conservation measures can do the same for less cost.
- Page 25, first bullet at the top. This section says that while secondary treatment has been the standard for years, higher levels of treatment and reduced discharges are now being driven the DNR. I am not aware of any cases of DNR driving a higher level of treatment. I am aware of DNR driving dischargers to relocate outfalls so as to not preclude the harvest of geoduck clams. The section seems to praise the designation of outfalls as a non-water-dependent use because it will open the door to additional options for wastewater discharge, such as land application of biosolids or reuse of wastewater. Those options are always there and can be considered where appropriate. Land application of biosolids is common now, and reuse of wastewater occurs in some appropriate areas. Designation of outfalls as a non-water-dependent use does not open the door to additional options. Rather, it closes a door to an existing option that has worked well in the past, and forces much higher costs on society. The higher costs prevent being able to afford other more beneficial actions.
- Page 25, discussion about Combined Sewer Overflows and Combined Sewer Systems As noted before in these comments, combined sewer systems offer some advantages along with the risks of CSO events. More stormwater in communities served by combined sewer systems, receives treatment before discharge than in communities served by separate stormwater systems.
- Page 25, section on On-Site Sewage Systems.  
The first bullet notes that standards for septic system design do not typically address removal of nutrients and toxic compounds. There actually are septic systems that can perform very well on nutrient removal. The standards for new systems going into the upper Methow Valley in Okanogan County require the new septic systems, and where there are concerns with nutrients in either the groundwater or the surface water, the newer septic systems should be used.
- Page 26, section on Airborne Pollution  
The name of the Puget Sound Air Pollution Control Authority was changed a number of years ago to the Puget Sound Clean Air Agency. I doubt that air deposition of arsenic or cadmium is significant now. There is a good study of the sources and fates of certain phthalates that presents new dilemmas, as they outgas

- from vinyl and other plastic products over the life of the product, then in the atmosphere bind to fine particles, then drop back to the land either by dry or wet deposition, and then runoff in stormwater, accumulating in sediments in quiescent areas that receive the stormwater. Other chemicals may follow a similar pathway.
- Page 27, section on Source Control  
This section needs to discuss the various source control programs implemented by municipalities and by Ecology. The industrial pre-treatment program is one. Household hazardous waste turn in programs is another. Hardening of the city of Seattle's water supply is another (it reduced corrosion of metal pipes in the city, thereby reducing metals going to the treatment plant). Programs are getting started for turn in of unused pharmaceutical products. These all should be recognized, and encouraged. There is no mention in the document about trash. Plastic debris in particular is a significant water quality concern. The Seattle area is home to a preeminent marine trash oceanographer, Curtis Ebbesmeyer. Perhaps he can offer some wording for the document.
  - Page 28, first paragraph.  
The paragraph asserts that since 1995 when the first Phase 1 NPDES municipal stormwater permits came online, only a handful of urban streams or lakes have been removed from a 303(d) listing and more have been added. Is this true? How many such listings have been removed?
  - Page 29, first bullet at top. This bullet says "Wherever possible, turn stormwater and wastewater into water resources." The idea sounds good, but needs to be moderated, so that it does not result in requiring a blind application of technology to do so everywhere. That has potential to be very costly, and somehow such an approach needs to be moderated to apply where it is needed as a water resource, or needed for a real environmental need.
  - Page 29, first bullet under Stormwater, this emphasizes need to begin or accelerate retrofits of impervious surfaces in untreated urban areas. Note that this may be very costly. Seattle recently retrofitted 660 feet of a residential roadway at a cost of \$850,000. The retrofit resulted in approximately 99% of the total runoff potential being retained. (See page 68 in the April 2008 issue of Water Environment & Technology) What does this cost for the whole city?
  - Page 29, an additional bullet that could be added.  
Develop a strategy to rapidly replace brake pads state wide when copper free brake pads become available. This is probably the single most effective thing that can be done to reduce copper loading from urban runoff, which may be a problem in urban streams. The turnover needs to happen faster than just waiting for replacements to occur.
  - Page 30, first bullet under Wastewater. The focus in the first bullet is on requiring tertiary or Class A wastewater treatment and reuse to reduce nutrient loadings to

nutrient-sensitive areas. Another option that should also be included is to discharge in deep water so the effluent traps below the pycnocline, thereby not introducing the nutrients into the nutrient sensitive surface waters. It works, so don't preclude it. The section also identifies that increased expenses in energy and operating costs must be considered in the balance. To that, the paper should also add greenhouse gas emissions need to be considered.

- Page 31, first bullet, this section calls for reviewing wastewater outfalls for potential decommissioning. This is simply another call for tertiary treatment or treatment to reuse standards. The paragraph should be removed. Deepwater discharges of nutrients are much different than shallow water discharges. Source control strategies may be better approach than end-of-pipe treatment strategies.
- Page 33, second paragraph in bullet to Evaluate existing water quality standards. The paragraph implies that the only toxic substances criteria for the state are those in Table 240(3) in Chapter 173-201A WAC. Human health water quality criteria for toxic substances, applicable in Washington state are found in the National Toxics Rule 40 CFR 136.31 and are specifically called out in WAC 173-201A-240(5). Chapter 173-205 WAC is also the whole effluent toxicity testing and limits rule that imposes WET testing and a means for imposing limits where needed. The paragraph recommends that DOE adopt numeric limits for common pollutants (e.g., phthalates) for which there are no current state criteria. The paragraph confuses “limits” with “criteria” and the two are not and should not be the same thing. The paragraph should comment that DOE adopt criteria, not limits.
- Page 26--An expanded discussion is provided below. This comes from the background for the Air Deposition project that Ecology will be conducting for the Puget Sound Partnership to sample direct deposition to the waters of Puget Sound and from general Air Quality program information:

Tons of toxic chemicals are emitted into the air from mobile, industrial and commercial sources in western Washington each day. Some of these toxic pollutants are deposited to the waters of Puget Sound. Over time these toxins accumulate in the water, sediments and biota of Puget Sound. The Control of Toxic Chemicals in Puget Sound report (Phase 1: Initial Estimate of Loadings) suggested that run-off from land surfaces and deposition from air (directly to marine waters) are the two most important avenues of contaminants to Puget Sound. In addition, the report found atmospheric deposition directly to Puget Sound to be an important source of toxics loading for polycyclic aromatic hydrocarbons (PAHs) and polybrominated diphenyl ethers (PBDEs). Atmospheric loading of PAHs and PBDEs directly to the marine waters and tidelands was found to be greater than or comparable to the loading from surface runoff. Due to these findings and the associated large data uncertainties for these toxic chemicals, the report recommended collecting and analyzing atmospheric

deposition samples to better understand the atmospheric deposition rates to the waters of Puget Sound.

Sources of diesel particulate emissions in the Puget Sound are dominated by heavy-duty vehicles, construction equipment and marine vessels. These three source categories account for 79% of all fine particulate in the Puget Sound. Wood burning devices in the 11 counties adjacent to Puget Sound emit 9,700 tons of fine particulate each year. There are 900,000 wood-burning devices in these counties. There are 200,000 older, high-polluting woodstoves and inserts that account for 60% of the wood smoke pollution. Deposition from the air directly into marine waters of Puget Sound appears to be an important source of loading for some of the chemicals of concern, including PAHs and PBDEs. Significant sources of PAHs include fuel oil related emissions from diesel vehicles, gasoline vehicles, marine vessels, and wood combustion.

Air monitoring for fine particulates related to combustion is conducted at several locations throughout the Puget Sound region by the Department of Ecology, the Puget Sound Clean Air Agency, the Olympic Region Clean Air Agency and the Northwest Clean Air Agency. There are federal and state standards for these fine particulates. The Department of Ecology also monitors toxic air pollutants at one site in Seattle and a subset of pollutants in Tacoma. Many of these monitored toxic compounds and metals are those of concern for deposition into the sound. There are no direct federal or state standards for most of these compounds. However, many of these compounds adhere to the fine particulates from diesel engines and wood smoke, so are indirectly managed through fine particulate control and reduction programs.

- Page 3, Para 5 (Shellfish) – The paper says that over 30,000 acres of shellfish beds are closed to harvest, and this is repeated again on page 5. This should be revised to say that “approximately 30,000 acres of commercial shellfish tidelands have been closed to harvest since 1980 because of pollution” and should reference the 2007 State of the Sound. It’s also important to note that the trend for the past 15 years has been positive due to effective protection and restoration efforts across the region (net gain of 8,000+ acres during the period).
- Page 4, Para 5 (Threats) – Don’t agree that Puget Sound is at greater risk than other estuaries. The other ones have natural barriers and special problems as well.
- Page 4, Para 6 (Impaired Waters) – You should be able to update and fill out the regional description of these impairments based on the most recent assessments completed by Ecology.
- Page 5, Bullet 3 (Emerging Contaminants) – Recommend adding the point that little is known about the health and environmental effects associated with these pollutants. Please include information on the known effects if available. (Comment also applies to bullet #4 on page 6 and other sections.)

- Page 5, Bullet 4 (Groundwater) – Please reference findings on nitrate levels in the state’s groundwater in this new USGS report:  
"<http://pubs.usgs.gov/sir/2008/5025/pdf/sir20085025.pdf>"
- Page 5, Para 7 (Pathogens) – The list of sources should be broadened to include stormwater from impervious surfaces, wastewater treatment plants, combined sewer overflows, pets and boats. Loadings from commercial marine traffic is unknown but should be investigated.
- Page 7, Para 4 (Stormwater Pollutants) – The list should include “fecal material and pathogens.” This is true whether it comes off a parking lot or comes from a farm. Stormwater always has high levels of fecal coliform bacteria and it is safe to assume that people will be exposed to the waters and pathogens.
- Page 8, Para 6 (Effects) – This discussion of imperviousness, specifically the significance of the 10 percent level of impervious cover, should be expressed in more cautious terms. The research does suggest that 10 percent impervious cover and 65 percent forest cover are telling measures at the landscape scale. However, the research also makes the point that increasing development, as measured by a host of landscape metrics and stream- and shoreline-health indicators, is associated with a continuum of environmental effects and these impacts are often measurable at levels of development below 10 percent impervious cover. This seems to be the more important point to stress. That is, you can say with certainty that species diversity (and other indicators of stream- and shoreline-health) will not be universally high at development levels below 10% impervious cover.
- Page 8, Para 6 – In addition to ions and dissolved organic carbon, pH and temperature also have an effect on the toxicity of metals.
- Page 9 (Author’s Request, Ag Practices) – You request material linking agricultural practices with fecal coliform bacteria. You can say the following:  
“The Washington Department of Health monitors and classifies shellfish growing areas based on the results of comprehensive sanitary surveys. These surveys include water quality sampling, pollution source investigations, and other information. Animal wastes from commercial and non-commercial farms have been identified as pollution sources in many shellfish growing areas in the Puget Sound region, including Dungeness Bay, Samish Bay, Portage Bay and Drayton Harbor.”
- Page 9, Para 7 (Wastewater) – Suggest changing this to say that “most” sewage treatment plants in the region discharge wastewater directly to Puget Sound, and other plants discharge to rivers that drain to Puget Sound. The Partnership or the Department of Ecology should be able to provide an inventory of municipal treatment plants in the region and their discharge locations.

- Page 9 (Author’s Request, Wastewater Inputs) – The UW cruise ship study, available at [www.doh.wa.gov/ehp/sf/Pubs/cruise-ship-report.pdf](http://www.doh.wa.gov/ehp/sf/Pubs/cruise-ship-report.pdf), estimated land-based WWTPs contribute nearly 400 million gallons per day into Puget Sound. Where possible, the paper would be strengthened by including loading data for other sources.
- Page 10, Bullet 2 (Wastewater Pollutants) – Include nutrients in the list of pollutants. Wastewater treatment plants remove only 10-40% of nitrogen from wastewater and about 400 million gallons per day are discharged directly to Puget Sound. The percentage of nutrient removal is about the same as septic systems, which do not directly discharge into Puget Sound.
- Page 10, Bullet 3 (Pathogens) – Add wastewater treatment plants and collection systems (leaks and wet-weather upsets and overflows) to the list of sources. Also, the last sentence in this paragraph says that failing septic systems are presumed to cause pollution in some locations. You should delete this sentence or convert it to a statement and include a reference. All of the pollution sources listed in the paragraph or elsewhere can cause pollution. To the extent possible, the paper should focus on documented problems to illustrate the points and to gauge the threats and impacts.
- Page 10-11, Bullet 6 (Septic Systems) – Here are several points. (1) There are now an estimated 525,000 onsite sewage systems in the Puget Sound region. (2) The last sentence should say that onsite sewage systems, if they are improperly designed or maintained, may be sources of pathogen pollution. (3) We don’t know the pathogen and nutrient loading from onsite systems to Puget Sound. (4) We don’t know precisely what the systems are capable of doing—limited effectiveness removing all pollutants. Prevention and source reduction are keys to keeping micro-constituents out of the waste stream. (5) Makes sense to better understand and improve treatment for known problems before shifting attention to concerns with other emerging contaminants.
- Pages 10-11 (Wastewater Discharges) – It’s unclear what the distinction is between the bullet on “wastewater discharges” on page 10 and “wastewater Discharges to streams” on page 11.
- Page 12, Para 7 (Water Activities) – See the EPA cruise ship assessment at [www.epa.gov/owow/oceans/cruise\\_ships/disch\\_assess\\_draft.html](http://www.epa.gov/owow/oceans/cruise_ships/disch_assess_draft.html), section 2, page 8. In Alaska, only 43% of ships met FC discharge standard of 200 FC/100 ml. Of those that had poor effluent, 5/6 Cruise Ships inspected by Coast Guard either had MSDs that were either improperly used or had failed to maintain them. If big boats with dedicated crews can’t maintain MSDs, what does that mean for smaller boats?
- Page 13, Para 2 (Marine Traffic) – You’ll find more information on the state’s ballast water program at [HYPERLINK](#)

"<http://www.wdfw.wa.gov/fish/ballast/ballast.htm>"  
[www.wdfw.wa.gov/fish/ballast/ballast.htm](http://www.wdfw.wa.gov/fish/ballast/ballast.htm) .

- Page 15, Para 1 (Stormwater Runoff) – As explained in our general comments, the first sentence should be reworked to clarify your use of the term stormwater. Stormwater is not the only way that nonpoint sources contribute to pollution. Septic systems, manure, and waste from boaters can be discharged directly into water bodies—no storm or stormwater required.
- Page 16, Para 9 (Stormwater BMPs) – This point about the performance of conventional stormwater practices should be inverted. The point isn't that the design and application of conventional BMPs have not been demonstrated to consistently meet standards. Instead, the research that has been conducted has demonstrated that conventional practices consistently do not meet water quality standards due to many factors, including real-life problems associated with siting, design, construction, operation, maintenance and replacement.
- Page 17, Para 2 (LID) – The paper needs to give substantially more attention to low impact development and substantially more credit to the research that has been conducted regionally and nationally on these approaches and practices.
- Page 18, Para 1 (Wastewater) – Advanced treatment to remove nutrients is used on a very limited basis in the Puget Sound region (e.g., the LOTT plant in Olympia). As noted previously, septic systems remove about the same percentage of nitrogen as wastewater treatment plants. Nutrient-removal technologies are available, but their use is not standard practice.
- Page 18, Para 3, Bullet 1 (MBR Technology) – Two emerging treatment options, membrane filters and UV disinfection, have much better removal efficiencies with bacteria compared with viruses. This renders coliform bacteria a less reliable indicator for viral pathogens from treatment plants employing these methods.
- Page 18, Para 3, Bullet 2 (Trace Compounds) – Standard onsite systems with septic tanks and soil drainfields can also remove or reduce certain trace substances.
- Page 18, Last Para (Effectiveness) – This section on measuring and documenting effectiveness is focused on stormwater and wastewater, and needs to be expanded and improved to include a broader suite of measures and indicators related to water quality. This should include water quality and classification data for the region's shellfish growing areas, including upgrades and downgrades associated with changes in water quality and related protection and restoration efforts.
- Page 19, Para 3 (Gaps) – Add a bullet regarding the need for expanded water quality modeling to inform monitoring needs and plans.

- Page 19, Para 3 (Gaps) – We need to better understand options, techniques and incentives to turn stormwater and wastewater into reclaimed water.
- Page 19, Para 3, Bullet 3 (Gaps) – Technologies are approved and available for nitrogen removal. A move to AKART would push the use of advanced wastewater treatment technologies.
- Page 20, Para 1 and following (Approaches) – This introduction—actually the entire section—should be expanded to more fully describe the institutional framework for protecting and restoring water quality. This includes management of point sources, nonpoint sources, and other related approaches. The point source discussion should include, for example, the State Clean Water Act in addition to the federal act. The nonpoint discussion should include state and local laws and programs for managing onsite sewage systems, boat wastes, farm animal wastes and other nonpoint sources (e.g., state onsite sewage rules, Thurston nonpoint ordinance, Whatcom nutrient management ordinance, Kitsap PIC program). These pollution programs are complemented and supported by requirements for land use planning (GMA and local comprehensive plans and development regulations), shoreline management (SMA and local shoreline master programs), shellfish protection (National Shellfish Sanitation Program, shellfish protection districts, closure response strategies), water cleanup plans (TMDLs) and watershed management plans. It all ties together for comprehensive management and protection of water quality, and the paper should reflect and explain this.
- Page 20, Bullet 1 (Stormwater) – Here or elsewhere you should mention that local governments have established different kinds of local utilities to fund a variety of projects and services to protect and restore water quality. This includes programs and fees for wastewater treatment, stormwater management (stormwater utilities), shellfish protection (shellfish protection districts), resource conservation (conservation district special assessment s) and other needs. In many cases utilities have been set up to address issues and fund local programs in a coordinated fashion (e.g., Kitsap surface and stormwater management program, and Skagit clean water district program).
- Page 21, Bullet 2 (Wastewater) – The bullet on rural sewage issues should note that local health jurisdictions are required to adopt onsite sewage management plans. This includes requirements to identify and protect marine recovery areas. To date, DOH has approved plans for 10 of the 12 local health jurisdictions in the Puget Sound region.
- Page 21, Wastewater – Consider adding a bullet recognizing the fact that shellfish protection districts and shellfish closure response strategies have been adopted and developed at numerous sites around the Sound helping to successfully protect and restore water quality and upgrade the classification of many shellfish areas.

- Page 22, Limitations – In the 2006 session the legislature called on local health jurisdictions to develop onsite sewage management plans and to designate and carry out additional activities in marine recovery areas. The legislature provided some funds for the plans, but none to carry out the new work. This work needs dedicated funding.
- Page 22, Bullet 4 (Limitations) – Funding needs extend beyond enforcement and outreach. Nearly all local jurisdictions lack funding to implement comprehensive water quality programs. Kitsap County is one county that seems to have adequate funding to monitor nonpoint sources and drainages into Puget Sound.
- Page 22, Bullet 3 (Stormwater) – This sentence is confusing. What are you saying is not planned together? Whatever it is, be more precise and recognize that there are examples where these items are being planned together to varying degrees.
- Page 23, Bullet 1 (Stormwater) – These pollution threats are partially and indirectly addressed by requirements to control suspended solids
- Page 23, Para 6 (Wastewater) – Advanced treatment for nutrient removal by municipal treatment systems, large onsite systems, or small onsite systems is not standard practice at this time and represents a significant challenge for the region. The technologies are available, but are not widely used.
- Page 23, Bullet 1, Sub-Bullet 2 (Wastewater) – This point talks about funding WWTPs in non-urban areas. This is confusing because there centralized WWTPs only serve urban areas. Are you referring to small or isolated developed areas that may be LAMIRDs or UGAs, such as Hoodspout and Belfair in Mason County? If so, then it would be helpful to describe such areas in these terms, or if you are referring to other areas or situations, please explain.
- Page 23, Bullet 1 (Wastewater) – Suggest adding another bullet to point out that funding and other incentives for repairing, replacing and maintaining onsite sewage systems—and also for connecting onsite systems to municipal STPs or for consolidating onsite systems to form a large onsite system is even more limited than funding for centralized systems. The decentralized wastewater infrastructure deals with other related barriers associated with private ownership of the systems and the lack of coordinated planning to guide infrastructure investments.
- Page 24, Bullet 1 (Wastewater) –This paragraph refers to municipal systems, but it raises questions for all types and scales of sewage systems. The list of challenges should include the fact that there are no state or federal requirements to remove the compounds, sampling protocols are not always reliable, and there’s very limited knowledge regarding the nature and extent of the problem. Also, is it appropriate to refer to pharmaceuticals as toxic compounds?

- Page 24, Bullet 2, Sub-Bullet 1 (Wastewater) – While not required to include reuse, water systems with over 1,000 connections are required to evaluate reclaimed water opportunities when doing their period water system plan.
- Page 24, Bullet 2 (Wastewater) – Add a sub-bullet regarding the need to develop a customer base for use of reclaimed water. Presents an opportunity to use social marketing. This point applies to other parts of the document, e.g., Page 29, Bullet 1.
- Page 24, Bullet 3 (Wastewater) – The cost of providing treatment to achieve reclaimed water standards may be modest for new facilities, but can be very pricey when retrofitting existing systems.
- Page 25, Bullet 1 (Wastewater). The issues described in this paragraph are vague and unclear. For example, what is the issue that you are drawing attention to regarding the inconsistency involving outfalls? Also, while DNR may have an interest in treatment levels and marine discharges, there are many agencies and organizations with an interest in these issue, so it seems misleading to say that DNR is driving these issue.
- Page 25, Bullet 2 (Flow Blending). The Department of Health and the Department of Ecology are on record of opposing flow blending. Flow blending does not encourage wastewater utilities to find inflow and infiltration into their collection systems. This results in more numerous bypasses of inadequately treated wastewater, which contaminates shellfish beds and swimming beaches.
- Page 25, Combined Sewer Overflows. The discharges from CSOs are highly contaminated with pathogens that threaten the safety of shellfish and swimming beaches. Although they may happen infrequently, the threat to public health is substantial. CSOs need to be eliminated.
- Page 25, Wastewater, Onsite Systems. (1) Regarding the first bullet, current state rules do contain a nitrogen standard. The new rules for large onsite systems will include a standard as well. (2) Regarding the second bullet, siting does have to take into account the receiving waters if deemed necessary. The new rules for large onsite systems will include the same requirements. (3) Regarding the third bullet, or more specifically sub-bullet 2, the authorizing statute (RCW 70.118, 118A and 118B) and related rules (WAC 246-272A and B) do not include new authority or requirements for onsite sewage utilities.
- Page 26, Para 1 – The requirements in the 2006 legislation are reinforced and spelled out in more detail in the State Board of Health Rules. Among other provisions, the rules call on local health jurisdictions to adopt onsite sewage management plans. This includes requirements to identify and protect marine recovery areas. To date, DOH has approved plans for 10 of the 12 local health jurisdictions in the Puget Sound region.

- Page 26, Bullet 2 (Direct Marine Pollution) – Cruise ships are a small percentage of the Sound’s marine traffic. While the US Coast Guard has the authority, they do not exercise it in any way that can be considered effective. The number of inspections per year is extremely low. They do not monitor the performance of MSDs on marine vessels, which have much poorer performance than advanced wastewater treatment systems on cruise ships.
- Page 26, Bullet 3 (Direct Marine Pollution) – No agency is taking a comprehensive look at pumpout use/maintenance, so this is similar to the Coast Guard comment (facilities there, but no one sure how well they work).
- Page 26 (Author’s Note, Land Use Planning) – The land use/habitat paper does not appear to address land use in broad terms, but instead addresses it only as it pertains to habitat. As such, the water quality paper needs to address land use issues as they pertain to protecting and restoring water quality.
- Page 26, Bullet 1 (Land Use Planning) – The bullet says that GMA advances integrated land use and water resources planning to the extent critical areas are specifically addressed. What does this mean, and what is it based on? Good land use planning and protection of water quality are not limited to critical areas. Critical areas and natural resource lands may require enhanced protection, but that does not mean that other areas get no protection. One of the goals of GMA is to “protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water.”
- Page 27, Para 2 (Comprehensive Watershed Planning) – This paragraph is confusing. If you are talking about watershed-based NPDES stormwater permitting, then it’s fair to leave the impression that this is a new tool that could be used in the Puget Sound region. However, if you are talking more generally about watershed planning, the Puget Sound region has 20 years of experience and hundreds of watershed management plans. We are plan rich, action poor.
- Page 28, Para 1 (P2) – The narrow scope of the paper is underscored with this opening sentence: “Water Quality threats associated with our approach to urban living are ubiquitous.” Again, the paper should address threats, issues and approaches across the region, not just in urban areas.
- Page 28 (Principles) – The first principle should be to “prevent the contamination of areas with healthy watersheds, functioning habitats and clean water.” Protection is always easier and cheaper than restoration. The cost of protecting the region’s most pristine watersheds could well be cheaper than cleaning up one contaminated urban bay. The principles should support and advance programs that have proven success, that focus on pollution prevention and resource protection, and that address the root causes of problems, not symptoms.

- Page 29 (Stormwater) – Add language to help advance development/building and stormwater management practices that emphasize the principles and practices of low impact development, especially the principles that call for the protection of land cover, soils and buffers that are essential to preserving the integrity of parcels, drainages and watersheds. Once trees are cleared and soils are compacted, the potential to mitigate the impacts of development on water resources are limited.
- Page 30, Bullet 1 (Wastewater) – Making the jump to tertiary treatment and reuse at all WWTPs may be desired or needed, but it probably doesn't qualify as a short-term goal.
- Page 30, Bullet 3 (Wastewater) – (1) This section incorrectly references a sewage utility law. The authorizing statutes for onsite sewage systems are RCW 70.118, 118A and 118B, and the related rules are WAC 246-272A and B. The 2006 legislature amended the statute when it passed HB 1458. Among other provisions, HB 1458 called on local health jurisdictions to adopt plans to improve the overall management of onsite sewage systems. Utilities can perhaps serve a role helping local health jurisdictions carry out this work, but utilities are not mentioned in the bill. (2) The rule is designed to protect both public health and environmental quality. The rule does not require nutrient removal. It sets a treatment standard and framework that locals can use if they choose to require nutrient removal. (3) Successful implementation of the local plans and programs will require effective and ongoing social marketing to change perceptions and behaviors regarding long-term use and maintenance of onsite sewage systems.
- Page 31, Para 1 (WWTP Outfalls) – With respect to the issue of decommissioning outfalls, consider adding more information on the policy options and related discussions regarding outfall extensions.
- Page 31, Bullet 1 (Land Use) – The call to protect high quality lands and watersheds is good, but seems to miss the mark a bit. While groups such as the Nature Conservancy can play an important role, the focus needs to be on local governments to ensure that local land use plans, development regulations and related programs and services are well designed and fully implemented to deal with both existing development and future growth.
- Page 32, Bullet 1 (Recommendations) – If sediment is considered a priority water quality issue, you should expand this to recommend examining the effects of resuspended sediments on bacterial levels in shellfish growing areas. (See Newton et al 2007 for a brief description of this issue; also staff at the Squaxin Tribe have done a literature review on this topic.)
- The paper discusses land cover change in central Puget Sound on page 8. Land cover data and analyses are available for the entire region, which would make a

more powerful statement in this part of the report. Check with the Partnership and other state natural resource agencies for this regional land cover information

- The paper talks about “stormwater runoff” in very broad terms. The discussion on pages 6-7, for example, suggests that “stormwater runoff” includes runoff from all land surfaces, and the discussion on page 15 suggests that “stormwater runoff” covers all nonpoint sources.
- Policy Question 2 on page 28 should be titled “Strategies to Protect and Improve Water Quality in Puget Sound” and principle #2 on that same page should be titled “Focus on ecosystem protection and improvement”.
- On page 4, the document states that 50% ± 24% are impaired by metal pollution, but on page on page 12 it states that only 8 sites out of 639 sites exceeded aquatic water quality chronic criteria for metals and mercury.
- S2-B: Includes a buried jewel: “Historically land use planning has not been strongly influenced by the provision for water supply, wastewater treatment, or stormwater management from an ecological perspective. More typically, land use decisions determined how water supply, wastewater disposal, and stormwater management would occur.” More emphasis is needed on the recommendation that the solution is going to be a systems approach, including land use, water use, source control, chemical use regulation (inputs).

S1. Detection limits inferred in paragraphs 2 and 3 are dependent on the methods used

- par. 2, 1.4: “since they cannot easily be detected”
- par. 3, “In addition, some of the organic compounds of concern are of very low solubility in water and would not be easily be detected by routine measurements”
- Pg. 8 (and others): The links between water quality, species and habitat need to be more broadly considered. For example, “Effects of Stormwater Pollutants on Species” is limited to freshwater systems and adult salmon. Effects on other life stages should be included, such as work done by R.M Kocan on embryos and larval development  
(see:<http://www.fish.washington.edu/people/kocan/publications.html>).
- Pg. 16: S2-A: More detailed discussion is needed on the pros and cons of the current concentration-based discharge standards versus the TMDL approach.
- Page 8 discusses the Effects of Stormwater Pollutants on Species. In addition to lacking information about frequency, magnitude, and duration of olfactory impairment, we also do not know how salmonid behavioral changes translate into

- real losses of juvenile salmon in wild populations. (However, Dr. Nathan Scholtz at NOAA told us that they are currently conducting related studies.) For all we know, the real problem could be dams rather than predation.
- On page 13, the paper addresses creosote-treated timber piles. Under current regulations, there is no way for a person to install any new treated pilings in our state. A marine biologist at Fish & Wildlife told us that both they and the Army Corps never allow the installation of creosote-treated pilings. These agencies take their direction from Chapter 220-110 of the Washington State Administrative Code.
  - Page 14 discusses Management Approaches to Addressing Water Quality. (A.) lists the preventive measures for stormwater pollution, which include permitting and best management practices. We propose that the State consider implementing incentive-based strategies for stormwater management, such as tax credits and recognition programs. The State should also offer grants to small businesses for implementing stormwater treatment retrofits and installing new treatment technologies.
  - We want to reiterate the section on page 16 that states, “Current design and application of BMPs for stormwater are not demonstrated to consistently achieve water quality standards.” This is because they are sometimes illogical. For example, boatyards are required to put plastic tarps under boats when they do their work, to catch paint and other solids. When the wind blows, all of those solids are displaced and fly into Puget Sound. The tarps are then put in dumpsters and sent to the landfills.
  - Pg 8 – Under the “urbanization” paragraph, the document could include the following sentence: “Significant growth continues outside the Urban Growth Boundary. In Pierce County, approximately 20% of the growth between 2000 and 2007 was outside the UGA. In Kitsap, between 40 and 60% of growth has been outside the UGA in recent years.” Source: Puget Sound Regional Council, Puget Sound Trends, April 2008   HYPERLINK  
"http://www.psrc.org/publications/pubs/trends/d5apr08.pdf"  
<http://www.psrc.org/publications/pubs/trends/d5apr08.pdf>
  - Pg 15 – The list of stormwater source control measures on this page could include “conservation and smart growth strategies”
  - Pg 17 – The document correctly lists out “limitation on impervious surface, and protection of ecologically functional areas” as an area that needs more findings. These findings should comment on the cost effectiveness of using conservation and smart growth as stormwater prevention strategies as compared to treatment.

- Pg 21 – The end of the list of existing regulatory or management programs for addressing stormwater could include, as an example, the stormwater benefits of preventing development on the 90,000 Snoqualmie Tree farm through King County’s transfer of development rights from that property.
- Pg 31 – Add a bullet under the Land Use section that states “concurrent with employing conservation strategies for undeveloped portions of watersheds in the Puget Sound basin, pursue strategies to direct growth into urban areas and foster a high quality of life in urban areas to provide a positive alternative to low-density growth on rural or resource lands. Match these growth strategies with a range of techniques for Low-Impact Development and green infrastructure.