

FOREWORD

As the world's leading maritime and trading nation, the United States relies on an effective and efficient marine transportation system to further enhance our global leadership. In *A National Strategy for a New Century*, President Clinton calls for our renewed commitment to promote prosperity, enhance American competitiveness, and invest in a world-class transportation infrastructure for the 21st century. We can meet his vision by working vigilantly together — as one team for America.

Many of you now share responsibility for America's marine transportation system. As you know, this Nation was built on its waterways and ports. So we must make certain they are ready to compete, and win, in the global economy of the 21st century.

To my colleagues in the U.S. Department of Transportation, I welcome your participation. And to those of you representing other Federal agencies and industry, public interest and environmental groups, I welcome your partnership. Thank you for your efforts.

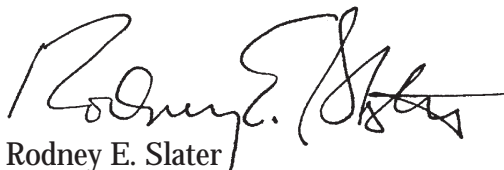
President Clinton, Vice President Gore, and all of us at the U.S. Department of Transportation will continue to vigilantly work with you to ensure that our Nation's marine transportation system is ready for the next century. Our waterways, ports, and their intermodal connections must meet the needs of a wide range of users. They must fulfill the public's expectations. And they must provide safe, efficient, and environmentally responsible transportation.

To identify what changes may be needed, we actively sought perspectives and ideas from everyone affected. We have received valuable input from many users — including commercial, national defense, and recreational interests. By listening and learning, we are working together to improve the system and prepare for the tremendous growth in maritime commerce expected in the years ahead.

President Clinton — in his State of the Union Address — called again for “common sense” government. Let me say that I share his commitment. In this department, I call common sense government ONE DOT. And the work of the Marine Transportation System Task Force has been a shining example of ONE DOT and common sense government at work to put every American first. Clearly, there will be differences of opinion, and differing needs. But know this — every American shares a common goal: to keep the Nation's transportation system the very best in the world.

We are relying on all of you for your continued support and leadership. Help us ensure that America's marine transportation system will serve the interests of the Nation now, and into the future.

We have made great progress. So believe me when I say: the best is yet to come.



Rodney E. Slater
Secretary of Transportation

An
Assessment
of the U.S. Marine
Transportation
System

A REPORT TO CONGRESS

September 1999

PREFACE

In recognition of the continuing importance of the U.S. Marine Transportation System (MTS), the U.S. Congress, on November 13, 1998, directed in Section 308 of the Coast Guard Authorization Act of 1998, that:

“The Secretary of Transportation, through the Coast Guard and the Maritime Administration, shall, in consultation with the National Ocean Service of the National Oceanic and Atmospheric Administration, the Corps of Engineers, and other interested Federal agencies and departments, establish a task force to assess the adequacy of the Nation’s marine transportation system (including ports, waterways, harbor approach channels, and their intermodal connections) to operate in a safe, efficient, secure, and environmentally sound manner.”

The Task Force was to consider the capability of the MTS, the adequacy of the depth of channels and harbors, and the cost to the Federal government of accommodating projected increases in foreign and domestic traffic over the next 20 years. Evaluations of the Nation’s capability to dispose of dredged materials and the future of the navigational aid system were additional components of this effort.

Congress required the Secretary to report the results of the Task Force’s assessment. This report summarizes the results of the assessment and constitutes the response to Congress.

Development of the Report

This report reflects a highly collaborative effort among public sector agencies, private sector organizations, and other stakeholders in the MTS. The process began with seven *regional listening sessions* in spring 1998, hosted by the U.S. Coast Guard, the Maritime Administration, and 12 other Federal agencies. The purpose of these sessions was to learn what users, stakeholders, and the public perceived to be the current state of the MTS and its future needs.

The input received at the regional listening sessions became the agenda for *The National Conference on the Marine Transportation System* hosted by the Secretary of Transportation in November 1998. Executives from industry, labor, and government participated in this conference. Through breakout groups and plenary sessions, the participants addressed two overarching issues — the development of a shared national vision for the MTS and public and private coordination of MTS activities. Participants also addressed MTS issues affecting safety, competitiveness, infrastructure, security, and the environment.

After the National Conference, the Secretary established the Congressionally mandated MTS Task Force. The Task Force included MTS users and service providers, such as Federal agencies and departments, ports, commercial carriers, shippers, labor, recreational boaters, fishermen, environmental organizations, and other MTS stakeholders. A listing of Task Force members and organizations involved in the assessment of the MTS and the development of this Report is included at the end of this document.

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EXECUTIVE SUMMARY

The U.S. Marine Transportation System (MTS) consists of waterways, ports and their intermodal connections, vessels, vehicles, and system users. Each component is a complex system within itself and is closely linked with the other components. It is primarily an aggregation of State, local, or privately owned facilities and private companies. As with the U.S. economy as a whole, decision making and investment are primarily driven by the marketplace. In addition, national, State, and local governments participate in the management, financing, and operation of the MTS.

More than 1,000 harbor channels and 25,000 miles of inland, intracoastal, and coastal waterways in the United States serve over 300 ports, with more than 3,700 terminals that handle passenger and cargo movements. The waterways and ports link to 152,000 miles of rail, 460,000 miles of pipelines, and 45,000 miles of interstate highways. Vessels and vehicles transport goods and people through the system. The MTS also contains shipyards and repair facilities crucial to maritime activity.

As the world's leading maritime and trading nation, the United States relies on an efficient and effective MTS to maintain its role as a global power. The MTS provides American businesses with competitive access to suppliers and markets in an increasingly global economy. The MTS transports people to work; provides them with recreation and vacation opportunities; puts food on their tables; and delivers many of the items they need in their professional and personal lives. Within the United States, the MTS provides a cost-effective means for moving major bulk commodities, such as grain, coal, and petroleum. It is a key element of State and local government economic development and job-creation efforts and the source of profits for private companies. With its vast resources and access, the MTS is an essential element in maintaining economic competitiveness and national security.

Annually, the U.S. marine transportation system:

- Moves more than 2 billion tons of domestic and international freight;
- Imports 3.3 billion barrels of oil to meet U.S. energy demands;
- Transports 134 million passengers by ferry;
- Serves 78 million Americans engaged in recreational boating;
- Hosts more than 5 million cruise ship passengers; and
- Supports 110,000 commercial fishing vessels and recreational fishing that contribute \$111 billion to State economies.

The MTS provides *economic value* by affording efficient, effective, and dependable all-weather transportation for the movement of people and goods. Waterborne cargo alone contributes more than \$742 billion to U.S. gross domestic product and creates employment for more than 13 million citizens.

The MTS provides *national security value* by supporting the swift mobilization and sustainment of America's military. As an example, 90 percent of all equipment and supplies for Desert Storm were shipped from U.S. strategic ports using our inland and coastal waterways.

The MTS provides *environmental value* by being an environmentally responsible method of transportation. Ships and barges have the fewest accidental spills or collisions of all forms of transportation. Waterways are an attractive alternative transportation mode for relieving congestion on roads and rails. The impact of increased MTS activity on the environment, however, has been an increasing concern.

The MTS provides *recreational value* to millions of Americans who participate in recreational boating and fishing or take sightseeing, excursion, dining, gaming, windjamming, whale watching, or nature cruises.

What are the Critical Issues Facing the MTS?

As comprehensive as the MTS is today, its ability to handle the emerging needs of tomorrow will be severely challenged.

Growing Levels of Demand: The total volume of domestic and international marine trade is expected to more than double over the next 20 years. The number of recreational users is expected to grow by over 65 percent to more than 130 million annually in the next 20 years. High-speed ferry transportation is experiencing rapid growth in response to land-transport congestion. Cruise ships anticipate attracting 6.5 million passengers by 2002. Commercial fishing is projected to increase. Military reliance on the MTS for force projection and sustainment is also expected to grow in the new millennium.

Shifting User Requirements: The business environment in which American companies must operate has become more competitive. They must be lean and capable of effectively serving larger, more demanding markets. Ports and other MTS operators must meet increasingly stringent requirements to successfully compete for American business. Everything must be accomplished faster and less expensively, while maintaining dependable, secure, and safe movement of goods. In response, transportation providers are merging or entering into business alliances. They are deploying new technologies and equipment to reduce the cost of moving goods and meet the needs of shippers. This includes larger and faster vessels capable of carrying more than 6,000 20-foot containers; double-stack trains for effectively transporting shipments over land; and advanced tracking systems so that businesses know where their goods are.

More Pressure on Infrastructure and Ensuring a Competitive MTS: The physical infrastructure and information systems that support the MTS must adapt to these changing needs. Key infrastructure issues include:

- *Dredging and marking the harbor channels that connect U.S. ports to the world.* Larger vessels, while more cost-efficient, require deeper waterways. Overall, the Nation's future dredging requirements can be expected to grow.
- *Modernizing locks and dams to regulate water flow and facilitate commerce.* By 2000, more than 44 percent of the inland waterway locks and dams will be at least 50 years old. Many locks are undersized for modern commercial barge movements.
- *Improving marine terminal capacity and access to rail, road, and pipeline.* Seamless movement of goods across transportation modes and geographical areas is needed to minimize transportation costs borne by the American consumer.
- *Advancing computer, communications, and navigation technologies to increase the productivity, safety, and security of the MTS.* Technologies include Intelligent Transportation Systems (ITS), such as Differential Global Positioning Systems (DGPS), Vessel Traffic Services (VTS), Physical Oceanographic Real-Time Systems (PORTS), and Electronic Navigational Charts (ENCs).
- *Minimizing conflicts among land uses along the waterfront and intermodal connections.* Many of our Nation's cities are trying to revitalize their communities through waterfront redevelopment that has focused on residential, commercial, and tourist-related uses, leaving less land available for port development. Intermodal connections at ports also experience land

constraints because of zoning and environmental regulations that restrict expansion, particularly in densely populated areas.

Enhancing Coordination: A recurring theme has been the need for comprehensive coordination, leadership, and cooperation among Federal, regional, State, and local agencies, as well as private sector owners and operators. MTS users often are unaware of the other public and private users' activities and inherent limitations. Federal, State, and local MTS service providers have not coordinated their efforts nor have they reached a consensus on goals and actions to maximize efforts and resulting benefits for the entire spectrum of MTS users and beneficiaries. Establishing partnerships (public-public, public-private, private-private) among competitors or organizations that operate with different and independently developed MTS objectives is difficult.

Ensuring a Safe System: With the rapid expansion of trade and recreational opportunities in recent years, many parts of the MTS are being stretched to their limits to cope with the size, speed, and diversity of vessels and users of the MTS. Human factors, ranging from the growth in personal watercraft use to inadequately trained crews, clearly contribute to MTS-related accidents.

Funding the System: Funding to create an MTS capable of meeting the increased demands of trade, passenger, and recreational use, coupled with national security, environmental stewardship, and safety requirements, is a responsibility of both the public and private sectors. Improvements in technology, better coordination, and process improvement will help, but not entirely relieve, the government and the private sector of growing resource and investment demands. In turn, this issue may give rise to the need for innovative financing mechanisms or user fees.

Sustaining the Environment: MTS encompasses some of our Nation's most treasured resources including coastal and estuarine waters, inland rivers, and associated wetlands and critical habitats. As such, MTS users and service providers, from recreational boaters to commercial vessels and waterfront terminals, should operate in a manner that protects and sustains the environment. Marine operations, maintenance, and investment should be in harmony with environmental protection. Environmental quality is essential for sustaining coastal and marine ecosystems, commercial and recreational fisheries, and the economic vitality of the MTS. Thus, the MTS decision making and planning must acknowledge and account for the fundamental interdependency between the MTS and the environment.

Increasing National Security Needs: The MTS encompasses a security landscape characterized by a rise in international organized criminal activity, along with a growing array of rogue states and terrorists. MTS users and service providers must deal with criminal enterprises that seek to exploit vulnerabilities in the system to pilfer cargo or smuggle contraband. MTS service providers must be vigilant to potential terrorist opportunities. The MTS must remain capable of supporting national security objectives — the projection of U.S. military force and their sustainment depends 90 to 95 percent on sealift deployment.

What is the Desired State of the MTS in 2020?

Task Force members adopted the following vision statement that was developed at the MTS National Conference:

The U.S. Marine Transportation System will be the world's most technologically advanced, safe, secure, efficient, effective, accessible, globally competitive, dynamic and environmentally responsible system for moving goods and people.

To realize this vision, the Task Force members also adopted the following set of guiding principles, which were designed at the MTS National Conference to shape the strategies and actions necessary to achieve the MTS for 2020. Achieving this vision is the equal responsibility of private, local, State, and national stakeholders.

- Integration of the MTS with domestic and international transportation systems will provide for the national security, ensure economic well-being, enhance the quality of life, and ensure environmental protection.
- Clearly defined, coordinated, and consistent Federal leadership is needed to achieve the vision for the MTS.
- Public-private sector partnerships will meet MTS challenges through shared responsibility, accountability, and agreement on funding.
- MTS decisions will be based on full consideration of and harmonization among diverse interests.
- Aggressive, cost-effective technology development and deployment are essential to maintaining long-term competitiveness.
- People — work force, passengers, and other stakeholders — are critical to the successful operation of the MTS, and human factors are essential to its development.

How Can We Attain the Vision of MTS 2020?

The Task Force recommended the following strategic actions, which must begin now to move the current MTS toward the system needed in 2020:

Facilitate coordination among MTS users and stakeholders: Improved coordination — among and through the public and private MTS stakeholders at the local, regional, and national levels — is a key element of the MTS envisioned for 2020. Greater Federal coordination will better inform policy makers on legislation, investment strategies, resource allocations, and regulations, without duplicating or overlapping existing decision-making processes.

A *Coordination Framework* provides the mechanism for achieving this objective. Coordination at the national level consists of a new Federal Interagency Committee for the Marine Transportation System (ICMTS), created through the expansion of the existing Interagency Committee for Waterways Management (ICWWM), and an MTS National Advisory Council (MTSNAC). The ICMTS will be the national coordinating body where Federal agencies responsible for one or more aspects of the MTS come together and discuss strategies to minimize duplicate efforts and coordinate overlapping functions. The MTSNAC will provide a structured approach for non-Federal stakeholders to contribute input to national-level issues. The MTSNAC will be composed of senior-level representatives from non-Federal organizations. Additional key elements of the MTS coordination framework include local and, where appropriate, regional committees.

Address MTS funding issues: Funding is at the core of many issues relating to the MTS, but it was one on which the Task Force could not reach full consensus. However, the Task Force did recommend a four-step process to gain a better understanding of MTS funding:

- *Coordinate public funding processes.* There is a need to better coordinate Federal resource considerations using a systems perspective rather than a mode-by-mode or activity-by-activity basis to maximize the use of limited resources.
- *Define MTS funding mechanisms.* Federal funding, including potential user fees and private

investment alternatives, should be examined and defined to the best extent possible. This analysis will provide MTS stakeholders with a better understanding of public and private funding sources.

- *Forecast demands on the MTS.* A clear understanding of the projected demands will provide guidance and information to public and private decision makers regarding investments.
- *Explore innovative funding mechanisms.* The objective of this effort is to maximize the ability of stakeholders to leverage limited fiscal resources and to make more effective use of existing funds.

Achieve the vision for system mobility and competitiveness: The ability to move people and cargo freely without infrastructure impediments or congestion delays is essential. Infrastructure that may have served well in the recent past, or is currently serving adequately, may become inadequate in the near future, causing unacceptable delays and costs. Actions are recommended in five strategic areas:

- *Establish a vessel clearance information exchange and one-stop shopping.* Establish one-stop shopping for Federal inspection and reporting requirements. Where appropriate, partnerships among Federal agencies and State and local governments should be developed. This recommendation includes the coordination and streamlining of multiple agency inspections and procedures.
- *Facilitate landside access to ports.* A concerted effort among port interests along coastal ranges is needed to address this issue. The feasibility and effectiveness of a port-oriented, intermodal program of Intelligent Transportation System (ITS) projects for addressing MTS capacity issues should be pursued. Local and State forums involving public and private sector stakeholders should be established to evaluate port access projects. These efforts would facilitate a rational analysis and a factual basis for decisions.
- *Create a national cooperative MTS research program.* A national cooperative MTS research program would coordinate and enhance MTS-related research by government agencies and the private sector in support of assigned public mandates and market priorities. Such a national program would also serve to foster and support intermodal MTS technology requirements that are beyond the scope of individual agency mandates and the funding priorities and interests of the private sector.
- *Develop systemwide traffic forecasts.* MTS infrastructure investment should be based on realistic forecasts of growth trends, along with the changing patterns of both domestic and foreign traffic. Forecasts should be developed for planners and stakeholders at the national, regional, and local levels, as appropriate, that incorporate alternative scenarios of U.S. and world market trends, energy sources, and internal U.S. demographic and economic regional shifts. Forecasts should also be periodically reviewed and updated.

Improve awareness of the MTS: Many Task Force members expressed a desire to better inform the general public and policy makers as to the value and role of the MTS in people's daily lives. The Task Force recommends that State, local, and private sector MTS stakeholders give priority to promoting the overall value of the MTS through their existing trade associations and other outreach efforts. In conjunction with National MTS stakeholders, these groups should also:

- Develop a collective set of cohesive messages to inform the public about the MTS and its relationship to their quality of life.
- Promote the Nation's maritime heritage and the value of a career in the MTS.

- Develop programs and outreach efforts to promote the responsibility of the boater, mariner and maritime professionals to protect the marine environment.

Establish information management and infrastructure supportive of the MTS: The quality of the information systems within the MTS is a key determinant in the safety, security, environmental soundness, and mobility of the system. Actions are recommended in three strategic areas:

- *Hydrographic and weather information.* Some of the greatest safety concerns relate to the availability of timely, accurate, and reliable navigation information. Providing accurate and timely hydrographic, charting, and meteorological data is crucial to the future performance of the MTS, the safety of vessels and passengers, and the minimization of risks to the environment.
- *Tracking cargo, passengers, and vessels.* Government agencies and many commercial private sector organizations require pertinent vessel, cargo, and passenger location and movement information to support MTS commercial operations as well as incident response, emergency management, and law enforcement activities. The integration of existing systems and design of any planned systems should be undertaken to maximize MTS operational awareness in support of these efforts.
- *Waterways traffic management information.* Systems supporting traffic controls and navigation assistance should be capable of providing order and predictability to commercial and recreational users, while simultaneously maximizing system capacity for safe vessel movement. Such systems will provide mariners, as well as port and waterways managers, with access to timely and accurate information on all matters pertaining to the waterways, the activity within the waterways, and the vessels, cargo, and crews of vessels transiting the waterways.

Meet national security objectives: The rising demands for efficient and uninterrupted MTS operations to service the projected growth in passenger and cargo movements should be balanced with the need to invoke safeguards and inspections to protect against the array of security threats, and support military mobilization. Two strategic action areas are:

- *Organized crime and terrorism.* Much of the investment in security infrastructure and protection of port facilities is the responsibility of State or private sector managers with support from Federal agencies. Yet, current policies prevent sharing intelligence information related to security threats and vulnerabilities with these entities. The Presidential Interagency Commission on Crime and Security in U.S. Seaports will heighten national awareness of security issues in the areas of cargo crimes, smuggling and terrorism and develop a coordinated interagency approach to MTS port security which addresses seaport organized crime and terrorism. Areas recommended for consideration and further development by the Commission include security awareness, system transparency, public and private sector coordination, and international cooperation. The Task Force defers to the Commission to make specific recommendations.
- *Military Mobilization and National Defense.* With growth in congestion and activity within the MTS there is increased opportunity for those with ill intent to avoid detection. Most governments and non-state actors will avoid force on force confrontation with the U.S. military. However, they may attempt to target the MTS to disrupt commercial carriers serving to mobilize military cargo and assets or attack U.S. critical infrastructure. Recommendations in this area include:
 - *Vulnerability assessments.* Establish baselines and conduct periodic reviews of the DOD strategic ports and waterways to determine vulnerabilities and readiness to meet mobilization requirements. Include exercises that test the readiness and ability to conduct uninterrupted mobilization while under asymmetrical attacks, e.g., chemical, biological, and information/control systems.

- *Ensure qualified operators.* As the U.S. relies more on commercial transportation activities to support national security objectives during contingencies, there is greater need to attract and retain a qualified MTS work force. MTS operators need to ensure continued use of qualified and well-trained personnel.
- *Forge stronger public/private partnerships.* Stronger interagency and public/private sector partnerships are needed to support military mobilization and port training exercises. A collective public and private approach to support and sustain the Nation's capacity for uninterrupted rapid deployment of U.S. forces should be developed and implemented. This includes assurance of shipbuilding and repair infrastructure needed to maintain the U.S. fleet.

Achieve safety and environmental objectives: Two primary goals of the MTS are the safety of people and property and the protection of the environment. These areas are of paramount importance to all MTS users and stakeholders. Environmental protection will be consistently incorporated into all aspects of marine activities and decision making. The breadth and depth of safety and environmental issues require a systematic approach as well as specific actions to achieve the desired MTS in 2020. Specific strategic areas of action identified by the Task Force include:

- *Local coordination.* Local committees should pursue safety and environmental concerns related to the MTS and develop and execute collective actions. For these purposes, the mission of existing harbor safety committees or local planning groups could be expanded to conduct comprehensive assessments of local safety and environmental risks and needed actions.
- *Ship-terminal interface.* Safety and environmental risks posed by some marine terminals include facilities that are too small for the ships served or poorly located; inadequately manned by personnel lacking training and experience; operating under inadequate procedures; and using inadequate or poorly maintained cargo handling equipment. Port operators should initiate assessments, where needed, to review safety and environmental protection systems; operational procedures and personnel training; and accident and fire drills. The assessments would identify a prioritized list of actions and assign responsibilities for improving safety and environmental protection.
- *Port development and terminal operations.* Port and terminal operations pose potential multiple media environmental risks, such as from storm water runoff, port expansion, vessel support activities, cargo handling, chemical storage and handling, motor carrier and rail port activities, and public access and recreation. Ports should continue to work closely as environmental stewards with Federal, State, and local governments, as well as other stakeholders, to conduct operations and development in an environmentally responsible manner.
- *Vessel operation and the human element.* Actions to address the human element in the areas of vessel navigation, recreational boating, and accidental discharges are needed and recommended as they offer the greatest potential for risk reduction.
- *Vessel discharges and shore reception facilities.* Almost all ships generate oily water mixtures from normal engine room and bunkering operations, cargo residues, sewage, and solid waste such as refuse. A vessel can legally deal with these pollutants using either shipboard techniques or by transferring wastes to a Shore Reception Facility (SRF). New shipboard techniques for environmentally sound handling of shipborne-generated wastes have moderated demand for SRFs; however, a need for SRFs still exists. Ports should assess their inventory of current and projected vessel discharges and an assessment of the capacity of existing SRFs should be prepared. These analyses would form the basis for developing prioritized actions to handle vessel discharges in an environmentally sound manner and support research and development to reduce discharges and air emissions.

- *Nonindigenous species.* The introduction and spread of exotic or nonindigenous species into an area continue to cause adverse economic, ecological, and human health impacts. The movement of these species to and throughout the U.S. occurs in ballast water, cargo, and on vessel hull surfaces. Recommendations include focusing on ballast water management research and technologies, along with working internationally to establish a legally binding process and industry standards for ballast water management.
- *Dredging and channel design.* Channel design and dredging are complex undertakings that impact MTS safety, the environment, and mobility. Channel dredging costs and environmental impacts, including the capacity to dispose of dredged material, are significant concerns. The application of a systematic approach and continuity with previous work in this area are essential for success. Several specific actions recommended by the Task Force include:
 - Pursue continued efforts in dredged material management and encourage and guide stakeholders to explore beneficial uses and adopt a watershed approach. Integrate dredged material management planning into local/regional watershed planning. The focus should shift from dredging and disposal to overall sediment management, which includes the need for holistic watershed and local/regional planning efforts.
 - The National Dredging Team (NDT) should coordinate and communicate its efforts with the ICMTS. The NDT is encouraged to continue to address dredged material management issues and initiatives, such as supporting the Regional Dredging Teams, promoting beneficial use of dredged material, developing scientific tools, resolving national dredged material management issues, and promoting public education and outreach to stakeholders.
 - Conduct research on effective sediment management, including research into the effect of structures such as weirs on navigation and improved dredging techniques to reduce concerns such as the release of bottom contaminants.
 - Incorporate provisions into all channel development projects for protection and/or improvement of permanent and seasonal wetlands and other aquatic habitats.
 - Apply hydrodynamic and maneuvering criteria to new channels and some existing channels and vessels to determine acceptable ship sizes and vessel traffic controls such as no-passing and no-meeting zones. Analyze the trade-off between vessel operations and channel criterion with the participation of all stakeholders.
 - Support and conduct research on improved navigation system efficiency and safety, which can moderate the need for dredging. Prepare and publish current guidance on design of waterway approach channels, including channel width and depth for mixed deep and shallow-draft vessel traffic; waterway use and allocation conflicts; ice mitigation measures for navigable rivers; and control of icing at locks and dams.

Who Needs to Take the First Step?

This Report provides an overall framework and general direction for both public and private MTS stakeholders to follow to achieve the MTS vision in 2020. Federal Task Force members are encouraged to promote the report recommendations within the policy and budget processes of their Departments and agencies. Non-Federal stakeholders are encouraged to make these recommendations a priority within their operations.

The development of this report has been a collaborative public and private sector effort. Continued cooperation and coordination will be essential to achieving our shared MTS vision.

I.

Introduction

Throughout our history, America's ports and navigable waterways have been a key factor in this Nation's extraordinary growth and prosperity. Long before the railroads, long before the highways — and certainly long before air travel — navigable rivers and canals were America's first 'interstate transportation system.'

The U.S. marine transportation system (MTS) is a remarkable resource. More than 95 percent of all overseas products and materials, by volume, that enter or leave the country move through the Nation's ports and waterways. More than 2 billion metric tons of domestic and international commerce move on the water through all seasons. Further, the marine transportation system is not just a mover of freight. The waterways, ports, and intermodal connections also accommodate.⁽¹⁾

- *134 million passengers who annually travel by ferries;*
- *78 million Americans who participate in recreational boating each year;*
- *110,000 commercial fishing boats;*
- *military deployment operations; and*
- *natural resources and wildlife habitats.*

A myriad of Federal, State, and local government agencies and private sector companies are responsible for investing in and managing different parts of the MTS. Through a dynamic of competition and cooperation among the MTS users and service providers, the MTS continually adapts to the Nation's evolving transportation needs.

As this Nation moves into the 21st century, domestic and international marine trade is expected to more than double over the next 20 years. The MTS is a valuable resource that is critical to meeting this challenge. The creativity and innovation of the many MTS users and service providers, who compete and cooperate to meet the Nation's growing marine transportation needs, will forge the keys to success in this effort.

THE VALUE OF THE U.S. MARINE TRANSPORTATION SYSTEM

The United States is the world's most active trading nation, accounting for 1 billion metric tons or nearly 20 percent of the annual world oceanborne overseas trade. As international trade increases in the next two decades, the capacity of America's marine transportation system, including its infrastructure, must increase to remain competitive.⁽²⁾

Our lives and livelihoods depend on America's MTS to deliver everything, including energy, raw materials, food, and other consumer goods, to our doors — at competitive prices. The more than 300 United States public and private ports and 25,000 miles of waterways are gateways to domestic and international markets for our shipments of agricultural products, raw materials, and manufactured goods. The system encompasses a network of navigable channels, pipelines, publicly and privately owned vessels, marine terminals, intermodal connections, shipyards, vessel-repair facilities, and associated management and safety information systems. A talented, trained labor force maintains the marine transportation system.

The MTS also plays a vital role in national and global defense, even as it provides tens of millions of Americans directly and indirectly with employment and recreational pleasure. It also adds significant environmental value to the Nation as it includes and supports important natural resources and provides recreational opportunities. The MTS also plays a key role in State and local governments' economic development and job-creation efforts. Finally, the MTS provides the means by which private MTS service providers earn a profit.

Economic Value

America's oceans and navigable waterways have been and remain an essential component of this Nation's extraordinary growth and prosperity. They are vital links in the Nation's intermodal transportation system. Whether farmers or manufacturers move products in the domestic trade or overseas, or shoppers buy electronic equipment or running shoes, America's businesses depend on all-weather marine transportation to ensure that economical goods are available to U.S. citizens and to consumers around the world.

The MTS is a mainstay of our extraordinary economic growth and has enabled the United States to become the world's largest trading partner. However, many Americans are unaware of its important contributions to their lives and livelihood. For example:

- More than 95 percent of the overseas trade that comes in or out of this country moves by ship — that includes importing 9 million barrels of oil daily that help heat and power homes and businesses and fuel our vehicles.⁽³⁾
- United States ports and waterways handle more than 2 billion tons of both domestic and foreign commerce each year.⁽⁴⁾
- The waterborne cargo moving on the MTS contributes more than \$742 billion to the U.S. gross domestic product and creates employment for more than 13 million individuals.⁽⁵⁾
- Every State relies upon a national network of ports for its goods. On average, a State uses 13 to 15 ports, located throughout the country, to handle 95 percent of its import and export tons.⁽⁶⁾
- Americans spent \$19 billion in 1997 for new and used boats, accessories, and memberships in 8,000 yacht and boat clubs.
- The cruise passenger industry spent \$6.6 billion on goods and services in the United States in 1997, which generated 176,000 jobs. The total economic impact of cruise lines, passengers, and their suppliers was \$11.6 billion.
- In 1996, Americans spent \$18.1 billion on wildlife watching.
- Commercial and recreational fishing contribute more than \$111 billion to States' economies annually.

Issue: America's MTS must adapt to the changing demands of moving increasing quantities of goods and people. By the year 2020, U.S. overseas trade — approximately 95 percent of which is carried by marine transportation — is projected to more than double. No other system will be able to accommodate this growth.

National Security Value

Just as our Interstate Highway System was inaugurated in the 1950s to accommodate the swift mobilization of America's national defense, America's MTS plays a vital role in mobilizing and maintaining today's national security efforts. Whether it's Desert Storm or Operation Allied Force, America's fighting men and women depend on the marine transportation system to be their lifeline for equipment and supplies.

- 90 percent of all equipment and supplies for Desert Storm were shipped via our inland and coastal waterways from U.S. strategic ports.
- Virtually all waterborne cargoes, commercial and defense related, are intermodal in nature, which makes the vitality of our intermodal connections a significant national defense consideration.
- Commercial transportation assets decrease the cost and environmental impact of meeting military transportation requirements.

Issue: The United States fulfills its national security or global security missions through a safe and effective marine transportation system. Since the national military strategy has shifted from forward presence to force projection, security planners are placing increasing demands on marine transportation, particularly at strategic ports.

Environmental Value

Our valuable coastal and marine ecosystems in the MTS are important for commercial and recreational fishing, wildlife watching, and boating, as well as for drinking water. Therefore, it is critical that protection and enhancement of environmental quality be central to MTS activities. While public and private efforts need to be made to minimize the adverse environmental effects of MTS activities, marine transportation is an environmentally responsible method of transportation. Some important characteristics of the MTS are:

- Ships and barges have the fewest accidental spills or collisions of all forms of transportation. They routinely load and discharge millions of barrels of petroleum, tons of coal, grain, chemicals, and other essential products throughout the U.S., from Alaska to Maine.
- The MTS can provide environmentally sound transportation of people and goods, which can relieve congestion in other transportation modes, thereby reducing some negative environmental impacts, such as air pollution.
- America's waterways also transport people. Ferries increasingly provide an environmentally sound alternative to cars. The ferry systems in New York and Washington State, for example, are significant commuter links. In Puget Sound, ferries carry 23 million passengers each year; in Alaska, ferries are literally the *highways* to and from homes and businesses.

- Numerous port and waterway improvement projects, which include beneficial uses of dredged material, enhance the environment through beach nourishment, wetlands creation, and air quality mitigation. In addition, removal, treatment, and disposal of contaminated sediments from the waterways have significant environmental benefits. Many port areas also provide for public access to recreational opportunities on the waterfront and the MTS.

Issue: The health of America's precious ecosystems must be at the core of decisions affecting major investments in MTS infrastructure and operations.

Recreational Value

Americans also use the MTS for recreational and leisure purposes.

- About 78 million Americans participated in recreational boating in 1997, using 16 million boats of all types.
- Millions of Americans enjoy passenger vessels that provide sightseeing, excursion, dining, gaming, windjamming, whale watching, and nature cruises.

Issue: Americans value the MTS as a recreational resource. Shared access and use have a large impact on system operations and management.

The Challenge

Our Nation depends on its marine transportation system. It is a key element of our economic competitiveness, national security, environmental improvement, and recreation.

Secretary of Transportation Rodney Slater asked the Congressionally mandated Marine Transportation System Task Force to identify and address the issues affecting this system. The challenge is to find ways to harness the creativity and innovation of the diverse MTS users and service providers to ensure that the MTS adapts to meet the Nation's changing transportation needs. As stewards of this great system, we must work together to build a bridge to the future that ensures America's marine transportation system is technologically advanced, safe, secure, efficient, effective, accessible, globally competitive, dynamic, and environmentally responsible.



II.

The Marine Transportation System

This chapter describes the marine transportation system — its principal components, functions, and the support systems that it requires — and its service providers.

PRINCIPAL COMPONENTS

The MTS contains physical elements, including the waterways, ports, and the network of railroads, roadways, and pipelines that connect the waterborne portions of the system to the rest of the Nation. The physical elements also include the vessels and vehicles that move goods and people within the system. The physical network is supported by a series of systems that facilitate the movement of goods and people, and provide access for recreation and to natural resources.

The principal components of the U.S. marine transportation system are:

- **Waterways** include the navigable waters of the United States and associated infrastructure (for example, locks, bridges, aids to navigation) that vessel traffic uses;
- **Ports** contain marine transportation facilities where vessels transfer cargo and passengers, and include recreational access facilities and shipyards;

- **Intermodal connections** are linkages at the land-water boundary that allow the transfer of cargo and passengers between transportation modes. Intermodal connections include pipelines, road, and rail access routes;
- **Vessels and vehicles** are the transportation equipment that moves goods and people within the system and include oceangoing, coastal, and inland vessels, trains and trucks;
- **MTS users** are the people who depend on the system for their livelihood and recreational access.

Waterways

The waterways portion of the U.S. MTS consists of:

- Harbor channels;
- Inland and intracoastal waterways; and
- Locks and dams.

Harbor Channels: There are 926 Federal harbor channel projects (including both deep draft and shallow draft) that support the U.S. port system. In addition, non-Federal interests maintain and improve a network of channels, connecting channels and berths.

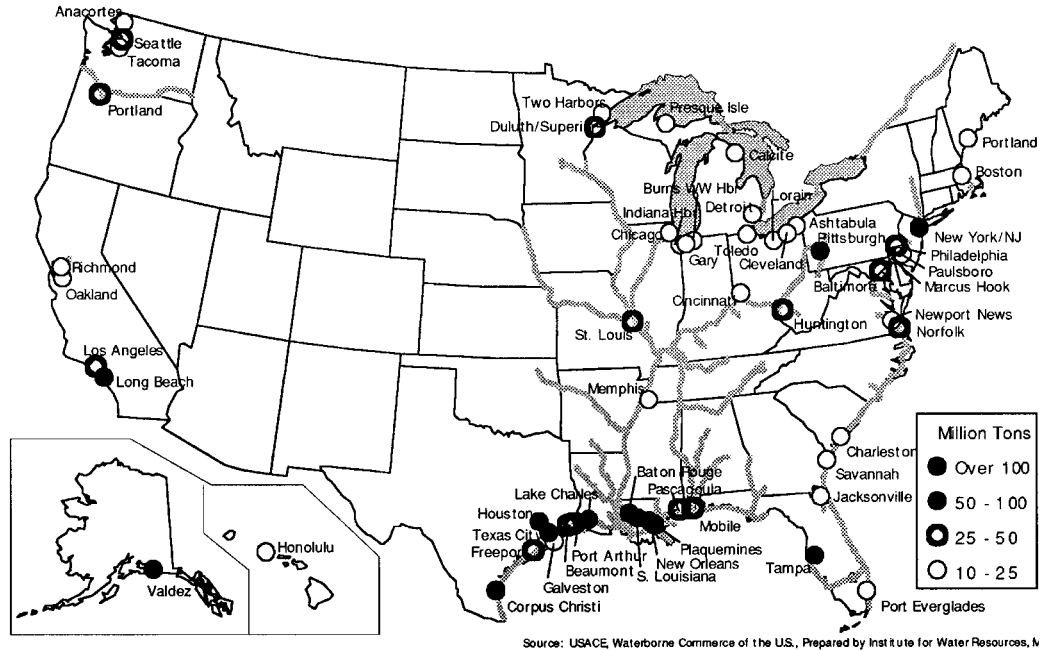
The U.S. deep-water port system includes more than 300 Federal harbor channel projects. There are 51 ports with depths greater than or equal to 40 feet. The 25 ports most active in foreign trade have depths of at least 40 feet.

Although some ports have natural deep water, most Federal harbor channels are deepened channels. Deepening projects may include breakwaters, seawalls, channel control structures, dredged material disposal sites, drift removal components, and other related features. There is no one-to-one relationship between ports and Federal channels. Some U.S. ports contain several Federal harbor channel projects with varying depths, while a few ports have no Federal channels. In addition, a single Federal harbor channel may provide access to more than one port.⁽⁷⁾

Inland and Intracoastal Waterways: There are about 25,000 miles of inland, intracoastal, and coastal waterways and channels in the United States. Of this total, nearly 12,000 miles of network constitute the commercially active inland and intracoastal waterway system. This network includes 10,867 miles of fuel-taxed inland waterway system. Fuel-taxed waterways comprise nearly all of the commercially significant inland and intracoastal waterways in the U.S.

The Mississippi River and its tributaries and the Gulf Intracoastal Waterway (GIWW) connect Gulf Coast ports with major inland ports. The controlling depth of 45 feet in the section of the Mississippi River from Baton Rouge to the Gulf of Mexico allows ocean shipping to connect with the barge traffic, thereby making this segment vital to both the domestic and foreign trade of the United States. On the Great Lakes, seven key waterways must be kept navigable during portions of average or severe winters when ice formation would otherwise restrict or prohibit ship movements. The U.S. Coast Guard (USCG) is tasked by Executive Order to conduct icebreaking operations in order to meet the reasonable demands of commerce to keep harbors and channels open for navigation during the winter months. During average or severe winters, domestic icebreaking allows shipping to continue for an additional 6 to 8 weeks — enabling 10 to 12 million tons to be shipped over ice-covered waters.

The Atlantic Intracoastal Waterway (AIWW) is a combination of protected coastal waterways and connecting canal segments that parallel the Atlantic Coast between Norfolk, Virginia, and

Figure II-1: *Location of Major U.S. Seaport Facilities.*

Jacksonville, Florida. Another section known as the Intracoastal Waterway continues from Jacksonville southward to Miami. A shallower, partially protected stretch of the Intracoastal Waterway that is not fuel taxed also extends along the Atlantic Ocean side of the Virginia portion of the Delmarva Peninsula and along the coast of New Jersey and Long Island, NY. The shallow-draft, fuel-taxed inland waterways of the Pacific Coast include the Columbia-Snake Waterway and the Willamette River above Portland, Oregon.

Locks and Dams: Lock and dam structures allow vessels to move up or down one level when traveling navigable waterways with different water levels. There are 192 commercially active lock sites, with 238 chambers in the Federal navigation system. Of these, 171 lock sites with 215 chambers are in segments designated as fuel-taxed waterways.

Lock and tow sizes are critical factors in the amount of cargo that can pass through a lock in a given period of time. Locks may vary in width and length based on their location (for example, in a major river or tributary) and their age (for example, by 2000, 44 percent of the chambers will be more than 50 years old).

Despite a number of relatively new lock chambers, there are significant signs of age within the system. Locks on any given waterway tend to be from the same era. Therefore, problems associated with aging locks on the waterways tend to affect many locks within the same segment at the same time.⁽⁸⁾

The Ports

In 1997, the U.S. port system handled more than 2 billion metric tons of foreign and domestic waterborne cargo. This cargo moved through 326 coastal, Great Lakes, and shallow-draft ports. Within the individual ports, cargo is transferred between water and landside transportation modes at publicly and privately owned marine terminals. Private ownership of inland waterway facilities is more pronounced than that of the coastal and Great Lakes facilities, with 87 percent privately owned, compared to 66 percent at the deep-water ports. The movement of waterborne commerce

Table II-1: *U.S. Ports Handling More Than 10 Million Tons in 1997.*

Coastal Region	Number of Terminals ⁷	Percent of Total	Number of Berths	Percent of Total
North Atlantic	421	22.0	761	24.1
South Atlantic ²	197	10.3	349	11.0
Gulf	484	25.3	786	24.9
South Pacific ³	223	11.6	414	13.1
North Pacific ⁴	249	13.0	365	11.6
Great Lakes	340	17.8	483	15.3
Total	1,914	100.0	3,158	100.0

Source: U.S. Department of Transportation, Maritime Administration, adapted from U.S. Army Corps of Engineers, Navigation Data Center.

Notes:

¹ Includes those commercial cargo handling facilities with a minimum depth alongside of 25 feet for coastal ports and 18 feet for Great Lakes ports.

² Includes Puerto Rico and the U.S. Virgin Islands

³ Includes Hawaii

⁴ Includes Alaska

through the U.S. port system is concentrated. For 1997, the top 50 ports — coastal and inland — handled 82 percent of the total waterborne trade. Even with this high degree of concentration, 148 ports — or 45 percent of all U.S. ports handling waterborne commerce — each handled more than 1 million metric tons of cargo. These figures reflect the broad base on which the U.S. port system is built, the large volume of waterborne trade, and the adaptability of ports to market forces. Figure II-1 (page 7) shows the U.S. ports handling more than 10 million tons in 1997. Major ports on the Atlantic and Pacific Coasts service container trades, while the major Gulf Coast ports are involved primarily in tanker and dry bulk trades. For cruise ships, Miami and San Juan were by far the largest U.S. ports of call.

Shipyards and repair facilities form an important part of the MTS infrastructure in which ships, barges, and vessels are designed, built, and repaired. The U.S. shipbuilding and repair industry is an aggregate of more than 280 privately owned facilities throughout the Nation's waterways and ports.

Passenger vessels are a growing consideration for ports. For example, the Port of Miami is the world's largest cruise port. In 1997, cruise lines called on over 30 ports in the U.S. More than 6,000 vessel calls were recorded at these ports.⁽⁹⁾

The two major types of port facilities are:

- Deep-draft seaport and Great Lakes port facilities; and
- Inland river and intracoastal waterways port facilities.

Deep-Draft Seaport and Great Lakes Port Facilities

Table II-1 shows the location of the major U.S. seaport facilities by coastal region. Twenty-eight States contain coastal or Great Lakes ports.

As shown in Table II-1, 1,914 terminals contain 3,158 berths. Berths are the locations where vessels dock. These figures include both privately and publicly owned facilities.

Table II-2: *Top 25 U.S. Ports and Their Number of Cargo Vessel Calls.*

PORT	TANKER		DRY BULK		CONTAINER		OTHER		TOTAL	
	CALLS	OOO DWT	CALLS	OOO DWT	CALLS	OOO DWT	CALLS	OOO DWT	CALLS	OOO DWT
Houston	3,450	132,185	807	33,273	515	16,558	2,031	25,798	6,803	207,814
New Orleans	1,660	94,621	3,337	150,999	399	10,071	1,366	20,802	6,762	276,493
Los Angeles	806	57,563	952	49,602	2,462	102,174	1,365	19,695	5,585	229,034
New York	1,219	62,216	485	21,148	2,150	77,153	1,270	21,848	5,124	182,365
San Francisco	773	55,922	361	12,497	1,643	67,874	382	7,575	3,159	143,868
Hampton Roads	198	8,398	841	66,802	1,488	53,026	571	11,249	3,098	139,475
Philadelphia	1,076	92,577	476	20,069	522	8,567	922	10,591	2,996	131,804
Port Everglades	338	13,820	83	2,734	734	11,981	1,807	12,706	2,962	41,241
San Juan(PRI)	155	4,980	83	2,620	671	12,266	1,993	13,762	2,902	33,628
Miami	10	321	26	1,073	607	15,193	1,946	12,673	2,589	29,260
Columbia River	203	10,022	1,303	46,872	259	9,634	456	10,133	2,221	76,661
Charleston	151	5,521	103	3,241	1,289	50,793	614	13,032	2,157	72,587
Baltimore	146	4,116	499	26,989	579	17,887	809	14,250	2,033	63,242
Jacksonville	195	7,632	217	6,504	497	11,426	680	8,761	1,589	34,323
St. Thomas	8	117	21	126	4	56	1,442	8,966	1,475	9,265
Corpus Christi	1,106	64,487	330	16,997	0	0	29	405	1,465	81,889
Texas City	1,209	63,088	122	5,669	1	18	23	242	1,355	69,017
Savannah	123	4,069	222	7,122	414	15,236	526	11,386	1,285	37,813
Seattle	32	1,611	203	9,824	755	33,856	276	5,898	1,266	51,189
Tacoma	82	3,168	307	13,441	526	17,943	338	5,616	1,253	40,168
Tampa	267	7,032	492	17,613	5	62	457	3,843	1,221	28,550
Mobile	137	7,059	465	25,468	0	0	560	10,193	1,162	42,720
Beaumont	816	53,279	151	7,019	1	41	46	990	1,014	61,329
Honolulu	165	9,180	93	4,504	448	12,002	201	2,815	907	28,501
Lake Charles	538	34,817	135	5,729	0	0	177	1,963	850	42,509
Top 25	14,863	797,801	12,114	557,935	15,969	543,817	20,287	255,192	63,233	2,154,74
All Ports	20,584	1,270,89	14,481	645,945	16,930	568,868	25,858	315,205	77,853	2,800,91
Top 25 Percent	72.2	62.8	83.7	86.4	94.3	95.6	78.5	81	81.2	76.9

**Excludes calls by non-self-propelled vessels under 1,000 Gross Tons.*

Source: Lloyd's Maritime Information Services, Vessel Movements, London: Lloyd's of London Press, February 1998.

Note: The Lloyd's port scheme often combines several ports. For example, Long Beach is included in the Los Angeles figures, and Oakland is considered in the San Francisco data.

Berths can be specialized to serve specific types of freight and passenger movements. For example, berths may be designed to handle containerized cargo, dry and liquid bulk cargo, automobiles and other cargo that can roll-on/roll-off vessels, and general cargo. Passenger berths may handle ferries or large cruise vessels.

Table II-2 shows the top 25 deep-draft U.S. ports and their number of cargo vessel calls.

Table II-3: *U.S. Shallow-Draft Terminal Facilities by State.*

STATE	NUMBER OF TERMINALS	GENERAL CARGO	NUMBER AND TYPE OF FACILITIES							MULTI-PURPOSE
			DRY BULK CARGO				LIQUID BULK CARGO			
			GRAIN	COAL	ORE	OTHER	PETROL	LPG	OTHER	
Alabama	137	8	16	21	-	41	21	-	15	15
Arkansas	84	2	26	-	-	24	7	-	6	19
Illinois	267	6	64	18	1	70	37	-	42	29
Indiana	60	2	8	14	1	16	9	-	2	8
Iowa	75	-	16	9	-	17	8	-	11	14
Kansas	8	-	4	-	-	1	-	-	2	1
Kentucky	175	3	13	48	-	49	32	1	15	14
Louisiana	66	1	8	2	-	12	19	1	14	9
Minnesota	55	1	10	-	-	20	8	-	7	9
Mississippi	69	1	16	-	-	13	16	1	6	16
Missouri	133	2	22	6	-	59	14	-	18	12
Nebraska	17	1	7	-	-	4	-	-	4	1
Ohio	132	6	7	21	2	43	23	-	19	11
Oklahoma	27	3	5	-	-	9	4	-	2	4
Pennsylvania	145	9	-	41	2	49	18	-	18	8
Tennessee	129	6	21	7	1	47	23	-	12	12
West Virginia	149	9	-	47	1	52	21	1	15	3
Wisconsin	20	1	1	4	-	7	3	-	2	2
Mississippi System										
Subtotal	1,748	61	244	238	8	533	263	4	210	187
Idaho	4	1	2	-	-	1	-	-	--	-
Oregon	24	3	7	-	-	12	-	-	1	1
Washington	36	5	18	-	-	5	2	-	4	2
Columbia/Snake										
Subtotal	64	9	27	-	-	18	2	-	5	3
Total	1,812	70	271	238	8	551	265	4	215	190

Source: U.S. Department of Transportation, Maritime Administration, adapted from U.S. Army Corps of Engineers, Navigation Data Center.

Inland River and Intracoastal Waterways Port Facilities

There are more than 1,800 river terminals located in 21 States. The U.S. inland waterway ports and terminals have unique characteristics that distinguish them from the deep-water ports on the Nation’s coasts and Great Lakes seaports. Aside from shallow water depths of 14 feet or less, the inland system is less concentrated geographically and provides almost limitless access points to the waterways.

Overall, there are more inland facilities located outside traditional port boundaries than within. Terminal siting on the inland waterways is less constrained than coastal ports, which provides greater flexibility to the users in determining the location of plants requiring water access.

Table II-3 (page 10) profiles by State the terminal facilities located on the U.S. inland waterway system.

Dry bulk facilities account for 59 percent of inland terminals. Grain and coal terminals are the leading types within dry bulk. Liquid bulk terminals are the second largest category comprising 27 percent. Within this category, petroleum facilities account for more than half. Multipurpose and general cargo terminals account for the balance of the terminals.

Intermodal Connections

Waterways, ports, and terminals are only part of the MTS. The system also includes inland rail, roadway, and pipeline connections that permit cargo and passengers to reach the marine facilities. In general, these intermodal connectors are almost exclusively built and maintained by the private sector, for example, by Class I railroads and pipelines, or by States through State-funded local roads or user fee-supported Federal highways. The importance of intermodal connections was recognized in the National Highway System (NHS) Designation Act of 1995. This Act directed the Secretary of Transportation, not later than 180 days after the date of the enactment, to submit for approval to Congress modifications to the National Highway System that consist of connectors to major ports, airports, international border crossings, public transportation and transit facilities, interstate bus terminals, and rail and other intermodal transportation facilities. These modifications were in addition to connectors approved in the Designation Act of 1995.

In May 1996, the Secretary submitted to Congress for approval the modifications to the NHS in the report titled *Pulling Together: The National Highway System and Its Connections to Major Intermodal Terminals*. As a result, connections to 1,407 terminals have been identified. The report cites connections to 519 freight terminals, including 247 ports and terminals, 211 rail terminals, and 61 pipelines. Of the identified 907 passenger terminals, there are connections to 59 ferry terminals and 42 multimodal (more than one nonhighway mode) facilities. Approval of the connections by Congress is still pending, however, on an interim basis, improvements to connectors are eligible for NHS funds.

The Transportation Equity Act for the 21st Century (TEA-21), enacted June 1998, directed the Federal Highway Administration (FHWA) to conduct a freight study to evaluate NHS connections to terminals and their related investments. The purpose of the NHS Connector Condition and Investment Study is to characterize the nature and extent of physical and operational problems on freight connectors and investments made on them. This effort will result in a Report to Congress, scheduled to be submitted by September 30, 1999.

The Nation's public port authorities have recognized the need to improve the intermodal movement of cargo. Several ports, often with their local Metropolitan Planning Organizations (MPOs), have built or are planning intermodal projects. In most cases, these projects are outside the port's boundary and require extensive coordination and partnering. The largest such project, the Alameda Corridor (serving the Ports of Los Angeles and Long Beach), will cost more than \$2 billion.

Vessels and Vehicles

Vessels and vehicles move goods and people throughout the U.S. MTS. The U.S. domestic fleet includes more than 30,000 vessels that transport goods and people between U.S. ports.

As of January 1, 1999, the domestic fleet includes:⁽¹⁰⁾

- Domestic coastal and oceangoing vessels including 55 container ships, 104 tankers, 982 dry cargo barges, and 456 tank barges;
- An inland-barge fleet consisting of 22,279 dry cargo barges and 2,791 tank barges;
- 5,424 tugs and towing vessels that move coastal and inland barges and provide shipdocking, vessel escort, lightering, and other services;
- The Great Lakes system consisting of a fleet of 56 dry bulk carriers, 8 cement carriers, 3 tankers, and an additional 101 dry cargo barges and 41 tank barges; and
- Hundreds of passenger vessels that serve as ferries, excursion vessels, and gaming vessels.

In addition, the MTS is served by an international fleet that transports goods and people among U.S. and foreign ports. The international fleet consists of a wide variety of vessel types such as tankers, dry bulk carriers, containerships, roll-on/roll-off ships, and cruise ships. In 1997, 7,520 vessels (27 percent of the world merchant fleet) called at U.S. ports. In terms of capacity, these ships represented 44 percent of the world's merchant fleet.

The intermodal component of the MTS also relies on an inland freight rail system, which consists of nearly 1.3 million freight cars, 20,000 locomotives, 152,000 miles of railroad, and 200,000 employees. From double-stack trains, which transport containers stacked two high, to hopper or tank cars carrying bulk cargo, U.S. railroads provide a full range of equipment to accommodate inland movement of waterborne cargo.

In addition to the railroads, nearly 5 million trucks operate in the U.S. While many of these vehicles move domestic cargo, a significant number are involved in a variety of port-related activities, including moving cargo between the port and rail yards and transporting international cargo both long and short distances to customers.

MTS Users

The MTS transports people to work, provides them with recreation and vacation opportunities, puts food on their tables, and brings them many of the items they need in their professional and personal lives. The MTS also provides American businesses with access to suppliers and markets around the world. Within the U.S., the MTS provides a cost-effective means for moving major commodities. Further, the MTS is an essential element in maintaining national security.

The MTS serves an extensive range of users, including commercial, recreational, and defense-related activities. For example, in the movement of freight alone, the MTS users include:

- Companies that need to ship or receive freight by water, including manufacturers, retailers, agricultural concerns, petroleum companies, utilities, and mining operations;
- Companies that arrange and physically move the freight to, from, and across the water, including ship operators, trucking firms, railroads, third-party logistics operations, freight forwarders, consolidators, customhouse brokers, and others;

The U.S. Marine Transportation System users include:

- Carriers and cargo owners of the more than 2 billion tons of domestic and international freight pass through the system annually.
- 134 million passengers who travel each year by ferry.
- 78 million Americans who use the system for recreational boating annually.
- Annually more than 5 million cruise ship passengers.
- Commercial fishers operate 110,000 boats that contribute \$111 billion to the U.S. economy.
- Shipyards and repair facilities.

- Public and private organizations that support the movement of the waterborne cargo, including terminal operators, shipyards, pilots, and tugboat operators;
- Governmental agencies that inspect waterborne cargo and vessels, along with supporting maritime operations and commerce;
- Firms that provide the information, telecommunications, financial, and insurance services needed to facilitate the movement of waterborne cargo; and
- Governmental agencies that protect U.S. citizens, critical infrastructure, national interests, and environmental quality.

MTS FUNCTIONS

The marine transportation system serves five functions:

- Provides a global gateway to world markets and for military mobilization;
- Provides domestic transportation of goods and passengers;
- Supports recreational uses;
- Supports other commercial uses; and
- Supports local economic development and creates jobs.

Global Gateway

Three sets of users rely on the MTS as a global gateway:

- Cargo operations;
- Passenger operations; and
- National defense and mobilization.

Each user places different demands on the U.S. marine transportation system.

Cargo Operations: The U.S. annually imports and exports more than 1 billion tons of freight through its ports and waterways. The billion tons of cargo move in a wide range of vessel types, extending from barges to *mega-ships* capable of carrying more than 6,000 20-foot containers (projected to reach 15,000). The increase in vessel size in maritime transportation is, in general, a direct result of the significant increase in the trade volumes, current and projected. Additionally, economic and competitive forces will decrease transportation costs per unit volume, as well as increase reliability for shippers.

- Container vessels account for 121 million metric tons.⁽¹¹⁾
- Roll-on/roll-off vessels are used for military mobilization, as well as to carry vehicles.
- Bulk vessels, which carry commodities such as petroleum, coal, and grain, account for 532 million metric tons.
- Breakbulk vessels (for such commodities as steel and lumber) account for 414 million metric tons.
 - *Container vessels* represent a growing portion of the vessels calling on U.S. ports. These vessels generally carry higher value cargo and serve a range of users. Container ships

carry 66 percent of the value of U.S. waterborne overseas trade and represent 11 percent of the annual tonnage. Container operations require large acreage facilities and specialized cranes.⁽¹²⁾

Carriers have also deployed increasingly larger container vessels. These larger vessels provide significant economies of scale and are consolidating their activities at designated hub ports on primary trade lanes. The new class of container vessels, called mega-ships, is included in the "Post Panamax" category of vessels, which means that they exceed the size of the locks in the Panama Canal. The mega-ships are deployed on the longest trade routes of Europe-to-Asia and U.S. West Coast-to-U.S. East Coast via the Suez Canal. The growth in the containership industry and vessel size is driving many of the harbor improvement projects in the United States. To accommodate these ships, ports need to provide channel depths of at least 50 feet, cranes that can fully extend over their width, highly efficient terminals, and superior inland connections.

- *Bulk vessels* carry commodities such as petroleum, chemicals, minerals, and grain. Bulk facilities can be quite diverse and are designed to meet the requirements of specific commodity movements. Bulk vessel movements account for a considerable portion of trade at U.S. ports. The largest vessels in the world (with a draft more than 85 feet) are crude oil tankers that generally do not call at U.S. ports.
- *Breakbulk vessels* transport a wide variety of general merchandise cargo. This cargo is carried in a variety of ways, including palletized, baled, or boxed. These vessels are capable of serving a broad range of ports and terminals because they often have equipment onboard for the loading and unloading of cargo.

Passenger Operations: In addition to freight operations, the U.S. MTS acts as a global gateway for business and leisure travelers. According to the Cruise Lines International Association, nearly 5.5 million North American vacationers took a cruise in 1998. Passenger terminals, similar to airports, require more detailed security measures and streamlined processing. These vessels range in capacity to more than 5,000 passengers and crew. The vast majority of the passenger vessels serving U.S. markets are built in foreign shipyards, registered under foreign flags, and crewed with foreign nationals.

National Defense and Mobilization: The United States remains committed to a policy of engagement abroad to promote peace, prosperity, and democracy. Because the overwhelming majority of material to sustain overseas operations needs to move by sea, the logistical backbone for the all-season rapid loading and transport of American forces and material relies ultimately upon the marine transportation system.

The Department of Defense (DOD) spends more than \$2 billion annually on commercial freight services, increasingly emphasizing the use of intermodal freight movement.⁽¹³⁾ DOD relies on commercial transportation providers for 90 percent of its peacetime freight and personnel movements and an estimated 95 percent of its wartime movements. The availability of U.S.-flagged vessels is essential to this effort. One key element of maintaining this capability is the U.S. cabotage laws. Commercial shipyards provide critical infrastructure needed to build new military and commercial sealift vessels, as well as maintain and repair the U.S. fleet of vessels needed to support national defense and mobilization efforts.

National defense and mobilization also increasingly depend upon domestically based operations, especially with the closure of so many overseas bases during the last decade. More than 3 million tons of military equipment and supplies were loaded at U.S. commercial ports for shipment to the Persian Gulf during Operation Desert Shield/Storm. Concurrent with the greater

dependence on commercial ports is the use of larger, deeper draft vessels designed for specific cargo types. These vessels rely on technically sophisticated, highly specialized shoreside facilities and their intermodal connections, as well as shipyard repair facilities.

The National Port Readiness Network promotes the readiness of three continental U.S. military and 13 commercial strategic seaports to support deployment of military surge and sustainment cargo. These ports and waterways must continue to provide the critical infrastructure and services needed to ensure rapid, secure, and effective military mobilization. These strategic resources include deep-draft harbor channels, modern port facilities, and an extensive network of intermodal links. Under its Railroads and Highways for National Defense program, DOD, with the support of the Department of Transportation (DOT), ensures the Nation's rail and highway infrastructure can support defense emergencies. The Strategic Rail Corridor Network (STRACNET) consists of 38,800 miles of rail lines important to national defense and provides service to 193 defense installations whose mission requires rail service. The Strategic Highway Network (STRAHNET) consists of 61,000 miles of highways defining DOD's public highway needs. An additional 2,000 miles of STRAHNET connectors link important military installations and ports to STRAHNET. These highways define the total minimum public highway network required to support defense emergencies.

Domestic Movement

The MTS also moves a substantial amount of cargo within the U.S., and is becoming an increasingly popular method of commuting to work. More than 1 billion metric tons of domestic freight moves through the marine transportation system, which is equal to the amount of cargo imported and exported by the MTS.

Domestic Freight Movement: In 1997, carriers serving this market segment moved:

- 239 million tons of freight between U.S. ports on the deep seas;
- 572 million tons on the inland waterways; and
- 111 million tons on the Great Lakes.

The 1997 tonnage was 70 percent greater than the level of traffic in 1965, and 18 percent greater than the level of traffic recorded in 1980. Most of the 1997 traffic was composed of liquid and dry bulk commodities such as petroleum and petroleum products, coal, grain and other farm products, sand, gravel and other nonmetallic minerals, industrial and agricultural chemicals, forest products, and metallic ores and products. The number of ton-miles increased by 67 billion (29 percent) to 294 billion ton-miles over the 1980-97 period.

The domestic deep-sea (coastwise) traffic in 1997 was 239 million metric tons, 20 percent below the record total in 1980. The main commodities shipped were:

- Petroleum (72 percent); and
- Coal (9 percent).

Barges carried 86 percent of cargoes moved less than 500 miles, while self-propelled vessels carried 91 percent of the metric tons moved in trades greater than 2,000 miles. The capacity of the dry cargo vessel fleet is expected to remain at its 1997 level through 2002, reflecting limited growth in U.S. noncontiguous trades.

In 1997, barges moved 96 percent of the 572 million metric tons that moved on the inland waterways. Waterway traffic grew by 18 percent from 1980 to 1997. Total inland barge capacity

increased by 6.2 percent in 1995-1996 — the largest annual increase in capacity since 1980-1981. The primary commodities moved by barge were: coal (28 percent), petroleum (25 percent), crude materials (19 percent), and farm products (13 percent).

In 1997, 111 million metric tons of domestic cargo moved on the Great Lakes, 7 percent above 1980 traffic.⁽¹⁴⁾ More than 90 percent of the overall trade is moved in dry bulk ships, and this traffic is expected to remain at the 111 million ton level annually over the next 5 years. The major commodities moved via the Great Lakes were: iron ore (49 percent), limestone (24 percent), and coal and coke (19 percent).

Passenger Movement: Ferries in the United States provide critical links in the U.S. highway, transit, and freight network, as well as the national intermodal network. As highway links, transit providers, and floating high-occupancy-vehicle lanes, ferries transport commuters, recreational travelers, and vehicles of all sizes, from bicycles to freight trains. According to a national ferry database, 35 States have ferry systems. Service is provided by 168 entities (72 public/96 private) on 264 routes. Of the 264 individual ferry routes, approximately 112 are lifeline routes, linking mainland ports with island communities. Annually, ferries carry an estimated 134 million Americans and tens of millions of vehicles, thereby relieving congestion on other surface transportation modes. For example, the Washington State Ferry System carries more people annually than Amtrak. A number of ferries are designated as part of the NHS. Congress has recognized this trend in ferry growth and that transportation planners need more accurate and complete data about this growing sector of the MTS. Section 1207(c) of TEA-21 required the compilation of information on existing ferry operations and forecasts about new routes and technologies for ferry vessels.

Hundreds of American companies operate passenger vessels that provide sightseeing, excursion, dining, gaming, windjamming, whale watching, and nature cruises.

Recreation

Boating is a major source of outdoor recreation for millions of Americans. The National Marine Manufacturers Association estimates that more than 78 million Americans participated in recreational boating in 1997. That same year, Americans:

- Used 16 million boats of all types.
- Spent \$19 billion for boats, accessories, and memberships in 8,000 associations.

Reasonably easy access to the waters is essential for their full enjoyment. The majority of recreational boats are transported to the water by trailer. Access from the roadways to boat launching ramps and marinas is an important consideration for boaters. The MTS also provides recreational opportunities to a vast array of others, including swimmers, bird watchers, and fishermen. Sufficient access for those uses is necessary. However, recreational boating safety is a critical issue.

Other Commercial Use

Commercial users of the MTS include the fishing industry and shipbuilding and repair.

Fishing: Americans operate 110,000 commercial fishing vessels, which contribute \$20 billion in product value to the U.S. economy and provide an important food source for the American population.

Table II-4: *Major U.S. Shipbuilding and Repair Base as of October 1998.*

	EAST COAST	GULF COAST	WEST COAST	GREAT LAKES	NON- CONTIGUOUS*	TOTAL BY TYPE
Shipbuilding	5	8	3	3	0	19
Repair w/ Drydock	13	8	7	2	3	33
Topside Repair	10	19	8	2	1	40
Total (By Coast)	28	35	18	7	4	92

*Alaska, Hawaii, Puerto Rico, and the Virgin Islands

Source: U.S. Department of Transportation, Maritime Administration, Office of Ship Construction.

Shipbuilding and Repair: Shipbuilding is an important industry in the United States and around the world. Table II-4 shows the coastal location of major U.S. shipbuilding and repair yards. U.S. shipbuilding and repair, a key element for national security, is dominated by two main components:

- Military market and
- Commercial market for deep- and shallow-draft vessels, including recreational vessels.

The United States shipbuilding industry has made progress in its reemergence as an active participant in the commercial shipbuilding market. The National Shipbuilding and Conversion Act of 1993 and the expanded Title XI Federal Ship Financing Program provide one of the primary stimuli for this evolution of the U.S. shipbuilding industry and its ability to aggressively enter and compete in the market. As of May 1999, the U.S. Maritime Administration (MARAD) had applications for 17 projects pending, including three shipyard modernization projects — as well as projects for tankers, ferries, various offshore vessels, barges, and tug/supply vessels — for an estimated cost of \$1.3 billion, with Title XI guarantees totaling \$1.1 billion. These pending applications may not all be approved and may not be approved in the short term. Those with a longer lead time do not reflect near-term demand.

The U.S. orderbook, as of May 1, 1999, consisted of one tanker, three crude carriers, and two cruise ships. During 1998 and the first quarter of 1999, U.S. shipyards delivered six commercial oceangoing ships, two nonoceangoing ferries, one oceangoing ferry, and scores of smaller vessels.

The U.S. Navy's (USN's) proposed Fiscal Year 1999-2004 shipbuilding program will average 7.5 new ships a year, compared to 5.8 new ships per year in the FY 1998-2003 shipbuilding program, and 10 new ships per year in the 1992 to 1997 shipbuilding program.

The U.S. government and the shipbuilding industry have made great strides in their efforts toward industry revitalization and market transformation. The small or mid-sized shipyards continue to build an assortment of vessels for use on the inland and coastal waterways, as well as for foreign markets. The major change has been the surge in activity relating to the offshore exploration, drilling, and servicing sectors. These shipyards are expected to continue to prosper for the next decade.

The benchmark used to track the U.S. shipbuilding industry is the U.S. Major Shipbuilding Base (MSB). The MSB is defined as those privately owned shipyards that are open and have at least one shipbuilding position consisting of an inclined way, a launching platform, or a building basin capable of accommodating a vessel 400 feet or more in length. With few exceptions, these

shipbuilding facilities are also major repair facilities with drydocking capability. As of January 1, 1999, there were 19 major shipbuilding facilities in the United States.

Employment in the U.S. shipbuilding and repair industry, as of December 1998, was 100,300, up 1,700 from 1997. The MSB shipyards employ about 60 percent of the total work force of the shipbuilding and ship repair industry. The remaining 40 percent were in the 550 smaller establishments with 10 or more employees. In addition, as of October 1998, 14,473 people were employed in the four USN and one USCG shipyards.

Offshore Oil and Gas Exploration: There are more than 4,000 offshore facilities in place to support mineral development under Federal jurisdiction. These facilities have a critical impact on MTS safety and waterway navigation. Almost \$3.5 billion per year, on average, is collected and distributed by the Federal government from bonuses, rents, and royalties from offshore (outer continental shelf) mineral leases. This effort provides about \$2.5 billion annually to Federal and State treasuries, \$900 million per year to the Land and Water Conservation Fund, and \$150 million to the National Historic Preservation fund.

SUPPORT SYSTEMS

Two systems support the U.S. MTS:

- ***Information systems*** are communication and information systems that collect, store, retrieve, analyze, and disseminate information required by all MTS stakeholders and users; and
- ***Management systems*** are the multiple and diverse systems that currently exist to direct and manage the MTS.

Information Systems

Information technology is transforming the MTS and the intermodal freight industry by enabling it to integrate operations across the supply chain. In addition, navigational aids are crucial to the safe and efficient operation of the marine transportation system.

Intelligent Transportation Systems

Advanced communication and information systems and intelligent transportation systems (ITS) provide real-time information on intermodal freight operations and congestion on the physical transportation system. Sharing information about congestion and operations across intermodal freight systems is critical to increasing capacity and improving reliability. Some examples of the existing private and public sector information systems with ITS applications include:

- Shipment Information Systems that manage the flow of materials and products from source to user include shipping, booking, and gate clearance systems.
- Security Systems monitor the condition of vehicles, containers, and goods during shipment or in storage at terminals.
- Customs Clearance Systems automate filing, processing, review, and issuance of documents for import and export of goods.
- Ship Stowage Management Systems plan and track the location of containers aboard ships.
- Asset Location and Management Systems locate and track vehicles or containers.

Navigation Systems

Navigation systems are key to safe operations within the MTS. Vessels, both large and small, rely upon existing public and private navigation systems to transit the Nation's waterways and ports. These vessels, possibly carrying large numbers of passengers or environmentally harmful cargoes, have the potential to cause significant accidental injury and damage.

The National Oceanic and Atmospheric Administration (NOAA), USCG, U.S. Army Corps of Engineers (USACE), and the National Imagery and Mapping Agency (NIMA) cooperate to provide navigation warnings information to mariners. These are used to update nautical charts and publications issued by NOAA and NIMA. The USCG issues the Local Notices to Mariners, the USACE issues Notices to Navigation Interests, and NIMA issues worldwide Notices to Mariners, including U.S. notices of interest to international shipping. U.S. notices must be coordinated with the national charting authority, NOAA, and with other information providers such as the port authorities. Notices to Mariners are currently issued in paper form and communicated through broadcasts. However, NOAA, USCG, USACE, and NIMA are considering or are using Internet-based systems for both Notices and nautical chart updates.

Short-range aids to navigation help mariners operate safely and efficiently. Used in conjunction with nautical charts, these aids to navigation provide mariners with visual directions that guide them away from dangers by marking channels, shoals, and hazards, and help them to avoid groundings, obstructions to navigation, and collisions with other vessels.

Among the many factors considered when establishing aids to navigation are depth of water, bottom composition, tides and currents, width of the waterway, and size and types of vessels (naval, commercial, recreational) using a waterway. Additionally, the requirements of all mariners using a waterway are considered when establishing aids to navigation. The USCG maintains approximately 50,000 Federal aids to navigation and oversees an additional 50,000 private aids to navigation. Many of the 50,000 Federal aids mark channels to and from commercial or military ports used by deep-draft vessels. However, the largest percentage of aids is located in shallow waters frequented primarily by shallow-draft commercial operators and recreational boaters.

Navigation methods and techniques vary with the type of vessel, the conditions of the waterway, and the navigator's experience. Navigating a pleasure craft, for example, differs from navigating a container ship or supertanker; and both differ from navigating a naval vessel. As such, these mariners have different requirements for navigation information and use the available aids in different ways. To determine the optimal mix of aids to navigation, the USCG conducts a study that includes evaluating the characteristics of the waterway user and the expressed user needs for aids to navigation. To minimize duplication, the needs of the entire spectrum of users are simultaneously analyzed. This analysis considers the varying needs of the international shipping community, coast-wise trade, inland waterway trade, intra-harbor traffic (tugs, ferries, small commercial craft, etc.), fishing vessels, recreational boats, special operations craft (survey, oceanographic, search and rescue, etc.), vessels of very large size, and high-speed vessels (hydrofoils, air cushion vehicles, etc.). Also considered are the number of vessels, tonnage of vessels, value of the cargo, and the nature of the cargo visiting the area, along with the benefits (economic, safety, and convenience) to the mariner.

Mariners require real-time access to integrated hydrographic services, including bathymetry, shoreline, detailed large-scale digital vector charts, precise positioning information, and real-time and predicted oceanographic and meteorological data. This integrated information data suite is essential to providing the mariner with a three-dimensional view of the significant hazards to navigation. Accurate bathymetric information implies recent acquisition of full bottom surveys. Accurate shoreline information implies recent data from aerial surveys or satellite remote sensing.

Detailed large-scale digital vector charts, coupled with precise positioning, enable precision docking and undocking and waterway transit.

Real-time and predicted information provide the reliable safety margins and competitive advantage necessary to conduct modern just-in-time (JIT) intermodal commerce. In the event of hazardous materials accidents, they facilitate accurate containment, cleanup, and restoration response. The nautical chart, whether paper or electronic, is the background on which this information suite is integrated and displayed. A chart update service will refresh this most fundamental tool of safe navigation on a weekly basis. These navigational system components and their integration are offered through various programs supported by the Hydrographic Services Act of 1998. One such element is NOAA's Physical Oceanographic Real-Time System (PORTS), which provides real-time tide and current information. Positioning technologies are centered on the Differential Global Positioning System (DGPS).

A Vessel Traffic Service (VTS) promotes the safe and orderly flow of traffic through a port or waterway. The USCG operates nine VTSs. In the Port of Los Angeles-Long Beach, a tenth VTS is operated jointly by the USCG and the local Marine Exchange. The USACE operates a VTS in the Cape Cod Canal. Port authorities and pilots' associations operate VTS advisory services in Tampa Bay and Delaware River. VTSs increase safety and efficiency by providing navigational information, traffic organization, and navigation assistance services. Ninety-nine percent of all communication between the VTS and participating vessels is information in nature.

Management Systems

These systems involve managing the marine transportation system, as well as funding the operations, maintenance, research, and new investment in the MTS.

MTS Management

A variety of public and private sector organizations at the national, regional, and local levels currently manage the MTS. These organizations serve users, operators, managers, and regulators, as well as plan, conduct research, invest, operate, and maintain the Nation's waterways, ports, and intermodal connections.

Different organizations may be responsible for different geographic areas, users, or parts of the MTS. They may have different priorities, requirements, and procedures. Coordinating the MTS, along with the role of the MTS in the total transportation system, is complex and not always clear. For example, there is little coordination of the few MTS research efforts.

Funding

Funding in the MTS is a difficult subject to break down. Local, State, and Federal government agencies and the private sector concerns all share fiscal responsibilities within the system. The Standing Committee on Water Transportation of the American Association of State Highway and Transportation Officials (AASHTO) compiled and published *Marine Transportation Funding and Responsibilities* (December 1998). This report provides an overview of MTS funding issues and mechanisms. The introduction to this report captures the essence of the complexity of MTS funding:

“Waterborne transportation historically has influenced development patterns in the United States, and continues to be extremely important to our present and future economic vitality. The marine system is very complex and includes an extensive infrastructure of waterways and harbors, port facilities, and connections to the nation's highways, railroads, and pipelines.

“There is great diversity among the various water transport systems in terms of their size, geographical service areas, and type of governance. While most of the actual transportation of marine cargo and passengers is conducted by private sector companies and vessels, many public agencies and organizations at the international, Federal, State, and local levels are involved in developing, operating, promoting, and regulating the marine system. Governmental involvement becomes increasingly complex as the size of the governing entity increases. Indeed, at the federal level there are numerous agencies with responsibility, oversight, and powers of funding for marine projects.”

As this quote illustrates, the U.S. MTS is highly decentralized and investment decisions are made by many users and service providers, both public and private, often in partnerships that are intended to take advantage of competitive opportunities in the marketplace. However, overlying this complex investment environment is a general framework, established in the U.S. Constitution and through long-standing practice, that rests responsibility for the development and operation of landside infrastructure with State and local governments and the private sector. Responsibility for construction and maintenance of common waterways rests with the Federal government while responsibility for private channels, approaches, and berths rest with non-Federal stakeholders.

The Maritime Administration’s U.S. Port Development Expenditure Reports include past and projected capital expenditures by inland and deep-draft ports and discussion of their funding sources. These reports provide a more detailed discussion of the funding mechanisms within the MTS. Other public agencies, private terminal operators, and vessel owners in the MTS infrastructure make additional significant, but unquantified, investments. Highlights of MTS-related funding are:

Waterside

- **Federal Channels and Harbors** — Since 1986, Federal funding has been provided on a cost-share basis with other stakeholders for harbor improvements (channel deepening). The amount of cost-share is a function of channel depths and dredged material disposal costs. The Harbor Maintenance Trust Fund (HMTF) is used to provide Federal funding for maintenance dredging. A fee on passengers and cargo loaded or unloaded in U.S. ports supports the HMTF. In March 1998, the Supreme Court ruled that the fee on exports was unconstitutional. The Administration has proposed a replacement fee called the Harbor Services User Fee. In May 1999, the Administration introduced legislation, the Harbor Services Fund Act of 1999 (H.R. 1947), that would replace the existing fee and address the issues raised in the court decision. The new fee, which is based on the vessel’s volumetric carrying capacity, is intended to pay for the USACE annual cost of developing, operating, and maintaining the Nation’s harbor channels. The proposed fee would be assessed on ship owners and be based on the type of ship (general cargo, tanker, bulk, and cruise ships) and the level of services required by that type of ship. Estimates are that the fee would generate approximately \$1 billion annually for Federal channels. While many non-Federal MTS stakeholders recognize the benefits they receive from Federal harbor improvements, they feel that the benefits accrue to a wide spectrum of MTS users and to broader national concerns such as national defense and our overall economic well-being. For these reasons, they believe that general revenues are the appropriate funding source. However, the highway and aviation systems, which share these characteristics, are supported by user fees. The Administration believes that waterways improvements should — much like highway, transit, and airport improvements — be financed by the users who benefit from those improvements.
- **Federal Inland Waterways System** — The Federal government uses general revenues to fund maintenance costs for the inland waterways. Two sources fund most new construction costs: 50 percent from Federal general revenues and 50 percent from the Inland Waterways Trust Fund, which is supported via a fuel tax levied on system users. Continuing construction projects initiated prior to fiscal year 1986 are funded from Federal general revenues.

- **Non-Federal Navigation Channels** — These channels are generally approaches to marine terminals, berths, marinas, and private moorings that connect to deep-draft channels. They are constructed and maintained by non-Federal organizations but require similar permits and approvals as required for Federal dredging projects.
- **Navigational Aids** — Federal public funds provide a broad range of navigation-related support including buoys, lights, vessel traffic services, fog signals, and publications such as the *Coast Pilot*, *Light Lists*, and *Notice to Mariners*. Historically, these activities have been funded from general revenues. Private and local public organizations also maintain local navigational aids. Recently, the Administration proposed two fees to fund some MTS navigational aids:
 - A *Navigational Services Fee* would recover a portion of the USCG aids-to-navigation costs from commercial cargo and cruise vessels, which rely on these services to operate safely and efficiently. It is estimated that the fee would raise \$41 million in FY 2000 (part-year collection) and \$165 million on an annual basis. USCG aids-to-navigation costs exceed \$500 million per year.
 - The *NOAA Navigational Assistance Fee* is a proposal to levy a fee on commercial cargo carriers to recover the cost of NOAA navigational services, such as navigational charting. The fee would raise \$14 million annually.

For similar reasons discussed in the previous section on *Federal Channels and Harbors*, many non-Federal MTS stakeholders feel general revenues is the appropriate funding source for these navigation services. The Administration disagrees. It should be noted that Congress has also required the USCG and NOAA to seek specific authorization for new fees before developing implementing regulations for those new fees.

Landside

- **Terminals** — Marine terminals are generally funded by private sector investment based on economic issues. There is also public funding via local or State agencies such as port authorities. In 1997 alone, the Nation's deep-draft public ports invested \$1.5 billion in terminal improvements, dredging, and intermodal projects; over the next 5 years, these ports estimate they will spend \$7.7 billion on these and other capital investments. Revenues generated through fees, services, leases, etc., by the public agency may be used for this purpose. Public funding is generally raised via bonds (general obligation or revenue) or by taxing authority. There are some avenues of Federal public funding via grant programs, such as Economic Development Agency programs.
- **Intermodal Connections** — There are three major types of intermodal connections to the MTS: rail, pipeline, and highway. Rail and pipeline development is almost exclusively funded by private sector investment. Highway connections are either by private access roads or public roadways. Funding for public roadways is available through State and local road funding processes and possibly from the Federal Highway Trust Fund, which is funded from a Federal gasoline tax.

Services and Programs

- **Services** — In addition to infrastructure, the MTS funding mechanisms support a number of services provided by Federal, State, and local governments and the private sector. These include services such as search and rescue, vessel and facility inspection, VTS, pilotage, towing, icebreaking, and navigation information.

- **Programs** — In conjunction with services, the stakeholders in the MTS, public funding, and private investment also support a number of related programs including recreational boating safety, research and development, bridge administration, shipbuilding and repair, and port marketing, and promotional activities.

MTS SERVICE PROVIDERS

The Federal government plays an integral role in the function and management of the Nation's marine transportation system, based on statutory authority and responsibility to provide core services. This authority and responsibility is spread across numerous Federal agencies that provide leadership, expertise, technical assistance, advice, resources, information, and promote system mobility, safety, environmental protection, and security. Many of the marine services promote system mobility through activities such as aids to navigation, channel design and construction, icebreaking, and traffic management. Other services protect human health and safeguard the natural environment through programs aimed at prevention, preparedness, response, and restoration. They also protect U.S. citizens and national security interests by activities such as law enforcement, defense operations, port safety, and security.

State and local agencies also provide services and support to the MTS. State and local governments play key roles in planning, investing, and operating the intermodal system so essential to maritime operations. These agencies are also involved in land use decisions and economic development initiatives that affect ports and waterways. State and local governments additionally interface and reflect the needs of communities in the vicinity of the MTS.

State governmental entities have a significant impact on vessel navigation in their State waters. Examples include California's Office of Oil Spill Prevention and Response, Washington State's Department of Ecology, and the Florida and New Jersey Marine Patrols. State agencies also service the MTS in other areas including pilotage regulation, environmental protection, emergency response, infrastructure maintenance and investment, economic development, law enforcement, safety patrols, port facilities security, removal of wrecks and obstructions, permits for dams and dikes, non-Federal aids-to-navigation, maintenance of bridges, fire protection, and reviewing ocean-dumping permits.

The private sector owns the majority of the infrastructure — ports, terminals, piers, vessels, trucks, trains, and cranes — critical to the effectiveness of the MTS. To a large degree, the private sector also handles the movement of people and goods in the system. Transportation providers develop, invest in, and operate the vehicles, vessels, and equipment that make the movement of goods and people possible.



III.

Trends and Competitive Pressures

Chapter II illustrated the breadth and importance of the U.S. marine transportation system. Today, the MTS is under extraordinary pressure from:

- *Growing levels of demand from its users;*
- *Shifting user requirements;*
- *Changing infrastructure needs and MTS competitiveness;*
- *Increasing national security needs; and*
- *Growing awareness of the environment.*

This chapter summarizes the trends and pressures facing the marine transportation system.

GROWING LEVELS OF DEMAND

Increases are anticipated in both international and domestic cargo movements. Passenger and recreational traffic are also expected to grow.

Table III-1:
**U.S. Foreign Trade
Annual Compound Rates in Percent.**

	1993-1997 %	1998-2002 %
Container	8.6	7-8
Dry Bulk	6.2	2-3
Tanker	2.9	2-3
Other General Cargo	(3.1)	(2-3)
TOTAL	4.6	3-4

Source: DRI/McGraw-Hill, World Sea Trade Service.

Table III-2:
**World Trade Growth Compared to
Fleet Growth 1998-2002.**

VESSEL/TRADE	TRADE %	FLEET %
Dry Bulk	3-4	1-2
Tanker	2-3	1-2
Product	4-5	3-4
Crude	1-2	0-1
General Cargo	6-7	2-3
Container	8-10	8-10
TOTAL	3-4	1-2

Source: Adapted from McGraw-Hill Companies and the U.S. Department of Commerce, 1999.

Trade

World population growth will influence the scope and character of world transportation demand in the 21st century. Over the next 25 years, world population is projected to grow from its present 5.5 billion to 8.5 billion people. The increased demand for transportation will require the expansion of existing infrastructure for all modes of transportation and perhaps the deployment of new transportation alternatives. For the MTS, this translates into a significant increase in the demand to move goods and people internationally and domestically.

World trade trends have been setting the stage for further integration of the economies of individual countries into several economic blocks. In North America, Canada and the United States signed a Free Trade Agreement in January 1989, covering trade between the world's largest trading partners. The U.S., Canada, and Mexico signed the North American Free Trade Agreement, which became effective January 1994. In Europe, a single economic market was established in accordance with previous agreements in January 1993. Finally, the Asia-Pacific Economic Cooperation (APEC) group of countries adopted the Bogor Declaration in November 1994. This statement of common resolve by APEC economic leaders was aimed at achieving free and open trade and investments by 2020 (2010 for industrialized economies).

International Cargo Movements

Trade: World trade increased by 3.8 percent annually (on a tonnage basis) between 1993 and 1997 to a total of 5.3 billion metric tons. In that same period, U.S. foreign waterborne trade grew by 4.6 percent per year to 1,071 million metric tons, and accounted for about 20 percent of global waterborne trade (see Table III-1). By 2020, U.S. foreign maritime trade is expected to more than double over 1996 tonnage levels, with total tons projected to grow 3.5 percent annually.

One of the fastest growing areas in U.S. exports is in high-value agricultural products (e.g., chilled, refrigerated, and processed foods), which has increased substantially and makes up a greater proportion of total U.S. agricultural exports that have more than doubled to over \$50 billion. In 1975, the value of high-value exports was 27 percent of total U.S. agricultural exports. By 1998, they made up 63 percent of total U.S. agricultural exports. Going into the new millennium, agricultural exports are expected to increase about 45 percent to \$72.6 billion – 36 percent bulk and 64 percent high value by 2008.

Table III-3: *U.S. Inland Waterway Projections by Commodity Groups (in millions of short tons).*

COMMODITY GROUP	WEIGHTED ANNUAL AVERAGE 95-98	2005	2010	2020	ANNUAL AVERAGE 1995-8 TO 2020
Farm Products	87.9	103.0	110.2	124.2	1.6%
Metals	30.9	34.6	38.2	44.7	1.7%
Coal	175.2	183.3	194.2	222.2	1.1%
Crude Petroleum	43.4	46.3	48.7	53.8	1.0%
Nonmetallic Minerals	99.9	116.8	125.6	139.9	1.5%
Forest Products	17.9	18.5	19.7	21.9	0.9%
Industrial Chemicals	41.7	46.3	52.3	65.0	2.0%
Agricultural Chemicals	12.2	13.2	13.7	14.9	0.9%
Petroleum Products	111.5	119.0	125.1	138.2	1.0%
Other	11.2	10.4	10.6	11.1	-0.1%
Total	631.8	691.4	738.3	836.0	1.3%

Sources: U.S. Army Corps of Engineers, *Waterborne Commerce of the United States* (for historic traffic) and the Institute for Water Resources (for projected traffic).

Vessel Types: In the near term, the number of containerships is expected to continue to grow at a significantly higher rate (8 to 10 percent) than other vessel types (see Table III-2 (page 26)). The growth increases as larger containerships are introduced into mainstream east-west trades, and as containerships continue to replace traditional breakbulk ships in world liner trades. Approximately 40 percent of the new capacity on order is containerships in the 4,500 TEU+ mega-ship category. Mega-containerships were first launched in 1996 and are a growing sector of the containership fleet.

Tanker fleet growth is expected to remain limited (around 2 percent) in the near term. With the expansion of global refinery capacity in crude oil-producing areas (Middle East and Asia), it is expected that the product tanker fleet will grow more rapidly than the crude oil tanker fleet, and that the average size of product tankers will grow in response to long-haul shipping requirements.

Over the next 5 years, near-term growth for the dry bulk segment of the fleet (around 2 percent) will be limited by the recent surge in dry bulk fleet capacity (DWT) and limited growth in world primary products trades.⁽¹⁵⁾

Domestic Movements

Total inland waterways traffic is forecast to increase 1.3 percent annually, to more than 836 million tons by 2020. The impact on inland waterways infrastructure could be significant as an undersized and aging system attempts to accommodate total traffic to 738 million tons by 2010 and 836 million tons by 2020. This impact would be expected to occur more acutely on some waterways than on others.

Growth rates among major commodity groups are forecast to vary, generally between 0.9 and 2 percent (see Table III-3). Farm product traffic is expected to rebound to a growth rate of 1.6 percent. With exports comprising more than 90 percent of farm product movements on the inland waterways, total farm products traffic is projected to grow from about 88 million tons at present to about 124 million tons by 2020.⁽¹⁶⁾

Passenger Movements

Cruise Traffic: The number of cruise passengers increased at an average annual rate of 7.8 percent per year from 1995 to 1997, and is expected to continue to grow annually at 7.5 percent over the next 5 years. Increases are also expected in other cruise areas such as local harbor excursions, gambling, and dinner vessels.

The popularity of cruises has led to a record number of new vessel orders. Further, cruise operators are building increasingly larger vessels capable of carrying thousands of passengers. Even with the considerable number of vessels recently added to cruise fleets, the estimated occupancy rate for 1998 was more than 90 percent.

Ferry Traffic: Using ferries to commute to and from work is increasingly popular in the United States. Annually, Americans take an estimated 134 million ferry trips. New ferry programs have been initiated, or are being planned, in almost every coastal U.S. State as well as on international routes to Canada and Mexico. New high-speed technology has been a principal reason for the activity. The U.S. is currently the nation with the most fast ferry shipbuilding under way, with an estimated 14 such vessels under construction.

Recreational Use

The number of persons participating in recreational boating increased at an average annual rate of 1 percent per year from 1987 to 1997. Growth in the number of participants is expected to decline slightly and level off over the next 5 years as competition with other recreational activity increases. The number of recreational boats owned increased by 1.2 percent per year from 1987 to 1997. This rate of growth is expected to continue. The explosive growth in personal watercraft has changed the mix of the boating population, especially with the advent of high-speed watercraft. Canoeing and kayaking, including coastal kayaking, are growing in popularity as well.

SHIFTING USER REQUIREMENTS

Competitive pressures are affecting all users of the U.S. MTS. In some cases, it is competition among the different user groups who must share space in the MTS. In other cases, it is changes in the transportation requirements and practices of businesses that are driving changes throughout the freight movement industry. The profound changes occurring in freight movement, in particular, have significant ramifications for the U.S. marine transportation system.

Changes in Business Practices

American companies have been modernizing their manufacturing and distribution systems, as well as downsizing and restructuring their operations. As part of this efficiency drive, manufacturing industries in the U.S. also increasingly rely on multinational production. In the new global economy, American manufacturers need to be able to move raw materials, partially assembled products, and finished products efficiently and reliably, year-round, throughout the world. Retail operations similarly source and sell globally.

This decentralization of production operations has increased the total number of freight movements that must be undertaken, both domestically and internationally. Logistics, distribution, and transportation systems, therefore, become increasingly important. To compete for U.S. business, ports and other MTS components strive to make themselves efficient and effective.

The Nation's business community naturally seeks out those in the MTS that can provide cost-effective and reliable transportation. Under the emerging production, retail, and transportation systems, the delivery of nearly all goods is on a *time-definite* basis; that is, the receivers of products — either manufacturers or retail operations — require that shipments arrive on a certain date and even by a specified time. This time-definite approach, a refinement of JIT inventory management that began in the 1980s, extends across the full range of commodities, from low-value bulk items to high value consumer goods. JIT practices also evolved from the desire by businesses to reduce their costs of maintaining inventory. In the case of JIT, transportation replaced inventory. Today, inventories have been reduced further by substituting information for the physical possession of goods; that is, companies use advanced telecommunications and information systems to track where their goods are and make changes in routing, if necessary. With this tracking capability, sometimes referred to as in-transit visibility and flexibility, less physical inventory is needed. However, this approach requires shippers and transportation providers to become more sophisticated in their communications and information systems and ensure the highest possible level of system and modal reliability.

Changes in Freight Transportation Requirements

Businesses now seek five qualities in their freight transportation service:⁽¹⁷⁾

- Reliability,
- Transit time,
- Efficiency,
- Low cost, and
- Damage minimization.

Further, freight transportation is no longer viewed as a series of separate negotiations and arrangements with different types of freight providers such as trucking firms, railroads, and steamships. Instead, freight transportation is viewed and purchased in terms of the total trip from origin to destination, regardless of the number and type of transportation methods involved. Therefore, the U.S. marine transportation system extends beyond the waterfront, using trucks, railroads, and pipelines to receive and ship products.

Reliability is defined as ensuring that goods are delivered on the specified date at the specified time, in the specified amount in the specified condition, at the specified cost in a consistent manner. Reliability, in terms of on-time performance, is often part of the contract negotiated between a transportation provider and the shipper. Exacting requirements are now far more common, with on-time performance goals often being close to 100 percent. Reliability is applied to the entire trip from origin to destination, meaning that each element of the freight movement must strive for a higher degree of consistency of service. For the MTS, this means ensuring that vessels are able to enter and depart ports as scheduled; that terminals are as efficient as possible in processing shipments; and that inland connections are not hampered by congestion or other delays.

Transit time is also a consideration. However, today, transit time is often balanced against cost. As long as customers can be assured that their goods will arrive on a specified date (and time) and sufficient advance notice exists, goods can move by less expensive, slower modes. This trend has increased interest in the waterborne movement of freight. However, similar to the other factors, transit time is considered across the entire trip from origin to destination. Accordingly, there is

increased pressure to facilitate and expedite the transfer of shipments between freight conveyances (for example, from vessels to railroads or trucks).

Efficiency is defined as optimizing the use of transportation equipment so as to minimize costs. The development of the mega-ships was largely an efficiency measure to significantly reduce the cost per container. As another example, the current Asian economic situation has severely affected the balance of trade and negatively affected the efficiency of container operations. Significant increases in imports from Asia have strained containership capacity, while U.S. exports to Asia have significantly decreased to about 50 to 60 percent of capacity. Redeployment of empty containers to Asia has depressed shipping rates by 30 percent, contributing to the low profitability of liner companies.

Cost has often been the primary consideration in the handling of freight. As previously noted, businesses desire to reduce their costs of maintaining inventory. Cost is defined as obtaining the lowest possible cost for moving goods according to specified requirements (which generally consider transit time, efficiency, reliability, and damage minimization). Shippers look at the overall cost from origin to destination. As competition continues to intensify domestically and globally, companies are increasing their efforts to reduce transportation costs. In turn, transportation providers seek to improve the efficiency of their operations and reduce their costs. As transportation providers seek efficiencies and cost savings, they seek out those components of the transportation systems that have made themselves efficient.

Damage minimization has always been a consideration in goods movement. However, it is of more critical concern today. Damaged shipments are less tolerable in a business that maintains only a minimal level of inventory — the effect of an unusable shipment can reverberate through entire production lines and retail operations. In addition, increased environmental responsibilities have led corporations to a greater awareness of materials handling. The safety of workers who handle and manage the movement of goods is also part of damage minimization.

Changes in the Intermodal Transportation Industry

The increasingly stringent requirements placed on transportation providers are also reshaping the transportation industry. These changes are particularly apparent in the users of the MTS. Competition among transportation providers has intensified. Simultaneously, the freight transportation industry has undergone an unprecedented number of mergers and alliances.

Alliances and mergers are being used to increase service offerings and reduce costs. Examples of recent mergers involving MTS users and participants include Neptune Orient Line's purchase of American Presidents Lines and the restructuring of Conrail by CSX and Norfolk Southern. Alliances may occur within a single freight mode (for example, trucking, railroads, and steamship lines) or involve transportation providers from several modes. Alliances across freight modes may develop from the need to offer a total transportation package from origin to destination. An example of a single-mode alliance is the vessel sharing agreements among steamship lines. Five major alliances currently exist. Steamship lines within each alliance share container slots on their vessels. This practice enables vessels to travel at closer to maximum carrying capacity (thereby reducing the cost per container), allows steamship lines to deploy their vessels more efficiently, and increases the frequency of service that lines can offer their customers (because they have more slots available on more ships). As steamship lines rationalize, the result is a likely increase of traffic at hub ports. The concentration of cargo at hubs requires that investments be linked to volumes of traffic.

In addition to business and industry restructuring, transportation providers are continuing to innovate and rapidly deploy new technologies and equipment. The overall objectives of this research

and development are to increase customer service and reduce costs. Past examples of such innovations include the development of the double-stack train concept and the rapid acceptance of containerization in the maritime industry. A current example, with ramifications for the MTS, involves shifting traditional breakbulk commodities such as coffee, cocoa, and bananas to containers. This shift may reduce the need for breakbulk facilities while increasing the need for container terminals.

CHANGING INFRASTRUCTURE NEEDS AND MTS COMPETITIVENESS

These changing levels and types of demand place additional pressure on the marine transportation system. Competitiveness is defined as ensuring that the marine transportation system can meet the requirements of its users. The trends affecting the competitiveness of the MTS and the infrastructure that must be in the system include:

- Advances in MTS technologies;
- Competing water uses;
- Increasing dredging requirements;
- Increasing demands on locks and dams;
- Competing land uses; and
- Enhancing intermodal connections.

Advances in MTS Technologies

Advances are occurring in information technologies and navigation systems.

Information technologies. Information technology is transforming the intermodal freight industry by enabling it to integrate operations across the supply chain. The first wave of change, which is well under way, has been a shift from paper-based systems to electronic systems for transaction management and information exchange. The driving technologies have been low-cost computers; bar codes and readers; automated equipment identification (AEI) tags; sophisticated database management software; and electronic data interchange standards. The industry has adopted these technologies to meet basic customer demands for timely information and transactions. With the introduction of more accessible and affordable electronic commerce services over the Internet, all parties to the intermodal system — not just the largest corporations — will be expected to exchange information and conduct business electronically.

The second wave of change, just now under way, is the integration of real-time operations. The driving technologies include satellite location and communication systems. For example, low earth orbit satellites make it possible to track containers, and perhaps packages, either directly or by way of the truck, ship, or train carrying them. Additional technologies employ smart cards, global communications networks, and expert systems software.

These technologies are making possible the exchange of real-time performance and asset utilization information among shippers, carriers, and receivers. This information will feed manufacturing, distribution, and sales operations models and optimization tools. The systems are used to optimize the end-to-end visibility, security, and control of goods through a logistics system. They focus on the total freight trip and serve shippers' and receivers' needs. What will emerge is an integrated supply chain management system that is highly dependent upon cost-effective and reliable intermodal freight service.

Navigational Systems. Technological developments such as the Global Positioning System (GPS) and DGPS provide a level of accurate and reliable navigation services to mariners that is substantially greater than was previously available. As a byproduct of the development of electronics and computing technology, electronic navigation is becoming cheaper, more accurate, and more reliable. The power of the real-time precise positioning service offered by DGPS is only fully realized when used in conjunction with electronic charts. However, a prudent mariner does not rely on any single aid to navigation, but instead uses all available means to determine a position in the waterway and compares it to positions obtained from other forms of navigation.

Only DGPS provides the level of positioning accuracy required for electronic chart navigation. Electronic chart navigation relies on DGPS and GPS for its positioning input. Recent concerns have been expressed about the ability to jam GPS signals, the loss of signals caused by satellites becoming inoperable, shipboard positioning system breakdowns, and regions of GPS signal loss because of local electronic interference or blockage from structures or terrain. As with all Federally provided radionavigation systems, operation of the Maritime DGPS Service in time of national emergency is also subject to the direction of the National Command Authority. As such, traditional short-range aids are the backup navigation system for DGPS/GPS electronic chart users.

With continued progress in the development of advanced navigation technologies, the potential exists for the elimination of some visual short-range aids to navigation. The near-term future of maritime aids to navigation consists of a combination of visual and electronic aids, including electronic charting and GPS and enhancements. Although the reliability and accuracy of electronic aids to navigation continue to improve, the present and near-term reality is that visual aids remain an important navigation safety tool for the majority of the diverse waterway user groups. There is currently a large user base (recreational, small commercial, and fishing vessels) that continues to rely almost exclusively on the visual aids to navigation system. Even large commercial users, including harbor pilots, use the visual aids to navigation system in concert with electronic navigation tools to operate safely and efficiently. As electronic navigation tools mature and become less expensive, their use is expected to become more widespread. The USCG's goal is to leverage new technologies to establish the most cost-effective system of aids to navigation without sacrificing the safety, mobility, and environmental quality of our waterways. The USCG will encourage users to adopt proven new technologies as it works with the International Maritime Organization (IMO) to establish carriage requirements for more modern systems.

Other marine navigational services and tools reveal remarkable trends that will promote the safety and competitiveness of the MTS. These fall in the areas of nautical charts, tide, current, and water level information, hydrographic and shoreline surveying, and positioning.

Nautical charts of U.S. waters will soon benefit from continual maintenance, whereby the entire chart suite is updated on a weekly basis. These charts will initially focus on items critical to safe navigation, but in another year will include all chart information. Using new print technology, charts would no longer be printed at infrequent intervals. Instead, mariners could contact a chart retailer for a chart printed directly from NOAA's continually updated chart database.

Tide, current, water level, and meteorological information available via PORTS have already been credited with preventing groundings, reducing shipping delays, maximizing vessel capacities, and significantly improving spill response efforts. Maritime organizations and the USCG have expressed interest in expanding implementation of NOAA's PORTS. That effort is under way. PORTS data formats will comply with international standards so as to be usable on all shipboard Electronic Nautical Chart systems, from expensive to inexpensive systems.

Hydrographic and shoreline surveying technologies and strategies offer promise as well. Precise hydrographic surveying will use side-scan and multibeam sonar technologies. Shoreline surveying

will use more satellite-based imaging and other remote sensing technologies to overcome limitations of remote locations, severe weather and cloud cover. Both take advantage of advanced GPS strategies to increase survey speed and efficiency.

Trends such as larger ships and efforts to minimize vessel underkeel clearance will be significant factors in determining new mixes of aids to navigation.

Competing Water Uses

As noted earlier, growth in commercial and recreational waterway use is expected to continue. Vessel types are also changing with larger freight ships, higher speed ferries, and small, high-speed personal watercraft. The increased use, coupled with vessel speed and size, will place additional demands on already congested waterways and will add stress to the safety and mobility mechanisms used to manage the MTS today. Failure to address the increased risk factors on our Nation's waterways both increases the probability of incidents and ensures the consequences.

Increasing Dredging Requirements

The USACE is currently conducting a multiyear *National Dredging Needs Study of Ports and Harbors* to assess the needs of the national system of ports, harbors, and waterways of the United States. This study will be completed after this report is submitted to Congress. Overall, however, the Nation's future dredging requirements can be expected to grow above recent highs following the completion of current and future deepening projects and the ongoing maintenance requirements associated with these deeper channels. Some growth will also be stimulated by the increased maintenance requirements needed to meet the service demands of the maritime industry, tempered somewhat by those quantity reductions that result from regional sediment management and related efforts. The net effect would be a gradual upward trend in future annual dredging requirements, which can be expected in the long term to taper off at an elevated level.

Historical dredging data indicate a slightly downward trend in the annual quantity of dredged material for the past 10 years, with an average of 275 million cubic yards per year. However, over the next 5 years this trend can be expected to change. The current dredging program already reflects some of this growth. There is a significant amount of new dredging work under way, such as deepening of Kill Van Kull in the Port of New York/New Jersey and the Houston-Galveston Ship Channel (both projects involve deepening channels to 45 feet). A number of other significant projects await either Congressional authorization or the completion of ongoing feasibility studies. These include channel deepening at Oakland Harbor, Savannah Harbor, the lower Columbia River Ports, and the Port of New York/New Jersey. This strong demand for harbor channel deepening can be expected to stimulate a continued growth in new dredging work.

Upon completion of justified deepening work, an initial increase in maintenance dredging requirements can be expected until the hydrodynamics of the deeper channels begin to stabilize to the new dimensions. The long-term impacts of deeper channels on annual maintenance dredging is somewhat more uncertain, with dredging needs highly specific to each project location and subject to a complex set of variables involving the natural coastal and river processes that affect sediment movement.

The trend toward deeper channels, including channels 45 feet deep or greater, is also accompanied by maritime users increasing demand for channel reliability. This also creates increased conflict between channel needs and pipeline crossings. The demand is driven by the expected growth in liner trade and continued deployment of mega-ships on U.S. trade routes. The time-sensitive operating practices of these ships require the full availability of channel dimensions in order for these vessels to efficiently call at U.S. ports without service-related delays. This expectation of channel availability is

likely to increase the demand for more frequent maintenance dredging.

Such growth in dredging requirements could likely motivate the dredging industry to invest in new equipment that would expand the overall capability to undertake dredging work in the United States. This added capacity would provide the balance and flexibility needed to efficiently accommodate the combination of deepening and maintenance work expected in the future.

Although there appears to be a trend toward increased dredging needs, there is pressure to reduce the amount of material dredged because of heightened awareness and concern regarding the environmental affects of dredging and dredged material disposal. The Nation's needs for safe and efficient ports, channels, and harbors, may be achievable at the same time the quantity of material dredged is reduced. Adopting new approaches to MTS issues, such as considering dredged material as a resource and encouraging its beneficial use, should be studied.⁽¹⁸⁾

Increasing Demands on Locks and Dams

By 2000, more than 44 percent of the inland waterway locks and dams will be at least 50 years old. Many are undersized for modern commercial barge tows, which must then be broken up and reassembled at each lock. This lengthens transit times, produces queues at locks — increasing operating costs and decreasing efficiency — and causes safety and environmental concerns. These delays will become more severe as system traffic grows and as aging infrastructure requires increased maintenance and repair time. In 1998, 36 lock chambers on the system averaged delay times greater than 1 hour.⁽¹⁹⁾

Competing Land Uses

Several factors are straining land capacity at many of the Nation's ports. One notable influence on land capacity is containerization. The increased use of containers for shipping goods increased demand for extra land because containers take up more acreage portside than traditional breakbulk storage. Many ports lack the acreage needed to accommodate the growth in containerization, but some ports have successfully expanded their land capacity by purchasing and redeveloping additional waterfront property.

The availability of waterfront property to serve expanding port operations is sometimes complicated by community economic redevelopment efforts. Recent waterfront development has not addressed traditional maritime and industrial uses, but focused largely on revitalization that focuses on residential, commercial, tourist, and recreational-related uses. There is also increasing public demand for environmental enhancement projects such as creating wetlands and cleaning up contaminated media. These new land uses, while valuable and important, also increase the:

- Competition for space along the waterfront;
- Cost of land on the waterfront;
- Potential for safety hazards;
- Conflicts among land uses; and
- Environmental impacts.

As conflicts among land uses grow, environmental impacts are also likely to increase. The shortage of land requires port operators to work closely with community planners and coastal managers to identify options to harmonize waterfront redevelopment and port expansion while maintaining a sustainable marine environment.

Enhancing Intermodal Connections

The movement of goods and people in today's business environment, as previously discussed, requires a competitive logistics system that emphasizes quality service and total cost. Accordingly, the Nation's economy, international competitiveness, and national security increasingly depend on the effectiveness of the intermodal transportation system.

The benefits of an integrated intermodal system can only be achieved by the cost-effective linking of the various modes of transportation. Good intermodal access is a prerequisite to support the growing demand in people and goods transportation.

For example, ports may generate an inland effect on rail traffic. Midwest rail yards and cross-country mainlines are rapidly approaching capacity. Railroads may need to improve hundreds or even thousands of miles inland from the ports themselves to accommodate additional port-related intermodal traffic.⁽²⁰⁾

INCREASING NATIONAL SECURITY NEEDS

The contemporary national security landscape is characterized by a rise in international organized criminal activity, along with a growing array of rogue states and terrorists. Accordingly, national security needs are shifting in the areas of:

- Crime;
- Terrorism; and
- Deployment.

Crime

U.S. seaports provide intermodal interfaces that expedite the movement of commerce through the international maritime trade corridors by a complex mix of private sector service providers. These providers include ocean and land transportation providers, shippers, freight consolidators and forwarders, financial institutions, warehousemen, labor unions, and the security departments of all parties involved.

A wide range of organized criminal enterprises target seaports and their landside accesses. Criminal enterprises are intent on exploiting these marine intermodal transfer points for a range of economic crime, including cargo theft and smuggling. This exposes millions of MTS workers and the general public to the consequences of illegal activity, which range from higher costs of goods to personal harm.

In Fiscal Year 1998, 8.1 million passengers and 5 million cargo shipments entered the United States through our Nation's seaports. Criminals take advantage of the increased tempo needed to move the growing volume of cargo through the MTS corridor by:

- Exploiting vulnerabilities within the MTS, insufficient law enforcement and private sector countermeasures;

- In 1995, Americans spent approximately \$48 billion to buy heroin and cocaine that originated from foreign sources and were smuggled into the United States.
- The INS estimates that there are 5 million illegal aliens in the United States; they represent nearly 2 percent of the population.
- The National Insurance Crime Bureau estimates that 200,000 stolen vehicles valued at nearly \$1 billion were smuggled out of the U.S. last year.

- Effecting internal conspiracies involving the acquisition of cargo transaction data and other forms of facilitation;
- Operating fictitious or front firms; and
- Operating in extra-regional criminal alliances for trading products and services.

The practice of using JIT to improve efficiency means that manufacturers and retail businesses will have growing concerns about law enforcement delays in moving cargo and cargo losses from theft.

Terrorism

In addition to the surge in international crime, the end of the Cold War has left in its wake a growing array of rogue states and terrorists. These states and transnational adversaries appear intent on undermining the global forces of integration and the economic and political structures that advance U.S. interests and values. They will most likely avoid a direct challenge to the U.S. Armed Forces and could, instead, target the critical infrastructure, which includes the transportation and communications networks that support U.S. economic power.

The burgeoning cruise ship industry also presents a potent terrorist opportunity for those intent on advancing their cause through publicity or by extracting concessions from national governments by holding their citizens hostage. Passenger vessels and the facilities that embark U.S. passengers are required by regulation to develop security plans to address the prevention of and response to security threats.

When considering its importance and vulnerability, the domestic security of the Nation's marine transportation system requires particular scrutiny. The primary responsibility for physical security falls to the owner/operator of the facility and master of the vessel. In general, requirements for facility and vessel security measures are broad and nonspecific. There are no routine assessments to identify the critical infrastructure and vulnerabilities of ports and waterways, nor is there information sharing among ports and agencies.

Deployment

The United States continues to be committed to a policy of engagement abroad to promote peace, democracy, and prosperity. In order to support our national security objectives, the U.S. must be able to project power, whether that is military force or humanitarian support. The force projection from our nation depends to a large extent — 90 to 95 percent — on sealift deployment.

The force projection and crisis response capabilities that support U.S. national security objectives increasingly depend upon our domestic and commercial mobilization plans and operations. This is especially the case because of the closure of so many overseas bases over the past decade, resulting in a continental U.S. (CONUS)-based force. Likewise the ongoing Base Realignment and Closure (BRAC) initiatives closed several military-owned and -operated ports such as Oakland and Bayonne, resulting in the reliance upon U.S. commercial ports for the deployment of military forces and crisis response capabilities.

DOD planners rely on three sources of sealift: government-owned active duty forces, reserve forces, and commercial transportation partners. The deployment capability requirements of the MTS stem from the DOD's Mobility Requirements Study (MRS), which is presently being reexamined for the 2005 time frame.

Future contingencies of the Operation Desert Shield/Storm-scale will be even more challenging with regard to sealift demands. Current planning stipulates the delivery of forces to theaters within 75 days (compared to the 205 days it took to close the force during Operation Desert Shield/Storm). Concurrent with the greater dependence on commercial ports is the use of larger, deeper draft commercial vessels that depend upon technically sophisticated, highly specialized shoreside facilities for loading and offloading. Ports selected to serve as DOD deployment points are designated as Strategic Ports. The coordination of deployment activities at these strategic ports relies upon the local Port Readiness Committees (PRCs) and National Port Readiness Network (NRPN).

An example of increased reliance on commercial transportation to meet power projection needs is the Voluntary Intermodal Sealift Agreement (VISA) established by DOT, DOD, and the commercial maritime industry. The object of VISA is to provide the DOD a coordinated, seamless transition from peacetime to wartime for the assured acquisition of commercial sealift and intermodal capability to augment government-owned organic sealift capability. VISA capacity may be called upon to provide some early surge deployment of cargo, although the bulk of this capacity is planned for movement of sustaining supplies for DOD forces.

GROWING AWARENESS OF THE ENVIRONMENT

Environmental quality is essential for sustaining coastal and marine ecosystems, commercial and recreational fisheries, and the economic vitality of the marine transportation system. The environmental protection of the MTS ensures its desired efficiency and safety. In recent years, there has been a growing public awareness of potential adverse environmental impacts from the MTS. This trend is expected to continue and will affect how our Nation addresses many MTS issues.

Although current programs address many of the direct environmental threats posed by MTS users, much still needs to be accomplished in implementing existing environmental standards, coordinating environmental goals and objects, increasing public education efforts on MTS environmental issues, and harmonizing environmental protection with sustainable economic growth and national security. Improving integrated and nonregulatory approaches that involve all levels of government, MTS users, and all stakeholders is important in addressing the future trends and challenges in MTS environmental protection.

The MTS Task Force identified three primary areas of environmental issues related to the MTS:

- Ship operations and vessel movements;
- Port development and terminal operations; and
- Dredging.

Because the MTS is downstream of homes, industries, farms, communities, and rivers, the health of the MTS environment is inextricably linked to the health of the ecosystem watersheds. Therefore, a holistic approach of environmental protection to the entire system is needed. Environmental stewardship types of programs that involve all stakeholders from upland to downstream of the MTS are encouraged as a future trend of the MTS environmental program.



IV.

Critical Issues

The Task Force reviewed the current state, trends, and pressures on the MTS. From this review and assessment, the Task Force identified a series of issues, challenges, and gaps in six areas:

- *Coordination;*
- *Safety;*
- *Competitiveness;*
- *National Security;*
- *Infrastructure; and*
- *Environment.*

This chapter discusses each of these issue areas.

COORDINATION

MTS stakeholders often work without knowledge of each other's activities or concerns. Stakeholders expressed concern about:

- Absence of a national MTS vision;

- Fragmentation of government responsibilities;
- Failure to view the MTS as a system;
- Failure to adequately share information;
- Unclear responsibilities; and,
- Overlapping jurisdictions among government agencies.

Currently, there appears to be insufficient coordination at the local/regional and national levels. System users are often unaware of the other public and private users' activities and inherent limitations. Federal, State, and local MTS service providers often have not coordinated their efforts or reached consensus for goals and actions to maximize efforts, and resulting benefits, for the entire spectrum of MTS users/beneficiaries.

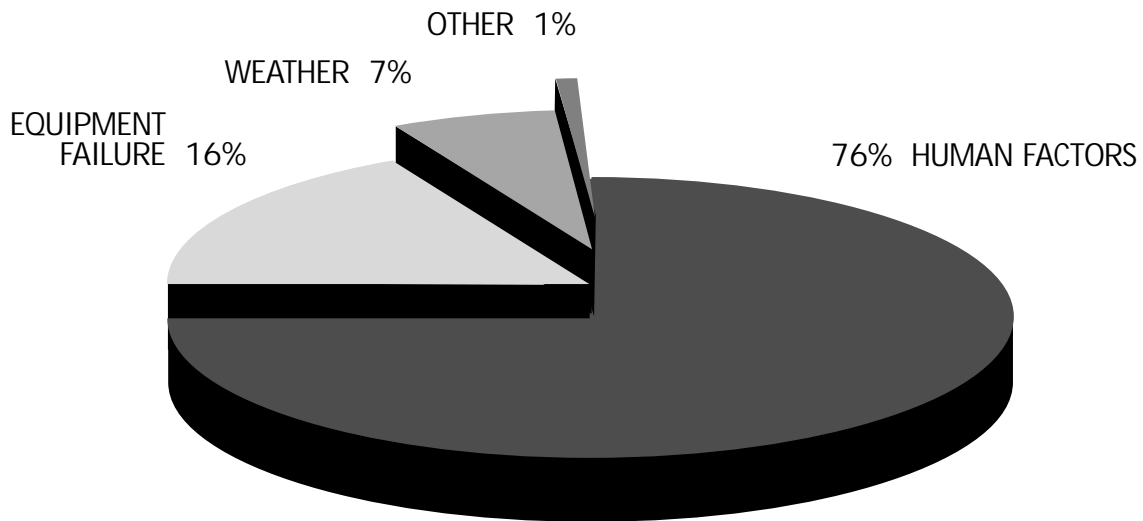
At the national level, virtually all activities to improve waterways, ports, and their intermodal connections are subject to review or approval by several Federal agencies. Reaching consensus through an efficient decision-making process is difficult without an agreed-upon organizational framework or shared process to focus and align the efforts of the many agencies involved. Federal agencies rarely coordinate their efforts through joint budget and legislative submissions or effective partnering arrangements, and there are no permanent processes or mechanisms that provide common management oversight of critical issues that often arise from local or regional efforts or requests for action. This results in a diminished emphasis on the MTS as a whole, a complex permitting process, inconsistent enforcement, redundant regulatory measures, lost opportunities, and a lack of customer service standards.

Similarly, there have been few formally structured mechanisms or processes for communication and coordination among local/regional and national stakeholders regarding MTS. Of particular concern are issues where local and regional stakeholders have reached consensus, yet there has been no national forum to coordinate agreed-upon solutions among the Federal agencies. Thus, these issues are traditionally handled by each agency, which loses the benefits of a systemic approach and the resulting synergism for shared, efficient, and cost-effective action. The fragmented marine transportation authority and jurisdiction are primary factors in the lack of coordination between the local/regional and national levels. Another contributing factor is that local agency representatives are often not empowered to act. Also, national policies are often enacted disparately and without consideration of the system's ability to meet multiple policy objectives.

The importance of coordination among stakeholders in the decision-making process has long been recognized, and local and/or regional committees have been established in many port areas. The Harbor Safety Committees in California and the Harbor Safety, Navigation, and Operations Committee in New York were often cited as good examples of local forums that have been undertaken and address a breadth of long- and short-term local/regional issues involving a diverse group of interests.

There is currently no national forum that looks at the waterways, ports, and their intermodal connections — as a system. The importance of coordination among Federal agencies has long been recognized, but little more than Memorandums of Understanding or Memorandums of Agreement on specific projects have been implemented.

Some interagency committees have been created to address common concerns. One such committee is the Interagency Committee for Waterways Management (ICWWM), which is chaired by the USCG. Committees other than the ICWWM are generally narrowly focused or stove piped, and issues are discussed independently in a piecemeal fashion. Responsibility for the MTS is spread among numerous Federal agencies and overlap occurs.

Figure IV-1: *Causes of Recreational Boating Accidents.*

Source: U.S. Department of Transportation, U.S. Coast Guard Boating Statistics, 1997.

SAFETY

With the rapid expansion of trade, wealth, and recreational opportunities in recent years, many parts of the U.S. MTS are being stretched to their limits to cope with the size, speed, and diversity of craft and users of the MTS. Safety and environmental protection are no exception. While new technology will help solve some safety problems, safety remains primarily a people and communication matter.

Task Force members identified two groups of safety-related issues:

- Vessel operations; and
- Infrastructure.

Vessel Operations

Human Element: Safe and efficient operation of the MTS is contingent upon a well-educated and trained work force. The MTS needs to be supported by an educational and training infrastructure that will ensure properly trained and motivated men and women to serve the system at all its levels. All waterborne users of the MTS, from deep-sea merchant ships to coastal tug/barges to recreational boaters, depend upon information and services provided by others for their safe passage. Safety of all traffic in coastal, harbor, and estuarial waters is potentially compromised without current, reliable data on tides, currents, water depths, aids to navigation, and on the adherence to the governing regulations for vessel traffic sharing the same waters (*Rules of the Road*).

In the busier waterways, knowledge of the intentions of other craft in close proximity is vital to ensuring safe passage, yet communications between vessels is increasingly difficult because of frequency interference in congested and urban areas. Marine pilots are experts on the particular waters for which they are licensed and must continually familiarize themselves with the various types of ships and navigation systems they handle. When a pilot boards a ship entering or leaving

a harbor, safe passage will depend on teamwork between the pilot and the master and bridge personnel on each ship, thus, a master/pilot exchange of information is essential. The pilot will advise the master of the particular route to be followed and conditions to be expected. The master must advise the pilot of the condition of all key systems aboard his ship — steering, engine, radar and navigation equipment, and anchors and any emergency procedures that may be needed. There are still problems at times, such as language barriers, to achieving this teamwork.

It has been clearly recognized that human factors contribute to MTS-related accidents. Despite regulatory, quality management, and education initiatives, approximately 80 percent of commercial and recreational waterborne accidents can be traced to human error. As an example, Figure IV-1 (page 41) shows the causes of recreational boating accidents. The same trend applies for commercial accidents. The human factor in vessel operations and accidents is receiving increasingly greater emphasis through programs such as Prevention Through People (PTP). The underlying goal of PTP is to reduce the risk of marine accidents associated with operator error through nonregulatory solutions. Based on mutual respect and a shared commitment by government, industry, and labor, PTP promotes an approach to safety and environment protection that systematically addresses the root cause of accidents — the human element. A key element of addressing human factors is adequate training and education. The global implementation of the 1995 amendments to the international convention on Standards of Training, Certification and Watchkeeping will focus the world's merchant fleets on the critical nature of human factors and the importance of adequate training and education.

The number of recreational boats continues to increase each year, adding to the congestion in settings shared by recreational and commercial users. The growth in personal watercraft use alone has created additional safety hazards, primarily caused by the speeds of such craft and lack of operator skills. The Federal government provided \$55 million to States in fiscal year 1998 for recreational boating safety services to the public. States spent \$169 million of State funds during the same time period. However, recreational boating remains second only to highways in transportation-related fatalities, and the conflict between commercial and recreational use of the waterways must be addressed.

Systematic Approach to Safety: The International Safety Management (ISM) Code emphasizes shipping management's role in the safe maintenance and operation of vessels. Management's role is to provide safe practices in ship operations, identify risks and safeguards, and continuously work to improve safe management skills of its employees. This code, applicable only to vessels sailing internationally, is enforced on passenger vessels, oil and chemical tankers, bulk carriers, gas carriers, and cargo high-speed craft of more than 500 gross tons. Other cargo ships and mobile offshore drilling units over 500 gross tons will have to comply with the code by July 2002. There is a need for similar and expanded systems approaches in the nonregulatory and regulatory control of all vessel operations.

In many U.S. ports, Harbor Safety Committees (HSCs) coordinate harbor services. Some of these committees have been mandated by individual States (such as California and Washington). Two are Federal Advisory Committees — Houston/Galveston and the Lower Mississippi River. Most are local cooperative efforts (examples include Delaware, the New York-New Jersey area, and Tampa). The keys to successful harbor safety committees include:

- Combination of the expertise of pilots and local users with the legal authority of the USCG;
- Participation of terminal operators, tug companies, along with representatives of local traffic (recreational and ferries), the public, and local government; and
- Expertise of NOAA and the USACE.

With this combination of user/regulator/service provider views, HSCs can make intelligent decisions on safe and efficient uses for each waterway. Coordinating mechanisms such as the HSCs can implement a systems approach to handling vessel operations on the waterways and at the ports. They address the needs of all vessel operators, from deep-draft commercial vessels and commercial fishing vessels to operators of personal watercraft and other recreational users.

Vessel Movements: Substandard ships and crews remain a safety and environmental problem. Growing data from a number of ports shows an unacceptably high rate of engine and/or steering failures on deep-sea ships entering or leaving ports. There is also growing recognition that safety and environmental threats from vessels have potential for disastrous events, threatening not only other traffic, but also shore installations as well.

This safety situation is not limited to commercial traffic. In 1996, more than 11,000 recreational boats were involved in largely preventable accidents. These accidents killed more than 700 people and injured more than 4,400 — despite the fact that boating safety activities exist at the local, State, and Federal levels.

Infrastructure

The infrastructure-related safety issues fall into three areas — terminal/ship interface; dredging and channel design; and information management/infrastructure.

Terminal/Ship Interface: MTS safety is a continuous consideration in the design and operation of terminals. Factors include terminal placement, age, staffing, and procedures. At oil and chemical terminals, cargo transferring presents the greatest risk of spills. Currently, some U.S. commercial maritime terminals are too small for ships that call on them and they have inadequate mooring arrangements that could cause a breakout from passing large ships in narrow channels. Similar problems occur with cargo handling equipment at older freight terminals that have not kept pace with the increasing demands of recent cargo tonnage throughput or the increasing size of vessels. Safety considerations should be part of the local planning and development of MTS facilities.

Dredging and Channel Design: Task Force members indicated that current channels and anchorages cannot safely accommodate the vessels and cargo throughput expected by 2020. Damage to vessels, structures, and equipment could potentially cause fatalities and injuries, pollution, and economic loss. In short, waterways are a vital part of the safety equation.

Task Force members recognize that safety must be a key consideration in channel project design. Safety issues should be part of the cost/benefit analysis when channels are designed, including the establishment of safe channel widths and depths relative to anticipated ship sizes and maneuverability.

Information Management/Infrastructure: Accurate and timely navigation information is a critical issue to ensure the continued safety of the MTS. There is also a need to systematically manage the ever-growing number of faster and larger commercial vessels, high-speed ferries, and recreational craft that navigate restricted channels. Management tools such as Vessel Traffic Systems, navigational aids, and automated identification systems must be considered when implementing a systems approach.

GPS or DGPS technology provides a proven superior navigational system capability with accuracy that exceeds that of much charted information and of aids to navigation. This will clearly be the navigation system of the future when it is available at prices that recreational boaters and fishermen

can afford. However, abandoning traditional aids to navigation because of the great benefits of DGPS will leave an unacceptable gap in mariners' ability to position themselves.

Task Force members identified the need to establish a safety information infrastructure. Real-time environmental and waterway situational information is essential to safe navigation and competitive use of our waterways. As the average size of today's commercial ships continues to grow, the margins between their keels and channel floors decreases. Maneuverability is increasingly restricted, raising the risk of oil spills and accidents involving other hazardous materials. Accompanying the demand for enhanced environmental protection is industry's shift to JIT manufacturing and delivery, and consumer demand for competitive prices. Because of uncertainty about tides and currents, large commercial vessels are delayed in port and offshore as they await optimal transit conditions. Such real-time information is also instrumental in preventing and responding to spills of hazardous materials and oil, predicting coastal flooding, and conducting scientific research.

A major safety issue is the currency of crucial hydrographic and shoreline information for charts and the lack of broader implementation of real-time tide, current, and weather information that is vital to a vessel's safe passage. Without accurate raw data, mariners will not achieve the full benefit of accurate DGPS/GPS navigation. Mariners must continue prudent navigation practices and not assume that nautical chart data in digital format improves the accuracy of the data. Data that would be questioned on paper, with consequent safety allowances being made by responsible mariners, is frequently accepted as absolutely accurate when presented on a computer screen. The mystique of technology often carries with it the assumption of precision and reliability.

Transponders and marine automated information systems provide potentially valuable capability for silent VTS in which mariners can make direct bridge-to-bridge maneuvering decisions without relying upon VHF radio, which is overburdened in many heavy traffic and urban areas. They can also be used in high seas collision avoidance. With these systems, and accurate data, the era of Electronic Chart and Display Information Systems (ECDIS) can become a reality and maybe replace paper charts on many ships — subject to adequate operational and legal backup.

A number of critical issues affect nautical charts:

- Although the international performance standards that define ECDIS displaying ENC's have been approved by their respective organizations — IMO and the International Electrotechnical Commission (IEC) — no national regulations have been issued for ECDIS in U.S. waters.
- ECDIS can be implemented for U.S. waters when official digital ENC data is combined with a service for updating the data. In the U.S., the raster nautical chart is fully implemented and an update service will be on-line this year. However, the ENC program is still compiling vector data, beginning with the Gulf of Mexico and the Great Lakes; and
- There is currently inadequate and inaccurate hydrographic and shoreline survey information depicted on paper and electronic nautical charts. NOAA is responsible for charting approximately 95,000 miles of coastline and 3.5 million square nautical miles of ocean. Today, more than 50 percent of all water depths in the most critical 43,000 square miles are based on pre-World War II data. One-third of the U.S. shoreline has never been mapped by NOAA, and of the portion that has been mapped, one-quarter was mapped prior to 1970. Only about 10 percent of the shoreline data has been produced digitally.⁽²¹⁾

- For support of defense, NIMA has developed a worldwide vector chart database that uses the meter as the common unit of measurement and an interoperable format for air, land, and sea operations. Nautical chart data in this format has not yet been accepted as equivalent for use by civil mariners under the Safety of Life at Sea Convention. Initiation of digital updating of this database is scheduled for late 1999, and it will provide U.S. Government vessels a global digital navigation capability. The NIMA portfolio contains more than 5,000 nautical charts. International copyright issues complicate the public release of charts of foreign waters.

A final information system identified by Task Force members deals with cargo tracking. Seamless cargo tracking from origin to destination has become an increasing necessity, particularly as more hazardous materials are shipped into and out of the United States via the MTS. There is a need for private/public sharing of information to ensure responsible entities are aware of what passes through the MTS and appropriate incident responses can occur.

COMPETITIVENESS

Chapter III discussed the competitive pressures faced by MTS users and the competitiveness issues for the U.S. MTS. Attendees at the Regional Listening Sessions expressed the need for a seamless, world-class transportation system. The attributes of the desired system include:

- Ease in complying with local entrance and clearance processes;
- Safe navigation systems; and
- Adequate facilities for the efficient and effective transfer of goods and people.

Current Approach to MTS Competitiveness

Multiple Jurisdictions: Each component of the MTS — waterways, ports, and their intermodal connections — is a complex system within itself, and each is closely linked with the other two components. National, State, and local government agencies share ownership, management, and operation of the MTS with private sector owners and operators.

The Task Force recognized the need to identify overlapping regulatory agencies and responsibilities at all levels of government. These overlaps create inefficiencies (such as redundant and conflicting regulations) that add costs to the system and its users. Collaboration and cooperation among these stakeholders is also desirable.

Role in the National Transportation System: Integrating all the elements of the U.S. transportation system, including roadways, railroads, pipelines and waterways, is more than a goal for private sector businesses — they are demanding it, requiring it, and acting on it with insufficient coordination. Achieving this integration on the public sector side remains an issue. To some degree, the issue is, again, coordination and communication.

MTS Technologies

Information technology is transforming the intermodal freight industry by enabling it to integrate operations across the supply chain. Advanced communication and information systems and ITS provide real-time information on intermodal freight operations and congestion on the physical transportation system. Sharing information about congestion and operations across the intermodal freight system is important to increasing system capacity and reliability.

The Marine Transportation System Initiative can act as a catalyst to focus, coordinate, and accelerate the application of advanced communications, information systems, and ITS technology by the intermodal industry and Federal, State, and local transportation agencies. The intermodal industry is driven by private sector demand. The public sector cannot design and deliver new intermodal services, nor should it force such management information systems upon the marketplace. However, the U.S. DOT, in cooperation with other Federal agencies, can bring parties together, focus attention on issues and opportunities, provide seed money to leverage private investment and test applications, and underwrite standards development to determine industry and user consensus.

Diverse and incompatible technologies and information management systems currently exist among MTS private sector users, as well as the public agencies managing, operating, and enforcing regulations and requirements in the system. In addition, DOD increasingly relies upon the use of commercial transportation services, especially intermodal and maritime freight services. DOD maintains its own electronic systems — as does any large global shipper — to trace and manage its freight shipments. However, there is a growing consensus within DOD that it must operate in a more integrated environment. It must ensure that its shipment identification and information systems are compatible with those of commercial carriers. Coordination with private sector systems will, therefore, be needed to ensure the efficiency of defense and commercial systems during national emergencies and to reduce duplicative research and development efforts.

The diversity and incompatibility of existing technologies present major obstacles to achieving a seamless transportation system. Further, the high costs of developing and deploying new technologies and information systems are another potential barrier.

There is a need to define and assess the best practices in maritime technologies and applications, as well as to establish benchmarking techniques for port and waterways efficiency and productivity for State and local users. International standards for technology and data are also needed. Research and technology initiatives must support national and regional MTS strategic objectives and require adequate funding.

Currently, the Task Force views MTS-related research and technology (R&T) efforts as fragmented. There is a need to:

- Encourage interagency R&T cooperation;
- Promote and expand cooperative R&T programs between government and industry;
- Review and update, jointly and cooperatively, the national R&T agenda on an ongoing basis; and
- Promote and monitor R&T application to the MTS.

Labor

Human resources are an important element of the MTS. While technology has grown in importance, people remain the primary element in making the MTS run smoothly, as well as being a key factor in maintaining the safety and environmental integrity of the MTS. Well-trained, multiskilled employees will be needed to operate equipment and information systems, both on land and at sea.

The need for a qualified work force will be crucial to meeting the emerging requirements of the private, public, and military users of the MTS. Some MTS stakeholders indicate that a critical shortage of such qualified labor currently exists on a worldwide level.

There are inadequate programs to recruit, retain, and educate an expanded MTS workforce, including seafarers, longshoremen, shipyard workers, intermodal operators, and military personnel.

Promotion, by private and public organizations, of the MTS as a key element in sustaining modern society will help attract talented men and women to the various MTS activities.

NATIONAL SECURITY

Security issues pertaining to the marine transportation system include the need to support national security programs; keep the flow of traffic moving; and safeguard the Nation's waterways, ports, facilities, vessels, persons, and property in the vicinity of the port from accidental or intentional damage, destruction, loss, or injury. The MTS is especially vulnerable because its scale, complexity, and pace of activity often overwhelm local, State, and Federal enforcement capabilities. As the importance and value of the MTS grows and becomes increasingly visible, security needs will be greater. Opportunities to threaten our national security or disrupt the flow of traffic and response forces may increase.

Crime and Terrorism

Collectively, criminal and terrorist activity trends suggest that national security planners will place increasing demands on the operations of our MTS. Security planners will insist that the mesh be tightened to deter or ensnare terrorists and criminals who seek to injure U.S. citizens or critical infrastructure, smuggle contraband and migrants, or steal cargo that moves through our ports. They will require appropriate safeguards to reduce the exposure of the public and the MTS infrastructure to would-be adversaries intent on doing harm. To do otherwise would place the American people and vital U.S. interests at an unacceptably high level of risk.

On April 27, 1999, the President directed the establishment of the Presidential Interagency Commission on Crime and Seaport Security. The Commission will undertake a comprehensive study of the nature and extent of the crime problem and state of security in U.S. seaports. The Commission will review ways the Federal, State, and local governments are responding to the problem, and recommend options for improving law enforcement and crime prevention.

Critical issues raised by Task Force members related to criminal terrorist threats to be considered by the Presidential Commission include:

- The lack of national security awareness of the MTS and recognition of the MTS's pivotal role in the Nation's infrastructure.
- The lack of integrated Federal leadership of MTS security issues.
- The lack of visibility in all cargo and people movement on vessels hampers the prevention and detection of illegal activities. This includes the absence of a systemic and integrated approach to track cargo, people, and vessel operations throughout the MTS to detect and respond to criminal activity
- The lack of shared approaches to security, such as public/private partnerships to implement coordination mechanisms to address MTS security vulnerabilities and establishing minimum MTS security standards and operating guidelines for day-to-day operation of on-shore facilities, off-shore facilities, and vessels.
- Capability of port readiness and security committee assets to address terrorism and sabotage threats. Sufficient waterside security must be capable of protecting U.S. citizens and critical MTS infrastructure, as well as keeping vessel traffic lanes open and unrestricted to ensure the efficient deployment of U.S. military forces.

Deployment

The logistical backbone for the rapid deployment of American forces and materiel from the fort to the port to the foxhole relies to a great extent upon the MTS. Both U.S. government-owned ships and commercial trading vessels will conduct sealift deployment. The commercial ships will be called upon to support power projection of military forces through DOT and DOD contractual obligations from the Maritime Security Program and VISA. DOT and DOD mobility planners will rely upon assured access to sealift deployment.

The critical deployment issues are:

- Assured access in all seasons to U.S. commercial capacity and their intermodal systems, and U.S. government-owned sealift ships.
- Sufficient shipbuilding industrial base to build and repair the commercial and military ships needed for deployment.
- Sufficient U.S. manpower, including mariners, longshoremen, shipyard workers, and others, to support deployment operations.
- Sufficient capability to meet DOD deployment timelines in terms of ports, waterways, intermodal connectors, and U.S.-owned commercial vessels.

The value of the MTS to the security and power projection of the United States is often understated. Trends and issues related to the continued existence of a U.S.-flag fleet and its mariner base include Federal budget support, globalization and corporate restructuring, and commercial vessel technology. DOD military planners determine the level of commercial sealift required to meet military deployment, while commercial market forces drive alliances, investments, and vessel use. Changes resulting from these forces could compromise the Nation's ability to respond to national security interests.

Increased business at commercial ports has led to concern by some commercial port authorities and terminal operators regarding their potential role as strategic ports. The nature of military deployments — moving large volumes of cargo with little warning — has caused some ports to view DOD wartime business as a potential constraint on their ongoing commercial operations.

The MTS must strive to meet the needs for deployment capabilities from the ports, waterways, intermodal connectors, and sealift ships (both government owned and commercial) outlined in DOD's MRS. The MTS must also strive to meet the MRS timeline requirements for the rapid projection of forces and timely delivery of sustainment supplies by the commercial industry. Trends and issues that concern the maritime industry, such as landside access, adequate channel dimensions, and security, are of equal concern to DOD.

National security, force projection, and forward presence of American seapower depend upon a strong shipbuilding and repair industrial base and U.S.-flag merchant fleet. However, this base is now at a critical level because of the dramatic contraction in the number of ships that have been built for commercial customers and the U.S. government. This contraction has seen the U.S. market share of commercial shipbuilding fall from number one in the world to only 1 percent of the world market share. The pool of skilled shipyard workers fell from 1.2 million to 100,000; the build rate for naval ships fell to its lowest level since the Great Depression. As a result only seven shipyards currently build commercial or naval ships of 400 feet of length or greater. Consequently, if the national security objectives of the U.S. are to be accomplished, it is imperative that a comprehensive plan be developed and executed to ensure the U.S. shipbuilding industrial base and U.S.-flag merchant fleet is sustained.

The reliance upon peacetime transportation capabilities to support deployments for national security objectives during contingencies also reinforces the need to attract and retain qualified MTS personnel workforces. The MTS work forces of the ports, waterways, intermodal connectors, ship construction and repair facilities, and ship crews and operators are necessary to support deployment capabilities. There is a demand for ship crews and operators to support the activation, operation, and sustaining of government surge vessels. Aside from a small number of retention crews assigned to these 100+ vessels, the mariners will be sought from the same commercial sources as the commercial operators. The commercially active U.S.-flag merchant fleet generates a pool of mariners who would be available for surge fleet crewing while on shore side relief, but if the size of the commercial U.S.-flag fleet decreases, there is a corresponding decrease in the available mariner pool.

INFRASTRUCTURE

The U.S. MTS is one of the largest in the world. With more than 300 ports, 1,900 terminals, 25,000 miles of waterways and harbor channels, and extensive intermodal connections, the MTS is a complex system. It is utilized by a wide range of users and is of interest to an even wider range of stakeholders.

Task Force members identified three issue areas within infrastructure — capacity, funding, and the regulatory framework.

Capacity Issues

Capacity issues include increasing:

- Demand for use of the MTS;
- Demand for dredging, along with disposal of dredged material;
- Concerns regarding the physical condition of locks and dams;
- Competition in land uses in and around the MTS; and
- Demand and constraints on intermodal connections.

Increasing Demand: The demand for commercial use of the MTS continues to grow, fueled by increases in world trade and domestic use of the waterways to transport goods and people. Population growth along the coasts is also contributing to this demand. Fifty-three percent of the Nation's population lives along the coasts, even though coastal communities represent only 17 percent of the Nation's landmass. Coastal communities are experiencing higher growth rates than other parts of the country. This puts a heavy burden on the coastal environment.⁽²²⁾ Reflective of this are the increasing demands being placed on the system by pleasure craft, cruise ships, sightseeing boats, floating restaurants, and casinos. As vast as the Nation's MTS is, it is still a limited resource.

Accordingly, there is a critical need to improve productivity, throughput capacity, mobility, and accessibility to meet the projected growth in world trade and recreational use. The Congressional mandate for this report explicitly required the MTS Task Force to:

“Take into account the capability of the marine transportation system, the adequacy of depth of approach channels and harbors, and the cost to the Federal Government to accommodate projected increases in foreign and domestic traffic over the next 20 years.”

There is a sense of urgency among some port and waterway stakeholders who maintain that there is not enough spending on construction and operations and maintenance (O&M) programs for harbors and waterways. Stakeholders recognize the importance of managing this increased throughput to avoid and minimize the environmental impact of projected growth. Already, the impact of larger vessels, industry consolidation, and hub port operations has begun to shape the portfolio of the USACE harbor-deepening projects. Additionally, USACE field offices are conducting navigation system studies to examine the need to replace or rehabilitate multiple lock chambers on key inland waterway segments.

Dredging: Dredging is one of the most visible and hotly discussed capacity issues. The Congressional Mandate specifically required an evaluation of the capability to dispose of dredged materials that will be produced to accommodate projected increases in MTS traffic. As was discussed in Chapter III, the Nation's future dredging requirements can be expected to grow above recent historical levels following the completion of current and future deepening projects, and the initial maintenance requirements associated with these deeper channels.

In conjunction with the expected growth in dredging requirements, there is a need to identify new dredged materials disposal sites to augment existing upland confined disposal facilities and open water sites that are at or near capacity. This need is being systematically addressed through the development of Dredged Materials Management Plans (DMMPs), in coordination with local planning groups, as prescribed in the National Dredging Team (NDT) guidance published in June 1998.

The expected growth in future annual dredging requirements also underscores the need for finding new disposal alternatives, including using dredged material as a resource in beneficial use applications and implementing dredged material reduction practices. This need is beginning to be addressed, as reflected in the number of harbor channel-deepening and improvement projects that are, or likely will be, authorized with innovative disposal options such as island and habitat creation. In addition, improved transportation and watershed planning are necessary to minimize dredging.

Some large industrial ports are burdened with contaminated sediments and have encountered difficulties in locating suitable upland disposal sites. There is a need to identify cost-effective technologies that can remediate contaminated sediments at full-scale dredging operational levels of production. Again, research and development efforts are focusing on this issue. Existing, more costly methods will have to be utilized until such time as research efforts lead to new lower cost procedures.

Locks and Dams: As noted earlier, the inland lock and dam system is aged and undersized, requiring the break up and reassembly of some tows. This increases transit times, produces queues at locks, and results in increased operating costs and decreased efficiency. Nationwide, queuing delays total some 550,000 hours annually, representing an estimated \$385 million in increased operating costs borne by shippers, carriers, and, ultimately, consumers. These delays will become more severe as system traffic grows and as aging infrastructure increases maintenance and repair time. Among the 36 locks with high average delays in 1998, 19 are on the Upper Mississippi River-Illinois Waterway system, 5 are on the GIWW or its connecting channels, and 12 are on the Ohio River system. Two locks on the GIWW and one on the Ohio River averaged delays of 10 to 12 hours, and four other locks averaged delays of 4 to 5 hours. Most of the locks with delays of 1 hour or more have improvement projects under way, authorized, or under study. The time spent at locks is an expense, regardless of whether the tow is waiting or processing through the lock. Delay costs are in the range of \$250 to \$350 per hour, based on a 15-barge tow.

Competing Land Uses: Today, many of our Nation's cities are trying to revitalize their communities through economic redevelopment. These efforts have led to renewed interest in urban waterfront areas. The land use implications of this trend are significant for maritime interests in terms of both current operations and future needs. The primary focus of this waterfront redevelopment is on residential, commercial, recreational, and tourist-related uses. Intermodal connections may also suffer land constraints because of zoning and environmental regulations that restrict expansion, particularly in densely populated areas.

For the MTS community, this type of development can lead to increased congestion in and around marine terminals and other marine activities, community conflicts caused by compatibility issues, and limited future expansion opportunities for traditional industrial and maritime uses. Land use conflicts may also generate increased environmental impacts. To prevent or minimize adverse impacts, maritime interests need to work closely with community planners to seek solutions that allow marine activities to function efficiently and in an environmentally sustainable manner, while providing local communities with nonmaritime waterfront development opportunities. It is equally important for local planners to provide for future maritime expansion because of the limited availability of suitable waterfront property.

Intermodal Connections: The adequate development and maintenance of the intermodal connections — roadways and railroads — is a particularly crucial capacity consideration for the MTS. The Nation's economy, environment, international competitiveness, and national security, as previously discussed, increasingly depend on the effectiveness of our intermodal transportation system. The benefits of an integrated intermodal system can only be achieved by cost-effective linking of the various modes of transportation. Good intermodal access is a prerequisite to support the growing demand on the MTS.

U.S. ports and terminals, as the land/water transportation interface, are the pivotal links for the movement of our Nation's international trade. The projected growth in international freight poses an enormous challenge for U.S. ports and their landside access connections. For example, the Ports of Long Beach and Los Angeles handle 20,000 truck and 30 train movements per day. These figures are expected to reach 50,000 trucks and 100 trains by 2020.

Landside access is a major challenge that most U.S. ports face. Intermodal connections between the transportation modes are often the weakest links in the Nation's transportation system. The major ports of the Nation are predominantly located in large metropolitan areas where truck and rail traffic compete with commuters on crowded highways. Numerous rail at-grade street and highway crossings impede access to ocean terminals and cause delays and increased dwell time in the ports. Collisions associated with at-grade crossings and roads are already a problem and promise to become even worse because of competing demands of expanding populations and increased trade.

In 1997, MARAD examined the issue of landside access to U.S. ports and terminals by reviewing surveys conducted by private organizations. The analysis of 58 ports, including 31 container ports, identified the following key infrastructure impediments:

- More than half of all respondents including the container ports identified traffic impediments on local truck routes as the major infrastructure problem;
- Half of all respondents have limited availability and location of turning lanes and multiple access routes;
- Half of all container ports lack near-dock rail terminals that would ease transfer of containers from rail to vessel; and

- Nearly half of container ports and more than a third of all ports reported bridge impediments pertaining to highway access and load-bearing capacity.⁽²³⁾

The continuing growth of container ship size and capacity could add to rail and highway capacity problems. The peaking of demand for rail and truck service associated with vessel arrivals will intensify with mega-ships, and the even larger vessels that may evolve, sending waves of containers through the MTS. The pressure of peaking demand on ports and inland transportation facilities is an issue that should be addressed. Railroads and motor carriers cannot be expected to provide transportation capacity to meet peak demands (locomotives, railcars, and crews, in the case of railroads) without compensation to cover the costs of that capacity in off-peak periods.

This point was illustrated by a recent situation in Southern California. In fall 1997, peak holiday cargo flows and a port labor shortage, coupled with insufficient train sets to meet peak demand and railroad merger problems, led to near gridlock and extensive cargo delays. Movement of international freight in today's business environment requires a competitive logistics system that emphasizes quality service and total logistic costs. Inefficiencies at any point in the system can disrupt the total system, which reduces productivity and profitability for transport providers and, ultimately, adds costs for shippers and consumers.

Inland from the port/railroad connections, railroads face challenges that could hamper the flow of containerized foreign trade to and from interior markets. There is increasing recognition that the railroads' main lines, yards, etc., are reaching their capacity to handle traffic efficiently.

Significant private sector capital investment will be required to meet emerging demands. As private companies, railroads (like shipping companies) will make investment decisions based on the anticipated return earned on assets.

This situation could adversely affect intermodal transportation. Intermodal trains require a great deal of rail main line capacity compared to other types of freight service — and profit margins on intermodal traffic are generally slim. As they face capacity challenges and mounting investment requirements, railroads may reduce the least profitable aspects of their intermodal business. The effect on container traffic moving inland from the ports could be mixed. Railroads in the west earn acceptable profits on double-stack trains moving 2,000 miles or more from Pacific Coast ports to the Midwest and eastern parts of the country. However, the shorter rail hauls from Atlantic Coast ports could be reassessed, where the 700-mile cost/rate breaking point of double-stack container trains with trucking plays a greater role.

There is an increasing recognition of interplay of intermodal investments with related economic benefits. Inefficiencies in the transportation system impose additional costs to the distribution system. Removing them by providing intermodal improvements and other strategies creates benefits both locally and nationally. Decision makers need to know the costs of an inefficient transportation system and the broad-based benefits. Identifying and quantifying the benefits associated with intermodal freight projects is difficult, but they must be addressed in order to better allocate scarce public funds.

The interplay between intermodal efficiency and environmental protection also is becoming better understood. For example, effective and efficient cargo movement can reduce congestion-related environmental impacts.

Funding

Challenged by limited resources, the MTS infrastructure and services must adapt to meet the increased demands of trade, passenger, and recreational use, coupled with national security

requirements. Funding the MTS is a daunting challenge for the future. Improved technology, better coordination, and refined processes will help, but not entirely relieve the government and private sector of growing resource and investment demands. Government and the private sector MTS users and service providers must cooperate to ensure that the needs of each component of the MTS are recognized and appropriately funded. There was widespread agreement among Task Force members that the MTS provides benefits to a wide spectrum of stakeholders. While full consensus could not be reached on funding, the Task Force members clearly recognized its importance to achieving an MTS that is capable of meeting future MTS demands.

Regulatory Framework

The Task Force identified an issue related to the current regulatory framework under which MTS must operate. The jurisdiction of the MTS, as previously discussed, falls under many levels and agencies of the government. Local, regional, State, and Federal guidelines and regulations on use and expansion affect various portions of the marine transportation system. This myriad of regulatory activity creates redundant, overlapping requirements on the system users and service providers.

ENVIRONMENTAL

Environmental quality is essential for sustaining coastal and marine ecosystems, commercial and recreational fisheries, and the economic vitality of the marine transportation system. The health of coastal and marine ecosystems is affected by water quality, and in turn, water quality depends upon ecosystem health. There is a clear relationship between environmental protection and MTS efficiency and safety. Improving MTS efficiency and safety will reduce risks to the environment.

A broad spectrum of environmental laws, regulations, and practices at the Federal, State, and local levels currently governs the MTS. These often lead to separate management regimes that, at a minimum, require improved coordination and implementation at all levels. As evidenced in the discussion to follow, many of the direct environmental threats posed by ports and waterway users are addressed to some degree by existing programs. While there are several MTS environmental issues that need additional focused attention, much of the need in this area is for continued vigilance in implementing existing environmental standards, coordinating environmental goals and objectives, increasing education, and harmonizing environmental protection with other national goals, such as economic growth and national security. In doing so, improving integrated and nonregulatory approaches should be fully explored before creating new regulatory and statutory tools.

While significant progress has been made, important challenges continue to exist in effectively reducing point and nonpoint sources of pollution that enters the waterways. Because the MTS is downstream of homes, industries, farms, communities, and rivers, the health of the MTS environment is inextricably linked to the health of the watersheds. Identifying and reducing sources of pollution upstream will help to maintain and improve the health of the MTS environment. The activities supported by the MTS also directly affect air quality, land uses, and water quality. The connection between port and waterway operations and water quality is more visible because most of the Nation's ports are located in estuaries. Estuaries serve as critical migration routes, habitats, and nursery areas for diverse marine species and support a variety of industrial, commercial, and recreational marine uses.

Thus, decision-making and planning efforts must acknowledge and account for the fundamental interdependency between the MTS and other watershed interests and the environment. This relationship will take on even greater significance as the volume of maritime transportation grows over the next century.

Many ports have recognized the importance of environmental stewardship as well as the interrelationship among port activities, waterway activities, and other watershed activities with regard to environmental health. In cooperation with Federal, State and local governments, the ports are taking steps to implement environmentally sound practices and are becoming more active in State, local and watershed planning and management processes.

Ship Operations and Vessel Movements

Larger vessels, growing congestion, and the anticipated increase in maritime traffic are raising the risks of accidents that harm the environment. In addition, the day-to-day operation of vessels continues to be a potential source of marine pollution and damage to the seabed.

Vessel Discharges, Spills, and Groundings: While the discharge of oil, sewage, and plastics into marine waters by maritime vessels is generally regulated at the Federal, State, local, or international level, some direct discharges still occur (for example, emptying untreated sewage from vessel toilets) because of the lack of awareness or compliance with the requirements. Other discharges may leach from antifouling agents or paints, which in some cases may harm marine species. Beach and shellfish fisheries closures are among the most visible and costly examples of the effects of these uncontrolled discharges.

Recreational users are often unaware of the effect of their activities on the environment. Recreational and commercial fishing vessels and activities are also a source of marine pollution. For example, lost or neglected fishing gear contributes to the depletion of commercial fisheries. Plastics, sewage, fuel spills, and debris from recreational vessels adversely affect marine life.

Shallow-water habitats, such as seagrass beds or coral or hard-bottom reefs, are fragile but critical elements of surrounding ecosystems. These habitats often serve as nurseries for commercial and recreational fish species. When vessel groundings occur, vessel parts such as the propeller, hull, keel, or anchor can seriously harm marine habitats. Even minor scrapes from propellers are often a high enough frequency to prevent the natural recovery of habitats. For coral reefs, a relatively small vessel can cause major structural damage to habitat, especially if the damage is exacerbated by natural events such as hurricanes.

Human Factors/Education and Training: Environmental degradation can often be traced to human factors that can cause accidental discharges, spills, collisions, and groundings. Human causal factors can be the result of poor judgment, flawed operational procedures, lapses in communication, design flaws, and inadequate training and education. This remains a critical area for public and private stakeholders to address in MTS management and operation.

International Standards and Enforcement: The trends previously discussed show that foreign vessel calls in U.S. ports will continue to increase. Ninety-five percent of all international trading vessel calls in the United States are foreign flag. International conventions are an important way to control the quality of vessels entering U.S. waters. Existing conventions and codes provide broad coverage of vessel pollution-prevention issues. However, without universal implementation and effective enforcement, these conventions alone will not achieve the desired result.

International standards for addressing global environmental issues are important tools for environmental protection and maintaining a level playing field. A recent example is the current effort through the International Maritime Organization to control anti-fouling paint. While global action on anti-fouling systems is preferable — economically and environmentally — to U.S. action, care must be taken to avoid inadvertent anticompetitiveness effects that could result through treaty negotiation.

Shore-Based Reception Facilities and Shipboard Treatment: Many international and national standards establish a need for shore-based reception facilities (SRFs) to dispose of garbage, sewage, ballast water, bilge water, and other ship-generated materials. These standards aim to ensure that reception facilities are available to meet vessel operators' needs, which makes SRFs a viable alternative to MARPOL-permitted at-sea discharges. However, these facilities often do not exist at marine terminals in ports for a variety of reasons, including limited land area, complex facility management and regulatory requirements, liability, cost, and technical feasibility. Shipboard technologies may be available for some of these waste streams. For others, such as ballast water, shipboard technologies are being developed.

Vessel Air Emissions: Air emissions from vessels' cargo vapors, incinerators for ship-generated wastes, and propulsion and auxiliary engines — including suspended particulates, carbon monoxide, sulfur dioxide, and nitrogen oxides — affect environmental quality. In 1997, IMO added an emissions annex to MARPOL. Annex VI addresses emissions from vessels. Ship air emissions have not been the focus of significant regulation, but as air quality issues have become more acute, increased international and domestic attention is being focused on these emissions. New domestic regulations implementing MARPOL 73/78 Annex VI are being developed.

Invasive Species and Organisms: A critical environmental issue for the MTS, one receiving significant attention, is the introduction of invasive species. The introduction of exotic or nonindigenous species into an area, whether intentionally or accidentally, can severely affect the ecological, economic, and social aspects of the environment. These effects occur when the nonnative species overwhelm the local species or upset the native ecological balance. Transportation of these species to and throughout the U.S. occurs in ballast water, cargo, and on the hulls of recreational and commercial vessels.

Vessels carry seawater in onboard tanks to adjust their draft, buoyancy, trim, and list, and to improve stability under various operating conditions. This water, which may be discharged into coastal and inland waters during loading and unloading operations, has the potential to contain nonnative plants and animals, including microorganism and pathogens. The surviving organisms have the potential to alter the local ecosystem. Invasive species have been implicated in several extinctions and currently threaten many protected species, and reduce the overall numbers of native species, which alters local food webs. Ballast water management requirements apply in certain areas within the U.S., while voluntary measures have been adopted internationally and are being implemented in the U.S. Similarly, damaging organisms adhere to or stowaway on vessels and cargo. Such organisms can cause significant damage to agricultural and other natural resources.

While a number of steps have been taken to begin addressing the serious threat of invasive species, they will continue to be a challenge into the next century. Additional technological, management, and legal measures likely will be needed to reduce the threat further. In addition, research and technology development and deployment should focus on providing safe alternatives (for example, in vessel design and treatment technologies) to current ballast exchange, an operation that may pose risks to both the vessel and the environment under certain conditions. Clear standards governing the efficacy of treatment and exchange alternatives also must be developed, incorporated into legal authorities, and deployed. Consideration should also be given to improved mechanisms to prevent introduction of unwanted organisms in cargo.

Port Development and Terminal Operations

As with vessels, ports and terminal operations pose multiple media environmental risks that in large part are addressed by existing statutes and regulatory programs. Nevertheless, Task Force

members noted that port operations and development can conflict with other land uses and habitat conservation objectives in the Nation's increasingly congested waterways.

Potential impacts upon MTS environmental quality result from many port operations and related activities. These include storm water runoff; port expansion; vessel-support activities; cargo handling; chemical storage and handling; motor carrier and rail port activities; and public access and recreation.

Storm Water/Wastewater: A significant environmental concern for marine facilities is wastewater and storm water management. By their very nature and location, many of the activities at marine facilities are exposed to the elements and, thus, are large generators of storm water. Storm water frequently contains sediments, chemicals, and debris.

Port Development: Port expansion, bulkhead installation, land filling, pier construction/rehabilitation, dredging, and dredged material placement are among the port activities that directly affect water quality, including wetland and other habitat loss, degradation, and creation.

Vessel-Support Activities: Vessel maintenance and construction activities also pose environmental risks. The major waste streams are chemical paint stripping, abrasive blast and surface preparation, painting and painting equipment cleaning, solvent, and engine overhauling and repair. In addition to particulate emissions, ship maintenance and repair activities emit various chemicals such as volatile organic compounds into the air.

Cargo Handling/Landside Vehicle Emissions: A significant amount of diesel-powered equipment is used in a typical port and terminal facility, including forklifts, tractors, and front-end loaders. Air emissions from these vehicles, when combined with those from vessels, as well as from trucks and trains that deliver and remove cargo, may contribute to nonattainment of certain air requirements. Off-port landside vehicle emissions continue to be a concern. The interrelationship between rail, truck, and automobile sources, particularly in congested areas, and MTS activities should be considered in addressing airshed issues.

Dry bulk cargo handling causes air, water, and solid waste pollution. The loading and unloading techniques used with cargo handling may produce dust and solid waste. Loading and unloading of hazardous materials can potentially impact human health and the environment.

Watershed Impacts: U.S. coastal areas — including both the waterfront and the waterways — support an extensive and unique set of ecological, commercial, and recreational functions, and provide food, shelter, and nursery areas for birds, marine invertebrates, fish, and other wildlife. Across the Nation, estuaries contain:

- 32,300 square miles of wetlands,
- 21,900 square miles of shellfish waters, and
- 27,000 public recreation sites.

Many of these productive areas have been modified or lost to support residential, agricultural, industrial, and commercial growth, as well as expansions of ports and terminals.

Since the 1700s, the 48 contiguous States have lost more than half of their original wetlands. Annual wetland losses have decreased significantly, from an estimated 460,000 acres a year 25 years ago, to less than 120,000 acres today. Nonetheless, physical alteration or degradation of habitat continues to occur, with a concomitant loss of diversity, as a result of human activities such as channeling, drainage for agricultural purposes, development, and dredging. Between 80 and 90

percent of U.S. shorelines are undergoing net long-term erosion. While some this erosion is caused by natural processes, erosion resulting from anthropogenic factors has increased over the last century. The development of tidal flats and barrier islands has eliminated unique and essential habitats for many plants and animal species. As pressures for port expansion and economic development increase with the growth of population and trade, harmonizing the MTS demands and requirements with the environmental objective — the stewardship of the environment — will become increasingly challenging. Achieving this goal will require multidimensional vision. In addition, watershed and regional transportation planning must become truly intermodal. Furthermore, it is understood again that improvements in marine navigation, safety, and efficiency will reduce MTS operational risks and enhance environmental protection.

Waterway and waterside infrastructure improvements, without appropriate landside connections and infrastructure, can lead to additional environmental degradation caused by congestion and accompanying air pollution and increased risk of environmentally damaging accidents. At the same time, improperly planned and developed waterside infrastructure, such as inadequate channels and aids to navigation, can create a substantial risk of environmental damage from on-water spills and accidents and exacerbate landside congestion.

Major challenges remain in identifying causes and effects of marine pollution sources and successfully addressing nonpoint source pollution. To properly address MTS environmental quality, it is necessary to conduct studies to account for the consequences of the vast array of activities conducted in associated watersheds and airsheds. Addressing marine environmental quality issues will require increased communication between policy makers, planners, MTS stakeholders, and researchers, greater coordination among the many organizations responsible for governance and management of the MTS, and the cross-application of study knowledge and technology.

In addition, industry has begun initiatives to develop best management practices to reduce pollution. These programs include application of technology, pollution-prevention and environmental awareness education, and worker training. Additional efforts in this area should be encouraged.

Finally, restoration and recovery efforts from past pollution should be encouraged. Continuing negative impacts from historic sources of pollution should be controlled and, where possible, eliminated.

Dredging

Issues surrounding dredging and dredged material management are one of the important forces in the MTS that play a role in different aspects of the MTS including, infrastructure, safety, and the environment. While some discussion of the issue appears in various parts of this report, this discussion focuses on the question how the Nation can effectively and efficiently deepen and maintain U.S. ports and harbors in an environmentally sound manner. It also addresses whether there are sufficient environmentally sound dredged material disposal options (including disposal capacity) to accommodate the anticipated needs of the MTS in the 21st century.

Dredging is necessary in many harbors and channels because most of the Nation's harbors and channels are not naturally deep enough to accommodate modern vessels. The maintenance and improvement process is challenging because ports are located in or near some of the Nation's most environmentally sensitive areas, such as valuable wetlands, estuaries, and associated fisheries.

The dredging challenges that must be addressed by Federal agencies, State/local governments, and MTS stakeholders include:

- Improving the coordination and planning among all stakeholders to ensure the development and maintenance of the Nation's maritime infrastructure in a manner that will increase economic growth and protect, conserve and restore coastal resources;
- Expediting the development and use of new technologies to cost-effectively remediate contaminated sediments at full-scale production of dredging operations;
- Conducting comprehensive regional dredged material management planning in a manner that ensures the beneficial use of dredged materials, wherever possible;
- Developing regional sediment management procedures that seek cost-effective, environmentally sound dredged material disposal applications, increase dredged material reuse alternatives, and minimize dredged materials production;
- Expediting the development of navigation channel maintenance management technologies that improve reliability and safety of Federal navigation channels;
- Developing a better understanding of the uncertainties in both setting environmental requirements and evaluating and predicting the impacts of dredged material disposal on human and ecological health;
- Integrating long-term dredged material management planning into the local watershed planning process; and
- Taking steps to minimize the amount of dredging required.

Issues Discussion: The USACE is the primary Federal agency responsible for managing the program that directs dredging and disposal of dredged material from Congressionally authorized navigation improvement and maintenance projects. USACE is responsible for developing and maintaining Federal navigation channels. Permit applicants (e.g., port authorities, pipeline operators, terminal owners, industries, and private individuals) dredge an additional 100 million cubic yards annually for non-Federal navigation projects (i.e., ports, berths, and marinas). USACE reviews projects and issues permits for dredging and dredged material disposal in accordance with the Rivers and Harbors Act (RHA), the Clean Water Act (CWA), and the Marine Protection Research and Sanctuaries Act (MPRSA or Ocean Dumping Act).

Under the CWA and MPRSA, the Environmental Protection Agency (EPA) is responsible for providing environmental oversight and for developing, in cooperation with USACE, the environmental criteria by which the USACE evaluates proposed discharges of dredged material. EPA is also responsible for designating and monitoring ocean-dredged material disposal sites under the MPRSA. Several other project development and environmental compliance statutes, regulations, and policies at the Federal, State, and local level (such as the Coastal Zone Management Act for dredging in the coastal zone) also apply to typical dredging projects. A USACE permit is required when dredged sediments are disposed of in the ocean, inland, or near-coastal waters. If dredged material is disposed of on land, a number of other Federal, State, and local regulations may come into play.

This regulatory framework, evolved over many decades, consists of a number of statutes and regulations that are based upon a variety of different goals and objectives. This is a byproduct of decades of efforts by a variety of Congressional committees and subcommittees with diverse interests and jurisdictions. The scope and intent of each statute and regulatory program tend to track closely the jurisdictional authority of the sponsoring Congressional committee rather than make a systematic effort to address sediment management comprehensively and coherently.

For a broad range of reasons, dredging projects can become stalled in the review process. The problems that slow down the dredging process can be categorized into the following areas: planning;

project review (including sequential rather than concurrent review); scientific uncertainties; inconsistent funding allocations; and inconsistent vertical and horizontal collaboration among governmental offices and stakeholders. Some of these and other shortcomings were highlighted in the 1994 Interagency Working Group on the Dredging Process Report to the Secretary of Transportation, *The Dredging Process in the United States: An Action Plan for Improvement*. As a result of that report and MARAD-sponsored Regional Listening Sessions, the Federal NDT was formed in 1995 to facilitate the resolution of dredging issues among Federal agencies.

The NDT was formed to facilitate communication, coordination, and resolution of dredging issues among participating Federal agencies and to ensure that dredging of U.S. harbors and channels is conducted in a timely, environmentally sensitive, and cost-effective manner. Regional Dredging Teams (RDT) have been created around the country to provide forums for local and regional issue resolution; foster the exchange of information with stakeholders; and provide liaison with Local Planning Groups. These groups are charged with developing long-term dredged material management plans. Finally, a national dredging policy has been established that recognizes that the aquatic environment is a critical asset that must be protected, and understands the need for timely and effective dredging to ensure the viability of the Nation's ports and waterways.

Since the NDT was established, progress has been made to implement the recommendations of the Report by providing dredging-related guidance to and encouraging the establishment of Regional Dredging Teams and Local Planning Groups. Likewise, some progress has been made in engaging stakeholders earlier in the dredging decision-making process and in coordinating Federal activities related to dredging projects.

Dredged Materials Management Planning has been initiated using a consensus-based approach to develop long-term plans for environmentally sound and cost-effective management of dredged material. Stakeholders, (e.g., port authorities, government officials, natural resource agencies, public interest, and environmental groups, the scientific research community, recreational marine interests, shipping and business interests, and private citizens) are encouraged to work together in Local Planning Groups to develop the long-term plans.

The Local Planning Groups need to use a watershed approach in developing their plans because much of the contamination found in dredged sediments originates from sources of pollution located upstream from the affected ports and harbors. Watershed planning to reduce contamination and sediments entering waterways should diminish the need for port and harbor dredging and the amounts of contaminated sediments that are encountered when dredging is required. Scientific uncertainties in evaluation of risks of dredged material disposal are being recognized and addressed. To protect human and ecological health, dredged materials should be evaluated in a scientifically sound and environmentally protective manner to identify potential contaminants and their associated potential risks.

While taking into account the physical, chemical, and biological complexities of the sediment and the environmental conditions specific to each disposal site, uncertainties still exist in the scientific evaluations. Additional efforts to reduce these uncertainties include developing scientifically sound sediment toxicity testing methods and creating a biological-effects database for bioaccumulative contaminants. Improving the understanding of the science involved in dredged material management is important because this information assists risk managers in making scientifically sound decisions that protect ecological resources and human health.

In considering dredging and dredged material management, several basic principles must be understood:

- A significant amount of dredged material can be beneficially reused. Based upon recent

statistics, about 5 to 10 percent of dredged material is contaminated and some of this material may, in some cases, also be reused in beneficial applications.

- There will be a continuing need for material to, among other things, replenish beaches, create, and restore vital wetlands and wildlife habitat, maintain barrier islands, and create land area.
- Through natural and human processes, sediments will continue to be deposited in our waterways, and that sediment must, in many cases, be removed to maintain safe navigation.
- The Nation's wetlands, estuaries, rivers, and other coastal habitats where dredging and dredged material disposal occur, are critically important for supporting wildlife, commercial fisheries, recreational opportunities, and livable communities.
- While progress has been made in addressing some of the process difficulties identified above, additional work is needed.

With these basic principles in mind, it becomes clear that our focus should shift from one of dredge and disposal to one of overall sediment management.

Sediment Management: Looking at dredging from the venue of sediment management brings into focus the need for holistic watershed and regional planning and strategies. We must consider ways to reduce the volume of sediments entering the waterways through best management and smart growth techniques (such as restricting waterfront development to leave buffers), while developing strategies to control erosion, and techniques to reduce runoff from agriculture and soil disruption activities. At the same time, consideration needs to be given to *in-water* management techniques to capture or redirect sediments flowing downstream. The cost/benefits of perpetual dredging should be compared to techniques or combinations of techniques that also reduce the overall input of sedimentary particles. When dredging is needed, dredging projects, projects in the watershed or region that require sediment placement, and habitat improvements/restoration should be coordinated and planned well in advance. Each of these activities will require an extraordinary amount of Federal, State, local government, and private sector planning, coordination, cooperation, and vision.

While contaminated sediments pose a potentially more complex problem, a similar watershed or regional approach is necessary to address the issue. As with reducing the volume of sediment entering the waterways, additional attention should be given to strategies to reduce the contaminants in those sediments. While progress has been made in decreasing end of pipe discharges of contaminants into waterways, storm water runoff continues to be a major problem. Again, concepts of best management practices (reduced use of fertilizers, chemicals, etc.) and smart growth could be used to reduce pollution entering the waterway. Planning growth to maintain buffers along the waterways, planning development to minimize the burden on municipal sewer systems, and controlling runoff from paved surfaces are among the approaches that should be considered. These efforts, combined with the end of pipe controls and the removal of existing contaminated sediments through dredging, should result in some reduction in the future amount of dredged material that is contaminated.

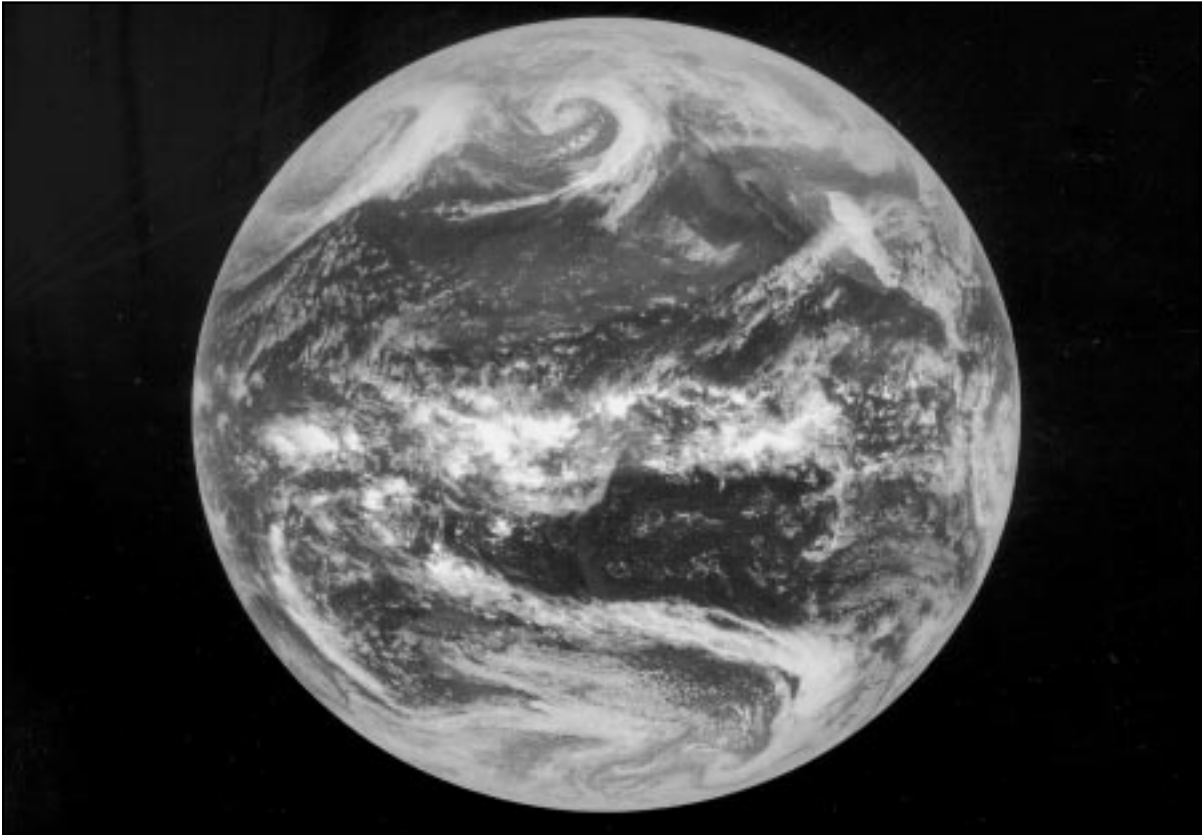
Beneficial Use: As noted above, the vast majority of dredged material is uncontaminated and, thus, potentially available for reuse. In recent years there has been a change in emphasis on dredged material management to maximize its potential use. It is now recognized that dredged material can also be a resource to be used beneficially. Among the beneficial uses for dredged materials are beach nourishment, wetlands creation, habitat restoration, barrier island reclamation, manufactured soil, abandoned mine reclamation, contaminated site remediation, and landfill for development and recreation uses. Examples of such projects abound.

More innovative funding approaches, particularly at the local level, have been established throughout the country for beneficial uses. Unfortunately, however, the costs associated with beneficial use of dredged material sometimes exceed the cost of traditional open-water disposal. Congress has established cost-sharing formulas for Federal participation in beneficial use projects. Local governments and other non-Federal sponsors are having difficulty raising the non-Federal share. Innovative funding sources should be explored and encouraged. For example, incentives could be developed for the private sector to construct beneficial use projects with reimbursement from dredging proponents including the USACE under section 217 of the Water Resources Development Act (WRDA) 1996.

Intermodal Transportation Planning: Although it is well recognized in some sectors that the waterway infrastructure is integrally connected to the landside transportation network, that recognition is not widely shared by the public at large. Until very recently, little attention was given to this relationship because waterways tend to be distant and removed from daily activities. When the public thinks of transportation, it brings to mind those parts of the transportation system that are seen and felt directly in everyday life — primarily the highway, but also rail lines and airports. As previously mentioned, the majority of products we use in our daily personal and professional lives comes to us through the Nation's ports and waterways. If any part of that system fails or is improperly maintained, goods fail to reach our homes, businesses, or markets in a timely manner. A failure of one part of this system affects the other parts. For example, if the roadways from the port are constricted or in poor condition, the movement of goods from the port inland becomes difficult, and congestion occurs, compounding its byproducts of increased air pollution and safety concerns. Likewise, insufficient dredging creates congestion at the port and interferes with the smooth flow of goods, both into and out of our Nation. Conversely, resources spent building or improving roadway access are wasted if channels leading to the port do not have the year-round capacity to move more cargo — dredging may not be appropriate without resources spent on landside improvements.

A better understanding and recognition of this interrelationship is necessary. Proper infrastructure development and maintenance of each mode of the system require an integrated approach to planning. MPOs, State Departments of Transportation, and other State and local agencies and organizations must work with the ports and other stakeholders to reach beyond the traditional unimodal focus to embrace true intermodal transportation planning and development. In addition to ensuring the rational allocation of resources to transportation-related projects and the continuous flow of goods, such an approach would aid assessment and planning for dredging needs.

Summary: There is inadequate information regarding whether there will be sufficient capacity to properly manage the quantity of dredged material that will be generated to meet the needs of the MTS into the 21st century. Efforts must be made to seek alternatives to dredging while meeting system capacity needs. To be sure, better cooperation is needed among all levels of government and with the public and private stakeholders. The public must be provided information about the true nature of dredging and dredged material and the uses to which it can be put. Resources will need to be directed toward better planning, better management of sediments, and reuse of dredged material. The existing statutory and regulatory framework should be assessed and possibly adjusted to approach sediment management comprehensively and coherently and in a way that harmonizes environmental protection with sustained economic health and growth. While proper open-water disposal causes limited negative environmental impacts, public demands for beneficial uses are becoming more prevalent. As a result, the cost for dredging is increasing, and more innovative approaches to designing and financing beneficial uses and sediment management should be fully explored. Better planning and management will be helpful in containing those costs, but that too will require resources.



v.

The Desired State of the U.S. Marine Transportation System in 2020

VISION STATEMENT

Task Force members adopted the following vision statement, which was developed at the MTS National Conference:

The U.S. Marine Transportation System will be the world's most technologically advanced, safe, secure, efficient, effective, accessible, globally competitive, dynamic and environmentally responsible system for moving goods and people.

GUIDING PRINCIPLES

The vision summarizes our goal for the MTS in 2020. To realize this vision, the Task Force members also adopted the following set of guiding principles, which were designed at the MTS National Conference, to shape the strategies and actions necessary to achieve the MTS for 2020.

Achieving this vision is the equal responsibility of private, local, State, and national stakeholders.

- Integration of the MTS with domestic and international transportation systems will provide for national security, ensure economic well-being, enhance the quality of life, and ensure environmental protection.
- Clearly defined, coordinated, and consistent Federal leadership is needed to achieve the vision for the MTS.
- Public-private sector partnerships will meet MTS challenges through shared responsibility, accountability, and agreement on funding.
- MTS decisions will be based on full consideration of and harmonization among diverse interests.
- Aggressive, cost-effective technology development and deployment are essential to maintaining long-term competitiveness.
- People — work force, passengers, and other stakeholders — are critical to the successful operation of the MTS, and human factors are essential to its development.

PRINCIPAL COMPONENTS

The MTS is comprised of waterways, ports, their intermodal connections, vessels and vehicles, and system users. Although each is described separately, all are integral components of the MTS that require coordination for the system to operate efficiently and effectively.

Waterways include the navigable waters of the United States and associated infrastructure (e.g., locks, aids to navigation) that are used by vessel traffic. Channel depth and width will be maintained consistent with demand while achieving cost-efficiency and promoting protection and enhancement of environmental quality. Locks, aids to navigation, and other infrastructure will be maintained for efficient and safe operations.

Ports are those marine transportation facilities where vessels transfer cargo and passengers and where vessels are maintained. Ports will be located and sized to ensure convenient and ready access with characteristics that reflect the markets they serve. Port facilities, such as anchorages and piers, will be sized and outfitted for the range of vessels and traffic expected to be using the system in 2020. Shipyards will be capable of meeting system needs, including national security.

Intermodal Connections are linkages required at the land-water boundary to allow the transfer of cargo and passengers between transportation modes. Intermodal connections include pipelines; road and rail access routes; state-of-the-art intermodal cargo-handling equipment; and communication technology. The connections must maximize throughput and minimize transloading times and costs. Shoreside infrastructure planning, investments, and waterfront development will ensure that access to ports and waterways is sufficient to sustain the current and projected traffic and operations of the ports, while ensuring the protection of the environment.

Vessels and Vehicles are the infrastructure that transports goods and people through the system. They will be safely designed and operated, technologically advanced and matched appropriately to their function in order to minimize impacts on the environment.

MTS Users encompass a wide range of individuals and organizations, both near to and far from U.S. waterways and ports. Every American benefits from the MTS, directly or indirectly. Some of the principal users of the MTS include:

- Domestic and international marine carriers;
- Pilots, and operators of tugboats, dredges, and passenger-vessels;
- Terminal, shipyard, and marina operators;
- Truck, rail, and pipeline operators;
- Waterfront employers and labor;
- Manufacturers, distributors and retailers;
- Agricultural, chemical, petroleum, mining and utility companies;
- Vacationers, nature enthusiasts, and recreational users;
- Commercial fishing; and
- U.S. military.

Primary Functions

The U.S. marine transportation system will serve three primary functions in 2020:

- Provide domestic transportation of goods and passengers;
- Act as global gateways to world markets and for military mobilization; and
- Support recreational and commercial uses and local economic development.

Domestic Transportation of Goods and Passengers: The U.S. MTS is an integral component of the entire domestic intermodal transportation system that provides shippers and travelers with a waterborne means of transportation that is modern, fuel-efficient, cost-effective, dependable, safe, and environmentally sound. Market demands will size the capacity of the system, which in turn will foster the economic development of supported regions, particularly those areas that depend on cost-effective transportation.

The domestic waterborne transportation system will be characterized by full integration with international ports and with other transportation modes, and by the use of technology and standards that improve effectiveness and productivity. Surface and vessel transportation, ports, waterways, and intermodal connection capacities will be balanced for optimal efficiency. Industry-supported ITS will optimize traffic management, allowing for the full use of system capacity while minimizing congestion, delays, and costs.

Global Gateways: As gateways to the world, the MTS will operate with modern infrastructure provided by dependable funding sources, using optimal technology. In terms of speed, safety, security, capacity, efficiency, and environmental enhancement, the system will be world class. The system's component capacities will be coordinated through a robust ITS such that inland transportation capacity matches gateway throughput. Consolidated and coordinated government (Federal, State, local) requirements and regulations will streamline the administrative and funding procedures for infrastructure improvements and rapid freight throughput.

Gateway capacity will account for growth, competition, backup capacity, and surge/sustainment requirements for the national defense. The MTS will afford rapid, efficient transportation of military cargo and supplies that support national defense.

Recreational and Other Commercial Activities: The U.S. MTS will support recreational and commercial activities, such as fishing, power generation, and waterfront development that contribute to the Nation's quality of life. The growing volumes of both recreational and commercial traffic may require additional vessel routing measures, as well as other changes in waterway management. The challenge will be to accommodate and integrate the needs of both user groups. The vision is an automated, nonintrusive, more capable traffic management system that more efficiently guides the flow of vessel traffic. Waterfront development planning will consider the needs of all MTS users and stakeholders, along with other land use (for example, residential, commercial, industrial, parklands, and sensitive environmental habitats, plus the need to support a healthy watershed). State and local governments will continue to support MTS activities as part of their local economic development and job-creation activities.

Support Systems

Two sets of systems must be developed and operational to support the envisioned U.S. MTS:

- Intelligent transportation systems and
- Management systems.

Coordination is an essential component of the desired management systems.

Intelligent Transportation Systems (ITS): ITS will be a collection of electronic communication and information systems and networks that provide the means for collecting, storing, retrieving, analyzing, and disseminating the information required by all MTS stakeholders and users. Where appropriate, the MTS ITS will be integrated with the ITS of other transportation modes. Integration will ensure the smooth and efficient movement of freight and passengers within and between modes and maximize use of the system. ITS will ensure dependable and uninterrupted service.

Intelligent transportation systems supporting the MTS will:

- Encourage efficient and safe vessel operations by providing, where deemed necessary by the local port community, dependable communications and real-time, all-weather, reliable information on vessel location, keel clearances, water and channel conditions, other vessel traffic, delays, and hazards.
- Provide electronic and satellite navigation that will improve mobility and enhance waterways safety and may allow for the removal of some physical aids to navigation in the future.
- Facilitate efficient administration of the MTS by providing a single freight/shipper database. Cargo and vessel data entered once will meet all Federal, State, and local information requirements. Consolidation will allow these carriers, shippers, and Federal, State, and local agencies to coordinate regulatory actions, eliminate redundancies, and increase administrative efficiencies. In conjunction with the ITS of other transportation modes, the MTS ITS will provide total in-transit visibility of cargo and passengers.
- Promote informed decision making by all stakeholders and system users concerning mode, route, and schedule choices; maintenance, repair, construction, and operating schedules; and research and development, infrastructure investment, and user fee policies.

- Promote safety and an improved throughput of marine traffic through the application of modern technologies, e.g., electronic charts, automated information systems, and VTS with the communication and digital updating of important information.

Management Systems: The management systems supporting the MTS will be a confederation of systems and processes to provide better information to decision makers. The management systems supporting the MTS will:

- Ensure that governing laws and regulations are periodically reviewed for their economic effect on trade and other sectors of the U.S. economy and their environmental effects.
- Involve several tiers (e.g., local, regional/State, and national). Participation at each tier will be open to both private and public stakeholders and allow comprehensive consideration of all interests. An established structure will facilitate communications between tiers, allowing issues to be raised at the appropriate level for quick resolution through dialog and negotiations among all stakeholders.
- Be forward-looking to allow stakeholders at all levels to make timely decisions on policy, investment, and research and development to provide for a world-class, technically advanced MTS.
- Be agile enough for timely decision making on short-term national emergency issues while maintaining long-range objectives.
- Be forward-looking to allow timely decisions on policy, investment, and research and development to provide for a world-class, technically advanced MTS.
- Provide the mechanism for systematic planning with other transportation modes for national defense requirements and emergency operations.
- Provide for a capable and educated work force.

MTS Systemwide Attributes

The physical characteristics, functions, and support systems of the U.S. marine transportation system, as envisioned, address many of the critical issues identified in Chapter IV, particularly in the areas of competitiveness and infrastructure. Additional system attributes in the areas of the environment, security, and safety, necessary in the MTS, address the critical issues in these areas.

Safety: Safe operations result in increased efficiency of the marine transportation system, protecting life, property, and the environment. Safety will continue to be a high priority of all stakeholders and system users. Safety attributes of the U.S. MTS will include:

- Encouraging compliance with standards for personnel qualifications and for design, construction, operation, and maintenance of vessels, infrastructure, and equipment.
- Evaluating and updating safety standards on an ongoing basis to ensure that the standards remain relevant to changing equipment and operations of a continually evolving transportation system.
- Ensuring the appropriate skills, training, and experience for all individuals engaged in commerce and recreational activity in the MTS.
- Establishing well-developed and exercised safety and contingency plans to prevent and respond to incidents.

- Supporting the creative use of technology and information that contributes to safe operations in a full range of geographic, geospatial, and environmental conditions.
- Collecting, analyzing, and disseminating information about marine casualties, near-miss incidents, and other lessons learned.
- Being leaders in raising international safety standards.
- Sponsoring forums to provide greater access to marine safety expertise and resources.
- Making the necessary investments in safety to meet or exceed the anticipated increased risks resulting from emerging technologies and changes in operations.

Security: The MTS must support National security efforts to ensure quick, secure, and efficient support of all types of military operations. It must also support deployment of nonintrusive inspection technology and continued law enforcement efforts to detect and prevent movement of contraband, theft, illegal immigration, and other criminal or terrorist activities, as well as quick and efficient response to disasters.

The security attributes of the U.S. marine transportation system will include:

- Designing and operating critical infrastructure in a manner that detects, prevents and/or mitigates system disruptions that result from natural and manmade disasters.
- Restoring, as quickly as possible, MTS services disrupted by natural or man-made disasters.
- Ensuring uninterrupted capability to deploy forces and materiel in support of national security operations.
- Improving transparency of the system to facilitate tracking of maritime cargo and personnel transportation operations, which support detection and deterrence of smuggling, cargo theft, tariff evasion, terrorism, and other potential acts of violence.
- Fostering cooperation among law enforcement and other appropriate authorities to maximize timely sharing of intelligence information via electronic exchange on potential smuggling and terrorist activities.
- Development of uniform security standards and security measures in all aspects of MTS design and operations so as to reduce MTS vulnerability, deter illegal activity, protect the public, and minimize impact to the user. Security requirements will be balanced upon the threat and the requirements of cost-effective operations.
- Emphasizing the criticality of national security in commercial port improvements and maintenance that improve the capability to deploy and sustain military forces, when required.
- Ensuring that adequate U.S. shipbuilding and repair capacity is available to support national security needs.
- Ensuring that adequate U.S.-flag shipping and crews are available for materiel movement in all threat conditions.

The Environment: All maritime interests, as users and stewards of the Nation's waterways, will implement sustainable practices that protect, enhance, and further the restoration of marine resources while meeting the Nation's transportation needs. Environmental protection will be consistently incorporated into all aspects of maritime activities and decision making.

To achieve this vision, concerted and coordinated efforts must ensure that the MTS is:

- Guided by policies that safeguard environmental concerns and are fully integrated throughout the planning process to support development and environmental goals.
- Designed and operated to preserve and enhance the Nation's natural resources while ensuring that large volumes and varieties of cargo and passengers can be efficiently transported over the waterways while ensuring environmental protection.
- Guided by efficient and effective environmental science, regulations, and policies.
- Staffed with a work force trained to understand and deal with environmental concerns and hazards.
- Supported by rapid, effective pollution response that is aided by optimal technology for monitoring and responding to environmental incidents.
- Overseen by uniform compliance/enforcement of all air and water standards at local, State, and Federal levels.
- Managed by a comprehensive process that includes planning and permitting for dredging and disposal of dredged material that protects and enhances the environment while allowing for efficient, effective, and timely channel development and maintenance.
- Supported fully through the development of partnerships with all stakeholders including public education and outreach programs.
- Cognizant of the environmental effects of ports, waterway operations, and intermodal connections that extend beyond local ecosystems.
- Designed and operated in a manner that protects and preserves the regional economic viability of the natural resources, including fisheries and tourism.
- Designed to anticipate and avoid, as well as mitigate, where unavoidable, negative environmental impacts of channel development and maintenance during the decision-making process concerning these projects.
- Guided by comprehensive planning efforts in ports and harbor development, including dredging of channels, that use a holistic watershed approach that includes all stakeholders to ensure timely and effective economic development while meeting environmental protection and enhancement goals.
- Managed by a process that views dredging and dredged material disposal in the larger context of sediment management. Dredged material should be considered a resource for beneficial use projects.



VI.

Strategic Areas of Action

The strategic areas of action provide direction for public and private MTS stakeholders to consider to evolve the current U.S. marine transportation system into the MTS desired in 2020. Recommended actions have been developed for seven strategic areas:

- *Coordination;*
- *Funding the MTS;*
- *MTS competitiveness and mobility;*
- *Improving awareness of the MTS;*
- *Information management and infrastructure;*
- *Security; and*
- *Safety and environmental protection.*

The strategic areas include potential mechanisms and recommendations for action.

Based on the development of the Critical Issues in Chapter IV, and the previous work of the Regional Listening Sessions and National MTS Conference, the Task Force members developed a set of strategic actions to address these issues. The lead entity, public or private, in most cases, has been identified to take responsibility for leading efforts to address the issue. This report provides a course for addressing the critical issues facing the MTS to meet the challenges posed by the demands of trade, security, safety, and environmental protection.

COORDINATION

Coordination has been a recurring theme throughout the identification and discussion of the critical issues facing the U.S. marine transportation system. Improved coordination — among and through the public and private MTS stakeholders at the local, regional, and national levels — is a key element of the MTS envisioned for 2020. Greater Federal coordination will better inform policy makers on legislation, investment strategies, resource allocations, and regulations, without duplicating or overlapping existing decision-making processes.

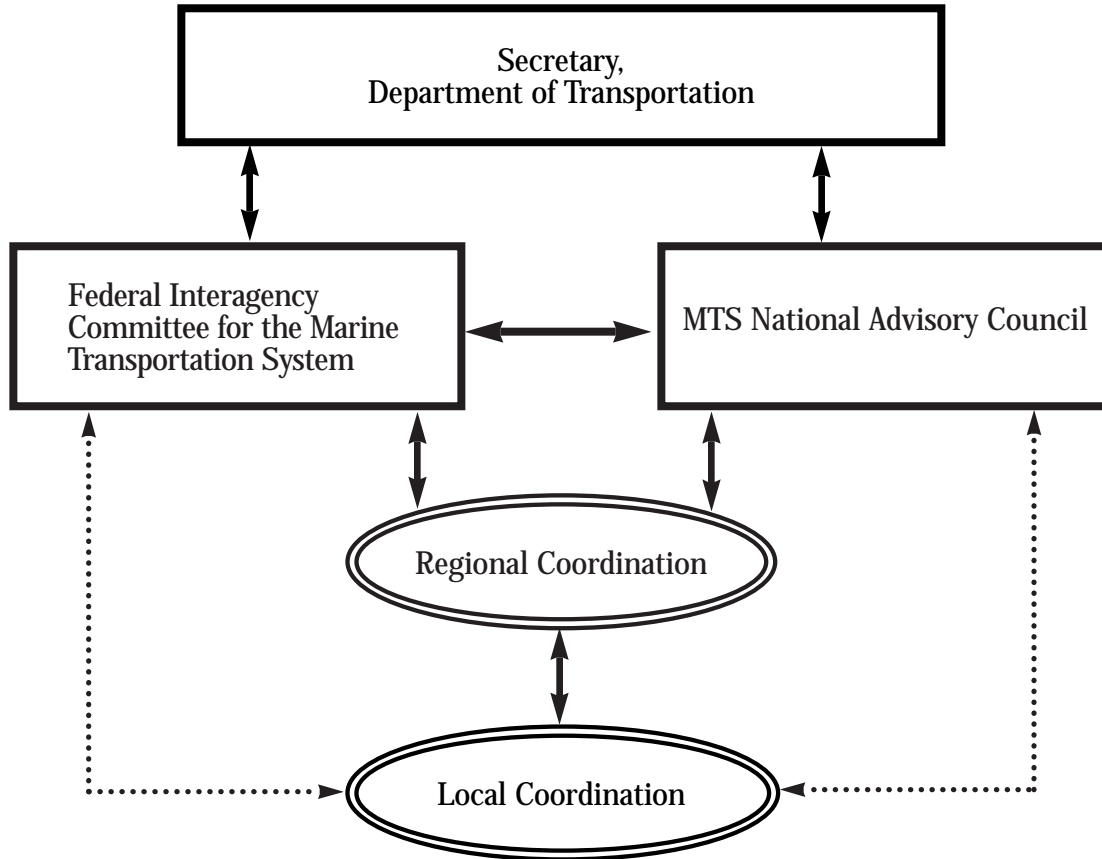
Coordination among and through the MTS stakeholders at individual ports, within regions, or at the national level increases the flow of ideas and communication. It should encourage effective interaction and coordination among these users of, and stakeholders in, the MTS. It expands the level of understanding of user and provider activities and the inherent limitations of each. It encourages partnership formation, especially to implement shared goals and objectives. It supports information sharing. It can streamline and improve the effectiveness of the regulatory processes. It can also facilitate nonregulatory solutions to vexing problems. Finally, coordination can increase public awareness of the importance of the U.S. marine transportation system.

Recommendations:

The Task Force recommends a series of actions to achieve the desired state of coordination for the MTS:

- Create a National Advisory Council, comprised of non-Federal members, that advises on MTS matters.
- Improve the coordination among Federal agencies by creating a new Federal Interagency Committee for the Marine Transportation System (ICMTS) through the expansion of the existing Interagency Committee on Waterways Management (ICWWM).
- Encourage the creation of Harbor Committees and regional organizations, where appropriate, to address local concerns.
- Develop policies, strategies, and goals consistent with Administration policies and the general public and stakeholder needs.
- Establish a mechanism to cross-check the 2020 vision with current and future initiatives.
- Conduct a coordinated review of regulatory system processes at the national, State, and local levels.
- Encourage non-Federal stakeholders to raise the visibility of the MTS as a vital part of the U.S. transportation system and as a major resource of the Nation.
- Establish communication channels among private MTS users, stakeholders, and public sector agencies to foster interaction and improve decision making.
- Facilitate establishment of an applied research forum involving academic and other private and public sector stakeholders.

Figure VI-1: *Marine Transportation System Coordinating Structure.*



Notes:

- 1) Double-lined ovals contain groups with parallel functions and communication channels.
- 2) Dotted lines indicate alternate channels of communication.

Coordinating Framework

Figure VI-1 depicts a framework to achieve and support the level and types of coordination necessary at the local, regional, and national levels to achieve the MTS vision. Coordination and communication are the keystones to achieve the MTS desired state in 2020. The structure consists of local, regional (where appropriate), and national level coordination.

National-Level Coordination. Coordination at the national level consists of a new Federal ICMTS, created through the expansion of the existing ICWWM, and a Marine Transportation System National Advisory Council (MTSNAC) composed of non-Federal members.

Interagency Committee for the Marine Transportation System: Participants in the Regional Listening Sessions and the National MTS Conference in November 1998, expressed the need for greater coordination, information sharing, and consistent regulatory and policy application among Federal agencies. The ICMTS will be the national coordinating body where Federal agencies with responsibility for one or more aspects of the MTS come together and discuss strategies to minimize duplicated efforts and coordinate overlapping functions. The MTSNAC provides advice to the ICMTS

and the Secretary on MTS matters. Federal agencies, through the ICMTS, will consider this input in developing Administration policy, budget requests, legislative proposals, and in their day-to-day program management. Therefore, the ICMTS may coordinate and/or implement the recommendations developed by the MTSNAC, and adopted by the Administration. The ICMTS will:

- Identify, evaluate, develop, and promote the implementation of Federal policies and resource utilization to ensure effective public funding decisions, support services, and management of the MTS. This might include the coordinated development of budget submissions to communicate the interdependency of the system and its components to financial decision makers.
- Identify and eliminate barriers to interagency cooperation and review the regulatory system process, as recommended at the National MTS Conference. This should include a review of Federal, State, and local regulatory regimes and jurisdictional overlaps and gaps. A primary goal of the ICMTS is to improve government cohesiveness.
- Consider the advice and recommendations of the MTS National Advisory Council.

Open communication is important in the development of MTS strategy and goals. The ICMTS will provide a centralized location for non-Federal MTS stakeholders to raise issues that may require Federal attention. The broad Federal participation in the ICMTS will guarantee that the issue is brought to the attention of the appropriate agencies and dealt with in a coordinated manner. The ICMTS will also not encroach upon local or private decision making by non-Federal stakeholders, and it feeds into, but does not duplicate existing Administration policy-making processes.

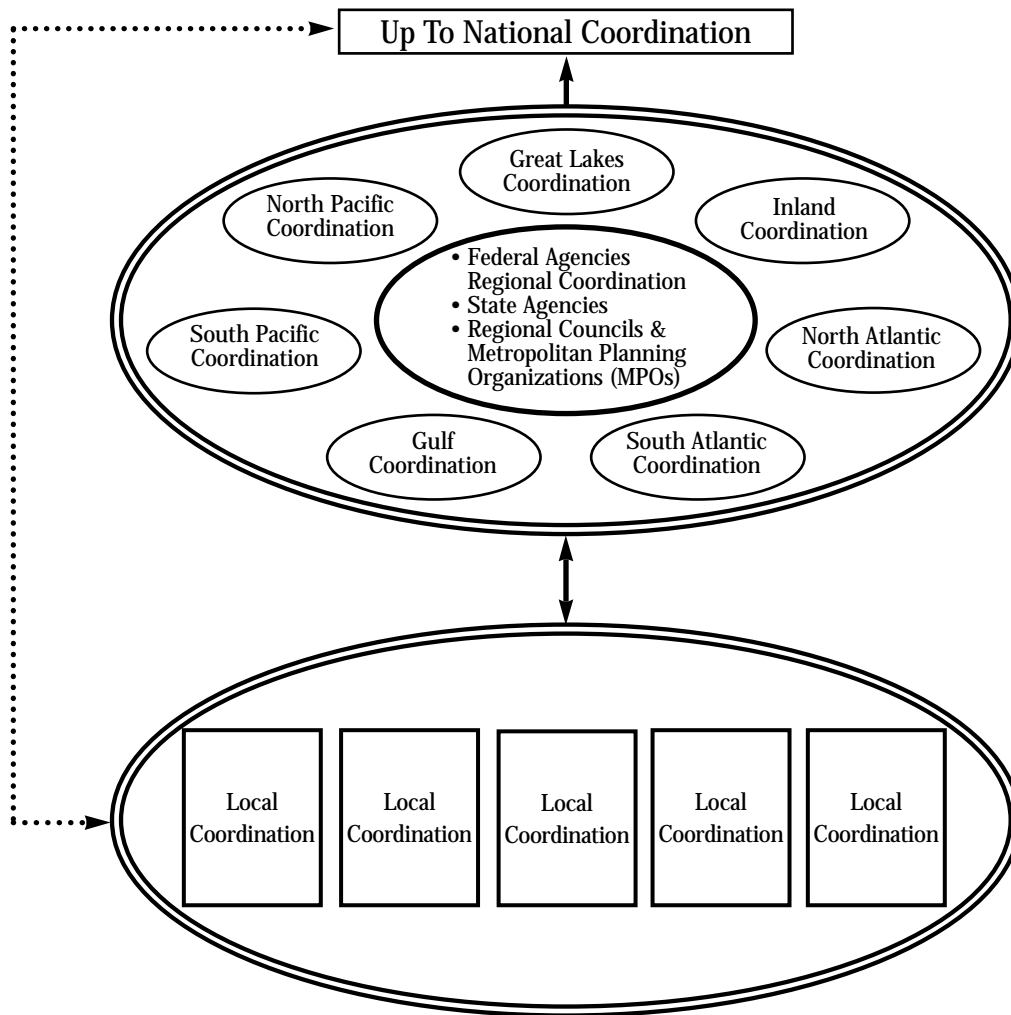
MTS National Advisory Council. The MTSNAC, a key element of the coordination framework, will provide a structured approach for non-Federal stakeholders to provide input on national-level issues. The Council should be chartered by the Secretary of the U.S. Department of Transportation and governed by the Federal Advisory Committee Act (FACA) (Pub.Law 92-463; 5 U.S.C. App.2). The MTSNAC will be composed of senior-level representatives from non-Federal organizations. The Council will advise the Secretary on MTS matters such as:

- Waterway, port, and intermodal infrastructure and services;
- National strategy, policy, and goals in the areas of safety, environment, mobility, competitiveness, and security;
- International maritime standards and policies; and
- Status and needs of the MTS.

The MTS National Advisory Council should establish, as needed, ad hoc committees comprised of non-Council members, to address issues, assess MTS research and development needs, advise on the effect of existing or proposed laws and regulations or needed reforms, and participate in outreach activities. The primary function of these committees is to advise the Council, which in turn advises the ICMTS and the Secretary. Council recommendations, which may reflect broad-based consensus, could provide support to advance Administration goals, such as seeking a legislative change to address a specific problem or improve the MTS.

Regional-Level Coordination. Regional transportation coordination mechanisms already exist in some parts of the country and should be considered, where applicable. Where established, regional coordinating bodies should be flexible to account for individual regional characteristics and needs. Therefore, the organization and membership of regional coordinating bodies may vary from area to area. For instance, some bodies may need to be divided into local forums representing different

Figure VI-2: *Marine Transportation System Coordinating Structure: Regional and Local Levels.*



Notes:

- 1) Double-lined ovals contain groups with parallel functions and communication channels.
- 2) Dotted lines indicate alternate channels of communication.

parts of the same region, depending on the issue area. Participants in regional MTS coordination bodies can include State agencies, regional councils, MPOs, public interest groups, and regional offices of Federal agencies.

Figure VI-2, for example, depicts regional areas that represent major trade areas. Whatever the format and definition, regional coordination bodies should allow the concerns and interests of all MTS users and stakeholders to be addressed.

Although their structures may be different, regional coordinating bodies should have a common set of functions. They should:

- Provide a direct communication vehicle for Federal regional offices, State agencies, regional councils, MPOs, and local forums.
- Identify overlapping authorities and advise on streamlining and improving the effectiveness of regulations, and identify opportunities for improved environmental protection and enhancement.

- Evaluate policy and strategy options that often depend on legislative or other enforcement measures.
- Act as a vehicle for technical assistance and public outreach that stresses the interdependence of the MTS, particularly as it relates to national security, competitiveness, and the environment.

The recently established Great Lakes Regional Waterways Management Forum is one example of a regional coordinating body. The purpose of this forum is to identify and resolve waterways management issues that involve the Great Lakes Region. It will specifically review issues that cross multiple jurisdictional zones and involve international issues. The forum will focus on developing operational solutions that improve the use and effectiveness of the Great Lakes for all. There are eight local port committees that may bring issues forward to the regional forum when they cannot be resolved at the local level. The forum operates on three principles:

- Flexibility;
- Decision making at the local level, when possible; and
- A willingness to develop a consensus for the Great Lake Region.

Local-Level Coordination. Elements of local and regional coordination are well defined through existing statutes for surface and air transportation. For example, TEA-21 outlines an extensive framework for surface transportation planning. A similar framework exists for aviation. However, no formal structure exists to coordinate and consider MTS projects.

All MTS stakeholders and users need to be actively involved in coordinating and considering the various aspects of the system. Equitable representation and participation promote collaborative problem solving and information sharing.

Raising public awareness of the MTS should also begin at the local level. Local committees can conduct public outreach to educate people about the value of our waterways, ports and their intermodal connections, the issues and challenges facing them, and their importance to our Nation's overall transportation system. Local committees should encourage partnerships between individual members and groups outside the committee.

Three examples of local forums are the Mariner's Advisory Committee for the Bay and River Delaware, the Harbor Safety, Navigation, and Operations Committee for the Port of New York/New Jersey, and the Prince William Sound/Valdez (Alaska) Marine Safety Committee. The latter committee attributes its success to a set of mutually accepted operating elements:

- Information sharing and awareness;
- A shared sense of responsibility for safety;
- Open and frank discussion;
- Cooperation and respect;
- A willingness to recognize committee recommendations as the de facto standard of care;
- The effectiveness of nonregulatory solutions; and
- The high value of expert local input to regulatory solutions.

The Alaska committee's formal mission is to provide a proactive forum for planning, assessing, communicating, and implementing operational measures that promote safe and efficient use of Prince William Sound and the Port of Valdez.

Local and regional committees should coordinate discussion and resolution of local and regional issues. The objective is to create a local coordinating body that can enhance communication and cooperation between localities and their encompassing regions. Such local and regional bodies can also provide a mechanism to coordinate decisions beyond jurisdictional boundaries on issues that affect broader regional areas and matters of national significance.

FUNDING THE MARINE TRANSPORTATION SYSTEM

Funding is at the core of many issues relating to the MTS, but it was one on which the Task Force could not reach consensus. It is a divisive topic because of the broad range of MTS users and stakeholders, all of whom have their own concerns and motivations and funding concepts. It is divisive because the funding of the MTS involves a complex relationship among the Federal government, State, and local port authorities, State and local governments, and private companies and stakeholders. It is difficult to find agreement on funding approaches that will satisfy all system users and stakeholders.

Currently, ownership of the MTS varies widely, including public, private, and public-private arrangements. The MTS intermodal partners are privately supported (for example, Class I railroads and pipelines), supported by a combination of Federally collected user fee programs (such as highways, transit, and aviation), and supported through other sources, including general revenues at the Federal, State, and local levels.

Recommendations:

The Task Force recommends four actions:

- Coordinate Federal funding processes;
- Define MTS funding mechanisms;
- Forecast demands on the MTS; and
- Explore innovative funding mechanisms.

Coordinate Federal Funding Processes: The MTS is a complex system with a variety of stakeholders, components, and needs. Public funding at the Federal, State, and local levels come from many different sources and programs. There is a need to better coordinate Federal resource allocations from a systems perspective versus a mode-by-mode or activity-by-activity basis. For example, navigation information is a key component of the MTS that is supported by several different Federal agencies. The call for integrated traffic management and control, communications, charts, and real-time tide, current, and weather information should be coordinated in the USCG, NOAA, and USACE budget planning cycle. Coordinating navigation information as a system in multiple agency budgets will allow resource decision makers to determine appropriate funding levels based on a comprehensive view of the navigation aid system and understand the effects of budget decisions on other agencies and the MTS. This recommendation is not meant to change the normal budget submission and review process of the Federal government, but to provide a more complete budget picture to decision makers.

Quantitatively Define MTS Funding Mechanisms: This recommendation focuses on defining current revenue and funding sources in the MTS — waterways, ports, and intermodal connections. Public funding, at all levels, and private investments will be examined and defined to the best extent possible based on currently available information. There are already a number of sources for this information in the public record, including reports by the General Accounting Office and MARAD that primarily focus on Federal aspects. Collecting this information from State and local governments and the private sector is also essential to gain a complete picture of the MTS funding mechanisms.

A quantitative definition of funding mechanisms as they currently exist will provide MTS stakeholders with a better understanding of public and private funding sources.

Forecast Demands on the MTS: U.S. competitiveness depends on infrastructure adequate to move people and goods efficiently. This has been proven throughout the development and expansion of the United States. Understanding projected demands and recognizing investment needs for that infrastructure have been part of the solution. Based on the projected increase in trade and current state of the Nation's aging MTS infrastructure, the system will need improvements and investments. Coordination of anticipated infrastructure needs, as determined at the Federal, State, and local levels, would greatly increase the efficient use of limited resources and avoid duplication of efforts.

Explore Innovative Funding Mechanisms: The MTS should reduce its reliance on a single strategy for funding transportation infrastructure requirements. The objective of this effort is to maximize the ability of stakeholders to leverage limited fiscal resources and to make more effective use of existing funds. Examples and ways to expand funds for investments include using credit enhancements to lower the cost of capital when issuing bonds and other debt instruments, and taking advantage of increased flexibility in the types of funds or assets that can be used to match available funds. The coordinating mechanism and the National Advisory Council can provide forums to share lessons learned and best practices.

MTS COMPETITIVENESS AND MOBILITY

Competitiveness and mobility are key aspects that influence America's place in global markets; they are also essential elements of national security. To compete successfully for American business in domestic and international markets, ports and other MTS operators must have the ability to move people and cargo efficiently, reliably, and at a reasonable cost, without infrastructure impediments or congestion delays.

For exporters and importers, as well as domestic movers of cargo, mobility and competitiveness translate into a demand for intermodal services that provide speedy movement through the waterways, ports, and terminal transfer facilities to landside transportation. Mobility and competitiveness also translate into a demand for ready access to the transportation information that is needed by all parties to the various transactions involved in trade. Additionally, it translates into the needed capability to move military personnel, equipment, and supplies in support of national security needs.

Waterways, terminal facilities, and inland connections must:

- Have adequate throughput capacity;
- Accommodate the full range of vessel sizes, types, and speeds necessary to support the projected future traffic; and
- Integrate the prevailing transport and information technologies.

Infrastructure that may have served well in the recent past, or is currently serving adequately, may become inadequate in the near future and cause unacceptable delays and costs. The ability to make informed decisions to support coordinated research, planning, and development (among the operators, managers, regulators, and investors of the interfacing water, highway and rail transport modes, and environmental interests) can ensure that the intermodal system will perform satisfactorily in 2020.

Task Force members recommend a series of actions to develop the fundamental knowledge and support tools required for informed decisions on the part of all the private sector and public sector parties responsible for the several elements of the total intermodal MTS. The proposed product of each of these recommendations may be characterized as decision support tools required to ensure the orderly development and smooth operations of all the components of the MTS essential to mobility and competitiveness. The recommendations include:

- Establish a vessel clearance information exchange and one-stop shopping;
- Facilitate landside access to ports;
- Create a National Cooperative MTS research program; and
- Develop systemwide MTS traffic forecasts.

Vessel Clearance Information Exchange and One-Stop Shopping

Vessels involved in international trade and calling on the U.S. must report to and/or be inspected by several Federal agencies. These include USCG, U.S. Customs Service, the Immigration and Naturalization Service (INS), and the U.S. Department of Agriculture (USDA). When a vessel makes several port calls along the coast, it is often required to submit to duplicate reporting requirements and inspections in a short period of time. The vessel, crew, and cargo manifest information collected by one agency is seldom shared with another agency within the same port, or even within the same agency's offices in other ports. Reporting redundant information is labor intensive, costly, and leads to inefficiency and unnecessary hindrance to the mobility and competitiveness of the MTS.

Recommendation:

The Task Force recommends that Federal agencies establish one-stop shopping for inspection and reporting requirements. Where appropriate, partnerships should be developed among Federal agencies and State and local governments. This recommendation includes coordinating and streamlining of multiple agency inspections and procedures.

To proceed with this recommendation, a working group comprised of non-Federal organizations and all Federal agencies with inspection and data collection responsibilities for waterborne trade should examine and develop approaches for coordinating and streamlining reporting activities. Under the structure recommended earlier in the report, this group could be a committee under the MTSNAC. After the Administration adopts the committee's recommendations, the ICMTS should lead the development of an implementation plan.

Another committee could be established for the sole purpose of developing the functional software and hardware requirements, the conceptual design, and the user interfaces. This system must be designed in consultation with representatives of all potential data sources and data users. The committee should explore alternative approaches toward shared direction of operations and funding of the proposed system, and propose an implementation plan for Administration consideration.

Landside Access to Ports

Highway connectors and rail lines provide essential access between the maritime terminals and the interior markets of the United States. The major ports of the Nation are predominantly located in or near densely populated metropolitan areas. Among the landside infrastructure inadequacies faced by these ports, two stand out:

- At least half of all ports, and nearly two-thirds of container ports, have growing traffic congestion on the truck routes that serve the port terminals.
- Many ports report that rail lines serving their facilities have at-grade crossings on local streets, which pose a safety hazard, impede the efficient access of trains to port terminals, and tie up traffic on local streets. Planners believe that grade separations and coordinated traffic control systems are essential to alleviating these inadequacies.

Expanding population and growing waterborne trade promise to increase landside access problems dramatically. Swelling port throughput requirements could escalate congestion on highway connectors, and trains could become longer and more frequent. Improving port access will require new investment in highway/street capacities for truck traffic and for closing crossings or construction of grade separations along rail lines through port cities (construction of grade separations are a highway responsibility under present arrangements). Passage of the Intermodal Surface Transportation Act (ISTEA) in 1991 largely shifted responsibility for local highway planning and project selection to MPOs. TEA-21 continued this arrangement. While the ISTEA and TEA-21 require particular attention to the access needs of ports and freight intermodal terminals, port access projects, particularly those involving railroads, are reported to receive low priority in current planning. Public/private partnerships of port users are needed to present a stronger case for their needs to MPOs.

Another issue for stakeholders is landside access for MTS activities, not just the intermodal connections. There is limited space for activities and increased competition and encroachment by nonmaritime interests. Regional, State, and local planners should consider the Nation's transportation system when planning development at their level. Alternatives for reducing congestion and competition for limited waterside access should be investigated to improve mobility and reduce safety and environmental concerns. In addition, improvements in terminal operating procedures could increase terminal efficiency and reduce peak-period congestion on highway and rail access routes.

Recommendations:

The Task Force recommends these actions:

- Encourage a concerted effort of the port interests along a coastal range, primarily terminal operators, to focus attention on these issues. Maritime terminal operators have antitrust immunity to meet and coordinate activities and service prices. A united position on these efficiency improvements would ensure that making such improvements would not significantly change the respective competitive positions of the ports. The proposed regional and local coordinating bodies can provide the forums to bring the ports, shippers, vessel operators, the landside transport modes, and governments together to address this issue.
- Encourage regional, State, and local planners to consider the benefits of an MTS that is an integral part of the local, State, and regional transportation system. This effort

should consider reducing congestion by developing a smart transportation system, and encourage effective facility placement. Planners should maximize the participation of the private sector in the decision-making process through a number of mechanisms including MPO boards and economic or environmental councils.

- Investigate the feasibility and effectiveness of a port-oriented, intermodal program of ITS projects for addressing MTS capacity issues, in coordination with longer range investment strategies focused on traditional capacity enhancements. A general consensus exists that coordinated electronic data interchange systems built around intermodal ITS technologies could relieve some of the throughput pressure in ports. ITS applications could coordinate arrival and departure times for trains and trucks to meet ship schedules and facilitate the regulatory and customs functions of port-based public agencies. DOT should lead this effort through demonstration projects at participating ports.
- Continue the implementation of the DOT strategic actions to address the safety issue of at-grade crossings.

National Cooperative MTS Research Program

The Nation's transportation system has realized significant productivity increases through a combination of technological innovation and deregulation; however, there continues to be a modal orientation to transportation research and technology development. Some MTS stakeholders believe that the water transportation component, especially the land/water connection, has not received the attention or research necessary to meet projected needs. Because virtually any movement of cargo or passengers on water involves an associated landside movement, research focused on port access and the water/land intermodal connections is critical.

Precedent exists to establish national cooperative transportation research programs, including the Transit Cooperative Research Program (TCRP); the Strategic Highway Research Program (SHRP); and the Environmental Cooperative Research Program in the recent TEA-21 legislation. These programs, together with the National Cooperative Highway Research Program (NCHRP), are administered by the National Research Council. They provide ample evidence of the significant payoffs of cooperative research programs, particularly in terms of leveraging scarce research dollars, obtaining and maintaining end-user support, and producing essential results.

Recommendation:

Establish a National Cooperative MTS Research Program to:

- Coordinate current and planned MTS-related research by government agencies, and educational institutions, and the private sector;
- Foster research to assess and address mobility, safety, environmental protection, and security issues related to the MTS; and
- Ensure, through research and technology development, that the MTS has adequate capability to accommodate the projected cargo and passenger traffic patterns.

Following the TCRP model, the ICMTS would provide the policy guidance and communications linkages with the MTS users and stakeholders. A subcommittee established under this committee would:

- Identify the research needs;
- Define the specific projects;
- Identify experts to serve on specific oversight panels; and
- Arrange for dissemination of the research results in cooperation with the relevant Federal agencies and the National Research Council.

Systemwide Traffic Forecasts

Planning and development of port infrastructure must be based on realistic forecasts of growth trends, along with the changing patterns of both inbound and outbound traffic. Underestimating the future requirements for infrastructure will lead to inadequacies, unacceptable service quality, and increased operating costs caused by congestion. As previously noted, congestion constrains regional mobility and detracts from the competitiveness of the port and the firms using the port. Conversely, overestimating the future requirements will lead to excess capacity and underutilization, which may offer acceptable service quality but yields low rates of return on the infrastructure investments. Both situations represent a potential negative impact on the local, regional, and national economies, as well as the mobility and competitiveness of the MTS at the national level.

Reliable national trade and fleet forecasts, jointly funded by all stakeholders, are necessary tools for all planners — national, regional and local. Admittedly, precise traffic forecasting is an uncertain art. Often the sum of a set of independently prepared local port traffic forecasts is far greater than could reasonably be expected for the U.S. as a whole. Further, forecasts should consider a systems perspective. A systematic approach, which is carefully reviewed and validated, can benefit local and regional MTS planning and operation.

Recommendation:

The Task Force recommends the formation of a planning information cooperative for the joint development of national and regional traffic forecasts for planners at all levels that:

- Incorporates alternative scenarios of U.S. and world market trends, energy sources, and internal U.S. demographic and economic regional shifts; and
- Involves periodic reviews by representatives of individual industries and ports, shippers, regional, and national interests to track actual performance, validate input assumptions, and update incorporating new information.

IMPROVING AWARENESS OF THE MTS

State, local, and private MTS stakeholders repeatedly urged the Task Force to make the public and key decision makers in government more aware of the significant contributions our waterways, ports, and their intermodal connections make to America's economy, national security, and environment. This message was clearly stated by the participants in the DOT-led Regional Listening Sessions and at the MTS National Conference.

Building awareness of the MTS starts with creating an understanding of the entire MTS. This facet was observed in the Regional Listening Sessions as participants gained an understanding and appreciation for other parts of the MTS that they themselves did not normally observe. Recreational

boaters who understand the demands of cargo vessels, and safety managers garnering greater knowledge of the environmental consequences of dredging, are a few such examples. Based on this broader understanding, participants were more willing to display some compromise and develop collective consensus-based recommendations to address the pressing issues within the system.

Recommendations:

State, local, and private sector MTS stakeholders should give priority to promoting the overall value of the MTS through their existing trade associations and other outreach efforts. These stakeholders are encouraged to coordinate their efforts and message. In conjunction with national MTS stakeholders, these groups should also:

- Promote the Nation's maritime heritage and the value of career development in the MTS through outreach designed to:
 - Attract, train, continuously develop, and retain highly skilled personnel for the MTS;
 - Promote pursuit of long-term careers in the diverse programs and opportunities afforded in the MTS; and
 - Broadcast messages seeking to fill existing and future personnel shortages in the MTS and the organizations that rely on it.
- Employ new technology and develop effective communication tools designed to share best practices, personnel training, and collective approaches among the maritime user community and across government agencies.
- Inform the public and MTS users of the fragile nature of the MTS environment and suggest proactive steps that all stakeholders can use to continue enhancement and protection of the MTS. Also, increase awareness of the benefits of waterborne transportation.
- Develop programs and outreach efforts to promote the responsibility of the boater, mariner, and maritime professionals to improve MTS environmental soundness.

INFORMATION MANAGEMENT AND INFRASTRUCTURE

The MTS supports international and domestic trade and recreation. The MTS encompasses a large and rich part of our natural environment and is a vital component of our national security system. The quality of the information systems within the MTS is a key determinant in the safety, security, environmental soundness, and mobility of the system. Current and future changes in the nature of the MTS combine to make Information Management and Infrastructure a principle area for strategic action to meet the desired state of the MTS in 2020. These changes in the nature of the MTS include the expansion of JIT cargoes; transportation of hazardous materials; increased number of vessels; their size and related maneuverability constraints; threats of terrorist activity; and increasing criminal activity (cargo theft and smuggling).

The collective public and private vision of the MTS includes a system where:

- Compliance with regulations and clearance processes is both universal and uncomplicated;
- There is timely access to pertinent navigation information;

- A full intelligence picture for incident response, emergency management, and security is available to responsible organizations; and
- Data flow promotes seamless intermodal transportation.

The principal characteristics that lead to these attributes are superior information management systems and infrastructure.

Coordinated information management systems will benefit both the waterways and port users. Focusing on helping U.S. ports and transportation and shipping industries to operate safely and without conflict will lead to improved efficiency by reducing disruption costs. This improves competitiveness, safety, security, and environmental protection. Reliable, accurate, and real-time information will provide a one-stop shopping feature to MTS users. It will also enhance the services provided by the government, which will translate to greater effectiveness while potentially lowering management and operational costs. These will be realized through the coordinated collection, packaging, and dissemination of current and planned information systems related to navigation, the environment, and MTS operations.

Likewise, there is a desire by all MTS users and stakeholders to minimize the burden of regulatory compliance and to work closely together to design compliance processes that achieve the desired results with least cost and disruption to the system. Interagency cooperation and coordination, as they relate to the development of their information systems, are key factors to achieving success.

Therefore, the recommendations presented in this section and those presented in the MTS Mobility and Competitiveness strategic area of action should be viewed holistically to achieve superior information management systems and information infrastructure for the MTS. The Task Force identified three strategic areas for action:

- Hydrographic and weather information;
- Tracking of cargo, passengers and vessels; and
- Waterways traffic management information.

Hydrographic and Weather Information

The greatest safety concern voiced at the Regional Listening Sessions and the November 1998 MTS National Conference related to the availability of timely, accurate, and reliable navigation information. Current shortfalls in the collection and dissemination of navigation information increase safety and environmental risks, as well as impede mobility.

Recommendations:

Providing timely hydrographic data is crucial to the future performance of the MTS and the safety of vessels, passengers, and the environment. It is recommended that:

- The proposed National Advisory Council develop detailed recommendations to establish an integrated base of navigation information systems in waterways and ports to provide real-time delivery and display of current and forecast oceanographic and meteorological conditions, positioning data, navigation aid information, and vessel traffic information. The USCG, NOAA, NIMA, and the USACE, which have primary responsibility for safe navigation and navigation information, respectively, must incorporate local stakeholders into the planning, design, and implementation of improved systems.

- NOAA, in conjunction with the USCG and USACE, should work in partnership with local and regional stakeholders to design, develop, and install appropriate PORTS technology. Identify potential private and public sources of funds for long-term maintenance and operations for this technology by identifying public funding and private investment opportunities.
- NOAA and USACE should explore: (1) expanding the ENC coverage to support MTS users; (2) incorporating the latest hydrographic and shoreline survey information; and (3) enhancing the ENC with high-resolution depth information and very-large-scale source data, such as docking charts. Additionally, nautical charting agencies should support the use of very accurate positioning technology to acquire data on waterways facilities for large-scale charts to allow ships to navigate safely using electronic charts.
- NOAA should accelerate the current timetable of approximately 15 to 20 years to reduce the current survey backlog.⁽²⁴⁾ The backlog prevents NOAA from making progress on surveys and charts for the rest of the exclusive economic zone (EEZ).
- NOAA periodically review and refine its ranking of critical areas to ensure that priority areas are identified in order to provide mariners with timely, accurate, and reliable hydrographic information. Ranking should be through regular communication with user communities to ensure that the most critical areas are surveyed.
- NOAA and USACE incorporate state-of-the-art technology into hydrographic surveying to improve the accuracy and efficiency of data collection (such as GPS), remote-sensing technology, and multibeam and sidescan sonar equipped with DGPS. Full deployment of advanced technologies will promote safe navigation and influence decisions about dredging and habitat restoration — the latter by providing detailed information about sediment quantities and characteristics.

Tracking Cargo, Passengers, and Vessels

Pertinent information is needed to facilitate the efforts associated with incident response, emergency management, and with security activities to detect, intercept, and prevent terrorism and criminal activity. Current information about cargo, passengers, and vessels movement through all sectors of the MTS is not integrated or real-time, and existing information is not always available to responsible organizations. The ability to more effectively monitor cargo, passengers, and vessels would support the vision of MTS safety, security, and environmental soundness.

Recommendations:

The recommendations are to provide the total intelligence operational picture for safety and security activities and to develop a tool for resource allocation by safety and security agencies. These Task Force recommendations should be considered concurrently with the recommendations detailed in the Vessel Clearance Information Exchange, One-Stop Shopping, and Landside Access to Ports sections addressed under the Mobility and Competitiveness strategic action area.

There are legitimate concerns with regard to these recommendations about the protection of civil liberties and proprietary information received from private sector activities. Implementation of these recommendations should be accomplished with full private sector input and participation so that a win-win consensus can be the foundation for improving the competitiveness, safety, environmental soundness, and security of our MTS.

- MARAD, USCG, and the Customs Service should work with the maritime community and other government entities, including INS, DOD, DOE, EPA, NOAA and USDA, to explore the use of tagging and tracking systems to improve the efficiency and productivity of their operations for security, incident response (especially for hazardous materials), and customs activity. This should include developing an international standard for tagging the world container fleet, as well as a defense-related project to manage military cargo in support of deployment of U.S. armed forces. Some of the issues that must be addressed include standardizing technologies, data flows, and procedures. This recommendation should build on identified initiatives from the 1998 Intermodal Freight Identification Technology Workshop. This includes the ongoing effort by the Intermodal Working Group to optimize information exchange.
- Private sector organizations involved in the transfer of cargo to and from the water mode or to and from trucks should evaluate the use of identification and validation systems to process drivers through a gate to a container yard or secured area. Tags or similar cards can be used to verify a driver's identification via biometrics or other applications to gain access to the terminal yard. This type of system can be integrated with closed-circuit television systems to provide enhanced verification for access to and control of cargo. This would improve the mobility of the MTS by reducing congestion and delays while improving security from cargo theft and terrorism threats. Development of an industry-wide standard would improve efficiency and is recommended. This activity should be designed to ensure broad private sector participation and any public stakeholder involvement needed.
- While incident response, security concerns, and traffic management require information on individual movements of cargo, passengers, and vessels, the trade forecasts and network analysis recommended earlier in this report require data aggregated over time and geography on both overseas and domestic transportation of international trade. The statistical organizations of Federal transportation agencies should be given access to the relevant U.S. Census Bureau detailed files to reconcile, aggregate, and publish the required data with appropriate confidentiality protections.

Waterways Traffic Management Information

With projected increases in waterway traffic, both commercial and recreational, congestion will continue to be a major concern in navigating the Nation's ports and waterways. Future needs may not align with current practices and the technology being applied today. Current vessel traffic management, for the most part, has not been fully integrated into the overall operations of the port. Additionally, ship-to-ship and ship-to-shore voice communication is becoming increasingly difficult in the more urban areas because of frequency interference and congestion.

Recommendations:

Navigation safety depends on ensuring that traffic controls and navigation assistance are adequate to provide order and predictability into traffic flows while simultaneously maximizing system capacity for safe vessel movement. In addition to establishing appropriate controls, navigation safety depends on ensuring mariners have access to timely and accurate information on all matters pertaining to the waterway, the activity within the waterway, and the vessels, cargo, and crews of vessels transiting the waterways. Under its Port and Waterways Safety Assessment (PAWSA) projects and its Waterways Management Programs, it recommended that the USCG:

- Conduct port-specific assessments to determine the appropriate traffic management regime and related information needs in each port. The port assessment should be conducted with the participation of all local port users and sources of relevant traffic management information.
- Determine the cost-effectiveness of alternative technologies for collecting and disseminating the needed information to users, while protecting proprietary rights of information sources.
- In collaboration with port stakeholders, investigate potential solutions to the voice communications problems. Consult with the Federal Communications Commission (FCC) on matters related to radio frequency.
- Continue to explore voiceless modes of communication and transfer of needed navigation, traffic management, and other safety-related information (e.g., automatic identification systems and DGPS).
- Explore the need and cost-effectiveness of alternative structures for vessel traffic management in each port, for normal operations and for crisis management.
- Continue to recommend upgraded information systems, with stakeholder participation.
- Continue to implement appropriate traffic management measures such as Traffic Separation Schemes, Regulated Navigation Areas, anchorage establishment and management, and vessel movement coordination mechanisms.
- Develop a plan for fostering and supporting navigation safety-related information systems that conform to a national standard. Work to make this standard compatible for international users of the MTS.
- Develop and implement an objective method of benchmarking the current waterway traffic management performance of each port/waterway and periodic measurement of progress.
- Explore linking waterways traffic management information with landside intelligent transportation systems.

SECURITY

Security issues pertaining to the marine transportation system include the need to support national security programs; keep the flow of traffic moving; and safeguard the Nation's waterways, ports, facilities, vessels, individuals, and property in the vicinity of the port from accidental or intentional damage, destruction, loss, or injury. Key concerns of MTS security relate to the growing threat of organized crime (cargo theft and smuggling), terrorism threats, and the dependence on the MTS to meet U.S. military deployment requirements.

Both the public and private sectors should be mindful of the availability, adequacy, and security of the MTS to support national security and economic security mobility requirements. In addition to illegal activity, national, personal, and economic security efforts require quick and efficient response to disruptions caused by natural disasters and man-made events. The rising demands for efficient and uninterrupted commercial operations to service growth in international commerce must be balanced with our need to invoke safeguards and inspections to protect against the array of security threats. Agencies of the Departments of Transportation and Treasury participate as Task Force members and serve as Co-chairs with the Department of Justice on the President's recently established Commission on Crime and Seaport Security. As such, the critical issues raised by Task Force members related to cargo and other seaport crime, smuggling, and terrorism will be considered by the Presidential Commission. The Task Force identified five strategic areas for action related to MTS security:

- Improve security awareness;
- Improve transparency;
- Ensure qualified operators;
- Forge stronger public/private partnerships; and
- Strengthen international cooperation.

Improve Security Awareness

Much of the investment in security infrastructure and protection of port facilities is the responsibility of State or private sector port facility managers. Current policies prevent sharing intelligence information related to security threats and vulnerabilities with these entities. Appropriate mechanisms, similar to those of MARAD and USCG, for sharing information with ship operators need to be identified for port operators. These mechanisms could allow for the timely sharing of threat and vulnerability information with State and local law enforcement agencies, as well as appropriate nongovernmental entities, without compromising methods and sources, and while reinforcing two-way communication.

Recommendations:

The Presidential Commission will consider the following Task Force recommendations for improving security awareness:

- Support the Presidential Interagency Commission on Crime and Security in U.S. Seaports to heighten national awareness for the need for collective action and to develop a coordinated interagency approach to MTS ports and waterways security.
- Develop national exercises that measure U.S. ability to prevent and respond to terrorist

attacks; include scenarios where attacks are directed at military mobilization or critical infrastructure within U.S. ports and waterways. DOT, DOD, and the Federal Bureau of Investigation (FBI) should assume responsibility for this recommendation and coordinate with other agencies and public and private sector stakeholders.

Identify Vulnerabilities and Improve Transparency

As governments remove barriers to trade and travel, greater knowledge of the cross-border flows of people and goods in the maritime sector is required to discover criminal and terrorist activity. With a growth in congestion and activity within the MTS there is increased opportunity for those with ill intent to hide in the shadows and go undetected. Most governments and non-State actors will avoid force-on-force confrontation with U.S. military. However, they may attempt to target the MTS to disrupt commercial carriers serving to mobilize military cargo and assets or attack U.S. critical infrastructure. There is a lack of sophisticated communications systems and integrated intelligence systems to support real-time monitoring of vessels, people, and cargo movements within MTS. As such, MTS remains vulnerable to criminal and terrorist activities, and both the efficiency and effectiveness of law enforcement actions are limited. Current law enforcement and security actions will often result in increased disruption and delay costs.

Recommendations:

The Presidential Commission will consider the following Task Force recommendations for improving transparency:

- Conduct baseline and periodic reviews of the strategic ports and waterways of the National Port Readiness Network to identify vulnerabilities and determine the readiness of public and private resources to meet military mobilization requirements.
- Conduct readiness exercises that test the ability to support continued waterside security and uninterrupted military mobilization operations while responding to:
 - (1) Terrorist threats and acts and
 - (2) Nontraditional asymmetrical attacks on the MTS.
- Develop and integrate real-time intelligent systems for tracking cargo, personnel, and vessel operations throughout the MTS. This recommendation and considerations with regard to its execution were previously described in the Information Management and Infrastructure section.

In addition, the Task Force made the following recommendation, which falls outside the Presidential Commission's purview, to improve transparency:

- Develop real-time, dynamic modeling of MTS disruptions — cargo congestion, man-made or natural disasters, terrorist activity, etc. DOT and DOD should partner to conduct this action. This recommendation could be facilitated through the proposed MTS National Advisory Council and/or the National MTS Research Program.

Ensure Qualified Operators

As the U.S. relies more on commercial transportation activities to support national security objectives during contingencies, there is vital need to attract and retain a qualified MTS personnel work force. This work force is needed to support all levels of U.S. military mobilization requirements including ship crews, shipyard support for government surge activations, and cargo loading personnel.

Recommendation:

The Task Force made the following recommendation which also falls outside the Presidential Commission's purview to ensure qualified operators:

- Evaluate existing programs or encourage new programs, where needed, to provide qualified, well-trained personnel to operate ships, towboats, and barges, ports, terminals, ship-repair facilities, waterways, and intermodal connectors now and in the future. A well-trained peacetime work force is necessary to support the MTS infrastructure and operations that are called upon in times of military operations and deployment. DOT and associated labor and modal organizations should create a partnership to address this issue and develop a detailed plan of action to attract, train and employ a skilled MTS work force. Such a skilled workforce would support safety and environmental goals.

Forge Stronger Public/Private Partnerships

Stronger interagency and public/private sector partnerships are needed to support national defense and port security, military mobilization planning, and port training exercises. The U.S. must be able to detect, intercept, and respond to threats to the MTS as far offshore as possible. The U.S. must be able to implement the collective public and private efforts required to sustain the Nation's capacity for uninterrupted rapid deployment of U.S. forces. This includes assurance of the shipbuilding and repair infrastructure needed to maintain the U.S. fleet of combatant and commercial vessels needed. Contingency planning must be an ongoing process involving responsible Federal agencies, the private sector, State, and local law enforcement and emergency service providers.

Recommendations:

The Presidential Commission will consider the following Task Force recommendations in this strategic area:

- Advocate and oversee integration of public/private sector national security strategy, policy, and goals to support DOD mobility plans. It is recommended that DOD be designated as this advocate and work with DOT and the Department of Justice.
- Develop public/private sector MTS partnerships to establish security guidelines for onshore facilities, offshore facilities, and vessels and implement incentive-based mechanisms to address MTS security vulnerabilities. The ICMTS and regional and local coordinating bodies should be engaged on this issue. Participants should include USCG, DOD, MARAD, the Customs Service, private sector organizations, State and local authorities, and labor organizations.
- Develop public/private sector partnerships to support sustained and uninterrupted

rapid deployment of U.S. forces. For example, DOT and DOD — in partnership with commercial ship owners, U.S. shipyards, port authorities, and terminal operators — should develop an executable plan to recapitalize and expand the commercial and DOD auxiliary fleets and strategic ports necessary to meet and support national mobility requirements.

Strengthen International Cooperation

The origin of much of the cargo that moves through the MTS lies well beyond America's borders. More effective international cooperation to establish and police security standards at overseas ports that serve as a primary entry point in the system for U.S.-bound cargoes and people will reduce the risk that contraband or terrorists will find their way into the U.S.

Recommendations:

The Task Force recommendations to strengthen international cooperation are to:

- Develop a strategy and process for advancing U.S. operating guidelines and minimum security standards on an international basis; and
- Provide intelligence and training to improve international oversight of the global maritime infrastructure.

This should be incorporated into several ongoing interagency and public/private sector efforts such as The Interdiction Committee, the Customs Service Carrier Initiative Program, Americas Counter Smuggling Initiative, and the Business Anti-Smuggling Coalition.

SAFETY AND ENVIRONMENTAL PROTECTION

Two primary goals of the MTS are to ensure the safety of people and property and protect the environment. These areas are of paramount importance to all MTS users and stakeholders. Safety and environmental protection issues, as previously discussed, include ship channel configuration, port and terminal development and operations, interaction of vessel traffic including ice navigation, terminal operations and cargo handling, pollution sources, nonindigenous species invasions, and recreational boating.

Many factors influence the risk of accidents (with their associated consequences of fatalities, injuries, property losses, and traffic disruptions) as well as the risk of environmental degradation. The Regional Listening Sessions and the November 1998 National MTS Conference identified a long list of these issues and recommended a number of actions to improve MTS safety and environmental protection.

The breadth and depth of safety and environmental issues requires a systematic approach, as well as specific actions, to achieve the desired MTS in 2020. This recommendation is focused on development and application of structured analyses of MTS safety and environmental impacts. This will facilitate appropriate evaluation of the scope and impact of the perceived deficiencies as well as proposed remedies.

The specific areas of action presented here focus on the critical issues of safety and the environment, which are current challenges that will become increasingly important with the projected increase in MTS traffic. These areas, which represent a consensus of what the Task Force considered to be the most important issues, include:

- Ship-terminal interface;
- Vessel operation and the human element;
- Shore reception facilities;
- Nonindigenous species; and
- Dredging and channel design.

Systematic Approach to MTS Safety and Environmental Protection

The Task Force recommends a systematic approach for identifying and addressing safety and environmental protection risks. While such an approach should be conducted to the lowest appropriate level of the MTS, it requires active participation by both private sector and public sector stakeholders. Managers, operators, and users of the waterways, port facilities, the landside transportation system, environmental interests and the public are all stakeholders who must be involved via local committees or planning groups.

One example of a systematic approach that is used internationally — and that may provide a broad framework to recognize safety and environmental responsibilities and clearly define the various MTS stakeholders interests — is an integrated Safety, Quality and Environment (SQE) Management System.

A systematic approach is recommended that links MTS with protection of watershed and airshed. Because the MTS is downstream of homes, industries, farms, communities, and rivers, the health of the MTS environment is inextricably linked to the health of the entire ecosystem. Identifying and reducing sources of pollution in upstream watersheds will help maintain and improve the health of the MTS environment. Cooperative efforts and partnerships that address environmental concerns are an increasingly effective trend at all levels of government. It is important to note that there are significant challenges to reducing point and nonpoint source pollution that enters the waterways from non-MTS-related activities. MTS users are becoming more active in the local/regional watershed planning and management process, and incentives should be developed to encourage and expand these efforts.

Local area or watershed application of these assessment practices provides stakeholders with the information they need for better local planning and development. Communication of best management practices between system stakeholders should be encouraged.

A Safety and Environment Management System can become a point of reference for planning and decision making. For example, MTS stakeholders can use risk assessment driven analysis to:

1. Identify how inherent hazards associated with MTS operations/facilities potentially affect safety and the environment;
2. Produce risk profiles for MTS operations/facilities;
3. Characterize the risk of the potential safety and environmental impacts;
4. Assess the measures to effectively manage the identified risks;
5. Develop recommendations for preventing and reducing safety and environment-related risks; and

6. Propose issues of potential national significance that regional or national forums should address.

This approach will also help to identify common regional- and national-level risks and best management practices.

Establishing a systematic approach would provide a viable political environment for dealing with both national strategic issues and specific local tactical issues that may constrain development of improved safety and environmental protection in marine transportation. In some cases, this systematic approach may be easily achieved by extending or enhancing existing programs, or by linking complimentary efforts currently conducted in selected areas or by different organizations.

In many cases, these effects could take advantage of existing local committees, such as the local Harbor Safety Committees (HSCs). Where HSCs are used, their scope and membership must be expanded to incorporate the broader mission.

Specific Strategic Areas of Action

In the interim period required to develop and implement the recommended systematic approach to safety and environmental protection, several actions should be initiated. As previously discussed, the Task Force has developed recommendations in five areas: Ship-Terminal Interface; Vessel Operation and the Human Element; Vessel Discharges and Shore Reception Facilities; Nonindigenous Species; and Dredging and Channel Design.

Ship-Terminal Interface and Port Development and Terminal Operations: There are safety and environmental risks posed by some marine terminals for both liquid and dry cargo. Risk factors include terminals that are too small for the ships served, poorly located, have inadequately trained ship-based and shore-based manning, operate under inadequate procedures, have inadequate or poorly maintained cargo handling equipment, or a combination of these factors. The USCG already has the authority to enforce existing regulations, and the oil and hazardous liquid cargo shipping and terminal industries have comprehensive design, equipment, and procedural codes covering mooring, cargo transfer, safety, fire fighting, and training at the ship-terminal interface. Port and terminal operations pose potential multiple media environmental risks, such as from storm water runoff, port expansion, vessel support activities, cargo handling, chemical storage and handling, motor carrier and rail activities, and public access and recreation.

Recommendation:

It is recommended that marine terminal and vessel operators, in cooperation with the USCG, MARAD, and port authorities, initiate assessments, where needed, including:

- Safety and environmental protection systems;
- Operational procedure codes and personnel training and safety inspections;
- Accident and fire drills;
- Prioritized action lists of recommended upgrades and improvements; and
- Public and private responsibilities for actions to improve safety and environmental protection.
- Ports should continue to work closely as environmental stewards with Federal, State,

and local governments, as well as other stakeholders, to conduct operations and development in an environmentally responsible manner.

Local harbor safety committees or similar local stakeholder groups should lead this recommended action, with input from all involved stakeholders. The USCG should act as the coordinator of Federal input to these ship-terminal interface assessments. Recommendations for improvements should be forwarded through the proposed MTS National Advisory Council to facilitate lessons learned and best practices, as well as to identify the need for any regional and national level coordination.

Vessel Operation and the Human Element: Marine transportation is a complex and difficult process that introduces risk to personnel, property, and the environment. One of the key areas requiring attention is managing the human element in MTS operations. Specifically, working in the area of vessel navigation, recreational boating, and accidental discharges promise the greatest risk reduction return on investment. Marine pilots and USCG personnel represent the initial points of contact when a vessel approaches a port, and their communications and interaction with vessel officers and crew constitute a critical element in the safety and environmental protection system. Addressing the human element in cargo transfers and vessel operation will assist in reducing accidental discharges of harmful substances into the environment.

Recommendations:

The Task Force recommends that:

- Ship operators and marine pilots continue their current partnership efforts on pilot/master exchange.
- The USCG maintain active dialogue with, and participate in seeking ways to improve the safe navigation of vessels, including all pilot organizations, commercial and recreational users of the waterways, and port facilities using such organizations as HSCs.
- HSCs, pilotage organizations, and the USCG develop, in cooperation with tug/barge and ferry operators, Transit Advisories for each local area and publish these in *Notice to Mariners*.
- HSCs and the USCG encourage waterway users who are not subject to the ISM Codes to adopt appropriate quality assurance measures comparable to ISO 9000/9002.
- HSCs, pilot organizations, ship owners and operators, seafaring organizations, and the USCG foster training programs for all waterway users to raise the level of competence consistent with the traffic in each port and the availability of new navigation and communication technologies and to increase the awareness of environmentally protective requirements and practices.
- HSCs, local commercial and recreational users, and the USCG should investigate ways to reduce the safety risks associated with mixed waterway use. This might include such actions as developing local regulated navigation areas, traffic separation schemes, and prohibited zones.
- Private sector organizations that are involved in modal operations develop outreach programs, in partnership with the USCG, that focus on the human element to help

reduce accidental vessel discharges during cargo transfers and operations — including those from commercial fishing and recreational vessels. Explore methods of extending this approach to foreign flag vessels.

- States and recreational boating organizations should develop mandatory boating safety training and education.

Vessel Discharges and Shore Reception Facilities: Almost all ships generate oily water mixtures from normal engine room and bunkering operations, cargo residues, sewage, and solid waste such as refuse. Tank washing and ballasting procedures of petroleum and chemical tankers can generate relatively large volumes of contaminated mixtures in certain trades. Untreated sewage discharges can cause human health risks by contaminating shellfish and shoreline.

A vessel can legally deal with these pollutants by using either shipboard techniques or by transferring wastes to a Shore Reception Facility (SRF). New shipboard techniques for environmentally sound handling of shipborne-generated wastes have moderated demand for SRFs; however, a need for SRFs still exists. The United States has fulfilled its obligations under the 1973 International Convention for the Prevention of Pollution from Ships to provide SRFs for wastes of ocean-going vessels, but there are no regulations governing the quality, pricing, or customer service aspects of these reception facilities.

Recommendations:

The Task Force recommends that the ports, in partnership with the shipping industries, the terminal operators, and Federal agencies, when needed:

- Evaluate their current and projected needs for oily and chemical waste discharge, cargo residues, sewage, and solid waste, and assess the current capacity of existing SRFs; and
- Implement a plan to upgrade facilities to accommodate the projected demand.
- In addition, the Task Force recommends that the USCG conduct research and employ technology to reduce pollution, vessel discharges, and air emissions. Actions addressing SRFs should be coordinated through local committees and the ICMTS.

Nonindigenous Species: The introduction and spread of exotic or nonindigenous species into an area continues to cause adverse economic, ecological, and human health impacts. This occurs when nonnative species become established in their new environments, and upset the native ecological balances. This often greatly reduces the biodiversity of their new habitats. The movement of these species to and throughout the U.S. occurs in ballast water, cargo, and on vessel hull surfaces.

Recommendations:

The Task Force recommends that:

- Federal agencies continue to use their statutory authorities, as well as working through the Aquatic Nuisance Species Task Force (ANSTF) and Invasive Species Council, to minimize the introduction and spread of invasive species. Coordination among Federal agencies is needed. The DOT should take a leadership role in the transportation-related issues.

- USCG maintain its leadership role in the ballast water management area with the Voluntary National Guidelines program (mandated by the National Invasive Species Act of 1996).
- Federal agencies work with State governments, academic institutions, and the maritime industries to conduct ballast water management research and develop management technologies.
- The Ballast Water and Shipping Committee of the ANSTF develop a protocol for testing and approving alternative technologies for ballast water management.
- The U.S. delegation to the IMO, with MTS stakeholder cooperation, foster development of a legally binding international instrument for ballast water management. Any instrument should be reconciled with the diverse range of Federal and State requirements.
- The U.S. should work through international standard organizations and societies to foster the development of industry standards related to ballast water management and technology.

MTS users and stakeholders can become involved in carrying out these recommendations through participation in the proposed MTS National Advisory Council.

Dredging and Channel Design: Channel design and dredging, as previously discussed, is a complex undertaking that affects the national MTS goals involving safety, environment, and mobility. Channel dredging costs and environmental impacts, including the capacity to dispose of dredged material in an environmentally responsible manner, are significant concerns to MTS stakeholders.

Appropriate future dredging decisions require holistic planning with broad stakeholder input early in the process. Comprehensive channel design efforts must incorporate the best available information on present and future ships' dimensional characteristics and hydrodynamic and maneuvering characteristics. It is imperative that channel design account for the dynamic effects and response of ships as well as the hydrology and the geography of the area and the prevailing wind and weather conditions. Dredged material management should be considered in the context of overall sediment management within the watershed.

Rather than recommending a single solution, the Task Force endorses applying a systematic approach and maintaining continuity with previous work in this area. Stakeholders are looking to the Federal government for leadership in building consensus and ensuring economic competitiveness and environmental protection.

Recommendations:

The Task Force recommends the following actions:

- Continue to implement short-term recommendations from the December 1994 report, *The Dredging Process in the United States: An Action Plan for Improvement*. Agencies and stakeholders should encourage increased activity by the NDT and by RDTs. RDTs should be created where they do not currently exist. The MTS National Advisory Council should also provide recommendations to the NDT. Among the actions that the NDT should implement fully are:

- Assist the RDTs to implement dredged material management planning guidance;
 - Promote the use of scientifically sound dredged material evaluation tools;
 - Continue to develop public outreach and education programs to facilitate stakeholder understanding and involvement;
 - Promote the beneficial use of dredged material;
 - Assist RDTs to identify and resolve issues with local stakeholders on dredged material management related issues; and
 - Pursue clarification of the roles and coordination mechanisms among the USACE, EPA and other Federal stakeholders.
- Apply hydrodynamic and maneuvering criteria to new channels and some existing channels and vessels to determine acceptable ship sizes and no-passing and no-meeting zones. Analyze the trade-off between vessel and channel criterion with the participation of all stakeholders. Current and projected vessel characteristics and handling capabilities must be balanced against channel design constraints inherent in the proposed ports of call of each vessel type. Nonconforming vessels may require tug escorts, access restrictions, or traffic control, and other elements. The USACE, in partnership with the USCG, should lead this effort to work with local stakeholders through HSCs.
 - The USACE should complete the National Dredging Needs Study of Ports and Harbors to assess the needs of the national system of ports, harbors, and waterways of the United States. This study is necessary for the development of long-term planning, requirements, and investment strategies.
 - Conduct research on improved navigation system efficiency and safety. Prepare and publish guidance on design of waterway approach channels, including channel width and depth for mixed deep and shallow-draft vessel traffic; guidance for addressing waterway use and allocation conflicts; ice mitigation measures for navigable rivers; and guidance for control of icing at locks and dams. The USACE, in partnership with the USCG, should lead this effort to work with local stakeholders through HSCs, in consultation with pilots, operators, and naval architects who can contribute vessel-maneuvering expertise.
 - Conduct research on effective sediment management, including the effects of bendway weirs on navigation, numerical model evaluation of riverine training structures, and multidimensional hydraulic and sedimentation modeling. Conduct research into improved dredging techniques to reduce current concerns such as release of bottom contaminants. The USACE, EPA, and MARAD should lead this effort.
 - Incorporate into all channel development projects provisions for protection and/or improvement of permanent and seasonal wetlands and other aquatic habitats. The USACE and EPA should lead this effort.
 - Shift the focus from dredging and disposal to overall sediment management, which includes the need for holistic watershed and local/regional planning efforts.

- Under the auspices of the NDT, and to ensure an adequate ability to dispose of dredged material in an environmentally responsible manner:
 - Increase education of, and outreach to, system stakeholders, government agencies, the public, and policy decision makers on the nature of dredged material and beneficial uses. MARAD and USACE should partner and lead this effort.
 - Address questions regarding benefits and costs of dredging activities, such as material disposal and beneficial uses. See the earlier recommendation of an assessment of MTS needs and dialog on mechanisms to meet those needs. USACE and MARAD should partner and lead this effort.
 - Review existing processes for dredging planning and execution, and disposal of dredged material to encourage and guide agencies and stakeholders in using a watershed approach in these activities. Ecosystem considerations are most often larger in scope than individual dredging projects. Integrate dredged material management planning into local/regional watershed planning. EPA, USACE, and MARAD should partner and lead this effort.
 - Encourage innovative approaches to designing and financing beneficial uses and sediment management. EPA, USACE, and MARAD should partner and lead this effort.

ENDNOTES

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ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials	MARPOL	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978
AEI	Automated Equipment Identification	MPO	Metropolitan Planning Organization
AIWW	Atlantic Intracoastal Waterway	MPRSA	Marine Protection Research and Sanctuaries Act (or Ocean Dumping Act)
ANSTF	Aquatic Nuisance Species Task Force	MRS	Mobility Requirements Study
APEC	Asia-Pacific Economic Cooperation	MSB	U.S. Major Shipbuilding Base
BRAC	Base Realignment and Closure	MTS	Marine Transportation System
COA	Certificates of Adequacy	MTSNAC	MTS National Advisory Council
CWA	Clean Water Act	NCHRP	National Cooperative Highway Research Program
DMMPs	Dredged Materials Management Plans	NDT	National Dredging Team
DOD	Department of Defense	NHS	National Highway System
DOT	Department of Transportation	NIMA	National Imagery and Mapping Agency
DGPS	Differential Global Positioning System	NOAA	National Oceanic and Atmospheric Administration
DWT	Dead Weight Tons	NPRN	National Port Readiness Network
ECDIS	Electronic Chart Display and Information Systems	O&M	operations and maintenance
EEZ	exclusive economic zone	PORTS	Physical Oceanographic Real-Time System
ENC	Electronic Navigational Chart	PRC	Port Readiness Committees
EPA	U.S. Environmental Protection Agency	PTP	Prevention Through People
FACA	Federal Advisory Committee Act	R&T	research and technology
FBI	Federal Bureau of Investigation	RDT	Regional Dredging Team
FHWA	Federal Highway Administration	RHA	Rivers and Harbors Act
FCC	Federal Communications Commission	SHRP	Strategic Highway Research Program
FRA	Federal Railroad Administration	SQE	Safety, Quality, and Environment Management System
FTA	Federal Transit Administration	SRF	shore-based reception facility
GIWW	Gulf Intracoastal Waterway	STRACNET	Strategic Rail Corridor Network
GPS	Global Positioning System	STRAHNET	Strategic Highway Network
HSC	Harbor Safety Committee	TCRP	Transit Cooperative Research Program
HMTF	Harbor Maintenance Trust Fund	TEA-21	Transportation Equity Act for the 21st Century
ICMTS	Interagency Committee for the Marine Transportation System	USACE	U.S. Army Corps of Engineers
ICWWM	Interagency Committee for Waterways Management	USDA	Department of Agriculture
IEC	International Electrotechnical Commission	USCG	U.S. Coast Guard
IMO	International Maritime Organization	USN	U.S. Navy
INS	Immigration and Naturalization Service	USTRANSCOM	U.S. Transportation Command
ISM	International Safety Management Code	VISA	Voluntary Intermodal Sealift Agreement
ISTEA	Intermodal Surface Transportation Equity Act of 1991	VTS	Vessel Traffic Service
ITS	Intelligent Transportation Systems	WRDA	Water Resources Development Act
JIT	Just-in-Time		
MARAD	U.S. Maritime Administration		

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