Steelhead Status in Washington

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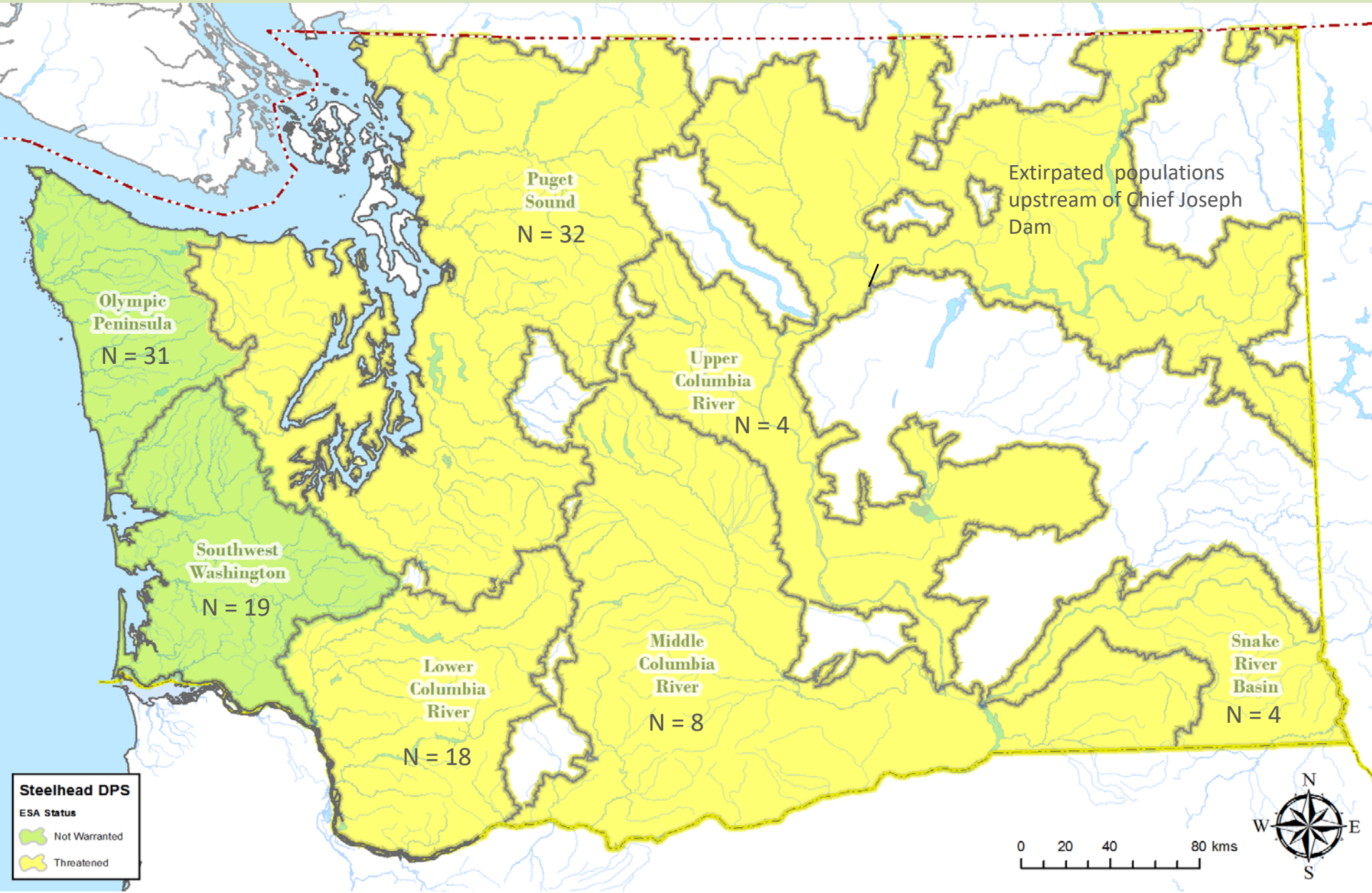
Overview

- Review of Washington's populations
- DPS-level abundance trends
- Population abundance trends - examples
- Productivity, diversity & spatial structure
- Factors affecting status – risks & threats
- Current actions to reduce risks
- Recommendations for further actions

Seven DPSs in Washington

N = number of populations

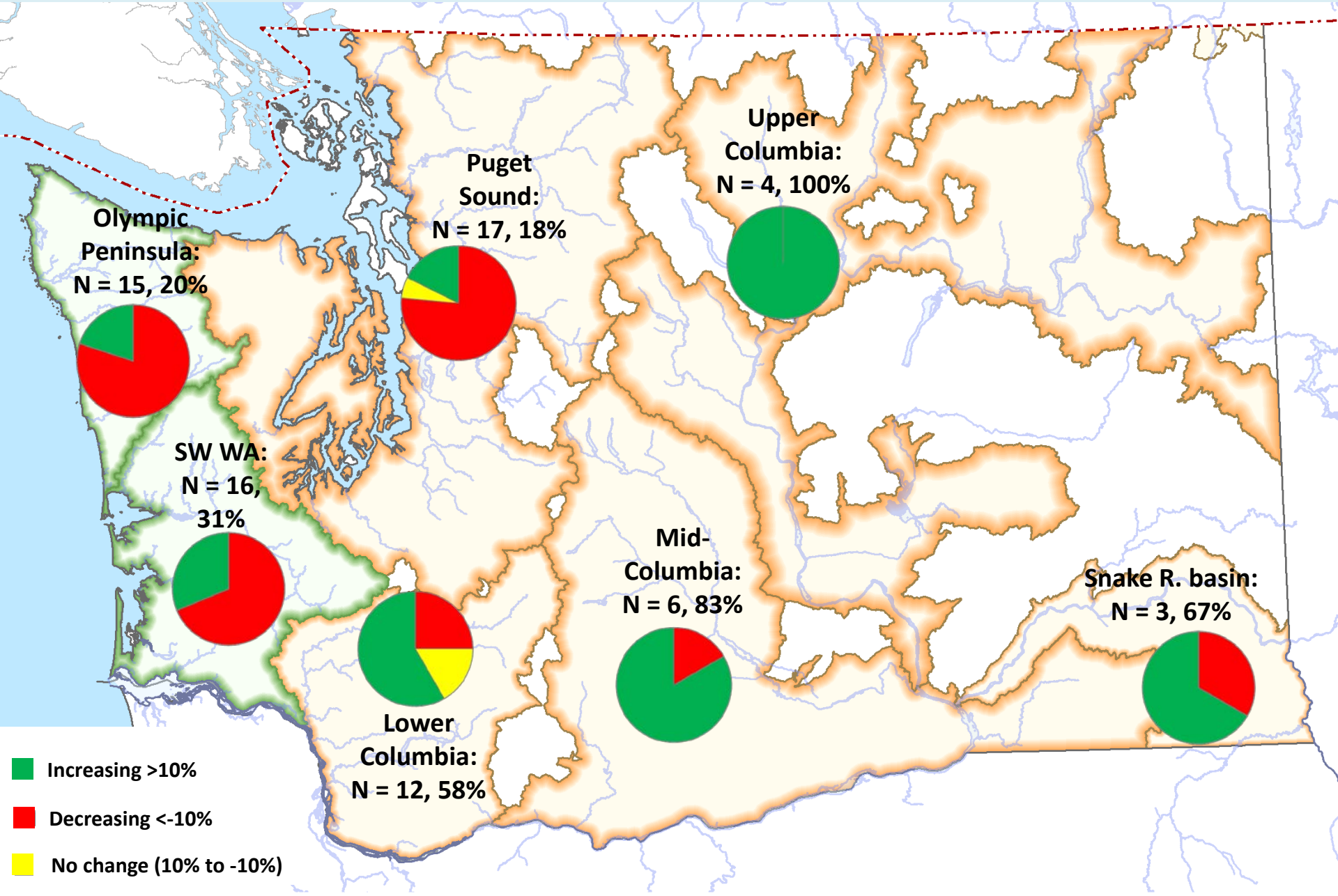


Status - Abundance

- **Annual spawner abundance data from 1980 forward**
  - Most estimates based on expansion from redd-counts
  - Some estimates from dam counts or mark-recapture
- **Trend analysis**
  - Regression with temporal autocorrelation
  - Percent change based on means of fitted line of the latest and earliest 5 years
- **Long-term trend** – entire available data series
- **Short-term trend** – starting in 2005 (for 12 years)
- **Trend categories**
  - Increasing > 10% change
  - Decreasing < -10% change
  - No trend: 10 to -10% change

Abundance trends by DPSs – 1980-2016

Number of populations with data; percent of these with increasing trends



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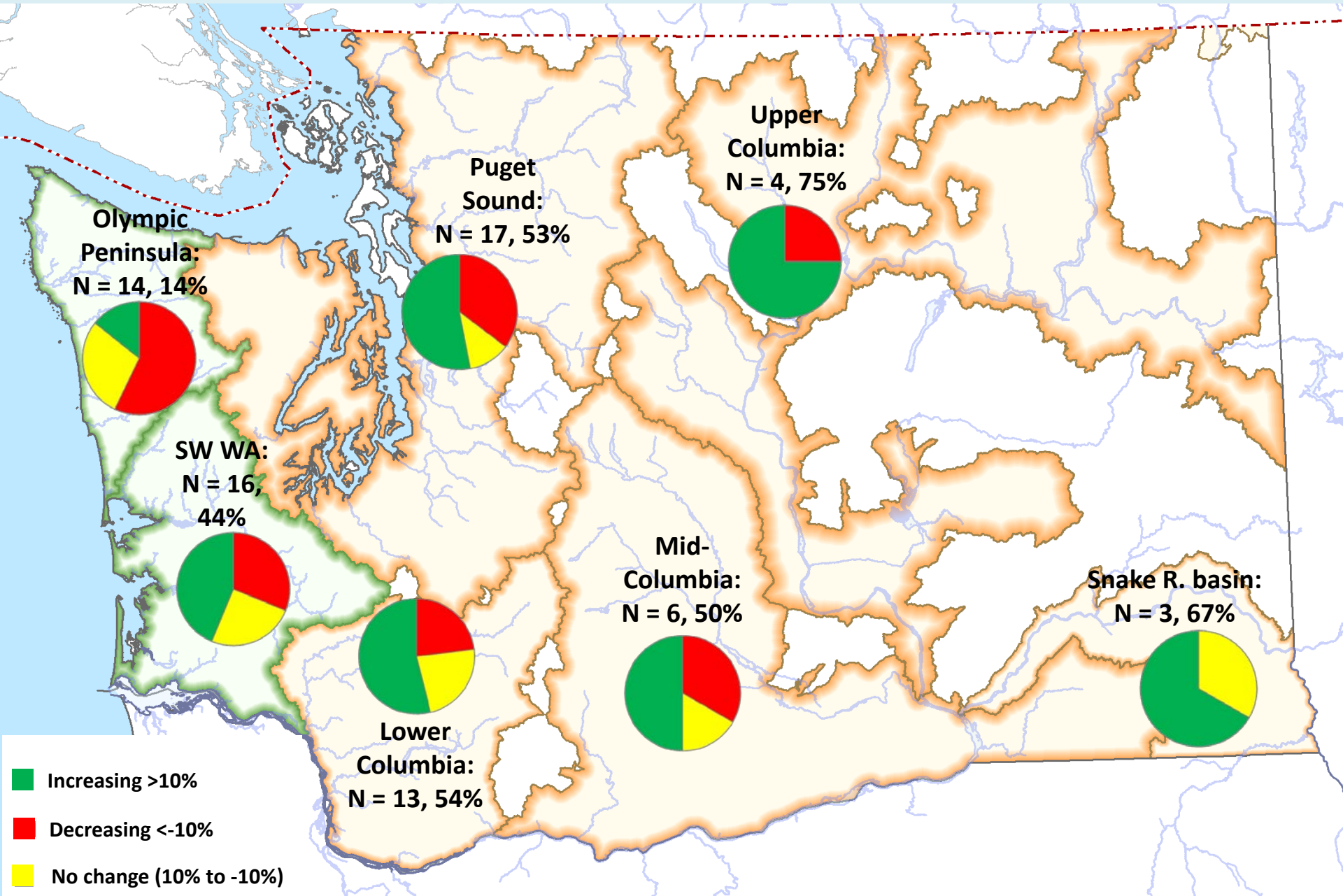
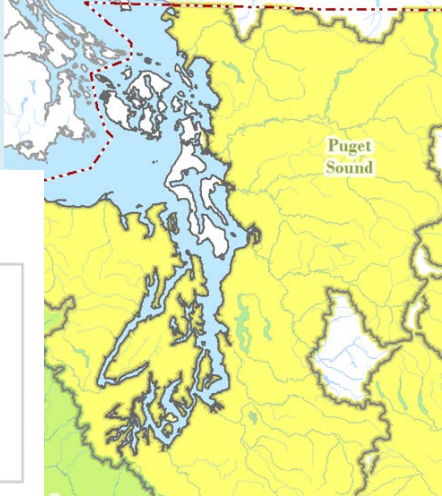


Puget Sound DPS – ESA-listed 2007



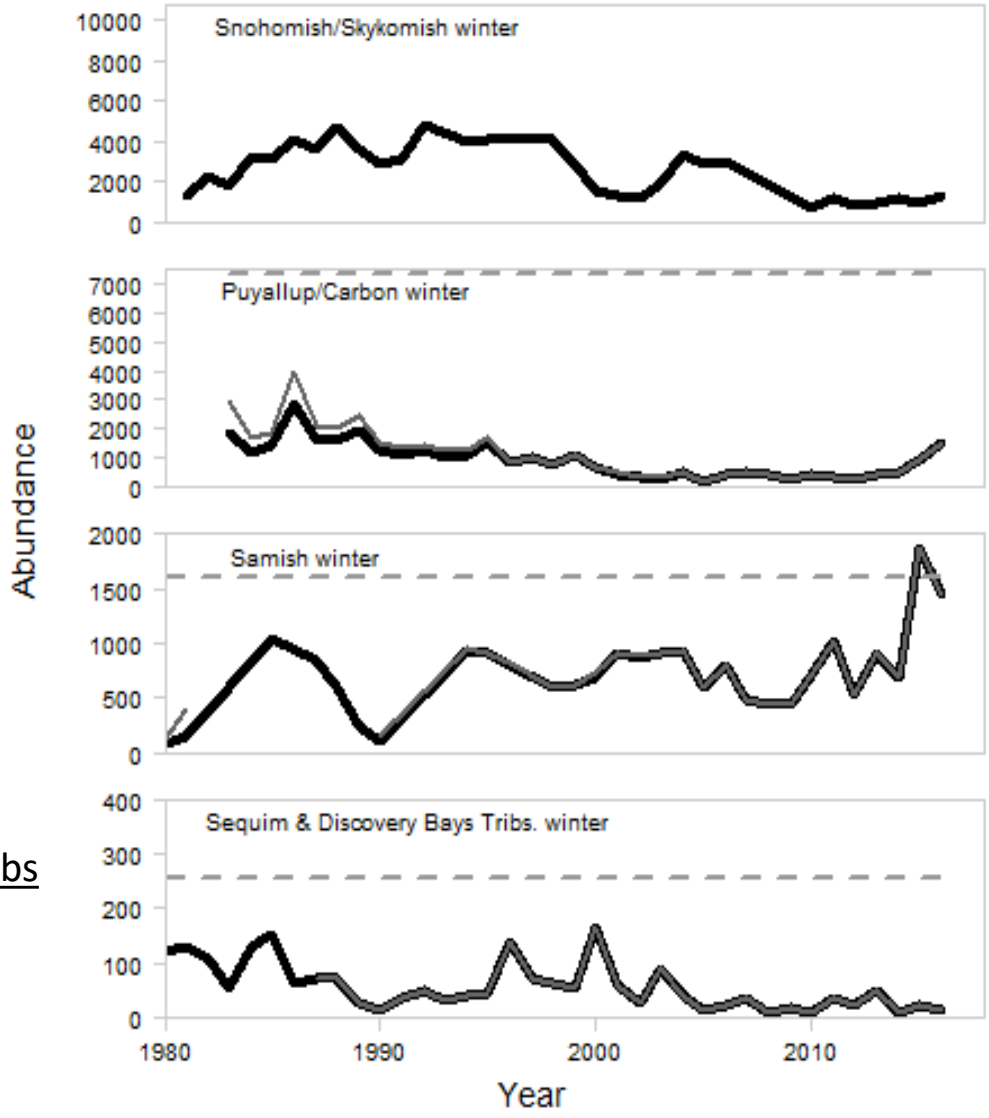
Trend examples

<u>Snohomish/Skykomish</u>
Basin area: 1,595 km^2
Trend: -59%

<u>Puyallup/Carbon</u>
Basin area: 1,395 km^2
Trend: -59%

<u>Samish</u>
Basin area: 661 km^2
Trend: 44%

<u>Sequim/Discovery bays tribs</u>
Basin area: 557 km^2
Trend: -80%



Interim viability goals; no recovery goals established

Olympic Peninsula DPS

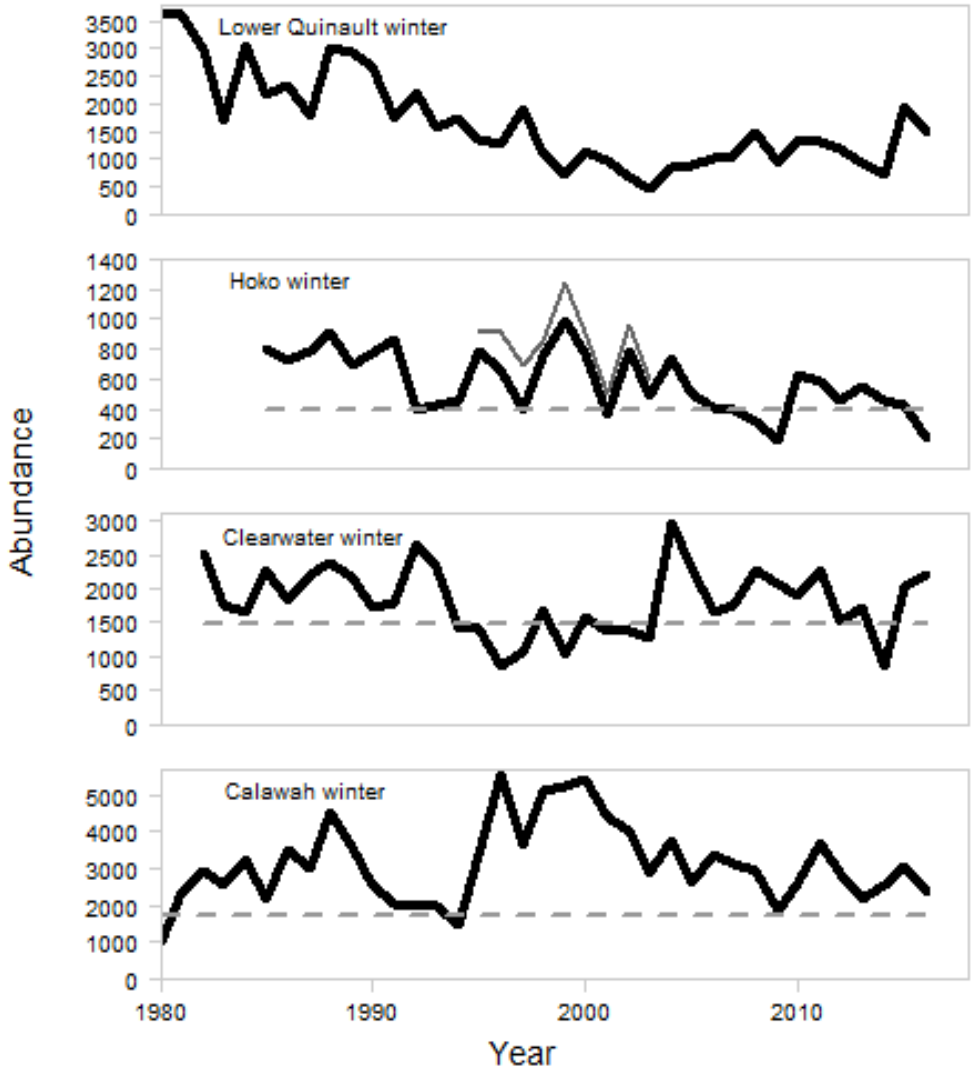
Trend examples

<u>Lower Quinault</u>
Basin area; ~300 km^2
Trend: -63%

<u>Hoko River</u>
Basin area: 190 km^2
Trend: -49%

<u>Clearwater River</u>
Basin area: ~300 km^2
Trend: -11%

<u>Calawah River</u>
Basin area: 414 km^2
Trend: 42%



Escapement goals
Not ESA-listed

Southwest Washington DPS

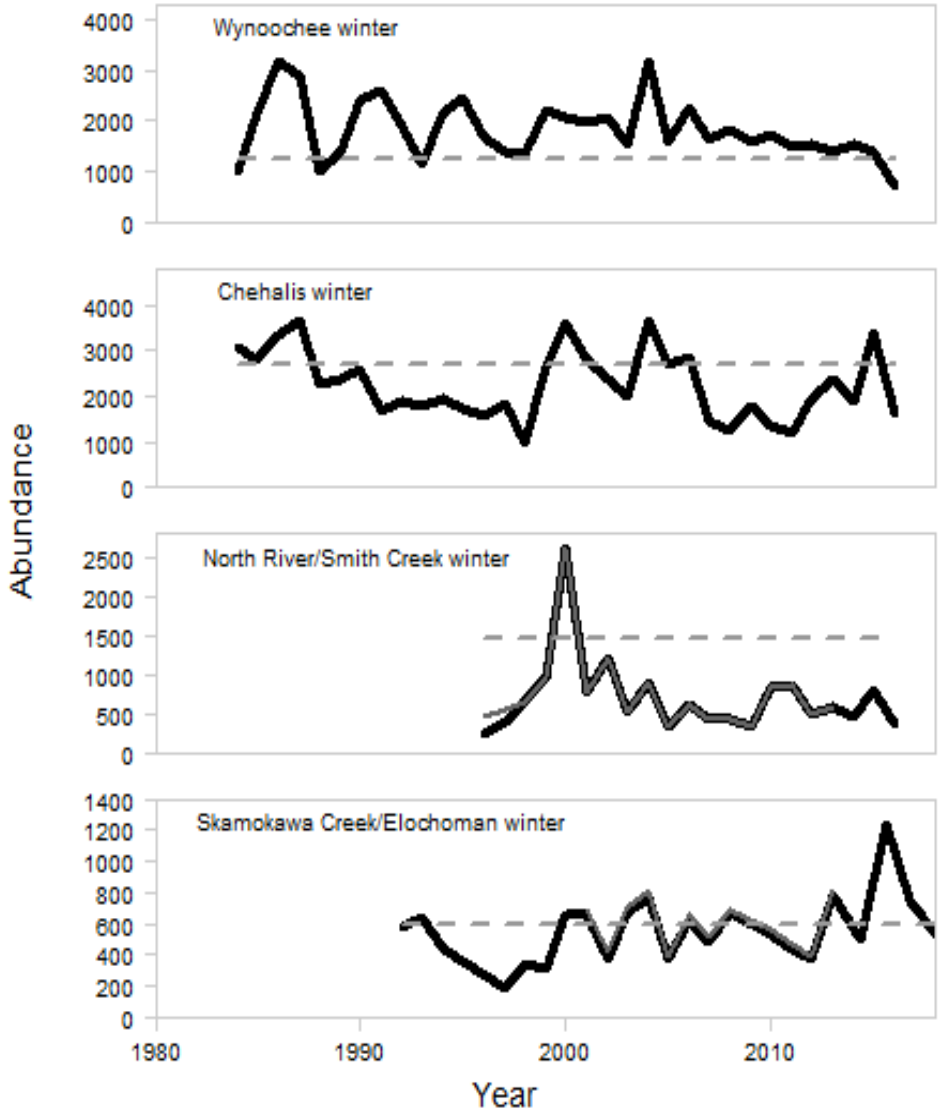
Trend examples

<u>Wynoochee River</u>
Basin area: 560 km^2
Trend: -24%

<u>Chehalis River</u>
Basin area: ~1500 km^2
Trend: -28%

<u>North R./Smith Cr.</u>
Basin area: ?300 km^2
Trend: -11%

<u>Skamakowa/Elochoman</u>
Basin area: ~315 km^2
Trend: 55%



Escapement goals
Not ESA-listed

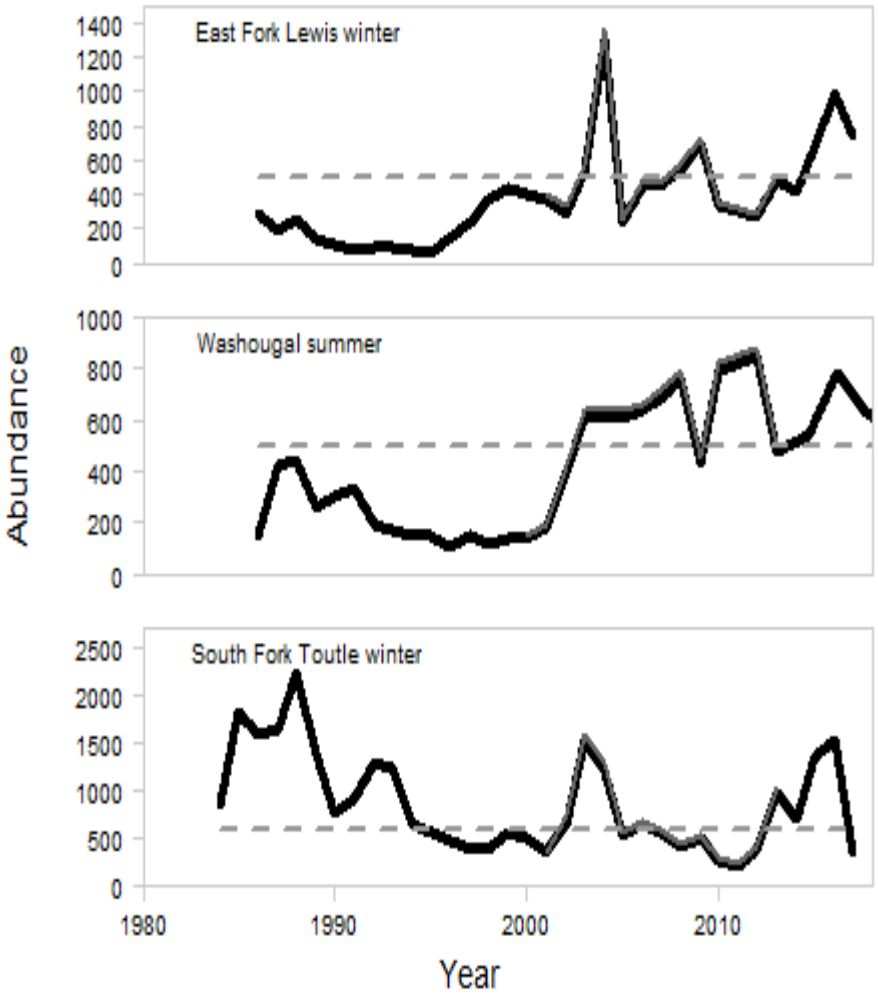
Lower Columbia DPS – ESA-listed 1998

Trend examples

<u>East Fork Lewis winter-run</u>
Basin Area: ~550 km^2
Trend: 318%

<u>Washougal summer-run</u>
Basin Area: 549 km^2
Trend: 232%

<u>South Fork Toutle winter-run</u>
Basin area: ~300 km^2
Trend: -57%



Recovery goals - minimum viable target

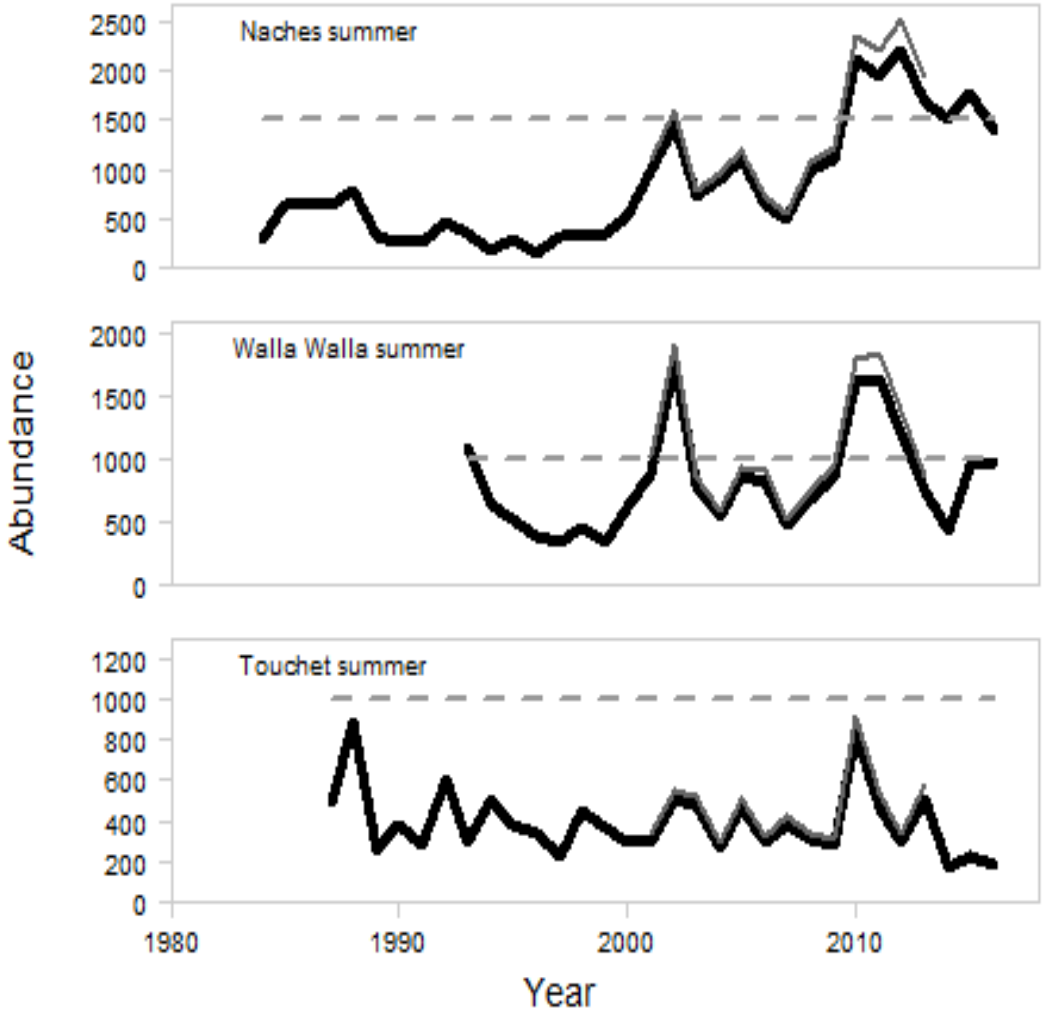
Middle Columbia DPS – ESA-listed 1999

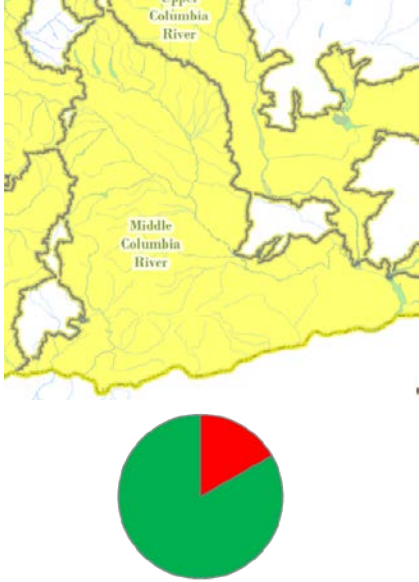
Trend examples

<u>Naches River</u>
Basin area: ~2000 km^2
Trend: 358%

<u>Walla Walla River</u>
Basin area: 2550 km^2
Trend: 39%

<u>Touchet River</u>
Basin area: 1917 km^2
Trend: -30%

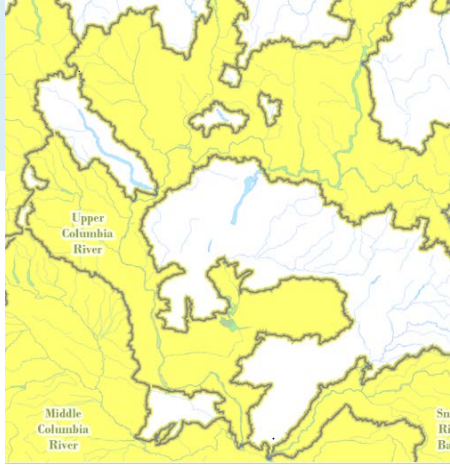




Recovery goals

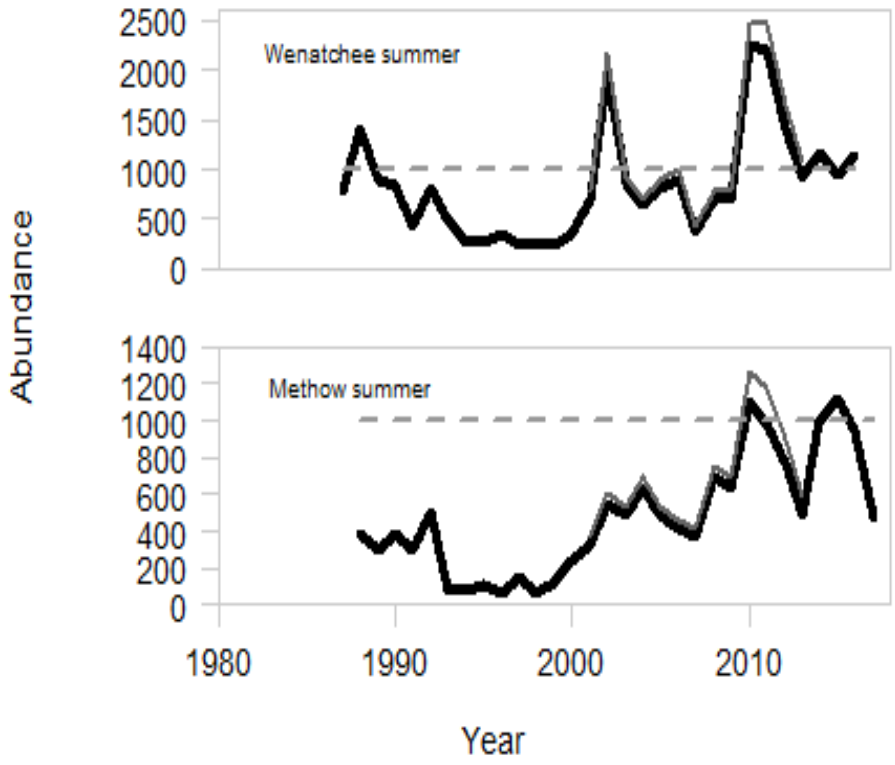
Upper Columbia DPS – ESA-listed 1997

Trend examples



<u>Wenatchee River</u>
Basin area: 3,452 km^2
Trend: 78%

<u>Methow River</u>
Basin area: 4,700 km^2
Trend: 142%



Recovery goals

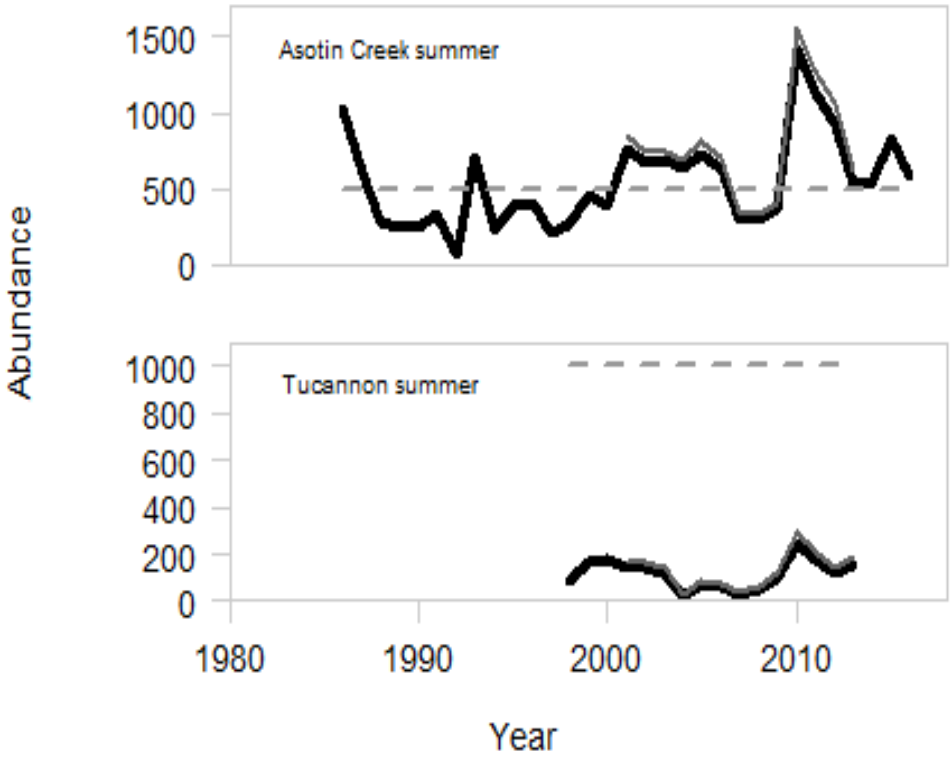
Snake River Basin DPS – ESA-listed 1997

Trend examples

Recovery goals

<u>Asotin Creek</u>
Basin area: 842 km^2
Trend: 103%

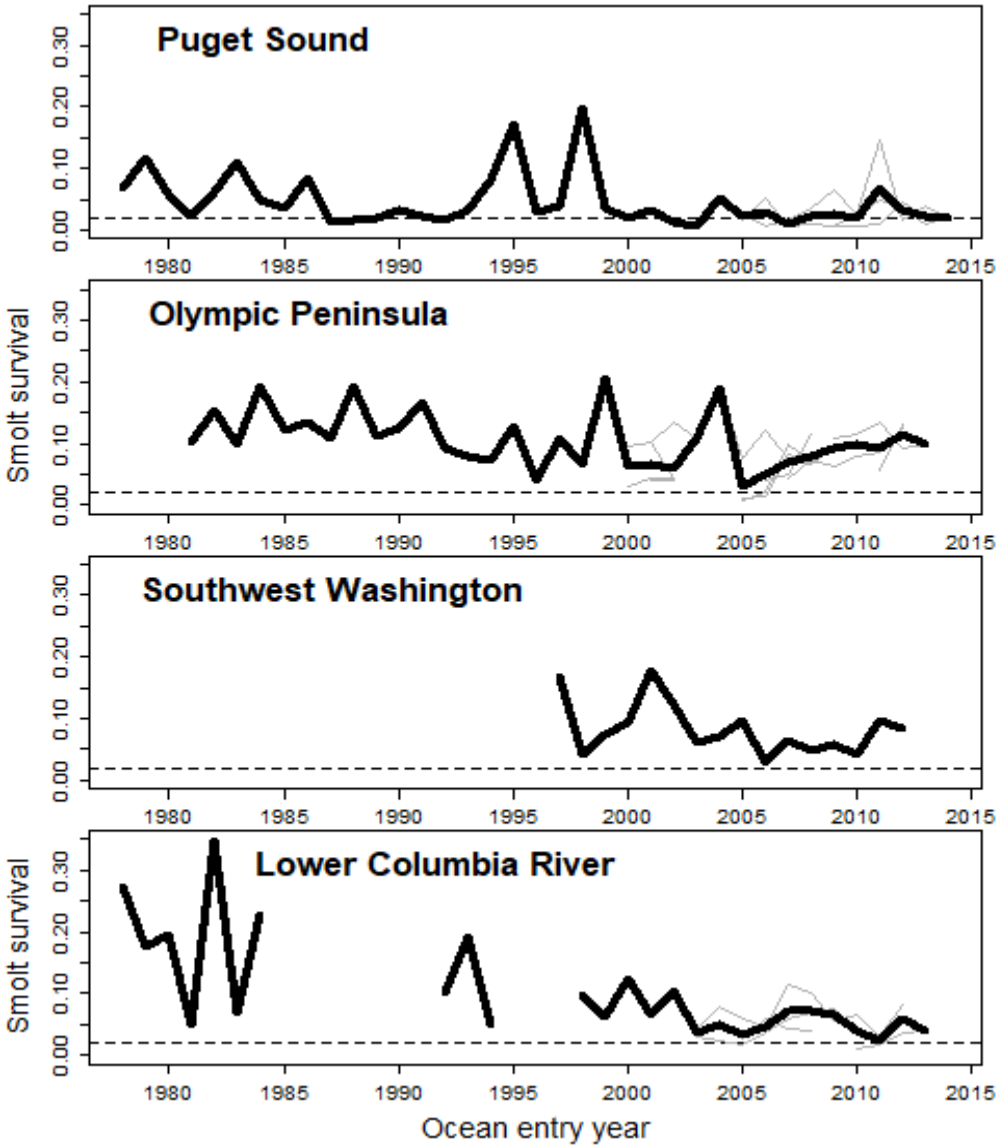
<u>Tucannon River</u>
Basin area: 1,300 km^2
Trend: 27%



Status – productivity

Average smolt to adult return rates

Annual smolt abundance estimates available for 12 populations or sub-populations, which had available adult age composition data.



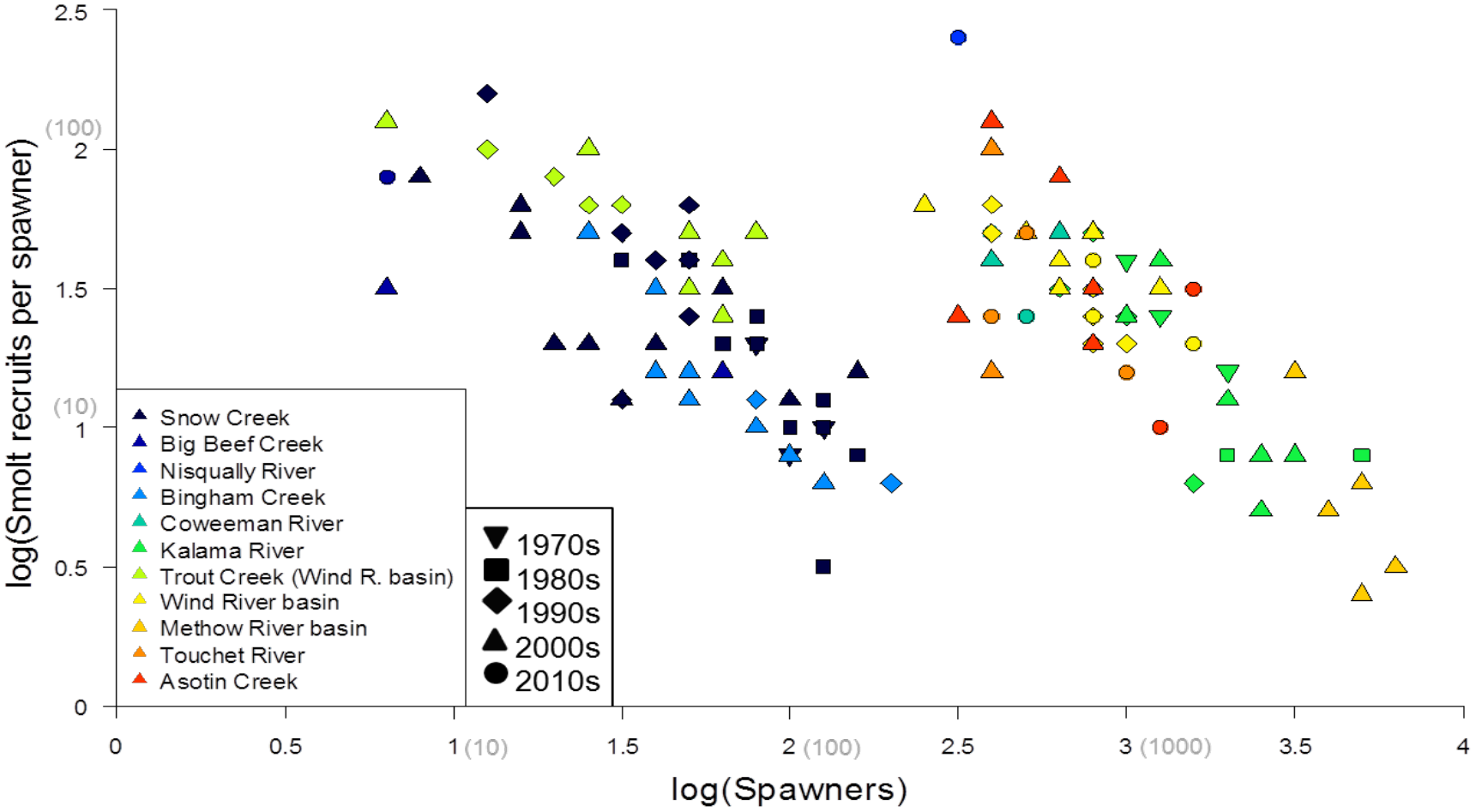
Puget Sound trend largely based on one small sub-population. Currently, marine survival rate is low overall.

Coastal DPSs currently have highest rates.

Lower Columbia DPS had largest decline in average rates over time period

Freshwater productivity

Smolts per spawner across populations and time



Status – Diversity & Spatial Structure

- **Diversity**
  - No quantitative analyses of life-history diversity change over time
  - More baseline data needed for comparative genetic diversity analyses
- **Spatial structure**
  - Habitat constricted by impassable large and small barriers
  - Percent of populations with > 5% habitat loss due to large dams:

Puget Sound	19%	Middle Columbia	44%
Olympic Peninsula	0%	Upper Columbia	75%
SW Washington	11%	Snake River Basin	25%
Lower Columbia	22%		

  - Recent restorations: Elwha River (PS); White Salmon River (Mid-Col)
  - Habitat loss due to small barriers (culverts, roads, de-watering, etc.) is likely very large, but not quantified statewide

Factors affecting status and viability

Habitat loss

- Legacy of degradation- logging, agriculture, development
- Flow & water quality alterations- water extraction, diversion, climate change
- Restoration occurring but loss continues from land conversion

Dams and other passage barriers

- Large reduction in access to historical habitat
- Interrupted wood & sediment transport
- Downstream passage mortality of adults, kelts & juveniles, particularly Columbia Basin mainstem dams

Hatchery production

'Segregated' programs- harvest augmentation; H only broodstock

'Integrated' programs- conservation; W & H broodstock

- Genetic risks – unintended interbreeding; domestication
- Ecological risks – competition, e.g., hatchery juveniles residualize; density effects, e.g., more adults do not yield higher production

Factors affecting status and viability

Harvest

- Incidental wild fish mortality in sport fisheries targeting hatchery stocks
- Handling rate of wild fish is estimated in few locations annually
- Potential inaccuracy of harvest impact estimates due to existing methods
- Illegal and unreported harvest of wild steelhead
- Unaccounted-for loss between Columbia mainstem dams may indicate under-estimated harvest (tagged fish data)

Predation

- Elevated predation associated with dams and migration bottlenecks
- Bird predation facilitated by man-made islands, other habitat alterations

Statewide actions targeting threats

Habitat

- Enhance habitat restoration success through WDFW's Hydraulic Project Approval permit process
- Continued collaboration on protection & restoration of riparian areas
- Investments in flow enhancement & irrigation fish screens

Dams and other passage barriers

- Ensuring required passage survival targets are met at all dams
- Continued culvert inventory & prioritization plans for barrier removal
- Removing all artificial fish passage barriers on WDFW-owned lands

Hatchery production

- Continue operating programs to meet Hatchery Genetic Management Plan (ESA permits) requirements & minimize wild fish impacts
- Maintenance of universal external marking of hatchery steelhead
- Continue implementing hatchery reform recommendations to reduce genetic risks

Statewide actions targeting threats

Hatchery production – continued

- Designation of 'Wild Steelhead Gene Banks' – protection from hatchery effects; 14 populations designated & occur in all seven DPSs

Harvest

- Construction of regulations that protect wild steelhead through time, manner, and place of fishing
- Ongoing wild steelhead release requirements
- Continued management of fisheries to keep overall impacts at low or acceptable rate
- Continue and expand catch-and-release mortality studies

Predation

- Continued work with dam operators & other agencies to develop management plans for facility-associated predation
- Continued support of the Salish Sea Marine Survival project

Recommended further statewide actions

- Identify locations where climate change may have large negative impacts to better prioritize habitat restoration
- Expand monitoring of presence & proportion of hatchery fish on spawning grounds for programs with largest potential impacts
- Transition to use of volitional smolt releases & remove non-migrants
- For conservation hatcheries, scale smolt release goals by considering carrying capacity and density dependent productivity relationship
- Systematically estimate total harvest mortality for populations either by expanding creels or exploring alternative methods
- Undertake studies to quantify illegal harvest and work to increase enforcement where necessary

DPS-level actions to improve status - examples

Puget Sound

- Recent reductions in some hatchery program releases
- February 15 closure for hatchery winter steelhead fisheries

Southwest Washington

- Ensuring that aquatic species impacts of proposed dam in Upper Chehalis Basin are accurately quantified

Lower Columbia

- Continuing studies to measure genetic introgression and ecological impacts of segregated hatchery programs

Middle Columbia & Snake River Basin

- Evaluating effects from adults that fail to return downstream to natal streams after passing several Snake River dams ('overshooting')

Upper Columbia

- In-season harvest management based on hatchery and wild run size
- Removal of excess hatchery fish at dams or traps

Acknowledgements

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Questions?
Photo by Mark Downen, WDFW