

lost area of natural habitat is the habitat fragmentation that contributes to declines of numerous terrestrial and semi-aquatic species.^{46 47 48} Highways have greater impact than railroads because they cover more miles and a much greater area. Highways in particular alter hydrology and contribute to contaminated runoff.^{49 50}

The geographical footprint of harbor and waterway infrastructure is much less than land-based transportation infrastructure. Over 926 harbors and 12,000 miles of waterways have been developed and are maintained by the U.S. Army Corps of Engineers.⁵¹ The estimated total footprint is about 3,000 square miles. The estimate provides a basis for comparison despite uncertainty.⁵² The estimated total geographical footprint is about 10 percent of the estimated 29,000 square miles of free-flowing rivers, natural lakes other than the Great Lakes, and estuarine wetlands, but many effects were temporary.⁵³

Many lock and dam effects are permanent. The adverse effects of navigation reservoirs on species survival are well established.^{54 55 56} Waterway impoundments cover about 500 square miles of natural river channel with deeper, slower water. Impoundment effects on river hydraulics are frequently cited as among the major factors contributing to the decline of riverine species, but especially freshwater mollusks.^{57 58} Many of these species are protected under the ESA.

Another 7,000 miles of river and coastal shore was disturbed by excavation, dredged material disposal, and boat and barge use—about 400 square miles altogether. About 300 square miles of harbor channels were similarly disturbed. Annual maintenance dredging ranged up to 300

⁴⁵ Hecht, J. 1997. The environmental effects of freight. Presented to the Joint Session of Trade and Environment Experts, Organisation for Economic Co-operation and Development. Paris, France <http://www.oecd.org/dataoecd/14/3/2386636.pdf>

⁴⁶ Fahrig, L., Pedlar, J. H., Pope, S. E., Taylor, P. D., and Wagner, J. F. 1995. Effect of road traffic on amphibian density. *Biological Conservation* 73:177-182.

⁴⁷ Forman, R. T. T., and Alexander, L. E. 1998. Roads and their major ecological effects. *Annual Review of Ecology and Systematics* 29:207-231.

⁴⁸ Trombulak, S. C., and C. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. *Conservation Biology* 14(1):18-30.

⁴⁹ Gjessing, E., E. Lygren, L. Berglind, T. Gulbrandsen, and R. Skanne. 1984. Effect of highway runoff on lake water quality. *Science of the total environment* 33:247-257.

⁵⁰ Jones, J.A., F.J. Swanson, B.C. Wemple and K.U. Snyder. 2000. Effects of roads on hydrology, geomorphology, and disturbance patches in stream networks. *Conservation Biology* 14:76-85.

⁵¹ USACE (U. S. Army Corps of Engineers). 2010. U. S. waterway system facts. Washington, DC <http://www.ndc.iwr.usace.army.mil/factcard/fc02/factcard.htm>

⁵² see Cole et al. 2012 for methods

⁵³ Allen, K.O. and Hardy, J. W. 1980 Impacts of Navigational Dredging on Fish and Wildlife: A Literature Review FWS/OBS-80/07. U.S. Department of the Interior, Fish and Wildlife Service. Washington, D.C.

⁵⁴ Neves, R. J., A. E. Bogan, J. D. Williams, S. A Ahlstedt, and P. W. Hartfield. 1997. Status of aquatic mollusks in the southeastern United States: a downward spiral of diversity. Pages 43-85 *in* G. W. Benz and D. E. Collins, eds. *Aquatic fauna in peril: the Southeastern perspective*. Special Publication 1, Southeastern Aquatic Research Institute, Lenz Design and Communications, Decatur, GA.

⁵⁵ Parmalee, P. W. and A. E. Bogan. 1998. *The freshwater mussels of Tennessee*. The University of Tennessee Press, Knoxville, TN

⁵⁶ Cole 2009

⁵⁷ Parmalee and Bogen 1998, Neves et al. 1997

⁵⁸ Watters, G. T. 1999. Freshwater mussels and water quality: A review of the effects of hydrologic and instream habitat alterations. Pages 261-274, *Proceedings of the First Freshwater Mollusk Conservation Society Symposium*.

million cubic yards/year⁵⁹ since the waterways were virtually completed 40 years ago and averaged perhaps half of that rate during the time period most modern waterways were developed from 1930 to 1970. Deposited to a depth of 10 feet, material from maintenance dredging would cover about 1,800 square miles of aquatic and upland habitat. About 10 percent of the disposed dredged material was severely contaminated with toxic materials.⁶⁰ Environmental laws now require proper treatment and containment.

Numerous studies of dredging effects completed after NEPA and the Clean Water Act were passed were reviewed by Allen and Hardy.⁶¹ In general, dredging temporarily reduced bottom organism abundance except in highly altered environments, such as contaminated sediment and deep channels where depressed productivity and altered species composition often persist. Sediment toxicity effects bottom organisms, fish and other predators and humans at the end of the food chain.⁶² Deepening channels in estuaries can allow saline water to penetrate deeper into freshwater ecosystems where it may damage wetlands and contaminate water supplies.^{63 64} Rising sea level associated with global warming may worsen these effects. Dredging in some scarce ecosystems has had more persistent adverse effects on productivity and species composition, including unavoidable take of threatened and endangered species⁶⁵ in shallow estuary wetlands⁶⁶ and coral reefs. Dredging impacts on threatened and endangered species have improved significantly. Sea turtle take, for example, has been reduced to about 35 per year, which is a small fraction of total human-caused mortality. Past disposal on land created new habitat that could be more or less desirable than original habitat, depending on the site and its management. Islands created incidentally from dredged material disposal provided beneficial refuges for birds⁶⁷ before dredged material was intentionally used for that and other beneficial purposes.

Following institution of strong laws and executive orders, Corps policy in recent decades has emphasized protection of healthy wetlands and effective containment and treatment of contaminated sediments. In 1992, the Corps was authorized to beneficially use dredge material

⁵⁹ Francinques Jr., N. R., M. R. Palermo, C. R. Lee, and R. K. Peddicord. 1985. Management strategy for disposal of dredged material: Contaminant testing and controls. Miscellaneous Paper D-85-1. U. S. Army Corps of Engineers, Engineer Research and Development Center. Vicksburg, MS.

⁶⁰ Francinques et al.1985

⁶¹ Ibid.

⁶² Burton, G. A. and P. F. Landrum. 2005. Toxicity of sediments. Pages 478-571 *In* G. V. Middleton, M. J. Church, M. Carigilo, L. A. Hardie, and F. J. Longstaff (Editors). Encyclopedia of sediments and sedimentary rocks. Springer-Verlag. New York, NY

⁶³ PIANC Working Group no. 6. 1993. Problems caused by saltwater infiltration. Appendix 3: Summary of saltwater intrusion problems due to inland navigation channels in the United States. Permanent International Association of Navigation Congresses. Brussels, Belgium

⁶⁴ Savannah District Corps of Engineers. 2011. Draft tier II environmental impact statement for the Savannah Harbor expansion: Chatham County, Georgia and Jasper County, South Carolina. U. S. Army Corps of Engineers. Savannah, GA

⁶⁵ U. S. Army Corps of Engineers. 2006. USACE sea turtle data warehouse. Washington, DC.

<http://el.erdc.usace.army.mil/seaturtles/intro.cfm>

⁶⁶ Ray, G. L. 2007. Ecological Functions of Shallow, Unvegetated Estuarine Habitats and Potential Dredging Impacts (with emphasis on Chesapeake Bay). ERDC TN-WRAP-05-3. U. S. Army Corps of Engineers, Engineer Research and Development Center, Vicksburg, MS.

⁶⁷ Landin, M. C. and R. F. Soots. 1978. Colonial bird use of dredged material islands: A national perspective. Proceedings of the Colonial Waterbird Group: Volume 1. Waterbird Society, Waco, TX <http://www.jstor.org/stable/1520902>

for environmental improvement. About 20 to 30 percent of dredged material is now being used beneficially.⁶⁸

Impacts of Transportation System Operations

For many people, the transportation system impacts of greatest concern are the adverse effects of atmospheric emissions associated with fuel consumption, including greenhouse gas emissions. Fuel efficiency is an important consideration in seeking the most beneficial combination of transport modes, including atmospheric impacts. The land- and water-based freight transportation system consumes 8.6 percent of the total energy used.⁶⁹ While large ocean-going vessels in general are highly fuel efficient,⁷⁰ smaller vessels, such as those used for waterway barge transport, are substantially less so. Separate assessments by USDOF⁷¹ and OEE⁷² indicate that freight trains and smaller freight vessels have similar fuel efficiencies, but that trains and trucks have been improving while waterway vessels have not. Trucks consume over 72 percent of freight-transport energy used, largely because of fuel inefficiency.⁷³ Greenhouse gas emissions from the different transport modes exhibit similar ratios.⁷⁴ Reducing truck traffic in favor of train and barge is often promoted but difficult to accomplish. Trucks need to be used at points of freight origin and delivery and, despite higher fuel costs, are the most cost-effective mode for short freight hauls.⁷⁵

Because property values are typically lower near sources of pollution, congestion, and unpleasant appearance, people with low income are more likely to be impacted. This inequitable impact is inconsistent with national environmental policy and recent presidential emphasis on executive order 12898 on environmental justice.

Among other effects of operations, vessel wakes contribute to shoreline erosion, including wetland and bottom community changes.^{76 77 78} Vessel-caused turbulence also disturbs bottom communities and contributes to turbidity,⁷⁹ which deprives submerged plants and sight-feeding species of necessary light. However, this is a minor source of turbidity compared to nutrient enrichment and sediment runoff resulting from human caused changes in watersheds. Vessel,

⁶⁸ U.S. Environmental Protection Agency, U.S. Army Corps of Engineers. 2007

⁶⁹ U. S. Department of Energy. 2012. Transportation energy data book. 30th Edition. <http://cta.ornl.gov/data/index.shtml>

⁷⁰ Economic Development Research Group, Inc. 2012. Panama Canal Expansion Study Phase 1 Report: Developments in Trade and National and Global Economies. *Prepared for:* The United States Department of Transportation, Maritime Administration. Washington, DC

⁷¹ IBID

⁷² OEE (Office of Energy Efficiency). 2011. Energy use handbook tables (Canada). Natural Resources Canada. Ottawa, Ontario

⁷³ USDOF 2012

⁷⁴ OEE 2011

⁷⁵ Economic Development Research Group, Inc. 2012

⁷⁶ Koch, E. W. 2002. Impact of boat-generated waves on seagrass habitat. *Journal of Coastal Research* 37: 66-74

⁷⁷ Bishop, M. J. 2005a. Displacement of epifauna from seagrass blades by boat wake. *Journal of Experimental Marine Biology and Ecology* 354:111-118

⁷⁸ Bishop, M. J. 2005b. Joint effects of boat wake and dredge spoil disposal on sediments and assemblages of macro-invertebrates. *Estuaries*, 28: 510-518

⁷⁹ Allen and Hardy 1980

port, train and truck operations often are sources of oil, metals, and other water pollutants.⁸⁰ Vessel cargo and ballast water have been major vectors for non-native invasive species with adverse environmental effects.^{81 82} Trucks and trains are major means for nonnative species invasion of inland areas.⁸³ All modes contribute to inequitable exposure of low income and minority groups to unhealthy pollutants and noise.⁸⁴ Intermodal trucks contribute to vehicular traffic congestion. Ports have been addressing these problems, but according to critics can improve further.^{85 86}

Impacts of Accidents

Accidents not only threaten human safety and health, but scarce ecosystems and species as well. Accidents often receive attention disproportionate to their contribution to all transportation system impacts, but can be locally to regionally costly as signified by large oil spills, which are most associated with vessel collisions and pipeline breaks.⁸⁷ Accidents in and around ports are a function of increasing traffic rates and counteractive measures.⁸⁸ Vessel collision with endangered whales, sea turtles, fish and other species is a concern in a number of port areas.^{89 90} Recently imposed regulation of vessel speeds may reduce that source of mortality. Vehicular traffic is a threat to some endangered species.⁹¹

Future Environmental Impact Vulnerabilities and Possibilities

Given the uncertainty about where and what form and extent transport system modernization actually takes place, regional forecasts of adverse impact and mitigation needs are uncertain. Other environmental and social changes only amplify that uncertainty, including the potential effects of sea level change on *post-Panamax* depth requirements and associated adverse impacts. Instead of specific forecasts, indicators of human and resource vulnerabilities and possible sources of adverse impacts were used to discuss regional differences and similarities.

⁸⁰ Bailey, D., T. Plenys, G. M. Solomon, T. R. Campbell, G. R. Feuer, J. Masters, and B. Tonkonogy. 2004. Harboring pollution: The Dirty Truth about U.S. Ports. Natural Resources Defense Council, Washington DC

⁸¹ NRC (National Academies of Science) 1996. Stemming the tide. Controlling introductions of nonindigenous species by ships' ballast water. National Academies of Science. Washington DC

⁸² Corn, M. L., E H. Buck, J. Rawson, A. Segarra, and E.Fischer. 2002. *Invasive Non-Native Species: Background and Issues for Congress*. CRS Report RL30123 Congressional Research Service, Washington, DC

⁸³ Greenberg, D.H., S.H. Crownover, and D.R. Gordon. 1997. Roadside soil: a corridor for invasion of xeric scrub by nonindigenous plants. *Natural Areas Journal* 17:99-109.

⁸⁴ Rhodes, E. L. 2003. *Environmental Justice in America*. Indiana University Press: Bloomington, IN

⁸⁵ Bailey et al. 2012

⁸⁶ Cannon, J. S. Undated. U.S. Container Ports and Air Pollution: A Perfect Storm. Energy Futures, Boulder, CO
http://s3.amazonaws.com/energy-futures.com/port_study_ef.pdf

⁸⁷ Etkin, D.S. 2001. Analysis of oil spill trends in the United States and worldwide. *Proceedings*, 2001 International Oil Spill Conference. American Petroleum Institute, Washington, DC.

⁸⁸ Etkin 2001

⁸⁹ Vanderlann, A. S. M. and C. T. Taggart. 2006. Vessel collisions with whales: The probability of lethal injury based on vessel speed. *Marine Mammal Science* 23:144-156.

⁹⁰ Laist, D. W. and C. Shaw. 2006. Preliminary evidence that boat speed restrictions reduce deaths of Florida manatees. *Marine Science* 22:472-479.

⁹¹ Fahrig et al. 1995

Environmental assessments and environmental impact statements for individual actions were consulted, but varied greatly in coverage and were difficult to compare directly across regions. Eleven quantified indicators of environmental vulnerability and sources of modernization impact were used. The indicators were selected based on environmental impact history data, comparability across regions, quantification, reliability and representativeness. All data were gathered by authorized Federal agencies.

Potential Environmental Impacts at Ports

The indicators of the potential regional impact of future modernization and need for mitigation are shown in Table 10 with footnotes about each metric used. The metrics indicate environmental vulnerabilities in the vicinity of port locations. They include vulnerabilities of human populations (air emission fractions, water discharge permits, superfund sites, and low income and minority groups), cultural and natural resources of important heritage value (official reserves, wetlands, and endangered species), and beneficial uses of natural resources (commercial fishing, sport fishing and public beach area). Cole et al. (2012) describe the indicator metrics in detail. Three other general metrics were used to indicate the potential for significant environmental impacts of modernization on vulnerable people and resources. These include potential impact from harbor expansion, increased operations associated with greater freight movement, and port expansion to increase capacity. The modernization impact metrics indicate general sources of impact while the vulnerability metrics indicate the relative significance of the populations and resources that may be impacted.

Port harbors vary in their readiness to accept *post-Panamax* vessels and increased freight traffic. A fully ready harbor is assumed to allow any vessel to call once it has passed through the new Panama Canal locks, which will have 50-foot depths upon completion. The difference between 50 feet and existing depth times the main channel length is used as an indicator of harbor expansion impact. Landside port expansion needs and associated infrastructural and operations impacts are indicated by the differences between the average unused port capacity and projected 30-year regional population growth rates, both expressed as percentages. In general, less port modernization is needed where unused capacity exceeds forecast population growth by significant amounts. However, modernization for the largest *post-Panamax* vessels may require changes in freight transfer equipment and berth dimensions. The 30-year growth of the region served by the ports indicates environmental impacts associated with freight transport growth and associated operations effects, such as from pollution emissions and accident frequency. These impacts could be moderated by transporting the freight on fewer but larger vessels.

Table 10. Regional Indication of Potential Environmental Impact for the Four Most Important Container-port Regions. The raw data for individual metrics were normalized to values between 0 and 100 to allow regional comparison and summation.

Indicators	Port Regions ¹			
	Northeast Atlantic	Southeast Atlantic	Gulf	Pacific
Vulnerabilities				
Health, Safety & Equity ²	44.2 ⁸	35.7	45.7	48.9
Heritage Loss ³	11.9	33.7	26.2	20.3
Economic Loss ⁴	27.7	25.9	22.1	34.0
Subtotal	83.8	95.3	94.0	103.2
Modernization Sources				
Harbor Expansion ⁵	33.2	16.6	29.8	0
Freight Transport ⁶	17.8	73.7	43.3	76.0
Port Expansion ⁷	44.0	90.6	60.2	74.6
Subtotal	128.0	180.9	133.3	150.6
Total	211.8	276.2	227.3	253.8

1. Port selection was based on main channel depth and freight volume. The Northeast Atlantic includes Boston, New York-New Jersey, Philadelphia, Wilmington, and Baltimore. The Southeast Atlantic includes Norfolk, Wilmington, Charleston, Savannah, Jacksonville, Port Everglades and Miami. The Gulf includes Tampa, Mobile, New Orleans, and Houston. The Pacific region includes Los Angeles, Long Beach, Oakland, and Tacoma.
2. Health and safety vulnerabilities are indicated for an area within 10 km of ports by 1) number of days air pollution exceeded limits for respiratory illness, 2) number of permitted waste water discharges, and 3) number of superfund sites (EPA 2012 a and 2012b). Potential for environmental injustice is indicated by the percentages below poverty level and in non-white minority groups within 5 km of the port. (Census Bureau (United States Census Bureau). 2011. 2010 public use microdata areas (PUMAs). Department of Commerce, Washington DC <http://www.census.gov/geo/puma/puma2010.html>)
3. Vulnerability to loss of important local and national heritage is indicated for an area within 10 km of the port by 1) the percentage of wetlands. (USGS (United States Geological Survey) 2010.) National land cover database. (U.S. Department of the Interior. Washington DC <http://www.mrlc.gov/index.php>); 2) the area encompassed in parks and other preserves. (USGS (United States Geological Survey) 2012). USGS gap analysis program. (U.S. Department of the Interior. Washington DC <http://gapanalysis.usgs.gov/data/padus-data/>); and 3) the number of species listed as threatened or endangered (FWS 2012).
4. Vulnerability to a loss of natural resource economic value is indicated by 1) the state commercial fish dockside value divided by state shoreline length (NOAA 2012). Annual commercial landings by Group (year 2010). NOAA Fisheries, National Oceanographic and Atmospheric Administration. Washington, DC http://www.st.nmfs.noaa.gov/st1/commercial/landings/gc_runc.html) and Census Bureau 2012a, 2) state saltwater fishing days divided by state shoreline length (FWS, (U. S. Fish and Wildlife Service and the U.S. Department of Commerce, and U.S. Census Bureau) 2006. National Survey of Fishing, Hunting, and Wildlife-Associated recreation. FHW/06-NAT. U. S. Department of Interior. Washington, DC) and (Census Bureau 2012a), and 3) area of public beaches within 10 km of the port (EPA (United States Environmental Protection Agency). 2012c. Watershed assessment, tracking & environmental results. USEPA. Washington, DC <http://www.epa.gov/waters/data/downloads.html#BEACH> Datasets (EPA BEACHES dataset)). State data were divided by shoreline length to account for large differences in the dispersal of fishing access along shore and away from ports.

5. Harbor channel expansion needed to accept the largest post-Panamax vessels is indicated by the difference between existing depth and 50 feet times existing channel lengths. This metric indirectly indicates potential excavation and maintenance impacts.
6. Future rate of freight transport through ports is indicated by the 30-year population growth in states within 500 miles of the port. This metric indirectly indicates possible impacts from emissions and other operations effects.
7. Port expansion needs and potential impacts are indicated by the differences between percentage population growth over the next 30 years and the mean percentage of unused capacity for 1) berth size for vessels calling at the ports, 2) number of berths serving calling vessels, 3) freight transfer cranes, 4) port storage space, and 5) average vessel utilization.

Total vulnerability scores were slightly lower than average in the Northeast largely because of low heritage impacts associated with endangered species and preserves. The Pacific Region vulnerability was higher than average because of greater potential health and economic impacts. The sum of vulnerability differences among regions is smaller than differences in potential need for modernization and its associated environmental impacts. No region was consistently more or less vulnerable across all indicators. This suggests that modernization is likely to incur significant costs for required environmental impact avoidance, minimization, and compensatory mitigation, regardless of the region modernized. However, mitigation cost would vary widely among ports within regions depending on their specific vulnerabilities and impact extents and intensities.

Potential modernization and freight transport impacts are especially high in the Southeast and Pacific regions where regional population growth is nearly equally high and port capacities are most used. The higher score of the southeastern region is due largely to less harbor and port capacity. The harbors at two major ports in the Northeast are, or soon will be, ready for *post-Panamax* vessel use, but the amount of dredging required at ports that are not ready makes potential harbor expansion impacts the highest among regions. However, actual population growth and percent growth is quite low in the Northeast compared to the other regions, making future modernization needs the lowest. The Gulf Region has a somewhat less unused capacity and more anticipated regional growth, but substantially less than in the southeastern and Pacific regions.

When vulnerability and potential modernization scores are totaled, the Southeastern region is highest and the Pacific region a close second. Metric scores are not likely to be proportional to mitigation costs, however. The Northeast Region ranks lowest. The physical need for harbor expansion in the Southeast Region is low compared to other regions, for example, but heritage vulnerability to harbor expansion impact is comparatively high.

While the impacts of harbor expansion could be substantial, there are potential environmental benefits from increasing capacity for *post-Panamax* vessels if, as expected, it moderates impacts on air and water quality impact per ton of freight shipped. Assuming that freight transport rates will increase regardless of average vessel size calling at the ports, harbor expansion could reduce anticipated increases in emission impacts on human health, including inequities among minority and low income groups near the ports. Other effects are harder to judge. While the frequency of ship passages may decrease, possibly lowering the number of harmful collisions with scarce species and other costly accidents, the increased size of the vessels may increase the likelihood of collisions when a vessel passes through the area. Regulations to slow vessel speeds

may moderate any difference in potential effect. Accidents involving freight losses and oil and other spills may be more costly on larger vessels because more freight is lost and more harmful pollutants are released.

The results of analysis shown in Table 10 could be significantly altered by the effects of Panama Canal expansion, which may reduce the transport costs of freight with eastern destinations that now enter through Pacific ports. Panama Canal enlargement could result in a significant shift in transport-cost advantages at Southeastern ports, especially if they are able to accept *post-Panamax* vessels. That could also reduce transport system atmospheric emissions because of the higher fuel efficiencies of large vessels. If the scenario plays out, freight transport rates through southeastern ports could be elevated above the rates indicated by forecasts of future population growth in the southeastern region. Highway and rail transport from southeastern ports into areas in the U. S. interior now served by Pacific ports may somewhat reduce projected freight movement through Pacific ports based on regional population growth alone. That prospect could redistribute the intensity of adverse emissions impacts from west to east and further support harbor enlargements with their associated potential impacts on valued resources.

Another possibility could alter the picture. Existing *post-Panamax* ports on the East Coast and international ports in the Caribbean have potential for becoming deepwater transport hubs for vessels of all sizes. That may favor smaller feeder vessel delivery of transferred freight to East Coast ports that are not ready for *post-Panamax* vessels.⁹² If that happened, freight transport rates and pollutant emissions may increase above regional population predictions, but the environmental impacts from harbor expansion may be largely avoided. Atmospheric emissions from vessels would increase because emissions, per ton of freight transported increases as vessel size decreases.⁹³

Improved performance of rail and highway freight transport from West Coast ports could also moderate a Panama Canal effect. Pacific ports are better prepared than eastern and Gulf ports to accept *post-Panamax* vessel sizes and container traffic, have transport-time advantages, are projected to serve rapidly growing populations west of the Appalachians, and may become more competitive by cutting their costs.⁹⁴ Such advantages could result in relatively little change in the proportion of freight moving into east and west ports despite Panama Canal enlargement. Cost cutting strategies like container stacking on railroad cars and increased truck-trailer lengths could significantly reduce the growth in atmospheric emissions per ton of freight transported, but perhaps not enough to make up for the much greater efficiency of large vessels entering the eastern U.S. through East Coast ports. The tradeoffs among different scenarios are complicated by numerous unknowns and by harbor enlargement impacts at

⁹² Economic Development Research Group, Inc. 2012

⁹³ Notteboom, T.E. and B Vernimmen. 2009. The effect of high fuel costs on liner service configuration in container shipping. *Journal of Transportation Geography* 17:325-337.

⁹⁴ Economic Development Research Group, Inc. 2012

Southeastern ports and local air quality degradation and port congestion at some West Coast ports that are already stressed.

Regional summaries do not reveal the substantial variation in vulnerability and modernization need that occurs among sites within each region. The results indicated in Table 6 are preliminary, given the variation in the data, incomplete representativeness of the impacts, and uncertainty in various national and world transportation decisions. But the results are of strategic interest because they reinforce the uncertainties that signal a need for an adaptive approach to port and waterway modernization investment and “flag” potential impacts for specific attention in future environmental impact studies.

Potential Environmental Impacts at Waterway Locks

Panama Canal enlargement may make shipment of grains and other goods out of the Midwest to Gulf ports and Asian markets more attractive than existing routes. That could increase barge traffic down the upper Mississippi and Illinois Rivers and on to the Gulf. Potential environmental impacts are most associated with lock rehabilitation to maintain reliability.

Lock rehabilitation would largely occur in areas of relatively low human population density where health and safety concerns are relevant but less likely to affect people to the extent probable around ports. Atmospheric emissions would increase as barge and intermodal transport increased, but maintaining lock reliability through rehabilitation would moderate the increase by reducing barge congestion in the lock vicinity. The main alternative to barge transport is rail or truck transport directly to Gulf ports, which would circumvent the need for a shipment transfer. Barge shipment no longer has an environmental advantage over railroads because railroads are now about equally efficient.⁹⁵ Truck transport remains more versatile, but much less fuel efficient.

The upper Mississippi and Illinois rivers are home to a number of freshwater mussels and other threatened and endangered species, but, in general, adverse impacts on them are likely to be small. Our analysis indicates that 62 percent of the 100 meter riparian strip next to locks and dams on the upper Mississippi is wetland based on data from FWS,⁹⁶ which would require compensatory mitigation. On the Illinois River, 42 percent is wetland. No critical habitat of endangered species is expected to be impacted, but at least 1 endangered riparian species lives in each of the counties where most locks are located. The resource uses most likely to be impacted are agricultural and residential.

Summary

⁹⁵ USDOF. 2012. OEE 2011

⁹⁶ U. S. Fish and Wildlife Service. 2012. Environmental Conservation Online System. U. S. Department of the Interior. Washington DC <http://ecos.fws.gov/ecos/indexPublic.do>

A small area of the conterminous United States has been transformed by the land and water transportation system, but the adverse impacts on humans, ecosystems and wild species are significant despite major improvements in mitigating impacts. The environmental footprint of the transportation system indicates that future environmental impact from transportation system modernization could be associated with degraded human health and safety (including inequitable impacts on low income and minority groups), loss of important natural and cultural heritage, and loss of economically important natural resources. Impacts could come from changes in air and water quality, harbor and port expansion, and intermodal links. A regional assessment of potential impact sources and human population and resource vulnerabilities reveals the potential for somewhat greater environmental impact in the Southeast Atlantic and Pacific Regions, largely because these are the areas where freight transport growth is expected to be greatest. The effects of Panama Canal expansion have potential to redistribute some freight transport growth from Pacific ports to Southeast Atlantic ports. Adverse impacts from possible lock rehabilitation in the Upper Mississippi and Illinois Rivers are expected to be relatively minor except for potential need to mitigate for loss of riparian wetlands. In general, the uncertainties point to the need for an adaptive approach to future investment in port and waterway modernization. In that approach, port and waterway use would be monitored and modernized systematically as more certain information about freight movement, environmental impacts, and public benefits becomes available.

"Factoring in environmental and public health costs needs to be part of the decision making process at every step in order to ensure future sustainability of our ports, our coastline, and our population."

-Environmental Defense Fund

Chapter 5: Financing Options for Funding U.S. Port and Inland Waterway Infrastructure Needs

To remain competitive in a changing global trade market, the U.S. would need to continue making the justified investments necessary to maintain and improve its navigation transportation infrastructure, where it is appropriate and efficient to do so. Understanding the current funding challenges and making long-term plans for operations and maintenance (O&M) and justified investments are critical to developing an effective vision for a competitive navigation system.

USACE Civil Works appropriations to address waterside infrastructure has averaged about \$1.5 to \$2 billion per year for the last decade. These expenditures have been used to maintain, construct and improve the most highly justified inland and coastal navigation infrastructure projects, and reflect the Nation's most efficient navigation investment strategy.

To accommodate expected increase in agricultural exports through the Gulf, the current inland waterways must be adequately maintained through maintenance dredging and justified major rehabilitation.

USACE currently has 17 active studies investigating possible port improvements, most associated with the desire to be *post-Panamax* ready. One such study at the Port of Savannah is nearing completion and indicates an economically justified project that will cost about \$652 million. It is likely that other studies will also show economically justified projects, either to become "*post-Panamax* ready" or "*cascade* ready." The preliminary estimate to expand some ports along these two coasts was about \$3 to \$5 billion. Specific investments in ports must be individually evaluated for their timing and economic and environmental merits.

Addressing "the critical need for additional port and inland waterway modernization to accommodate *post-Panamax* vessels" necessitates an examination of the current delivery mechanisms, the identification of issues and the offering of options for the future. Among the issues identified, securing funding sources to take advantage of modernization opportunities in a timely manner, given the constrained fiscal environment, was judged the most critical. A notional list of financing options is presented to initiate discussion of possible paths to meet this challenge—it is anticipated that a variety of options may be desirable, and in all cases individual project characteristics, including its economic merits, would need to be considered in selecting the optimal financing mechanisms. These options are illustrative only and do not necessarily represent any Administration, USACE or IWR position.

The Administration and Congress divide the U.S. Army Corps of Engineers budget into the broad categories of construction (which may include major rehabilitation) and operations, maintenance, repair, rehabilitation and replacement (O&M). For every dollar spent by USACE for harbor improvements (channel deepening and widening) a certain percent is appropriated from

general Federal revenues. The cost share, which varies by depth of the harbor, is paid by project sponsors, typically port authorities or states, over a 30-year period.⁹⁷ All harbor maintenance dredging up to 45 feet is paid with appropriations from the Harbor Maintenance Trust Fund (HMTF). Over 45 feet, there is a 50 percent non-Federal cost-share requirement.

The USACE budget for inland waterways improvements (construction) draws from the balance in the Inland Waterways Trust Fund (IWTF) for 50 percent of each appropriated dollar and general Federal revenues for the other 50 percent. Operations, maintenance and repair to the inland waterway channels and navigation locks and dams are funded entirely by general Federal revenues. (See Vocabulary of terms used in this chapter on page 88.)

There is a long-standing Federal funding commitment, manifested through the USACE budget, to harbor improvement and maintenance and inland waterway navigation system improvement and O&M. In recent decades some of this financial responsibility has been transferred to the beneficiaries of the projects in the form of increases in required cost share and as requirements to pay user fees and dedicated taxes into the two trust funds. Attention is now directed to whether Federal general revenue and trust fund appropriations are adequate to improve, operate and maintain inland waterways and assure that Gulf and East Coast harbors have the channel capacity to accommodate larger ships that will soon pass through an expanded Panama Canal.

The budgetary concern is for improvements to and maintenance of existing harbors and inland waterways and is not about the creation of “new” ports, channels, navigation locks or dams. The concern is over how the Nation can secure and then efficiently spend funds that will secure the future value of past valuable investments. Because of the historical role played by the Federal government through USACE, an associated question becomes “What is the role for USACE in assuring that future value?”

In recent decades USACE responsibilities have expanded to include environmental oversight and regulation of environmental impacts associated with improvements and O&M at harbors and on the inland waterway navigation system. Such improvements and O&M alter the geomorphic and hydrologic processes in coastal estuaries and along rivers and, in turn, habitat conditions and aquatic life. Other environmental concerns associated with this transportation system include finding acceptable means for disposal of contaminated dredged material, the disposal of ballast water and, as appropriate, the beneficial use of clean dredged material for habitat creation. (See Chapter 4 for discussion of environmental effects).

As part of its project evaluation of proposed improvements and O&M, USACE evaluates environmental impacts and determines how to avoid and minimize such impacts.⁹⁸ Where avoidance and minimization is not possible, the project budget includes funds that provide for

⁹⁷ Non-Federal cost share requirements are as follows: Harbor Depth less than 20 feet: 20%; Harbor Depth 20-45 feet: 35%; and, Harbor Depth > 45 feet: 60%

⁹⁸ These evaluations are made in compliance with the National Environmental Policy Act as well as other Federal or state government required assessments.

compensatory mitigation. The costs for compensatory mitigation can be a substantial part of the total costs of any improvement project. For example, about 45 percent of the total cost of the proposed channel deepening for Savannah harbor to 47 feet is for the mitigation requirements established within the USACE planning process. Even still, there have been challenges to the plan that assert that the mitigation is inadequate or even that the project should be abandoned because it has unacceptable environmental consequences.

Vocabulary

General Revenue Funding – Appropriations for the cost of construction, operations, maintenance and repair of harbors and waterways made from general revenues of Federal and non-Federal governments.

Beneficiary Based Funding – Payments for the cost of construction, operation, maintenance and repair of harbors, channels, locks and dams using revenues from user fees or from a dedicated tax source. A user fee is a charge paid voluntarily by the user of the harbor or waterway; failure to pay the charge results in exclusion from use (e.g., a lock passage fee or a wharf access fee). In contrast, a dedicated tax is a required payment to a government entity, enforced by threats of sanction for nonpayment rather than by denial of a use (e.g., a tax on fuel). Revenues from user fees and dedicated taxes are often deposited to a government managed trust fund.

Trust Fund – A government established and managed account that accumulates the revenues from user fees and dedicated taxes. The managers of the fund make decisions about the disbursements from the fund.

Cost Sharing – A legally mandated sharing of the costs for construction, operations, maintenance and repair for harbor and waterway improvements and OMR between the Federal government and a non-Federal entity. Cost-sharing is a requirement for Federal budgetary participation in harbor and inland waterway improvements.

Cost Recovery – A requirement that all costs for construction, operation, maintenance and repair costs incurred over a period of time be matched by general tax revenues and receipts from user fees and dedicated taxes. Since benefits are realized over time, payments toward cost recovery may be received over several years. Upfront costs will typically require sale of bonds; repayment of bond debt would be spread over some period of project life.

Financing – The advancement of funds from a public, quasi-public or private entity to an entity initially responsible for the costs of improvements and OMR at harbor and waterway facilities. The responsible entity then uses a combination of general revenues, user fees and dedicated taxes to repay the incurred debt.

Infrastructure Bank – A chartered government institution that makes or guarantees loans for non-Federal infrastructure improvements in anticipation of repayment through future dedicated revenue streams, such as revenues from user fees or dedicated taxes.

Under the Clean Water Act the USACE regulatory program has responsibility, shared with the U.S. Environmental Protection Agency, to issue permits for the placement of fill material in U.S. waters. In reviewing these permits the regulatory program is obligated to be sure that the proposed action is needed, minimizes adverse environmental effects and then compensates through mitigation for any unavoidable adverse environmental consequences. In current planning and budgeting practice, USACE harbor and navigation business lines have the lead in planning for and implementing improvements and O&M and the regulatory program issues a permit if it affirms the environmental assessment and mitigation of the USACE planning process. Also, the 404 permit process requires that the states affirm the compatibility of any improvement or maintenance operation with state water quality standards, consistency with Coastal Zone Management Act plans if appropriate, and other environmental laws and regulations of both the state and Federal government.⁹⁹ Therefore, even if a non-Federal entity wishes to deepen a harbor (for example) with its own funds, USACE would still be involved in issuing the appropriate environmental permits.¹⁰⁰

Harbor Funding (Maintenance and Construction)

Decisions on spending HMTF dollars for maintenance dredging are made through a hierarchical process that begins with requests made at the USACE district level and ends with allocations made in the President's budget. Modest adjustments have been made in the past during the congressional appropriations process.¹⁰¹ Allocations made from the HMTF during the past five years have been less than the revenues earned; there is a balance in the HMTF account.

The principal concern regarding harbor maintenance is whether the level of collections and disbursements from the HMTF will be adequate to maintain harbors at levels sufficient¹⁰² to provide reliable service to shippers. Looking forward, the question is whether revenues collected with the current HMTF fee system can keep pace with increasing costs of dredging over time even if all collected funds were allocated to maintenance (possible causes of increasing costs include increased shoaling, increases in unit costs of dredging).

⁹⁹ These requirements can be far-reaching and, for example, can extend to the evaluation of effects on local and regional air quality.

¹⁰⁰ Section 14 of the 1899 Rivers and Harbors Act (33 U.S.C. 408), often referred to as Section 408, requires any Federal entity wishing to make a modification to a project originally authorized by Congress and built by USACE to receive a permit from USACE to assure that the modification does not injure the public interest or impair the existing project's usefulness. Therefore, for most harbor projects and for channel or inland waterway improvements USACE would need to issue a 408 permit as well as a 404 permit even if there were no Federal funds involved in the modification.

¹⁰¹ The Administration's fiscal 2013 budget calls for a 12 percent increase from fiscal 2012, rising funding to \$848 million, representing about half the annual revenues deposited to the fund. The Administration argues that this level of funding has proven adequate to maintain the existing harbor infrastructure. Nonetheless, there has been some congressional legislation proposed to increase the amount expended from the trust fund.

¹⁰² A sufficient channel is not necessarily going to be one that is maintained to its authorized width and depth. Sufficiency of the channel depends upon traffic utilization patterns and currently is determined by analysis of such patterns during the budget justification process.

Port expansions to accommodate *post-Panamax* vessels present a different set of concerns. Harbor channel capacities at Gulf of Mexico and Eastern U.S. ports currently do not accommodate fully laden *post-Panamax* vessels. Many of these ports are currently being studied or implemented by USACE or non-Federal interest under Sections 203 or 204 of WRDA 1986.¹⁰³ The challenge going forward is to identify funding mechanisms to take advantage these opportunities against the backdrop of a fiscally constrained environment.

Inland Waterways Funding

Over the past five fiscal years the total appropriations for lock and dam improvements and for O&M of inland waterway navigation structures and channels have been relatively constant. Of the total appropriations, a large percent are from general revenues.

Decisions on funding for inland waterways improvements are made based on a USACE economic justification analysis and are accompanied by an environmental evaluation and mitigation plan. Funds for waterway improvements are drawn from the balance in the IWTF and are cost shared with general Federal revenues on a 50/50 basis.

There have been concerns expressed in Congress and by the barge industry about the adequacy of funding for lock improvements and about delays in planning and implementing projects.¹⁰⁴ At present there is industry support for raising the fuel tax to increase the revenues flowing to the IWTF and for accompanying that raise with other reforms that change the share of total costs for waterway improvements paid from general revenues. The current Administration, as well as the previous Administration, proposed replacing the fuel tax with a lock passage fee that also includes changes in the share of total costs borne by general revenues.

Decisions on appropriations for operations, maintenance and minor repair are made through a process that begins with requests made at the USACE district level and ends with allocations made in the President's budget. Modest adjustments in annual appropriations have been made in the past during the congressional appropriations process.

Within this budget context, the issue of concern is whether the level of collections for and disbursements from the IWTF, combined with Federal general appropriations, will be adequate

¹⁰³ The Water Resources Development Act of 1986 (Sections 203 and 204) includes provisions for non-Federal interests to undertake feasibility studies for harbor improvements. These studies are to be in accordance with guidelines promulgated by the Secretary of the Army. The Secretary would review the study results and make a recommendation to the Congress on whether the proposed improvement would warrant Federal financial support under existing cost-sharing policy. If the Congress authorized the proposed harbor improvement, the non-Federal interest could make expenditures for improvements, subject to obtaining necessary permits, and later seek reimbursement for the federal share of the total cost, including study costs. These provisions might expedite the planning and implementation of harbor improvement projects, but would not necessarily increase Federal appropriations made to such projects. In effect, the nonfederal interest and the nation would realize the benefits of the improvement; however, there is no assurance that reimbursement for the Federal cost share would be forthcoming. This same process could be followed for making improvements to inland waterways.

¹⁰⁴ See footnote 23.

to improve, operate and maintain channel and lock and dam facilities at levels sufficient to provide reliable service. The focus of this discussion about this issue has been on the revenues collected with the current fuel tax, the level of Federal general revenue cost sharing and consideration of possibly increasing costs of improvements and O&M.¹⁰⁵

Options for Harbor Improvement and Harbor Maintenance Funding¹⁰⁶

Option 1: Business as Usual for Harbor Improvement and Continued Maintenance

Harbor improvements would continue to receive Federal funding from general revenue appropriations and from the project cost share partner. Currently cost share partners raise revenues to meet their cost share obligations using multiple strategies including landside facility fees, appropriations from general state revenues and more. Under this “business as usual” approach, funding for the next decade would remain consistent with that provided during the past five years. Allocation of funds for harbor improvement would be made according to Administration budget priorities, based on analyses of project justification provided through the existing USACE evaluation and justification processes.

Funding for channel maintenance would draw upon revenues from the HMTF with the fee structure which generates revenues for the fund remaining unchanged. Allocations from the fund to harbor maintenance would be made by the Administration in consideration of the need to maintain channels without regard to the size of the HMTF revenue stream. Because of the continuing revenue streams dedicated to the HMTF, and because of the reserves in that fund, financial support for maintenance of existing channels would be assured, at least for the near term.¹⁰⁷

Option 2: Increase Appropriations from General Federal Revenues for Harbor Improvements

With this option Congress would follow the traditional model of support for harbor improvements but would *increase* general revenues appropriated for funding harbor improvement projects. The decision to increase appropriations would be based on USACE analyses showing that investment would be economically justified and environmentally acceptable, i.e., that the investment is a high priority when compared with other Federal investments and the investment fits within overall Federal fiscal limits. Federal funds still would be matched with cost sharing by project sponsors following existing cost-sharing rules.

¹⁰⁵ Possible causes of increasing costs include fragility of aging structures at an increasing rate with time and increases in unit costs of construction and O&M.

¹⁰⁶ The options presented are illustrative only and do not represent any administration position.

¹⁰⁷ One argument made for not fully expending revenues received by the HMTF is that appropriations are adequate to meet the maintenance dredging requirements. However, maintaining a balance in the fund, with no clear plan for spending that balance on harbor maintenance, has drawn the attention of the World Trade Organization. The fundamental concern is that if the fund maintains a surplus over time then it is no longer a fee for government service but is rather a tax or duty on imports. Options 4 or 5 would be a way to avoid this criticism.

Allocation of funds for harbor improvement would be made according to Administration budget priorities, based on analyses of project justification provided through the existing USACE evaluation and justification processes.

With this option, maintenance dredging would continue to be funded from revenues collected at the current level of user fee, deposited to the HMTF and allocated to harbors on an annual basis following current practice. For the reasons described under Option 1, it is likely that revenues received by the HMTF would prove adequate to maintain channels at least over the next decade.

Option 3: Modify Authority to Use HMTF Revenues as Appropriations for Harbor Improvements

An alternative to seeking additional general Federal revenues would be to raise the fees collected for the HMTF and then extend the allowable use of those increased funds from maintenance to include investments in harbor improvement.¹⁰⁸

The logic is that the beneficiaries of the improvement projects can be readily identified and such an increase would be an application of the “beneficiary pays” principle. Under this option, the decision-making process would remain—that is, the USACE planning process would determine which projects were economically justified and environmentally acceptable and would then receive appropriations for managing the construction of such projects. Channel maintenance would continue to be funded from the revenue enhanced HMTF.

Option 4: Increase Cost Share Contributions to Harbor Improvements

This option would increase total revenues by increasing the non-Federal contribution for every dollar of Federal appropriation. Under this option the HMTF balances would continue to be used for maintenance.

As an illustration, the cost-share requirement of 35 percent might be raised to 65 percent for depths up to 45 feet and Federal participation in harbor deepening might cease at 45 feet; at depths greater than 45 feet the total cost for any further deepening would be paid 100 percent by the non-Federal sponsor. Variations on these differences can be imagined, but the basic objective would be to increase the share of harbor improvements paid by a non-Federal entity.

Under this option, as the non-Federal cost share approached 100 percent, the question would be whether or not the investment being made would still need to pass a Federal benefit-cost justification test. In fact, the willingness of the sponsor (port or the state) to provide a substantial share of the cost would be evidence that the benefits of the project do exceed the costs to the non-Federal sponsor. In effect, this is an application of the “beneficiary pays” principle and is a “market like” test of the justification for the investment. However, some form

¹⁰⁸ While increasing such charges and depositing them to the HMTF would be an application of the “beneficiary pays” principle, such action might be subject to challenge unless the funds were disbursed expeditiously for the purposes of harbor improvement and maintenance.

of planning and evaluation would still be required by USACE to establish the Federal interest in making a Federal appropriation and in determining how the proposed activity would meet environmental protection requirements. Cost share partners would need to raise additional funds using existing or new revenue sources.

Opportunities for non-Federal sponsors to raise funds for harbor improvements (as well as maintenance) are discussed further under Option 5 below.

Option 5: Individual Port Initiative

Under this option the HMTF would be phased out, as would the current fees dedicated to the fund. Individual port authorities would include the costs of maintenance in their overall cost structure and would levy fees in whatever form they deem appropriate for cost recovery for harbor improvements and maintenance at their own facilities.

Infrastructure Bank Financing

If an infrastructure bank is created under Federal authority, provisions could be made to allow ports to borrow from that bank and then repay the bank with user fees collected. USACE analyses could continue and inform bank due diligence, and underwriting, supporting the bank's determination of the strength of the potential revenue stream from a given project, and potential risks associated with such projections.

Individual port authorities could secure the initial funding for harbor improvements by entering into partnerships with shippers who would use the improved and maintained harbor, and/or by other financing means. The funds borrowed or otherwise advanced for purposes of construction would be repaid using revenues from the same kinds of user fees now currently in place for paying cost share.¹⁰⁹

The shift of responsibility for securing funds and repayment (relative to Options 1 through 4) would be accompanied by a parallel shift of responsibility for evaluating the justification for harbor improvements and maintenance. Each individual harbor authority would establish whether the expenditure of funds was economically justified as opposed to relying on USACE analyses. The shift of decision responsibility on whether to deepen the harbor, by how much and what depths to maintain from the USACE-led planning process to the individual port is the fundamental difference between this option and simply raising the required cost share for the harbors (Option 4).

However, this option will not remove USACE from playing a central role in harbor improvement and maintenance decision-making. First, to the extent that a harbor improvement modifies a project that was historically built under Federal authority, USACE would need to issue a 408

¹⁰⁹ With this option the required revenues will exceed those now required for paying current cost share.

permit that would affirm that the actions being proposed by a non-Federal entity are consistent with the original authorized purposes of the project. The requirements that would be applied in making this 408 determination would need to be specified.

Perhaps of greater significance is the fact that the USACE regulatory program would maintain its permitting authority over any harbor improvement project or maintenance request. Currently the environmental evaluation that determines what environmental requirements must be met is a responsibility of the USACE planning process. Under this option, that responsibility would shift to a non-Federal entity¹¹⁰ but the USACE regulatory program would retain the final decision authority as to whether or not the proposed harbor improvement or maintenance activity is environmentally acceptable.

Discussion: Harbor Improvement and Harbor Maintenance

Based on analyses elsewhere in this report, under Option 1 harbor improvement projects now underway or anticipated would be delayed due to a lack of funding. Determining the consequences of such delay would require further analysis. One possible response to Option 1 is that individual ports would choose to move forward without Federal support. In fact, there is no barrier to individual ports choosing to pursue option 5 on their own. For these individual ports, Option 5 becomes the operable financing and funding strategy.

Among the options that increase funding, option 2 is the most simple administratively and there is reason to believe that the non-Federal cost-sharing requirements triggered by an increase in Federal general revenue appropriations could be met. However, recent budget allocations and the extremely tight fiscal environment in the future makes reliance on this option for future funding.

Option 3 would require congressional action and it is not clear if it would be supported by the shipping industry. The fact that fees now collected for the HMTF are not fully appropriated back to harbor maintenance may create doubts about whether any newly increased revenues would be expeditiously appropriated to harbor improvements. Additionally, efforts to increase revenues would fall completely on imports (for legal reasons) and could draw the scrutiny of the World Trade Organization as being an unwarranted tariff on trade. Finally, if Option 3 resulted in increases in the level of fees for the HMTF, some shippers could divert to non-U.S. ports to unload cargo. The extent of this effect is unknown.

Options 4 and 5 would make changes to current policy to assure that all revenues collected from port users are used for harbor improvement and maintenance. Individual ports could choose their own user fees and taxes for covering costs. For example, a port could choose to levy charges on vessel draft instead of value of cargo, which would more directly relate to the cost of

¹¹⁰ It may be possible for the USACE planning staff to offer this environmental assessment service on a cost reimbursable basis to the non-Federal entity.

providing the channel capacity. Option 4 would require legislative change that would demand (and so would need) Administration support and congressional action.

As cost share approaches 100 percent under Option 4, the financial difference between it and Option 5 (individual port initiative) narrows. In fact, modifications to the current Federal investment decision criteria might be modified as the Federal share of total costs decreases. The possible attractiveness of Option 4, relative to Option 5, is that USACE would continue to do the environmental analysis and have the responsibility to defend that analysis (and the compensatory mitigation it calls for) as being adequate and in the national interest.

Option 5 is the most direct application of beneficiary based funding. There are reasons to believe that the larger ports would be able to raise fees and taxes sufficient to recover costs of improvements and maintenance. Individual ports would collect their own fees, repay their own debt and make their own decisions. National port capacity would be determined through a system of decentralized decisions made at individual ports on where to dredge and by how much.¹¹¹ Individual ports would take into account their location in relation to trade patterns (volume and value of cargo) to assess the demand for additional depth, evaluate their costs of making channel improvements and providing maintenance, and make a final assessment of whether the demand for channel depth would be sufficient to support levels of user fees and taxes adequate to cover costs.

The resulting “market like” competition among the ports, constrained by the need to meet environmental requirements set by USACE permitting, could lead to more rapid decisions. The case for inter-port competition is that the result will be an efficient size and distribution of channel capacity. All harbors would not be at maximum depths for fully loaded ships. The network of ports, their channel capacity and origin-destination transport patterns would adjust such that some ports would accommodate heavily laden ships and other ports might become regional ports for light-loaded ships. Whether the result from this port competition model would yield the efficient allocation and capacity for the port network would need further evaluation.

This efficiency argument for Option 5 requires ports to base their user fees on the costs of dredging instead of a uniform tax rate on value of cargo. This would require shippers to bear the actual cost of improvements and maintenance and in so doing creates an incentive for shippers to favor the most cost-efficient ports. Of course, if ports begin to lose business as a result of this fee structure they would likely shift their revenue strategy to one that does not create an incentive for shipping to an alternative port.¹¹²

¹¹¹ State legislatures could have a role if states choose to provide assistance.

¹¹² If individual harbors were to be responsible for their own deepening there is a risk that expenditures made for that deepening may not be recovered by user fees if those fees cause a change in shipment patterns. One way to address this for any given harbor would be to enter into a partnership agreement with the shipping company so that both parties are invested in the deepening activity and paying for the costs (perhaps repaying a loan) over a fixed period of time. Such a contract would be established between the harbor and one or more shipping companies.

Also, the efficiency case for inter-port competition will not apply for all harbors. At some harbors beneficiaries (users) by themselves may not be able to pay the full cost of improvements and operations over time, as required by Option 5. If Option 5 were followed in this situation, there may be a role for Federal general revenue subsidies on a case-by-case basis to supplement the tax and fee collections at those ports. Criteria and prioritization for establishing such subsidies would need to be developed, and should consider the characteristics of each project, including the economic merits.

A different perspective would challenge the efficiency case for Option 5. From this perspective, USACE-led planning is needed to define and then create an optimal allocation of harbor capacity across ports.¹¹³ For Options 1 through 4, USACE could apply investment optimization models to recommend allocation of improvement funds to individual harbors in accord with minimizing the total costs of origin to destination transport of goods (or some other objective function). This model would replace individual harbor by harbor justification as is currently done now. The reality is that efforts at such multiport analysis have been attempted over many decades and proven to be both technically challenging and politically difficult to implement as a budget guide.¹¹⁴

Finally, in all options USACE would be responsible for the final determination of whether the proposed action is environmentally acceptable. Under Options 1 through 4, USACE would retain the responsibility for completing analyses needed for establishing the environmentally acceptable project, considering mitigation issues, and then would issue permits for the project instruction. In fact, the ability to navigate the regulatory process in ways that will expedite decision-making on harbor development is one of the principal reasons given for maintaining a significant USACE role in the planning and execution of harbor deepening projects. Under Option 5, the USACE role would be one of review of a ports application for a permit.

There remains a concern that environmental regulatory processes and permitting will continue to be a source of delay in all options (1-5). This concern may be addressed in part by the Administration's issuance of Executive Order 13604, "Improving Performance of Federal Permitting and Review of Infrastructure Projects" (March 22, 2012).

The expressed intent of the Executive Order is "...to significantly reduce the aggregate time required to make decisions in the permitting and review of infrastructure projects by the Federal Government, while improving environmental and community outcomes..." The Executive Order applies to reviews of "...improvements in Federal permitting and review

¹¹³ There are efficiency arguments that can be made for centralized planning and investment and for inter-port competition. The arguments are complicated and would need to be considered in greater detail if Options 1-4 are being considered as an alternative to Options 5.

¹¹⁴ A practical concern is that harbors investing on their own may not make justified investments (revenues prove inadequate to recover the cost of that advanced investment) and will seek assistance from Federal taxpayers even if the original investment was not nationally justified. For this reason, Option 4 would be a preferred response to the need for more funding relative to Option 5.

processes for infrastructure projects in sectors including surface transportation, aviation, ports and waterways [emphasis not in original], water resource projects, renewable energy generation, electricity transmission, broadband, pipelines..." The Executive Order sets in place a process to develop procedures to implement this expressed policy.

Options for Inland Waterways Improvements, Operations, Maintenance and Repair

Option 1: Business as Usual for Improvements and O&M

Appropriations for inland waterway improvements would continue to be from a combination of general Federal revenues and disbursements from the IWTF, and would be constrained by the revenues realized from the existing fuel tax revenue stream. Allocation of funds from these two sources would continue to be made according to Administration budget priorities in consultation with the Inland Waterways Users Board. Under this option total funding for the next decade would remain consistent with that provided during the past five years. Investments that drew upon either revenue source would continue to be based on analyses of project justification provided through the existing USACE evaluation and justification processes.

Financial support for maintenance and navigation lock and dam operations and repair would continue to be funded from general revenues at the same level as the average of the past five years.

Option 2: Increase Fuel Tax and Appropriations for Waterway Improvements and O&M

With this option the Administration and Congress would follow the traditional model of support for inland waterway improvements but authorize an increase in the fuel tax that increases the available balance in the IWTF.

At the same time, the Administration and Congress would provide increases in Federal appropriations to track with the increased revenues flowing into the IWTF. Depending upon the revenues from the fuel tax, they could reduce the share of total costs that is paid from general appropriations. The Administration and Congress would need to agree to an increase or decrease in the cost-share distribution. However, a requirement of this option would be that the total amount appropriated each year increases, even if the distribution between general revenues and withdrawals from IWTF change.

USACE analyses would continue to be the basis upon which expenditures for inland waterway improvements would be deemed economically justified and environmentally acceptable.¹¹⁵

¹¹⁵ See the discussion of E.O. 13604 above.

A variation on this option would allow increases in the fuel tax revenues to be used in waterway O&M. The use of IWTF funds for O&M would represent a major change in the source of funds for maintenance. However if the additional revenues realized from increases in the fuel tax were dedicated to O&M, such increases could not replace current Federal appropriations if the total budget for O&M were to increase.

Option 3: Replace the Fuel Tax with a Vessel Use Fee and Increase Appropriations for Waterway Improvements and O&M

With this option the fuel tax would be eliminated and replaced with vessel user fees (lock passage fees or segment tolls)¹¹⁶. The user fees could be related to the costs of improving a lock, O&M at a lock, the size of the lock, the value of the cargo passing through the lock, the congestion at the lock (higher fees when the lock is congested) or any combination of the above. Special fees for recreational boats passing through the lock could be included.¹¹⁷ The segment toll, however levied, would be related to the costs of maintaining and operating locks and channels of the waterway segment. (See further discussion of segment tolls under option 5, below). Revenues from the vessel user fees would continue to be deposited to the IWTF. Under this option the distribution of costs for waterway improvement and O&M that is paid from general revenues and the IWTF could be the same as under Option 1 (the current distribution) or could be modified to either increase or decrease the non-Federal share. However, a requirement of this option would be that the total amount appropriated each year increases, even if the distribution between general revenues and withdrawals from IWTF change.¹¹⁸

USACE analyses would continue to be the basis upon which expenditures for inland waterway improvements and O&M would be deemed economically justified and environmentally acceptable.¹¹⁹

Option 4: Maintain the Current Fuel Tax and add a Vessel User Fee to Increase Appropriations for Waterway Improvements and OMR&R¹²⁰

With this option the fuel tax would be unchanged and a vessel user fees (as described above) would be assessed on an annual basis.

Revenues from the user fees would continue to be deposited to the IWTF. Under this option the distribution of costs for waterway improvement that is paid from general revenues and the IWTF would continue to be 50/50. However, a requirement of this option would be that the total amount appropriated each year increases.

¹¹⁶ A version of this option was included in the Administration's FY13 budget.

¹¹⁷ Option 3 would redistribute the user fee burden to those who use the lock system in comparison to the fuel tax that is borne by all waterway users.

¹¹⁸ This option could allow for the use of IWTF funds for O&M.

¹¹⁹ See the discussion of E.O.13604 above.

¹²⁰ The Administration transmitted a legislative proposal to the Congress to reform the laws governing the Inland Waterways Trust Fund as part of the Jobs Bill proposal in September 2011.

USACE analyses would continue to be the basis upon which expenditures for inland waterway improvements and OMR would be deemed economically justified and environmentally acceptable.

Option 5: Public-Private Partnerships

The creation of Public-Private Partnerships (PPPs) has been proposed as a solution to supporting infrastructure modernization in a number of different venues. The success in forming such partnerships varies, but there are successes that can be pointed to for what has been termed "fixed guideway" infrastructure. However, a basic requirement for private participation in a PPP is assurance that there will be adequate revenues to allow the private entity to recover its costs and earn a return on investment from joining the partnership. Therefore, for a PPP to work in the inland waterway context it would require a commitment on behalf of the federal government to honor payment commitments made in the PPP contracts.

A PPP contract would define the sharing of risk from sources outside the control of either party (e.g., unexpected technical difficulties in executing the project) and the retention of other risks by the public entity (e.g., changes in regulatory rules or regulatory decisions that affect costs or technical feasibility¹²¹). Therefore, for a PPP to work in the inland waterway context would require contracts that address the sharing and assignment of these risks.

Option 3 addresses the problem of inadequate access to financial resources for making *immediate* improvements and for critical O&M on an aging infrastructure. USACE would divide inland waterways into segments (for current planning USACE recognizes 27 independent segments), recognizing the interconnectedness of certain those segments. The priorities for work on the segments would be defined principally by an assessment of the need for new investment and by the historic operation and maintenance costs per ton-mile traffic movement. One preliminary illustration of how this might be done is offered by the "*Inland Waterways Capital Development Plan*" that was prepared and submitted to Congress at the direction of the Inland Waterways Users Board in 2010.¹²²

For priority segments, USACE would then issue requests for proposals for improvements and/or maintenance and repair over a fixed-term contract (say 30 years). In those requests for proposals USACE would specify what services were expected to be provided by the private partner, when the services would be realized, and would request a repayment schedule for the provision of those services.¹²³

¹²¹ See the discussion of E.O. 13604 above.

¹²² The Inland Waterways User Board might be reconfigured in terms of its authority, membership and purpose to act in concert with USACE in participating in the PPP process.

¹²³ The PPP agreement would need to avoid and minimize effects on current non-commercial shipping waterway users. For example, recreational uses may need to be protected or accommodated or the reliability of water supply intakes. Even if these are not currently authorized purposes, accommodating such users may be necessary if the PPP is to be politically acceptable.

The private partner could be asked to design and/or build and/or operate and maintain channels and navigation locks and dams in return for an annual payment. USACE would provide support to¹²⁴ and oversight over the private partner, assuring that the terms of the contract with respect to lock operations and channel maintenance were honored. The private entity would secure all the necessary financing for waterway improvement or O&M.¹²⁵ The Federal government would agree to compensate a private partner for expenses incurred in segment improvements and maintenance. Revenues needed to honor the contracts could be derived from any or a combination of the following: general appropriations, raising the fuel tax, lock passage fees, lock congestion fees, or segment passage fees.¹²⁶ A segment passage fee would be relatively simple to administer with current technology. GPS tracking is now standard practice for all tows. It would be possible to determine when a tow has utilized the capacity of a particular segment. The charge for use of that segment would be in relation to the cost of operating, maintaining and repairing infrastructure for that segment and could be based upon a fixed ton-mile charge, perhaps adjusted for the value of the cargo.

The PPP contract would specify which of these revenue sources would be used by the Federal government to make payments to the private entity.

Discussion: Waterway Improvement and O&M

Options 2, 3, and 5 are similar in the sense that all seek to raise the level of initial funding for waterway improvements and O&M above “business as usual.” The main difference is that under Option 5 the initial funding is secured through private partnership agreements allowing investments to move forward more quickly than they would under the current planning and budgeting process. The likelihood of such revenues coming from general Federal appropriations is low given current budget realities. Therefore, for Option 5 to be viable there is a need to increase revenues paid by the users. Especially important is that the added revenues are dedicated to honoring the contracts entered into with the private provider of improvement and maintenance services. It is this contractual commitment that makes this option attractive as a method for increasing funding. Specifically, the contractual commitment creates an expectation that all revenues collected and deposited to the IWTF will be used for the purposes of honoring

¹²⁴ A simple example is that USACE would continue to collect and report traffic volume, cargo type, as well as origins and destination of shipments.

¹²⁵ A public-private partnership contract that relies on beneficiary based revenues is unlikely to work for what have been termed “low use” waterway segments, unless there were a commitment of general revenue and a share of the dedicated fuel tax to the PPP contract. The case that would need to be made for continued improvement and maintenance of those segments that parallels the case that might be made for low-use harbors, as described above.

¹²⁶ Tax and fee collection is an example of another function that could be retained by USACE. The barge companies who are the immediate users of the waterways would seek to pass on the costs of any fees or taxes to their customers, the shippers of goods (grains, coal, fertilizer, etc.). The shippers in turn would seek to pass on costs to the buyers of their products. The final distribution of the burden of the fees and taxes would depend on the demand for the product (technically, in economics, the elasticity of demand) and the availability of alternative transportation modes.

the contracts and will be supplemented as needed by appropriations from the general budget appropriation process.¹²⁷

¹²⁷ No current Congress can obligate a future Congress to a particular spending plan. However, there is experience that provides evidence that the Federal government would honor long-term contracts and that evidence may increase the confidence of the private entity that the agreed-to revenues would be forthcoming.

Chapter 6: Additional Considerations

National Intermodal Freight Transportation Strategy

A modernization strategy should be part of an overall national intermodal freight transportation strategy. While the three dominant freight carrier modes – water, rail and truck – compete for market share, there is a growing recognition of the need for multi-modal linkages and for infrastructure investments to be coordinated across the modes to ensure that they complement each other and ensure the best overall use of the available funds for the Nation. This can be supported by prioritizing navigation investment according to their multi-modal connectivity. On March 1, 2012 USACE signed a Memorandum of Understanding with the Department of Transportation on collaboration with a purpose to identify and capitalize on opportunities to improve the Nation’s transportation infrastructure investments where shared equities exist.¹²⁸

A national intermodal freight transportation strategy could also consider local sponsor commitment in terms of cost sharing and community support should be taken into consideration. Opportunities to contribute the Administration’s initiative to increase exports, energy independence and enhance national security must be considered.

Adaptive Management

This report also recognizes the uncertainty held in future modernization actions – which depend on specific location, types of actions taken and other unknowns – indicate that an adaptive approach to modernization is a wise strategy. When infrastructure projects are planned, designed and implemented, they should explicitly include the concept of adaptive management (i.e., the identification of sequential decisions and implementation based on new knowledge and thresholds). It is an important concept that should be included in both the system modernization strategy and individual projects identified for implementation under that strategy. Adaptive management has been primarily used in improving environmental management policies and practices. However, it can also be applied to developing sustainable solutions in navigation.

Employing adaptive management techniques in the development of a modernization strategy and decisions on specific infrastructure investments makes sense given the complex nature of trade routing and inherent uncertainties and risks associated with forecasts, not only of economic future conditions, but physical future conditions such as climate change, sea level change and social future conditions such as population demographics and distributions.

¹²⁸ See appendix C for a copy of this MOU.

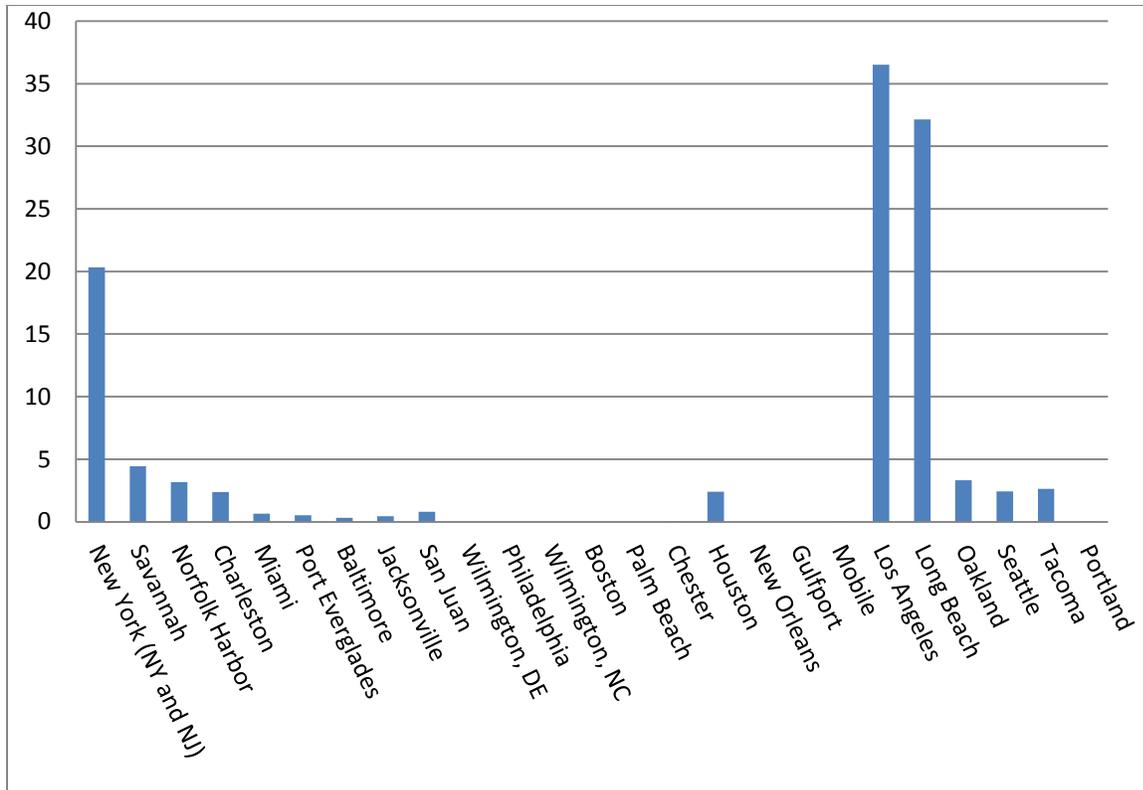
Within the context of navigation channels, adaptive management techniques could be adopted to allow channel and turning basin dimensions to be adjusted during normal maintenance dredging to adjust to actualized market conditions. This would resemble the approach of phased construction through the implementation of separable elements, but would allow conditional authorization of future elements that are currently economically unjustified. The NEPA documentation for the project would be required to cover the impacts of all the envisioned future elements. An example that illustrates this approach is the recently completed study for the Port of Savannah. The port sought a project depth of 48 feet. USACE economic evaluation techniques led the Division office to recommend a depth of 47 feet. Considerable time and energy was spent on this issue. If there is justification to deepen to 48 feet in the future, the Port of Savannah will have to start the entire process over from the beginning. An adaptive management approach have allowed the project to move forward with the 47 feet depth; if time shows justification for a 48-foot channel the deepening could be done as part of the regular maintenance cycle without the need to go through the entire planning process again. An adaptive management approach could reduce study time, reduce conflict and improve USACE responsiveness and product delivery.

Coastal Port Service Area

One factor the Congress has asked IWR to consider in this report is the current and projected population trends that distinguish regional ports and ports that are immediately adjacent to population centers.

To examine this issue IWR developed a port index of regional trade. This index can be used to gain insight into the degree a port serves a local catchment area or a larger regional community.¹²⁹ The index was developed for container ports. It considers the population adjacent to the port and the total number of TEUs moving through the port for the years 2005-2009. The results are presented in Figure 38 below. The index reveals three distinct categories of ports. The ports with the largest indices could be called “national ports.” They are Los Angeles, Long Beach and New York. The second category is “regional ports.” Regional ports include: Savannah, Oakland, Norfolk Harbor, Tacoma, Charleston, Houston and Seattle. Local ports include Miami, Port Everglades, Baltimore, Jacksonville, San Juan, Wilmington DE, Philadelphia Wilmington NC, Palm Beach, Chester, New Orleans, Gulfport, Mobile and Portland. The index shown in Figure 40 was developed based on freight traffic measured in TEUs.

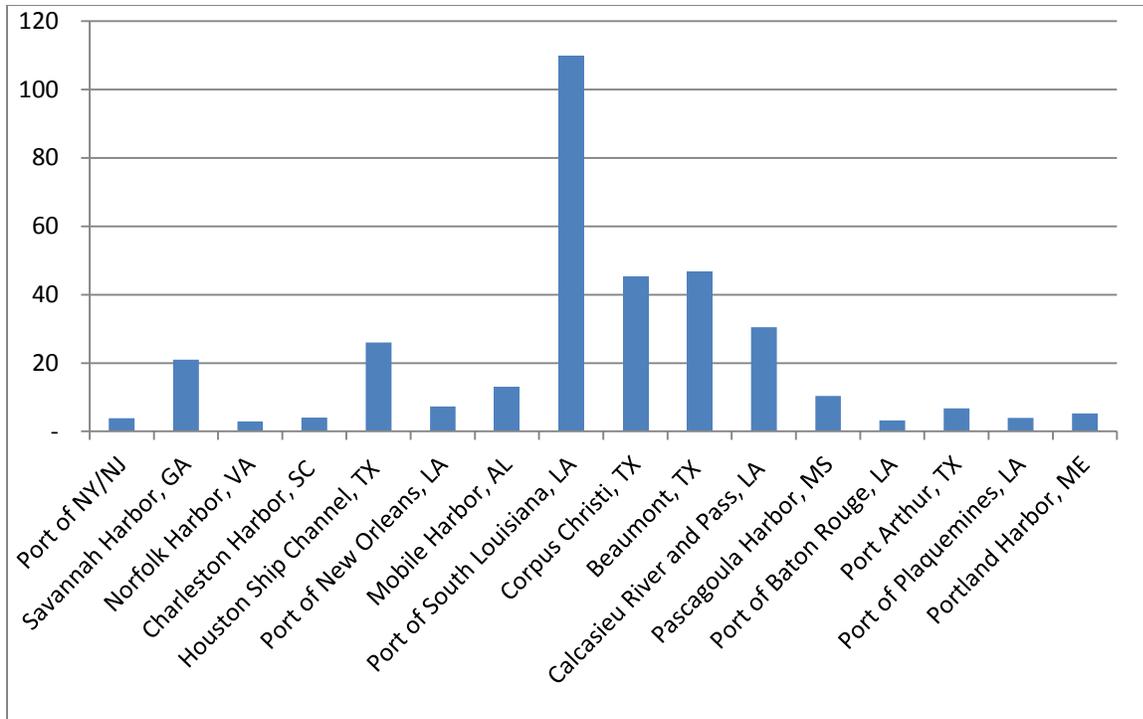
¹²⁹ USACE Institute for Water Resources



Source: USACE Institute for Water Resources

Figure 38: IWR Port Index of Regional Trade – Traffic Measured in TEUs

A similar analysis was conducted measuring freight traffic in tons for consideration of bulk ports. The results for selected ports are presented in Figure 39. This index shows the Port of South Louisiana to be a “national” port. Regional ports are Savannah, Houston Ship Channel, Corpus Christi, Beaumont and Calcasieu River and Pass.



Source: USACE Institute for Water Resources

Figure 39: IWR Index of Regional Trade – Traffic Measured in Tons

As a general observation it may be surmised that investments in “national” or “regional” ports will have a wider distribution of benefits than those that serve a local catchment area. Preference may be given to investments in ports that serve a broader community as part of a national transportation strategy.

Report Observations and Findings

The main observations and findings of the report are as follows:

- World trade and U.S. trade is expected to continue to grow.
- Post-Panamax size vessels currently call at U.S. ports and will dominate the world fleet in the future.
- These vessels will call in increasing numbers at U.S. ports that can accommodate them.
- Along the Southeast and Gulf coast there may be opportunities for economically justified port expansion projects to accommodate post-Panamax vessels.
 - This is indicated by an evaluation of population growth trends, trade forecasts and an examination of the current port capacities. As well as completed and ongoing Corps feasibility studies.
 - Investment opportunities at specific ports will need to be individually studied.

- The potential transportation cost saving of using post-Panamax size vessels to ship agricultural products to Asia, through the Panama Canal may lead to an increase in grain traffic on the Mississippi River for export at Gulf ports.
 - An analysis indicated the current Mississippi River capacity is adequate to meet potential demand if the waterways serving the agricultural export market are maintained.
 - A need for lock capacity expansion is not indicated.
- Despite the uncertainty in market responses to the deployment of post-Panamax vessels and the expansion of the Panama Canal, individual investment opportunities for port expansion can be identified using established decision making under uncertainty techniques. Adaptive management techniques can also be used to address uncertainty issues. Preliminary estimates indicate the total investment opportunities may be in the \$3-\$5 billion range.
- Environmental mitigation costs associated with port expansion can be significant and will play an important role in investment decisions.
- The primary challenge with the current process to deliver navigation improvements is to ensure adequate and timely funding to take advantage of potential opportunities.
 - A notional list of financing options is presented to initiate discussion of possible paths to meet this challenge—it is anticipated that a variety of options may be desirable, and in all cases individual project characteristics, including its economic merits, would need to be considered in selecting the optimal financing mechanisms.

A Final Thought

There is uncertainty in the navigation industry regarding the expected impacts from the deployment of *post-Panamax* vessels. Current fiscal conditions and budget priorities suggest the Federal government’s role may become more limited than in the past. Within the navigation program there is competition between maintenance of our current projects and capacity expansion.

Maintaining the capacity of our major ports and waterways and expanding port capacity when, where, and in a way that best serves this Nation will require leadership at all levels of government, and partnership with ports and the private sector. The main challenges are to continue to maintain the key features of our current infrastructure, to identify when and where to expand coastal port capacity, and to determine how to finance its development. Congress, by directing the preparation of this report, and the Administration, by proposing a White House task force on navigation, have demonstrated a coincident interest in this topic, indicating an opportunity to jointly develop appropriate guidelines, methods, and legislation to establish a national investment strategy.

Appendices

Appendix A

Organizations providing written comments:

Port of Seattle	National Waterways Conference
Port of Tacoma	Fifth Coast Guard District
Port of Virginia	EPA
Port of Houston	USACE NAN
Port Miami	USACE, NAO
Port of Baltimore (Maryland Port Administration)	Broward County
Port Authority of NY and NJ	Big River Coalition
American Association of Port Authorities	NRDC (Natural Resources Defense Council)
South Carolina State Port Authority	National Wildlife Federation/ Sierra Club
Florida Port of Council	Center for a Sustainable Coast
Texas Transportation Institute	Taxpayers for Common Sense
Pacific Northwest Waterways Association	Environmental Defense Fund
GICA (Gulf Intracoastal Association)	Izaak Walton League of America
Lake Carriers Association	Chip Meador
Dredging Contractors of America	Paul Pollinger

Appendix B

Term	Definition
Beneficiary Based Funding	Payments for the cost of construction, operation, maintenance and repair of harbors, channels, locks and dams using revenues from user fees or a dedicated tax source. A user fee is a direct charge paid voluntarily by the user of the harbor or waterway; failure to pay the charge results in exclusion from use (e.g., a lock passage fee or a wharf access fee). In contrast, a dedicated tax is a required payment to a government entity, enforced by threats of sanction for nonpayment rather than by denial of a use (e.g., a tax on fuel). Revenues from user fees and dedicated taxes are often deposited to a government managed trust fund. This “beneficiary pays” funding strategy has been advocated for assuring the efficient use of funds for investment and maintenance. However efficiency requires more than just collecting revenues from beneficiaries; efficiency requires that expenditure of those funds be the responsibility of those entities who pay for the service. Otherwise, fees and dedicated systems cannot be distinguished from general revenues.
Berths	Berth is the term used in ports and harbors for a designated location where a vessel may be moored, usually for the purposes of loading and unloading. Berths are designated by the management of a facility (e.g., port authority, harbor master). Vessels are assigned to berths by these authorities. Most berths will be alongside a quay or a jetty (large ports) or a floating dock (small harbours and marinas). Berths are either general or specific to the types of vessel that use them in the process. The size of the berths varies from 5-10m for a small boat in a marina to over 400m for the largest tankers.
Bulk cargo	Bulk cargo is commodity cargo that is transported unpackaged in large quantities. This cargo is usually dropped or poured, with a spout or shovel bucket, as a liquid or as a mass of relatively small solids (e.g. grain, coal), into a bulk carrier ship's hold, railroad car, or tanker truck/trailer/semi-trailer body. Smaller quantities (still considered "bulk") can be boxed (or drummed) and palletised. Bulk cargo is classified as liquid or dry.
Cascade	Cascading refers to the shifting of vessels from one trade service to another that occurs when new, large vessels are deployed on the longest and largest trade service – Asia to Northern Europe. The displaced “smaller” vessels on that service are forced to re-deploy to the next most efficient service for that vessel size, in turn displacing another set of vessels, and so on.
Container	A shipping container is a container with strength suitable to withstand shipment, storage and handling. Shipping containers range from large reusable steel boxes used for intermodal shipments to the ubiquitous corrugated boxes. In the context of international shipping trade, "container" or "shipping container" is virtually synonymous with "(standard) intermodal freight container" (a container designed to be moved from one mode of transport to another without unloading and reloading).

Cost Recovery	A requirement that all costs for construction, operation, maintenance and repair costs incurred over a period of time be matched by general tax revenues and receipts from user fees in dedicated taxes. Since benefits are realized over time, payments toward cost recovery may be received over several years. Upfront costs will typically require sale of bonds; repayment of bond debt would be spread over some period of project life.
Cost sharing	A legally mandated sharing of the costs for construction, operations, maintenance, repair, rehabilitation or replacement for harbor and waterway improvements between the Federal government and a non-Federal entity. Cost-sharing is a requirement for Federal budgetary participation in harbor and inland waterway improvements.
Cube trade	See "Volume Trade"
Docks	See "Wharf"
Financing	The advancement of funds from a public, quasi-public or private entity to an entity initially responsible for the costs of improvements and O&M at harbor and waterway facilities. The responsible entity then uses a combination of general revenues, user fees and dedicated taxes to repay the incurred debt.
General Revenue Funding	Appropriations for the cost of construction, operations, maintenance and repair of harbors and waterways made from general revenues of Federal and non-Federal governments.
Hinterland	The area from which products are delivered to a port for shipping elsewhere is that port's hinterland.
Infrastructure	Infrastructure is basic physical and organizational structures needed for the operation of a society or enterprise, or the services and facilities necessary for an economy to function. It can be generally defined as the set of interconnected structural elements that provide framework supporting an entire structure of development. It is an important term for judging a country or region's development. The term typically refers to the technical structures that support a society, such as roads, water supply, sewers, electrical grids, telecommunications, and so forth, and can be defined as "the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions." Viewed functionally, infrastructure facilitates the production of goods and services and also the distribution of finished products to markets, as well as basic social services such as schools and hospitals; for example, roads enable the transport of raw materials to a factory. In military parlance, the term refers to the buildings and permanent installations necessary for the support, redeployment and operation of military forces.
Infrastructure Bank	A chartered government institution that makes or guarantees loans for non-Federal infrastructure improvements in anticipation of repayment through future dedicated revenue streams, such as revenues from user fees or dedicated taxes.

Inland waterway	The U.S. Army Corps of Engineers (USACE) is responsible for 12,000 miles (19,000 km) of the waterways. This figure includes the intracoastal waterways such as the Gulf Intracoastal Waterway and the Atlantic Intracoastal Waterway. Most of the commercially important inland waterways are maintained by USACE, including 11,000 miles (18,000 km) of fuel taxed waterways. Commercial operators on these designated waterways pay a fuel tax, deposited in the Inland Waterways Trust Fund, which funds half the cost of new construction and major rehabilitation of inland waterways infrastructure.
Intermodal	Intermodal freight transport involves the transportation of freight in an intermodal container or vehicle, using multiple modes of transportation (rail, ship and truck), without any handling of the freight itself when changing modes.
Jetty	A jetty is any of a variety of structures used in river, dock and maritime works that are generally carried out in pairs from river banks or in continuation of river channels at their outlets into deep water; or out into docks and outside their entrances; or for forming basins along the sea-coast for ports in tideless seas. The forms and construction of these jetties are as varied as their uses (directing currents or accommodating vessels), for they are formed sometimes of high open timber-work, sometimes of low solid projections, and occasionally only differ from breakwaters in their object.
Long ton	Long ton is the name for the unit called the "ton" in the U.K. system of measurement. One long ton is equal to 2,240 pounds (1,016 kg), 1.12 times as much as a short ton. It has some limited use in the U.S. and is often used to measure the displacement of ships. (see "Short Tons" for a more in-depth discussion of the term "ton.")
Multi-modal	See "Intermodal"
Panamax	<i>Panamax</i> refers to vessels sized to the maximum allowed by the dimensions of the pre-expansion Panama Canal.
Post-Panamax	<i>Post-Panamax</i> refers to vessels that are too large to fit through the channels and locks of the pre-expansion Panama Canal. Several classes of vessels would be appropriately called <i>post-Panamax</i> . With the expansion of the Canal expected to be complete in 2014, several classes of <i>post-Panamax</i> vessels will be able to transit the Canal. Those vessels sized to the maximum allowed by the new dimensions of the expanded canal have been dubbed "New Panamax" and larger vessels have been dubbed "Neo Post-Panamax" or "Super Post-Panamax."
Short ton	The short ton is a unit of measurement equal to 2,000 pounds (907.18 kg). In the U.S. most references to "ton" refer to the short ton. There are other measurements of a ton including the metric ton (tonne) equal to 1,000 kilograms (2,204.62 lbs) or the long ton equal to 2,240 pounds (1,016.05 kg). There are some U.S. applications for which "ton" means long tons (e.g., Navy ships) or metric tons (e.g., world grain production figures). Both the long and short ton are defined as 20 hundredweights. In the U.S. system a hundredweight is 100 pounds but would be 112 pounds in the U.K. system (or approximately 100 kg).

TEU	The twenty-foot equivalent unit (often TEU or teu) is an inexact unit of cargo capacity often used to describe the capacity of container ships and container terminals. It is based on the volume of a 20-foot-long (6.1 m) intermodal container, a standard-sized metal box which can be easily transferred between different modes of transportation, such as ships, trains and trucks. One TEU represents the cargo capacity of a standard intermodal container, 20 feet (6.1 m) long and 8 feet (2.44 m) wide. There is a lack of standardization in regards to height, ranging between 4 feet 3 inches (1.30 m) and 9 feet 6 inches (2.90 m), with the most common height being 8 feet 6 inches (2.59 m). Also, it is common to designate 45-foot (13.7 m) containers as 2 TEU, rather than 2.25 TEU.
Transshipment	The transshipment of containers at a container port or terminal can be defined as the number (or proportion) of containers, possibly expressed in TEU, of the total container flow that is handled at the port or terminal and, after temporary storage in the stack, transferred to another ship to reach their destinations. The exact definition of transshipment may differ between ports, mostly depending on the inclusion of inland water transport (barges operating on canals and rivers to the hinterland). The definition of transshipment may: include only seaborne transfers (i.e., a change to another international deep-sea container ship) or include both seaborne and inland waterway ship transfers (sometimes indicated as water-to-water transshipment). Most coastal container ports in China have a large proportion of riverside “transshipment” to the hinterland. In both cases, a single, unique, transshipped container is counted twice in the port performance, since it is handled twice by the waterside cranes (separate unloading from arriving ship A, waiting in the stack, and loading onto departing ship B).
Trust fund	A government established and managed account that accumulates the revenues from user fees and dedicated taxes. The managers of the fund make decisions about the disbursements from the fund.
Volume trade	Services that tend to fill vessels to their volume capacity are considered "volume trade." They generally require channel depths providing clearance less than the vessel's maximum draft.
Weight trade	Services that tend to fill vessels to their weight capacity are considered "weight trade." They require channel depths providing clearance of the vessel's maximum draft.
Wharf	A wharf or quay is a structure on the shore of a harbor where ships may dock to load and unload cargo or passengers. Such a structure includes one or more berths (mooring locations), and may also include piers, warehouses, or other facilities necessary for handling the ships.

Appendix C

Memorandum of Understanding between U.S. Department of the Army and U.S. Department of Transportation

MEMORANDUM OF UNDERSTANDING
BETWEEN
U.S. DEPARTMENT OF THE ARMY
AND
U.S. DEPARTMENT OF TRANSPORTATION

I. PARTIES

This Memorandum of Understanding (MOU) confirms a collaborative relationship between the U.S. Department of Transportation (DOT) and the U.S. Department of the Army (Army), collectively referred to herein as “the Parties.”

II. AUTHORITIES

Department of the Army:

1. 33 U.S.C. § 2281, which directs the Secretary of the Army to consider enhancements to U.S. economic development in planning water resources development projects.
2. 33 U.S.C. § 2323a, which permits the Secretary of the Army to engage in activities in support of other Federal agencies to address problems of national significance to the United States related to water resources, infrastructure development, and environmental protection.

Department of Transportation:

1. 49 U.S.C. § 301(3)&(4), which direct the Secretary of Transportation to:
 - a. Coordinate Federal policy on intermodal transportation and initiate policies to promote efficient intermodal transportation in the United States; and
 - b. Promote and undertake the development, collection, and dissemination of technological, statistical, economic, and other information relevant to domestic and international transportation.

III. PURPOSE

The purpose of the collaboration is to identify and capitalize on opportunities to improve the Nation’s transportation infrastructure investments where shared equities exist.

IV. OBJECTIVE

The objective of the collaboration is to synchronize the Parties’ strategies and coordinate and align infrastructure project proposal criteria and project evaluation and selection methodologies in support of a multimodal transportation network that improves the nation’s economic competitiveness.

The information shared is not expected to include information about individuals (personally identifiable information PII “privacy protected” information), but could include business proprietary information (confidential business information—CBI) received from business entities.

Any information sharing must comply with applicable disclosure restrictions and practices (e.g., sharing of CBI may require the consent of, or notice to, the submitters of the information).

When the systems and information are known, each Party will prescribe appropriate restrictions on further dissemination and use, and appropriate labeling and handling instructions, for any information that is sensitive, to ensure the information remains confidential and to ensure each Party and/or the submitters retain control over the information.

VI. PERIOD OF AGREEMENT

The effectiveness of this MOU will commence upon full execution of the final signatures of the Parties, and will remain in effect indefinitely from the date of execution, unless the MOU is terminated by mutual agreement or by either side with thirty days notice.

VII. MODIFICATION

This MOU or subsequent annexes may be amended or modified at any time by mutual agreement of the Parties. Such modifications shall be in writing and will take effect upon execution by the Parties.

VIII. OTHER PROVISIONS.

Generally: All provisions of this MOU are subject to the availability of funds.

Severability: Nothing in this MOU or any related annex is intended to conflict with current statutes, regulations, orders, or directives of DOT, Army, or any other Federal agency or entity. If a provision of this MOU, or any annex, is determined to be inconsistent with such authority, then that provision will be invalid to the extent of such inconsistency, but the remainder of that provision and all other provisions, terms, and conditions of this MOU and any related annexes will remain in full force and effect.

Rights and Benefits: Nothing in this MOU is intended to diminish or otherwise affect the authority of any agency to carry out its statutory, regulatory or other official functions. This MOU is not a final agency action by any of the signatory agencies, and does not create any right or benefit, substantive or procedural, enforceable at law or equity by any party against the United States, its agencies or officers, State agencies or officers carrying out programs authorized under Federal law, or any other person. This MOU does not impose any legally binding requirements on Federal agencies, States, or the regulated public.

This MOU Does Not Involve Funding: This MOU is neither a fiscal nor funds obligation document. It does not obligate, commit or authorize the expenditure of funds and cannot be used as the basis for the transfer of funds. Any endeavor involving the reimbursement or contribution of funds between the Parties shall be in accordance with applicable laws, regulations, and procedures. Funding arrangements, if any, shall be the subject of separate agreements that will be subject to the availability of funds.

Disputes: Should disagreement arise in the interpretation of the provisions of this MOU, or related amendments and/or revisions, that cannot be resolved at the operating level, the area(s) of disagreement will be stated in writing by each Party and presented to the other Party for consideration. If agreement on interpretation is not reached within thirty (30) days, the Parties will forward the written presentation of the disagreement to respective higher level officials for appropriate resolution.

IX. CONTACT INFORMATION

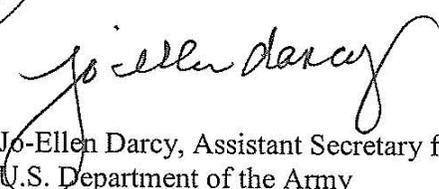
For the purposes of exchanging information and coordinating activities under this MOU, the respective points of contacts for the Parties are as follows:

For Army: Chief of Operations, U.S. Army Corps of Engineers
For DOT: Chief Economist, Office of Transportation Policy

X. SIGNATURES



John Porcari, Deputy Secretary
U.S. Department of Transportation



Jo-Ellen Darcy, Assistant Secretary for the Army (Civil Works)
U.S. Department of the Army

U.S. Port and Inland Waterways Modernization: Preparing for Post-Panamax Vessels

Institute for Water Resources

U.S. Army Corps of Engineers



US Army Corps
of Engineers

June 20, 2012



Exhibit 4 Page 128

NEEC Scoping Comments