Daniel Schindler

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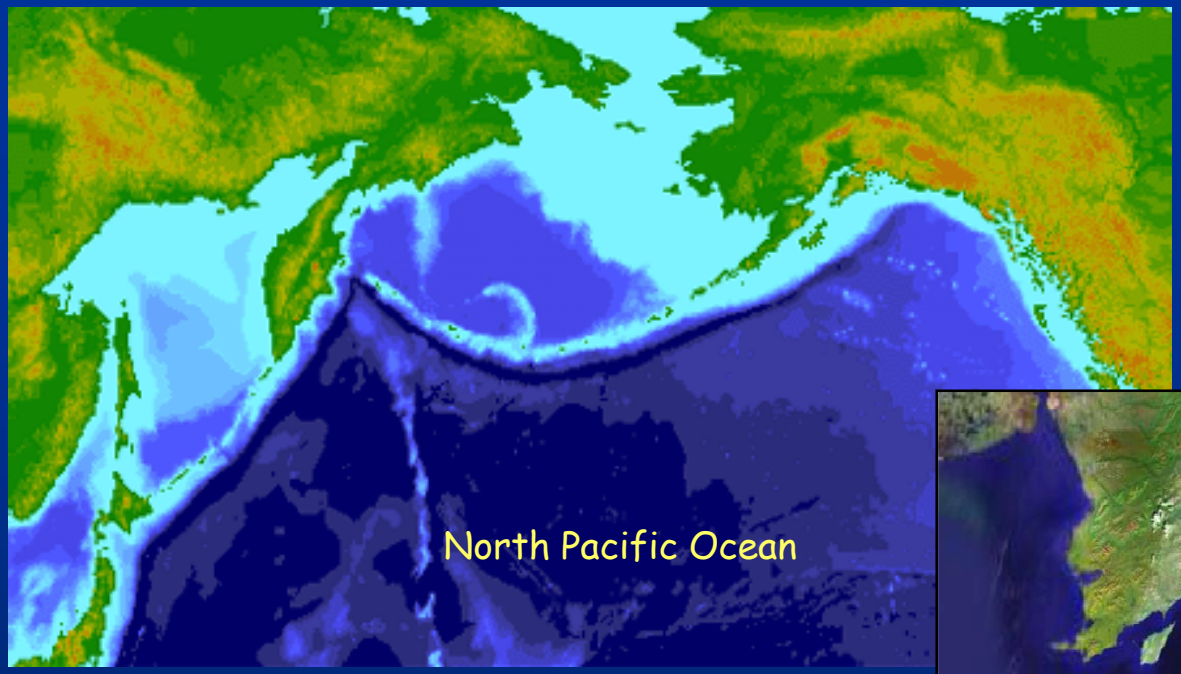
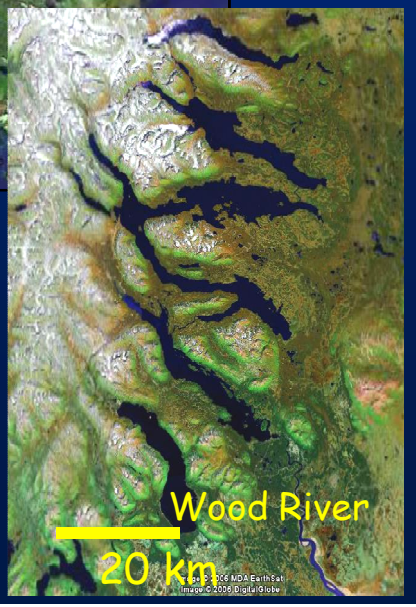
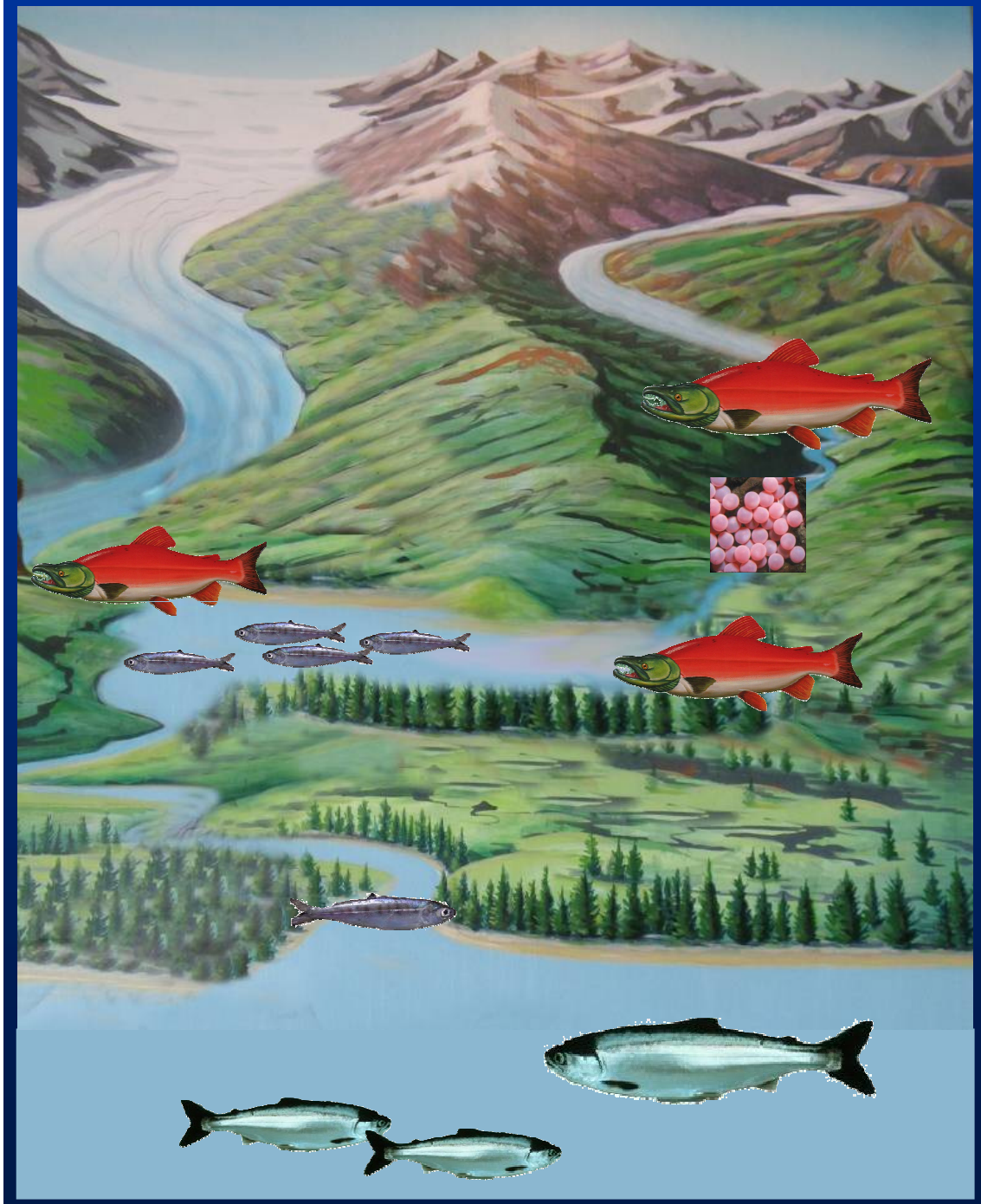


What are the benefits of population diversity to fisheries and conservation?





Spawning

Embryo incubation

Juvenile rearing in lakes
(1-2 years)

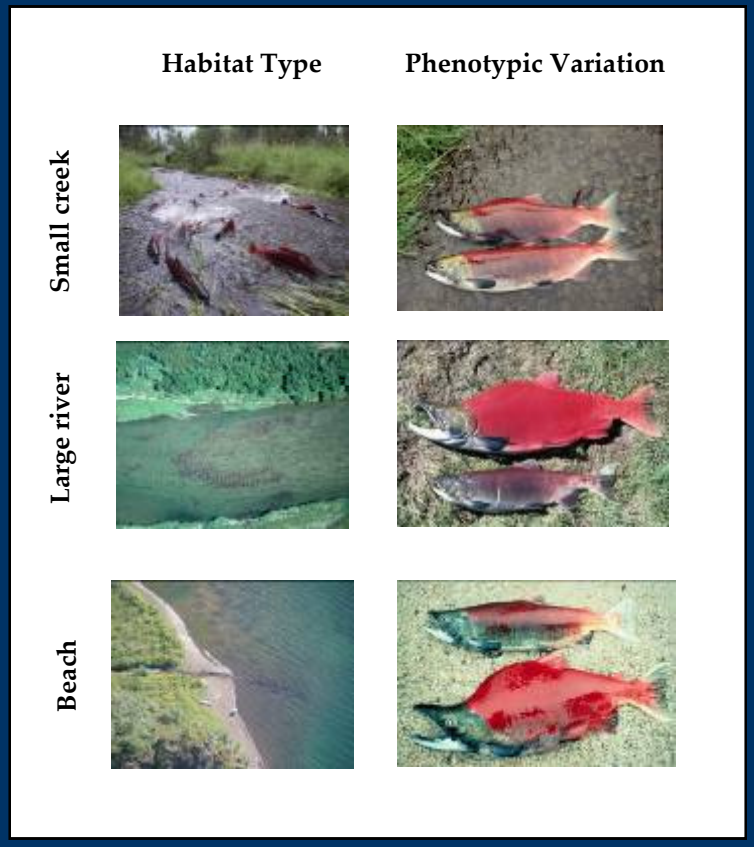
Smolt migration

Ocean residency
(1-3 years)

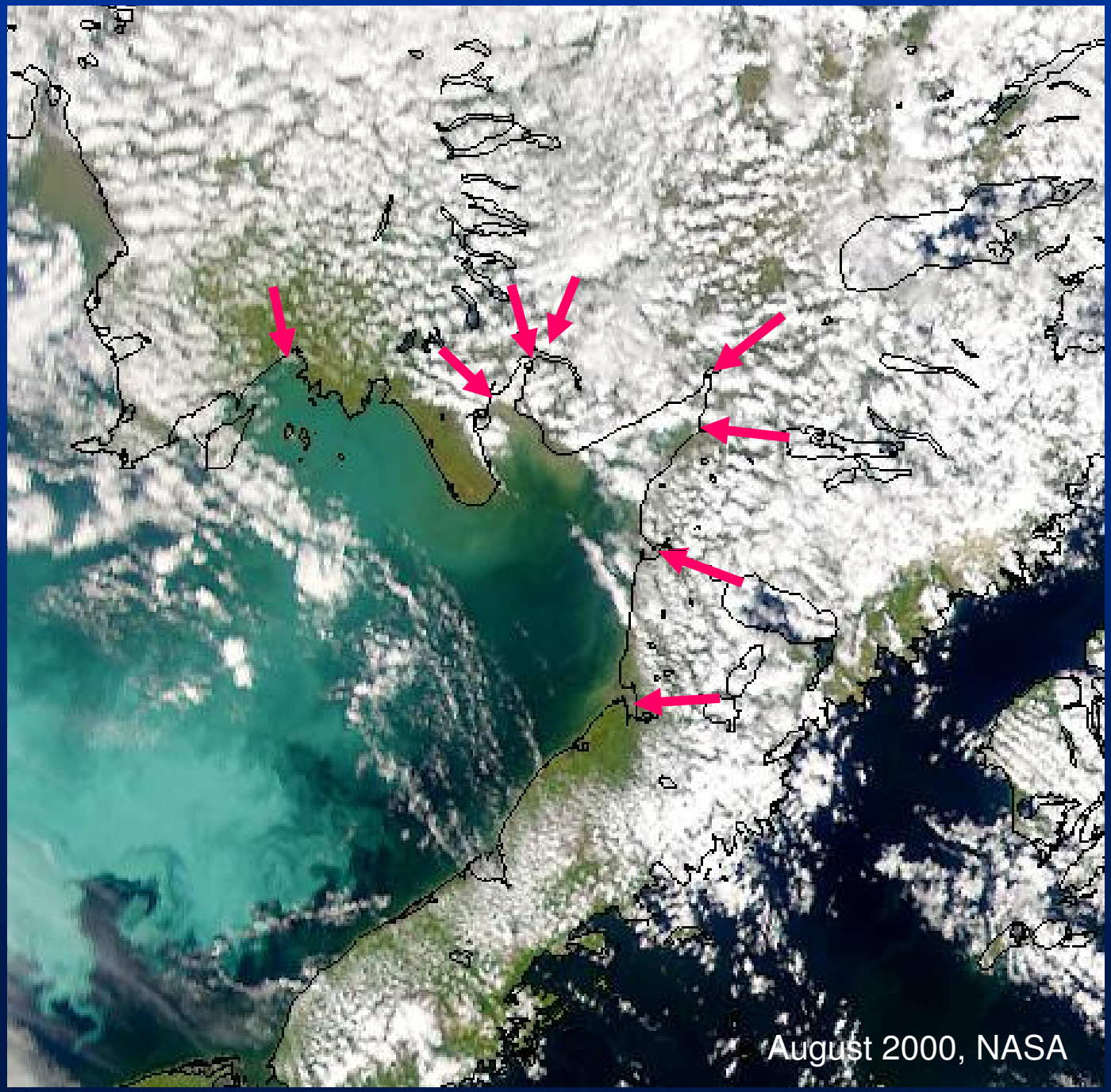
Return migration

Adapted from Alexis Rockman painting, 1998 (L.A. Rogers)

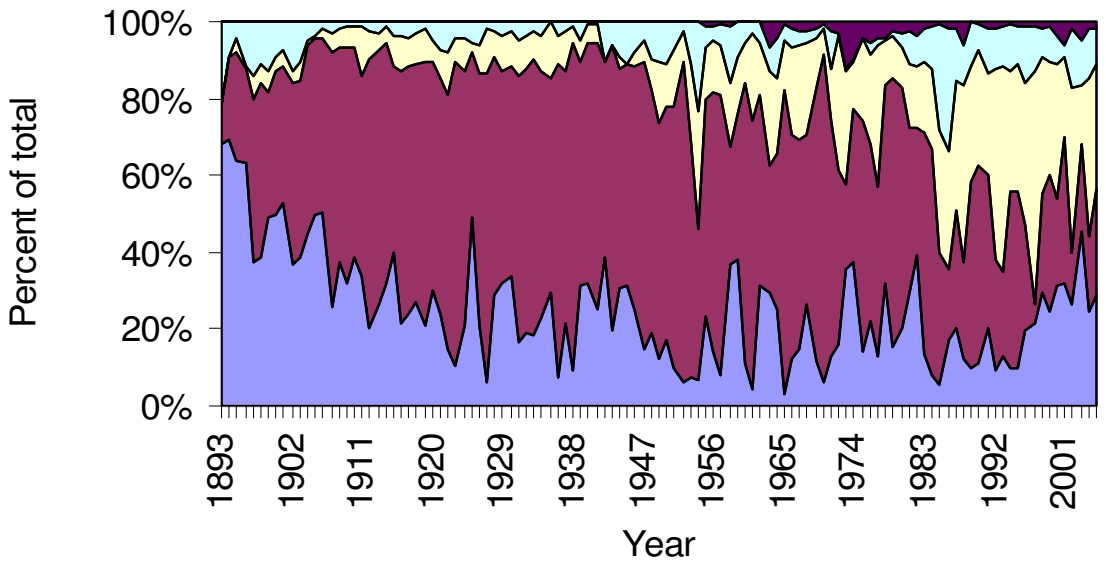
Biocomplexity and local adaptation

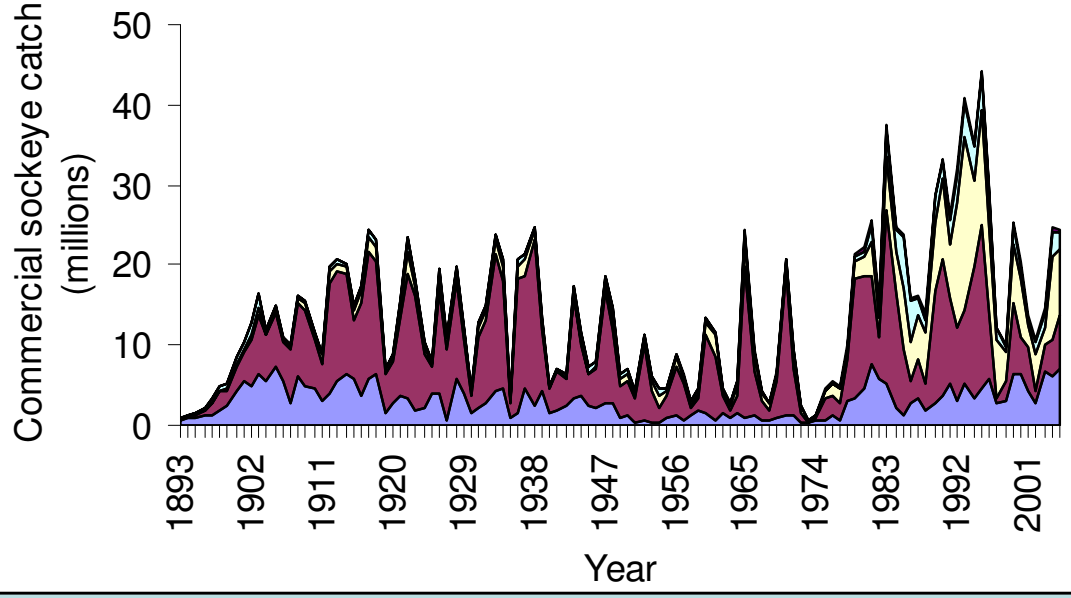


Salmon landscapes are heterogeneous and dynamic filters of climate

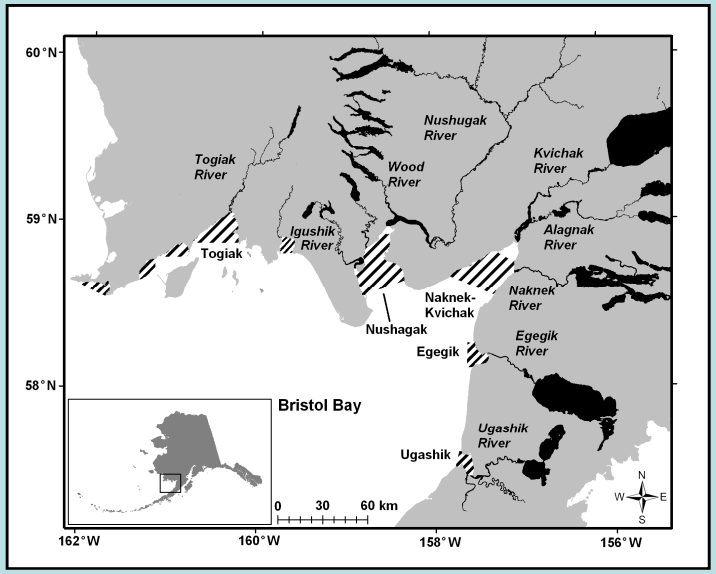

August 2000, NASA

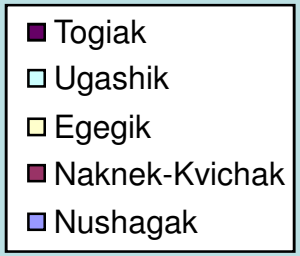
Bristol Bay sockeye salmon fisheries





data from ADFG

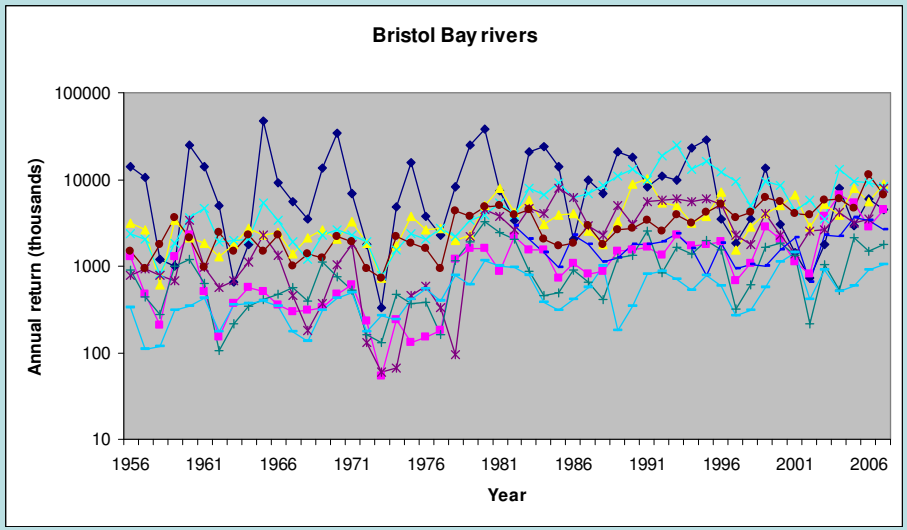


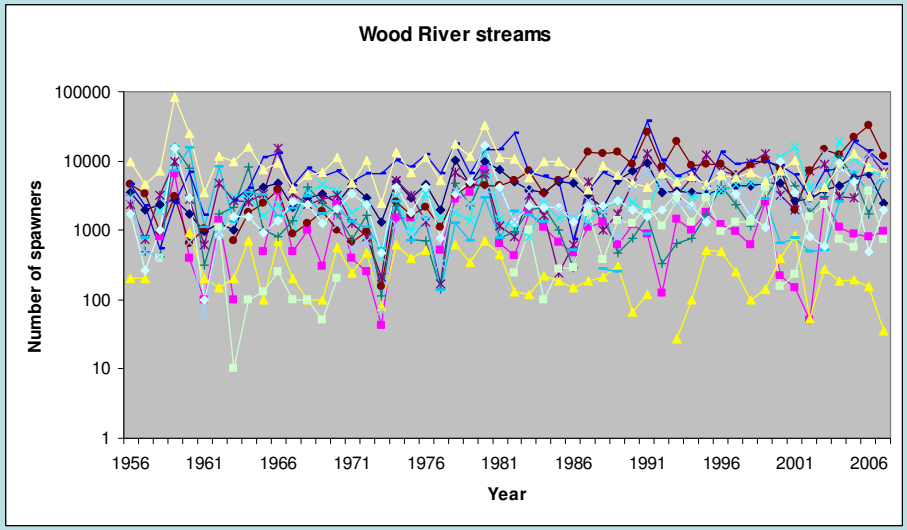


updated from Hilborn et al. (2003)

Is the aggregate stock less variable than individual populations?

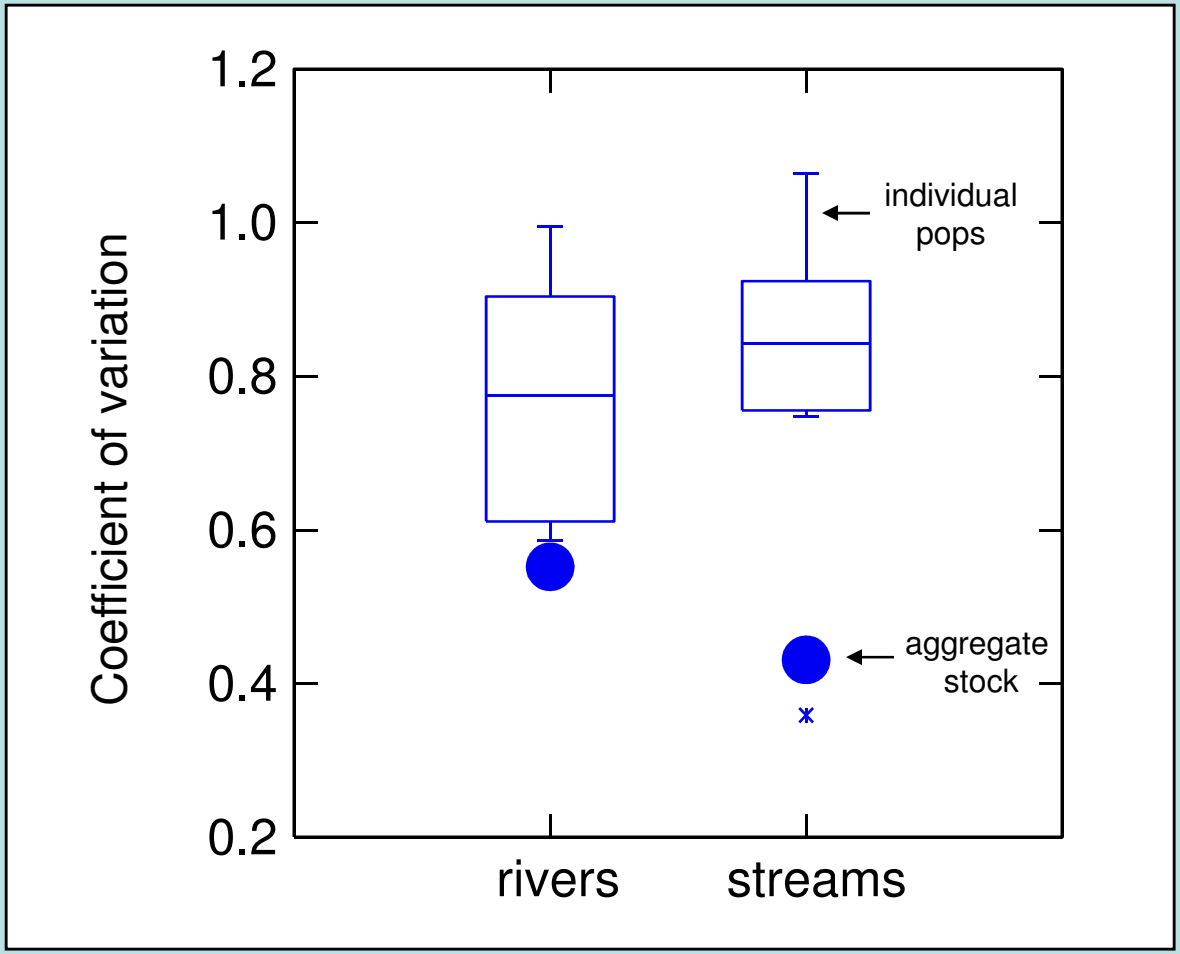
(is there a portfolio effect?)



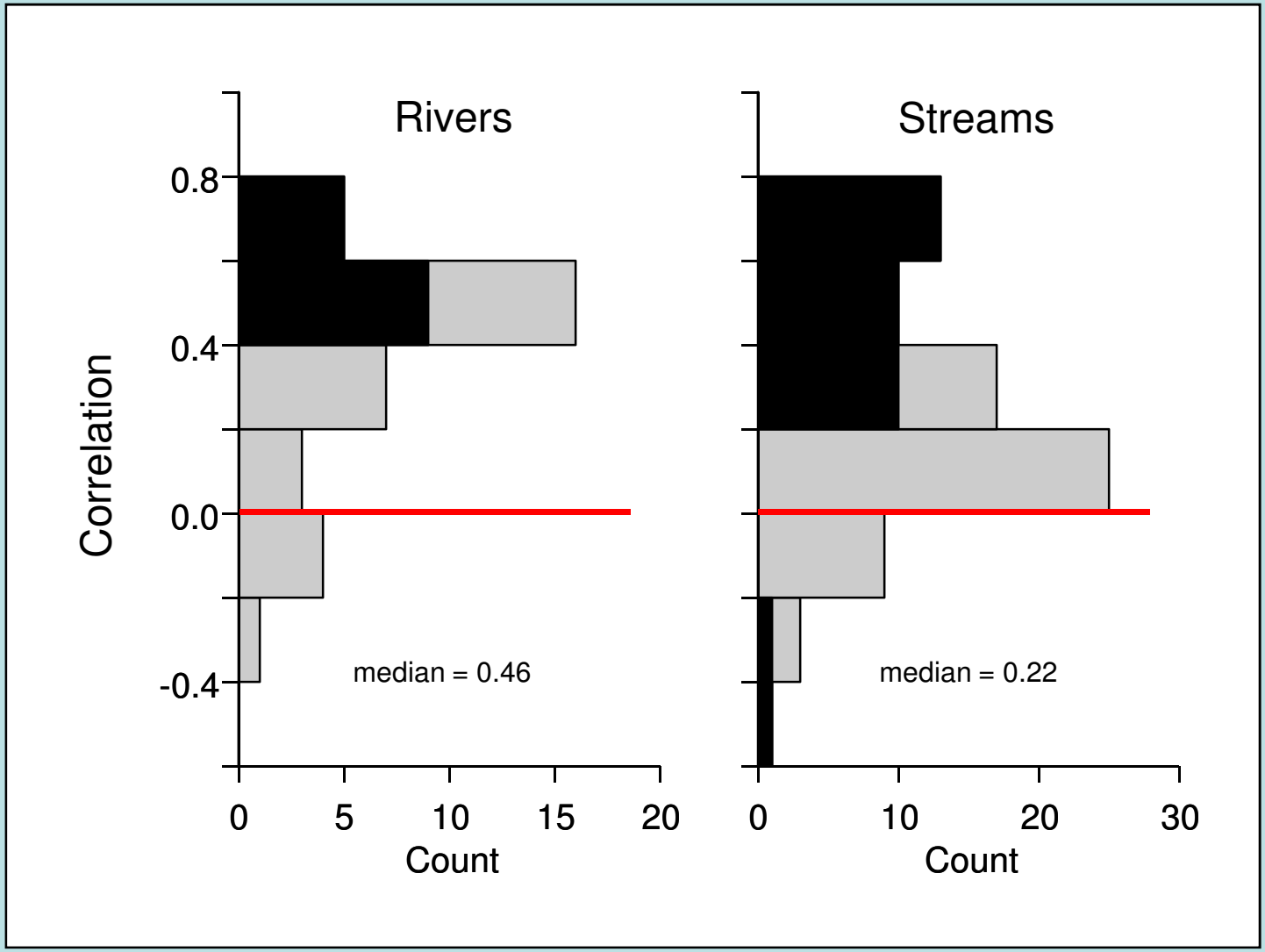


Portfolio effect in Bristol Bay sockeye salmon stocks

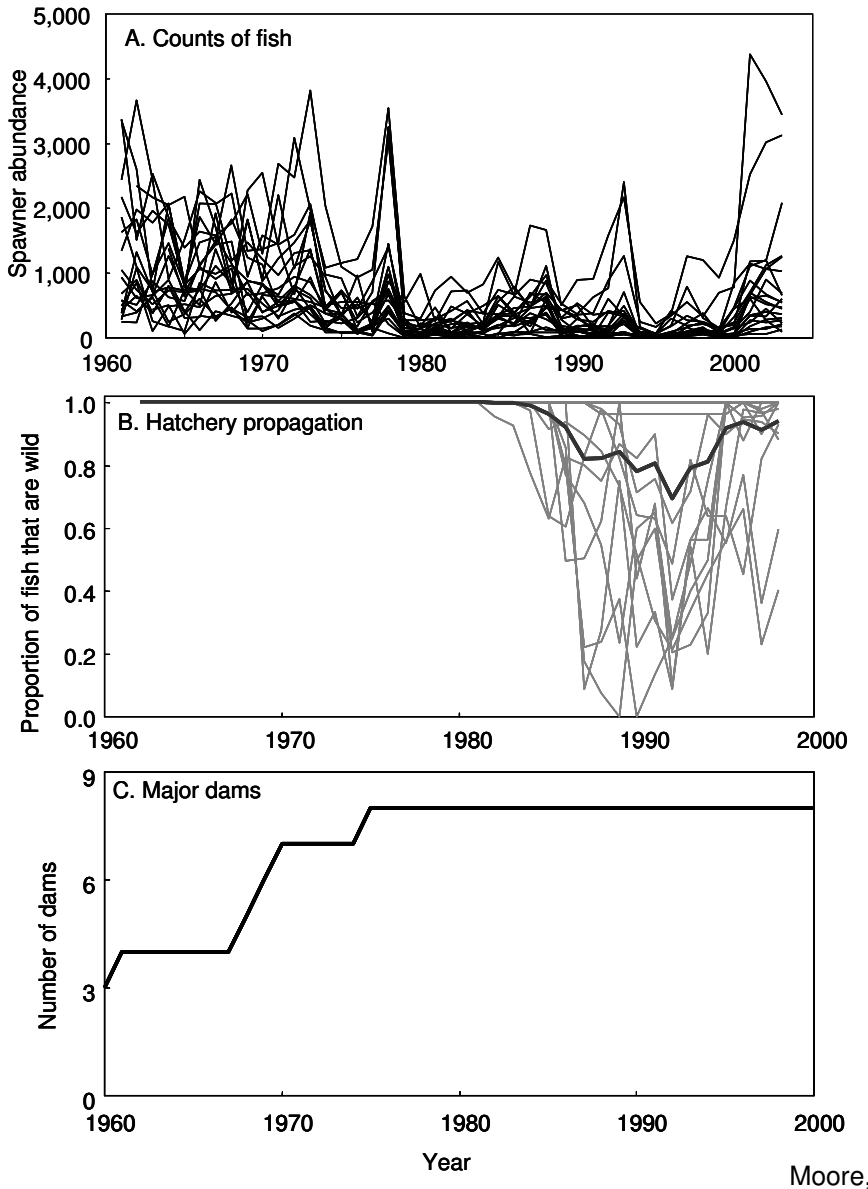
Annual returns, 1956-2007, for rivers (8) and streams(13)



Co-variation in annual returns to Bristol Bay rivers and streams
1956-2007

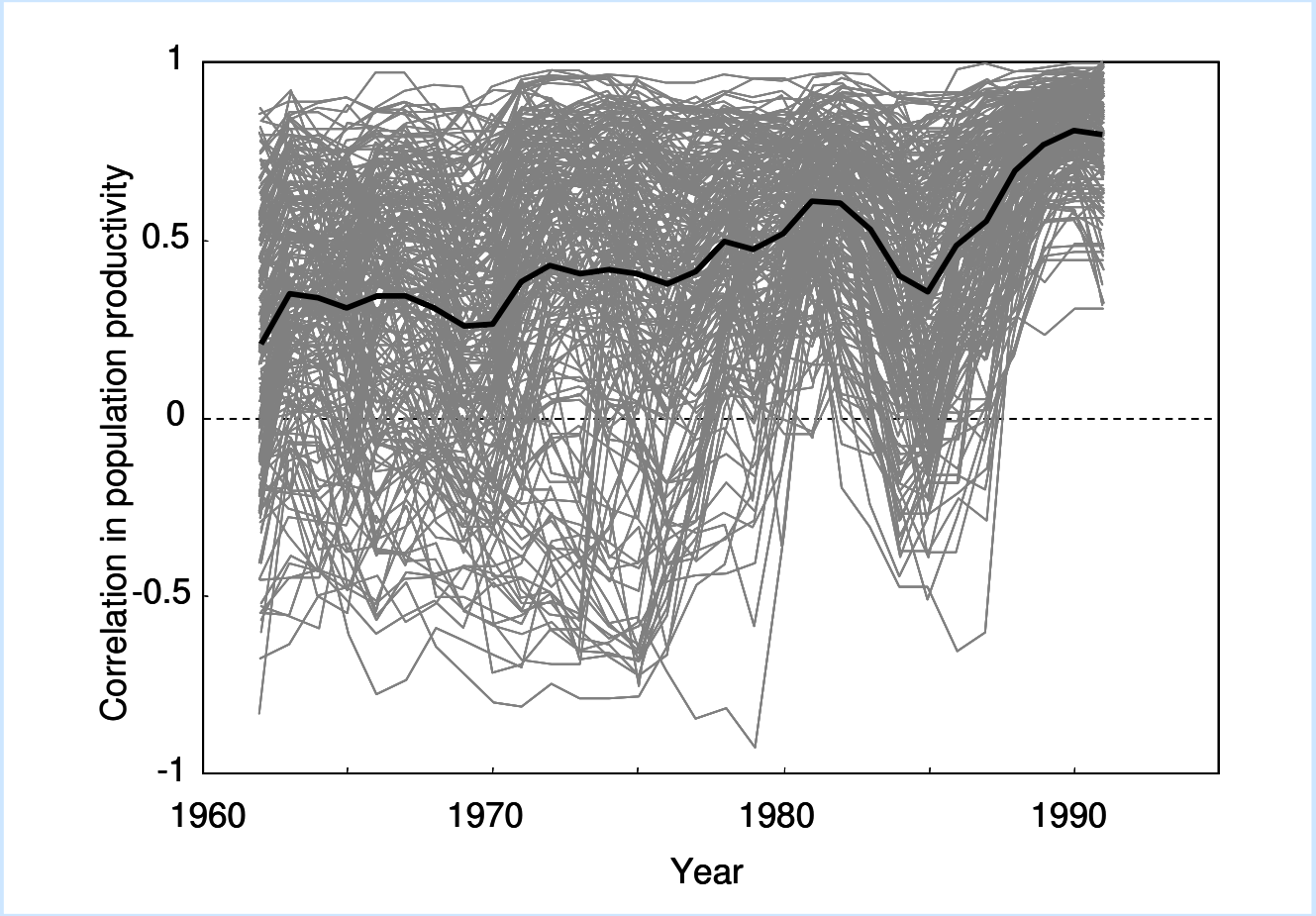


Snake River Chinook



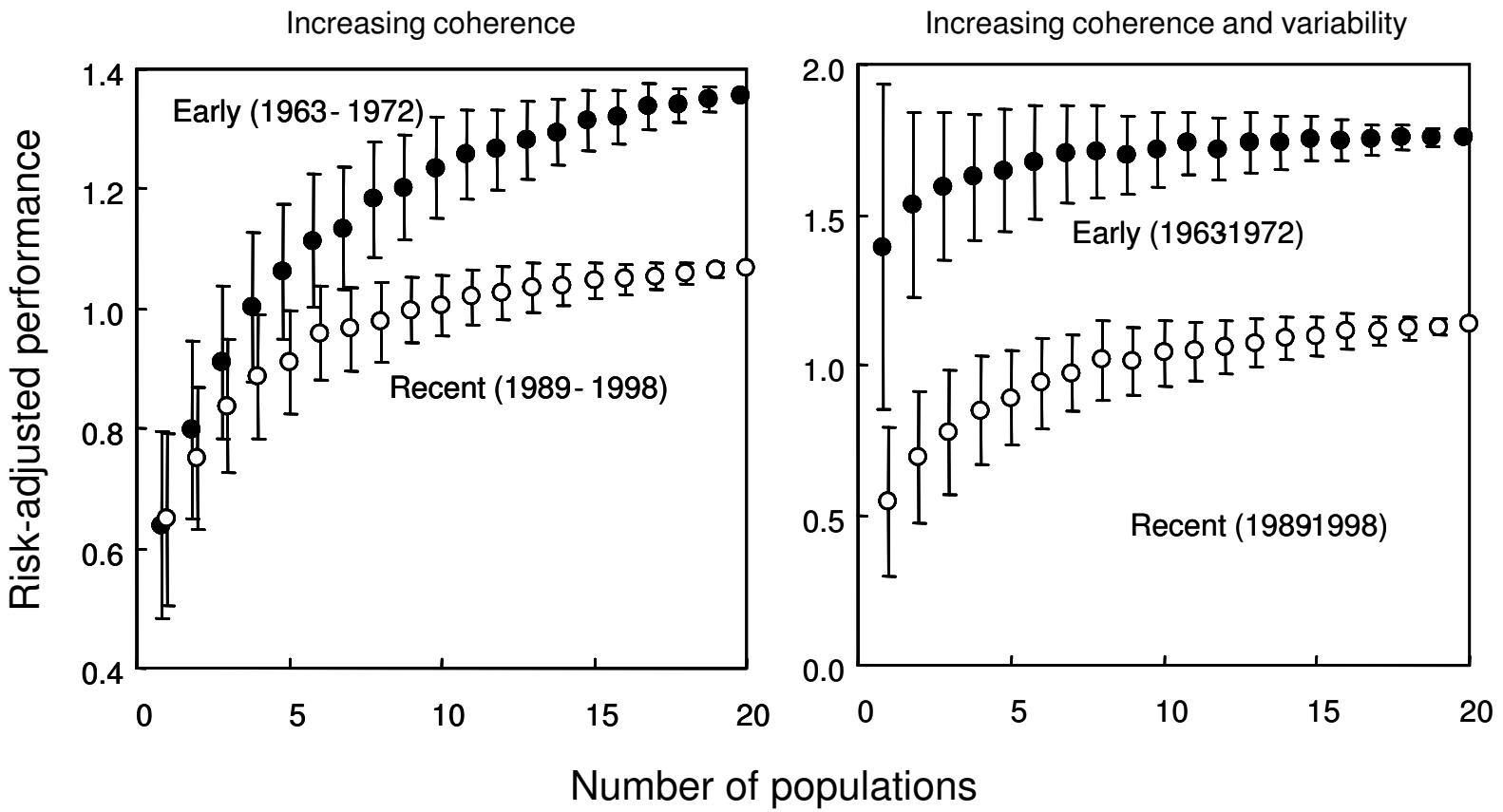
Moore, McClure, Rogers, & Schindler, *unpublished*

Snake River Chinook



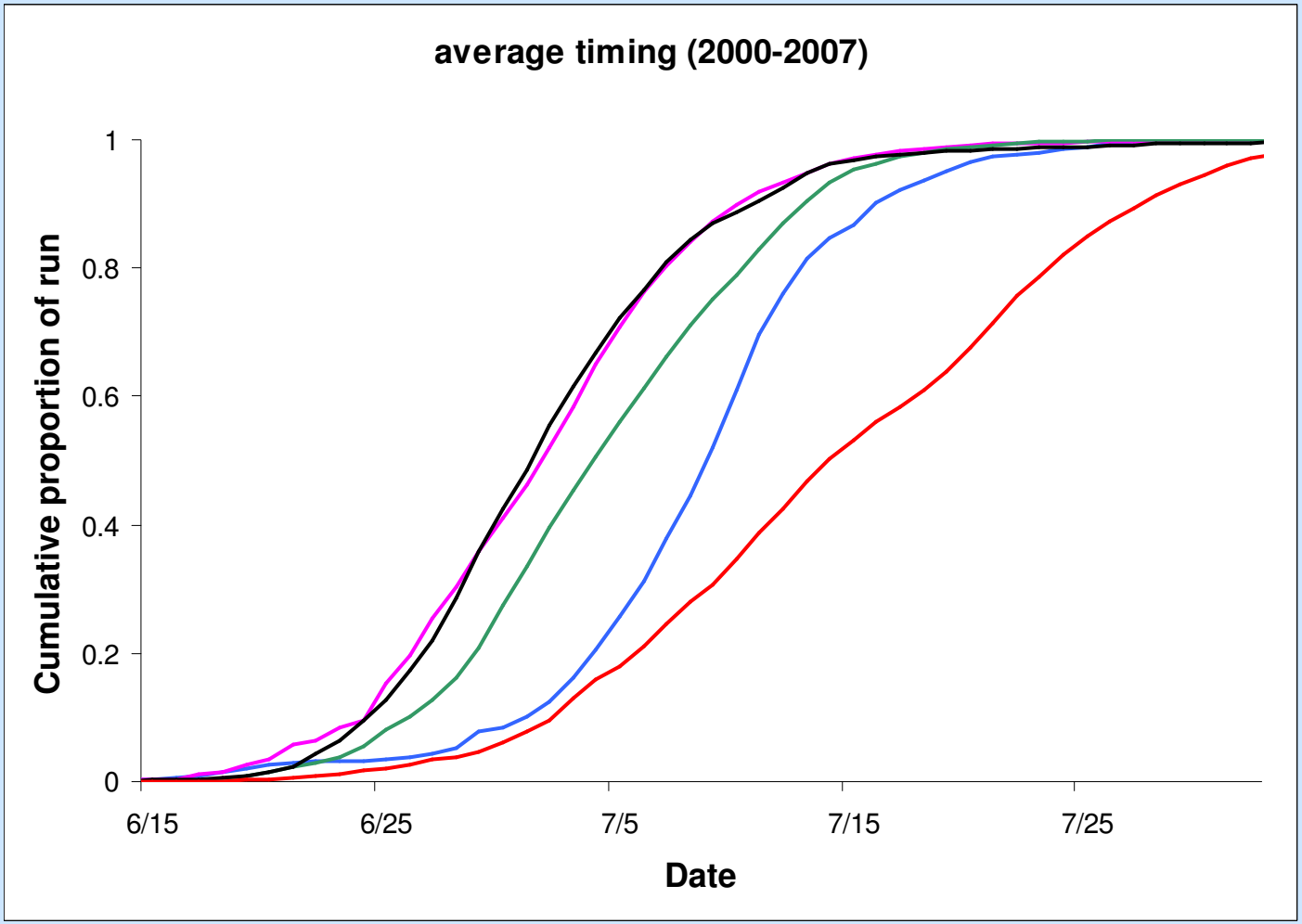
Moore, McClure, Rogers, & Schindler, *unpublished*

Snake River Chinook portfolio performance

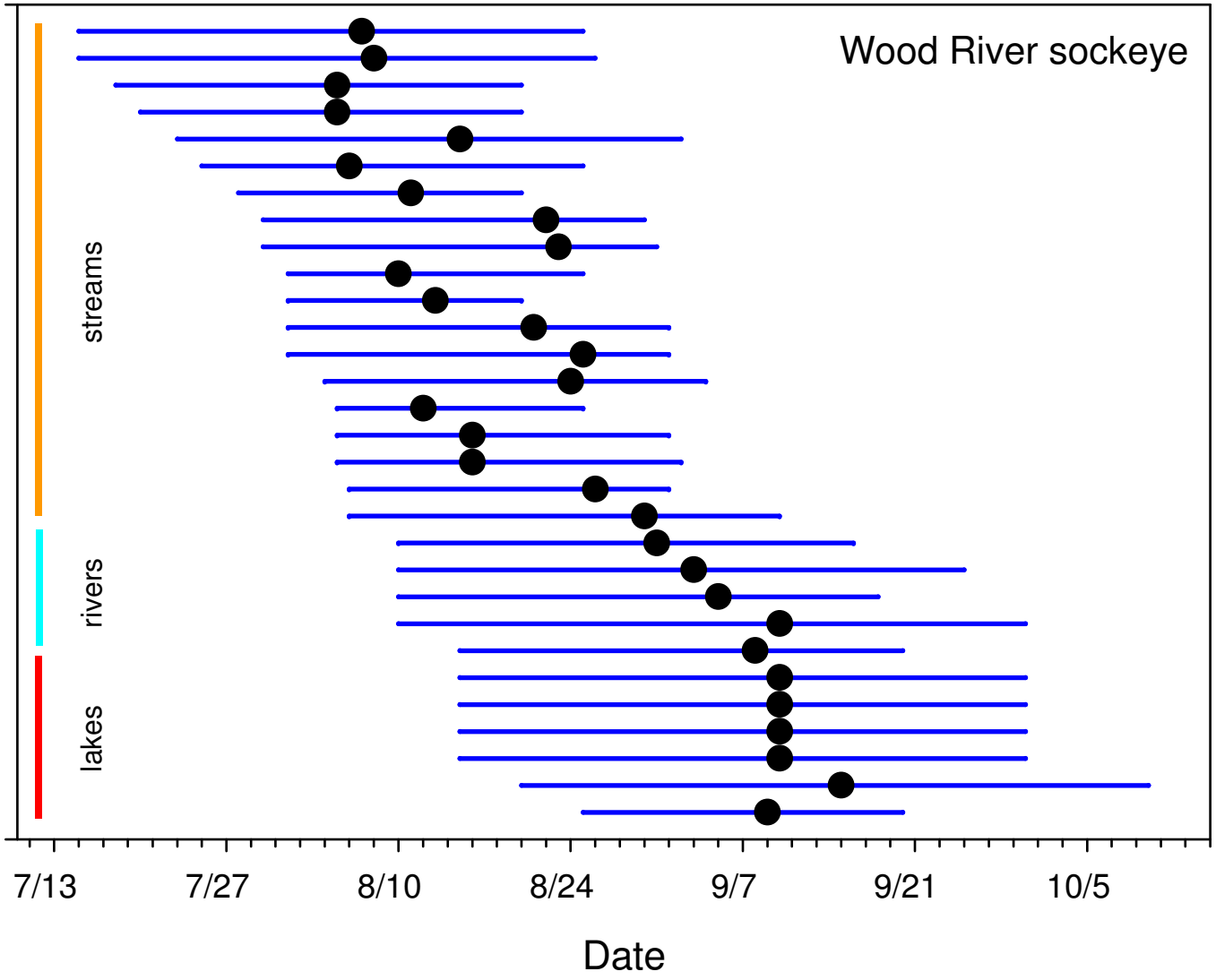


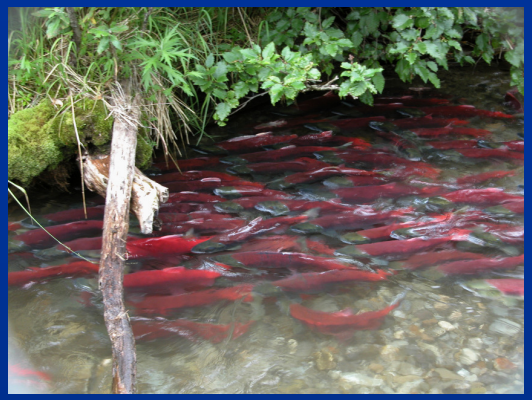
Moore, McClure, Rogers, & Schindler, *unpublished*

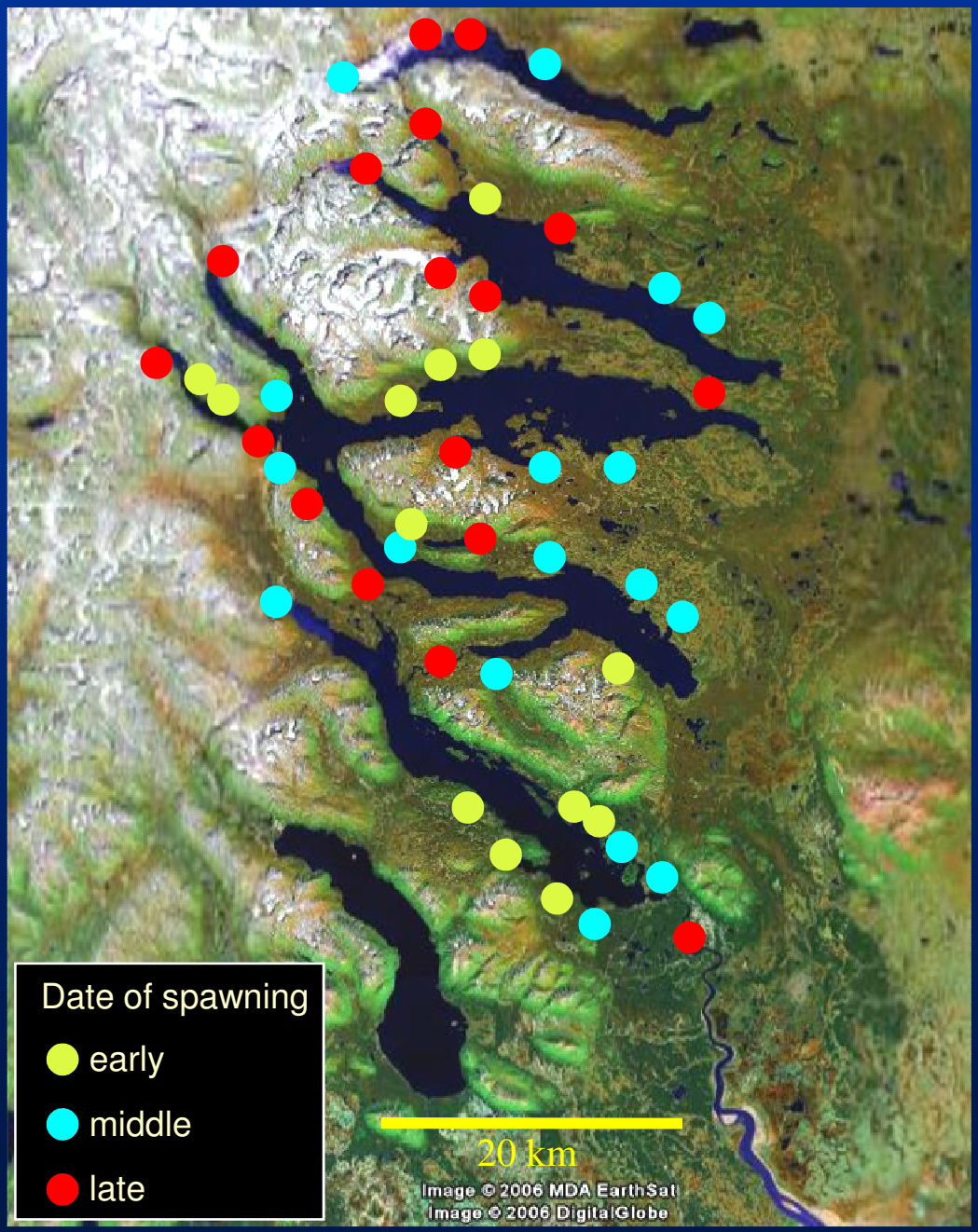
Arrival of sockeye in Bristol Bay fishing districts



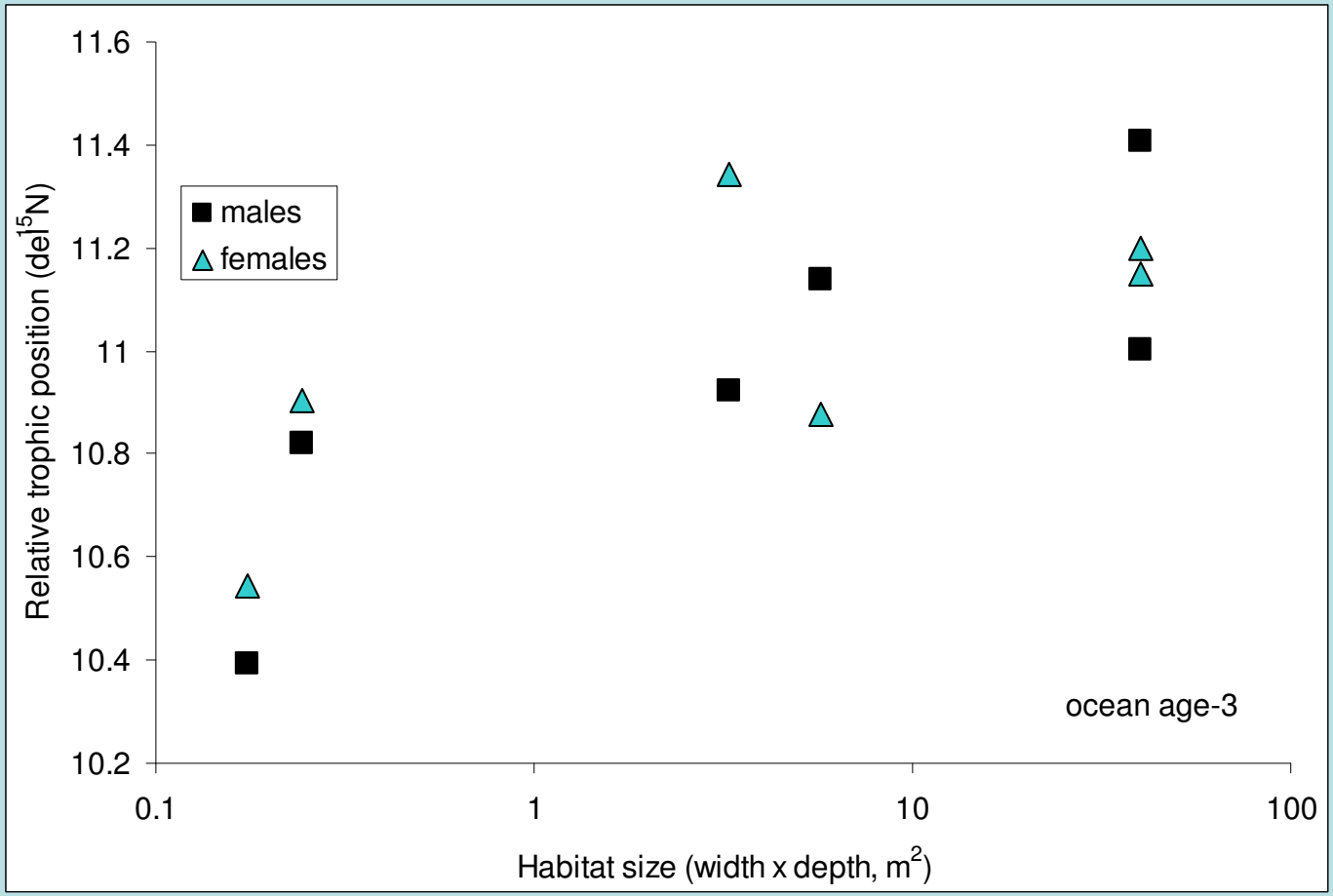
Dates of occupancy in spawning sites






Date of spawning
early
middle
late
20 km
Image © 2006 MDA EarthSat
Image © 2006 DigitalGlobe

Linking habitat variation in freshwater to marine foraging ecology



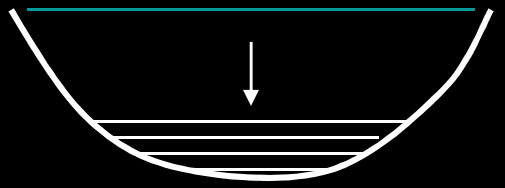


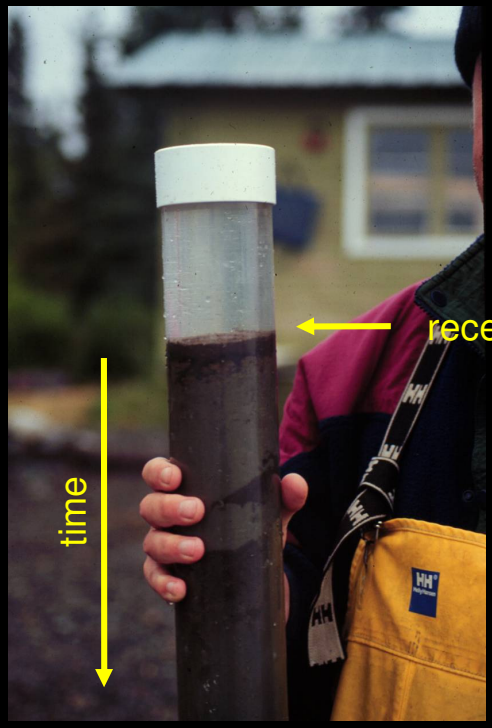



Sue Johnson.

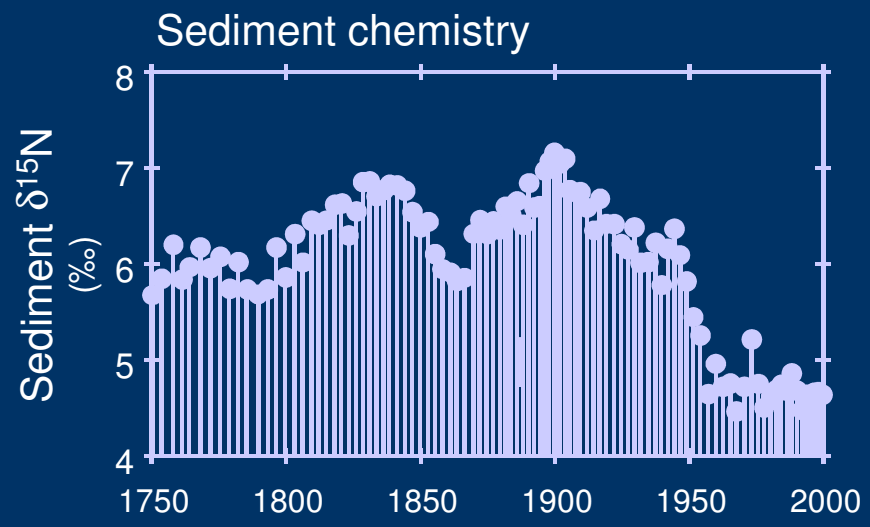
Paleolimnology

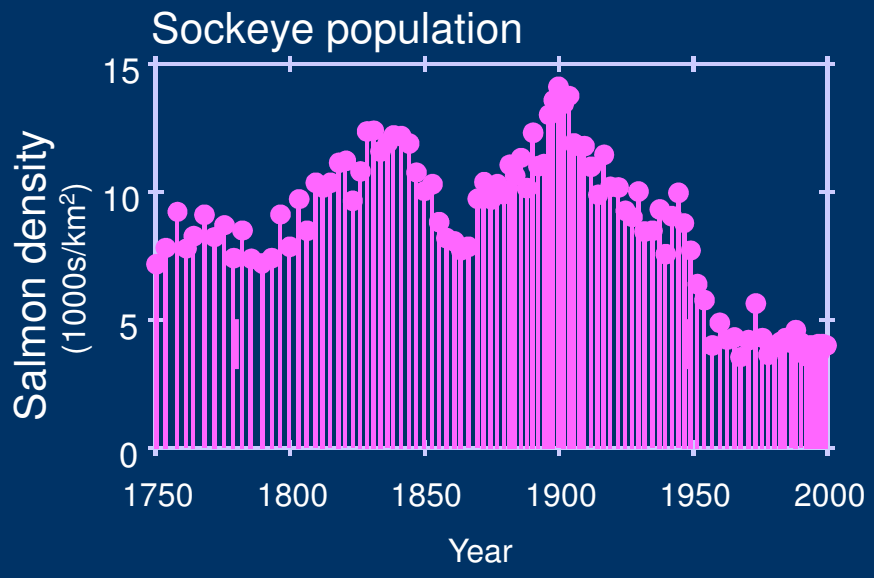
Lake sediments contain a biogeochemical archive that reflects salmon abundance

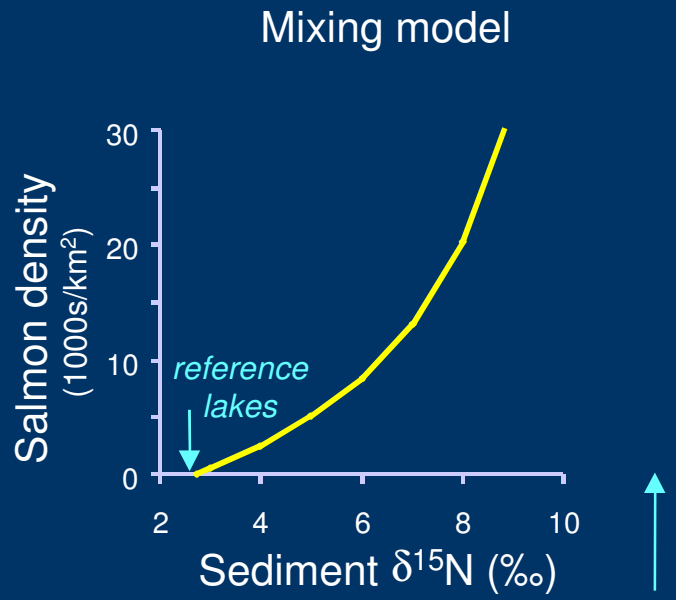




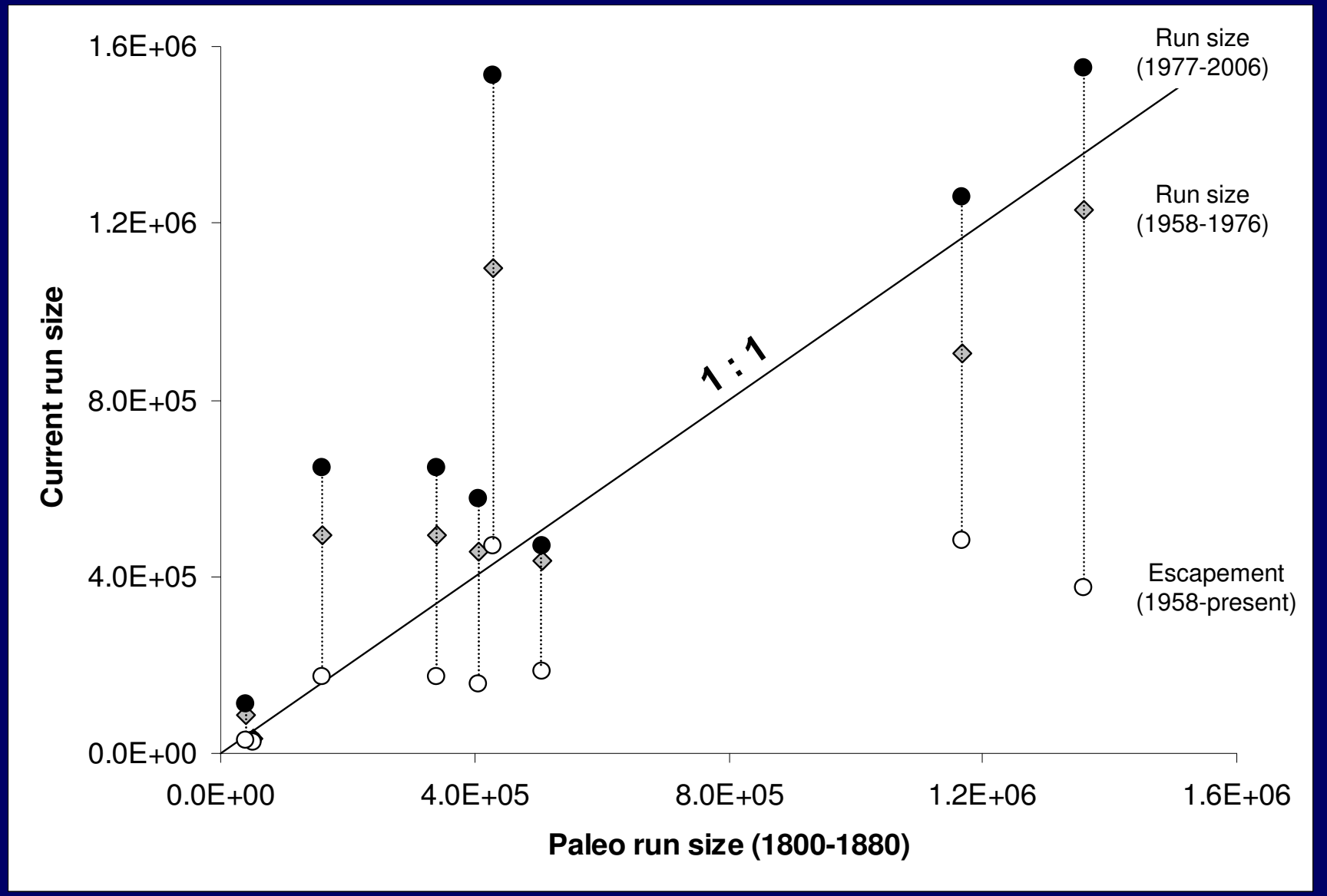
Reconstruct pre-historical sockeye population dynamics by accounting for temporal changes in sediment isotopes







Bristol Bay sockeye salmon production pre-historical versus today

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