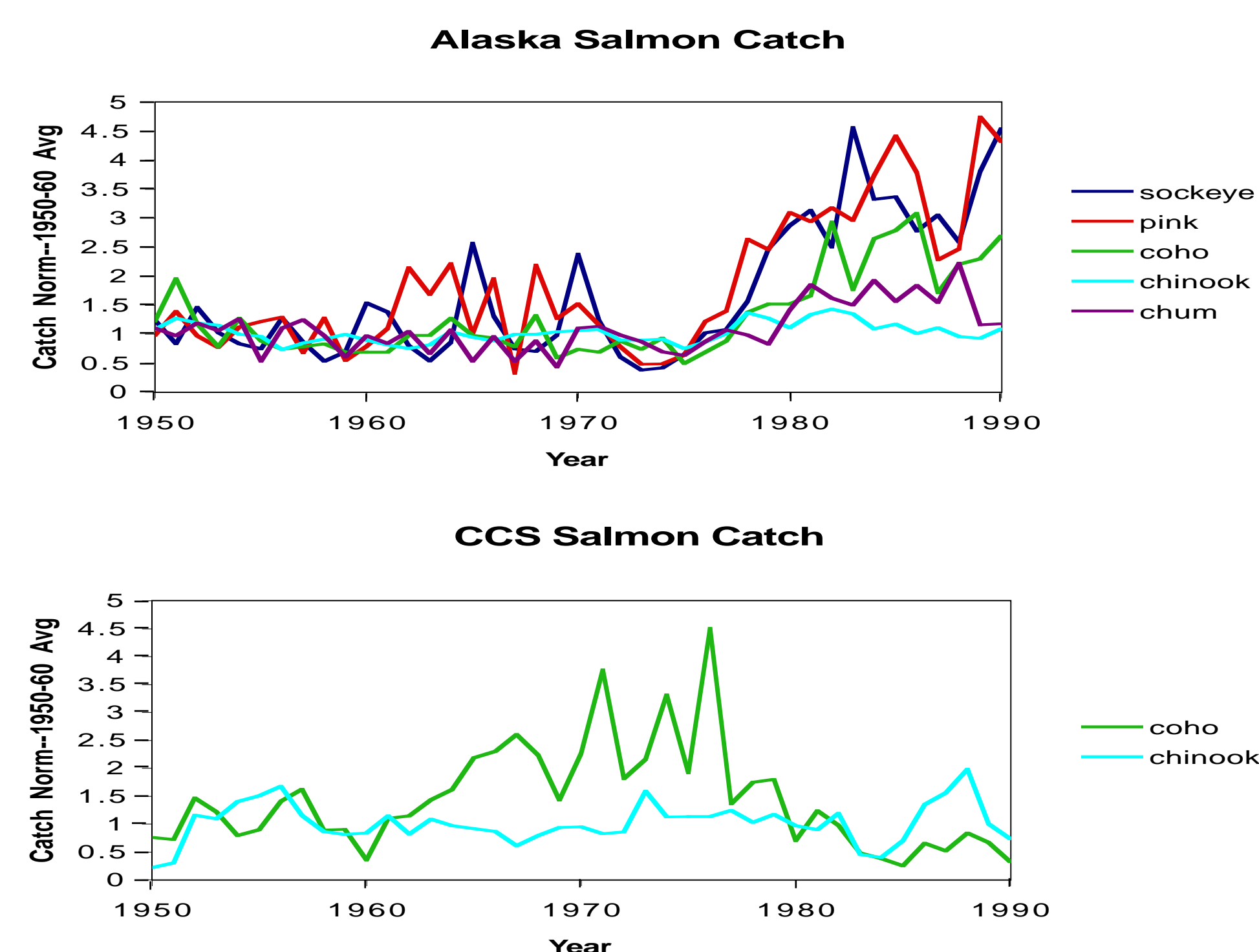


Comparative Analysis of How Coho and Chinook Salmon Populations Respond to Environmental Variability

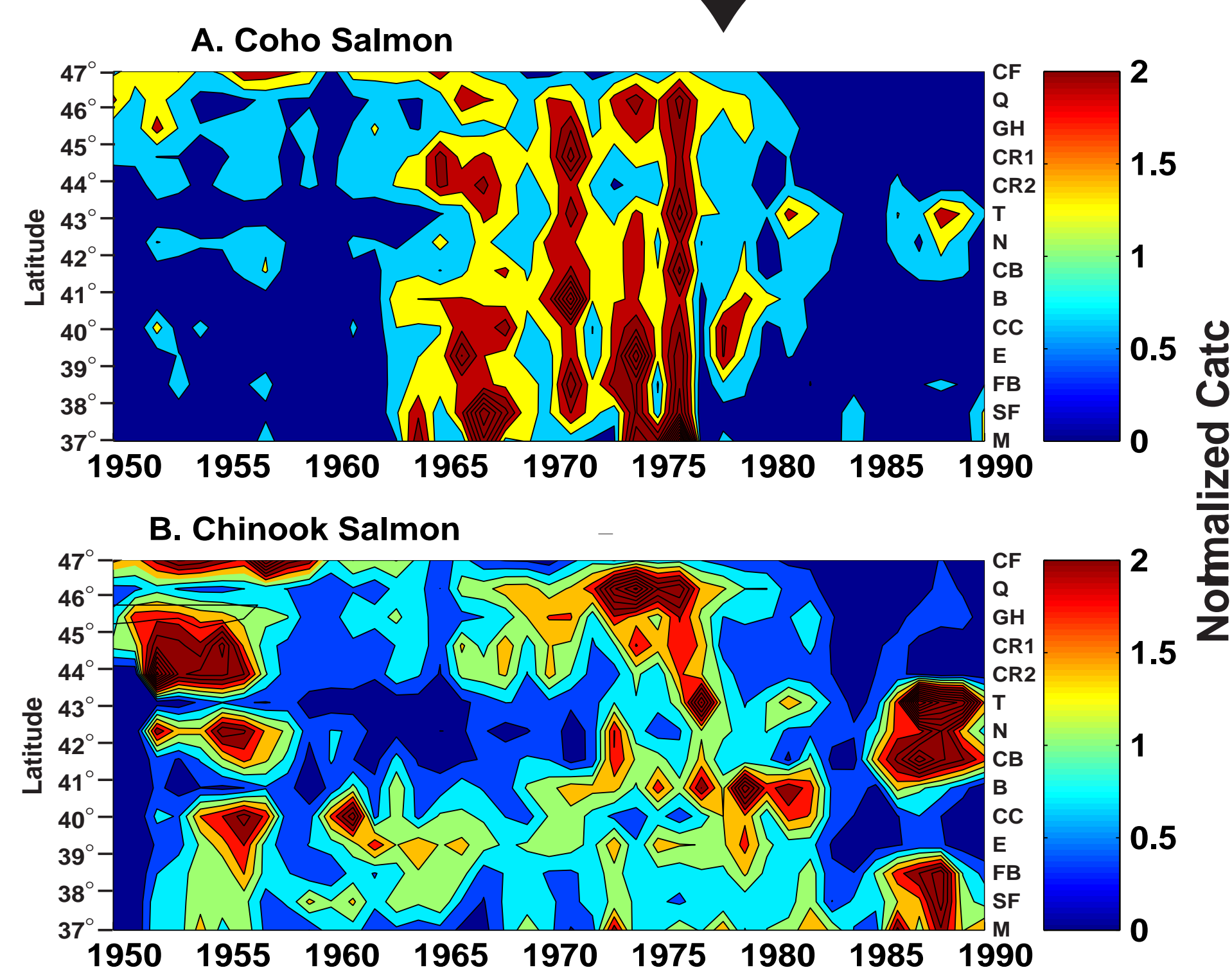
Louis W. Botsford, Forrest Hill, Alan Hastings, and Cathryn A. Lawrence
UC Davis

GLOBEC NEP Core Hypotheses

- I. Production regimes in the Coastal Gulf of Alaska and California Current System covary (inversely), and are coupled through atmospheric and ocean forcing.
- II. Spatial and temporal variability in mesoscale circulation constitutes the dominant physical forcing on zooplankton biomass, production, distribution, species interactions, and retention and loss in coastal regions.
- III. Ocean survival of salmon is primarily determined by survival of the juveniles in coastal regions, and is affected by interannual and interdecadal changes in physical forcing and by changes in ecosystem food web dynamics.

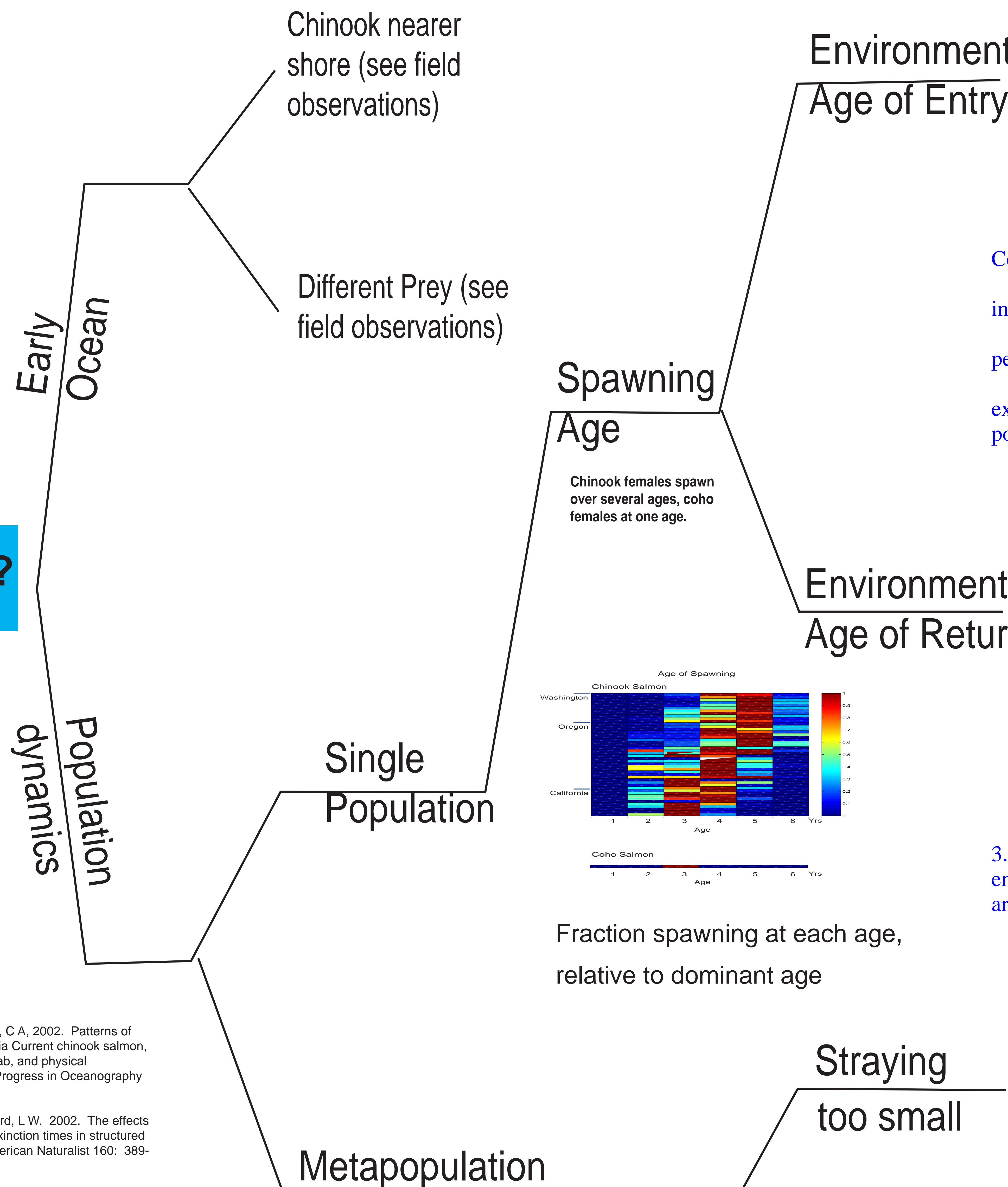


Catch records indicate that while coho salmon populations covary inversely between CCS and Alaska, chinook populations do not. CCS Coho collapsed in the 1970s but CCS chinook did not.



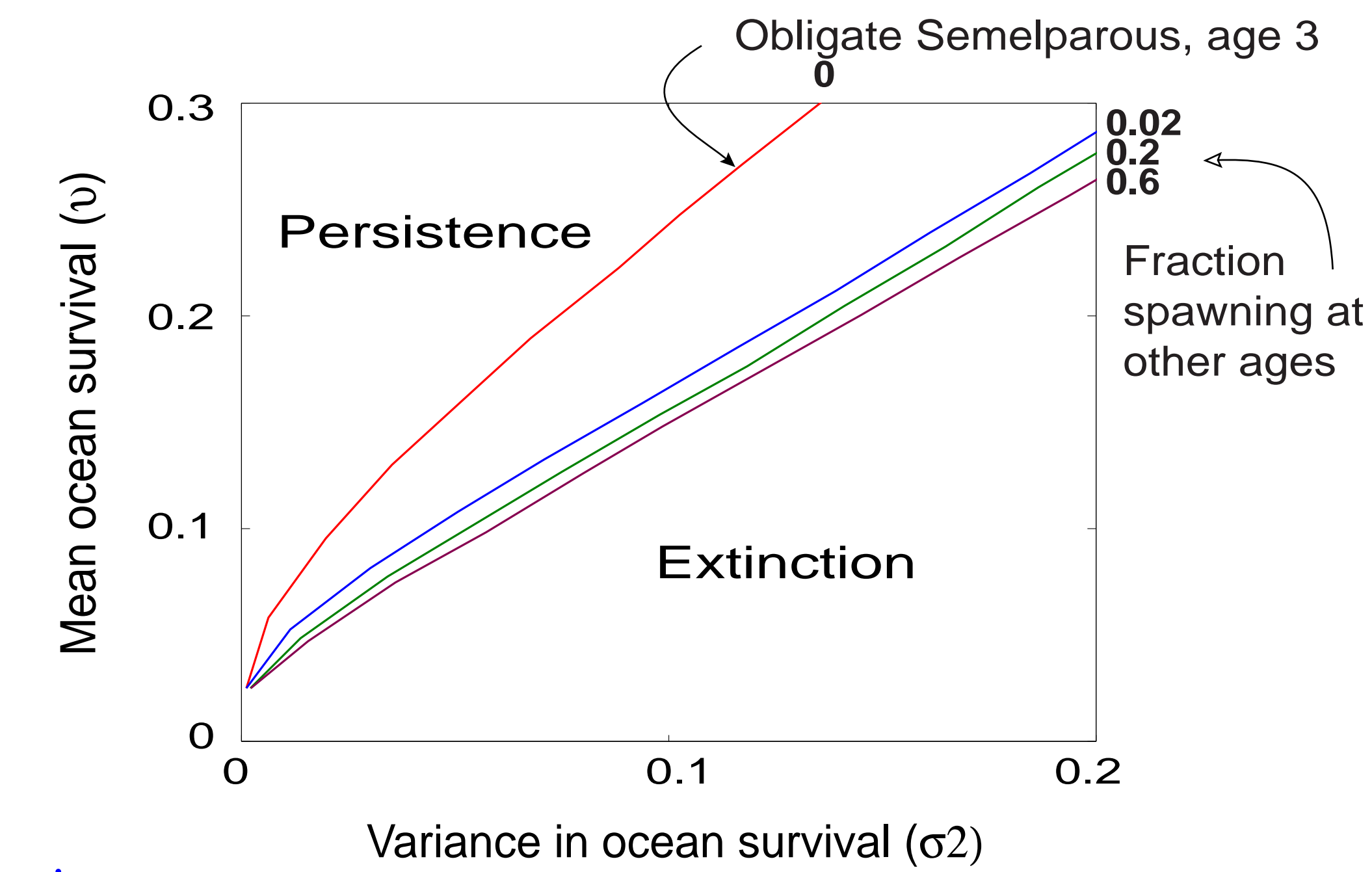
CCS catch records indicate coho and chinook salmon differ in time scales (coho varies annually and decadal, collapsing in the mid 1970s while chinook varies more slowly and does not collapse) and spatial scales (coho is synchronous along the coast while chinook have a spatial pattern on 100 km scale).

WHY?



References:
Botsford, L W and Lawrence, C A, 2002. Patterns of covariability among California Current chinook salmon, coho salmon, Dungeness crab, and physical oceanographic conditions. Progress in Oceanography 53: 283-305.
Hill, M F; Hastings, A; Botsford, L W. 2002. The effects of small dispersal rates on extinction times in structured metapopulation models. American Naturalist 160: 389-402.
Botsford, L W; Lawrence, C A; Hill, M F. 2002. Dynamic response of California Current populations to environmental variability. pp 215-226 in AFS Symposium: McGinn, N A (Ed.). Fisheries in a Changing Climate.

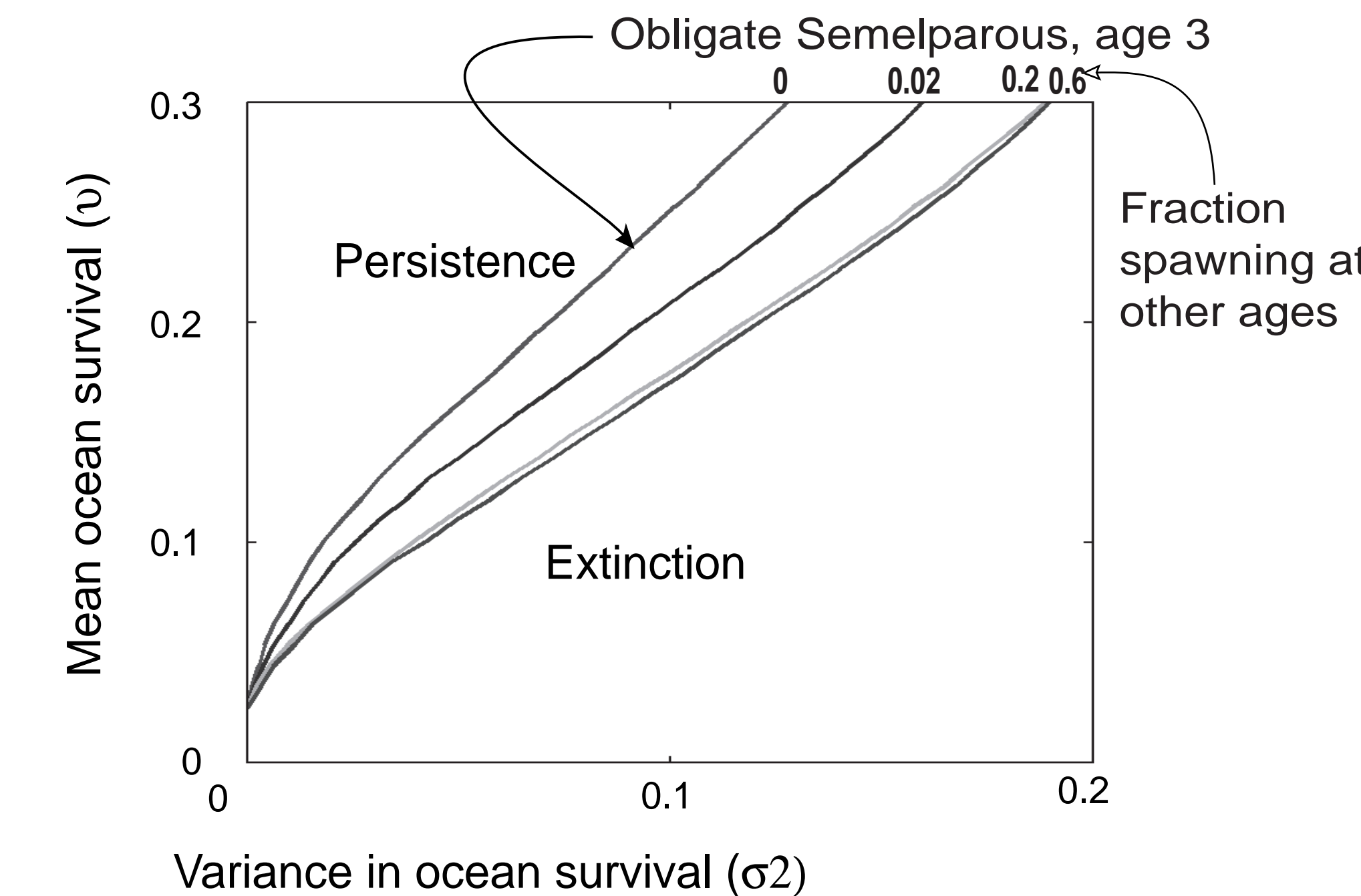
Environmental Variability at Age of Entry



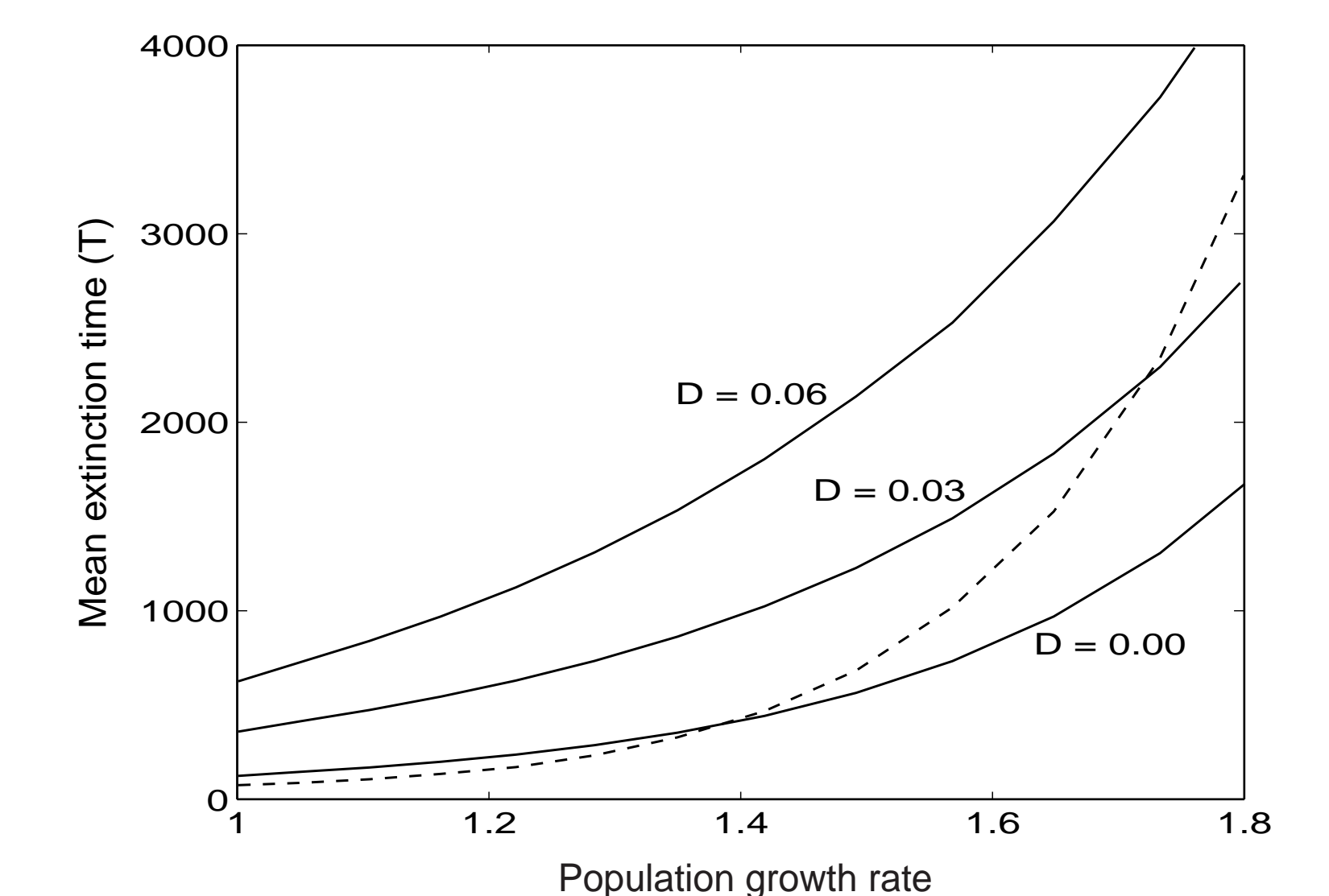
Conclusions:

1. Obligate semelparous populations are more persistent than indeterminate semelparous
 2. However, FOOBAR that difference takes place in the first 10 percent spawning in other age classes
- Considering precocious spawning, this is not a reliable explanation of differences between coho and chinook salmon population response.

Environmental Variability at Age of Return



3. Populations with environmental variability in the age of entry, rather than the age of return show similar behavior but are more persistent.



4. Although fraction straying and straying distances may be small, they still can have a significant effect on population dynamics.

Bottom Line: No reliable population dynamic explanation for differences (yet). Cause may be differences in the way ocean conditions affect survival.