



#### 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.

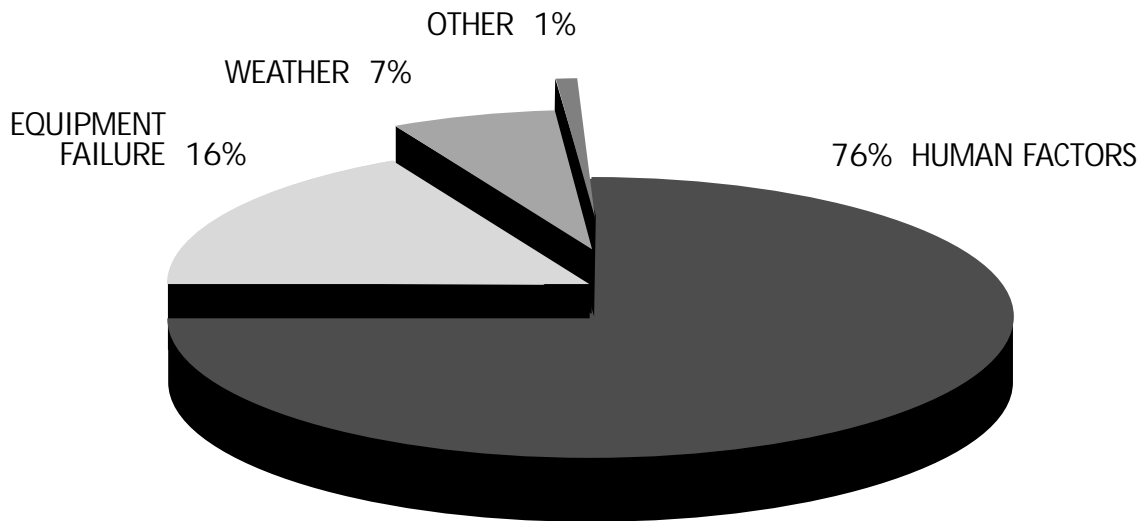
At the national level, virtually all activities to improve waterways, ports, and their intermodal connections are subject to review or approval by several Federal agencies. Reaching consensus through an efficient decision-making process is difficult without an agreed-upon organizational framework or 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.<sup>(21)</sup>

- 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.<sup>(22)</sup> 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.<sup>(23)</sup>

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.