## Project Title:
Supporting Secure and Resilient Inland Waterways

### Project Abstract (Brief Description):
To mitigate inland waterway disruption impacts, we developed the cargo prioritization and terminal allocation problem (CPTAP) to minimize the total value loss of disrupted barge cargoes. CPTAP is formulated as a nonlinear binary integer program, and problems of realistic size can be efficiently and effectively solved with a heuristic approach. The final solution identifies an accessible alternative terminal for each disrupted barge and the prioritized offload turn that each barge takes at its assigned terminal. Implementation of CPTAP results in reduced cargo value loss and response time when compared to a naïve minimize distance approach. This proposed project extends our earlier work through CPTAP model enhancement, expanded application, and improved solution approach development.

Describe Implementation of Research Outcomes (or why not implemented): Task 1: Model Enhancement (in progress) - Incorporating additional real-world system attributes into the CPTAP model, e.g., time windows could be incorporated to consider expected cargo arrival dates  Task 2: Improved Solution Approach Development (in progress) - Examining additional improved solution approaches for the CPTAP model such as network representation and memetic algorithm approaches  Task 3: Expanded Application - Employ CPTAP in pre-event planning by assessing the resiliency of the inland waterway transportation system to handle potentially disrupted cargo based on the existing commodity capacity of the offload terminals and alternative modes of land-based transportation and Develop a scalability plan for expanding the CPTAP decision support system throughout the U.S. inland waterway transportation system  Task 4: Documentation and Dissemination (in progress) - Project results have been submitted to one transportation-related conferences, related journal articles will be submitted, and practitioner publications will be developed.

Impacts/Benefits of Implementation (actual, not anticipated)
*To be determined upon conclusion of the project:*

Web Links: martrec.uark.edu

Budget (Funding) Amounts & Source(s) (US DOT +Match(s) =Total Costs): $158,000 MarTREC + $79,119 Salary Release = $237,119

Project Start and End Dates: 08/01/14-06/30/17

Principal Investigator(s) and Contact Information: Heather Nachtmann Ph.D and Justin Chimka Ph.D

Principal Investigator Institution (University): University of Arkansas

Revised May 1, 2015