NOAA Hydrographic Services Review Panel

“Economic impacts of restricted visibility and fog, a case study for Galveston and Houston ports and enclosed waterways

By Prof. Maria G. Burns * College of Technology * University of Houston
Modern Fog Technologies

Examples: Ports of Rotterdam and Hamburg
Modern Fog Technologies
A case on the Houston-Galveston Region
Key players impacted by Fog

The losses spread across the supply chain

Cargo Sellers
Shipowners & Crew
Ports & Stevedores
Insurance
Multimodal carriers
Warehouses & Distribution Centers
Cargo Buyers

References:

M. Burns - NOAA
Impacted Areas of Fog Disruptions

**Safety**
- Ship Collision
- Environmental Pollution
- 3rd Party Damage e.g. port structures

**Economic**
- Houston ➔ global energy hub
- Houston ➔ container hub
- Galveston ➔ cruise ships

**Social Impact**
- COVID Medical supplies & First Aid, etc.
- Environmental
- Loss of Revenue

References:
## Typical Day in the VTSA - 2019

<table>
<thead>
<tr>
<th>Average</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>63</td>
</tr>
<tr>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>71</td>
<td>112</td>
</tr>
<tr>
<td>366</td>
<td>482</td>
</tr>
<tr>
<td>162</td>
<td>210</td>
</tr>
<tr>
<td>14</td>
<td>37</td>
</tr>
</tbody>
</table>

- **Tanker Transits**: 42 on average, 63 at high
- **Freighter Transits**: 20 on average, 32 at high
- **Cruise Ship Transits**: 2 on average, 5 at high
- **Ships in Port**: 71 on average, 112 at high
- **Tow Transits**: 366 on average, 482 at high
- **Ferry Transits**: 162 on average, 210 at high
- **OSV /Miscellaneous**: 14 on average, 37 at high
Monthly Comparison: 2015 - 2019

Source:
Channel Closure Hours

<table>
<thead>
<tr>
<th>Year</th>
<th>Fog</th>
<th>Dredge Ops</th>
<th>Incident</th>
<th>Heavy Wx</th>
<th>Cargo Ops</th>
<th>Anc Vsls</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>389.55</td>
<td>94.15</td>
<td>5.5</td>
<td>28.1</td>
<td>111.35</td>
<td>25.75</td>
</tr>
<tr>
<td>2013</td>
<td>319.96</td>
<td>57.36</td>
<td>26</td>
<td>33.1</td>
<td>33.83</td>
<td>3.53</td>
</tr>
<tr>
<td>2014</td>
<td>384.1</td>
<td>48.33</td>
<td>83.88</td>
<td>20</td>
<td>59.26</td>
<td>7.2</td>
</tr>
<tr>
<td>2015</td>
<td>680.2</td>
<td>99.2</td>
<td>91.5</td>
<td>75.5</td>
<td>70.5</td>
<td>6</td>
</tr>
<tr>
<td>2016</td>
<td>379</td>
<td>137.26</td>
<td>221.75</td>
<td>88.6</td>
<td>84.25</td>
<td>3.53</td>
</tr>
<tr>
<td>2017</td>
<td>347.38</td>
<td>148.75</td>
<td>13</td>
<td>305.75</td>
<td>71</td>
<td>7.2</td>
</tr>
<tr>
<td>2018</td>
<td>537</td>
<td>128.6</td>
<td>10</td>
<td>42.2</td>
<td>33.4</td>
<td>6</td>
</tr>
<tr>
<td>2019</td>
<td>525</td>
<td>52.5</td>
<td>180.5</td>
<td>23.5</td>
<td>16.5</td>
<td></td>
</tr>
</tbody>
</table>

# Impacted Areas of Fog Disruptions

## Daily Traffic

<table>
<thead>
<tr>
<th>Daily Traffic</th>
<th>Average</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean-going ships</td>
<td>135</td>
<td>212</td>
</tr>
<tr>
<td>Smaller ships (Coastal &amp; Inland)</td>
<td>542</td>
<td>729</td>
</tr>
</tbody>
</table>

## Annual Fog Facts

<table>
<thead>
<tr>
<th>Year</th>
<th>Hours</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>525</td>
<td>21.875</td>
</tr>
<tr>
<td>2018</td>
<td>537</td>
<td>22.25</td>
</tr>
</tbody>
</table>

Source:

## Supply Chain Impact

- Port congestion (delayed ship entries and departures)
- Tows, barges, pilot ships delayed
- Delays in ship inspections (e.g. USCG, Vetting, etc.)
- Shippers’ demurrage charges
- Insurance costs
- Passengers delayed *e.g. Galveston, 20,000 travelers delayed/stranded for 5 consecutive days.*
- Multimodal delays, e.g. trucks
- Warehousing delays

## References:

USCG VTS. Lone Star Harbor Safety Committee. 02/26/2020

Detailed estimations, algorithms, cases:
## Annual losses at the Houston Ship Channel for 2019
~ 22 Days of fog annually

### Economic losses due to fog

<table>
<thead>
<tr>
<th>Impacted variable</th>
<th>Median values (estim.)</th>
<th>High values (estim.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss per ship</td>
<td>~ $1 million</td>
<td>~ $4 million</td>
</tr>
<tr>
<td>Regional, Commercial, Workforce losses</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1 Day’s port traffic</strong></td>
<td>135</td>
<td>212</td>
</tr>
<tr>
<td>(number of ships)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1 Day’s impact of fog</strong></td>
<td><strong>$135 million</strong></td>
<td><strong>$540 million</strong></td>
</tr>
<tr>
<td>In the Houston Ship Channel</td>
<td><strong>$212 million</strong></td>
<td><strong>$848 million</strong></td>
</tr>
<tr>
<td><strong>Annual impact of fog</strong></td>
<td><strong>$2.97 billion</strong></td>
<td><strong>$11.88 billion</strong></td>
</tr>
<tr>
<td>Example: 22 days in 2019</td>
<td><strong>$4.664 billion</strong></td>
<td><strong>$18.656 billion</strong></td>
</tr>
</tbody>
</table>

### IMPORTANT NOTES
1. The above estimation assumes that all the ships at the Houston/Galveston area are affected/halted by fog.
2. The above estimation does not include barges and smaller vessels, due to the diverse use of these ships (support vessels, not always carrying cargo).

### References:
Estimation by Maria Burns, based on primary data provided by USCG VTS (2020) State of the Waterway 2019. Operations/Training Manager, VTS Houston-Galveston. 02/26/2020
Detailed estimations, algorithms, cases:
- [https://www.khou.com/article/money/closure-of-houston-ship-channel-because-of-fog-fire-could-cost-1b/285-f3e7f897d833-417b-bfe-4cc72c0f34b1](https://www.khou.com/article/money/closure-of-houston-ship-channel-because-of-fog-fire-could-cost-1b/285-f3e7f897d833-417b-bfe-4cc72c0f34b1)
Observation:
Why don’t we know about these losses?
1. Because the losses are suffered by hundreds of companies;
2. Because the private sector does not like to talk about their losses;
3. Because fog, and weather conditions are stipulated as “Act of God”;
   Many insurance policies cover segments of the losses.

Carriers, Cargo owners, insurance companies share the losses, and move on...

Prof. Maria Burns
Director, Logistics & Transportation Policy Program * Researcher BTI, a DHS Center of Excellence * Faculty SCLT
College of Technology, University of Houston
Tel: 713-743-1194 * Email: mburns2@uh.edu * Web: www.uh.edu/bti/education

Thank You.