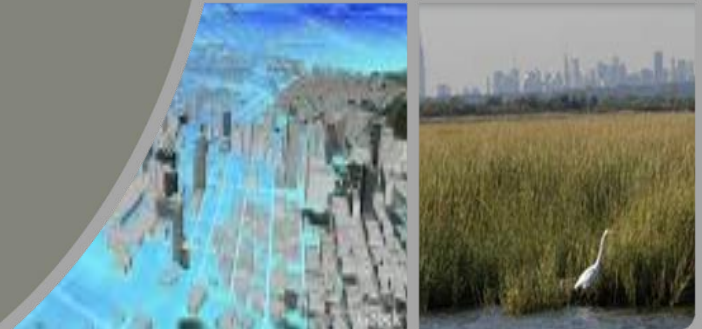


Measuring the Response and Recovery of Ports to the 2017 Hurricane Season

Katherine Touzinsky

AAPA Finance Committee Meeting

April 16-19th, 2018



US Army Corps of Engineers®



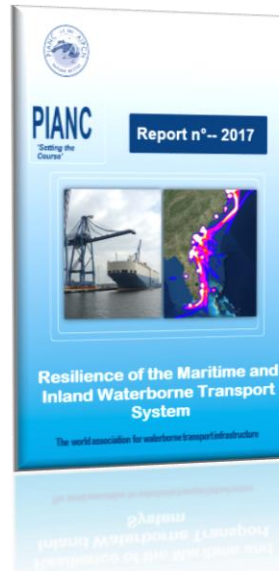
Innovative solutions for a safer, better world

Overview

- MTS Resilience and Disruption
- Resilience Best Practices
- Measuring Response, Recovery, and Resilience for 2017 Hurricane Season

SOURCES:

- Committee on the Marine Transportation System (CMTS) Resilience Integrated Action Team (RIAT)
- PIANC Task Group 193 – Marine and Inland Transportation System Resilience

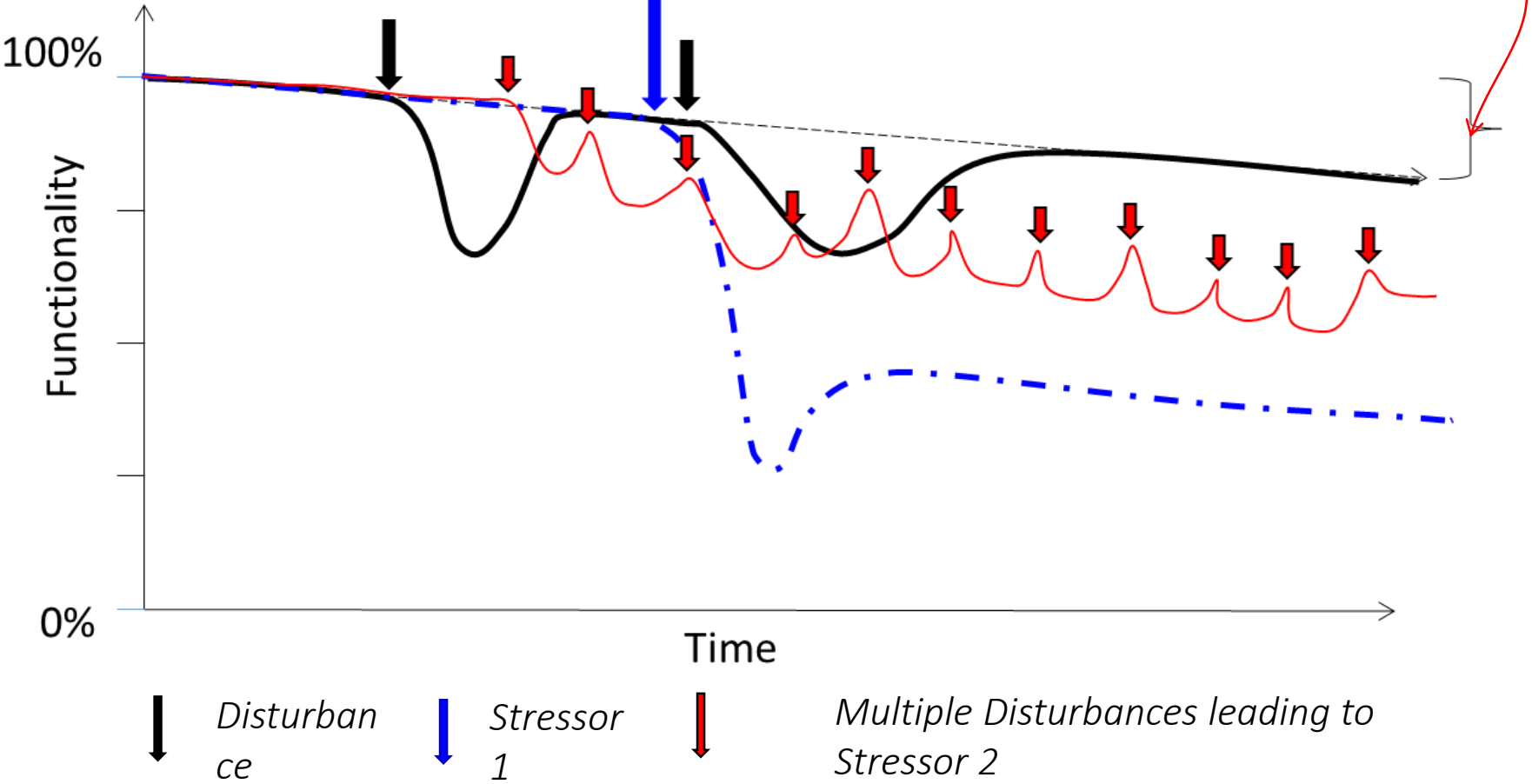


Marine Transportation System Resilience

- **Anticipate and plan** for disruptions,
- **Resist loss** in operations and/or **absorb the impact** of disturbances or stressors,
- **Rapidly recover** afterwards, and
- **Adapt** to short- and long-term stressors, changing conditions and constraints.



Potential loss in relative functionality over time (e.g., no maintenance, greater demand, or increasing environmental forcing)



Stressors, Disturbances, and Federal Activities addressing MTS Resilience Summarized in Resilience Factors Matrix Report (www.cmts.gov)

Environmental Factors

Water level/ inundation/ surge (7 agencies, 38 activities)

Water level extremes and long term change (7 agencies, 36 activities)

Invasive species (5 agencies, 39 activities)

Threatened and endangered species (5 agencies, 39 activities)

Changing migration patterns (5 agencies, 28 activities)



Non-Environmental Factors

Infrastructure resilience (7 agencies, 37 activities)

Emergency response capabilities (7 agencies, 34 activities)

Regulation/ political/ budgetary (6 agencies, 29 activities)

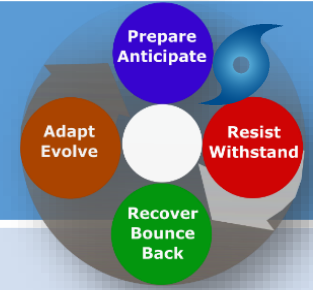
Hazardous materials/oil spills (5 agencies, 32 activities)

Competing uses of land/ ocean/ coastal areas (5 agencies, 26 activities)

Larger vessels (5 agencies, 23 activities)

Stage of Resilience

Action



PREPARE

- Port resilience plans
- Port contingency plans
- Marine Transportation System Recovery Unit (MTSRU) participation
- Emergency operation & recovery training

RESIST

- Communicate and act according to standard operating procedures (SOPs) for Emergency Support Functions (ESFs)

RECOVER

- Communicate and act according to SOPs for ESFs
- Improvise as needed!

ADAPT

- Review port and marine transportation system performance during event
- Identify lessons learned and best practices
- Work to implement lessons learned, identify most effective best practices

2012 PONYNJ Superstorm Sandy



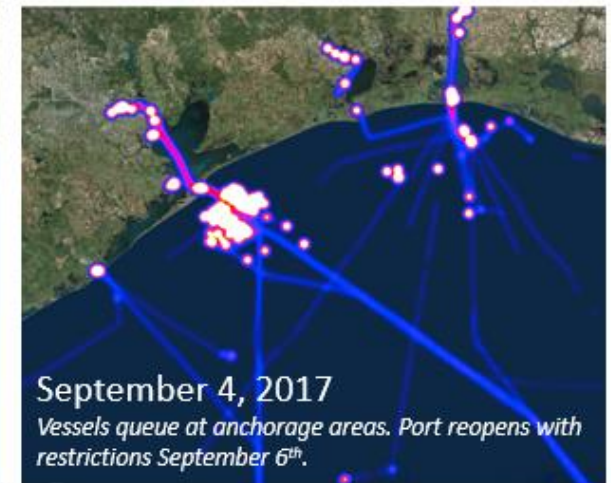
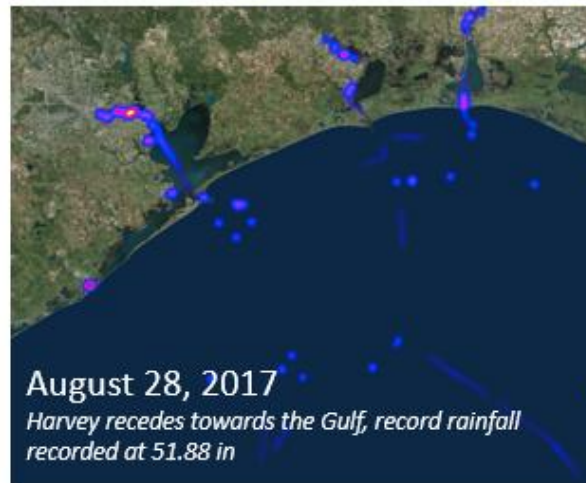
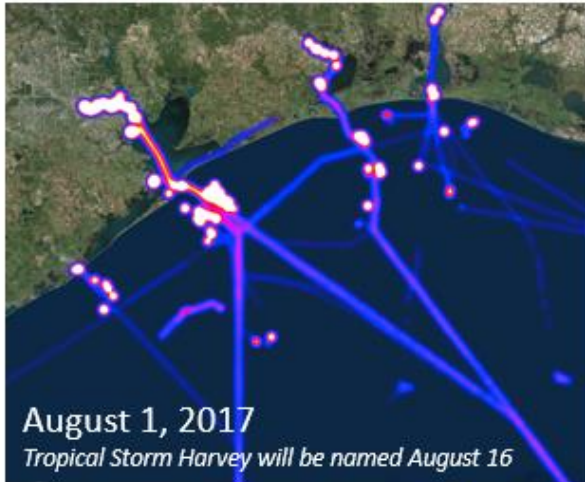
- Damage to supporting infrastructure and utilities shut port and refineries for 1 wk, both states recognized the need to address resilience.
- Port Collaboration: 9/11 followed by years of collaboration and prior hurricane experience at the Marine Transportation System Recovery Unit had **prepared** and **adapted** them for operations.
- PONYNJ infrastructure: **design guidelines for new construction resulted in well prepared infrastructure**, and **it could handle the effects of the storm**. Since Sandy, **the guidelines have been updated to include future storms and SLR** (raised pumps and electric, battery backups for traffic signals, flood gates, secure elevators).
- Confined Disposal Facilities: **Many CDFs were damaged during Sandy; resulted in ongoing efforts to repair, strengthen, and elevate the facilities**. The new work has increased their capacity for both dredged material storage and future storms.



2017 Hurricane Season

Hurricane Harvey Cargo and Tanker Vessel Signal Density Plots

Created with ERDC Automatic Identification System Analysis Package (AISAP)



ERDC Navigation Data Performance Team: Katherine Touzinsky, Kenneth N. Mitchell, Patricia DiJoseph, Marin Kress

CMTS 2017 Hurricane Season Lessons Learned Workshop:

Federal Agency Roles and Responsibilities

1. USACE – assists DHS and FEMA as primary for public works and engineering-related response.
2. USCG – safeguards maritime interests, operates Maritime Transportation System Recovery Units, ESF 10 Oil and Hazardous material response
3. DHS Infrastructure Protection (IP) – supports Infrastructure Systems Recovery Function, develop recovery support strategies, local Protective Security Advisors
4. NOAA – provision of critical data and expertise to make decisions on port reopening
5. EPA – assess and monitor health and safety risks

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Andy Saporito reflects on lessons learned from the 2012 superstorm and its aftermath



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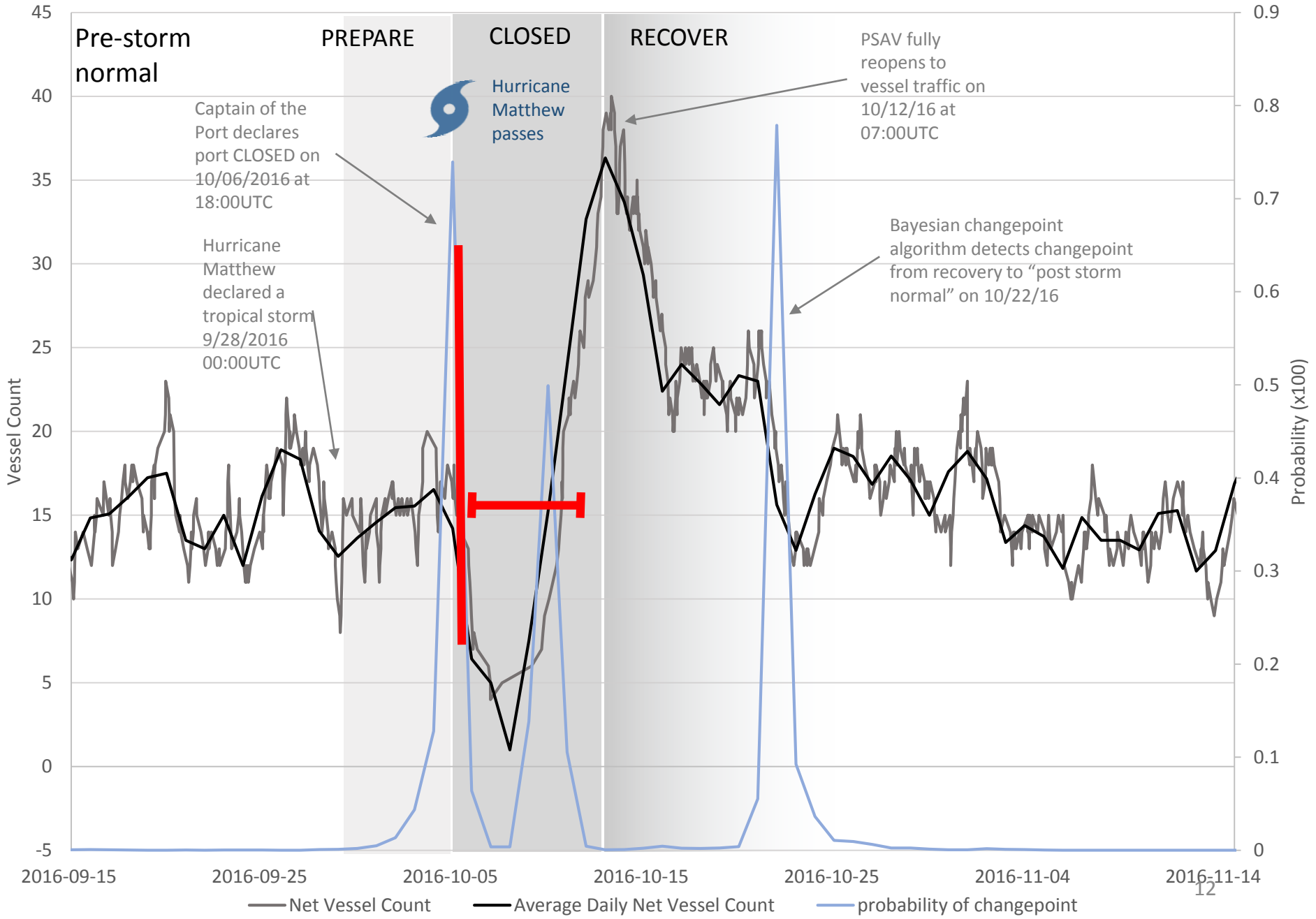
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What Hurricane Sandy Should've Taught Us About Disaster Response

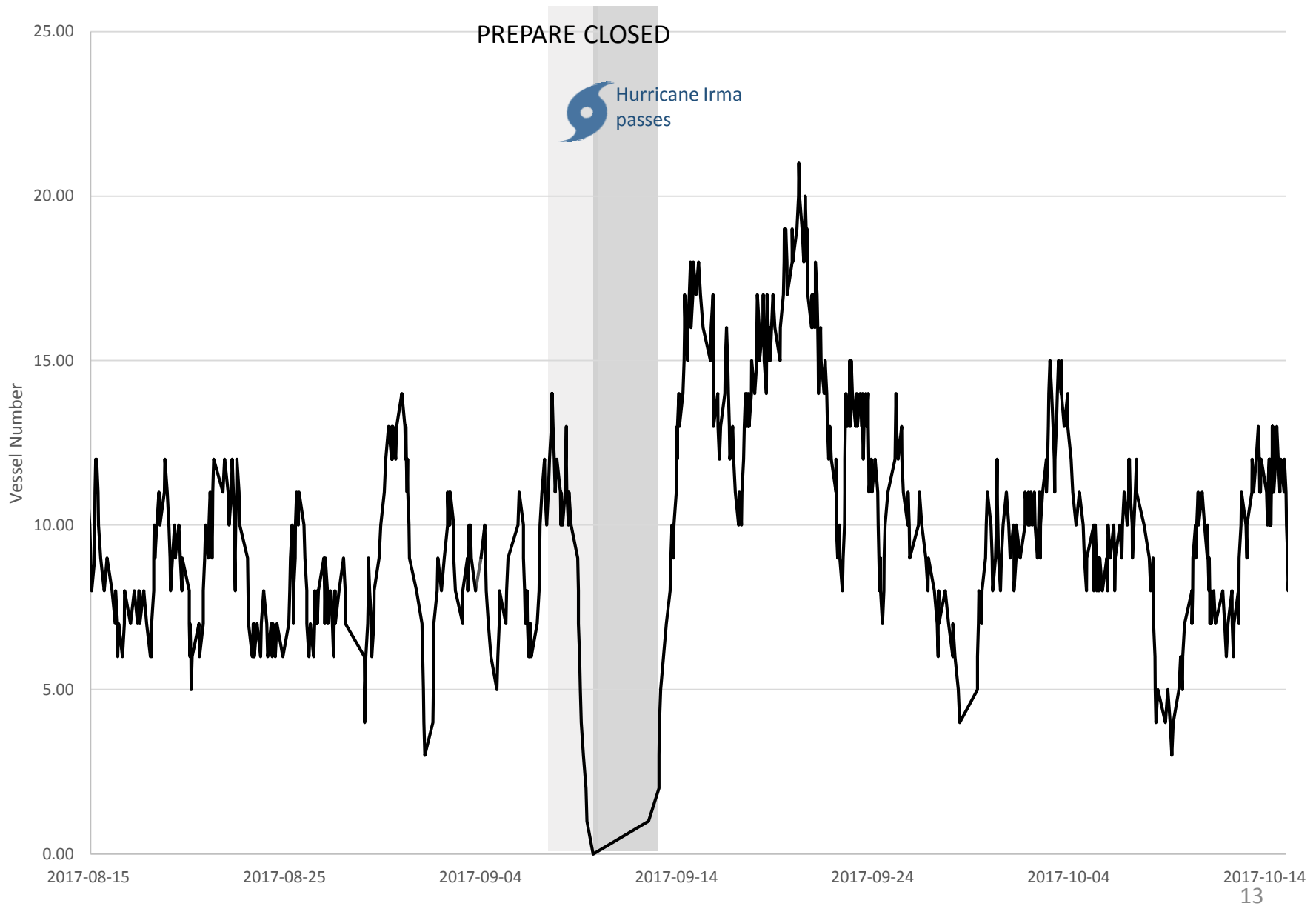
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Port of Savannah - Cargo and Tanker Net Vessel Count for Hurricane Matthew

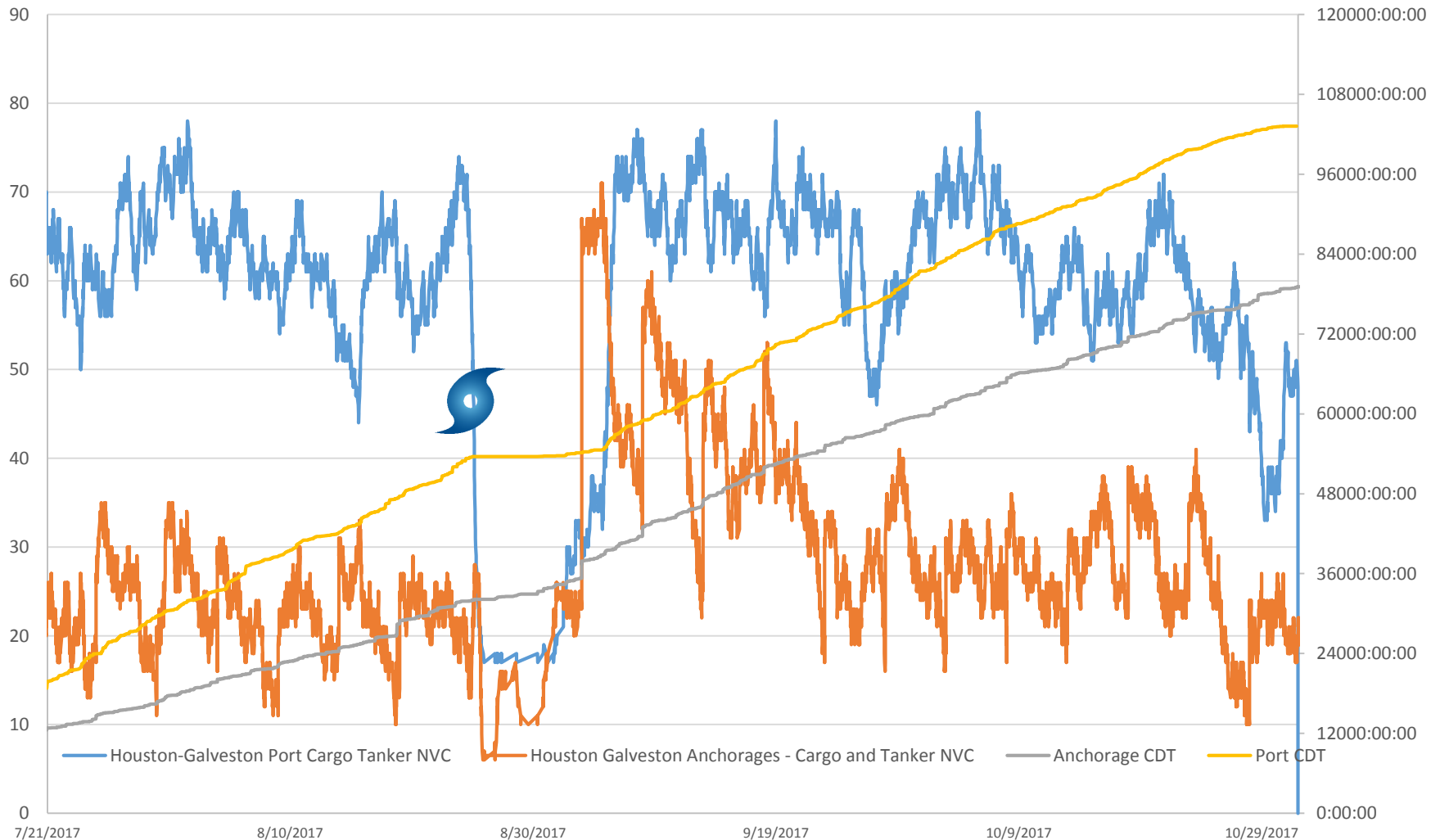


Developing Metrics for 2017 Hurricane Season: Port of Savannah - Net Vessel Count

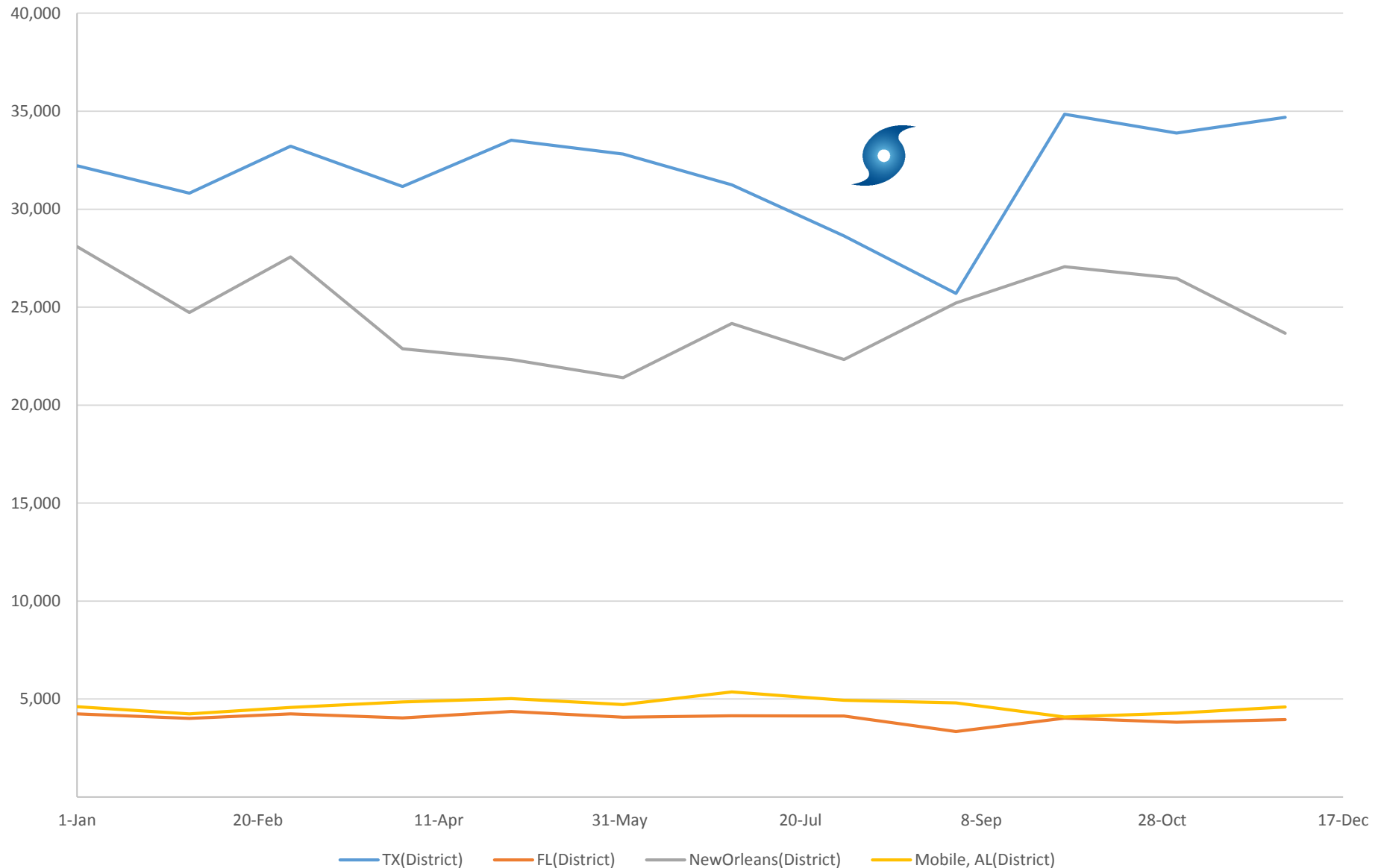


Developing MTS Resilience Metrics – Houston Galveston

Houston-Galveston Port Area - Cargo Tanker Net Vessel Count (NVC) and Cumulative Dwell Time (CDT)



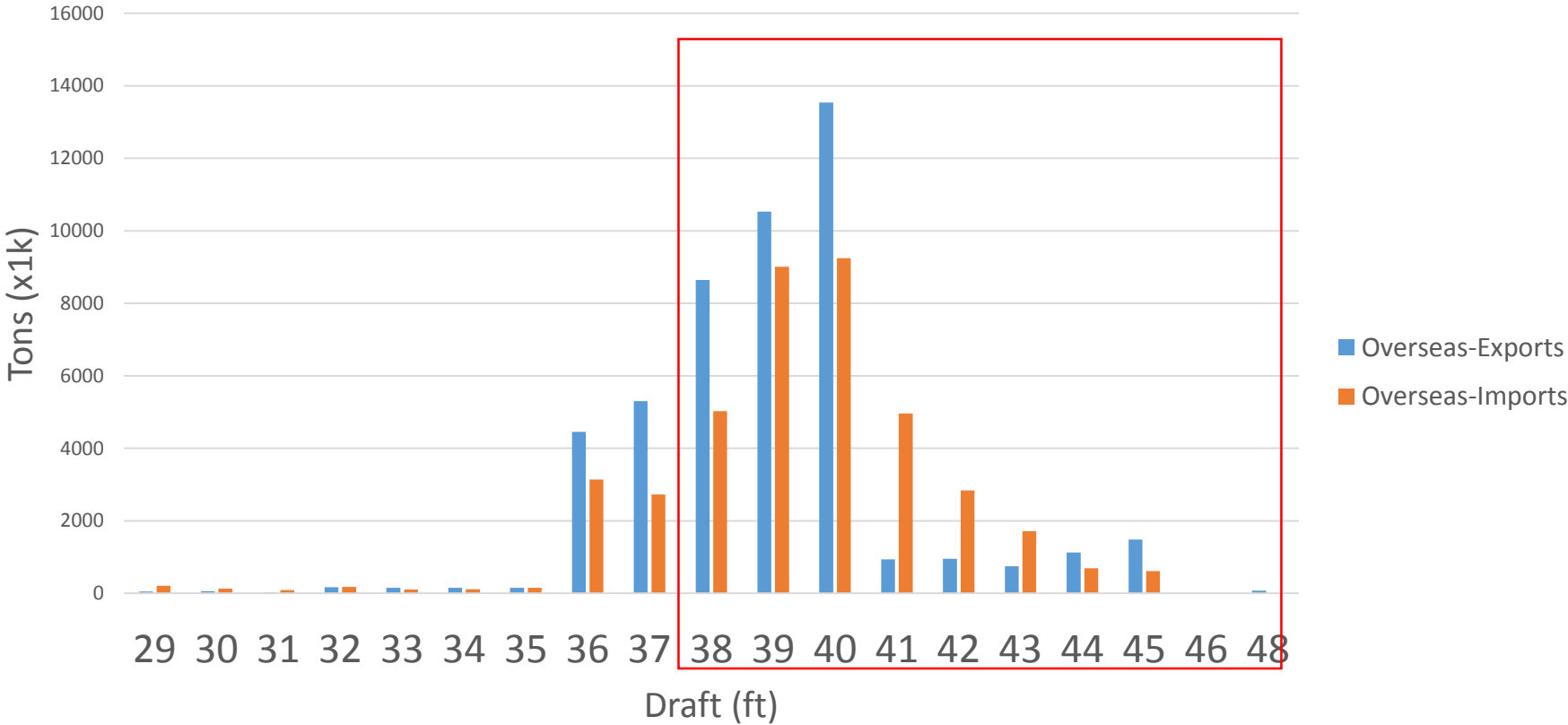
Monthly Net Vessel Exports and Imports in Tons (x1k)



SOURCE: Weight: U.S. Census Bureau, Economic Indicators Division, Foreign Trade Statistics, available at <http://www.census.gov/foreign-trade/guide/index.html> as of March 2018.

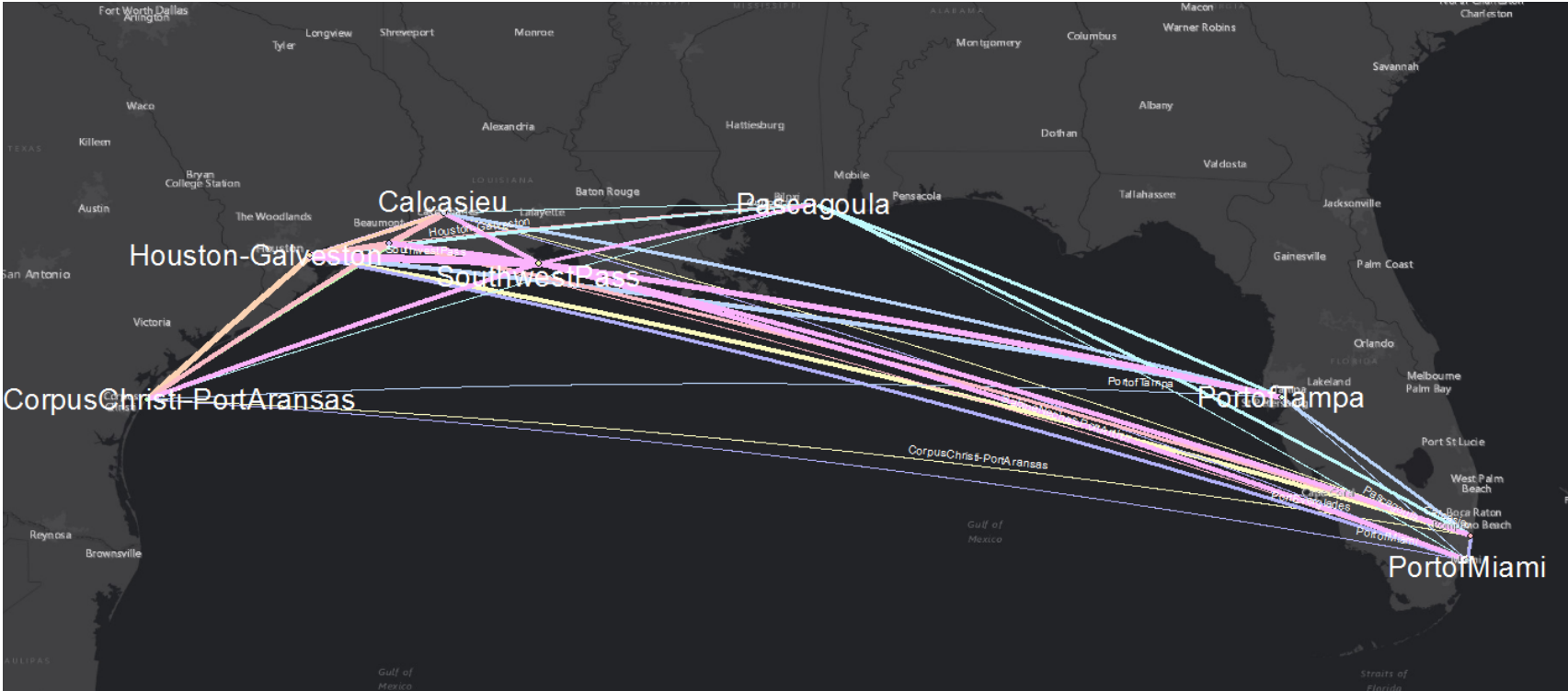
Calculating impacts on cargo

Traffic Draft vs Average Yearly Tons – Port of Houston

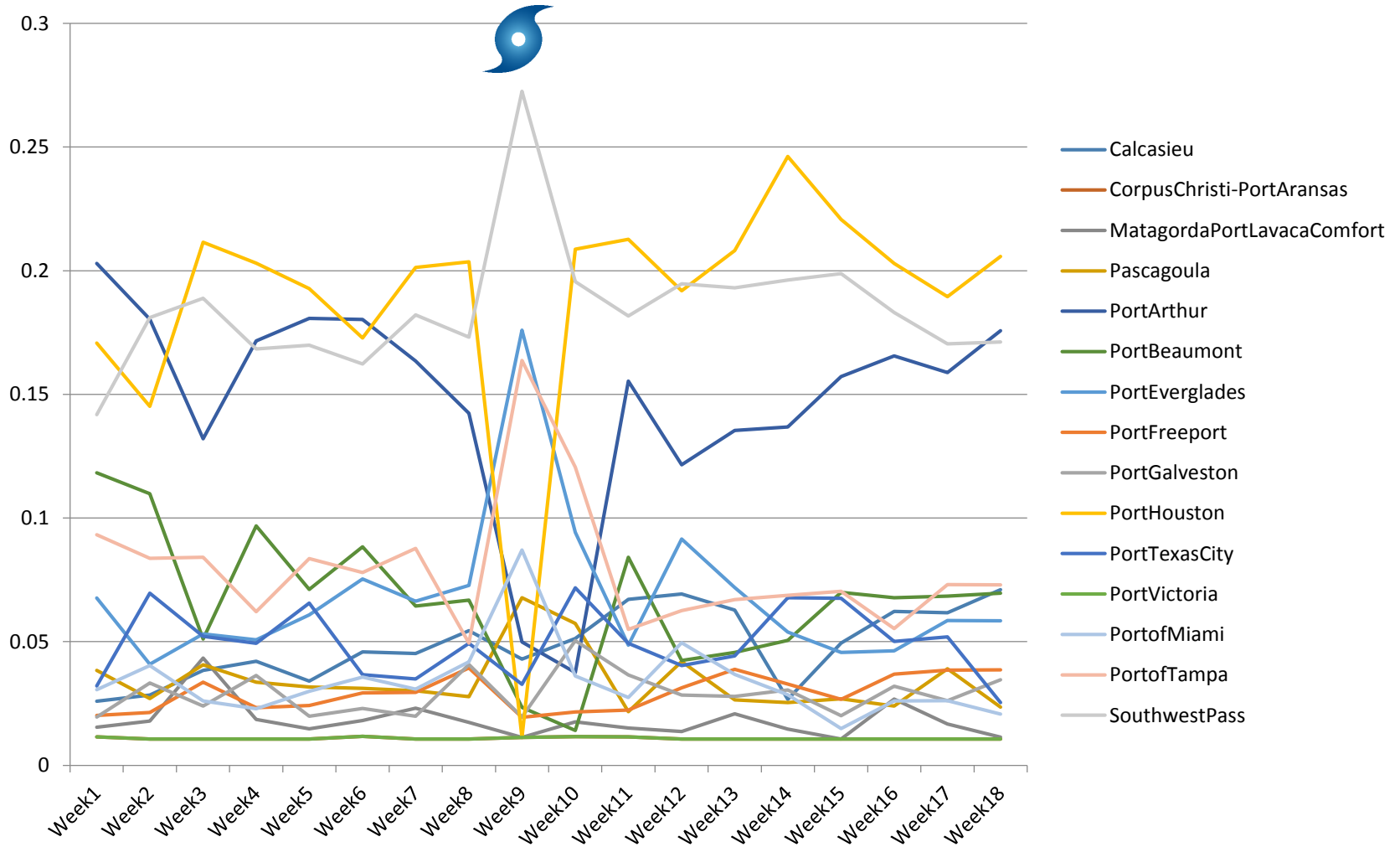


- closed for 6 days
 - 37 ft draft restriction for 4 days
 - 40 ft draft restriction for 3 days
- IMPACTED CARGO in TONS - 2.8M

Networked MTS



Networked MTS



Topics for discussion

- Future work – continue to develop models and tools for understanding complex coastal and inland marine transportation systems (including intermodal capabilities) and their performance over time to increase preparation, response, recovery and adaptation.
- Do these topics resonate with you? Do you have direct experience with them at your workplace, or are there challenges to implementation?
- What tools do ports need to increase their resilience to the 2018 storm season?
- What are your future challenges or focus areas?

Questions?

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