RITA Office of Research, Development, and Technology

UTC Spotlight

University Transportation Centers Program

This month: Mack-Blackwell Rural Transportation Center | August 2011

Emergency Response via Inland Waterways

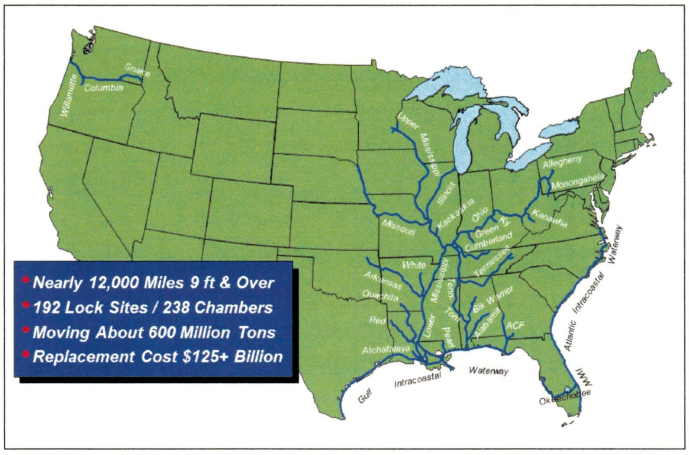
A catastrophic disaster can disable or destroy the very same vehicles, roads, and bridges that are needed to provide emergency response. But for many communities, inland waterways may provide access to equipment and emergency services when other means of transportation are unavailable. A goal of the Mack-Blackwell Rural Transportation Center (MBTC) is to enhance community emergency preparedness and disaster relief efforts by developing an index to help emergency planners evaluate the feasibility of incorporating inland waterways into their emergency response planning.

Chip Moore

Inland waterways may provide transportation of emergency supplies and equipment when other means are unavailable.

Inland waterways may be especially useful for rural emergency planners who must cover a large geographical area with limited resources.

Inland waterways are a tremendous asset to the United States, providing an economical and environmentally sound mode for moving cargo. The U.S. Army Corps of Engineers is responsible for nearly 12,000 miles of commercial, navigable U.S. inland and intracoastal waterways—the Mississippi/Ohio River System, the Gulf Intracoastal Waterway, the Intracoastal Waterway



U.S. Inland and Intracoastal Waterway System

Map courtesy of U.S. Army Corps of Engineers.

along the Atlantic Coast, and the Columbia-Snake River System in the Pacific Northwest. Inland and intracoastal waterways serve 38 States with 192 commercially active lock sites.[1]

Domestic waterborne trade over inland waterways amounted to 522.5 million short tons in 2009 alone.[2] The Nation's waterways are used to transport approximately 20% of America's coal, 22% of U.S. petroleum and 60% of the Nation's farm exports.[3]

Historically, tugs and barges have been used to provide emergency response services. As part of recovery efforts in the wake of the January 2010 Haiti earthquake, tugs

[1] U.S. Army Corps of Engineers, *Inland Waterway Navigation: Value to the Nation* (2009), available at http://www.corpsresults.us/ (Accessed July 2011).

[2] U.S. Army Corps of Engineers, Navigation Data Center, *The U.S. Waterway System, Transportation Facts and Information* (November 2010), http://www.ndc.iwr.usace.army.mil/factcard/temp/factcard10.pdf (Accessed July 2011)

[3] Ibid, *Inland Waterway Navigation: Value to the Nation* (2009).

and barges participated in the vast international relief operation, carrying large volumes of food and supplies as well as aid to help ease shortages.

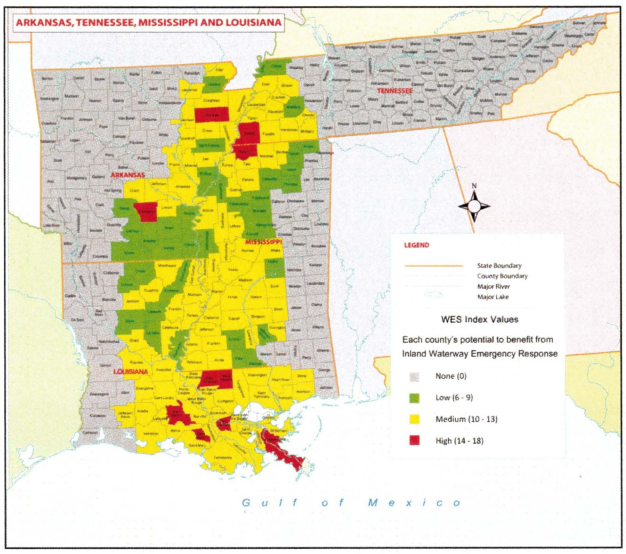
MBTC has developed a Waterway Emergency Service (WES) index to measure the potential of individual counties to benefit from inland waterway emergency response. The WES index consists of seven factors:

1. Accessibility to navigable inland waterways,
2. Population demand,
3. Social vulnerability,
4. Risk of disaster,
5. Limited access to medical services,
6. Limited access to resources, and
7. Limited access to transportation modes.

Researchers calculated the WES index values for four States along the lower Mississippi River: Arkansas, Louisiana, Mississippi, and Tennessee. The map graphically depicts WES index results in the four-state region by color-coding each county's potential to benefit from inland waterway emergency response.[4]

Among the 145 counties with access to the Mississippi River, more than 73% had at least a medium level of potential to benefit from emergency response via inland waterways. Distance from the public ports on the lower Mississippi River precluded 171 counties in the four-state region from use of inland waterway emergency services.

In addition to the WES index, MBTC research has led to the development of a systematic planning strategy for utilizing the inland waterway transportation system to provide emergency response. The research team is currently developing an optimization-based methodology to determine the number of barges required to provide the best possible inland waterway-based emergency support. The methodology will also help emergency response planners determine the optimal starting location of available barges to ensure that the communities with the potential to benefit from emergency response via inland waterways have maximum coverage.



Final WES Index Values for Lower Mississippi River Region, July 2011.

SOURCE: *Navy Times*, Jan. 18, 2010, http://www.navytimes.com

[4] H. Nachtmann and E. A. Pohl, *Emergency Response via Inland Waterways*, Mack-Blackwell Rural Transportation Center final report, forthcoming, July 2011.

About This Project

Heather Nachtmann, Ph.D. is the director of the Mack-Blackwell Rural Transportation Center and an associate professor of industrial engineering at the University of Arkansas. The project team also includes Edward A. Pohl, Ph.D., associate professor in Industrial Engineering, and Leily Farrokhvar, an industrial engineering doctoral student. This material is based on work supported by the U.S. Department of Transportation's University Transportation Centers program. Follow-on support was provided by a grant from the U.S. Department of Homeland Security. The research was conducted through the Mack-Blackwell Rural Transportation Center at the University of Arkansas, a USDOT UTC and a member of the DHS National Transportation Security Center of Excellence. For more information on this project and others, please visit www.mackblackwell.org.