Presentation
3. Invasive Species Early Detection and Rapid Response

Early Detection Monitoring for Vulnerable Great Lakes Coastal Ecosystems

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Great Lakes harbors/embayments are vulnerable to introduction of aquatic invasive species. Monitoring is needed to inform on new introductions, as well as to track success of prevention programs intended to limit spread. We have completed a pilot field case study in the Duluth-Superior Harbor, an at-risk shipping port on Lake Superior. Our "oversampling" strategy used spatially-comprehensive, high-density sampling strategies. We found >35 fish species and >162 benthic invertebrate taxa, including all known non-native and invasive species and another 8 new non-native benthic invertebrates we have now reported for the first time. "Oversampling" provided an empirical basis to perform analyses/modeling and illustrate the prime dilemma with detection of potentially-invasive species while they are still rare in their abundance and distribution: we can improve detection probability through increased sampling effort, but this comes at increased cost. A related technical issue is to how to develop cost-efficiency yet maintain a high statistical confidence in ability to detect species in very low abundance, when rapid responses could be most effective. We have used the extensive information base from our case study to evaluate effectiveness of sample allocation strategies, in an effort to develop a model approach. Other Great Lakes case studies are being planned for 2010-2011; together these will help define an early detection monitoring design for a broad network to be established across the Great Lakes by 2014.