

Memorandum

To: Forum Leader, Water Quality Topic Forum
Puget Sound Partnership

From: Jacqueline Brown Miller, Executive Director
Washington Oil Spill Advisory Council

Date: May 5, 2008

Subject: Puget Sound Partnership Action Agenda and Oil Spills

I. Introduction

This memorandum pertains to the Water Quality Topic Forum being held by the Puget Sound Partnership as part of its process for assembling the Puget Sound Action Agenda. In particular, this memorandum is about why it is important to address oil spill prevention, response, and remediation to prevent oil related toxins from harming water quality in the Sound.

The Washington Oil Spill Advisory Council's mission is to maintain Washington's vigilance in preventing oil spills in marine and navigable waters, by ensuring an emphasis on oil spill prevention while also recognizing the importance of improving spill preparedness and response. The Council was created to help ensure Washington's coastal and marine environments, and navigable waters, continue to be a source of beauty, recreation, health, ecological integrity, food production, and economic betterment for Washington citizens. The Council is a mechanism to foster a long-term partnership and consensus between communities, government, and industry.

The April 14 Initial Discussion Draft for the Water Quality Topic Forum posed several questions relevant to oil spills.

Science Questions

- (S1) *What is the status of water quality in Puget Sound?*
 - *What are the documented threats to fresh and marine water quality, in particular from toxics?*
 - *What are the sources of toxics to Puget Sound water bodies?*
- (S2) *What management approaches are being used to address the sources of toxins entering Puget Sound water bodies?*
 - *What are the main findings relating to management approaches and their documented effectiveness?*
 - *How do we measure and document effectiveness?*
 - *What are the gaps in our understanding?*

Policy Questions

- (P1) *What are the policy approaches to address toxics in Puget Sound?*
 - *What are the existing regulatory or management programs and their limitations?*
- (P2) *What are strategies to improve water quality and reduce toxics in Puget Sound?*

The Council, through its Public Outreach and Education Committee, has contemplated these questions and how the action agenda could best address the issue of oil spills. Based on the Committee's work and consultation with the Department of Ecology Spills Program and others, I am making the following recommendations set forth in Section III of this memorandum for the Action Agenda regarding oil spills.

II. (S1) What is the status of water quality in Puget Sound?

Qualitatively speaking, water quality in Puget Sound should support:

- Thriving populations of plants and animals that are important for the web of life.
- Human health, wellbeing, and welfare.
- Local industries and economies that depend on well-functioning ecosystems and pristine resources.

Specifically, water quality in Puget Sound should be clean enough to support:

- Flourishing populations of fish, bird, and marine mammal species, none of which are threatened or endangered.
- Maintenance of uncompromised ecosystem services that Puget Sound gives and which support the health of various species, humans, and our local economies.
- Ample opportunity for local people to swim and fish in Puget Sound and to eat Puget Sound's bounty without accumulating toxic body burdens, the long-term affects of which we still do not know.
- An environment in which marine recreation is safe and appealing.
- Shellfish growing, fisheries, tourism, and indigenous population subsistence.
- The psychological and spiritual tranquility that comes from knowing we are living in harmony with our surroundings.
- Future generations, our grandchildren's grandchildren, who can enjoy the same healthful and supportive Puget Sound our grandparents did.

A healthy Puget Sound would contain no more oil-related toxins than our local ecosystem can tolerate and still support the above values. Currently, we can not say oil-related toxins in Puget Sound are low enough to support the above values.

A. What are the documented threats to fresh and marine water quality, in particular from toxic oil spills?

1. Risks associated with directly-to-water oil spills.

The Initial Discussion Draft of the Water Quality Topic Forum paper, in science question one, makes the following observations: The total amount of reported oil and petroleum products from reported spills directly to surface waters in Puget Sound was about four percent of the amount estimated to enter via surface runoff. When the relatively rare large spill occurs, it often has a large local impact, including acute toxicity to organisms and plants. Shellfish and other types of marine commercial and recreational harvest are usually curtailed. Thereafter, aside from treating any oil that may be a part of storm water, the paper makes no mention of the need for the Partnership to address oil spills to water.

The paper vastly understates the threat in-water oil spills pose to the Sound-- in terms of how often they can occur, how large they can be, and the potential long-term toxic impact. The Council recognizes that oil as a component of storm water is an important and challenging issue and believes the Partnership should address this issue.¹ However, addressing spills directly to water is equally important.

2. How often should we expect serious spills and in what volume?

In 2000, the U.S. Coast Guard commissioned a study to assess the risk of oil spills in the United States. Table 2.2 of the report provides the number and volume of oil spilled by vessel type for the period from 1985-1999 using an overall input from a spilled volume of 42,301,810 gallons. The data in the table shows tankers are the major contributor of spilled oil into U.S. waters in terms of volume spilled, followed closely by barges. Freighters (including bulk carriers and container ships) are the third largest contributor, and fishing vessels are fourth in volume contributed.

Table 2.2 Volume of Oil and Number of Spills by Vessel Type in U.S. Waters, 1985-1999.

Vessel Type	% by Volume	Volume (gal)	% by Number	Number
Tanker	55.4	23,435,203	8	4,640
Barge	27.6	11,675,300	17	9,861
Freighter	8.7	3,680,257	10	5,801
Fishing	4.3	1,818,978	23	13,341
Passenger	0.5	211,509	5	2,900
Recreational	0.3	126,905	15	8,701
Other vessel	3.2	1,353,658	22	12,761

Source: ERC data compiled for this study (2001).

¹ Partly for reasons of resource allocation, and partly for the Council's interpretation of its mandate, the Council has chosen to focus on spills directly to water.

The table shows tankers responsible for over 4,500 spills, barges for over 9,800 spills, and freighters for over 5,800 spills. This is an average of 1,450 spills per year nationwide. Regarding anticipated trends from 2000 to 2010, the report noted the following about the serious risks cited in the table:

- For tanker spills, there is a possible increase of a major spill from what was reported.
- For barges and freighters (cargo vessels) the threat is expected to remain stable.

The amount of oil that could be spilled in one accident ranges between one gallon and 630 million gallons (the biggest tank ships that come into Puget Sound can carry over 1.5 million barrels (630 million gallons) of combined crude oil and fuel oil). The 2007 Cosco Bussan accident and resulting spill to San Francisco Bay -- just over 53,000 gallons-- was widely labeled a “moderate sized spill.” Another thing to consider is that with increasing international commerce, cargo vessels are getting much, much bigger.² This means the size of the bunker tanks is growing, increasing the risk of larger spills.

The above information pertains to a nationwide threat. What about the Sound? What are the chances each year of a mid-level to a catastrophic-level spill in Puget Sound? This question was somewhat answered by the Coast Guard in 1999. In a study relating to Puget Sound, the Coast Guard provided baseline spill analysis for the “probable” case, given the various planned risk mitigations (programs and laws designed to reduce risk) such as double hulled tankers. The study projected risk from the years 1997 to 2025. Table 32 shows this probable estimate per year, for all tankers, tank barges, and cargo vessels combined, as follows.

Year	Total No. of Accidents	Total Accidents with Oil Outflow	Total Outflow in barrels
1997	3.79239	0.20240	1,016.1
2010	4.97091	0.230189	737.0
2025	6.65715	0.28136	725.3

² Projections show that cargo vessels will grow not just in number, but also in size. The 1999 Coast Guard report noted that in 1997 27% of containerships were less than 2500 TEU and that 36.7% were 2500 to 4000 TEUs, with 36.1% being greater than 4000 TEUs. The report noted that the first of the large 6000 TEU containerships were delivered in 1996, and more than thirty 4500 plus TEU container ships were delivered through 1999. The study projects that by 2025, vessels under 4000 TEU will comprise only 30% of the container fleet, with 70% of the fleet being comprised of vessels over 4000 TEU. Regulatory Assessment, Use of Tugs to Protect Against Oil Spills in the Puget Sound Area, p. 1-20, U.S. Coast Guard, Report No. 9522-02, November 15, 1999.

Naturally, the bunker fuel carried increases with the size of the ship. Thus, the Coast Guard reported that gallons of oil transported as bunker in cargo vessels (bulk liquid carriers, bulk carriers, container ships, and vehicle carriers) would increase from 78,385,168 gallons in 2000 to over 143,405,063 gallons per year in 2025. This is a transit increase of about 160% and an increase of oil transported by cargo vessels of about 180%. Regulatory Assessment, p. 19-20. This oil transport presents a serious and significant risk.

Table 32 Baseline—Projected Spill Volumes and Number of Accidents per Year (reference case based on “probable” estimate of spill frequency)³

In essence, the probable case shows the number of collision and grounding accidents increasing by 71% over the study period. This is primarily due to a predicted increase in vessel traffic. The number of collision and ground accidents which result in spills greater than 10,000 gallons increases by 37% over the study period. The more gradual growth in spills as compared to accidents has to do with the transition into double hulls for tank vessels and by the expectation that crude oil receipts will remain flat over the study period.⁴

This indicates the following:

- In 2010 there will be almost five accidents per year, .23 of which will lead to the outflow of 737 barrels of oil—or almost 31,000 gallons.
- In 2025 there will be over six accidents per year, .28 of which will lead to the outflow of 725 barrels of oil—or almost 30,500 gallons.

Certainly, many things will affect these numbers. However, this is an oil spill risk in Puget Sound that should not be ignored.⁵

This is especially true given that oil spills do not necessarily “evaporate” shortly after it occurs. As described below, thick and viscous oils persist in the environment, sometimes for decades—even indefinitely. If Puget Sound saw one thick gooey and toxic oil spill—like thick bunker fuel—each year, or even every decade, it is likely that the Sound would sustain very serious cumulative impacts.

3. How long do oil spill toxics persist in the environment?

Oil released into marine waters may be comprised of various materials, including crude oil, refined petroleum products (such as gasoline or diesel fuel) or by-products, ships' bunkers, oily refuse, or oil mixed in waste.⁶ Scientists have made significant progress in determining how oil

³ Regulatory Assessment, Use of Tugs to Protect Against Oil Spills in the Puget Sound Area, p. 40, U.S. Coast Guard, Report No. 9522-02, November 15, 1999.

⁴ Regulatory Assessment, Use of Tugs to Protect Against Oil Spills in the Puget Sound Area, p. 39, U.S. Coast Guard, Report No. 9522-02, November 15, 1999.

⁵ Risk Assessment for the Coast Guard’s Oil Spill Prevention, Preparedness, and Response Program (OSPPR), Phase I: Concept Development, Risk Characterization, and Issue Identification, pages 2-12, 2-14, 2-45, http://www.environmental-research.com/erc_reports/ERC_report_13.pdf.

⁶ Wikipedia, http://en.wikipedia.org/wiki/Oil_spill.

impacts the environment. However, the answer depends on the oils chemical composition and where it lands in the marine environment.

Tracking oil's sources, fates, and effects is challenging. First, oil is a complicated mixture of hundreds, or thousands, of chemicals. Every oil source, even among similar types of oil (such as crude or fuel oils, for example), can have distinctive compositions depending on the oil field they are from and how they are refined.⁷

Second, when spilled into marine waters, this varying and complex mixture of chemicals enters a complex chemical stew of seawater, mud, and marine organisms. The oil is stirred by currents, tides, is altered by other physical processes, and changed by chemical reactions and interactions with organisms in the sea.⁸

The lighter fractions of oil, such as benzene and toluene, are highly toxic, but are also volatile and evaporate quickly. Heavier components of crude oil, such as polycyclic aromatic hydrocarbons (PAHs) appear to cause the most damage. While they are less toxic than the lighter volatiles, they persist in the environment much longer. A heavy oil spill can also blanket estuaries and shoreline ecosystems such as salt marshes and tidal pools or lagoons, preventing gas exchange and blocking light. The oil can mix deeply into pebble, shingle or sandy beaches, where it may remain for months or years.⁹

This is a result of the fundamental chemistry of oil compounds. They do not dissolve in water. Therefore, they adhere to particles in the water or get incorporated into biological debris. From there, they settle from the water column and become part of the sediments on the bottom. Once mixed into the sediment, oil and its chemical constituents can persist for decades, depending on the environment. In areas swept by high energy current, the material may be dispersed. But in areas where sediments accumulate, contaminated sediments are an environmental concern—both when lying on the bottom where organisms can expose themselves to it and when dredged.¹⁰

There are several examples of toxic oil elements persisting indefinitely in the marine environment, even though surface sediments may appear healthy. Still today after nineteen years, oil from the 1989 Exxon Valdez spill persists in an only-slightly weathered form below the surface at some beaches along the Gulf of Alaska. National Oceanic and Atmospheric Administration's scientists analyzed subsurface oil at 10 beaches, selected at random from among

⁷ Wikipedia, http://en.wikipedia.org/wiki/Oil_spill.

⁸ *Mixing Oil and Water*, Woods Hole Oceanographic Institution, June 23, 2004, <http://www.whoi.edu/page.do?pid=12467&tid=282&cid=2493>.

⁹ Wikipedia, http://en.wikipedia.org/wiki/Oil_spill.

¹⁰ *Mixing Oil and Water*, Woods Hole Oceanographic Institution, June 23, 2004, <http://www.whoi.edu/page.do?pid=12467&tid=282&cid=2493>.

oil-contaminated areas included in earlier studies. Earlier research demonstrated buried oil could retain toxic components for years if buried in anoxic (oxygen-depleted) sediments where little decomposition from weathering occurs. The new study identified a newly discovered mechanism that allows oil to be preserved in sediments that do contain oxygen. Oil can persist if it exists in a thick, emulsified "oil mousse" that resists weathering. Their researchers concluded that it can stay there for decades and "pose a contact hazard to inter-tidally foraging sea otters, sea ducks, and shorebirds, create a chronic source of low-level contamination, discourage subsistence in a region where use is heavy[,] and degrade the wilderness character of protected lands."¹¹

Toxic oil impacts also persist in Massachusetts, 38 years after a barge ran aground off Cape Cod, rupturing its hull and spilling 189,000 gallons of number two fuel oil that winds and waves pushed onto the beaches and marshes of West Falmouth. As of 2007, oil still persisted in the marshes. Bacteria had degraded the most easily eaten oil compounds soon after the spill, but then moved to their more typical fare. Therefore, the bacteria were no longer eating the oil, leaving it to do continuing damage.

PAHs were found to still be present, indicating life in the marsh is still affected by toxins from the spill. One particular species was quite dramatically affected. The observations of scientists showed that where oil concentrations were present, there were fewer crabs and they moved more slowly as if they were intoxicated from exposure to residual oil. Worse, observations showed that in the areas of the highest concentrations, crabs stopped burrowing downward when they ran into oil and then moved sideways through the sediments. This left them vulnerable to predators and prevented the crabs from tilling the salt marshes so that the marsh grasses could grow better.¹²

We can expect that well over half of every oil spill that has persistent characteristics will remain (with its toxic constituents) in some portion of the environment, just like the Exxon spill and the Cape Cod spill. It is generally accepted that once an oil spill happens, it is almost impossible to completely clean up-- experts generally call it a success when able to recover 36 percent of the spilled oil.¹³ Of the 53,500 gallons of bunker fuel spilled into San Francisco Bay, almost 40,000 gallons remained in the environment. Chemical analysis of the oil spilled in San Francisco Bay showed high levels of PAHs and three other carcinogenic chemicals: Pyrene, at 1100 parts per million, phenanthrene, at 2000 parts per million, and another called two-methylnaphthalene, at 1800 parts per million. Along with the heavy bunker fuel, these chemicals could easily remain in

¹¹ *Subsurface Oil from 1989 Exxon Valdez Spill in Alaska May Persist for Decades*, *Science Daily*, February 5, 2007, <http://www.sciencedaily.com/releases/2007/02/070205125919.htm>.

¹² *Still Toxic After All These Years*, Woods Hole Oceanographic Institution, April 23, 2007, <http://www.whoi.edu/page.do?pid=7397&tid=282&cid=25568>.

¹³ Incident Specific Preparedness Review (ISPR) M/V Cosco Busan Oil Spill in the San Francisco Bay, Report on Initial Response Phase, January 11, 2008.

the ecosystem by finding their way from the water column into the sediments where they will interact within animals and organisms.¹⁴

Again, if Puget Sound saw one thick gooey and toxic oil spill—like thick bunker fuel—each year, or even every decade, it is likely that the Sound would sustain very serious cumulative impacts.

Below is a discussion of some of the specific ways that oil spills threaten the values we need Puget Sound to support.

4. Toxic impacts to species, including humans.

A particularly deadly fraction of oil, polycyclic aromatic hydrocarbons or PAHs, cause long-term injury at minute levels of parts per billion. Scientists have linked PAH exposure from lingering oil to long-term injury in a variety of fish, birds, and mammals. A team of scientists summarized decades of oil spill studies in the magazine *Science* in December 2003. The team wrote that PAHs are deadly actors linked to long-term injury, including reproductive failure, disruption of cellular function, and death.¹⁵ Other constituents can include the carcinogenic chemicals Pyrene, phenanthrene, and two-methylnaphthalene.¹⁶ Again, there are thousands of chemicals that can be part of oil.

a) The resident killer whale and other marine life.

For the Southern Resident killer whale, a huge spill (the size of the 450,000-gallon spill like the *Tenyo Maru* in 1991 or the 11 million-gallon Exxon Valdez spill in 1989) would spell disaster. This population is listed as endangered under the U.S. Endangered Species Act. The proposed Recovery Plan for the whale identifies oil spills as a primary threat for the endangered Southern Residents. Also, available evidence suggests killer whales are unlikely to detect and avoid spilled oil.

We understand, as it was widely reported, that the Valdez spill killed 25 killer whales. Numerical estimates of the Puget Sound resident population range from between 90 and 176. A loss of 25 individuals could cause the elimination of resident population in Puget Sound. Yet, even smaller spills are bad for whales because they irritate eyes and skin, and contaminate prey.

Oil spills are also potentially harmful to other threatened and endangered species, such as salmonids with navigational systems that can be affected by toxics, as well as wild seabirds such as the Marbled Murrelet, which feeds on forage fish.

¹⁴ *Oil Spill Testing Shows Toxic Chemicals*, CBS 13, <http://cbs13.com/local/oil.spill.toxic.2.597332.html>.

¹⁵ *Long-Term Ecosystem Response to the Exxon Valdez Oil Spill*, Charles H. Peterson, Stanley D. Rice, Jeffrey W. Short, Daniel Esler, James L. Bodkin, Brenda E. Ballachey, and David B. Irons, *Science*, 19 December 2003.

¹⁶ *Oil Spill Testing Shows Toxic Chemicals*, CBS 13, <http://cbs13.com/local/oil.spill.toxic.2.597332.html>.

b) Impacts to humans.

Humans, of course, are negatively affected by toxics that find their way into our marine environments, including those from oil spills. In recent years, several studies have been done, including several studies by the Center for Disease Control, to track the accumulated body burden of industrial and synthetic chemicals and to study the potentially serious long-term affects of this exposure. It would take a study to determine whether the bio-accumulating chemicals include the chemical constituents found in oil. Needless to say, however, exposure to these chemical constituents, whether from dermal exposure or through ingestion, is not healthy to humans.

5. Economic damage.

Part of the Partnership's mandate is to provide for the economic well being of the Puget Sound population. What would be the economic costs of an oil spill? There is no definitive answer to this question. Experts calculate, however, that significant oil spills in Washington waters could result in *hundreds of millions, if not billions, of dollars* of socioeconomic impacts. This is at a minimum.

Yet, this measure -- socioeconomic damages-- does not incorporate a spill's impact on several other things. These include economic measures of a loss of longer-term quality of life, psychological impacts, and spiritual values. These also include economic measures of the ability of a damaged natural environment to provide us with valuable ecosystem services.

a) Socioeconomic costs—damages measure one.

To the tune of hundreds of millions, if not billions, of dollars, socioeconomic impacts would be felt by the region, local communities, residents, the state, and the federal government. These impacts include damages to real and personal property, loss of use of natural resources (parks and recreation areas), and loss of income and expenses (fishing, tourism, recreation, shipping and other commerce). As a major shipping port and tourist and recreation area, Puget Sound is particularly vulnerable to socioeconomic impacts from oil spills. Reduction in tourism, commercial fishing, and blocking the shipping port could have widespread impacts. There can also be serious impacts on the Tribal Nations, particularly with respect to subsistence fishing. A spill could also disrupt the state's transportation system as ferry traffic could be suspended or rerouted.

Socioeconomic costs are based on the real and perceived impacts, which are related to the degree of oiling, the oil type and persistence, the degree to which cleanup operations can mitigate the oil impacts, and the time of the impact.¹⁷

¹⁷ *Oil Spill Response, Socioeconomic, and Environmental Cost-Benefit Analysis* (WA Dept. Ecology): (2003 – ongoing); *Socioeconomic Cost Modeling for Washington State Oil Spill Scenarios: Part II* (2005).

b) Loss of longer-term quality of life, psychological impacts, and spiritual values—damages measure two.

How does one place a value on a loss of life's quality for the people of Puget Sound as a result of oil spills? What about a loss of elements within the environment that give us spiritual inspiration? And what of the psychological impacts of a people who no longer are to be connected to nature—no longer able to swim in Puget Sound or eat its bounty without fear of being harmed?

c) Lost ecosystem services—damages measure three.

Modern economic thinking is beginning to incorporate the loss of ecosystem services into damages calculations. When portions of the commons that belong to all humanity are lost, the ecosystem services provided by those resources are no longer available to humanity. An oil spill would damage the environment's ability to provide us with valuable ecosystem services.

Generally speaking, ecosystem services include *provisioning*, such as the production of food and water; *regulating*, such as the control of climate and disease; *supporting*, such as nutrient cycles and crop pollination; *cultural*, such as spiritual and recreational benefits; and *preserving*, which includes guarding against uncertainty through the maintenance of diversity.¹⁸ The services of ecological systems and the natural capital stocks that produce them are critical to the way the Earth's life-support systems function. These directly and indirectly contribute to human welfare and represent part of the total economic value of the planet.¹⁹

Coastal systems, including estuaries, coastal wetlands, river deltas and coastal shelves, are particularly rich in ecosystem goods and services. They provide widely ranging and highly valued resources that include fisheries, open spaces, wildlife habitat, nutrient cycling, and recreational opportunities.²⁰

Economists are working to develop better frameworks for assessing and valuing the goods and services provided by coastal systems. If we add the loss of ecosystem services to previous socioeconomic damages assessments, damage amounts exponentially increase.

B. What are the sources of toxic oil spills to Puget Sound water bodies? Variability between catastrophic and chronic small.

¹⁸ Wikipedia. http://en.wikipedia.org/wiki/Oil_spill

¹⁹ *Economic Reasons for Conserving Wild Nature*, Andrew Balmford, et al, *Science Magazine*, Vol. 297, August 9, 2002.

²⁰ *Integrated Assessment and Valuation of Ecosystem Goods and Services provided by Coastal Systems*, Matthew A. Wilson, et al (attached and incorporated by reference). They also provide climate regulation and soil formation. Balmford, *supra*.

Both large and small spills threaten and have harmed Puget Sound. One major spill from an oil tanker, a refinery, or a pipeline, could significantly impact the accomplishments made toward the 2020 goal. Additionally, the 2020 goal could be thwarted by the fact that Puget Sound is slowly being fowled by small, chronic spills that add up.

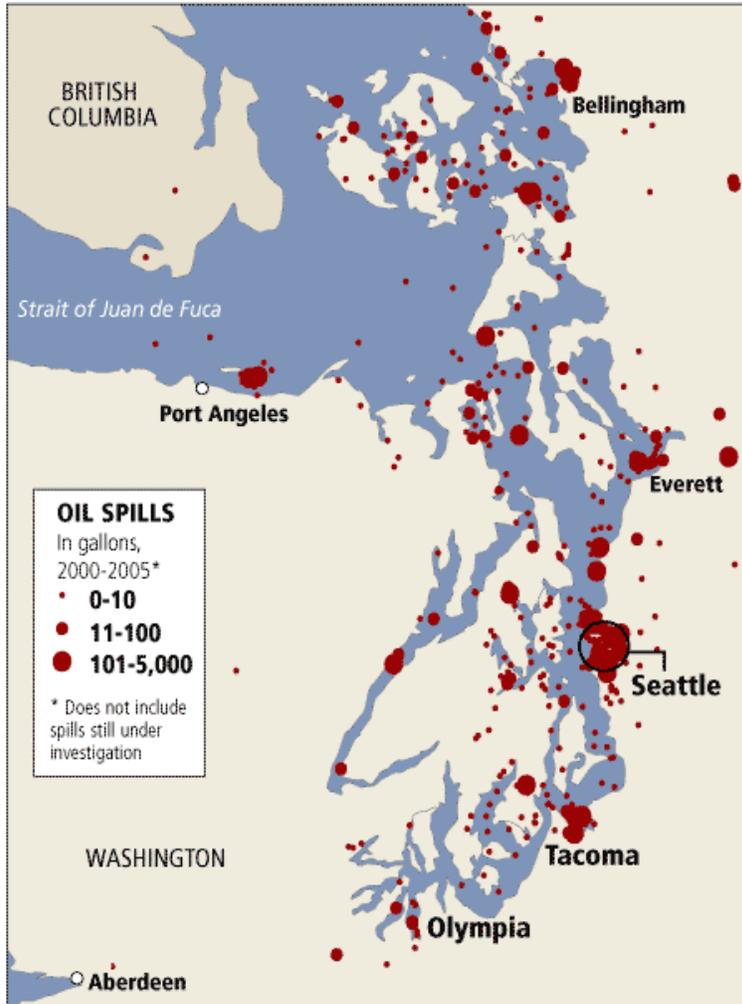
The threat of large oil spills come principally from high-volume commercial activities. An oil spill large enough to cause catastrophic impacts to our natural resources and economy could happen at any time. A very large oil spill, such as one from an oil tanker or a refinery, would be devastating to almost every value mentioned above that we want the Sound to support.

Yet, small, chronic spills continue in Puget Sound with an unknown number of spills releasing an unknown number of gallons of oil into Puget Sound each year. Experts agree that these spills add up over time to be a big problem, and they are very damaging to the Sound's ecology. Sources of these include point source pollution from near-water activities (above ground storage tanks, gas stations, railroads) and sources associated with small scale water related activities (marinas, recreational boaters, fishing vessels, small work boats, two-stroke engines, and derelict vessels).

On October 12, 2006, the Seattle Post Intelligencer ran a story on oil spills and published the map below to show how the many small spills in Puget Sound accumulate to represent a major problem. The map was based on data provided by the United States Coast Guard.

OIL SPILLS AROUND THE SOUND

Large oil spills in Puget Sound have been rare, but countless small spills add up, putting marine life at risk.



Source: U.S. Coast Guard

SEATTLE P-I

In general, oil spill threats include, but are not limited to:

- Ship collisions and groundings.
- Oil processing, storage, and transfer facility failures.
- Failures of shipboard equipment, often due to the failure to do proper maintenance.
- Failure to implement proper procedures.
- Intentional disregard of regulations.
- Sinking of derelict or abandoned vessels.
- Small spills from recreational boaters and fishing boats on which navigation and fuel bunkering are ancillary to recreation and fishing.

III. (P2) What strategies and actions must be taken to improve water quality and reduce oil-related toxics in Puget Sound?

In general, to achieve a healthy Puget Sound we must eliminate enough oil spills to assure toxic concentrations do not exceed what a healthy ecosystem can support. There are numerous areas of Puget Sound that can tolerate *no* level of oil pollution—such as shellfish beds, eel grass, and herring spawning areas. Some areas of Puget Sound – industrial areas and areas with considerable flushing-- may be able to withstand some level of oil pollution. However, even for these areas, we are beyond the time when dilution can be the solution to pollution. This will become even truer as populations around Puget Sound increase. We must get a handle on this problem now by taking effective steps to better prevent large catastrophic spills, moderate sized spills, as well as the smaller chronic spills that add up. Also, when spills do occur, we must have a system in place to rapidly assess and clean up spills, particularly moderate to large spills.

Oil spill prevention, response, and remediation programs are in place already—both at the federal and state levels. Many describe these systems as being very good. But there is room to improve and there is much to learn.²¹

Washington State agencies and entities with oil spill responsibilities include:

- The Spills Program within the Washington Department of Ecology.
- The Oil Spill Team within the Washington Department of Fish and Wildlife.
- The Derelict Vessel Program within the Washington Department of Natural Resources.
- The Oil Spill Advisory Council.
- The University of Washington Sea Grant Funded Boater and Marina Education program.

The Council finds it to be critical that the Partnership do the following:

1. Include in the Action Agenda the goal of preventing all oil spills, small and large.
2. Include in the Action Agenda the goal of rapidly and effectively responding to oil spills.
3. 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.

²¹ The Council's hope is that the Department of Ecology Spills Program will provide additional information useful in answering the following questions posed by the Partnership in the Initial Discussion Draft for the Water Quality Topic Forum Paper. These questions were:

- (S2) What management approaches are being used to address the sources of toxins entering Puget Sound water bodies?
 - What are the main findings relating to management approaches and their documented effectiveness?
 - How do we measure and document effectiveness?
 - What are the gaps in our understanding?
- (P1) What are the policy approaches to address toxics in Puget Sound?
 - What are the existing regulatory or management programs and their limitations?

More specifically, the Council recommends considering adopting the following items into the action agenda. These recommendations should result in better prevention of both large and small oil spills.

A. Generally agreed upon additions to state's oil spill program.

In a 2006 report, the Council made the following recommendations for programmatic changes to the oil spill program.

1. Fully fund a year-round dedicated rescue tug at Neah Bay.

The Council recommended permanently stationing a year-round rescue tug at Neah Bay. Rescue tugs are designed to prevent large oil spills from happening when ships find themselves drifting to shore with no power or steering. Since 2006, Washington has made a great deal of progress toward getting a year-round tug at Neah Bay. With Governor Gregoire's support, the Legislature provided year-round funding for the 2008-2009 fiscal year. The funding source is not permanent, however. The State is hoping Congress will create a permanent federal tug funding plan. The Council is hopeful that Congress will come through and that if it does not, the Legislature will find a permanent source of funding for the year-round Neah Bay tug.

2. Identify locations where we may need other rescue tugs and fund them.

The Council recommended creating an Ecology-managed tug fund to place rescue/response tugs in other critical locations on an as-needed basis, such as in a storm. Again, this would be to prevent large spills due to drift groundings. The Legislature has not acted on this recommendation.

3. Better deal with issue of derelict vessels that leak oil.

The Council recommended eliminating the backlog of abandoned and derelict vessels in Washington. This backlog resulted largely from funding to the derelict vessel program being inadequate to handle large, previously commercial, vessels. The goal in eliminating this backlog, and figuring out ways to stop the pipeline of small and large derelict vessels alike, is to reduce the amount of smaller oil spills being dumped into Puget Sound.

The Legislature took critical first steps in 2007 by providing a temporary revenue stream to assist Department of Natural Resources (DNR) with moving through the backlog of derelict vessels, as well as making it easier for local governments and marinas to participate in derelict vessel removal. The Legislature also directed DNR to convene a working group to, among other things, examine new revenue stream options for managing large, previously commercial, vessels. DNR has made considerable progress in this work. The Council is hopeful that the Legislature will act on DNR's recommendations in the 2008 session.

4. Adequately fund the Oil Spill Advisory Council.

The Council serves as a nexus between “oil spill insiders” and the outside citizen world. As Governor Gregoire said, “It's so important. Only if public engagement continues are we going to make sure we don't have complacency [;] The public has to be engaged and involved...” To this end, the Legislature tasked the Council with numerous interrelated objectives that include early consultation with government decision makers and providing independent advice, expertise, research, monitoring, and assessment in relation to oil spill prevention, preparedness, and response.²²

In 2006, one year after its creation, the Council hired an independent consultant to evaluate what the Council would need in order to achieve its mandate. This consultant made the conservative recommendation that the Legislature should fund the Council at \$1.75 million per biennium. The Legislature has not yet acted on this recommendation.

Nonetheless, the Council has proven that it adds considerable value to the state's level of oil spill prevention and preparedness. Through its continued conversation with Ecology over the

²² RCW 90.56.130 sets forth the Council's duties. These duties are broad and encompass a wide range of activities that can support improved oil spill prevention, response, and preparedness in Washington.

The Legislature charged the Council with approximately ten duties, including the following:

1. Hire professional staff and expert consultants.
2. Early consultation with government decision makers in relation to the state's oil spill program, analyses, rule making, and related oil spill activities.
3. Provide independent advice, expertise, research, monitoring, and assessment for review of and necessary improvements to the state's oil spill program, analyses, rule making, and other decisions, including those of the Northwest Area Committee, as well as the adequacy of funding for these programs.
4. Monitor and provide information to the public, as well as state and federal agencies regarding state of the art oil spill prevention, preparedness, and response programs.
5. Actively seek public comments on proposals for specific measures to improve the state's oil spill prevention, preparedness, and response program, including measures to improve the effectiveness of the Northwest Area Committee.
6. Evaluate incident response reports and make recommendations to the Department of Ecology regarding improvements.
7. Consult with the Department of Ecology on lessons learned and agency progress on necessary actions in response to lessons learned.
8. Promote opportunities for the public to become involved in oil spill response activities, and provide assistance to community groups with an interest in oil spill prevention and response, and coordinate with the Department of Ecology on the development and implementation of a citizens' involvement plan.
9. Serve as an advisory body to the Department of Ecology on matters relating to international, national, and regional issues concerning oil spill prevention, preparedness, and response, and provide a mechanism for stakeholder and public consideration of federal actions relating to oil spill preparedness, prevention, and response in or near the waters of the state, with recommended changes or improvements in federal policies on these matters.
10. Each year, make recommendations for the continuing improvement of the state's oil spill prevention, preparedness, and response activities through a report to the Governor, the Director, and the appropriate committees of the Senate and House of Representatives.

implementation of the oil transfer and oil spill contingency planning rules, the Council has gained several incremental improvements to oil spill prevention and preparedness. The Council is proud of its work in moving the state to the point where it now funds a year-round tug at Neah Bay. Similarly, the Council is pleased that its work on derelict vessels lead to statutory changes to improve the derelict vessel program.

Additionally, the Council is in the process of conducting several very important studies that could lead to significant improvements. First, the Council is conducting a study to find out if there are ways to improve Washington's ability to respond to a large-scale spill. Second, the Council is initiating a study to find out if there are programmatic improvements that can be made to intervene early in the error chain before incidents that lead to spills can occur on cargo and tank vessels while they are underway. Doing just these things, however, has stretched the Council's budget and staff to their limits.

Other advisory bodies similar to the Council are funded well beyond the Council's current level of funding. For example, the Prince William Sound Regional Citizens Advisory Council (RCAC) receives biennial funding above \$6 million and the Cook Inlet RCAC is funded at over \$1.6 million biennially. This funding allows them to reach their full capacity as citizen advisory bodies.

Until Washington's Council is funded beyond its current biennial budget of \$715,000, it will be difficult for the Council to effectively conduct the long list of important duties set forth by the Legislature in RCW 90.56.130. For example, the Council has set forth modest goals in its 2007 work plan, but may not be able to achieve all of them due to resource issues. Also, the Council is limited in how much it can expend to conduct important education and outreach, to participate in several key working groups, and in developing expertise and capacity to monitor drills and other important activities.

B. Move forward on a much-needed overhaul to funding for oil spill programs.

In addition, the Council made recommendations for funding that were specific about the source of the revenue collection and the amounts needing to be collected. These are important given the dire straights in which oil spill programs have been placed due to the way Washington funds its oil spill programs.

All oil spill programs in Washington are funded from two taxes charged on crude oil brought to Washington's refineries via vessels. The first tax is a one-cent per barrel tax that feeds the Oil Spill Response Account. When that account reaches \$9 million, the tax turns off. The second tax is a four-cent per barrel tax that feeds the Oil Spill Prevention Account. This account feeds oil spill related programs run by the following entities:

- o The Spills Program within the Washington Department of Ecology.

- The Oil Spill Team within the Washington Department of Fish and Wildlife.
- The Derelict Vessel Program within the Washington Department of Natural Resources.
- The Washington Oil Spill Advisory Council.
- The Oil Spill Prevention Education program at Washington Sea Grant, University of Washington.

Exclusive of any programmatic additions recommended by the Council in its 2006 report, the Council predicted in 2006 that Ecology would have a revenue shortfall of \$1.6 million in the 09-11 biennium. In 2007, Ecology affirmed this shortfall, citing that current level expenditures have risen to exceed revenue. Ecology wrote that the Oil Spill Prevention Account is insolvent and that we are currently mining fund balance carried forward from previous years. The barrel tax that funds the program was not tied to inflation and has not kept pace.

It gets worse. By adding the programmatic additions recommended by the Council in 2006, this revenue shortfall would be about \$6.2 million after 07-09 biennium. With proposed additions for DNR's derelict vessel program, the deficit would grow to \$9.6 million after 07-09 biennium.

To make matters even worse, each year the barrel tax paid on oil exported from the state is refunded. This year, the refund resulted in a hole bigger than \$2 million in the Oil Spill Prevention Account. The Council understands Ecology was faced with having to lay off nineteen people from its oil spill prevention program. Additionally, other agencies funded from the Oil Spill Prevention Account were also threatened—WDFW and the Oil Spill Advisory Council.

Luckily, the Legislature patched the hole. But next year, this problem will be back as oil companies are refunded the barrel tax paid on oil that is ultimately shipped out of state after being refined. This is a refund for oil that will often be transported by water out of the state—a refund for a second risk being posed to state waters.

There is a clear need for the Legislature to fundamentally change the tax structure—to significantly increase the amount of revenue raised, to assure that the revenue is designed to automatically keep pace with inflation and necessary programmatic augmentation over time, to assure that the system is set up so that refunds from the revenue stream do not continually disrupt programmatic continuity, and to assure that the amount charged (and kept by the state) reflects the risk that is posed to state waters.

In addition, many have argued that the state should consider:

- Increasing the cap on the Oil Spill Response Account (OSRA) to adequately reflect resources needed by the state when a spill occurs.
- Allowing the OSRA fund to be more easily opened to pay for small oil spill events.

The Council's 2006 recommendations were in line with these goals. However, the Legislature did not act on the Council's recommended funding sources and amounts. Rather, it asked the Joint Legislative Audit and Review Committee (JLARC) to study the issue further and release a report this fall. In particular, JLARC is to examine funding mechanisms for oil spill prevention and response programs and compare sources of oil spill risk with the funding mechanisms. The Council is hopeful that the Legislature will act in 2008 to fix the quite dire funding situation.

C. Other important elements to spill prevention and rapid assessment and response.

1. Council studies and activities to explore needed improvements.

In addition to the suggestions above in Section III A 4, the Council can play the following role in enhancing Washington's ability to prevent spills, both large and small, and to quickly clean them up when they do happen. The Council is hopeful that the Partnership will support the following work that is geared primarily toward preventing and responding to medium to large spills from mostly industrial sources. More information is available about each of these in the attached two-page handout.

1. Study whether there are ways to make programmatic improvements to address underlying root causes of mishaps that lead to oil spill pollution events.
2. Study whether Washington is ready to effectively and rapidly respond to a large-scale oil spill.
3. Review the use of escort tugs and review manning issues relating to articulated tug and barge systems and integrated tug and barge systems.
4. Determine if current escort tug regulations are sufficient in light of human and other factors that cause oil spills.
5. Study additional rescue/response tugs as risk interventions in key locations.
6. Track and evaluate Ecology's implementation of its new Contingency Planning rule.
7. Track and evaluate Ecology's implementation of its new Oil Transfer rule.
8. Work in conjunction with other relevant groups, in addition to other state agencies, such as the Puget Sound Harbor Safety Committee, the Regional Response Team and Northwest Area Committee, and the Pacific States/ British Columbia Oil Spill Task Force.
9. Examine whether there are ways to improve the oiled wildlife program.
10. Evaluate methods of calculating natural resources damages assessments.
11. Conduct public education around oil spill issues.

2. Education and outreach about oil spill issues to prevent small, chronic spills from recreational and fishing activities.

With the advent of the Puget Sound Partnership, saving Puget Sound is the topic of the day, year, and decade. The Partnership has a huge educational mandate, which includes public education about oil spills—preventing big spills and small spills, reporting spills, and rapidly assessing and cleaning up spills.

As indicated earlier, we must focus not only on large oil spills, but on small, chronic spills that add up, such as those from fishing vessels, recreational boats, small work boats, and other small vessels. Indeed, for spills of 25 gallons or more, spills from these vessels make up one third of the total volume of oil spilled directly into Washington waters. Yet, this does not include a significant amount of oil that is likely released daily from boats that leak fluids and pump their bilges into the water.

It is likely that many citizens allow oil to enter Washington waters because either they do not understand the cumulative impacts of small oil spills, or they have not been given basic tools and assistance to prevent spills. Additionally, there is perhaps a culture of “it is not my fault and there is nothing I can do to fix it.” If success is in its future, the Partnership must work toward changing this culture. The first step is embarking upon a massive educational effort.

There are several organizations that partner to conduct public education around preventing small spills. This was done under the premise that small oil spills can add up to significant environmental and economic harm, and are a regional problem that can be remedied more effectively through collaborative projects drawing from existing talent and resources. The main focal point of this partnership is the Pacific Oil Spill Prevention Education Team, or POSPET, which operates under the sponsorship of the Pacific States/ British Columbia Oil Spill Task Force. Learn more about POSPET at <http://www.oilspilltaskforce.org/pospet.htm>. Local (Washington) participants include the Department of Ecology, Washington Sea Grant, the Puget Sound Keeper Alliance, the Coast Guard Auxiliary, the Oil Spill Advisory Council, city marinas, and more. There are also POSPET participants from British Columbia, Oregon, and California.

A centerpiece of POSPET’s effort is the “Spills Aren’t Slick” campaign which produces and distributes materials to marinas and other partners across Washington, Oregon, California and British Columbia.

Additionally, those entities that partner in POSPET conduct their own independent education. For example, the Washington Sea Grant is funded to support an outreach position that addresses the recreational boating community and commercial fisherman. Program staff also participates on a steering committee focused on the development and outreach of Washington’s new Clean Marina Program. Additionally, Ecology distributes public news releases identifying the causes

and preventive measures that can be taken to avoid oil spills from recreational and commercial boaters.

The Puget Sound Partnership, with the huge amount of public focus it enjoys, could play a crucial part in this educational partnership by coordinating with and supporting their efforts in Washington.

In addition, Ecology has posited that there are additional tools needing to be developed or funded and provided to state entities that are funded by the Oil Spill Prevention Account. These could enhance POSPET's work. These items include:

- A small vessel program geared toward recreational and commercial vessels under 300 gross tons. This would include public education/outreach to small vessels and fishing vessels and the recreational boating community. The emphasis would be on preventing spills when refueling, bilge pumping and routine engine maintenance.
- Develop and implement an educational and outreach strategy to prevent spills similar to the anti-litter or the click-it or ticket programs. This would be geared toward educating industry, commercial fisherman, recreational boaters, and citizens about spills and their impacts to Washington waters.
- Work to increase participation in the Clean Marina program that was created in 2005 as an expansion of the EnviroStars program.
- Expand the oil transfer inspection program to Class 4 facilities that transfer fuel and oils to non-recreational vessels that do not hold more than 10,500 gallons.

3. Work with Recreation and Conservation Office and the Washington State Parks to pursue small vessel objectives.

Ecology came up with the idea of coupling educational programs, like those of POSPET, with additional recreational boater education and resources. This would be done through the Washington State Recreation and Conservation Office and Washington State Parks and Recreation Commission. Additional resources geared toward assisting recreational boaters with oil spill prevention could include:

- Head pump-out stations.
- Waste oil and bilge water receptacles.
- New and efficient engine incentives.
- Business rebates.
- Exhaust incentives.
- Fuel filling port design changes.
- Fuel tank vent design changes.
- Derelict vessel removal.

4. Increase number of oil and bilge receptacles at ports and marinas; petition for Puget Sound to be a federal “no discharge zone.”

Ecology also came up with the idea of working with ports and marinas to establish bilge water and oil reception facilities around Puget Sound. This will likely require grant funds to assist ports and marinas with this work.

In addition to providing these resources, so that boaters have alternatives to polluting Puget Sound, it would be possible for Washington agencies to petition the US Environmental Protection Agency to designate Puget Sound as a “no discharge zone” under 33 USC Sec. 1322 B(2)-(4).

5. Storm water pollution and local point source pollution.

Oil products are part of storm water. The Council supports the Partnership addressing storm water management systems as a whole, rather than peeling off individual groups of toxics to be addressed separately. Of course, the Council recognizes that public education on how to keep oil out of storm drains, along with other toxics, could be enormously beneficial.

It would also be helpful to develop methods that make it easier for emergency responders and law enforcement to track spills back to the source through the storm water collection systems. Ecology came up with the idea to add GIS layers for all storm drain systems that empty to Puget Sound available for responders. It would be necessary to partner with local governments to accomplish this.

In addition, Washington must strengthen efforts to engage those in the community that have the potential to spill oil from point sources when that oil has the potential to be transported to marine waters. Members of the community that meet this description include hydro-electric projects, rail roads, and tanker trucks. This would be something that could be coordinated in conjunction with Ecology’s Spills Program and its water quality program.

Ecology has indicated it would like to develop an expanded program to perform spill prevention inspections for oil handling facilities that do not transfer over water, but pose a risk of contaminating waters of the state when spills occur. Apparently, there are almost 5,000 oil handling facilities in Washington that are not regulated by Ecology, but could be.

6. Increase investigations of small spills.

Spills are less likely to occur if there are thorough investigations for those that do happen. This is particularly true if those investigations lead to lessons learned and also lead to penalties that deter future spills. Investigations also serve to educate government and the public about the impacts of spills and, thus, have a preventative future effect.

7. Department of Ecology's oil spill program.

Key to preventing oil spills in Washington waters are the following Ecology programs (this is not an exhaustive list). Assuring that these programs are well-funded and effectively administered is important to assuring the health of Puget Sound. Additionally, however, as indicated below, there are ways to augment these programs.

a) Prevention from vessels and oil-handling facilities

Prevention activities include:

- Implementing the new oil transfer rule.
- Boarding vessels to educate and monitor compliance with federal law.
- Requiring, reviewing and granting approval of operation manuals, prevention plans, and training and certification programs.
- Maintaining the Neah Bay tug.
- Implementing protocols from the Memorandum of Agreement with the U.S. Coast Guard.
- Administering voluntary programs for vessels: Voluntary Best Achievable Practices (VBAP) and Exceptional Compliance Program (ECOPRO).

b) Response preparedness.

Preparedness for rapid spill assessment and response is done through the following:

- Implementing the new oil spill contingency plans rule.
- Administration of drills.
- Distribute spill response equipment to communities.

c) Rapid response.

Assistance with rapid spill assessment and response is done through the following:

- Maintaining constant spill response capability.
- Responding to all oil spills from vessels and facilities.
- Working with Incident Command in the event of a spill.

d) Areas needing further development.

The following items represent areas where support from the Puget Sound Partnership could be vital to achieving augmentations to Ecology's oil spill prevention, preparedness, and response program. These augmentations would enhance prevention and containment of medium to large sized spills:

- Federal delegation -- Support delegated authority from the U.S. Coast Guard to conduct vessel and facility inspections and conduct reviews of federal oil spill contingency plans.
- Vessels of opportunity – Assist with identification and designation of vessels (such as fishing vessels) that could be designated to assist with deployment of spill response equipment in the event of a spill. This is in addition to assuring that appropriate industry-funded work boats are designated under the oil spill contingency planning rule.
- Volunteer responders – Assisting Ecology (and WDFW) with programs to bring pre-trained volunteers into spill response and to more effectively handle convergent volunteers in spill events.
- Developing green ports – Support Ecology’s coordination with public ports to create incentives to discharge waste oil in port.
- Local response equipment – Help to enhance grant programs for communities and marinas to have spill response equipment on hand.

IV. Conclusion

By incorporating the above oil spill issues into its Action Agenda, the Puget Sound Partnership can go a long way toward restoring and protecting the health of Puget Sound.

Please do not hesitate to contact me or the Council staff to discuss ways to collaborate on this issue.

Thank you.



Building Industry Association of Washington

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TO: Puget Sound Partnership
FROM: Andrew Cook, BIAW Legal Counsel
RE: Comments to Puget Sound Partnership Topic Forum Papers
DATE: May 5, 2008

Introduction

The Building Industry Association of Washington (BIAW) appreciates this opportunity to submit comments regarding the Initial Discussion Draft of the Puget Sound Partnership's Land Use/Habitat Protection and Restoration Topic Forum paper. This letter also provides comments to the Water Quality Topic Forum paper.

BIAW is the largest trade association in the state representing over 13,500 members involved in various aspects of the homebuilding industry. The typical BIAW member builds five to 15 homes per year. Unlike large, out of state conglomerate developers or commercial developers, such builders operate on much smaller budgets and have much fewer resources to navigate the costly and onerous maze of land use and environmental regulations. Ultimately, more regulations lead to higher operating costs for builders that exacerbate the housing affordability crisis in Washington. BIAW is very concerned with the provisions in the proposed draft recommendations and the severe implications they will have, particularly on small builders. BIAW will oppose many of the recommendations if/when they are proposed to the Legislature.

Proposed Regulations in Land Use/Habitat Protection and Restoration Topic Forum Paper Will Further Exacerbate the Affordable Housing Crisis in Washington State

A recent study by University of Washington economics professor, Theo Eicher, found that current land use regulations add roughly \$200,000 to the cost of a home in Seattle and the Puget Sound region. *UW study: Rules add \$200,000 to Seattle house price*, The Seattle Times, Feb. 15, 2008. The proposed recommendations contained in the topic forum papers, if enacted, would further drive up the cost of housing and make it virtually impossible for first-time home buyers and middle and low income families from ever being able to afford a home. At the same time, the proposed recommendations would do little to enhance Puget Sound.

The recommendations contained in the Land Use/Habitat Protection and Restoration Topic Forum are an example of what breeds mistrust between the building industry and the environmental community. The sweeping anti-growth, anti-development regulations would drive small builders out of business, while leaving only large, out-of-state corporations able to afford to build in Washington state. In turn, the cost of housing would skyrocket.

BIAW opposed creation of the Puget Sound Partnership precisely because it was concerned that the new agency would take extreme measures. It appears that BIAW's fears were well-founded.

The Puget Sound Partnership Does Not Have Authority to Impose New Regulations

It is perplexing that the Partnership is proposing the extreme recommendations, especially when the agency has no authority to impose such regulations. Along with stripping the Partnership of regulatory authority, the Legislature also explicitly withheld from the Partnership the authority to transfer responsibility to another agency unless specifically authorized. See RCW 90.71.360(1) (“The partnership shall not have regulatory authority nor authority to transfer the responsibility for, or implementation of, any state regulatory program, unless otherwise specifically authorized by the legislature.”).

Thus, in order to carry out the recommendations the Partnership would need to come back to the Legislature to seek authorization. BIAW will adamantly oppose the recommendations contained in this document. In addition, if the Partnership attempts to carry out any of the recommendations without seeking legislative authority, BIAW will sue the Partnership.

Comments to Specific Recommendations – Land Use/Habitat Protection and Restoration Topic Forum

1. Enacting a single, integrated, set of regulations at the state-level that apply to the lands, streams and marine areas within Puget Sound (Preliminary Policy Recommendation 4).

As noted, *supra*, the Partnership has no authority to create a new agency or impose regulations. Thus, the Partnership has no authority to impose this recommendation.

If the Partnership goes back to the Legislature to obtain authority to create a new top-down, one-size-fits-all regulatory regime, BIAW will strongly oppose the legislation. Such a system would take away all local control and undoubtedly be used as a way to strictly limit development. In turn, this would drive up the cost of housing.

In short, creation of a new regulatory agency would do nothing to protect Puget Sound but instead would be used to stop development and make it virtually impossible for average citizens to live in this State.

2. Use acquisition and other voluntary tools as a strategy to gain permanent protection for existing, undeveloped lots in key areas (Preliminary Policy Recommendation 6).

There are already a number of state programs, *e.g.* Washington Wildlife and Recreation Program, which purchase easements and development rights. Another state agency with more state funding is not the answer. Too often these programs purchase land within or near urban growth areas that one day could be used to alleviate high housing costs.

Moreover, too often transfer of development rights programs, which purport to be voluntary, are in fact de facto mandatory programs. Many of these programs also run into constitutional taking problems.

While BIAW does not oppose the use of private money to purchase development rights, BIAW does oppose a new government agency using more tax dollars to take away potential buildable land in perpetuity.

3. Examine the entire spectrum of land ownership and ensure that management tools that protect the ecosystem are being used to address all phases of the process (Preliminary Policy Recommendation 7)

While extremely vague, BIAW has concerns with this policy recommendation. Thousands of dollars are added to the cost of a home in Washington state due to the lengthy permitting process in many jurisdictions. Therefore, BIAW has concerns that this policy recommendation could be used to make it even more difficult to obtain a permit in a timely fashion.

4. Require low impact development techniques to be used in all Puget Sound jurisdictions to reduce the loss of forest cover and increase in impervious surfaces (Preliminary Policy Recommendation 9)

BIAW will oppose this recommendation if it is proposed to the Legislature. While many builders are voluntarily adopting low impact development (LID) techniques, making LID mandatory would drive up the cost of housing.

BIAW specifically opposes the recommendation of using low impact development techniques such as "limitations on clearing in rural areas..." Such clearing and grading restrictions reduce the amount of badly needed affordable housing in rural areas. Moreover, regulations that impose mandatory set asides or dedications of land without showing that the dedication is necessary as a direct result of proposed development may potentially run afoul of Washington statutory and case law. *See* RCW 82.02.020; *see also Isla Verde Intern. Holdings, Inc. v. City of Camas*, 146 Wn.2d 740 (2002) (Court ruling that RCW 82.02.020 requires a municipality to demonstrate "that a dedication is 'reasonably necessary as a direct result of the proposed development or plat,' and also mandates that, in the case of a payment in mitigation of a 'direct impact that has been identified as a *consequence*' of the proposed development, a municipality must establish that the payment is 'reasonably necessary as a direct result of the proposed development or plat.'") (Emphasis in original).

In short, BIAW opposes this recommendation.

5. Consider amending the state's vested rights doctrine to achieve opportunities for higher protection of ecosystem processes, structures and functions (Preliminary Policy Recommendation 10)

This policy recommendation is a non-starter and will be opposed by BIAW. Washington's vesting laws further society's interest in having government agencies follow the law, and they establish certainty, predictability, and fundamental fairness. Rolling back vesting laws will unnecessarily increase the cost of housing.

6. Use incentives and non-regulatory programs (Preliminary Policy Recommendation 13)

See response to number 2, *supra*.

7. Address cumulative effects of stressors on the ecosystem by adopting new mitigation standard (Preliminary Policy Recommendation 14)

While not clear, this policy recommendation appears to be adding a restoration requirement. No such requirement exists under the Growth Management Act (GMA), thus if this is the intent of this policy recommendation, BIAW would oppose such legislation.

8. Preliminary Governance Recommendation – creating a single land use regulatory agency in the Puget Sound Region

Similar to the vesting law recommendation, this recommendation is a non-starter. BIAW will vigorously oppose the legislation if/when it is proposed to the Washington Legislature.

The Washington Legislature has long recognized the need for local control and has repeatedly rejected attempts to make Washington's GMA a top-down planning process. For example, the Legislature amended the GMA to ensure that the growth management hearings boards grant local jurisdictions proper deference when planning based on local circumstances. *See* RCW 36.70A.320 & 36.70A.3201.

A single agency with all-encompassing power to regulate land use would strip away local control. Moreover, BIAW is concerned that any agency would be stacked with unelected bureaucrats with anti-growth and anti-development ideology.

Therefore, BIAW strongly opposes this recommendation.

Comments to Specific Recommendations – Water Quality Topic Forum

Unlike the Land Use/Habitat Protection and Restoration Topic Forum paper, the Water Quality Topic Forum paper contains fewer and more vague recommendations. Below are a few comments to the proposed strategies.

Regulatory Strategies – Stormwater, wastewater, and land use

- One strategy suggests addressing the lag in adoption of new stormwater standards with state vesting laws. As noted above, BIAW will oppose any recommendations that would weaken Washington vesting laws. Washington's vesting laws provide property owners with certainty and thus are one of the remaining mechanisms developers still have to keep housing costs down. Thus, BIAW opposes this recommendation.
- Another strategy calls for improving the rate of existing permits through additional staff. BIAW opposes this recommendation. Washington has the most restrictive construction stormwater regulations in the country. Adding more inspectors—whose sole purpose is to shut down development—will only exacerbate housing costs and do little to protect Puget Sound. BIAW therefore opposes this recommendation.

Conclusion

BIAW is extremely concerned with the direction the Partnership is heading based on the topic forum papers. Many of the policy recommendations would drastically increase the cost of housing yet do very little to protect Puget Sound. Therefore, BIAW will oppose many of the substantive policy recommendations contained in the draft topic forum papers.

**King County Comments on
PSP Water Quality Topic Forum Draft Discussion Paper
May 6, 2008**

Here are comments from King County on the Water Quality topic forum draft discussion paper. These are organized in three sections, from the general to the particular. The first section provides high level answers to key questions for the county; the second section offers the county's general concerns on the topic as presented in the paper; and the last section provides specific notes on gaps, inaccuracies, or particular points of concern. Wherever possible and appropriate, we have included references to back our comments. Thanks for considering our comments as you revise the paper and move it into the integration phase.

County Questions for Review

Is the paper thorough, accurate, and telling the truth? Are the conclusions grounded in fact?

- We appreciate the limited time available to the core group to tackle such a complex topic, but we have to say that there are a number of inaccuracies throughout the paper. Many statements are not backed up by references and in some cases, King County data and information are misrepresented or key data are not included where appropriate. The level of detail is inconsistent and it is poorly organized. KC staff have submitted the following 35 some pages of detailed comments on the document.

Does the paper lay out the major threats, as they pertain to Puget Sound and King County Action Areas, succinctly?

- No, the document organization is confusing and it is hard to understand what the primary goal or the intended overarching message is. The paper does lay out some key threats, but does not address individual action areas. Discussion regarding the relative contribution of the numerous threats is also not well represented. Some key areas are not adequately addressed, such as sediments, or groundwater. However, there are many references to issues and information both directly and indirectly associated with King County. Furthermore, no criteria are presented that would assist in distinguishing the threats as major or minor. The paper also does not discuss whether and how the threats can be prioritized.

Does the paper propose solutions and the key factors influencing their implementation feasibility? Are the solutions likely to be effective? If not, why?

The paper discusses some general solutions, but does not specifically address feasibility of implementation in a meaningful way, nor whether the solutions are prioritized where they can have the greatest effect. As such, it is unclear if solutions will be effective; there is insufficient information to gauge this question.

Are there other existing programs and models that are not covered as possible solutions that we can share? If so, what do we know about their effectiveness?

- Yes, it was clear by the discussion at the Water Quality Topic Forum Workshop that many programs and models were not addressed or included in the document. As such, there is currently limited information on their effectiveness. There are significant opportunities for

King County staff to provide key information for this process. Also, as noted frequently at the Topic Forum work session, there needs to be an analysis of the limitations/barriers to fully effective implementation of the current programs to identify whether additional successes could be gained from programs already in place.

Where criteria for prioritizing actions are proposed, are they appropriate and sufficient? Are there other criteria to consider? Where they are applied to suggested actions, do the results of their application make sense?

- The presentation of any kind of criteria for prioritization was limited to high-level general discussions. At this point, they are insufficient for decision making. Cost-effectiveness is not addressed by this document.

What are possible implications to county departments and divisions (cost and resource impacts, and on lines of business)?

- There are a number of potentially significant implications to King County, ranging from the suggestion of increased levels of wastewater treatment, new stormwater retrofit efforts, to reevaluating water quality criteria. However, based on the broad discussion presented in the document and the level of comments presented at the workshop, it is difficult to gauge the specific level of impact on King County resources at this time.

General Comments

The majority of comments provided by King County staff were specific detailed comments on a particular section or page of the document. The following text summarizes the general comments that were received, in addition to some larger picture comments on stormwater and comments addressing the King County specific questions to be considered when reviewing the document.

- 1. Consistency** - In order to be useful to the PSP science panel and ultimately the PSP leadership, the paper needs to use an approach that is consistent with the other topic discussion papers. In general, the paper has not consistently covered all the sub-questions which will result in inadequate presentation of factors needed to inform decision makers of key priorities necessary to develop the initial action agenda. This organization and completeness of this document is critical to provide a thorough assessment of all the strategy options across topics and allow resources to be applied to those that offer the best chance of success and significant gains. At present, without this information, it is not possible to determine if the proposed strategies described in the paper are the best ones to pursue for water quality – much less across topics.
- 2. References** – A number of statements throughout the document are not supported by references. Without the research behind such statements, the reader is unable to determine if these statements are justified and/or if subsequent use of this information used to develop policy conclusions is justified.

3. **Sediment** - Sediment quality is not sufficiently represented in this document. There is inadequate information presented in the science questions to make conclusions regarding the direction the policy questions should take. This is demonstrated by the complete lack of discussion regarding sediment issues in the policy questions. At present, the reader is unable to determine if this is a correct reflection of the PSP's priorities or not. Significant input is needed to develop these sections.
4. **Mercury** - The paper does not address mercury. This discussion does not really fit into the metals discussion and, since it represents significant health risks (Human Health Topic paper); it really should be treated separately throughout the toxics sections.
5. **Hydrology Discussion** - In several places throughout the paper, there is emphasis on a body of research regarding increased stormwater flows into streams. There is a connection between water quantity and water quality, especially for stormwater, and particularly relative to calculating annual loads of specific constituents, which is of importance relative to any prioritization of actions. However, this connection, while noted, does not address the important water quality "constituent specific" effects. We suggest moving the material and discussion on hydrology throughout the document to the Water Quantity Topic Forum (except to acknowledge that there is much known about hydrologic impacts but not WQ); for example, see pages 4 and 8. This suggests there is a gap in our knowledge – we may be able to estimate loadings from stormwater, but apparently we know little about the WQ effects of those discharges. This raises a fundamental question about what would be achieved based on the proposed strategies. Alternatively, the paper can choose to go with the broader definition of ecosystem health. This would allow the quantity discussions to have relevance, but would also create other issues throughout the paper. Either way, the definition should be placed up front in the document, and the paper should be consistent in its approach.
6. **Magnitude of Risk** - It is important to convey the relative magnitude of risk each threat represents, as they relate to PS as a whole, or to any specific area of the Sound to:
 - Help inform and focus public concern,
 - Highlight and prioritize issues of the Action Agenda,
 - Give context for immediate or long term issues.This needs to happen in S1& 2 so that P1 &2 recommendations can flow from those highlighted areas.
7. **Beneficial Use** – The PSP may wish to consider formulating their WQ sections using Beneficial Use criteria rather than individual numeric constituent's WQ criteria. That would bring in the biological linkages to other topic areas.
8. **Regulatory Barriers** - An immediate Action Item should be analysis of barriers and limitations to current regulatory strategies. Only by identifying why the present regulatory systems are not effective, can the PSP's future recommendations be informed to avoid these same pitfalls.
9. **Glossary** - Would be helpful to have a glossary/ definition of terms, including:
 - a. water quality

- b. pristine
- c. degraded
- d. pollutants
- e. contaminants
- f. impairment
- g. serious impairment
- h. Puget Sound waters
- i. threats
- j. contamination

10. Question S-1- Response to Science Question S1: Status of Water Quality in Puget Sound did not address sub-question 2: How does the current status compare to a 'healthy' or reference condition... (as listed in "Topic Forums - Specific Topic Questions" from PSP website).

11. Organization - General difficulty with the overall organization of this section.

- Did a good job of separating into Freshwater, Marine, and Sediment
- Needs to organize and separate comments into Nutrients, Pathogens, and Toxics.
- Section B (Sources and pathways...) describes the understanding of where pollutants come from, but is not directly relevant to the questions that were asked of S1. It is unclear if it might be better to include this information in the relevant discussion in Question S2.

12. Definition of terms - Would be helpful to start by defining "Water/Sediment Quality" as meeting existing regulatory standards. Chemicals without standards can then be addressed separately as areas requiring more research, or if studies exist, an addition to the regulatory standards can be proposed.

13. Sediment and water quality- If the paper intends to address sediment as well as water then the issue of turbidity and sediment runoff is too lightly addressed. Activities such as construction and silviculture contribute significant amounts of sediment to freshwater systems contributing to loss of habitat and change in the substrate of freshwater sediments.

14. Emerging Chemicals of Concern - There is little discussion on issues surrounding contaminants like PDDEs (delayed phase-out because of pushback from fire depts.), phthalates (not understanding the biological impacts), persistent biological toxics, etc. The effects of loss of habitat like wetlands on water quality (filter systems) are also not discussed.

15. Biological Impacts - Biological impacts on sediment and water quality are not well addressed. Studies show that returning salmon are bringing PCB s to local fresh water bodies, and studies in the Great Lakes have shown that zebra mussels (invasive species) are impacting water quality (no discussion of the potential impacts of invasive species on water quality).

Stormwater-Specific Comments

This initial draft paper is a rather disappointing document regarding stormwater and water quality in Puget Sound at this stage in the process. The organization is broken up, difficult to follow and uneven. There is not clear narrative flow from science to options to recommendations. The paper gives no integrated perspective of water quality, nor the importance of quantity in moving water quality constituents from one place to another.

There is not much time left to turn this into a usable and credible document for developing the 2020 Action Agenda for spending millions to save the sound. Given the amount of work that has been done on this topic over the last several years, there should be much more information presented on what is known about stormwater and water quality, what should be done to remedy the situation and what additional analyses are needed to fill scientific and management gaps.

We recommend that the stormwater discussions in the paper should include the findings from and refer to “*Stormwater Runoff and Puget Sound – Problems, Issues and Analyses Needed*”, by Booth, Crawford, Derry, Hinman, Horner, May, Moore, Richey, Roni and Wulkan submitted to the PSP in June, 2007 (attached).



Stormwater Runoff
and Puget Sound fina

Identify criteria appropriate to prioritize new actions needed for correcting existing and preventing future stormwater problems

1. This issue was discussed extensively at the WQ Forum on April 24. The paper needs to reflect the significant retrofit and new management needs especially in older urban areas; the time it will take to evaluate current (age of development; status of existing facilities; roads network; status of water bodies; land use; etc) and future risks and management options (projected population growth and land use development; etc) in basins and across watersheds throughout Puget Sound; and the need to complete comprehensive watershed/basin scale planning in areas with higher current and future risks across all water quality vectors. The relatively superficial risk analysis presented at the Forum used broad scale “high level” data. Area specific, inter-jurisdictional planning that uses area specific information across drainage basins regarding current and future facilities, retrofit options, other BMP options including source control, land use and other controls is needed to prioritize investments. While basin planning or planning of any kinds can be politically unpopular, its absence will only result in investments being made in an ad hoc fashion.
2. The paper would benefit from a new section that discusses the criteria and pathway to effective prioritization that takes all vectors impacting water quality into account (not just stormwater or wastewater but across all vectors).

Identify any missing gaps in management needs

1. The paper lacks a meaningful and forceful discussion of retrofits. On Page 29: Strategies, Stormwater - “*Begin or accelerate retrofits of impervious surfaces in untreated urban areas*” Yes, moving ahead with retrofits is a very important strategy. Good analogy with secondary

treatment cost and scale. Determining what strategies to use, what standards to apply and prioritizing areas to be retrofitted first is needed. It is not known what standard of flow control is needed, i.e. that target hydrologic regime to use. It is clear that using a forested regime as a target is impractical and probably not appropriate for streams that have adjusted to developed hydrology. Much more research and basin-specific study is needed. In addition the important role of road systems in adversely impacting water quality is not specifically addressed except very peripherally.

2. *“A high priority of the retrofit effort would be to reduce system connectivity (e.g., removing areas from the larger drainage system) without concurrently increasing potential flood damages”*. Not clear what is meant here. Reducing connectivity on individual parcels is a strategy that could be pursued, which is a subset of an LID retrofit approach. The use of LID approaches within public road rights of way is another approach. Larger-scale diversion of stormwater out of stream systems could also be used.
3. Another very significant gap is a meaningful discussion of low impact development and its role in managing both water quality and quantity problems from stormwater. Specifically, on Page 17: Low Impact Development *“Stormwater management at a landscape scale”*: [findings about reduction of impervious surface, avoiding compaction, and the need to manage at a landscape scale, rather than site-by-site, could be inserted here.]
4. Add a strategy to address source substitution. For example, the European Union has required that automobile tires be made with lower levels of PAHs; or use of alternative brake pads that would reduce copper.
5. There is no mention of the high cost of maintaining both structural and non-structural (LID) BMPs and precious little regarding the difficulty of effecting behavioral changes that reduce water quality threats from individual behaviors on private property.
6. In addition there needs to be cross reference in the WQ paper especially for stormwater to the land use paper and the importance of impervious surface and vegetative/forest cover/re-forestation as means of preventing/controlling stormwater and water quality problems. There should also be something either in land use or stormwater/water quality regarding site development standards.
7. *“Limitation on impervious surface, and protection of ecologically functional areas:”* These topics may be more appropriately treated as part of the LID discussion rather than as other measures. The discussion of these topics should also refer to the Land Use paper, where there should be extensive discussion of these issues.
8. *“Reuse stormwater generated from rooftops for non-potable uses.”* Use, not reuse (stormwater runoff has not yet been used). Can also use for potable use. Runoff could be collected from other areas such as parking, which would have the advantage of removing the most polluted runoff from the stormwater system.

9. “Coordinate with regional transportation efforts.” Yes, support regional transportation, but should not be a focus of water quality effort. Regional transportation would help reduce the growth in pollutants generated by the road network, but water quality benefits would be a secondary benefit from the billions that need to be spent on regional transportation. Retrofitting of existing roadways still needed and is a more important approach for restoration of water quality in Puget Sound.

Identify any missing regulatory barriers

1. The paper would benefit from more extensive discussion of the advantages of implementing a coordinated, inter-jurisdictional watershed based permit system for stormwater – with of course consistent standards across the full watershed. Stormwater moves from one jurisdiction to another and needs a comprehensive watershed based approach to be managed effectively. The paper addresses the lack of consistent standards between Phase 1 and 2 permits – which is part of the issue but mentions area-wide permits only in passing. In addition the paper does not discuss an important limitation of the current permits that address the MS4 or publicly owned stormwater system fairly well, but do not directly address, or give authority to control, pollutants that enter surface waters directly (or without entering a publicly owned stormwater system), i.e., non point source pollution.
2. There is some mention of the difficulty of Washington’s vesting laws in terms of regulating stormwater and land use in the paper. That is a regulatory barrier for sure.

Identify any thing else you think is important to help us move to action regarding stormwater and its impacts on water quality, etc.

1. The recommendations for immediate actions and needed analysis regarding more effective management of stormwater and the importance of connecting land use and stormwater in the attached scoping paper prepared for the Partnership in June 2006 should be reviewed for inclusion in the paper.

Specific Comments

One reviewer answered the King County questions. This is followed by detailed comments from reviewers organized according to the four PSP questions.

- **Is the paper thorough, accurate, and telling the truth? Are the conclusions grounded in fact?**

The task this paper attempts is very difficult – to cover several threats (nutrients, pathogens, and toxics) and several sources. Generally, paper follows the outline but there are areas where the paper could be more thorough (for example, more information on the relative importance of sources, and more information on some threats, like sediments). Some statements (mainly provided in text specific comments) appear to be inaccurate, misleading, or inadequately supported -- for example, the statement that “the cost of providing this level of treatment may be modest” is inaccurate as applied to existing facilities, for additional treatment for nutrient removal.

○ **Does the paper lay out the major threats, as they pertain to Puget Sound and King County Action Areas, succinctly?**

The paper does lay out threats and identifies sources. However, it does not adequately characterize the relative contribution of various sources to different threats, which, along with the cost of addressing each source, is very important for laying out priorities. Some issues may not be adequately addressed, such as sediments, or groundwater.

○ **Does the paper propose solutions and the key factors influencing their implementation feasibility? Are the solutions likely to be effective? If not, why?**

While the introduction to the paper indicates that it does not focus on implementation (the “how”), several of the policy actions (or strategies) called for in the paper focus on the implementation of specific actions. This may be premature, because several of these proposed solutions may be very costly, difficult to implement, or may not be effective.

- For example, one recommendation could potentially be interpreted as calling for requiring tertiary treatment and re-use everywhere, given the bolded text on p. 30 (although the text following the bolded statement suggests targeting facilities more carefully). There would be significant cost and implementation feasibility concerns if such treatment would be required everywhere. Given the Partnership’s task of prioritizing actions, it may be appropriate to emphasize more that such actions should be carefully target additional nutrient removal for those facilities and times of the year where such action is determined to be needed and would be effective. Moreover, it may be more appropriate at this stage that the recommendation not specify a particular technology but that nutrient reductions be achieved where and when they are needed (e.g., in nutrient limited wastewaters in South Sound during critical parts of the year). This concept seems to be in the text now but should be clearer. In addition, there may be ways to achieve nutrient reductions through means other than WWTP tertiary treatment and re-use (e.g., advanced secondary treatment, addressing septic, or stormwater depending on the extent of these sources/pathways).
- Another example is reviewing wastewater outfalls (p. 31) for potential decommissioning. It is unclear whether this will have demonstrated effects. The assertion is also made that this may provide efficiencies of scale in operations and costs. The justification for this recommendation is not apparent.
- We appreciate the paper’s emphasis on some emerging tools, such as the use of reclaimed water and frequent mention of source reduction.

○ **Are there other existing programs and models that are not covered as possible solutions that we can share? If so, what do we know about their effectiveness?**

There are some key components missing from the analysis that should be addressed before developing recommendations on proposed actions. It is important to address the following before recommending to policymakers specific actions:

- Assess the relative magnitude of various sources of a threat, and relative importance of different threats (this paper?)
- The relative cost (per unit of loading reduced) from various sources (e.g., septic, wastewater, stormwater, other) (future work? But needed to garner support for actions)

This is more of a suggested element of the analysis that will enable prioritization and broader support for recommendations, which may be costly. Resources are limited and from the perspective of the region as a whole, it will be important to target specific actions as carefully as possible to maximize the benefit for dollars spent.

- **Where criteria for prioritizing actions are proposed, are they appropriate and sufficient? Are there other criteria to consider? Where they are applied to suggested actions, do the results of their application make sense?**

As indicated above, cost-effectiveness is missing from the criteria. It is important to note that resources are limited and it will be important to implement actions first that are likely to provide the greatest benefit for the dollars spent.

- **What are possible implications to county departments and divisions (cost and resource impacts, and on lines of business)?**

Depending on what is required, adopting a recommendation for moving to tertiary treatment (or, alternatively, increasing in nutrient removal at treatment facilities) could pose substantial feasibility questions and potentially be very costly for wastewater facilities and ratepayers. Attaining the benefits while minimizing costs will require careful targeting of actions (requiring nutrient removal where and when it will be effective, rather than uniformly).

Science Question 1 (S1): Status of Water Quality in Puget Sound

1. **General comment** – The paper does not seem to describe what the baseline condition is – what a restored or clean Puget Sound is.
2. **Page 1, 2nd paragraph** - Add “treated and untreated” as adjectives to “wastewater discharge”
3. **Page 1, 3rd and 4th paragraph** - Please provide citations for some of these statements and conclusions: Low dissolved oxygen levels...*appear* to be increasing in frequency and duration (is this all year?), Other toxic contaminants such as PAHs *appear* to be increasing Over 1,000 water bodies around Puget Sound are listed as category 5 (what is the percentage?).
4. **Page 3** - The statement that the fjord like structure puts Puget Sound at greater risk than other estuaries – may be too strong. Rather than compete with other estuaries with problems, it may suffice to say that the fjord like structure compounds the problems.

5. **Page 3, 2nd Paragraph** – It would be good to include some text that indicates spatial distribution and numbers of parameters (especially toxics) are limited for most monitoring programs.
6. **Page 3, 2nd Paragraph – Reword** - Many of the regions jurisdictions, including federal, state, and local agencies, as well as other permitted entities measure many of the substances deposited in Puget Sound Basin’s waters.
7. **Page 3, 3rd Paragraph** – *However, we lack standards for many toxics and it is unclear that established standards adequately protect aquatic and human health.* This is an overly broad statement that has significant consequences to the regulatory world and would need to be supported by scientifically based studies delineating which standards are inadequate and pose adequate measures to replace the current standards.
8. **Page 3, 4th Paragraph** – The last half of the 1st sentence is unclear, especially the phrase “*existing standards and sampling methods*”. Are you referring to a problem with sampling methodology and suggesting that standards may not be protective? Can you clarify this? Suggest adding PBDEs to the last sentence in this paragraph.
9. **Page 3, 4th paragraph** – It is not clear if this summary of impaired water bodies includes sediment. Therefore, if one quarter section exceeds listing criteria for sediment in a water body, does that mean that it qualifies the water body as impaired?
10. **Page 3, 1st Paragraph** -When discussing excess nutrient loadings, or TSS, or many other constituents, the natural (and modified) freshwater systems are the primary route of conveyance, not just stormwater systems, septic etc.
11. **Page 3, 3rd Paragraph** -This statement only means that all of the freshwaters of Puget Sound are not contaminated. While this is true, the issue remains that the freshwater system is the collector and conveyance for the vast majority of the anthropogenically generated pollutants and control at the source, or in the freshwater system, provides the best opportunity to address the majority pollutant load to the Sound.

A. Documented threats to freshwater and marine water quality in Puget Sound

1. **Page 4, 1st Bullet** –Suggest that you add “*alteration of the food web*” as an additional impact of nutrient enrichment.
2. **Page 4, first sentence.** Where does cyanobacteria and other toxic phytoplankton fit in here?
3. **Page 4, 2nd Bullet** – Suggest you add “*and freshwater*” after “*....naturally in the marine.....*”
4. **Page 4, 3rd Bullet** - Suggest you change “*...toxic chemicals contain additional risk....*” to “*.....a number of toxic chemicals (PCB, DDTs etc) are also persistent.....*”

5. **Page 4, Intro. Paragraph, Bullet 2.** Under the “pathogens” bullet, mention should be made of the direct threat of pathogens to marine mammals (e.g. cat waste impacting sea otters and distemper impacting porpoises).
6. **Page 4, 1st paragraph** - Add temperature as a category of pollution
7. **Page 4, 2nd paragraph** - Not convinced that presence of sills has been shown to reduce flushing with ocean. Mixing over sill could enhance flushing rates. Please provide reference. There are different reasons why there are problems with the 3 categories of pollutants and they cannot be generalized as stated here. The last statement is also not true as there are other estuaries with far greater risk from one or more of these categories than exists in Puget Sound. Needs to be rewritten to discuss how the structure creates particular problems for each category.

WATER QUALITY IN PUGET SOUND FRESHWATER SYSTEMS

1. **Page 4, 1st Paragraph and Bullet** – This paragraph seems to be mixing up 303(d) and 305(b). It would be good to clarify and separate the discussions of these 2 programs. The data are evaluated differently and the spatial coverage and types of parameters are variable. Parameters on the 303(d) list tend to be skewed toward conventional parameters since that data is easy and cheap to collect; it would be helpful to clarify this in your discussion. Suggest you add “.....and other aquatic life and wildlife.” at the end of the first sentence in that bullet; the concern goes beyond people and fish. Did Ebbert et al. (2000) compare their data to criteria/standards or guidelines? It was my understanding that many of their data were for chemicals for which there are no WQC and they used a variety of guidelines; it would be helpful to clarify this. In general, there seems to be inconsistent use of the terms guidelines, standards and criteria, please clarify.
2. **Page 4, Bullet 1** - The “percent freshwater stream miles” reported as contaminated by metals is footnoted as being disputed. Due to the nature of the reason behind the disputed data, it is suggested that this “factoid” not be included.
3. **Page 4, 1st Bullet** - Doesn’t mention metals, yet they are 50% of 303(d) listings in next bullet; provide breakdown of which metals.
4. **Page 5, 1st Bullet.** This statement is misleading because this data set is primarily limited to metals. More recent data, which included analysis of a number of organic compounds, indicated a greater number of exceedances. 2nd sentence is incorrect and should read “*Data collected from 27 small streams between 1987 – 2002 indicated that about half of the streams had at least one exceedance of sediment quality guidelines, however, data for organic contaminants was limited (King County, 2005). Sediment data collected from 70 station covering 16 creeks indicated that approximately 1/3 of the sites exceeded sediment quality guidelines. Contaminants included metals, phthalates, PAHs, DDTs, and PCBs. (King County 2008). Sediment data collected from Lakes Washington, Sammamish, and Union and the Sammamish River indicated that out of over 70 sites and approximately 1/3*”

exceeded sediment quality guidelines. Contaminants included metals, phthalates, PAHs, DDTs, and PCBs (King County 2005 and Moshenberg 2004)”.

5. **Page 5, Paragraph 1-** USGS study found elevated PCBs, PAHs, and total DDTs in King County streams (<http://wa.water.usgs.gov/pubs/fs/fs.105-98/>). Many other studies could be cited and summarized that cover rivers and lakes...e.g., Sammamish River Water and Sediment Quality Assessment (King County 2005a), Sediment Triad in Lakes Sammamish, Washington and Union (King County 2005b). Also, this section belongs under Sediment Quality heading on p.6.
6. **Page 5, 2nd Bullet** - Last sentence should read: “...especially important for **pregnant women**, women of childbearing age...”
7. **Page 5, 2nd Bullet, Lake Fish**The statement that DOH has completed an assessment of contamination may be misleading, would be good to provide some context for the areas sampled and parameters evaluated if you are going to make a generalization here. The current fish advisory on Lake Washington is based on limited data that was collected for an ecological assessment. What is the reference for the DOH work that you are referring to here?
8. **Page 5, 3rd Bullet, Emerging Chemicals**....This paragraph contains a number of errors. I was involved in collecting this data and preparing the report. It should read as follows:
In 2003, King County conducted a limited survey of a select group of 16 endocrine disrupting chemicals (7 phthalates, 6 hormones, total 4-nonylphenol [surfactant], bisphenol-A [plasticizer] and vinclozolin [pesticide]) in surface waters (streams, lakes and marine waters) within the county (King County 2007). Five compounds were never detected. In general, all detected concentrations were low; however the highest levels and greatest frequency of detection were found in streams. Few data for EDCs in freshwaters are available for other areas of Puget Sound. There are little or no data available for most pharmaceuticals and personal care products in fresh waters within the Puget Sound basin. (This is the link to the Ecology study in Sequim that looked at pharmaceuticals <http://www.ecy.wa.gov/pubs/0403051.pdf>).
9. **Page 5, 3rd Bullet – Emerging Chemicals** - There is no discussion of relative toxicity of the detected concentrations. Detections alone leave interpretation to the reader and often citizens misinterpret detections to mean implicit toxicity. Need context such as “at levels that may be harmful to (fish or other pertinent) organisms.” Just because you detect a chemical does not always mean there will be toxicity.
10. **Page 5, 4th Bullet** – The section on groundwater states that shallow groundwater contains chemicals related to transportation. It would be clearer to state that leaking underground tanks associated with gas stations and fuel use have caused localized groundwater contamination by petroleum products. Another point to include is groundwater contamination associated with the discharge of organic and inorganic materials at commercial and industrial facilities.

Water Quality in Marine Waters and Nearshore Areas

1. **Subheading** - This section needs introduction as previous section has for freshwater.
2. **Page 5-6, 5th Paragraph** – This section does not include a section on chemical discharges from hazardous waste sites or Superfund Sites. Superfund Sites such as the Lower Duwamish Waterway and Eagle Harbor contribute a variety of chemical contaminants to Puget Sound, although there needs to be context to determine relative rankings of contaminant sources (e.g., analysis on current releases from the Lower Duwamish vs the loadings coming down from the Green River to determine relative contribution). Toxic releases from these sites may fit into the subheadings in this section but there are others such as the semi-volatile organics that do not. This discussion could be located in the section on Sediment Quality (Page 6).
3. **Page 5, 1st bullet – 303(d)....**It would be good to provide some context for the 303(d) discussion and describe that the lack of listings for parameters other than DO and temp are partially a function of the type of data that is collected and the lack of much data for other parameters. Also, number of listings is not meaningful. The fish advisory listings for Puget Sound are also an indicator of water quality impairments, that is not discussed here or in the sediment section on the next page.
4. **Page 5, Bullet 1** - Note should be made that most of the 303(d) listings for dissolved oxygen in the main basin of Puget Sound are the result of natural conditions and that the listings themselves are contentious.
5. **Page 5, 303(d) listings, 2nd sentence** - Makes it sound like PCB advisories are part of 303(d) list. Clarify.
6. **Page 5, 303(d) listings** - 1st bullet doesn't really belong here. This is a sediment quality issue, needs to be moved to that section.
7. **Page 5** - Need to add a pathogens discussion to FW.
8. **Page 5, 303(d) listings** - It is not clear whether these are only Cat 5 or others. Not a really useful statistic anyway. A more relevant statistic would be the percentage of waters that are impaired.
9. **Page 5, Marine section** - Should have a bullet for fish advisories here also. Need consistent approach to 3 WQ groupings either by impairment types or by pathways.
10. **Page 5, Pathogens** - Clarify what type of contamination fecal indicates
11. **Page 5, Pathogens** - Reference underlying data, not meeting summary. Describe areas closed due to pollution, not just proximity to urban areas.

12. Page 6, Nutrients - 5th sentence - Reference underlying data, not meeting summary 5th sentence: Clarify.

13. Page 6, Nutrients - The way this is written implies that nutrient loading in Puget Sound is causing problems in June and October (odd that it is just these two months – is it June through October) and highlights the importance of nutrient and sediment sources transported by stormwater and streams. This implies some targeted action during the summer months, and also suggests stormwater may be a key area on which to focus attention? The bullet on the top of p. 10 further indicates some ambiguity regarding the cause of nutrient problems (how important are increasing inputs from residential development?) The paper should investigate these findings more thoroughly, as these may be the apparent basis for later policy recommendations.

14. Page 6, 4th bullet – Endocrine.....This statement is incorrect. I was involved in collecting this data and preparing the report. It should read as follows: *As described above, King County conducted a limited survey of EDCs in lakes, streams and marine waters in 2003 (King County 2007). Only 4 of the 16 measured compounds were detected in marine waters. In general, the lowest concentrations and number of detected compounds were found in marine waters. Limited data are available for EDCs in Puget Sound marine waters.*

15. Page 6, Bullet 5 - Why is the statement “Widespread impairment from metals is uncertain.” made when the documentation that follows more correctly indicates that any uncertainty would be surrounding whether any impairment from metals exists at all. Note that the correct spelling of the author cited in this bullet is “Mickelson.”

16. Page 6, Bullet 6 - The statement made in this bullet is false.

Stormwater Runoff

1. Page 6, 6th Paragraph – *[Authors/Reviewers request more information on the contribution of existing contaminated sites to the overall loading.* Note studies done by Eric Crecilius of the Battelle Marine Science Lab on marine sediment cores. Puget Sound Atlas, though dated has compiled marine sediment data and identified impact areas such as Inner Harbor of Everett.

Sediment Quality

2. Page 6 - There are sediment MTCA sites in freshwaters, such as off Gas Works Park L. Union. Significant L. Union MTCA site data and King County monitoring data clearly show high contamination in this area.

3. Page 6, Sediment Quality, 1st sentence - Make conclusion parallel to one for water quality (not universally contaminated); description at end of page 11 is clearer; presence of chemicals does not equal contamination. Clarify wording.

4. **Page 6, sediment quality** - Need to organize to breakout marine and freshwater consistently in sediment sections as they are really different. Mention not much data but should summarize KC lakes dataset.
5. **Page 6, sediment quality**, Author note. This request was not made for any of the other WQ topics. Please approach consistently.
6. **Page 6, 1st paragraph** – Suggest that this paragraph be limited to marine waters and that you deleted text on freshwater sediments.
7. **Page 6, “Sediment Quality.”** Need to present this section consistent with others. This section does not really provide any useful information. It is misleading in its use of the word “contamination” when the documentation cited shows that the “contamination” is below regulatory.

B. Sources and Pathways for nutrients, pathogens.....

1. **General structure** - Suggest structure by pathway then cover sources under each pathway. This information would help authors and readers to determine which sources are of the highest concern and therefore which approaches have the most merit. Also, there is inconsistent treatment on effects in this section. Need to decide if it is to be included and if it follows presentation of sources and pathways or dealt with in S2. Discussion of relative importance would be useful to help readers understand recommendations later.
2. **Page 6, last paragraph 2nd sentence** - Need a citation if you state this as a fact.
3. **Page 6, last paragraph** - One of the most significant pathways is missing and should be discussed. Many chemicals are transported by volatilization or off-gassing into air, adsorption onto atmospheric particles, deposition onto the ground, washed off into drainage systems and waterways by runoff (SPWG 2007).
<http://www.ecy.wa.gov/programs/tcp/smu/phthalates/Summary%20of%20Findings%20and%20Recommendations%20FINAL%20092807.pdf>
4. **Page 6, 7th Paragraph – Reword** - *Nutrient, pathogen, and toxic pollutants are carried into Puget Sound freshwater and marine waters through runoff from the land surface.*

Stormwater Runoff

1. **Page 7, 1st paragraph** – This paragraph is awkward – not clear what you are really trying to get across here. The Ruckelshaus and McClure 2007 reference does not seem like the most appropriate one for this discussion.
2. **Page 7, 1st Paragraph** – Text discussing relationship with development and stormwater – the following report (part of the Green Duwamish Water Quality Assessment) contains relevant information on this topic <http://dnr.metrokc.gov/wlr/waterres/streamsdata/reports/green-duwamish-loading-report.htm>

3. **Page 7, Paragraph 1.** Why is “deposition from the air” mentioned in the stormwater runoff section?
4. **Page 7, 3rd Paragraph** – There have been a number of microbial source tracking assessment done throughout the region.
 - City of Seattle. 1993. Pipers Creek Bacteriological Source Tracking Investigation. 1993. Prepared for the City of Seattle by Herrera Consultants.
 - Little Soos Creek Microbial Source Tracking Survey. 1995. Prepared for King County by Mansour Samadpour, University of Washington.
 - Link to Green River MST study
 - <http://dnr.metrokc.gov/wlr/waterres/streamsdata/reports/Green-Duwamish-MST.htm>
 - Thornton Creek and Matthews Beech Microbial Source Tracking Study. 2007 Prepared by Herrera Consultants for Seattle Public Utilities.
5. **Page 7, Bullet 4 - reword** “...from **professional and residential** landscaping byproducts”
6. **Page 7, Bulleted List** – The list of pollutants should include petroleum products from oil and greases that run off roads. The DOE loading estimate for petroleum is 22,580 (with a range of 9,580 to 55,750) metric tons per year.
7. **Page 7, 4th Paragraph** – *Metals* - Sources include metal roofs, galvanized fences and poles, industrial activities, etc. • *Polynuclear aromatic hydrocarbons (PAHs)..... from asphalt surfaces and paving resealants.* Not so much an issue due to the type of sealants used in this part of the country.

Range and Variability of Pollutants

1. **Page 7, all bullets** - It would be good to include regional references were available in this section were possible rather than generic references.
2. **Page 7** - Based on a very limited number of samples, stormwater may be a source of some EDC compounds (bisphenol-A and total 4-nonylphenol) (King County 2007).
3. **Page 7 – last paragraph** – This paragraph is very confusing, it is not clear what message you are trying to convey here. This part of the document has a very unbalanced level of detail.
4. **Page 7, Bullet 2** - Why are airborne pollutants being mentioned in the stormwater runoff section? If the intent is to include them because they enter the runoff stream via rainfall, mention this fact. If so, name the types of pollutants
5. **Page 7, Bullets** - In general, this bulleted section could benefit from some additional detail and consistency in presentation on sources and pathways of these pollutants.

6. **Page 7, 2nd bullet airborne pollutants** - Suggest that this discussion clarify pollutants using this pathway (such as PCBs dioxin/furans, PAHs, phthalates, Hg). Also the discussion should be broadened to include off-gassing from manufactured products (SPWG 2007) and volatilization from soils primarily through the air-stormwater-water body-sediment pathway
7. **Page 7, last paragraph** - Should add some discussion on which are hydrophobic and attach to particulates and which primarily dissolved in water.

Hydrology, Connectivity and Imperviousness

1. **Page 7, 1st paragraph** - Discussion on flow and habitat not directly related to WQ; remove discussion on flow and habitat: out of scope; next paragraph goes on to state it is hard to make this connection. Recent KC study indicates that combined sewers do not show any significant differences between land uses in several key pollutants.
2. **Page 8, hydrology** - The discussion here should be changed to focus that we are not presently sure at what point we start seeing effects due to WQ impairment above and beyond those associated with physical effects.

Urbanization

1. **Page 8, 4th paragraph** - Add reference condition for forested land.
2. **Page 8, “Urbanization.”** What is the point of this paragraph?

Effects of Stormwater Pollutants on Species

1. **Page 8, 1st and 2nd Paragraphs** – These 2 paragraphs seem like a list of facts that don’t really belong in the same paragraph – not really clear what your message is and it seems like the detail is more than what is warranted here. Please clarify.
2. **Page 8, Effects** - This section is really targeting effects and belongs in the appropriate part of the document – not here. This portion of the discussion appears to be centered on sources and pathways.
3. **Page 8, effects of stormwater pollutants on species** - It seems a little odd to have a section unique to stormwater pollutants - -aren’t these effects of pollutants, irrespective of how they are deposited? Or are some pollutants only deposited by stormwater?
4. **Page 8, 6th Paragraph** – *What is lacking are standards that capture these ideas of frequency (how often effects occur), magnitude (how much of the toxic substance is present at any one time), and duration (how long the exposure lasts each time a compound is present).* This statement is unclear, needs more detail and discussion. Issues such as seasonal first flush, synergistic effects, different receptors, etc. The whole issue of what standards are needed for stormwater is too complicated to be thrown off with this sentence

Runoff from Agriculture, Forest Practices and Landscaping

- 1. Page 9, Bullet 2.** What were the “elevated concentrations” that pesticides were found at? Were these concentrations greater than State of Washington fresh water quality guidelines?
- 2. Page 9, middle of page -** Authors requested material linking agriculture and forestry and fecal coliform bacteria. MST studies have been conducted in King County that relates land use and bacterial sources. Little Soos Creek study showed cows, dogs and horses were dominant sources of bacteria in a hobby farm dense land use type. Green River MST study showed bacterial sources changing with land use, such as agriculture. Also, Upper Willapa River MST study included agricultural, forest and rural land use types. In agricultural areas, bacteria were dominated by elk/deer sources. Also – see comment above (Stormwater 4) for references.
- 3. Page 9, Bottom -** Authors note need for more information regarding the relative importance of wastewater and septic for marine and fresh waters. A literature survey would assist in analyzing links between water quality effects and treated wastewater discharges.

Algal Blooms

- 1. Page 9 -** The statement “. . . along with the apparent spread of harmful algal blooms . . .” needs a citation.

Wastewater and Septic Systems

- 2. Page 9 –** It is important to note that there are a number of smaller wastewater treatment plants that discharge into freshwaters.
- 3. Page 9 -** The paper quotes a 1991 source from King County that states that “wastewater is a source for a broad spectrum pollutants, nutrients, and pathogens”. There is an author’s note that more information is needed. We agree. At minimum, all future discussions of wastewater and its potential impact on water quality need to clearly differentiate between wastewater (typically untreated) and effluent (treated water). Currently, this lack of clarity can give the impression that treated effluent is a source for a broad spectrum pollutants, nutrients, and pathogens. Additionally, if PSP is asserting that treated effluent is indeed a source for a broad spectrum of pollutants etc., they need to provide much more detail and much more up-to-date source information to assert their point.
- 4. Page 9, Paragraph 1, Sentence 3 -** Arguably, wastewater is not a “source” of pollutants – it is a pathway. This may be helpful in emphasizing source reduction strategies rather than end of pipe solutions.
- 5. Page 9, wastewater...**Not clear on structure of this section. List sources but then much of discussion goes into effects, not pathways. Needs clarification of pathways to inform later choices. Need consistency across subsections.

6. **Page 10, Bullet 1** - This bullet, as written, does not provide information on “geographic effects of wastewater.” Neither sentence is tied to wastewater.
7. **Page 10, Bullet 2.** Why is caffeine mentioned?
8. **Page 10, 1st Bullet – Geographic Effects of WW** – Second sentence should also include significant natural affect of seasonal depression of DO in PS from the inflow of low DO ocean waters. Documentation of this effect is attached.
9. **Page 10, 1st Bullet – Geographic Effects of WW – In areas other in the Central Puget Sound,** nutrient contributions to marine areas have been documented to contribute to low dissolved oxygen – any sense of relative importance relative to septic or stormwater? See note on bottom of that page for how septic may be a big source of nitrogen. Is it a problem in shallow embayments in many areas scattered around Puget Sound or “throughout” Puget Sound (implies every shallow embayment)? Rename to nutrients for consistency and combine with later bullet on effects on lakes.
10. **Page 10, 1st Bullet -Geographic effects of wastewater** - The paper identifies “South Puget Sound” as an area that has “low dissolved oxygen” etc. It would be useful if PSP would provide specific information as to the boundary lines that they use to identify South Puget Sound, Central Puget Sound etc., and information as how and why these boundaries were established. There is no issue with the geographic breakdowns. However, it would be helpful to have the information for context. It would also be useful to have information about water circulation patterns in the Sound in relation to tidal influences, inflow of fresh water from streams, and inflow of water from treatment plant outfalls. This would allow people to know how different ongoing natural functions and activities (like wastewater treatment) affect different portions of the Sound. It may be easiest for PSP to address this comment in a separate paper and accompanying maps.
11. **Page 10, 2nd bullet, Wastewater Pollutants** – This paragraph is misleading and seems to limit the discussion of compounds in waste water to personal care products and pharmaceuticals. Most of the references listed for effects of EDCs and pharmaceuticals on aquatic life are inappropriate – the Anway papers are related to human health and Stoker et al. is about crocodiles in Argentina. There should be no discussion of human health in this part of the document. The Markman reference refers to a paper on songbirds with no apparent connection to worms and bioaccumulation of EDC and PPCPs. Kinney et al. (2008) looks at worm PPCP bioaccumulation; however, this paper refers to biosolids which is not relevant here. Some classic references for effects of EDCs that could be listed here are Colburn et al. 1996, Jobling et al. 2002, Jobling et al. 1996, Jobling et al. 1998 and Kidd et al. 2007. The current PPCPs discussion here is disproportionate with other sections and should eliminate references to human health. This bullet should be combined with “Wastewater Discharges” 4th bullet. The combined section should be revised and shortened to indicate that wastewater discharges can be from municipal or Industrial discharges; they contain a mixture of organics, metals and nutrients and PPCPs.

- 12. Page 10, 3rd Bullet, Pathogens** - Section should include a discussion of analyses done on microbial source tracking highlighting difficulty in attributing human health risk to indicators since wildlife and birds can be major contributor. One reference is MST report for Green - <http://dnr.metrokc.gov/wlr/waterres/streamsdata/reports/Green-Duwamish-MST.htm> (also-see list of references above)
- 13. Page 10** -Combine Wastewater pollutant and wastewater discharge sections.
- 14. Page 10, Wastewater Discharges** – If this section is not combined with 2nd bullet (suggested in comment 13 above). This section should reference the “Ecology Phase 1 Loadings Report” by its full name Ecology Phase 1 Loadings Study and give more about the limitations of this study.
- 15. Page 10, Combined Sewer Overflows** – Similar comment as above – provide context for these statements by highlighting the limitations of the Ecology Phase 1 Loadings Study.
- 16. Page 10, Septic Systems, Bullet 6** - The statement “. . . approximately 472,000 septic systems . . .” needs a citation.
- 17. Page 11, Wastewater discharges to streams** – The first sentence is misleading and is not necessarily true. There are direct correlations with wastewater discharges and stream health. It may be difficult to tease apart the portion of the degradation to wastewater vs. physical habitat impairment, but it is incorrect to say that there is no association between biological measurements and waste water discharge. The classic reference paper for occurrence (not effects) of EDCs is Kolpin et al. 2002, not USGS 2008. USGS 2008 discusses biosolids application and is not relevant to this discussion.
- 18.** The last sentence in this paragraph is incorrect. The King County EDC survey (King County 2007) **DID NOT** collect samples in water bodies that receive wastewater discharge; this statement is not true. Based on a very limited number of samples we found that stormwater draining into freshwaters contained some EDCs, but there was no connection to wastewater in that study.
- 19. Page 11, Effects on lakes** - provide reference for effect of lake's depth
- 20. Page 11, Lakes** - The following references should be included:
- King County. 2005. Highway 520 Bridge Stormwater Runoff Study. Dean Wilson, WLRD. Seattle, WA
 - King County. 2005. Highway Freshwater stream sediments: review of historical monitoring data 1987-2002. WLRD. Seattle, WA
 - Water Quality Monitoring of Northern Lake Washington Streams. 2002. WLRD. Seattle, WA.

Industrial and Commercial Practices

Contaminated Sediments

1. **Page 11** - This section seems to be a list of facts with a wide range of detail – it is not really clear what your message is. Please clarify this section. “Puget Sound 2008” is not listed in the reference section.
2. **Page 11, Paragraph 1** - This paragraph is composed of several sentences that have nothing to do with each other and, as such, makes no sense.
3. **Page 11** - clarify PAH distribution on sediment sizes
4. **Page 11**– This appears as a subsection under Industrial and commercial practices? Same with metals and groundwater. Please restructure.
5. **Page 11, 2nd to last paragraph** - “Many concentrations were above the **WA State** cleanup sediment level...” last sentence, “...require cleanup under **CERCLA or MTCA** regulations...”
6. **Page 11, last paragraph** - The last sentence is nonsequitor, expand to discuss PBTs in general. 2nd bullet, last sentence - move “persistent, bioaccumulative chemicals” to after “As...” after first comma add “their”. 3rd bullet: MTCA also requires cleanup.
7. **Page 12, Biomagnification** - Provide underlying reference, not summary document. Not clear this is accepted in the literature for all of these organisms.
8. **Page 12** – Biomagnification – Ruckelshaus and McClure (2007) is an odd reference for this discussion. There are numerous Puget Sound references for this topic – O’Neil and West and numerous NOAA documents.

Metals P, 12

1. **Page 12, Metals** - Discussion here is not related to section topic (Sources and pathways)
2. **Page 12. “Metals,” Sentences 1 and 2** - The phrase “. . . level of severity of metals contamination . . .” is not supported by the data in the second sentence “. . . 8 sites out of 639 where dissolved metals and mercury results were reported exceeded 2006 Washington State water quality standards chronic criteria . . .

Groundwater p 12

1. **Page 12, Groundwater** - Relative importance include that it can be a significant source of nutrients to surface waters and that for toxics it appears to be only a localized pathway.
2. **Page 12, 2nd Paragraph** – The section on groundwater could include language from Hart Crowser, Inc.; Washington Department of Ecology; U.S. Environmental Protection Agency; and Puget Sound Partnership. Phase 1: Initial Estimate of Toxic Chemical Loadings to Puget Sound. Ecology Publication Number 07-10-079. October 2007. Olympia, Washington. The

paragraph below is a direct quote from the report and the general nature is consistent with the rest of the report. The lack of groundwater information could be added to the Gaps in Knowledge section c. *“Sources of toxic chemical contamination of groundwater include contact with contaminated soil sites, leaking underground storage tanks, landfill leachate, and other releases from industrial sites. The sites of most concern for groundwater contamination are located within a kilometer of the edge of Puget Sound or its drainages. As of June 2006, there were 1,014 listed contaminated sites within 0.8 kilometers (0.5 miles) of Puget Sound, although 34 percent of these had been cleaned up (Washington GMAP 2006). Tidally-induced movement of groundwater can increase the transport rate of contaminants at sites located within 180 meters (600 feet) of the shore.”*

- 3. Page 12** - Shallow groundwater in urban residential areas were reported to often contain chemicals related to transportation and household activities. In addition, shallow groundwaters in these areas have elevated levels of nitrate from use of fertilizers on lawns, gardens, and septic system drainage. Shallow aquifers used for domestic supply in agricultural areas were commonly reported to have nitrate exceedances of the drinking-water standard. For example, cropland applications in the Nooksack River Basin caused nitrate exceedances above the drinking-water standard in about 60 percent of groundwater sampled. Historically, surface water has been the main drinking water source for the region. However, as urban development continues, reliance on groundwater as a drinking water source has increased. References :Ebbert, J.C., Embrey, S.S., Black, R.W., Tesoriero, A.J., and Haggland A.L., 2000, Water Quality in the Puget Sound Basin, Washington and British Columbia, 1996–98: U.S. Geological Survey Circular 1216, 31 p., on-line at <http://pubs.water.usgs.gov/circ1216/>

Air Deposition

- 1. Page 12, 3rd sentence** - "Growing evidence..." provide references including King County study on air deposition (Tiffany 2008).
- 2. Page 12, Paragraph 1, Sentence 5** - This statement needs a citation and reference.
- 3. Page 12, Paragraph 2, Sentence 1** -What “fraction” of the surface water runoff loading does atmospheric loading provide? This statement needs to be quantified.
- 4. Page 12** - Needs more here on the major pathways to air deposition, the key toxics and possibly nutrients included.

Recreation Water Activities P, 12

- 1. Page 12** - Swimming should be included in the recreational activities.
- 2. Page 12, Recreational Activities, 3rd sentence** - Detail which pollutants. Provide references. Discussion of relative importance would be useful.

3. **Page 12** - There are many in-water bulkheads constructed of creosoted wood and/or old railroad ties along Puget Sound, particularly in the south Sound. These should be specifically included in this section.
4. **Page 13, “Creosote-Treated Timber Piles,” Sentence 2** - The sentence states that the concentrations of PAHs are higher near treated docks but doesn't state in what the concentrations are higher. Is it in sediment, tissue, or the water column?
5. **Page 12, Recreational Activities** - This is really about oil spills and direct discharges that may be better suited separated.

Marine Traffic

1. **Page 13, Oil Spills,” Sentence 1** - There needs to be citation and reference for the statement regarding “4% of the amount estimated.”

C. Gaps in Knowledge

1. **Page 13** - This section has no organizational structure and does not tie back to Sections A and B. This section of the report is very disorganized and has no clear message. It is a list of factoids that do not provide a clear message. This section should break down to the three classes of pollutants: nutrients, pathogens, and toxics and then split between fresh water, marine water, and sediments. This should be a gap analysis and that approach or the resultant information is not presented in this paper. A significant portion of this section is spent on suppositions on climate change and emerging contaminants.
2. **Page 13** - Other gaps to add:-relative contributions of sources of chemicals to Puget Sound-fate and transport dynamics in Puget Sound for PCBs, PBDEs, phthalates.
3. **Page 13, gaps** - Based on what I have read one of the most significant would be the contribution to effects on systems. Which pathways and sources contribute significant amounts that could result in reductions that may have an effect?
4. **Page 13, 6th paragraph** - Disagree that climate change is a significant gap in water quality knowledge. The effects on water quality would not be very significant except for temperature and possibly pH. Other than that the changes expected will not have any direct effects on changing sources or pathways of pollutants. Therefore, there is not enough connection to make such statements. The best information would be to provide clear statements about what will change and what may not. This paragraph is unrelated to water quality, remove.
5. **Page 13** - A big gap seems to be the relative importance of different sources at problems toxics, pathogens, nutrients (see bottom of p9). It also implies that there are just gaps in knowledge for pathogens – apparently there are gaps in knowledge for the relative importance of sources for other pollutants as well.

6. **Page 13-14** - The paper states that current “wastewater systems will be affected” by changes in circulation patterns in the Sound. This is a potentially significant conclusionary statement that is preceded by a discussion about gaps in knowledge. It would be useful to know what PSP based their statement on. Alternatively, I suggest that the paper be revised to raise this point as a question for further study.
7. **Page 13/14** - Climate change is a big unknown, but the last statement of this paragraph (p. 14) does not seem useful: “It is also likely that current accepted “knowns” about Puget Sound pollutants will be rendered obsolete in the face of these challenges.” Some may construe it to suggest that there is no point to doing anything if climate change completely alters processes and the effects of pollutants. In all likelihood many of the pollutants will remain problematic in the face of climate change.
8. **Page 14** - The last statement of this paragraph is misleading. Climate change may change the status of Puget Sound somewhat, but won’t change the existing pollutant loadings to the Sound much. Climate change will likely **not** change what is known about Puget Sound pollutants.

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

1. **General Comments** – Similar to those above, this section is disorganized and is hard to follow. This section is very incomplete and it is hard to use this as the basis for evaluating P1 and P2. Needs a consistent and thorough coverage of SW point source and sediments?
2. **Page 15, Stormwater** - *“Modern stormwater drainage standards did not begin to come into effect in the Puget Sound region until 1995. Most of the developed land in Puget Sound remains untreated for stormwater quantity and quality (see attached map reflecting an analysis of pre-1995 development in King County). The first widely-used manual that included water quality treatment facilities was the 1990 King County Surface Water Design Manual (KCSWDM), followed by the 1992 DOE manual. The attached map which was prepared by King County reflects pre and post 1990 development (not 1995). The paper should clarify the difference between flow control and water quality treatment facilities. Flow control facilities play an important role in mitigating hydrologic impacts of development to freshwater systems, controlling erosion and sediment transport. Conventional flow control facilities that use infiltration can also provide a high level of water quality treatment.*
3. **Page 15, 2nd Paragraph** – *Identifying and removing illegal connections of non-stormwater discharges to stormwater systems is considered to be effective in reducing contaminants entering the Sound.* This is but one of many BMPs called for in the Municipal NPDES permit.
4. **Page 15, 2nd Paragraph** – *Stormwater prevention and remediation problems are compounded by the lack of interjurisdictional mapping of stormwater systems, which can hamper efforts to clean up accidental spills.* This is one of many issues that need to be

addressed by the Municipal NPDES permit. One of the biggest handicaps is the lack of funding.

5. **Page 15, 3rd Paragraph** – *Some examples of specific source control measures include [Authors request more information here]* There are dozens of source control measures listed in King County’s surface water design manual. This document does not need this level of detail.
6. **Page 15, 1st paragraph** - Add comprehensive planning and land use regulation to the list. Also operations and maintenance are really management or preventative measures, not remediation.
7. **Page 16, 1st Paragraph** - *many jurisdictions use equivalent manuals specific to their areas or have not yet adopted the Ecology Manual.* Have any jurisdictions been granted equivalency?
8. **Page 16, Treatment measures** - (Also see above – comment 2 this section) “*Treatment techniques and requirements have evolved over the last three decades along with technical understanding of stormwater impacts.*” - Traditional structural stormwater BMPs. The information in this discussion has been well known for many years. Different facility types are used to target different pollutants of concern. This approach was initiated in the 1998 KCSWDM followed by DOE in 2001. For example, stormwater wetlands can be effective at removing metals, but may also be sources of phosphorus at some times of the year. Facility effectiveness is highly dependent on influent concentrations; to make any meaningful assessment of effectiveness, concentrations need to be similar. For facilities with long residence time, it is very difficult to determine the relationship between influent and effluent; in such cases total annual removal is a more meaningful approach. Also note that detention basins are not considered to be water quality treatment facilities in the KC and DOE manuals and hydrodynamic devices are not approved to meet basic treatment requirements.

Stormwater treatment BMPs are not designed to meet an effluent standard – they remove a percentage of the incoming pollutants based on the influent concentrations. Treatment facilities remove more pollutants with higher influent concentrations, but even with a high pollutant removal, it is possible that the effluent would not meet water quality standards. Making a connection between the BMP, water quality standards, and ecosystem impacts would be very site specific and would include pollutant levels, BMP effectiveness, and receiving water specifics. One BMP may be sufficient to remove pollutants to meet water quality standards discharging to a large river, but not to a small receiving stream. Water quality standards are applicable in the receiving water body and do not apply to the treatment facility effluent.

9. **Page 17, 2nd Paragraph** - *Other measures* Refer to King County SWMP.

Stormwater

1. **Page 15, “Stormwater,” Paragraph 1, Sentence 2** - The sentence refers to a map showing analysis of pre-1995 development in King County, however, the legend on the actual map shows “pre-1990.”

Source Control Measures

1. **Page 15, Bullet 4** - No information given on source control measures for “airborne.”
2. **Page 15, List of Source Control Measures** - should include KC and other local Industrial Pretreatment Programs.

Treatment Measures P, 16

1. **Page 16, top** – King County Design Manual was implemented prior to the State’s.
2. **Page 16, Paragraph 1, Sentence 2** - The sentence refers to storm treatment beginning in 1995 with the first *Stormwater Management Manual for Western Washington* but gives the reference for the 2005 version of the manual.
3. **Page 16, 4th Bullet** – This wording of this bullet suggests that three BMPs increased the amount of zinc in effluent over influent. Is this the intent? If it is, should there be a short discussion or explanation.

Other Measures P, 17

Wastewater, P 18

1. **Page 18, Wastewater Section, first bullet states** – Characterization of MBRs effectiveness is not fully supported. While MBR’s have the potential to remove greater amounts of solids than conventional biological treatment systems, however whether any particular application of MBR or other methods are *better* at removing specific compounds will depend on how they are operated. Therefore the statement that MBR are “more efficient” is very process dependent and should not be generalized.
2. **Page 18, 1st para** - Change the second sentence: “but these facilities are not generally designed to remove other **dissolved** constituents, including some toxicants and endocrine disrupting compounds (EDCs).”
3. **Page 18, 3 bullets** -It is not appropriate to make blanket statements such as you have done here. The removal efficiencies of these technologies vary between chemicals and type of influent and it can be misleading to make these one size fits all statements. Please revise this text and provide some additional context.
4. **Page 18, wastewater** - Secondary WWTP is well documented for removal of particulates and associated pollutants.

5. **Page 18, wastewater** - Add subsection on pretreatment programs required for industrial discharges to sewers.
6. **Page 18, wastewater** - Add subsection on local hazardous waste and other programs designed to keep toxics out of the waste streams including wastewater such as pharmaceuticals, oil recycling etc.
7. **Page 18, 3rd bullet** - The statement that reclaimed water removes nutrients is not necessarily true – there are many reclaimed water technologies that do not significantly remove nutrients. It is possible that production and use of reclaimed water removes nutrients from the water body if the water application consumes the nutrients (e.g., turf irrigation). However, there are many reuse applications that may not consume the nutrients in the reclaimed water (e.g. industrial cooling, street washing). It may be worth mentioning that these technologies are available, but may have substantial cost or implementation questions. Also, the production and then use of reclaimed water reduces the nutrient loading that would have otherwise been discharged through the treatment plant outfall directly into receiving water. This is an alternative kind of “removal”.

Contaminated Sediments p, 18

1. Include discussion of sediment remediation alternatives and effectiveness (dredging, capping, MNR). King County would be happy to provide this information and relevant references.
2. **Page 18, contaminated sediments**—Note that authors suggest analysis of contaminated sediments related to cost is needed. This is also needed for other things described in this document.

B. How is the effectiveness of management techniques measures and documented?

1. **Page 18, last paragraph** - Add in discussion that in some cases, modeling can be used as a tool to evaluate potential effects of program alternatives to meet objectives and then monitoring is used to verify.
2. **Page 19, Paragraph 1, Sentence 3** - PSAMP is now the “Puget Sound Assessment and Monitoring Program.”
3. **Page 19, Paragraph 1, Sentence 5** - The reference to the work done by WERF needs some kind of reference.
4. **Page 18** - This section introduced the concept of cost-benefit analysis. Needs more explanation. Easily confused with effectiveness.

S2 - C: Gaps in our understanding

1. **General** - Need to have a coherent discussion on what the existing regulations can and can't do. Key components of the regulations are not really addressed such as TMDLs. A critical

discussion of what authorities and measures are available along with their current limitations is essential to set up P2 and allow readers to decide if the solutions recommended make sense.

2. **Page 19** - Add to bullets: effectiveness of existing state water and sediment cleanup programs and their prioritization of cleanups; standards for freshwater sediments; TMDL process includes chemical 303(d) listings but has not developed action plans for these listings and has only focused on conventional parameters and bacteria listings; MTCA process is inefficient and slow.
3. **Page 19, Gaps in our understanding** - The statement the largest gap is the absence of an “ecosystem monitoring program” is an identification of a solution, not the gap itself. The overall gap described is the insufficient understanding of cause and effect of many management actions, a solution could be a target monitoring program, special studies, other.

As indicated before, another gap appears to be an understanding of the relative magnitude of the sources of the threats (pollutants). This, in addition to the effectiveness and cost of management actions, is important to identifying solutions. Another gap is the sufficiency of regulatory targets (standards) themselves.

The partial list of gaps appears to cover elements of all three categories. Since the list is incomplete, it may be better to list the categories of gaps:

- gap in understanding of adequacy of regulatory targets (e.g. standards)
- gap in understanding of relative magnitude of sources (e.g. livestock)
- gap in understanding of cause and effect relationships
- gap in understanding effectiveness of management actions (effectiveness of BMPs, on-site nitrogen removal technologies, stormwater retrofit approaches).

It may be appropriate to end with a statement (which appears to be intended) that monitoring is currently not adequate to provide answers to these questions (this may be an overall recommendation that comes later). Like everything else, it will be important to not only increase monitoring efforts but target them effectively to provide answers to key questions.

4. **Page 19, Data Gap** – Extent to which Emerging Contaminants are biologically available and/or can be remobilized from sediments should be added as a Gap.

P1- Policy Approaches to Address Water quality in Puget Sound

1. Subsection A addresses three categories of management programs – stormwater, wastewater, and sediment. Subsection B, however, provides “limitations” of additional categories (airborne pollution, direct marine pollution, and land-use planning) without having introduced the management programs in Subsection A. Subsection B also does not address limitations of sediment management programs, of which there are a number of instances (e.g. lack of state funding, staffing, expertise to oversee sediment cleanups; lack of consensus among the regulatory and scientific community about the validity of regulatory approaches

such as sediment bioassays and the apparent effects threshold approach to numerical sediment quality criteria). Subsection C introduces two other types of plans or programs but does not provide any “documented effectiveness” as the subsection title would indicate.

A. Existing Regulatory or management programs p 20

1. **Page 20, 3rd paragraph** - Add soils to sediments and groundwater as sources to Puget Sound.
2. **Page 20, 4th paragraph** - Add GMA to list of regulations

Stormwater p, 20

1. **Page 21, 2nd bullet** - The federal Endangered Species Act DOES NOT allow incidental take of listed species.

Wastewater

1. **Page 21** - Need to have a bullet on NPDES industrial discharge permits under this section if not calling it out separately.
2. **Page 21 – add a bullet: CSO Reduction Plans** – The CWA and State WAC require the implementation of Combined Sewer Overflow (CSO) Reduction Plans to eliminate, to the extent practicable, CSO discharges into PS. For example, the KC CSO Program is addressed at <http://dnr.metrokc.gov/WTD/cso/>.

Sediments

1. **Page 21, sediments** - Add a bullet on state Sediment Management Standards (WAC 173-204). It has standards to protect benthic community and human health in addition to program to address sources in areas that have exceedances of sediment criteria that cannot be met or maintained.
2. **Page 21, sediments** - Need discussion of the effectiveness of regulations on meeting cleanup objectives. King County would be happy to provide this information and relevant references (not in this comment timeframe but can work with the core team on this).

B: Limitations of existing programs

1. **Page 22, General** - This section could be huge if it was truly exhaustive. This may be what’s needed to be able to accurately assess the appropriateness and feasibility of P2 solutions. Or you could state up front that you are only going into detail for those regulations that are affected by proposed solution to help readers assess proposals.

2. **Page 22, General** -The current MTCA and CERCLA cleanup programs address some of the most contaminated areas but do not necessarily cover contaminant issues causing fish advisories, e.g. Lake Washington. This is a policy gap.
3. **Page 22** - One of the critical limitations with existing regulations is that they are designed to work at a localized scale and are not addressing problems that are showing up are larger scales. Other components under the regulations exist to help address these larger scale issues such as TMDLs but have not been effectively used or implemented to show significant or consistent results. Also these regulations only are invoked when problems have already arisen.
4. **Page 22, limitations** –Limitations may be broader than just integrated planning, but also integrated coordination of implementation. Different jurisdictions/institutions have been responsible for water supply, wastewater, stormwater (cities, federal, county, utilities, other). Lack of funding is mentioned as a limitation for enforcement. Lack of funding is arguably a limitation for everything. I suspect funding should be mentioned other places too or not at all. Other limitations
 - a. regulatory authorities to require actions;
 - b. may not get at all sources (sources coming into Sound, such as atmospheric deposition, historical/legacy pollutants, climate change, ship deposition, other)
5. **Page 22, 1st paragraph** - Provide references.
6. **Page 22, 1st paragraph** - Add bullet: insufficient resources have been allocated to implement existing regulations (i.e. Ecology's TMDL MOA).
7. **Page 22, 1st paragraph** - Bulleted list needs to be more specific as to which regulatory program is being referred to.
8. **Page 22, 2nd Paragraph** – For the most part, there has been very little water quality monitoring to address the effectiveness of stormwater treatment on receiving water conditions. Ecology and NPDES permit holders have spent years trying to determine how to monitor receiving water to see the effectiveness of stormwater programs and have been unsuccessful in teasing out stormwater impacts from all other influences impacting receiving waters. Congress recognized that discharge from an MS4 system is not the same as discharge from an industrial facility or construction site. The number and minimal control of different dischargers into an MS4 system limits the ability of a jurisdiction in achieving water quality standards. That is why AKART and MEP were included as a measure of achievement for municipal NPDES permits. If Ecology feels that the treatment or flow control BMPs listed in the SMMWW are ineffective or the effectiveness is unknown then the BMP should be removed or tested by Ecology to determine effectiveness. Ten SWMP components listing best management practices are contained in section S5 of the Phase I Municipal NPDES permit. Trying to determine the effectiveness of each element in improving water quality standards is a unfeasible.

- 9. Page 22, 4th bullet** - "...adequate **monitoring, planning**, enforcement and outreach...", **5th bullet** - WQ standards do not account for bioaccumulative effects, Add bullet - freshwater sediment standards are nonexistent.

Stormwater

- 1. Page 22, Bullet 1** - "*The CWA NPDES regulations treat stormwater as a point source although stormwater behaves more like a non-point source.*" The author should describe what a non-point source "behaves" like and why he/she thinks that treating stormwater as a point source is a "limitation."
- 2. Page 22, stormwater bullets, note for advances** - King County has adopted requirements under its clearing and grading code to require the retention of existing topsoil onsite and have minimum organic content requirements for topsoil in order to have better onsite retention of runoff.
- 3. Page 22, Stormwater, 2nd bullet** - It is not clear how this meets the purpose of this section. Suggest delete or build issue into a solution as part of P2 rationale. It is not a limitation in the regulation effectiveness.
- 4. Page 22, Stormwater, 4th bullet** - Add the effectiveness here (~50% of sediment associated pollutants and ~30% dissolved).
- 5. Page 23, Stormwater 5th bullet** - It is not clear why this would not be covered under current TMDL approach.

Wastewater

- 1. Page 23** - Statement that funding for WWTPs has been generous at the federal and state levels in the past is very misleading, as applied to Puget Sound. While this level of federal and state funding was received by some communities in the U.S., for historical reasons WWTPs around Puget Sound did not receive this level of funding support for secondary treatment. This is one reason why wastewater treatment rates in this region are relatively high. It is appropriate to correct this in order to show the region's local commitment to clean water, perhaps as a point of reference in any requests for future federal funding.
- 2. Page 23, wastewater, 1st bullet** – We are not aware of any waivers being granted to any PS discharges. If this is true, then all WWTPs are secondary; however, many areas are covered by septic systems.
- 3. Page 24** - The paper identifies barriers to the widespread production and use of reclaimed water. Several barriers reference cost and pricing factors – which are of obvious importance. While it may not be appropriate for this particular paper, PSP should be focusing the discussion of reclaimed water on value. This would allow for continued consideration and discussion of important costing, pricing, and customer impacts to water purveyors – but

within the context of the gain to the region by the production and use of reclaimed water.

Also, future discussion of reclaimed water uses needs to include those uses where reclaimed water cannot necessarily be sold (e.g. stream flow augmentation, groundwater recharge, wetlands enhancement, and wetlands restoration).

4. **Page 24, “Wastewater,” Bullet 3** - At the end of the final sentence “. . . there are a number of barriers that hinder its widespread” insert the word “use”.
5. **Page 24, 1st bullet** - Mention that for these types of situations, the fact that regulations target individual compound concentrations instead of modes of action, it is hard to know what levels of effects there may be from these compounds.
6. **Page 24, 2nd bullet, 6th sub-bullet** - It is not clear how tertiary treatment reduces discharges. It may reduce amounts of certain pollutants but does not reduce volume. . The term “versus” should be changed to “and”, and “enhanced nutrient removal” should be added to or used instead of tertiary treatment. The statement could read: “The benefits and costs (triple bottom line analysis) of additional treatment to produce reclaimed water and/or enhance nutrient removal are is unknown.”
7. **Page 24, 2nd bullet 7th sub-bullet**: Suggest using the term: has the potential to substantially fund the facilities.
8. **Page 24, third bullet** – The use of the term tertiary treatment may also be applied too broadly (it may be the case that additional nutrient removal could be achieved through processes other than tertiary treatment). The statement that the cost of reclaiming water and tertiary treatment may be “modest” is misleading; it may be confused because tertiary treatment and reclaimed water are combined. Costs of enhancing treatment for nutrients, either enhanced secondary treatment or tertiary treatment would be very costly, likely requiring both operating costs (increased energy use) and capital costs. It would more realistically be on the order similar to moving to secondary treatment as entirely new facilities would need to be built. The cost of providing reclaimed water, however, can be modest as an additional cost for a new facility. Suggest separating concept of additional treatment for nutrients from reclaimed water, deleting comment on cost.
9. **Page 24** – We appreciate the discussion of the use of reclaimed water as a tool to improve water quality through reduced discharges and improved treatment. However, the paper could note that there are ways to reduce discharge volumes of pollution to Puget Sound other than the production of reclaimed water and while the installation of purple pipe is a significant cost associated with reclaimed water, there can be other significant costs associated with the production and distribution of reclaimed water.
10. **Page 24** - There does not appear to be much discussion of Class B and C reclaimed water, just class A. Is there a reason for this? Might the uses of these other classes be encouraged where appropriate?

- 11. Page 24, first bullet** - It is important to mention source control (take back programs, education, other) in addition to treatment. Source control is mentioned elsewhere in this document so this would reinforce that.
- 12. Page 24 - 3rd bullet, First sub-bullet**- Paradox—greater population densities are needed to keep utility rates affordable. It is true that there are often economies of scale, but it is not the only thing driving rates and costs. Cost-effective, targeted actions also help keep utility rates affordable.

Wastewater: Combined Sewer Overflows

- 1. Page 25, first bullet under CSOs** – The federal standard of four overflows per year is not per outfall. It is four overflow events per year system wide (however, there can be multiple overflow locations in any event).
- 2. Page 25, “Wastewater: Combined Sewer Overflows,” Bullet 4** - This section appears to be a description of current actions rather and a section solely on program limitations, as other sections appear to be. This inconsistency should be addresses so that this section follows all others. For example current remediation of legacy sediments at CSO sites is not a “limitation”.
- 3. Page 25, 1st bullet – Sub-bullet 3** – Is not correct, in addition to “numbers of untreated overflows”, the federal and State CSO policies also require CSOs not to exceed WQ standards.
- 4. Page 25, wastewater- CSOs, 3rd bullet** - This is a true statement but does not capture issue correctly. Both standards were developed as technology based standards and are the best that each situation can be expected on average to achieve.

Wastewater: Onsite Sewage Systems

- 1. Page 25, septic -- wastewater** – on site, should clarify what is the “limitations of permit fee based funding” are?

Airborne Pollution

- 1. Page 26, airborne pollution** - Add PCBs, dioxin furans and PAHs to the list of chemicals that are significant in this pathway. There are tools available in the Clean Air Act. It is just that the levels in air usually do not trigger health effects. Better implementation of the Acts ecosystem effects narrative provision could be used to address but it has not to date.

Direct Marine Pollution

- 1. Page 26, Bullet 2** - Please explain how this is a “limitation.”
- 2. Page 26** - This belongs in section A.

3. **Page 26** - Add oil spills explicitly to direct marine discharges and discuss limitations with regulations.
4. **Page 26** - 3rd bullet introduced the concept of cost-benefit analysis. Needs more explanation. Easily confused with effectiveness.

Land use Planning P, 26

1. **Page 26, Bullet 1** - Please explain how this is a “limitation.”
2. **Page 26** - Much of this belongs in section A
3. **Page 26** – Appears that there is a missing word in second bullet (“allowing”)? → “cases of [allowing] environmental degradation...”; period at end of last bullet.
4. **Page 27, comprehensive watershed planning** – This section is undeveloped; there have been many attempts at watershed planning over the years, beginning with Section 208 plans in the 1970s. There should be another paragraph emphasizing that this idea is not new, but has been problematic in implementation for a variety of reasons.

Policy Question 2 (P2): Strategies to Improve Water Quality in Puget Sound p 28

1. **Page 28** - Sediment issues are not mentioned until Subsection D (recommendations for further assessment). Sediment issues probably belong in both Subsections B and C. There is already a strong causal link between sediment contamination on “water quality” already established. The final sentence in Bullet 1 under Subsection D – “*In particular, there may be opportunities for expediting cleanup efforts that move public funds from contentious to cooperative efforts.*” – shows that sediment should be covered in both Subsections B and C.
2. **Page 28** - There is a single paragraph with a small type font header that reads “*How will we know when we are making progress?*” Does this paragraph apply only to Policy Question 2 or to the whole forum topic (I think the latter). If so, it should be called out much more boldly.
3. **Page 28, Subsection A, Bullet 6** – The sentence “*Greater feasibility, however, does not imply lower importance.*” in the context of the bullet does not make sense.
4. **General comment** – This section is problematic because it makes recommendations for strategies without adequate consideration of implementation, including overall feasibility and cost (and cost-effectiveness). Because resources for cleaning up Puget Sound are limited, it will be important to consider cost-effectiveness and prioritize actions prior to making recommendations. Because costs and implementation feasibility was not addressed in the papers, it may have been preferable at this stage in the process for the authors to have

identified strategies and elements affecting their success rather than making specific recommendations for near term and long term actions.

5. **Page 28** - General comment – The paper does not discuss the relative priority of actions, e.g., the actions called for stormwater, wastewater, septic. Decision-makers may ask these questions.
6. **Page 28** - Combined with information on cost, effectiveness, and implementation feasibility, the concept of near term and long term actions will be a useful approach.
7. **Page 28, Under A, criteria that is missing cost-effectiveness** - Resources are limited and it will be important to ensure that goals are attained at least cost.

A. Principles of Water Quality Improvement in Puget Sound p28

1. Add source control strategy - regulatory or voluntary restrictions could be implemented to significantly reduce loadings of specific chemicals to the environment.

Stormwater

1. **Page 29, 1st Bullet – • Wherever possible, turn stormwater and wastewater into water resources** - Reclaimed water is currently economically infeasible despite obvious economic benefit. *The creation of a distribution system for reclaimed water would make this reuse economically feasible.*
2. **Page 30** - *“Mapping of interjurisdictional stormwater networks”*. Coordination is already required under new NPDES permits. Where is there any documentation that indicates that spills crossing jurisdiction boundaries is a significant issue? Spill response and cleanup is an important issue

Wastewater

1. **Page 30, Require tertiary or Class A wastewater treatment at WWTPs to reduce nutrient loadings** - This recommendation needs to be clarified – it is unclear whether this would be universally applied or specifically targeted to certain WWTPs and certain times of the year. It also may be the case that nutrient removal might be accomplished through means other than tertiary treatment and re-use (in some cases, additional secondary treatment). If broadly applied, there are significant questions as to the overall feasibility and overall cost of this recommendation. It is more appropriate to recommend nutrient reduction be addressed – in parts of the Sound and times of the year when it will be important -- rather than mandating specific technologies at every plant. It is also unclear whether this realistically could be accomplished in the near term. In the italicized note – it is important to note that more discussion is need on the size parameters and cost impacts to all systems, not just small systems. The statement that “the increased expense in energy and other operating costs to the wastewater system...” should also mention the increase in capital costs (and potentially mention climate impacts from increased energy demands).

- 2. Page 30, suggested rewrite of 1st bullet** - Require nutrient removal or Class A wastewater treatment and reuse at WWTPs to reduce nutrient loadings. *-In nutrient-sensitive areas of Puget Sound, require the operation of wastewater treatments to address nutrient removal, or treatment to Class A standards for reuse. The direct addition of nutrients to the Puget Sound increases the potential for hypoxia, algal blooms, and other related threats in nutrient-limited waters such as south Puget Sound.*

Effective wastewater treatment technologies exist to address nitrogen and other nutrient loadings. Benefits would be a reduction in nutrient loading to nutrient-limited areas of Puget Sound. Alternatively, or in combination with nutrient removal, treating wastewater to reuse standards (Class A, B or C) can allow the added benefit of supporting the freshwater ecosystem through the reduction in groundwater withdrawals.

Where needed, the primary barrier to implementing nutrient removal is the availability of funding. The use of reclaimed water is typically impeded by the lack of access to potential customers, public acceptance, and state water rights law.

Nutrient reduction would only be needed for specific wastewater plants in identified nutrient-sensitive areas of Puget Sound and only needs to be employed during critical parts of the year when receiving waters are most sensitive. The increased expense in energy and other operating costs to the wastewater system must be considered in the balance.

- 3. Page 31, 1st paragraph (outfall decommissioning)** - Remove. (a) This is not a near-term strategy, (b) if outfalls were sufficiently close to be feasible to combine, there would be no significant difference in area of shellfish bed closure because of the typical tidal excursion in Puget Sound; and (c) the area of potential exposure would likely not decrease (e.g., two mixing zones versus one larger one). Furthermore, it is unclear what the basis is for this recommendation, and its effectiveness. In addition, the statement that this will reduce operations and costs. There may well be substantial cost increases associated with this (rather than decreases).
- 4. Page 31** - The distinction in strategies is near term strategies, regulatory strategies, and recommendations for further assessment. It seems that more logically it would be near term, long term, recommendations for further assessment. Could some regulatory strategies be short term? (e.g., source control).

Land Use

- 1. Page 31** - Integrate land use and water resources planning: this is a long-recognized problem in water resources management, and not easily accomplished. It is potentially more of a long term strategy?

Policy Question 2 Strategies to Improve Water Quality in Puget Sound p 28

B: PRELIMINARY RECOMMENDED NEAR-TERM STRATEGIES

1. Implementation and adequate enforcement of existing regulations should be the first priority. We have many strong approaches to address many of the identified problems but do not have consistent application and the stick of certainty in enforcement behind them. One solution to help improve implementation would be to develop a team that would go around to the various municipalities to train staff on implementation, O&M and enforcement.

Municipal NPDES permits for Phase I jurisdictions have the following requirements:

- S5.1. Legal Authority to control discharges to and from an MS4
- S5.2. A MS4 mapping program
- S5.3. Coordination within a jurisdiction and with other jurisdictions
- S5.4. Public Involvement and participation for stormwater management programs
- S5.5. Controlling runoff from to prevent impacts from new development, redevelopment and construction activities
- S5.6. A program to construct structural stormwater controls to prevent or reduce impacts to waters caused by discharges from the MS4
- S5.7. A source control program to reduce pollutants entering the MS4 from dischargers.
- S5.8. An illicit connections and illicit discharge detection and elimination program that includes a spill response program.
- S5.9. A program to regulate jurisdictions maintenance activities and to conduct maintenance activities to reduce stormwater impacts from jurisdictions properties and operations, including the MS4 and roads.
- S5.10. Education and outreach program aimed at residents, businesses, industries, elected officials, policy makers, planning staff and other jurisdictions employees.

These are the actions mandated by the CWA and should be the primary near-term strategies. All of the bullets in this section are subsections of one of the mandated actions listed above. The organization of this section should reflect the permit requirements.

Stormwater

1. **Page 29, stormwater retrofit, 1st Bullet** - Suggestions on how to achieve this would be most helpful. For example the Redmond model giving height bonuses to retrofit would address the economic problem of private development implementation. Suggest several ideas are included as alternatives to be considered with there advantages and disadvantages as this is the key issue with stormwater.
2. **Page 29, transportation, 3rd Bullet** - This proposal will need a significant effort of social marketing to generate behavioral change if any real reduction is to be counted on. It should be noted that while the effort is proposed as near-term strategy for implementation, the effects are not expected to be realized near term.

- 3. Page 30, top of page, Mapping** - Another approach that would address this problem would be to change the current mapping requirement to go all the way to receiving bodies. This approach would be simpler to implement than requiring all jurisdictions to coordinate with each other. There would be incentive to coordinate where needed to complete mapping. Alternatively, a central repository should be set up that would require all jurisdictions to deliver their portions to it by a certain date and then that entity would generate the cross-jurisdictional map.

Wastewater

- 1. Page 30, wastewater, 2nd bullet, Outreach** - The scope of this work should be expanded to other sources such as cleaners, disinfectants, household products, building materials etc.

Land Use

- 1. Page 31, 1st bullet** - Clarify which constituents this would effect. Mainly DO and temperature with some reductions in nutrients. It is likely to only have small effects on others.

OTHER

Page 31, Need section on Sediments - Based on what is presented, one can only conclude that near-term solutions are not needed - that not enough is known to take any current actions. While further research is needed in many areas, we disagree with this conclusion as recent advances in understanding of sediment effects on ecological and human health suggest some actions should move ahead. For example, near-term solutions that should be considered include:

- Remove procedural impediments to sediment cleanups by simplifying cleanup decision process to get initial cleanups started and relying on 5-year reviews to assess if more may be needed to meet cleanup goals.
- Recent advances in our understanding of sediment biota interactions have provided us with the knowledge to develop human-health based standards for the bioaccumulatives in the SMS.
- revisiting the DMMP open water disposal standards to account for effects from transfer to the food chain,
- developing tools to improve cleanup alternative evaluations to account for cleanup actions themselves,
- improving understanding of potential reduction to the food chain of sediments in order to help prioritize actions targeting reductions in upper trophic level organisms such as marine mammals,
- Implementing the recommendations of the Sediment Phthalate Work Group to address the problems of chemicals such as phthalates that predominately follow the air-stormwater-sediment pathway and only represent ecological or human health concerns once concentrated in sediments.

King County would be happy to work with the core team on developing solutions and screening which should be in the document.

C: REGULATORY STRATEGIES.

Stormwater, wastewater and land use

1. **Page 31, 5th Bullet** - Address all surface water discharges in MS4 permits or *in UIC regulations*. Currently all MS4 discharges are captured unless they discharge from a private property. If a construction site or industrial facility is discharging directly to a water body, then the discharge is covered under the relevant Industrial or Construction permit. These discharges cannot be legally be captured under the municipal permit.
2. **Page 31, 6th Bullet** - Implement source control for existing developed commercial areas. See S5.7 above.
3. **Page 31, 3rd Paragraph** - *Implement more comprehensive chemical management in Puget Sound*. This is a national issue that needs to be addressed on a national level.
4. **Page 31** - Need section on Sediments. King County would be happy to work with the core team on developing solutions and screening which should be in the document.
5. **Page 31, Water quality approaches** - There are numerous identified problems with limitations in the application of standards but no proposal here for a regulatory strategy to fix. While it is tempting to suggest overhaul of the existing approach to water quality, which realistically would take a decade to accomplish, we would suggest that the focus should be on utilizing existing methods to improve our ability to address these problems. Examples of these approaches include:
 - Develop a Sound-wide TMDL for PCBs (or other target chemicals) would help to get around many of the problems we face with limitations in applying the existing specific WQ criteria at individual sites.
 - Develop an approach to apply narrative beneficial uses in order to address limitations identified in the numeric criteria in addressing biologic endpoints.
 - Develop approach to implementation problems on federal lands through the ESA nexus to address toxic loading to PS that is otherwise not directly regulated.
6. **Page 31, Water quality approaches** - Implement the recommendations of the Sediment Phthalate Work Group to address identified problems with implementation of SMS, MTCSA and the Clean Air Act to address chemicals that predominately follow the air-stormwater-sediment pathway. These compound include many of the most concern for problems including PCBs, dioxin/furans, PAHs and Hg.
7. Need to resolve the site access issue if we are to achieve consistent implementation of many of the solutions. In Washington, there is very limited right to access unless immediate risk is identified. This can never be met with most of these WQ problems so therefore implementation is severely limited. Need to revise access to both protect property rights but allow assessment of compliance and identification of problems on site.

8. **Page 32, 2nd Paragraph** – The text suggests establishing watershed area-wide permits. Any new permitting effort should incorporate existing permits or replace existing permits. Exemptions to participation should be limited.

P2 - D: Recommendations for Further Assessment p 32

1. **Page 32, watershed area-wide permits** – Unclear how this would be implemented or would work – needs further development.
2. **Page 32 - Recommendations for further assessment:** In order to prioritize actions, there needs to be:
 - a. should include a characterization of relative importance of different sources
 - b. should include an assessment of cost of reduction strategies (a next step in prioritizing strategies)- to implement strategies that are most effective first.
3. See comments above concerning tertiary treatment, sediments, water quality standards that would affect what is currently written in this section.
4. **Page 32, 2nd Bullet -Evaluate existing water quality standards** -A more effective use of time would be to review and adopt water quality standards of other states. The Puget Sound Monitoring Consortium has already done much of the work in this section, examining and prioritizing the needs cited above. Recommend adopting the “*Surface Water and Aquatic Habitat Monitoring Advisory Committee Report and Recommendations*” Submitted to the Washington State Department of Ecology 11 January 2007:
<http://www.ecy.wa.gov/programs/wq/psmonitoring/index.html>
5. **Page 34, 2nd Paragraph** - *There are limited water quality monitoring data available for all of the geographic regions of interest, so a carefully thought out water and sediment quality monitoring program should be established against which to compare future conditions in the fresh and marine water bodies of the Puget Sound basin.* This region does not need another baseline study. All of the funds for the PSP can easily be spent on another Puget Sound baseline and trends study
6. **Page 34, How do we know we are making progress?** – This section needs to be more fully developed and more thorough. While it claims that the only way to know is to measure against baseline conditions, this requires some effort to define baseline conditions (not in this paper). As the paragraph suggests, it may be necessary in the near term to establish some indicators. However, this list should be more thorough and carefully thought out. Many seem to be outputs rather than true performance indicators.



May 6, 2008

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RE: Initial Discussion Draft Water Quality Topic Forum White Paper – Science Question One

Dear Martha:

We are writing to comment on *Initial Discussion Draft Water Quality Topic Forum* white paper, dated April 14, 2008. We will refer to this document as the “WQ Paper” for the remainder of the comments.

People For Puget Sound is a nonprofit, citizens’ organization whose mission is to protect and restore Puget Sound and the Northwest Straits.

The Puget Sound Environmental Caucus, which includes People For Puget Sound, is submitting comments that focus on management actions – status, gaps and needs, including needed regulatory changes.

In this letter, People For Puget Sound is focusing on the first science question in the document: *Science Question 1 (S1): Status of Water Quality in Puget Sound*. We have been participating in the Indicator development effort and we therefore are looking at this portion of the WQ Paper from that point of view.

In summary, we suggest that the WQ Paper be re-organized to match the Indicator Group’s Water Quality Conceptual Model, that these components be carried through to the Policy Questions, and that more summary information be added to the Paper, such as tables that summarize chemicals of concern.

Reorganization

For clarity and completeness, we suggest that the S1 Section of the WQ Paper be reorganized to 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:

- **Sources:** *Currently mixed with pathways in the section titled: “Sources and pathways for nutrients, pathogens, and toxics entering Puget Sound*
- *water bodies”*
- **Pathway:** *See above*

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- **State and Impacts:** *Currently section titled: “Documented threats to fresh water and marine water quality in Puget Sound.”*
- **Management Response:** *Science Question #2, Policy Questions #1 and #2*

Each class of pollutant can be considered within this framework. Below, we offer comments within this framework suggestion along with some cited statements of current conditions. We primarily used the sources that are listed in the Water Quality Conceptual Models. 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.

Additions

We suggest that a discussion of Natural Drivers be should be separated out into its own section of the WQ Paper. 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.¹

In addition, we suggest that the WQ Paper include more tables and charts that show the chemicals of concern, effects, types of sources, etc. One example is shown in Attachment 1 - *Sources of Air Pollutants of Concern to Great Waters and Coastal Areas*. Another example is use of the information from the Ecology-led Toxics Loading Assessment Phase I (completed in November 2007). While imperfect, the Assessment document lists the relative loads of 15 individual or families of toxic chemicals of concern to Puget Sound. A great deal of discussion and thought went into choosing those chemicals. A table showing this list of chemicals, including their toxic effects on wildlife, could be included in the WQ Paper as an important starting point for discussion. Further, the relative loads of these chemicals in 10 pathways should be included in a table in the WQ Paper in order to give readers a relative sense of the problems we face. We look forward to the results of Phase I and Phase III studies, but in the meantime, the Phase I results form a credible basis for discussing toxic chemicals of concern.

Suggested Framework

We didn't have time during this short public comment period to fully comment on each component below but offer examples of referenced statements that could be added to some of the Source or Pathway components as well as a listing of references that could be used for the State and Impacts section.

A. Sources

Industrial processes/Power Plants

In this section, we suggest a that the WQ Paper include a brief discussion of the numbers of, distribution of and pollutants associated with the industrial facilities in the Puget Sound Basin. An easy starting point would be EPA's TRI (Toxic Release Inventory) database and Ecology's permit database. The most recent (2006) TRI reporting facilities are compiled in Attachment 2. Their reported 2006 toxic

¹ Albertson, S.L., et al., 2007. Estuarine Flow in the South Basin of Puget Sound and its Effects on Near-Bottom Dissolved Oxygen. Department of Ecology. Publication No. 07-03-033.

4/14/2008-5/9/2008

chemical release (air, surface water, injection, land) totaled 16,069,795 pounds.² This total load is significantly lower than the offsite transmittal of toxic chemicals to sanitary sewers or to landfills which could also be compiled.

Vehicles

- **Emissions and oil drip.**
- **Brake pads.**
- **Wheel weights.**
- **Tire wear.** Tire wear is a significant source of metals. Tires contain arsenic, cadmium, nickel, zinc, mercury, chromium, and zinc as well as a suite of organic chemicals.³ New automobile tires weigh 25 pounds while scrap tires weigh 20 pounds; new truck tires weigh 120 pounds, scrap tires 100 pounds.⁴
- **Resuspension.** One of the most significant sources of pollutants to the atmosphere and potentially to waterbodies are due to the resuspension of particles due to movement of vehicles on roadways contributing metals such as chromium, copper, lead, nickel and zinc.⁵

Marine vessels

- **Recreational boats.**
- **Container Ships, Tankers and other large vessels.**
 - **Oil.**
 - **Ballast.** A good summary of ballast problems, including number of ships arriving in Puget Sound and ports of origin, ballast volumes (average of 8 million cubic meters of ballast), and critical locations was presented by Kevin Anderson of the Puget Sound Action Team.⁶ Significant additional work on this topic has been conducted by Ecology.
- **Cruise Ships**
- **Maritime-associated air emissions.** The Ports of Seattle, Tacoma and Vancouver BC recently completed an excellent inventory of maritime-related emissions with a focus on diesel and greenhouse gas emissions. Toxic chemical loadings can be calculated from Appendix D.⁷

Marinas/Boathouses

- **Wastes**
- **Paint and maintenance operations**

² EPA TRI web page. <http://www.epa.gov/tri>

³ US EPA 1997 (October). Air Emissions from Scrap Tire Combustion. EPA600-R-97-115.

⁴ Rubber Manufacturers Association. Scrap Tire Fact Sheet. Web Page.
http://www.rma.org/scrap_tires/scrap_tire_markets/scrap_tire_characteristics/

⁵ Lisa D. Sabin, Jeong Hee Lim, Maria Teresa Venezia, Arthur M. Winer, Kenneth C. Schiff and Keith D. Stolzenbach. 2006. Dry deposition and resuspension of particle-associated metals near a freeway in Los Angeles Atmospheric Environment, Volume 40, Issue 39, December 2006, Pages 7528-7538.

⁶ www.psmfc.org/ballast/ballast_2006/Anderson.ppt

⁷ Puget Sound Maritime Air Forum. 2007. Maritime Air Emissions Inventory

Other transportation: rail, air

- **Airplane-related**
 - **De-icers.**
 - **Jet emissions**
- **Rail**
 - **Idling.**
 - **Yards/Transfer Operations.**

Accidental spills (land-based)

Mining

Forest Practices

Agricultural

- **Biosolids use in agriculture/forestry.** 70% of the antibiotic triclocarban persists in Biosolids after treatment⁸
- **Fertilizers.**
- **Pesticides.** In a study of pesticides from agricultural lands in the Yakima area from 2003-2005, the most frequently detected herbicides were 2, 4-D, bromacil and terbacil, atrazine, and diuron and most common insecticides were chlorpyrifos, malathion and azinphos.⁹
- **Animal Wastes.** 90% of the estrogen load is animal manure from concentrated animal-feeding operations (CAFOs). These estrogens, as well as those from human sources, are shown to be the most potent endocrine disrupters in aquatic environments.¹⁰

Pesticide use in homes, schools, landscaping

- **Outdoor use in urban areas.** In urban areas, Pentachlorophenol, a wood preserver, is used in large enough quantities and persists to the extent that it shows up in creeks. In addition to pentachlorophenol, other most frequently detected compounds as shown in a 2003-2005 urban study (Thornton Creek) are herbicides triclopyr, dichlobenil and MCPP and the insecticide diazinon.¹¹

Aquatic pesticides applied directly to waterbodies

Home Wood Stoves and Trash Burning

⁸ Jochen Heidler, Amir Sapkota, and Rolf U. Halden, Partitioning, Persistence, and Accumulation in Digested Sludge of the Topical Antiseptic Triclocarban During Wastewater Treatment. Environmental Science & Technology. April 26, 2006.

⁹ Washington State Departments of Ecology and Agriculture. 2006. Surface Water Monitoring Program for Pesticides in Salmonid-Bearing Streams, 2003-2005. Ecology Publication No. 06-03-036.

¹⁰ Khanal, S.K., et. al., 2007. Fate, Transport, and Biodegradation of Natural Estrogens in the Environment and Engineered Systems. Environ. Sci. Technol., ASAP Article 10.1021/es0607739 S0013-936X(06)00773-5.

¹¹ Washington State Departments of Ecology and Agriculture. 2006. Surface Water Monitoring Program for Pesticides in Salmonid-Bearing Streams, 2003-2005. Ecology Publication No. 06-03-036.

Building materials

- **Roofing, gutter materials**
- **Vinyl siding**
- **Coatings**
- **Asphalt paving**

Consumer products (used in homes, offices, industry, etc)

Chemicals such as polybrominated diphenyl ether (PBDE) flame retardants, PFOAs, phthalates, other organic chemicals and metals in consumer products off-gas or are eroded from the products and adsorb onto particulates in air or onto dust.

- **PBDE example.** PBDEs are found in common foamed or textile products such as upholstery, carpet padding and padded dashboards and in electronics plastics such as computer and television housings. PBDEs volatilize into the air and attach to dust, although the exact mechanism is unknown. Recent studies show that higher levels are found in Americans compared to Europeans and that some populations have much higher levels than others (“super highly exposed people”) which is believed to be reflective of varying concentrations in households. A portion of this dust is ingested.¹² In addition to human sewage, additional pathways to the Sound may be indoor-outdoor air exchange, or through sewage via household laundering and cleaning processes.

Log Booming/Rafting

Existing Structures/Creosote pilings

Aquaculture

- **Fish Pens**
- **Shellfish Growing Areas**
- **Hatcheries**

Sewage

- **Pharmaceuticals.** In addition to reference listed in the WQ Paper, pharmaceuticals in Washington have also been studied in Sequim¹³
- **Drinking Water.** Surface waters that are downriver from Sewage Treatment Plant Outfalls are used in at least two rivers for drinking water (Anacortes and Firnwood). Lake Whatcom, a major source of drinking water is severely impaired due to development pressures.

Leaking landfills.

Hazardous waste sites

¹² Betts, Kellyn S. Unwelcome Guest: PBDEs in Indoor Dust . 2008 (May) Environmental Health Perspectives Volume 116, Number 5

¹³ WA Department of Ecology. Environmental Assessment Program. 2004. Results of a Screening Analysis for Pharmaceuticals in Wastewater Treatment Plant Effluents, Wells, and Creeks in the Sequim-Dungeness Area. Publication Number: 04-03-051

Sediment Sites

- A listing and map of contaminated sediment sites in the Puget Sound Basin, including chemicals of concern would be helpful.

Soil Sites

- Rayonier Mill - which left dioxin in soils and in landfills in Port Angeles
- Everett Smelter - which left lead and arsenic in a footprint¹⁴
- Asarco Smelter - which left a large areawide plume of lead and arsenic in soils from Tacoma northward

Military activities

- In-water Ordnance training in specified bays
- Other training exercises
- Construction and maintenance operations

Other?

Source Issues that should be listed as areas for further research:

- **Additional Emerging Chemicals.** Impacts of extremely persistent sugar substitute Sucralose (a half-life in water of up to several years) on the environment is unknown. New studies show that a significant amount passes through sewage treatment plants.¹⁵
- **DNA impacts.** New studies show that contaminants are causing changes in the DNA structure and cellular physiology of the livers and gills of English sole in lower Duwamish River.¹⁶

B. Pathways

Aerial deposition

- Air is not routinely assessed on a cumulative basis in Washington. Further, the air toxics program has been measured by the amount of emissions reductions achieved as opposed to measured changes in air quality.¹⁷
- A concern is that inorganic mercury from air and other sources is converted by bacteria to highly toxic methylmercury in oxygen-poor sediments¹⁸ in the bottom of wetlands, lakes, rivers and the Sound. This conversion process presents a significant complicating factor if we aim to create

¹⁴ ://www.ecy.wa.gov/programs/tcp/sites/asarco/es_main.html

¹⁵ Brorström-Lundén, E et al., 2008. Measurements of Sucralose in the Swedish Screening Program 2007- PART I; Sucralose in surface waters and STP samples. IVL Swedish Environmental Research Institute Ltd. IVL Report B1769.

¹⁶ D.C. Malins, K.M. Anderson, J.J. Stegeman, P. Jaruga, V.M. Green, N.K. Gilman and M. Dizdaroglu. 2006. Biomarkers signal contaminant effects on the organs of English sole (*Parophrys vetulus*) from Puget Sound. Health Perspectives 114 No 6. June 2006.

¹⁷ U.S. Environmental Protection Agency. Office of Inspector General. 2005. Progress Made in Monitoring Ambient Air Toxics, But Further Improvements Can Increase Effectiveness. Report No. 2005-P-00008. March 2, 2005

¹⁸ Branfireun, B.A., Hilbert, D., Roulet, N.T., 1998. Sources and sinks of methylmercury in a boreal catchment. Biogeochemistry 41, 277-291.

more salt marsh and nearshore habitat at the same time as we continue to allow significant sources of mercury in air emissions in our low lying industrialized areas.

Groundwater

- **Groundwater associated with leaking landfills.**
- **Groundwater associated with hazardous waste sites.**
- **Groundwater associated with faulty septic systems.**
- **Seeps to Puget Sound.** Seeps have been studied in detail as part of the Duwamish Superfund Site investigation.
- **Seawater Intrusion.** Seawater intrusion has begun to be a problem in some Puget Sound areas leading to salty water in domestic supplies, including Bainbridge.¹⁹ Although this issue may be discussed in the water resources issue, it should be also included in the WQ Paper in brief.

Surface Runoff

Stormwater

- **Toxic chemicals.** The WQ Paper unnecessarily focuses on the variability of stormwater data (on page 7) rather than the demonstrated need to address toxic chemicals in stormwater. In addition, the last paragraph on page 8 does not accurately reflect the conclusions and recommendations of Nat Sholtz's team's work.

Oil Spills

Contaminated Sediment Site Flux/Dredge Activity

Sewage Wastewater Point Discharges

- On page 9-10, the WQ document could be strengthened by a more robust discussion of the number of Sewage Treatment Plants that discharge to surface waters (103), the number that discharge to rivers and creeks versus directly into Puget Sound, an acknowledgement that many discharge into shallow waters, that Washington allows mixing zones for PBTs which allow for the discharge of toxic chemicals at acute levels near the outfalls, and the lack of data we have available about the bioaccumulation of toxic chemicals in organisms near outfalls.²⁰

Industrial Wastewater Point Discharges

Combine Sewer Overflows (CSOs)

- There are 10 CSOs systems in Puget Sound, primarily in older urban areas.²¹
- On page 10, the WQ document incompletely describes the impacts of CSOs in Puget Sound: "Combined sewer overflows: Episodic discharge of a mixture of untreated wastewaters and stormwater from combined sewer overflow outfalls contributed relatively little to the total

¹⁹ <http://www.ci.bainbridge-isl.wa.us/documents/WRReport2006.pdf>

²⁰ Trim, H., et. al., 2007. Draft Toxic Chemicals in Puget Sound: The Impact of Mixing Zones on Permitted Discharges.

²¹ Trim, H., et. al., 2007. Draft Toxic Chemicals in Puget Sound: The Impact of Mixing Zones on Permitted Discharges.

loading of toxic chemicals to Puget Sound (Hart Crowser et al., 2007).” Ample evidence shows the significant impacts of CSO discharges associated with legacy and ongoing pollution in urban bays.

Direct Contact (Creosote pilings, Ordinance Training)

Other?

C. State and Impact Status

For this section of the WQ Paper (in paper, this is the ““*Documented threats to fresh water and marine water quality in Puget Sound*” section) we suggest a number of other current references

- **Pesticides in waterbodies.** A 2003-2005 study examined the difference in pesticides in urban areas versus agriculture in Washington.²² A major study by U.S. Geological Survey examined pesticides detected in urban streams.²³
- **Regional groundwater quality.** USGS water research paper published in 2000 covered much of the Puget Sound region.²⁴
- **Air in National Parks.** Recent study examined toxic chemicals in snow, lichen, fish and alpine lakes associated with regional and local air pollution.²⁵
- **Use of 305/303(d) List.** Everywhere that this report is mentioned, it should be qualified that the list is not based on representative data collection program and must be viewed as incomplete. On page 4, the statement, “There have been an increasing number of impaired water body listings on the State’s 303(d) lists for temperature, fecal coliform bacteria, and dissolved oxygen in freshwater streams over the last 10 years,” should be modified to indicate that the increase may be based on increased data collection and compilation.
- **Shellfish Beds.** On page 5, the discussion of closed shellfish beds should also include the status of all recreational areas as well.

²² Washington State Departments of Ecology and Agriculture. 2006. Surface Water Monitoring Program for Pesticides in Salmonid-Bearing Streams, 2003-2005. Ecology Publication No. 06-03-036.

²³ Voss, F.D., Embrey, S.S., Ebbert, J.C., Davis, D.A., Frahm, A.M., and Perry, G.H., 1999, Pesticides detected in urban streams during rainstorms and relations to retail sales of pesticides in King County, Washington: U.S. Geological Survey Fact Sheet FS-097-99, 4 p.

Voss, F.D., and Embrey, S.S., 2000, Pesticides detected in urban streams during rainstorms in King and Snohomish Counties, Washington, 1998: U.S. Geological Survey Water-Resources Investigations Report 00-4098, 22 p.

²⁴ Inkpen, E.L., Tesoriero, A.J., Ebbert, J.C., Silva, S.R., and Sandstrom, M.W., 2000, Ground-water quality in regional, agricultural, and urban settings in the Puget Sound Basin, Washington and British Columbia, 1996-1998: U.S. Geological Survey Water-Resources Investigations Report 00-4100, 66 p.

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- **Biota.** A major gap in the WQ Paper is a lack of discussion of biota endpoints. The topics that should be included range from orcas, otters and osprey, salmon and herring to benthic invertebrates. PCBs in fish in Lake Washington, PBDEs in salmon, osprey eggs,²⁶ and fish kills in Hood Canal are other obvious subject areas. Sex altered fish in Elliott Bay should also be included.

Thank you for the opportunity to comment on the draft white paper. We would be pleased to provide references, if needed, for many of the components in the proposed framework that are left blank in this comment letter. Please contact me with questions at (206) 382-7007.

Sincerely,

Heather Trim
Urban Bays and Toxics Program Manager

Attachments

²⁶<http://fresc.usgs.gov/news/newsreleases.asp?NRID=12>

Attachment 1

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).

Mercury and Compounds: Naturally occurring element often used in thermometers, electrical equipment (such as batteries and switching equipment), industrial control instruments, and industrial processes (e.g., Chlor-alkali plants). Released during combustion of fossil fuels (e.g., coal, oil); incineration of municipal, medical, and hazardous waste; and from numerous manufacturing and natural processes. Banned as a paint additive in U.S. in both interior (1990) and exterior (1991) paint. Being phased out of batteries. Removed from catalysts, turf products, and explosives.

Cadmium and Compounds: Naturally occurring element used in metals production processes, batteries, and solder. Often released during combustion of fossil fuels and waste oil, and during mining and smelting operations.

Lead and Compounds: Naturally occurring element historically used in gasoline and paint additives, and still used in storage batteries, solder, and ammunition. Released from many combustion and manufacturing processes and from motor vehicles. Use in paint additives restricted in U.S. in 1971. U.S. restrictions on use in gasoline additives began in 1973 and have continued through the present, with a major use reduction in the mid-1980s.

POM_s (includes PAHs): Naturally occurring substances that are by-products of the incomplete combustion of fossil fuels and plant and animal biomass (e.g., forest fires). Also, by-products from steel and coke production and waste incineration.

Dioxins/Furans: By-products of combustion of organic material containing chlorine, chlorine bleaching in pulp and paper manufacturing, and diesel-fueled vehicles. Also a contaminant in some pesticides.

Nitrogen Compounds: By-products of power generation, industrial, and motor vehicle fossil fuel combustion processes (NO_x). Also, compounds used in fertilizers and released from agricultural animal manures (NH₃).

PCBs: Industrial chemicals used widely in the U.S. from 1929 until 1978 for many purposes, such as coolants and lubricants and in electrical equipment (e.g., transformers and capacitors). In the U.S., manufacture stopped in 1977 and uses were significantly restricted in 1979. Still used for some purposes because of stability and heat resistance, and still present in certain electrical equipment used throughout the U.S.

Chlordane: Insecticide used widely in the 1970s and 1980s. All U.S. uses except termite control canceled in 1978; use for termite control voluntarily suspended in 1988. Use of existing stocks permitted.

DDT/DDE: Insecticide used widely from introduction in 1946 until significantly restricted in U.S. in 1972. Still used in other countries. Used in U.S. for agriculture and public health purposes only with special permits.

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Dieldrin: Insecticide used widely after introduction in late 1940s. Used in U.S. for termite control from 1972 until registration voluntarily suspended in 1987.

Hexachlorobenzene: Fungicide used as seed protectant until 1985. By-product of chlorinated compound and pesticide manufacturing. Also a by-product of combustion of chlorine-containing materials. Present as a contaminant in some pesticides.

Hexachlorocyclohexane: Component of technical-HCH, an insecticide for which use is restricted in U.S., but which is used widely in other countries.

Lindane: An insecticide used on food crops and forests, and to control lice and scabies in livestock and humans. Currently used primarily in China, India, and Mexico. U.S. production stopped in 1977. Use was restricted in 1983; many uses are still registered, but are expected to be voluntarily discontinued in the future.

Toxaphene: Insecticide used widely on cotton

Attachment 2. Toxic Chemical Releases of Puget Sound Basin Facilities

Toxic Release Inventory (TRI) 2006

Total On- and Off-site Releases, including air emissions, surface discharge, injection, onsite landfills and land treatment. This table does not include offsite transport and discharge to sanitary sewers (which are much larger loads). These numbers should be considered minimum numbers as the TRI reporting thresholds are high and information is based on self-reporting. *Reference: <http://www.epa.gov/tri>*

Categories	# Facilities	Chemicals		Total Pounds in 2006
Aircraft Manufacturing Other Aircraft Parts and Auxiliary Equipment Manufacturing	10	Certain Glycol Ethers Chromium Compounds Copper Diethanolamine Freon 113 Hydrogen Fluoride Lead Manganese	Manganese Compounds Methanol Methyl Isobutyl Ketone Naphthalene Nickel Nitric Acid Phenol Tetrabromobisphenol A Toluene	356,892
All Other Motor Vehicle Parts Manufacturing Heavy Duty Truck Manufacturing Overhead Traveling Crane, Hoist, and Monorail System Manufacturing	5	Certain Glycol Ethers Ethylene Glycol Lead Manganese		37,680
Boat Building Ship Building and Repairing	8	1,1-Dichloro-1-Fluoroethane Diisocyanates Dimethyl Phthalate Dioxin And Dioxin-Like Compounds	Methyl Methacrylate Styrene Toluene Xylene (Mixed Isomers)	310,717
Concrete Pipe Manufacturing Cement Manufacturing Ready-Mix Concrete Manufacturing	9	Dioxin And Dioxin-Like Compounds Lead Lead Compounds Manganese Compounds	Mercury Compounds Nitrate Compounds Polycyclic Aromatic Compounds Zinc Compounds	761
All Other Basic Inorganic Chemical Manufacturing All Other Miscellaneous Chemical Product and Preparation Manufacturing Carbon and Graphite Product Manufacturing Other Chemical and Allied Products Merchant Wholesalers	5	Di(2-Ethylhexyl) Phthalate Ethylene Glycol Lead Lead Compounds	Mercury Methanol Nitric Acid Sulfuric Acid Tetrachloroethylene	190,913
Bare Printed Circuit Board Manufacturing Dental Equipment and Supplies Manufacturing Printed Circuit Assembly (Electronic Assembly) Manufacturing Switchgear and Switchboard Apparatus Manufacturing Telephone Apparatus Manufacturing /Other Communications Equipment Manufacturing	9	Ammonia Copper Formaldehyde	Lead Lead Compounds Nitrate Compounds	11,226
Creamery Butter Manufacturing Dry, Condensed, and Evaporated Dairy Product Manufacturing Fats and Oils Refining and Blending Fluid Milk Manufacturing Soap and Other Detergent Manufacturing	5	Certain Glycol Ethers Methanol Nitrate Compounds Nitric Acid		2,560
Brick and Structural Clay Tile Manufacturing	1	Hydrogen Fluoride		51,574
Hazardous Waste Treatment and Disposal Solid Waste Collection/Hazardous Waste Collection / Other Nonhazardous Waste Treatment and Disposal Specialized Freight (except Used Goods) Trucking, Local /Specialized Freight (except Used Goods) Trucking, Long-Distance /Hazardous Waste Collection	5	1,2-Dichloroethane Acetonitrile Barium Benzene Chloroform Chromium Copper Copper Compounds Cyclohexane Dichloromethane Ethylbenzene Ethylene Glycol Lead Lead Compounds	Mercury Methanol Methyl Isobutyl Ketone N,N-Dimethylformamide N-Butyl Alcohol N-Hexane Nickel Compounds Nitric Acid N-Methyl-2-Pyrrolidone Pyridine Silver Toluene Triethylamine Xylene (Mixed Isomers)	256,669
All Other Miscellaneous Fabricated Metal Product Manufacturing	26	Aluminum (Fume Or Dust) Antimony	Manganese Manganese Compounds	1,494,796

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Categories 4/17/2008-5/9/2008	# Fac iliti es	Chemicals	Total Pounds in 2006
Electroplating, Plating, Polishing, Anodizing, and Coloring Fabricated Pipe and Pipe Fitting Manufacturing Finishing Iron and Steel Forging Iron and Steel Pipe and Tube Manufacturing from Purchased Steel /Fabricated Pipe and Pipe Fitting Manufacturing Metal Can Manufacturing Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers Other Nonferrous Foundries (except Die-Casting) Plate Work Manufacturing Primary Aluminum Production Rolled Steel Shape Manufacturing Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum) Sheet Metal Work Manufacturing / Other Aircraft Parts and Auxiliary Equipment Manufacturing Steel Foundries (except Investment) Steel Investment Foundries /Machine Shops /Metal Heat Treating Steel Wire Drawing		Benzo(G,H,I)Perylene Carbonyl Sulfide Certain Glycol Ethers Chromium Chromium Compounds Copper Copper Compounds Hydrochloric Acid Hydrogen Fluoride Lead Lead Compounds Mercury Mercury Compounds Naphthalene N-Butyl Alcohol Nickel Nickel Compounds Nitric Acid Polycyclic Aromatic Compounds Trichloroethylene Xylene (Mixed Isomers) Zinc Compounds	
National Security	4	Copper Copper Compounds Ethylbenzene Ethylene Glycol Lead Lead Compounds Manganese N-Butyl Alcohol Nickel Xylene (Mixed Isomers)	428,639
Fossil Fuel Electric Power Generation Industrial Gas Manufacturing Petroleum Bulk Stations and Terminals Petroleum Lubricating Oil and Grease Manufacturing Petroleum Refineries	13	1,2,4-Trimethylbenzene 1,3-Butadiene Ammonia Benzene Benzo(G,H,I)Perylene Carbon Disulfide Carbonyl Sulfide Chlorine Copper Compounds Cresol (Mixed Isomers) Cumene Cyanide Compounds Cyclohexane Diethanolamine Dioxin And Dioxin-Like Compounds Ethylbenzene Ethylene Hydrochloric Acid Hydrogen Cyanide Lead Lead Compounds Manganese Compounds Mercury Compounds Methanol Molybdenum Trioxide Naphthalene N-Hexane Nickel Compounds Nitrate Compounds Phenanthrene Phenol Polycyclic Aromatic Compounds Propylene Styrene Sulfuric Acid Tetrachloroethylene Toluene Xylene (Mixed Isomers) Zinc Compounds	1,771,352
Flat Glass Manufacturing Glass Container Manufacturing Lime Manufacturing Other Pressed and Blown Glass and Glassware Manufacturing	4	Barium Compounds Lead Lead Compounds Zinc Compounds	2,133
Fabric Coating Mills All Other Plastics Product Manufacturing All Other Plastics Product Manufacturing /Sheet Metal Work Manufacturing All Other Plastics Product Manufacturing /Industrial Mold Manufacturing /Special Die and Tool, Die Set, Jig, and Fixture Manufacturing Fiberglass products manufacturing Plastic materials manufacturing Plastics Pipe and Pipe Fitting Manufacturing Urethane and Other Foam Product (except Polystyrene) Manufacturing	13	Chromium Chromium Compounds Di(2-Ethylhexyl) Phthalate Dichloromethane Diisocyanates Manganese Methyl Methacrylate N-Methyl-2-Pyrrolidone Phenol Styrene Toluene Diisocyanate (Mixed Isomers)	637,300
All Other Converted Paper Product Manufacturing All Other Miscellaneous Wood Product Manufacturing Coated and Laminated Paper Manufacturing Paper (except Newsprint) Mills Paperboard Mills	13	Acetaldehyde Ammonia Barium Compounds Benzo(G,H,I)Perylene Catechol Lead Compounds Manganese Compounds Mercury Compounds Methanol Naphthalene	2,279,122

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Categories	# Facilities	Chemicals		Total Pounds in 2006
Pulp Mills /Paper (except Newsprint) Mills /Coated and Laminated Paper Manufacturing Pulp Mills/Paper (except Newsprint) Mills Sawmills Softwood Veneer and Plywood Manufacturing		Chlorine Chlorine Dioxide Diisocyanates Dioxin And Dioxin-Like Compounds Ethylbenzene Formaldehyde Formic Acid Hydrochloric Acid Lead	Nitrate Compounds Phenol Polycyclic Aromatic Compounds Propionaldehyde Sulfuric Acid Toluene Xylene (Mixed Isomers) Zinc Compounds	
Paint and Coating Manufacturing	5	Certain Glycol Ethers Di(2-Ethylhexyl) Phthalate Ethylbenzene Ethylene Glycol Manganese Compounds Methanol Methyl Isobutyl Ketone	Methyl Methacrylate N-Butyl Alcohol Styrene Tetrachloroethylene Toluene Xylene (Mixed Isomers)	24,092
Wood Preservation	2	Dioxin And Dioxin-Like Compounds Pentachlorophenol	Polycyclic Aromatic Compounds	22

Water Quality Program Comments on PSP Water Quality Paper

Page	Paragraph	Comment
Bigger Deal Comments		
Overall		The paper should include more information on the role of TMDLs in reaching clean water.
Overall		The paper needs to address Hood Canal dissolved oxygen problems more. If the intent is to leave all Hood Canal issues to the Action Area to resolve, we should specifically state that.
Overall		The paper should talk about the authorities and responsibilities under the state Water Pollution Control Act.
Overall		Flow blending discussion should be coordinated with Ecology flow blending policy right now this paper is at odds with agency thinking.
4	5	Be careful about relating number of 303(d) listings to the overall quality of the water. The number of 303(d) listings is most closely related to the number of locations where we monitor.
4	Last	In the final sentence, the paper says that 151 water bodies were listed. This isn't accurate – there are 151 listings, but many waterbodies have more than one listing. There are actually 47 different water bodies listed. For example, Sawyer Lake (one water body) is listed for pathogens and phosphorus (two listings).
8	Last paragraph, last sentence	1. Incorrect information in sentence. Existing metals criteria do include frequency, magnitude, and duration, contrary to this last sentence. However, what IS missing are criteria based on the specific olfactory effect addressed here, and the specific frequency, magnitude, and duration information applicable to this effect. Please correct and clarify. 2. Incorrect wording. Correct the wording in the first parenthesis: change from “(how often effects occur)” to “(how often exposures occur).”
13	2 nd paragraph of “C”	It may be helpful to be more specific about what we know and don't know. We know that water has these emerging contaminants, but we don't know what concentration would be 'safe.' We know the sources of some, but not all emerging contaminants.
12	Groundwater	Author asked for paragraph—provided one below this table to be considered
22	Last bullet	The standards for dissolved oxygen in Puget Sound cover the nutrient issue fairly well – this is not one of the five biggest limitations.
23	1 st paragraph	The statement that nutrient removal has become fairly standard

Page	Paragraph	Comment
	of “wastewater”	practice is not true in Washington. It is true for WWTP in some parts of the country. Only LOTT is using denitrification.
24	3 rd dark bullet	The statement “the cost of providing this level of treatment may be modest” is unsupported. While it may be modest compared to other even more expensive things, it is definitely still expensive.
25	Wastewater	The discussion on Flow Blending should be considered carefully before including in the paper. The advantages/disadvantages in the use of flow blending for managing wet weather flows is an active topic of discussion nationally
25	CSO	The discussion on CSO separation should be considered carefully. Combined sewer separation projects are very important to mitigate wet weather impacts to treatment plants and to allow them to function properly. The text implies that combined sewer separation projects may be misguided in certain circumstances--that would be a significant divergence from current public policy
33	3 rd bullet	Changes to the water quality standards are very time consuming (last one took 15 years) for an agenda with a 2020 deadline.
Accuracy and edits		
1	2	Sediment quality is affect by past <i>and present</i> human activities
1	5	The first sentence is confusing. The authors probably meant “Existing standards and sampling identifies some serious impairments...”.
7	3	The author probably meant “...tracking individual pollutants to specific land uses...” not “...pollutant sources...” Connecting the pollutant source (i.e. cars) to the land use (i.e. roads) is easy – connecting the pollutant (i.e. copper) to the land use is more difficult.
7	2 nd bullet	While many airborne pollutants are from indefinable sources, there are also many airborne pollutants from local, definable sources. We should not forget about these.
10	1 st bullet	This paragraph is true, but doesn’t address the issue. Recommend mentioning WWTPs in South Sound the potential impact of central sound WWTPs in South Sound. I would also mention Hood Canal (no WWTPs, but do have septics). Also a simple statement of most WWTP and near urban areas (esp. central puget sound)
10	3 rd bullet	This section talks about pathogens in general, but doesn’t mention WWTPs.
10	4 th bullet	The first sentence is very confusing – “...incompletely accounted for....” It should simply state that WWTPs are a source of toxics, but clearly not the only source. The bullet title

Page	Paragraph	Comment
		does not match the content of the paragraph (toxics).
10	Last bullet	Here, or elsewhere, the paper should discuss septic and toxics.
12	2 nd paragraph of air deposition	“Fraction” is not a useful descriptor. The paper should say small fraction or large fraction, or if we don’t know, it should say we don’t know.
12	First full paragraph, next to last sentence	In this section on metals the next to last sentence says that effects occur at 2 ppb over background, and the last sentence says criteria are at 4.8 and 3.1 ppb. Without a range of (background + 2 ppb) copper concentrations to compare with the criteria this is uninformative.
13	1 st paragraph of “C”	The second sentence is something we know, not a gap. It should be moved to earlier in the document
18	1	The first part of the second sentence is misleading (“Most larger facilities are operated to remove some nutrients, primarily nitrogen...”). Only LOTT removes a significant amount of the total nitrogen.
18	2	The first sentence should add “well maintained” as this is an important factor.
18	Bullets in the middle of page	The bullets should include denitrification as the way to remove nitrogen from WWTP effluent (such as what LOTT does).
19	2 nd bullet	More clarity would help here. Are we talking about water quality criteria that we have (which some consider too protective and others consider not protective enough) or the many toxics for which we do not have criteria?
19	3 rd bullet	This bullet doesn’t make sense. What does “Clarity... of effective removal” mean? Perhaps the authors intended “identification of cost effective nitrogen removal technology for onsite”?
21	Wastewater	Wastewater. This section needs to acknowledge the role of Washington's Growth Management Act and local planning in determining where urban services like centralized wastewater treatment are provided. Areas outside Urban Growth Boundaries are generally not served by centralized systems. The GMA in fact prohibits urban services outside UGAs. This is important in thinking about how future growth may impact the Puget Sound
23	Wastewater	Specific treatment for nutrients is the exception rather than the norm for current discharges to Puget Sound. Currently, pollutants with "far field" impacts such as nutrients are not typically regulated under current wastewater discharge permits. There are limited exceptions such as LOTT.

Page	Paragraph	Comment
23	Wastewater	Terminology. It should be noted that the use of "Class A" reclaimed water is somewhat misleading. Treatment to Class A is not always required in order to reuse wastewater and eliminate discharges to Puget Sound or its tributaries. Consider dropping the use of "Class A" throughout the document and instead refer to just "reclaimed water".
23	Wastewater	Terminology. Removal of nutrients such as nitrogen may be accomplished without "tertiary" treatment. Secondary treatment plants designed for biological nutrient removal (BNR) may be very effective in removal of nutrients. Suggest dropping the term "tertiary" in favor of "nutrient removal" or "designed to remove nutrients".
23	Wastewater	See above comment. The current and future coverage of centralized sewer around Puget Sound is determined largely by planning under GMA. Urban services such as centralized sewer are not permitted outside UGAs under GMA
23	2st bullet of "wastewater"	To answer the questions in brackets – yes, all WWTPs in Washington have secondary treatment. As the document stated earlier, WWTP are in more urbanized areas – rural areas rely on septics.
30	Wastewater	Terminology. Consider not using the term "tertiary" or "class A" to describe treatment levels. Consider instead using the terms "nutrient removal" and "reclaimed water".
32	Source control	We should actively solicit additional recommendations for the Source Control section.
33	Nutrient bullets	The first bullets need to be: "How human sources of nutrients affect dissolved oxygen levels in Puget Sound (especially South Puget Sound and Hood Canal)."

PSP Ground Water information to fill gaps where authors wanted more information
[Authors and reviewers note more specific description with data on geographic concentrations and magnitude is needed.]

Pages 10-11

• **Septic systems:** There are approximately 472,000 septic systems in the Puget Sound basin, according to previous estimates by the Puget Sound Action Team. Septic systems are not generally designed for nitrogen removal, and leachate contains high levels of nutrients. If systems are not designed well, which may mean poorly draining soils or excessive hydraulic loading, leachate is not properly treated in the soil column. When systems are located near streams and marine waters, the leachate may be a significant source of nitrogen, and if they are improperly designed or maintained, they are a major source of pathogens. *[Authors and reviewers note more specific description with data on geographic concentrations and magnitude is needed.]*

Suggested Changes:

• **Septic systems:** There are approximately 472,000 On-site sewage systems in the Puget Sound basin, according to previous estimates by the Puget Sound Action Team. Standard on-site sewage systems, such as septic tanks, are not designed to remove nutrients. They discharge nutrients,

including Nitrate and Phosphorus, to the soil. If systems are not designed well, which may mean poorly draining soils or excessive hydraulic loading, the sewage is not properly treated in the soil column. When systems are located near streams and marine waters, the sewage may be a significant source of nitrogen and phosphorus. If they are improperly designed or maintained, they are a major source of pathogens. Recently, nutrient removing systems have become commercially available, but few have been installed in Washington to date.

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Groundwater

[Authors and reviewers note the need for more information regarding the relative importance of groundwater relating to the health of Puget Sound.]

Suggested:

Ground water provides a relatively constant flow of cool water to both fresh water streams and marine waters like Puget Sound. Contaminants in the ground water may also be discharged to Puget Sound. The potential for contaminant travel in ground water will vary depending upon aquifer characteristics. Many organic chemicals bind to the soil particles in fine grained soils and are effectively removed. Course material, such as the Steilacoom Gravels near Tacoma, allows ground water to travel very quickly over long distances with little contaminant removal. Nitrate, a stable form of nitrogen, does not bind to soil and will likely to be discharged to Puget Sound with the ground water. Pathogens may be deactivated by the time it takes for ground water to travel to Puget Sound, unless they are from a source that is relatively close to the Sound, like a near shore septic system or travel quickly through coarse gravels.

Topic: Puget Sound Partnership Topic Forum Papers: Analysis of Data Management Needs

From: Stewart Toshach –NOAA/NWFSC

Data/Information Management Needs Identified in Puget Sound Partnership Topic Forum Papers and Suggestions for Further Work to Identify and Document Needs.

Introduction

I am providing this analysis for your consideration as I thought it would be useful to the Partnership as it decides how to proceed on data management.

In any science based decision making enterprise, such as that proposed for the recovery of the Puget Sound by 2020, it is critically important to identify, plan and provide for information management practices, services, tools and technologies.

Identification of actual data and information needs is an important step to be completed before investments are made in system changes or improvements.

The Puget Sound Partnership (PSP) recently published 7 separate Topic Forum papers for public discussion. Through some basic analysis the papers offer a ‘window’ into some of the data that could be needed for Puget Sound science and recovery decisions. The papers also reveal that more work is needed to define data/information management needs.

Analysis Method:

Each paper was searched for the use of common data or information management terminology as follows: “data management”, information management”, “data quality”, “data gaps”, “data inventory”, “data” and, “database”. Table I shows the number of ‘hits’ for the use of each term are shown in Table I.¹

¹ This analysis has not been reviewed.

Then each of the ‘hits’ was reviewed for the context of the use of the term. Where the use of the term identified a possible data need such as at page 8 in the Human Health paper –*“Most of the data characterizing metals are from sediment sampling programs. There is less information characterizing metals in the water column”* the need was compiled in Table II. In addition a brief summary of the possible need was written, eg *“More data needed on metals in water column. Lack of Comprehensive data”*

Note that when a report stated, for example in the Risk Analysis paper at page 8, *“We briefly summarize methods and data sources for each ecosystem attribute below.”*, this comment did not constitute a data or information management need so was not compiled into Table II.

Analysis Results:

While Table I shows some 387 references to common data management terms the great majority of these references are for generic uses of the terms and do not identify needed improvements to data/information quality, systems or gaps.

Table II shows approximately 60 information or data management needs. They identify a typical range of needs from data being inadequate to establish certainty to data not being collected at all to the need to specific data bases to the need to link data to management objectives or principles. Each of these is instructive but they do not define the extent of data or information management needs. In part this is because of the limited questions that were posed to the Authors of the Topic Forum Papers. No questions specifically asked authors to address data management or information management needs. In addition the authors were all asked to answer questions within their specialty or discipline. None were asked to identify needs or gaps with respect to our Puget Sound wide capability to integrate data across multiple disciplines. Therefore it could appear as if integrated cross-discipline data is not needed – which is unlikely to be the case. This is understandable for a couple of reasons. Few if any information specialists have participated as authors in the Topic Forums and the task of understanding how all of the Topics relate to each other is, in fact, a future topic. The Partnership may want to consider including data/information specialists in this upcoming discussion.

The results are instructive and helpful but they are insufficient for the purpose of designing, providing or locating data/information management practices, services, tools and technologies to meet Partnership science (or management) needs. Other methods such as focus groups, surveys and interviews are typically used by data/information management professionals to define data needs within and across disciplines. When put together these are called information needs assessments. In conventional data/information management practice these are considered to be a prerequisite before data/information management investment decisions are made.

In addition to local knowledge about specific Puget Sound Data/Information management needs there is a wealth of information from needs assessments prepared for other environmental recovery efforts that are similar in size and scale to the proposed Puget Sound recovery. These assessments and the lessons learned from deployment are interesting and instructive and could provide valuable information to the PSP as it decides what information and data management practices, services, tools and technologies are needed to support Puget Sound Recovery.

The Puget Sound Science Panel has a task at @ RCW 90.71.280 (1) b “...to assist in developing an ecosystem level strategic program that: (i) addresses monitoring, modelling, data management and research...”, and at @ RCW 90.71.290 “...a strategic science program shall be developed by the [science] panel and may include recommendations regarding data collection and management to facilitate easy access and use by all participating agencies and the public...”

As the Panel and the Leadership Council address data management action items for Puget Sound Recovery by 2020 the value of first completing a formal and detailed enterprise level information needs assessment might be considered before proceeding too far in addressing data management needs.

Again, this analysis and suggestions are offered only as information that may be useful to the Partnership.

Table 1: Number of References to Common Data Management Terms Used in PSP Topic Forum Papers								
Data/Information Term	Human Health	Quality of Life	Species Biodiversity	Land Use, Habitat, Food Web	Water Quality	Water Quantity	Risk Analysis	
Data management	0	NA	0	0	0	0	0	0
Information management	0	NA	0	1	0	0	0	1
Data quality	0	NA	0	0	0	0	0	0
Data gaps	1	NA	0	0	1	12	0	14
Data inventory	1	NA	0	0	0	0	0	1
Data	26	NA	21	11	19	79	42	198
Information	24	NA	18	29	20	14	51	156

Database	2	NA	1	3	5	6	0	17
	54		40	44	45	111	93	387

Table 2: References to Data Needs from Topic Forum Text			
PAGE #	Topic Forum	Reference	Summary of Data Mgt Need
		Key: HH: Human Health, SB: Species and Biodiversity, LU&H: Land Use and Habitat, WQL: Water Quality, WQ Water Quantity, RA: Risk Assessment	
5	HH	Limited data on toxics in shellfish from Puget Sound have been collected and evaluated by the Washington State Department of Health (DOH).	More data on shellfish
7	HH	<i>C. What is the certainty about our understanding of these threats and their status?</i> The certainty of understanding relating to characterizing human health risks varies. Human health risk is dependent on chemical toxicity, pathogen virulence, and level of exposure. However, many years of monitoring data help to shape the understanding of these risks, and in some cases provide a reasonable certainty.	<i>More certainty from monitoring data</i>
8	HH	Metals Most of the data characterizing metals are from sediment sampling programs. There is less information characterizing metals in the water column. Limited site-specific data for metals indicate a potential human health risk from consumption of shellfish in urbanized bays and at hazardous waste sites. Levels of metals in shellfish outside of these sites indicate little risk, but comprehensive data are lacking.	More data needed on metals in water column. Lack of Comprehensive data
9	HH	Fish consumption rates More data about the historical use of resources across different populations would allow for a more accurate assessment of human health exposure for different communities and their cultural uses.	Data needed on historical use
10	HH	"Emerging" contaminants, pathogens, and biotoxins A host of chemicals are present in discharges to Puget Sound that have not yet been assessed for their risk to human health. These include pharmaceuticals and PFCs, amongst others. In addition, there are a number of pathogens that will require additional analysis to determine the risk they pose to human health. One example is <i>Vibrio parahaemolyticus</i> , for which there are data available regarding presence in water, shellfish, and plankton, but the synthesis of that information has not yet occurred.	Synthesis of data on contaminants pathogens and biotoxins

10	HH	Broad risk assessment for toxics in shellfish While a Puget Sound-wide risk assessment has been done for human health threats associated with the consumption of toxics in finfish ⁷² , a similar risk assessment has not been conducted for shellfish.More data are available for metals in shellfish than other contaminants.	Data on shellfish contaminants
10	HH	Toxics and pathogens in crab Data are limited for toxics and pathogens in Puget Sound crab.	More toxic and pathogen data
10	HH	Toxics in additional species Information about toxics in other salmon species such as pink, chum, and sockeye is currently limited. This information is needed to confirm predicted low contaminant levels in these Puget Sound species. DOH work has characterized these as species likely to be consumed, but for which data are unavailable (DOH professional judgment). Lingcod, cabezon, and shrimp are additional species that are consumed, but with little characterization of contaminants.	More data on toxics in pink, chum and sockeye
10	HH	Cumulative impacts Little is known about the cumulative, additive, and synergistic impacts of exposure to multiple contaminants through multiple consumption pathways or direct contact over time. Traditional risk assessment should assume that exposure to multiple contaminants is additive with respect to overall risk when considering the same toxic endpoint (e.g., neurodevelopment). More specific information about interaction of toxics in the body would be helpful in validating this assumption.	Information on cumulative impacts of toxics in humans
10	HH	Toxics in the water column There is a lack of understanding about the presence and concentration of toxics in the water column. Information from PSAMP and NPDES monitoring is available, but it is either site-specific or does not address the specific toxics of concern. More complete information about toxics in the water column may lead to a better understanding of the human health risk from direct exposure, as well as the sources of contamination in fish and shellfish.	Improved data on toxics in water column
11	HH	Reference conditions While some site-specific data are available, the extent to which current conditions in Puget Sound meet or exceed reference conditions is not fully known.	Improved data on Puget Sound reference conditions

14	HH	<p><i>From a scientific standpoint, which management approaches have been documented to have the most effective response?</i></p> <p>Several programs have been documented as effective in reducing threats to human health, within the limitations of effectiveness measurement.</p> <p>Washington State Mercury Chemical Action Plan based on reductions in mercury concentrations in the 2005-2006 biosolids data.</p> <p>Fish consumption advisories, based on awareness of advisories and on success of outreach efforts (including Washington Department of Fish and Wildlife pamphlet, website hits, and grocery store pilot project and evaluation). There are limited data that show these advisories are reducing human health risk. However, there is some indirect evidence of the programs' effectiveness in that species with lower contamination levels are increasingly preferred by consumers</p>	<p><i>Data to show effectiveness of health advisories</i></p>
20	HH	<p>A new European Community Regulation, referred to as the Registration, Evaluation, Authorization and Restriction of Chemical Substances (REACH), was established in 2007. This regulation requires that manufacturers and importers of chemical substances gather information about the properties of these substances to ensure their safe handling and register the information in a central database maintained by the European Chemical Agency. The agency will coordinate in-depth evaluation of chemicals that present a potential threat and maintain a public database for consumers and professionals to provide information on these chemicals.</p>	<p>A database for chemical substances affecting Puget Sound</p>
22	HH	<p><i>What are the gaps between existing programs or plans and the identified needs?</i></p> <p>There are both "general" gaps (such as geographic gaps in data collection) and "specific" gaps (such as lack of information on specific biotoxins) that limit the effectiveness of existing programs and plans.</p>	<p><i>Data gaps in geographic extent of and specific biotoxins</i></p>
23	HH	<p>What criteria should be considered for prioritizing actions to address threats to human health?</p> <p>A comprehensive inventory of data being collected would enhance the coordination of data collection and information between state and local agencies and Tribes.</p>	<p>Comprehensive inventory of data related to human health</p>
24	HH	<p>How will we know we are making progress on human health?</p> <p>We will know we are making progress on reducing threats to human health when... We have reduced the number and severity of data gaps.</p>	<p>Identify and reduce data gaps for human health</p>

3	SB	Marine primary producers: Phytoplankton is the foundation of Puget Sound's pelagic food chain. Its distribution is highly variable, with maximum abundances in the summer. Long-term status and trends are not well known	Long term status and trends of phytoplankton are not well known
4	SB	Food web status Fundamental data are still needed on many basic food web elements, such as phytoplankton productivity. Indicators of marine and freshwater food web status could include predator-to-planktivore and other ratios.	Lacking fundamental data on basic food web elements
5	SB	Assessments of Puget Sound biodiversity are rare, with perhaps the most prominent being the Puget Sound Ecoregional Assessment prepared by The Nature Conservancy and partners. This work highlights areas of the Sound that are understood to both support significant biodiversity and to be vulnerable; due to limitations on data for marine biodiversity, this work focuses on upland areas.	Only limited marine biodiversity data
7	SB	<i>B. Main gaps in our understanding of threats</i> There is much we do not know about the forces that threaten species survival, or about how the interactions between natural and anthropogenic stressors affect populations and alter food webs and biodiversity. ⁵⁷ We do not understand the cumulative effects of stressors and major drivers, the magnitude of impacts from individual stressors, or the relative importance of threats. ⁴ Perhaps the largest gap is in our understanding of the impacts of climate change on biodiversity and species. Current predictions incorporate our best estimates of future changes in the Northwest weather regime, based on global-scale models, combined with our understanding of the impacts of these changes on species and ecosystems. While new empirical data on climate change impacts continue to inform these projections, uncertainties in the data and model assumptions make it difficult to forecast effects precisely.	Data uncertainties limit predictions of impact of natural and anthropogenic stressors on ecosystem
13	SB	An additional benefit of harvest management is that required catch and population abundance data can be useful species-status information for purposes other than harvest management.	Harvest data can be used for other purposes
16	SB	<i>How is the effectiveness of management techniques measured and documented?</i> While a number of agencies and groups monitor species' abundance or health in the Puget Sound ecosystem, little of	PSAMP data not linked to management objectives or approaches

		<p>this monitoring is done with the goal of informing modifications in management approaches.⁴⁹ For example, the Puget Sound Assessment and Monitoring Program (PSAMP) has been monitoring key indicators of water and sediment quality, nearshore habitat, shellfish beds, and the health of fish, seabirds, and marine mammals for almost 20 years. While PSAMP has provided a wealth of information on species health, abundance, diversity, and distribution, these data are not well-linked to management objectives or approaches.⁵⁰</p>	
16	SB	<p>The Washington Department of Fish and Wildlife monitors a network of 18 marine reserves in Puget Sound for research purposes. Scuba divers estimate fish densities, measure individual fish, and identify and quantify lingcod nesting activity.⁸ While these data do have relevance for the impacts of harvest on species, benefits for species or overall population management outside the reserves have not been demonstrated.</p>	<p>Limited data on impacts of harvest on populations outside of reserves</p>
23	SB	<p><i>E. Plans or programs in place to address food web status and biodiversity in the Puget Sound region</i></p> <ul style="list-style-type: none"> • Establishing a Biodiversity Science Panel and a Biodiversity Data Partnership, as well as a Biodiversity Inventory to document all species in the state, and a Biodiversity Monitoring Plan to track the status of those species. <p>The Nature Conservancy has found that Ecoregional Assessments provide a common information base, identify additional data needs, and help to build partnerships essential to conservation.</p>	<p>Biodiversity data partnership is needed to track status of species</p>
34	SB	<p>Build understanding of species, biodiversity, the food web, and the effectiveness of management actions: Conduct research to constrain and define the problem: what is the Puget Sound food web? This research should be designed to provide information about trends, patterns, and mechanisms of change in the food web, so that we can discriminate between natural and human-caused changes.</p>	<p>Need more information on trends, patterns</p>
10	LU & H	<p>Current Status of Puget Sound Threats and Habitat Structure</p> <p>Studies and monitoring of Puget Sound have measured certain aspects of habitat structure (e.g., eelgrass beds), human-induced threats (e.g., impervious surfaces), and ecosystem function (e.g., shorebird colonies). Rarely have ecosystem processes been addressed. Also, information that is Sound-wide tends to be limited in terms of data detail and accuracy, while localized information is often not consistent between different Puget Sound jurisdictions</p>	<p>Ecosystem process data limited in accuracy and detail. Local information inconsistent between jurisdictions</p>
29	LU & H	<p>Habitat Restoration and Mitigation</p>	<p>Project performance</p>

		As these examples show, there is project performance monitoring information, both for habitat structure and resulting functions. However, scientific certainty about project results is difficult to attain as projects differ in what they examine, how they collect and data, and the time over which the project is studied.	difficult to measure – projects collect different data
40	LU & H	Monitoring and Adaptive Management to Ensure Ecosystem Health over Time Measuring our progress in restoring the health of Puget Sound with objective data and information from a comprehensive monitoring and adaptive management plan is critical to ensuring that our strategies are effective and ensuring that our actions are increasingly efficient in the context of reaching recovery goals.	Objective data and information is needed to measure progress
63	LU & H	<i>Science and Research Preliminary Recommendations</i> 1. Create a clear science framework and database from which to measure and act. 11. Establish a centralized and transparent approach to managing information, maps, studies, plans and data related to Puget Sound ecosystem and the Action Agenda. A centralized approach to information management would maximize transparency, accessibility and the sharing of information to improve our scientific knowledge about the Puget Sound ecosystem.	Need a science framework and database Need a centralized and transparent approach to managing maps, studies, plans and data. Improve sharing
5	WQL	Water Quality in Puget Sound Freshwater Systems ...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.	Overall trend analysis limited by lack of consistent date, sample locations and time periods
6	WQL	Sediment Quality The available scientific evidence, combined with the regulatory assessments conducted by Ecology under their Clean Water Act responsibilities, generally supports a conclusion that marine sediments in localized areas of Puget Sound are contaminated. However, there is greater variability in the data for freshwater sediments, making it difficult to conclude the status.	High variability for freshwater sediments prevents status assessment
10	WQL	Septic systems: There are approximately 472,000 septic systems in the Puget Sound basin, according to previous estimates by the Puget Sound Action Team.When systems are	Need data on geographic

		located near streams and marine waters, the leachate may be a significant source of nitrogen, and if they are improperly designed or maintained, they are a major source of pathogens. <i>[Authors and reviewers note more specific description with data on geographic concentrations and magnitude is needed.]</i>	concentration and magnitude of septic tank locations/impacts
13	WQL	<i>C. Gaps in knowledge</i> While new empirical data on climate change impacts continue to inform these projections, uncertainties in the data and model assumptions make it difficult to forecast effects precisely (Lawler and Mathias, 2007).	Climate data is uncertain
30	WQL	Mapping of interjurisdictional stormwater networks. Improved coordination and mapping of stormwater networks across jurisdictions is needed to reduce the potential for spills to travel across waterways through stormwater connections.	Need inter jurisdictional map of storm water networks
32	WQL	Source control To address the human and environmental concerns associated with chemical manufacturing and use, the European Union has moved forward with a regulatory program that requires cradle-to-grave understanding of chemicals prior to allowing their import or use within the European Union. Implementation of the regulation is in its early stages, but a part of the effort that may be of immediate use to the Partnership is the “REACH” database that is being assembled to assess relative risks and potential for source reduction of commonly used chemicals. The Partnership could begin by tracking the REACH database and bringing the available information to bear on decisions in the Puget Sound region.	Need to track chemical manufacturing and use with a REACH type database
	WQL	Improve understanding of the dynamics and levels of nutrients in Puget Sound. How increased nutrient levels affect the Puget Sound food web. In this case we lack both	Need monitoring info on phytoplankton and

		the basic monitoring information on the phytoplankton and zooplankton constituents of the food web and an understanding of the dynamics related to nutrient additions.	zooplankton as parts of food web
34	WQL	<p><i>How will we know when we're making progress?</i></p> <p>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. There are limited water quality monitoring data available for all of the geographic regions of interest, so a carefully thought out water and sediment quality monitoring program should be established against which to compare future conditions in the fresh and marine water bodies of the Puget Sound basin. It is important to compile all of the existing data available, identify geographic or chemical constituent data gaps, and collect baseline data to fill the gaps.</p>	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
4	WQ	<p>Data Gaps and Uncertainties</p> <p>To date, no regional summary exists of the adequacy of freshwater resources in the Puget Sound basin. Much of what we know about the adequacy of water resources in Puget Sound has been assessed at a watershed scale by WRIA (water resource inventory area) or more locally. There are 19 WRIs within the Puget Sound basin (Figure S1-1). However, even with local information, a regional summary of ecological and human water needs is difficult due to:</p> <ul style="list-style-type: none"> • The disparity in water quantity data and its varying geographic distribution, • Regional variation in climate and geology, • The temporal and geographic variability in the needs of different species, and • Institutional and political sensitivities associated with water use and instream flows. <p>For example, the adequacy of groundwater to meet human needs can vary at a local level within a watershed, or even within an aquifer. Some wells may provide adequate supply while others within the same subwatershed may provide inadequate or saline water. Similarly, streamflows may be limiting for human water supply or aquatic species in some tributaries and not in others within a single watershed. Our understanding of whether low flows are adequate for individual aquatic species is further limited by incomplete knowledge of the complex relationship between flow and channel structure and function, offchannel wetland storage, and riparian condition. Full ecosystem function needs to be considered to determine whether flow is "adequate" for species' needs.</p>	Need summary of freshwater resource adequacy and data. Local information does not approximate a regional summary
5	WQ	<p>Current Adequacy of Freshwater Supply</p> <p>The 2004 State of Salmon Watersheds Report lists the Nooksack, Snohomish, Lake Washington, Green, White, Puyallup, Dungeness and Elwha as "water-critical basins" that are over-appropriated. The Stillaguamish and lower</p>	No data to show impacts of appropriations on

		Skagit watersheds are listed as "low flow," and are noted to be experiencing significant pressure for increased water use and declining flows. However, data are not presented to document the impact of these flows on aquatic species.	water critical basins
5	WQ	<p>Data Gaps and Uncertainties</p> <p>Major gaps in our understanding include:</p> <ul style="list-style-type: none"> • Low-flow requirements for aquatic species are not well understood, and they are intricately linked to other elements of the ecosystem. For example, relationships between flow and the four Viable Salmon Population (VSP) parameters (abundance, productivity, spatial structure, and diversity) that are used to determine the relative health of salmonids have not been determined in the Puget Sound region (Shared Strategy, 2007). <p>There is no regional assessment of the adequacy of flow variations for optimum habitat function, although some newer operational permits for FERC licenses and HCPs are considering high- and low-flow release prescriptions (Cushman Hydroelectric Project, Seattle Public Utilities Cedar River HCP).</p> <ul style="list-style-type: none"> • Local data about the effects of flow alterations on native species are available. For example, local empirical data indicate the adverse effects of scouring floods and low spawning flows on smolt production (e.g., Seiler <i>et al.</i>, 2005). However, such information has not been quantified or extrapolated more regionally. • There are no known studies that address the potential adequacy of flows for aquatic habitat in the future. Threats such as increased groundwater and surface water withdrawals due to growth, associated land use impacts, and climate change may impair flows in watersheds where this is not currently an issue. 	<p>VSP parameters for Salmon not determined for Puget Sound region. Only local data is available for low flow impacts on native species.</p> <p>No studies (and data?) on adequacy of flows for aquatic habitat for future</p>
6	WQ	<p>Future Demand for Fresh Water</p> <p>Data Gaps and Uncertainties</p> <p>Major gaps in our understanding include:</p> <ul style="list-style-type: none"> • There is no statewide program that compiles and reports water use information (Lane, 2004). Where watershed planning has occurred (under RCW 90.82), local communities have attempted to identify local problem areas for water supply and develop demand solutions. However, watershed planning under RCW 90.82 is not occurring in all watersheds in the Puget Sound region, nor are the data consistent between watersheds planning under the act, and so data on potential water supply shortfalls are not available consistently throughout the Sound. • Water system plans are numerous and not regionally compiled. Water supply management is typically addressed at the scale of a retail or wholesale service area of a water system through a water system plan. 	<p>No state wide water use information. Data inconsistent between watersheds</p> <p>No compilation of water system plans at</p>

		<p>The plan addresses population projections, demand forecasts, supply sources, and infrastructure requirements. There are over 2,300 Group A water systems (water systems with 15 or greater connections) that have prepared water system plans in the Puget Sound region (WDOH, 2008). The Washington State Department of Health is responsible for approving water system plan updates once every six years. However, they do not compile water system information at a regional scale. Comprehensive Irrigation District Management Plans address the adequacy of water supply for agriculture in the Dungeness and Skagit River watersheds.</p> <ul style="list-style-type: none"> • Water rights provide an accounting of permitted water withdrawals. However, actual water withdrawals may differ from the water right, and illegal water use occurs. • Regional water supply planning is not occurring everywhere. In some areas such as central Puget Sound, regional water supply planning is comparing regional water demand with regional water availability (CPSWSF, in process). This has not occurred in other areas in Puget Sound. • Permit-exempt water use is not well accounted for. More current instream flow rules call for tracking future installation and use of permit-exempt wells. Reservations for new domestic and municipal supply have been established in those basins, and new uses are tracked through a reservation as a condition of the instream flow rule. Other watersheds that do not have instream flow rules, or have older flow rules, have no method of accounting for current or future permit-exempt water use. 	a regional scale
8	WQ	<p>Watershed Scale Assessments</p> <p>Numerous studies and planning processes have addressed aspects of freshwater supply needs, some focusing on species' needs and others including human water uses. Table S1-1 describes these assessments and indicates where these studies and planning processes have been conducted in the Puget Sound region and general outcomes by WRIA. Each has a different geographic coverage and uses different methodologies for identifying flow needs and inadequacies. Lack of inclusion of a watershed in a study or a planning process does not necessarily indicate that there are water availability issues in that geographic area.</p>	Different geographic coverage and methodologies for identifying water flow needs
8	WQ	<p>Water Quantity Data</p> <p>The collection and analysis of data on freshwater quantity, and the use of this information in planning, occurs on geographic scales ranging from individual point locations to coordinated regional monitoring. Surface water data are monitored through stream gages maintained by federal, provincial, state, and local agencies. These gages provide point data that are often used to infer flow conditions in some portion of the upstream area. Where data do not exist, it is possible to use models to create streamflow records based on rainfall, stream gage data, and runoff characteristics from a similar watershed. There is no statewide ambient groundwater monitoring program and</p>	No statewide ambient water quality monitoring so lack of data. Monitoring not uniform

		generally, there is a lack of ambient groundwater monitoring data for Puget Sound. Where groundwater is monitored within Puget Sound, it is not monitored uniformly. Monitoring is primarily performed by local or state agencies. It typically is driven by site-specific needs and limited in scope to particular management objectives (e.g., nitrates, chlorides for seawater intrusion, or other contaminants of concern).	
9	WQ	<p><i>F. What is the certainty of our understanding?</i></p> <p>As described in earlier sections of this report, there is little certainty regarding freshwater supply, or its adequacy for instream needs and out-of-stream beneficial uses at a regional level. In the Puget Sound region, most ecological assessments and studies have been broadly focused on habitat conditions and impacts to salmon species listed under the Endangered Species Act, and have not addressed water quantity and streamflow issues. As a result, the information regarding the extent and nature of streamflow issues is in most cases general in nature (Lombard and Sommers, 2004). The salmon limiting factors analysis (WSCC, 2005), which provides the most detailed statewide assessment, is a snapshot in time of habitat conditions. In those places where quantitative models and empirical data confirm conclusions, it is reasonable to hold them with confidence. However, given the disparity of data across the Puget Sound region, whether it is gage measurements of freshwater supplies or studies conducted to establish flow-biota relationships, it may not currently be possible to apply site-specific analysis to other areas in the region.</p>	Disparity of data across the Puget Sound region means that site specific analysis cannot be applied across the region
9	WQ	<p><i>G. What are the main known gaps in our understanding?</i></p> <p>Specific topics were detailed earlier in this report. In summary, the main gaps include:</p> <ul style="list-style-type: none"> • Data that indicate groundwater levels, trends, and depletion on a regional scale; • Localized hydraulic continuity between surface water and groundwater; • A quantitative correlation between streamflow and fish productivity; • A quantitative understanding of geomorphology and fish needs during high flows; • Identification of flow impairments (both low and high flow problems) within the Puget Sound watershed (similar to the inventory of low flow impairments conducted by the King County Tributary Flow Committee (2006) in WRIAs 8 and 9); <p>Regional understanding (survey) of water system plans and watershed plans: Where is current water supply inadequate to meet projected demand between now and 2020;</p> <ul style="list-style-type: none"> • Evaluation of freshwater requirements for estuary health; and • The quantity of water used to meet consumptive needs. 	Gaps in groundwater data levels trends and depletion. Data to support streamflow and productivity for fish. Data needed to relate geomorp to fish needs at high flow. Low flow impairments. Water availability projections.
28	WQ	<i>Watershed Planning and Implementation</i>	Most WRIA's

		Watershed planning is voluntarily occurring in some watersheds in Washington State under RCW 90.82 (see Table S1-1). Where watershed planning has occurred, citizens, Tribes, local governments, and state agencies have worked together in WRIAs to develop watershed management plans that address the quantity of surface and groundwater. Local groups undertaking this type of planning have addressed water quantity issues in their plans, and some have also performed supplemental assessments of instream flows, water quality, storage, and fish habitat needs (Ecology, 2007a). Most plans address data gaps with actual projects to fill these gaps. Most of these WRIA groups are just beginning to implement the watershed plans they have developed; therefore the effectiveness of the plans is currently unknown and will likely vary over the region.	watershed plans identify data gaps – but effectiveness of plans is unknown and will likely vary over region
33	WQ	Review of a number of freshwater management plans ¹⁴ indicates a lack of coordination or integration among existing plans at the regional level. None of the planning programs to date have provided a consistent summary of current water use, projected future water use, current supply, and potential shortfalls in meeting projected demands or instream flow needs for the Puget Sound region at any scale (across all WRIAs, action areas, or other jurisdictional areas). This can be attributed to both programmatic inadequacies and to disparities in the scale at which different aspects of water quantity are addressed by programs in the Puget Sound region. Instream needs ¹⁵ are typically addressed at a subwatershed scale, not a WRIA scale. However, municipal water use is addressed at the even smaller scale of a water service area. Individual water users operate at the smallest scale, their own projects. Individual water use data for water systems in Puget Sound have not been summarized at a more regional level (Lane, 2004), nor have the data been correlated with watershed-scale instream needs or streamflow.	Freshwater mgt plans do not provide consistent summary of water use projected use supply and etc. Individual water use data has not been summarized at a regional level. Data has not been correlated to watershed instream needs or flow
42	WQ	Identify benchmarks for flow improvements and evaluate them. (Short-term) Analyze streamflow trends for all of the major tributaries to Puget Sound and compare to instream flows set by rule. Identify metrics that indicate the benefits of flow improvements. Quantify those benefits for individual species. Collect the data that will quantify the benefits of flow improvements for individual species.	Identify metrics and collect data to quantify benefits to individual species
42	WQ	Conduct a regionally consistent assessment of water use and future water needs, and availability. (Long-term) • Estimate the quantity of ground and surface water use and future water availability by watershed (WRIA) or regional management area (action area) in the Puget Sound region. Integrate findings about water needs with reclaimed-water planning and stormwater planning.	Develop a groundwater monitoring program database

		<ul style="list-style-type: none"> • Develop an integrated and regionally accessible groundwater monitoring program (including some targeted streamflow monitoring) and associated database. 	
43	WQ	<p>Model climate impacts uniformly in the ESU. (Long-term) Project the effects of a changing climate on streamflow over time by applying the model created by The Climate Impacts Group (CIG) at the University of Washington (Palmer, 2007) to all major watersheds in the Puget Sound region. Maintain a database of the information developed from the model that is available (through web access) to resource agencies and water suppliers. Update the assessments every 5 or 10 years to reflect new data and knowledge.</p>	Maintain a database of information developed for the Climate impacts Group at UW.
43	WQ	<p>Require metering and reporting for 80 percent of water use (by volume) in all watersheds. (Immediate) Begin with “fish critical” Puget Sound watersheds (Nooksack, Snohomish, Cedar/Sammamish, Duwamish/Green, Puyallup/White, Chambers/Clover, Quilcene/Snow, and Elwha/Dungeness). Create a web-enabled database for metering data.</p>	Create a web-enabled database for data on metered water use in fish critical watersheds.
2	RA	<p>This first iteration of the risk analysis is a mix of qualitative and quantitative information; as more data are amassed in the latter half of 2008 and into the future, increasingly quantitative analyses will be included in the risk analysis so that better estimates of the potential ecosystem response to threat mitigation are available to help inform decisions on priority actions.</p>	More qualitative and quantitative information is needed
2	RA	<p>We summarize status for several attributes of each ecosystem component, depending on the availability of information. Gaps in our understanding of status are noted for those attributes lacking information.</p>	Details of data gaps – go to specific tables in Risk Analysis report
3	RA	<p>For many attributes, information either is not available throughout the region or it has not been compiled and summarized. Such gaps in our understanding of ecosystem status are noted in subsequent tables to accurately reflect this source of uncertainty.</p>	Data gaps are prevalent
7	RA	<p>We aim to document several sources of uncertainty that should be kept in mind when interpreting the results of this risk assessment: (1) information is insufficient or lacking to</p>	Data is insufficient or lacking

		describe the status of an attribute (e.g., in many cases, trends in condition or a reference condition for the attribute is not known, thus it is difficult to relate the current abundance to status	
9	RA	For those data that did not fit cleanly into Action Areas (e.g., county-based data may overlap with 2 or more Action Areas), some data manipulation was required, and this is noted in the corresponding summary tables.	To fit data, data manipulation is needed
8	RA	It is important to note that some of the data available are proxies or surrogate metrics for the attribute, and thus should be considered to be potential, rather than actual threats to ecosystem components. For example, one of the metrics summarized for the toxic pollution attribute is the number of permitted hazardous waste facilities by Washington Department of Ecology. This number is likely to be correlated with the risk of a hazardous chemical spill, but it is not a direct count of how many spills actually have occurred.	For some attributes only proxy data is available
10	RA	Sources of uncertainty in threat/driver assessment (1) Information does not exist or is insufficient for several potentially important threats/drivers, (2) metrics available to summarize spatial information are proxies or surrogates for a potential threat or driver, but are not a direct measure of that threat,	Data gaps contribute to uncertainty
11	RA	As for many other ecosystem components, there is little/no information on reference condition or trends in water quality attributes; making interpretation of its status difficult. In addition, different data sources can produce different indications of status (e.g., WA DOE 303d data and the PS Update), so further work is needed to reconcile the implications of different results from different sampling approaches and sources.	Little or no information for reference conditions for water quality



WASHINGTON FOREST PROTECTION ASSOCIATION

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May 5, 2008

Puget Sound Partnership
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RE: Comments Regarding Initial Discussion Drafts: Habitat and Land Use, and Water Quality

Dear Puget Sound Partnership:

Thank you for the opportunity to comment on the Initial Discussion Drafts relating to Habitat and Land Use and Water Quality. WFPA represents private forest landowners who grow and harvest trees on approximately 4.2 million acres in Washington State. We are committed to sound forest management that protects public resources, is sustainable, and keeps the industry economically viable in Washington State. As such, we have a significant interest in the Puget Sound Partnership's Action Agenda for restoring Puget Sound.

To start, we would like to commend the Partnership and its constituent entities in tackling the important and difficult task of restoring Puget Sound. Many of WFPA's member companies have been in existence in Washington for over 100 years, and because they desire and intend to be here for at least another 100 years, share a deep commitment for protecting the quality of life in the state. For a large area of Washington State, Puget Sound is truly a cornerstone of the quality of life we all enjoy.

Habitat and Land Use Discussion Draft

We acknowledge that timber harvest can have an impact on riparian and upland ecosystems which can be transferred to Puget Sound (Question S1 - Status of Land Use/Habitat in Puget Sound). Having said that, it is critical that the Discussion Draft, the Action Agenda, and ultimately all of the Partnership's actions recognize that Washington State currently has a robust program designed to minimize and mitigate the impact of timber harvest, specifically on riparian ecosystems. The process impacts listed in table S1-1 with respect to timber harvest are quite generalized potential impacts that in large part are avoided or mitigated through the existing regulatory programs. Additionally many of these impacts are functions of historic practices, which are also addressed within existing regulations that provide for restoration. While this program was not designed explicitly with the restoration of Puget Sound in mind, it is designed to meet salmon recovery and water quality goals, and to generally ensure properly functioning riparian systems. This program is embodied in the state's Forest Practices Act (RCW 76.09), implementing regulations (WAC 222), and programs.

In its discussion of the forest practices program the Discussion Draft appears to omit the last 21 years of history (Initial Discussion Draft – Protecting the terrestrial and freshwater ecosystem: State and Local Laws, page 35, Protecting terrestrial and freshwater aquatic ecosystems from human impacts:

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Federal regulations, pages 36-37, and Habitat and Land Use, pages 44-45). The forest practices program has undergone substantial change since the 1987 TFW revisions. Notably, the Forest Practices Act, regulations, and programs were all substantially revised between 1999 and 2001 with the adoption of the Forests & Fish Agreement.

The goal of Forests & Fish is to meet the requirements of the Endangered Species Act as well as the Clean Water Act. In order to meet these goals, the Forests & Fish Agreement resulted in modified rules and regulations related to:

- The protection of riparian areas, unstable slopes and wetlands;
- The construction, maintenance and abandonment of forest roads;
- The application of forest chemicals, and;
- The implementation of a formal adaptive management program to ensure that the program adapts through time according to new scientific learning.

Forests & Fish covers about 6.1 million acres of forest land on the west side of the crest of the Cascade - all private and state forestlands in this region. Many of these lands ultimately impact Puget Sound. Washington's forest practices program is the only program in the country to operate under a Habitat Conservation Plan approved by the U.S. Fish and Wildlife Service and National Marine Fisheries Service, providing ESA coverage for all fish and seven amphibian species.

It is our view that having identified timber harvest as a threat under Question S1 (Status of Land Use/Habitat in Puget Sound), the Discussion Draft must recognize the fact that Forests & Fish is designed specifically to address these threats in Questions P1 (Policy Approaches to Address Land Use and Habitat: What is currently being done?) and P2 (Needs Assessment and Actions: What are the gaps?). Furthermore, the Discussion Draft must recognize that the Forests & Fish adaptive management program is designed to address the issues raised in Question S2 (Management Approaches Addressing Land Use/Habitat Protection and Restoration).

We have attached a copy of Review of the Scientific Foundations of the Forests and Fish Plan which was prepared by CH2M Hill on behalf of the WFWPA. We hope that this document will prove useful in understanding how the specific prescriptions enacted under Forests & Fish will address the habitat and ecosystem impacts identified in the Discussion Draft. We have also included a copy of the Forest Practices Habitat Conservation Plan and Final Environmental Impact Statement. Both of these documents describe in great detail the state forest practices regulations and the scientific underpinnings for them.

We also recommend that the final draft take into consideration the fact that there are several other Habitat Conservation Plans (HCPs) for forested landscapes, all of which are designed to protect aquatic species. A number of these HCPs are geographically located in areas that will have positive implications for the recovery of Puget Sound. Approved HCPs on private forestland cover approximately 723,000 acres (approximately 9%) of forestland in Washington State. Industrial Landowners with HCPs include: West Fork Timber Company, Plum Creek Timber Company, Port Blakely Tree Farms and Green Diamond Resource Company. In addition to private land HCPs, the

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DNR entered into a multi-species HCP covering 1.6 million acres (approximately 70%) of state trust land managed by the DNR. Municipalities having completed HCPs for nonfederal forestlands include the City of Seattle with a 90,500 acre Cedar River watershed HCP and the City of Tacoma multi-species HCP in the Green River watershed, which covers 14,188 acres.

Table 1. Completed Forestland Habitat Conservation Plans

Company	Species Covered
West Fork Timber Company, LLC (formerly known as Murray Pacific)	<p>The 54,610-acre West Fork Timber HCP covers all species (vertebrates and invertebrates) and the list of protected species runs into the hundreds. However a partial list includes:</p> <p><i>Bull Trout, Northern Spotted Owl, Gray Wolf, Marbled murrelets, Golden eagle, Grizzly bear, Northern Goshawk, Osprey, California wolverine, Vaux's swift, Pileated woodpecker, Western bluebird, Olive-sided flycatcher, Little willow flycatcher, Larch Mountain salamander, Pacific fisher, Townsend's big-eared bat, tailed frog, Cascades frog, Vandyke's salamander, Northern red-legged frog, Columbia pebblesnail, Fender's soliperlan stonefly.</i></p>
Plum Creek Timber Company	<p>The Plum Creek HCP includes land from 32 watersheds totaling 418,690 acres along the Interstate 90 corridor between Seattle and Ellensburg. Of that total, 148,300 acres are owned by Plum Creek, 218,700 acres belong to the Forest Service, 45,300 acres to the State of Washington and private landowners, and 6,683 acres account for various lakes. The Plum Creek HCP covers 315 vertebrate species of which five are federally listed as threatened or endangered. A partial list of the species covered in Plum Creek's HCP includes:</p> <p><i>Coastal-Puget Sound population of Bull Trout, Northern spotted owl, Gray Wolf, Marbled murrelets, Golden eagle, Grizzly bear, Northern goshawk, Osprey, California wolverine, Vaux's swift, Pileated woodpecker, Western bluebird, Olive-sided flycatcher, Little willow flycatcher, Pacific fisher, Townsend's big-eared bat, tailed frog, Cascades frog, Vandyke's salamander, Northern red-legged frog, Columbia pebblesnail, Fender's soliperlan stonefly</i></p>
Port Blakely	<p>The HCP covers the 10,671-acre Robert B. Eddy Tree Farm in Grays Harbor and Pacific Counties. The property is dominated by second growth Douglas fir and western hemlock. The Port Blakely HCP covers multiple species, including:</p> <p><i>Coastal-Puget Sound population of Bull Trout, Northern spotted owl, Gray Wolf, Marbled murrelets, Golden eagle, Grizzly bear, Northern goshawk, Osprey, California wolverine, peregrine falcon, Vaux's swift, Pileated woodpecker, Western bluebird, Olive-sided flycatcher, Little willow flycatcher, Pacific fisher, Townsend's big-eared bat, tailed frog, Cascades frog, Vandyke's salamander, Northern red-legged frog, Columbia pebblesnail, Fender's soliperlan stonefly.</i></p>
Green Diamond (Simpson)	<p>The HCP covers Simpson's 262,000 acres in Mason, Thurston, and Grays Harbor County. The HCP covers 51 species of fish and wildlife, including the Coastal-Puget Sound populations of Bull Trout, marbled murrelet, Chinook salmon, and Hood Canal summer run chum.</p>

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Company	Species Covered
Department of Natural Resources	<p>The DNR HCP covers 1.6 million acres of state trust land. The HCP provides protection for the following federally listed species:</p> <p><i>Coastal-Puget Sound Bull Trout, Northern spotted owls, marbled murrelets, Oregon silverspot butterfly, Aleutian Canada goose, peregrine falcon, Bald eagle, gray wolf, grizzly bear, and Columbia white tailed deer.</i></p> <p>The HCP also conserves habitat for other species in western Washington including western Washington runs of several salmonids, other federal and state candidate species, and other unlisted species west of the Cascade crest.</p>
City of Seattle	<p>The City of Seattle HCP covers the 90,500 acre Cedar River watershed. The HCP provides significant benefits to 83 species. A partial list includes</p> <p><i>Coastal-Puget Sound population of Bull Trout, Northern spotted owl, marbled murrelet, northern goshawk bull trout, Coho and Chinook salmon, steelhead trout, bald eagle, peregrine falcon, grizzly bear, gray wolf, and a host of other birds, fish, mammals, amphibians and reptiles</i></p>
City of Tacoma	<p>The City of Tacoma HCP covers 14,188 acres in the Green River Watershed. Covered endangered and threatened species include:</p> <p><i>Coastal-Puget Sound population of Bull Trout, Gray wolf, bald eagle, marbled murrelet, northern spotted owl, grizzly bear, Chinook salmon, bull trout, Canada Lynx. Many other species are also covered in the HCP.</i></p>

Finally, we are concerned with the recommendation to “Consider enacting at a state-level a single, integrated, set of regulations that apply in to (sic) the lands, streams and marine areas within Puget Sound to replace our present fragmented system of regulations” including the Forest Practices Act. (Initial Discussion Draft – Habitat and Land Use, Page 67). As described above, the Forest Practices Act and implementing regulations have been specifically designed to protect riparian functions that have the potential to impact Puget Sound. In all likelihood, this program will sufficiently ensure that Puget Sound is restored so long as other factors are addressed. The Forests & Fish adaptive management program is created to determine whether this is in fact the case. In our view, it would be imprudent to tinker with a system that is currently contributing to the Partnerships goal of restoring Puget Sound in an attempt to create a unified regulatory system. For this reason, we do not support this recommendation.

Water Quality Discussion Draft

We believe that the Water Quality Discussion Draft has appropriately recognized that the greatest threats to Puget Sound water quality are not related to forest practices on forested landscapes. Having said that, we feel it is important that the discussion draft recognize the fact that many of the habitat-based regulations and plans mentioned above have a direct positive impact on water quality. For example, the Forests Practices Habitat Conservation Plan was designed specifically with Clean Water Act compliance in mind.

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We also believe it is important to recognize that the Forests & Fish adaptive management program is conducting several multi-year monitoring studies to determine whether forest practices are meeting water quality goals. The Puget Sound Partnership should defer on this process for the forested landscape.

We would be happy to provide any additional information or answer any questions that you might have, and look forward to tracking the progress of the Puget Sound Partnership.

Very truly yours,



Josh Weiss, JD
Director of Environmental Policy

cc: David Dicks, Director, Puget Sound Partnership
Bill Wilkerson, Puget Sound Partnership Leadership Council
Bill Dewey, Puget Sound Partnership Ecosystem Coordination Board
Sam Anderson, Puget Sound Partnership Ecosystem Coordination Board
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May 6, 2008

Ms. Martha Neuman
Action Agenda Director
Puget Sound Partnership
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Olympia, WA 98504-0900

Dear Martha,

On behalf of the 4,500 member companies of the Master Builders Association of King and Snohomish Counties (“MBA”), following are some initial comments on the Water Quality and the Land Use/Habitat Protection and Restoration topic forum discussion papers. We appreciate the opportunity to comment on these preliminary proposals.

PSRC Vision 2040 plan

We strongly support the idea of directing new growth to urban areas and promoting responsible, compact development patterns to help preserve forest and pristine lands in rural areas. However, we are concerned about language in the Land Use Discussion Paper describing Vision 2040 as a plan that “reduces growth levels in rural areas and supports maintaining the current urban growth boundaries.”

First, while we agree most growth should be directed to urban areas, we must also recognize that a certain, limited amount of growth will continue to occur in rural areas. As such, our goal should be to identify sensible growth levels in these areas and to engage in a meaningful dialogue about how this growth should occur. For example, given long-term population projections, large lots in rural areas may ultimately cause more harm than good.

The problem with 2.5- or 5-acre zoning is that once it is established, it is very difficult, if not impossible to change in the future as we grow. Allowing this type of large-lot zoning outside existing urban growth areas would be very shortsighted because it only serves to promote sprawl and place added development pressure on our most pristine forestlands. Large lot development can also cause more harm than good as impacts are spread across a larger area, potentially thwarting conservation efforts vital to the environment and our region’s quality of life.

Second, it was never the intent of the Growth Management Act to rigidly maintain current urban growth boundaries. Our urban growth areas must remain flexible as we continue to grow and be allowed to expand where appropriate, or to be re-shaped to allow for more sensible boundaries.

There are a variety of measures we can take to better accommodate growth and reduce barriers to infill development throughout the region. For example, local jurisdictions should reexamine height restrictions to allow greater density in urban areas. Also, concurrency should not be a state mandate because all this policy serves to do is to promote use of the single-occupant vehicle, which creates sprawl. Instead, projects should be allowed to move forward based on what city or county decision makers determine they can tolerate, want to do or need to do in order to satisfy their GMA housing requirements. Additionally, the Action Agenda should call out, recognize and adhere to growth targets established by the Washington State Office of Financial Management.

Single, integrated set of regulations

We have serious concerns about the recommendation to adopt a single set of regulations to protect the ecosystem of Puget Sound. The MBA believes that local control allows for local innovation when it comes to critical areas regulations, the Growth Management Act, NPDES stormwater permits and so on. We have always maintained that performance based requirements, rather than prescriptive regulations, are significantly more effective at achieving any desired ecological goal.

For example, we believe local jurisdictions should have the ability to provide greater flexibility in determining the size of no-build buffers around critical areas, depending on the quality and function of the critical area. We have long advocated for smart buffers that enable environmental protection and also allow property owners to responsibly use their land. Larger, one-size-fits-all buffers, which would likely result were this recommendation implemented, have the potential to restrict land availability for much-needed housing in our region without providing any additional environmental benefits.

Tools like “buffer averaging,” where for example, a property owner makes a buffer larger in one area and smaller in another to make room for a home improvement, should be allowed if it can be demonstrated that wetlands still receive the same protections (i.e. meet the no-net-loss standard). Another such tool would be allowing buffer reductions, if wetland functions can be improved. We are concerned that a single, integrated set of regulations would hinder this type of local innovation and not be based on protecting the subject land’s ecological function.

At the same time, we are concerned that a one-size-fits-all approach would hurt local governments’ ability to adequately balance other important GMA goals, such as directing growth to urban areas, providing adequate housing for residents, promoting economic development and preserving our rural and forestlands.

In our view, local government is already overburdened with GMA planning, and adding one more layer of government would only serve to exacerbate the situation. A single set

of regional regulations is just an outdated method of concentrating power in the hands of a few, defeating the trend toward local governance and adaptive management for performance based results.

Finally, we are concerned about language in the Land Use Discussion Paper stating, “Where impacts are allowed to occur, net improvement of ecosystem processes, structures and/or functions should be required as a project outcome.” The GMA creates a duty to protect, not enhance or restore, critical areas. Going beyond this standard, particularly inside urban areas, forces us to make difficult choices. Moreover, it unfairly burdens a few to fix the sins of the many.

Instead of pursuing a prescriptive approach, we believe the Partnership should explore opportunities to incentivize development and redevelopment that restores degraded habitat, for example, with such things as smaller buffers or expedited permits.

Low Impact Development

The Land Use Discussion Paper includes a recommendation to require the use of low impact development. We strongly disagree with taking a mandatory approach to low impact development and cannot support an Action Agenda that contains this recommendation.

Our association supports measures to encourage greater use of low impact development (LID) techniques, where appropriate. The MBA already promotes LID through our Built Green® program and through our educational offerings.

However, as I emphasized throughout the first Puget Sound Partnership process, we would strongly oppose any attempt to require LID. While there are benefits to be gained from LID, we must also recognize its limitations. Infiltrative LID techniques do not work well over till soils or where water may be delivered to steep slopes subject to landslides. The 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.

Additionally, some LID features, such as infiltrating roof runoff, are in many cases simply too expensive for dense urban infrastructure construction. Also, some fire districts, for example, are not receptive to narrower roadways, a LID feature that would lessen impervious surface. Furthermore, forcing certain LID features, such as rain barrels or rain gardens, on homeowners unlikely to use or maintain them is not realistic.

Finally, it is unclear whether LID benefits in urban areas could be of a scale capable of having meaningful impact on Puget Sound.

That said we recognize LID techniques can be effective in naturally treating pollutants in stormwater and should be encouraged where appropriate. We believe the 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.

Vested Rights Doctrine

The discussion paper recommends providing for a later vesting date for compliance with critical areas and shoreline regulations. We strongly oppose this approach and cannot support an Action Agenda containing this recommendation.

Land use applications vest to current regulations, only when they are substantially complete. Complete applications can and often do include delineation and plans for critical areas and geotechnical studies, assuring protection of ecosystem processes, structures and functions.

Landowners spend significant resources planning for and obtaining land use approvals under existing codes. A later vesting date that would allow appeals to the Growth Management Hearings Board or legislative bodies would have the effect of slowing the permitting process, effectively increasing uncertainty and cost for developers. In many jurisdictions, the permitting process is already unduly long, difficult and expensive. This requirement would only serve to drive up housing costs and hurt our state economy.

Also, it is important to note that current vesting laws in Washington do not apply to valid health, safety and welfare regulations or the State Environmental Policy Act.

There may be justification for expediting permits under certain circumstances, namely compliance with LID techniques, but the process of delaying vesting for other projects is not justified.

If a later vesting date were adopted, under what process would the new date be established? Is there significant scientific evidence showing that a later vesting date would significantly improve ecological protections?

Delaying the point at which projects could vest would completely undo previous efforts to provide more predictability and certainty for landowners while providing greater opportunities to those seeking to stop development. Furthermore, the Legislature already considered and rejected this concept. We believe it would be inappropriate for the Partnership to attempt to circuitously adopt it.

We believe changing the vested rights doctrine, as recommended in the Land Use Discussion Paper, would be completely shortsighted and irresponsible. We urge the Partnership to reject this recommendation.

Off-site mitigation programs

The Land Use Discussion Paper recommends expanding the availability of off-site mitigation programs. The MBA supports efforts to create more and better options for mitigation, and to that end we are participating in the Washington State Department of Ecology's Mitigation That Works Stakeholder Forum. In order to be successful, we believe that any adopted program must offer applicants a timely and predictable process.

Governance Recommendation

We find it very curious, to say the least, that the Land Use Discussion Paper recommends concentrating power in a single agency to ensure Puget Sound ecosystem policy goals are being met. According to the discussion paper, the underlying concerns this measure is intended to address is the lack of coordination among governmental agencies that play a role in protecting and restoring Puget Sound. It is our understanding that this is the very reason the Puget Sound Partnership was created! As such, it would appear this recommendation discounts the ability of the Partnership to deliver on its mission before it has even had a chance to produce an Action Agenda. Instead, the drafters of the Land Use Discussion Paper suggest that what is needed is an overarching regulatory agency. We strongly disagree.

As an original member of the Puget Sound Partnership, we supported the creation of the Partnership in order to coordinate the numerous activities of agencies charged with managing the Sound. Now, one agency is guiding the recovery of Puget Sound and helping to prioritize actions that would have the greatest positive impact, while considering their consequence on both population and economic growth. We believe the current Partnership should be given the opportunity to do its job before advancing a recommendation that neither my association members nor the broader business community can support.

Education and Outreach

The MBA maintains that public education and outreach is critical to our success in improving the health of Puget Sound. In our view, everyone has an important role to play when it comes to the Puget Sound's recovery and future health. In particular, members of the public should be educated about individual actions they can take to improve water quality and water quantity. This includes everything from car washing and lawn care practices to how we dispose of unused pharmaceuticals and maintain septic systems.

The Water Quality Discussion Paper recommends expanding outreach efforts to reduce emerging pollutants in personal care products, and we believe that is a good start. However, much more is needed to build local awareness and action, engage volunteers and to encourage behavior change. We believe the Partnership should place much more emphasis on public education and outreach as part of our efforts to improve water quality in Puget Sound.

Also, an area we believe has been sorely lacking in the land use arena is public outreach and education on the benefits of Growth Management Act required density and urban growth areas. Local builders fight battles over density and suffer through constant appeals from individuals seeking to stop growth. The public doesn't want more density in their neighborhood, but they don't see that rural and forestlands are being preserved as the other side of the equation. We believe that as we continue to grow, the state must be willing to help the public better understand the benefits of GMA required density.

Retrofitting

We appreciate the fact that the Water Quality Discussion Paper clearly acknowledges our region has not dealt in any meaningful way with existing (pre-1995) urban development in most areas. The topic forum paper rightly notes that the majority of existing urban commercial, industrial, residential and transportation infrastructure development occurred before current stormwater management standards. Most scientists will agree that development in Puget Sound prior to the mid-1990's is playing a significant and ongoing role in Puget Sound's deteriorated health, not just in terms of habitat elimination, but also in terms of untreated stormwater discharge. We view this to be a major gap in our efforts to address stormwater. Unless retrofitted with proper controls, this pre-1995 development provides no or minimal management of stormwater.

As such, we strongly support the recommendation to begin or accelerate retrofits of impervious surfaces in untreated urban areas. In fact, we believe applying 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. If we are really serious about better managing stormwater runoff to improve water quality and water quantity in our region, then we must be prepared to adequately address runoff from older development.

At the same time, we recognize the significant challenges of implementing such a program. Developing a process for prioritizing retrofit projects, identifying funding sources to help pay for them and coordinating with existing property owners will be no easy task. Though expensive, we believe the cost benefit of contaminants removed per dollar spent is likely highest with retrofitting and source control of existing development. Furthermore, attempting to improve the condition of Puget Sound by further increases in regulations on new and redevelopment projects cannot possibly have the cost benefit to aquatic habitat that retrofitting existing development will.

The Washington State Department of Ecology's stormwater manual and modern flow control requirements are among the most stringent for managing stormwater from new construction sites in the country. If nothing were done to address stormwater runoff from existing, particularly pre-1995 development, then water quality improvements from those older developments – whether residential, commercial or industrial developments or highways – would be dictated by the rate of redevelopment. It is difficult to predict how long it would take to redevelop the existing pre-1995 built environment, and with such redevelopment bring about upgrades in stormwater management and sensitive area protections. But it would most certainly extend well beyond the Action Agenda's 2020 deadline.

Reuse of stormwater generated from rooftops

We support the recommendation to amend state water rights law to exempt the reuse of stormwater runoff generated from rooftops for non-potable uses. Many, including our

association's Built Green® program, promote rainwater collection as an important voluntary tool for addressing urban stormwater issues. Yet under existing water law in our state, the use of rainwater requires a water right permit that can take years to process. As such, current state law acts as another regulatory barrier to low impact development. We believe state water law should be changed to recognize and accommodate the benefits of rainwater collection from rooftops for those seeking to employ this technique.

Expanding NPDES

We have serious concerns about expanding NPDES Phase II stormwater permits to urban areas below the current threshold. The Phase II municipal stormwater permit is a very complex and costly permit to implement. Moreover, the newly issued Phase II permits have barely begun to be implemented. They will, for the first time, require 102 cities and 13 counties across Washington to implement stormwater management programs. We believe it is unreasonable to suggest expanding the Phase II permit to other jurisdictions, especially before the new permit has been fully implemented.

Protecting intact and high-quality lands and watersheds

As supporters of the Cascade Land Conservancy and the Cascade Agenda, we support responsible efforts to protect our most pristine lands. However, we would caution against any effort that would negatively impact buildable land inside urban growth areas. As such, we believe our state needs to adopt a no net loss of buildable lands policy. Such a policy would compensate for the reduction in housing units that necessarily occur any time a new public policy – such as increased wetland buffers in urban areas or increases in stormwater vault sizes – is adopted.

Any change that reduces our buildable land supply, and in turn our housing capacity, would have to include measures to increase density in the urban growth area or increase land availability, including moving the urban growth boundary. We believe this change is critical for accommodating our region's expected population growth and encouraging the Growth Management Act's affordable housing goal.

Thank you for considering our comments. I look forward to engaging in further dialogue on these and other issues as development of the Action Agenda moves forward.

Sincerely,



Samuel L. Anderson
Executive Officer

Cc: PSP Director David Dicks
PSP Leadership Council Chair William Ruckelshaus
MBA Chair Officers

From: Peter Beaulieu

Date: 05/19/2008

Comment: Dear Martha:

Enclosed are four sections from the programmatic environmental impact statement done for the original regional Vision 2020 plan adopted by the Puget Sound Council of Governments (replaced by the Puget Sound Regional Council) in 1990. (Water Resources: 4.1.10 and 5.1.10; and Ground Water/Surface Water/Puget Sound: 4.2.3 and 5.2.3).

These provide a brief but perhaps useful regional scale synthesis of water quality and water supply issues for the Puget Sound region and for the four-county urbanized core. This 1990 overview might help answer some of the questions posed during the Partnership's five recent listening sessions.

For example:

- In Edmonds, a request was made for quantitative approach to watershed analysis (Chris Kaufman, Cascade Conservancy?). Table 5.1.10-3 indicates in the right hand column the percent of annual flow in ten basins that was diverted (1990) for out-of-stream uses (varying from 81.3 percent in the Bremerton vicinity and 27.7 percent of the Hamma Hamma River, and 66.7 percent in the Cedar, to lesser amounts in the many other basins and 11.9 percent overall (an apples and oranges type aggregate).
- Information is bright-lined from significant research which might already be known to you: The Puget Sound Dredge Disposal Analysis (see Section 5.2.3, p. 285), and regional trends for a range of specific contaminants (Section 5.2.3, p. 286), and
- A few passing references to the probably still informative Environment 2010 (e.g., Section 5.2.3, p. 290, 291) produced by the Department of Ecology in 1990. The enclosure and these references are submitted and identified not in order to obligate a response at this point from the Partnership, but simply to help develop a possible narrative for the Partnership's work - which basinwide narrative might offer cross-sectional snapshots for previous (and future) decades such as 1990.

Attached: vision2020.pdf