

PugetSoundPartnership

our sound, our community, our chance

Draft Action Agenda Comments

Tribes

Nov. 6 - 20, 2008

Set 8 of 8

November 19, 2008

William Ruckelshaus
Leadership Council
Puget Sound Partnership
P.O. Box 40900
Olympia WA, 98504-0900

RE: Comments on the Puget Sound Partnership's Draft Action Agenda

Dear Chairman Ruckelshaus:

The Jamestown S'Klallam Tribe wishes to thank you for your sage counsel and your unwavering support for the Puget Sound Partnership. You and the other members of the Leadership Council are to be congratulated on the progress that the Partnership has made to date.

We wish to acknowledge the contributions made to the Partnership by the thousands of citizens around Puget Sound who have put so much thought and energy into this "last best chance" to save the ecosystem that is our home. David Dicks and the staff of the Puget Sound Partnership have done a terrific job of pulling this Draft Action Agenda together. What is an extremely complex and difficult set of issues is presented in as concise and organized manner as possible. It really is a quality product.

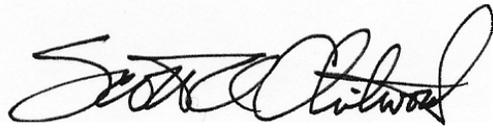
Many of us became engaged in this effort because we were losing something. In our case it was salmon. Dungeness Chinook, for example, are teetering on the edge of extinction. As unique a stock of fish as the Dungeness spring/simmer Chinook are, extinction simply cannot be allowed. Drastic measures are needed so let us take them. This endeavor will be expensive and find the resources we must. The needs of the resource must be raised so lifted over our heads they will be. These fish are extremely important to the Tribe, to the people of the valley and to all those in the region who want to live in a quality environment.

Examples of other fish stocks in trouble and environmental concerns of all shapes and sizes are in evidence all across our region. The people part of the Puget Sound ecosystem has enjoyed phenomenal growth for over 100 years. Yet more of us are on the way. We need to figure out how to accommodate the people that are here, the people that are on

the way, the Dungeness Chinook that require our attention and all of the other ecosystem needs that have been outlined in the Draft Action Agenda.

Please accept our thanks for making this start to our combined effort to save Puget Sound. We are long way from the end but perhaps we have the road map we need to guide us there.

Sincerely,



Scott Chitwood
Natural Resources Director

Puget Sound Partnership
our sound, our community, our chance

Comments on the Draft Action Agenda from the Jamestown S'Klallam Tribe
November 19, 2008

Question 1.

Targets and Benchmarks

Salmon and Steelhead status and trends. Add the term “harvestable.” The State and Tribes are co-managing salmon to recover them to *harvestable* levels, not simply a population that is self-maintaining.

Question 2.

Economic development has been a key driver in the region for over 150 years. Natural resources are what attracted people to the region and what fueled the economy for much of that time. Many industries have come and gone leaving their impacts on Puget Sound. Despite the important position that the Puget Sound region plays in the nation's economy and in the global marketplace we see today how fragile that economy can be. We cannot lose sight of the past and the lessons learned. There is a smart way to foster economic development in the region and it does not have to occur to the detriment of the environment.

Regulations are part of the answer to resource protection. So are voluntary actions such as private and public land stewardship efforts. A mix is needed. We need to work with those who would protect the environment by providing incentives and rewards. For those who would destroy ecosystem functions regulations may be the only way that the region's recovery can be enforced.

We need to emphasize, repeatedly, the biggest problems that we need to address as stated; losses of estuaries, rivers and floodplains and forests and the pollutants constantly delivered to the Sound.

Question 3.

Priority A.

A.1 Overall a good job on encouraging the focus of development to UGA's, which is a main purpose of the Growth Management Act. It is similar to how Europe manages their rural areas, which are reserved for Agriculture/Forestry/Natural areas and not Sprawl. However this section is also vague and not really compelling.

1. A.1.2. We think it is a good idea to have a regional discussion of Critical Areas and regulations that protect them. The skeptics will ask (for example) how far apart in terms of buffer widths are individual county CAO regulations? Being able to prove the necessity of this regional effort will be of great value.
2. A1.3 Using watershed characterizations to set priorities is an excellent idea. To a varying extent, this has already been done starting with the WRIA limiting factor analyses a few years ago. Most of these recommended reports are freshwater, this process must include nearshore areas as well.

A.2 Overall a good strategy. We have limited funds and do need to focus on those areas that are at risk.

1. A.2.2.5. Please add “creative funding” to: “Limit density in rural areas and GMA designated natural resource lands using a mix of tools including voluntary incentives, model ordinances, *creative funding*, or legislation...”. To ensure development stays within UGA’s will require a substantial investment by urban dwellers in rural areas. The only way to get some rural folks (who can be vocal critics of government) to buy into this strategy is to purchase their allegiance. We of course cannot afford to purchase everyone’s development rights, limits and criteria will have to be set.
2. A.2.2.4. Please add Tribes and property owners, “work with FEMA, *Tribes*, *floodplain property owners*, and local governments to prevent further residential and commercial development in floodplains.”
3. Near Term Actions, #X: Please add this to list: “Decommission or relocate federal and state roads within geologically unstable Critical Areas by identifying and prioritizing a list of these road segments.” Road decommissioning would be for lightly travelled forest roads, relocation are in more developed areas.
4. Near Term Actions, #5: Please add Critical Areas Ordinances, or “...to update local shoreline management programs and *critical areas ordinances*...”

A.3. Protecting instream flows is critical, and our ignorance is substantial to how much water sustains ecosystems. Perhaps all water flowing down a river is utilized for a fluvial process or by some organism; what is lacking is our understanding of how or why that water is important. Thus the goal should be to minimize our utilization of water and conserve what we use.

In terms of Instream Flows, the standard for fish is IFIM (Instream Flow Incremental Methodology). Many watersheds/WRIA’s that are now (or have been) in Instream Flow Rule-making do not have IFIM studies. We must understand that IFIM is a very coarse estimate of physical water (depth/velocity) needed for fish; IFIM ignores hydrologic processes and therefore is only one small piece of information. However IFIM is better information than making decisions based upon a rule-of-thumb (i.e. water withdrawal must be equal to or less than 10% of the 50% exceedence flows).



1. A.3.2.1. needs to be a Near Term Action, #X. Please add: “Reform state water laws to place Instream Flows as the most Senior Water Right in each basin.” This would discourage water waste. An example of wasting water can be found in the heavily irrigated Dungeness valley. The irrigation ditches were originally dug for agriculture, now the valley is more often growing houses. Water rights stay with the property, so river water is used to maintain large lawns. Millions of public dollars have been spent on water conservation and keeping water in the river, yet this waste is legal. State water law reform is necessary.
2. Near-term Action #X. Add “Require a water budget for major watersheds that identify not only how much water is being used, but who is using the water (Agriculture, Industry, Residential). Fund or regulate those users to require or encourage use of less water.”
3. Other Near-term Actions are excellent.

A.4. We agree with protecting “working” rural areas as a cornerstone to preventing further resource degradation. However, we must remember that some agricultural and forest land contains very poor habitat due to historic destructive management, the lack of riparian and wetland buffers, and they also contribute to water quality problems in Puget Sound from the over-reliance of pesticides and herbicides. This section appears to be centered on maintaining working lands (i.e. preventing conversion) and not the larger recovery of Puget Sound. Restoration/revegetation of at least buffers needs to be included in the Action Agenda.

1. A.4.3.X and Near-term Action #X. Please add: “to increase funding to programs that protect or restore Critical Areas or their buffers within working farms and forests.” An example is the Conservation Reserve Enhancement Program through the U.S. Department of Agriculture, or the Wetland Reserve Program through NRCS.
2. A.4.4 The other half of promoting viable working forests is ensuring that that the watersheds remain biologically productive and viable as well. Small forest landowners received an exemption under Forest and Fish; which was later expanded to include medium forest landowners. These are generally low-elevation forests and prime salmonid habitat.
 - a. A.4.4.2. Per the above, please add an additional sentence: “Encourage protection and restoration of Small forest landowner critical areas and buffers through an expanded emphasis on technical assistance programs and riparian conservation easements.”

Priority B

1. B.1. We agree with this short, succinct recommendation “*prioritize the implementation of restoration projects identified within existing species recovery*”



plans, flood hazard management plans, road decommissioning plans, and other documented, well-vetted processes.” This should be somehow reflected in the Near-term Actions.

2. B.1.2.c. We appreciate the recognition for the importance of lower Dungeness River recovery within Puget Sound.
3. B.3. Near-term Actions, #1. We would add to the list “County Community Development Departments”. Often these are the places landowners go with development plans involving critical areas and it is absolutely necessary to have someone there that can recommend restoration, in addition to or instead of development.

Puget Sound Partnership
our sound, our community, our chance

Priority C

Water pollution in terms of persistent toxins, pathogens, increased temperature, and nutrient loading may very well be the 800-pound gorilla that is killing Puget Sound. The Current Situation is well-stated.

C.1

1. C.1.1.4 and C.1 #2 Near Term Actions. Please change to this more significant goal: “eliminate the use of all chemicals on the Persistent Bioaccumulative Toxin list by 2020.”
2. C.1.2.1 and C.1 #3 Near Term Actions. We strongly support “permanently maintain a year-round rescue tug at Neah Bay.”
3. C.1.2.3. We feel all of Puget Sound should fall under No Discharge Zones as stated in Near Term Action #5.
4. C.1 #1 Near Term Actions. We strongly support all actions to reduce the pharmaceutical loading in Puget Sound.
5. C.1 #7. We strongly support all water quality protection listed here that protects existing commercial and tribal shellfish operations.

C.2

1. C.2.3.X “Map stormwater facilities (ditchlines) in rural areas that extend the stream channel network or increase the density of stream channels.” This has a cascade effect on stream process and aquatic communities, and can be used as an important data source for stormwater control projects.
2. Near Term Actions. All are Excellent. For #7, should read (including Tribal Trust Land)

C.3

Near Term Action #1. We agree with the Northwest Indian Fisheries Commission recommendation: “Ensure that AKART (All known and Reasonable technology) or better standards are applied immediately, to lead to zero discharge, for all new construction utilizing State of Federal funding, and for all remaining treatment plants of Puget Sound by 2020.”

C.4

1. C.4.1. “Establish in a coordinated way...” This language is too vague. In 1999 in the Dungeness, Clallam County Commissioners were required to establish a Clean Water District due to commercial shellfish closures. The Commissioners declined to



tax the residents within the district, limiting its effectiveness. The County (through Jamestown S'Klallam Tribe) then received a EPA Targeted Watershed Grant to fund repair/replacement for Septics of Concern, of which several dozen were eventually replaced. And the County has implemented a law for the Marine Managed Area, however they lack funds to track when folks need to be notified to get their septic systems need to be checked. This leads to the following Near Term Recommendation:

2. Near Term Action #1. Develop and implement sewage management plans in each Puget Sound county that: identifies failing septic systems, requires repairs of same, and tracks and notifies landowners to complete periodic review of their septic system.

Priority D. This section is really where the rubber hits the road in terms of organizing and coordinating the multitude of disparate efforts across Puget Sound. This coordination is very important to Puget Sound recovery.

D.1

D1.1, D1.3. Very important and will require a dedicated Coordinator with facilitation skills.

D1.4. Limiting harvest will not magically recover the ecosystem. The Tribes are united in their desire to return all fish and shellfish to harvestable levels. Change to “Set annual wild-fish harvest and hunting rates to what the ecosystem can bear with the goal of recovering ecosystem condition and traditional harvest opportunities.”

D1.5. Suggest change of focus to “Communicate results of annual fishing and hunting regulations and rates in a way that is transparent with readily available information.”
Near Term Action #1. Who will decide what is to stay and go? We think the idea is good, but who and how it is implemented will greatly determine its scope and success.

D.2 How we respond to climate change will determine the fate of many Puget Sound species and ecosystems. Climate change needs to be integrated into every decision framework throughout the Action Agenda. Climate Change is important enough to be a stand-alone Priority, and not buried on pg 29.

D.3 The reality that local, county, state budgets are sharply declining in the near-term needs to be addressed. How will the Action Agenda be implemented for long-term capacity, given our current situation? Certainly this ties to funding and hopefully funding strategies that are outside of the Legislative Budgetary cycle (see E.2).

1. D.3.5.2. Please add this sentence: “Streamline federal permit processes (Corps, NOAA Fisheries, USFWS) for implementation of Partnerships 3-yr plan restoration projects.” This could follow the ESA model that SRFB has set up with NOAA and



FWS. It is counter-productive and inefficient for habitat restoration projects to jump through the same hoops and timeframes as development, or habitat-impacting, projects. This is in Section D.4.1.5, but needs to be here as well.

2. Near Term Actions, are solid. Note: all Near Term activities in each Priority that require new funding should be evaluated or prioritized given our present state budgetary situation. Eventually funding separate from the cyclical nature of sales tax and B&O tax is imperative.

D.4. Converting the viewpoint of regulations to the ecosystem level is a needed step for Puget Sound recovery. Also of high importance is the education and outreach message that any development project within a watershed, will to some extent impact that watershed and Puget Sound. Embedding this idea within the public may potentially shift the viewpoint of a given development to “how can I minimize my impact” rather than “how do I get my permit?”

1. D.4.1.X. Suggest adding the following subsection: “Change Washington State Vesting laws from the time period of the initial subdivision application, to when the developer is applying for building permits. Initially this change could be limited land within Critical Areas, but ultimately it should apply Puget Sound wide if the goals in A.1 are to be met. Washington State allows developers to vest earlier in the process than any other state in the Country. As an example, the potentially disastrous development of dense floodplain lots along portions of the Dosewallips and Duckabush Rivers come to mind.
2. D.4.1.X. SEPA is broken and needs a major overhaul (e.g. the SEPA checklist in reality provides little information and ultimately protects almost nothing). Suggest adding a subsection to D.4.1 covering SEPA. Suggested language is “Overhaul SEPA checklist to present a more accurate picture of the project and its impacts, and extend the permit analyses for an individual project to an appropriately larger scale and cumulative effects.” An example is permitting for a private dock; the density of other docks in the bay and their cumulative impacts is not currently considered.
3. D.4.1.X Suggest adding the following subsection: “Identify and reverse laws that require jurisdictions to allow development to “highest and best use” of property. This is an often-used damaging pathway to development within critical areas. While a variance is usually required, the Counties and Hearing Examiners are all over the map on this.
4. D.4.2. Thank-you, these are welcome recommendations for improving mitigation.
5. Near Term Actions #2. Streamlining permit processes sounds great, but the goal here is not streamlined permits but better resource protection. That is somewhat lost in the language “regulations consistent with the Puget Sound ecosystem decision-making framework.”
6. Near Term Action #3. Thank you, see our comments at D.3.5.2.
7. Near Term Action #4. Overall very welcome. Please insert between the first and second sentence: “The Corps is required to consider levee-removal, levee setback,

and property acquisition of impacted properties in lieu of levee repair.” Currently the Corps is tone-deaf to anything other than returning the levee to its original design.

D.5

Near-term Actions: Thank you, we have no idea in most Puget Sound counties regarding the implementation and effectiveness of regulatory habitat protection measures. The Tribes would like to be part of this regulatory review process, and not just limit it to County Code enforcers.

1. Near-term Action #1. Add “Tribes”, written as ...”Convene a process with Federal, Tribal, State, and Local jurisdictions...”

Priority E.

E.1 Building a management system will be an incredibly-large task. Our concern is this will consume and overshadow many more pressing issues. The start of the management system construction should occur after the dust settles and more pressing Actions are funded and underway.

E.2 Funding. The funding proposals in this section are good, but it is highly unclear whether they will add up to the needed levels. We are in favor of a direct, dedicated effort to discover and pursue any and all funding avenues deemed productive. The public needs to know up front that this effort is going to be expensive, it will take a long time and that we all will be required to pay for it. This is not the best message to present given the current economic downturn but there is never a good time to tell the public that they are going to have to pay for something. In this way people will know what is expected if the effort is to be successful. They will know what we are talking about when we say funding is needed, how much, for what, for how many years. There should be no surprises.

Some examples include:

1. An economic analysis of existing and recommended funding packages is needed.
2. Consider resource impact/activity specific fees and taxes. These are directed towards activities that harm Puget Sound. All of these are small in size relative to the individual, but jointly would likely raise enough to fund the Partnership’s Action Agenda. These would include:
 - a. Small tax per gallon on groundwater or surfacewater withdrawal. Removing water, a public resource, has an ecosystem impact, yet that “cost” is not levied to the user. Certain activities, such as agriculture could be exempted if they are following water conservation practices.
 - b. Small tax on gas (by gallon) and other petroleum/fossil fuel products to mitigate the huge impacts of roads and automobiles/trucks to Puget Sound as



well as the risks associated with transporting oil. Gas for mass transit could be exempt.

- c. **Energy tax:** Surcharge for energy use required to light, heat and provide hot water for that portion of a residence larger than 2,000 square feet. The region's energy comes from public energy sources and owners of homes beyond reasonable sizes should be required to pay a premium to use public energy.
- d. **Ecological impervious-surface fee.** This small impact fee would be assessed to new and existing residences and businesses that did not use LID techniques to mitigate for stormwater and pollution.
- e. **Pollutant tax.** If you want to pollute it will cost, since Puget Sound is ultimately paying the pollution price.
- f. **Flush tax.** Charged by bathroom. Help pay for sewer upgrades or creating a sewer district in rural areas. Urban \$ could be used to help jumpstart sewer districts in rural areas.

E.3. A coordinated regional science/monitoring program would be useful, as long as it emphasizes the coordination part amongst decentralized governments and agencies (i.e. is not about centralized control of science/monitoring).

1. Near-term Actions are comprehensive and needed.

E.4 Education and Outreach are the most important Near-term Priority, this section should be elevated to a Priority. Without new and substantial public support and public change of their behavior, the goal of recovering Puget Sound will fail.

1. E.4.1. Overall, this strategy is fine. However, the outreach must capture the hearts and minds of especially the young adults and families. The innovative use of a ferry trip video to describe Puget Sound health was effective; more of the same type of creative communication is needed across many subjects.
2. E.4.1. There is a vocal minority that voices, "too much regulations already" and "volunteer programs are sufficient." The majority vaguely supports habitat-protecting regulations, until it potentially alters what they want to do. Suggest using the data contained in the report "A New View of the Puget Sound Economy..." by Earth Economics as one outreach leg.
3. E.4.3. The basic challenge is not only training teachers, but getting kids outside so they can see and feel our natural legacy. Schools themselves do not support these activities. There are many programs already existing that could be tapped: e.g. Wilderness Awareness School and Northwest Environmental Training Center are two of many.

From: Hilton Turnbull, Jamestown S’Klallam Tribe

Comment: I am a Tribal Biologist working for a Native American Tribe along the North Olympic Peninsula for the past 6 years. I very much appreciate the chance to comment on the Draft Action Agenda and the Puget Sound Partnership's efforts to restore the Puget Sound ecosystem. One area of the Agenda that could use some expansion is: Priority A.5 'prevent and rapidly respond to the introduction of new invasive species'. This of course is the proactive approach but it doesn't go far enough to address existing invasive species infestations which are threatening our freshwater and marine resources. The suite of (State Noxious Weed listed)invasive species that I have been working on in the Dungeness River are still available for purchase commercially, and present a very real existing and recurring degradation both economically and ecologically.

Puget Sound Partnership
our sound, our community, our chance



LOWER ELWHA KLALLAM TRIBE

ḡəḡəx'ə nəx" s'á'ay'am "Strong People"

2851 Lower Elwha Road
Port Angeles WA 98363

(360) 452-8471
Fax: (360) 452-8428

FAX COVER SHEET

TO: Puget Sound Partnership

FAX # 360-725-5456

ATTENTION: Bill Ruckelshaus

DATE: 11-20-2008

FROM: LOWER ELWHA TRIBAL OFFICE

SENDER: LaTrisha Suggs

PHONE # (360) 452-8471 EXT. 143

MATERIAL TO FOLLOW:

LETTER: MEMO: DOCUMENT: OTHER:

NUMBER OF PAGES: 3 inc cover sheet

COMMENTS: _____

THE INFORMATION CONTAINED IN THIS FACSIMILE COMMUNICATION IS PRIVILEGED AND OR CONFIDENTIAL INFORMATION INTENDED ONLY FOR THE USE OF THE INDIVIDUAL OR ENTITY NAMED ABOVE. IF THE READER OF THIS COVER SHEET IS NOT THE INTENDED RECIPIENT, YOU ARE HEREBY NOTIFIED THAT ANY DISSEMINATION, DISTRIBUTION OR COPYING OF THIS COMMUNICATION OR THE INFORMATION CONTAINED HEREIN IS STRICTLY PROHIBITED. IF YOU HAVE RECEIVED THIS COMMUNICATION IN ERROR, PLEASE NOTIFY US BY TELEPHONE AT THE ABOVE NUMBER. THANK YOU.



LOWER ELWHA KLALLAM TRIBE

᠘᠗᠗᠘ᠠᠨᠠ ᠨᠠᠬᠤᠰᠯᠠᠶᠠᠮ "Strong People"

2851 Lower Elwha Road
Port Angeles, WA 98363

(360) 452-8471
Fax: (360) 452-3428

November 20th, 2008

Sent Via Fax: 360-725-5456

Re: Tribal comments on the Draft Puget Sound Partnership Action Agenda

Bill Ruckelshaus, Chair
Leadership Council of the Puget Sound Partnership
PO Box 40900
Olympia, WA 98504-0900

Dear Bill:

Thank you for allowing us to review and provide input on the draft 2020 Action Agenda for Puget Sound. Due to the short time frame to review the draft plan we reserve the right to make future comments. We do recognize that this is a historic effort by the Puget Sound Partnership in efforts to protect, preserve, and restore by developing an action agenda

None of the Elwha related projects made the "final cut" in the Implementation Table. We are working on some funding at the state and/or federal level to help speed up the actual dam removal process, but there is no guarantee of this occurring at this date. More importantly, the "suite" of Elwha related actions dealt with unfunded activities such as in-river fish restoration work, ecosystem recovery monitoring and research, public education and outreach, and mitigation projects. These activities need to be included in the Action Agenda in order that State agencies, the Tribe, Clallam County, the City of Port Angeles, and others can pursue funding in relation to these priority actions.

We also note that the action and lead agency associated with the Port Angeles Harbor project (Priority B, B.2, #1) is not consistent with discussions that were held in the Straits work group. This action involves establishing a "Pilot program to develop a coordinated cleanup and restoration plan for PA Harbor". The Port of Port Angeles is designated as the Lead Agency. We feel this project is more aptly managed under the purview of the Department of Ecology OR the Port Angeles Harbor Steering Committee (Tribe, DNR, City of Port Angeles, Port of Port Angeles, and Clallam County) in concert with Ecology. Apart from the actual cleanup of the harbor, this plan should also include future land use planning and management within the harbor to allow the public to contribute to the future vision of their harbor. Land use planning will also

help reduce the risk of recontamination and resulting failure of ongoing and future restoration projects.

We want to ensure that the action items are well conceived and afford significant benefit to the Straits Action area whenever funding does become available.

The Tribe stands ready to protect and restore the Puget Sound. The Lower Elwha Klallam Tribes living legacy include the removal of the Elwha and the Glines Canyon Dams, Clean-up of the Rayonier Mill Site, many miles of stream restoration by an award winning stream restoration team, and cultural protection of the Tse-Whit-Zen village site.

Respectfully,

Dennis R. Sullivan, Vice Chairman

For -- Frances G. Charles
Chairwoman

From: Robert Elofson, Lower Elwha Klallam Tribe

Comment: The Puget Sound Partnership needs to take a firmer stand on eliminating bulkheads and riprap. It is important to stop expansion and restore areas to their natural state. No additional areas should have bulkheads or riprap unless there is an unavoidable public need. It should not be done for private or commercial purposes.

Puget Sound Partnership
our sound, our community, our chance

Lummi Natural Resources
2616 Kwina Road
Bellingham, WA, 98226
(360) 384-2267

November 20, 2008

William Ruckleshaus, Chair
Leadership Council
Puget Sound Partnership
PO Box 40900
Olympia, Washington, 98504

Dear Bill:

Thank you for the opportunity to provide input on the draft Action Agenda. It is a large and complicated document and the time for review was short. I hope that you realize that we have not had time to have all affected departments at Lummi evaluate the Agenda or to review these comments.

A lot of money has been made by the activities that destroyed the natural ecosystem processes that are required to support human health and welfare and circle of life, yet there is a reluctance to fund the restoration of these processes. We have struggled long and hard to work in public processes to restore the salmon populations that are essential to the Lummi Schelangen, or way of life.

The Partnership charge was overwhelming and many of the problems have been well identified, and a lot of possible solutions have been put forward. We recognize that the next version will likely not be like the current draft. Rather than make detailed comments on small errors or omissions, we would focus on some of our concerns.

- 1) The distinction between the Partnership as a state agency and the Partnership as a united effort by tribal, local, state and federal parties to restore essential ecosystem processes in Puget Sound is difficult to understand.
- 2) The Partnership, since the demise of Shared Strategy is the party responsible for the implementation of the Puget Sound Chinook Recovery Plan. We are concerned salmon recovery is getting lost in the shuffle of the larger tasks. Because the Chinook salmon require properly functioning habitat everywhere from the mountains to the ocean, if the actions identified in the Recovery Plan are implemented, we will have made major progress on the recovery of Puget Sound.
- 3) The rush to achieve the mandate of the legislation has left the impression that the Partnership is building from the top down and not the bottom up. There does not seem to be recognition for those with the responsibility for watershed management and recovery that are so strapped for resources are not able to devote the time to adequately respond to the additional workload imposed by Partnership staff.

- 4) With appropriate financial support and wise advice the groups in the watersheds that developed the Chinook Recovery Plan are capable of making significant strides toward recovering Puget Sound.
- 5) We feel that there is room for further discussion on the selected indicators and benchmarks.
 - a) We question the value of the eelgrass standard as an indicator of habitat. Many indicators were identified in the salmon recovery plans.
 - b) Water quality target should be compliance with all applicable water quality standards in the watersheds and surrounding marine areas. The benchmark should be definition and implementation of TMDLs by 2015
- 6) We do not support the MPA or Aquatic Reserve concepts but with adequate resources would participate in Marine Management Areas were jurisdictions with authority to manage activities in an area agree to a common plan for protection and restoration.
- 7) Where best available science is references, it is not clear whose interpretation of that science is to be followed, and what the credentials of those making the decisions are.
- 8) There are references to many plans, processes and agencies that are being recommended without appropriate buy in by affected jurisdictions in the watersheds and oceanographic sub-divisions of the sound.
- 9) There is not enough emphasis on the understanding of the functions of the water masses required to sustain the food web in the marine and estuarine areas and the affect of upland uses of water that affect those water masses.
- 10) The process for prioritization of actions, and the creation of standards on a local and regional scale is not clear.
- 11) The emphasis on storm water seems to overwhelm the impacts of other water quality factors on ecosystem processes.
- 12) There should be more emphasis placed on reuse of municipal wastewater.

We wish the Partnership well in its efforts and will participate to the best of our ability to see that the role of the watersheds is fully supported and the influence of the region is moderate. You might forgive our reluctance to trust a state agency with the responsibility of protecting treaty reserved hunting, fishing and gathering rights as past experience does not support that trust. We support the concept of improving the interactions between watersheds to share experiences and successes encountered in moving toward recovery of the Puget Sound Watershed. If you have been able to allow us to realize the requirements of our Schelangen, then you will have recovered Puget Sound.

Sincerely yours,



Randy Kinley
Policy Coordinator



PORT OF NEAH BAY

P.O. BOX 137 • NEAH BAY, WA 98557
TEL (360) 645-3015 • FAX (360) 645-3016

MAIL: portofneahbay@portofneahbay.com

Preliminary comments of the Makah Tribal Council

On

Puget Sound Partnership Action Agenda

November 20, 2008

The Makah Tribal Council (MTC) appreciates the opportunity to provide the following preliminary comments on the Puget Sound Partnership's Action Agenda to restore Puget Sound by 2020.

During the federal caucus meeting last week it was made clear to us that in order for the Action Agenda to be federally approved as a Comprehensive Conservation and Management Plan (CCMP), thereby allowing for federal funding, it would have to meet two criteria: 1) it is comprehensive in nature; 2) it has allowed for adequate public review.

While we are very supportive of the efforts to restore Puget Sound, which provides critical habitat for numerous treaty trust resources, we concur with the EPA's statement in the Federal Tribal Caucus that the plan as currently constituted fails short due to the lack of time afforded the public to review this important document. However, it would not be difficult for it to be improved significantly with a couple of additions.

Regarding its comprehensive nature, we believe that in order for the Action Agenda to comprehensively address the threats posed to Puget Sound or any of Washington's navigable waters it should acknowledge the risks posed by maritime trade that transports over 90% of the world's cargo. Additionally, it should acknowledge and address the Makah Tribal Council's and other Northwest Treaty Tribes' contribution to addressing these threats and risks for the benefit of the greater Puget Sound.

Regarding the issue of adequate public review, we again concur with the EPA's statements made in the Federal Tribal Caucus supporting more public review. Given the statutorily mandated deadline to complete the Action Agenda by December 1, 2008 we believe that it would be helpful to open the Action Agenda for further public comment early in the new year to increase public awareness, support public education of the Action Agenda components, and foster compliance with implementing its many programs and actions.

Washington State is often credited as being one of the most trade-dependent states in the nation. The Ports of Seattle and Tacoma combined form the third largest container port complex in the Country, while the Port of Vancouver is the largest port in Canada. The container ports and five oil refineries makes Juan de Fuca Strait one of the busiest waterways in North America with over 15 billion gallons of oil transported yearly, according to the Department of Ecology. In addition, these waters are shared with the world's third largest Naval Complex, the nation's largest ferry system, as well as high recreational use, not to mention the commercial and tribal fishing fleets of which the Makah are among one of the largest.

The threats posed by this diverse mix of traffic include:

- oil and hazardous material spills
- air emissions
- Invasive species
- sewage discharges
- noise

In recognition of the significance of these impacts, with over 3 million gallons of oil spilled in our Usual & Accustomed Treaty Protected Area and Reservation, the MTC has placed the Office of Marine Affairs in the Tribal Organization. Through the Office of Marine Affairs, the MTC has advanced the protection afforded this region's marine resources by elevating the unique relationship defined by the federal government's Trust Responsibility to the Makah Tribe as Resource Trustees and as co-managers with the State of Washington to the issues surrounding maritime safety. We recently held a community meeting to seek public input on our activities in Neah Bay. Several of our members noted the increased prevalence of cruise ships plying our waters. These observations underscore the importance of the Neah Bay tug being on station during the summer when cruise ships are present and that efforts are being made to assure that discharges from these floating cities do not impact the quality of our fisheries resources.

Evidence of our regional impacts includes:

- * Coast Guard Closure of the Makah Bay Anchorage
- * International Maritime Organization creation of the Area To Be Avoided within the Olympic Coast Sanctuary
- * Tug in Neah Bay since 1999 with 41 responses
- * Makah tribal members employed as first responders
- * MTC appointment to Regional Response Team/Northwest Area Committee and Incident Command and the Affiliated Tribes of Northwest Indians adopting a resolution recognizing the importance of tribal appointment to the RRT/NWAC
- * Ecology's recognition of the Neah Bay Staging Area
- * Establishment of Coast Guard and Navy Tribal Liaisons
- * Tribal amendments to Northwest Area Contingency Plan and policies on dispersant use
- * Consultation with Coast Guard Headquarters on Salvage and Firefighting Rule per the Oil Pollution Act of 1990
- * Participation in State and Federal advisory committees and legislative initiatives.

We urge the Puget Sound Partnership and Leadership Council to recognize the importance of addressing maritime impacts as a priority in the Puget Sound Action Agenda. In particular, we ask the following:

- 1) the value of the Neah Bay rescue tug needs to be recognized in the Juan de Fuca Action Area as well as in the overall plan;
- 2) the tug needs to be able to do more than rescue towing to include firefighting, spill response, and salvage;
- 3) the State's ability to keep the tug on station 24/7/365 should be explored through their regulatory authority by amending the Contingency Plan rule;
- 4) While Neah Bay is far from major industrial centers, we are subject to the air emissions from vessel traffic as are the marine resources we are dependent on. However, the Plan does not do enough to address the impacts of air emission on water quality and human health;

The Makah Tribal Council has not only helped to elevate maritime policy to address our interests but we have also contributed to capacity of the spill response community as first responders.

We urge the Partnership to recognize the contributions Makah Tribal Council has made in this arena that not only furthers our interests but also can be replicated around the Sound with the region's wealth of Treaty Tribes who can contribute policy and physical assets to "Sound" conservation.

The MTC has submitted a proposal for funding by the Partnership that we hope you will view as contributing to region-wide benefits.

Finally, we have done our best participate in the Juan de Fuca Action Area and have provided testimony before the Leadership Council. We hope to be able to comment again on this plan for we understand that you hope to apply principals of adaptive management to the development of this action agenda.

Thank you again for this opportunity to help you meet your goals of recovering the Sound by 2020.

Sincerely,

Chad Bowechop, Manager
Makah Office of Marine Affairs
(360)645.3015

From: Chad Bowechop, Makah Indian Tribe

**Verbal
Comment:**

My name is Chad Bowechop, Manager of the Makah Office of Marine Affairs. I am pleased to be able to provide these preliminary comments on your critical plan given the results of the Federal and State elections. While the general public may not be keenly aware of the changes that have occurred to our region's natural wealth, the MTC recognizes that we have an obligation to future generations for as Billy says, "we aren't going anywhere."

No plan can comprehensively address the threats posed to Puget Sound or any of Washington's navigable waters if it does not acknowledge the risks posed by maritime trade that transports over 90% of the world's cargo.

Washington State is often credited as being the most trade-dependent states in the nation. The Ports of Seattle and Tacoma combined form the third largest container port complex in the Country, while the Port of Vancouver is the largest port in Canada. The container ports and five oil refineries makes Juan de Fuca Strait one of the busiest waterways in North America with over 15 billion gallons of oil transported yearly.

In addition, these waters are shared with the world's third largest Naval Complex, the nation's largest ferry system, as well as high recreational use, not to mention the commercial and tribal fishing fleets of which the Makah are among the largest.

The threats posed by this diverse mix of traffic include:

- Oil and hazardous material spills
- Air emissions
- Invasive species
- Sewage

In recognition of the significance of these impacts with over 3 million gallons of oil spilled in our U&A the MTC has placed the OMA in the Tribal Organization. We have advanced the protection afforded this region's marine resources by Trust Responsibility the tribe shares as resource trustees and co-managers to the issues surrounding maritime safety.

Evidence of our regional impacts include:

- *CG Closure of the Makah Bay Anchorage
- *IMO creation of the ATBA
- *Tug in Neah Bay since 1999 with 41 responses
- *Makah employed as first responders
- *MTC appointment to RRT/NWAC and Incident Command
- *Ecology's recognition of Neah Bay Staging Area
- *Establishment of Coast Guard and Navy Tribal Liaisons
- *Tribal amendments to NW Area Plan, dispersant use
- *Consultation with CG Headquarters on Salvage and Firefighting
- *Participation in State and Federal advisory committees and legislative initiatives

We urge the Puget Sound Partnership Leadership Council to recognize the importance of addressing maritime impacts as a priority in the Puget Sound Action Agenda.

We further urge the Partnership to recognize the contributions Makah have made in this arena that not only furthers the interests of the Partnership but can be replicated around the Sound with the region's wealth of treaty tribes who can contribute policy and physical contributions to "Sound" conversation.

November 19, 2008

Mr. William Ruckelshaus, Chair
Leadership Council of the Puget Sound Partnership
P.O. Box 40900
Olympia, Washington 98504-0900

Dear Mr. Ruckelshaus,

The Nisqually Indian Tribe would like to thank you and the dedicated members of the Leadership Council as well as David Dicks and his exceptional staff for producing the draft Action Agenda for Puget Sound. This document represents the dedication of Partnership staff and all of those involved in this effort for the past 18 months. This Agenda is the basis of our conversation as we take critical steps towards our goal of restoring Puget Sound.

Although the Agenda is useful as a foundation for our early steps, we are excited about the opportunity that is before us to create a path to success that is built on innovation, creativity, and accountability. We support the comments from the Northwest Indian Fisheries Commission to strengthen that groundwork and would offer a few additional constructive remarks.

We suggest the addition of language to better reflect the goals of the tribes in this effort so that as our community reads this document they clearly see where they fit in. The tribes have developed a few key statements that we would like to see included in the relevant sections of this plan:

Our Mission as Tribes: To encourage and support a healthy Puget Sound ecosystem, from the mountains to the sea, that supports our families, communities, and culture with bountiful and healthy resources in perpetuity.

Our Overall Goal as Tribes: Our people continue a quality of life that is connected to the ecosystem of this region. The natural resources of Puget Sound – the forests, the fish and wildlife, the water – coexists with our communities and economy. These resources are abundant and safe for daily use of culturally important resources and provide for sustainable commercial harvest for generations to come.

We recognize the enormity of collating the Action Agenda and the substantial time constraints that have directed this effort to date but we are hopeful that now we can begin

the real work necessary to meet our goals without some artificial deadline restricting our ability to create. It is in this new space that the path will be defined and we are committed to standing there with you and the Partnership to contribute productively to those conversations.

The Nisqually Tribe would suggest that those discussions occur sooner rather than later and that there be a focused intent to facilitate the next steps. There seems to be some obvious areas where immediate attention is needed if this first step with the Action Agenda is to be followed successfully by our next steps. The primary effort needed is to describe the specific goals and objectives that we are trying to achieve in Puget Sound. We need this specificity in order to clearly direct our actions, assert accountability, and implement adaptive management responses to provide for course corrections.

The current Action Agenda does not specifically address this critical issue but it does set the stage. Without clearly stated and measurable goals this effort will struggle to make progress and maintain the vigor necessary to complete the mission. These goals need to be bold, inspiring and unbounded by our current views of reality; whether it is fiscal, political or technological realities based in our historic relationship to Puget Sound. **When** we boldly establish zero discharge as our goal for storm-water, waste-water, non-point, and toxics our partners in this effort **will** create pathways forward that we simply cannot see in the limitations we stand in today.

We also need to take an objective look at the actions and programs described in the Action Agenda and evaluate them through an independent analysis how far down the path they would take us if fully implemented. For example, if all storm-water systems in Puget Sound were compliant with NPDES phase I and II permits would that solve our storm-water issues? If the GMA were applied across the landscape as intended would that lessen the impacts of land use decisions? If the all of the region's Shoreline Master Programs were updated using the current guidelines would that result in an increase of habitat values in and around our aquatic environments?

We then need to provide the space for creation and innovation. We need to support the experts and professionals in the fields that impact this effort with the assignment to deliver to all of us a set of tools to move us toward our clearly articulated goals. This effort should be completely free of the constraints of the past to think in ways that are as bold as our goals.

President Kennedy was not bound by reality or the technologies of the past when he challenged the country to land on the moon in the 1960's. We **will** come together to restore and protect Puget Sound.

The Nisqually Indian Tribe is committed to this effort and will work with you to describe this path that moves and inspires this region in ways that we have never seen before. We will also be there with you on the journey of implementation and celebration as we succeed and see robust and vibrant economies, healthy communities, and the return of a sustainable Puget Sound ecosystem.

Sincerely,

David A. Troutt

Puget Sound Partnership
our sound, our community, our chance



Northwest Indian Fisheries Commission

6730 Martin Way E., Olympia, Washington 98516-5540
Phone (360) 438-1180 www.nwifc.org FAX # 753-8659

November 19, 2008

William Ruckelshaus, Chair
Leadership Council of the Puget Sound Partnership
P.O. Box 40900
Olympia, WA 98504-0900

Dear Bill:

I am writing to thank and congratulate everyone who has worked so hard these past months to build the Puget Sound Partnership and develop the Action Agenda. PSP staff has done an excellent job of piecing together decades of work into one Action Agenda.

The strong science and policy guidance provided through the Partnership offers the best chance of restoring Puget Sound to the healthy ecosystem that it once was. The tribes stand ready and are committed to participating in this important effort. Success in this endeavor is critical to the continued existence of our culture and economy and to the well-being of all the citizens of this state.

The Tribes appreciate that you continue to recognize the importance of implementing salmon recovery plans and recovering and re-opening shellfish beds. These resources are the cornerstone of tribal culture.

While the Action Agenda outlines great strides forward in recovering Puget Sound, many challenges remain. For the treaty Indian tribes in western Washington, this includes the need for consistent funding to continue our essential work. We are working hard to bring together watershed decision-makers to resolve tough natural resource management issues that will help ensure that the salmon Action Agenda is implemented. Additionally, ensuring that our shared waters are adequately protected from the risks posed by 15 billion gallons of oil being transported annually through greater Puget Sound should be addressed in the Action Agenda.

We believe the Leadership Council needs to be bold in articulating goals and near-term actions if we are to recover Puget Sound by 2020. We have identified a few key issues where we think stronger goals and actions are needed:

1. Persistent Bio-accumulative Toxins (PBT's) (C.1.1.4 – P.20 and C.1 near-term action 2)
– These are the only two sentences in the Action Agenda relating to PBTs. “Accelerate

reduction of the loading of Persistent Bioaccumulative Toxic chemicals to Puget Sound. Implement DOE's PBT program to reduce and eventually eliminate the use of all chemicals on the PBT list." In our opinion, these statements do not go far enough. The near term action statement should state that **"our goal is to eliminate the use of all chemicals on DOE's PBT list by 2020, including those from NPDES permits and the sale of products containing them"**.

2. Reduce pollutant loading from sewage treatment plants – The description of the problem is compelling, but the near-term actions (C.3 – near-term action 2, P.24) do not reflect the urgency. "Ensure that AKART or better standards are met in nutrient sensitive areas such as Hood Canal, South Sound, and the Whidbey Basin." The basins mentioned are not isolated from the rest of Puget Sound – pollutants entering one part of Puget Sound flow to all other parts. The technology currently exists to treat the effluent and remove the nutrients to a level that allows 100 percent reuse and recycling of the water. Stronger language should be included such as **"all treatment plants in Puget Sound to achieve zero discharge by 2020."**
3. Stormwater – DOE issued a new report on toxic loadings entering Puget Sound; and the portion coming from stormwater is staggering (C.2 – near-term action 2, P.23). "Provide financial and technical assistance to cities and counties to implement NPDES Phase I and II permits." While these new NPDES permit standards are a significant improvement over historical requirements, they are the result of negotiations that occurred before adoption of the mandate to clean up Puget Sound by 2020. We recommended strengthening this to state: **"Before providing financial and technical assistance to cities and counties to implement NPDES Phase I and II permits, conduct an independent review to ensure that the provisions of the Phase I and II permits are compatible with the goal of recovering Puget Sound by 2020."** There should also be a requirement to **identify the sources of significant loadings from the DOE study and employ methods to eliminate toxins before they enter the stormwater systems.**
4. Review of existing programs and regulations for consistency with recovering Puget Sound by 2020 – WDFW's HPA program continues to suffer from Legislative intervention such that it is required to permit activities that damage Puget Sound. This must be changed if we are to recover Puget Sound. We strongly encourage the Partnership to critically evaluate this program and provide leadership for changes necessary to achieve our 2020 goal.

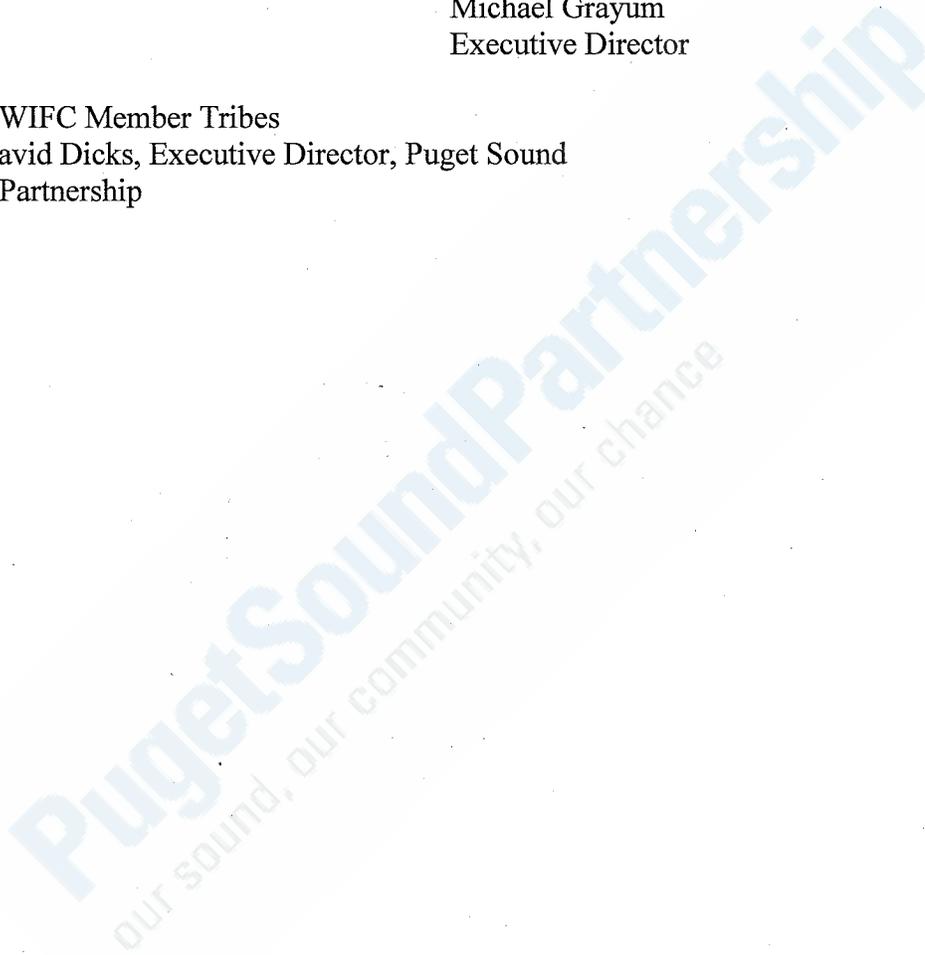
The guidance provided through the Partnership's Action Agenda offers a good first step toward a healthy Puget Sound. The treaty tribes are ready and committed to work with you to define and take the next steps along this important and lengthy path.

Sincerely,



Michael Grayum
Executive Director

cc: NWIFC Member Tribes
David Dicks, Executive Director, Puget Sound
Partnership



Point No Point Treaty Council
Comments on November 6, 2008 Draft Puget Sound Partnership Action Agenda

We greatly appreciate the tremendous effort the Puget Sound Partnership has put into preparing the Action Agenda. The draft Agenda is well organized and effectively presents the components required for Puget Sound recovery. Following are our comments on the draft.

Q1/pages 3 and 4: We recommend you more clearly state that the provisional indicators shown in the table (describing indicators, targets and benchmarks) are a subset of a larger set of indicators subject to review and improvement.

Also, with reference to the Supplemental Material for Question 1 (or perhaps a pending more comprehensive treatment of indicators), we recommend indicator benchmarks and targets be added in the future that address, in addition to P.S. Chinook, other Puget Sound listed species, including Hood Canal summer chum and P.S. steelhead. Benchmarks/targets for the summer chum can be developed based on recovery goals established by the state/tribal co-managers (PNPTT and WDFW 2003) and the H.C. summer chum document prepared by the P.S. Technical Recovery Team (PSTRT 2007). P.S. steelhead indicators would come later and may be based on future work by the co-managers and the P.S. steelhead TRT.

Q3/ page 10, A.3 Near-term action #5: This and the immediately following two near-term actions focus on support for effective updating of shoreline management programs under the SMA. Are not updates of CAOs (under the GMA) also underway or scheduled to begin in the near future for some local jurisdictions? If so, we believe P.S. Partnership support of these near-term CAO updates is merited and recommend editing near-term action #5 as follows: **“Provide funding and technical assistance to local jurisdictions to update local shoreline management programs and critical area ordinances by current deadlines...”** (Underlining indicates added text).

Q3/page 17, B.1, Near-term actions, #2: We strongly support the inclusion of lower Dungeness River recovery in these near-term actions. Dungeness recovery planning and implementation has been a long-term, comprehensive local program that has included a broad base of stakeholders and has been successful in implementing other recovery projects in the Dungeness watershed. Lower river recovery is a key to overall success of the Dungeness River program.

Q3/page 18, B.2, Near-term Actions to revitalize waterfront communities while enhancing marine and freshwater shoreline environments: We recommend adding a third near-term action that may read as follows: **“Remove overwater structures at Port Gamble mill site, restore beach and shoreline, and construct marine tourist parks and local natural resource interpretive features.”** This action would be complementary to DOE’s current toxic clean-up project at the same site.

Q3/D.5, Improve compliance with rules and regulations to increase the likelihood of achieving ecosystem outcomes: We believe this is a critical part of the Action Agenda. The intent and approach of this action is well described in this section.

Q3/E3, Build and implement the management system to support the implementation and continual improvement of the Action Agenda: This section is well conceived and effectively laid out. However, it along with the Biennial Science Work Plan that it summarizes, stands at some distance from the monitoring and assessment efforts required. Doing so is appropriate in order to gain the proper perspective and develop an effective and integrated approach over the long term. Still, near-term monitoring and assessment actions considered in other forums and applicable here should be considered here for inclusion. Examples, including harvest and artificial production actions, are contained in the salmon recovery plans.

Also, regarding regulatory programs related to growth and shoreline protection, little to no monitoring of the regulations effectiveness is currently in place and efforts to assess past effectiveness are few. Regulatory protection of habitat is a critical component of recovery and it is important that we understand its history and track its progress so that we can effectively manage it. What is missing in this section, and relates also to section D.5, are new near-term actions to monitor and assess the existing habitat protection, regulatory measures.

Table of Contents: Recognizing the Action Agenda is in draft form, we would recommend the final version include a table of contents to help orient the reader, making it easier to understand, up front, the content and structure of the Agenda.

Thank you for the opportunity to review the Action Agenda.



PORT GAMBLE S'KLALLAM TRIBE
NATURAL RESOURCES DEPARTMENT
31912 Little Boston Rd. NE – Kingston, WA 98346

November 20, 2008

William Ruckelshaus, Chair
Leadership Council
Puget Sound Partnership
P.O. Box 40900
Olympia, WA 98504-0900

Dear Mr. Ruckelshaus:

We are pleased to submit the following comments on the November 6, 2008 Draft 2020 Action Agenda for Puget Sound, as slightly revised on November 11th, 2008. We appreciate this opportunity to provide you with our input even though we had a very short amount of time to review the document. Due to our need to review and provide comments in such a short timeframe, our comments are somewhat limited in scope and we hope that you will all keep an open door for all interested parties to provide broader based comments within the next 6 months in the spirit of this first draft being a living document still in its infancy. We also want to make sure you take note of the intentional inclusion, by attachment, of comments from three other organizations that we are in full agreement with. This saved us a lot of valuable time by being able to review their specific comments, finding that we were in agreement and then allowing us to move on to other items. These comments are from the Point No Point Treaty Council, the North West Indian Fish Commission and the Hood Canal Coordinating Council. By this inclusion, we are making these additional comments our own in order to show collaborative support on some of these very important issues.

Before we get into our comments, we want to thank you, the Leadership Council, David Dicks and all of your staff for this great work and all the tremendous effort that set up the foundation necessary to produce this first draft of the all important action agenda. We know that many of the recommendations for actions will have political fallout and we hope the Partnership and its Leadership Council will build in some appropriate buffers and protections from the political interference that will surely be trying to change things up and delay or negate important conservation, cleanup and restoration efforts. The successful implementation of the “final” 2020 Action Agenda for Puget Sound, as you well know, will require a Herculean effort from this point forward. We will need to all work together collaboratively toward developing clear understandings of the issues at hand, how they are best prioritized and the critical coordinated responses needed to address them. For those issues that float to the top based on scientifically defensible merit, true collaboration will be needed in order to assist Tribes, lead entities and local governments with the capacity and resources to help act out our respective roles as true partners in this effort.

Comments

First off, we ask that you take the time to note the points from the attached comments representing the three organizations’ (PNPTC, NWIFC and HCCC) mentioned above so they are also included as our own. We realize this is somewhat unusual but again, with the time constraints, we leaned on all three of these groups that we work in direct partnership with and are also represented as a member of the board of all three of these groups.

Phone: (360) 297-4792 Fax: (360) 297-4791

Major Issues

Point Source Discharges

The first major issue we want to point out is a clear lack of language and what we hope is not an intentional oversight from addressing important point source discharges. As we have pointed out before in many of the meetings, the data from many sources including a recent study by the People for Puget Sound characterize the massive on going discharge of multiple toxics coming into Puget Sound streams, rivers, lakes and ultimately it's marine waters and species. And in far too many instances, these toxics come right back to us via ingestion or other exposure pathways.

If we are going to get a handle on and significantly decrease toxic discharges and other water quality damaging releases into Puget Sound, we absolutely need to put point source discharges high up on the list of action agenda priorities. Just because non-point sources are also huge and just as important to address, we can not afford to miss this 800 pound gorilla. As you know, non-point source discharges are much higher in numbers and lower in volumes. While important to get started, it will take a long time to diminish non-point discharges with regulations, education, changing peoples awareness and behaviors etc. In comparison, **point source pollution is no longer excusable**, the are much larger discharges from a much lower number of discharge sites **and as such can be much more effectively and efficiently regulated** to come into compliance with new and much stricter criteria. Such new regulations should be leveraged to be inclusive of getting the tribal subsistence consumption rates adopted as they are doing (via Umatilla et.al.) in Oregon and even the potential of a zero discharge by 2020 should be considered using new technologies that are even now available for truly clean treatment. **We therefore request point source discharges are added into the appropriate toxic and pollution segments** of the draft Agenda.

Toxics in Relation to Human Health i.e. "Safe to Eat"

In your current draft Agenda, you address this partially but again, and in connection with the above point source issue, the draft Agenda is not nearly going far enough. On page Q1/P2 it states (our bold and underlined emphasis): "Human health is supported by clean air and water, and marine and freshwaters that are safe to come in contact with. **In a healthy ecosystem the fish and shellfish are plentiful and safe to eat**, air is healthy to breathe, freshwater is clean for drinking, and water and beaches are clean for swimming and fishing." Fish consumption needs to be a much larger issue both in the Human Health sections and its important association with cleaning up the Sound. On page Q2/P2 under the Human Health section of How healthy is Puget Sound? it states: "Human health is closely tied to environmental health. **Humans are impacted by pollution through contact with water, through consumption of seafood**, through breathing, and through other pathways."

This sounds OK at first but then there is a noticeable disconnect between the suggested action measure and the description of the current condition. The Current condition states, in part, that "**Toxic contaminants, especially PCBs and mercury, occur in high enough levels in Puget Sound fish that the Department of Health advises that people limit the number of meals they eat** of winter resident Chinook (2 meals per month), other Chinook (1 meal per week), rockfish in many areas (1 meal per week), and flat fish like English sole in some urban bays (2 meals per week). Other human health concerns related to the condition of the Puget Sound

ecosystem include illnesses from exposure to biotoxins in shellfish, particulates and other pollutants in air, and pollution in water used for drinking and swimming.”

The Current Condition section mentions herring and the PBDE toxics in herring which are listed as a provisional indicator and mentioned as the Water Quality Action Agenda Measure on Q1/P3. The actual provisional indicator listed on Q1/P4 states: “PBDE levels in Pacific herring from south and central Puget Sound are not higher than levels in herring from the Strait of Georgia” for the Target indicator and the Benchmark being that in 2014 the PBDE levels will not be worse than they were in 2004.

The toxic reduction and human health sections need to be significantly revised if in fact we are going to address cleaning up the sound in association with human health i.e. fish consumption. We recommend going far beyond a single chemical type (PBDE’s) in a single species (herring). We suggest that you change the indicator language i.e. provisional indicator and associated Action Agenda Measure’s from “Toxics in pelagic fish” to **Toxics in and Consumption of Marine and Forage Fish**.

In addition, we hope you will take some time to review the much more important focus of **keeping salmon, halibut and other marine and forage fish safe for human consumption as well as safe from acute and chronic impacts to the various species and their respective predators** higher up the food chain. So our other big 800 pound gorilla in this Action Agenda is best described as the need for **using the levels and associated risk of multiple chemicals in singular species and how that effects the safety of human health via consumption** as well as individual species at risk for acute or chronic impacts. This should be used for appropriate Action Agenda Measures as well as assessment indicators.

Please note the attached EPA guidance documents (table of contents and Chapter 3) in this regard which show scientifically how this should be done as well as the one page summary titled “EXAMPLE 11: Calculating Consumption Limits for Multiple Contaminants in a Single Species Diet” which comes from page 3-22 of the attached chapter 3 of the EPA guidance document entitled “**Guidance for Assessing Chemical Data for Use in Fish Advisories, Volume 2, Risk Assessment and Fish Consumption Limits, Third Edition**”, November 2000.” I have also attached an example calculation of how this more appropriate process would be used with King Salmon with data from an Alaska study I was working on a few years back. These equations should be run for all major salmon, other finfish and shellfish using whatever recent tissue data is available. In most cases (I have run some preliminary calculations) people would be shocked at how much of an issue this is with dietary limitations based on cancer risk and non-cancer chronic risk equating to very few meals per year for many Puget Sound Species. It is also the best way to use science to steer toward a healthy end point for 2020 and beyond based on Human Health.

Port Gamble Bay Cleanup and Restoration

We are hoping that we can get this important project added to Q3/P17, B.2, “Near-term Actions to revitalize waterfront communities while enhancing marine and freshwater shoreline environments”. We recommend adding cleanup and restoration of Port Gamble Bay as a third near-term action under this section to read approximately as follows: “Remove overwater structures at Port Gamble mill site, restore beach and shoreline, and construct marine tourist

parks and local natural resource interpretive features.” This action would not only be complementary to DOE’s current toxic clean-up project at the site but would be a great example and case study of how an important and productive Hood Canal bay can be protected, conserved and restored through the Action Agenda process. This would be a good match to the Hood Canal Action Area Priorities, which also should be tuned up to best capture this project.

Data Management, State of the Sound and Prioritization Process

We all really need a great web based “data warehouse” for all scientific data, population status and trends, resource management and production documents, reports and other pertinent information. This is necessary for making of the important decisions ahead as to how best to prioritize issues and projects, create transparency and develop a much better understanding of the true “State of the Sound” as it were. Without a really good handle on, and access to, the real, science based environmental status and associated threats and constraints facing Puget Sound, its habitat and multitude of important species, we will hard pressed to move forward intelligently on conservation, cleanup and restoration actions.

If such a system based data system and does not materialize, its going to be hard to understand the priority actions much less how best to address them. We recommend using a web based system like Paladin Data Systems EKO-System with a customized expanded package for all relevant Puget Sound data and information. A data management work group should be put together in order to insure the science, data and information added is reasonable, labeled as to the degree of importance and correctness etc. and then to figure out how best to set up and manage the system.

Thanks again for the opportunity to provide these comments. We would be happy to engage in follow up discussions on how we can assist you further in refining this extremely important Action Agenda. If you have any questions or comments or want additional information in connection with our comments, please feel free to call.

Sincerely,

Paul A McCollum

Paul McCollum
Director, Natural Resources Department

Attachments

SECTION 3

DEVELOPMENT AND USE OF RISK-BASED CONSUMPTION LIMITS

3.1 OVERVIEW AND SECTION ORGANIZATION

This section describes the derivation and use of the risk-based consumption limit tables provided in Section 4. Consumption limit tables were developed for each of the 25 target analytes listed in Table 1-1 and described in further detail in Volume 1 of this series. This section discusses

- Equations used to calculate the consumption limit tables
- Default values used in developing the consumption limit tables
- Modifications to the consumption limit calculations to allow for different input values and for multiple species consumption and/or multiple contaminant exposure.

Methods for deriving consumption limits for chemical contaminants with carcinogenic and/or noncarcinogenic effects are described. When available data indicate that a target analyte is associated with both carcinogenic and noncarcinogenic health effects, consumption limits based on both types of effects are calculated. In these cases, it is recommended that the toxicological effect resulting in the more conservative consumption limits be used to issue an advisory since resulting limits would be protective of both types of health effects. Methods for calculating consumption limits for a single contaminant in a multiple species diet or for multiple contaminants causing the same chronic health effects endpoints are also discussed. Species-specific consumption limits are calculated as fish meals per month, at various fish tissue concentrations, for noncancer and cancer health endpoints.

Developing fish consumption limits also requires making assumptions about the edible portions of fish because most chemical contaminants are not evenly distributed throughout the fish. The portion of the fish typically eaten may vary by fish species and/or the dietary habits of the fisher population of concern. Most fishers in the United States consume fish fillets. Therefore, it is recommended that contaminant concentrations be measured using skin-on fillets for scaled fish species and skinless fillets for scaleless fish species (e.g., catfish) (see Section 6.1.1.6 in Volume 1 of this series for further discussion of edible fish and shellfish sample types). However, for populations that ingest whole fish, consumption

values corresponding to whole fish contaminant concentrations are more appropriate. Fish consumption patterns are discussed in more detail in Appendix B.

People may be exposed to one or more fish contaminants through sources or pathways other than through consumption of recreationally or subsistence caught fish. These sources include ingestion of contaminated commercially caught fish, other contaminated foods, or contaminated drinking water; inhalation of the contaminant; or dermal contact with contaminated materials including soil and sediment. Caution should be used in setting health safety standards that do not take these other sources into account (see Section 2 for further discussion). Methods for quantifying exposure via sources other than consumption of recreationally or subsistence caught fish are not discussed in detail in this series.

3.2 EQUATIONS USED TO DEVELOP RISK-BASED CONSUMPTION LIMITS

Two equations are required to derive meal consumption limits for either carcinogenic or noncarcinogenic health effects. The first equation (3-1 for carcinogenic effects or Equation 3-3 for noncarcinogenic effects) is used to calculate daily consumption limits in units of milligrams of edible fish per kilogram of consumer body weight per day (mg/kg-d); the second equation (3-2) is used to convert daily consumption limits to meal consumption limits over a specified period of time (e.g., 1 month). Toxicological benchmark values for carcinogenic and noncarcinogenic health effects used in the calculation of risk-based consumption limits are summarized in Table 3-1.

3.2.1 Calculation of Consumption Limits for Carcinogenic Effects

To calculate consumption limits for carcinogenic effects, it is necessary to specify an “acceptable” lifetime risk level (ARL). The appropriate risk level for a given population is determined by risk managers; see Volume 3 for further discussion of selection of appropriate risk level. This document presents consumption limits that were calculated using a risk level of 1 in 100,000 (10^{-5}). Equations 3-1 and 3-2 were used to calculate risk-based consumption limits for the 12 target analytes with cancer slope factors (see Table 3-1), based on an assumed 70-yr exposure. A 70-yr lifetime is used in keeping with the default value provided in EPA’s *Exposure Factors Handbook* (U.S. EPA, 1990a). This is a normative value; individuals may actually be exposed for greater or lesser periods of time, depending on their lifespan, consumption habits, and residence location. It should be noted that no populations were identified as being particularly susceptible to the carcinogenic effects of the target analytes.

3.2.1.1 Calculation of Daily Consumption Limits—

Equation 3-1 calculates an allowable daily consumption of contaminated fish based on a contaminant’s carcinogenicity, expressed in kilograms of fish consumed per day:

3. DEVELOPMENT AND USE OF RISK-BASED CONSUMPTION LIMITS

Table 3-1. Risk Values Used in Risk-Based Consumption Limit Tables

Target Analyte	Noncarcinogens	Carcinogens
	Chronic RfD ^a (mg/kg-d)	CSF ^a (mg/kg-d) ⁻¹
Metals		
Arsenic (inorganic) ^c	3 × 10 ⁻⁴	1.5
Cadmium	1 × 10 ⁻³	NA
Mercury (methylmercury) ^d	1 × 10 ⁻⁴	NA
Selenium	5 × 10 ⁻³	NA
Tributyltin ^b	3 × 10 ⁻⁴	NA
Organochlorine Pesticides		
Total chlordane (sum of <i>cis</i> - and <i>trans</i> -chlordane, <i>cis</i> - and <i>trans</i> -nonachlor, and oxychlordane) ^e	5 × 10 ⁻⁴	0.35
Total DDT (sum of 4,4'- and 2,4'-isomers of DDT, DDE, and DDD) ^f	5 × 10 ⁻⁴	0.34
Dicofol ^g	4 × 10 ⁻⁴	withdrawn
Dieldrin	5 × 10 ⁻⁵	16
Endosulfan (I and II)	6 × 10 ⁻³	NA
Endrin	3 × 10 ⁻⁴	NA
Heptachlor epoxide	1.3 × 10 ⁻⁵	9.1
Hexachlorobenzene	8 × 10 ⁻⁴	1.6
Lindane (γ-hexachlorocyclohexane; γ-HCH) ⁱ	3 × 10 ⁻⁴	1.3
Mirex	2 × 10 ⁻⁴	NA
Toxaphene ^{h,j}	2.5 × 10 ⁻⁴	1.1
Organophosphate Pesticides		
Chlorpyrifos ^k	3 × 10 ⁻⁴	NA
Diazinon ^l	7 × 10 ⁻⁴	NA
Disulfoton	4 × 10 ⁻⁵	NA
Ethion	5 × 10 ⁻⁴	NA
Terbufos ^m	2 × 10 ⁻⁵	NA
Chlorophenoxy Herbicides		
Oxyfluorfen ⁿ	3 × 10 ⁻³	7.32 × 10 ⁻²
PAHs^o	NA	7.3
PCBs		
Total PCBs	2 × 10 ⁻⁵	2.0 ^p
Dioxins/furans^q	NA	1.56 × 10 ⁵

CSF = Cancer slope factor (mg/kg-d)⁻¹.
 DDD = p,p' -dichlorodiphenyldichloroethane.
 DDE = p,p' -dichlorodiphenyldichloroethylene
 DDT = p,p' -dichlorodiphenyltrichloroethane.
 NA = Not available in EPA's Integrated Risk Information System (IRIS, 1999).

PAH = Polycyclic aromatic hydrocarbon.
 PCB = Polychlorinated biphenyl.
 RfD = Oral reference dose (mg/kg-d).

(continued)

3. DEVELOPMENT AND USE OF RISK-BASED CONSUMPTION LIMITS

Table 3-1 (continued)

- ^a Unless otherwise noted, values listed are the most current oral RfDs and CSFs in EPA's IRIS database (IRIS, 1999).
- ^b The RfD value listed is for the IRIS (1999) value for tributyltin oxide.
- ^c Total inorganic arsenic should be determined.
- ^d Because most mercury in fish and shellfish tissue is present primarily as methylmercury (NAS, 1991; Tollefson, 1989) and because of the relatively high cost of analyzing for methylmercury, it is recommended that total mercury be analyzed and the conservative assumption be made that all mercury is present as methylmercury. This approach is deemed to be most protective of human health and most cost-effective. The National Academy of Sciences (NAS) conducted an independent assessment of the RfD and concluded, "On the basis of its evaluation, the committee consensus is that the value of EPA's current RfD for methylmercury, 0.1 µg/kg per day, is a scientifically justifiable level for the protection of human health."
- ^e The RfD and CSF values listed are derived from studies using technical-grade chlordane (IRIS, 1999). No RfD or CSF values are given in IRIS (1999) for the *cis*- and *trans*-chlordane isomers or the major chlordane metabolite, oxychlordane, or for the chlordane impurities *cis*- and *trans*-nonachlor. It is recommended that the total concentration of *cis*- and *trans*-chlordane, *cis*- and *trans*-nonachlor, and oxychlordane be determined.
- ^f The RfD value listed is for DDT. The CSF value is 0.34 for total DDT (sum of DDT, DDE, and DDD). The CSF value for DDD is 0.24. It is recommended that the total concentration of the 2,4'- and 4,4'-isomers of DDT and its metabolites, DDE and DDD, be determined.
- ^g The RfD value is from the Registration Eligibility Decision (RED). Dicofol (U.S. EPA, 1998a).
- ^h The RfD value listed is from the Office of Pesticide Program's Reference Dose Tracking Report (U.S. EPA, 1997c).
- ⁱ IRIS (1999) has not provided a CSF for lindane. The CSF value listed for lindane is from HEAST, 1997.
- ^j The RfD value has been agreed upon by the Office of Pesticide Programs and the Office of Water.
- ^k Because of the potential for adverse neurological developmental effects, EPA recommends the use of a Population Adjusted Dose (PAD) of 3×10^{-5} mg/k-d for infants, children to the age of six, and women ages 13-50 (U.S. EPA, 2000b).
- ^l The RfD value is from a memo data April 1, 1998, Diazinon: Report of the Hazard Identification Assessment Review Committee. HED DOC. NO. 012558 (U.S. EPA, 1998c).
- ^m The RfD value listed is from a memorandum dated September 25, 1997; Terbufos-FQPA Requirement Report of the Hazard Identification Review (U.S. EPA, 1997h).
- ⁿ The CSF value is from a memo dated 9/24/98; REVISED Oxyfluorfen (GOAL) Quantitative Risk Assessment (Q1*) Based on CD-1 Male Mouse Dietary Study With 3/4's Interspecies Scaling Factor. HED Document No. 012879 (U.S. EPA, 1998c).
- ^o The CSF value listed is for benzo[a]pyrene. Values for other PAHs are not currently available in IRIS (1999). It is recommended that tissue samples be analyzed for benzo[a]pyrene and 14 other PAHs and that the order-of-magnitude relative potencies given for these PAHs (Nisbet and LaGoy, 1992; U.S. EPA, 1993b) be used to calculate a potency equivalency concentration (PEC) for each sample (see Section 5.3.2.4 of Volume 1).
- ^p The CSF is based on a carcinogenicity assessment of Aroclors 1260, 1254, 1242, and 1016. The CSF presented is the upper-bound slope factor for food chain exposure. The central estimate is 1.0 (IRIS, 1999).
- ^q The CSF value listed is for 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) (HEAST, 1997). It is recommended that the 17 2,3,7,8-substituted tetra- through octa-chlorinated dibenzo-*p*-dioxins and dibenzofurans and the 12 dioxin-like PCBs be determined and a toxicity-weighted total concentration be calculated for each sample, using the method for estimating Toxicity Equivalency Concentrations (TEQs) (Van den Berg et al., 1998).

$$CR_{lim} = \frac{ARL \cdot BW}{CSF \cdot C_m} \quad (3-1)$$

where

- CR_{lim} = maximum allowable fish consumption rate (kg/d)
- ARL = maximum acceptable individual lifetime risk level (unitless)
- BW = consumer body weight (kg)
- CSF = cancer slope factor, usually the upper 95 percent confidence limit on the linear term in the multistage model used by EPA [(mg/kg-d)⁻¹], (see Section 2 for a discussion of this value)
- C_m = measured concentration of chemical contaminant *m* in a given species of fish (mg/kg).

The calculated daily consumption limit (CR_{lim}) represents the amount of fish (in kilograms) expected to generate a risk no greater than the maximum ARL used, based on a lifetime of daily consumption at that consumption limit.

3.2.1.2 Calculation of Meal Consumption Limits—

Daily consumption limits may be more conveniently expressed as the allowable number of fish meals of a specified meal size that may be consumed over a given time period. The consumption limit is determined in part by the size of the meal consumed. An 8-oz (0.227-kg) meal size was assumed. Equations 3-1 and 3-2 can be used to convert daily consumption limits, the number of allowable kilograms per day (calculated using Equation 3-1), to the number of allowable meals per month:

$$CR_{mm} = \frac{CR_{lim} \cdot T_{ap}}{MS} \quad (3-2)$$

where

- Cr_{mm} = maximum allowable fish consumption rate (meals/mo)
- Cr_{lim} = maximum allowable fish consumption rate (kg/d)
- MS = meal size (0.227 kg fish/meal)
- T_{ap} = time averaging period (365.25 d/12 mo = 30.44 d/mo).

Equation 3-2 was used to convert daily consumption limits, in kilograms, to meal consumption limits over a given time period (month) as a function of meal size. Monthly consumption limits for carcinogenic effects in adults in the general population were derived for 13 of the 25 target analytes in Section 4.

Other consumption rates, such as meals per week, could also be calculated using this equation by substituting, for example, 7 d/wk for 30.44 d/mo. In using

3. DEVELOPMENT AND USE OF RISK-BASED CONSUMPTION LIMITS

Equation 3-2 in the table calculations in Section 4, the reader should note that 1 month was expressed as 365.25 d/12 mo or 30.44 d/mo.

3.2.1.3 Input Parameters—

Calculating risk-based consumption limits for carcinogenic effects requires developing appropriate values for the parameters in the equations. The default values used to calculate the consumption limits listed in Section 4 are shown in Table 3-2; a range of values is provided for the measured contaminant concentration in fish tissue (C_m) to represent a broad spectrum of contaminant concentrations. See consumption limit tables in Section 4. Development and modification of these values are discussed in Section 3.3.

EXAMPLE 1: Calculating Monthly Consumption Limits for Carcinogenic Health Endpoints in the General Population for Chlordane

Table 3-2. Input Parameters for Use in Risk Equations

Equation Parameter ^a	Values
Maximum acceptable risk level (ARL)	10 ⁻⁵ (unitless)
Cancer slope factor (CSF) ^b Reference dose (RfD)	(mg/kg-d) ⁻¹ mg/kg-d
Consumer body weight (BW)	70 kg (general adult population)
Average fish meal size (MS)	8 oz (0.227 kg)
Measured contaminant concentration in edible fish and shellfish tissue (C_m) ^c	mg/kg (ppm) varies with local conditions for each chemical contaminant, for each species, and for each size (age) class within a species
Time-averaging period (T_{ap})	30.44 d/mo (monthly limit)

^a Selection of the appropriate maximum acceptable risk level, consumer body weight, and average fish meal size are considered risk management decisions. For information regarding these values, see Sections 2 and 5 of this document and Volume 3.

^b Most of the CSFs and RfDs were obtained from EPA's Integrated Risk Information System (IRIS, 1999). The RfDs not listed in IRIS were obtained from EPA's Office of Pesticide Programs. The CSFs and RfDs used in the risk equations are listed in Table 3-1 and are discussed in Section 5.

^c Values for contaminant concentrations should be determined from local fish sampling and analysis programs conducted in the waterbody of concern as described in Volume 1.

Using Equations 3-1 and 3-2, the monthly meal consumption limits were calculated for the carcinogenic effects of chlordane for adults in the general population as shown in Table 3-3. **Note:** In this section, the monthly consumption limits for chlordane for both carcinogenic and chronic (noncarcinogenic) health effects are used to illustrate various modifications to the monthly consumption limit tables.

3.2.2 Calculation of Consumption Limits for Noncarcinogenic Effects

Noncarcinogenic health effects caused by consumption of contaminated fish include systemic effects such as liver, kidney, neurological, muscular, ocular, reproductive, respiratory, circulatory, or other organ toxicities and adverse developmental/reproductive effects from acute and chronic exposure. Risk-based consumption limit tables for chronic exposure health effects were developed for adults and young children for 23 of the 25 target analytes using RfDs for chronic systemic health effects.

3.2.2.1 Calculation of Daily Consumption Limits—

Equation 3-3 calculates an allowable daily consumption (CR_{lim}) of contaminated fish, based on a contaminant's noncarcinogenic health effects, and is expressed in kilograms of fish per day:

$$CR_{lim} = \frac{RfD \cdot BW}{C_m} \quad (3-3)$$

where

- CR_{lim} = maximum allowable fish consumption rate (kg/d)
- RfD = reference dose (mg/kg-d)
- BW = consumer body weight (kg)
- C_m = measured concentration of chemical contaminant m in a given species of fish (mg/kg).

CR_{lim} represents the maximum lifetime daily consumption rate (in kilograms of fish) that would not be expected to cause adverse noncarcinogenic health effects. Most RfDs are based on chronic exposure studies (or subchronic studies used with an additional uncertainty factor). Because the contaminant concentrations required to produce chronic health effects are generally lower than those causing acute health effects, the use of chronic RfDs in developing consumption limits is expected to also protect consumers against acute health effects. They are designed to protect the most sensitive individuals.

To calculate weekly fish meal consumption limits, Equation 3-3 was modified as follows:

$$C_m = \frac{RfD \times BW}{CR_{lim}} \quad (3-4)$$

Using this equation, one can calculate the level of chemical contamination (C_m) in a given species of fish assuming that a 70-kg adult consumes a maximum of one 8-oz (0.227-kg) meal/wk.

3.2.2.2 Calculation of Meal Consumption Limits—

Equation 3-2 is used to convert daily consumption limits, in kilograms, to meal consumption limits over given time periods as a function of meal size. An 8-oz meal size was assumed in the calculations. Monthly consumption limits were derived for all target analytes in Section 4 except PAHs and dioxins, for which RfD values are not available. Monthly consumption limits pertain to recreational fishers (see Section 2.4.5.4). Where appropriate, risk assessors may choose to derive consumption limits based on a shorter time-averaging period such as a 14-d period (see Section 3.3.6). Note that, irrespective of the time-averaging period selected (e.g., 7-d, 10-d, 14-d, monthly), the same chronic systemic RfDs are applicable; the difference is in the averaging periods used in Equation 3-2.

Note: This approach does not expressly limit the amount of fish that may be consumed in a given day during the specified time period, so care must be taken to inform consumers of the dangers of eating large amounts of contaminated fish in one meal when certain acute or developmental toxicants are of concern.

3.2.2.3 Input Parameters—

For noncarcinogenic effects, calculating risk-based consumption limits requires developing appropriate values for similar parameters to those required for carcinogenic effects (see Table 3-2).

3.2.3 Developmental Effects

This guidance document does not calculate consumption limits specifically for developmental effects. For the majority of target analytes, sufficiently detailed developmental toxicity data are not available. For two analytes, methylmercury and PCBs, sufficient data are available demonstrating that women exposed to these chemicals may transfer sufficient amounts in utero or through breast feeding to induce pre- or postnatal developmental damage in their offspring. The interim RfD for methylmercury (1×10^{-4} mg/kg-d) is based on developmental effects in humans (i.e., neurologic changes in Iraqi children who had been exposed in utero).

EXAMPLE 2: Calculating Monthly Consumption Limits for Chronic Systemic Health Endpoints for Recreational Fishers for Chlordane

Using Equations 3-3 and 3-2, the monthly meal consumption limits were calculated for the noncarcinogenic and carcinogenic health effects of chlordane for recreational fishers as shown in Table 3-3. Note: In comparing the consumption limit tables for chlordane based on carcinogenic and noncarcinogenic effects for the general population, it is apparent that the carcinogenic endpoint results in a more conservative consumption limit assuming an ARL of 10^{-5} and equivalent meal sizes and contaminant concentrations in fish tissues. For example, based on a chemical contaminant level in fish tissue of 0.1 ppm, an adult could eat seven 8-oz fish meals assuming an ARL of 10^{-5} . Given the same level of tissue contamination, an adult could eat >30 8-oz meals per month based on noncarcinogenic effects of chlordane. To protect consumers from both the carcinogenic and noncarcinogenic effects of chlordane, a risk assessor may choose to base consumption limits on the more conservative meal sizes derived for carcinogenic effects. In this situation, a risk assessor or risk manager may wish to issue the consumption advisory based on the carcinogenic effects of chlordane, which would be protective of chronic health effects given the above-stated assumptions.

Thus, the consumption limits would be protective against developmental effects for methylmercury.

3.3 DEFAULT AND ALTERNATIVE VALUES FOR CALCULATING CONSUMPTION LIMITS

The consumption limit tables provided in Section 4 are based on default values for consumer body weights and average meal sizes. This section describes the default values shown in Tables 3-1 and 3-2 and provides alternative input values and multipliers for use in modifying and/or recalculating the consumption limit tables.

Seven variables are involved in calculating the values in the consumption limit tables (see Equations 3-1 through 3-3):

- Maximum acceptable risk level (ARL)
- Cancer slope factor (CSF)
- Chronic reference dose (RfD)
- Consumer body weight (BW)
- Fish meal size (MS)
- Contaminant concentration in edible fish tissue (C_m)
- Time-averaging period (30-d period).

3. DEVELOPMENT AND USE OF RISK-BASED CONSUMPTION LIMITS

Monthly meal consumption limit tables for both the carcinogenic and noncarcinogenic health effects of chlordane are used as examples to illustrate the effects of modifying one or more of the variables listed above.

Table 3-3. Monthly Fish Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints - Chlordane

Risk Based Consumption Limit ^a	Noncancer Health Endpoints ^b	Cancer Health Endpoints ^c
Fish Meals/Month	Fish Tissue Concentrations (ppm, wet weight)	Fish Tissue Concentrations (ppm, wet weight)
Unrestricted (>16)	0 - 0.15	0 - 0.0084
16	>0.15 - 0.29	>0.0084 - 0.017
12	>0.29 - 0.39	>0.017 - 0.022
8	>0.39 - 0.59	>0.022 - 0.034
4	>0.59 - 1.2	>0.034 - 0.067
3	>1.2 - 1.6	>0.067 - 0.089
2	>1.6 - 2.3	>0.089 - 0.13
1	>2.3 - 4.7	>0.13 - 0.27
0.5	>4.7 - 9.4	>0.27 - 0.54
None (<0.5)	>9.4	>0.54

^a The assumed meal size is 8 oz (0.227 kg). The ranges of chemical concentrations presented are conservative, e.g., the 12-meal-per-month levels represent the concentrations associated with 12 to 15.9 meals.

^b Chronic, systemic effects.

^c Cancer values represent tissue concentrations at a 1 in 100,000 risk level.

Notes:

1. Consumption limits are based on an adult body weight of 70 kg, an RfD of 5×10^{-4} mg/kg-d, and a cancer slope factor (CSF) of $0.35 \text{ (mg/kg-d)}^{-1}$.
2. None = No consumption recommended.
3. In cases where >16 meals per month are consumed, refer to Equations 3-1 and 3-2, Section 3.2.1.2, for methods to determine safe consumption limits.
4. The detection limit for chlordane is 5×10^{-3} mg/kg.
5. Instructions for modifying the variables in this table are found in Section 3.3.
6. Monthly limits are based on the total dose allowable over a 1-month period (based on the RfD). When the monthly limit is consumed in less than 1 month (e.g., in a few large meals), the daily dose may exceed the RfD (see Section 2.3).

3.3.1 Maximum Acceptable Risk Level

The consumption limit tables shown in Section 4 for target analytes with carcinogenic effects were calculated for maximum individual ARL of 10^{-5} . Note that the variable ARL appears in the numerator of Equation 3-1, the equation for calculating the daily consumption limit for carcinogens. Because ARL appears in multiples of 10, one may derive new meal consumption limits from the existing tables by multiplying or dividing the existing meal consumption limits by factors

3. DEVELOPMENT AND USE OF RISK-BASED CONSUMPTION LIMITS

of 10, as appropriate. In the same way, changing the ARL by a factor of 10 would cause the same meal consumption limits to be valid for chemical concentrations 10 times higher or 10 times lower than those associated with the original ARL (see Table 3-4).

Puget Sound Partnership
our sound, our community, our chance

3. DEVELOPMENT AND USE OF RISK-BASED CONSUMPTION LIMITS

Table 3-4. Monthly Fish Consumption Limits for Carcinogenic Health Endpoints - Chlordane

Risk Based Consumption Limit ^a	Recommended Risk-Based Consumption Limit (meals per month, 8-oz meal size) Fish tissue Concentrations (ppm, wet weight)			
	ARL 10 ⁻⁴	ARL 10 ⁻⁵	ARL 10 ⁻⁶	ARL 10 ⁻⁷
Fish Meals/Month				
Unrestricted (>16)	0 - 0.084	0 - 0.0084	0 - 0.00084	0 - 0.000084
16	>0.084 - 0.17	>0.0084 - 0.017	>0.00084 - 0.0017	>0.000084 - 0.00017
12	>0.17 - 0.22	>0.017 - 0.022	>0.0017 - 0.0022	>0.00017 - 0.00022
8	>0.22 - 0.34	>0.022 - 0.034	>0.0022 - 0.0034	>0.00022 - 0.00034
4	>0.34 - 0.67	>0.034 - 0.067	>0.0034 - 0.0067	>0.00034 - 0.00067
3	>0.67 - 0.89	>0.067 - 0.089	>0.0067 - 0.0089	>0.00067 - 0.00089
2	>0.89 - 1.3	>0.089 - 0.13	>0.0089 - 0.013	>0.00089 - 0.0013
1	>1.3 - 2.7	>0.13 - 0.27	>0.013 - 0.027	>0.0013 - 0.0027
0.5	>2.7 - 5.4	>0.27 - 0.54	>0.027 - 0.054	>0.0027 - 0.0054
None (<0.5)	>5.4	>0.54	>0.054	>0.0054

^a The assumed meal size is 8 oz (0.227 kg). The ranges of chemical concentrations presented are conservative, e.g., the 12-meal-per-month levels represent the concentrations associated with 12 to 15.9 meals.

Notes:

1. Consumption limits are based on adult body weight of 70 kg and a cancer slope factor of 0.35 (mg/kg-d⁻¹).
2. None = No consumption recommended.
3. In cases where >16 meals per month are consumed, refer to Equations 3-1 and 3-2, Section 3.2.1.2, for methods to determine safe consumption limits.
4. The detection limit for chlordane is 1 x 10⁻³ mg/kg.
5. Instructions for modifying the variables in this table are found in Section 3.3.
6. ARL = Acceptable risk level.

3.3.2 Cancer Potencies and Chronic Reference Doses (q₁*s and RfDs)

Table 3-1 contains the risk values used in the development of the consumption limit tables shown in Section 4. All of the CSFs and RfDs were obtained from EPA databases, primarily from IRIS (1999). Preference was given to IRIS values because these values represent consensus within EPA. When IRIS values were not available, RfDs from other EPA sources were used (see Section 5).

3.3.3 Consumer Body Weight (BW)

The consumption limit tables in Section 4 are based on fish consumer body weight of 70 kg (156 lb), the average body weight of male and female adults in the U.S. population (U.S. EPA, 1990a).

As Equation 3-3 shows, consumption limits are linearly related to body weight. That is, the higher the body weight assumed for the population of concern, the higher the consumption limits. EPA's *Exposure Factors Handbook* (U.S. EPA, 1990a) provides additional specific body weight information that can be used to adjust the body weight component of Equation 3-3. The values can also be used to develop a set of multipliers to directly adjust consumption limits for body weight variations.

Table 3-5 provides a range of average body weights (based on age and sex) for the U.S. population and their associated multipliers. Values in bold are those values used in the calculation of the consumption limit tables in Section 4. A **multiplier** is provided for each age group, which represents the number by which the meal consumption limits in the **general adult population** tables may be multiplied to calculate new meal consumption limits using an alternative body weight.

3.3.3.1 Derivation of Multipliers for Body Weight Adjustment—

Body weight multipliers represent the ratio of the alternative body weight to the standard 70-kg adult body weight. Body weight multipliers were calculated as follows:

$$\text{Multiplier}_{\text{BW}} = \frac{\text{Alternative Consumer Body Weight}}{\text{General Adult Body Weight}} \quad (3-5)$$

To derive modified consumption limits using alternative values for body weight, multiply the existing consumption limits (in meals per month) found in the tables for the **70-kg adult fisher consumer** by the multiplier associated with the new body weight:

$$\text{New CR}_{\text{mm}} = \text{CR}_{\text{mm}70\text{-kg BW}} \cdot \text{Multiplier}_{\text{BW}} \quad (3-6)$$

where

- Cr_{mm} = maximum allowable fish consumption rate (meals/mo)
- $\text{CR}_{\text{mm}70\text{-kg BW}}$ = maximum allowable fish consumption rate of a 70-kg fish consumer (meals/mo)
- BW = consumer body weight (kg)
- $\text{Multiplier}_{\text{BW}}$ = body weight multiplier (unitless).

3.3.4 Meal Size

Meal size is defined as the amount of fish (in kilograms) consumed at one meal. EPA has identified a value of 8 oz (227 g) of uncooked fish fillet per 70-kg consumer body weight as an average meal size for adults in the general population assuming consumption of noncommercially caught fish only. At this

Table 3-5. Average Body Weights and Associated Multipliers

Age Group (yr) ^a	Average Male Body Weight (kg)	Average Female Body Weight (kg)	Average Body Weight for Males and Females Combined (kg)	Multiplier ^b
<3	11.9	11.2	11.6	0.17
3 to 6	17.6	17.1	17.4	0.25
0 to 6	14.8	14.2	14.5	0.21
6 to 9	25.3	24.6	25.0	0.36
9 to 12	35.7	36.2	36.0	0.51
12 to 15	50.5	50.7	50.6	0.72
15 to 18	64.9	57.4	61.2	0.87
18 to 25	73.8	60.6	67.2	0.96
25 to 35	78.7	64.2	71.5	1.0
35 to 45	80.9	67.1	74.0	1.1
45 to 55	80.9	68.0	74.5	1.1
55 to 65	78.8	67.9	73.4	1.0
65 to 75	74.8	66.6	70.7	1.0
18 to 45	—	64	—	0.91
18 to 75	78.1	65.4	71.8^c (70)^c	1.0

^a Numbers in bold represent the default values used to calculate the consumption limit tables.

^b The body weight multiplier is multiplied by the consumption limits associated with 72-kg adult fish consumers to obtain new consumption limits using the alternative body weight (see Section 3.3.3). The body weight multiplier represents the alternative body weight divided by the adult body weight.

^c Per recommendations in the Exposure Factors Handbook, the body weight value of 71.8 kg was rounded to 70 kg (U.S. EPA, 1990a).

EPA recommends that the same default value be used for shellfish. However, EPA is currently investigating this issue and a different default value may be recommended in the future. Readers may wish to develop fish consumption limits using other meal sizes obtained from data on local fish consumption patterns and/or other fish consumption surveys as appropriate (see Appendix B). Table 3-6 provides alternative meal sizes and their associated multipliers. To obtain modified consumption limits using alternative values for meal size, multiply the existing consumption limits found in the tables for the **8-oz meal size** by the multiplier associated with the new meal size:

$$\text{New CR}_{\text{mm}} = \text{CR}_{\text{mm}_{8\text{-oz MS}}} \cdot \text{Multiplier}_{\text{MS}} \quad (3-7)$$

where variables are as previously defined.

3. DEVELOPMENT AND USE OF RISK-BASED CONSUMPTION LIMITS

In addition, if specific meal consumption limits are desired for consumers ages 4 to adult, modifications can be made for both body weight and meal size using the following equation:

$$\text{New CR}_{\text{mm}} = \text{CR}_{\text{mm}70 \text{ kg BW}, 8\text{-oz MS}} \cdot \text{Multiplier}_{\text{BW}} \cdot \text{Multiplier}_{\text{MS}} \quad (3.8)$$

where the parameters are as previously defined.

3.3.5 Contaminant Concentration in Fish Tissue

Chemical contaminant concentrations in fish tissue are influenced by the specific species and age (size) class of the fish sampled, the chemical properties of the chemical contaminant (e.g., degradation rate, solubility, bioconcentration potential), and the contaminant level in the waterbody. A detailed discussion of selection of target species for use in fish sampling and analysis programs is presented in Section 3 of Volume 1 of this guidance series. In addition, the reader may obtain some indication of the range of contaminant concentrations possible for a specific target analyte in a specific species by reviewing results of regional and national fish sampling programs such as the EPA *National Study of Chemical Residues in Fish* (U.S. EPA, 1991b), The National Contaminant Biomonitoring Program (Kidwell et al., 1995), the U.S. Fish and Wildlife Service National Contaminant Biomonitoring Program (Lowe et al., 1985; Schmitt et al., 1990), and the National Oceanic and Atmospheric Association (NOAA) Status and Trends Program (NOAA, 1989).

Note: The chemical contaminant concentration in fish tissue values used in calculating the risk-based consumption limits should be derived from monitoring data obtained from fish sampling and analysis programs and be specific to the waterbody, fish species, and fish size (age) class that were sampled.

3.3.6 Modifying Time-Averaging Period (T_{ap})

Calculated daily consumption limits represent the maximum amount of fish (in kilograms) expected to generate a risk no greater than the maximum ARL used for carcinogens or the maximum amount of fish (in kilograms) that would be expected not to cause adverse noncarcinogenic health effects based on a lifetime of daily consumption at that consumption rate. Most fish consumers, however, do not think about consumption in kilograms per day. Therefore, consumption limits may be more conveniently communicated to the fish-consuming public expressed as the allowable number of fish meals of a specified meal size that may be consumed over a given time period.

Monthly consumption limits were derived for all target analytes as shown in Section 4. For chemical contaminants with carcinogenic properties, there is no current methodology for evaluating the difference in cancer risks between consuming a large amount of the carcinogenic contaminant over a short period of time and consuming the same amount over the course of a lifetime. Therefore, EPA's current cancer risk assessment guidelines recommend prorating exposure

over the lifetime of the exposed individual (U.S. EPA, 1986a). To provide usable and easily understood consumption guidance, the time-averaging period of 1 month was used as the basis for expressing meal consumption limits in Section 4. In certain situations, risk managers may wish to calculate alternate consumption limits for different time intervals. For example, the state of Minnesota calculates consumption limits for mercury for 3-week (vacation), 3-month (seasonal), and annual time periods. This is done for mercury because it is eliminated from the body in a relatively short time period (half-life of approximately 50 days) and also because of seasonal fish consumption patterns in the state.

3.4 MODIFICATION OF CONSUMPTION LIMITS FOR A SINGLE CONTAMINANT IN A MULTISPECIES DIET

Equations 3-1 and 3-3 may be modified to calculate consumption limits for exposure to a single contaminant through consumption of several different fish species. This section describes the modifications required to do this.

Individuals often eat several species of fish in their diets. Equations 3-1 and 3-3, however, are based on contaminant concentrations in a single species of fish. Where multiple species of contaminated fish are consumed by a single individual, such limits may not be sufficiently protective. If several fish species are contaminated with the same chemical, then doses from each of these species must first be summed across all species eaten in proportion to the amount of each fish species eaten. This is described by Equation 3-9:

$$C_{tm} = \sum_{j=1}^n C_{mj} \cdot P_j \quad (3-9)$$

where

C_{tm} = total concentration of chemical contaminant m in an individual's fish diet (mg/kg)

C_{mj} = concentration of chemical contaminant m in species j (mg/kg)

P_j = proportion of species j in the diet (unitless).

Note: This equation requires that the risk assessor know or be able to estimate the proportion of each fish species in the exposed individual's diet. Equation 3-9 yields the weighted average contaminant concentration across all fish species consumed (C_{tm}), which then may be used in modified versions of Equations 3-1 to 3-3 to calculate overall and species-specific risk-based consumption limits for carcinogenic and noncarcinogenic effects as shown in Sections 3.4.1 and 3.4.2.

3.4.1 Carcinogenic Effects

The equation to calculate an overall daily consumption limit based on exposure to a single carcinogen in a multiple species diet is very similar to Equation 3-1. However, in place of C_m , which indicates the average chemical contaminant concentration in one species, Equation 3-10 uses the equation for C_{tm} , the

weighted average chemical contaminant concentration across all of the species consumed:

$$CR_{lim} = \frac{ARL \cdot BW}{\sum_{j=1}^n (C_{mj} \cdot P_j) \cdot CSF} \quad (3-10)$$

where

- CR_{lim} = maximum allowable fish consumption rate (kg/d)
- ARL = maximum acceptable lifetime risk level (unitless)
- BW = consumer body weight (kg)
- C_{mj} = concentration of chemical contaminant *m* in fish species *j* (mg/kg)
- P_j = proportion of a given species in the diet (unitless)
- CSF = cancer slope factor, usually the upper 95 percent confidence limit on the linear term in the multistage model used by EPA ([mg/kg-d])⁻¹.

The daily consumption limit for each species is then calculated as:

$$CR_j = CR_{lim} \cdot P_j \quad (3-11)$$

where

- Cr_j = consumption rate of fish species *j* (kg/d)
- CR_{lim} = maximum allowable fish consumption rate (kg/d)
- P_j = proportion of a given species in the diet (unitless).

Meal consumption limits may then be calculated for each species as before using Equation 3-2 (see Section 3.2), with CR_j substituted for CR_{lim} in the equation. Note that Equation 3-11 may be used before or after Equation 3-2, with the same results.

3.4.2 Noncarcinogenic Effects

For noncarcinogenic effects, the equation to calculate an overall daily consumption limit based on exposure to a single noncarcinogenic chemical in a multiple species diet is similar to Equation 3-3 for a single species. However, in place of C_m, which indicates the chemical contaminant concentration in one species, Equation 3-12 uses the equation for C_{im}, the weighted average chemical contaminant concentration across all of the species consumed:

$$CR_{lim} = \frac{RfD \cdot BW}{\sum_{j=1}^n (C_{mj} \cdot P_j)} \quad (3-12)$$

where the parameters are as defined above. The consumption rate for each species is then calculated using Equation 3-11. Meal consumption limits for each species may then be calculated as before using Equation 3-2.

3.5 MODIFICATION OF CONSUMPTION LIMITS FOR MULTIPLE CONTAMINANT EXPOSURES

Equations 3-10 and 3-12 discussed in Section 3.4 can be further modified to develop consumption limits for multiple chemical exposures across single or multiple fish species. Section 2.3.4 provides additional information on exposure to multiple chemical contaminants.

Individuals who ingest chemically contaminated fish may be exposed to a number of different chemicals simultaneously. This could occur when: (1) a single fish species is contaminated with several different chemical contaminants; (2) an individual consumes a mixture of species in his or her diet, each contaminated with a different chemical; or (3) some combination of the above circumstances occurs.

EXAMPLE 10: Calculating Consumption Limits for a Single Contaminant in a Multispecies Diet

The combined results from a fish sampling and analysis program and a local fish consumption survey determine that local fishers eat a diet of 30 percent catfish contaminated with 0.006 mg/kg chlordane and 70 percent trout contaminated with 0.008 mg/kg chlordane. The RfD for chlordane reported in IRIS is 0.00005 mg/kg/d (IRIS, 1999). Because chlordane causes both chronic health and carcinogenic effects, consumption limits must be calculated for both health endpoints. The CSF for chlordane reported in IRIS is 0.35 per (mg/kg-d)⁻¹ (IRIS, 1999). The average body weight of an adult is estimated to be 70 kg.

Carcinogenic Effects: Using a risk level of 10⁻⁵ and the values specified above, Equation 3-5 yields a daily consumption rate of 0.028 kg/d, based on carcinogenic endpoints:

$$CR_{lim} = \frac{10^{-5} \cdot 70 \text{ kg}}{(0.006 \text{ mg/kg} \cdot 0.3 + 0.008 \text{ mg/kg} \cdot 0.7) \cdot 0.35 \text{ per mg/kg-d}}$$

$$= 0.029 \text{ kg/d .}$$

Equation 3-2 is then used as before to calculate a monthly meal consumption limit, based on a meal size of 8 oz (0.227 kg):

$$CR_{mm} = \frac{0.029 \text{ kg-d} \cdot 30.44 \text{ d/mo}}{0.227 \text{ kg/meal}} = 38.8 \approx 39 \text{ meals/mo .}$$

(continued)

EXAMPLE 10 (continued)

Equation 3-2 yields a meal consumption limit of 39 8-oz meals per month based on chlordane's carcinogenicity.

Based on a diet of 70 percent trout and 30 percent catfish:

$$CR_{\text{trout}} = 39 \text{ 8-oz meals/mo} \cdot 0.7 = 27 \text{ 8-oz meals/mo}$$

An adult may safely consume 27 8-oz meals of trout and 12 8-oz meals of catfish per month.

Note: In both cases the meal consumption limits were rounded down. This is a conservative approach. One might also **round up** the number of meals of the species with the **lower** contaminant concentration, and **round down** the number of meals of the species with the **higher** contaminant concentration, so that the total number of fish meals per month equals that found by using Equations 3-6 and 3-2.

Noncarcinogenic Effects: Equation 3-8 is used to calculate the daily consumption limit based on chlordane's noncarcinogenic health effects using the RfD rather than the CSF

$$CR_{\text{lim}} = \frac{5 \times 10^{-4} \text{ mg/kg-d} \cdot 70 \text{ kg}}{0.006 \text{ mg/kg} \cdot 0.3 + 0.008 \text{ mg/kg} \cdot 0.7} = 4.73 \text{ kg/d}$$

As with carcinogenic effects, Equation 3-2 is used to convert the daily consumption limit of 0.570 kg fish to a meal consumption limit:

$$CR_{\text{mm}} = \frac{4.73 \text{ kg/d} \cdot 30.44 \text{ d/mo}}{0.227 \text{ kg/meal}} = 634.3 \approx 634 \text{ meals/mo}$$

This analysis indicates that 4.73 kg/d is equivalent to 634 8-oz fish meals per month or over two 8-oz fish meals per day under this mixed-species diet. This is categorized as safe fish consumption (represented by ">16" meals/ month) and has been defined as an intake limit of 16 meals per month for the monthly consumption limit tables in Section 4. Thus, based on the above results, risk managers might choose to issue a consumption advisory for adults based on chlordane's carcinogenic effects, the more sensitive of the two health endpoints.

Possible toxic interactions in mixtures of chemicals are usually placed in one of three categories:

- **Antagonistic**—the chemical mixture exhibits less toxicity than the chemicals considered individually
- **Synergistic**—the chemical mixture is more toxic than the sum of the individual toxicities of the chemicals in the mixture
- **Additive**—the toxicity of the chemical mixture is equal to the sum of the toxicities of the individual chemicals in the mixture.

Using available data is especially important in cases where mixtures exhibit synergistic interactions, thereby increasing toxicity. Very little data are available on the toxic interactions between multiple chemicals, however, and no quantitative data on interactions between any of the target analytes considered in this document were located. Some qualitative information is provided in Section 2.3.4.

If all of the chemicals in a mixture induce the same health effect by similar modes of action (e.g., cholinesterase inhibition), contaminants may be assumed to contribute additively to risk (U.S. EPA, 1986c), unless specific data indicate otherwise. Chemicals in a particular class (e.g., organochlorine or organophosphate pesticides) usually have similar mechanisms of toxicity and produce similar effects. Effects of chemicals and chemical groups are discussed in more detail in Section 5. For mixtures of chemicals that produce similar toxicological endpoints, EPA recommends dose addition. This procedure involves scaling the doses of the components for potency and adding the doses together; the mixtures response is then estimated for the combined dose (U.S. EPA, 1999a).

Some chemical mixtures may contain chemicals that produce dissimilar health effects. For these chemicals, EPA recommends response addition. This procedure involves first determining the risks for the exposure for the individual components; the mixture risk is then estimated by adding the individual risks together (U.S. EPA, 1999a).

3.5.1 Carcinogenic Effects

Few empirical studies have considered response addition in any depth, and few studies have modeled cancer risk from joint exposure. If interactions data are available on the components of the chemical mixture, EPA recommends that they be incorporated into the risk assessment by using the interactions-based hazard index or by including a qualitative assessment of the direction and magnitude of the impact of the interaction data (U.S. EPA, 1999a).

A detailed discussion of the interactions-based hazard index approach is available in EPA's proposed guidance for conducting health risk assessment of chemical mixtures (U.S. EPA, 1999a). For calculating consumption limits, additivity will be assumed for both carcinogenic and noncarcinogenic effects of components of chemical mixtures.

Equation 3-13 can be used to calculate a daily consumption rate for chemical mixtures of carcinogens in single or multiple fish species. It is similar to

Equation 3-1, with the summation of all species and all chemicals substituted for C_m in the denominator:

$$CR_{lim} = \frac{ARL \cdot BW}{\sum_{m=1}^x \left(\sum_{j=1}^n C_{mj} \cdot P_j \right)} \cdot CSF \quad (3-13)$$

where

- CR_{lim} = maximum allowable fish consumption rate (kg/d)
- ARL = maximum acceptable lifetime risk level (unitless)
- BW = consumer body weight (kg)
- C_{mj} = concentration of chemical contaminant m in species j (mg/kg)
- P_j = proportion of a given species in the diet (unitless)
- CSF = cancer slope factor, usually the upper 95 percent confidence limit on the linear term in the multistage model used by EPA ($[mg/kg \cdot d]^{-1}$).

Meal consumption limits for mixtures of carcinogens are then calculated using Equation 3-2. When only one fish species is involved, Equation 3-13 may be simplified to Equation 3-14:

$$CR_{lim} = \frac{ARL \cdot BW}{\sum_{m=1}^x C_m \cdot CSF} \quad (3-14)$$

where the variables are as previously defined.

3.5.2 Noncarcinogenic Effects

Equation 3-15 can be used to calculate a daily consumption rate for noncarcinogenic chemical mixtures in single or multiple fish species. It is similar to Equation 3-3, with the summation of all species and all chemicals assumed to act additively. Equation 3-3 has been modified with the respective summation of concentrations (C_{mj}) substituted in the denominator and their respective RfDs in the numerator.

$$CR_{lim} = \sum_{m=1}^x \left(\frac{RfD_m \cdot P_m}{\sum_{j=1}^n (C_{mj} \cdot P_j)} \right) \cdot BW \quad (3-15)$$

where the parameters are as previously defined and P_m = proportion by weight of chemical in diet. Meal consumption limits are then calculated using Equation 3-2, as above. Again, when only one fish species is involved, Equation 3-15 can be simplified to Equation 3-16:

$$CR_{lim} = \sum_{m=1}^x \left(\frac{RfD_m \cdot P_m}{C_m} \right) \cdot BW \quad (3-16)$$

where the variables are as previously defined. Note that Equations 3-15 and 3-16 may **not** be used for contaminants causing dissimilar noncarcinogenic health effects.

EXAMPLE 11: Calculating Consumption Limits for Multiple Contaminants in a Single Species Diet

A single fish species is contaminated with 0.04 mg/kg chlordane and 0.01 mg/kg heptachlor epoxide. A maximum acceptable risk level of 10^{-5} and an adult body weight of 72 kg are used. Because chlordane and heptachlor epoxide cause both carcinogenic and chronic systemic health effects, both health endpoints must be considered in establishing consumption limits for these chemicals.

Carcinogenic Effects: The CSF for chlordane reported in IRIS is 0.35 per (mg/kg-d) (IRIS, 1999). The CSF for heptachlor epoxide reported in IRIS is 9.1 per (mg/kg-d) (IRIS, 1999). Equation 3-10 is used to calculate daily consumption rate based on the combined carcinogenic effects of both contaminants:

$$CR_{lim} = \frac{10^{-5} \cdot 70}{(0.04 \cdot 0.35) + (0.01 \cdot 9.1)} = 0.007 \text{ kg/d} .$$

A daily consumption rate of 0.007 kg fish per day is calculated. Using Equation 3-2, this daily consumption rate is converted to a meal consumption limit of one 4-oz meal per month (or six 8-oz meals per year).

Noncarcinogenic Effects: Chlordane and heptachlor are both organochlorine pesticides and cause many similar noncarcinogenic effects. Heptachlor epoxide is a metabolite of the organochlorine pesticide, heptachlor. When heptachlor is released into the environment, it quickly breaks down into heptachlor epoxide. Therefore, the toxicity values used in this document are for heptachlor epoxide, not heptachlor (see Section 5.3.7). Adverse liver effects formed the basis of the RfDs for both chemicals (IRIS, 1999). A combined daily consumption limit based on an RfD of 5×10^{-4} mg/kg-d for chlordane and 1.3×10^{-5} mg/kg-d for heptachlor was calculated using Equation 3-12:

(Continued)

EXAMPLE 11 (continued)

$$CR_{lim} = \left(\frac{5 \times 10^{-4} \text{ mg/kg-d}}{0.04 \text{ mg/kg}} + \frac{1.3 \times 10^{-5} \text{ mg/kg-d}}{0.01 \text{ mg/kg}} \right) \cdot 70 \text{ kg} = 0.97 \text{ kg/d} .$$

Equation 3-12 yields a daily consumption rate of 0.97 kg fish/d at the contaminant concentrations described above. Using Equation 3-2, a meal consumption limit of 130 4-oz meals per month is calculated. Therefore, based on the carcinogenic and chronic systemic consumption limits calculated for combined heptachlor epoxide and chlordane contamination, a risk manager may choose to advise (1) limiting fish consumption to six 8-oz meals per year, based on the combined carcinogenic effects; or (2) limiting fish consumption to 133 4-oz-meals/month, based on noncarcinogenic effects. **In general, EPA advises that the more protective meal consumption limit (in this case, the limit for the carcinogenic effect) serve as the basis for a fish consumption advisory to be protective of both health effects endpoints.**

3.5.3 Species-Specific Consumption Limits in a Multiple Species Diet

Equation 3-11 is used to calculate the risk-based consumption limits for each species in a multiple species diet, for both carcinogenic and noncarcinogenic toxicity where the variables are as defined above. CR_{lim} is calculated using Equations 3-13 or 3-15, for carcinogenic and noncarcinogenic toxicity, respectively. As with the consumption limits for single chemicals, these consumption limits are valid only if the assumed mix of species in the diet is known and if the contaminant concentrations in each species are accurate.

EXAMPLE 12: Calculating Consumption Limits for Multiple Contaminants in a Multispecies Diet

Chlorpyrifos and diazinon both cause cholinesterase inhibition, so are considered together when developing meal consumption limits. The RfD for chlorpyrifos is 0.0003 mg/kg-d, (EPA, 2000b), and the RfD for diazinon is 0.0007 mg/kg/d (U.S. EPA, 1998b).

A local fish consumption survey reveals that adult fishers consume trout and catfish at a ratio of 70:30, respectively. A fish sampling and analysis program reports chlorpyrifos and diazinon contamination in both species. Trout fillets are contaminated with 4.0 mg/kg chlorpyrifos and 0.3 mg/kg diazinon. Catfish fillets are contaminated with 6.0 mg/kg chlorpyrifos and 0.8 mg/kg diazinon. Given an adult body weight of 70 kg, a risk-based consumption rate of 0.15 kg fish per day is calculated using Equation 3-11:

(Continued)

EXAMPLE 12 (continued)

$$CR_{lim} = \left(\frac{0.0003}{(4.0 \cdot 0.7) + (6.0 \cdot 0.3)} + \frac{0.0007}{(0.3 \cdot 0.7) + (0.8 \cdot 0.3)} \right) \cdot 70$$

$$= 0.11 \text{ kg/d} .$$

Using Equation 3-2, a meal consumption limit of 15 8-oz meals per month is derived. **Note:** If chlorpyrifos and diazinon did not cause the same health endpoint, then separate meal consumption limits would have to be calculated for each as described in Section 3.4.2, with the more protective meal consumption limit usually serving as the basis for a fish consumption advisory (see Section 3.5.2).

Based on a diet of 70 percent trout and 30 percent catfish:

$$CR_{trout} = 15 \text{ 8-oz meals/mo} \cdot 0.7 = 10 \text{ 8-oz meals/mo} .$$

An adult may safely consume 10 8-oz meals of trout and 5 8-oz meals of catfish per month. Again, as mentioned in Section 3.4.2, rounding down both species-specific consumption limits is a conservative approach.

National Guidance

Guidance for Assessing Chemical Contaminant Data for Use In Fish Advisories

Volume 2: Risk Assessment and Fish Consumption Limits - Third Edition

SECTION

Download the desired chapter of the **Risk Assessment and Fish Consumption Limits** in the Adobe Acrobat PDF format.

- Read...

- [Figures](#)
- [Tables](#)
- [Acknowledgements](#) (PDF, 8K)
- [Acronyms](#) (PDF, 15K)

- Download...

- [Cover Page](#) (PDF, 92K)
- [Table of Contents](#) (PDF, 42K)
- [Executive Summary](#) (PDF, 19K)

1. [Introduction](#) (PDF, 56K)

2. [Risk Assessment Methods](#) (PDF, 345K)

- 2.1 Introduction
- 2.2 Hazard Identification
- 2.3 Dose-Response Assessment
- 2.4 Exposure Assessment
- 2.5 Risk Characterization
- 2.6 Summarizing Risk Data

3. [Development and Use of Risk-Based Consumption Limits](#) (PDF, 122

- 3.1 Overview and Section Organization
- 3.2 Equations Used to Develop Risk-Based Consumption Limits
- 3.3 Default and Alternative Values for Calculating Consumption Limits
- 3.4 Modification of Consumption Limits for a Single Contaminant in Multispecies Diet
- 3.5 Modification of Consumption Limits for Multiple Contaminant

Exposures

4. [Risk-Based Consumption Limit Tables](#) (PDF, 71K)
 - 4.1 Overview & Section Organization
 - 4.2 Consumption Limit Tables
5. [Toxicological Profile Summaries for Target Analytes](#) (PDF, 357K)
 - 5.1 Introduction
 - 5.2 Metals
 - 5.3 Organochlorine Pesticides
 - 5.4 Organophosphate Pesticides
 - 5.5 Chlorophenoxy Herbicides
 - 5.6 Polycyclic Aromatic Hydrocarbons (PAHs)
 - 5.7 Polychlorinated Biphenyls (PCBs)
 - 5.8 Dioxins
6. [Mapping Tools for Risk Assessment and Risk Management](#) (PDF, 323K)
7. [Literature Cited](#) (48 KB)

Appendix

- A [Reviewers of First Edition of Guidance Document](#) (PDF, 12K)
- B [Population Exposure Assessment & Consumption Patterns and Sur](#) (PDF, 132K)
- C [Dose Modification Due to Food Preparation and Cooking](#) (PDF, 90K)
- D [Guidance for Risk Characterization](#) (PDF, 122K)
- E [Additional Developmental toxicity Issues](#) (PDF, 28K)
- F [Summary of Limits of Detection for the Recommended Target Analy](#) (PDF, 15K)

List of Figures

- 1-1 Series Summary: Guidance for Assessing Chemical Contamination for Use in Fish Advisories
- 2-1 Elements of Risk assessment and risk management
- 2-2 Schematic of exposure categories in upper half of a normal population distribution
- 6-1 GIS Data Layers may use raster or vector Representation techniques
- 6-2 Examples of GIS Displays from EPA's BASINInfo Maps-on-Demand Facility

6-3 Map showing active fish and wildlife advisories for a state

List of Tables

- 1-1 Target Analytes Recommended for Fish Sampling Programs
- 1-2 Comparison of FDA Action Levels and Tolerances with EPA Screening Values
- 1-3 Fish Consumption Rates for Various Fisher Populations
- 2-1 Uncertainty Factors and Modifying Factors for Estimating Exposure Limits for Chronic Effects
- 2-2 Mean Body Weights of Children and Adults
- 2-3 Categories of Information Necessary for a Population Exposure Assessment
- 2-4 Exposure Data Template
- 2-5 Risk Estimates
- 2-6 Risk Characterization
- 2-7 Risk Summaries for a Waterbody
- 2-8 Risk Summaries for a Geographic Area
- 3-1 Risk Values Used in Risk-Based Consumption Limit Tables
- 3-2 Input Parameters for Use in Risk Equations
- 3-3 Monthly Fish Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints & Chlordane
- 3-4 Monthly Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints- Chlordane
- 3-5 Average Body Weights and Associated Multipliers
- 4-1 Monthly Fish Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints - Arsenic
- 4-2 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoints - Cadmium
- 4-3 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoints - Methylmercury
- 4-4 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoints - Selenium
- 4-5 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoints - Tributyltin
- 4-6 Monthly Fish Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints - Chlordane
- 4-7 Monthly Fish Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints - DDT
- 4-8 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoints - Dieldrin
- 4-9 Monthly Fish Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints -Dieldrin
- 4-10 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoints - Endosulfan

- 4-11 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoint - Endrin
- 4-12 Monthly Fish Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints - Heptachlor Epoxide
- 4-13 Monthly Fish Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints - Hexachlorobenzene
- 4-14 Monthly Fish Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints - Lindane
- 4-15 Monthly Fish Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints - Mirex
- 4-16 Monthly Fish Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints - Toxaphene
- 4-17 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoint - Chlorpyrifos
- 4-18 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoint - Diazinon
- 4-19 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoint - Disulfoton
- 4-20 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoint - Ethion
- 4-21 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoint - Terbufos
- 4-22 Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoint - Oxyfluorfen
- 4-23 Monthly Fish Consumption Limits for Carcinogenic Health Endpoint - PAHs
- 4-24 Monthly Fish Consumption Limits for Carcinogenic and Noncarcinogenic Health Endpoints - PCBs
- 4-25 Monthly Fish Consumption Limits for Carcinogenic Health Endpoint - Dioxins/Furans
- 5-1 Health and Toxicological Data Reviewed for Target Analytes
- 5-2 Toxicity Equivalent Factors for Various PAHs
- 5-3 Relative Potency Estimates for Various PAHs
- 5-4 Reported Concentrations (ppm) of Dioxin-Like Congeners in Commercial Aroclor Mixtures
- 5-5 PCB and Dioxin Concentrations (ppb) in Channel Catfish
- 6-1 Comparison of Raster- Versus Vector-Based GIS Programs

Example Demonstration for Combined Chemical Contaminant Calculations for Monthly Dietary Limitations of Cook Inlet King Salmon.

The following example calculations are to help demonstrate how to calculate dietary limitations for all combined chemical contaminants based on contaminant levels reported from the EPA Subsistence Contaminant Study Results by using EPA's "Guidance for Assessing Chemical Data for Use in Fish Advisories, Volume 2, Risk Assessment and Fish Consumption Limits, Third Edition", November 2000 (herein referred to as "Guidelines"). The full data can be seen in a spreadsheet I created entitled "EPA Contaminant Study Synopsis of Data and Dietary Limitations" which is available by request.

You will need a copy of the above EPA referenced guidance document and specifically Volume 2, chapter three, which can be downloaded at:

<http://www.epa.gov/waterscience/fishadvice/volume2/index.html> and the latest August 2003 version of the EPA study data which got significantly revised from the originally reported data.

King Salmon Contaminant Levels from EPA Sampling

You can look up the Sea Base chemical concentrations in tissue data from the August 2003 version of the EPA report data section to verify the data below:

EPA Contaminant Data	August 2003 Version		Converting the Data	
Chemical Detected	Avg. Concentration	Units	Concentration	Units
Dioxins/Furans	13.30	ng/kg	.0000133	mg/kg
PCB Aroclor 1260	3,200.00	ng/kg	.0032	mg/kg
Total PAH's	253.00	ug/kg	.253	mg/kg
Pesticides				
Chlordane (Sum)	1,227.00	ng/kg	.001227	mg/kg
DDT Compounds	5,398.00	ng/kg	.005398	mg/kg
Dieldrin	769.00	ng/kg	.000769	mg/kg
Endosulfan (Total)	544.00	ng/kg	.000544	mg/kg
Endrin	582.00	ng/kg	.000582	mg/kg
Heptachlor Epoxide	238.00	ng/kg	.000238	mg/kg
Hexachlorobenzene	1,787.00	ng/kg	.001787	mg/kg
Lindane	185.00	ng/kg	.000185	mg/kg
Pentachloroanisole	594.00	ng/kg		mg/kg
Trace Metals				
Arsenic (Organic)	541.00	ug/kg	.541	mg/kg
Barium	139.00	ug/kg	.139	mg/kg
Cadmium	109.00	ug/kg	.109	mg/kg
Chromium	184.00	ug/kg	.184	mg/kg
Methylmercury	39.00	ug/kg	.039	mg/kg
Selenium	371.00	ug/kg	.371	mg/kg

1. **Convert Data.** All data for the EPA Guidelines formulas referenced above must be converted to parts per million or mg/kg which you can verify in the converted mg/kg column above. The µg/kg or parts per billion data and then the ng/kg or parts per trillion data are both converted to parts per million or mg/kg. You can quickly do this by looking at the Metric Values And Equivalentents section of my November 2nd, 2001 “Review and Summary of the 1998 EPA Cook Inlet Subsistence Contaminant Study” (funded by Chugachmiut for the Cook Inlet Tribes) on page 10 which I have copied onto the last page of this document for easy reference.

- For ug/kg data, simply divide by 1,000 since there are 1,000 ug in a mg or you can just move the decimal three places to the left.
- For ng/kg data, simply divide by 1,000,000 since there are 1,000,000 ng in a mg or you can just move the decimal six places to the left.

2. **Use the Cancer Slope Factors or CSF from Guidelines Document page 3-3.** You will see in Table 3-1 which I have copied below the mg/kg/day CSF’s in right column.

Table 3-1. Risk Values Used in Risk-Based Consumption Limit Tables

Target Analyte	Noncarcinogens	Carcinogens
	Chronic RfD ^a (mg/kg-d)	CSF ^a (mg/kg-d) ⁻¹
Metals		
Arsenic (inorganic) ^c	3 × 10 ⁻⁴	1.5
Cadmium	1 × 10 ⁻³	NA
Mercury (methylmercury) ^d	1 × 10 ⁻⁴	NA
Selenium	5 × 10 ⁻³	NA
Tributyltin ^b	3 × 10 ⁻⁴	NA
Organochlorine Pesticides		
Total chlordane (sum of <i>cis</i> - and <i>trans</i> -chlordane, <i>cis</i> - and <i>trans</i> -nonachlor, and oxychlordane) ^e	5 × 10 ⁻⁴	0.35
Total DDT (sum of 4,4'- and 2,4'-isomers of DDT, DDE, and DDD) ^f	5 × 10 ⁻⁴	0.34
Dicofol ^g	4 × 10 ⁻⁴	withdrawn
Dieldrin	5 × 10 ⁻⁵	16
Endosulfan (I and II)	6 × 10 ⁻³	NA
Endrin	3 × 10 ⁻⁴	NA
Heptachlor epoxide	1.3 × 10 ⁻⁵	9.1
Hexachlorobenzene	8 × 10 ⁻⁴	1.6
Lindane (γ-hexachlorocyclohexane; γ-HCH) ⁱ	3 × 10 ⁻⁴	1.3
Mirex	2 × 10 ⁻⁴	NA
Toxaphene ^{h,j}	2.5 × 10 ⁻⁴	1.1
Organophosphate Pesticides		
Chlorpyrifos ^k	3 × 10 ⁻⁴	NA
Diazinon ^l	7 × 10 ⁻⁴	NA
Disulfoton	4 × 10 ⁻⁵	NA
Ethion	5 × 10 ⁻⁴	NA
Terbufos ^m	2 × 10 ⁻⁵	NA
Chlorophenoxy Herbicides		
Oxyfluorfen ⁿ	3 × 10 ⁻³	7.32 × 10 ⁻²
PAHs^o	NA	7.3
PCBs		
Total PCBs	2 × 10 ⁻⁵	2.0 ^p
Dioxins/furans^q	NA	1.56 × 10 ⁵

CSF = Cancer slope factor (mg/kg-d)⁻¹.
 DDD = p,p'-dichlorodiphenyldichloroethane.
 DDE = p,p'-dichlorodiphenyldichloroethylene
 DDT = p,p'-dichlorodiphenyltrichloroethane.
 NA = Not available in EPA's Integrated Risk Information System (IRIS, 1999).

PAH = Polycyclic aromatic hydrocarbon.
 PCB = Polychlorinated biphenyl.
 RfD = Oral reference dose (mg/kg-d).

3. Now go to page 3-21 to use the combined chemicals formula for a carcinogens in a single species (formula 3-14) where you will see formula 3-13 modified to 3-14 which we will not use.

Equation 3-1, with the summation of all species and all chemicals substituted for C_m in the denominator:

$$CR_{lim} = \frac{ARL \cdot BW}{\sum_{m=1}^x \left(\sum_{j=1}^n C_{mj} \cdot P_j \right) \cdot CSF} \quad (3-13)$$

where

- CR_{lim} = maximum allowable fish consumption rate (kg/d)
- ARL = maximum acceptable lifetime risk level (unitless)
- BW = consumer body weight (kg)
- C_{mj} = concentration of chemical contaminant m in species j (mg/kg)
- P_j = proportion of a given species in the diet (unitless)
- CSF = cancer slope factor, usually the upper 95 percent confidence limit on the linear term in the multistage model used by EPA ([mg/kg-d]⁻¹).

Meal consumption limits for mixtures of carcinogens are then calculated using Equation 3-2. When only one fish species is involved, Equation 3-13 may be simplified to Equation 3-14:

$$CR_{lim} = \frac{ARL \cdot BW}{\sum_{m=1}^x C_m \cdot CSF} \quad (3-14)$$

So using the above formula 3-14, you simply multiply the ARL times the body weight of the consumers in kilograms, we will use EPA's 70 kilogram adult value for this calculation and an ARL of 1/100,000 risk level. Before we begin you can look at their example calculation on page 3-22 which I will paste below. Note that we will not use the non carcinogenic formula due to a serious error in this formula that I have discussed before. So for this example calculation we will only use carcinogenic dietary limitations.

EXAMPLE 11: Calculating Consumption Limits for Multiple Contaminants in a Single Species Diet

A single fish species is contaminated with 0.04 mg/kg chlordane and 0.01 mg/kg heptachlor epoxide. A maximum acceptable risk level of 10^{-5} and an adult body weight of 72 kg are used. Because chlordane and heptachlor epoxide cause both carcinogenic and chronic systemic health effects, both health endpoints must be considered in establishing consumption limits for these chemicals.

Carcinogenic Effects: The CSF for chlordane reported in IRIS is 0.35 per (mg/kg-d) (IRIS, 1999). The CSF for heptachlor epoxide reported in IRIS is 9.1 per (mg/kg-d) (IRIS, 1999). Equation 3-10 is used to calculate daily consumption rate based on the combined carcinogenic effects of both contaminants:

$$CR_{lim} = \frac{10^{-5} \cdot 70}{(0.04 \cdot 0.35) + (0.01 \cdot 9.1)} = 0.007 \text{ kg/d} .$$

A daily consumption rate of 0.007 kg fish per day is calculated. Using Equation 3-2, this daily consumption rate is converted to a meal consumption limit of one 4-oz meal per month (or six 8-oz meals per year).

4. Now run the calculation for combined carcinogenic dietary limitation for King Salmon.

The first step is to sum up the values of each chemicals level in mg/kg times that chemicals cancer slope factor or CSF value if there is one. So we will go down the list:

- For **Dioxin/Furans**, the level is **.0000133** and the CSF is 156,000. So multiplying the level times the CSF equals **2.0728**.
- For **PCB's** the level is **.0032 ppm or mg/kg** and the CSF in table 3-1 which is 2.0. So 0.0032 times 2.0 equals **0.0064**.
- Now for total **PAH's** we multiply the PAH level of **.253 ppm** times the PAH CSF of **7.3** which equals **1.8469**.
- For **Chlordane** its **.00123 ppm** times 0.35 CSF which equals **0.00043**.
- **DDT** (sum of DDT compounds) is **.005398 ppm** times .34 CSF which equals **0.00184**.
- Next is **Dieldrin** at **.000769 ppm** times **CSF of 16** which equals **0.0123**.
- For **Heptachlor Epoxide** its **.000238** times **9.1 CSF** equals **0.00217**.
- For **Hexachlorobenzene** its **.001787** times **CSF of 1.6** which equals **0.00286**.
- Finally for **Lindane**, its **.000185** times its **CSF of 1.3** which equals **0.00024**
- For metals, there are currently no cancer slope factors established for those metals detected in King Salmon.

5. Now sum up all the ppm*CSF results

(2.0728+0.0064+1.8469+0.00043+0.00184+0.0123+0.00217+0.00286+0.00024) which equals a sum of **3.94793**. Without Dioxin/Furans since only one duplicate sample individual had a

specific king salmon (PG-KS-01) had one congener (OCDD) the sum would be **1.87313**
Without PAH's or Dioxin/Furans factored in it comes to **0.02668266**

6. **Run formula 3-14 and** take the 70 kg E-5 on the top of formula or 0.0007 and divide it by the 3.94793 sum of all King Salmon detected contaminants in ppm*CSF and **that comes out to 0.00017731 kilograms per day** dietary intake limitation based on one in 100,000 cancer risk. Without Dioxin/Furans factored it comes out to **0.00037371** allowable kilograms per day intake. Then without Dioxin/Furan or PAH's factored it comes to **0.02668266** kilograms per day.
7. **Convert to 8 oz (.227 kg) meals per month** by multiplying kgs per day by 30.44 (days per month) and then dividing by .227 (kgs in 8 ounce meal) and based on equation 3-2 on page 3-5. This comes out to **0.02378 meals per month** (or 0.3 meals per year) limitation for 1/100,000 cancer risk or **0.05011** meals per month (0.6 meals per year) without Dioxin/Furan's factored or 3.578 meals per month without Dioxin/Furan's or PAH's factored.
8. **Is this acceptable risk?** All of these dietary limitations get down to a persons willingness or unwillingness to expose themselves to potential risk as well as to cross check all available food sources to see what appears to be the safest and most healthy. The other issue is that this is clearly outrageous that critical tribal subsistence resources have become contaminated to any level of potential health threat whatsoever. This in itself should be considered a red flag that should be used to challenge and potentially minimize the massive point source discharges officials are allowing in Cook Inlet and Kachemak Bay.
9. **Spreadsheet Information.** I have all the species in the EPA study calculated out in a spreadsheet and summary table for anyone that is interested.

Metric Values and Equivalent

The basic metric weights used in most scientific studies are as follows:

- One **kilogram** equals 1,000 grams;
- One **gram** equals 1,000 milligrams;
- One **milligram** equals 1,000 micrograms;
- One **microgram** equals 1,000 nanograms;
- One **nanogram** equals 1,000 picograms.

It keeps going but this is as far as we need to go for this project.

Contaminants in fish tissue is usually expressed in concentrations such as:

- **milligrams per gram (mg/gm) = parts per thousand (ppt) since there are one thousand milligrams in a gram, or;**
- **milligrams per kilogram (mg/kg) = parts per million (ppm) since there are one million milligrams in a kilogram (1,000 mg = gm and 1,000 gm = kg), or;**
- **micrograms per gram (µg/gm) = parts per million (ppm) since there are one million micrograms in a gram, or;**
- **micrograms per kilogram (µg/kg) = parts per billion (ppb) since there are one billion micrograms in a kilogram, or;**
- **nanograms per gram (ng/gm) = parts per billion since there are one billion nanograms in a gram, or;**
- **nanograms per kilogram (ng/kg) = parts per trillion (ppt) since there are one trillion nanograms in a kilogram**



SQUAXIN ISLAND TRIBE

November 20, 2008

William Ruckelshaus, Chair
Leadership Council of the Puget Sound Partnership
P.O. Box 40900
Olympia, WA 98504-0900

The Honorable Chairman Ruckelshaus:

The Squaxin Island Tribe congratulates everyone who has worked so hard these past months to build the Puget Sound Partnership and develop the Action Agenda. The document serves as a good starting point for further discussions and refinement of priorities as we move toward restoring ecosystem health to Puget Sound.

Thank you for the opportunity to provide additional input on the development of the Puget Sound Partnership's (PSP) draft Action Agenda. While we have accomplished much, many challenges remain. For the Squaxin Island Tribe, this includes the need for consistent funding to implement the salmon recovery components of the Action Agenda, as well as shellfish bed restoration and certification.

In our opinion, the agenda needs to be more explicit about the role of salmon recovery in the restoration of Puget Sound. In addition, we feel that the regional documents could be improved to more fully embrace the role that fish and shellfish harvest play in the culture, community and economy of the Puget Sound Tribes

We would like to respectfully suggest that the Leadership Council should be bolder in articulating goals and near-term actions if we are to recover Puget Sound by 2020. We have identified a few key issues below where we think bolder goals and actions are needed.

1. Reduce pollutant loading from sewage treatment plants – The description of the problem is compelling, but the near-term actions (C.3 – near-term action 2, P.24) do not reflect the urgency. *“Ensure that AKART (All Known, Available, and Reasonable Methods of Treatment) or better standards are met in nutrient sensitive areas such as Hood Canal, South Sound, and the Whidbey Basin.”* We

support the identification of South Puget Sound as an area that needs special and aggressive attention due to large nutrient inputs and limited flushing. The technology currently exists to treat the wastewater effluent and remove the nutrients to a level that allows reuse and recycling of 100% of the water. However, too often the economic considerations of “Reasonable” treatment are used to undermine the necessary outcomes. This is accomplished by externalizing costs such as the health of Puget Sound when considering the permitting standards and treatment requirements. Stronger language might be **“Ensure that improved wastewater treatment standards are applied immediately, with a goal of zero discharge, for all new construction utilizing State of Federal funding, and for all remaining treatment plants in Puget Sound by 2020.”** It should be incumbent upon us all to demand federal infrastructure funding for our wastewater treatment facilities as an investment in an improved future for Puget Sound.

2. Stormwater – DOE issued a new report on toxic loadings entering Puget Sound and the portion coming through stormwater is staggering (C.2 – near-term action 2, P.23). *“Provide financial and technical assistance to cities and counties to implement NPDES Phase I and II permits.”* While these new NPDES permit standards are a significant improvement over historical requirements, they are the result of federal regulatory negotiations that are not specific to, and occurred before the mandate to clean up Puget Sound by 2020 was adopted. They simply are not designed to achieve the objectives we must meet to restore Puget Sound health. We recommended strengthening the stormwater recommendations to state **“Before providing financial and technical assistance to cities and counties to implement NPDES Phase I and II permits, assign the PSP Science Panel to conduct an independent review to ensure that the provisions of the Phase I and II permits are compatible with the goal of Recovering Puget Sound by 2020, and to make recommendations on how this goal may be met.”**

Another component of these recommendations should be to **identify the sources of significant toxic loadings from the DOE study and target methods to reduce the quantities of toxics before they enter the stormwater conveyance systems.**

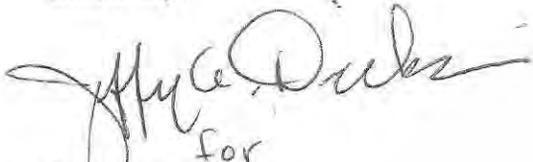
11/20/08

Page 3

We continue to believe that a strong local and regional approach is the best alternative to build support and ownership of the actions we need to take to restore Puget Sound. It is imperative that the Partnership continues to support the South Puget Sound strategy and works with us to find funding to support the development of a regional oversight board to fulfill the needs identified for regional coordination.

The strong science and policy guidance provided through the Partnership's Action Agenda offer our best chance to fix the health of Puget Sound. The Squaxin Island Tribe stands ready and committed to continue to protect and restore Puget Sound.

Sincerely,



for
Andy Whitener

Natural Resources Director



Stillaguamish Tribe

Natural Resources Department

November 25, 2008

Puget Sound Partnership
P.O. Box 40900
Olympia, Washington 98504-0900

RE: Comments on Draft Action Agenda

While we appreciate the effort that the Partnership has made in tackling the daunting task of cleaning up Puget Sound and helping to recover species and habitat, there are areas where the draft Action Agenda (AA) comes up short and/or is just plain wrong (in our opinion). This letter outlines our concerns and provides recommendations for improvements to the AA. If you would like further clarification on any of the points made below, don't hesitate to contact us; we would welcome the chance to discuss our concerns.

Q 1, p. 3 - - -

First off, we have serious concerns with the provisional indicators as listed. For example, the land cover indicator states that "success" will be achieved if 90% of the lowland forest cover is maintained. By the partnership's own numbers (Q 2, p.1-2) this is a 25% increase in current rate of forest cover loss (1991-2001). How exactly are we going to achieve "success" if the same path that got us to our present situation is held up as the ideal? And why is it that only lowland forest cover is used as the indicator? Upper elevation forest provide a significant hydrologic function; data collect by the Stillaguamish Tribe indicates that peak flows are the leading cause of freshwater mortality for listed Chinook salmon juveniles. Ensuring that **hydrologically mature** forest cover is protected and increases in area is a better measure of "success", regardless of elevation. The way the land cover indicator is presently written runs counter to the Stillaguamish Chinook Recovery Plan; "success" would bring further harm to Chinook populations Puget Sound wide.

We also strongly disagree that maintaining the current rate of impervious surface addition (1991-2001, 20% increase by 2020, Q.1, p.3) will move us anywhere near "success". There is a robust body of evidence linking impervious area increases to watershed function degradation (Booth et al. 1997), with serious ecological problems observed once impervious area approaches 10 percent. It is dishonest to tell the citizens of Puget Sound that 20% can be added to the existing impervious area and still be on the path to "success"; we have to reverse the tide of pavement if we are to truly change the direction the Sound is heading. If salmon recovery is looking to a 50-100 year time horizon, doubling the amount of

November 25, 2008

impervious area (on the current path) will make it extremely difficult (if not impossible) to restore viable salmon populations.

We also have a problem with the Flow indicator in the table (Q1, p.4). Why is it that wet years are only used? Our listed fish use the rivers in all years, and there are at least as many dry years as wet. Are we achieving “success” if instream flows do not meet the needs of fish 50% of the time? The indicator as written is unacceptable and should be changed to “all years”.

Our last concern with the provisional indicator table deals with the inconsistency of standards for the various metrics. On one hand, eelgrass must reach historic extents before “success” is achieved, while lowland forest cover can be reduced 10% from its current degraded state (50% of historic?). While we agree that eelgrass is important, why are other key habitats like estuarine marsh, freshwater wetlands, and old growth forest ignored? This disconnect underscores the weak link between science and the AA recommendations. There needs to be a clear connection between the amount and quality of habitat available (as compared to historic) and the desired future condition of the Puget Sound watershed. Everything is driven by habitat; therefore, it is imperative that the Partnership base “success” on achieving some percentage of historic habitat (not measuring how much current habitat we are losing). While the draft agenda is plain about the staggering amount of habitat loss that has occurred in the Puget Sound region over the past 150 years, it does an extremely poor job of conveying the scale of habitat restoration and protection that must occur if we are to see restoration of Orca and salmon populations. The Stillaguamish Chinook plan has ambitious ten-year restoration targets that were calculated on the actual ecosystem needs (80% of historic habitat), not what is politically realistic. The same should be true of the AA.

Q. 3, p.6, A.1 - - - -

Moving farther down the document, the Agenda asserts that growth and economic development can co-exist with the ecosystem goals. There is no historical precedence for **restoring** a large ecosystem while accommodating millions of new people. We emphasize the word restore here since the local watersheds are currently unable to maintain the status quo (forest cover, salmon numbers, impervious area, etc) with the current rate of economic activity. At certain level of humanity (any of our UGA’s), ecosystem functions are lost, no matter how carefully development is constructed. Watersheds filled with low-impact development and buffers are still not functioning compared to a forested landscape. What makes the Partnership so certain that the all of the AA goals are compatible? This assumption must be tested before society is told they can have it all- growth and ecological restoration. In our experience, the environment always suffers.

Also in this section (Q.3, p.7, A.1.3), the Agenda details the “watershed characterizations” that are needed to prioritize restoration and protection actions, along with directing growth. In our experience, such an effort is not needed in the Stillaguamish and would further delay implementation of our Chinook Recovery Plan. This highlights a concern of ours that threads through the whole of the AA- the call for further studies. The AA mentions doing the best of the best, in the proper sequence, at the right location (which is true to an extent), but we really need to do a lot of restoration and protection work everywhere- after all, nearly the entire landscape sustained historical fish and wildlife populations.

November 25, 2008

While we are not familiar with the other action areas, the Whidbey Basin has more than enough scientific groundwork for decades of restoration and protection work. Every year that passes without significant progress means many new missed opportunities (new subdivisions, more pavement, less forest cover, more infrastructure in the floodplain). The AA needs to recognize that some areas are further along than others, and can begin implementing more aggressively right away.

Q.3, p. 12, A.4 - - -

The AA lumps the preservation of working farms, forestlands, and aquaculture in the same category. While this might keep things from getting worse, it certainly does not get us closer to “success” – nor does it recognize that many of best restoration possibilities are on Ag lands. There are serious hurdles in the Whidbey Basin limiting the use of Ag land for restoration/mitigation projects, but not for development. This must change if we are to reach our goals, and the AA should come out and say this- not wait for the Ruckleshaus Center to release their report. The agenda also fails to point out that currently Ag land is exempt from most environmental regulations, and that working farms prevent many floodplain processes from occurring. The same is not as true of working forestlands, as there is an adequate series of regulations governing timber harvest and road building. It is time that agriculture is held to the same standards as everyone else.

Q. 3, p.17, B.2 - - -

While we agree that cleaning up contaminated port sites is important, the call for shoreline restoration in these areas will siphon monies away from areas that are less impacted. In addition, we feel it is misguided to call for revitalizing waterfront communities as a priority of the AA- that is work for developers not those in the business of protection and restoration. The restoration cost per acre or feet of shoreline in these highly degraded areas is often staggering. After the projects are finished, they will still be an urban area. Wouldn't money be better spent on protecting and restoring non-urban shorelines and estuaries?

Q. 3, p.33, D.4 - - -

We are pleased to see that the Partnership is calling attention to the need to streamline permits and reform regulations and enforcement. This is an area that needs a tremendous amount of work; permits take far too much time and money away from on the ground restoration work, and existing laws are often weak and inconsistently enforced (if at all). We would also like to point out one area that wasn't mentioned in the AA: State Patrol regulations regarding the transport of large woody debris. The current regulations are much too restrictive, greatly inflating the cost of transport. We could achieve significant cost savings without a reduction in public safety if restoration practitioners could meet with State Patrol officials and come up with a compromise solution.

November 25, 2008

Whidbey Action Area Profile

We have several comments on the profile, some editorial others substantive. Starting in the “Ecosystem Benefits” column . . .

- Fourth bullet under “Unique Habitat . . .” - Boulder River and Henry M. Jackson Wildernesses should be added.
- The fourth bullet under “Food and Timber Harvest” should not list the Stillaguamish hatchery programs as providing harvest opportunities- these programs are meant to re-build the wild runs. The local hatcheries that provide harvest opportunities include (but are not limited to) the Samish and the Tulalip Bay facilities. WDFW should be consulted for a complete and accurate list.
- Under “Community and Economy” many area tribes are left off, including us! Stillaguamish, Sauk-Suiattle, Upper Skagit, Snoqualmie, and Samish Tribes should be added if Swinomish and Tulalip are.

Moving on to the “Local Threats . . .” column:

- Under “Artificial Propagation”, does “salmon production” refer to salmon farming? If so, it should be made more clear.
- Under “Harvest” , poaching should be added as a significant threat.

Finally under the “Priority . . .Strategies” column:

- First bullet under “Protect . . .” heading- protection should not be limited to a few areas (and certainly not limited to the marine environment)! All of the nearshore, lowland, and upland habitat in the action area need protection. We must not only protect what we have, but restore a substantial amount of what was lost.
- Third bullet under same heading should not limit flow rule upgrades to the Snohomish Basin- both the Skagit and Stillaguamish have significant need for flow rule changes.
- Third bullet under the “Restore . . .” heading- should read “Implement large-scale floodplain projects to remove bank armoring, re-connect side channels, and provide mainstem rivers with the ability to migrate and create diverse instream habitat.”

November 25, 2008

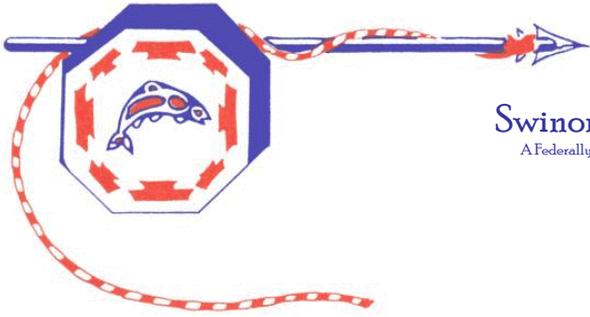
Although there are other areas of the AA that still are not quite right in our estimation, the above comments detail the major concerns we have with the draft Agenda. We hope you take the time to consider our comments seriously; we have decades of experience in the Whidbey Action Area, restoring habitat, working with landowners, and monitoring, managing, and enhancing treaty protected fisheries. The Stillaguamish Tribe has already given a lot to help recover fish and wildlife populations - they have not fished for Chinook salmon in twenty years! We would encourage the Partnership to hold other groups to the same level of sacrifice. We look forward to working with the Partnership on implementation of the Action Agenda, and hope our comments have proved helpful. Please don't hesitate in contacting us if you would like to continue the conversation.

Sincerely,

Pat Stevenson
Environmental Manager
pstevenson@stillaguamish.nsn.us

Jason Griffith
Fisheries Biologist
jgriffith@stillaguamish.nsn.us

Puget Sound Partnership
our sound, our community, our future



Swinomish Indian Tribal Community
A Federally Recognized Indian Tribe Organized Pursuant to 25 U.S.C. § 476
11404 Moorage Way
La Conner, WA 98257

November 19, 2008

Dear Puget Sound Partnership,

The Swinomish Indian Tribal Community would like to provide the following comments based upon our review, along with comments provided to us from the Skagit River System Cooperative, on the Draft 2020 Action Agenda for Puget Sound. We recognize and appreciate the significant effort and many meetings that led to this draft document. We recognize the importance of this work and look forward to its successful implementation and the important outcomes that should result. We wish we could have had a greater participatory role but due to lack of funding, our staff were not able to fully participate in this effort, leaving us with our only alternative to provide comments during a short review period. Because we did not have sufficient time for a thorough review, the Swinomish Tribe may have additional comments in the future. At this time we provide some initial general comments and then comment on specific sections in the Action Agenda.

While the Agenda recommends numerous initiatives to protect and restore Puget Sound, it lacks a cohesive framework that would allow the reader to understand the basis for a number of recommendations. For example, watershed characterization appears to be an important component of the Agenda, yet there is no meaningful discussion of the details of who will do the characterization, and what level of resolution will be developed. Yet a number of decisions appear to be predicated on completion of these characterizations.

While the Agenda references the Puget Sound Chinook Recovery Plan, it makes a number of recommendations that are inconsistent with a chapter of that plan, i.e., the Skagit Chinook Recovery Plan ("Skagit Plan"). The Skagit Plan is the roadmap that the Swinomish and Sauk-Suiattle Indian Tribes will pursue, in collaboration with others, in our efforts to recover these stocks. What is particularly troubling about the Agenda is the role that the Partnership has relegated to the Tribes. While it is reasonable for the State of Washington to make the Partnership its responsible entity for Chinook recovery and associated implementation plans, the Swinomish and Sauk-Suiattle Tribes wrote the Skagit Plan as equal partners with the State in Recovery Plan implementation. As was discussed when Recovery Plans were being developed, their implementation was intended to be a bottom up approach, yet the Partnership suggests that they will be implemented at a regional scale. We believe the proposed Agenda strays significantly from our government to government, co-manager roles with regard to fisheries, as well as a process based on a locally driven effort.

This action agenda appears to relegate Tribes to mere stakeholders, or ignores the role of tribes entirely. Funding tribes to participate in the refinement and implementation of the Action Agenda, including salmon recovery plans is a good idea (Question 3, page 31; Question 3, page 33). However, out of over 80 different actions listed throughout the Action Agenda (and summarized in a table starting on Question 4, page 2), the tribes are never listed as leads or co-leads for any action item. Tribes are only listed as “partners” in the following 10 areas:

1. Research to assist in focusing growth away from ecologically sensitive areas
2. Participate in a task force to develop a recommended mechanism to the Partnership on options to rapidly acquire properties with high ecological value and imminent risk of conversion.
3. Work with the Marine Managed Areas Work Group
4. Help other partners resolve conflicts between aquaculture and upland uses
5. Help other partners develop a coordinated clean up and restoration plan for the Port Angeles Harbor and waterfront.
6. Permanently fund a rescue tug at Neah Bay.
7. Implement actions to address low dissolved oxygen (Hood Canal and other areas within Puget Sound)
8. Make the southern resident killer whale plan actionable with assignments and implementation timelines and implement the plan.
9. Implement the 2008 Revision to the Pacific Salmon Treaty.
10. Implement the priority recommendations of the Hatchery Scientific Review Group to update state hatcheries to protect wild salmonid stocks.

Yet tribes play a key co-manager role for salmon management and recovery, which is part of the PSP Action Agenda. Tribes have roles and expertise in not only harvest, hatchery, and restoration, but also regulatory protection of ecosystem processes and habitat. Not including tribes as leads and partners throughout the Action Agenda is a flaw.

We find these glaring omissions particularly problematic. They reinforce our belief that the Partnership may ignore the expressed needs and opinions of Tribes in order to meet other political objectives.

We also believe that for the Agenda to obtain credibility and to generate the support necessary to maximize implementation, it is critical that there be scientific references to support the assertions made regarding threats to Puget Sound. For example, assertions are made regarding threats from artificial propagation and harvest. Some information to indicate to the readers why the authors feel this statement to be true would be helpful. Later in this document we will provide specific examples of where we find this to be particularly problematic.

In addition to the general comments above, we respond briefly to some of the specific recommendations in the plan.

Question 1, Page 3 states that the number of acres in farms is a measure of the health of Puget Sound. Given the well documented impacts of farming activities on water quality and riparian areas, this ill-defined target and benchmark is not a meaningful measure of how well we are protecting Puget Sound. This “benchmark” would be a more appropriate metric if it were to be linked to the number of acres of farmland where water quality is not compromised as a result of farming activity. This theme is repeated in priority A where a priority is to protect working resource lands. How does this protect or restore Puget Sound if the working resource lands are contributing to pollution entering the Sound, destroying riparian areas, or otherwise adversely effecting fisheries resources? The Agenda should strive to protect working resource lands only if land use activities are not contributing to the problem. Similar statements are made in section A.2 and A.4 as well, and the same concerns apply.

Question 2, Page 2. We support a net increase of at least 10,000 acres of shellfish growing areas, but this should not be limited to only commercial uses. Tribal members have an interest in shellfish harvest beyond commercial uses. We do find the goal of 10,000 somewhat arbitrary. It would be helpful if the basis for this acreage be provided in the document.

In addition, it is of significant importance that attention be paid to the toxic conditions found in some growing areas such that conditions be improved to the point that consumption of fish and shellfish at rates common found in Tribal communities will not jeopardize human health. Human health is listed as an indicator of success however there is no provision for truly examining the connections between human health and the environment. An additional element to address this issue should be included in the plan.

Question 2/ Page 3 Freshwater Resources. We would suggest that the Skagit and Samish River Basins be added to the State’s list of “water critical “ basins as these two rivers have both been documented to be over-allocated which results in adverse impacts to fisheries resources.

Question 2/ Page 4 Habitat Alteration and Land Conversion: As mentioned above, it is well documented that many farming activities result in denuded riparian areas and a failure to meet water quality standards, with resulting impacts to fisheries resources. Yet this section completely ignores these impacts and focuses on a very selected set of sources of pollutants. We believe that it is important to recognize the impacts of farming activities and to develop meaningful action agenda items that will eliminate or reduce these impacts. The Skagit Chinook Recovery Plan identifies a number of actions that should be taken on farmlands to meet these needs. Further, merely deferring to the Ruckelshaus 5248 process, as described later in the document, is not a meaningful response to this issue. It is unknown what will result from that effort, which was established not to restore Puget Sound, but to strike a legislative balance between the needs of fish and wildlife and a viable farming industry.

Question 3/ Page 1 An agenda item that should be included in the Agenda is preventing and reducing pollution associated with air effluent deposition. Air quality appears to be neglected in the document

Question 3/ Page 6 A.1.2 promotes a regional habitat protection decision-making framework to guide land use protection. However, a regional habitat protection decision-making framework is inconsistent with the basis upon which watershed specific Chinook Recovery Plans were developed. We are not sure what is actually being proposed here. Without some details regarding who will be making the decisions and the scope of their decision-making authority, it is difficult for the Tribe to understand how its Treaty resources may be affected. This approach, linked to an undefined watershed characterization process intended to set local protection and restoration priorities, creates a great deal of uncertainty as to how Swinomish Tribal priorities will be considered and met as part of Action Agenda implementation.

Question 3 Page 16 Priority B Restore Ecosystem Processes, Structures, and Functions
Improving strategies and actions over time:

The following action agenda statement fails to consider the existence of variable real world examples of large scale estuarine restoration projects that have already been implemented and are currently being monitored.

“The Action Agenda emphasizes the implementation of salmon recovery projects and identifies the restoration of Puget Sound estuaries as important to the ecosystem. By designing one or more of the large estuary restoration projects as experimental designs that can be measured, scientists and resource managers would be better poised to answer whether actions work as planned; the role of nearshore biology, physical processes, and functions in the broader ecosystem context; and what findings can inform similar projects around Puget Sound.”

This action item should take a more aggressive stance and work to ensure support for robust monitoring strategies, and subsequent implementation thereof, at all large scale estuarine restoration projects.

The statement:

“The ability model future ecosystem impacts will also improve restoration strategies by identifying how restoration projects affect future conditions and how climate change affects restoration opportunities.”

also fails to connect on the appropriate priorities. Modeling ecosystem impacts might be an appropriate line of investigation if we are attempting to consider the predicted impacts of (continued) human actions on ecosystems. However, this is a different line of investigation than attempting to predict the outcomes of specific restoration actions on ecosystems. We suggest you change the wording to “Improve restoration strategies by

modeling predicted impacts of human actions, including climate change, on ecosystems over time.”

Question 3, page 16 Item B.1

We are not aware of any flood hazard management plans that include a well vetted process for evaluating restoration opportunities. It is possible for these planning processes to have important synergies with restoration actions, however they typically do not place a premium on restoration elements or criteria.

Question 3, page 18 Item B.3

Include Lead entities under coordinated incentive and technical assistance programs.

. This section should also identify as a critical action item agenda the replacement and ongoing maintenance of culverts and tidegates throughout Puget Sound that block the upstream and downstream passage of anadromous fish and that impede the movement of wood, water and sediment

Question 3/Page 34 D4.2. The Swinomish Tribe is generally supportive of a watershed based approach to mitigation. We agree that frequently mitigation as called for during project permitting is either inadequately developed or insufficiently implemented. We also believe that the concept of mitigation banking is a good one, if properly implemented. However, we cannot support a regional approach for mitigation banking. There is no evidence to suggest that a regional approach will be effective at administering mitigation programs, or that a regional entity will have the ability to make informed decisions about how mitigation should take place at a local level. We also would point out that the decisions resulting in the use of an In-Lieu funding approach stems from implementation of Federal, rather than State, law. In this regard, we are opposed to making a State agency, or a non-profit organization, the entity responsible for implementing this mitigation program. We believe that this is most appropriately carried out at a local level without the encumbrances of regional politics. We believe that the In-Lieu funding elements of the action agenda should be removed throughout section D. and E.

It is also very unclear to us what is intended by “market-based techniques and other innovative compensatory mitigation tools” as described in section D4.2.3. We have not seen any analysis of current market-based tools to demonstrate that the Partnership should support these efforts, and the lack of detail as to what in fact would be supported precludes our support of this Agenda item.

Question 3/Page 33 D4 and Question 3/ Page 35 D.5. This section does a good job at identifying actions to be taken to increase compliance. However, an additional Agenda item should be a thorough and impartial analysis of the effectiveness of existing regulatory programs. Are current regulations, as written, adequate to protect Puget Sound? Are the laws and rules as written being implemented through appropriate

permitting conditions and are current conditions being implemented? By way of example, the Skagit Instream Flow Rule that was adopted in 2001 resulted in establishing instream flows standards that frequently are not met during summer months. Yet in 2006 the Department of Ecology revised these rules to allow for additional withdrawals from the Skagit River Basin. It is unclear to us how Puget Sound will be protected if rules passed as recently as two years ago are amended to increase impacts to fisheries resources in Puget Sound. Further, if the very agency responsible for protecting water quality and instream resources has determined that it is of over-riding public interest to reduce instream flows, what does that say about the likelihood of protecting Puget Sound resources in the future? It is for this reason that an in-depth analysis of current regulations is warranted.

Question 3, Page 33 Item D.2 and D.3 include the word “adequately” at the beginning of the sentence. The sentence should read “Adequately fund.....

Question 3, Page 35 Item D.4.3
serious flaw in the Action Agenda. Funding should be adequate to ensure meaningful participation for all Puget Sound Tribes.

Table Include Section 106 in list for restoration project streamlining.

Page 75-Action Area Priorities-Whidbey basin

Under Priority action area strategies;

- A. 5-Delete the word “protect”. Change to read “ support for working farms, forests and aquatic lands that meet action agenda objectives”

The table should also include language protecting functioning mainstems and floodplains from hydromodification. Hydromodification of mainstem rivers within the Action area still occurs, impacting both mainstem function and their associated floodplains. The action area strategy lists restoration of these areas as a priority. It should list protection as a priority as well

Implementation Table

D.3.3 “Fund Tribes to participate in the refinement and implementation of the action agenda, including salmon recovery plans” This is listed as an existing program that should be continued. If this program does exist funding has not found its way to individual tribes. This demonstrates a section “A: Protect Intact Ecosystem Processes, Structures and Functions” A.1 states:

“Protect unique functions of the Action Area: Smith Island kelp, Padilla and Fidalgo Bay eelgrass beds, and unique spawning areas and bird habitat.” Skagit Bay eelgrass should be included as well? It is equal or larger in extent than the two habitat areas represented USGS has shown loss of eelgrass in this area due to sedimentation caused in part by landuse (increased sediment supply and transport due to diking.

We request that the language found in the implementation table that states

o Continue to work cooperatively with farming community to develop a coordinated restoration strategy that balances the needs of agriculture and fish; support engagement of salmon recovery watershed groups with the Snohomish and Skagit County Agricultural Advisory Boards and other farming groups; support collaborative efforts to negotiate the Skagit Delta Tidegates and Fish Initiative

be changed to eliminate language associated with the Skagit Delta Tidegate and Fish Initiative. It is our view that the initiative as written is not consistent with the Endangered Species Act, spends public money for private gain, and will not be adequately protective of fish. We do not think it is appropriate for the partnership to be supportive of an initiative that will be harmful to fish and have adverse impacts on Tribal interests, and one in which the Tribe has previously informed the Partnership of its opposition . We are hopeful that ultimately a resolution to the issue of mitigation for tidegate repair and maintenance can be developed, but we believe it is counterproductive for the Partnership to take a position at this time.

The Swinomish Tribe regrets that we cannot be more complete in our comments and that we have focused on some of the problematic areas of the plan, rather than comment on all parts of the plan. This is in part due to the short comment and in part due to the lack of detail provided in the Agenda. We intend to engage and review Partnership activities as time and resources allow, and hope not only that you find these comments helpful, but also that you will thoughtfully consider and accommodate our concerns through plan revisions as suggested.

Sincerely,

Brian Cladoosby
Chairman

Puget Sound Partnership
our sound, our community, our chance

The Tulalip Tribes
Department of Natural Resources
7515 Totem Beach Road
Tulalip, WA 98271
(360) 716-4480

William Ruckelshaus, Chair
Leadership Council of the Puget Sound Partnership
P.O. Box 40900
Olympia, WA 98504-0900

Nov. 18, 2008

Dear Bill,

The Tulalip Tribes wish to thank you for the opportunity to provide input on the development of the Puget Sound Partnership's (PSP) draft Action Agenda. As a treaty tribe in western Washington, our predominant concern is that there are effective measures and adequate funding to implement the salmon recovery components of the Action Agenda.

We would like to suggest that the Leadership Council needs to be stronger in articulating goals and near-term actions if we are to recover Puget Sound by 2020, and we would like to see a federal review of the Action Agenda for adequacy.

We have identified a few specific issues below where we think bolder goals and actions are necessary.

1. Reduce pollutant loading (metals and other pollutants) from sewage treatment plants.
The agenda reflects the compelling nature of this problem, but does not provide for sufficiently urgent near-term actions (C.3 – near-term action 2, P.24) *“Ensure that AKART (All known and Reasonable technology) or better standards are met in nutrient sensitive areas such as Hood Canal, South Sound, and the Whidbey Basin.”* Tulalip believes that the technology currently exists to treat the effluent and remove the nutrients to a level that allows reuse and recycling of 100% of the water. Therefore we suggest this substitute language: ***“Ensure that AKART (All known and Reasonable technology) or better standards are applied immediately, to lead to zero discharge, for all new construction utilizing State of Federal funding, and for all remaining treatment plants in Puget Sound by 2020.”***

2. Take stronger actions to reduce toxic loading into Puget Sound from stormwater through strengthening permit requirements. The Department of Ecology issued a new report on toxic loadings entering Puget Sound and the portion coming through stormwater is astounding (C.2 – near-term action 2, P.23). It is essential that the agenda promotes more vigorously “...e financial and technical assistance to cities and counties to implement NPDES Phase I and II permits.” These new NPDES permit standards represent a significant improvement over historical requirements, but they are the result of negotiations that occurred before the mandate to clean up Puget Sound by 2020 were adopted and therefore very unlikely designed to achieve those objectives. We recommended strengthening this to state **“Before providing financial and technical assistance to cities and counties to implement NPDES Phase I and II permits, assign the PSP Science Panel to conduct an independent review to ensure that the provisions of the Phase I and II permits are compatible with the goal of Recovering Puget Sound by 2020.”**
3. Promote Low Impact Development (LID) techniques to improve stormwater quantity and quality. The Tulalip Tribes are currently studying and applying low impact development techniques that will work to improve stormwater quality into reservation waters, including the Tulalip Bay. We believe that low impact development methods should be a major focus of the action agenda, and used for new development, and retrofitting of older systems when opportunities arise, in order to reduce the quantities of toxics before they enter the stormwater systems and to reduce stormwater quantity into Puget Sound.
4. Strengthen requirements and enforcement of Hydraulic Project Approval (HPA). In recognition that any construction that affects the bed or flow of the waters of the state has the potential to cause habitat damage to the fish, shellfish, and their habitat, proposed construction must be carried out under the terms of a permit (called the Hydraulic Project Approval-HPA) issued by the Washington State Department of Fish and Wildlife. The Tulalip Tribes believe that the Action Agenda should promote the strengthening of the requirements under the HPA, and more consistent enforcement of the HPAs issued.
5. Strengthen actions to eliminate Persistent Bio-accumulative Toxins (PBT's) – There are only two sentences in the Action Agenda relating to PBTs (C.1.1.4 – P.20 and C.1 near-term action 2): “Accelerate reduction of the loading of Persistent Bioaccumulative Toxic chemicals to Puget sound.” “Implement DOE’s PBT program to reduce and eventually eliminate the use of all chemicals on the PBT list.” Tulalip does not believe that these statements go far enough. The near term action statement should at least state that **“our goal is to eliminate the use of all chemicals on the PBT list by 2020”**.
6. Add climate assessments to SEPA review on forested, agricultural, rural and urban lands. The Tulalip Tribes supports the Governor’s Climate Advisory Team’s efforts to integrate climate assessment into the state SEPA review process, and wish to see this goal included in the Puget Sound Action Agenda.

While we believe there needs to be stronger goals and actions in many areas, the Tulalip Tribes are glad to see the San Juan Marine Stewardship Area Plan guide the agenda for the San Juan Action area, and we strongly support those provisions.

The Tulalip Tribes remain committed to the protection and restoration of Puget Sound. We believe that the science and policy guidance provided through the Partnership's Action Agenda offer our best hope to restore the health of Puget Sound, and in this light we offer the above recommendations. Thank you again for this opportunity to share our concerns and ideas.

Sincerely,

Terry Williams
Commissioner, Fish and Natural Resources
The Tulalip Tribes of Washington
(360) 716- 4633

Puget Sound Partnership
our sound, our community, our chance