

**The Workshop in Applied Earth Systems Management
Policy Analysis of H.R. 2864 Water Resources Development Act of 2006
Upper Mississippi River-Illinois Waterway Pre-Construction Planning**



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**Leanna Dakik, Julia Farber, Kumiko Fujita
Billy Gridley, Casey Hogan, Alison Lechowicz
Becky Myers, Liam Strain, and James Vener**

Faculty Advisor: Steven Cohen, PhD

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The Workshop in Applied Earth Systems Management policy analysis of the 2006 Water Resources Development Act (WRDA) examines this civil works bill in the context of environmental policy debates and priorities. The historical, scientific, and political context of WRDA provides the framework that defines the purpose and scope of the bill. To effectively highlight the environmental policy aspects of the legislation, analysis focuses on the Upper Mississippi River Illinois-Waterway components of the bill. The overall objective of this analysis is to design and prescribe a Dedicated Planning Unit to facilitate the preconstruction planning objectives for the first year implementation of the bill.

Background and Introduction

Creation of the Water Resources Development Act

The first version of the Water Resources Development Act (WRDA) was passed in 1974, and is intended to be re-authorized every two years. WRDAs are the nation's primary federal legislation authorizing water-related infrastructure development and they mandate a large portion of the projects under the umbrella of the Army Corps of Engineers (Corps) Civil Works Projects program. The WRDA of 1986 represented a landmark policy change reflecting a shift in the fiscal and management burden of the nation's water resources to local stakeholders and away from the federal government, as well as an explicit acknowledgement of environmental considerations¹. The legislation represents a general acknowledgement that non-federal interests must be responsible for a larger portion of the financial and management burdens of the environmental considerations that are intrinsic part of managing the nation's water resources².

While the WRDA of 1986 proposed the centrality of environmental considerations, it became clear that the fiscal component of this legislation was a primary concern, as it outlined a cost-sharing structure based on project category (e.g., new construction of hydroelectric power).

The non-federal stakeholders recognized that the language in the legislation concerning environmental considerations could be easily satisfied with little effort and cost. Controversy would build around the WRDA of 1986 and continued with the passage of each reauthorization, eventually leading to the six-year delay between the 2000 and 2006 versions of the bill.

The WRDA of 2006 highlights the significant environmental policy challenge of balancing environmental agendas and fiscal responsibility. The WRDA project implementation process is very complex. First, Congress authorizes the activity outlined in the WRDA and thereby "establishes a project's essential character" with the passage of the bill. The projects then face the appropriation process to determine the level of federal funding³. Once Congress authorizes a project, there is no guarantee that funding will follow, as the Office of Management and Budget disperses funds according the current Administration's priorities. In the last 15 years, authorizations have substantially outweighed appropriations so that a backlog of more than 500 authorized projects emerged without construction funding. The WRDA of 2006 was stalled due to the opposition of the Bush

¹ <http://chl.erdc.usace.army.mil/chl.aspx?p=s&a=WaterRelatedNews;1>

² Reuss, Marty. "Reshaping National Water Politics: The Emergence of the Water Resources Development Act of 1986" *USACE Institute for Water Resources*. IWR Policy Study 91-PS-1. October 1991. <http://www.usace.army.mil/publications/misc/91-ps-1/entire.pdf>

³ Carter, Nicole. "Water Resources Development Act (WRDA): Army Corps of Engineers Authorization Issues in the 109th Congress" *Congressional Issues Brief for Congress*. March 22, 2005.

Administration, which was afraid that the bill would provide a false sense of encouragement for the enormous number of projects proposed with authorized budgets of more than \$4 billion, federal spending is under tight scrutiny, environmental failures of past Corps projects have recently been under a microscope because of the Hurricane Katrina disaster, and there is a significant backlog of projects.

This is why this project is a simulated implementation plan – the actual bill will not be enacted in 2006.

Army Corps of Engineers Implementation

The Corps is the primary agency responsible for implementation of the WRDA. The Corps has a rich organizational history extending back to 1779 when the Continental Congress established a Corps of Engineers to help the Army construct and repair coastal fortifications.⁴ Its role in both military construction and civil works has expanded and evolved over time with perhaps its greatest legacy rooted in the nation's infrastructure: canals, river and roads, commercial routes from western farms to eastern markets, and military routes for troops and vessels.⁵ The Corps' role in protecting water resources has also evolved over time, and Congress gave the Corps the authority via Section 10 of the Rivers and Harbor Act of 1899 to regulate most kinds of obstructions to navigation, environmental hazards resulting from effluents, and all construction activities in national waters.⁶

Criticism of the negative environmental impacts due to Corps activities grew in the 1970s against the backdrop of significant environmental legislation passage such as the Clean Water Act of 1977 and deteriorating water resources infrastructure built during the Great Depression of the 1930's. The WRDA of 1986 signaled several major changes in national policy toward water resources planning: increases in transport taxes to help fund new projects; non-federal interests were required to shoulder a greater proportion of financial and management burdens; and environmental considerations were made to be central to water resource planning.⁷ The WRDA of 1986 also formally recognized the impact of the Corps' traditional activities on environmental resources. The new relative emphasis on the environment along with the Corps' statutory environmental responsibility sowed the seeds for their growing role in the constellation of federal agencies with environmental management responsibilities. In fact, many of the Corps' current projects involve the mitigation of sites degraded by previous Corps operations like the construction of dams and the straightening of rivers.

Political and Scientific Context of the WRDA

The Corps has recently been the target of criticism and there has been a call for reform due to a lack of transparency in the planning process, poor project prioritization, the absence of peer review, and their backlog of projects. Competing versions of the 2006 WRDA have been passed by each chamber of Congress. The legislation is currently in the Environment and Public Works committee of the US Senate where a joint committee from each chamber will create a compromise version.

An amendment to the legislation was proposed by Senators McCain and Feingold to incorporate peer review and transparency into the procedures of the Corps. The amendment also called for an independent review process for any project over \$40 million dollars or for smaller projects upon request

⁴ US Army Corps of Engineers: Brief History, Chapter 1. Accessed November 20, 2006.
<http://www.hq.usace.army.mil/history/brief.htm>.

⁵ Ibid., Chapter 2.

⁶ Ibid., Chapter 12.

⁷ Ibid., Chapter 13.

of the local governors. The McCain-Feingold Amendment is a moderate version of a prior amendment to the legislation. The prior amendment called for both the peer review but also the idea of prioritization of projects. This amendment is dovetailed into one version of the legislation, S. 2288, proposed by Senator Feingold and addresses this idea of Corps reform.

A wide spectrum of stakeholders including environmental groups, local and federal agencies, and taxpayer responsibility groups favor the McCain-Feingold amendment, as does the Bush Administration. The White House's position, however, is that the Corps should adhere to its primary focus of infrastructure building rather than concentrating on environmental improvements. The Administration also supports the cost-sharing initiatives in the amendment that mandate non-federal funding responsibilities.

The WRDA of 2006 consists of a dual-purpose agenda where consideration is paid to both environmental improvements and the economy of infrastructure projects. In addition, environmental advocacy groups believe the Corps must address projects such as pollution control and storm surge protection as economic components of their infrastructure projects because of the significant economic impacts that result if these environmental challenges are ignored. In general, the addition of environmental aspects to the legislation marks a step toward a more comprehensive focus for the Corps.

Analysis Focus: Upper Mississippi River Illinois-Waterway

Science of the Problem

Each version of the WRDA is an expansive checklist of congressional district project demands that does not directly reflect a multi-dimensional environmental policy. To effectively address the challenge to inject environmental policy into the Civil Works Program, our Workshop team chose to focus our analysis on the Upper Mississippi River-Illinois Waterway section of the bill. The Upper Mississippi River-Illinois Waterway component of the WRDA is an appealing subject for environmental policy analysis because the national economic interests of navigation have dominated the water resources in this area, and the infrastructure practices that facilitated commerce on the Mississippi River and Illinois Waterway have effectively degraded the river ecosystem.

The major navigation projects involved in the Upper Mississippi River-Illinois Waterway are subject to controversy. Proponents of the navigation and infrastructure projects in the Upper Mississippi River-Illinois Waterway argue that barge transportation is the cheapest method of transporting agricultural goods and the best method to keep the farmers of the region competitive; while other stakeholders, however, fear these same projects are causing irreversible environmental degradation, and that the economic necessity of these projects is overstated. The dual purpose of the Corps (i.e., to protect water resources while preserving the environment) has been challenged from both sides of the issue because of these concerns. The 2006 WRDA attempts to settle the debate by authorizing the research, planning, and implementation of water infrastructure and ecosystem projects across the nation.

The ecosystem of the Upper Mississippi River-Illinois Waterway is a river dominated by a 670-mile system of locks, dams, pools, and a 9-foot deep channel designed to host water transportation of goods along the waterway. Water transportation and navigation is a crucial economic interest throughout the region and challenges environmental resource interests. The ecological health of the river system is directly affected by pollution from barge traffic, impeded or prevented movement ability of some species, and changes of temperature and oxygen concentrations in the water.

The river/waterway is home to almost 500 species, 10 of which are listed as federally endangered. This area is also a crucial migration corridor for nearly half the country's waterfowl and

shorebirds, and there are four wildlife refuges and three national parks along the waterway. The Congressional Research Service asserts the entire ecosystem is declining due to navigational component of the waterway⁸. Many compromised ecosystem services of the area produce decreased benefits to humans because of the shipping industry. For example, the water supplies (i.e., municipal, groundwater, and industrial) and source of agricultural irrigation are declining in quality and quantity. The commercial activities of navigation and transportation, the generation of hydroelectric power, and agriculture (from a loss of nutrients in the soil), will also suffer as will broader ecological functions that will decrease such as waste assimilation, viability of wildlife populations, the moderation of climate, and carbon sequestration.

The WRDA is intended to improve 700,000 acres of habitat along this river and waterway corridor. WRDA aims to monitor and improve the conditions leading to erosion, sedimentation, and species' health. The difficulties the program faces include the scope and measurements of success for these stated goals because measuring and monitoring ecosystem health is inherently complex. Another limitation is the restriction of mitigation activities along the navigation channel, not the whole watershed area. This will likely result in only a limited effect on the broader ecosystem problems.

Navigation channel traffic and maintenance causes environmental degradation by several mechanisms including deep and fast-moving water resulting in erosion and a lack of sedimentation, sediment dredging reduces soil quality, locks and dams decrease pathways for use by wildlife, barges and other vessels pose dangers for wildlife, and chemicals emitted by vessels reduce water quality. These sources of ecosystem degradation are not anticipated to be curbed substantially via the WRDA and small-scale improvement projects may not make a significant difference in overall ecosystem health. Additionally, the Corps is following its mandate of "no net loss," which means that if an area must be destroyed to build infrastructure, an area of comparable acreage must be restored and set aside elsewhere. Scientists and advocates disagree on the benefits of the no net loss policy. Some scientists point out that this may potentially do little to maintain the overall health of the environment while others question the viability of artificially created wetlands where they have not existed before. This is the crux of the issue of using "mitigation" as opposed to "restoration."⁹

The WRDA authorizes projects to meet the urgent needs of water infrastructure maintenance and development, including research, pre-construction, and construction of infrastructure projects such as dam and lock construction and maintenance, and channel dredging. The implementation of the 2006 version of the bill is estimated to cost over \$10 billion over a span of 50 years, and \$3.5 billion over the first 15-year increment.

Proposed Solutions

The WRDA mandates components of performance management for the environmental aspects of the bill that will be enacted over the 50-year lifecycle of the Upper Mississippi River-Illinois Waterway program. The ecological improvements will be reviewed by an independent technical committee that will act as peer review for the projects, the US Fish and Wildlife and US Geological Survey will conduct scientific monitoring, and then the Corps will address changes in the condition of the ecosystem in internal planning circulars thus implementing adaptive management. Bi-annual report cards will also be generated as a measure of internal review for ecosystem restoration progress.

⁸ Carter, Nicole, et al. CRS Report for Congress. Water Resources Development Act (WRDA): Corps of Engineers Authorization Issues." July 14, 2006.

⁹ Mitsch, William and Wilson, Renee. "Improving the Success of Wetland Creation and Restoration with Know-How, Time, and Self-Design (in Wetland Mitigation)." *Ecological Applications* 6:1. February 1996. 77-83.

Adaptive management was introduced in the 2000 version of the WRDA as a new component of project management. Ecosystem science is relatively young and many unknowns impact the management of restoration projects, and adaptive management is one method used to overcome this problem. Adaptive management periodically identifies uncertainties and then scientifically tests hypotheses in the field to gain more knowledge. This is an ongoing process that will likely lead to changing priorities over time as more and more functioning of the ecosystem is understood.

The Corps is charged with balancing the ecological functioning of the waterway with the economic demands on the system. The Corps must track the congestion of barges on the river to ensure that the economic livelihood of agricultural industry is not disrupted while maintaining the habitat of endangered species, the viability of fisheries, and protection of the slow-paced hydrology. Because the watershed is so large the Army Corps Environmental Management Program has developed multi-level goals to drive the restoration process. The broadest goal is the sustainability of the system with the component pieces of economic and ecological longevity. More specific goals include rehabilitating and protecting ecosystem drivers such as wildlife habitat and natural hydrology.

According to the Corps' 2004 Feasibility Report, the Corps sedimentation and floodplain development are the primary stressors in the Upper Mississippi River-Illinois Waterway system¹⁰. Ecological indicators for these processes must therefore be monitored more closely than other stressors. The Corps is currently working as a part of the inter-agency Navigation and Ecosystem Sustainability Program (NESP) Science Panel to assess the ecological indicators associated with the restoration projects. The panel has developed a comprehensive list of restoration objectives, criteria, indicators, and analysis models that assess ecosystem well being according to measures such as water quality. The NESP Science Panel also recognizes the adaptive management mandate, and has systematically reviewed the current scientific definitions of ecosystem functioning.

The NESP Science Panel acknowledged aspects of the science that need to be better developed if informed and efficient management actions are taken to restore and create healthy ecosystems. The 2004 Feasibility Report set guidelines for the Corps requiring a peer-reviewed, evaluation report be sent to the Administration and Congress every six years. This report will document the current market conditions and traffic patterns in the region as well as whether or not construction projects remain feasible. In addition, the statement made by the Feasibility Report allows Congress to halt construction if projects fail to be cost effective or not proceeding as planned. This component of review in the legislation was a direct response to recent criticism and refining the process led to the delay of the WRDA's passage¹¹.

First-Year WRDA Implementation

Traditional Army Corps of Engineers Organization

The Corps is a large and complex organization with 35,250 personnel, of whom 650 are military and the balance are civilians. The Corps has both domestic and foreign offices. The Headquarters and Executive Office are located in Washington D.C. Headquarters operations are responsible for: developing key relationships with other Federal agencies; promulgating policies across the spectrum of Corps operations; integrating and coordinating mission execution; and securing requisite resources to

¹⁰ US Army Corps of Engineers. "Final Integrated Feasibility Report and Programmatic Environmental Impact Statement for the UMR-IWW System Navigation Feasibility Study." September 24, 2004.

¹¹ US Army Corps of Engineers. "2004 Report to Congress: Upper Mississippi River System Environmental Management Program." August 2, 2004.

fulfill its mission.¹² The Corps also relies heavily upon the private sector personnel services for up to 58% of its workload.¹³

The Corps is divided into seven divisions nationally, one of which is the Mississippi Valley Division with regional headquarters in Vicksburg, Mississippi. The Mississippi Valley division is, in turn, composed of six districts: St. Paul's, Rock Island, St. Louis, Memphis, Vicksburg and New Orleans, with the Upper Mississippi area being located in the first three districts. The Corps' proposed Upper Mississippi River-Illinois Waterway Organizational Chart is provided in Appendix 1, which was used as a basis of the Dedicated Planning Unit (in addition to ECO-CX). A map of the area, which includes habitat rehabilitation and enhancement projects as of 1994, is included as Appendix 2. In the three Upper Mississippi River districts there are 2,275 employees; approximately 50 percent in the district headquarters and 50 percent in the field.¹⁴

In the Upper Mississippi River-Illinois Waterway component of the WRDA, environmental projects are designated by category such as bank erosion, backwater restoration, cultural resources management, dam point control, fish passage, forestry management, floodplain connectivity and restoration, monitoring, island/shoreline protection, island building, side channel restoration, site-specific locks, topographic diversity, water level management, and wing dam/dike alteration. Specific internal or external personnel expertise is required for different categories of the projects. Expertise from the larger organization is sourced on an as-needed basis to staff the projects.

The Corps generally structure its activities by dividing them into three broad categories: Investigations, Construction, and Operation & Maintenance. Investigations include surveys, feasibility studies, hydrological studies, field data collection, planning assistance to states, and pre-construction program design and planning. Presently, the Corps is completing the Investigation phase of WRDA implementation and is in a stage known as Preconstruction, Engineering, and Design in which planning is finalized before construction begins. Construction mainly includes the actual planned water infrastructure construction work. Operations & Maintenance include day-to-day activities such as lock and dam operation, dredging, maintenance of unimpeded waterways, water level management, etc. Other activities include on-going activities like the regulatory compliance and flood control, as well as general flood control, coastal emergency response, and non-Civil Works military programs.

Environmental Management Program and Structure

One of the on-going activities of the Corps in the Upper Mississippi River-Illinois Waterway is the existing Environmental Management Program. Established in Section 1103 of the WRDA of 1986, the Environmental Management Program is on-going, specifically dedicated to the river basin, and is administered by the Rock Island District. The Environmental Management Program consists of two main parts: Habitat Restoration and Enhancement Projects and the Long Term Resource Management Program.

The Habitat Restoration and Enhancement Project component is dedicated "to improving fish and wildlife habitat," and "to implementing and refining construction techniques for the same purpose."¹⁵ The Long Term Resource Management Program component "combines environmental

¹² <http://www.hq.usace.mil/hqhome/>

¹³ US Army Corps of Engineers. "Strategic Management of Human Capital in the U.S. Army Corps of Engineers. Figure 2-6. September 2002.

¹⁴ US Army Corps of Engineers. "Strategic Management of Human Capital in the U.S. Army Corps of Engineers. September 2002. p. 15.

¹⁵ US Army Corps of Engineers, Rock Island District. "2004 Report to Congress: Upper Mississippi Environmental Management Program." August 2, 2004. p. vii.

monitoring, research, and modeling with data management and dissemination to provide information and insight needed by river managers.”¹⁶ Both components of EMP have received continuing funding with most recent 1999 WRDA authorizations at \$22.75 million and \$10.42 million per year, respectively.¹⁷

In the Environmental Management Program, the Corps is responsible for project management and execution. However, it is a true partnership program with designated roles for individual Federal and State Agencies, including lead roles for US Fish and Wildlife Service, US Geological Survey, and state resource agencies. Although the Corps' portion of the Environmental Management Program is completely federally funded, other state-funded and state-run programs outside of the main 9-foot deep river channel are closely coordinated with the program's activities. The total area of federal improved river habitat since 1986 totals approximately 67,000 acres over 40 completed projects. As of 2003, there were 24 additional projects in various stages of design or under construction that will affect another 72,000 acres.¹⁸

The Corps delegates or contracts out almost all of the direct environmental work (with the exception of an emergency response crew), while retaining control of planning and management. The new WRDA elected not to use the Environmental Management Program organizational structure and there are a number of implications when failing to inject these new activities into this program: the Environmental Management Program addresses long-term habitat and environmental mitigation in coordination with other state programs; the dual-purpose nature of WRDA requires close coordination between new navigation and environmental activities; and the Corps needs to further develop its own environmental expertise.

Civil Works Program Actions under the WRDA

Once the bill passes and Congress authorizes the overall Upper Mississippi River-Illinois Waterway project, funding will be appropriated via the annual appropriation process of the executive and legislative branches, and then disbursed via the Office of Management and Budget. There is a significant backlog of water resources projects authorized by previous WRDAs, and because there are many projects competing for actual appropriation within the current WRDA, there is considerable uncertainty as to the timing of funding for individual Upper Mississippi River-Illinois Waterway projects. Therefore, a flexible planning and implementation framework is necessary, one that can handle a workload of varying size over varying time horizons.

The new and enlarged environmental responsibilities assigned to the Corps by the WRDA legislative mandate necessitate internal development and refinement of skills, knowledge, and organization capacity in the environmental arena. Although the Corps possesses some environmental expertise, in the past it has relied upon other agencies and/or contractors to either provide requisite expertise and/or to coordinate the day-to-day operations of entire environmental programs. To support dual purpose planning in the future and a general shift to dealing with water resources in a watershed context, the Corps needs to develop its own environmental expertise and capacity.

Upon passage of the bill in Congress, the first year of the Upper Mississippi River-Illinois Waterway project will be entirely devoted to planning. The final deliverable for the first year of

¹⁶ US Army Corps of Engineers, Rock Island District. "2004 Report to Congress: Upper Mississippi Environmental Management Program." August 2, 2004. p. viii.

¹⁷ Ibid., p. 5.

¹⁸ Ibid., p. 11.

planning will be to create a durable and on-going organizational structure for implementation of the Upper Mississippi River-Illinois Waterway WRDA projects.

ECO-CX Organizational Structure

In 2003, the Corp's Director of Civil Works established several National Ecosystem Centers of Expertise or ECO-CX centers to “conduct larger, complex planning studies for inland navigation, deep-draft navigation, ecosystem restoration, water supply, and flood damage reduction,” one of which was located in the Upper Mississippi River area.¹⁹ Designed to serve the Corps at both the national and international level, the group was intended to serve as “a clearinghouse for ecosystem restoration needs, interacting with project delivery teams and matching needs with resources” and “to develop, maintain and apply the best and most appropriate national and regional expertise and science and engineering technology to the planning of ecosystem restoration projects.”²⁰

The ECO-CX center is currently used exclusively in the Investigation phase of Corps work, specifically for surveys and feasibility studies. As is the case for the Environmental Management Program, neither the WRDA of 2006 nor the 2004 Feasibility Report specifies use of this regional ECO-CX organization in NESP project planning and implementation.

This Workshop analysis focuses on the first-year pre-construction phase of the Upper Mississippi River-Illinois Waterway and relates project tasks to funding by attaching costs to products. The organizational chart for first-year implementation is based on the ECO-CX organizational model. The organizational structure for first-year implementation of the WRDA is provided as Appendix 3.

Although neither the original bill nor the 2004 Feasibility Report specified new organizational requirements for WRDA implementation, and although neither Corps documents nor conversations and interviews with Corps personnel indicated recognition of the need for such a central planning unit, we strongly believe that a new organizational structure is required. The proposed ECO-CX-based model will provide the Corps with an internal structure in which its own ecological experts can take ownership and manage the ecological work.

Dedicated Planning Unit Organization

The Dedicated Planning Unit will consist of the Office of the Director, followed by Core Planning and Design Team, and finally the Virtual Environmental Team. The Office of the Director will provide top-level program management and will make certain national interests are in line with those in the Upper Mississippi River-Illinois Waterway area. The Core Planning and Design Team provides management, engineering, and general environmental expertise. The Virtual Environmental Team is designed to provide specific scientific expertise in this planning stage. The Virtual Environmental Team will be readdressed and redesigned as the planning progresses and new questions relying on scientific expertise arise.

The executive group, known formally as the Office of the Director, is composed five full-time employees: a Program Director, a Deputy Director, an Administrative Coordinator and two Administrative Assistants. The Office of the Director is responsible for: assembling the planning and environmental groups from personnel within the organization or from the private sector; administering and managing the Upper Mississippi River-Illinois Waterway planning unit; setting and adhering to the

¹⁹ US Army Corps of Engineers, Mississippi Valley Division. "National Ecosystem Center of Expertise (ECO-CX): Program Management Plan, p. 1.

²⁰ Ibid., p. 2.

unit budget; coordinating activities with the three partner District Headquarters (St. Paul's Rock, Rock Island, and St. Louis); reporting to regional and national headquarters; and overseeing any and all required unit management functions. Most importantly the Office of the Director is responsible for overseeing the production of a second-year workplan for the overall Upper Mississippi River-Illinois Waterway project.

The planning group, known formally as the Core Planning and Design Team is composed of 13 full-time and part-time employees which fall into five categories: program management and coordination, district representation, engineering, environmental experts, and administrative support. Program management includes a Program Manager and a Program Coordinator. District representation includes the District Managers of the three Upper Mississippi River Illinois Waterway districts on a part-time basis. Engineering includes three engineers, one from each of the three districts. Environmental expertise will come from three environmental experts, one from each of the three districts. Administrative support includes two administrative assistants who serve the entire Core Planning and Design Team. The Core Planning and Design Team is responsible for all facets of routine planning, including all overview planning, permitting, sequencing, and liaising with navigation project engineers. The second-year workplan is the major product for Core Planning and Design Team: this workplan will lay out activities in the Construction phase for projects appropriated and prioritized in the first year.

The environmental group, known as the Virtual Environment Team, is composed of 11 full-time and part-time employees in various categories. This team will call upon professionals across the Corps organization wherever they are located. Members of the team will include representatives of different scientific, ecological and technological disciplines, including botany, data modeling, environmental engineering, geomorphology, hydrology, meteorology, toxicology, and other required fields. The team is responsible for: review of the environmental restoration parameters set out in project feasibility studies; responding to Core Planning and Design Team requests for information relating to their planning efforts for the first year workplan; and liaising with peer review panels. An administrative assistant will support the group. This team is not specifically responsible for the first-year workplan.

The three groups total 29 full-time and part-time personnel. Although small in relation to overall Corps and relevant District staffing levels, the unit is intended to provide a locus of expertise and organization which will allow the Upper Mississippi River-Illinois Waterway program to start its first year on a sound basis, and to produce a robust first-year program workplan.

First-Year Dedicated Planning Unit Tasks

The ECO-CX developed a program management plan defining the necessary components of ecosystem project implementation in the Upper Mississippi River-Illinois Waterway region: responsibilities, organization, lines of authority and communication, membership, and schedules. In essence, this is a formalized project planning structure.

In the first year, the work will aim to organize and plan the construction of environmental and navigation projects to be implemented in the near future contingent on funding allocation from the Office of Management and Budget. This planning stage relies on the leadership of program managers, planners and environmental specialists from both in-house and contracted sources. We recommend that a *Dedicated Planning Unit* be established to oversee and coordinate the first year of Upper Mississippi River-Illinois Waterway implementation under the WRDA of 2006. The ECO-CX framework is tight and simple, and it follows the blueprint of an existing Corps organization with Corps matrix principles. We suggest it be located in Mississippi Valley Division Headquarters in Vicksburg, Mississippi.

Some internal planning has been on-going in anticipation of enactment of the bill and eventual appropriation of funds. However, major planning in the Preconstruction, Engineering, and Design phase has yet to be initiated since it requires new funding and additional staff. Once planning does begin, particular attention needs to be devoted to organizational structure at this stage in the Corps history for two main reasons: the Upper Mississippi River-Illinois Waterway program is very large; and the program is very high-profile because of the recent criticisms of the Corps' historic approach to environmental activities^{21,22}. The following are principle components of the first-year planning operations that will address some of these major criticisms:

- Gap Analysis. In the first year, aside from traditional pre-construction planning for the myriad combination of projects that may be appropriated in the early years after bill passage, the Corps should examine both its overall and regional Upper Mississippi River-Illinois Waterway organizational capacity through a management consultant lens. Firstly, it should conduct a gap analysis, which is a study of existing and required environmental capacity.
- Dual Policy Planning Capability. Secondly, the Corps should examine whether its planning and implementation structure needs to be modified, given the likelihood that most new infrastructure projects will be accompanied by simultaneous companion environmental mitigation projects. It should examine its dual policy planning and implementation capability, where navigation and environmental projects are carried out in tandem, and where environmental projects are subject to the new principles of adaptive management which may result in mid-stream plan correction.
- Project Prioritization. Finally, the Corps should devote some resources to consideration of project prioritization. For example, when funding comes, which projects should be prioritized? What is the right sequence in terms of navigation and environmental goals? What if those priorities conflict? How are they going to work effectively with navigation engineers and planners whose historic priorities and mindset have differed substantively from those of environmental planners?

These three special planning elements will be performed by the Core Planning and Design Team and overseen by the Office of the Director. The Virtual Environment Team will participate substantially in the Gap Analysis study to be performed by the external consultant, and will be an integral part of the two other special studies.

These three projects will help the Corps adapt its organization to the new challenge of large, long-term dual-purpose projects and to the broader modalities of watershed-based ecological management. For example, the 'dead zones' in the Gulf of Mexico are the result of nutrient loading due to agriculture runoff, in part, from the Upper Mississippi River-Illinois Waterway. Flooding downstream is partly a function of wetland integrity and loss upstream. The watershed is an integrated physical reality and the Corps needs to link its projects and develop new environmental expertise. This requires fresh thinking and a dedicated planning effort.

The three special planning elements will be structured as consultant studies to be performed in the first year. We recommend that an external consultant be retained to help perform the Gap Analysis in conjunction with members of the dedicated planning unit. We suggest that the Dual Policy Planning capability and Project Prioritization studies be pursued by members of the Dedicated Planning Unit,

²¹ National Academy of Sciences. "Compensating for Wetland Losses Under the Clean Water Act". Washington, DC: National Academy Press. 2001.

²² United States. General Accounting Office. "Wetlands Protection: Assessments Needed to Determine Effectiveness of In-Lieu-Fee Mitigation". Washington, DC. 2001.

drawing upon a variety of internal personnel and resources. In addition to the three special studies, the new organization will examine multiple other practical requirements of the Pre-construction, Engineering, and Construction phase.

A dedicated first-year planning effort will be a good investment for the Corps because the scope of the WRDA is so large with an Upper Mississippi River-Illinois Waterway program spanning 15 years and with a price tag of \$1.58 billion. Assembling the right organization capacity and ensuring that the planning process can adequately address challenges is an appropriate and central part of first year work that will result in swifter completion and likely less expenditure in the long-run. In addition, paying extra attention to ecosystem health in Civil Works projects will result in less environmental mitigation required in years to come.

Program Budget

Expenditures for the first year of planning will be allocated for staffing the administrative, public relations, navigation and ecosystem restoration planners, and health and safety functions of the WRDA. The budget allocates funding for an operational structure that facilitates crucial communication in this project pre-construction, engineering, and design phase.

The budget consists of two separate and integrated documents outlining the expenditures for both personnel and comprehensive costs (see Appendices 4 and 5, respectively). The budget document is based upon the guidelines presented by the ECO-CX Program Management Plan developed by the Army Corps of Engineers in 2004²³. The budget for the first year Dedicated Planning Unit development consists of two separate and integrated documents outlining the expenditures for both personnel and comprehensive costs.

Personnel are allocated portions of the budget for varying levels of employment from part to full time from the General Schedule GS-8 to GS-15 pay scale. In addition, funding is allocated to "Other than Personnel" expenditures such as communications, information technology, premises, research services, supplies, and travel. Funding is also provided for management overhead and the extension of personnel such as fringe benefits.

Personnel Expenditures

Personnel base salary costs were calculated using the 2006 General Schedule (GS) scale from the US Office of Personnel.²⁴ Having specified personnel functions, and having made reasonable assumptions about the appropriate grade for each function (e.g. GS-15 for the Director; e.g. GS-6 for the Virtual Environmental Team Administrative Assistant), it was assumed that all personnel were Step 5 on the Step scale of 1 to 10, and that all personnel were in a generic location. When the personnel are actually hired and their location change, if any, is known, salaries can be adjusted to the appropriate location. Each of the personnel was assigned a full-time equivalent factor or FTE from 0.20 to 1.0, being the estimated amount of time the employee will devote to Dedicated Planning Unit activities. Whereas there are 29 employee functions specified and costed, the FTE total for the Dedicated Planning Unit is 20.6 people.

²³ US Army Corps of Engineers, Mississippi Valley Division. "National Ecosystem Center of Expertise (ECO-CX): Program Management Plan.

²⁴ US Office of Personnel 2006 General Schedule (Base) Annual Rate Pay Table.
<<http://www.opm.gov/oca/06tables/indexGS.asp>>.

Other personnel services were calculated using a 18.75 percent of base salary Benefits multiplier, and allowing for a Relocation Allowance of a maximum of 25 percent of base salary for 4 of 29 employees under the assumption that the Office of the Director Program Director and Deputy Director, as well as the Core Planning and Development Team Program Manager and Program Coordinator, may have to relocate. To the degree more employees need to relocate, funds can be obtained from a Budget Contingency Fund (see the Other-Than-Personnel Services section below). Personnel Services total costs were the sum of Personnel Services Base Salaries plus Benefits plus Relocation Allowance.

Other-Than-Personnel Services

Other-Than-Personnel Services was calculated on the basis of six general expense categories: Communications, Information Technology, Premises, Research Services, Supplies and Travel. Using reasonable assumptions for each category (from a low of \$500 per year per FTE for Research Services to a high of \$15,000 per year per FTE for Premises), total Other-Than-Personnel Services were calculated.

In recognition that the Dedicated Planning Unit would need to call upon other organizational functions and services (e.g. Finance, Health and Safety, Legal, Public Affairs, etc.), a General Overhead Allocation or GOA was calculated using a charge of 4.5 percent of the sum of Personnel Services and Other-Than-Personnel Services.

The costs of the three special studies were specified as single line-items sums. In the first quarter of the first year, the Office of the Director in conjunction with the Core Planning and Design Team will create budgets for the three special studies. The external consultant for the Gap Analysis study will be hired from the roster of Corps-approved contractors for a single lump sum. In all three special studies, to the degree Dedicated Planning Unit and other Corps personnel are utilized, they will be charged on an FTE basis to the appropriate study.

Lastly, the first year Dedicated Planning Unit budget has one additional component: a single line-item Contingency Fund to be used as appropriate to cover cost overruns in any of the major categories. The total cost of the first year Dedicated Planning Unit will be financed by charging in their first year all appropriated Environmental Projects according to their relative percent of the first year appropriation.

Itemized Budget

As shown in Table 1, the first-year budget for the Dedicated Planning Unit calls for a total expenditure of \$4.02 million.

Table 1: 2007 Comprehensive Budget; ECO-CX Upper Mississippi River-Illinois Waterway Environmental Dedicated Planning Unit

Budget Category	Cost	Budget % EX Projects	Budget %
Personnel Services	\$1,426,099	59%	35%
Other Than Personnel Services	\$576,800	24%	14%
General Overhead Allocation	\$70,101	3%	2%
3 Special Projects	\$1,600,000	0%	40%
Contingency	\$350,000	14%	9%
Total Excluding Special Projects	\$2,423,001	0%	0%
Total Including Special Projects	\$4,023,001	100%	100%

Strictly defined personnel costs (Personnel Services plus Other Than Personnel Services) are the major components of the budget at 35 percent and 14 percent respectively. The Special Project costs themselves (40 percent) are also highly dependent upon personnel costs (internal and external).

Master Calendar

The final deliverable for this analysis of first year of pre-construction planning is a Master Calendar that conveys the program goals, the timetables to reach each objective. Logistics are carefully considered and acknowledged in this first year of planning to promote productivity. The Master Calendar serves as a check on program feasibility as it is designed as a somewhat flexible reference that can reflect the unforeseen challenges as the Dedicated Planning Unit comes across them. The Master Calendar's main components outline the process of staffing, budgeting, refining program specifications, and project requirements through a master list of individually defined tasks. Incorporated into the calendar are quarterly meetings that will be used to gauge program progress and provide a time for internal auditing; and midterm reports will be submitted for third party peer review. The full master calendar is included in the Appendix 6.

Conclusion

The 2006 WRDA has explicitly incorporated environmental policy into a traditionally commerce-driven piece of legislation. In order to implement the WRDA over the first year in the Upper Mississippi River-Illinois Waterway, a Dedicated Planning Unit will be established to perform a gap analysis, dual purpose planning, and project prioritization while creating an environmental planning capacity that the Corps has been historically lacking. The current ECO-CX organizational structure is an appropriate model for the first-year dedicated planning unit. It is tight and simple, follows the blueprint of an existing Corps organization, and utilizes the Corps matrix principles. We suggest it be located in Vicksburg, Mississippi at the Mississippi Valley Division Headquarters. The final deliverable after the first year will be a framework for program management that, going forward, will be used by the Corps to direct WRDA projects that receive Administration and Office of Management and Budget money dispersal.

While the WRDA now acknowledges the importance of assessing environmental impacts, the actual projects do little to address the large-scale problems that have been a direct result of the infrastructure and navigation efforts assigned to the Corps, nor does it do much to deal with the wide

array of environmental damages on the Upper Mississippi River-Illinois Waterway ecosystem that have their source much further inland in the vast watershed. Incorporating the new organizational Dedicated Planning Unit defined in this analysis is a first step in expanding the application of the bill to truly address the environmental concerns acknowledged in this new version of the bill.

Appendix 1: Army Corps of Engineers Proposed Upper Mississippi River Organizational Structure

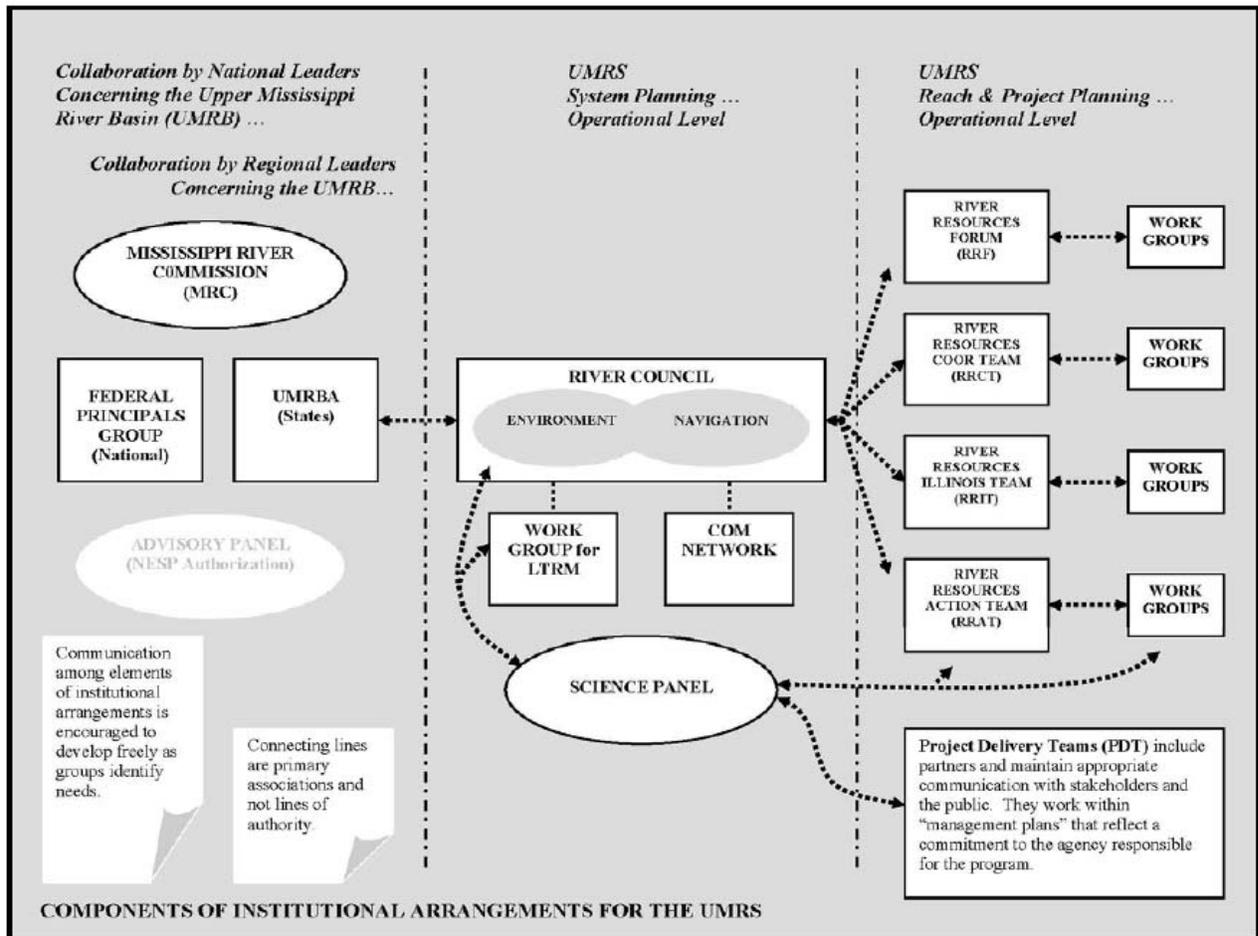


Figure 2. Proposed Upper Mississippi River institutional arrangements. The Science Panel is adjunct to and available to all partners.

Source: US Army Corps of Engineers. "Strategic Management of Human Capital in the US Army Corps of Engineers. Figure 2-6. September 2002.

Appendix 2: Environmental Management Program in the Upper Mississippi River System

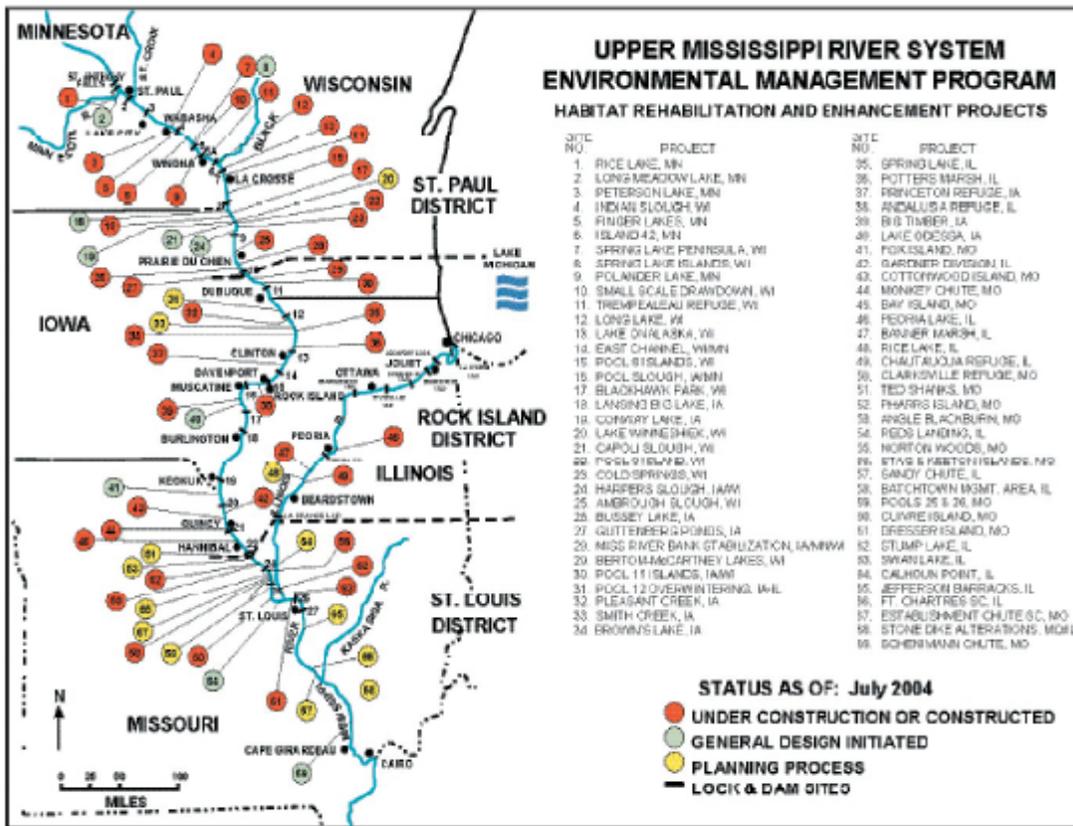


Figure 2-1. Upper Mississippi River System Habitat Rehabilitation and Enhancement Projects (Pool 8 Islands listed as three separate projects in Table 2-1).

Source: US Army Corps of Engineers, Rock Island District. "2004 Report to Congress: Upper Mississippi Environmental Management Program." p. 14.

Appendix 3: Dedicated Planning Unit Organizational Structure

