

PugetSoundPartnership

our sound, our community, our chance

SUMMARY OF COMMENTS AND RESPONSES HUMAN HEALTH TOPIC FORUM

JULY 11, 2008

Human Health
Comment Summary

July 11, 2008

Table of Contents

INTRODUCTION	3
KEY THEMES.....	3
TOPICS MISSING/UNDEREMPHASIZED	5
DATA GAPS/MORE INFORMATION, STUDY IS NEEDED ON:	12
WHAT DID WE MISS? DOCUMENTED EFFECTIVE PROGRAMS	16
PRINCIPLES/CRITERIA THAT SHOULD BE REFLECTED IN THE STRATEGIES TO ADDRESS THREATS.....	22
ACTIONS THAT SHOULD BE CONTINUED, ADDED, CHANGED, STOPPED	25
SCOPE OF HUMAN HEALTH TOPIC FORUM PAPER	35
DOCUMENT ORGANIZATION/CONTENT/STYLE.....	37

Introduction

Following is a summary of comments received on the Human Health Topic Forum Paper. These comments were received at the Topic Forum Workshop, held on April 22 in Tacoma. More than 60 people attended the forum, providing comments on all aspects of the discussion draft. In addition, comments were obtained through email and through an online discussion tool on the Partnership's web page. More than 90 pages of comments were received on the Human Health discussion paper. These comments have been sorted and summarized by theme; and general responses provided below. Many comments were made numerous times, and some requested information at a level of detail that is beyond the scope of the topic forum paper or outside the Partnership's objectives. The responses provided below indicate how the comment was addressed; individual responses to each comment are not provided, but all comments were reviewed and considered. All comments received can be viewed on the Partnership web page.

Key Themes

Often-repeated comments are characterized below as "key themes".

Lack of understanding

Existing threats to human health are not well understood. We need a broader understanding of the full range of contaminants, their extent in the environment, and their potential effects on human health.

Existing regulations not enforced

Existing programs are not well monitored or enforced. Existing regulations should be strengthened before developing new ones.

Source Control

There should be a heavier emphasis on source control as it is a key factor in long-term success in reducing human health risks

Multi-faceted approach

The approach to addressing human health threats needs to include short term components as well as long term strategies.

Reducing Institutional Barriers

Institutional barriers need to be addressed, including lack of funding for research, implementation, monitoring and enforcement of existing programs.

Parity in source control

Source controls need to be broad-based and aimed at all types of contaminant generators: industries, small businesses, and households.

Communications

The Action Agenda needs to be accountable and transparent.

Communication in general from the Puget Sound Partnership needs to be geared toward the average person.

We need diversity in the participants developing the Action Agenda, including industry and communities, students, as well as urban/rural representatives.

Education and partnerships are key to implementing the Action Agenda.

Topics Missing/Underemphasized

The following comments were made regarding issues or topics that were perceived to be missing / underemphasized:

Chemicals/Toxics

Comments	Response
<ul style="list-style-type: none"> • Hormonally-active compounds and endocrine disruptors; phthalates; pesticides; fluoride; dioxins; furans; emerging chemicals (nanoparticles; fluoride; biosolids; PAHs). • These chemicals need to be specifically discussed as threats • Persistent bioaccumulative toxics list is limited 	<p>The paper has focused on categories of chemicals rather than a comprehensive list of specific compounds. These chemicals are acknowledged as threats to human health. The paper focuses on the chemicals of greatest human health threat/exposure through consumption of fish; as more information on these chemicals becomes available, information could be added and management strategies will be refined.</p>
<p>Need more focus and additional information on emerging POPs such as polybrominated diphenyl ethers and perflourinated compounds.</p> <ul style="list-style-type: none"> • Further clarification is needed so that the reader is not confused about the identity of many of these compounds – i.e. PCBs / PAHs are not PBDEs, which in turn are not PFOA / PFOS and related perfluorinated compounds. The health issues (toxicological concerns) surrounding the various POPs are different. 	<p>This comment has not been incorporated into the Topic Forum Paper at this time. The paper has focused on categories of chemicals rather than a comprehensive list of specific compounds. The chemicals of greatest human health threat/exposure through consumption of fish were listed. These chemicals are acknowledged as threats to human health; as more information becomes available, management strategies will be refined. The paper focused on categories of chemicals</p>

Comments	Response
	rather than a comprehensive list of specific compounds.
Newer, more sophisticated approaches are needed for assessing human risk from synergistic interactions between POPs (e.g., PBDEs and perflouorinated chemicals) and other contaminants.	This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1
<p>Need to address excessive pesticide use by residents and government.</p> <ul style="list-style-type: none"> • State agencies should stop using herbicides and stop promoting use of pesticides • Dept of Agriculture, Ecology, DNR and WSDOT buy and promote the use of these products. • “Trade secret” ingredients are often more toxic than the “active” ingredients. 	Pesticides are acknowledged as a threat to human health, and management strategies are incorporated into overall source control strategies. This comment has not been incorporated into the Topic Forum Paper at this time. The comment addresses a level of detail that is beyond the scope of the topic forum discussion draft.
The list of "emerging chemicals" needs to be broadened. These chemicals are not regulated, but present a threat to human health. Department of Ecology has information on small quantity generators of hazardous waste and other information through technical assistance programs that could be used to expand this information.	These chemicals are acknowledged as threats to human health; as more information becomes available, details can be added and management strategies will be refined Current research on this topic has focused on potential impacts to fish. This threat is discussed in the Species and Biodiversity paper. The paper has focused on categories of chemicals rather than a comprehensive list of specific compounds. The chemicals of greatest human health threat/exposure through consumption of fish were listed.

Comments	Response
<p>Sufficient toxicity data needs to be available to adequately evaluate emerging chemicals.</p> <ul style="list-style-type: none">• It is difficult to evaluate risks from these chemicals from Puget Sound seafood because of the additive risk from the chemicals cannot be taken into account accurately• Higher priority should be given to pathogens, biotoxins, and PBT chemicals	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1</p>
<p>Need to address Multiple Chemical Sensitivity</p> <ul style="list-style-type: none">• MCS is an environmental illness resulting from exposure to comment chemicals at levels below regulatory toxicity thresholds that are normally considered safe	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1</p>

Pathogens

Comment	Response
The report should indicate which pathogens are being monitored by Ecology, DOH, and King County, and should describe the difference between monitoring for indicators and specific pathogens.	This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1 and P2

Exposure/Dose Considerations

Comment	Response
When discussing human health risk, the concepts of frequency of exposure and dose need to be considered. Also, it is important to consider those populations with maximum exposure, and differentiate between recreational and sustenance consumption of seafood.	This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1
The document is too vague on describing "healthy" and should include some type of graphic or chart that helps to explain the spectrum or risk for consumption or contact with pathogens or toxics. The risk needs to be explained in a way that is clearly understandable to the public.	This comment has been incorporated into the revised Topic Forum paper; refer to Section S1. A statement has been added regarding health risks from other sources.
The underlying assumptions about exposure and toxics needs to be clearly stated in the paper.	This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1

Consumption

Comment	Response
On page 4, the statement about bottom fish consumption by Pacific Islanders and Tulalip and Suquamish Indian tribes is not supported by facts (see King County comment letter for attached reference document).	This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1

Comment	Response
<p>The risk of eating fish and shellfish needs to be stated in understandable terms, relative to other sources of food. Recommend data be gathered or generated for seafood and other meats from grocery stores so that we can understand how risks compared to eating seafood from Puget Sound. We need to put toxics in Puget Sound seafood in perspective to other foods people consume.</p>	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1.</p>
<p>Consumption risk focused on children – should include pregnant women and immune compromised individuals as well.</p>	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1.</p>
<p>“Pooled” cooking of food in the same pan, such as in restaurants, was not addressed.</p>	<p>This comment has not been incorporated into the Topic Forum Paper at this time. This is not a documented significant threat related to health exposure.</p>

Health Risks from Other Sources

Comment	Response
<p>Red tides are understated as an ongoing problem and priority.</p> <ul style="list-style-type: none"> • Both sporadic and sometimes fatal to humans • Need to stress the importance of agile response capabilities alongside long-term management 	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1</p>

Understanding Relative Risk

Comment	Response
<p>The relative risk that each of the threats represent needs to be articulated.</p> <ul style="list-style-type: none"> • There is no context for threats provided • Threats treated essentially equal. Are the biggest threats stormwater? Septic? Cruise ships? • Should discuss how severe threat is, what the priority threats are, and discuss in the context of dosage • The first section of the paper does not adequately distinguish between threats that pose a “serious risk” vs those that may be considered as “risk” or “concern for the unknown.” This is important as it will be helpful in establishing priorities, for action and research. • Should recognize and make distinctions between short and long term threats (pathogens compared to toxins) that may lead to more apparent actions and results • Recommend some acknowledgement of the differences in health effects; i.e., pathogens and biotoxins are more associated with long-term exposures that can result in both cancer and non-cancer health effects. This should be taken into account when prioritizing efforts. More monitoring by location and frequency might be needed for pathogens and biotoxins compared to chemical toxicants in biota, water and sediments. • Reference to hydrogen sulfide as a threat is not accurate – better characterized as a nuisance. 	<p>This comment has been partially incorporated into S1; however the comment addresses a level of detail that is beyond the scope of the topic forum discussion.</p>
<p>Risk assessment information for contaminants with multiple pathways is lacking</p>	<p>The comment has been addressed by adding language that the paper is not a risk assessment.</p>

Illness Incidence Data

Comment	Response
Need data about incidence of illness relating to pathogen and biotoxin consumption.	This comment has been incorporated into the revised Topic Forum paper; refer to Section S1.

Benchmarks

Comment	Response
What are the risk benchmarks? <ul style="list-style-type: none"> • What is the unacceptable cancer risk threshold, non-cancer threshold, number of incidences of illness from pathogen exposure, etc. 	The comment has been addressed by adding language that the paper is not a risk assessment. Additional language has been added on illnesses in S1.

Supporting Data

Comment	Response
The conclusions in the documents need to be better supported by underlying data.	This comment has been incorporated into the revised Topic Forum paper; refer to Section S1.

Data Gaps/More Information

The following comments were made regarding issues or topics needing more studies or research:

Baseline Data Characterizing Human Health

Comment	Response
Baseline data need to be sufficient to characterize human health, and should be summarized in a format such as GIS. Data sources need to be evaluated for accuracy.	This comment has not been incorporated into the Topic Forum Paper at this time. The paper has used appropriate baseline data to characterize human health threats.
If the knowledge of contribution is an information gap, this needs to be addressed quickly in order to know if actions will be effective.	. The gaps discussion in Section S1 lists areas of knowledge gaps.

Threat / Sources of Contamination

Comment	Response
Sources of contamination need to be identified and monitored, to create a mass balance of contamination into and out of the Sound.	This comment has been incorporated into the revised Topic Forum paper; refer to Section S1.
Contribution of toxics from stormwater and municipal discharges is largely unknown. Sampling during appropriate high water, low water, PQLs and for priority pollutants + emerging PBTs should be a focus.	This comment has been incorporated into the revised Topic Forum paper; refer to Section S1
There is a need for more extensive and statistically significant sampling of contaminant levels in fish and shellfish.	This comment has been incorporated into the revised Topic Forum paper; refer to Section S1.
CSO events may be important to small localized areas, the magnitude of potential	This comment has not been incorporated into

Comment	Response
<p>loading from stormwater (especially small storms) significantly outweighs the infrequent CSO event. Need a process for setting priorities based on risk drivers .</p>	<p>the Topic Forum Paper at this time. This comment is not directly related to the Partnership’s stated objectives for the Human Health topic. The criteria discussion in Section P2 addresses the priority for threats in terms of severity of impact and magnitude of potential impacts. The prioritization for CSO control would be considered in light of these types of factors.</p>
<p>There appears to be a significant data gap regarding compliance with the MOU for marine vessels and the degree of applicability of this MOU to various vessel sizes. Additionally, the separate issue of vessel ballast water is also a potential vector for the stated issue of “emerging” biotoxins. Marine vessel ballast water and wastewater appears to be and under appreciated source.</p>	<p>This comment has been partially incorporated into the Topic Forum Paper.</p>
<p>Sludge and Industrial Fertilizers - Paper needs to address this.: The best reference for the history of how a hazardous waste, municipal waste, was approved for spreading across farm fields and now through nurseries and home gardens is: Toxic Sludge is Good for You, by John Stauber and Sheldon Rampton, Chapter 8. The Sludge Hits the Fan Publisher: Common Courage Press, Monroe, ISBN 1-56751-060-4 The lead EPA scientist, William Sanjour , refused to go along with giving EPA approval to "recycle" it and call is "biosolids" and lost his position. For the most complete insight into EPA politics on approving sludge as "biosolids" to be spread on land across the country, see http://pwp.lincs.net/sanjour/ Collected Papers of William Sanjour There are thousands of articles on this, legal actions where sludge spreading has affected the health of citizens, including causing death, legal actions, and air and water pollution. In sludge can be pesticides, heavy metal, POPs, pharmaceuticals, prions, personal care products, industrial wastes, etc... Most of these are not tested for at waste water treatment plants.</p>	<p>This comment has not been incorporated into the Topic Forum Paper at this time. The comment addresses a level of detail that is beyond the scope of the topic forum discussion.</p>

Existing Regulatory Effectiveness

Comment	Response
<p>The effectiveness of current regulations is not known, and needs to be addressed.</p> <ul style="list-style-type: none"> E.g., the paper states that sediments found in Puget Sound fall below sediment quality standards; however, it is well known that certain metals, particularly those that bioaccumulate like Hg, pose risk well below the state sediment quality standards. 	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1</p>

Swimming Beaches

Comment	Response
<p>More monitoring of swimming beaches is needed.</p>	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1</p>
<p>Need swimmable marine waters. Current Best Available Science was developed 10 years ago and did not consider human/social and economic components of the big picture. Need to look at science and policies to be certain they reflect the BAS that considers all Partnership goals.</p>	<p>This comment has not been incorporated into the Topic Forum Paper at this time. It is best addressed in broad policies and process being addressed by the Partnership as a whole and is not specific to the Human Health Topic.</p>

Science/Research Needs

Comment	Response
<p>Water quality management programs could be further informed by scientific investigations.</p> <ul style="list-style-type: none"> The impacts of metals can best be assessed by created loading estimates using a mass balance framework. Particularly important for certain dissolved metals, such as arsenic, and for metals that are naturally enriched 	<p>This comment has not been incorporated into the Topic Forum Paper at this time. The comment addresses a level of detail that is beyond the scope of the topic forum discussion draft. This comment will be referred to the Partnerships for consideration</p>

Comment	Response
<p>in the Pacific Northwest, such as cadmium.</p> <ul style="list-style-type: none"> • Information about the connectivity of Puget Sound marine waters with those of the Pacific Ocean will provide better understanding of the circulation, DO trends, and contaminant fate and effect. • Understanding the natural recovery rates for metals in Puget Sound will help asses current and project future contaminant levels. 	<p>as they assess priority science needs.</p>

Fish Consumption Estimates

Comment	Response
<p>Fish consumption figures need a definitive study on where populations get their seafood, how much they are eating, and cultural differences</p>	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1.</p>

Privately Owned Tideland Harvest

Comment	Response
<p>Need a better assessment of consumption rates of higher end users.</p>	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1.</p>
<p>Health risk from harvest from privately owned tidelands is unknown.</p>	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1.</p>

What did we miss? Documented Effective Programs

The following comments were made about things that were perceived to be missing regarding documented effective programs:

Stormwater NPDES Program

Comment	Response
Stormwater Management Plans and Stormwater Pollution Prevention Plans under NPDES should be shown as a documented effective program. Pollution prevention programs by Ecology such as the Technical Resources for Engineering Efficiency (TREE), the Urban Water Program, and the Beyond Waste Programs are documented as effective and should be included under the list of effective programs.	This comment has been partially incorporated into the revised Topic Forum paper; Refer to Section S2 and P2

Limitations of CSO Programs

Comment	Response
CSOs control programs have limited effectiveness for pathogen controls.	This comment has not been incorporated into the Topic Forum Paper at this time. This comment is addressed in greater detail in the Water Quality topic forum paper.

Ecology Programs Cited as Effective

Comment	Response
<ul style="list-style-type: none"> DW, CERCLA reporting, Hazardous Waste and Toxics Reduction Program, TRI regulations. Ecology inspections for Hazardous Waste (RCW 70.105 and WAC 173-303) and technical assistance for Pollution Prevention via the Waste Reduction Law (RCW 70.75C and WAC 173-307) should be recognized as 	This comment has been incorporated into the revised Topic Forum paper; Refer to Section P2.

Comment	Response
<p>well as local government inspections related to stormwater, pre-treatment and other local ordinances.</p> <ul style="list-style-type: none"> • Ecology’s Chemical Action Plan for mercury • Pollution Prevention Planning for businesses has reduced the generation of hazardous waste by half since the early 1990s and assists about 600 businesses a year • Along with TREE, Lean and Green should also be recognized as a program available through Ecology with similar benefits to TREE. • Technical Assistance Visits – available to any business upon request by Ecology staff. This is an underused program strategy for reducing toxic loads. 	

County/City Programs Cited as Effective

Comment	Response
<ul style="list-style-type: none"> • Industrial pre-treatment has resulted in measurable improvement in biosolids quality • Source control inspections • Brightwater-advanced wastewater treatment and water reuse • Pharmaceutical take back program • Catch basin cleaning program • Spokane River basin – PCB loadings from stormwater – has implications for Puget Sound • Seattle drainage ordinance • King County’s CSO Program • WA Department of Ecology urban waters program • Product bans 	<p>This comment has been partially incorporated into the revised Topic Forum paper; refer to Section S1. Not all individual jurisdiction programs are mentioned as examples.</p>
<p>DNR’s Aquatic Lands Enhancement Account (ALEA). This account funds grant</p>	<p>This comment has not been incorporated into</p>

Comment	Response
programs to local governments for improving and increasing access to public lands as well as programs various state agencies.	the Topic Forum Paper at this time, as it is not directly related to the stated objectives of the Human Health topic.

Recommended management approaches: what should be added, changed in our current list?

Source Control

Comment	Response
Source Controls need to be more heavily emphasized in management of human health risks	This comment has been incorporated into the revised Topic Forum paper; refer to Section P2.
Should emphasize source reduction and manufacturer responsibility programs.	This comment has been incorporated into the revised Topic Forum paper; refer to Section P2.
Source control programs should be taken to the household level	This comment has been incorporated into the revised Topic Forum paper; refer to Section P2.
Low Impact Development, mass transportation projects, should be listed as programs that contribute to source controls.	This comment has been incorporated into the revised Topic Forum paper; refer to Section P2.
Strategic chemical and product bans should be included as effective source control approaches.	This comment has been incorporated into the revised Topic Forum paper; refer to Section P2.
Look to the ENVVEST program (in Sinclair / Dyes Inlet) for a program that can inform the management of stormwater. An example of the findings is the	This comment will be forwarded to the Partnership for consideration as they identify

Comment	Response
<p>significant source of copper and zinc anodes from boats. The most important citations for the ENVVEST program are:</p> <p>http://www.ecy.wa.gov/programs/wq/tmdl/sinclair-dyes_inlets/index.html or http://www.ecy.wa.gov/programs/wq/tmdl/sincliar-dyes_inlets/sinclair_cd/DATA/Data_Directory.html</p>	<p>and develop priority science needs.</p>

Precautionary Principle

Comment	Response
<p>The precautionary principle could be used to develop risk tolerance targets</p> <ul style="list-style-type: none"> • Place burden of proof for product safety on manufactures (as is done in the EU). • If, and to what extent, the Precautionary Principle is to be incorporated into the Partnership’s approach to risk and uncertainty, is a management decision that needs to be addressed and communicated to the technical groups early in the process. 	<p>The precautionary principle means that where an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. The Precautionary Principle requires that "the proponent of an activity, rather than the public, should bear the burden of proof" (Wingspread Statement on the Precautionary Principle, 1998. http://www.who.int/ifcs/documents/forums/forum5/precaution/wingspread/en/index.html) This approach is embraced in various sectors of society (e.g. FDA drug approval). The major federal law that governs the introduction of chemicals into commerce in the United States, Toxic Substance Control Act (TSCA), puts most of this burden on EPA. The Precautionary Principle presents a challenge with respect to the use scientific data for decision-making if we acknowledge that there is no such thing as "zero" risk. The Precautionary Principle does not remove the need for risk assessment but offers a different, more value-based framework to assess risk. The Partnership Leadership Council has affirmed the need to be proactive in preventing problems before they begin and controlling problems at the source.</p>

Address Maximally Exposed Individuals

Comment	Response
Management approaches need to address "maximally" exposed individuals	This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1

Biomonitoring

Comment	Response
<p>Biomonitoring should be included as a tool to provide information about risks and exposures.</p> <ul style="list-style-type: none"> • Recommend including an emphasis on biomonitoring linked to specific biomarkers that are indicative of EDC (and other contaminate classes) exposure. Field sampling of feral fish / shellfish or caged deployment of fish and subsequent measurement of specific biomarkers can be a powerful tool for identifying the presence of contaminants. 	A general statement about biomonitoring is incorporated into Section P2
<p>The increased use of biomonitoring / biomarkers would complement ongoing monitoring efforts for levels of select POPs. Many toxicologically important ECSs/ pharmaceutical agents (ethynylestradiol [EE2] for example) do not bioaccumulate appreciably</p> <p>There is a need for direct measures of toxics exposure to people through periodic blood (plasma) monitoring of selected POPs in volunteers; this provides direct evidence of exposure that is superior to measuring POPs levels in seafood. This approach is being used elsewhere in the world, but has not been widely applied in the US.</p>	A general statement about biomonitoring is incorporated into Section P2

Comment	Response
We commend the authors for recognizing the need for a “parallel study for shellfish (including crab); we strongly encourage this approach. The potential for Dungeness Crabs as a vector for human contamination by POPs has been seriously overlooked in comparison to the focus on bivalves and finfish.	This comment is covered in the revised Topic Forum paper

Maintain Access to Food Supply

Comment	Response
Management approaches need to preserve access to food resources.	This comment is covered in the revised Topic Forum paper

Need Diverse Input

Comment	Response
Need a diversity of opinions and input into development of the Action Agenda	Agreed. The Partnership has worked diligently to identify stakeholders with a wide range of interests and background. As part of a parallel process, the Partnership is implementing a broad based outreach and education program.

Public Ownership and Access

Comment	Response
Public ownership and access plan should be developed	This comment has not been incorporated into the Topic Forum Paper at this time, as it is not directly related to the stated objectives of the Human Health topic.

Balance in Food Supply and Biodiversity

Comment	Response
Need to balance the need for food supply and biodiversity in management approaches	This comment has not been incorporated into the Topic Forum Paper at this time. It will be addressed as part of the synthesizing findings from the individual topic forums into the ecosystem-wide priorities.

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

Precautionary Principle

Follow the Precautionary Principle.

Approach

Comment	Response
A short-term and long-term approach to developing strategies should be developed Some prioritization should be given to short term threats that may be addressed quickly.	This comment has been incorporated into the revised Topic Forum paper; Refer to Section P2.
Actions that prevent exposure should be high priority E.g., source control – importance of preventive solutions.	This comment is covered in the revised Topic Forum paper.
The criterion “action eliminates the threat” may not be useful <ul style="list-style-type: none"> • Many actions may reduce or partially eliminate the threat, but cannot do it alone or completely. 	This comment has been incorporated into the revised Topic Forum paper; Refer to Section P2.

Comment	Response
<p>The criterion “action addresses threats with the highest potential severity of endpoint” is not clear.</p> <ul style="list-style-type: none"> • What if the action does not address it very effectively? How is severity of endpoint defined? 	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section P2.</p>
<p>Certainty of effectiveness should be a key consideration in developing strategies to address human health risk</p>	<p>This comment is covered in the revised Topic Forum paper.</p>
<p>Systematically link threats to strategies.</p>	<p>The topic forum paper has broadly linked threats to strategies, and the Partnership will continue to do so as management strategies are refined.</p>
<p>No more business as usual.</p>	<p>The Partnership has acknowledged the need to address institutional barriers and create new approaches to managing threats to Puget Sound.</p>
<p>Expand instead of limiting choices.</p>	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section P2.</p>
<p>Be realistic and prioritize</p> <ul style="list-style-type: none"> • Address greatest threats • Prioritize threats that have both ecological and human health impacts – look for actions with multiple benefits. • Look at implementation feasibility (particularly if speed in addressing a threat is important) 	<p>This comment has not been incorporated into the Topic Forum Paper at this time. It will be addressed as part of the synthesizing findings from the individual topic forums into the ecosystem-wide priorities. The paper generally prioritizes the risks to human health from eating contaminated seafood.</p>

Comment	Response
Continue to include human health concerns and intentionally create a system that is inclusive and environmentally just.	This comment is covered in the revised Topic Forum paper.
Need a regional policy fostering a myriad of local corrective actions.	This comment is best addressed in broad policies, priorities and process being addressed by the Partnership as a whole and is not specific to the Human Health Topic.

Parity

Comment	Response
Source controls should cover all types of sources (e.g., household, industrial..), big and small, and should be equitable	This comment has been incorporated into the revised Topic Forum paper; Refer to Section P2.

Cost

Comment	Response
Thinking should be broad on solutions, not limited by cost.	This comment is best addressed in broad policies and processes being addressed by the Partnership as a whole and is not specific to the Human Health Topic.
Cost-effectiveness should be emphasized more; it may drive some data gathering efforts as well as actions. <ul style="list-style-type: none"> • What are the sources of toxics and pathogens, and what is the comparative cost to reduce contributions from these sources? 	This comment is covered in the revised Topic Forum paper.

Actions that should be continued, added, changed, stopped

Source Control

Comment	Response
Source controls need to be considered more extensively, encompassing big and small producers, multi-faceted, multiple chemicals.	This comment has been incorporated into the revised Topic Forum paper; Refer to Section P2.
Improve management of older and under functioning on-site sewage systems	This comment is covered in the revised Topic Forum paper.
Need a strict phase-out / monitoring of septic systems near Puget Sound / Hood Canal	This comment is addressed generally in the revised Topic Forum Paper.
Need to address the lack of compliance tools available to assure on-site sewage systems can be evaluated in areas of concern.. Local Boards of Health or legislative bodies need tools to assure that all on-site systems in areas with public health concerns are properly evaluated and failing systems identified.	This comment is covered in the revised Topic Forum paper.
Need to work with organizations like the Washington Toxics Coalition, the NW Coalition for Alternatives to Pesticides, and the WA D.C. based Beyond Pesticides to plan a strategy to wean Washington off of toxics. Needs to include safe methods for handling noxious weeds, roadside and forest vegetation, and to educate state employees, the nurseries, and the public on why they should not use them and effective substitutes.	This comment has not been specifically incorporated into the Topic Forum Paper at this time. The comment addresses a level of detail that is beyond the scope of the topic forum. The Partnership is actively developing working partnerships with a broad range of agencies and organizations regarding all aspects of managing Puget Sound.
Need to eliminate tax exemptions for chemicals sold for home use. This exemption applies to the majority of pesticides sold in the Puget Sound region.	This comment has not been incorporated into the Topic Forum Paper at this time. The comment addresses a level of detail that is beyond the scope of the topic forum, however, this suggestion could be considered by the Partnership in the future.

<p>Cruise ships should not be allowed to discharge to surface waters while at dock. The 2007 State of the Sound report recommended that greater attention be paid to vessel discharges, noting “ The increase in cruise ship and recreational boat traffic may lead to establishing no-discharge zones.”</p>	<p>The comment addresses a level of detail that is beyond the scope of the topic forum. Management of discharges from cruise ships is discussed in Section P1 and P2.</p>
--	---

Indicators

Comment	Response
<p>Need to revisit water quality standards to develop a better indicator than fecal coliform bacteria</p>	<p>This comment has been incorporated into the revised Topic Forum paper; Refer to Section P2.</p>
<p>Reduced disease incidence should be used as an indicator.</p>	<p>This comment has not been incorporated into the Topic Forum Paper at this time. The Partnership’s Indicators Group and Science Panel is developing a recommended suite of indicators to be used in measuring progress on reducing threats to human health.</p>
<p>Progress Indicators – The establishment of current baseline conditions, a set of indicators, coordinating across jurisdictions, and closing of data gaps is not “progress” as indicated in the paper. Successful management will need to accept operating under conditions of uncertainty regarding toxics and bacteria sources, pathways, and potential solutions.</p>	<p>This comment has not been specifically incorporated into the Topic Forum Paper at this time. The Partnership’s Indicators Group and Science Panel is developing a recommended suite of indicators to be used in measuring progress on reducing threats to human health.</p>

Implementation – Policy/Regulatory

Comment	Response
Identify regulatory authority, determine overlaps and gaps, and specify regulatory authority	This comment has not been incorporated into the Topic Forum Paper at this time. This comment presents information that is related to the Partnership’s objectives for this topic, but cannot be fully evaluated as part of the topic forum. The Human Health Topic Forum recommends the Partnership consider further evaluation of this suggestion
Need to rethink regulation of chemicals in Washington, adding a rule to provide access to information about how chemicals are used	This comment has not been incorporated into the Topic Forum Paper at this time. This comment presents information that is related to the Partnership’s objectives for this topic, but cannot be fully evaluated as part of the topic forum. The Human Health Topic Forum recommends the Partnership further consider evaluation of this suggestion.
Need a more responsive and transparent Department of Ecology, with more strict implementation of existing regulations.	This comment has not been incorporated into the Topic Forum Paper at this time. It is best addressed in broad policies, priorities and processes addressed by the Partnership and the Department of Ecology.
Product bans as source control Ban more toxics, particularly carcinogens	This comment is addressed generally in the revised Topic Forum Paper, Section P2.

Comment	Response
<p>Expand TMDL program</p> <ul style="list-style-type: none"> • TMDLs are an important water quality management tool that can direct remediation efforts for water bodies that fail to meet water quality standards 	<p>This comment is addressed generally in the revised Topic Forum Paper, Section P1.</p>
<p>Tighten Air Permits</p> <ul style="list-style-type: none"> • Air Operating Permits (AOPs) are overseen by two agencies: Ecology and Clean Air Agencies. Recommend that all AOPs be put under the Clean Air Agencies in order to have consistent laws and oversight. • Currently, Ecology AOP regulations and oversight are lax. Industry has little regulation. 	<p>This comment has not been incorporated into the Topic Forum Paper at this time. It is best addressed in broad policies, priorities and processes addressed by the Partnership and the Department of Ecology and Air Agencies. The Human Health Topic Forum recommends the Partnership consider evaluating this suggestion in future phases of the Action Agenda.</p>
<p>Tighten NPDES</p> <ul style="list-style-type: none"> • Need to focus on reducing stormwater discharge volumes and specifically discharges of excess nutrients and toxic chemicals. • Need to address how water quality standards might be updated to address toxicity associated with complex mixtures such as stormwater • Permits do not have the ability to monitor or eliminate discharges of pollutants into Puget Sound. A strategy to encourage elimination of these discharges should be considered. 	<p>This comment has not been specifically incorporated into the Human Health Topic Forum Paper at this time, but is discussed in the Water Quality Topic Forum paper.</p>

Implementation – Plans

Comment	Response
<p>Develop persistent bioaccumulative toxics strategy plans</p>	<p>This comment is covered in the revised Topic Forum paper.</p>

Implementation – Programs

Comment	Response
Community involvement is critical. Partnership should require involvement for participation in their programs. Programs should be tailored to site-specific locations, should actively engage youth.	Agree. Issues related to education/outreach, institutional barriers and funding are being addressed through other efforts being conducted by the Partnership. Outcomes from these efforts will be integrated with the findings from the topic forums in development of the Action Agenda.
Behavior modification programs need to be developed to address non-sustainable behavior. Social marketing programs could be used.	Issues related to education and outreach, institutional barriers and funding are being addressed through other efforts being conducted by the Partnership. Outcomes from these efforts will be integrated with the findings from the topic forums in development of the Action Agenda.
Land use practices need to be included in solutions to address human health.	This comment is covered in the revised Topic Forum paper. Refer to Section P2.
Optimize existing programs.	The Human Health Topic Forum group has suggested management approaches that include changes to existing programs, however, this comment has not been specifically incorporated into the Topic Forum Paper at this time. It is best addressed in broad policies and process being addressed by the Partnership as a whole and is not specific to the Human Health Topic.

Comment	Response
The Partnership needs to look for ways to help companies reduce toxics.	The topic forum paper includes suggested tactics to include private companies to improve source control measures. The Human Health Topic Forum recommends the Partnership consider further evaluation of this suggestion
Signage on public beaches could be expanded to include information on toxics and pathogens.	This comment has not been specifically incorporated into the Topic Forum Paper at this time, however, the concept of notification is discussed in Section P1 and P2, The Human Health Topic Forum recommends the Partnership consider further evaluation of this suggestion
Toxic sediment cleanups should be accelerated.	General strategies addressing cleanup are included in Sections P1 and P2.. The Human Health Topic Forum recommends the Partnership consider further evaluation of this suggestion
Need expanded emergency response and prevention of oil and other toxic chemical spills.	General strategies addressing prevention are included in Sections P1 and P2, and in the Water Quality Topic Forum. The Human Health Topic Forum recommends the Partnership consider further evaluation of this suggestion
Require tugs for shippers of hazardous materials in state waters <ul style="list-style-type: none"> • Need a year-round tug stationed near Neah Bay 	This comment is addressed in the Water Quality Topic Forum paper. Spills are acknowledged as a risk to human health in the topic forum paper.

Comment	Response
Need a strong oversight committee on qualifications for tugboat captains – human error plays a big part in tug/shipping safety.	This comment has not been incorporated into the Topic Forum Paper at this time. This is a level of detail beyond the scope of the topic forum. The Human Health Topic Forum recommends the Partnership consider evaluating this suggestion in future phases of the Action Agenda.

Partnerships

Comment	Response
Lack of interagency coordination is an obstacle to addressing non-point source pollution and needs to be addressed, including data sharing and monitoring.	This comment has not been incorporated into the Topic Forum Paper at this time. Issues related to education/outreach, institutional barriers and funding are being addressed through other efforts being conducted by the Partnership. Outcomes from these efforts will be integrated with the findings from the topic forums in development of the Action Agenda.
Partnerships are needed between regulators, businesses, and private property owners.	The Partnership is developing and implementing a broad based outreach program to build partnerships with all stakeholders in Puget Sound. Issues related to education/outreach, institutional barriers and funding are being addressed through other efforts being conducted by the Partnership. Outcomes from these efforts will be integrated with the findings from the topic forums in development of the Action Agenda.

Implementation – Funding

Comment	Response
Funding is a problem for outreach, inspections and management. Without proper funding, programs will not work. Human health needs to be a priority for funding.	This comment has not been incorporated into the Topic Forum Paper at this time. Issues related to education/outreach, institutional barriers and funding are being addressed through other efforts being conducted by the Partnership. Outcomes from these efforts will be integrated with the findings from the topic forums in development of the Action Agenda.

Capital Project – Infrastructure

Comment	Response
Infrastructure needs to be available to support sustainability.	This comment has been incorporated into the revised Topic Forum paper; Refer to Section P2.

Monitoring / Measuring Progress

Comment	Response
Need both short and long term measures of progress. A baseline needs to be established to measure progress.	The Topic Forum paper includes measures of progress in Section P2. The Partnership's Indicators Group and Science Panel is developing a recommended suite of indicators to be used in measuring progress on reducing threats to human health.
Collect data on use of toxic chemicals.	This comment has not been incorporated into the Topic Forum Paper at this time. The comment addresses a level of detail that is beyond the scope of the topic forum. Recommendations for monitoring and research are being developed as part of separate, concurrent efforts being conducted by the Partnership.
Incidence of fewer closures and illnesses should be an indicator of progress.	Measures of progress are included in Section P2 of the Topic Forum paper. Additionally, the Partnership's Indicators Group and Science Panel is developing a recommended suite of indicators to be used in measuring progress on reducing threats to human health.
Use MTCA as an example, show where we are going and develop a roadmap.	MTCA is one of a number of programs that can be considered when reviewing broad, state level programs that could serve as guidance for the Partnership.

Other

Comment	Response
Low income communities don't always get tested for environmental health threats.	The Topic Forum paper acknowledges that some sectors of the population are disproportionately at risk from consumption of shellfish, including some low income communities. The paper recommends identifying at-risk communities and implementing strategies to address these communities.
The Washington Coastal Atlas would be a good format to develop accessible data.	This suggestion may be incorporated as future efforts by the Partnership and others are developed for data management. This suggestion will be forwarded to the parties developing strategies for data management.
Look to Chesapeake Bay for lessons learned.	This comment has not specifically been incorporated into the topic forum paper at this time. The Partnership is actively trying to learn from other efforts.
Train medical staff on toxins and human health.	This comment has not been incorporated into the Topic Forum Paper at this time. The comment addresses a level of detail that is beyond the scope of the topic forum paper.
Capture wastewater treatment and septic programs equally.	This comment has been covered in the revised paper.
Signage on public beaches could be expanded to include information on toxics and pathogens	The Topic Forum paper discusses signage and notification programs in Sections P1 and P2.

Scope of Human Health Topic forum paper

Air Quality Needs to be included

Contribution to Puget Sound Pollution

Comment	Response
The paper needs to address air contaminants contribution to marine contamination. There is a clear pathway for contaminant transport from the air to Puget Sound and has been identified as an important pathway in the Water Quality forum.	This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1 and Appendix A
Need to evaluate atmospheric contribution of chemicals (e.g., PCBs, mercury) from global sources that will be difficult to change.	This comment has not been incorporated into the Topic Forum Paper at this time. The comment addresses a level of detail that is beyond the scope of the topic forum paper.

Air Quality-Related Health Issues

Comment	Response
The paper needs to address air quality-related health issues, including inhaled air toxics.	This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1 and Appendix A.
The Partnership should resist requests to widen the scope of human health issues to include air quality-related health issues. Such a broadening of the efforts might dilute or render ineffective the efforts to address Puget Sound-specific issues.	This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1 and Appendix A.

Drinking Water Needs to be Included

Comment	Response
The paper needs to address threats from upland sources, including drinking water, and emerging chemicals. The paper is biased to the marine environment	This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1 and Appendix A

Address Whole Watershed

Comment	Response
There is too much focus on just the marine waterway and shoreline. Need to address ‘peak to peak.’	This comment has been incorporated into the revised Topic Forum paper; Refer to Section S1 and Appendix A

Focus on Actions to Address Health

Comment	Response
The paper should not be focused on risk assessment, but should focus on actions to address human health threats.	This comment has been incorporated into the revised Topic Forum paper, Section S1.

Document Organization/Content/Style

Include Conceptual Model

Comment	Response
Include the conceptual model being developed as part of the indicators work for the Partnership.	This comment has not been incorporated into the Topic Forum Paper at this time. It is not specific to the human health topic and should be addressed in the work of the Indicators Group in future phases of the Action Agenda as a whole.

Needs more data

Comment	Response
More data should be included.	This comment has been incorporated into the revised Topic Forum paper, Section S1.

Threats need to be linked to actions

Comment	Response
Link each threat to the regulatory programs that address it.	Section S2 includes a discussion that links threats with regulatory and management programs aimed at addressing them.
Identify progress measures and outcome measures and be clear which is which.	This comment has not been specifically incorporated into the Topic Forum Paper at this time, however, measures of progress are included in Section P2. The Partnership’s Indicators Group and Science Panel is developing a recommended suite of indicators to be used in measuring progress on reducing threats to human health.
The paper discusses potential solutions, but does not address implementation feasibility. <ul style="list-style-type: none"> • Important to consider implementation in considering strategies (not as an afterthought) 	The paper identifies needed solutions. These actions could be implemented in a variety of ways and feasibility will be considered prior to implementation.

Other

Comment	Response
Language should be accessible to public.	The Topic Forum paper was developed with an anticipated audience of professionals and informed citizens, however, efforts have been made to use easily understandable language, and to define terms used in the document.
Need to show data in GIS.	This comment has not been incorporated into the Topic Forum Paper at this time. The comment addresses a level of detail that is beyond the scope of the topic forum paper. Ongoing, parallel efforts by the Partnership are evaluating the acquisition and organization of data, and will consider GIS as part of this evaluation.
Document would benefit from considerable editorial refinement and consolidation.	The paper has been revised; however the focus has been on substantive revisions and some editing.
Paper should be accompanied by a simple primer in environmental health/toxicology for the lay reader. Paper needs to describe what “toxic” means and how risk and threat are determined.	This comment has not been incorporated into the Topic Forum Paper at this time. Terms used have been defined as much as possible.
Recommend a chart linking agencies within their respective role (EPA, State Health, Ecology, local health, etc.). Chart could diagram who has regulatory power and who has enforcement power.	The Human Health Topic Forum recommends the Partnership consider evaluating this suggestion

Comment	Response
<p>The Human Health paper could be strengthened by adding two tables that both synthesize the principal findings and communicate priorities. As it is currently written, the paper does not clearly and succinctly link the sources of threats with each of the human exposures of concern. Nor does it indicate relative priorities. Similarly, the paper does not directly link limitations of existing programs to strategies for addressing these limitations (nor does it try to set priorities) (see WRI comment letter for an example table).</p>	<p>The topic forum paper has been revised with the intention of strengthening the link between threats and suggested strategies.</p>
<p>We also suggest developing a table that links observed limitations of existing programs to strategies for addressing these limitations. This will enable readers to clearly see the link between existing policy and management gaps, and possible strategies to address these gaps. The easiest way to do this would be to add a column to Table P1-2 (page 18) titled “Strategies for addressing limitations.” The table could be color-coded to indicate relative priorities. (see WRI letter for an example)</p>	<p>The Topic Forum paper has added text with the intention of strengthening the linkage between threats and gaps. The Human Health Topic Forum recommends the Partnership consider evaluating this suggestion in future phases of the Action Agenda.</p>

Document Specific Comments

The following comments were received providing detailed comments on the topic forum discussion paper. Many of these comments have been summarized in the comment summary, others provide suggested editorial changes. These detailed comments were reviewed and incorporated into the document as deemed appropriate by the paper authors. Specific responses are not provided below.

The PBT program should be mentioned as an effective approach, rather than the Chemical Action Plan in table S2-2.

Combined sewer overflow (CSO) control plans should be included as an effective approach in Table S2-2.

NPDES is supposed to reduce use of waterways as a means of waste disposal, so should be marked as source reduction in Tables S2-1 and S2-2.

Use of the term “sensitive populations” is misleading and should read more like “potentially disproportionately impacted populations.”

Caution in use of language "sensitive individuals"

Need “x” in P1-2 Table box for pathogens for last line. Separate line for CSO/pathogens

Change "baseline" to "current conditions"

Page 4 Consumption of Fish – address consumption of different parts of organisms, often organs or whole body

Page 6 – direct contact with sediment and water: the first bullet needs to recognize contaminated groundwater contribution to seeps.

Page 10 – In addition to other limitations of PSAMP and NPDES monitoring, add that the available NPDES monitoring does not require current analytical methodology and therefore one cannot tell if the discharge is above water quality standards or not. The PQLs for analytical methodologies limits the value of sampling.

Page 13 (Management Approach Examples), State of Washington and federal chemical spill response cleanup and prevention regulations needs X’s in all three categories.

Page 15 – add a #8 – Controls on Contaminated Sites on or near Puget Sound (could include signs, groundwater pumping, fences or other barriers to human access)

Page 20 – Source Reduction Programs – Along with TREE, Lean and Green should also be recognized as a program available through Ecology with similar benefits to TREE.

Page 16, Table P1-1: Please add to this table the following program: The state Department of Natural Resources in coordination with the Department of Ecology is developing a program to expand opportunities to reopen recreational and commercial shellfish beds near municipal outfalls throughout Puget Sound. This program works to identify, eliminate and/or mitigate toxic and pathogenic impacts to shellfish beds from these point sources.

Page 9, S1-D-Main Gaps. Last sentence about “snapshot” should end with “because tribal consumption rates are often reduced because of health safety concerns.”

Page 11 – S1-D- Current Status A. Please don’t put the tribal cultures as a last bullet. It implies least value. It should be second because the first bullet is about consumption.

Page 17 – In addition to conservation commission and local conservation district programs, there are land conservation programs such as Pierce County’s TDR program which seeks to reduce the number of low density units on farms and forests in exchange for greater density in cities.

Page 20 – there are a number of conservation programs that are successfully reducing impervious surface and therefore stormwater runoff and the human health impacts that result from high runoff levels. Programs to this effect could be included in the “source reduction” category on this page.

Page 23 – The authors should broaden the 2nd bullet under “C” to address the need to limit impervious surface not only in a single development, but across the watershed.

Page 3: Sources of threats seem too broad and not well developed. Point and nonpoint source discharges – stormwater, septic, ships, etc. Somewhere the document should lay out what is known about the relative contribution of these to the various threats.

Pg 3, Section A: Another group of chemicals that should be highlighted are dioxin/furans.

Pg 7. Decline in availability of food sources are due to many factors and this implies it is due to toxics but habitat loss, over harvesting, etc. also attributes to decline in food resources.

Pg 4, Section B: Recommend more than one reference is needed to support the statement that consumption of fish, shellfish, etc represents the most significant human health exposure to toxic contaminants, pathogens and biotoxins. We agree with this statement but more references are needed to support this statement. They could reference findings from other health assessments such as Lower Duwamish Waterway. Mercury and

dioxin/furans should be added to the list of highlighted toxic contaminants. Disagree with statement that tribes and immigrant populations consume a greater dietary proportion of bottomfish. Based on survey of Asian Pacific Islanders (Sechena et al 1999), shellfish followed by finfish (not bottom fish) composed the majority of dietary preferences. This same survey data was evaluated for LDW but adjusted by EPA for self-harvesting from within King County by these populations and shellfish composed the majority of the dietary preferences (Windward 2007). Tribal surveys for the Tulalip and Suquamish tribes show shellfish and anadromous fish compose the majority of dietary preferences (Toy et al 1996; Suquamish Tribe 2000) not bottom fish. Recommend be more specific than just “Concentrations of contaminants in resident Chinook salmon are also of concern.” Please be specific as to which ones.

Page 4 (pages are document, not PDF pages – first bullet – only mentioned children for special risk, should also include pregnant and imuno-compromised. Also shouldn't long-lived shellfish be included (geoducks)

Page 5 – additional sources of contamination 1) resuspension or remobilization of chemicals contaminants during dredging or sediment disturbance; 2) Chemical Remobilization from freshwater to saltwater?

Pg 5, Section B: Recommend list out types of seafood largely consumed. What types of data are available? Which species tested, which classes of chemicals, pathogens, and what areas of Puget Sound have been sampled (maybe able to do most in map).

When discussing air deposition as source, please include dioxin/furans in the chemical list.

Pg 6, Section B (Emerging Chemicals):Sufficient toxicity data needs to be available to adequately evaluate emerging chemicals. Evaluating risks from synthetic hormones, antibiotics, and other pharmaceuticals is very challenging because people use all different kinds of pharmaceuticals (both over the counter and prescription). It is difficult to evaluate risks from these chemicals from Puget Sound seafood because of the additive risk from intended use of these chemicals by various individuals cannot be taken into account accurately. Because of these two concerns (sufficient toxicity data and difficulty in knowing individual use), higher priority should be given to pathogens, biotoxins, and PBT chemicals (e.g., PCBs, mercury).

Pg 6, Section B (Direct Contact with sediment and water):

Please be more specific about what chemicals pose risk from direct contact with water and sediment and supply more references. I suspect these risks (those associated with chemical toxicants) tend to be very low in most areas of Puget Sound. Risks due to pathogens are more likely if located by sources. The frequency and duration of exposure is also important in understanding these risks. More is needed here to understand degree of risk and what exposures relate to these risks. This is important to understand when prioritizing work.

Page 6 – Characterization of Emerging Contaminant as “serious risk” is perhaps exaggerated at this time – “risk or of concern” is more appropriate.

Page 6 - This statement seems too broad and is contradicted on page 12: “Direct contact with sediment, water, or biota contaminated with chemical toxics and pathogens within Puget Sound and on its beaches poses a human health threat, although not as great as that posed by consumption of contaminated fish and shellfish, because the magnitude of exposure is less significant.

Page 6 – their use of the term “Emerging Toxic Contaminants” defined as “... include a variety of chemicals found in stormwater and wastewater discharges (such as synthetic hormones, antibiotics, and other pharmaceuticals), as well as perfluorinated compounds (PFCs).32,33,34,35,36” first, is over broad and second, not all are know or suspected to be “toxic”. There has been a tendency but some groups to label all EDCs or other emerging issues “toxic” and this is just not accurate, as well as the term “Toxic” to some means Acute or Chronic toxicity, to others many mean others things. This general use is overly broad and alarming without balance or distinction.

Page 7 2nd bullet: Hydrogen sulfide, in the quantities produced by decaying seaweed, is not a human health threat. Quite likely a nuisance but, highly unlikely to pose any documented health effects beyond that. Does not belong on this list.

Pg 7, Section B (direct contact): Please clarify what is meant by “freshwater drainages.”

Pg 7, Section C: More supporting information (summary tables and/or figures) are needed to support the statement that there is reasonable certainty in characterizing human health risks from seafood consumption. How many species have data available and from what areas? Are these the species frequently consumed? Were detection limits adequate for non-detected chemicals?

Page 7 – the characterization of danger from - “Beaches or coastal waters as seaweed and other organic material decompose, producing hydrogen sulfide;” seems incorrect. While it may smell, the seaweed breakdown is not creating or unleashing toxicity and the H₂S is not harmful in such quantities.

Page 7/8 – the document’s section on *Certainty of Concern: Health Related Pathogens* does not mention any numbers regarding recreational beach closings. It is suggested that to give a sense of the magnitude of the issue (i.e., certainty that there is a problem), there should be some data on beach time lost or numbers of illnesses reported. Likewise the *Biotoxin* section gives no sense of magnitude so how can any certainty be gained that this is a problem? And these are only discussed in shellfish, not in any other consumable organism.

In the *Metals* section of this certainly sections they should specify is they are making their conclusions based on straight comparison of tissue data to HH standards or other standards. They should also mention some comparison to higher Tribal consumption

rates if their analysis takes into account consumption rates.

Pg 7 and 8, Section C (pathogens and biotoxins): To the extent possible, expand on pathogen and biotoxin discussions. These are important for short-term exposures and health impacts. What percent of areas are monitored? Is it sufficient to inform and protect the public? Should more funding be made available because of insufficient monitoring?

Pg 8, Section C (metals): This section could be improved by focusing the discussion on water, sediment and then biota. A figure/map would help this discussion so that the spatial scale (and temporal scale) of available data could be better understood. Scale is important factor for water and sediment data. Urban bays likely have different levels than, for example, the Central Basin, and therefore exposures and risks will differ in these areas. This is important to understand when prioritizing efforts.

The LDW found risks from consumption of clams from inorganic arsenic and carcinogenic PAHs. More information is needed to understand risks toxicants from consumption of clams from other areas.

Page 8 - Natural pathogens. Here is the first attempt at context, “two or more confirmed VBM illnesses annually w/in the past three years”, but is it two *or more* illnesses? Presumably there’s documentation if we’re citing it as ‘confirmed’, so which is it? Also, it isn’t clear to the non-microbiologist if VPM is a result of human activity/urbanization or if it’s natural, (i.e., from the natural environment).

Pg 9, Section C (PAHs): Agree it is unlikely these chemicals will be of concern in fish because they can metabolize them but shellfish do not. Therefore, the adequacy of detection limits for PAHs should be checked

Pg 9, Section C (Fish Consumption rates): There are data available from a study on Asian Pacific Islanders. And some creel surveys from Puget Sound for recreational fishers.

More data should be gathered on human recreational use of the areas around Puget Sound. This will help understand patterns of use by different populations and regions. An inventory of beaches frequently used, shellfish harvest areas, fishing areas and species harvested would be helpful. This information can be used to help prioritize areas for further study and/or improvement.

Page 9 – mention of concerns from PBDEs is presented but there are no current standards to our knowledge, so they should identify what they are using to determine risk here. It may be related to the fact that PBDEs have a structure and properties very similar to PCBs – if so they should say that is their reasoning – again characterizing the nature of their certainty.

Page 9 – *Sediments* section should note that for tribal fishing or any other human activities where this is a greater likelihood of exposure to sediments cares with it a larger

possibility of human health risk. KC WTD Green Duwamish CSO WQA has analysis of this and showed increase human health risk to net fishers.

Page 10 – Data Gaps – section *Biotoxins*, the document discusses one *Vibrio parahaemolyticus*, but not the other one mentioned earlier *Vibrio vulnificus*. Also mentioned others ones but does not list them – seem like this sections could benefit from more substance.

Page 10 – these sections refer to *shellfish* but go on to talk about other species separately which are also ‘shellfish’ so it suggests that the ‘shellfish’ section may only be referring to bivalves (clams, oysters, mussels) and perhaps should be clarified

Pg 10, Section C (Toxics in water column): While I agree more information is needed on toxics in water column, it must be recognized this is a large task. Here is where use surveys/information would be important to help prioritize study areas.

Page 10/11 – *Toxics in Water Column* and *Freshwater* - should also mention KC data as available and perhaps should say that while data is limited, the data available has not typically or yet been analyses with HH issues in mind.

Page 11 – the section on *Reference conditions* – is presented without context until you read on to the next sections. It does not appear meaningful part of section.

Page 11 – *Effectiveness Monitoring* – This section should talk about what is meant by effectiveness monitoring before stating that it would be useful. Such a concept may be premature since the question of health risk in most cases, is not settled so knowing if that risk is significantly reduced is perhaps, not possible.

Page 11 Current Status, Part A. Bullet 2: "Should not harm" is very ambiguous and essentially unattainable. There is "risk" involved with every aspect of human use and enjoyment of Puget Sound and its resources. The document should specify (in its management objectives) what the acceptable level of risk is. E.g. 1 in 1,000,000 excess King County Comments on Human Health Topic Forum Discussion Paper 10 risk of cancer. The management options listed later should then be connected to these allowable risk levels.

Page 11 – Effectiveness monitoring. Once I read the entire paper I came back to this because it isn't clear how this might be accomplished.

P. 11 top of page – Add new statement – Groundwater toxics entering Puget Sound -- with same statement as made for freshwater toxics.

Page 12 – this statement is misleading: “Other areas, typically urban embayments like Elliott Bay, and those in close proximity to hazardous waste sites or wastewater outfalls, have advisories for no or limited consumption based on toxic contamination levels.” - since hazardous waste sites advisories will be based on toxic hazards where as

wastewater outfalls will be based on a broadly applied concern for pathogens. Very different issues effecting different organisms and human uses.

Page 12 – this statement could also use some modification: The best shellfish conditions and classifications are in rural areas, where there are few sewage treatment and stormwater outfalls. There are often other inputs that will affect water quality in rural area (e.g., Hood Canal, septic system contributions, overland stormwater runoff) so that such a blanket statement is not useful.

Page 12 – discussion of beach monitoring should be clarified that it only represents pathogen monitoring. Also the statement: “Some areas have good water quality; other beaches located in proximity to urban areas, marinas, and/or wastewater outfalls often have poor water quality conditions that have potential to pose a threat to human health through direct contact”, again does not seem to be fully substantiated or is generalizing because the beaches in relative proximity to KC outfalls, that KC monitor, are not usually have poor water quality. Therefore the general presumption may not be backed up with fact and should thus be modified.

Page 12 – The *Tribal use* section should also mention that while some areas are restricted other areas that are not are being used and evidence it beginning collected that tribal members, consuming high quantities of shellfish, are showing high body burdens of metals.

Page 13 – Table S2.1 and S2.2- Wastewater system industrial pretreatment – is a Source Reduction as well as management of exposure. Table could also include State Surface Water Quality standards and TMDL regulations as Source Reduction.

Page 13 Table S2-1: The first 2 rows should be labeled as source reduction management approaches and well as threat exposure management.

The Sediment Quality Standards, MTCA cleanup standards, spill response programs, and (not listed) dredged material disposal standards do not fully address bioaccumulation of toxics into biota.

P. 13 Table S2-1 – Add “groundwater protection” to row with stormwater management (six up from bottom of page)

Page 14 Table S2-2: Product bans like that on deca-PBDE should be listed as a source reduction option.

Page 14: Is this how effectiveness is currently measured or can be measured? Are trends in water quality really as relevant here (maybe it is indirect), as point of this paper is human health, others are more clearly human health

Page 14: Cite on #2 on chart S2-2 – what indirect evidence?

Page 16: Table P1-1 – this is examples or a complete list? Is this prioritized as to what is most effective?

Pg 17, Section A (Table P1-1): Are CSO control plans included as part of one these? If not, it should be added.

P. 17 Table P1-1 – Add “groundwater management areas” next to watershed management plans in last row (bottom of page)

Page 18: This table is not useful in terms of prioritizing actions. Many of the actions it implies would be very costly.

Page 18 – Table P1.2 – this statement should have both Biotoxin and pathogen checked - Although all commercial shellfish areas and most major recreational beaches are regularly tested for biotoxins and pathogens, some beaches are not included in existing programs. In addition, monitoring covers only a portion of Puget Sound shoreline areas.

Pg 18, Section B (Table P1-2): Stormwater permits are only now starting to require monitoring in surface waters and in some cases, stormwater discharges

Page 18 – Table P1-2, “Threats Not Fully Addressed”. The wording of this implies that these threats can be fully addressed and aren’t, and it isn’t clear that they can be or should be. For example “Not all chemicals present in wastewater are either monitored or addressed by NPDES permits”, should all of them be monitored, tested for, etc., should all of them be addressed in NPDES permits? Or the next one...”emerging chemicals... are not being addressed by existing programs.” How should they be ‘addressed’, are we talking about acknowledging their presence or something else in the face of limited understanding? This section should be carefully crafted and be clear (i.e., **do** they mean *known toxics* that should be monitored, etc.). Even **with** clarity, it’s mind boggling to consider what this might cost.

Page 19 – Section C. The examples seem weak and their effectiveness has not been documented. Maybe this section should either cite some of the innovative models being King County Comments on Human Health Topic Forum Discussion Paper 12 developed in Europe, or the paper should recommend this be further explored as a ‘gap’ in knowledge.

Page 20 – Section A. The examples don’t include enforcement of building codes that limit stormwater runoff. It’s later in the paper, but there is evidence this can address some identified threats (SPU has studied in their system). The paper doesn’t answer why, and states that “it’s unknown if the effectiveness of these programs has been documented.” Again, can we cite examples from here and abroad?

Page 20 – under Source Control the current municipal source control/pretreatment programs continue to show (at least KC does) measurable reduction in metals from the waste stream that the treatment plants must treat.

Pg 21, Section B (gaps): The quality of existing data needs to be evaluated (see general comments). Do we understand the cause of biotoxins such that we can reduce the occurrence of them?

Page 21: I agree that closing gaps in existing 'pollution' management programs is where some of the greatest gains may be achieved. However, there seems to be a disconnect between the bullets listed on the bottom of page 21 and the limitations of existing management programs shown on Table P1-2.

Page 21, under cleanup programs: “Ecology’s Toxics Cleanup Program has been effective at moving sites toward cleanup” is not very informative. Is it moving fast enough? Are there too many sites for this program?

P. 21 Section B Gaps – Add “Groundwater monitoring and evaluation of groundwater quantity and quality and evaluation of discharge to Puget Sound”.

Page 22 – The shellfish in this comment should also include shrimp - Although a study has been completed for Puget Sound on chemical contamination of fish 114, a parallel study for shellfish (including crab) has not been completed. Also, I believe earlier the text indicated that there is also a gap in study of some finfish as well.

Page 23 – This section should also mention the gap in knowledge regarding the other Emerging contaminants of concern including pharmaceuticals, personal care products, and soaps and other household products with contain chemicals that may have other nontypical effects still being studied worldwide and that this will be a data gap for a long time and something that will not be able to be filled locally.

Page 23: Reduce pollutant discharges —“more stringent standards should be established for wastewater” – seems too broad and premature, given the lack of knowledge of the relative importance of wastewater.

Page 23:, General comment – Many of these actions call for more funding – which will be difficult to obtain. Which, among these, is relatively more important, or are they in order of priority?

Pg 23, Section C (strategies): Need to understand source and movement of toxicants within food web and abiotic media to know where to focus work to improve conditions. Land use will affect inputs to the system (urban areas have more inputs than rural area for most toxicants). Work with businesses to have spill prevention programs and work with them to keep catch-basins cleaned. How do air emissions from industries affect atmospheric inputs to Puget Sound? Public education in product use and disposal and funding to help lower income families properly dispose of products.

Pg 23, Criteria for actions: Why are biotoxins not included in first bullet? In second bullet, do we know what to focus on, which chemicals, pathogens and their

sources. Are their sources something we can control, especially in urban areas or if from global source?

Pg 23, Criteria for actions: It may not be possible to eliminate some threats (see general comments).

Pg 23, Making Progress: Some of these do not seem like measures to see if we are making progress but rather steps we need to take so that we can then find ways to measure progress. What would be the indicators of making progress? X% reduction in shellfish bed closures, increase in consumption of residence salmon (change health advisories), X% reduction in biotoxin occurrences, X% reduction in PCB levels in urban bay fish, etc. Others such as “increased resource harvest options” could be more specific, such as 10% increase in 5 years to 50% increase in 10 years.

Page 23 Section C: There is no mention of enforcement in this subsection. Many older septic and stormwater systems are poorly maintained (according to urban legend which may or may not be true). Whether this is due to lack of funds, ignorance, or neglect is unknown. But one missing aspect of the management of older and under-functioning sewage and stormwater systems is enforcement of existing rules and regulations.

Page 23 – Section C. These are pretty much saying that everything we’ve been doing is adequate if we just do it more/better. Is that where we want to be? If so, bullet two needs to include *improved inspection programs* to ensure regulations are being met in construction and *follow-up to ensure the on-site controls are operating as intended*. Bullet five is review and update the list of PBTs, but this doesn’t address the criterion that says “The action directly addresses reduction of the origin or threat.”

P. 23 Section C specific strategies – Add “Complete and implement groundwater protection plans. The lack of information on the quality and evaluation of discharged to Puget Sound needs to be addressed both as a public health issue and a water supply issue.”

Page 24 Progress indicators: The establishment of current baseline conditions, a set of indicators, coordinating across jurisdictions, and closing of data gaps is not “progress.” Those are merely intermediate scientific and bureaucratic steps to a cleaner Puget Sound ecosystem. Many of the listed indicators are obtuse and several of them are merely indicators of greater/perfect knowledge. Successful management will need to accept operating under conditions of uncertainly regarding toxics and bacteria sources, pathways, and potential solutions.

The following are much simpler and more directly indicate progress and successful management of the key human health risks listed in question 1:

- 1) Declining concentrations of bioaccumulative chemicals in fish;
- 2) Fewer fish advisories and/or the relaxing of consumption limits;
- 3) Fewer Pathogen, PSP and Domoic acid shellfish closures and/or shorter duration closures;

4) Fewer swimming beach closures due to pathogens or risks from direct contact with water/sediment.

Page 16, Table P1-1: Please add to this table the following program: “The state Department of Natural Resources in coordination with the Department of Ecology is developing a program to expand opportunities to reopen recreational and commercial shellfish beds near municipal outfalls throughout Puget Sound. This program works to identify, eliminate and/or mitigate toxic and pathogenic impacts to shellfish beds from these point sources.

Pg 17 – In addition to conservation commission and local conservation district programs, there are land conservation programs such as Pierce County’s TDR program which seeks to reduce the number of low density units on farms and forests in exchange for greater density in cities. This work lowers the amount of stormwater runoff in the watershed

Pg 20 – There are a number of conservation programs that are successfully reducing impervious surface and therefore stormwater runoff and the human health impacts that result from high runoff levels. Programs to this effect could be included in the “source reduction” category on this page.

Pg 23 – The authors should broaden the 2nd bullet under “C” to address the need to limit impervious surface not only in a single development, but across the watershed. Even if there is more impervious surface in a single development, this can improve the overall amount of impervious surface in the watershed as a whole. EPA conducted a study comparing 10,000 houses across 10,000 acres, and 10,000 houses across 1,250 acres, and found that in the more compact scenario, there was a 70%+ decrease in stormwater runoff. Source: Richards, Lynn. "Protecting Water Resources with Higher-Density Development." Smart Growth. Environmental Protection Agency. January 2006. http://www.epa.gov/smartgrowth/pdf/protect_water_higher_density.pdf.