The Scientific Challenge of Establishing Appropriate Baselines for Restoration

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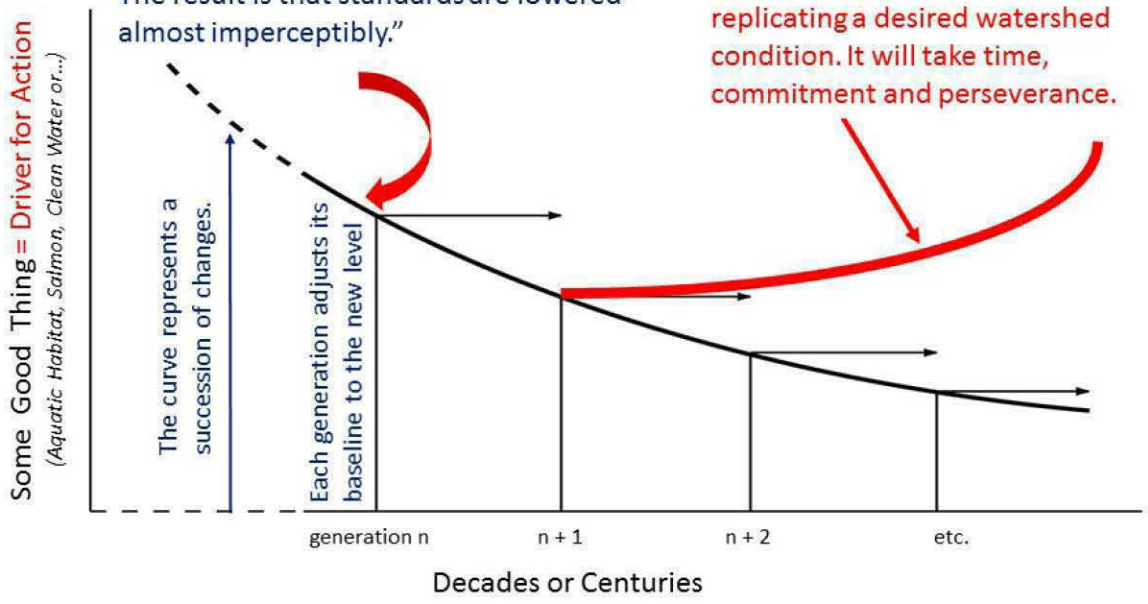
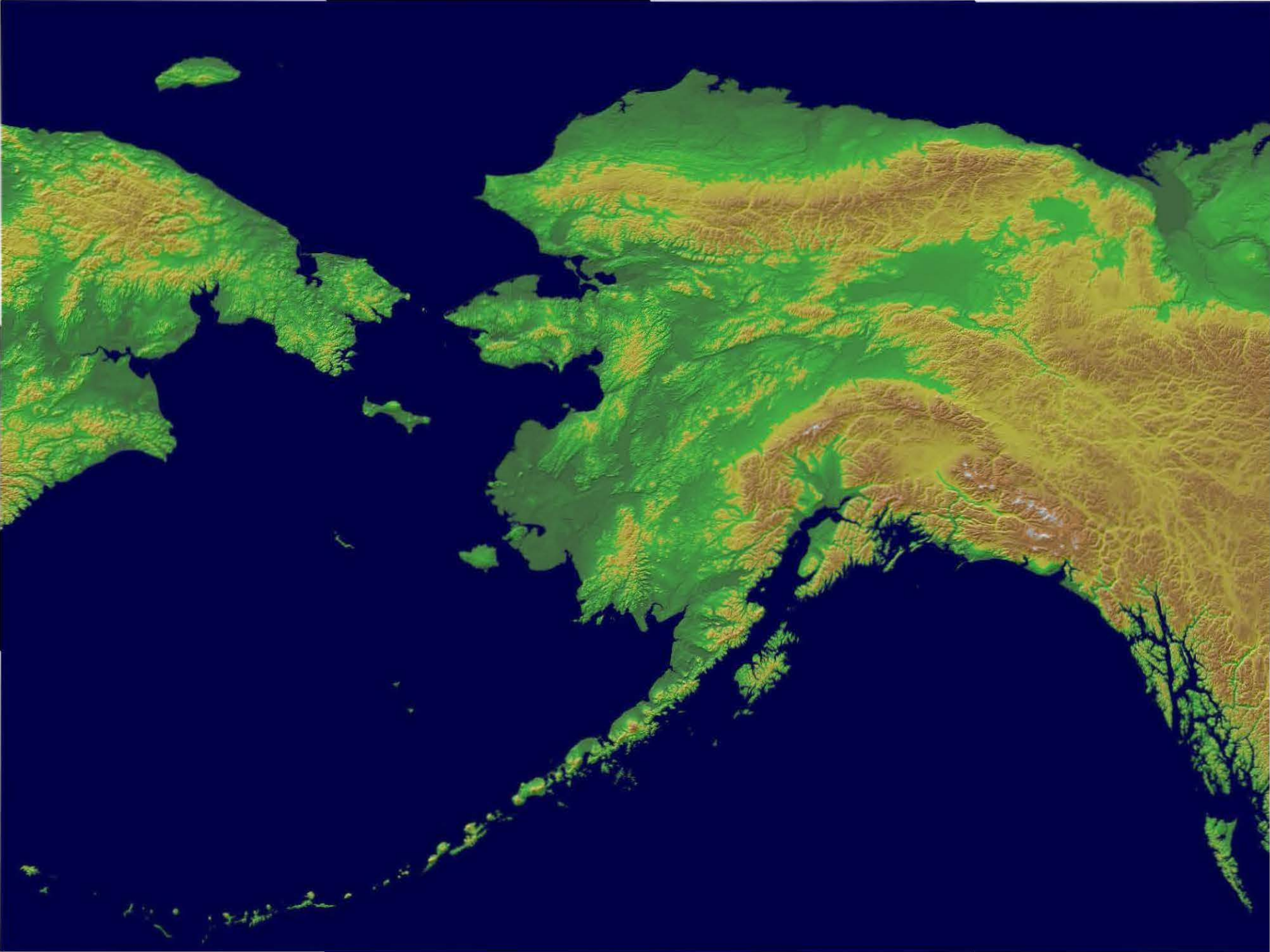
Shifting Baseline Syndrome

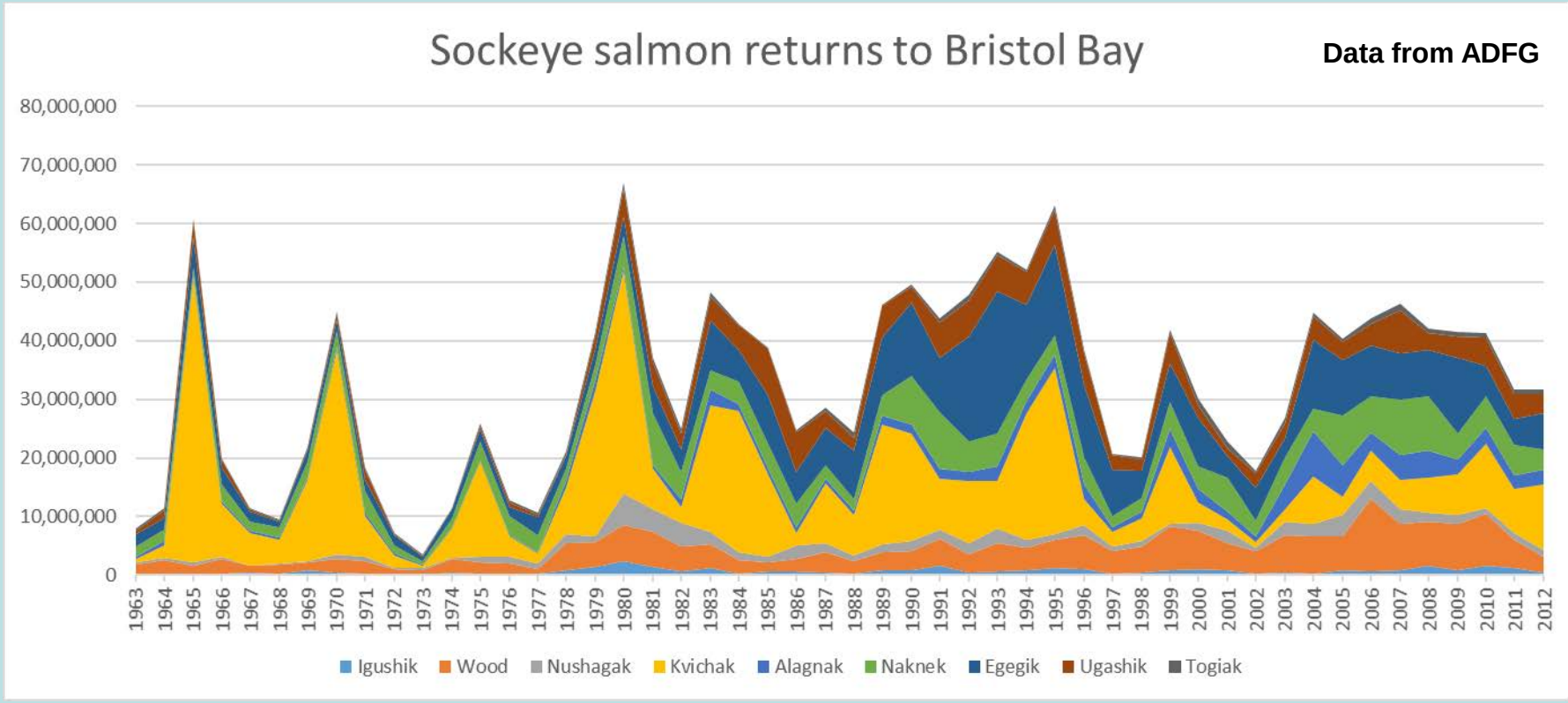
In 1995, Dr. Daniel Pauly coined the phrase
"Shifting Baseline Syndrome"

"With each new generation, the expectation of various ecological conditions shifts. The result is that standards are lowered almost imperceptibly."

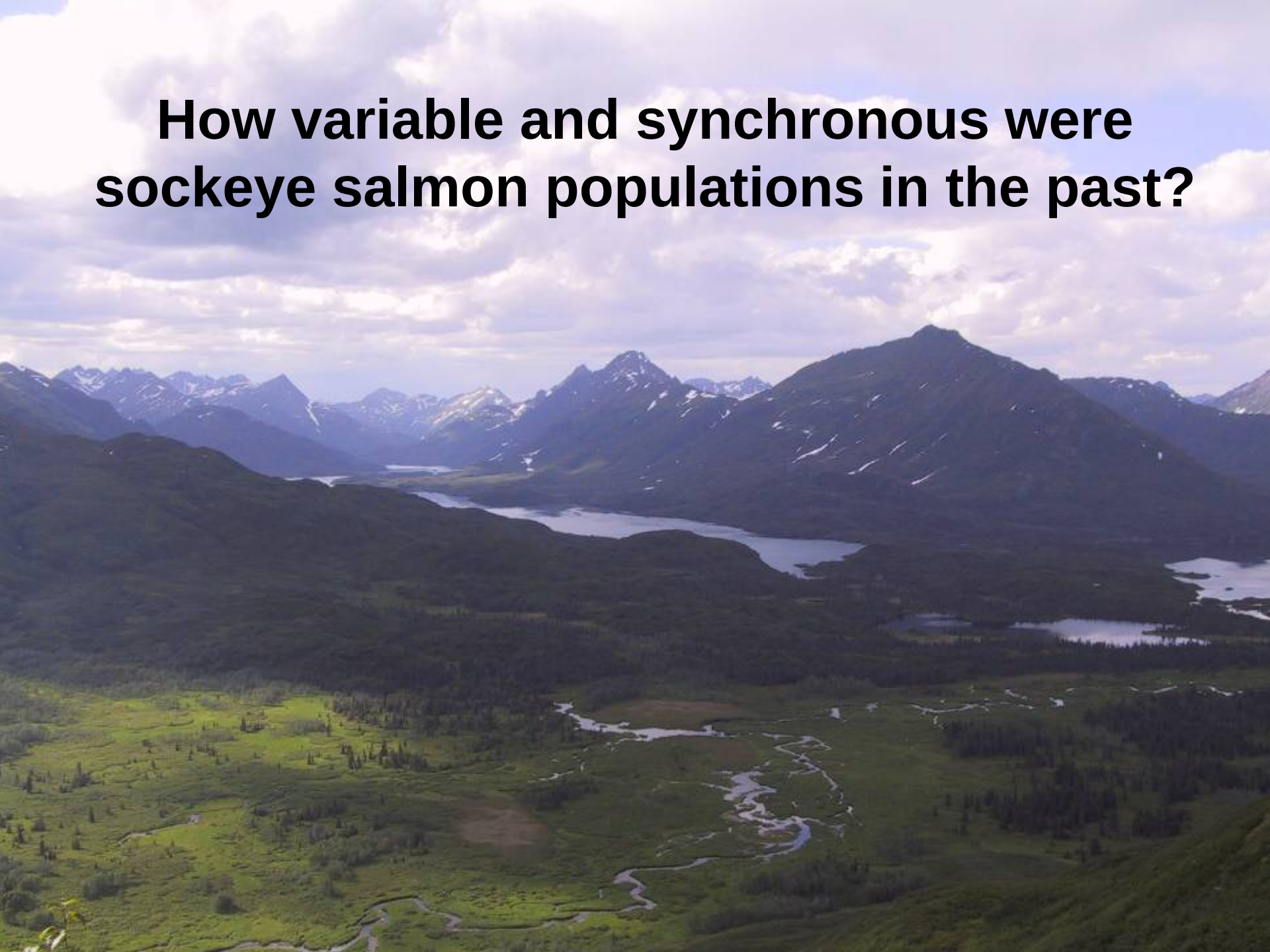
We can shift the baseline by replicating a desired watershed condition. It will take time, commitment and perseverance.





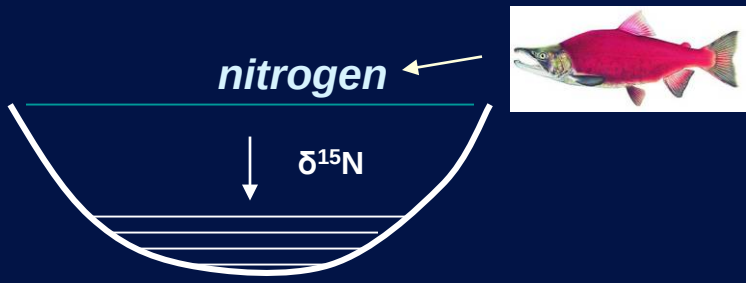


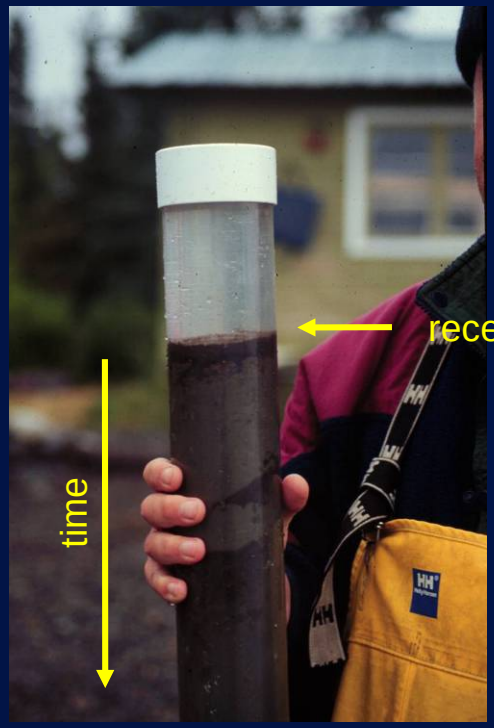
http://www.absc.usgs.gov/research/Fisheries/Lake_Clark/subsistence.htm


How variable and synchronous were sockeye salmon populations in the past?

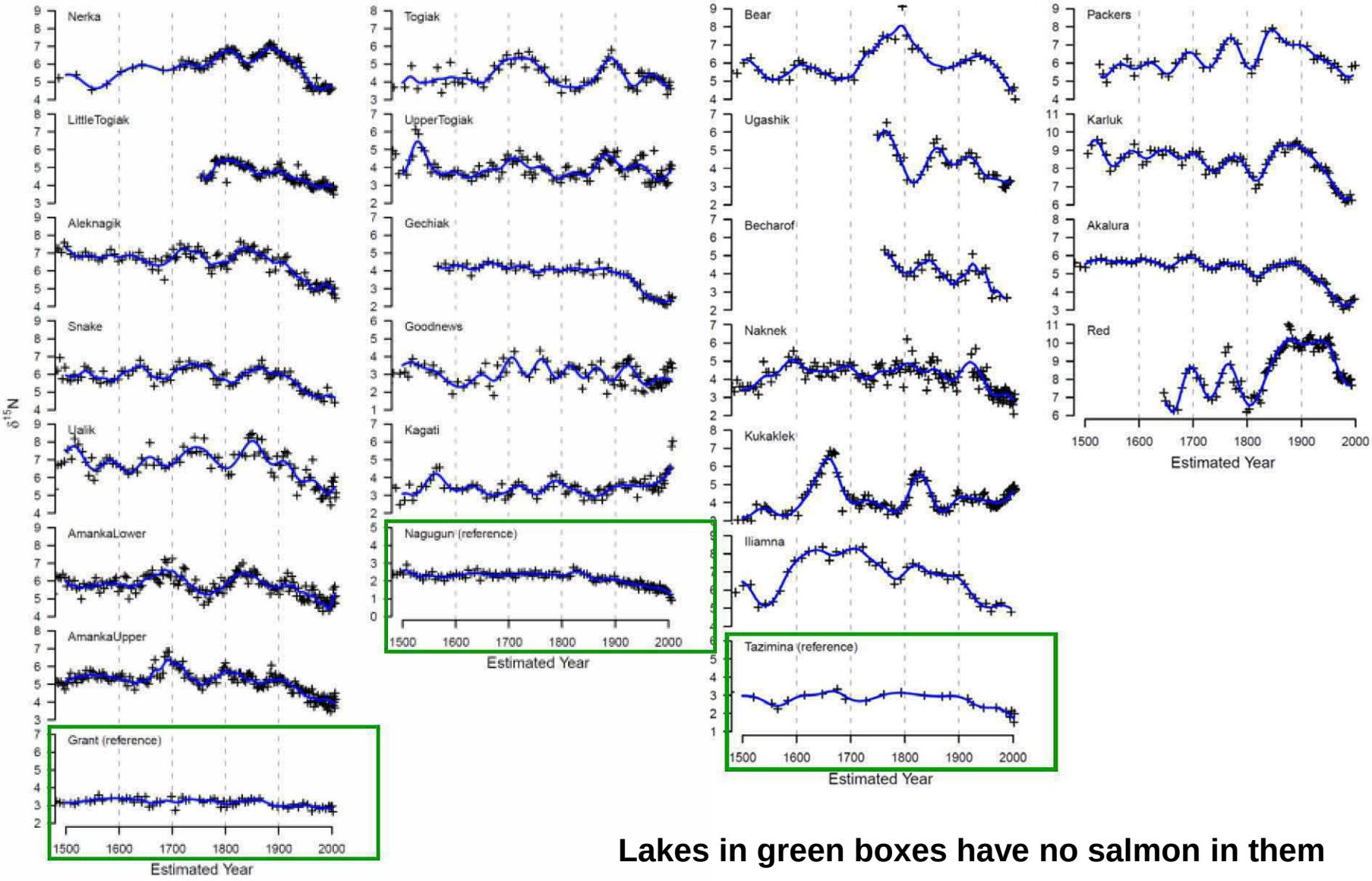
Paleolimnology

Lake sediments contain a biogeochemical archive that reflects salmon abundance (centuries to millenia)





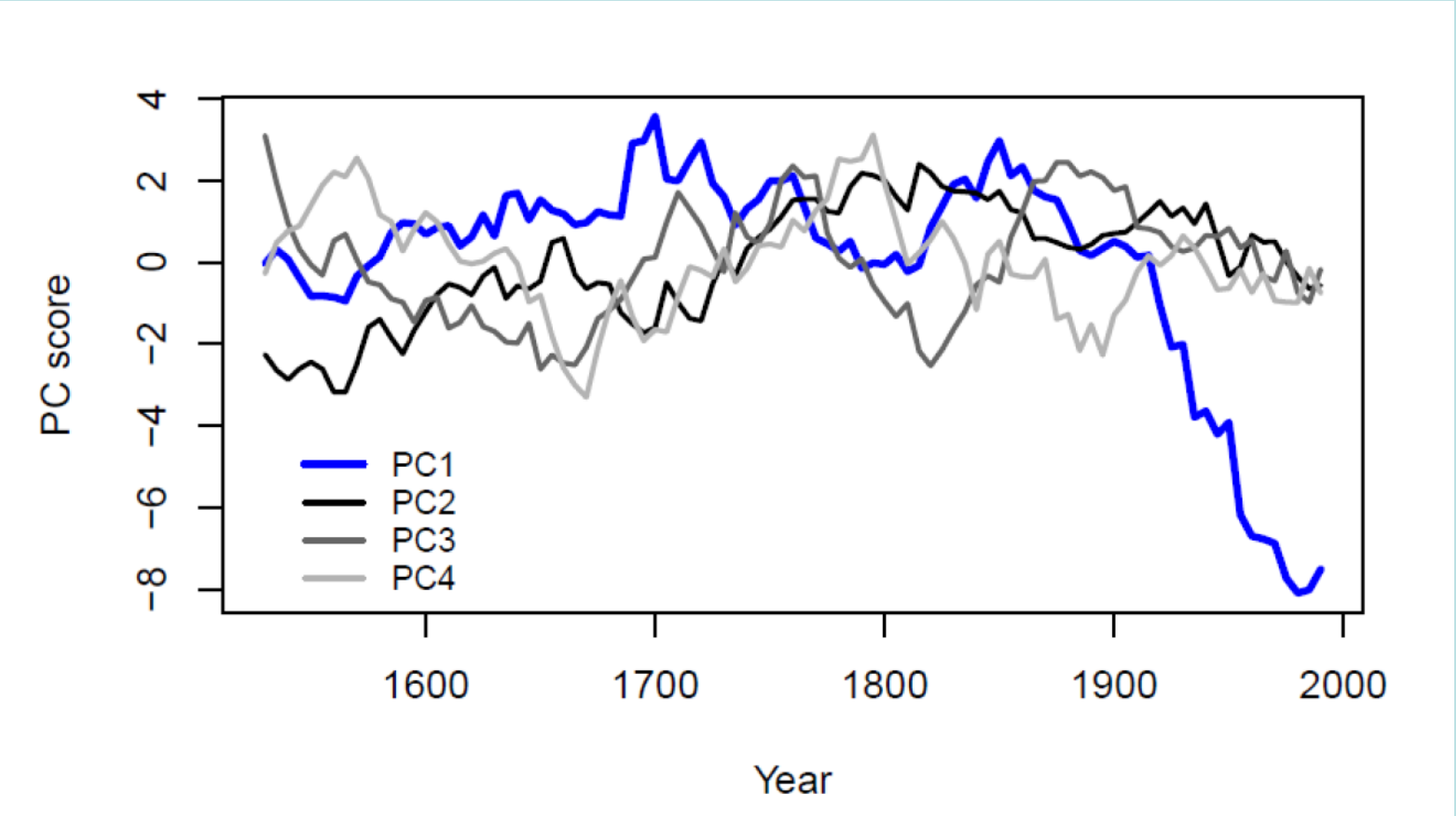
Variation in salmon returns to Alaskan lakes 1500-2000



Lakes in green boxes have no salmon in them

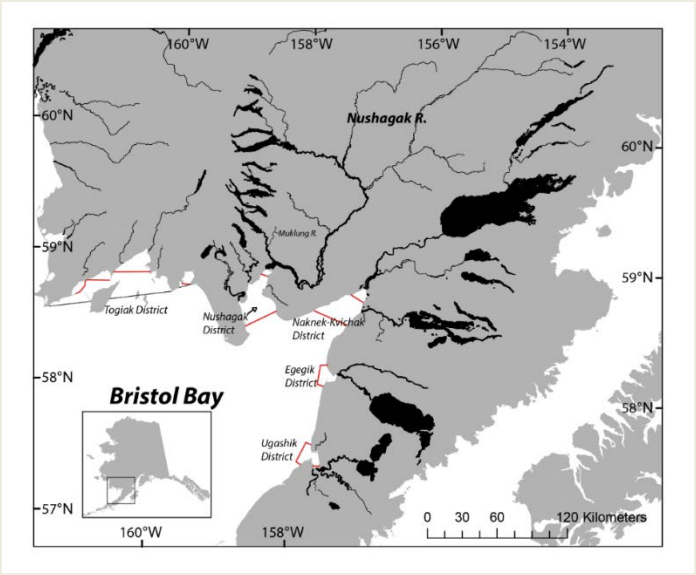
Rogers et al., PNAS 2003

Weak coherence in salmon population dynamics among stocks in western Alaska (1500-present)



Rogers et al. PNAS 2013

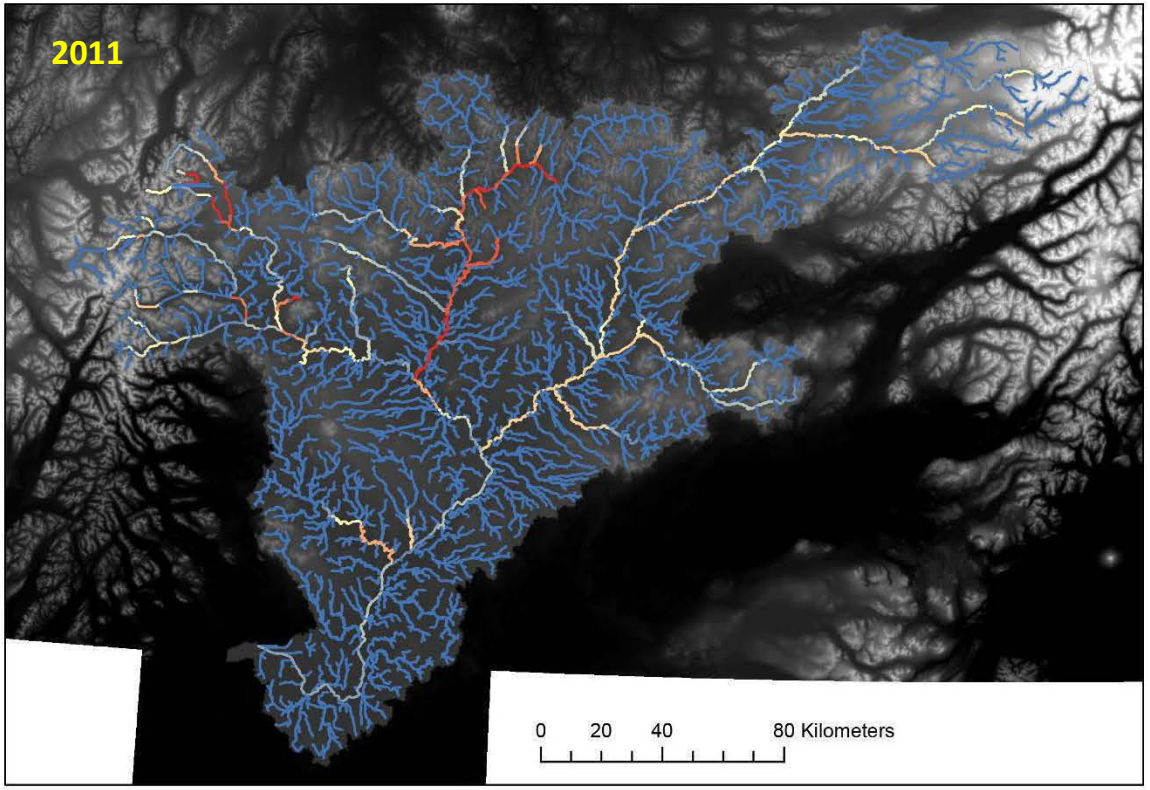
Chinook salmon – habitat use within watersheds (how consistent is production within individual tributaries?)



Chinook salmon production in the Nushagak River

Nushagak R.
2011 (n=255)

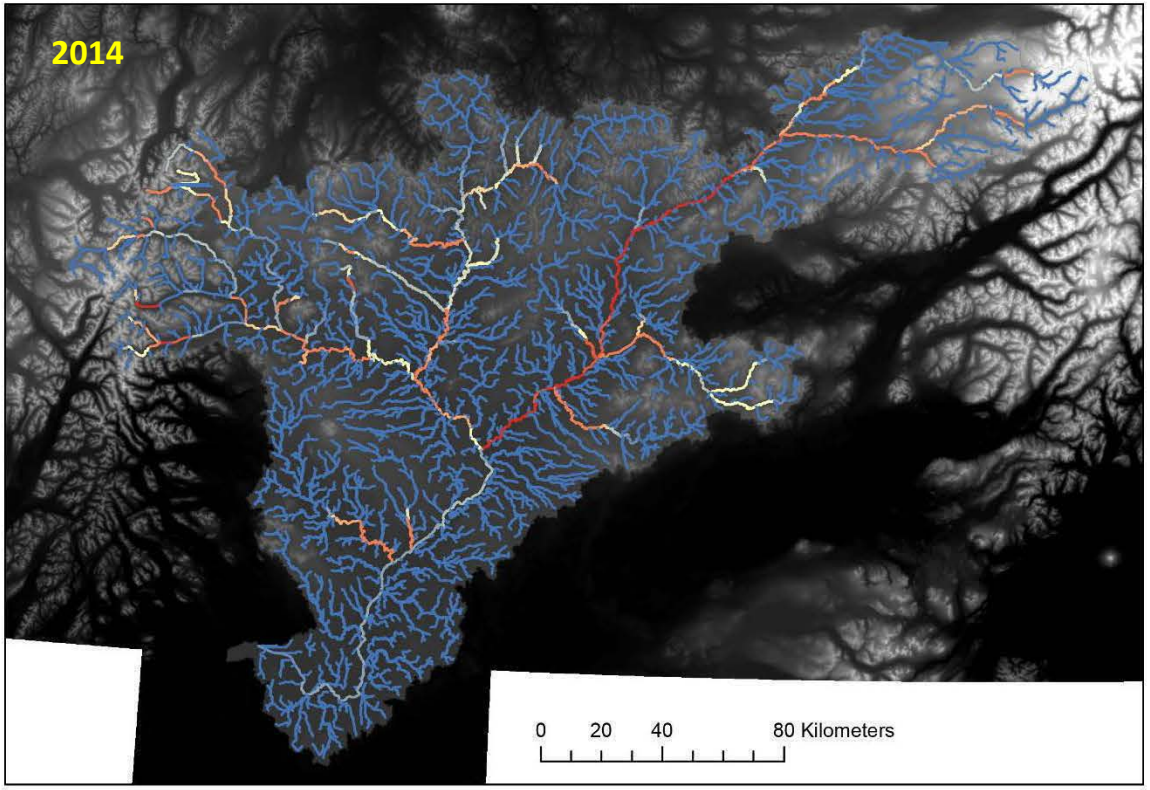
Brennan and Schindler, in press



Chinook salmon production in the Nushagak River

Nushagak R.
2014 (n=279)

Brennan and Schindler, in press

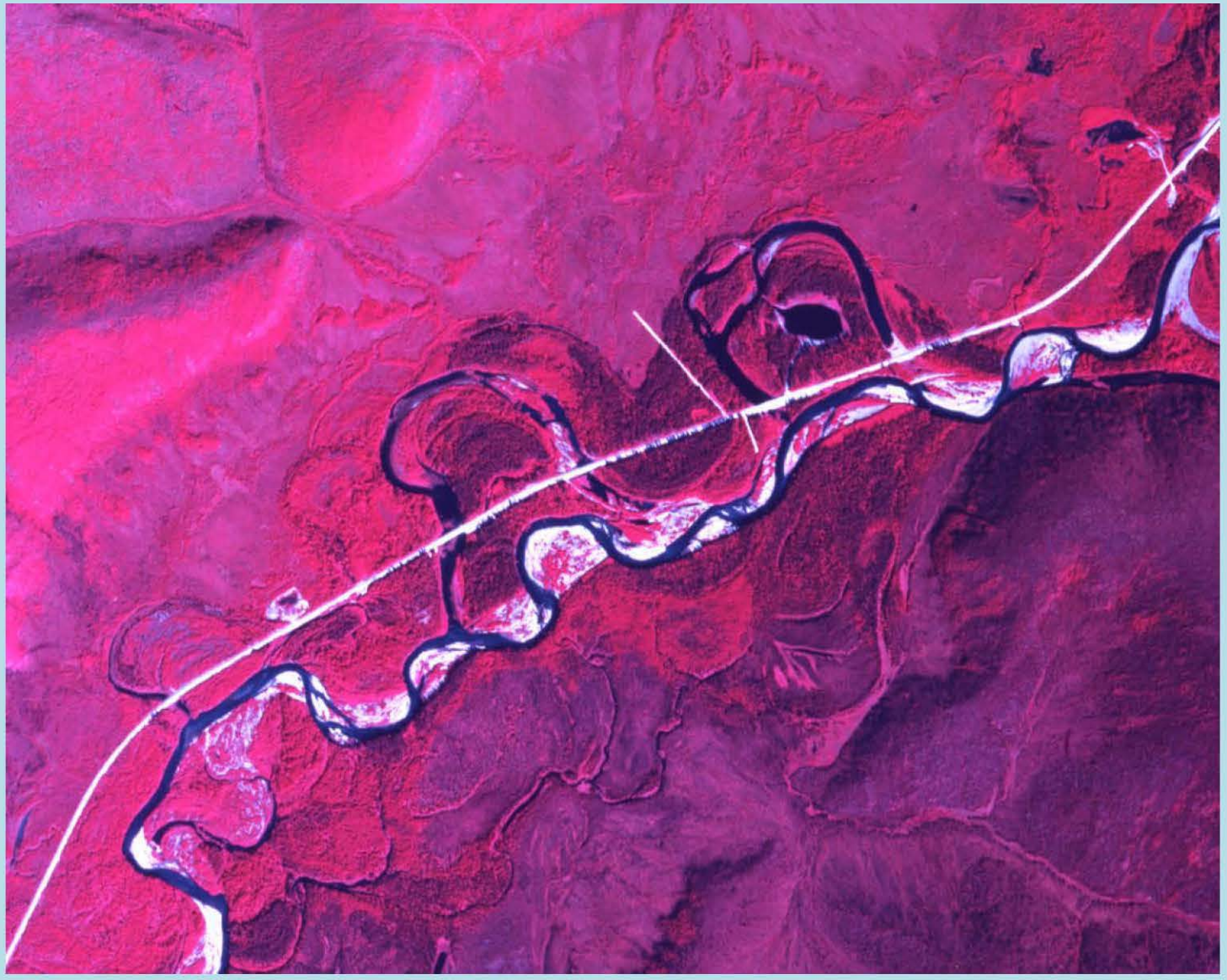


Fine scale thermal heterogeneity

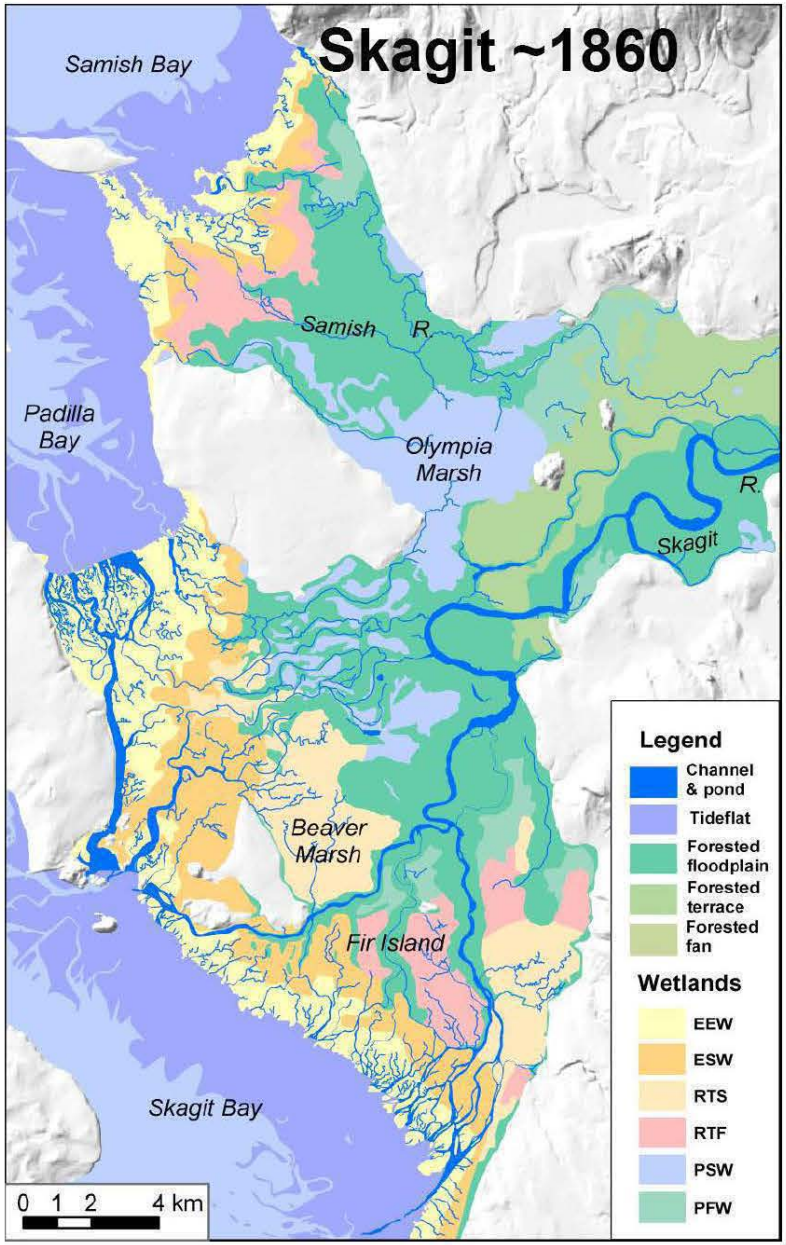
Habitat variation is also important at very small scales

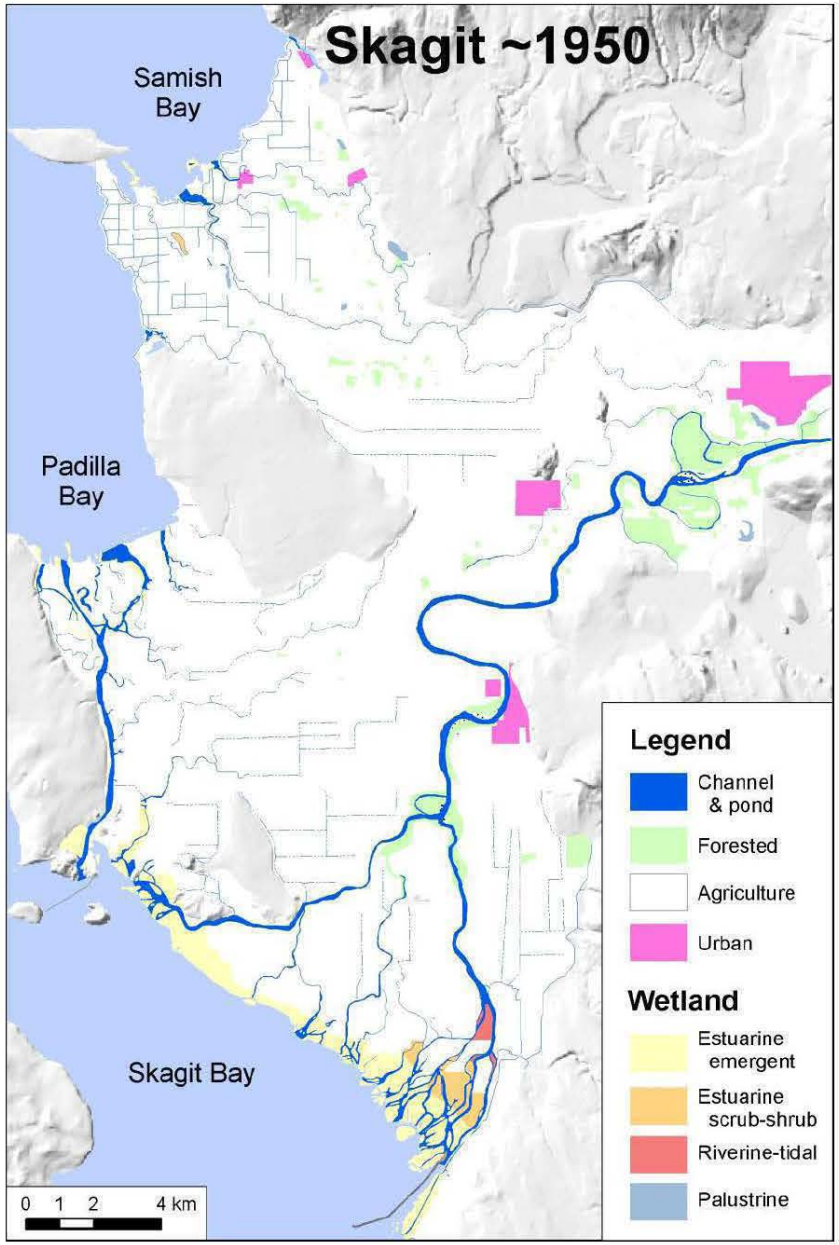
Bear Creek, 3km long

Chena River, Alaska



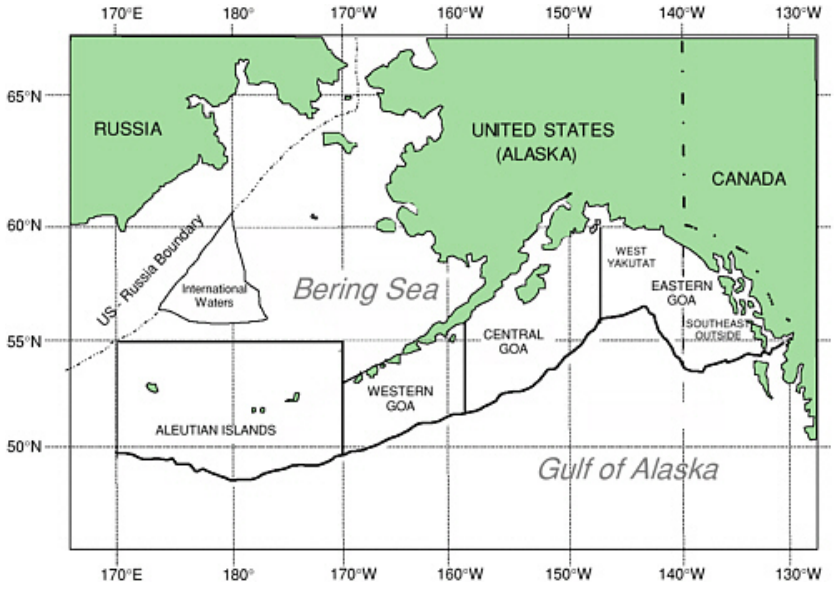
Courtesy of Chris Stark, UAF

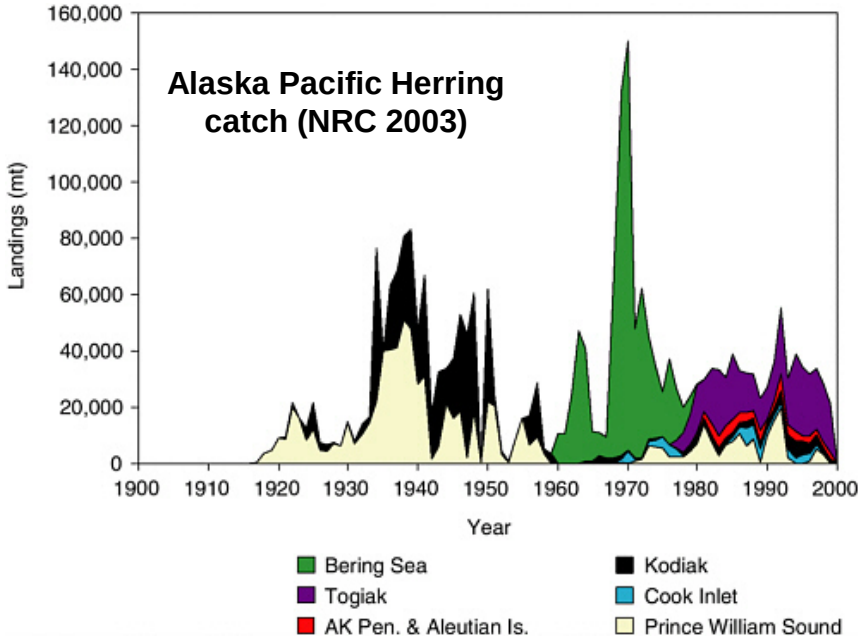




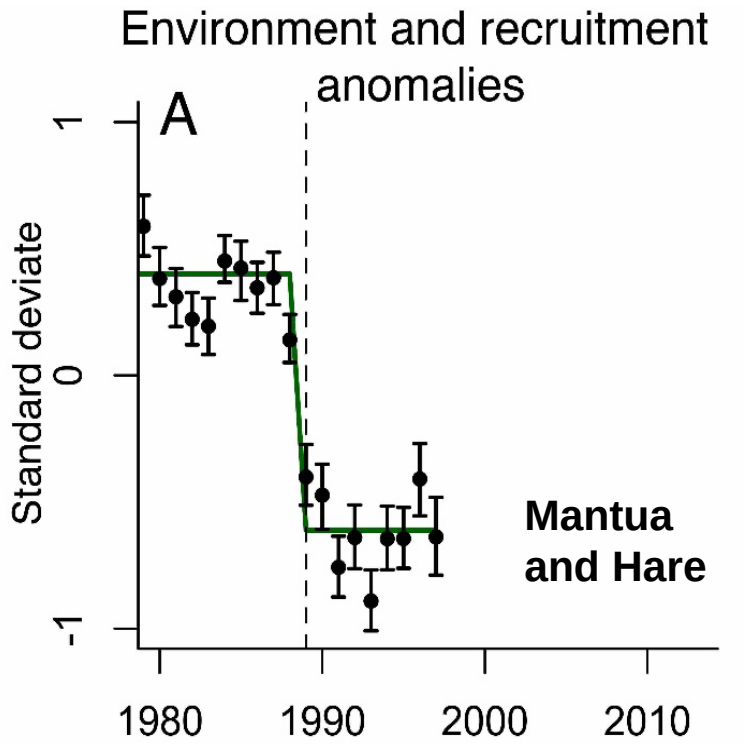
Collins, 2002

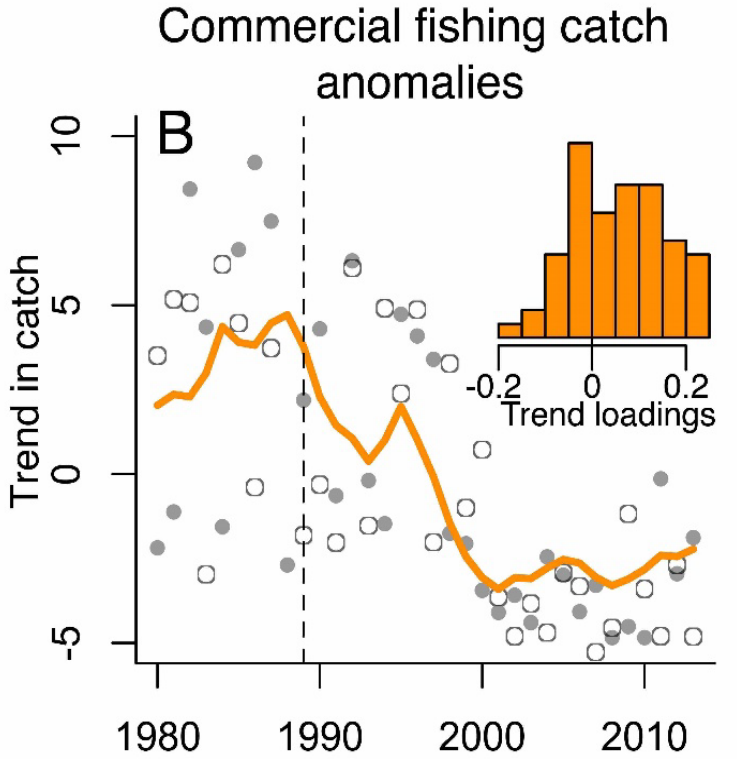
Ecosystems are continuously changing, sometimes smoothly, sometimes abruptly





Regime shift in N. Pacific in 1989 caused massive changes in catch and composition of fisheries

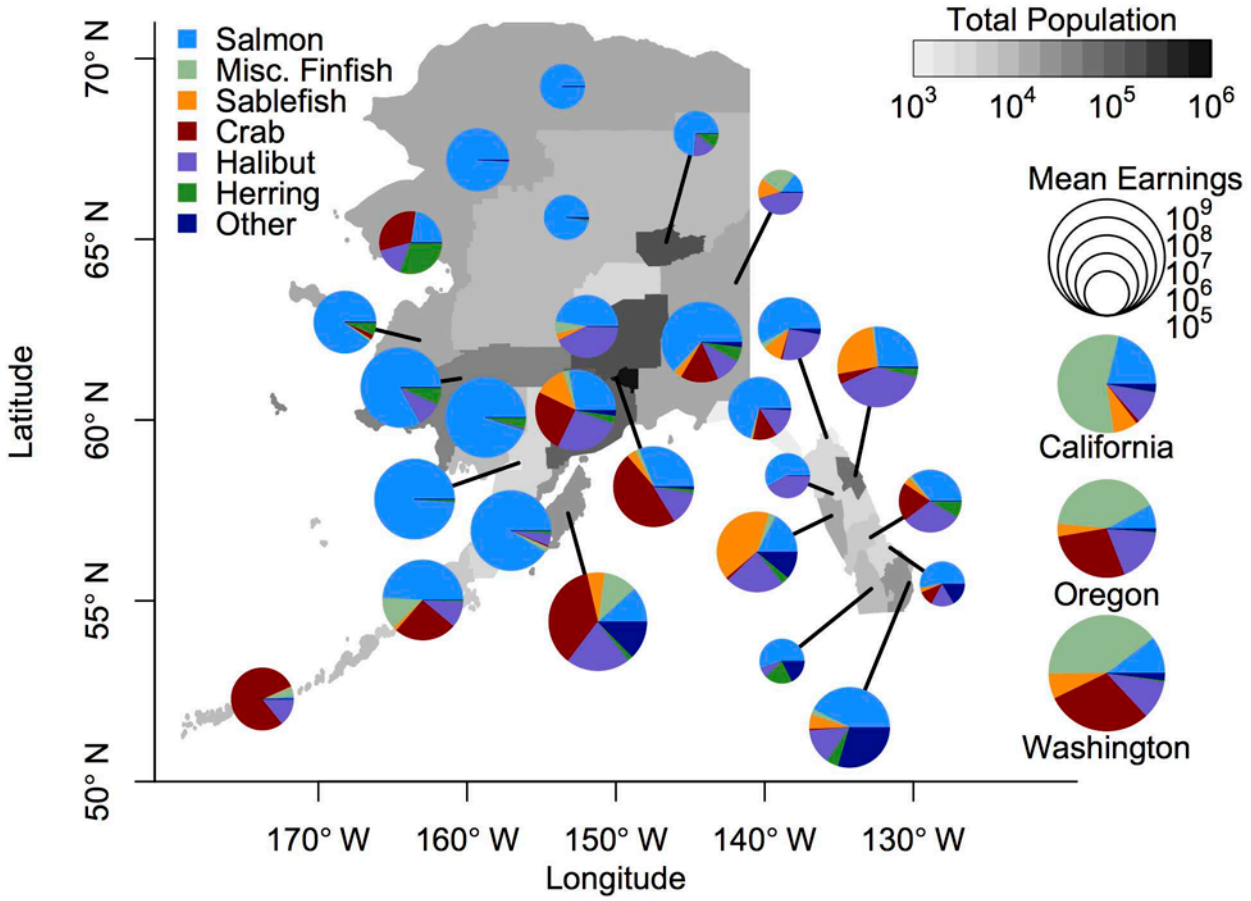




Cline, Schindler and Hilborn (in press)

data from AK - CFEC

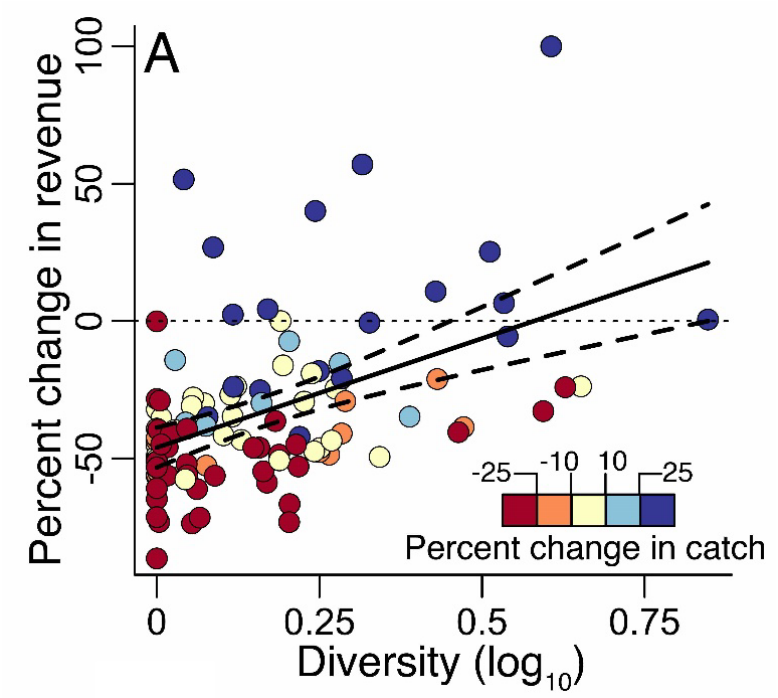
Wide variation in diversity of fisheries that Alaska communities participate in

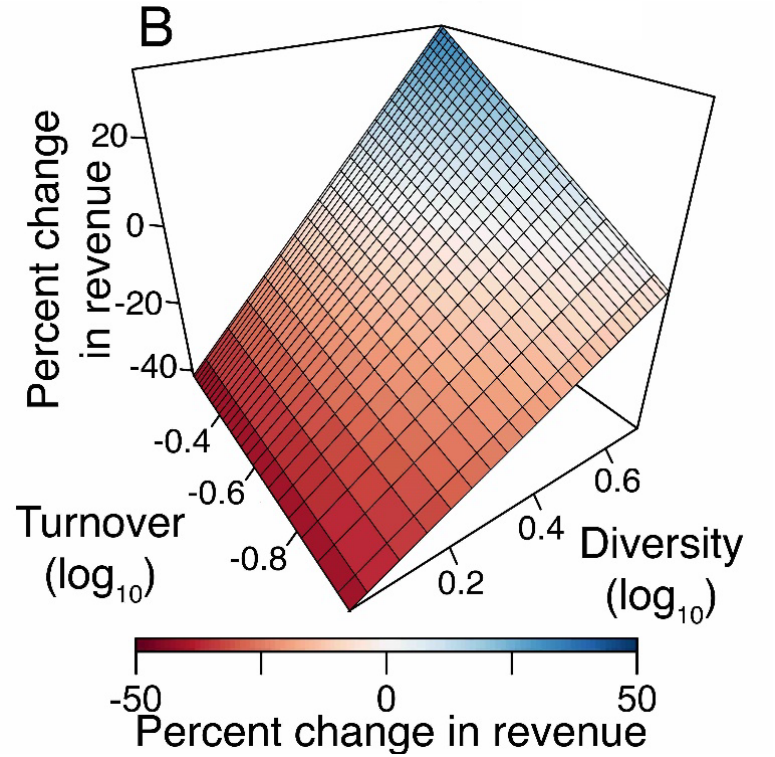


Cline, Schindler and Hilborn (in press)

data from AK - CFEC

Communities participating in several fisheries suffered little from regime shift; many that changed composition actually benefitted!





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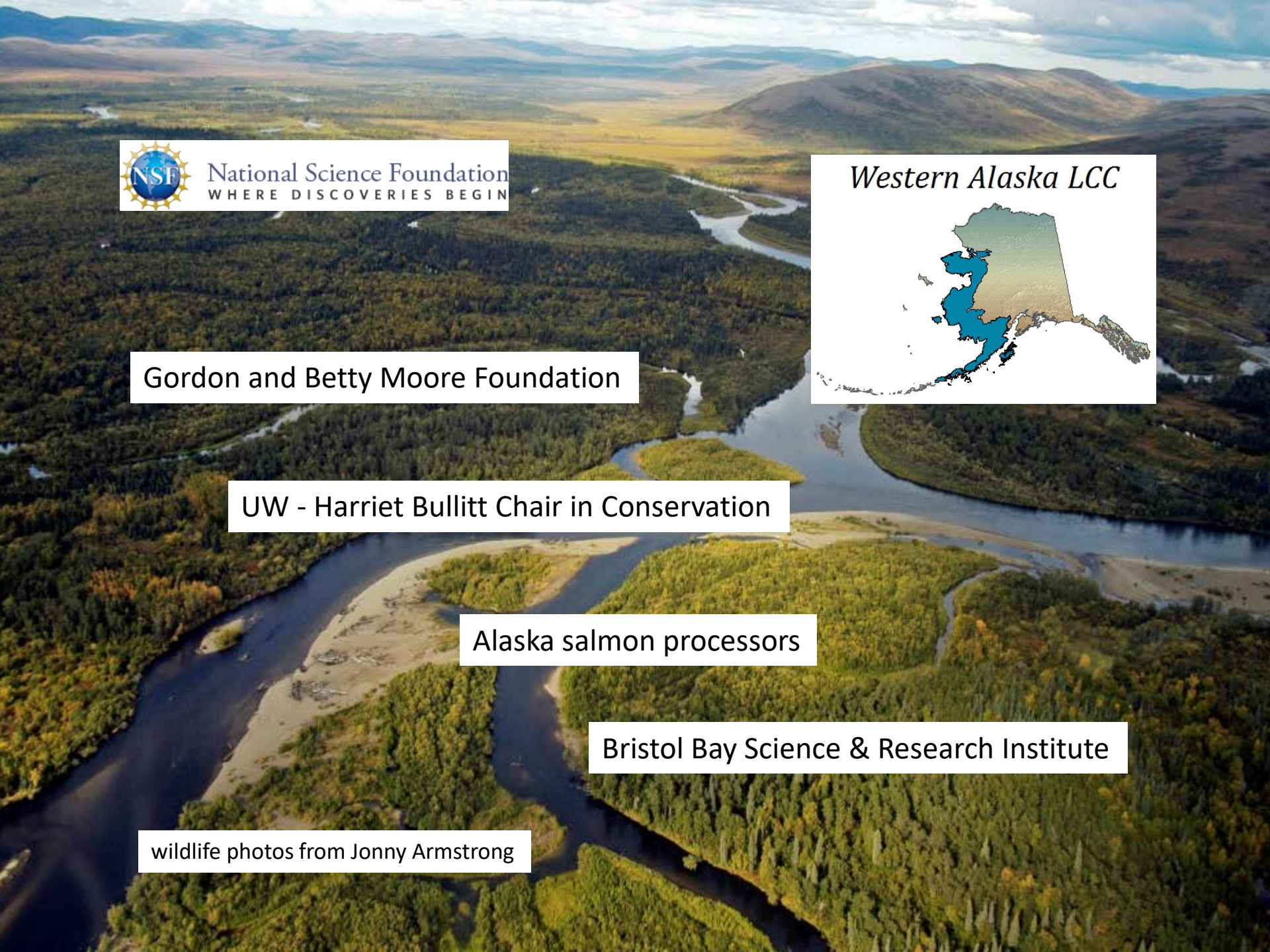
‘the way things used to be’
versus
the reality that ecosystems are continuously reorganizing
… a hallmark of resilience.


National Science Foundation
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Gordon and Betty Moore Foundation
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wildlife photos from Jonny Armstrong