Making a Great Lake Superior

Great Lakes Maritime Commerce and Global Warming: Dredging Impacts

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Areas of Operation: The Current Eight Great Lakes Shipping Patterns With Examples

- **Seaway traffic – Foreign**
  - Antwerp to Hamilton, Cleveland, Windsor and Burns Harbor
- **Seaway traffic – US/Canada to US/Canada**
  - Sept Isles to Hamilton
  - Portland, Maine to Buffalo, NY
- **Connecting inland waterway routes:**
  - Milwaukee to Dubuque, IA via the Illinois waterway
- **Interlake – US / Canada**
  - Superior, WI to Nanticoke
- **Interlake – US / US**
  - Superior, WI to Detroit
- **Interlake – Canada / Canada**
  - Thunder Bay to Hamilton
- **Intralake – Canada / Canada**
  - Sarnia, Ontario to Sault St. Marie, Ontario
- **Intralake – US / US**
  - Muskegon to Milwaukee
Global Warming Predictions for Great Lakes: Impacting Shipping

- **Predicted drop in lake levels** (Millard, F 2005) (Lindberg, J.D. and G.M. Albercook, 2000)
  - Reduced draft in navigation channels = reduced vessel carrying capacity
  - Reduced draft in navigation channels = reduced access to docks
  - Reduced draft will impact not only large 1000 foot vessels but small 40 foot vessels.
Vessel Carrying Capacity Per Trip

<table>
<thead>
<tr>
<th>Great Lakes Bulk Carriers</th>
<th>Vessel Length (feet)</th>
<th>Per-Trip Carrying Capacity</th>
<th>Capacity Per Inch Of Draft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,000</td>
<td>69,664</td>
<td>267</td>
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<td>806</td>
<td>34,720</td>
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<td>767</td>
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<td>501</td>
<td>13,776</td>
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</tbody>
</table>

*Capacity per inch of draft reflects the incremental tonnage carried at normal loaded draft.*

Major Great Lakes U.S. flag vessel classes
Commercial vessels working the Great Lakes are leaving behind cargo virtually every time they load because of inadequate dredging of deep-draft ports and waterways. The map above uses select Great Lakes ports to illustrate how many inches of loaded draft the dredging crisis is costing the industry.
Options to Address Channel Depth Issues

1) Increased Dredging
2) Move Cargo to other Modes
3) Change Vessel Designs and build new vessels
1. Issues in Increased Dredging

- **Physical limits** –
  - Rock Cut in St. Marys’ River and other rock bottoms

- **Increased Costs** –
  - Adverse sedimentation occurs faster with shallow water calling for increased dredging frequency

- **Disposal limits** –
  - May lack adequate disposal sites for dredge especially if material has contaminants

- **Public Navigation Channels and Private Docks** –
  - Great Lakes’ Ports are composed mostly private docks.

- **Undermining Dock Pilings** –
  - Older docks may not have pilings driven deep enough to support dredging deeper

Options for increased Great Lakes dredging are limited.
Lake Vessels will carry less cargo per trip.
2. Move Cargoes to other Modes

- Trade will double in next 10 years
- Truck and Rail will lack adequate capacity
- Energy costs will continue to rise impacting other modes first
- Highway congestion will continue to grow
- Environmental concerns will increasingly shape transportation decisions
## Vessel Draft / Capacity

<table>
<thead>
<tr>
<th>Vessel Length</th>
<th>Capacity Per Inch of Draft</th>
<th>Tonnage loss w/ 6“ decrease</th>
<th>Tonnage loss w/ 12“ decrease</th>
<th>Tonnage loss w/ 18“ decrease</th>
<th>18” = Trucks @ 35 tons cargo</th>
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</thead>
<tbody>
<tr>
<td>1,000</td>
<td>267</td>
<td>1602</td>
<td>3204</td>
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<td>501</td>
<td>71</td>
<td>426</td>
<td>852</td>
<td>1278</td>
<td>37</td>
</tr>
</tbody>
</table>
Capacity in Modal Shifts

- It would take 2,800 25-ton trucks to carry as much cargo as one loading of a 1,000-foot-long US-flag Laker.
- It would take seven 100 car unit trains to carry the cargo of one voyage of a 1,000 foot Laker.
Infrastructure Changes

RAIL MILES
- 1960 – 207,334
- 1980 – 164,822
- 1990 - 119,758
- 2000 – 99,250
Net loss 108,084 miles
51%

HIGHWAY MILES
- 1960 – 3,545,693
- 1980 – 3,859,837
- 1990 - 3,866,926
- 2000 – 3,936,229
Net Gain 390,536 miles
11%

Bureau of Transportation Statistics -2004
2020 Highway Congestion

Increased cost due to Congestion Costs and accident costs
Excerpt from paper for SNAME 2007 additional study done by Great Lakes Commission Study – October Seaway Review
2. Change Vessel Designs

• Requires new building in US shipyards due to Jones Act
• Canada has similar law – Coastal Trading Act.
• New vessels with wider beams could carry more cargo at shallower drafts
• New vessels could be more cost effective
• New vessels could have even lower environmental footprint.
Great Lakes/River Vessels

- Bridge Forward design
- Z Drive for Maneuverability
- Removable Gen-Sets
- Modular design – bulk - RO/RO- passenger - container
- Bulk, Break bulk or Container designs
- Low air draft
SECU Vessels. Terminals, Rail

Tallor made SECU-Carrier

The hub in Gothenburg

Swedish cargo ship, Tor Selandia, made her maiden call into the new paper handling facility
The Future (10-30 years)
Great Lakes Fleet

- **Maximize cargo capacity in shallow channels**
  - Length/beam/draft

- **Reduced crew size**
  - Multi-skilled crew and shoreside repair of units

- **Efficient cargo systems**
  - Reduce port time for all cargoes

- **Reduced environmental footprint – Green Ships**
  - Low emission engines
  - Bio-diesel capable engines
  - Ballast treatment systems
  - Highly accurate navigation systems
  - Zero Discharges to water:
    - Cargo hold cleaning, spills, sewage
Questions?

Thank you!