An overview of a risk analysis framework

Purpose of this talk:

- Risk analysis is under development
- Illustrate nature of information to be provided--examples
- Schedule and next steps

A framework for risk analyses for the Puget Sound ecosystem

(1) Estimating the current status of each of the ecosystem components, and

(2) Conducting a vulnerability assessment to ascertain the degree of threats facing each component and the resiliency of the components

Purpose: to provide spatial information to help in assessing current status and informing priority strategies for PSP Action Agenda

Risk analysis technical steering committee

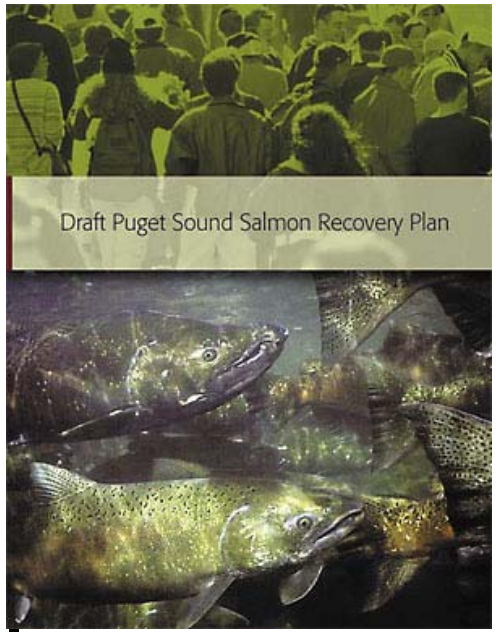
- Helen Berry, Tom Mumford (WA DNR)
- Wayne Palsson, Jim West, Craig Busack, Pete Hahn (WDFW)
- Philip Bloch (WA DOT)
- Molly Ingraham, Jacques White (TNC)
- Mary Mahaffy (USFWS)
- Joe Joy (WA DOE)
- Mike Letourneau (EPA)

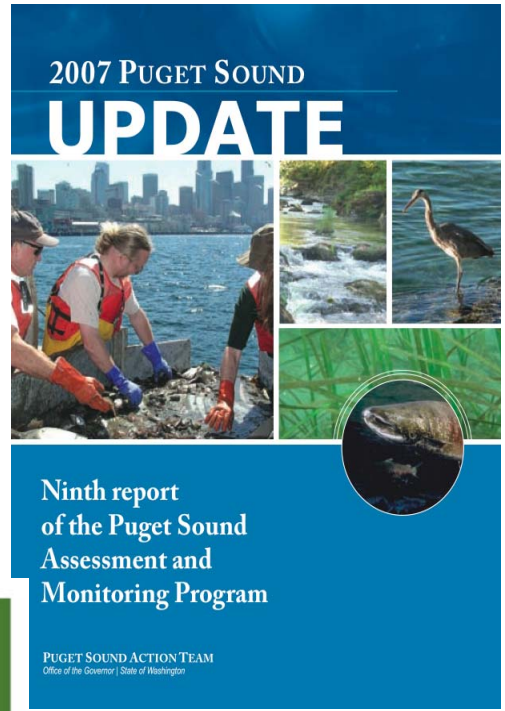
6 ecosystem goals by 2020

- Healthy people supported by healthy Puget Sound
- Quality of human life sustained by a healthy Puget Sound
- Puget Sound species and the web of life thrive
- Puget Sound habitat is protected and restored
- Puget Sound rivers and streams flowing at levels that support people, fish and wildlife and the environment
- Puget Sound marine and freshwater are clean

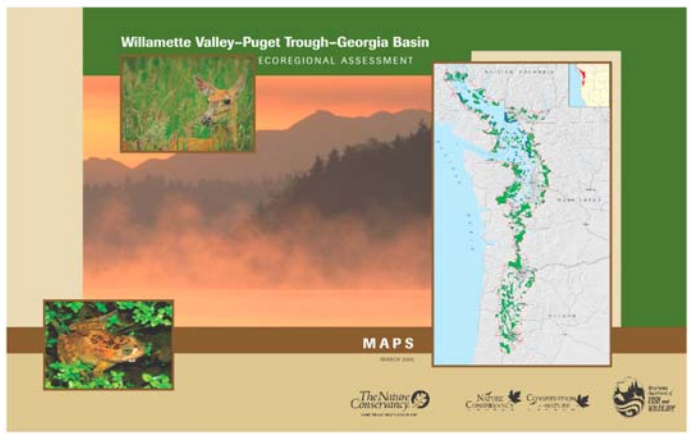
Sources for qualitative risk analysis

- Existing assessments





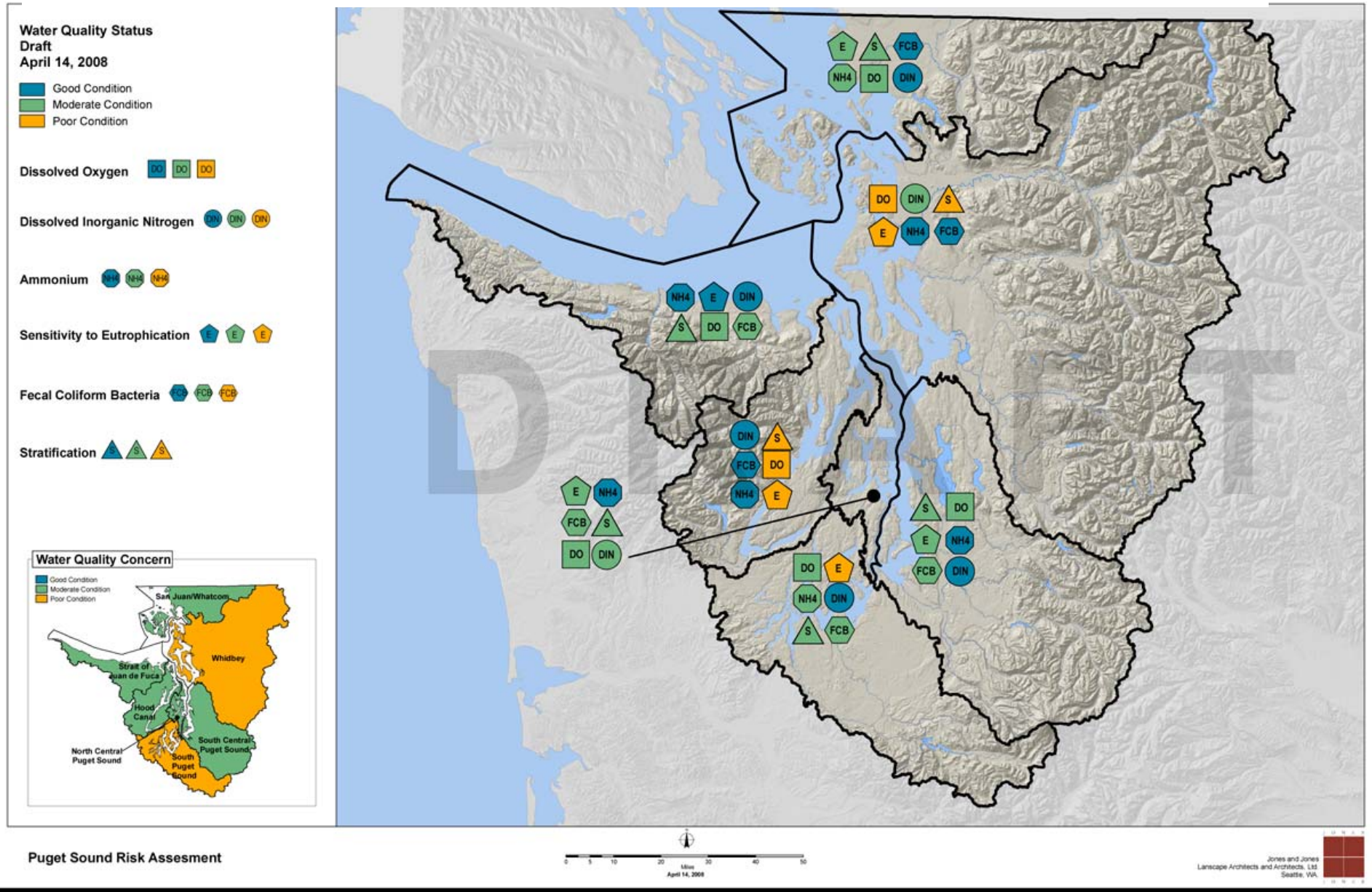
- Simple spatial analyses



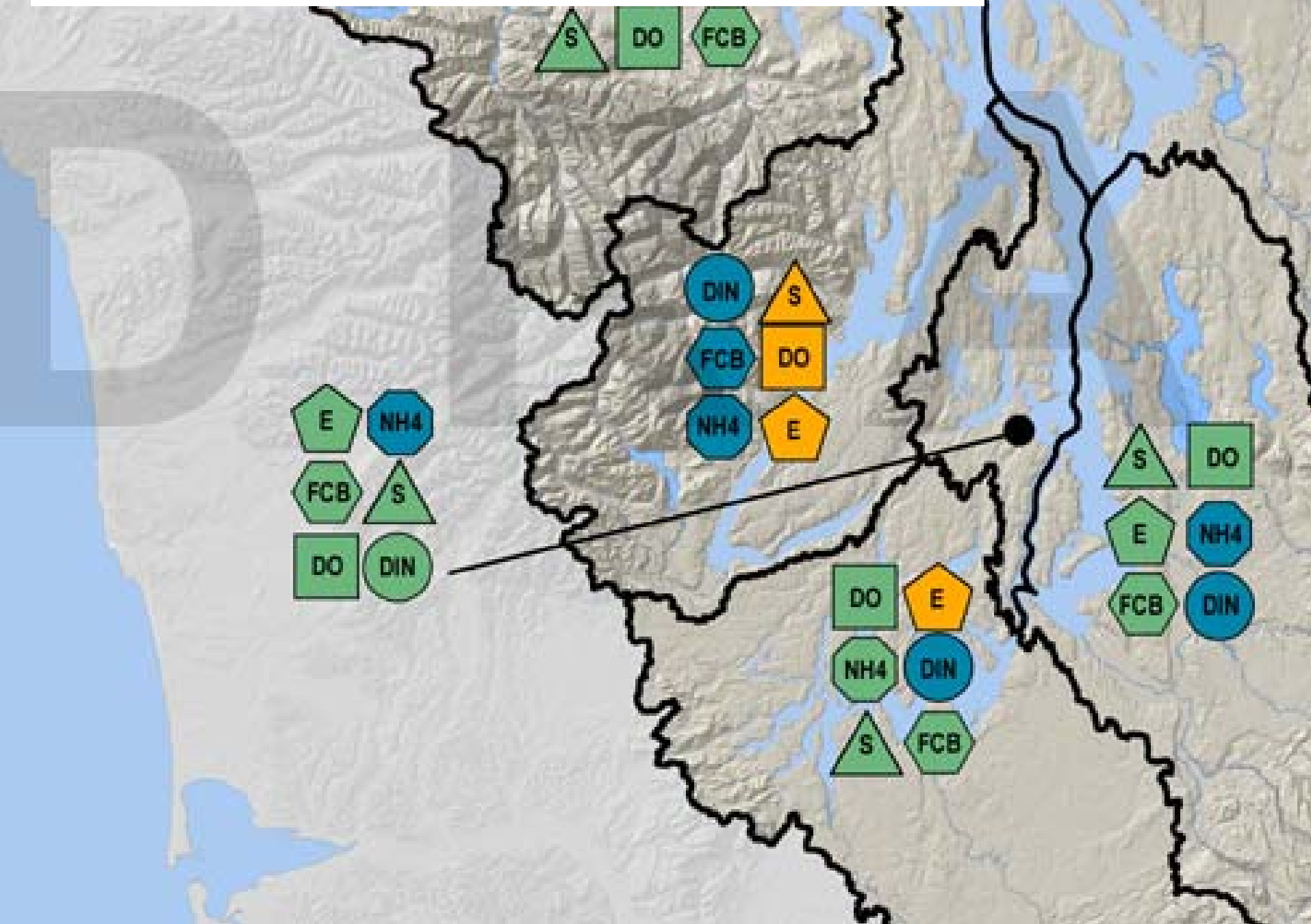
Summarizing status: Examples

Ecosystem component	**Status Attributes**
Species/food web	Shorebird & seabird colonies, salmon, herring, marine fish, intertidal species richness, bald eagle, cutthroat trout, Golden paintbrush
Habitat	Eelgrass, sub-alpine grasslands, shrublands and woodlands, herbaceous wetland, oak prairie and grasslands, wet- and dry-Douglas Fir, montane mixed, riparian systems
Water quality	Water quality index and 6 sub-components
Water quantity	Peak and low stream flows
Human health	Shellfish bed pollution
Human well being	Landscape value, commercial catch of marine species, recreational use patterns (SCUBA and sites)

Marine Water Quality Status: Example summary graphic



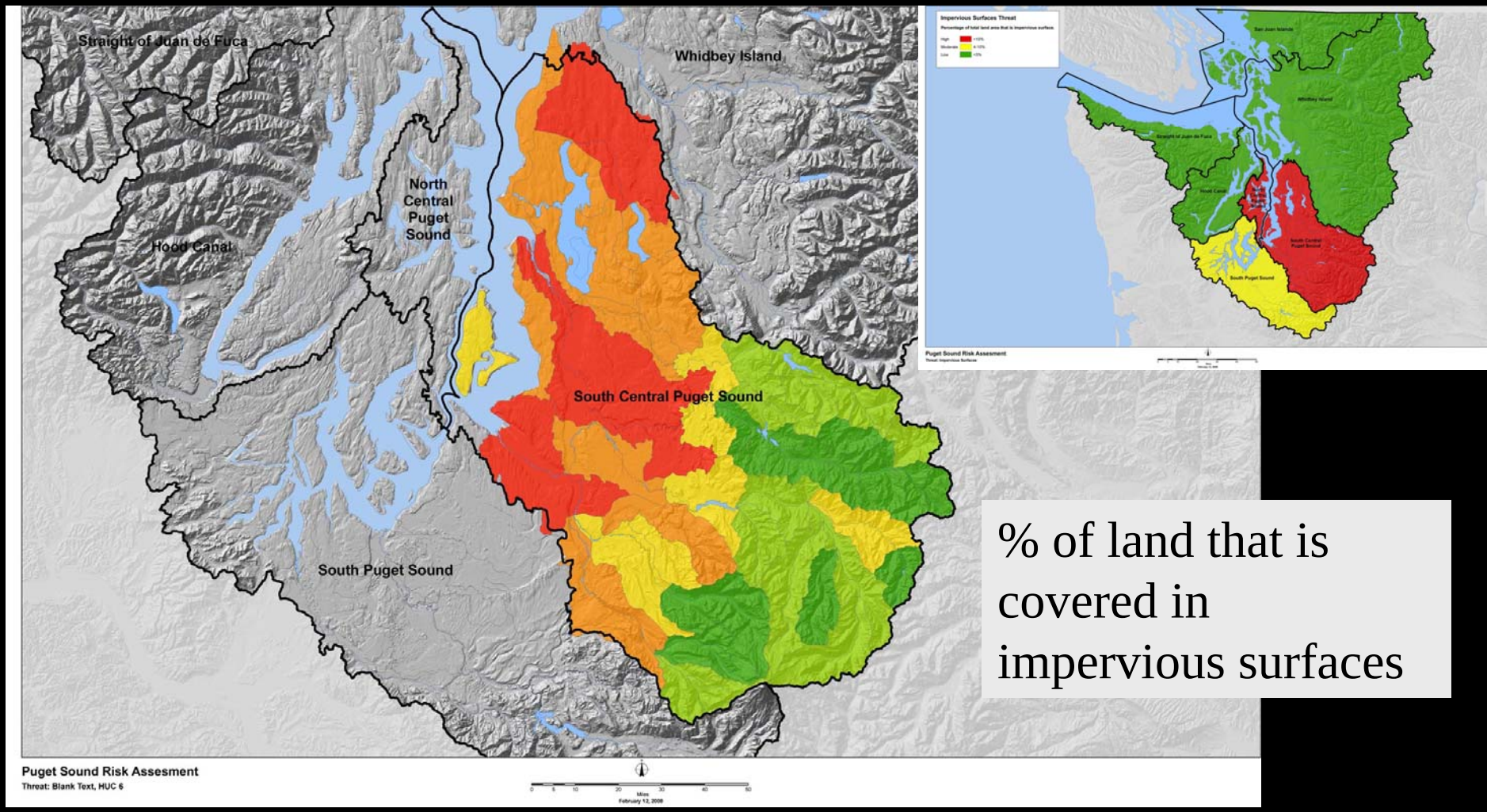
Water Quality Status: Example summary graphic



Summarizing threats/drivers: examples

Threat type	Threat Attributes
Habitat alterations	Shoreline modification, forest cover, overwater structures, impervious surfaces, shoreline ownership
Surface/groundwater impacts	Surface and groundwater withdrawals
Pollution	Hazardous waste generators, oil spill likelihood, toxics in biota
Artificial propagation	Salmon hatchery releases
Harvest	Marine harvest (crab, groundfish, salmon, shellfish)
Species invasion	NA for today
Natural drivers	Sea level rise

Example: scales of reporting drivers and pressures

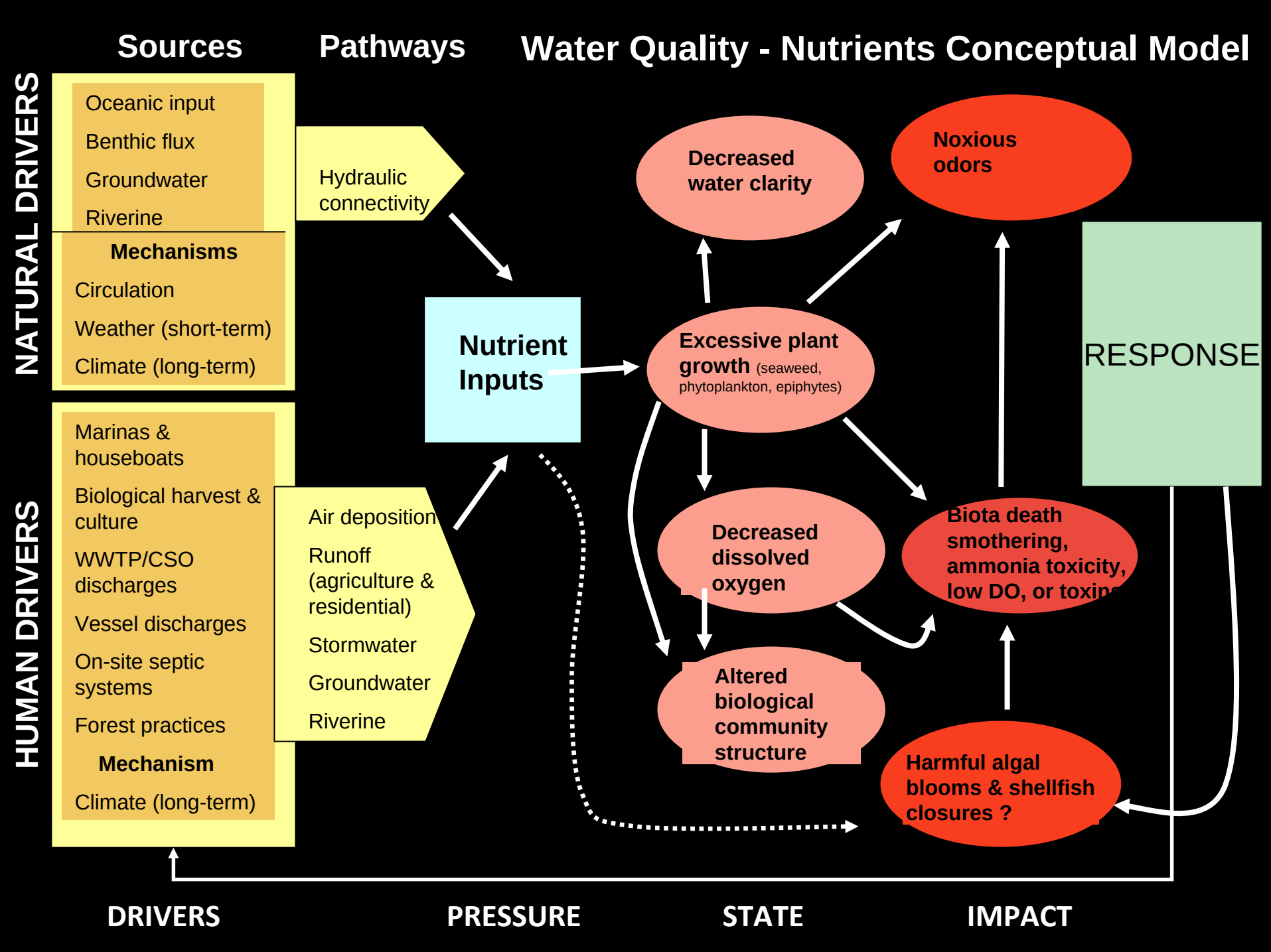


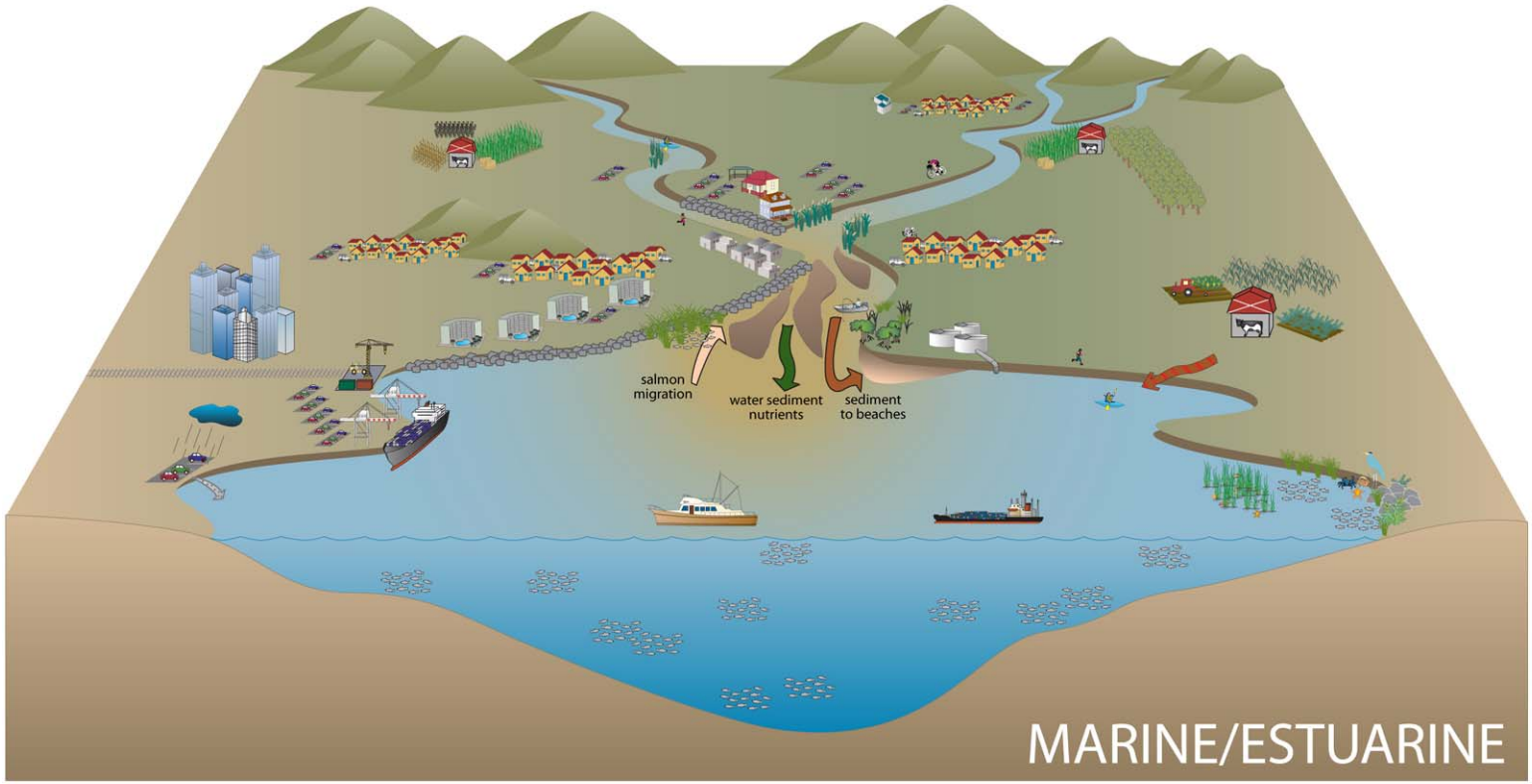
% of land that is covered in impervious surfaces

Threat: Impervious Surface, South Central Puget Sound: sub-watershed (HUC6)

Linking status and threats: conceptual models

Water Quality - Nutrients Conceptual Model





KEY ECOSYSTEM COMPONENTS/SERVICES

Estuaries support high primary production and provide important habitat for fish and other aquatic species (refs).

Estuaries regulate flooding and improve water quality (refs).

Shorelines provide important habitat for marine plants and animals, as well as aesthetic and recreational opportunities for humans (refs). Shorelines also represent an important transition zone between upland/terrestrial habitats and nearshore marine habitats; regulating transfer of organic and inorganic matter both upstream and downstream (refs).

Marine ecosystems support high primary productivity and species abundance, as well as managed aquaculture, commercial and recreational harvests (refs). Marine systems also provide aesthetic and recreational opportunities (refs).

MAJOR THREATS/DRIVERS

Invasive species; development; point and non-point sources of water pollution (e.g., from agriculture, stormwater, septic systems, etc.; sea level rise (refs).

Floodplain conversion to industrial, commercial, urban, and agricultural land uses results in changed hydrology and degraded habitat and water quality conditions. (refs).

Shoreline armoring and structures; shoreline development; stormwater and other discharges; unmanaged shoreline recreation, natural disturbance regimes (i.e., extreme weather events) (refs).

Invasive species; spills and discharges; channel dredging and boat operation; natural disturbance regimes (i.e., extreme weather events) (refs).

MANAGEMENT PRIORITIES

Next steps for risk analysis

- Develop summaries of attribute status for each of PSP 6 goals and threat/driver categories
- Draft results for peer review by summer 2008
- Appendix to Action Agenda in Dec. 2008

Species, Biodiversity, and Food Web Topic Forum

May 1, 2008

PugetSoundPartnership

our sound, our community, our chance

Session 1: Status & Threats

Status

- Puget Sound basin supports thousands of species
- Knowledge of species varies widely
- 21 species listed as threatened or endangered
- Food web may be changing in fundamental ways
- Biodiversity threatened by declines in abundance & productivity of species

Data Gaps

- Little is known about thousands of species
- Still gaps in our knowledge of well-studied species
- Many studies list gaps; three major categories:
  - Identify immediate needs for species recovery
  - Improve understanding of food web
  - Develop appropriate frameworks to assess & manage biodiversity

Documented Threats

- Habitat alteration
- Climate change
- Surface/ground water impacts
- Pollution
- Harvest

Documented Threats

- Cultured species
- Invasive species
- Human disturbance
- Natural forces/variability

Gaps in Knowledge of Threats

- Interactions among natural and anthropogenic threats
- Cumulative effects of stressors
- Magnitude of impacts from individual stressors
- Relative importance of threats
- Effects of climate change

Healthy Condition

Partnership definition:

- Species exist at viable levels; biodiversity naturally maintained
- Invasive species do not significantly affect viability of species or food web function
- Harvest is balanced and ecosystem-based

A healthy Puget Sound is dynamic & resilient.

Current Condition

- Many species do not meet definition of healthy
  - 21 listed species
  - Many others declining
- But some are meeting or exceeding definition
  - Bald eagle de-listed, brown pelican could be
  - Harbor seals, sea lion populations increasing

Discussion

- What did we get right?
- Have we missed any major findings?
- What are the key themes from this paper that should carry forward to the Action Agenda?