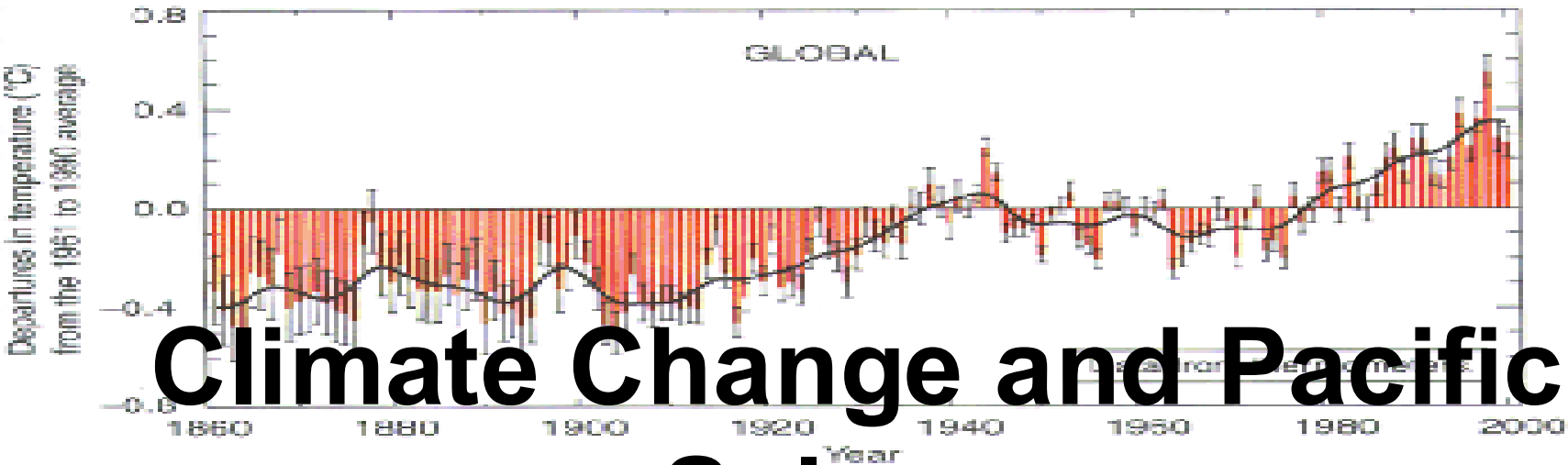


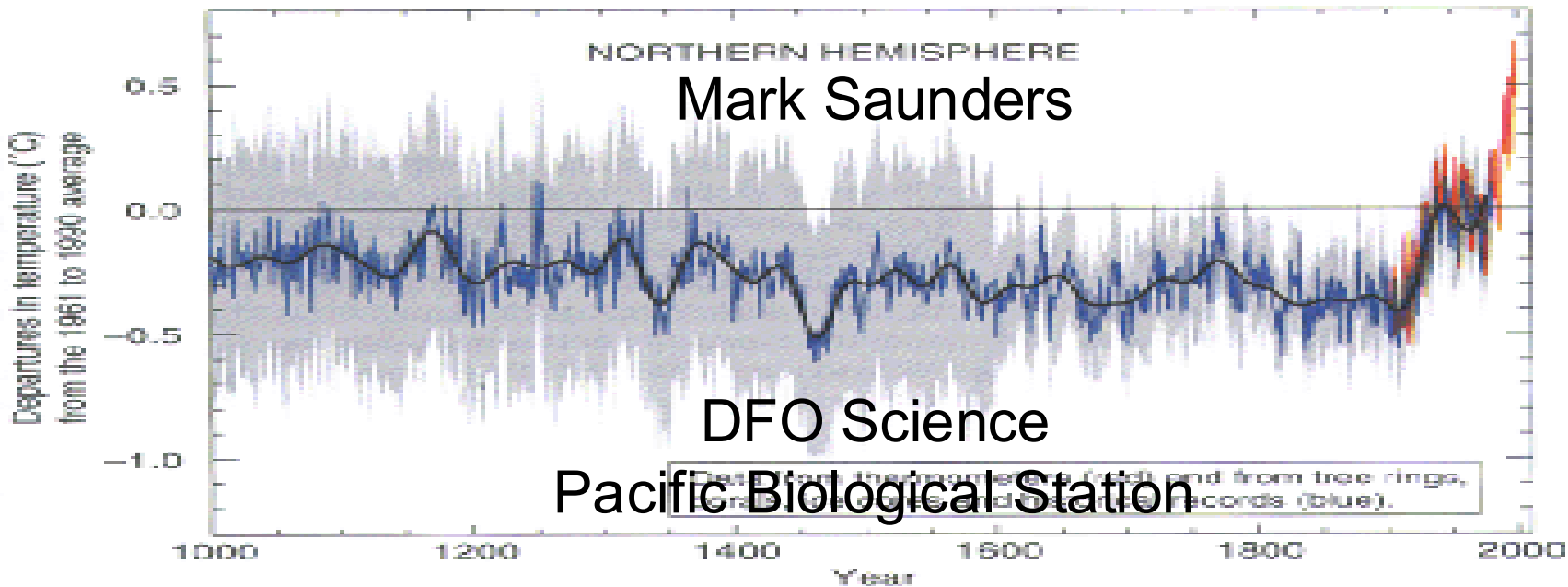
Variations of the Earth's surface temperature for:

(a) the past 140 years

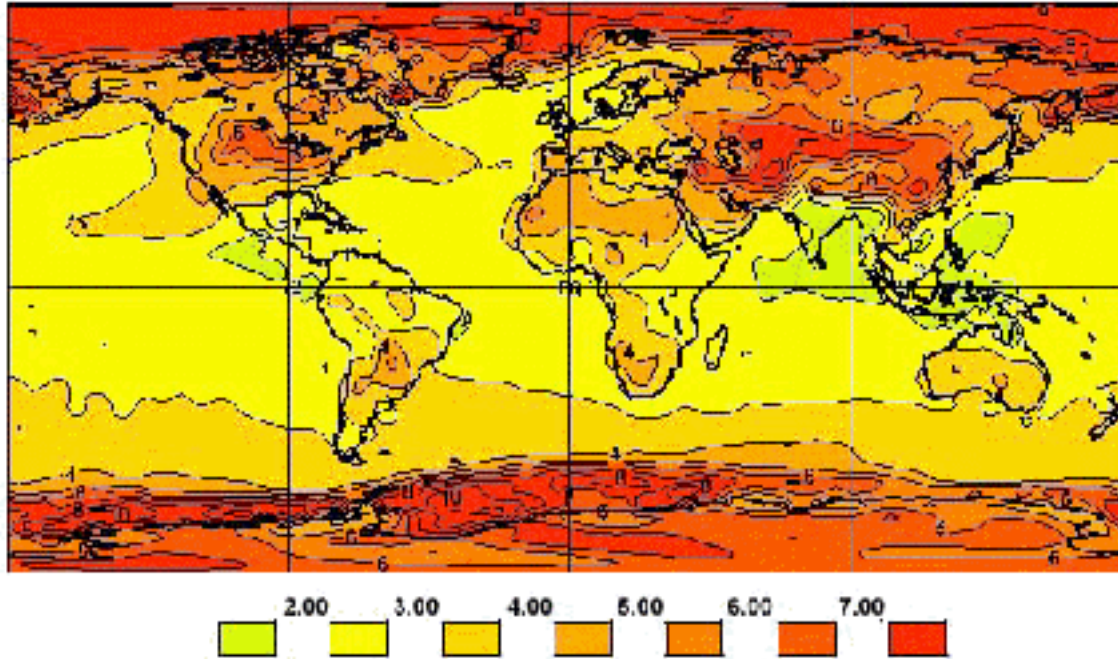


Climate Change and Pacific Salmon

(b) the past 1,000 years



Climate Change – Marine



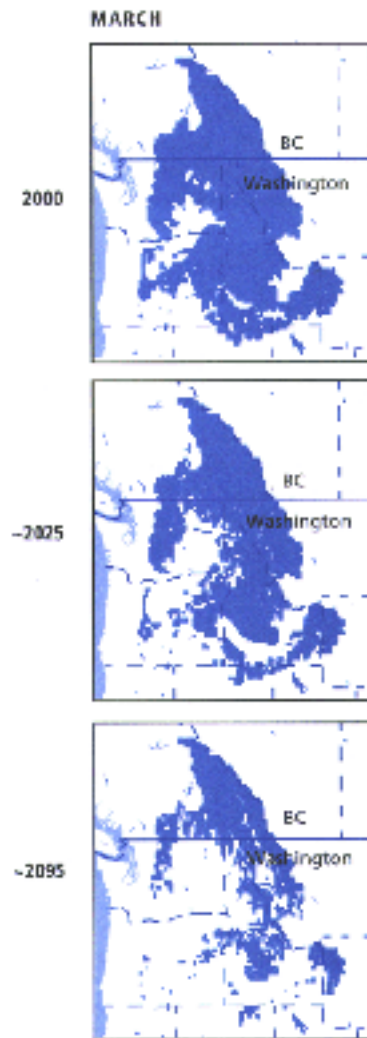
- Average increase in temp about 1.2 degrees per 100 yrs
- Increased frequency and intensity of ENSO events (ecosystem reorganization-predators/prey).
- Decreased ocean venting and decreased oxygen in upwelling deep waters
- Increasing ocean acidification with risk of major species changes in food webs.

Climate Change -Freshwater

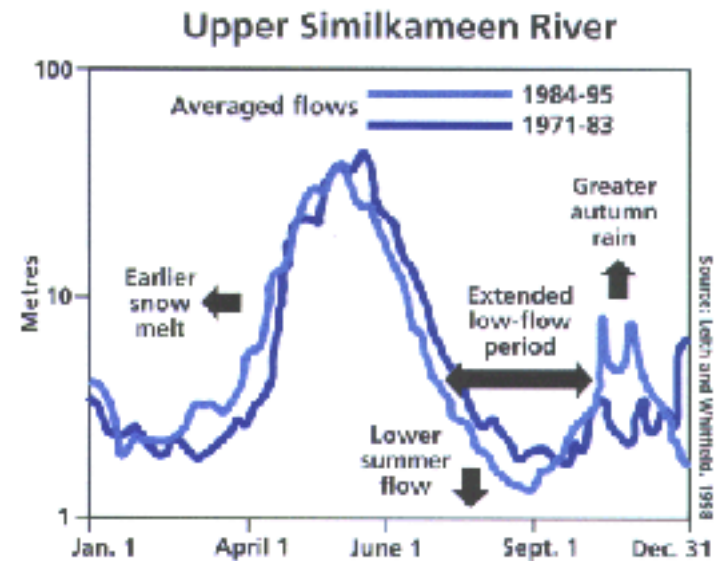
- More warming in north and interior
- Snowpack decreases of 25 % in <50 yrs
- Continued glacial recession (90 % of BC & Ak glaciers exhibit significant recession in past 50 yrs)
- Average increases in annual precipitation but dryer late summer-fall (more intense rainfall events, greater risk of flash events)

Freshwater Examples

Regional
Snow pack
(P. Mote-
UW)

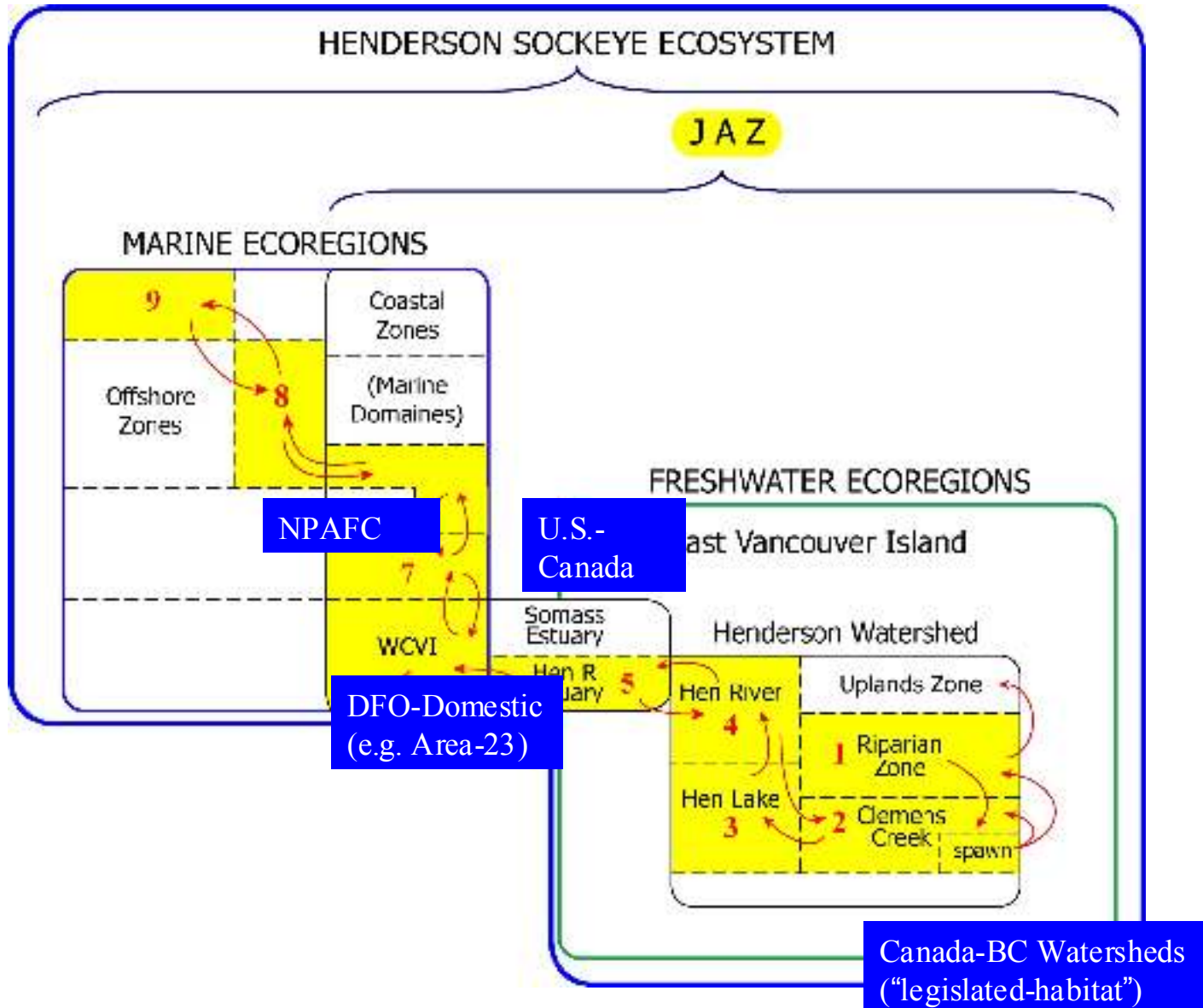


Flow Timing and
Variability in Snow Fed
Rivers (P. Whitfield -
DOE)

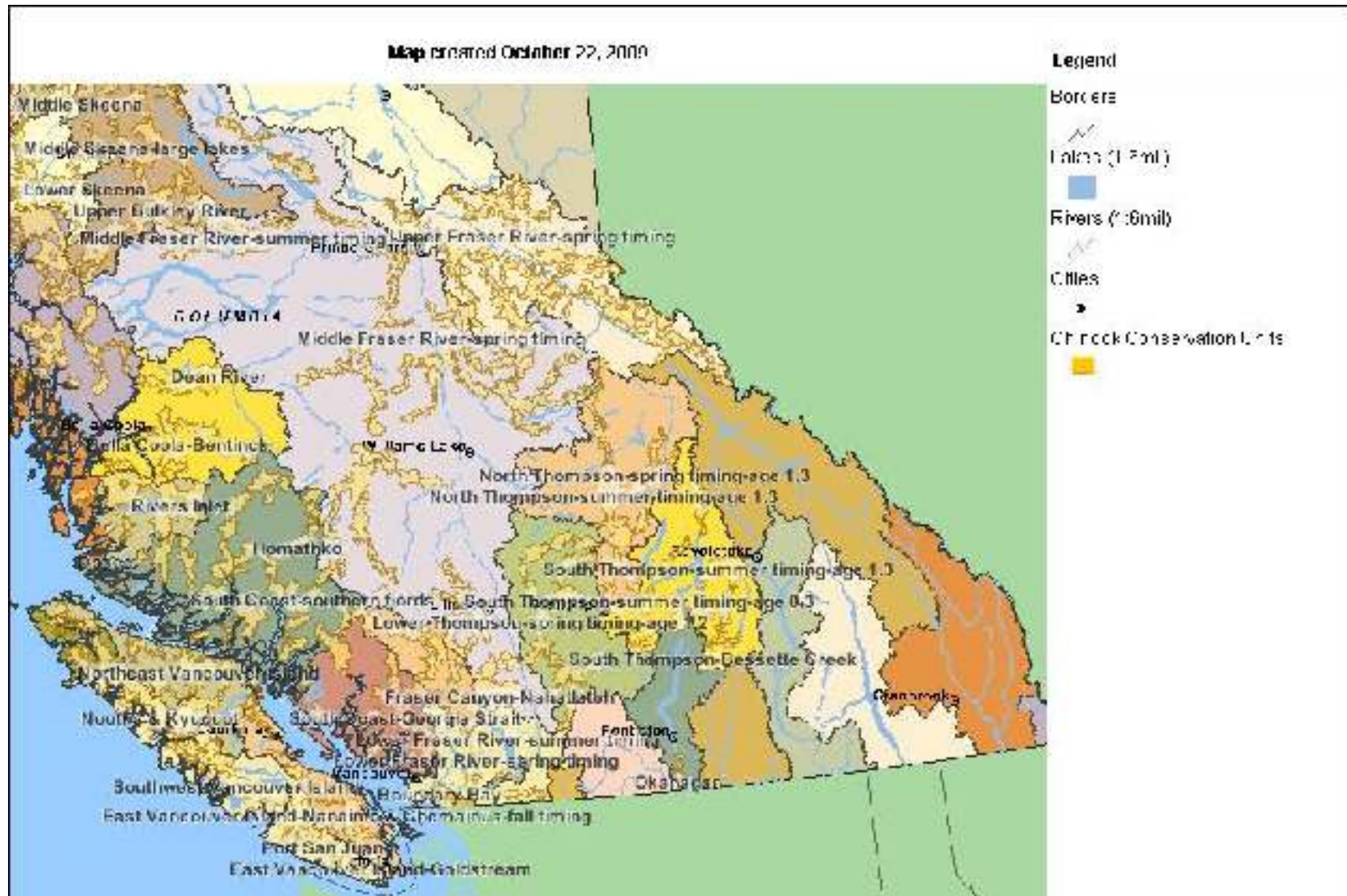


Changes to Seasonal Thermal
Regimes in Freshwater Lakes,
Rivers and Streams

Climate Change will affect all Salmon Life History Stages



Salmon FW Adaptive Zones and Chinook Conservation Units



Management Impacts

- Increased uncertainty re: salmon production and available catch
- Decreased forecasting ability (past will not predict the future)
- Decreased effectiveness of historic best practises.
- Increased inter-sectoral conflict re: allocation of water for fish versus extractive uses.

How do we move forward?

- Increased conservation buffers.
- Increased reliance on abundance based in-season management.
- Broader implementation of EBM as per Wild Salmon Policy and Living Water Smart.
- Regional analyses of vulnerability and adaptation options for sustainable fish and habitat mgt (new mgt models, decision support systems, engineering options e.g fish-and-water, role of fish culture)

Assessment of Vulnerability

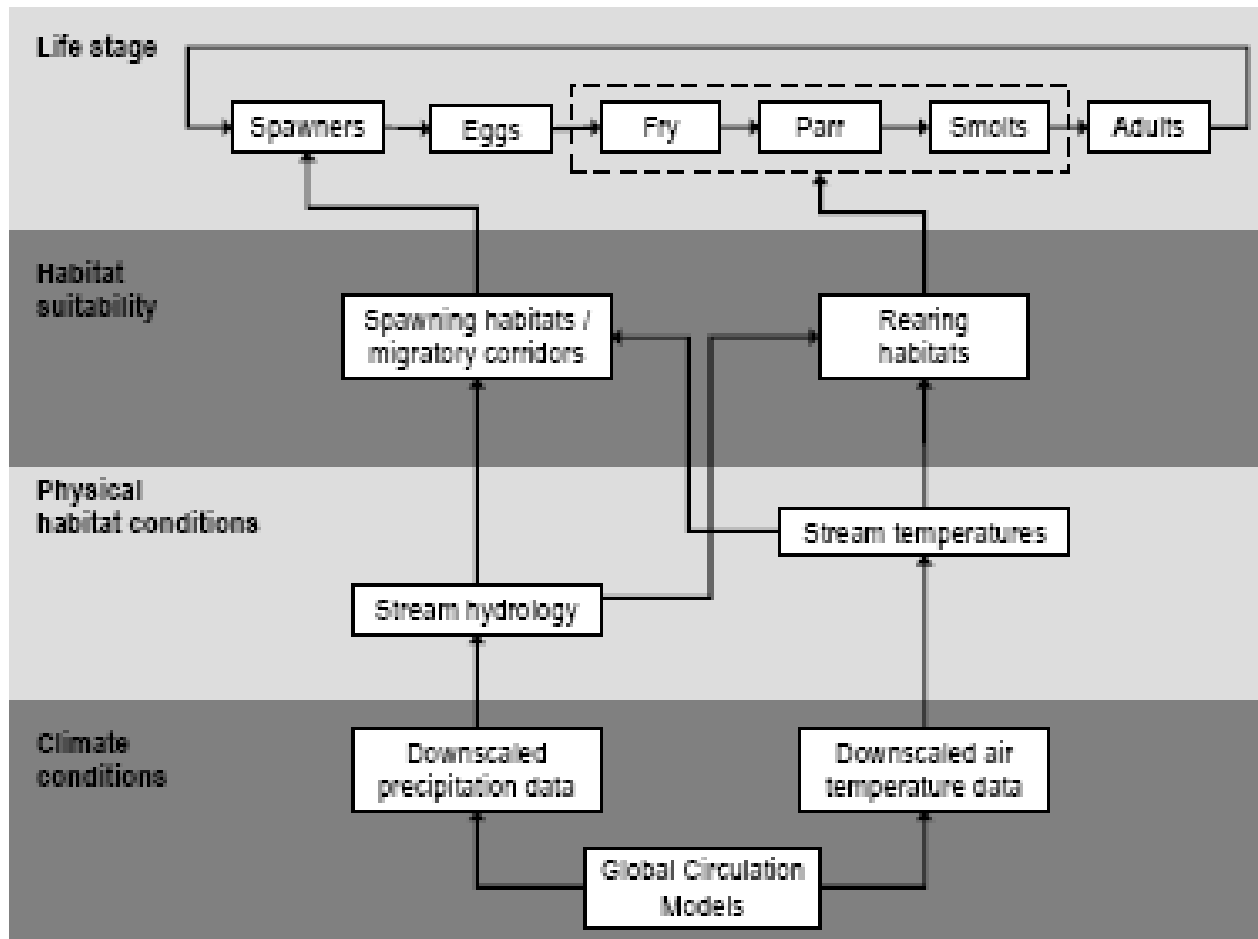
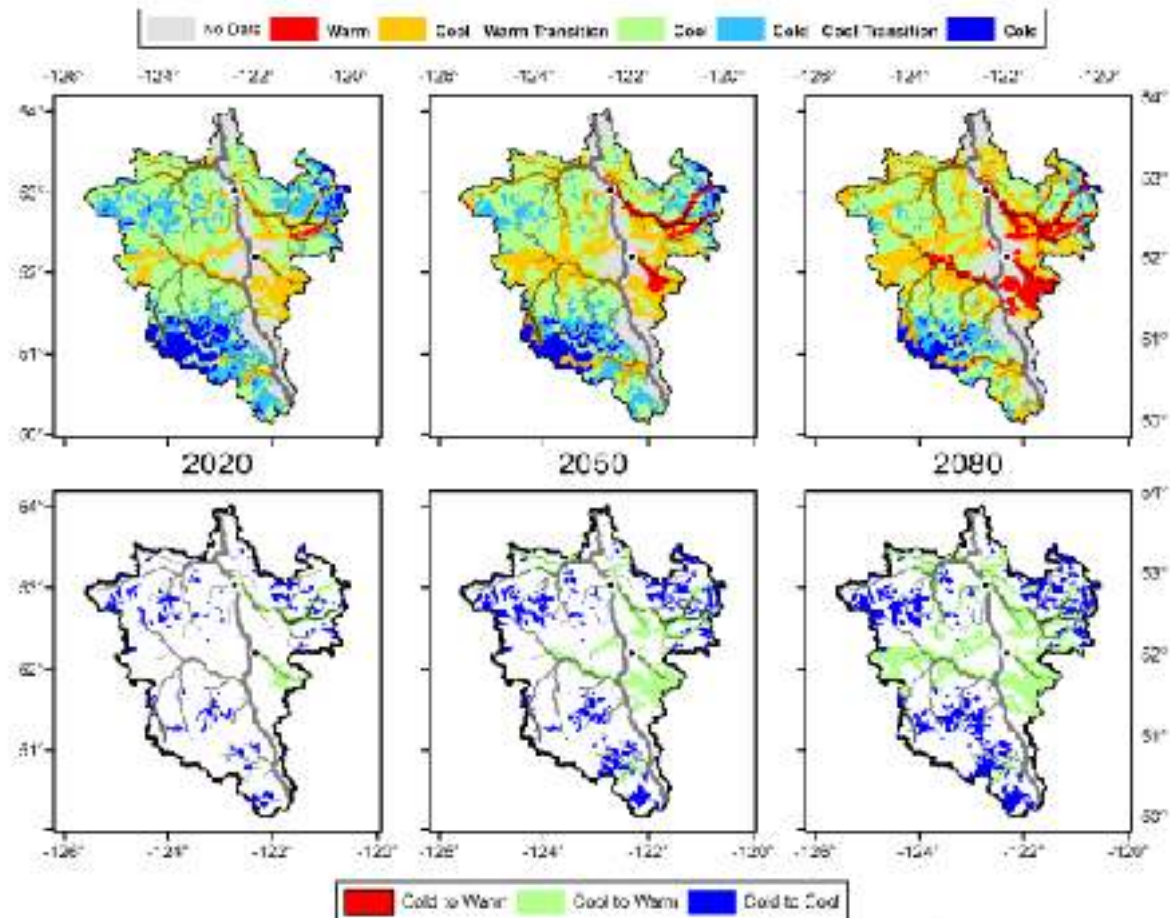


Figure 2. Simplified conceptual model illustrating the linkages among climate, physical habitat conditions, habitat suitability, and Pacific salmon life stages.

From Nelitz
2009

Vulnerability Scenario



From Nelitz
2009

Figure 7: "Worst" case outcome (i.e., most change in thermal classes) out of six climate change scenarios. Top panel represents predicted thermal classes over three time periods (2020s, 2050s, 2080s), while the bottom panel represents shifts in thermal classes (as noted by legend) from baseline predictions in Figure 5.