

A cross-ecosystem comparison of temporal variability in recruitment of functionally analogous fish stocks

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As part of the international MENU collaboration, variability in temporal patterns of recruitment and spawning stock were compared among functionally analogous species from four marine ecosystems including the Gulf of Maine/Georges Bank, the Norwegian/Barents Seas, the eastern Bering Sea and the Gulf of Alaska. Variability was characterized by calculating coefficients of variation for each time series and by representing the time series as anomalies. Patterns of synchrony and asynchrony in recruitment and spawning stock indices were examined among and between ecosystems and related to observed patterns in biophysical properties (e.g. local trophodynamics, local hydrography and large scale climate indices) using a wide range of time series analyses, autocorrelation corrections, autoregressive processes, and multivariate cross-correlation analyses. Of all the commonalities, the relatively similar cross-ecosystem and within-species magnitude of variation was most notable. Of all the differences, the timing of high or low recruitment years across both species and ecosystems was most notable. However, many of the peaks in these indices of recruitment were synchronous across ecosystems for functionally analogous species. Yet the relationships (or lack thereof) between recruitment anomalies and key biophysical properties demonstrated that no one factor consistently caused large recruitment events. Our observations also suggested that there was no routine and common set of factors that influences recruitment; often multiple factors were of similar relative prominence. This work demonstrates that commonalities and synchronies in recruitment fluctuations can be found across geographically very distant ecosystems, but biophysical causes of the fluctuations are difficult to partition.

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