Multimodal Freight Transportation within the Great Lakes-Saint Lawrence Basin

National Cooperative Freight Research Program, Project No. 35

GLMRI Annual Meeting

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Summary of NCFRP 35 Research Results

Overview of GLSLB Multimodal Freight Transportation System

- Economic Importance
- Major Commodities Handled
- System Performance
- Barriers to System Performance
- Opportunities to Improve System Performance
- Potential Framework for Multimodal Planning
The Study Area

Great Lakes / St Lawrence Basin
Study Area

- Minnesota
- Wisconsin
- Lake Michigan
- Michigan
- Lake Huron
- Ontario
- Quebec
- New York
- Lake Ontario
- Pennsylvania
- Ohio
- Indiana
- Illinois
- Lake Erie
GLSLB Port System

Legend
- Top 20 GLSLB Ports (2007)
- Water Locks
- Other Marine Ports (handled < 9,000 Tons in 20**)
- Inland Waterways

15 large international marine ports,
50 regional marine ports,
16 locks,
Network of inland waterways
Inland Waterway Traffic

Legend
- Top 20 Ports (2007)
- Marine Ports & Docks

Freight Flow Direction
- South - North
- North - South

Total Freight Movement
(In US Short Tons)
- 1
- 1,000,000
- 10,000,000
- 100,000,000
Seven Class 1 railways (totaling 30,778 miles), 68 intermodal terminals, Several short lines and rail border crossings.
GLSLB Origins & Destinations of Rail Freight Movement by State/Province

(Source: Association of American Railways, Statistics Canada)
Extensive highway system and several border crossings:
US - I-35, I-55, I-65, I-75 and I-95 and on the east-west axis, the I-70, I-80 and I-90
CAN - East-west along the St. Lawrence River and northern edge of the Great Lakes
The GLSLB's 20 largest airports make up 95.2% of the regional air cargo traffic. 36 airports of 156 that handle over 10,000 tons of cargo per year are in GLSLB, majors being Chicago O'Hare and Toronto Pearson.
GLSLB Pipeline Network

Network of pipelines privately owned and operated by energy companies, moving petroleum products.
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Economic Impacts (Transportation Activity, as an Output)

Employment – 3.8 million jobs

Output – Total U.S. $627 billion

Value-Added – Total U.S. $311 billion

Taxes – Total U.S. $87 billion
58% of impacts accrued to the GLSLB states, 13% to the two GLSLB provinces, 29% to other U.S. states and Canadian provinces.

60% of total employment can be attributed to regional commodity flows, 32% to national trade, 8% to international trade.
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The major commodities moving to, from or within the GLSLB include:

- **Coal** (largely for regional power production)
- **Iron ore** (for regional steel production and export)
- **Grain and other agricultural products** (local consumption and export)
- **Automotive and machinery** (supporting local manufacturing base)
- **Other manufactured goods** (including containerized imports for regional distribution and consumption and exports)
Top 5 commodities handled:

**Weight**
- Minerals: 24%
- Fuels and chemicals: 21%
- Agriculture and food products: 18%
- Coal: 11%
- Manufact. and misc.: 11%
- Other: 15%

**Value**
- Machinery and transport. equipment: 28%
- Manufact. and misc.: 31%
- Primary and fabricated metal products: 8%
- Agriculture and food products: 11%
- Fuels and chemicals: 14%
- Other: 8%
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Performance measurement:

- Highly complex
- Different measurement by different stakeholders
- Most salient is the shipper perspective
- Performance tradeoff:
Coal is largely captive to its transport chain, low cost and less time sensitive.

Flow is typically from outside to the GLSLB, mostly for power production.
Most intermodal traffic moves by rail between coasts and the GLSLB.

Chicago is undisputed regional intermodal hub, but consequently extremely congested.
Automotive Supply Chains

Most significant commodity by value. 20 M tons on freight cross the border annually.

Most of the industry inputs are regionally produced.
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Potential Framework for Multimodal Planning
• Modal constraints are fairly well understood

• **What is relatively less well understood are commodity or supply chain specific barriers and their potential solutions.**

• The following are some of the most significant barriers and constraints to multimodal freight transportation performance in the GLSLB, as identified by those consulted...
Capacity constraints and congestion are most significant around Chicago.

Airports and waterways have excess capacity, however, modal shift not a given.
Others Include:

- Modal integration challenges
- Lack of jurisdictional coordination
- Lack of multimodal funding mechanisms
- Modal inequality
- Insufficiency of data and performance metrics
- Lack of awareness of importance and role of freight transportation system
- Labor constraints
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Performance Improvement Opportunities

• Opportunity for better freight transportation performance data and performance measures
• Opportunity for gateway and corridor or supply chain specific performance analysis
• Opportunity for better modal and jurisdictional coordination
• Opportunity for regional strategic framework to identify multimodal freight transportation priorities
• Opportunity for multimodal funding and funding mechanisms
Performance Improvement Opportunities

• Infrastructure Investment:
  – The Heartland Corridor
  – The CREATE Program in the Chicago area
  – The Detroit River International Crossing (DRIC)
  – Detroit-Windsor rail tunnel to accommodate double stacking
  – Northeast CanAm Corridor
  – Transport Canada is also expecting to soon announce its infrastructure investment strategy for the Ontario-Quebec Continental Gateway and Corridor.

• Education and raising awareness
# Summary of NCFRP 35 Research Results

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Transportation Strategy Consultants

Framework for Multimodal Planning

Multimodal Freight Flows
Total traffic flows, today and over forecast period (by commodity, mode, origin/destination supply chain)

Performance of Each Mode in Freight Transportation System
- Marine Infrastructure & Operations: Capacity, Efficiency, Competitiveness, Safety/Sustainability
- Rail & Intermodal Infrastructure & Operations: Capacity, Efficiency, Competitiveness, Safety/Sustainability
- Road Infrastructure & Operations: Capacity, Efficiency, Competitiveness, Safety/Sustainability
- Air Infrastructure & Operations: Capacity, Efficiency, Competitiveness, Safety/Sustainability
- Pipeline Infrastructure & Operations: Capacity, Efficiency, Competitiveness, Safety/Sustainability

Transport Chain (Multimodal) Performance Metrics
For key commodity flows: End-to-end supply chain key performance indicators (KPIs), including transit time, logistics costs, reliability, externalities (safety, emissions, etc.), and benchmarking of overall gateway/corridor performance

Barriers and Constraints to Transport Chain Performance
- Infrastructure Investment Needs
- Supply Chain Integration Needs
- Enabling Regulation Needs
- Technology & Other Needs

Strategic Framework for Prioritization and Initiatives and Opportunities for Optimization of Transport Chain Performance

Priority Strategic Initiatives and Opportunities

Available Funding and Resources

Data Needs
- Freight Flow Data (Tonnages, TEUs, Vehicles, etc.), in Integrated, Consistent Format for US, Canada, States & Provinces
- Modal Performance Data (Capacity, Efficiency, Time, Cost, Accidents, Emissions, etc.)
- Supply Chain Performance Metrics for Key Flows
- Input from Shippers, Carriers, other Transport Chain Stakeholders
- Incentives for Private Sector Input
- Coordination of R&D Efforts. Providing incentives for Data Sharing
- Key Priorities and Policy Goals for Regional Freight Transportation System

Coordination Needs
- Data Sharing and Coordination Among Relevant Public Sector Agencies and Integrated Framework
- Sharing of Data from Shippers, Carriers, Freight Forwarders, Government (Confidential)
- Coordination of R&D Efforts. Providing incentives for Data Sharing
- Incentives for Private Sector Input
- Coordinated, Strategic Regional Multimodal Multijurisdictional Freight Plan
- Coordinated Public (Multi-Jurisdiction) and Private Funding

Source: CPCS
Potential Framework for Multimodal Planning

Data Development and Sharing
- Link data needs to strategic and research goals
- Define meaningful key performance indicators
- Identify means of obtaining required data
- Establish appropriate data sharing arrangements
- Integrate data across modes (multimodal)

Strategic Framework
- Define regional/national/continental freight transportation policy objectives
- Identify best practice freight planning approaches and relevance to GLSLB
- Develop process for collaboration, funding and decision-making to realize policy objectives

Collaboration/Coordination
- Define barriers to collaboration and integration of multimodal freight planning per pan regional policy goals
- Review successful collaborative examples for lessons (international)
- Identify potential collaborative structures and governance models that could be used in GLSLB
Opportunities for Future Research

• Greater clarity is needed on specific regional/national/continental transportation policy goals
• More research is needed on individual supply chains, their performance needs, and related issues/opportunities
• Need for more data and key performance indicators on freight performance
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