Chesapeake Megaregion Freight Analysis

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Megaregion – FHWA Strategic Plan

• New planning geography results from
  – Expanding metropolitan areas
  – Boundaries between areas blurring
  – Interlocking economic systems
  – Shared natural resources and ecosystems
  – Common transportation systems

• FHWA Strategic Plan: “The nation’s megaregion will be the operative regions when competing in the future global economy.”
Emerging U.S. Megaregions

- Richard Florida, University of Toronto, 2007
- America 2050, Regional Plan Association, 2009
- Dr. Catherine Ross, Georgia Tech, 2009

Richard Florida

America 2050

Catherine Ross
Exploratory Advance Research Program

Megaregion Analysis Framework

Megaregion Market Analysis
- Identify Megaregion Issues
- Define Megaregion Boundary
- Characterize Megaregion

Tool Development
- Economic Model
  - GDP
  - Land Use Model
    - Land Cover
    - Location Quality
    - Accessibilities
  - Transport Model
    - Roadway Link Volumes
    - Activity Locations
  - Commodity Flows Long Distance Travel
    - Accessibilities

Performance Measures
- Megaregional Model
  - National or Global Model
Freight Analysis

• Chesapeake Megaregion Characteristics
  – Population & employment distribution
  – Goods production/consumption by mode share
  – Industry profile & commodity mix
  – Ports traffic & access mode

• Intra-megaregion linkage
  – Freight flow
  – Supply chain analysis
  – Economic impact analysis
Chesapeake Megaregion Study Area
Analysis of Unit & Data Sources

**Analysis Unit**
- Megaregion
- Subregion
- FAF zone
- County

**Data Sources**
- Freight Analysis Framework 3
- American Community Survey 2006-2008
- 2009 IMPLAN
- Megaregion model input & output
Infrastructure

Map layers:
- Chesapeake Megaregion
- State
- Interstate Highway
- Rail Road
- Major Airports
- Major Ports

Legend:
- 0 25 50 75 Miles

Cities and Locations:
- Wilmington, DE
- New Castle, DE
- Baltimore, MD
-Washington DC
-Richmond
-Newport News, VA
-Norfolk Harbor, VA
### The Chesapeake Megaregion in Numbers

<table>
<thead>
<tr>
<th>Category</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 Population</td>
<td>15 million</td>
</tr>
<tr>
<td>2010 Employment</td>
<td>9 million</td>
</tr>
<tr>
<td>2010 GDP</td>
<td>$880 billion, 6% of U.S. GDP</td>
</tr>
</tbody>
</table>

#### Major Airports

(Top 100 national ranking per 2013 passenger volume)

1. Baltimore Intl (20<sup>th</sup>)
2. Ronald Reagan Washington National (25<sup>th</sup>)
3. Washington Dulles Intl (28<sup>th</sup>)
4. Norfolk Intl (68<sup>th</sup>)
5. Richmond Intl (71<sup>st</sup>)

#### Major Ports

(Top 100 national ranking per 2013 cargo volume)

1. Norfolk Harbor, VA (15<sup>th</sup> – 47 millions)
2. Baltimore, MD (16<sup>th</sup> – 45 millions)
3. Newport News, VA (28<sup>th</sup> – 25 millions)
4. Wilmington, DE (71<sup>st</sup> – 6 millions)
5. New Castle, DE (74<sup>th</sup> – 5 millions)

**Source:** Population: Census 2010; Employment: County Business Pattern 2010; GDP: BEA 2010; Airport: National Transportation Atlas Databases 2013; Port: National Transportation Atlas Databases 2013
Access Modes to/from Ports

Norfolk Harbor & Newport News, VA
- Truck: 32%
- Rail: 49%
- Water: 7%
- Multiple Modes and Mail: 11%
- Pipeline: 0%
- Other and Unknown: 1%

Wilmington & New Castle, DE
- Truck: 24%
- Rail: 27%
- Water: 0%
- Multiple Modes and Mail: 1%
- Pipeline: 1%
- Other and Unknown: 43%

Baltimore, MD
- Truck: 75%
- Rail: 18%
- Water: 1%
- Multiple Modes and Mail: 2%
- Pipeline: 0%
- Other and Unknown: 0%

Legend
- Truck
- Rail
- Water
- Multiple Modes and Mail
- Pipeline
- Other and Unknown
- Crude petroleum to an on-site refinery

Note: FAF3 Data includes shipments from a private sector establishment to military, but excludes military-to-military shipments.
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Household & Employment Distribution by Subregion

Household by Income Group

Employment by Industry Group

Source: Chesapeake Megaregion Model: 2007 Base year
Economic Dependence

Data Source: Department of Agriculture, Economic Research Service
Origin of Goods Consumed in Chesapeake Megaregion by FAF3 Zone

Origins of goods consumed (in Million tons)

Sum of Fields

- 180
- Produced same FAF zone
- Produced in FAF zone of CM region
- Produced in FAF zone outside of CM region

Source: FAF 3.3
Freight Mode Share in Tons by FAF3 Zone

Production

Consumption

Source: FAF 3.3
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Highway Freight Flows in Tons

Source: 2009 IMPLAN data, EcoNorthwest Haul-Choice Model of truck-dependent industries
2009 Freight Flows by Truck in Tons

From the City of Baltimore

To the City of Baltimore

Source: 2009 IMPLAN data
2009 Freight Flows by Truck
in Tons

From Washington DC

To Washington DC

Source: 2009 IMPLAN data
2009 Freight Flows by Truck in Tons

From Richmond City

To Richmond City

Legend

Freight from Richmond
Tonnage

< 10,000
10,001 - 25,000
25,001 - 50,000
50,001 - 200,000
> 200,000

Freight to Richmond
Tonnage

< 10,000
10,001 - 25,000
25,001 - 50,000
50,001 - 200,000
> 200,000

Source: 2009 IMPLAN data
Supply Chain Analysis

Highway Shipments into Richmond
(Show Top 7 Counties)

Richmond to Baltimore ➔
Baltimore to other Counties

Source: 2009 IMPLAN data
Supply Chain Analysis

Highway Shipments into Baltimore
(Show Top 7 Counties)

Baltimore to Richmond ➔
Richmond to other Counties

Source: 2009 IMPLAN data
Impact of 1% Change in Richmond Production on Selected Counties – Magnitude (in dollars)

Source: 2009 IMPLAN data
Impact of 1% Change in Richmond Production on Selected Counties – Industry Share (in $)

Source: 2009 IMPLAN data
Conclusions

• The Chesapeake Megaregion is tightly linked by freight Flows

• The MPO planning areas are unable to capture complex supply chain relationships & economic dependence

• Future travel congestion can threaten not only local economies but the economy of the entire megaregion
Conclusions

• There is a need for an analytic framework at megaregion level
• Travel model can be constructed with available data

FHWA Project Reports:

1. A Framework for Megaregion Analysis: Development and Proof of Concept"
2. The Chesapeake megaregion Market Analysis