SYSTEM DISRUPTIONS

Bruce Lambert
Three things to evaluate a disruption

- What are base flows
- What occurred
- What responses are available
Base Flows

- Corps Datasets
- Other federal data sets
- Facilities and locations
- Commodity details
Note: Highway & Rail is additional highway mileage with daily truck payload equivalents based on annual average daily truck traffic plus average daily intermodal service on parallel railroads. Average daily intermodal service is the annual tonnage moved by container-on-flatcar and trailer-on-flatcar service divided by 365 days per year and 16 tons per average truck payload.

Tenn-Tom Waterways Economic Benefit

Economic Impact 1996-2008 (in Millions)

<table>
<thead>
<tr>
<th>State</th>
<th>Direct</th>
<th>Indirect</th>
<th>Induced</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>$15,217.1</td>
<td>$550.3</td>
<td>$718.8</td>
<td>$16,486.2</td>
</tr>
<tr>
<td>Kentucky</td>
<td>$887.2</td>
<td>$163.1</td>
<td>$559.1</td>
<td>$1,609.4</td>
</tr>
<tr>
<td>Mississippi</td>
<td>$6,854.7</td>
<td>$1,333.0</td>
<td>$1,276.6</td>
<td>$9,464.3</td>
</tr>
<tr>
<td>Tennessee</td>
<td>$2,361.6</td>
<td>$38.1</td>
<td>$47.1</td>
<td>$2,446.8</td>
</tr>
<tr>
<td>Regional</td>
<td>$25,320.5</td>
<td>$2,083.3</td>
<td>$2,641.1</td>
<td>$30,054.9</td>
</tr>
<tr>
<td>United States</td>
<td>$25,320.5</td>
<td>$5,822.6</td>
<td>$11,380.6</td>
<td>$42,523.7</td>
</tr>
</tbody>
</table>

This table shows the impact from private investment and ports operating in the Tenn-Tom Waterway region.

Employment Impact 1996-2008

<table>
<thead>
<tr>
<th>State</th>
<th>Direct</th>
<th>Indirect</th>
<th>Induced</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>8,384</td>
<td>3,879</td>
<td>7,567</td>
<td>19,830</td>
</tr>
<tr>
<td>Kentucky</td>
<td>8,046</td>
<td>1,201</td>
<td>5,850</td>
<td>15,097</td>
</tr>
<tr>
<td>Mississippi</td>
<td>12,145</td>
<td>7,858</td>
<td>13,440</td>
<td>33,443</td>
</tr>
<tr>
<td>Tennessee</td>
<td>507</td>
<td>271</td>
<td>493</td>
<td>1,271</td>
</tr>
<tr>
<td>Regional</td>
<td>29,191</td>
<td>13,292</td>
<td>27,806</td>
<td>70,289</td>
</tr>
<tr>
<td>United States</td>
<td>29,191</td>
<td>29,001</td>
<td>79,471</td>
<td>137,663</td>
</tr>
</tbody>
</table>

This table indicates the number of jobs that were directly and indirectly created based on industry-to-industry transactions, as well as the number of jobs that were created based on employee spending in the local economy.
Complex Corridor Connections

http://www.wired.com/magazine/2011/05/ff_jobsi85/
## Top 10 O-D flows, 2010

<table>
<thead>
<tr>
<th>Destination</th>
<th>Origin</th>
<th>Million tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX</td>
<td>TX</td>
<td>60.7</td>
</tr>
<tr>
<td>LA</td>
<td>LA</td>
<td>21.4</td>
</tr>
<tr>
<td>LA</td>
<td>IL</td>
<td>17.3</td>
</tr>
<tr>
<td>FL</td>
<td>LA</td>
<td>16.4</td>
</tr>
<tr>
<td>KY</td>
<td>KY</td>
<td>16.3</td>
</tr>
<tr>
<td>WA</td>
<td>AK</td>
<td>16.3</td>
</tr>
<tr>
<td>TX</td>
<td>LA</td>
<td>16.3</td>
</tr>
<tr>
<td>OH</td>
<td>WV</td>
<td>16.3</td>
</tr>
<tr>
<td>LA</td>
<td>MO</td>
<td>16.3</td>
</tr>
<tr>
<td>AL</td>
<td>AL</td>
<td>16.3</td>
</tr>
</tbody>
</table>
What can go wrong?

- Closure of the river from waterway traffic event
- Closure of segment from bridge, land based event
- Closure of river – maintenance issues
Capacity Constraints

Average Hourly Delays by Lock - All Tows, 2005

Multiple lockages to pass a tow result in long queues that are costly and inefficient.
Challenge: Aging Infrastructure + O&M
Backlog = Increasing “Downtime” at Locks

Navigation Lock Unavailability, 1991-2005
Total Hours Scheduled vs. Unscheduled without Ice
Closures Cost Money!

NETS (IWR-USACE)
- Greenup 2003 Closure (52 days)- $42 Million
- Hannibal Locks 2005 Closure (5 days)-$5 Million
- Lock 27 Closures
  - (August 2007)-$3.9 Million
  - (Oct 2005-Feb 2006)- $2.7 Million
- McAlpine (August 2004)-$6.3 million

GLOBAL Insight – Upper Miss 90 Day Closure
- $118.6 million for Waterway freight
- $482.8 million by rail
- $1.50 billion by truck
Projected Truck Flows from Collapse of Bridge at Webbers Falls.
What responses are available?

- Modal Shift
- Relocation shift
- Does not move
Comparability of transport modes
Areas of Application- PIANC Report 111-2010

- Infrastructure
- Ports
- Environment
- Fleet and Vehicles
- Cargo and Passengers
- Information and Communication
- Economic Development
- Safety
- Security
Some Research Ideas?

• Are some externalities only negative, or can they be viewed in a different context as positive, i.e., can rationalize second order benefits in a study?
• What data, modeling gaps exist?
• Do we need this approach or some other optimal strategy for network improvements?
• Do we want some framework for developing a systems perspective for corridor investment?
• What is the balance between local, regional, national participation in project planning and operations?
• Spatial markets and realignment in response to transportation projects
• Externalities related to non-monetary public goals (risks, health, etc.)
Who Needs to Know?
The Corps?
“Decision Makers”
Industry
Other Modal operators
Thank you

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