

Dinoflagellate Blooms in the Lower Chesapeake Bay

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A unique sequence of dinoflagellate blooms occurred in the lower Chesapeake Bay from July through September 1992. These took place in a sequential temporal pattern beginning with *Ceratium furca* in July, followed by *Cochlodinium heterolobatum*, *Gyrodinium aureolum*, *Gymnodinium nelsonii* and *Noctiluca scintillans*. The developmental regions for *Ceratium furca* and *Cochlodinium heterolobatum* were associated with the plumes of the Rappahannock and York Rivers respectively. These locations represented active dispersal centers for these two bloom species. From these locations, the two blooms spread southward along the western margin of the Bay to the Bay entrance, where at times in the Bay, the *C. furca* bloom covered 272.2 km² and the *C. heterolobatum* bloom 215.7 km². These blooms each lasted 4-5 weeks at various locations, with *C. heterolobatum* being carried with the Bay plume into the Atlantic, and is recorded for the first time as a bloom producer in Virginia and North Carolina Atlantic coastal waters. The other three dinoflagellates produced more localized blooms of shorter duration. With the exception of *Gyrodinium aureolum*, none of the other species were associated with fish or shellfish kills, or hypoxic conditions. *Gyrodinium aureolum* produced an intensive bloom that was centered in a confined harbor where there did occur brief periods of hypoxia and some fish mortalities. This species has not been reported in the Bay since 1980.

These blooms were associated with the rising water temperatures in the Bay, increased salinity, high nutrient levels and the lower levels of river flow common for summer. The transition from June to the mid-summer/early fall included increased phosphorus concentrations, with N:P ratios moving from marginal phosphorus limiting conditions to a more balanced relationship into September. Growth of the bloom species did not reduce the presence, or abundance of other common phytoplankters, or autotrophic picoplankters, during the bloom periods. The termination of these dinoflagellate blooms coincided with the increasing abundance of a fall diatom assemblage. Supported in part by the Virginia Department of Environmental Quality.