

Standing Committees of the Marine Group (AW000)
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TRB Marine Group – Advancing Knowledge of the Marine Transportation System

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THE MARINE TRANSPORTATION SYSTEM

The Marine Transportation System delivers vital goods and transportation services to businesses and consumers, provides key commuter travel routes and vehicular links, facilitates imports and exports, creates jobs, and supports local and national economic growth. There are 360 commercial ports that provide approximately 3,200 cargo handling facilities and passenger terminals. (Environmental Protection Agency, 2016). In addition, there are some 560 reported ferry terminals in coastal, lake and river locations, 60 of which are designated National Highway Connectors. The waterborne transportation system is made up of 12,000 miles of inland and intracoastal shallow-draft waterways (9- to 14-foot draft), including 236 lock chambers at 191 lock sites on 41 waterways, and 13,000 miles of greater than 14-foot deep channels (U.S. Army Corps of Engineers, 2019).

These 25,000 miles are operated and maintained for commerce. They also provide the navigable corridors for the nation's ferries. According to USDOT's *2018 Transportation Statistics Annual Report*, in 2016, the water transportation industry was responsible for the movement of 798 million tons of waterborne cargo valued at \$527 billion. Additionally, based on those 163 out of 2002 ferry operators that responded to the 2016 National Census of Ferry Operators, a reported total of 118.9 million passengers and 25.0 million vehicles were transported by ferry in 2015 (Bureau of Transportation Statistics, 2016). Research and innovation have the potential to revitalize the U.S. maritime industry by providing mobility solutions, improved processes, and next-generation technologies which can spur growth opportunities for moving freight and people by water and generate new spin-off industries.

Coastal Ports

Currently, there are more than 150 deep draft seaports under the jurisdiction of 126 public seaport agencies located along the Atlantic, Pacific, Gulf and Great Lakes coasts, as well as in Alaska, Hawaii, Puerto Rico, Guam, and the U.S. Virgin Islands. These ports accommodated 82,044 vessel arrivals by self-propelled vessels (of all flags) of 1,000 gross tons or more in 2015 (the latest statistics available) (U.S. Maritime Administration, 2019). The Nation's top 10 ports accounted for over 78 percent of our waterborne containerized trade as measured by loaded twenty-foot equivalent unit (TEU) containers in 2017 (U.S. Army Corps of Engineers Institute for Water Resources, 2019).

Inland Waterways

The rivers that make up the U.S. inland waterways system and its corresponding lock chambers serve as a key link to the nation's intermodal transportation system. They serve the freight and passenger needs of more than 41,000 U.S. domestic tugs, barges, ferries, and offshore support vessels. The rivers also provide a connection to inland and ocean ports, providing U.S. industries and businesses with access to global markets. Primary users of the U.S. inland waterways system are distributed across multiple sectors and facets of the U.S. economy, including agriculture and farm products, coal, petroleum and petroleum products, chemicals and related products, crude materials, and passenger transportation.

Environmental Issues

With continued growth in global trade projected, there is great pressure on not just the ports themselves, but also on the rail and highway intermodal connections that support them. Increasing numbers of ever-larger containerships and cargo vessels are competing for the limited U.S. port space and infrastructure able to accommodate their dimensions and cargo volumes. Most U.S. ports are surrounded by metropolitan areas where space for port expansion and growth is unavailable, very costly, or zoned for non-freight purposes (e.g., residential), and where current air quality standards often are unmet due to the emissions from a range of activities, including the maritime transportation sector.

As with any form of transportation, maritime activities have some adverse effects on the environment, the most noticeable being air emissions and oil pollution from spills. In the United States, the most recognized adverse impact of maritime activities has been associated with major gateway ports where the confluence of transoceanic vessels, terminal equipment and harbor craft, railroad services, and truck drayage can generate significant volumes of emissions and noise. Major improvements in air quality in port cities have been accomplished by implementing

requirements for cleaner fuel; more efficient truck, train, terminal equipment, and vessel engines; and use of shore power (supported by research to develop cleaner fuels and technologies). The initiatives have also reduced emissions and noise problems at inland ports and intermodal facilities.

Port-related activities can have localized, adverse effects on community health and quality of life, through air and water quality, noise levels, light pollution, vibration, partitioning of communities and other intrusions. Community opposition to adverse impacts can also lead to restrictions on freight and ferry movements and prevent new freight and ferry projects from being implemented unless the needs of the communities are carefully addressed in the regulatory, planning, and design processes. Port authorities that pursue efforts to reduce environmental impacts and engage their communities in the port planning process can reduce opposition and achieve better outcomes for both the communities and the ports.

Marine Safety Issues

Significant volumes of cargo and people are transported by waterborne commerce. Vessel or terminal incidents can result in loss of lives, injuries, environmental impacts, and damages to vessels, bridges, and other maritime infrastructure at a port or inland waterway. They can shut down operations for several days, impacting maritime transportation and have secondary and tertiary economic effects on other transport modes including highway and rail. Therefore, improving the safety of maritime commerce is critical to the well-being and economic health of the nation. Assessing the risks of accidents and understanding the causal and contributing factors of such accidents is key to implementing corrective actions in order to minimize risks in the maritime sector.

Additionally, when there are highway and bridge outages or during times of natural disasters, ferries and marine vessels have provided alternative means of transport. The evacuation of Manhattan Island on 9/11 was the largest marine evacuation in history.

TRB'S MARINE GROUP

The Marine Group was officially created on January 1, 2004 and consists of four committees. Those committees, with their TRB designations, are:

- Standing Committee on Inland Water Transportation (AW020) created in 1975;
- Standing Committee on Ports and Channels (AW010) created in 1984;
- Standing Committee on Marine Environment (AW030) created in 2006; and
- Standing Committee on Marine Safety and Human Factors (AW040) created in 2011.

Additionally, the work of the Marine Group has closely coordinated with the Standing Committee on Ferry Transportation, which is part of the Public Transportation Group and was created in 1996.

Despite their relatively recent formation, the Marine Group committees have been very active in promoting research and the exchange of information in their respective areas. Several editions of *TR News* have focused on the work of these committees:

- January-February 2018: *Marine Transportation and the Environment: Trends and Issues*;
- July-August 2011: Articles on *Supporting Secure and Resilient Inland Waterways* and *Maritime Security, Piracy, and the Global Supply Chain*;

- September-October 2006: *The Intermodal Container Era: History, Security, and Trends*;
- July-August 2008: *Developing a Waterways Curriculum for Young People: Framework for Highlighting Careers in the Marine Industry*;
- July-August 2002: *Inland Waterways: Opening the Channels*; and
- August 2000: *Ferries in the United States*.

The committees have been active in preparing workshops and focused sessions for TRB annual and summer meetings. Several examples of work done by the Marine Group committees and their predecessors highlight these activities. The Ports and Channels Committee has (co)sponsored several sessions and workshops at annual meetings and summer meetings of the TRB covering issues such as:

- Port Resilience, Disruptions, Vulnerability;
- Cargo Diversion, Planning, Financing, and Management of Maritime Transportation;
- Funding Port and Freight Infrastructure Investments;
- Port Drayage and Chassis Management;
- Monitoring and Evaluating the Performance of Ports and Intermodal Transportation Networks; and
- Optimizing Freight Traffic in Congestion--Connected Trucks and Advanced Technologies.

The Committee on Ferry Transportation has sponsored workshops at the annual meeting that have recently focused on:

- Marine safety;
- Geospatial positioning systems;
- Information technology to help prevent accidents and minimize loss of life; and
- Necessary factors (challenges) for a new service in a metropolitan area.

The same committee has used recent summer meetings to highlight local and regional ferry systems including: the SS Badger service from Ludington, Michigan to Manitowoc, Wisconsin; the Cape May, New Jersey to Lewes, Delaware service; and Galveston, Texas ferry system.

The 2000 Ferry edition of *TR News* brought together articles, notes, photographs and commentary on ferries throughout the United States. Prepared by committee members, public and private ferry operators, federal agency representatives, academic contributors and TRB staff, the issue continues to be a valuable resource.

Members from the Committee on Marine Safety and Human Factors have long been instrumental in championing the marine-related sessions at the TRB Human Factors in Transportation Workshop now in its 55th year as a daylong activity at the TRB Annual Meetings.

TRB staff members over the years have provided excellent guidance and assistance for the Marine Group. The Group particularly appreciates the assistance of Tina Casgar, Joedy Cambridge, and Scott Brotemarkle.

MARINE COMMITTEE CONTRIBUTIONS

Standing Committee on Ports and Channels

The Ports and Channels Committee was originally established in 1984 as the Standing Committee on the State Role in Waterborne Transportation. At the time, marine transportation was a relatively new mode of transportation on the TRB pallet. Even though maritime transportation moves more U.S.-international trade by tonnage and value than any other mode and carries millions of cruise ship and ferry passengers, it was not represented as such at TRB at the time. Relatively little marine or intermodal research had been done. It quickly became obvious, especially with the rapid growth in containerization, that mounting issues needed immediate study and research. The stage was now set for the early committee chairs to identify those critical issues of the day and began to create subcommittees, and later task forces, necessary to pursue them.

The committee established several subcommittees to help focus on emerging marine and intermodal issues. Following several years of growth and active work, the committee proposed these subcommittees be elevated to full committee status. These include:

- Ferry Transportation. This committee represented marine transportation problems and issues that had largely been overlooked—those representing the transport of people and goods by ferry. This committee works collaboratively with both the Marine and Public Transportation Groups today.
- Military Transportation. Now part of the Freight Systems Group, this committee brought into the TRB-fold the greatest single consumer of world transportation services, the military. Beginning with a focus on marine, this committee now engages across multiple groups within TRB.
- Marine Environment. This committee is now a robust player on issues ranging from marine fuels, ballast water discharge, dredging practices, port drainage, construction, vessel emissions, and so much more. The regulatory world demands TRB-level research and studies pertaining to the protection of our environment.
- Marine Safety and Human Factors. This committee plumbs the common transportation human factor issues, which lets it join with other modal research endeavors, and—just as important—delve deeply into those problems unique to marine activities.

The Ports and Channels Committee is concerned with issues of planning, financing, and management of coastal and Great Lakes ports and channels. Coverage includes port maintenance and development issues, technology relating to cargo handling and deep draft vessels, landside access, cruise operations, environmental issues, and other local, state, and national issues, which contribute to the integration of water transportation into a multimodal transportation system. The committee focuses on the following goals:

- Continuously foster and contribute to the research, development, and implementation of best practices in ports and channels;
- Support communications and dissemination of research findings and best practices in freight and passenger movements (including international developments) that are applicable to ports and channels;
- Enhance the understanding and skills of transportation leaders and professionals in the art and science of ports and channels management and development; and

- Show how ports and channels are an integral component of an effective freight and people movement strategy that contributes to regional, national, and international economic vitality, in the course of helping to address critical transportation issues.

To achieve its goals, the committee, in collaboration with other TRB committees, has and will continue to focus on the emerging issues relating to deep-water port and channel operations and development, including:

- Strategic asset management of ports and channel navigation infrastructure for prioritizing investment and maintenance;
- Institutional arrangements, governance mechanisms, and policies to address emerging financing challenges in ports and waterways infrastructure;
- Multimodal and logistics coordination between the commercial and the public sectors in matters relating to diverse cargo types such as bulk, containerized, or otherwise unitized cargo; different vessel types such as passenger, cargo ships, and other watercraft; and landside operations;
- Service delivery effectiveness of ports and channels in support of increasing supply chain competitiveness and complexity, considering operational distinctions in multimodal and intermodal transportation of people and goods;
- Considerations and cost-effective approaches to port emergency preparation, response and recovery efforts;
- Economic and operational impacts of environmental policies and regulations on ports and harbors;
- The environmental performance of port operations to avoid, minimize, or mitigate adverse impacts on public health and the environment;
- The development and commercialization of new engine technologies and alternative fuels (infrastructure and education);
- Technological advancements (3-D printers) and vulnerabilities (cyber terrorism) that may impact how ports do business in the future;
- Implications of trends and policy changes in international trade and economic activity on ports, waterways, and related transportation infrastructure;
- Labor relations, performance measurement, and technological advancement at ports/terminals;
- Feasibility and impacts of Marine Highway investments, operations, and policies on ports, related transportation infrastructure and the environment;
- Business case strategies to incentivize use and interconnectivity among and between coastal and inland waterways and ports; and
- Evaluation of the differences from purely public enterprise responsibilities and stewardship, and identification and quantification of challenges in alternative finance and project delivery approaches such as those facilitated through public-private partnerships, outsourcing, and private investment in port and terminal development, improvement and/or operation.

In recent years, the committee's scope has expanded to look more broadly at the economic and supply chain impacts of port efficiency, including congestion, terminal operations,

data availability, electronic data exchange between ports and inland carriers/suppliers (port community systems), and first-mile/last-mile infrastructure. The committee has recently created two subcommittees to support research in two emerging areas: Port Automation and Port Performance.

The Port Automation Subcommittee's mission is to understand initiatives leading to increased automation in marine terminal and related infrastructure operations, incentives, challenges and implications for ports and their stakeholders. Its goals and objectives include:

- Identification and characterization of drivers, constraints, implications for management and operations, and future directions in automation;
- Ensuring that all stakeholder interests are represented and articulated;
- Identification of applications, benefits and costs of automation, including economic, social, environmental, safety and security perspectives;
- Addressing opportunities for cascading applications for non-container (tonnage) cargo operations; and
- Identify and recommend public policy actions to increase benefits and minimize costs of increased automation in port and connecting modal operations.

The Port Performance Subcommittee's mission is to focus on nationally consistent port data standards and sources as well as identify and explore new and existing Federal and industry standards for collecting and reporting sources of port data and statistical information. Its goals and objectives include:

- Exchange of information;
- Research dissemination;
- Identification of emerging data standards and sources as they relate to port performance; and
- Supply Chain Competitiveness

The committee is currently in the process of standing up a third subcommittee for supply chain competitiveness.

Standing Committee on Inland Water Transportation

This committee's current scope focuses on research related to the movement of freight and passengers by inland and intra- and inter-coastal waterways. This includes planning, financing, management, vessels, ports and port facilities, environmental considerations, and engineering and operational aspects. The committee also includes the intermodal aspects of inland water transportation and intermodal system integration.

The committee was initiated in 1975 with a focus of defining, encouraging, promoting and disseminating quality research relevant to the inland water transportation system. Committee topics and areas of focus historically ranged from research promoting port management associated with the inland waterway system; research relating to dredging and dredge material disposal; and modal and logistics coordination among commercial, military, and public sector users.

Since its formation, the committee has worked to coordinate such research initiatives and related activities with several federal agencies, including the U.S. Coast Guard, the Maritime

Administration, U.S. Army Corps of Engineers (USACE), and the National Oceanic and Atmospheric Administration, among others.

Over the years, Committee partnership contributions include the development of several notable national and regional events, including the U.S. Committee on the Marine Transportation System (CMTS) initiative. CMTS is a federally supported initiative to promote a marine transportation system that improves the global competitiveness and national security of the U.S. transportation network. Other recognized government and industry contributions include coordination with other groups such as PIANC (World Association for Waterborne Transport Infrastructure) and the European Federation of Inland Ports in the development of international papers and issues relating to inland waterways, including the SmartRivers conference.

Research has also been brought forward to identify and resolve infrastructure challenges facing the U.S. inland waterways system, which are paramount to many water transportation users with respect to the need for investment and modernization. Members of the committee participated on the special committee assembled by the National Research Council in producing the report titled *Funding and Managing the U.S. Inland Waterways System: What Policy Makers Need to Know. Special Report 315*, published in 2015.

Going forward, the committee will be pursuing the following strategic goals to facilitate and promote research initiatives focused on promoting and facilitating:

- Research necessary to demonstrate the benefits to the nation of modernizing and maintaining the inland river navigation system;
- Research necessary to demonstrate the value of ports and terminals on the inland river system;
- Research necessary to address the benefits to the nation and the states of the development of multi-state intermodal transportation corridors;
- Research necessary to develop performance metrics other than those based on tonnage and ton-miles; and
- Research on commodity diversion toward barge transportation on the U.S. inland waterways.

Standing Committee on Marine Environment

The Marine Environmental Task Force was formed in 2003. The initial membership was a mix of representatives from the academic, non-profit, and maritime business communities. This diversity of membership has been a characteristic of the group ever since. The other founding members of the Task Force had served on other TRB committees and this experience was valuable in launching the Task Force. The new Task Force quickly organized with the filling of all the leadership positions.

In 2005, the Task Force conducted a survey to identify the leading maritime environment issues. The top three issues were quantification of the costs of marine pollution, discharges of pollutants from vessels, and invasive species. In 2006, after completing its initial three-year cycle, TRB approved the Task Force's application to become a standing committee within the Marine Group and since then has operated as the Standing Committee on the Marine Environment.

Over its life, the committee has looked at a wide-range of marine environmental issues, including environmental windows for dredging, beneficial uses of dredged materials, air emissions from vessels and their health impacts, invasive species and management of ballast water, and alternative fuels. In 2015, the committee compiled a document that provide an overview of these leading topics: marine emissions and air quality impacts, supply chains, ecological systems, and system impacts. TRB issued the document in January 2016 as “Trends and Issues in Marine Transportation and the Environment, a White Paper by the TRB Marine Environment Committee”. This was used later as the foundation for the January-February 2018 edition of *TR News*, mentioned earlier.

Over its tenure, the committee has worked with a wide variety of governmental agencies, including the Environmental Protection Agency, the U.S. Coast Guard, and the Committee on the Marine Transportation System. The committee also produces research needs statements and calls for papers. The committee works closely with the other TRB Marine Group committees including holding joint meetings and co-sponsoring sessions at annual meetings.

Standing Committee on Marine Safety and Human Factors

The Marine Safety and Human Factors Task Force was formed in 2008. At that time, TRB had a number of standing committees that were involved with human factors. The TRB leadership recognized that that there were sufficiently unique aspects of maritime safety that warranted forming the Task Force to test if it would add value to TRB and the research community.

The initial meeting of the Task Force included representatives from academia, industry, and government. The Task Force adopted two primary working areas. The first was to work with the other established units in TRB that were working on human factors issues in specific modes and in general cross-modal issues. The second was to work with the other committees within the Marine Group on safety and human factors problems and research areas. The Task Force’s discussions focused on:

- Voluntary safety reporting;
- Skilled manpower shortages;
- Ship design and automation ;
- Safety culture; and
- Human fatigue and alertness.

The Task Force had a successful start and was active in annual meetings, mid-year meetings, and various conferences. In December 2010, the Task Force prepared a proposal to become a full standing committee. This was approved and since 2011 operated under the name of Standing Committee on Marine Safety and Human Factors.

Since its founding, one of the major interests of the committee has been in the area of reporting of near miss incidents and analyzing the collected data. At various venues, the group has discussed and moved this issue forward with members of industry and academia. In 2016 and 2017, committee members reviewed the work products that led to the development of maritime near miss reporting program by the maritime industry and Lamar University. Representatives from the program regularly report on the program at committee meetings.

Ongoing work of the committee includes working with other human factors groups in developing the multimodal Human Factors Workshops at the annual meetings, developing research needs statements, soliciting and reviewing papers and organizing sessions for the annual meetings. Over the years, the committee has been quite successful in attracting a significant number of submissions of research papers in the marine safety area. The committee continues to have a diverse membership with members and friends from government; industry, including the Passenger Vessel Association and the American Waterways Operators; and academia, including maritime academies. Committee members and friends work in coordination with related organizations, including the Society of Naval Architects and Marine Engineers, the American Bureau of Shipping, the Maritime Administration's Ship Operation Cooperative Program, and the Department of Transportation's Human Factors Coordinating Committee. Continued or emerging issues for the committee include the development of autonomous vessels, fatigue and crew endurance, and operator distraction.

At the TRB Annual Meetings, the committee receives papers on a broad array of topics ranging from maritime transportation traffic modelling, waterways suitability, and human systems integration. The committee is currently investigating how Automatic Identification System (AIS) data can be collected and analyzed to enhance safety and prevent accidents in the maritime industry. In addition, the increasing role of automation in the maritime sector presents ongoing research opportunities to better understand automation's impacts on Marine Safety and Human Factors.

Standing Committee on Ferry Transportation

The purpose of the Committee is to foster and distribute research concerning ferry systems to users, operators, suppliers, manufacturers, public agencies and regulators. Ferries in 37 states and 2 US territories serve 880 route segments totaling 20,042.4 miles, ranging from less than 1 mile to 595 miles. Vessel sizes in the reported fleet of 652 vessels range from small scheduled water taxis to a Staten Island ferry carrying 5200 passengers. Ferries are defined as vessels that carry passengers and vehicles with drivers, including trucks. The scope of the research activities concerns, among others: ferry requirements, operations, planning, management, design, construction, maintenance, intermodal links, environmental issues, and utilization. Ferries that operate in ocean, coastal, inland, and river environments are included.

Prior to the current standing of the Ferry Transportation Committee, it was a TRB subcommittee in the Public Transportation Group. Members were drawn from the domestic and international ferry industry, both public and private sector. Professional associations were also invited to attend, including the Society of Naval Architects and Marine Engineers (SNAME) and American Society of Civil Engineers (ASCE). Both organizations made key contributions to the committee. Founders and directors of the International Marine Transit Association (IMTA - now INTERFERRY), and the Passenger Vessel Association (PVA) were early participants in the Ferry Transportation Committee's direction and work. The key public agencies affiliated with the Ferry Transportation Committee have been Federal Highway Administration (FHWA), Federal Transit Administration (FTA), Bureau of Transportation Statistics (BTS), U.S. Coast Guard, and U.S. Army Corps of Engineers. Additionally, representatives of Defense Advanced

Research Projects Agency (DARPA), seeking new marine platforms for military purposes including moving military cargo, also participated in early meetings.

The Committee became a standing committee in the Public Transportation Group in 1996; it remains there today. The establishment of a Marine Highway (Short Sea Shipping) Subcommittee in 2008 expanded the scope of the Committee to include additional emphasis on goods movement. Ferry Committee members participate in the Marine Highways Subcommittee to explore seamless transfer from one mode to another where navigable waterways provide the best option for moving cargo by water.

Over the years, the TRB Committee on Ferry Transportation has encouraged papers and presentations that have reflected a changing spectrum of issues. These have included best practices in integrated intermodal design, designing for accessibility, environmental best practices, risk and safety, new European ferry routes, national ferry statistics, the scope of funds available in federal transportation bills, the regulatory framework, working with the Coast Guard and other federal agencies, high-speed ferries and their potential in U.S. transit service, etc. Resilience and issues relating to climate change, network design, and improving “intermodality” through technology are among the pending areas of investigation.

Over the past few years, there has been an increase in presentations from the international ferry community. Submissions have been received from Asia, Europe, Australia, and Canada. In addition, TRB has looked at ways in which ferry systems provide an alternative right-of-way during disasters or construction programs constricting a corridor. Presentations how this worked after the Loma Prieta Earthquake in San Francisco and the loss of the Bay Bridge, after the Hood Canal floating bridge collapse, during the construction of the wastewater treatment facilities in Boston Harbor (ferries carried all construction material to the site and half of the labor force each day for 10 years), after flooding in subways or during strikes in New York City, or as an alternative to Southeast Expressway reconstruction, etc. all illustrated creative and innovative transportation solutions in complex situations.

The most dramatic of these happened after the 9/11 World Trade Center disaster when ferries and “all available boats” mobilized to evacuate Manhattan, the largest evacuation by water in history.

The 2000 Ferry edition of TR News brought together articles, notes, photographs and commentary on ferries throughout the United States, prepared by TRB committee members, public and private ferry operators, federal agency representatives, academic contributors and TRB staff. It continues to be a valuable resource.

The Ferry Committee has encouraged and reviewed many key ferry studies over the years. Most recently, in 2011, the Ferry Committee proposed TCRP-152, “Guidelines for Ferry Transportation,” published in 2012. Several members of the Committee participated in the review panel. In 2018, the Committee proposed research and offer support to the newly established Marine Highway Advisory Committee in New York City. Members of the Committee currently participate in quarterly meetings held by the Northern Virginia Regional Commission (NVRC) for the study of a commuter ferry service in the DC area.

For the TRB Annual Meeting, the Committee receives papers that contribute to the industry; in 2019, these included modeling for unique access-challenged islands in Japan and Greece, yet included the practical application of the modeling to the system managed by the San

Francisco Water Emergency Transportation Authority in the sponsored Annual Meeting session. The Committee efforts also sponsored three-hour respective workshops at the 2016 and 2019 Annual Meetings - on marine safety, Geospatial Positioning Systems, and information technology to help prevent accidents and minimize loss of life in 2016 and reviewing necessary factors (challenges) for a new service in a metropolitan area compared to established and growing services in other urban areas in 2019. Both workshops involved presentations and discussion with outcomes.

Members of the Committee also participate in, and have led studies of best practices in ferry operations in states and regions across the United States, as well as studies in all areas related to ferry transportation. Members of the Committee participated in the development of Chapter 9, Ferry Transit Capacity, for the Third Edition of the “Transit Capacity and Quality of Service Manual,” published by the Transportation Research Board in 2013.

A number of significant national and state ferry studies have involved TRB committee members who were either ferry operators who were the subjects of study or consultant members of the Committee who led the investigations. These have included studies of ferry transportation in San Francisco Bay, in Rhode Island, in Corpus Christi, in Massachusetts, in New Jersey and New York, in Seattle, North Carolina, and in Alaska, among others. TCRP proposals shaped by the Ferry Committee have become valuable studies undertaken by members of the Committee and their associates.

OUTSTANDING ACHIEVEMENTS AND AWARDS

A number of individuals who have been key players in the five committees included in this paper have been recognized for outstanding achievements. These include:

- Lillian Borrone served as chair of the TRB Executive Board (the first woman to hold the post), bringing marine issues into focus for the Board. She was also appointed as a member of the National Academy of Engineering in 1996. Borrone was also the Honoree of the Transportation Research Board’s Thomas B. Deen Distinguished Lectureship in 2005 where she successfully made the case for a focus on freight at TRB, a focus which eventually resulted in the creation of Freight Day sessions at the annual meetings;
- Carl Berkowitz founded the International Marine Transit Association (INTERFERRY), a distinguished international ferry association.
- Arlene Dietz was designated a National Associate of the National Academy of Science (NAS), National Research Council, 2004;
- Geraldine Knatz was the Honoree of the Transportation Research Board’s Thomas B. Deen Distinguished Lectureship, 2009. She was also appointed as a member of the National Academy of Engineering in 2014.
- Jim Kruse was appointed to the Marine Transportation System National Advisory Committee in 2016;
- Robert Portiss received the 2015 White House Transportation Champions of Change Award and the 2009 U.S. Army Corps of Engineers’ *de Fleury Medal* Award;
- Thomas Wakeman was appointed to the Marine Transportation System National Advisory Committee in 2016;

- Gregg Ward was appointed to the Marine Transportation System National Advisory Committee in 2008; and
- Roberta Weisbrod launched the Worldwide Ferry Safety Association.

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