The influence of climate variation on eastern oyster (Crassostrea virginica) juvenile abundance in Chesapeake Bay

Kimmel, David G., Roger I. E. Newell

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ABSTRACT: There has been a significant downward trend in the annual abundance (= spatfall) of 0-age eastern oysters (*Crassostrea virginica*) measured in the autumn since 1940 in the Maryland portion of Chesapeake Bay. We developed a multiple linear regression model to predict spatfall from environmental conditions and the magnitude of the previous year's oyster harvest. The model explained 57% of the variance in spatfall from 1940 through 1976. We used the model to predict spatfall using data from 1977 to 2004 and found poor fit for the years after 1985. We suggest that this predictive relation was lost because an epizootic of the protistan parasite *Haplosporidium nelsoni* in 1985 and 1986 killed large numbers of oysters in the Maryland portion of Chesapeake Bay. This event disrupted the tight relation between oyster harvest and spatfall. Using the same variables as in our initial model, we constructed a second multiple linear regression model for all data after 1977. This new model explained 53% of the variance in spatfall, although there was a reduced relation between oyster harvest in the previous year and a strong relation between July salinity and spatfall. Hindcasting spatfall from 1940 to 1976, this model explained 49% of the variance. We suggest that the overall downward trend in oyster spatfall since records began in 1940 is driven by the loss of adult oysters in the spawning stock. Superimposed on this trend is large interannual variability in oyster spatfall that is strongly related to climate-driven changes in environmental conditions during the summer period of larval development and settlement.