Inland Port Resilience

FHWA Talking Freight Webinar

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Overview of Presentation

- Overview of the study
- Impacts of extreme weather events on inland waterway transportation
- Definition and importance of resilience
- Roadmap for Resilience

Overview of Study

- Inland Port Community Transportation Resilience Analysis in Mississippi-Tennessee-Arkansas
  - Funded by U.S. Environmental Protection Agency
  - Initial focus on Memphis
  - Resilience to extreme weather
- Assessed available tools:
  - Evaluate community environmental, health and economic needs of multi-modal shifts in freight flows on inland waterways
- Conducted outreach to the Port of Memphis
- Created a roadmap to improve inland port resilience

Impacts of Extreme Weather on Inland Waterway Transportation

- **High water event impacts**
  - River closures, navigation restrictions, erosion, damage to port infrastructure & navigation channels and disruption of port operations
- **Examples:**
  - Due to floods in the Midwest this winter, the Coast Guard has issued a number of river closures, restrictions and advisories.
  - On January 12 and 13 barges struck two bridges over the Mississippi River in Vicksburg. These accidents resulted in a brief river closure.
  - In 2011flooding in Memphis in 2011 caused $9 million of damage to President's Island in erosion and structural damage to the island itself.

Impacts of Extreme Weather on Inland Waterway Transportation (continued)

- **Low water event impacts**
  - Reduction of barge drafts in navigation channels
  - Creation of bottlenecks as navigable channel is narrowed – one-way traffic
  - Navigation restrictions – hours of operation, number of barges towed, etc.
  - Closure of the river all together.
  - Disruption of loading and unloading

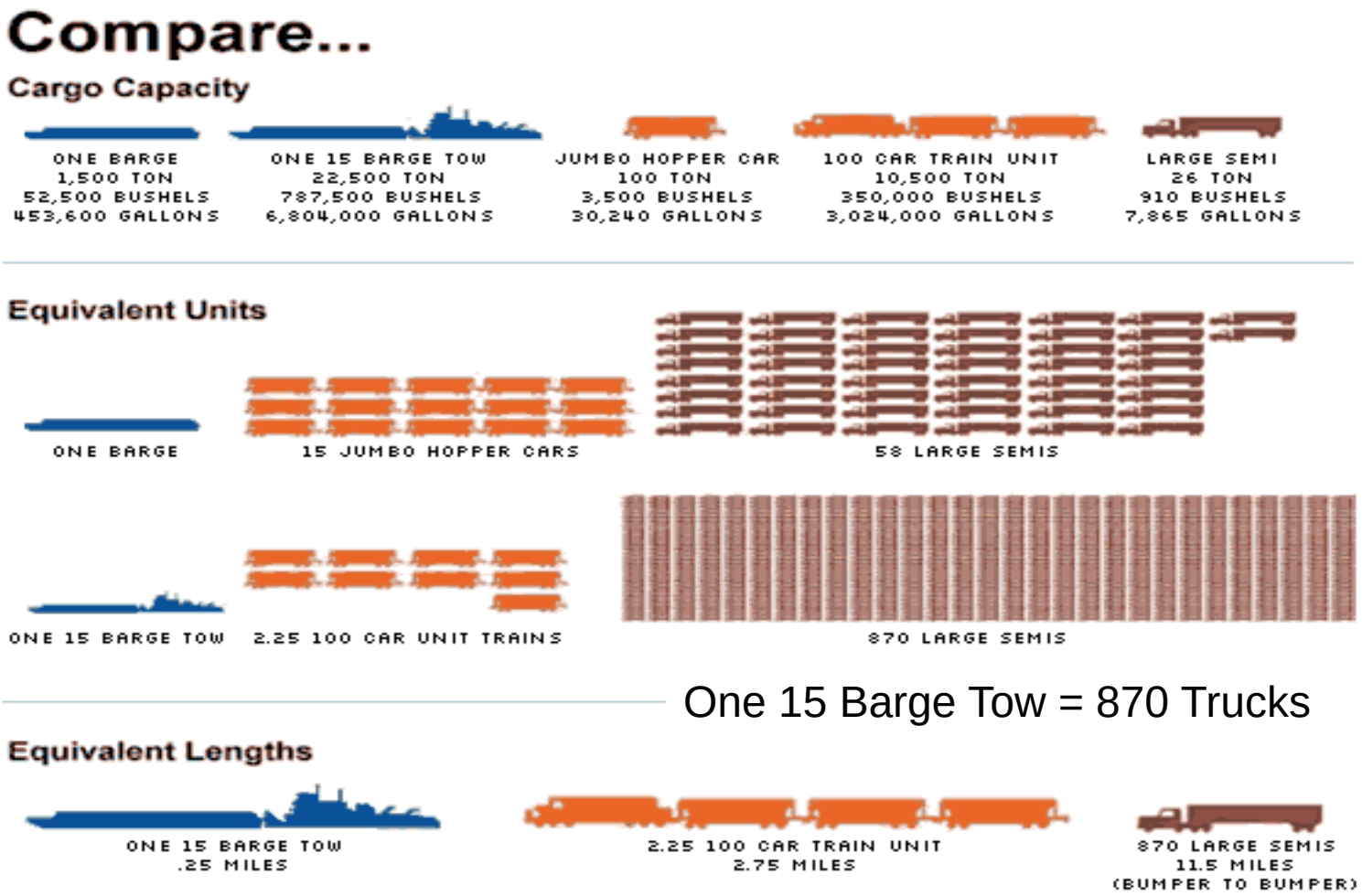
- **Examples**
  - In August 2012, low water required the closure of the Mississippi river at Greenville (below Memphis) for over a week.
  - In 2012 barge tow sizes were restricted to no more than 25 barges at Memphis for southbound tows and 36 barges, up to 20 of them loaded, for northbound tows. Barge draft levels were reduced from 12 feet to 9 feet for over a month on the lower Mississippi river

Impacts of Extreme Weather on Inland Waterway Transportation (continued)

- **There are a number of impacts of extreme weather events on freight**
  - Delays
  - Reductions in the volume freight moved by barges
  - Increases in loading time
  - Reductions in the number of barges that can be transported
  - Increased cost of barge transportation
  - Increases in truck traffic from mode shifts
  - Increased emissions resulting from delays and switch from barge to less efficient modes.

- **The American Waterways Operators Association estimated the following impacts:**
  - It costs towing companies at least $10,000 a day when a towboat sits idle.
  - With every one-inch loss of water, each barge is unable to move 17 tons of cargo.
  - The typical tow on the lower Mississippi is 30-45 barges, resulting in decreased capacity of up to 765 tons for one-inch loss of water.

Mode Shifts and Modal Cargo Capacity



One 15 Barge Tow = 870 Trucks

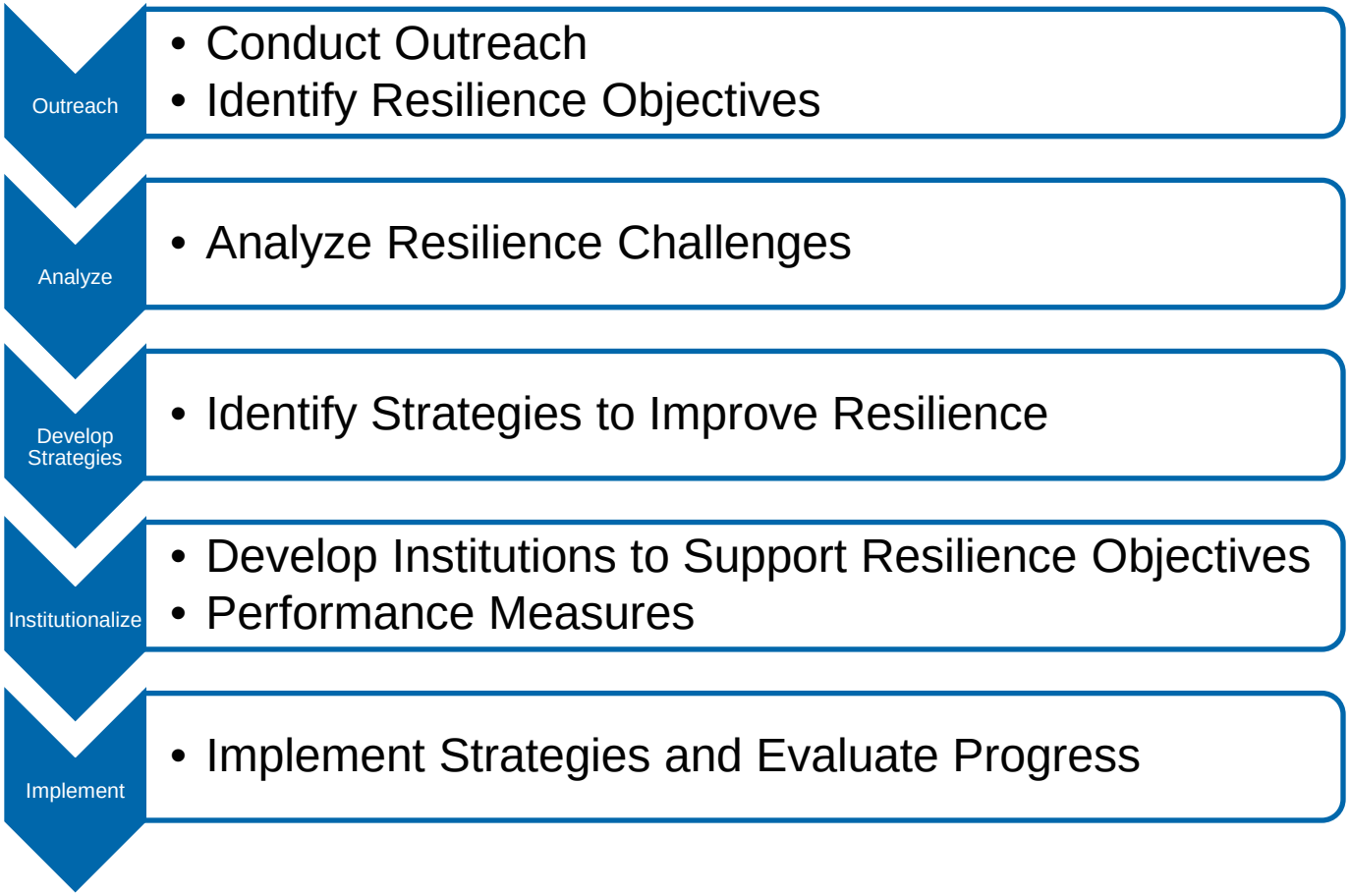
Source: Kentucky Association of River Ports

Definition and importance of resilience

- **Definition:**
  - The National Academy of Science defines resilience in the following way: “Individual, community, and national resilience is the ability to prepare and plan for, absorb, respond, recover from and more successfully adapt to adverse events”.

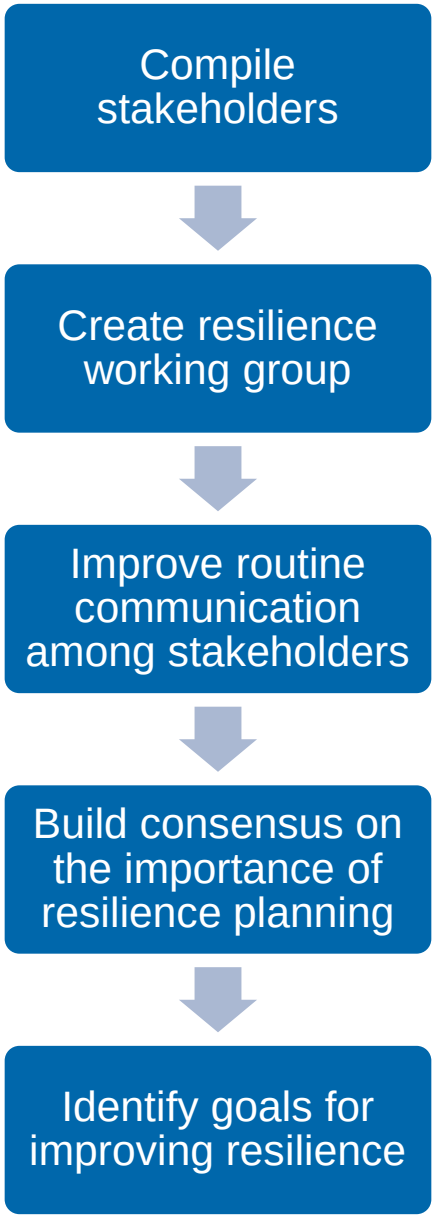
- **Importance**
  - Flooding and drought cycles on the Mississippi River have curtailed barge traffic in recent years.
  - These disruptions have had significant economic impacts on the barge services, other marine shipping, and agricultural industries.
  - Freight mode shifts from barge could overwhelm highway and rail systems and can cause localized increases in air pollution and other negative effects on noise levels, road safety, and emergency access.
  - Disruptions can result locally in difficulties in moving freight through ports, lost wages and economic activity in the community, and social uncertainty.
  - Disruptions in barge transportation also results in production disruptions and economic losses throughout the country.

Overview of Roadmap to Resilience



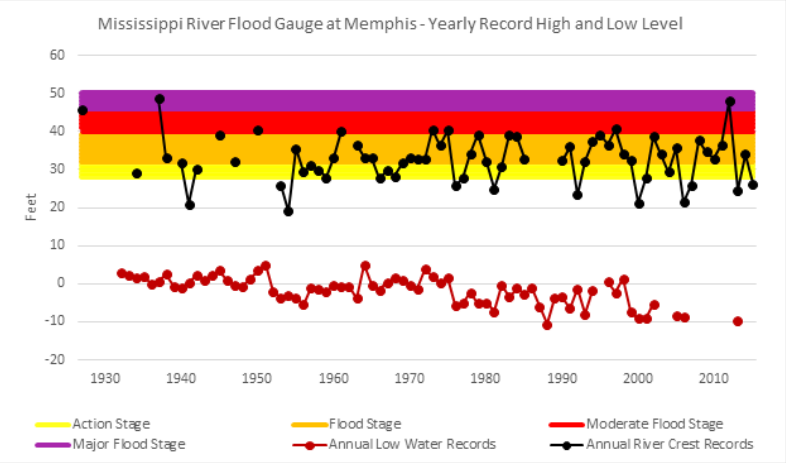
Outreach

- **Stakeholders include carriers, shippers, port officials, community groups, state/local government officials, policymakers, and planners**
- **Do key stakeholders know each other? Are there informal avenues for communication and meeting each other?**
- **Is there expertise available in local academic or research institutions that could help the port become more resilient?**
- **Communicate with stakeholders to build a big picture understanding of why planning for port resilience is an important**
- **Identify goals**
  - Port infrastructure and operations
  - Economic
  - Community
  - Environmental and human health



Analyze Resilience Challenges

- **Characterizing the prevalence of extreme weather events** – river gauge records indicate that river levels on the lower Mississippi have become increasingly variable over time



- **Assess impacts** on human health, navigation, port operation, broader economic impacts, community impacts

Define baseline commodity flow scenario

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Identify trends in extreme weather

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Identify weather impact scenarios on port – high and low water

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Develop alternative freight movement scenarios

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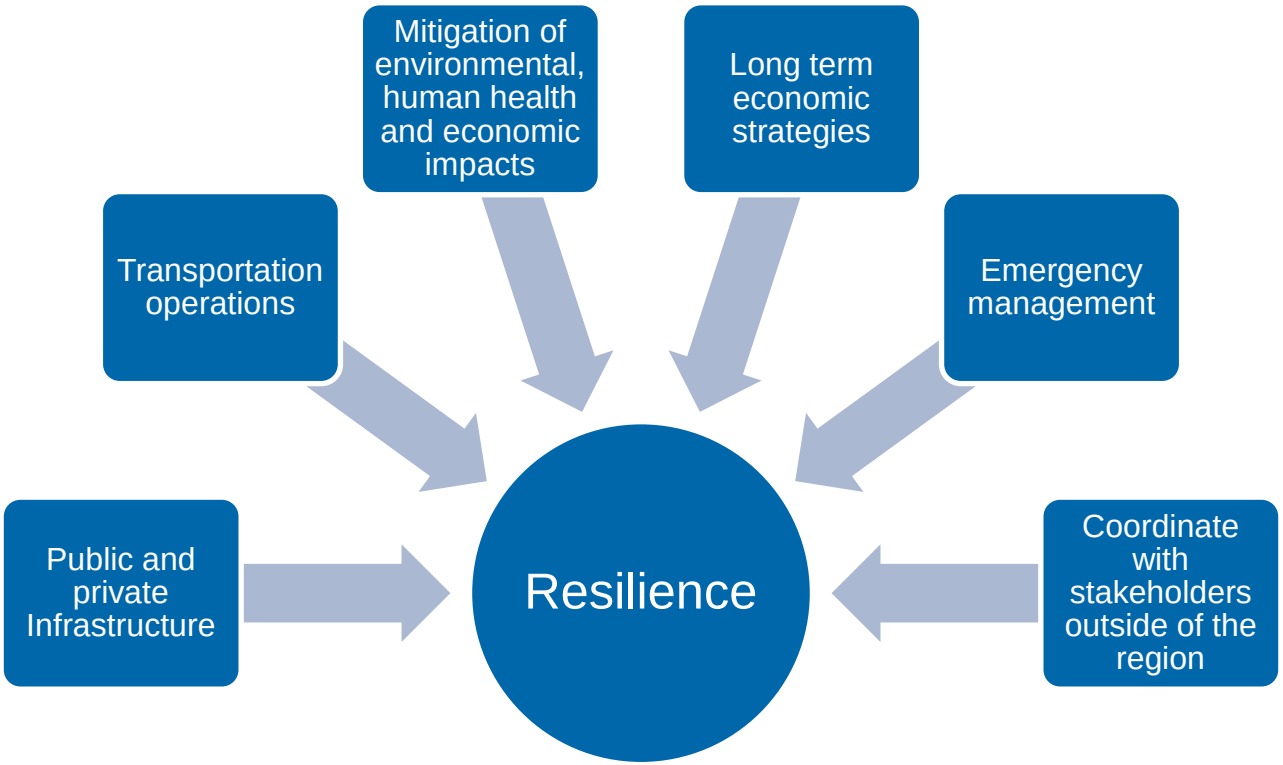
Estimate impacts

Identify Strategies to Improve Resilience

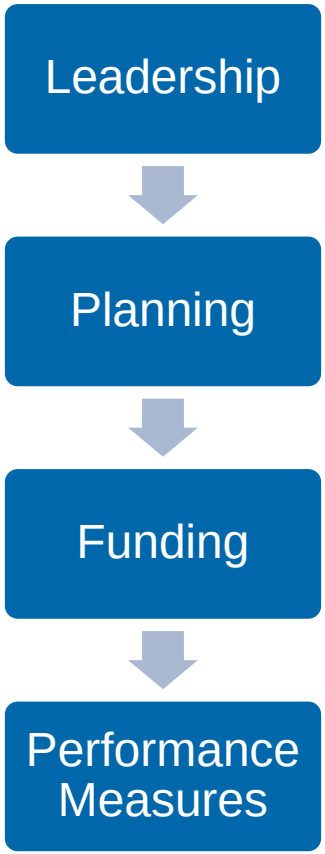


Strategies to Improve Resilience

- **Infrastructure**
  - Increasing redundancy in roadway access,
  - Flexible infrastructure - floating docks and flexible conveyors
  - Increasing rail capacity
  - Protection of existing access routes (through flood barriers or elevation)
  - Floodplain management best practices
    - *Building above the base flood elevation*
    - *Stream abatement*
    - *Drainage maintenance*
- **Transportation Operations**
  - Equipment strategies
  - Operations – congestion, idling
  - Availability of river pilots
- **Environmental & Human Health**
  - EMS
  - Updating processes for disposing of silt
  - Ensuring the reliability of flood pumps
- **Long Term Economic Strategies**
  - Diversification
  - Knowledge of supply chains
- **Emergency Management**
  - Planning
    - *Strategic, tactical and operational plans*
  - Response
  - Recovery
- **Coordinate with stakeholders outside the region**
  - USACE and the Coast Guard
  - River management
  - Private sector supply chain professionals

Develop Institutions and Performance Measures to Support Resilience Objectives

- **Leadership** - Identify responsible parties for various strategies, and a process to revisit progress on a continuing basis
- **Planning** - Develop a process to include resilience measures into freight transportation planning and port infrastructure projects
- **Funding** - Identify and delineate the sources of funding to invest in resilience
- **Performance measures** - Develop indicators of resilience that can be used to measure progress



Implement Strategies and Evaluate Progress

- **Implement strategies**
  - Management, coordination and execution of projects
  - Actions required at different levels of government and in private sector entities
  - Maintain communication
- **Continuously evaluate progress**
  - Evaluate progress
  - Communicate with stakeholders about what has worked
  - Adjust strategies as necessary

Source: CBO – August 2015 Baseline

Conclusions

- Resilience is an especially challenging area because it requires coordination and communication across multiple stakeholder organizations.
- Resilience incorporates diverse goals and objectives, including those related to economic performance, human health, environmental quality, port operations and community well-being.
- Large array of possible strategies to address resilience.
- Foundational components of a resilience program include bringing diverse stakeholders to the table to build a consensus and common understanding of what needs to be done

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Source: CBO – August 2015 Baseline

Contact Information

- For additional information, feel free to contact me at:

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- Report is currently undergoing EPA review for release as an EPA report

Source: CBO – August 2015 Baseline