

S1: Status of Threats to Human Health in Puget Sound

- Key findings from previous efforts
- Current status of Puget Sound compared to “healthy” condition

Past Findings: Documented Threats

- Pathogens
 - Bacteria monitored as indicator for a variety of pathogens (e.g. vibrio)
- Biotoxins
 - Paralytic Shellfish Poison (PSP or "red tide"),
Amnesic Shellfish Poison (ASP, or domoic acid)
- Toxics
 - Mercury, PCBs, PBDEs and others

Past Findings: Sources of Threats

- Point- and non-point discharges
 - Direct and indirect from air, soil and water
- Direct spills to aquatic systems
- Historical land uses
- Naturally occurring biotoxins

Past Findings: Nature of the Threats

- Consumption of fish and shellfish
 - Persistent, bioaccumulative toxics
 - Exposure to pathogens (both natural and human-related) and biotoxins is most likely to occur through the consumption of shellfish

Past Findings: Nature of the Threats *Cont'd*

- Direct contact with sediment and water, including contact on beaches
 - Hazardous waste sites
 - Industrial outfalls\stormwater outfalls (for both toxics and pathogens)
 - Combined sewer outfalls
 - Spills
 - Freshwater drainages

Past Findings: Nature of the Threats *Cont'd*

- Decline of food source availability
 - Important of fish/shellfish in diet
 - High-end consumers, (e.g. tribal and some immigrant populations) are at increased risk

Past Findings: Certainty and Status of Threat

- ***Human related pathogens***
 - Consumption of shellfish
 - Positive trend for shellfish growing areas
 - More acreage upgraded than downgraded
 - More areas added to DOH's monitoring program
 - Evidence restoration is creating a positive trend in beach classification
 - **Direct contact at swimming beaches**
 - State and local partners monitor swimming beaches

Past Findings: **Certainty and Status of
Threat** *Cont'd*

- ***Natural pathogens***
 - Effects of *Vibrio parahaemolyticus* are well known
 - Less is known about the causes for its occurrence and spread across Puget Sound
 - **Other pathogens??**

Past Findings: **Certainty and Status of
Threat** *Cont'd*

- ***Biotoxins***

- Consumption of shellfish

- DOH conducts comprehensive monitoring for biotoxins
 - paralytic shellfish poison and domoic acid
 - growing areas closed when shellfish show harmful levels

Past Findings: **Certainty and Status of
Threat** *Cont'd*

- ***Toxics***

- Consumption of fish

- Persistent bioaccumulative toxics (PBTs) permeate the Puget Sound food web
 - Puget Sound fish are an important part of a healthy diet
 - PBTs (e.g. PCBs, mercury, PBDEs) in Puget Sound fish are high enough to warrant consumption limits from DOH

- Consumption of shellfish

- Smaller risk
 - Site-specific
 - More sampling for metals across Puget Sound is needed

Past Findings: **Certainty and Status of
Threat** *Cont'd*

- **Toxics** *Cont'd*
 - Direct contact with sediments
 - Low risk compared to PBTs in fish
 - Site-specific
 - Exposure to metals in sediment some hazardous wastes

Past Findings: **Certainty and Status of Threat**

- ***Oil spills:***
 - Infrequent but have potential to remove resource (e.g. Dalco Passage oil spill in October, 2004)

Past Findings: Gaps in Understanding

- Fish consumption rates
- “Emerging” contaminants, pathogens, and biotoxins
- Broad risk assessment for toxics in shellfish
- Toxics and pathogens in crab

Past Findings: Gaps in Understanding *Cont'd*

- Toxics in additional species
- Cumulative impacts of exposure to multiple contaminants
- Toxics in the water column
- Freshwater toxics entering Puget Sound.
- Effects of climate change on pathogens and biotoxins.

Do we Have a healthy condition?

- *Waters and beaches are safe for swimming*
 - Pathogens
 - In some areas water quality at swimming beaches is good; in other areas, water quality poses a potential human health threat
 - Toxics
 - Some hazardous waste sites represent specific risks for small segments of the population through direct contact.
 - Tacoma smelter

Do we Have a healthy condition? *Cont'd*

- *Fish/shellfish are safe and plentiful*
 - Some areas of Puget Sound have fish consumption limits based on toxic contamination
 - Including Chinook salmon
 - Positive trend in commercial shellfish harvest classifications
 - Best conditions and classifications are in rural areas, where there are few sewage treatment and stormwater outfalls

Do we Have a healthy condition? *Cont'd*

- *Tribal cultures are sustained through subsistence, ceremonial, and tribal harvest; treaty rights are supported/restored*
 - Contamination has made some fish, shellfish and other marine biota unavailable for consumption across Puget Sound
 - Sites of intense cultural harvest, including usual and accustomed tribal fishing grounds, have been affected or abandoned