Prepared Remarks

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Introductory Comments and Summary

For more than a generation, I've studied and described the importance of commercial inland navigation to the US economy. Today, by virtue of the Committee's invitation, I again have an opportunity to discuss this topic. My appearance here leaves me both humbled and energized. To those who have helped bring me here, particularly Chairman Mica, Congressman Rahall, and Subcommittee Chairman Gibbs, I offer my sincere thanks. Finally, to *my* Congressman, Representative Jimmy Duncan from Tennessee's Second District I wish to say thank you for the many years of leadership and service you've provided East Tennessee.

This morning, I hope to make four points. First, at this very moment, inland barge transportation is functioning as an essential element within our nation's system of freight transport. The navigation industry's history is long and storied. Similarly, navigation's potential value to forward-looking commerce is important. However, neither topic should obscure the fact that, today in 2011, barge transportation fills important freight mobility needs that would, otherwise, be costly or even impossible to address.

Second, the capacity and flexibility afforded by inland barge transport *is* important to the United States as we look to the future. With regard to global commerce, inland navigation can safely connect interior cities and regions to international markets, adding to the interior's prosperity, while reducing the congestion and environmental challenges faced by coastal regions. At the same time, available inland navigation (much like truck-rail intermodal transport) can, everywhere, play an increasingly important role in segregating the most disruptive freight movements from those passenger activities necessary to personal mobility and livable communities.

Unfortunately, much of the infrastructure that currently sustains barge transport has aged beyond its design life. It requires renewed federal investment if navigation is to continue its current role and be available as an even more productive future resource. The monolithic nature of the locks, dams and other required structures, the Herculean efforts of those who maintain them, and the geographic isolation of most such facilities has hidden their deterioration from the public, but this lack of visibility does not diminish the threat that chronic underinvestment now poses to the inland navigation system.

Finally, in an era of fiscal scrutiny, I wish to make clear that federal investments in transportation infrastructures like those represented by the nation's navigation system remain an economically justified and theoretically sound form of government intervention into, otherwise, freely functioning transportation markets. Assuming that the fiscal responsibility of reinvestment is appropriately apportioned between *all* those who benefit – both directly and indirectly – from available inland navigation, the federal government's share of this responsibility will represent a prudent and equitable expenditure of public funds.

The balance of my remarks expand on these four points.

Does Inland Commercial Navigation Play a Meaningful Role in Twenty-First Century Freight Transportation?

The current economic value of inland barge transportation falls into four distinct categories **(1)** the highly efficient and affordable movement of traditional bulk commodities such as coal, grain, stone-based aggregates, metallic ores, and chemical products, **(2)** the vastly less expensive movement of oversized and overweight shipments that cannot be moved by either truck or rail, **(3)** the competitive influence that available commercial navigation has on the rates available to rail shippers, and **(4)** the indirect benefits that navigation provides in terms of environmental outcomes and concurrent uses of navigable inland waterways. I briefly discuss each of these in turn.

Moving Bulk Commodities

In a normal year on the inland waterway system between 500 and 700 million tons of bulk commodities with a current approximate value of nearly $125 billion are moved an average of roughly 500 miles to produce in excess of 300 billion ton-miles of freight transportation.[1] Given that freight shippers choose barge transport over other modal alternatives, it is safe to assume that *every* bit of this freight traffic moves at a total supply-chain cost that is lower than what would, otherwise, be available.[2] Work that I and many of my colleagues have done in conjunction with the US Army Corps of Engineers suggests an average shipper savings of $12 per ton, so that barge shippers and their customers save more than $7 billion annually.[3]

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[1]The representative tonnage and distance figures reflect averages for the period 2005 -2009. The commodity value figure is based on a 2002 US Army Corps of Engineers figure of $86 billion that was subsequently adjusted to 2010 dollars by use of the Producer Price Index's aggregated producer commodity component.

[2] It is often necessary to include more comprehensive inventory management costs along with actual transportation charges in order to understand the transportation choices made by shippers.

[3] The per-ton savings is based on an average of the savings computed for the upper Mississippi River (2007) and the Ohio River main stem (2010). The highly aggregated values obscure the sometimes dramatic shipper savings yielded by available navigation. Indeed, in many cases, the cost of shipping by an alternative mode or modal combination is sufficiently high to preclude any movement at all in the absence of barge.

While most residents don't directly observe the shipper savings that inland barge transportation produces, they enjoy the consequences of these savings in the form of lower product or service prices. For example, a recent University of Tennessee study of coal traffic on the Ohio River and its tributaries suggests that electricity users within the region save millions annually on electricity purchases by virtue of barge transport. When this savings is extended to reflect its overall economic impact on the region, the UT study estimates that the barge movement of coal and correspondingly lower electricity rates is responsible for more than 75 thousand jobs and over $2 billion in annual incomes within the region.[4]

Oversized Shipments

Inland barge transportation is also a valuable means of moving overweight or over-dimensioned shipments. Example include massive generators used in both steam-powered and nuclear generating facilities, extremely large bridge components, rocket engine boosters and other aerospace components, windmill blades and turbines, and uncategorized military equipment.[5] In some cases, there are no feasible alternatives to inland navigation, so that the location of activities is wholly predicated on available barge transport. In other cases, modal alternatives, while physically feasible, involve the construction (or reconstruction) of roadway and railroad facilities at tremendous cost for what is often a one-time use. In either case, it is difficult to assign a dollar value on the availability of navigation. Hence, the true value of these inland barge movements is obscured, seldom counted, and almost never incorporated into the benefit-cost calculations used to evaluate infrastructure construction and maintenance costs.

Competitive Influence for Railroad Freight Movements

Not everything that can move on the inland waterway system does so. However, there is overwhelming evidence that even when railroad carriers retain traffic that could move by barge, they do so only by competing with the available barge rate(s). Thus, the railroad prices observed as result of this navigation influence are typically referred to as "water-compelled" rail rates. Estimates across various regions where navigation is available suggest that these competitively enforced transportation rates yield shipper savings of several billion dollars annually.[6]

There are a number of interesting aspects related to the competitive relationship between rail and barge. First, federal transportation policy is aimed at assuring effective competition among largely deregulated freight transportation providers. Thus, in an environment where railroad competition is a perennial concern, available navigation dampens the arguments of those who advocate renewed railroad rate oversight. Also, the degree to which railroads are sensitive to a water alternative provides a good gage of available railroad capacity. In the early post-deregulation period, when ample railroad

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[4] Bray, Larry G. and C. Michael Murphree, "An Evaluation of the Potential for Commercial Navigation to Additionally Contribute to Freight Transportation in the Tennessee River Basin," Tennessee Department of Transportation and the Nashville District of the US Army Corps of Engineers, January 2011.

[5] Recent examples of over-dimensional shipments include a six-barge movement of a complete (but disassembled) from its manufacturing location in Korea to a destination near Sioux City, Iowa via the Mississippi and Missouri Rivers or the 2009 movement of wind turbine assemblies and towers from their manufacturing locations in China and the Netherlands.

[6] See, for example, Burton, Mark L., "Rail Rates and the Availability of Barge Transportation: The Missouri River Basin," U.S. Army Corps of Engineers, Omaha, Nebraska, 1996.

capacity was available, rail carriers were very sensitive to available navigation in the prices they charged. However, as rail traffic continued to grow through the mid 1990s and railroad capacity became scarce, available rail rates became far less responsive to a barge alternative.[7]

Avoiding Negative Externalities and Securing Benefits to Other Waterway Users

Most goods and services are produced and consumed so that only those involved are affected. This is not true of transportation. The production of freight transport necessarily involves traversing space – space that is routinely occupied by thousands of people who have no direct connection to the freight or its movement except for their proximity. These people are "external" to the transaction that produced the freight movement and any negative outcomes they suffer are called "negative externalities". Freight produces many of these – diminished air quality, roadway congestion and delay, noise pollution, and increased exposure to hazardous materials. However, across transport modes and externality categories, commercial navigation is the least offensive. With the exception of recreational waterway users, very few people are ever close to barge transportation. Railroads are more intrusive and motor carriage is much more so.

The reduced incidence of negative externalities is a tangible benefit of commercial navigation that is easily recognized, but seldom counted within decision-making processes. Ostensibly, this is because of the uncertainties involved in accounting for the value of reduced exposure to unpleasant outcomes. It is, in fact, a difficult area in which to assign reliable numbers. Still, to ignore the environmental or other quality of life improvements associated with a greater reliance on inland transport also assures getting the wrong policy answer.[8] I, along with many of my colleagues, have worked for more than a decade to remedy this problem, but have achieved only modest progress.

The final source of economic value attributable to commercial navigation on the inland waterways is one which we have only recently begun to treat empirically. Waterways that support commercial navigation also support a number of other uses that include hydro-electric power generation, cooling for other means of electricity generation, municipal and industrial water supply, personal recreation, crop irrigation, and regional flood control. Almost without exception, these other uses are enhanced by the maintenance of a navigation channel and the operation of the structures that support it.

Historically, these "other beneficiaries" have, more often than not, been asked to pay fees as a result of their waterway use. However, very little has ever been done to quantify the magnitude of benefits they enjoy or to ensure that fee payments at least cover the system costs that are incremental to their codependence on the maintenance of predictable channel depths or rates of flows.[9] To date, only navigation users have been asked to demonstrate that their economic contributions are aligned with system expenditures.

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[7] See Burton, Mark L., and Wesley W. Wilson, "Network Pricing: Service Differentials, Scale Economies, and Vertical Exclusion in Railroad Markets," *Journal of Transport Economics and Policy*, May 2006.

[8] See, "Surface Freight Transportation: A Comparison of the Costs of Road, Rail, and Waterways Freight Shipments That Are Not Passed on to Consumers," US Government Accountability Office, January 2011.

[9] In a purely economic setting, payments that are less than any associated incremental cost would constitute a cross-subsidy by other users whose contributions meet or exceed this minimal threshold.

Summarizing the Current Economic Value of Inland Waterway Commerce

The use of inland waterways to support freight transportation saves shippers (and their customers) billions of dollars annually. Moreover, in some cases, the freight that moves by water cannot be moved any other way. In these cases, the value of available barge transportation is literally incalculable. Beyond these seemingly obvious benefits, inland navigation also provides competition that helps discipline railroad pricing. This, in turn, diminishes the need for federal railroad oversight. Next, increased reliance on barge transportation reduces the incidence of most negative externalities, thereby, providing uncounted benefits to populations that are exposed to fewer of the ”bads” commonly associated with moving freight. Finally, maintaining a navigable waterway channel makes waterways more useful for other purposes. Many, perhaps even most, of these other beneficiaries do pay for this benefit, but their required contributions would almost certainly increase in the absence of waterborne commerce.

Could Expanded Railroad Service Eliminate the Need for Commercial Navigation?

Transportation industry pundits freely use the word “renaissance” to describe the railroad industry changes that have occurred since its deregulation in 1980. From the mid 1980s through the early years of the current century real railroad costs per ton-mile of freight service fell steadily and, in most cases, the rates charged to shippers mirrored cost reductions. During the same period railroads consolidated operations and rationalized networks, trimming thousands of route-miles, while simultaneously investing billions of dollars in the trackage they retained. Unquestionably, in 2011, both the fiscal and physical state of the railroad industry is vastly improved over what existed less than 30 years ago.

I would suggest, however, that in spite of these improvements (or perhaps, because of them), today’s freight railroads are neither prepared for nor probably desirous of the traffic moved on the nation’s inland waterway system. Several factors support this conclusion. First, many of the largest shippers of bulk commodities – both coal and stone – are at locations that are not (and cannot be) rail-served. For these shippers, the loss of waterborne commerce would simply mean shutdown. In numerous other cases, a switch from barge to rail would require extensive capital investments to create the necessary railroad connections and on-ground storage areas.

Next, there is the issue of both equipment and line-haul track capacity. A wholesale diversion of waterway traffic to the nation’s rail network would require roughly 100 thousand additional railroad freight cars and 2,500 additional locomotives.[10] It would also increase total annual railroad tonnage by roughly 33 percent.[11] The additional traffic could be readily absorbed on some route segments. On others, however, it would require substantial capacity expansions through the addition of mainline tracks, passing sidings, and signal upgrades. There is no reason to expect that the railroad industry could not accomplish these increases. However, given its self-proclaimed limited ability to raise capital funds, there is no guarantee that this could be done without outside (federal) assistance.

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[10] These are representative calculations based on 96 tons of freight per loaded car, five-day freight car cycle times, 2.5 6,000 hp. locomotives per train set.

[11] This calculation is based on average annual barge traffic of 600 million tons and 1.8 billion tons of annual railroad traffic (Association of American Railroads).

Additionally, commercial navigation moves a significant amount of tonnage that railroads do not want or simply cannot accommodate. Over the past decade, Class I carriers, lead by CSX, have actively worked to shed their most hazardous chemical traffic, contending that the costs associated with this traffic are simply unrecoverable under anything like current rate structures. The same is also true of less perilous, but equally troublesome cargoes such as salt and asphalt. Finally, the weight and/or dimensions of a small number of waterborne shipments simply exceed anything that can be reasonably moved by any other freight mode – including rail. Again, without the waterway the shipments would simply disappear.

Setting aside all of these considerations, the fact remains that current inland navigation tonnages are on the waterway system based on the preferences of shippers, presumably because waterborne carriage reduces achievable costs. Thus, any forced substitution of railroad transport, where feasible, would, at a minimum; increase costs and diminish the competitiveness of the affected shippers.

Looking Forward, Is There a Meaningful Role for Commercial Inland Navigation in American Commerce?

Many of the facilities that provide for today's inland waterway commerce were designed and built a full generation before diesel power was available for either river vessels or railroad locomotives. Indeed, one of the most daunting challenges in planning for future freight mobility is the extreme longevity of the required structural assets. Today's waterway planners typically work with a 50 year planning horizon. Hence, seeing into the future with as much clarity as possible is required to forecast traffic volumes, alternative transportation costs, and operating conditions. These forecasted values combine to form the project benefits and costs that are used to establish project viability.

Fortunately, within the current context, I can speak more generally about a future that I consider largely unknowable. Armed with this latitude, I focus on a handful of observable trends that seem likely to continue and which have an immediate bearing on the future value of inland navigation in the United States. These include **(1)** relative stability in the future bulk commodity flows that are the base for today's waterway traffic, **(2)** increasing and ever more volatile petroleum prices, **(3)** a continued growth in global trade, and **(4)** continued increases in environmental standards and the preference given to livable communities. As with earlier material, I briefly discuss each of these factors in turn.

Bulk Commodities, Manufactured Goods, and Future Waterway Traffic Demands

The most basic components of inland navigation traffic are dry-bulk commodities like coal, grain, stone-based aggregates, raw fertilizers, metallic ores, and Portland cement. This traffic is rounded out by a relatively small set of manufactured commodities that includes a variety of chemical and petroleum products, intermediate and finished steel products, and animal feeds.

Unlike many more highly valued goods, the demands for the basic industrial and agricultural products have had a strong international component for more many generations. Thus, prediction of the demand for their domestic transport has long been influenced by global trends in production and consumption. Stepping away from the immediately observable impacts of sometimes pronounced disruptions, the basic international demographic and economic patterns that govern the availability and demand for these goods change very slowly. Thus, when we strip away the fantastic and the short-lived, the fundamental conditions that sustain the demand for inland barge transport within the US are unlikely to change significantly, even over a very long time horizon.

Future Fuel Prices and the Demand for Inland Navigation Capacity

Fuel is basic and in the short-run fuel markets can fluctuate a great deal. Still, in the current context, it is the long-run pattern of fuel availability and pricing that matters most. Forecasts for petroleum prices vary widely, with the severity of projected increases or degree of relative price stability generally correlated to the politics of the forecast-issuing organization. The US Department of Energy's Energy Information Administration provides three long-range price forecasts – a mid-range prediction bounded by high and low forecasted values. The mid-range forecast suggests an increase in inflation-adjusted petroleum prices from $60 per barrel to $130 per barrel (117 percent) between the time of the forecast (2007) and the out-year (2030). A moving average of monthly prices observed over the four years since the forecasts' release depicts a trend that is slightly above the mid-range forecast, but well-below the "worst case" projections. In addition to underlying a predicted upward trend in petroleum prices, actual prices observed over the past decade also suggest increased petroleum price volatility. There are a number of available explanations for this volatility, but the most likely seems to lie in a lack of excess production capacity among OPEC members which, in turn, has limited the cartel's ability to dampen rapid spikes in worldwide crude oil prices.

At the simplest level, escalating fuel prices favor inland navigation over other freight modes. The per-ton-mile rate of fuel consumption of waterway vessels is generally lower than a similar figure for railroad locomotives and several times less than the corresponding rate for trucks. This said, a number of factors partially mitigate navigation's advantage in this area.[12] Even so, this advantage seems likely to persist for the foreseeable future.

Continued Growth in the Domestic Importance of Global Trade

As a young economist studying at the University of Tennessee, I recall a time when the percentage of US GDP tied to international trade was less than 10 percent. The latest data suggest a corresponding figure for 2010 of approximately 30 percent and the share of US economic activity tied to global markets is projected to reach as high as 50 percent by the current century's midpoint. A number in my profession have eloquently recounted the sequence of events that is producing the steady growth in international commerce. However, virtually every author includes substantial reductions in global transportation costs as a key factor.[13]

In the US, as elsewhere throughout the world, the growth in international trade has lead to observable changes in land-side commodity flows and lane-specific freight volumes, as increasingly large volumes of traffic move longer distances to and from deep draft ports. However, unlike other parts of the world (China, Europe, and Brazil), globally-induced traffic growth on US inland waterways has been constrained primarily to bulk commodities. In the US the containerized movement of finished goods and semi-finished products is almost exclusively by rail and truck.

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[12] The primary factor has been the railroad industry's rapid compliance with federally mandated fuel efficiency standards – standards that have demanded greater fuel economy improvements for locomotives than similar requirements for marine engines.

[13] Other often cited factors include the opening of the Chinese and former Soviet economies to international trade and the rapid growth in communications capabilities that allows the nearly instantaneous and precise management of product inventories across great distances.

There are numerous reasons that explain the absence of container shipping on US waterways. These include the traditional dominance of container routes to and from the west coast, the early capacity of US railroads to immediately absorb the growth of containerized traffic and the relatively slow transit times provided by inland barge transportation. The pressing question is whether these short-run factors will continue over the long-run or whether gradual adjustment will eventually draw US inland shipping into the arena in which international containers are moved.

To some extent, these underlying factors have already begun to change. Traditional West Coast-inclusive container movements will remain important, but ongoing improvements to the Panama Canal have lead to generally accepted predictions that future container traffic growth will favor East Coast and Gulf Coast ports. Moreover, a significant share of this growth may involve north-south traffic between US Gulf coast ports, interior US locations and origins and destinations in both Canada and Mexico.[14] Also, the excess rail network capacity evident in the 1980s and early 1990s has largely evaporated. US Class I railroads continue to add intermodal capacity as fast as available financing will allow, but there is concern that a rebounding economy and resulting resumption of intermodal traffic growth will absorb nearly all newly-created capacity within a short period of time.

The factor that has yet to be addressed is the relatively slow transit times available on the US inland navigation system. In the US, attempts to move international containers over water-inclusive inland routes have relied on traditional deck barges and towing operations. In other world quarters, waterborne inland container shipments are aboard dedicated vessels that mirror their larger ocean-going counterparts. These vessels are able to achieve measurably faster transit times between inland ports. While discussions of such vessels abound in the US, neither private nor public entities have, so far, been willing to undertake the necessary investment.

Environmental Constraints and "Livable" Communities

Proponents contend that restricting commercial and industrial activity in favor of personal mobility, green spaces, and other environmental outcomes results in "livable" communities. Opponents of such practices refer to them as "gentrification" and warn that they will lead to economic hardships for the regions that embrace them. I have no particular opinion on the issue except to observe that the proponents of livable communities seem to be winning – particularly in the coastal regions that continue to see the greatest levels of population growth.

From a freight perspective, the inherent conflict is obvious. Global trade growth demands increased deep draft port capacity and growing coastal populations require increasing quantities of consumer goods. On the other hand, livable community standards restrict port growth and very often limit local freight operations in ways that inhibit freight's movement. The response has been a trend toward relocating freight activities inland, away from metro centers. Clearly, this doesn't eliminate the need for port access, but it can reduce the required footprint of port-related distribution activities. In this way, the impacts of freight on local metropolitan communities are minimized.[15]

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[14] Mexico and Canada already rank among the top US trading partners.

[15] This pattern of land-use has already been widely adopted by the railroad industry which is rapidly abandoning traditional intermodal facilities located in city centers in favor of more distant sites where space is abundant and only metro-related traffic is subjected to urban roadway congestion.

From the standpoint of inland commercial navigation, this pattern of traffic diversions holds opportunities for traffic growth. Vessel-to-vessel transfers can be affected without the need for land-side facilities and the corresponding port-side land use. Moreover, these transfers preserve the integrity of cargoes by isolating them from exposure to security threats. For inland communities, with greater quantities of developable property and fewer land-use concerns, the capture of trade-related freight activities can often spur much needed economic development.[16]In short, everybody wins.

Finally, while community livability and environmental concerns may be more pronounced in coastal areas, the same basic pattern of land-use preferences is emerging in many inland metropolitan areas. And similarly, where commercial navigation is available, it is often possible to relocate some amount of heavy industrial freight traffic away from metro centers to more receptive communities with the effect of improving conditions for both. In my home state of Tennessee, we recently completed a detailed analysis that suggests relocating certain waterborne freight traffic from its current location on the Cumberland River within metropolitan Nashville to a proposed location approximately 40 miles to the north would reduce localized traffic congestion in Nashville, improve the efficiency (reducing cost) of product distribution, and provide an economic boost to the alternative destination community.[17]

Future Demands for Inland Commercial Navigation – A Summary

Currently, most barge traffic consists of bulk commodity movements of coal, grain, aggregates, metallic ores, and chemicals. While this traffic is subject to both domestic and international cyclical variations in volumes, there is no immediate reason to expect any lasting change in the demands for the movement of these products on the inland waterway system. Thus, from a planning perspective, the most relevant question is whether or not we may reasonably expect *other* economic changes that will measurably add new waterborne traffic to the existing mix.

There is no single, heavily-weighted factor that demands an answer of "yes" to this question. On the other hand, there are numerous (albeit less powerful, indications) that the potential for waterway traffic growth cannot be readily dismissed. Likely fuel price increases and price volatility, while certainly uninvited, probably favor the use of barge transports over other modes. Similarly, increases in international commerce – particularly over US Gulf ports – also point to an increased role for navigation. Even the use of inland navigation for the movement of international containers, while by no means eminent, may be feasible under conceivable economic conditions. Finally, land-use patterns that push freight away from metropolitan areas could lead to additional traffic if navigation is available.

[16] For a contrast in local attitudes, survey the popular responses to proposed port developments in Savannah and Charleston to a similar proposal for new port-related developments in Jasper County, South Carolina, immediately north of Savannah.

[17] See, "An Evaluation of the Potential for Commercial Navigation to Additionally Contribute to Freight Transportation in the Tennessee River Basin," Center for Transportation Research, The University of Tennessee, February 2011.

Has Aging Infrastructure Left US Inland Navigation at a Crossroads?

While my years of study have rewarded me with both a familiarity and a fondness for commercial navigation, I am an analyst not an advocate. Accordingly, I'm inclined to address questions surrounding industry's future value and viability with available reason rather than rhetoric. This motivates a number of questions. The first of these is whether or not inland navigation is now and will continue to be important to the vitality of the US economy. I am convinced the answer to this question is "yes" for both now and foreseeable years to come. The next questions deal with the current system's state of repair, the need for reinvestment, and the likely consequences if this investment is not forthcoming.

In my introductory remarks, I observed that many of the physical facilities that support commercial navigation are well beyond their design-lives. In spite of this fact very few facilities have experienced actual failures. This is the result of careful monitoring and maintenance. However, this necessary vigilance imposes additional costs on both users and the federal government that could be avoided if assets were replaced in a timely way. More importantly neglect sows the seeds of uncertainty among users. Facility failures are unlikely to compromise the navigation system's overall viability, but uncertainty might.

The severely degraded condition of many locks and dams sends a powerful signal to both current and would-be users – a signal that future availability is far from assured. This signal causes uncertainty. Uncertainty slows private investment in waterway terminal facilities and other assets. Shippers, who can, investigate their alternatives.[18] Those who have no alternative must decide whether to risk further waterway-related investment in the face of uncertain future access or simply make do with the facilities they already have in place. In this way, the failure to adequately invest in public infrastructure or even prolonged periods of indecision can induce the quiet collapse of system use.[19] Those who doubt the impact of user expectations on subsequent traffic volumes need only look to the Missouri River basin for a powerful example.[20] If national transportation policy includes commercial inland navigation going forward, then significant system investments must be planned and plans must be executed sooner rather than later.

It is similarly risky to reduce the system to its core components by ending support for tributary navigation. Obviously, it is impossible to make commercial navigation equally available in all quarters, but eliminating access at any location reduces the value of the overall system for remaining network users and should be done only after careful thought. This situation is analogous to telephone service. Your phone is valuable to you, because you can call (or be called by) a large number of other telephone subscribers. If some act suddenly ended all service to Cincinnati, *your* telephone would be less valuable

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[18] Alternatives include adapting their shipping practices to make use of modal alternatives or relocating to an alternative waterway site where continued navigation access seems more certain.

[19] Each time a waterway segment is closed to navigation, remaining users are connected to fewer origin-destination pairs. For this reason the value of the system to remaining users is diminished. Economists refer to this phenomenon as a "network externality".

[20] In the case of the Missouri River, user expectations regarding the likely adoption of a split navigation season stemmed private investment in dock and other terminal facilities. Ultimately, the uncertainty resulted in marked traffic reductions. Finally, the lost traffic was used to justify the split season's actual implementation.

to you even if you currently don't know a soul who lives or does business there. Tributary origins and destinations represent potential value for shippers on main-stem waterway segments even if their current shipping practices do not include them.

Finally, we can only hope the decision-making process regarding renewed inland navigation investment adequately reflects the wildly asymmetric penalties associated with making the wrong decision. If we decide to renew the inland waterway's capacity and it proves to be unneeded, we will have, at least partially, misspent a considerable sum of money. Alternatively, if we forego waterway investments that later prove to have been in the public's best interest, we may well have created a harm that cannot be fixed. Technically, navigation capacity, once lost, could probably be restored, but the resources necessary for this restoration would be remarkably large. This sort of potential punishment is not simply hypothetical outcome. It is, instead, a scenario that was played out countless times within the railroad industry during the latter half of the Twentieth Century. If you ask the currently retiring generation of railroaders about regrets, wrongly-abandoned routes that can never be restored will top many lists.

Does Economic Theory Support a Federal Role in the Creation of Renewed Inland Navigation Capacity and, If So, What is the Proper Course?

Even after decades of mergers, it is still common to find two or more competing railroads running side-by-side. Moreover, even when one rail route is not visible from the tracks of another, there is generally railroad competition. Literally hundreds of thousands of US city pairs are linked by two, three, four, or five different rail carriers or rail carrier combinations. If there is any lack of competition at all it is generally over the last few miles over which railroad customers connect to the greater railroad network. This is not true of the inland navigation system. With only few exceptions there are not duplicate waterway network links. In most cases, there is only one waterway route between any origin-destination pair and little or no opportunity to create competing routes. Within economics, this outcome is referred to as a *natural monopoly*.[21] Unimpeded, any single firm that controlled the waterway network (or any of its component parts) could impose monopoly prices. Again, competition, through the development of a competing navigation network is impossible. Thus, the federal government is faced with only two choices, it could lease control of the inland navigation system to one or more franchise holders and carefully regulate their activities (pricing, network access, service levels, etc.) or it must retain control of the system and operate it equitably to the benefit of all waterway users. We have very wisely chosen the latter course.

The efficient federal control of the inland waterway network imposes obligations on government planners and decision makers that are relatively easy to describe. They must design a network sufficient in extent and capacity to ensure that any further expansion would impose incremental costs that are greater than corresponding additional benefits. The cost of actually constructing, operating, and maintaining the resulting system must then be recovered through fees charged to those who benefit from the waterway's use. Fees faced by each group of users should (at least) reflect any costs that are directly incremental to that group's use.[22]

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[21] Strictly speaking a natural monopoly exists when a single provider can satisfy market demand at lower unit costs than any combination of two or more providers.

[22] Technically, the user fees for each group should also be less than the "stand-alone" cost of building the system exclusively for that group's problem. Practically, however, this is not a consideration.

I've chosen these words very carefully so that they conform to my discipline's practice. However, simpler language can convey similar notions without a catastrophic loss of precision. The inland navigation system need not be the biggest, most extensive system *possible*. Instead, it should be built out to the point where further investment seems silly. If our children don't understand this concept, our parents surely did. Building, operating, and maintaining such a system requires money. Thus, those who benefit must be made to "contribute" toward this end. Differences in who pays which share of the bill depend on whether or not it's possible to assign specific costs to distinct subsets of users – if you cause us to buy it and we can demonstrate that connection, then you pay for it.

The implications of this common sense (or if you prefer, theoretically sound) prescription for renewed investment in inland waterway capacity are simple. If, as some maintain, the only groups to benefit from the required investment are waterborne carriers and their customers, then the full burden of new investment should rest with them. Alternatively, if you conclude as I have, that a much broader set of Americans will benefit from this assured navigation capacity, then the burden must be spread equitably across this broader array of beneficiaries.