

Recovering salmon to feed whales -- do the southern resident killer whales have enough to eat?



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Michael Ford, Northwest Fisheries Science Center, April, 2019



Danny Westneat / Columnist f

In the great debate to save the orcas, the apex predator is missing

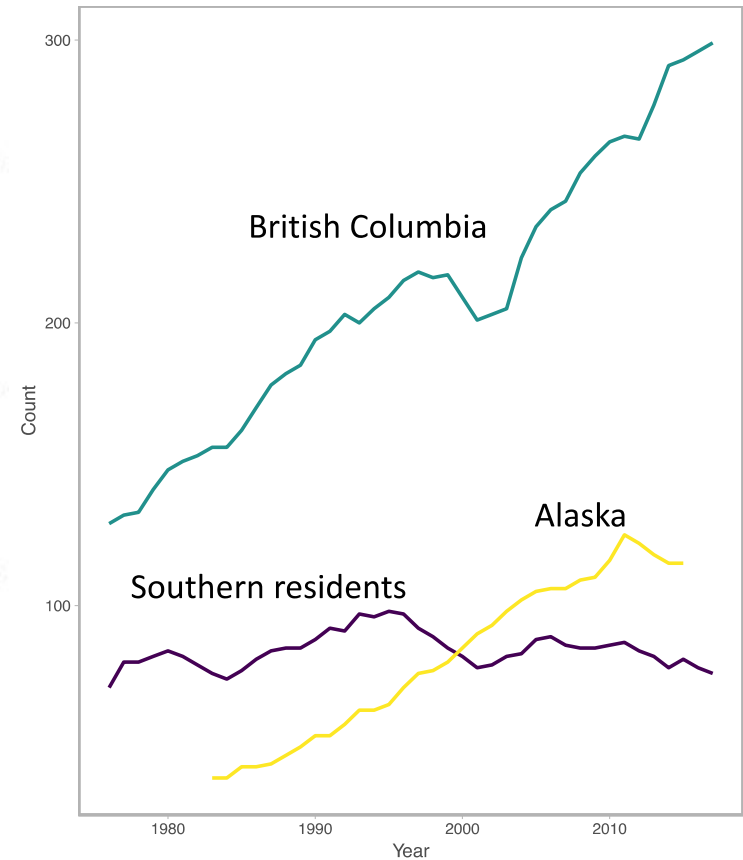
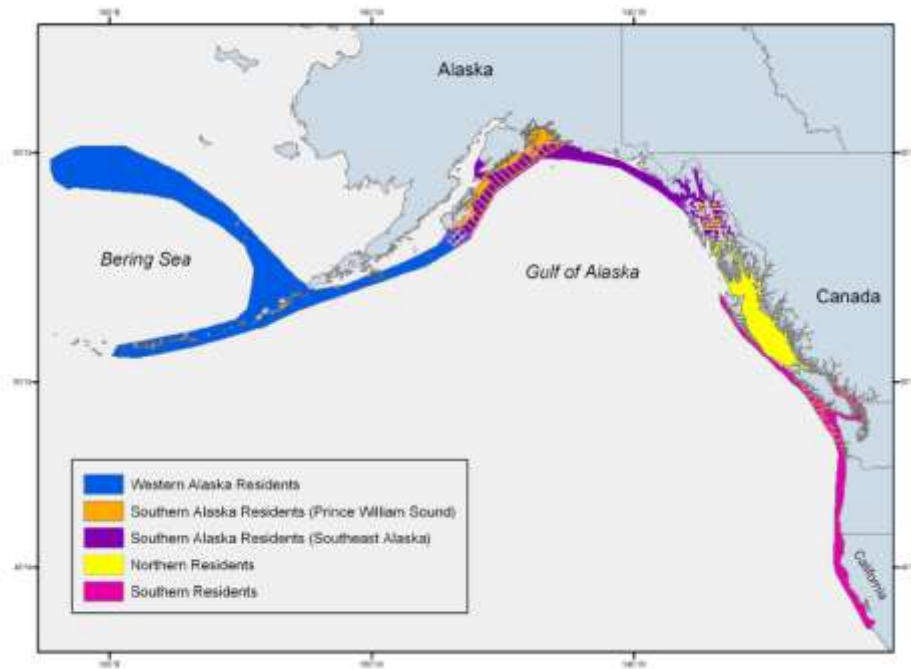
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It's time to call it: We have decided, collectively though passively, to let the Puget Sound orcas go extinct.

I say this because it should now be obvious to all that the whales are starving to death. ...

They simply need more food. Specifically, they need more chinook, or king, salmon. It's an emergency, which means they need them now.

Distribution of North Pacific fish-eating orca populations



Threats

Lack of sufficient food



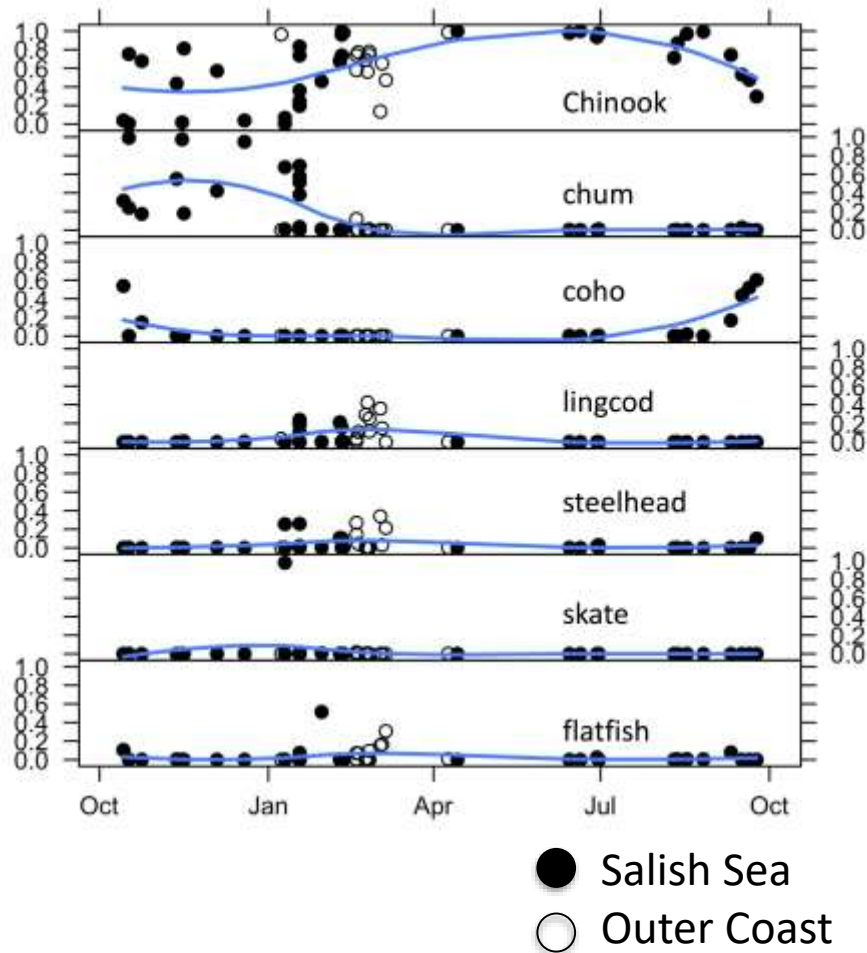
Too much disturbance



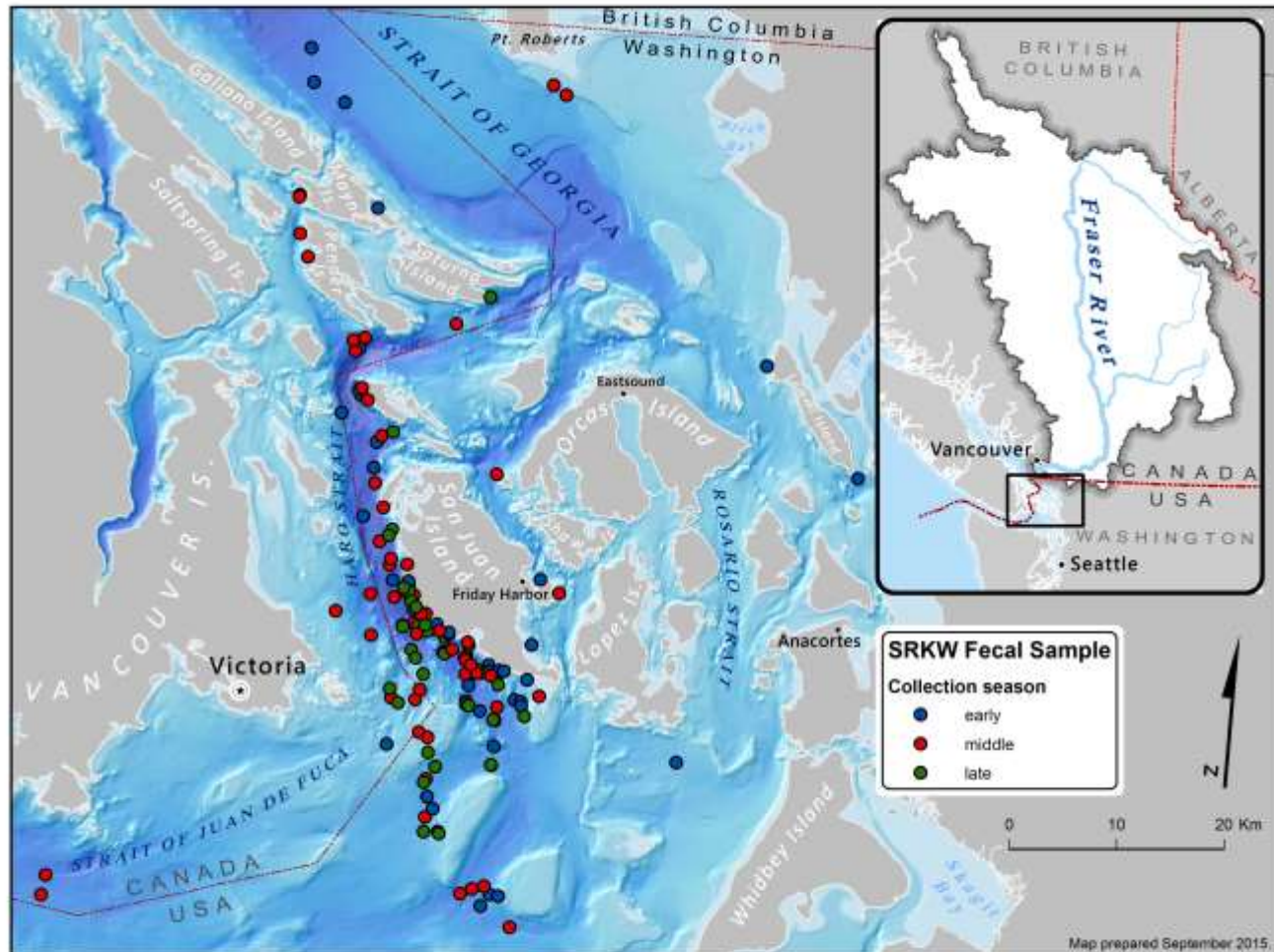
High contaminant levels



Resident killer whale diet



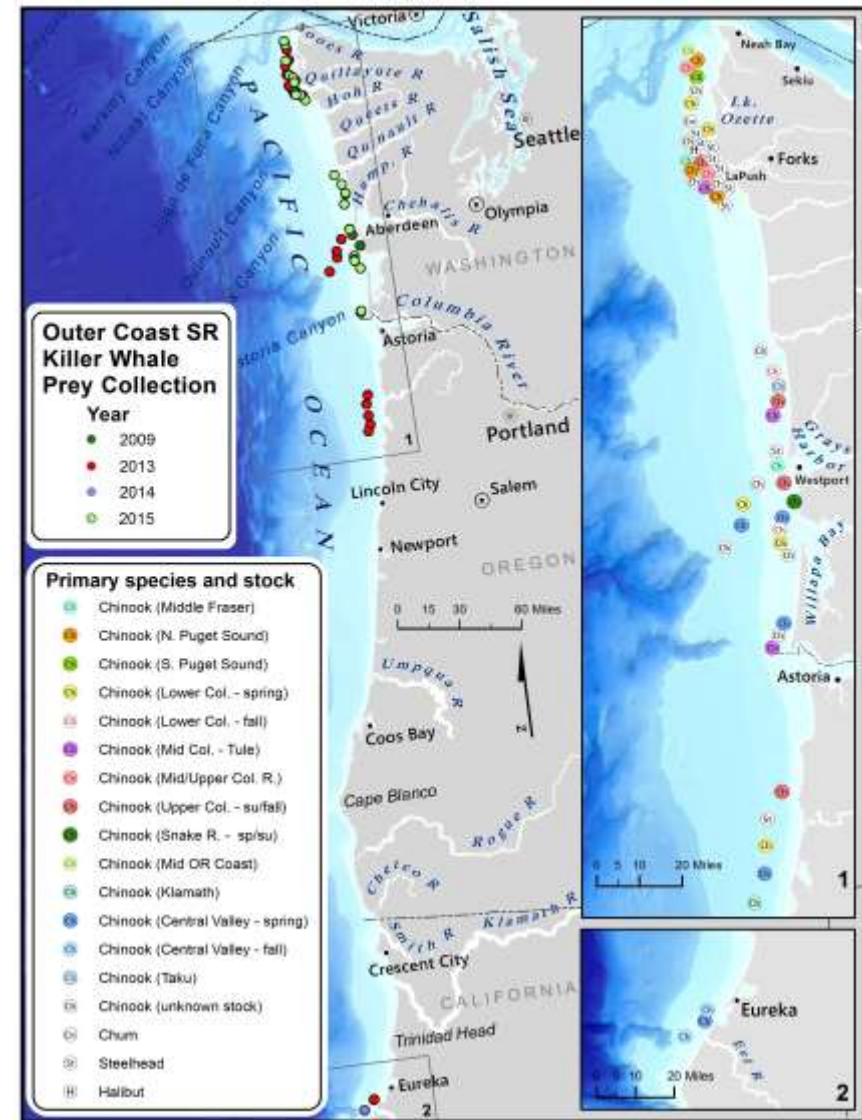
Fraser River Chinook are majority of diet in Salish Sea in summer time



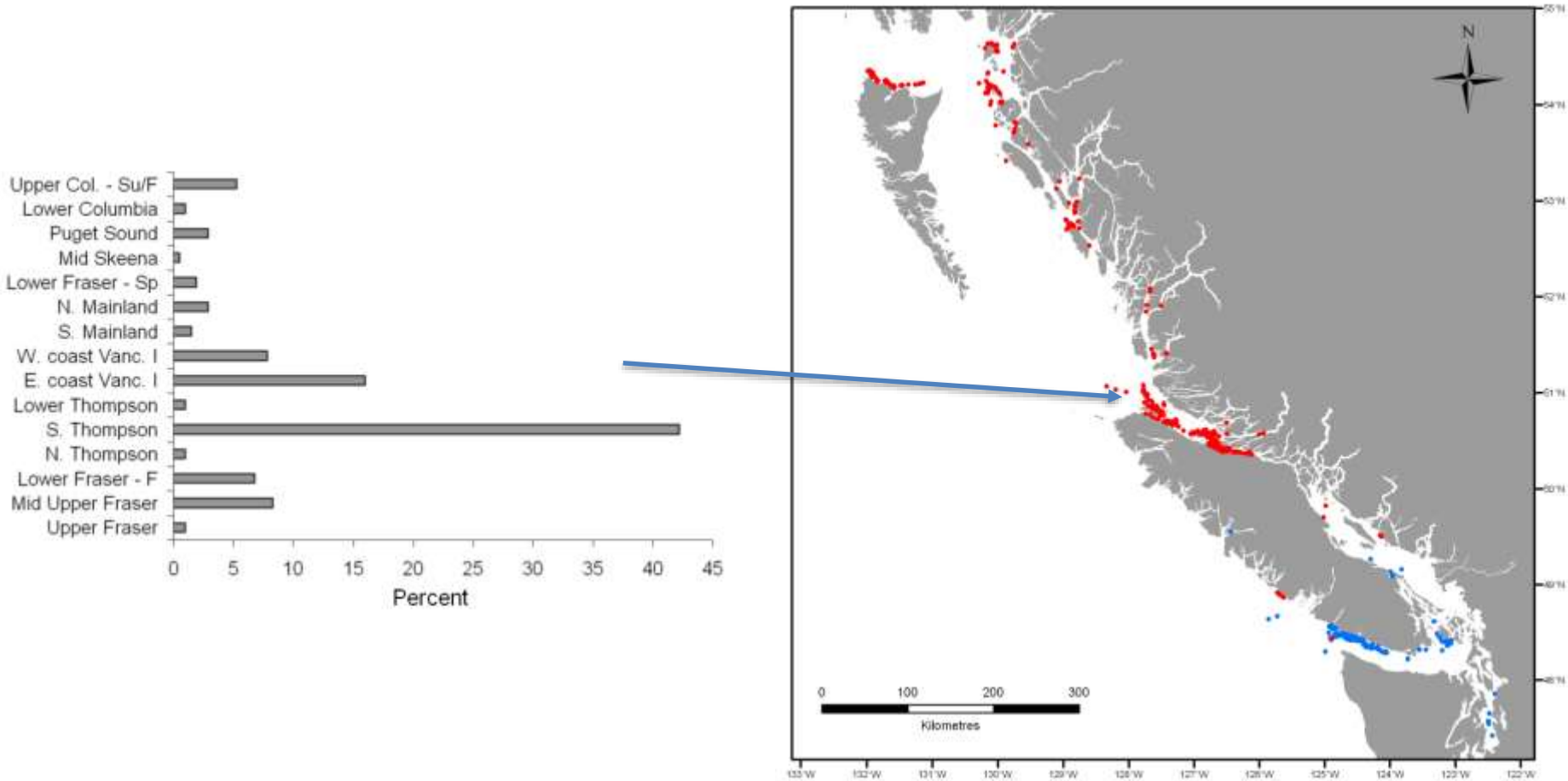
Hanson et al. 2010 and unpublished data

Whale eat a variety of Chinook stocks in the winter

- ~65% Puget Sound while in Puget Sound
- ~50% Columbia River while on coast
- Wide variety of other stocks

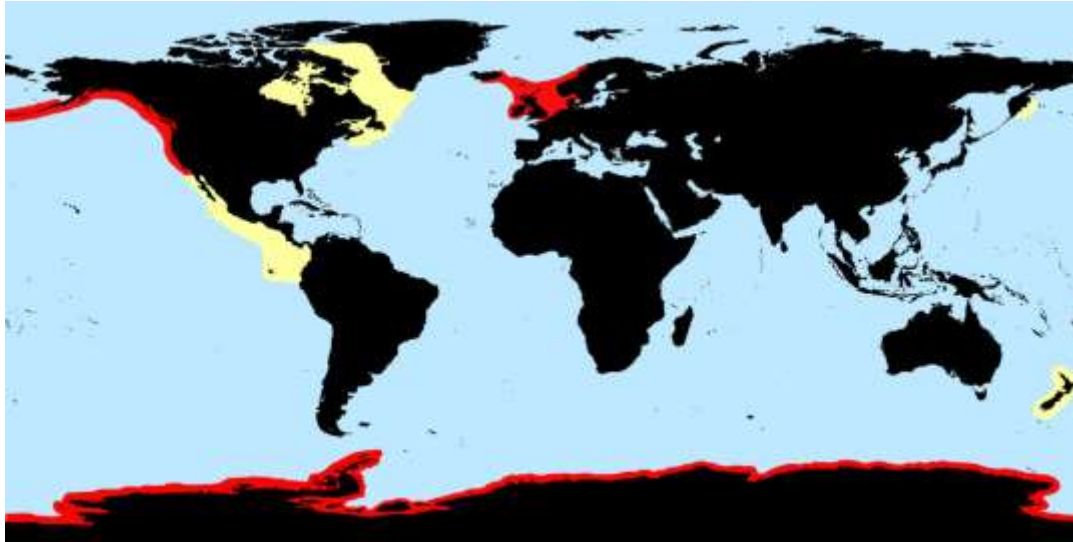


Comparison to Northern Resident killer whale Chinook consumption (summer)



Ford, J.K.B, Wright, B.M., Ellis, G.M., and Candy, J.R. 2010. Chinook salmon predation by resident killer whales: seasonal and regional selectivity, stock identity of prey, and consumption rates. DFO Can. Sci. Advis. Sec. Res. Doc. 2009/101. iv + 43 p.

Globally diverse diet



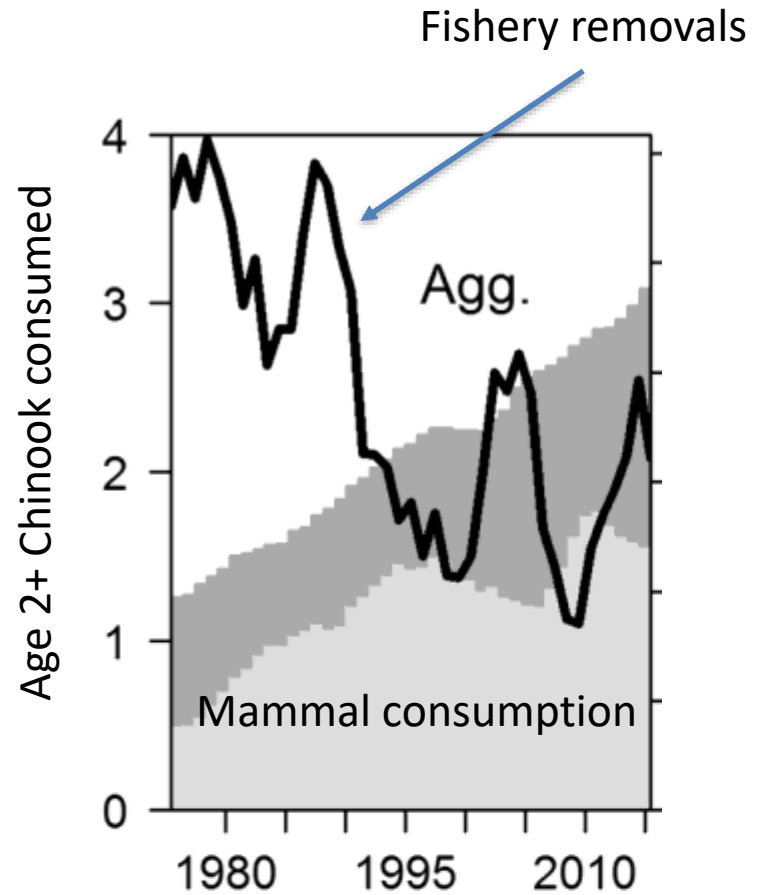
- >100 prey species
- Marine mammals
- Birds
- Reptiles
- Invertebrates
- Fish
 - Salmon
 - Herring
 - Toothfish

Southern residents are just one of many predator populations

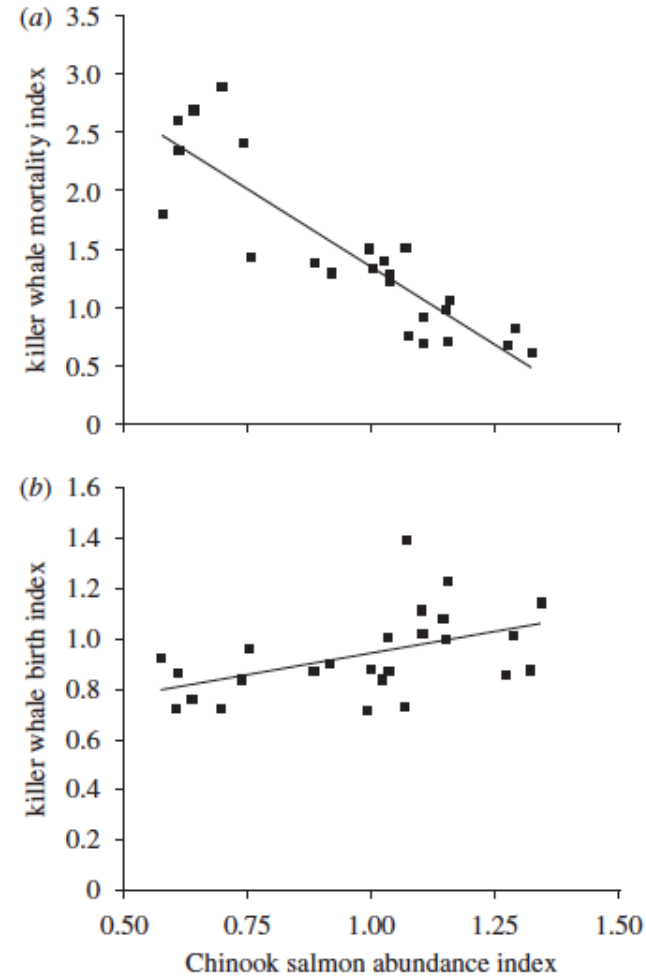
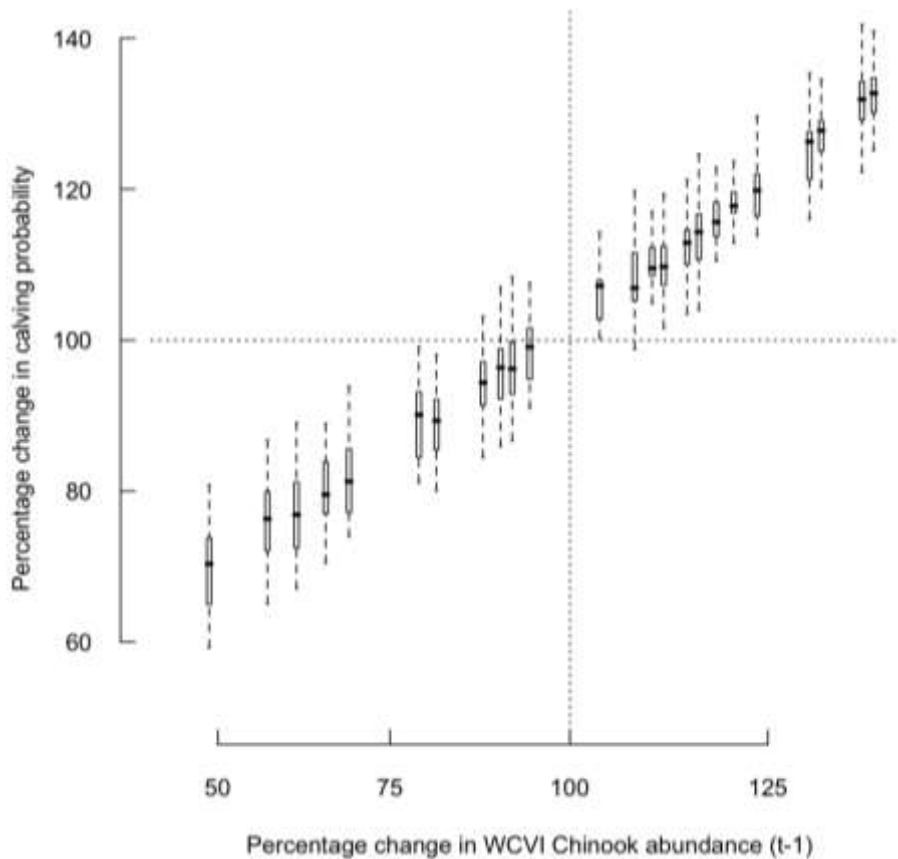


Austen C. Thomas¹, Alejandro Acevedo-Gutierrez²,
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deaths between
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Whale survival and birth rate is correlated with Chinook abundance



Demographic correlations weakened over time

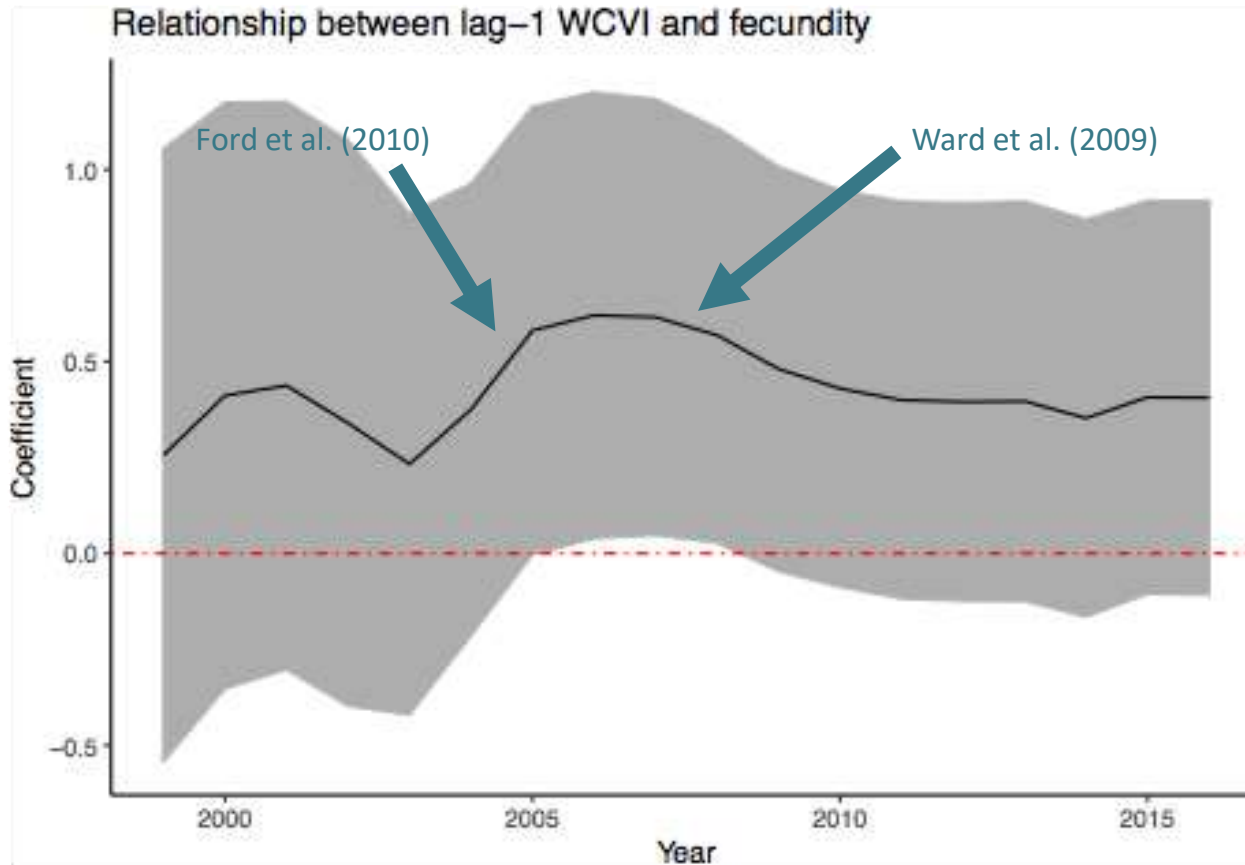
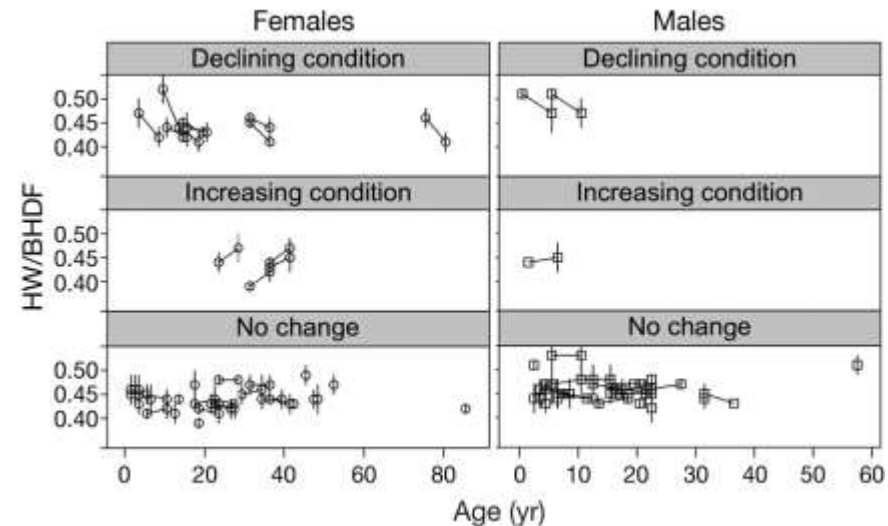


Figure 1: Estimated relationship between SRKW fecundity and WCVI salmon indices. The estimation model is identical to Ward et al. (2013) and includes NRKW data through 2010. Estimates for each year are estimated using data up to that year. The WCVI index starts in 1979.

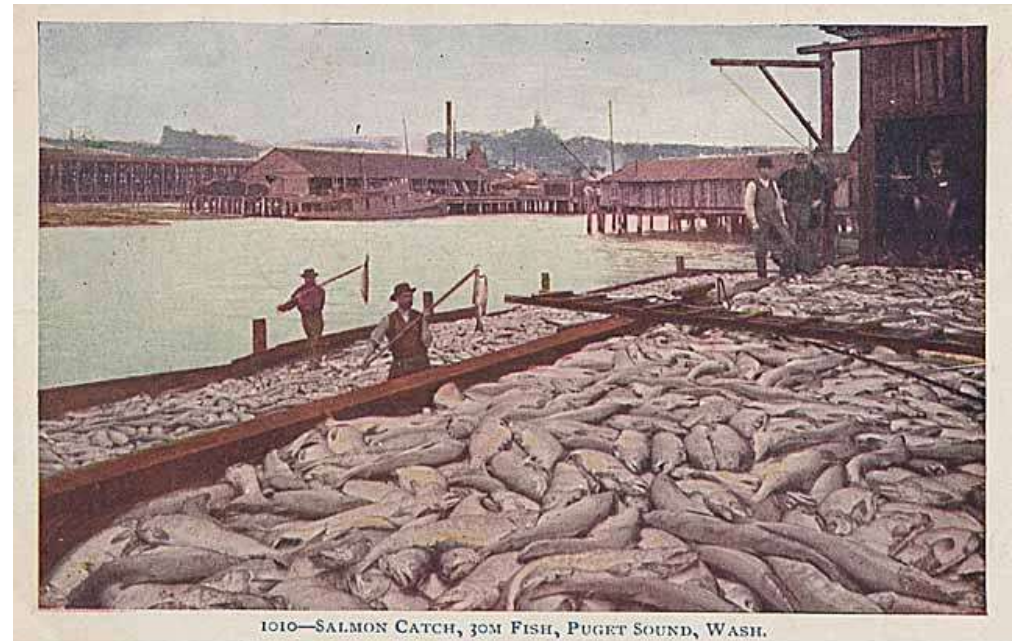
Evidence for nutritional stress?

- Changes in body shape – Fearnbach et al. 2018
- High fetal loss rate – Wasser et al. 2017

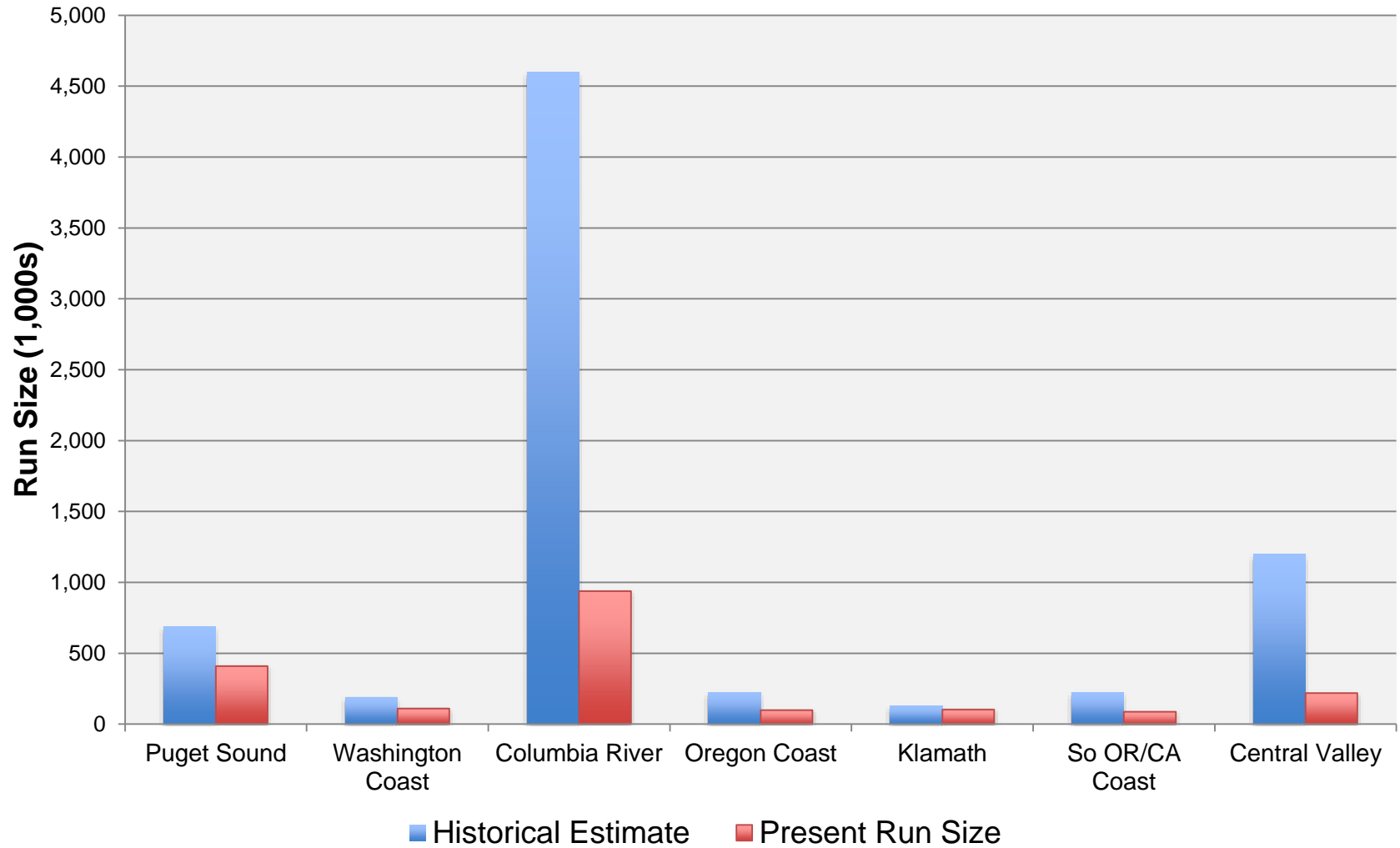


Overview of salmon status

- Historical abundance
- Long and short-term trends
- Focus on Chinook salmon

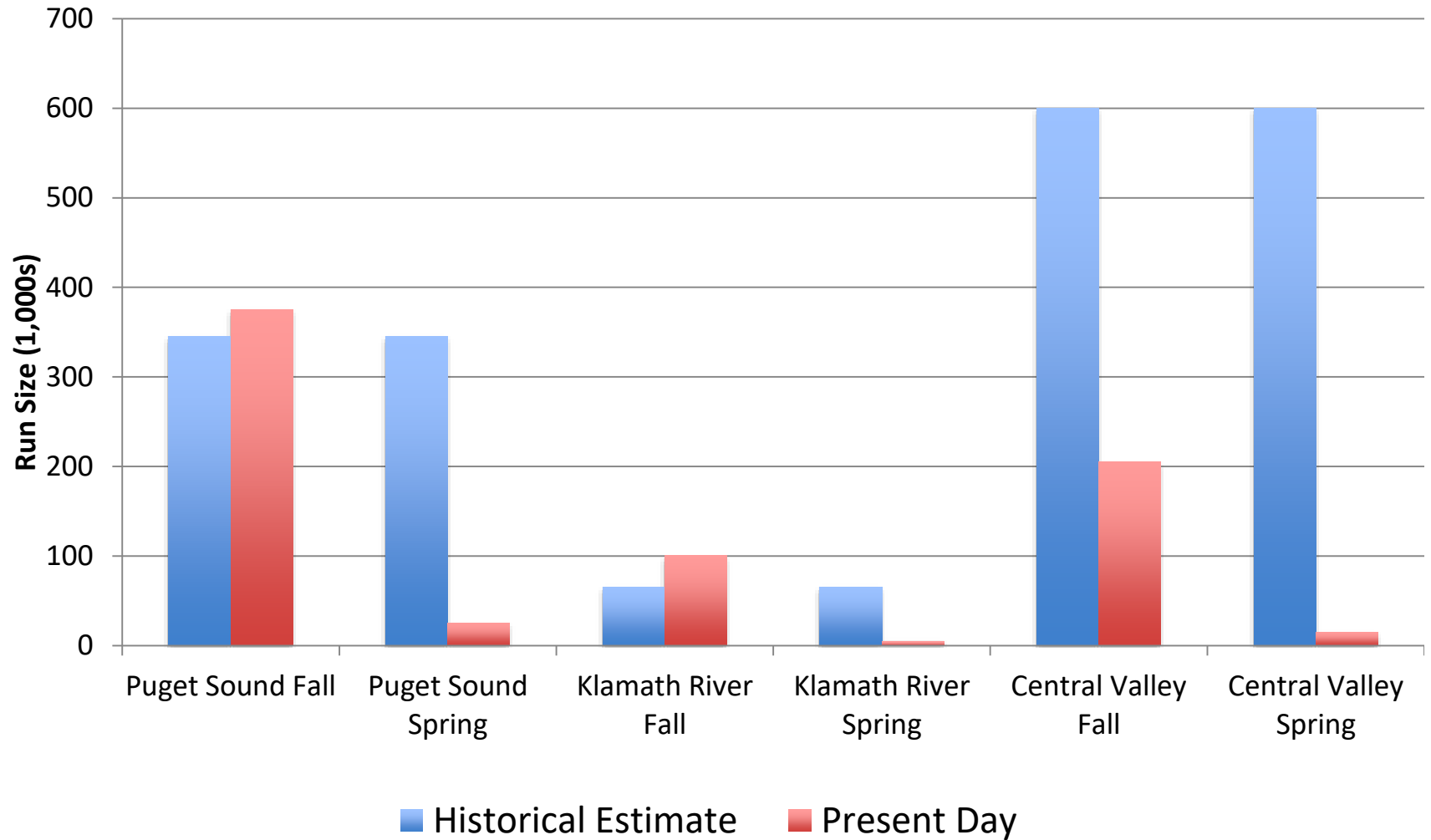


Historical Chinook salmon abundance

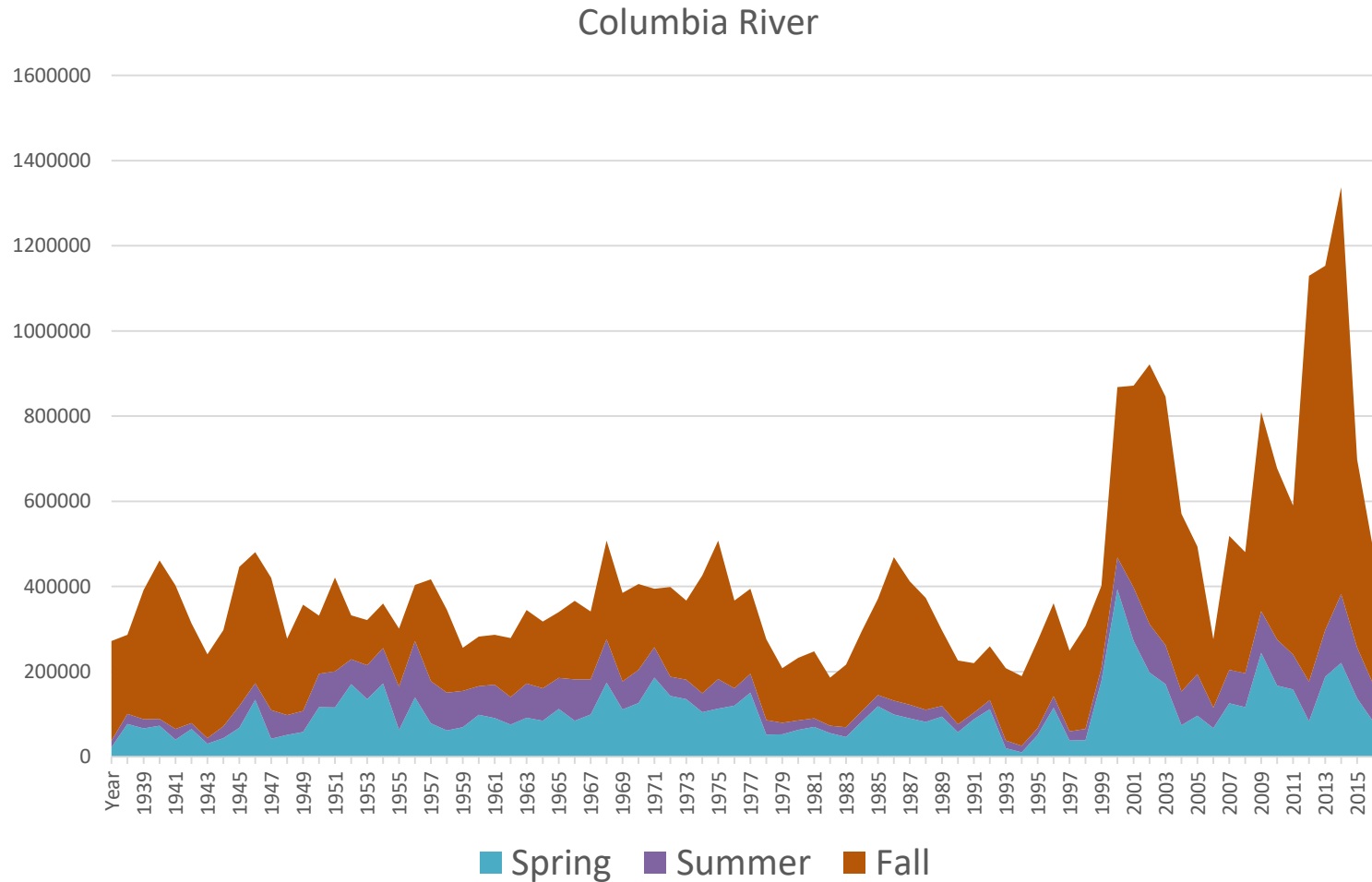


Source: Various, compiled by Jim Myers NWFSC

Run Timing Changes

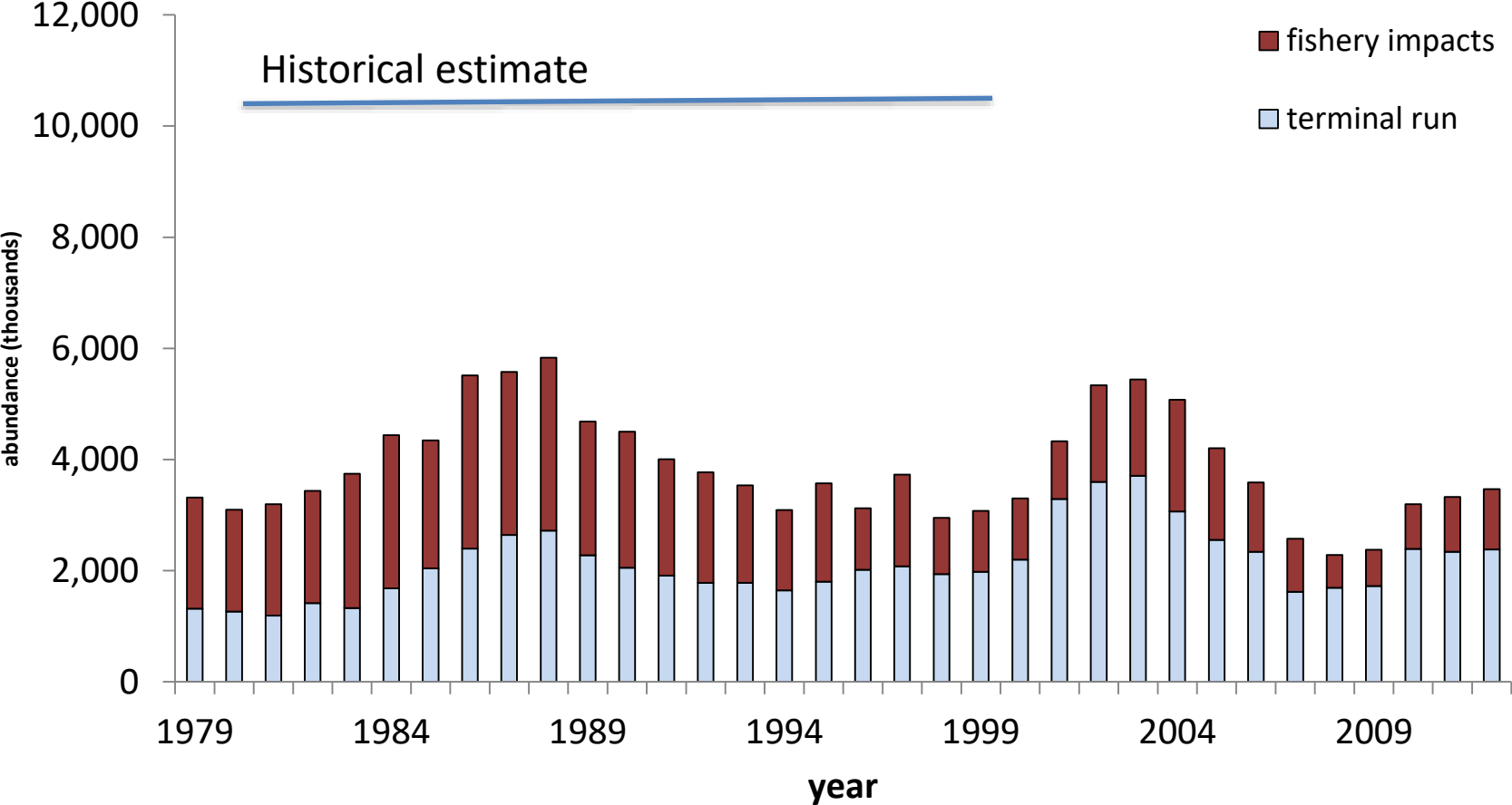


Abundance trends over the past 40-70 years



Bonneville Dam Chinook salmon counts – 1938 - 2017

Coast wide trend, BC to California



Source: Robert Kope / CTC

Salmon abundance summary

- CA: Highly variable, some years of collapse
- OR/WA coast and Columbia: Chinook abundance generally increased last 10-20 years
- Salish Sea: Chinook abundance generally steady last 10-20 years
- Fraser: Mixed and variable

Do the whales have enough to eat?

On the one hand

- Some whales in poor condition prior to death
- Correlations with salmon
- Many salmon populations are low compared to historical abundance

One the other hand

- Lots of potential causes of poor condition
- Other populations with similar diet are doing fine
- Some recent salmon trends have been positive but little response from whales



Questions?

How to prioritize?

- What will benefit the SRKW preferentially?
 - Overlap in time and space
- What will have opportunities rapid and effective increases in abundance?
- What will not adversely impact ESA-listed salmon recovery?
- Current stocks in diet may not reflect optimum stocks in diet