



**MarTREC UTC Project Information Form**  
 USDOT Tier 1 University Transportation Center  
 Agency ID or Contract Number DTRT13-G-UTC50

Project Title: Efficient Dredging Strategies for Improving Transportation Infrastructure Resilience
Project Abstract (Brief Description): The inland navigation system is highly dependent on uncertain natural factors such as shoaling that can render waterways unnavigable. In order to ensure waterway navigability, maintenance dredging must be completed. We consider the problem of selecting a budget-limited subset of maintenance dredging projects to maximize the expected commodity tonnage that can be transported through the inland waterway system. We develop an optimization model for this problem that incorporates uncertainty due to unpredictable amount of budget required for emergency dredging. This problem is modeled as a two-stage stochastic program and a genetic algorithm is developed as a solution approach. The model and heuristic is implemented using data obtained for the U.S. inland waterway network.
Describe Implementation of Research Outcomes (or why not implemented): We developed a mathematical model to explore inland dredging strategies (i.e., how to allocate funds into districts, which sites should be dredged) that are efficient with respect to cost and ensuring minimum disruption to freight transportation. We implemented algorithms, both exact and heuristic, to solve this problem and demonstrate results using data for the U.S. inland waterway network.
Impacts/Benefits of Implementation (actual, not anticipated): We produced a case study that illustrates the application of our model to the U.S. inland waterway network. We demonstrate how our model and algorithms can be used at a variety of resource levels to allocate maintenance budget to districts. Using these results, we demonstrate the tradeoff between available maintenance budget and system-wide performance. Furthermore, we demonstrate insights (e.g., which locations are more critical for dredging) that can be created as a result of solving our model.
Web Links: <a href="http://martrec.uark.edu">martrec.uark.edu</a>
Budget (Funding) Amounts & Source(s) (US DOT +Match(s) =Total Costs): \$113,747 Martrec + \$58,564 Academic Year Salary = \$172,311
Project Start and End Dates: 08/01/14-07/31/16. Extension to 12/31/16. Project Complete
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Principal Investigator Institution (University): University of Arkansas