

**Puget Sound Partnership  
Leadership Council  
Discussion of a Healthy Puget Sound  
January 28, 2008**

**Discussion Purpose**

- Confirm the use of the legislative definitions to outline “What is a healthy Puget Sound”. This handout draws from the work of the 2006 Partnership and the Partnership statute. This is the same handout from the January Leadership Council meeting.

**What is a healthy Puget Sound?**

*“What is a healthy Puget Sound ecosystem? In developing goals for the Puget Sound, the Partnership recognized that human well-being and natural systems are intimately connected. A healthy ecosystem means that fish and shellfish are plentiful and safe to eat, air is healthy to breathe, and water and beaches are clean for swimming and fishing. Well-being means that people are able to use and enjoy the lands and waters of the Puget Sound region, tribal cultures are sustained, natural resource-dependent industries such as agriculture, tourism, and fisheries thrive, and the region is economically prosperous. In a healthy ecosystem, the rich diversity of species flourish and are supported by plentiful, productive habitat, as well as clean and abundant water.”*

---- Recommendations of the 2006 Puget Sound Partnership

When Captain George Vancouver sailed into the soft gray fog of Puget Sound in 1792, he discovered a thriving and prosperous environment. Tribal communities were nestled along the bays and rivers, with cultures and economies that had been shaped around abundant cedar, salmon and other native plants and animals. To Vancouver and his lieutenant, Peter Puget, the lush landscape was a disappointing dead end in their quest for a Northwest Passage, but by the 1850s, word of “Puget’s Sound” had been spread by ships’ crews across the new American nation. The unbelievable stands of timber, salmon by the hundreds of thousands, and deep, sheltered anchorages with unobstructed ocean access represented unlimited opportunities for food, lumber and commerce. Pioneers began to arrive, keen on re-shaping Puget Sound in the image of distant cities, landscapes, and cultures. “Ecosystem health” wasn’t even a concept as settlers cleared and drained land for farms, built houses and timber mills, and initiated large scale projects for dams, dikes, and power supplies.

Puget Sound looks much different today, but many of our modern goals (Box) would have been embraced by early pioneers and tribal leaders. We still strive for a “healthy human population” and “quality of human life” with clean water, edible shellfish, and harvestable fisheries and timber resources. What has changed is the knowledge that the resources are no longer limitless, humans are part of a larger ecological system that provides these benefits, and our actions can be harmful and irreversible. While Puget Sound will never be exactly as it was in 1792, we have learned that a thriving and productive ecosystem can only be sustained if we are mindful of the

consequences of our actions and the many known and unknown connections within the natural world.

**In 2007, the Washington State Legislature adopted Engrossed Substitute Senate Bill 5372 which called for an Action Agenda for Puget Sound that shall strive to achieve the following goals by 2020:**

- (a) A healthy human population supported by a healthy Puget Sound that is not threatened by changes in the ecosystem;*
- (b) A quality of human life that is sustained by a functioning Puget Sound ecosystem;*
- (c) Healthy and sustaining populations of native species in Puget Sound, including a robust food web;*
- (d) A healthy Puget Sound where freshwater, estuary, nearshore, marine, and upland habitats are protected, restored, and sustained;*
- (e) An ecosystem that is supported by ground water levels as well as river and stream flow levels sufficient to sustain people, fish, and wildlife, and the natural functions of the environment;*
- (f) Fresh and marine waters and sediments of a sufficient quality so that the waters in the region are safe for drinking, swimming, shellfish harvest and consumption, and other human uses and enjoyment, and are not harmful to the native marine mammals, fish, birds, and shellfish of the region.*

--- ESSB 5372, Section 12

The goals of the Washington State Legislature clearly recognize the importance of a healthy ecosystem, but these aspirations must be set out in more precise scientific terms in order to judge whether Puget Sound is healthy and measure progress over time. Scientists are currently refining **environmental indicators** to translate terms such as “healthy,” “safe,” and “sustained” into agreed-upon and measurable criteria for assessing the state of Puget Sound. Many indicators have already been identified and are measured such as water quality, population levels of valued species, and the number of acres of important habitat types. (See reports such as the Puget Sound Update and State of the Sound by the Puget Sound Action Team, 2006). For some species such as Chinook salmon (Box), numeric and geographic targets have been established with interim benchmarks to measure progress. Other species, particularly the plants and animals at lower levels of the food web, do not have quantified targets but must be viable in order to sustain food web linkages. In addition to the measurement of individual species of Puget Sound, indicators must be developed for the larger ecosystem processes (such as water circulation, sediment transport, and nutrient cycling) that form and sustain habitat. Indicators for human health and well-being include negative symptoms such as outbreaks of disease from contaminated shellfish, or may be based on positive behavior such as water conservation and

recycling. Indicators must collectively contribute to a **whole ecosystem approach** that will look at the health of the entire Puget Sound ecosystem rather than a single species or geographic location.

***Action Agenda Goal:** Healthy and sustaining populations of native Puget Sound species.*  
***Environmental Indicator:** Puget Sound Chinook populations and habitats*

To ensure biodiversity and a robust food web, the Puget Sound ecosystem must support aquatic, terrestrial and marine species at **viable** levels into the future, and maintain overall biodiversity naturally. Viability is defined in terms of the species' numbers (abundance), how well they are reproducing themselves (productivity), whether they show a range of the physical and genetic traits they historically exhibited (diversity), and whether they are geographically distributed throughout their historical regions in Puget Sound (spatial structure). Puget Sound Chinook salmon are generally below 10 % of their historical estimates, and have been listed as a threatened species. The complex factors leading to their decline are described in the Puget Sound Salmon Recovery Plan (Shared Strategy, 2005). Puget Sound Chinook salmon are one of only a handful of species where explicit numerical conservation targets (measurable outcomes) have been established. Each watershed area in Puget Sound has developed a plan for habitat restoration in the salmon's rivers-of-origin. Although measurable progress toward Chinook recovery can be achieved by 2020, restoration of the primary limiting factors such as habitat degradation will take time. Less well understood are the complex relationships between Chinook salmon, their prey, and their predators, particularly in estuary and ocean environments. Chinook are a preferred food source for Southern resident killer whales -- an endangered species, and depend on herring (also in decline) for their sustenance.

Chinook salmon are a highly revered species for their economic, nutritional and cultural values, but are only one of the thousands of native species in Puget Sound. Scientists will not be able to, or need to, track the viability of every species to evaluate the ecosystem. However, they will need to select representative species at various levels of the food web in marine, river and upland habitats throughout Puget Sound as indicators of ecosystem health.

The Science Working Group for the 2006 Puget Sound Partnership described three key attributes of a healthy ecosystem:

*“A healthy ecosystem has three key properties: (1) it is **resilient** to changes in natural- and human-caused changes in environmental conditions; (2) has built-in **redundancy** in its parts so that not all members of a species or habitat type are limited to a single location .... [and thus at risk of catastrophic loss]; and (3) has a **representative** sample of the diversity of species and habitat types that characterized its historical state. A healthy ecosystem does not necessarily need to exist as it once did, but maintaining representatives of key components increases the chances that it will persist into the future.”* (Puget Sound Partnership, 2006)

It is a testament to the incredible resiliency of the Puget Sound ecosystem that so many species and habitats remain after 150 years of vast environmental modification by human residents. However, the reduced population numbers of key species, fragmentation of upland habitat, “dead zones” from oxygen depletion in the water, and toxic contamination in upper-level species indicate that the ecosystem has reached its limit to absorb further degradation. Furthermore, climate change and population growth threaten to exacerbate the strain on water, species, habitats, and human health and well-being in the future.