Summary of Opinions Regarding the Barriers to Preserving and Protecting Ports for Long-term Resilience

MARCH 2025

This report summarizes the responses to a U.S. Committee on the Marine Transportation System Request for Information related to identifying barriers to planning for long-term resilience in U.S. ports.
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EXECUTIVE SUMMARY

The U.S. Committee on the Marine Transportation System (CMTS) is a federal interdepartmental, maritime transportation policy coordinating committee, created in response to a directive in the George W. Bush Administration's 2004 U.S. Ocean Action Plan, and authorized by Congress in the 2012 Coast Guard and Maritime Transportation Act, 46 U.S.C. § 50401. Advancing long-term resilience in U.S. ports to support the growing needs of global and domestic trade has long been an interagency priority focused in the CMTS Resilience Integrated Action Team (RIAT). Coastal ports face a variety of challenges in dealing with the unexpected, including hurricanes, damaging storm surge and other long term coastal flood factors, and accidents, all which impact port infrastructure and the movement of people and commerce. Port resilience is key, both to prepare for and recover from such incidents when they occur. Resilience depends on access to expert guidance and quality environmental data. Without these tools, United States competitiveness and operational efficiency in the marine transportation system (MTS) will be negatively impacted.

On July 15, 2024, the CMTS published a Request for Information (RFI) in the Federal Register, seeking information from public and private stakeholders regarding what types of tools -- planning guidance, documents, datasets, and federal funding opportunities -- are being utilized in port resilience planning for changing physical and environmental conditions. The goal was to quantify the current state of port resilience planning so that CMTS member agencies could better assess what steps to take to close information gaps and address challenges to port resilience. Subsequent to the RFI, the American Association of Port Authorities (AAPA) hosted a port resilience workshop on October 28, 2024, in Boston at its annual meeting. The workshop provided an opportunity for the CMTS to share and expand the information received from the RFI and expound on the question of the need for resilience planning expertise in ports.

There were thirty-three responses to the RFI with an additional twenty-three respondents added at the AAPA workshop. Port respondents to the RFI were predominantly from the U.S. West Coast: California and Washington State. Three ports responded from the East Coast. Information from Great Lakes and Gulf Coast ports was received from the AAPA workshop. Broadly, the RFI and workshop provided the following summary responses:

- Ideally, there would be a single source to assess vulnerability, risk, and adaptation for decision-support.
- Sea-level projections are the most requested data.
- Extreme heat indexes, tidal information within commercial ports, Arctic data to support port development, and rainfall were specific data requests.
- Improvements could be made in the administration of federal grant programs, such as related to permitting rules, extensive application requirements, limited timelines

between posting of availability of funding and grant application deadlines, and uncertain timelines on funding availability.
- Ports generally require more localized, site-specific data, including sea level predictions, therefore relying more heavily on state, regional and local data sources.
- The benefit-cost calculations for some federal grants do not always fit for remote areas such as Hawaii and Alaska and given that ports are located on waterfronts in generally developed areas, nature-based solutions may not be feasible.
- There is an interest in a mechanism to develop port-specific resilience expertise for both in-house staffing and with third party resilience subject matter experts.
- The federal port resilience planning documents published in the RFI are not universally known by respondents.

In response to comments received in the RFI and the workshop, next steps for the CMTS RIAT include:

- Holding an interagency forum to review existing port-related grant program requirements to determine ways in which ports can more readily meet the application criteria.
- Establishment of a "port reliability" category within the existing online National Transportation Library ROSA-P directory.
- Developing no-cost tutorials using existing federal guidance documents to support the development of port resilience expertise.

INTRODUCTION AND METHODOLOGY

The U.S. Committee on the Marine Transportation System (CMTS) is a Congressionally mandated, Cabinet-level interagency body, created for the purpose of assessing the safety/adequacy of the marine transportation system (MTS), promoting the integration of the MTS with other modes of transportation and other uses of the marine environment, and coordinating, improving the coordination of, and making recommendations regarding federal policies that impact the MTS. The CMTS was established in response to a directive in the 2004 U.S. Ocean Action Plan and authorized by Congress in the 2012 Coast Guard and Maritime Transportation Act, 46 U.S.C. § 50401. The CMTS is chaired by the Secretary of Transportation with much of the day-to-day policy guidance provided by the CMTS interagency Coordinating Board.

One of the goals of the 2023-2024 CMTS work plan, under the CMTS Coordinating Board, was to support a more resilient MTS to meet the growing demands of the global and domestic trade and transportation markets. To further this priority, the CMTS sought to advance resilience of U.S. ports via interagency and industry collaboration.

On July 15, 2024, the CMTS published a Request for Information (RFI) in the Federal Register, which sought information from public and private stakeholders regarding what types of planning guidance, documents, datasets, and federal funding opportunities are being utilized in port resilience planning [Docket No. DOT-OST-2024-0044]. Response to the RFI was voluntary with an option to remain anonymous. The goal was to quantify the current state of port resilience planning to better assess what steps might be taken to close information gaps and address challenges to port reliability. The RFI established an initial 45-day comment period, subsequently extended until September 30, 2024.

The CMTS collaborated with the American Association of Port Authorities (AAPA) for additional industry outreach regarding the RFI, after which AAPA organized a port resilience workshop at its annual conference in Boston, Massachusetts, on October 28, 2024. The goal of the workshop was to further explore responses to the RFI and fill geographic response gaps. The workshop panel discussion included Ms. Ashley Chappell, CMTS Executive Director, Ms. Nicole LeBoeuf from the National Oceanic and Atmospheric Administration (NOAA), Ms. Lauren Gleason, Port Director of the Massachusetts Port Authority (Massport), and Ms. Helen Brohl, CMTS subject matter expert. Facilitation of the interactive discussion with workshop attendees was assisted by Dr. Austin Becker and PhD candidate Ms. Rosemarie Fusco from the University of Rhode Island Department of Marine Affairs.

Workshop attendees received an overview of the project and summary of responses to the RFI. Ms. Gleason shared the extensive efforts initiated and maintained by Massport to address long-term port resilience. During the workshop, a real-time survey application was used to extend questions and receive answers, which was then forwarded by AAPA to annual meeting attendees to expand the data and responses received. While the post-workshop survey added two Great Lakes port directors to the response set, the total of post-survey respondents was only five.

QUESTIONS and RESPONSES

The CMTS published the RFI and joined the AAPA workshop to:

- Better understand how ports are perceiving, planning for, and managing port resilience to physical and environmental stressors;
- Learn what types of planning guidance, documents, and datasets ports are using for long-term planning; and
- Identify the federal funding opportunities that ports are currently aware of and applying to for long-term resilience.

Within the RFI, respondents were asked to share or respond to the following eight guiding questions:

- Question 1: Respondent demographics
- Question 2: Use of guidance and/or information products/documents to support long-term (e.g., decades, or longer) port resilience planning
- Question 3: Access to port resilience data
- Question 4: Long-term port resilience planning process
- Question 5: Have you engaged in port-to-port sharing (i.e., data, best practices, etc.]?
- Question 6: Grants and other funding opportunities
- Question 7: Other comments

Essentially, the RFI asked respondents to share whether effective planning for long-term resilience was or was not being undertaken and, if not, to indicate the barriers to action.

Question #1: Demographics of the RFI Respondents

RFI & Workshop Response Breakdown

RESPONDENT	NUMBER
PORTS	14
TERMINAL OPS	1
ASSOCIATIONS	5
TECH/SERVICE ORGS	8
STATE GOVERNMENT	3
LOCAL GOVERNMENT	1
ACADEMIA*	3
INDIVIDUALS*	6
FEDERAL GOVERNMENT	2

RE ION	NUMBER OF PORTS
EAST (MASS, CT, UNIDENTIFIED SE)	3
WEST (CALIFORNIA & WASHINGTON)	8
GREAT LAKES	2
GULF COAST	1
HAWAII DOT & AMERICAN SAMOA DOT & KOTZEBUE COMMENTED RELATIVE TO THEIR PORT INTERESTS.	
AAPA SHARED INFO RECEIVED FROM MEMBERS.	

** At the AAPA workshop, the question of who do you represent was not asked. These RFI numbers include estimates drawn from the workshop discussion .*

TABLE 1: Number and type of respondents to the RFI and from the AAPA workshop.

There were thirty-three responses to the RFI with additional respondents added at the AAPA workshop. Port respondents to the RFI were predominantly from the U.S. West Coast: California and Washington State. The port respondents from both sources include:

1. Massachusetts Port Authority, MA
2. New Haven Port Authority, CT
3. Northwest Seaport Alliance & Port of Tacoma, WA
4. Port of Beaumont, TX
5. Port of Duluth, MN
6. Port of Everett, WA
7. Port of Long Beach, CA
8. Port of Los Angeles, CA
9. Port of Milwaukee, WI
10. Port of Oakland, CA
11. Port of San Diego, CA
12. Port of Seattle, WA
13. Port of Townsend, WA
14. Unidentified large SE seaport

Responses from the ports of Duluth, Milwaukee, and Beaumont were added at the workshop. Additionally, respondents included one container terminal, three state governments, one local government, two federal government representatives (at the workshop), three academic institutions, six technical or service companies, five associations, including AAPA, and three individuals. The complete list of respondents can be found in Appendix A.

Question #2: Use of Guidance and/or information products/documents to support long-term (*e.g.,* decades, or longer) port resilience planning and Question #3: Access to port resilience data.

Respondents were asked about the extent to which they used various federal port resilience-related resource documents, including but not limited to:

- Inland Port Community Resilience Roadmap – Environmental Protection Agency
- Marine Transportation System Resilience Assessment Guide – Cyber Security and Infrastructure Security Administration
- Digital Coast –NOAA
- Federal Funding Handbook for the MTS (Sixth Edition) – CMTS
- Federal Emergency Management Agency (FEMA) Federal Flood Risk Management Standards
- FEMA Multi-Hazard Mitigation Plans

The AAPA reported that, from member feedback, ports are making use of these resources, but utilization varies. Several RFI respondents (including individual port responses) indicated that

utilization ranged from “weren’t aware of the documents” to “fully aware.” The following list represents the Federal documents noted by RFI respondents as most utilized:

- FEMA Federal Flood Risk Management Standards
- FEMA Multi-Hazard Mitigation Plans
- NOAA’S Digital Coast
- U.S. Geological Survey (USGS) Coastal Storm Modeling System (COSMOS)
- CMTS Federal Funding Handbook

Port respondents engaged in local resilience planning also concurred with AAPA’s statement that ports primarily rely on datasets and resources provided by state governments, local governments, and local academic institutions. The reason given was that extreme weather or other disruptive events will have starkly different impacts on different regions according to local geography.

Sea level data was the most used or sought after information. AAPA reported that “while data on sea level rise appears to be readily available, some ports have highlighted a gap in rainfall data projections.” However, a number of ports vocalized that local sea level projections, particularly beyond five years would be of great value. Other respondents regarding data include:

- MASSPORT: MASSPORT has modeled its properties using the Massachusetts Coastal Flood Risk Model to identify and address at-risk infrastructure.
- Port of Long Beach (POLB): The POLB utilizes LIDAR-driven data for topography and land elevation, as well as California Ocean Protection Council recommendations, adopted by the California Coastal Commission, for future sea level projections.
- Port of Seattle: Locally, the port has relied on the University of Washington’s Climate Impacts Group to provide regional sea level rise projections that include vertical land movement.
- Hawaii DOT (HDOT): Existing data and projections for sea level rise are limited and insufficient to meet HDOT requirements. HDOT has initiated a robust data collection program with the goal of creating a digital twin for each of its nine ports.
- Port of San Diego: The only federal guidance document within the [RFI] list that has been utilized by the port is the NOAA Digital Coast. The port has also utilized the USGS COSMOS maps on sea level rise. California has several guidance documents as it pertains to sea level rise and climate adaptation that are more localized to the port’s needs and are often encouraged by regulatory agencies to consider and incorporate in the permitting process.
- Port of Everett: Everett has relied upon local resources for sea-level rise and impacts/adaptation information as part of planning for waterfront redevelopment projects. Ideally, the port would prefer to have a more robust data set specific to its

location that considers increased flooding potential, storm surge probabilities, extreme weather potentials, or other site-specific factors.

The RFI responses noted that California seaports typically use state agency guidance for resilience planning. Specifically, the California ports refer to the California Ocean Protection Council recommendations, adopted by the California Coastal Commission, for future sea level rise projections.

Question #3 of the RFI asked if the data that is obtained is sufficient to meet port requirements. The responses ranged based upon the extent to which a port or organization was currently engaged in long-term port resilience planning. Again, local, or site-specific information, particularly as it relates to sea levels, is the most requested. Massport stated that the data they use is sufficient for immediate needs but welcomed the opportunity to collaborate with large scale district teams and the resources they could provide. However, a port that was not currently engaged in long-term planning cannot fully answer the question and, from one port respondent where long-term resilience planning was not underway, indicated they would rely upon data being generated by the U.S. Army Corps of Engineers as part of a nearby (but not within the commercial port) dredging project.

In addition to the notation by AAPA related to the request for rainfall data, the Port of Los Angeles indicated a need for better heat index data. The Village of Kotzebue, Alaska, stated that there currently isn't enough Arctic data to support a deep draft port there. The Hawaii DOT noted that the existing water level information is not within the commercial port areas and the Port of Everett reported that, ideally, they would have a more robust data set specific to their location that considers increased flooding potential, storm surge probabilities, extreme weather potentials, and other site-specific factors. Adding to the general consensus on interest by ports for local information, Everett added that site-specific analysis would be helpful and would give confidence to the assumptions that are currently being made for long-range planning.

Old Dominion University (ODU) reported that lack of data has been a challenge to port resilience risk assessment and planning. No public spatial data have typically been available for port terminals (e.g., their footprint, elevations, and infrastructure, etc.). ODU further stated that prior ODU research published in the Transportation Research Record and Ocean and Coastal Management has used original data produced from open-source data (e.g., digitizing 4 ports and 17 different cargo terminals to assess flood vulnerability.)

Question #4: How do you approach long-term port resilience planning? Is it done in-house or contracted? Who in your organization does your port resilience planning?

The most common response from ports that have completed resilience planning, is that in-house technical staff (engineers/planners/project managers) work in consultation with outside consultant subject matter experts, particularly with design modeling or other specific analysis. At least one large port indicated that they primarily contract out for resilience planning efforts. Another noted that they do not have full-time equivalent staff for resilience work and rely on state, regional, and local partnerships as part of a larger resilient waterfront development effort. The State of Hawaii shared that data collection will be conducted by contractors, but the digital twins and modeling will be conducted by the Hawaii DOT GIS team.

Question #5: Have you engaged in port-to-port sharing or open to engaging?

All port respondents have either engaged in port-to-port sharing or are open to engaging; with one company stating they can provide a port-to-port sharing service. It is well-summed from AAPA's statement:

- …It is clear that many ports conduct planning exercises with their neighbors. Many have developed collaborative relationships with neighbors… [Regional port associations] such as in the Gulf Coast or Great Lakes, as well as states, like the Florida Ports Council or California Association of Port Authorities…could be productive forums for ports to share best practices…Best practice and data sharing between neighboring ports may prove a valuable tool to bring down the cost of resilience planning…

However, a few ports questioned the value of sharing data with ports in different regions, citing that the resilience planning requirements and factors are different for each locality. Yet, Hawaii DOT stated that they have engaged with the Ports of Oakland, Long Beach, and San Diego to learn about each port's respective efforts to plan for increased environmental stressors with a focus on sea level rise. The value is in the exchange of ideas rather than specific data points. The Long Beach Container Terminal welcomes the opportunity to pair with appropriate agencies to conduct a full analysis and prepare adaptation and mitigation plans and programs.

Question #6: Do you have an awareness of the availability of federal or state funding opportunities to support port resilience and infrastructure planning? If so, have you applied to and/or been awarded any funding specifically to support long-term port resilience and infrastructure planning? Do you know where to find funding opportunities?

All the large port respondents reported awareness of the availability of federal or state funding opportunities. HDOT, for example, has applied for a range of U.S. Department of Transportation and Environmental Protection Agency discretionary grants to support port resilience and infrastructure project implementation. The ports expressed that federal "formula fund" grants are not available for port infrastructure, while discretionary grant programs are extremely competitive. Respondents from Hawaii and Alaska noted that for discretionary grant programs that require a benefit-cost (B-C) analysis, the high cost of materials and labor in their states yield a low B-C ratio, making the proposals less competitive.

One anonymous terminal operator stated that access to federal funds to support much needed terminal infrastructure and resilience projects is challenging. "Currently, of the several major grant opportunities, a port authority may only submit one application for a specific grant and in ports with multiple private operators, this can often lead to critical projects being left out." Hence, it was this individual's opinion that private entities should also be able to apply for project funding without a public sponsor.

The respondent Ingleside on the Bay Coastal Watch Association (IOBCWA) is a non-profit formed to address sea level rise, subsidence, and ship traffic in and around the Port of Corpus Christi, Texas. The IOBCWA is aware of Texas Department of Transportation infrastructure-related funding to the Port of Corpus Christi, though resilience planning funds are more limited. The IOBCWA noted that federal funding is targeted to the port and its partners rather than area residents who are impacted by resilience and infrastructure. Further, it stated that applicants for federal funding should be directed more to planning and design for resilience rather than as an afterthought post project initiation.

The port information technology company, Kale Info Solutions, Inc., recommended better funding for digital infrastructure.

Interestingly, one individual respondent recommended that the CMTS develop a federal funding directory. It should be noted that the CMTS *Federal Funding Handbook for the Marine Transportation System* is regularly updated and includes a category for resilience-related funding programs. Other comments on barriers to funding included:

- Long-term funding was the #1 concern for long-term port resilience.
- The timeline between when the federal notice of funding is issued and when applications are due should be longer.

- State and local researchers and agencies that provide relevant data to ports should be funded.
- It should be accepted as a baseline that ports are located on waterfronts in highly developed areas and that many nature-based solutions may not be feasible.
- Small and large-scale grant opportunities for retrofitting infrastructure are needed.
- The CMTS Federal Funding Handbook is not universally known.

While most ports indicated that long-term resilience planning was a priority, competing priorities and interests within a port or larger community prohibit or limit progress in some smaller ports.

Question #7: What more (in addition to funding, existing guidance, and existing data) do you need to improve your long-term resilience planning?

Texas A&M University, Galveston, stated that there is no formal training to directly address port resilience. Specifically, there is a need to expand the education offerings for those interested in becoming specialist or professionals with expertise in U.S. port resilience. This respondent observed that large ports are equipped with [or contract for] multi-disciplinary teams of professionals who oversee designing and implementing resilience plans. This was affirmed by Everett, a small port respondent, which reiterated that free or low-cost online resilience training would be of value.

Texas A&M University also asked how resilience knowledge can be articulated in an education product/service to maintain a constant flow of workforce development in the area of resilience in U.S. ports. They remarked that there is no federal program that considers workforce development in ports for resilience purposes. The University noted that current grants are typically focused on one or two aspects of resilience (flood, infrastructure, disaster relief, etc.), but not how to teach or train the next generation of planners and directors of resilience plans in ports, particularly to support medium and small ports.

In follow up, attendees at the AAPA workshop were asked the extent to which they agreed with the statement that "education and training for workforce development for U.S. port resilience is an area that deserves attention and funding for more research." All but two respondents said yes and most agreed that it was a top issue for their ports. An observation at the workshop noted that the interest for port-specific resilience expertise extended beyond in-house resilience planners and port operations to engineering consultants and third-party resilience planners. On the issue of barriers to long-term resilience planning, ODU has found that proprietary pressures, port management capacity, and infrastructure data security pose challenges to independent port risk assessment and resilience studies.

CMTS NEXT STEPS

Because 16 AAPA workshop respondents indicated that they had not heard of the RFI, the CMTS will update its outreach strategy to ensure that federal MTS-related resilience resources, notices and information will be more thoroughly shared with the public. Further, the CMTS's Resilience Integrated Action Team and Supply Chain and Infrastructure Integrated Action Team have taken the RFI summary results under consideration for future work plan actions, including but not limited to:

- Aligning existing long-term port development efforts with current Administration priorities for safety, security, and reliability.
- Bringing together federal agency port funding subject matter experts to review the existing programs on long-term port reliability and where efficiencies and compatibility can be enhanced.
- Ensuring that federal resilience-related guidance documents are well-known and accessible.
- Using federal port resilience-related guidance documents as resilience training tutorials and investigating methods for presenting the information to the public in a low or no-cost manner.
- Reviewing the CMTS Federal Funding Handbook to the Marine Transportation System to enhance information on port resilience opportunities and to ensure that the document is readily known and available.

APPENDIX A: List of Known Respondents

A. **PORT AUTHORITES**

1. Massachusetts Port Authority, MA
2. New Haven Port Authority, CT
3. Northwest Seaport Alliance & Port of Tacoma, WA
4. Port of Beaumont, TX (at AAPA workshop)
5. Port of Duluth, MN (at AAPA workshop)
6. Port of Everett, WA
7. Port of Long Beach, CA
8. Port of Los Angeles, CA
9. Port of Milwaukee, WI (at AAPA workshop)
10. Port of Oakland, CA
11. Port of San Diego, CA
12. Port of Seattle, WA
13. Port of Townsend, WA
14. Unidentified large SE seaport

A. TERMINAL/CARGO OPERATORS

1. Long Beach Container Terminal

B. STATE GOVERNMENT

1. Hawaii DOT
2. American Samoa Department of Transportation
3. Washington State DOT Rail, Freight, Port Division

C. LOCAL GOVERNMENT

1. Native Village of Kotzebue, Alaska

D. FEDERAL GOVERNMENT

1. EPA (at AAPA workshop)
2. MARAD (at AAPA workshop)

E. ACADEMIA

1. Texas A&M University, Galveston
2. Lamar University Center for Advances in Port Management
3. Old Dominion University

F. TECHNICAL/SERVICE COMPANIES

1. Hohonu Environmental Monitoring
2. Kale Info Solutions, Inc.
3. CDP North America
4. Resilient Analytics, Inc
5. Marine Exchange of Southern California
6. Amogy

G. ASSOCIATIONS

1. AAPA
2. IOOS Association
3. Flood Mitigation Industry Association
4. Ingleside on the Bay Coastal Watch Association (Corpus Christi)
5. West Long Beach Association

H. THREE PRIVATE INDIVIDUALS