



**“METAPOPOPULATION DYNAMICS GUIDES OYSTER RESTORATION
VIA RESERVE NETWORKS”**

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Monday, September 9, 2013
3:30 PM

Room 1202, Engineering and Computational Sciences Building

Abstract

Metapopulation and source/sink concepts were used to assess the performance of oyster restoration via a network of no-take reserves in Pamlico Sound (PS), NC, the second largest estuary in the US. We parameterized a spatially-explicit, stage-based matrix metapopulation model with empirical measures of oyster demographic rates (fecundity, settlement, growth, survival) within reserves and larval connectivity (hydrodynamic and particle-tracking larval dispersal simulations) among reserves to determine: (1) the relative contribution of each reserve to the network (λc), and (2) the potential for reserves to persist or increase as a network connected by dispersal (i.e., $\lambda \geq 1$). Mean oyster density increased by 432% during the 3-year field study, and oyster growth and survival rates were relatively high compared to other systems; however, the overall metapopulation (network) was not self-sustaining ($\lambda = 0.52$). The metapopulation model then identified (3) rapid increases in λ with increasing oyster restoration, and (4) that building many small reserves would increase λ more rapidly than building several large reserves. Lastly, a GIS framework prioritized oyster restoration to sites located in the northeast and southwest portions of Pamlico Sound in accord with the major wind and larval dispersion axes for Pamlico Sound. The metapopulation and GIS framework applied in this study: (1) identified reserves that had different demographic “strengths”, thereby justifying different management goals for these reserves, and (2) is guiding an overall oyster restoration strategy in space.

Biography

Dr. David Eggleston earned a B.S. in Biology from Old Dominion University, and a M.A. in Marine Ecology and a Ph.D. in Fisheries Ecology from The College of William and Mary. Dr. Eggleston is a Professor of Marine Ecology and Conservation in the Department of Marine, Earth, and Atmospheric Sciences at North Carolina State University, as well as the Director of the Center for Marine Science and Technology at North Carolina State University. His research interests include marine conservation biology, experimental marine benthic ecology, detecting ecological impacts, fisheries and behavioral ecology, population dynamics and modeling, estuarine and coastal habitat restoration, and marine science education.

Reception before seminar at 3:00 PM