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Iordanka N Panayotova* (iordanka.panayotova@cnu.edu), 1 Avenue of the Arts, Department of Mathematics, Newport News, VA 23606, and **Maila Hallare**. *Inquiry-Based Learning: Mathematical Model of Three Fish Population Dynamics in the Chesapeake Bay*. Preliminary report.

We present an inquiry-based project that uses differential equations to study the relationships between three fish species in the Chesapeake Bay and the ecological issues associated with them. Striped bass are a commercial and recreational catch, and they are a key predator in the food web that preys on menhaden. Menhaden, often called “the most important fish in the sea,” are a critical link in the food chain but are severely overfished. The blue catfish, an invasive fish, competes with striped bass to prey on menhaden and may cause severe ecological harm in the region. We analyze biological interactions (two-predator competition on one prey), ecological concerns (overfishing and invasion), and the policy approach (harvesting) using a series of scenarios based on some simplifying assumptions to demonstrate the application of theoretical concepts to actual fisheries in the Bay. The project is an excellent instructional tool as it involves elementary skills such as finding the roots of polynomial equations, computing eigenvalues and eigenvectors, and advanced topics in differential equations and dynamical systems such as Routh-Hurwitz criteria and the Center Manifold Theorem. Numerical simulations using MATLAB are used to confirm theoretical results and visualize time-evolutions. (Received September 06, 2020)