

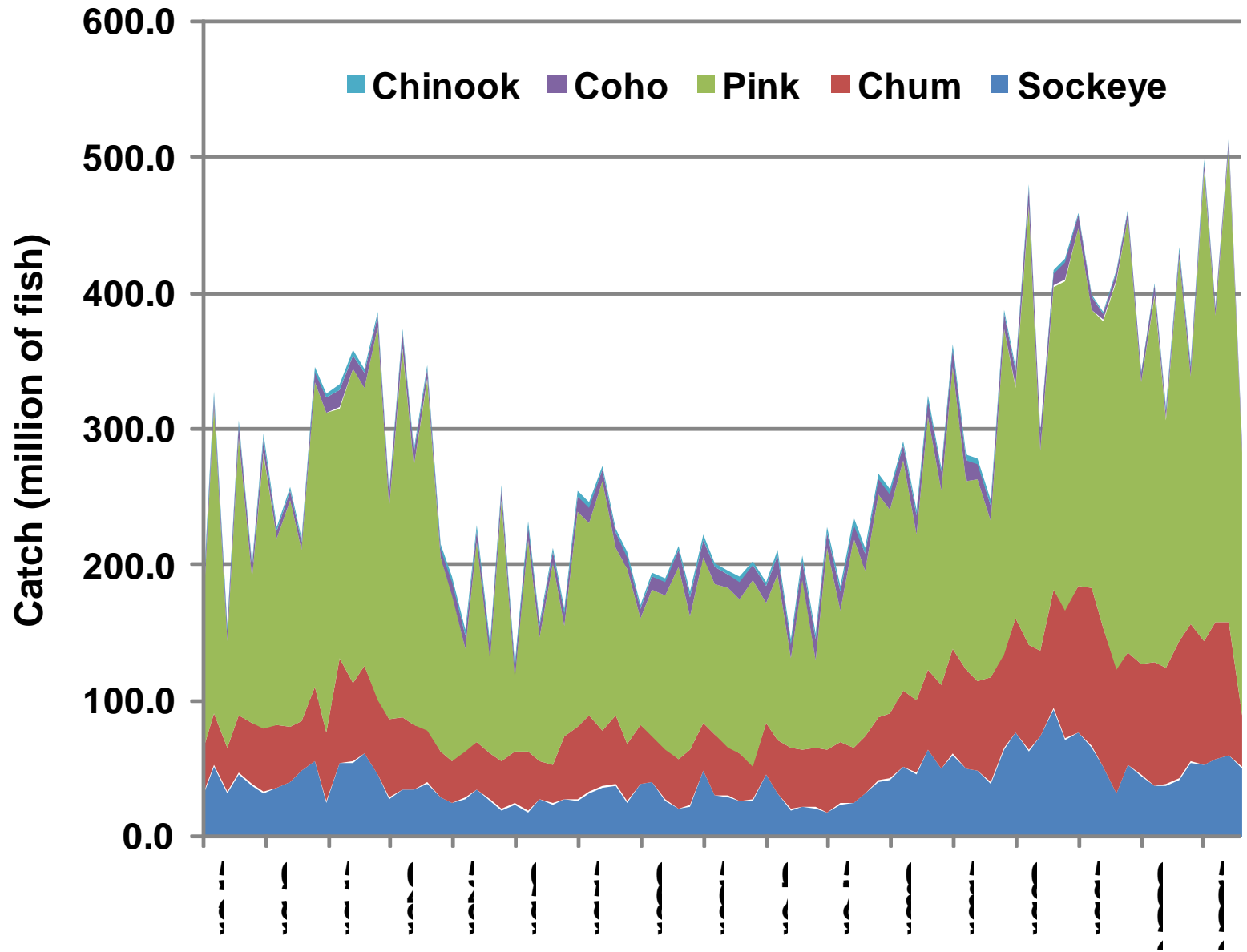
Regional Difference in Climate Factor Controlling Chum and Pink Salmon Abundance



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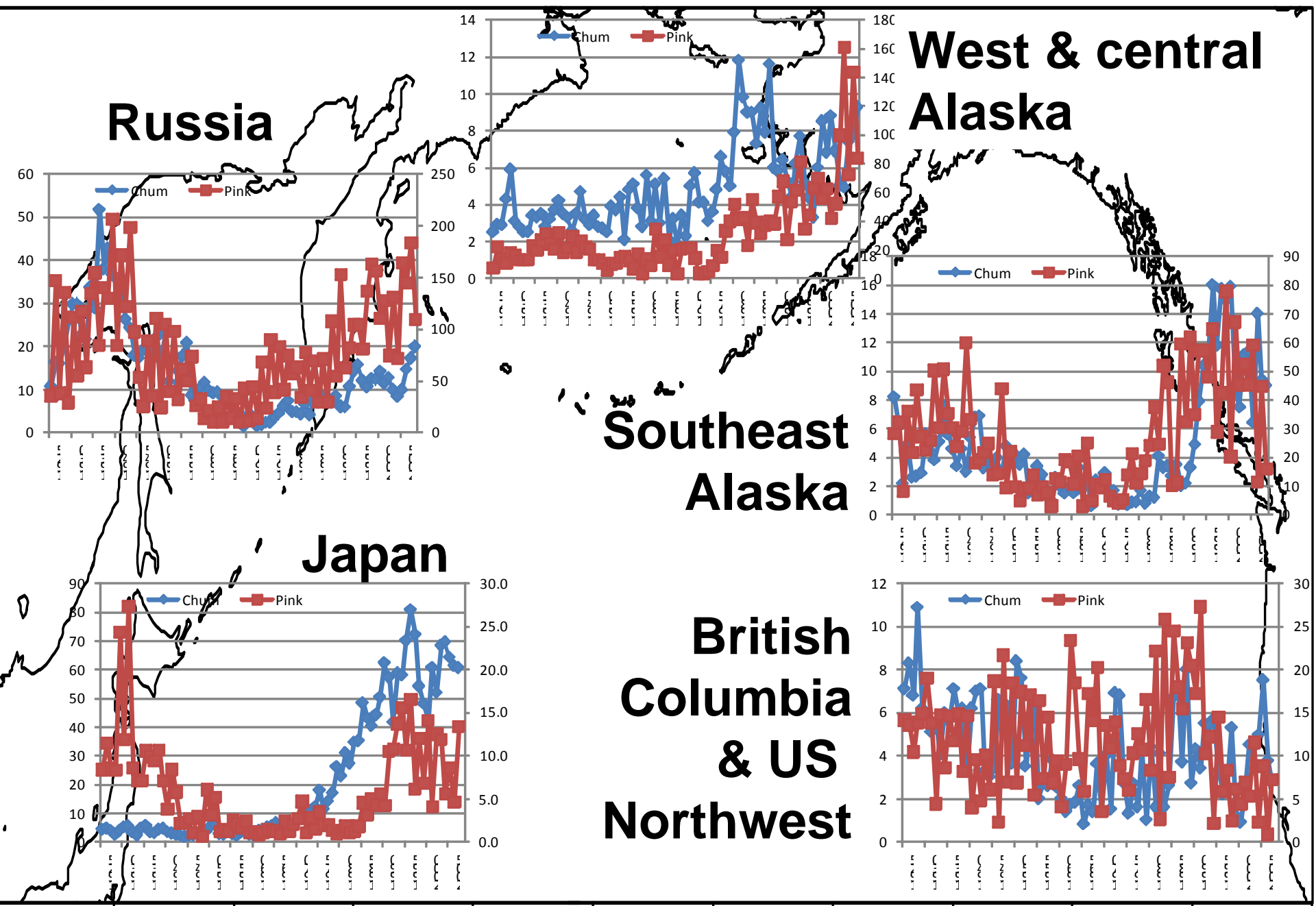


Pacific Salmon Commercial Catch



Peaked in 1930-40s and 1990-2000s

Regional catches seem to be synchronized



Questions

- How does climate change affect chum and pink salmon differently in various regions?
- Does recent climate change favor chum and pink salmon?

Index

- Abundance (catch) change per generation

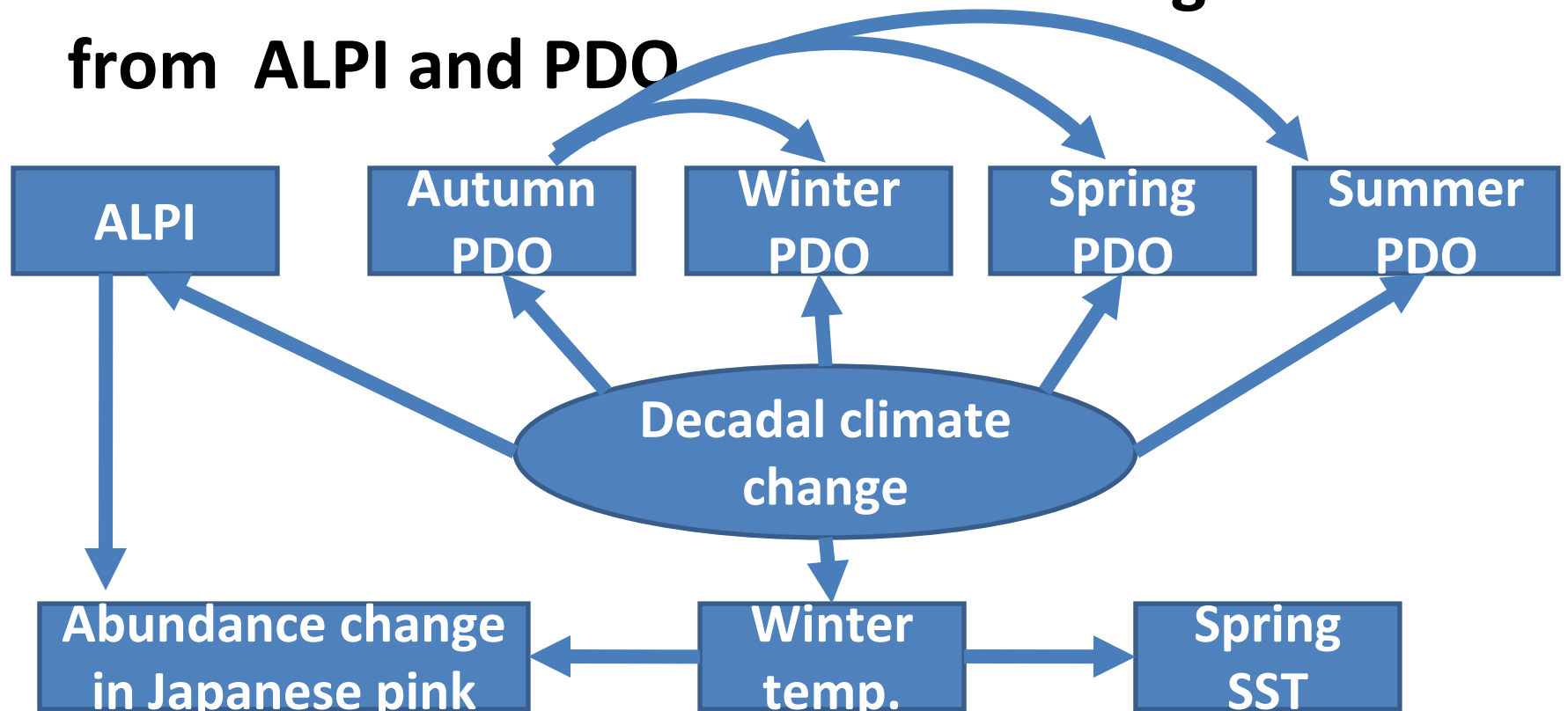
$$\ln(C_{t+T}/C_t) \approx \ln R_0$$

Analysis: Structural Equation Modeling

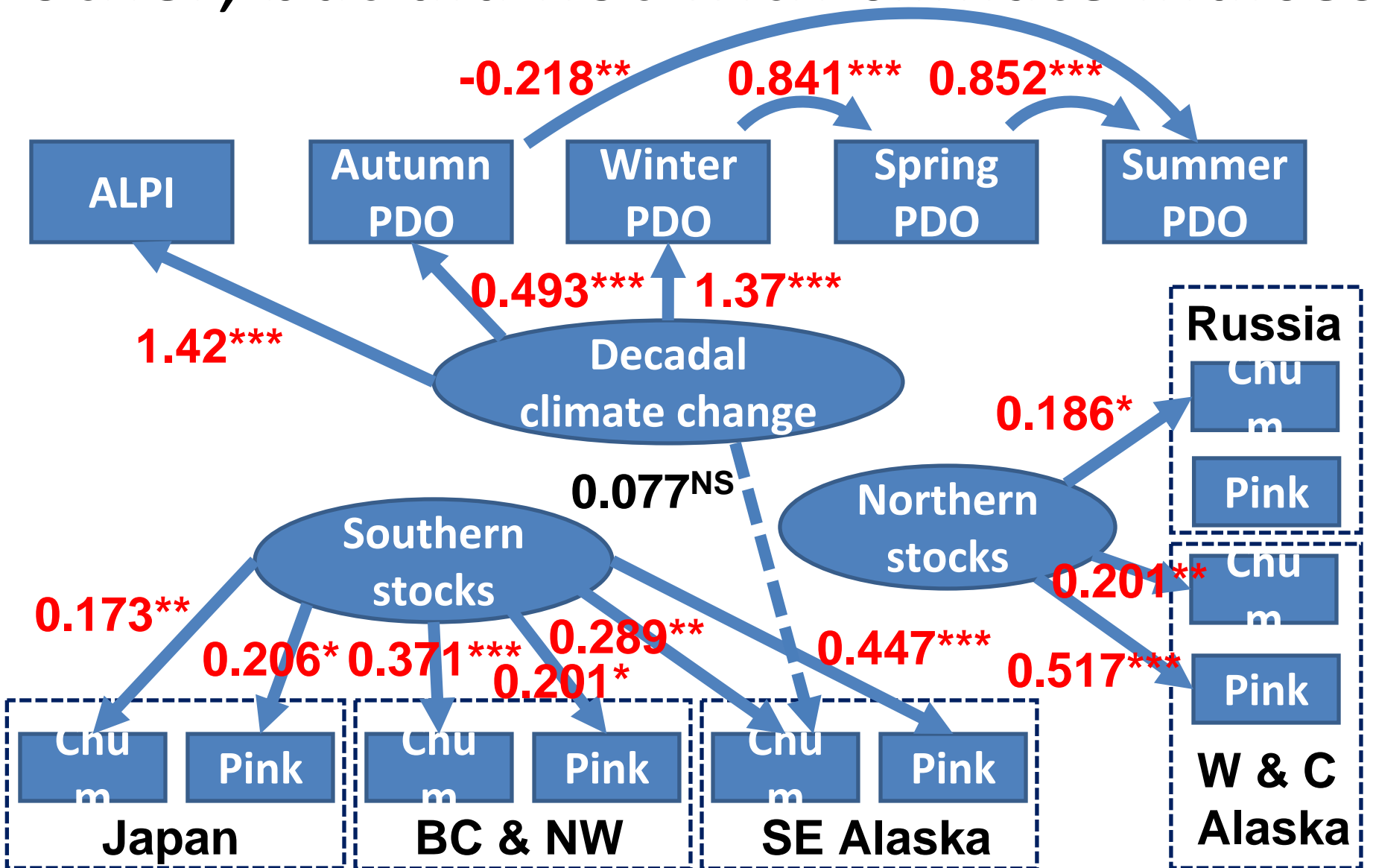
Backward elimination of paths by BIC

Climate factors: Temp., Precipitation, SST, PDO, ALPI

Latent variable: Decadal climate change extracted from ALPI and PDO



Abundance changes correlated each other, but did not with climate indices



What climate factors control salmon?

Stock	Climate factor	Path coeff.
Japan pink	Winter Temperature	0.174**
Russia chum	Winter Precipitation	-0.035**
Russia pink	Summer Temperature	-0.236**
BC & NW chum	Spring Precipitation	-0.014**
	Winter Temperature	0.136**
	Spring SST	-0.360**
BC & NW pink	Spring Precipitation	-0.015**
SE Alaska chum	Spring SST	0.484***
	Summer SST	-0.280*
	Summer Precipitation	0.013**
SE Alaska pink	Summer Precipitation	0.015**
W&C Alaska pink	Summer SST	0.327***

Red double-headed arrows indicate relationships between climate factors in the table:

- Between Winter Temperature and Winter Precipitation.
- Between Winter Precipitation and Summer Temperature.
- Between Summer Temperature and Spring Precipitation.
- Between Spring Precipitation and Winter Temperature.
- Between Winter Temperature and Spring SST.
- Between Spring SST and Spring Precipitation.
- Between Spring Precipitation and Spring SST.
- Between Spring SST and Summer SST.
- Between Summer SST and Summer Precipitation.
- Between Summer Precipitation and Summer SST.

Summary

- **Chum&pink catch peaks: 1930-40, 1990-2000s**
- **Climate indices: NOT~ abundance changes**
- **Climate factor controlling salmon abundance: Different among regions**
- **Some climate factors correlated among regions**

Conclusion

Response of chum and pink salmon stocks to global climate change can be different among regions.

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Photo by K. Morita