

# Some Pacific salmon populations are especially at risk from climate change

July 24 2019

## Mapping Vulnerabilities to Climate Change

NOAA Fisheries assessed the vulnerability of 33 population groups\* of Pacific salmon & steelhead to climate change along the West Coast.

### Number & Risk Level of Population Groups

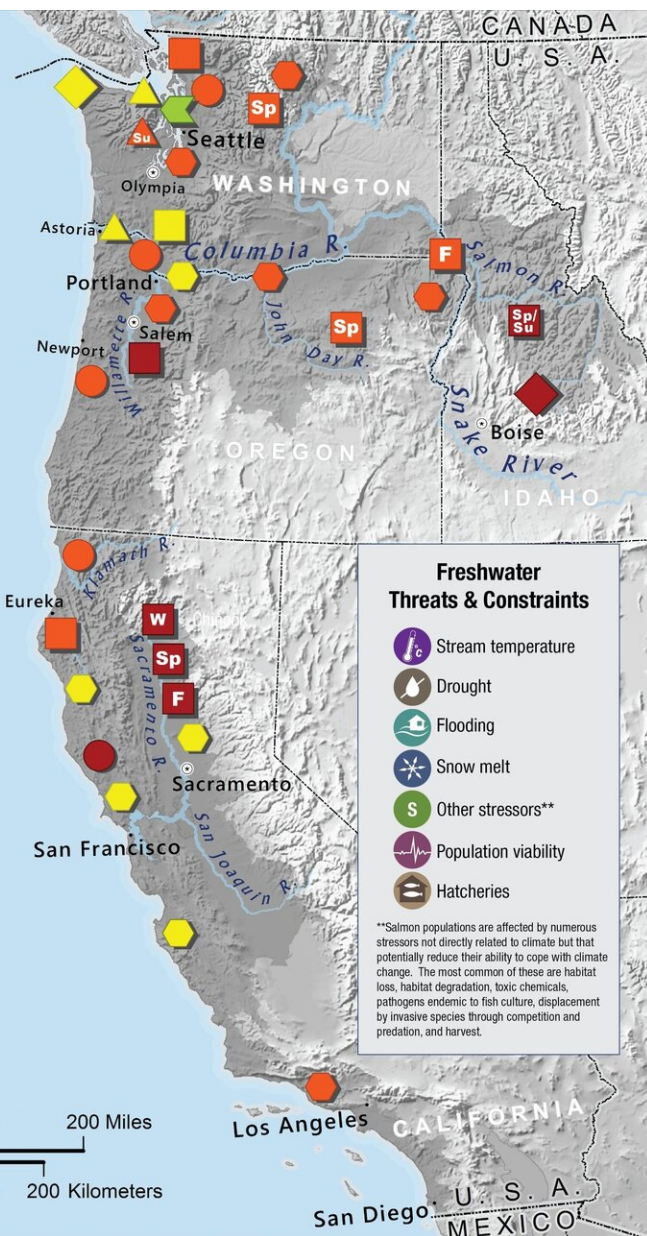


F = fall run Sp/Su = spring/summer run  
 W = winter run Su = summer run  
 Sp = spring run

\*Population groups refer to distinct population segments (DPS) & evolutionarily significant units (ESU).

**Marine Threats**

- Sea surface temperature
- pH Ocean acidification
- Sea level rise
- Upwelling



**Freshwater Threats & Constraints**

- Stream temperature
- Drought
- Flooding
- Snow melt
- Other stressors\*\*
- Population viability
- Hatcheries

\*\*Salmon populations are affected by numerous stressors not directly related to climate but that potentially reduce their ability to cope with climate change. The most common of these are habitat loss, habitat degradation, toxic chemicals, pathogens endemic to fish culture, displacement by invasive species through competition and predation, and harvest.



Mapping Pacific salmon and steelhead vulnerabilities to climate change. Credit: NOAA Fisheries (2019)

Four population groups of Pacific salmon in California, Oregon, and Idaho are especially vulnerable to climate change, according to a new study in the open-access journal *PLOS ONE* by Lisa Crozier of the National Oceanic and Atmospheric Administration and colleagues. The results will be useful for prioritizing protection efforts for salmon populations along the entire west coast of the United States.

Pacific salmon (*Onchorhynchus* spp.) spend most of their lives in the ocean, but return to the inland waterways of their birth to spawn, with some populations migrating as far inland as central Idaho. The broad range of environments in which salmon dwell make them especially sensitive to [environmental change](#). To better understand the vulnerability of Pacific salmon, the authors studied 33 threatened or endangered [population groups](#) of Pacific salmon, encompassing [local populations](#) from the Mexican border to the Canadian border. For each population group, the authors looked at 20 different attributes in order to assess the group's vulnerability to change. These attributes measured the magnitude of expected change in local environmental conditions, the capacity of the population group to adapt phenotypically to new climatic conditions, and the sensitivity of specific population groups to current environmental conditions.

Four population groups were found to be most at risk: Chinook in California's Central Valley, coho in northern California and Oregon, Chinook in the Columbia and Willamette River basins in Oregon, and sockeye in the Snake River basin of Idaho. All 33 studied population groups were found to be vulnerable to elevations of stream and [sea surface temperatures](#) as well as ocean acidification. However, some

population groups were more affected than others by local conditions, such as barriers to migration such as dams.

Crozier adds: "Salmon have always adapted to change, and they have been very successful, otherwise they wouldn't still be here. What we are trying to understand is which populations may need the most help with anticipated future changes in temperature and water availability, and what steps we can take to support them."

**More information:** Climate vulnerability assessment for Pacific salmon and steelhead in the California Current Large Marine Ecosystem. *PLoS ONE* 14(7): e0217711. [DOI: 10.1371/journal.pone.0217711](https://doi.org/10.1371/journal.pone.0217711)

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