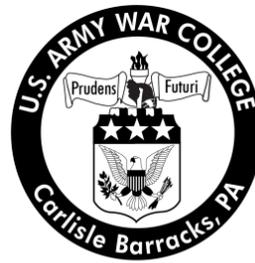


Strategy Research Project

Funding Infrastructure Despite Budget Reductions

by

Colonel Steven T. McGugan
United States Army



United States Army War College
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USAWC STRATEGY RESEARCH PROJECT

FUNDING INFRASTRUCTURE DESPITE BUDGET REDUCTIONS

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In the summer of 2011, the U.S. debt reached \$14.2 trillion, forcing the President of the United States and Congress to call for major cuts in discretionary spending. Cutting discretionary spending for all federal programs impacts the nation's inland waterway infrastructure which is maintained by the U.S. Army Corps of Engineers (USACE) through local districts like Huntington, West Virginia, via the annual federal discretionary appropriation for operations and maintenance. Reducing the Operations and Maintenance funding to one of USACE's major inland waterway systems, the Ohio River Basin (ORB), negatively impacts the ORB's economic strength. Severe impacts in the economic strength of the ORB translate into severe economic impacts for the economy of the United States, affecting the country's global economic superiority.

FUNDING INFRASTRUCTURE DESPITE BUDGET REDUCTIONS

The United States' ability to build and then maintain a network of infrastructure that is fully functional is one source of the country's international economic power. A cornerstone of the nation's infrastructure network, helping to drive the country's economic engine, is the national inland waterway system. An operational inland waterway system requires the construction of massive concrete and steel structures, capable of lasting many years. The structures built must survive the extreme forces of nature, all types of weather and must undergo constant maintenance so they are operational at all times. Conducting this maintenance to support the shipping industry and the national economy requires funding. The majority of the funding for inland waterway projects comes from the federal government because "the federal government continues to invest in navigation because of its benefit to the national economy."¹ Since the federal government recognizes the benefits of the country's inland waterway system to the nation's overall economic superiority, it is imperative that the United States Congress makes it a priority to annually fund the operations and maintenance (O&M) costs at an amount equal to or greater than the funds provided in FY11.

The United States' (U.S.) inland waterway system is "envied by the world because this natural 'water highway' running throughout our country [provides] key access for commerce."² Inland waterways are critical to commerce because "the inland waterway system carries one-sixth of the national volume of intercity cargo."³ The inland waterway infrastructure facilitates the flow of goods and services between raw material suppliers, manufacturers and consumers. Thanks to the United States' Inland Waterway

System “bulk products are moved on our waterways for the lowest cost and in the most environmentally friendly way.”⁴ Not only building, but more importantly maintaining, the inland waterway system is expensive and paying for this maintenance must be prioritized along with other national requirements by the U.S. Congress.

The purpose of this paper is to provide a summary of benefits the nation’s economy receives from a fully functional inland waterway system and to support maintaining O&M funding levels equal to the amount funded in FY11. The inland waterway O&M budget is an annual appropriation that Congress approves and is part of the federal government’s discretionary spending, currently being targeted for reduction in response to the budget crisis of 2011. Congress provides this O&M funding annually to the United States Army Corps of Engineers (USACE) to maintain the country’s inland waterways; this funding is approximately 45% of the annual USACE budget. If Congress reduces discretionary spending, it will affect the O&M funding required to keep the nation’s inland waterway system operational which increases the risk to the nation’s international economic superiority. To demonstrate why USACE should continue receiving yearly O&M funding at FY11 levels, a cost to benefit comparison is necessary. The benefits of the inland waterway system are; the savings industry achieves by shipping on the inland waterway system created by the dam and lock system, the positive environmental impacts shipping by water provides, the reduction in road and rail congestion due to shipping by water, the reduction of flood insurance costs and losses paid due to the flood control dams built on non-navigable rivers, the income generated at recreational lakes impounded by flood control dams, the cheaper electricity made by dams generating hydroelectricity and finally the amount of jobs the

entire system creates through system use, construction, maintenance work or public use. An additional benefit to completing O&M work on the water infrastructure system is increasing the safety of an aging system. The costs of the system include the annual maintenance costs and any emergency repairs required due to accidents or acts of nature. Finally, by comparing the annual monetary benefits generated by the waterway system to the annual costs of maintaining the system it is easy to show why Congress should continue to provide O&M funding at levels equal to or higher than those provided in FY11.

System Overview and USACE Role

The inland waterways of the United States are expansive. “The U.S. waterway system is comprised of 12,000 miles of navigable waterway, containing 230 lock sites that manage 275 lock stations.”⁵ The system is integral to the U.S. economy because it “offers the benefit of direct access to ocean ports from the nation’s interior, often without seasonal difficulties (Great Lakes and Upper Mississippi regions excluded).”⁶ The U.S. inland waterway system is broken down into four parts being “the Mississippi, the Ohio River Basin, the Gulf Intercoastal Waterway, and the Pacific Coast Systems.”⁷ Together these systems make it possible for industry and agriculture not directly located on either U.S. coast to get their products and materials to manufacturers and consumers more cheaply than by other means.

As noted earlier, the United States Army Corps of Engineers (USACE) is responsible for maintaining the majority of all the intercostal waterway systems in the U.S. The Corps executes this mission based on actions taken by Congress since 1824, which include numerous Acts and the annual appropriations provided each year in the

Federal budget. The Act that began USACE's role as the nation's river authority was the General Survey Act of 1824. The initial idea to establish the General Survey Act took shape in 1819, when Secretary of War, John C Calhoun "recommended that the U.S. Army Corps of Engineers be directed to improve waterways navigation and other transportation systems because such civil works projects would facilitate the movement of the U.S. Army and its materials while contributing to national economic development."⁸ Based upon Secretary Calhoun's recommendation and a decision by the Supreme Court in 1824, "that federal authority covered interstate commerce including riverine navigation,"⁹ Congress passed the General Survey Act. The act authorized "the president to have surveys made of routes for roads and canals of national importance, in a commercial or military point of view, or necessary for the transportation of public mail."¹⁰ The President, based on the authority of the legislation, directed the Army Corps of Engineers to begin the tasks as required by the General Survey Act. The following month, Congress passed an appropriation designating \$75,000 to improve the navigation of the Mississippi and Ohio rivers. As with the General Survey Act, the president then directed the Army Corps of Engineers begin the effort of clearing the rivers.

Since 1824, USACE's responsibility, under the General Survey Act, expanded. Now, USACE not only maintains the charting of inland waterways for navigational purposes and clears the rivers of snags and other impediments to shipping, but also controls flooding in many parts of the country. Due to the growth of the U.S. population in flood plains, it became critical to construct dams and levees to protect lives and property from the constant flooding that happened with the rivers. Congress "recognized

that flood control was a proper activity of the Federal Government in cooperation with States, their political subdivisions, and localities...[and] gave responsibility for federal flood control projects to the U.S. Army Corps of Engineers.”¹¹ Congress’s concern led to the passage of numerous Flood Control Acts in 1917, 1928 and 1936. The General Survey Act and these Flood Control Acts resulted in the USACE’s permanent involvement in building and maintaining the nation’s inland waterway system.

USACE executes the mission of building and maintaining the inland waterway system and providing flood control structures through its 44 District Offices located throughout the country. Each district receives annual O&M funds, as proportioned from Headquarters (HQ) USACE, based on the amount of infrastructure work required in a given year. In order to demonstrate the overall importance of the entire system to the U.S. in terms of benefits and costs, one district’s yearly costs versus the benefits it creates is analyzed to typify the entire system. The district chosen is the Huntington District. Huntington’s missions began in 1922 after combining two smaller districts, resulting in the district being responsible for all of the flood control and inland waterway navigation projects covering a 45,000 square mile area. The district’s area covers almost all of West Virginia, a portion of Virginia, North Carolina and Kentucky and the southern 60% of Ohio. The district’s ability to effectively execute the missions of maintaining inland waterway navigation, preventing floods, and ensuring the quality of life for the people within the district’s boundaries is dependent on yearly Congressional appropriations.

District Infrastructure and Benefits

The Huntington District's infrastructure provides multiple benefits per project to not only the federal government but to the local area as well. The district's infrastructure makes possible the movement of large amounts of raw material and manufactured goods along the Ohio River and its tributaries, reducing the cost of consumer goods locally and nationwide. The district's infrastructure provides a higher quality of life to those within the Ohio River Basin (ORB) by preventing and controlling floods, reducing environmental impacts of shipping, reducing traffic congestion on roadways, providing recreational opportunities, producing electricity and providing jobs for the local population. Ensuring the district's entire infrastructure works together as one system contributes to the overall strategic strength and prosperity of the local region and the U.S.

The district maintains the inland waterway infrastructure along a 311 mile section of the Ohio River as well as the infrastructure on the Kanawha River. The total amount of river infrastructure maintained to support shipping is nine locks and dams. These nine locks and dams facilitated the flow of "more than 92 million tons of commodities, valued at more than \$11.5 billion"¹² in FY10. Coal made up the largest share of the goods moving up and down this portion of the Ohio River, or "approximately 58% of the shipped commodities...[while the other] 42% of the goods being shipped [are] petroleum, grains, steel, ores and minerals."¹³ Shipping these goods is accomplished by use of tug boats pushing barges, called Barge Tows. Shipping by water is the most economical means, compared to train and truck shipments, due to the lower cost of fuel used per tonnage shipped. The cost ratio comparison of fuel used per shipment is "\$16.64 per ton of material shipped by water compared to \$30.08 per ton of material

shipped over land.”¹⁴ This lower transportation cost creates a savings to “[Ohio River Basin] shipper [of] \$3.1 billion”¹⁵ annually, resulting in savings for the manufacturers and ultimately the consumers in the end.

Another benefit of shipping goods by water is the reduction of the amount of trains and trucks needed to move goods which reduces the amount of traffic congestion on America’s roads. When comparing these three different ways of shipping goods, barges far exceed the capacity of trains and tractor-trailer trucks. In fact, “one barge tow (5 barges deep by 3 barges wide), guided by [a] single tug boat moves approximately 26,250 tons of material. The amount of tonnage shipped by one barge tow is the equivalent of 216 railcars (2.25 unit trains) or 1,050 trucks.”¹⁶ Using the factor of 1 barge equals 225 railcars (including 6 locomotives) equals to 1050 trucks means it would take 757,000 train cars or 3,200,000 trucks to equal the 3505 barge tows required to move the 92 million tons of commodities shipped on the river annually. The major reduction of train and truck traffic eases road congestion on America’s road and rail networks.

Shipping by water not only reduces road congestion, but shipping versus rail and truck positively impacts the environment. Positive environmental impacts are the result of reduced engine emissions, reduced noise pollution, and reduced fuel consumption. Reduced engine emissions result from the reduced amount of trains and trucks used to move the same amount of material as one barge-tow. Reducing the amount of truck and train traffic and operating tugs reduces noise pollution. Fuel consumption is less per unit of shipment because 1 barge tow operates uses less fuel than 1050 trucks and 6 diesel locomotives. The reduced amount of carbon dioxide emissions from diesel engines as

well as the reduced amount of reliance on oil benefits the country's air quality and need to import large amounts of crude oil.

The Huntington District also maintains 35 flood control dams in addition to the 9 dams providing navigation along the Ohio and Kanawha rivers. These dams control the flow of water to reduce flooding in the tributaries as well as the Ohio River. Preventing flood damage, as written earlier, is a critical component of the district's mission because "floods are the most common natural disaster in the U.S."¹⁷ A cost review of flood damages within the Huntington District reveals that damages "from 1929 through 2003...have ranged from a low of \$18 million...to over \$17 billion."¹⁸ As population numbers and land development continues to increase along the nation's rivers, the costs associated with future floods can only increase, making flood control more and more important.

Reducing the probability of flooding and the resultant damage allows business to continue operations uninterrupted. Preventing flood damage assists federal, state and local governments in saving money because they do not have to provide emergency support to businesses or residents. Likewise, insurance company expenses are also reduced because they don't need to reimburse businesses or residents for flood losses. Preventing flooding also reduces the cost of manufactured goods consumers use because businesses don't pass the cost of cleanup and repair to the consumers by way of higher prices. The losses paid by government and insurance companies combined with higher cost of consumer goods negatively impact the cost index of the country. The efforts of the district in the ORB show "an approximate \$11.3 billion in savings since flood control work began"¹⁹ due to flood control infrastructure currently in place.

An often unmentioned or overlooked benefit of the flood control program is the lakes impounded by dam structures. Most of the lakes are used by the local communities as a water source reducing the communities cost of municipal water. Additionally, every lake created by impounding water generates revenue by several means. These means range from fees charged to each person using the lake, the licenses sold for fishing and recreational vehicle use on the lakes, to the permits granted to allow construction of homes, motels, marinas and private docks along the lakes' shores. The income generated goes back into the general treasury fund of federal, state and local governments which is then used in other programs. The combined total of money generated by all of the lake projects managed by the district in fiscal year 2010 amounted to over \$100 million or approximately 9% of all the recreational fees received nationwide.²⁰ Most importantly, this monetary benefit exceeded the district's O&M budget for 2010.

Dam benefits are not limited to shipment of goods, flood control, and recreational lakes, they also provide for relatively cheap electricity. Currently three of the district's six dams on the Ohio River and all three dams along the Kanawha River produce electricity. These 6 dams produce only 6% of the total power within the district but they do so at a lower cost than electricity produced at a coal or gas electric plant. Hydroelectric power production accounts for only a small percentage of cheaper electricity in the ORB, while the greater savings is achieved by the shipment of coal and other fuels by water. There are 57 coal fired electrical plants located along the shores of the Ohio River accounting for approximately 86% of the total electricity produced in the ORB. Economically, electricity produced in the ORB is among the cheapest produced

nationally. Cost of electricity in the ORB in 2010 averaged “7.8 cents per kilowatt hour compared to the national average of 9.83 cents.”²¹ This savings is passed on to consumers and businesses alike, reducing cost of goods manufactured and homeowner costs for utilities. The ORB’s waterway infrastructure results in cheaper electricity because the fuel to make electricity either flows through the ORB’s dams or is moved by barge on its waterways.

Finally, the inland waterway navigation system supports strategic economic strength through the direct and indirect employment of people and increased business opportunities. The Huntington District’s workforce employs almost 900 people to maintain and supervise the operation of the structures within the district’s boundaries. The navigation industry within the ORB produces “approximately 100,000 jobs and \$3 billion in income.”²² The overall business activity that the inland waterway supports is almost \$40.8 billion with tax revenues of almost \$3 billion. Providing jobs and building overall economic capacity further strengthens the overall American economy and ensures America’s strategic economic strength. While all of the preceding measurable areas provide direct positive impact to the nation’s economic superiority, there is one other area that drives the need to maintain O&M funding at current or higher levels, dam safety.

After years of use and exposure to the elements and extreme weather, many of the dams that make shipping by water possible and provide flood protection need to be repaired. Many of these repairs are delayed for years due to insufficient or a total lack of funding. These repairs are critical because some waterway infrastructure is not capable of meeting current industry best practices. “According to the 2010–2011 Global

Competitiveness Index published by the World Economic Forum, the U.S. ranked 15th in the category of infrastructure, behind nations such as the United Arab Emirates (ranked number 3), Singapore (5), the United Kingdom (8), Canada (9) and Iceland (12). This ranking would seem to be the direct byproduct of a 50% decline in U.S. infrastructure investment as a percentage of Gross Domestic Product since 1960.²³

The decline in investment over the last 50 years is evident by the results published in the 2009 Infrastructure Report Card by the American Society of Civil Engineers (ASCE). ASCE's report graded America's infrastructure a D on a scale from A to F with A being excellent and F failing. This rating declined from the D+ awarded just four years earlier in the 2005 report. The grades given to dams and the inland waterway system were D and D- respectively, at or below the rest of the country's infrastructure level. As President Obama recently said:

Our aging transportation infrastructure costs American businesses and families about \$130 billion a year. That's a tax on our businesses; that's a tax on our consumers. It is coming out of your pocket. It's a drag on our overall economy. And if we don't act now, it could cost America hundreds of billions of dollars and hundreds of thousands of jobs by the end of the decade.²⁴

Looking at some of the key observations of the report shows that "the average age of all federally owned or operated lock[s] is nearly 60 years, [which is] well past their planned design life of 50 years. The cost to replace the present system of locks is estimated at more than \$125 billion."²⁵ The report also noted that as of 2006, forty-seven percent of the locks USACE maintains were functionally obsolete. The report highlighted that "assuming that no new locks are built within the next 20 years, by 2020, another 93 existing locks will be obsolete—rendering more than 8 out of every 10 locks now in service outdated."²⁶ In the Huntington District, over 53% of the locks and dams

are between 30 and 60 years old. Of the 9 locks and dams on the Ohio and Kanawha Rivers the district maintains, 3 are rated as C, 4 are rated as D, and 2 are rated as F.

In addition to two-thirds of the river's locks and dams being at or below a failing rating, three-fifths or 60% of the non-navigable dams were at or below failing as well. The most concerning aspect of all of the district's non-navigable dams is that they are high hazard potential dams. Being a high hazard potential dam means that if a dam fails, the failure "will" result in the loss of life and property. Due to land development along every river's banks throughout the district, "which is dramatically increasing the consequences of failure,"²⁷ dam failure is a grave concern locally as well as nationally. Flood protection, like all the other benefits summarized, provide an overwhelming sense of urgency to fund dam maintenance to ensure economic prosperity and safety.

The economic benefits that the ORB and nation enjoy every year are a direct result of the infrastructure that is in place on the nation's rivers. Totaling all of the benefits within the ORB waterway system shows a gain of \$44 billion in business activity, a return of \$3 billion in taxes to the national treasury, and a \$3 billion savings in fuel and transportation costs. In addition, the operation of the waterway system positively effects the nation's environment, reduces traffic congestion on the nation's roads and saves the property and lives of numerous Americans thanks to flood control. Comparing these benefits and realized monetary gains and comparing them to the costs of maintaining the system easily shows that funding O&M is in the nation's best interest.

Costs and Analysis of the Cost to Benefit Ratio

Maintenance of any of the inland waterway infrastructure begins with the money designated to USACE in the annual appropriations approved by Congress. When the

President submits the annual budget request to Congress, there is a designation for USACE, separate from the Department of Defense. In order for USACE to do any maintenance work on any project, Congress must provide it “through [the] annual Energy and Water Development appropriations acts or supplemental appropriations acts.”²⁸ The approved appropriation is broken down into multiple subaccounts, with one of these being O&M. Money provided in the subaccount for O&M directly funds maintenance required on any project already completed. Since O&M money is not project specific, USACE breaks down the dollar amount each district receives based on the priority of work necessary.

At the district level, this translates into millions of dollars available for routine maintenance. “Between the years of 2007-2011, the average annual O&M budget for the Huntington district was \$88 million, while the range was from \$64.5M to \$98.7M.”²⁹ The extreme range of dollar amounts reflects the importance placed on maintenance by the Congress and the prioritization done at the USACE level. Both of these factors affect how much money a district receives in a single year. The district updates its funding requirements for maintenance annually, based on the total amount of work needed across the district. The cost of the amount of work is then spread out across a period of 10 years because most of the maintenance projects exceed a district’s entire year of O&M allocation. Therefore, the planned costs for the years 2013 to 2022 are compared to the average annual benefits based on FY11 dollars.

The current projected costs for dam maintenance between FY13 and FY22 is \$460 million and the projected costs for lock maintenance is \$390 million. Taking the average of this amount over a 10 year period requires Congress through USACE to

fund the district approximately \$46 million for dams and \$39 million for locks or \$85 million overall for maintenance. Based on the amount of benefits produced annually across the district (\$100 million in revenue generated for the federal government at recreational projects) compared to the average maintenance funds required (\$85 million), the net benefit to cost ratio is 1.15 to 1. The current acceptable cost to benefit ratio used by the federal government before funding any work is anything over 1. Based on the higher ratio of benefits to the lower cost to gain those benefits, it is appropriate for the federal government to fund the works at current requested levels. This funding can occur, but it must be a deliberate decision by congress to focus part of discretionary spending on the inland waterway system.

Problems Realized by Underfunding Required Work

Funding for operating, maintaining and repairing the inland waterways is considered discretionary federal spending. Based on the budget crisis in the summer of 2011, the Budget Control Act of 2011 mandated that \$917 billion in cuts be made from the discretionary portion of the federal budget over the years of 2012-2021. The Budget Control Act envisioned deeper cuts based on the lack of success of the Super Committee it established. It is expected that funding for critical infrastructure maintenance will be at best maintained at current levels, but more realistically it will be decreased. Any reduction below current levels means only critical work will be accomplished. This critical work may prevent catastrophic failures, but it is not enough to start the process of bringing the infrastructure to higher safety ratings than D. Maintaining a D level of safety risks the safety of those in the ORB and threatens the overall American economic system.

The continuing delay of required infrastructure maintenance is going to result in higher cost to fix problems in the future. This is like someone trying to get a bank loan to fund the repairs needed on their home. If they received a loan to buy all the doors one year, then the next year they received a loan to buy the windows and in the third year they got a loan to redo the roof, the amount of the loans over three years would exceed the amount of one single loan to do all the work at once. No one repairs a house by spreading the costs over multiple years, but based on current federal funding practices, this is how the Congress expects USACE to operate. Looking at future requirements versus planned allocations, before budget cutting, presents some stark predictions. The inability to perform programmed maintenance means that in the coming years, there exists the possibility of more unscheduled stoppages of river traffic. In 2009 alone, “river haulers lost nearly 80,000 [shipping] hours [due] to lock outages... up from 55,000 [lost] hours in 2005.”³⁰ Lock outages can cause havoc on the financial bottom line of the industries depending on river shipments. This havoc is a result of higher costs in materials shipped by river, higher costs for alternative shipping methods, and the possibility of worker layoffs because assembly lines stop production with no materials to make new products. Lock outages also affect consumers because the price for services and commodities rise as businesses seek to stabilize their bottom line. All of these higher costs and loss of employment are not localized to the economy within the district, but have an impact on national economy.

There are many other ways that reduced funding affects not only the infrastructure, but the benefits the infrastructure brings to the economy. As discussed earlier, the amount of jobs supported by the river and industry directly related to river

activity is 100,000 Americans. If Congress authorizes higher funding levels instead of maintaining the current funding level, levels of employment in the district would increase as additional work is made possible. This increased employment would result in direct, indirect and general economic benefits. Direct benefits are the workers hired to accomplish any maintenance, while the indirect benefits are the sale, movement, and use of materials in the work conducted and the general benefits are the increased economic activity in the basin. Dams and Locks are not small scale projects. Civil works projects of both the 1930s and the 1950s acted as catalyst to put thousands of Americans to work and raise the level of activity in the economy. This is an important benefit that Congress can make possible by fully funding the construction requirements.

The more critical benefit is the increase in safety of the shippers using the rivers and of the people living below flood control structures. A review of the aftermath of an accident at the Belleville Lock and Dam in December 2004 shows that the economy suffered greatly when dams and/or locks fail. Even though this failure was caused by human error, the result of several breakaway barges running into the dam, a failure due to a lack of maintenance would have the same result, possibly worse. In this accident, four barges struck the Belleville dam, severely damaging the structure, before sinking and disrupting the ability of the five water gates to close. The immediate result was a complete loss of the navigational pool, a depth normally maintained at 9 feet, for a 42 mile stretch of the Ohio River. Losing the navigational pool means shipping immediately stops as the depth of river cannot support any boat shipments. The inability to ship means all the loads that were moving along that section of river became “frustrated” cargo sitting idle in a shallow river. The subsequent impact to that 42 mile stretch of

river consisted of a “\$4.5 million economic loss...Major companies, such as General Electric, [closed] their plants and [laid] off workers until the river [reopened]...and individuals living along the river saw their property values drop.”³¹ Again, the situation surrounding this problem resulted from an accident, not a structural failure, but if it were a structural failure, the results most likely would be longer lasting than fixing the damage from an accident. Regardless, failure to fund maintenance at the required level is risking the safety and livelihood of those living along the river as well as risking damage to the national economy.

Conclusion

Positive congressional action by fully funding one or many required lock and dam maintenance projects must happen in the coming budget cycles. Failure to provide required funding means the infrastructure, not only in the Huntington District, but nationwide, will be strained further and further to meet the country’s economic expectations. The ORB is a national asset that is the backbone to the north central and northeastern United States. The infrastructure of this river supports national commerce, earns money for the government and protects almost 30% of the nation’s population from flood damage. As noted by the Inland Waterways Board, “To the extent that the Administration and Congress agree in the coming months to address the nation’s current or future economic challenges by providing additional Federal funding support for infrastructure, lock and dam modernization should be one category of infrastructure project receiving significant additional funding.”³² In fact, “if we’re smart, we won’t just avoid damaging cuts. We will even find a way to increase forms of discretionary

spending. As history has shown, economic growth remains the best deficit-reduction strategy of all.”³³

Endnotes

¹ Nicole T. Carter and John F. Frittelli, *Harbors and Inland Waterways: An Overview of Federal Financing* (Washington, DC: U.S. Library of Congress, Congressional Research Service, January 12, 2004), 1 <http://www.policyarchive.org/handle/10207/bitstreams/1911.pdf> (accessed January 24, 2012)

² Tim Parker, “We must invest in our waterways”, *Birmingham News Commentary*, February 27, 2011 http://blog.al.com/birmingham-news-commentary/2011/02/viewpoints_we_must_invest_in_o.html (accessed January 24, 2012)

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