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**Decision Support Model for the Management of Ballast Water:
Waters Traveled and Plotting a New Course**

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Abstract

The introduction of invasive marine species into new environments has been considered one of the four greatest threats to the world's oceans. In response to increasing awareness about the seriousness of the potential economical, environmental and human health impacts caused by the spread of invasive species through ships' ballast water (*i.e.* the water vessels pump in and out from their tanks to adjust the vessel's draft for various loading conditions, and increase stability and maneuverability during transit), the International Maritime Organization (IMO) adopted the Ballast Water Convention (BWC, 2004). Among other things, the BWC will require that all ships comply with Performance Standards by the year 2016. The Convention also defines the right of nations to establish more stringent prevention standards, which is a potential source of conflicting policies. In order to resolve the many controversies related to the management of this complex issue, a 2004 IMO resolution called for "suitable decision-making tool" to analyze BW management protocols. In this context, a nonlinear optimization model that evaluates the potential for technology-policy alternatives to mitigate introductions of aquatic organisms from ballast water has been developed in a joined effort between researchers of the College of Marine and Earth Studies, University of Delaware, and the Rochester Institute of Technology. During our presentation, this model (previously introduced to this college in past seminar presentations) will be reviewed in light of the most recent research progress attained, and the application of the model to a specific port ecosystem, the Delaware Bay, will be illustrated through the presentation of two case studies. The complexities of the problem, uncertainties, and difficulties related to the scarcity, and often inexistent data will be discussed, and fundamental questions related to the successful management of ballast water, such as: "Are the current standards and policies feasible? Could more stringent standards be put in place? What would those standards cost to the industry?" will be addressed.