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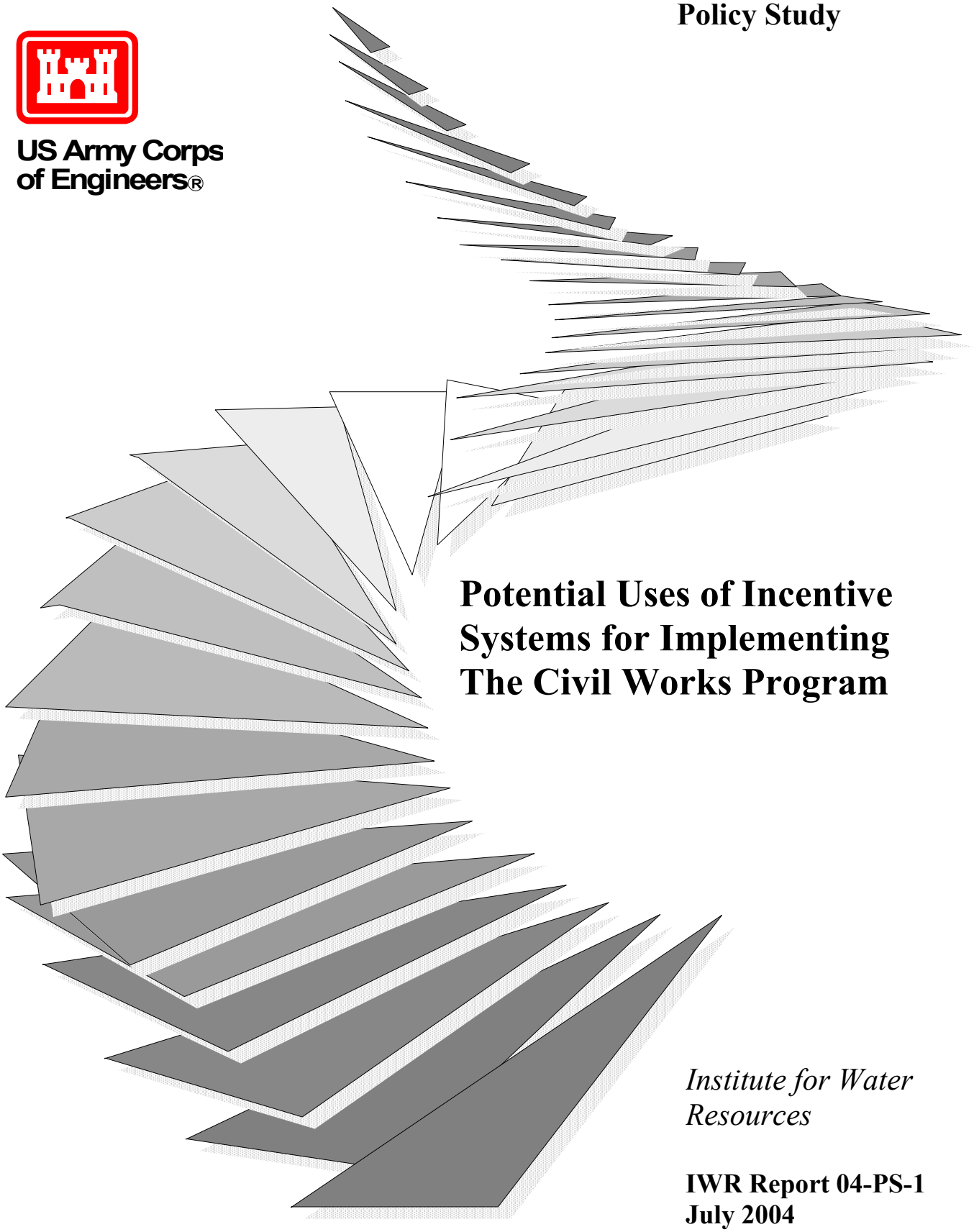

Potential Uses of Incentive Systems for Implementing The Civil Works Program

Institute for Water Resources

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POTENTIAL USES OF INCENTIVE SYSTEMS FOR IMPLEMENTING THE CIVIL WORKS PROGRAM

Prepared by

Paul Scodari

Institute for Water Resources
U.S. Army Corps of Engineers
Alexandria, VA 22315-3868

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EXECUTIVE SUMMARY

This report presents a characterization and preliminary assessment of the potential for using incentive systems to help implement the Civil Works Program. That program, which is administered by the U.S. Army Corps of Engineers (Corps), provides and maintains a wide variety of water-related services for the public. As the term is used here, incentive systems refer to tools and actions that expose the delivery and use of Civil Works services to the competitive incentives of the commercial marketplace. Two broad types of incentive systems are considered:

- Operational changes—Adoption of market-based principles and tools for service delivery and use within existing Corps ownership and management regimes (e.g., market-based pricing and cost accounting for hydroelectric power operations), and;
- Privatization—Transfer of functions, in whole or part, from the Corps to the private sector (e.g., divestiture of hydroelectric power assets and operations).

The study approach involved the analysis of both general and specific opportunities for using incentive systems in the Civil Works Program. The former focuses on a largely descriptive analysis of current executive branch initiatives to investigate and consider possibilities for privatizing the broad range of Civil Works functions. The latter focuses on the analysis of opportunities for using incentive systems to address recognized problems relating to specific Civil Works missions. Specifically, the study identified and examined potential incentive-based options for:

1. Reducing inefficiencies in the generation and marketing of hydroelectric power from Corps projects.
2. Increasing the supply and quality of wetlands compensatory mitigation required by the Clean Water Act Section 404 Permit Program.
3. Alleviating congestion on the inland navigation system.
4. Enhancing recreation opportunities at Corps projects.

The analysis provided for each problem area includes characterization of the problem context, the nature of the problem, and potential incentive-based remedies. This is followed by the analysis of important considerations for implementing identified incentive systems, including potential benefits, basic design and implementation issues, and major political, institutional and technical considerations.

1. INTRODUCTION

1.1 Background

The U.S. Army Corps of Engineers (Corps) Civil Works Program provides and maintains a wide variety of water-based services for the general public, including navigation, flood and storm damage reduction, recreation, hydroelectric power and water supply, as well as environmental protection and restoration. In principal, the Corps should strive to supply these services as cost-effectively as possible, and economists have long argued that incentive systems can play an important role in promoting such efficient outcomes. Yet, apart from contracting out to the private sector for support services, the Corps has not made significant use of incentive systems for implementing the Civil Works Program. While Corps policies and planning procedures generally do not advocate the formulation of incentive systems for implementing Civil Works functions, neither do they prevent consideration of such alternatives. There exists many possible opportunities for using incentive systems to help overcome problems and meet challenges faced by the Civil Works Program, and the Corps should fully consider those opportunities and include them in legislative initiatives and policy and planning guidance where appropriate.

1.2 Study Purpose and Approach

The purpose of this study is to characterize and preliminarily assess the potential applicability of incentive systems for implementing Civil Works missions. As the term is used here, incentive systems refer to tools and actions that can harness the competitive incentives of the commercial marketplace in the delivery and use of Civil Works services to. Two broad types of incentive systems are considered in the context of the Civil Works Program:

1. Operational Changes – Adoption of incentive-based principles and tools for service delivery and use within existing government ownership and management regimes. Such changes might include, for example, adoption of market-based pricing and cost accounting for Federal hydroelectric power (hydropower) operations.

2. Privatization – Transfer of functions, in whole or part, from the government to the private sector. Privatization includes everything from simple contracting out to private firms for support functions (e.g., project construction) to government shedding of primary functions and the divestiture of government-owned assets associated with those functions (e.g., divestiture of Federal hydropower assets and operations).

The study approach involved characterizing and evaluating both general and specific opportunities for using incentive systems in the Civil Works Program. General opportunities relate to current executive branch initiatives to investigate and consider

possibilities for privatizing the broad range of Civil Works functions. A largely descriptive analysis of these initiatives is provided in Section 2 of this report.

The analysis of specific opportunities for using incentive systems involved identifying problems related to the execution of Civil Works missions, and the characterization and preliminary assessment of one or more incentive systems that could help solve those problems. The selection of Civil Works problem areas for analysis focused on identifying those for which specific incentive-based remedies have been "crystallized" in the form of current or recent legislative proposals, administrative initiatives, or in recommendations by panels of experts such as those convened by the National Research Council. The study identified and examined incentive systems that could potentially be helpful for:

1. Reducing inefficiencies in the generation and marketing of hydroelectric power form Corps projects,
2. Increasing the supply and quality of wetlands compensatory mitigation required by the CWA Section 404 Permit Program,
3. Alleviating congestion on the inland navigation system, and
4. Enhancing recreation opportunities at Corps projects.

These are discussed individually in Sections 3-6 of this report according to a standard format that includes the following sub-sections:

- Problem Context
- Nature of the Problem
- Potential Incentive systems
- Considerations for Specific Incentive systems
    - Potential Benefits
    - Basic Design and Implementation Issues
    - Political Considerations
    - Institutional Considerations
    - Technical Considerations

2. GENERAL PRIVATIZATION IN THE CIVIL WORKS PROGRAM

2.1 Competitive Sourcing

A longstanding policy of the Federal government is that, whenever possible and cost-effective, Federal agencies should rely on private sector sources to perform recurring commercial activities needed to accomplish agency missions. Accordingly, Federal agencies are directed to use "competitive sourcing" whereby private sector providers are allowed to compete with existing Federal government providers (and vice-versa) to perform commercial functions. The premise behind competitive sourcing is that competition can help Federal agencies to save money while improving performance, whether the competitions ultimately result in functions being contracted out or retained in-house. When a Federal agency contracts out with the private sector for commercial functions, the government remains responsible for the provision of affected services, and maintains financial and management control over the type and quality of services provided. Traditionally, the competition process has been used primarily for support functions—such as computer services, data collection, and equipment maintenance--that help agencies to fulfill their primary missions.

Federal policies and procedures for identifying agency commercial activities and determining whether they should be provided through contract with private sector providers is established by Office of Management and Budget (OMB) Circular A-76, which was originally issued in 1966 and has since been revised several times, most recently in 2003. Circular A-76 generally requires that, before an agency converts commercial functions from in-house to contract providers or vice-versa, it must conduct a public-private competition in which the estimated cost of government performance of a commercial activity is compared to the cost of contractor performance in accordance with principles and procedures set forth in the Circular and its revised supplemental handbook (Office of Management and Budget, 2000). To perform such a cost comparison, the government must identify the work to be performed (described in a "performance work statement"), prepare an in-house cost estimate based on its "most efficient organization", and compare this cost estimate with the best offer from the private sector. According to Circular A-76 guidance, an activity currently performed in-house is to be converted to private sector performance if the best private offer is either 10 percent lower than the direct personnel costs of the in-house cost estimate or is $10 million less (over the performance period) than the in-house cost estimate. Until the 2003 revisions, the Circular also allowed Federal agencies to directly convert work to or from the private sector without conducting a cost comparison under certain conditions, such as for activities that are performed by 10 or fewer full-time-equivalent positions.

Circular A-76 requires agencies to maintain annual inventories of commercial activities performed in-house. A similar requirement was included in the 1998 FAIR Act (Public Law No. 105-270), which directs agencies to develop annual inventories of their positions that are not inherently governmental. An "inherently government function" is

defined as one that is so intimately related to the public interest as to require performance by Federal government employees. These generally include functions and activities that require either the exercise of discretion in applying government authority or the making of value judgments in making decisions for the government -- examples include policymaking and regulatory functions.

Despite the Circular's long history, public-private competitions have not been used to a significant extent throughout the Federal government. The Department of Defense (DOD), which includes nearly half of all Federal positions identified as commercial in nature, has been the leader among Federal agencies in recent years in its use of the Circular, with very limited use occurring in other agencies. Nevertheless, public-private competition through Circular A-76 accounts for a small percentage of service contracting within DOD; for example, the Department reported to Congress that only about 2% of its total FY 1999 contracting dollars resulted from Circular A-76 competitions (U.S. Department of Defense, 2000).

The private sector has complained about the limited extent of competitive sourcing by the Federal government and perceived problems with the Circular A-76 cost comparison process that they view as contributing to this result. The private sector contends that the process is too complex, expensive and lengthy. Private firms also complain that the process is inequitable because it requires companies to compete against each other before going against a public provider bid, and also allows the public provider to update its bid after having the opportunity to review private sector bids. Public providers, for their part, have also raised questions about whether the process treats their interests fairly, and have complained that it lowers morale as in-house employees are left wondering for years about the future of their jobs.

In 2001, Congress directed the Comptroller General to convene a panel of experts to study Circular A-76 policies and procedures and recommend ways to improve them. This "Commercial Activities Panel" (Panel) held 11 public hearings throughout the country in 2001 and 2002 at which they heard complaints about the Circular A-76 process. Panel staff also conducted a detailed review and analysis of DOD progress in implementing its A-76 program from the mid-to-late 1990s to identify program challenges and concerns that may have government-wide implications. Among the findings of the Panel's review of the DOD competitive sourcing program (Commercial Activities Panel, 2002) were:

1. A-76 studies took much longer to complete than initially expected,
2. Costs and resources needed to conduct and implement A-76 studies were underestimated,
3. Selecting and grouping functions to compete can be difficult, and
4. Developing and maintaining reliable estimates of government savings from use of contractors is difficult.

The Panel developed several recommendations for improving Circular A-76 policies and procedures. Many of these recommendations could be implemented administratively

under existing law and are reflected in revisions to Circular A-76 established by OMB in May 2003 (see below).

2.2 President's Management Agenda

In 2001, OMB sent to Congress the Presidents' Management Agenda (PMA) that sets forth a strategy for improving the management and performance of the Federal government (Office of Management and Budget, 2001). The PMA identifies competitive sourcing as one of five government-wide initiatives for improving government performance, and signals the Bush Administration's intention to require more accurate FAIR Act inventory of commercial functions performed by Federal employees and greater use of Circular A-76 public-private competitions. Accordingly, the OMB directed Federal agencies to take action in FY 2002 to directly convert or complete public-private competitions for not less than 5 percent of full-time equivalent positions listed in FAIR Act inventories, increasing to 10 percent in FY 2003. The ultimate goal of the PMA is to compete at least half of the approximately 850,000 Federal positions considered commercial in nature. However, in July 2003 the Bush Administration announced that federal agencies would not be required to meet the quotas listed above (Lee, 2003).

On November 19, 2002 the OMB proposed revisions to Circular A-76 to help meet the PMA competitive sourcing goals (Office of Management and Budget, 2002). The proposed changes, which largely follow the recommendations of the Commercial Activities Panel, were designed to facilitate broader and more strategic use of competitive sourcing as a management tool for improving agency performance. Notable changes include:

- Competition as the norm--directs agencies to presume that an agency activity is commercial in nature unless it can be justified as inherently governmental, and require agencies to annually submit inventories of both inherently governmental and commercial positions to OMB.

- Greater emphasis on best value--incorporates principles of the Federal Acquisition Regulation into the competitive sourcing process, including the ability to emphasize best value rather than cost considerations alone when conducting public-private competitions for certain limited functions. This would allow private sector and in-house suppliers to submit higher performance standards than those specified in contract solicitations, and permit agencies to make tradeoffs between performance and cost when evaluating bids.

- Strengthen accountability and results--requires agencies to centralize oversight responsibility for implementing Circular A-76, impose a one-year limit for conducting public-private competitions, and subject in-house providers of commercial services to the same oversight given to private sector suppliers.

Final revisions to Circular A-76 that include the provisions listed above were published on May 29, 2003 (Office of Management and Budget, 2003). The Revised Circular also

eliminates direct conversions to or from commercial providers for activities performed by 10 or fewer full-time-equivalent positions (FTEs), and creates a new streamlined 90-day competition process for activities involving 65 or fewer FTEs.

2.3 Status of Corps Competitive Sourcing Plans

In its scoring of Federal agency progress in meeting the PMA goals for FY 2001, the OMB gave the Corps a failing grade for competitive sourcing, noting that the agency had not yet developed a satisfactory sourcing plan. In commentary accompanying the grade, OMB noted:

> "The Corps currently contracts out about 60 percent of its work, but still has a significant inventory of commercial work performed by government employees. It has agreed to complete its assessment of competitive sourcing opportunities and its competitive sourcing plan by September 2002…"[1]

The Corps submitted a proposed competitive sourcing plan to OMB in September 2002. That plan identifies 20,600 "reviewable" commercial positions out of the roughly 38,000 civil and military funded positions within the agency, and proposes to conduct public-private competitions for about 7,500 of those positions over the next six years. The proposed plan apparently was not viewed as acceptable, however, and the Corps continued development of competitive sourcing plans during 2003. In that year the Corps established a "Strategic Sourcing Program Office" and an agency website to keep employees informed (www.hq.usace.army.mil/cepa/composurce/compsource.htm). A "message from the commander" to Corps employees posted to the website in August 2003 stated that a public announcement on Corps competitive sourcing studies, originally expected in September 2003, "may now be delayed while Department of the Army irons out policy issues associate with the new OMB circular on the performance of commercial activities". At the time of this writing no public announcement had yet been made.

2.4 Army "Third Wave" Privatization Initiative

Soon after the Corps' proposed sourcing plan was submitted to OMB in 2002, the Department of Army announced its intention to investigate and pursue ways to privatize or otherwise spin-off Civil Works functions. An internal Army memorandum from Secretary Thomas White dated October 4, 2002 sets forth the Army's "Third Wave" privatization initiative, so-called to distinguish it from two previous rounds of agency public-private competitions (White, 2002). The new initiative is much more aggressive than the PMA competitive sourcing goals, and much broader in scope than previous Army privatization efforts that focused on base operation functions. The White memo directed Headquarters Principal Officials (Functional Proponents) to develop "Implementation Plans for privatizing, divesting, competing using A-76, sourcing using alternatives to A-76, converting military spaces to civilian or contract, or transferring to

[1] See: http://www.whitehouse/gov/omb/budintegration/scorecards/coe_scorecard.html

other government agencies" all non-core functions and associated positions that fall under their purview. These "non-core" positions—spaces potentially eligible for private sector performance--include all those that do not directly support war-fighting efforts. The White memo stresses that Third Wave implementation plans must include all non-core positions unless an exemption, based on disruption to core missions, is approved in writing by the ASA (M&RA). Proposed exemptions were to be submitted by November 29, 2002 and decisions made on these by December 20, 2002. According to Army officials, the Third Wave initiative was designed primarily to free-up manpower and financial resources for the global war on terrorism and national defense, as well as to support the PMA competitive sourcing goals (Anderson, et al., 2002).

The White memo identified over 32,000 Corps positions, or roughly 90% of total on-board strength, as non-core spaces to be reviewed for potential privatization. The Corps submitted several memos to ASA (M&RA) requesting exemptions from Circular A-76 for various functions, including civil works functions deemed by the Corps to be inherently governmental. Approval of all requested exemptions would reduce the number of positions to be considered for A-76 competition from over 32,000 to about 20,000 (i.e., the number of reviewable positions proposed in the Corps competitive sourcing plan submitted to OMB in September 2002). But approval of the requested exemptions from Circular A-76 would not necessarily mean that the affected positions would be considered "core" Army functions for the purposes of the Third Wave initiative. Thus, the number of positions that the Corps may eventually consider for competition in its Third Wave implementation plan, as well as the specific types of competition used, remains to be seen.

2.5 Status of Corps Third Wave Plans

The White memo originally called for Third Wave implementation plans to be presented to Corps leaders in February 2003, with implementation of approved plans to begin in March 2003. However, those milestone dates were later move to the summer and fall of 2003 (Tate, 2003). Meanwhile, in a series of letters to Administration officials in 2002 and 2003, Congressional leaders expressed concern about the Third Wave initiative. For example, an October 22, 2002 letter to Army Secretary White from five lawmakers criticized the Army for pursuing widespread privatization without input from Congress (Peckenpaugh, 2002). And Congress has since taken action to affect the development and implementation of Third Wave privatization plans. Specifically, Section 109 of the Energy and Water Development Appropriations Act of 2003 bars the Army from using any FY 2003 appropriations "to study or implement any plans privatizing, divesting or transferring of any Civil Works missions, functions, or responsibilities for the U.S. Army Corps of Engineers to other government agencies without specific direction in a subsequent Act of Congress." By late 2003, the Army had suspended indefinitely Third Wave planning and implementation. According to an Army spokesperson speaking in December 2003, "The Third Wave is on hold right now. When former secretary White left [he resigned in April 2003] it was put on hold, and nothing has been done or sent up to the Army leadership about it. At this time, there is nothing going on" (Lee, 2004).

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3. REDUCING INEFFICIENCIES IN THE GENERATION AND MARKETING OF HYDROELECTRIC POWER FROM CORPS PROJECTS

3.1 Problem Context

The Corps, through its ownership and operation of power generating facilities at 75 multipurpose water projects, is the largest single producer of hydroelectric power (hydropower) in the United States, accounting for almost one-quarter of the nation's hydropower capacity and about 3% of total electric power capacity. In addition, non-Federal entities have obtained licenses from the Federal Energy Regulatory Commission (FERC) to install and operate power generation facilities at another 67 Corps projects subject to operating rules for these projects set by the Corps (U.S. Army Corps of Engineers, 2000).

Hydropower produced by the Corps and the Bureau of Reclamation (Burec) is transmitted and marketed by four "Power Marketing Administrations" (PMAs) that are Federal agencies within the U.S. Department of Energy (DOE). The PMAs include Bonneville, which markets Federal power in several western states, Western, which markets power in 14 states, Southwestern, which markets power in 6 states, and Southeastern, which markets power in 11 states. With the exception of Southeastern, the PMAs own and operate the facilities that transmit power to customers. Corps and Burec operating manuals define the timing and amount of water releases from reservoirs designed to meet multiple objectives such as flood control and navigation. The Corps and Burec generate hydropower subject to those operating rules as well as any applicable environmental and other restrictions, and the PMAs market power from these facilities in a manner consistent with those operating rules.

By law, the PMAs supply excess power wholesale to "preferred customers" that include publicly-owned utilities, customer-owned cooperatives, and some government entities, for resale to homes and businesses, primarily in small cities and rural communities. Current laws and regulations require the PMAs to set power rates at the lowest levels necessary to fully recover the costs of producing, transmitting and marketing power, including the repayment of Federal investments in power facilities and related debt. This cost-based rate setting approach, coupled with the fact that hydropower is inexpensive to produce relative to other sources of power production, ensures that most Federal power is sold by the PMAs to preferred customers at rates that are significantly below average wholesale market rates charged by non-federal power suppliers (Congressional Budget Office, 1997; Davis, 1997; Houston, 1996). The preferred wholesale customers can then pass at least part of this subsidy on to their own retail consumers.

Federal investments in hydropower production and transmission were originally intended to foster regional economic development and check the market power of investor-owned utilities (i.e., the potential for monopoly pricing), particularly in rural areas. But over time the relevant economic development goals have been met, while traditional regulatory

structures—and more recently, increasing competition within the electricity industry due to evolving industry restructuring and deregulation--have largely eliminated concerns about monopoly pricing. In recent years those concerns of a previous era have been replaced with new concerns about apparent inefficiencies and associated social costs of Federal hydropower operations.

Evidence of inefficiency in Federal hydropower operations includes information indicating that the Federal government does not fully recover costs through revenues generated from power sales. A 1997 investigation by the U.S. General Accounting Office (GAO) concluded that during fiscal years1992-1996 the Federal government incurred a net cost of $1.5 billion from hydropower marketed by the Southeastern, Southwestern and Western power marketing administrations (U.S. General Accounting Office, 1997).

Inefficiencies are also evident in the more frequent forced outages and lower capital utilization rates for Federal power generating capacity relative to that of non-federal power sources (U.S. General Accounting Office, 1998). Largely because unplanned outages require the PMAs to purchase power elsewhere in order to fulfill contractual commitments with their customers, a study by the Congressional Budget Office concluded that the Federal government could reduce hydropower-related costs by performing more and better-timed maintenance of power generating facilities (Congressional Budget Office, 1997).

In addition to internal inefficiencies, subsidized Federal power operations can create broader market inefficiencies and social costs. In theory, the regional preferences and subsidized rates for Federal hydropower would be expected to distort market signals for all power producers and consumers leading to social costs associated with less than optimal patterns of power production and consumption. For example, the sale of power at below-market rates likely encourages over-consumption of electricity by end users.

3.2 Nature of the Problem

Cost recovery problems for Federal hydropower activities can be traced to less than full accounting of relevant costs by the PMAs and a lack of effective monitoring and oversight of PMA cost estimation and associated rate setting. DOE rules require the PMAs to annually conduct power repayment studies to ensure that power rates are sufficient to recover costs that must be repaid within the relevant ratemaking period; these cost analyses form the basis for setting PMA rates. But while DOE rules require repayment studies to consider the full costs of Federal hydropower activities, they do not specifically identify each relevant cost component nor define how they should be considered. Audits of repayment studies by GAO investigators and of PMA financial statements by external auditors have found various un-recovered power-related costs that result in a net drain on the Federal Treasury (U.S. General Accounting Office, 1998). That investigation found that less than full cost accounting could be traced to Federal laws and DOE rules that prohibit or are not clear about the recovery of certain costs. For example, GAO concluded that that the bulk of un-recovered costs represent net financing costs that arise because, among other reasons, the interest charges on investment debt

paid by PMAs to the U.S. Treasury are lower than the rate at which the Federal government borrows money.

Further, the GAO investigation found that neither the Secretary of Energy, who is responsible for ensuring that PMA power-related costs are recovered, nor the Federal Energy Regulatory Commission (FERC), which reviews the PMA rate proposals for long term contracts, is effectively monitoring PMA cost estimation and rate-making to ensure full cost recovery. The FERC review and approval of PMA rates for long-term contracts is limited to ensuring that rates accurately reflect estimated costs as reported by PMAs and, according to FERC officials, they do not have the authority to challenge PMA cost estimates (Congressional Budget Office, 1997).

Problems with service reliability and capacity utilization can be traced to several factors. One is the way in which aging Federal power plants are operated. The PMAs' contracts with customers are largely based on capacity, which leads them to seek maximize output. Accordingly, Corps facilities generally operate under a "Full Gate" regime in which water control gates in the turbines are opened to provide maximum water flow and thus power output. In addition to being less efficient than the "Best Gate" regime under which investor-owned hydropower facilities operate, these operating practices may increase outage rates and thus maintenance needs (Parsons, 1996). Moreover, Federal planning and budgetary processes do not ensure that funds are available for facility repairs and maintenance when needed. Except for Bonneville, the PMAs return all revenues from power sales to the Federal Treasury. Independent of those revenues, the Corps receives annual Federal appropriations to fund the operation and maintenance (O&M) of power generation. Corps districts identify and estimate the costs to operate and maintain power and non-power facilities as part of the congressional appropriations process. However, hydropower repairs are sometimes given low priority relative to other project O&M needs by the Corps Division offices that disburse appropriations to the districts, resulting in lower than adequate maintenance.

Finally, potential broader market inefficiencies are related not only to Federal subsidies but also to unequal regulatory treatment for Federal operations vis-à-vis private sector operations. Perhaps most importantly, the PMAs, unlike private utilities, are exempt from FERC rules requiring open access to transmission lines at tariff rates set by FERC; the PMAs become subject to these rules only when they seek access to the transmission lines of other utilities. This exemption would be expected to dampen competition in wholesale electricity markets.

3.3 Potential Incentive systems

3.3.1 Operation and Management Reforms

A number of bills introduced in Congress over the last several years have sought to introduce one or more reforms in Federal hydropower activities in order to improve efficiency. The various reform proposals address cost accounting, the pricing of Federal power, and access to PMA transmission lines. For cost accounting, the proposed reform

would require PMAs to use the same accounting principles that FERC applies to public utilities. For pricing, the proposed reform would mandate that current preferred customers be given a right of first refusal for Federal power allocations, but at market rates rather than at rates set to just recover costs. To enhance competition in wholesale power markets, the proposed reform would open PMA transmission lines to all power suppliers subject to FERC approved rates and regulatory oversight.

A package of such legislative remedies, extended to include management reforms to end the division of responsibilities (and budgeting) between the Corps and the PMAs, would be expected to improve the efficiency of Federal hydropower activities and enhance competition in wholesale electricity markets. But it is questionably whether these reforms alone would eliminate all inefficiencies that characterize Federal hydropower operations. The example of the Tennessee Valley Authority (TVA) is perhaps instructive on this point. The TVA is organized as a Federal corporation, has direct control over its expenditures and rate setting, and is able to reinvest excess earnings in its operations. Yet, TVA continues to receive implicit Federal subsidies (e.g., the ability to borrow from the public at low rates reflecting the lower risk of default provided by the implicit backing of the Federal government) and protection from competition inside its "fenced" service area. These factors tend to shield the TVA somewhat from the efficiency discipline that the financial markets impose on truly private businesses. Such implicit subsidies and associated barriers to efficiency would likely also characterize Federal hydropower operations even if the operation and management reforms outlined above were fully implemented.

For the reasons outlined above, legislative reforms to make Federal hydropower operations more like those of private firms would not be expected to yield efficiency benefits comparable to that which could be realized by allowing the private sector to assume those operations. But such reforms could usefully serve as a means to smooth the transition to eventual divestiture and raise the market value of power assets before they are sold. Indeed, some legislative proposals of recent years have sought to introduce operation and management reforms as a transition step to ultimate divestiture.

3.3.2 Divestiture of Hydropower Assets and Operations

There are two basic options for divesting Federal hydropower activities under which the assets and operations of the PMAs would be divested in combination with different sets of Corps project assets/operations. One approach, termed full divestiture, would involve the transfer of comprehensive water project assets (dams and water locks, power generating assets, reservoirs and surrounding lands) and operations to the private sector. The other approach, termed partial divestiture, would transfer hydropower generation assets and operations only.

Under full divestiture, private investors would assume full project ownership and operation, including responsibility for providing and balancing non-power uses of those projects with power uses. Precedents exist for full divestiture of Federal water projects, most notably the sale of the two hydropower projects formerly owned and operated by

the Alaska Power Marketing Authority, which was terminated with those project divestitures. One Alaska project was sold to a publicly-owned utility and a local cooperative, and the other was sold to the state of Alaska, which then transferred effective project control to an investor-owned utility. Several important factors facilitated these divestitures that would not be expected to hold for the divestiture of Corps projects, however. First, unlike most Corps projects that include hydropower, the Alaska projects are located in small river basins that are not used for navigation or other functions that may compete with power uses. Second, legislation authorizing the sale exempted the new owners from FERC licensing requirements. Instead, environmental considerations were addressed through an agreement between the project buyers and the US Fish and Wildlife Service (Congressional Budget Office, 1997). Despite the relatively uncomplicated nature of these project divestitures, the final transfers occurred more than 13 years after Federal legislation authorizing the sale became law.

Perhaps more relevant to the potential for fully divesting Corps water projects are the hundreds of hydropower projects owned and operated by investor-owned utilities throughout the country. Those private projects, which like Corps projects typically also provide non-power functions, must obtain licenses from FERC that stipulate how the projects can be constructed and operated. FERC licensing thoroughly considers non-power uses and environmental conditions that would be affected by proposed projects, and FERC-issued licenses establish the terms under which private owners must balance power and non-power uses. Under a full divestiture approach, the FERC licensing process could play the same role that it now plays for projects built and run by the private sector. That is, FERC would assume the Corps' role in setting operating rules for privatized water projects. This option would thus relieve the Corps of all operation and funding responsibilities for projects.

From the perspective of private investors, important problems with full divestiture relate to the length of the FERC licensing process (that can take up to 10 years), and the equal consideration given in that process to non-power uses and environmental considerations. Indeed, as older private hydropower projects in western states have come up for renewal of their licenses in recent years, some owners have chosen to deconstruct their projects rather than incur the costs of project renovations to provide access for migrating fish that FERC has increasingly required as a condition for project licensing (Booth, 2002). Similar cost concerns might be expected to blunt the appeal of full divestiture to private investors.

Apart from potential investor concerns about the profit potential of full divesture, private investors may not be willing to assume the politically sensitive responsibility of providing and balancing non-power uses of projects with power operations. And for their part, the beneficiaries of those non-power functions might be expected to oppose a full divestiture path for Corps projects out of fear that private ownership and operation would not serve their interests as well as the status quo situation. For all of these reasons, the full divestiture option likely is not as economically or politically viable as partial divesture involving hydropower assets and operations exclusively.

Partial divestiture would involve selling the PMA's transmission and marketing assets together with Corps hydropower assets to the private sector, while the Corps retains ownership and operating responsibilities for all other project assets and functions. Precedents exist for this type of ownership and operating structure at Corps projects, including the Holt and Bankhead projects on the Black Warrior River in Alabama. When those projects were enlarged for navigation in the 1960s, an investor-owned utility installed powerhouses and transmission lines. The private utility owns and operates these hydropower assets subject to FERC regulation while the Corps owns and operates the dam, locks and other project facilities for navigation and other functions. The power company pays the Corps an annual leasing fee for use of the dams and coordinates its power activities with the Corps' non-power functions under operating rules set by the Corps.

This same basic structure could be used to divest hydropower operations at Corps projects. Depending on the rates private operators would be allowed to charge for wholesale power, it might be possible for the Federal government to charge private owners project leasing fees sufficient to cover O&M costs for non-power project assets and functions for which the Corps retains ownership and operational responsibility. The divestiture of hydropower operations is considered in more detail below.

3.4 Considerations for the Divestiture of Hydropower Assets and Operations

3.4.1 Potential Benefits

Proponents of divesting Federal hydropower assets and operations cite two primary reasons for divestiture: 1) to reduce operational inefficiencies, and 2) to improve the Federal Governments' fiscal position. The first reason largely relates to the lack of incentives for Federal operations to fully account for and minimize costs. In the private sector, competition and the ever-present threat of bankruptcy pushes firms to operate efficiently. The financial markets enforce this discipline through the control of funds on which private firms rely for investment and operating resources. Federal operations are not subject to the same discipline because of the ready supply of Federal financing. Unlike private firms, Federal enterprises thus face no hard budget constraints, allowing them to perpetuate costly mistakes indefinitely. In short, the efficiency justification for divestiture presumes that the private sector could produce the same level of output as produced by the Federal operations at a lower overall cost, or greater output at the same cost.

The second reason for divestiture touted by proponents—to improve the Federal Government's fiscal position—presumes that the sale of hydropower assets and discontinued Federal operations would have a positive net effect on the U.S. Treasury. The sale of assets to the private sector could provide a one-off gain to the Treasury to the extent that sales prices exceed the present value of future net power revenues expected through continued Federal power operations. And divested operations would produce significant tax revenues for the U.S. Treasury whereas current Federal operations are tax-exempt. The Congressional Budget Office, in a study of the budgetary implications of

divesting Federal hydropower assets and operations, concluded that under certain circumstances (e.g., relating to rates private operations would be allowed to charge) the Federal government could save money over the long term by selling hydropower assets, while under other circumstances it could lose money (Congressional Budget Office, 1997).

3.4.2 Basic Design and Implementation Issues

The divestiture of Federal hydropower assets and operations would face numerous and complex design and implementation issues, including those relating to determining:

- The specific assets to be sold and the contractual obligations and liabilities to be transferred with assets,
- The transfer or sales mechanism for divesting assets, and
- The rules governing private sector operations.

Decisions regarding these basic design and implementation issues would largely determine the appeal of divestiture to prospective private owners, and thus the economic viability of a divestiture path. For example, the profit potential for private investors depends in large part on the rules governing divested hydropower operations, such as whether or not private owners would face restrictions on the customers they could serve and the rates they could charge. In general, the willingness of private investors to assume ownership and operation of Federal hydropower assets, and the prices they would be willing to pay for those assets, vary inversely with the extent of restrictions placed on private sector operations.

Moreover, various political, institutional and technical considerations relating to divestiture design and implementation are relevant to a divesture path. Some of the more important considerations are reviewed below.

3.4.3 Political Considerations

The design and implementation of partial divestiture must address the interests of existing beneficiaries of Corps projects that might be affected by divestiture, and who thus might have an incentive to oppose it. Foremost among these interest groups are the end users of Federal hydropower who now pay below-market retail rates for electricity and who would lose this subsidy if divestiture were to go forward. Other interest groups that could pose political obstacles to divestiture include the various users of non-power functions provided by multipurpose water projects. And design and implementation would also need to address concerns about the Federal budgetary implications of divestiture.

3.4.4 Institutional Considerations

As outlined above, the institutional framework for divestiture must account for the concerns of various interest groups. That framework includes the institutional mechanisms that structure how divestiture is implemented as well as mechanisms that

shape the relationship between divested power operations and non-power functions of Corps projects.

One institutional mechanism that could provide an incentive for the end users of subsidized power to support divestiture of Federal hydropower operations has been proposed by Michael Block, a Professor at the University of Arizona, and Congressman John Shadegg (Block and Shadegg, 1996). Under the Block/Shadegg proposal, each PMA and the hydropower generating assets from which it markets power would first be turned into Federal corporations, with shares that could be sold to private citizens. Then, the homes and businesses that are the end users of power provided by these new Federal corporations would be given vouchers entitling them to purchase shares in the corporations. The number of shares any particular end user would be entitled to buy with issued vouchers would be based on how much power that user purchased from the relevant PMA in some defined time period. Importantly, the vouchers would entitle holders to purchase their allotted shares by a pre-set date at a price (the "strike price") strategically set to be below the expected market value of shares. The issued vouchers would be fully negotiable, allowing holders to sell their vouchers to anyone prior to the pre-set date. In essence, Federal power users would be given stock options in the new Federal corporations that they would then be able to sell to private investors seeking control of those enterprises. Strike prices could be set in a manner that ensures that power users would be able to offset the loss of power subsidies under divestiture with rights to obtain shares in the new corporations that are at least equally valuable as the lost subsidy.

It is less clear what institutional elements could satisfy stakeholders in the non-power functions of Corps projects who might pose political obstacles to a partial divestiture path. The Corps now has full responsibility for balancing Federal power and non-power functions of Corps water projects. In the current situation, potentially competing stakeholders must deal with the Corps when trying to influence the establishment of project operating rules that advance their own particular interests. If Federal hydropower assets at a Corps project were divested, however, then the rules governing the operation of the overall project would need to be written into the hydropower license granted by FERC. Such rules are needed to balance the ever-present conflict between private hydropower interests who seek to run as much water as possible through power plants when it is most lucrative, and the Corps' responsibility for ensuring that non-power purposes are maintained. Thus, under partial divestiture, project stakeholders might need to deal with two Federal agencies rather than one when trying to advance their particular interests. Non-power stakeholders might view such a new institutional framework as a potential threat to their interests, particularly if they believe that power interests might be given a louder voice in the establishment of project operating rules when ownership in project power assets passes from the Corps to the private sector. The existing project precedents for private ownership and operation of hydropower assets at Corps project might provide important lessons for establishing institutional elements that could minimize political opposition to a partial divestiture path from the various stakeholders in non-power project functions.

3.4.5 Technical Considerations

Various technical analyses would be needed to as part of an effort to divest PMA and Corps hydropower assets and operations. For example, analyses would be needed to determine the expected effects on power rates in the relevant regions and the Federal budgetary implications of divestiture under alternative sales prices. If the voucher (stock option) mechanism outlined above were used to implement divestiture, technical analyses would focus on determining the expected market value of the new Federal corporations established to facilitate divestiture, and the implications of setting different levels of strike prices for the stock options in these corporations to be allocated to the end users of PMA-supplied power. The level at which strike prices are set has implications for the extent to which end users of power are compensated for lost power subsidies, as well as for the budgetary effects of divestiture on the U.S. Treasury (Block and Shadegg, 1996). The higher the strike price, the lower would be the expected gains to the users of PMA-supplied power who sell their allocated stock options (since these gains are difference between the expected market value of shares in the new corporations and the strike price), and the higher would be the return to the U.S. Treasury (since Treasury receipts are equal to the number of shares times the strike price). So, for example, if one objective of divestiture is to fully compensate end users of Federal power for lost subsidies, and another is to ensure that the Federal government does not lose money through divestiture, supporting technical analysis would focus on identifying the level of strike prices that ensures both objectives would be met.

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4. INCREASING THE SUPPLY AND QUALITY OF COMPENSATORY MITIGATION IN THE CWA SECTION 404 PERMIT PROGRAM

4.1 Problem Context

The Clean Water Act (CWA) prohibits the discharge of dredged and fill material into waters of the United States, which includes most wetlands, unless authorized by a permit issued under Section 404 of the Act. The permit program is administered by the Corps, which has the authority to issue permits and attach conditions to them. The Corps issues two categories of permit authorizations—individual and general. The former requires case-specific review and permit issuance, while the latter authorize on a nationwide. Statewide or regional basis, fills associated with certain categories of activities deemed to result in no more than minimal effects on the aquatic environment. The U.S. Environmental Protection Agency (USEPA) has responsibility for developing the environmental standards governing permit review, shares with the Corps responsibility for program enforcement, and along with several Federal resource agencies plays a commenting role in Corps permitting.

Since 1990 the permit program has sought to support the Federal goal of "no overall net loss" (NNL) of wetlands acreage and functions through its aggregate permitting.[2] This goal recognizes that wetlands are a form of "natural capital" that can provide various ecological functions that benefit people and wildlife. Broadly defined, wetlands functions include hydrologic functions (e.g., flood and drought remediation), water quality functions (e.g., sediment trapping and nutrient assimilation), and habitat functions (e.g., nursery and feeding areas). The specific types and levels of functions provided by any particular wetlands parcel depend on its type (e.g., forested, scrub) and its locations in the landscape.

In support of the NNL goal, permit applicants are first required to take all practicable steps to avoid wetlands impacts and then minimize impacts that cannot be avoided. Finally, permittees are expected to provide compensatory mitigation for any remaining wetlands impacts as a condition of permit issuance. Compensatory mitigation involves the restoration, creation, enhancement, and in limited cases the preservation of other

[2] This programmatic goal has never been codified in law or regulation, however, nor has it always been clearly defined or articulated by the Corps. Until 2002 the Corps consistently took the position that the permit program supports, but is not governed by, the national goal of "no overall net loss" of wetlands first embraced by the George H.W. Bush administration and since supported by all subsequent administrations. In principal, permit program support for NNL relates to both wetlands acreage and function, although for practical reasons the Corps tracks progress toward NNL on an acreage basis only. The preamble to the 2002 issuance of Nationwide Permits (a type of general permits) defines regulatory support for the NNL goal somewhat differently, however. It states that each Corps district must ensure that wetlands functions and acreage impacted by activities authorized by nationwide permits must be replaced on a one-to-one basis within the geographic boundary of the district. What is not clear is whether this new NNL support goal pertains to the nationwide permit program exclusively or rather to the broader Section 404 permit program (i.e., all permit types considered together).

wetlands in order to offset the loss of wetland area and functions associated with permitted activities. Compensatory mitigation is thus best understood as an "offset" program intended to reconcile the conflict between maintaining economic growth and progress toward the NNL goal.

Traditionally, compensatory mitigation has been subject to strict regulatory priorities for location and design in which "on-site" and "in-kind" mitigation are the preferred options. On-site mitigation refers to compensation actions located at or contiguous to the site of wetland impacts authorized by fill permits, and in-kind mitigation refers to compensation involving the same type of wetlands as that impacted by the permitted activity. Typically, permittees contract with wetlands consultants to plan and construct such on-site, in-kind mitigation, but permittees retain legal responsibility for mitigation project implementation and success. Such "permittee-responsible", on-site and in-kind mitigation has accounted for the bulk of compensation actions implemented to offset permitted wetlands fills.

The regulatory preferences for in-kind and on-site compensatory mitigation are intended to help ensure not only equivalence between wetlands acres and functions lost and gained, but also equivalence of the benefits these functions provide to local people and wildlife. The in-kind preference can be interpreted as an effort to use wetlands type as a proxy for habitat functions and value. Similarly, the on-site preference reflects recognition that the values provided by the hydrologic and water quality functions of a wetlands parcel are largely site-dependent. For example, existing floodwater storage and water quality functions may benefit people living in areas downstream of the wetlands permitted for fill. If compensatory mitigation is located at a distance from the filled wetlands, then the hydrologic and water quality functions might be moved to a location that does not benefit these same downstream areas.

Federal policy also allows for off-site mitigation when regulators determine that opportunities for successful on-site mitigation are limited. Over the last decade regulators have demonstrated an increasing willingness to accept off-site mitigation, and this has encouraged the development and use of "third-party mitigation" in which another party accepts a payment from a permittee in return for assuming the permittee's legal obligation for mitigation implementation and success.

Third-party mitigation includes commercial wetlands mitigation banks and in-lieu fee (ILF) programs that consolidate at one or more sites the compensatory mitigation required to offset the impacts of numerous permitted fills that may be scattered across the landscape. Commercial mitigation banks involve private sector establishment of large areas of wetlands from which mitigation "credits" are produced and sold to permittees in need of compensatory mitigation. In an ILF program, permittees provide mitigation fees to public natural resource management or non-governmental conservation entities authorized by the Corps to receive and use such funds to implement required compensation. Together, commercial mitigation banks and ILF programs now provide a non-trivial but minority share of compensatory mitigation required by the CWA Section

404 Permit Program (although the use of ILF mitigation appears to have peaked and now may be in decline).

Since 1993, each of the Corps district offices has tracked data on the amount of wetlands acres permitted for fill as well as wetlands required as compensatory mitigation, and Corps headquarters aggregates the district data to report net wetlands quantity impacts of the permit program nationally. The national data indicates that wetlands acreage required as compensatory mitigation exceeded wetlands acreage permitted for fill in each of fiscal years 1993-2003. However, critics of the permit program note that the Corps data is misleading since it reflects mitigation acreage required by permits but not necessarily replacement wetlands actions actually constructed and certified successful.[3] These critics argue that, in practice, on-site mitigation required by permits is often not undertaken or fails to achieve functional success. As evidence they point to dozens of studies conducted over the last fifteen or so years that assessed the implementation and functional success of on-site compensation requirements in different areas of the country; these found that required on-site compensation actions often are not undertaken, and when implemented often fail to meet performance standards set out in permit conditions.[4]

Concerns about the implementation and effectiveness of wetlands compensatory mitigation led the USEPA to request that the National Research Council (NRC) evaluate how well and under what conditions compensatory mitigation required under Section 404 is contributing toward satisfying the overall objective of restoring and maintaining the quality of the nation's waters. The NRC established a Committee on Mitigating Wetland Losses to conduct the study and the Committee's report set forth several principle findings and associated recommendations (National Research Council, 2001). One finding is that compensation decisions could be improved if they were made using a watershed perspective. On this point the Committee argued that the regulatory preference for on-site and in-kind mitigation should not be automatic; instead, the decision about the appropriate form and location of compensation should follow from an analytically based assessment of wetlands needs in the watershed and the potential for compensation wetlands to persist over time. Another finding is that performance expectations for permittee-responsible compensation have often been unclear, and compliance has often not been assured nor attained. Accordingly, the Committee recommended that regulatory authorities establish and enforce clear compliance requirements for permittee-responsible mitigation relating to implementation, performance, and long-term stewardship and management. The Committee also found that third party mitigation offers important institutional and ecological advantages over permittee-responsible mitigation, and that institutional systems should be modified to ensure that third party mitigation provides assured compensation for all permitted activities.

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[3] The Corps acknowledges that the data it collects on wetlands acreage gained through wetlands mitigation reflects compensation required by permits and not actual results. The agency notes that this and other problems with data interpretation, such as that caused by the inclusion of data on compensation actions involving wetlands preservation, makes it difficult to draw conclusions on whether the permit program is achieving NNL in wetlands acreage (U.S. Army Corps of Engineers, 2001a).

[4] For a summary of these studies see: Turner, Redmond and Zedler, 2001.

4.2 Nature of the Problem

The NRC Committee conclusions about the wetlands compensation program implicitly point to a problem that has often plagued offset programs in other air and water pollution control contexts—lack of a ready supply of quality-assured compensatory offsets. As explained below, the insufficient supply of appropriate offsets for wetlands fills can be traced to problems facing both permittee-responsible as well as third-party mitigation options.

As outlined earlier, the primary problem with permittee-responsible (primarily on-site) mitigation relates to lack of compliance with and ecological success of compensation requirements. The apparent mixed record of implementation and success for on-site mitigation can be traced to two main factors. First, regulatory agencies lack the resources needed for comprehensive monitoring and enforcement of the thousands of permit-specific mitigation actions required each year. Second, when compensation actions are located near wetland fills, the habitat functions of the replacement wetlands are often compromised by polluted runoff and adverse changes in hydrologic regimes from surrounding development. In such cases replacement wetlands can effectively become cattail-fringed storm water ponds that may replicate the lost hydrologic and water quality functions of the filled wetlands, but not any lost habitat functions.

The commercial mitigation banking option addresses these institutional and ecological problems with on-site mitigation and thus has gained regulatory acceptance. The access to private capital makes funds available to initiate compensation actions in advance of fill impacts, strict quality controls imposed by regulators increase prospects for ecological success, and monitoring and enforcement of relatively fewer mitigation projects and responsible parties is much more readily accomplished. And importantly, banks have the flexibility to locate compensation actions in areas that favor long-term ecological success of wetlands habitat functions.

In fact, the number of commercial mitigation banks has expanded significantly since Federal guidance for the establishment and use of mitigation banking was issued in November 1995 (U.S. Army Corps of Engineers, et al., 1995). A recent survey found that 219 mitigation banks have been approved for use in the Section 404 Permit Program as of 2002, up from 46 approved banks documented in 1993 (Environmental Law Institute, 2002). Nevertheless, commercial mitigation banks now provide no more than 10-20% of the total mitigation required for fill permits in any region of the country, and in most regions the proportion is much less.[5]

Several factors--many under the control of regulatory authorities--appear to limit private sector investment in mitigation banking and make widespread bank expansion unlikely.

[5] This estimate is based on interviews with staff at some of the Corps district offices and policy analysts with the Corps Institute for Water Resources. Much of the national investment in commercial banks has been concentrated in Florida, Louisiana, California, Virginia and the Chicago area (Environmental Law Institute, 2002; Bailey, et al., 2004).

First, the process for bank development and approval as set out by the Federal guidance imposes significant costs on prospective bankers that serve to limit market entry (Shabman, et al., 1998). It is not uncommon for proposed banks to take 2-4 years to complete the multi-agency "Mitigation Bank Review Team" (MBRT) bank certification process and require significant expenditures by bank sponsors for legal counsel and technical consultants. Securing assurance that mitigation project areas will have the hydrologic, soil and vegetative characteristics of wetlands is typically time-consuming and costly for prospective bankers. Land must have been acquired or a purchase option secured. There is an intensive MBRT review of the techniques bankers will use to construct the wetlands. And strict performance criteria relating to hydrology, soils and vegetation are established for mitigation wetlands. Regulators also require bankers to post performance bonds or other financial assurances for constructed wetlands for which performance criteria have not yet been fully met. In seeking to assure ecological success, regulators thus impose significant and possibly redundant costs on bankers, including opportunity costs of funds invested in land while approval is pending, costs for the engineering design and documentation of how the project will be developed, and opportunity cost of the funds used to post performance bonds. Moreover, the MBRT agencies strive for and generally require internal consensus on all facets of bank development and use. Bankers have complained that the effect of the consensus goal is to increase bank development costs by forcing bank requirements toward the "lowest common denominator", and by extending the timeframe for bank approval. Bankers argue that the effect of the MBRT process and requirements is to increase bank development costs beyond that necessary to ensure that bank mitigation projects are ecologically appropriate and successful (U.S. Army Corps of Engineers, 2001b).

A second factor that discourages bank expansion is uncertainty about the future demand for bank credits (Shabman et al., 1998). Investors won't make an investment to produce a product if they are not sure when or if they will be able to sell that product. Difficulty in predicting future land development patterns that may affect wetlands filling--and therefore the future demand for credits—is always present. However, greater sources of demand uncertainty are embedded in the regulatory program itself. First, there is uncertainty created by the ambiguity of national wetlands policy. When Congress wrote Section 404 of the Clean Water Act its intent was unclear. As a result of the ambiguity of legislative intent, there has been persistent policy disagreement over matters as basic what constitutes a wetlands, what constitutes fill, what constitutes waters of the United States for defining the limits of Federal jurisdiction, what constitutes an activity significant enough to warrant intensive regulatory review, and what constitutes appropriate mitigation for a permitted fill (Zinn and Copeland, 2001). In the absence of legislative clarification, the goals and structure of the permitting program have repeatedly been redefined by executive orders, administrative rule making and rulings by the United States Supreme Court as well as lower courts (Strand, 1997, National Research Council, 2001). And such actions likely will continue to reshape Federal regulatory jurisdiction and requirements in the future. If prospective bankers believe that future regulatory requirements may not require mitigation for permitted fills, or may limit the wetlands areas or wetlands types for which mitigation will be required, they will discount the possibility of making credit sales in future years.

The sequencing process that governs the fill permitting process also creates credit demand uncertainty. Recall that the sequencing guidelines require permit applicants to first avoid and minimize wetlands impacts as conditions for permit issuance. Then, for any remaining wetlands impacts, the regulator will first examine and give regulatory preference to available opportunities for the permittee to provide on-site mitigation as compensation (even though, as noted earlier, regulators have been increasingly concerned about the quality of on-site mitigation). However, there is no standard analytical protocol that is followed in applying the sequencing steps, leaving the specific Corps project manager handling any particular permit application wide latitude in the process. Thus, the project manager's judgment determines whether the proposed activity is water dependent, whether the wetlands can be avoided and whether on-site mitigation is practical, and such judgments can be highly variable among different project managers. Then, if the project manager does allow the permittee to seek mitigation credits off-site, the kind and location of wetlands credits that will be required is determined for that permit and may not be at the location or be for the type of wetlands that have been created by a mitigation bank. So even if a permittee wants to use a specific bank (having come to agreement with the bank on credit price), there is no guarantee that the Corps project manager will decide that the proposed credit trade can be used to satisfy the permittee's mitigation requirement.

Finally, the MBRT approval procedures also circumscribe a bank's potential credit demand by limiting the geographic scope of permit impacts for which the bank's credits can be used as compensatory mitigation. Recall that wetlands, as a natural capital asset, may provide hydrologic, water quality and habitat functions depending on the wetlands type and its location. Also recall that social values that may flow from the hydrologic and water quality functions of wetlands are largely site-dependent; therefore, mitigation to compensate for these functions should be located near permitted fills. Habitat functions and values are much less site-dependent, however, and might often be enhanced if mitigation wetlands were located away from developing areas (for example, to adjoin a nature preserve). Requiring that mitigation actions be at or near the location of the permitted fill best replaces hydrologic and water quality functions and values, but habitat functions and values may best be replaced at more distant locations. Because the wetlands permitting program has been organized around the wetlands asset, and not its individual functions, there has had to be a compromise on location of the wetlands mitigation. The compromise has been to limit the geographic area in which bank credits can be sold; this is termed the bank's "service area". Service areas typically are limited to spatially small watersheds with the effects of both restricting the potential demand for credits from any bank and limiting the ability of banks to compete for business within the same area.

In sum, the acceptance and growth of mitigation banking within the Federal wetlands permit program was a response to a recognized need to expand the supply and quality of available mitigation offsets. [6] At the same time, however, the Federal policy frameworks

[6] The expansion of ILF mitigation in the mid-to-late 1990s was driven both by concerns about the widespread failure of on-site mitigation, and the absence or insufficient supply of bank credits in many watersheds where permits are issued (U.S. Army Corps of Engineers, 2000). A recent survey identified 87 active ILF program as of 2002, most of which began operating between 1995 and 2000 (Environmental

governing the permit process and the development and use of mitigation banking appear to limit future expansion of this mitigation option.[7] Thus, the permit program continues to suffer from a lack of a ready supply of quality-assured mitigation offsets.

4.3 Potential Incentive systems

The NRC Committee on Mitigating for Wetlands Losses recommended that "institutional systems be modified to provide third-party compensatory mitigation with all of the following attributes: timely and assured compensation for all permitted activities, watershed integration, and assurances of long-term sustainability and stewardship for compensatory wetlands." (National Research Council, 2002). One possible approach toward these ends, first proposed by Shabman and Scodari (1998, 2001), is outlined below.

4.3.1 Credit Resale Program

Based on the experiences to date with commercial mitigation banking and other mitigation options, a new program could be designed to provide a ready supply of affordable and high quality mitigation offsets, initiated in advance of wetland fills, in many more watersheds. Shabman and Scodari (2004) describe three interrelated elements that form the foundation for this approach, which they refer to as a "credit resale program". First, funds would be provided to a "watershed agency" charged with the mission of securing mitigation for permitted fills in some watershed area (however defined). Second, the agency would use some of the funds to predict programmatic offset needs within the relevant area by type and location for some fixed period of time. Third, the agency would be given the authorities to use its funding to act both as a credit purchaser and reseller. In that role the agency would use a competitive bidding program to secure an inventory of quality-certified credits to meet projected offset needs that it would then resell to permittees in need of compensatory mitigation.

The process would work as follows. The watershed agency would make an estimate of the number and type of mitigation credits needed to meet the compensation needs of future permittees over some time period (say, 5 years). The watershed agency would then issue a request for proposals (RFP) from potential credit suppliers. The low cost bidder(s)

Law Institute, 2002). Unlike mitigation banks, these ILF programs were not subject to a multi-agency review and approval process, nor were they required to secure mitigation sites, develop detailed mitigation plans, and begin implementation of compensation actions before accepting fees. However, Federal guidance for ILF mitigation issued in 2000 (U.S. Army Corps of Engineers, et al., 2000) implemented a framework for ILF development that includes many of the same requirements imposed on prospective banks. Thus, ILF development now faces much higher development costs. Further, the ILF guidance established a hierarchy for choosing mitigation options that favors the use of certified banks over ILF mitigation. These new provisions, as well as continuing concerns about the time lag between fee payments and mitigation implementation, appear to have stopped expansion of ILF mitigation. As one example, the Chicago District Wetlands Restoration Fund, one of the earliest and most heavily used district-wide ILF programs, is no longer offered as a mitigation option in the Chicago District.

[7] In a recent national survey that interviewed a stratified random sample of 89 certified private bankers, 75% reported that they had no plans for additional credit investments (Bailey, et al., 2004).

who provides favorable mitigation sites, ecological success assurances, and assurances for long-term site protection and maintenance (such as those now imposed on mitigation banks) would receive the credit supply contract(s). The prices paid for credits by the watershed agency would reflect the full cost of producing and then maintaining ecologically successful credits. The winning bidder(s) would immediately begin the mitigation project and receive payments from the watershed agency on a defined schedule tied to project construction milestones and the attainment of performance criteria. The credits purchased from the winning bidders would then be resold to future permittees in need of compensatory mitigation. If the watershed agency overestimated credit demand for the relevant time period, the surplus credits would be available for use in the next time period. If credit demand was underestimated, a new RFP could be issued immediately.

4.4 Considerations for a Credit Resale Program

4.4.1 Potential Benefits

If properly designed and administered, the credit resale approach could secure the supply, quality and price advantages of a competitive wetlands credit market. Area-specific credit resale programs could increase the supply and effectiveness of wetlands offsets by increasing reliance on third party mitigation projects subject to strict quality controls and implemented prior to the permitted fills that they serve. Moreover, by centralizing regulatory decisions about the general locations and designs of third party mitigation, a credit resale approach could better ensure that compensation projects serve priorities for wetland restoration in individual watersheds.

Further, a credit resale program could potentially reduce permittees' costs of securing compensatory mitigation. In principle, a competitive market for bank credits would have numerous bankers competing for the business of permittees. However, as outlined above, bank competition has been severely limited by the existing Federal policy framework governing mitigation bank approval and use, and by continuing reinterpretations of regulatory jurisdiction that serve to increase uncertainty surrounding the demand for bank credits. The credit resale approach, by contrast, would foster competition by having third party mitigation specialists compete to supply credits pursuant to RFP issued by regulatory agencies. The prices paid for credits by regulatory agencies could be driven downward toward the costs of production by competition among bidders, and by the elimination of demand-side risk and regulatory approval costs now associated with mitigation banking. This is in turn could reduce the prices paid for mitigation by permittees.

4.4.2 Basic Design and Implementation Issues

Several important design and implementation decisions must be confronted to make a credit resale approach to compensatory mitigation a reality. These include decisions relating to:

- The entities that would run the bid competition and the source of funding for contracting out credit production,
- The methods used to identify the future mitigation needs of permittees and watershed priorities for directing the general location and design of compensation actions, and;
- The specific types of credit offsets that will be secured through contracts and then resold to permittees in need of compensatory mitigation.

The state of North Carolina is currently experimenting with a credit resale program for permitted alternations to wetlands and other waters that provides one example of how these program elements have been approached in practice. The North Carolina Ecosystem Enhancement Program (NCEEP) was motivated by a widespread dissatisfaction with delays in the Federal permitting process for North Carolina Department of Transportation (NCDOT) highway projects. The solution was to create a program that would secure mitigation in advance of impacts in order to expedite the permitting process for highway projects. The NCEEP was preceded by the North Carolina Wetlands Restoration Program, which was an ILF program created to simplify the process of securing compensatory mitigation for relatively minor permit impacts to wetlands and streams. That earlier program is now subsumed under the NCEEP. [8]

The NCEEP is administered by the North Carolina Department of Environmental and Natural Resources (DENR), which signed an MOU with the Corps Wilmington District that establishes a Federal regulatory preference for using NCEEP credits for all permitted NCDOT highway projects (after wetlands avoidance and minimization has been fully achieved). Under the MOU, DENR agrees that, by the year 2014, the NCEEP will have credit offsets (i.e., replacement wetlands) in place five years in advance of an NCDOT permit being issued.

Advanced mitigation requires up front capital to invest in the creation of credits. The NCDOT has provided significant initial funding, one-third of which has been dedicated by NCEEP for watershed planning, and the remainder for restoration and enhancement projects. The watershed planning effort is being used to set restoration priorities in individual watersheds and to anticipate the future need for credits of particular types and in particular locations. This planning effort has made it possible to match the NCDOT projections of future highway development and mitigation needs with the identification of preferred areas and designs for implementing compensation actions in different watersheds.

The NCEEP is using an RFP process to secure credits in watersheds where highway fills are projected to occur and for the kinds of projects that will restore wetlands and streams that are identified as high priority by the NCEEP watershed planning efforts. The RFP are for a "full delivery" mitigation project.[9] The requirements in the RFP are related to and derived from the quality assurance requirements that have been placed on private mitigation banks in the Wilmington District. The winning bidders in the full delivery RFP process are selected and then paid on a defined schedule as project construction

[8] The information on the NCEEP provided here was taken from Shabman and Scodari (2004).
[9] The RFP can be found at the following address: http://www.ips.state.nc.us/ips/deptbids.asp

milestones and ecological success is documented. The payments required of the permittees (the credit "fee") are tied to the costs of securing the successful wetlands offsets through the contracting process.

In their review of the NCEEP, Shabman and Scodari (2004) argue that this program (and the credit resale approach more generally) could be more effective for securing appropriate offsets if its design and implementation were altered to confront a problem that has plagued wetlands mitigation generally—functional tradeoffs inherent in the choice of mitigation location. Earlier it was recognized that the water quality and hydrologic functions of a wetlands area are largely site-dependent, and thus often must be replaced on-site to assure no loss of beneit to local people. However, the values of the wetlands habitat functions to people and wildlife are much less site-dependent. Moreover, in many cases it is not possible to adequately replace lost habitat functions and values through on-site mitigation because they are ultimately compromised over time by surrounding development. In fact, the inability to secure habitat functions through on-site mitigation is largely why ex post studies of on-site mitigation projects have found high rates of ecological failure, and served as one major motivation for greater use of off-site, third party mitigation. But if the wetlands credits were moved far from the fill location to favor habitat functions, then site-dependent hydrologic and water quality functions would be lost. Because mitigation requirements are being defined in terms of the wetlands asset (i.e., wetlands area and aggregate functions) and not separable wetlands functions, there exists a tension over which functions to favor in regulatory decisions about mitigation location.

As indicated earlier, in the context of commercial mitigation banking this tension has been addressed by requiring bank mitigation projects to be located within the same (usually small) watershed area as the fill sites they serve. But this method of minimizing functional tradeoffs has proved less than ideal. Despite constricted bank service areas and broad support for a "watershed approach" to compensatory mitigation, allowing credits to be located away from the fill sites they serve remains controversial (as does the acceptance of out-of-kind credits).[10] Meanwhile, limiting bank service areas to small watershed areas has created other problems. One problem has been a thin market--there is often only one bank in areas where credits are now sold. A second problem has been that spatially small service areas limit the land parcels suited for a wetlands mitigation project that can provide all wetlands functions. The owners of such parcels have recognized the unique assets they hold in land sale negotiations with prospective bankers. The result has been escalating prices for mitigation sites that then feed into credit prices. Similar problems have been evident in the NCEEP where initial experiments with the RFP process have sought particular types of wetlands credits within relatively small areas as defined by USGS 8-digit hydrologic units.

[10] Salzman and Ruhl (2004), for example, argue that the effect of credit sales is to "move wetlands out of areas where they may provide valuable services to urban populations into sparsely populated areas where, most likely, their service provision is either redundant or less valuable." As evidence, they cite studies that compared the geographic location of wetland impact and credit sites for a limited set of credit sales in Florida (King and Herbert, 1997) and Virginia (Jennings, et al., 1999) which concluded that the examined trades resulted in the movement of wetlands from highly populated urban and suburban areas to less populated, more rural areas.

Shabman and Scodari (2004) propose a method for avoiding functional tradeoffs that could increase prospects for the success of a credit resale program. That method involves setting compensation requirements for permitted fills in terms of separate wetlands functions rather than for the wetlands asset itself. Then, the credit resale program could define credits in terms of wetlands habitat functions, separate from other wetlands functions. Habitat functions are the ones that should be the most mobile across the landscape. For both the ability to support habitat (e.g., to ensure that it is not in the midst of parking lots) and to add to a landscape mosaic that places wetlands in their upland context, habitat functions should be replaced away from fill sites. Indeed, what may be more appropriate is thinking not at watershed but larger eco-region scales when seeking credits for habitat functions. And while habitat functions must be compensated for through wetlands mitigation elsewhere, the replacement wetlands need not necessarily be of the same type affected by the fills that they serve. Instead, mitigation success might be defined by wetlands hydrology and the emergence of wetlands types that best fit and will persist in the chosen landscape settings. The required compensation for habitat functions lost to permit fills could then be measured on an acre-for-acre basis, thus ensuring no net loss in wetlands area as well as habitat functions. In sum, if the credit resale program were to focus on habitat functions exclusively, this would allow the watershed agency that issues RFP to seek habitat credits over spatially large and diverse areas, thus increasing the pool of land parcels that would be suitable mitigation sites. This in turn would be expected to increase the level of competition for credit sales contracts while minimizing the extent to which prospective credit producers might bid up prices for suitable land parcels.

If the credit resale program were used to secure compensation for habitat functions, regulators would still need to secure compensation for any lost hydrologic and water quality functions through other means. In effect, if regulators determine that a permitted fill would result in the loss of such site-specific functions, then the permittee would be subject to a two-part compensation requirement—one for habitat offsets secured through the credit resale program, and one for offsets for any site-dependent hydrologic and water quality functions to be provided on-site. In determining any needed on-site offsets, regulators would appropriately consider opportunities for on-site wetlands mitigation as well as non-wetlands means of securing compensation for lost site-dependent functions. Site design changes (e.g., low impact development), storm water ponds, pervious pavement, riparian buffers and a host of other methods can be substitutes for the water quality and hydrologic functions of a wetlands area (Center for Watershed Protection, 2000) and can be implemented near the sites of permitted fills. Significantly, there are a variety of local and state regulatory programs governing land development that already require actions to mitigate for the hydrologic and water quality effects of development projects. These non-wetlands mitigation programs may obviate the need for wetlands regulators to secure on-site offsets in many cases.

4.4.3 Political Considerations

Movement to a credit resale approach for securing wetlands mitigation must address the interests of various stakeholders who might have incentives to oppose such a policy. One

relevant stakeholder group is the mitigation banking community, which under the contracting approach would lose the ability to produce new mitigation credits for sale directly to permittees. At a minimum, private sector willingness to move to the contracting approach would require that those already approved banks that have outstanding credit balances be bought out by regulatory agencies or be allowed to continue selling remaining credits to permittees. Beyond that, it is an open question whether private sector mitigation specialists would on balance welcome the opportunity to work directly for regulators rather than for permit applicants. This would depend largely on how favorably they view the tradeoff between the high financial risks and profit potential of mitigation banking, and the relatively lower risks and profit potential associated with the contracting approach. But there is reason to suspect that bankers might support a shift to the contracting approach in light of uncertainty surrounding the future demand for bank credits. Indeed, established mitigation bankers in North Carolina have apparently welcomed the opportunity to bid for credit supply contracts under the NCEEP (Shabman and Scodari, 2004).

Another important interest group is the environmental advocacy community, which has expressed concern that a ready supply of off-site credits could weaken the commitment during the permitting process to protect existing wetlands and their functions (National Research Council, 2002). That concern might be effectively addressed by reiteration of the regulatory commitment to the "sequencing" process that requires permit applicants to first take all practicable steps to avoid and minimize wetland impacts before compensatory mitigation can be considered. Environmental advocates have also been strong supporters of the current regulatory preference given to on-site and in-kind mitigation, and thus might oppose a new focus on securing off-site credits. That potential opposition might be overcome if 1) the credit resale program was initially made available only to relatively minor fills or linear impacts associated with highway development that often have few practicable opportunities for on-site wetlands mitigation, and 2) local advocacy groups were given a role in decisions guiding the location and design of compensation actions according to area-wide priorities for wetlands restoration (see below).

4.4.4 Institutional Considerations

The credit resale approach involves new and modified institutional elements that would require careful analysis and development. The NCEEP is providing a laboratory for experimenting with needed institutional elements that likely will yield important lessons for applying this approach in other areas. As one example, the initial focus of the NCEEP on securing mitigation for highway projects illustrates one way to obtain the necessary upfront capital for implementing a credit resale program. That focus on road-building impacts on wetlands also makes it possible to predict future impacts and associated mitigation needs. The design of credit resale programs in other areas of the country might likewise focus initially on providing needed offsets for future highway impacts that can be readily predicted and for which a ready supply of funding might be available.

The credit resale approach, depending on how it is designed and implemented, might also require unprecedented coordination between wetlands regulators and non-wetlands regulatory programs. For example, if credit resale programs were established to secure compensation for habitat functions exclusively, then regulators would need to consider for each permitted fill whether to require a second-part offset requirement for on-site mitigation of any lost site-dependent water quality and hydrologic functions. To the extent that wetlands regulators would consider whether any state or local non-wetlands regulatory requirements placed on the development would effectively compensate for these functions and thus obviate the need for on-site wetlands offsets, making these determinations would require wetlands regulators to closely coordinate with relevant non-wetlands programs. This would represent a major institutional change for the wetlands permit program.

4.4.5 Technical Considerations

One important technical (as well as institutional) element of a credit resale program involves the identification of watershed priorities for wetlands restoration to guide the general locations and designs for credit production. Many wetlands professionals appear to agree in principal that such watershed-oriented wetlands mitigation is environmentally desirable, but view it as unworkable until formal watershed plans have been developed for all of the nation's watersheds. However, the NRC Committee on Mitigating Wetlands Losses stressed that a watershed-based approach to wetlands mitigation does not require a formal watershed planning process. Highly technical and data-intensive watershed plans are costly to develop, often controversial, and to date have been developed for very few of the nation's watersheds (Scodari and Shabman, 2001). Given this, the Committee argued that watershed-oriented compensatory mitigation should proceed using a less structured approach to priority setting. Indeed, some ILF programs (some of which are now defunct) have followed an informal planning process for guiding mitigation location and design (U.S. Army Corps of Engineers, 2000; Scodari and Shabman, 2001). In those ILF programs, Corps regulatory staff and program administrators (typically non-governmental conservation entities) jointly selected compensation actions that served their understanding of watershed priorities for wetland functions, in consideration of the functions lost from permit fills. The NRC Committee suggested that this is a workable and low-cost approach, but one that could be improved through broader-based participation in the priority setting process. Specifically, the Committee recommended that, "Absent a formal plan, a watershed approach to compensatory site decisions would be a process that engages community and multiple agency input supported by a panel of wetland experts from the scientific community who are familiar with the watersheds in question" (National Research Council, 2002; p. 148).

To the extent that a credit sales program focuses on offsets for wetlands area and habitat functions exclusively, and regulators were to consider whether non-wetlands regulatory requirements effectively compensated for lost site-dependent water quality and hydrologic functions, then regulators would need to have access to easy and inexpensive methods for assessing these lost functions and the extent to which required non-wetlands offsets will replicate these functions. This should be possible since there now exists a

suite of assessment models applicable at different scales, as well as easily applied rules of thumb that are now used in storm water, water quality and TMDL programs that could be employed to make these calculations of loss and offset.

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5. ALLEVIATING CONGESTION ON THE INLAND NAVIGATION SYSTEM

5.1 Problem Context

The problem context is traffic congestion at locks on the U.S. inland navigation waterway system. One specific part of the system experiencing chronic congestion includes the locks on the Upper Mississippi River-Illinois Waterway (UMR-IWW), where queuing delays can range up to 6 hours or more at high traffic density locks during peak use periods (U.S. Army Corps of Engineers, 2004). Commercial barge traffic on the UMR-IWW carries grain from the Corn Belt region down to New Orleans for export to international markets. Congestion on the UMR-IWW can be traced to increased commercial demand for use of the waterway and its lock infrastructure as well as changes in the nature of that demand over time. The volume of traffic and the length of tows using the system have increased significantly since the locks and dams along the system were constructed in the 1930s. Modern barge tow configurations are nearly twice the size of the older locks, requiring barges to be unhinged and sent through the locks in two parts. The longer time period required for such double lockages, which average about 1.5 hours per tow, increase delays for other tows waiting to use the locks (U.S. Army Corps of Engineers, 2004). Increasing congestion and delays on the locks of the UMR-IWW system has resulted in calls from shipping and grain industries for major lock extensions.

In 1989 the Corps initiated a feasibility study to determine if system lock extensions to alleviate congestion and accommodate future traffic growth were economically justified. But before the study was completed, controversies arose over the economic assumptions and methods employed in the study. These controversies led the Department of Defense to ask the National Academy of Sciences to conduct a review of the feasibility study and preliminary study results suggesting that major lock extensions are economically justified. The National Research Council (NRC), the Academy research arm, completed review of the UMR-IWR feasibility study in 2001 and the results are documented in a report released in that year (National Research Council, 2001).

Among the conclusions of the NRC review are that congestion at the locks and dams on the UMR-IWW can be traced to heavy but uneven use of the system throughout the shipping season, and that various demand management options could be employed to ensure more efficient patterns of capacity utililization. Further, the NRC report concluded that such demand management options are inexpensive relative to large-scale structural options such as lock extensions that focus on increasing system supply capacity, and that the potential benefits of lock extensions cannot be evaluated adequately without first managing traffic more efficiently on the existing system. Accordingly, the NRC report recommended that the Corps 1) Fully explore and assess the benefits and costs of options for managing traffic congestion on the system as it now exists, and 2) Use as the baseline condition for assessing the benefits of lock extension alternatives, those traffic patterns predicted to occur under the most economical traffic management option (National Research Council, 2001).

5.2 Nature of the Problem

Congestion at the locks on the UMR-IWW is the result of the open access, public nature of the waterway and its infrastructure. The locks on the system are available to all potential users at no charge, for the most part on a "first-come, first-served" basis. The decision by any potential user to use the system at any particular time is based on that user's calculation of his incremental benefits and costs from doing so, and that decision is independent of the decisions of other potential users. The system is thus intensively used at certain times--with the result that users impose congestion costs on each other--while at other times the locks sit idle. Since each individual user is not forced to bear the congestion costs his use may impose on other users, each user's decision about when to use the system will not consider these costs. The lack of full-cost pricing for access to the waterway, or some other mechanism for rationing access, is a form of market failure that leads to heavy but uneven use of the system and ultimately traffic congestion at certain times.

The NRC report argues that the key to alleviating congestion is to reduce the variability of tow arrivals at each lock in the system. If traffic were distributed more evenly, congestion would decrease and shipping costs would fall (National Research Council, 2001). On the UMR, the shipping year runs from March through November, with peak use periods for the most heavily used locks in the summer and early fall. On the IWW, traffic levels are more consistent throughout the year, with peak use periods occurring during December-February when the UMR is largely closed due to icy conditions (U.S. Army Corps of Engineers, 2004).

5.3 Potential Incentive systems

The NRC report noted that several demand management options could be used to smooth arrivals at UMR-IWW locks throughout the shipping year, and singled out two incentive systems--congestion pricing (tolls) and tradable lockage permits, as particularly promising and worthy of consideration.

5.3.1 Congestion Pricing

Congestion pricing is a market-based method for internalizing the costs of delay that the users of "network" (e.g., transport, telephone, computer) systems impose on other users during periods of congestion (Vickrey, 1992). In the navigation context, congestion pricing would charge tows variable tolls for using a lock or a series of locks characterized by traffic congestion. Toll rates would vary according to the level of congestion that exists at a particular time. That is, the system would be specifically designed to encourage a shift of peak traffic period trips to non-peak periods by charging tolls that are significantly higher during congested periods and lower or non-existent during periods of no congestion. In this way congestion tolls could provide a non-structural approach to reducing congestion on the existing inland navigation system. While congestion pricing is not a long-term solution for traffic congestion in the face of future traffic growth, it could

provide an effective means for reducing congestion in the short run while helping to signal the potential need for future lock expansion (National Research Council, 2001).

5.3.2 Tradable Lockage Permits

A system of tradable lockage permits is a market-based mechanism for controlling access to navigation locks that involves issuing to tow operators clear property rights for lock passage times at different locks. For example, permit rights could be issued at no cost to tow operators based on the percentage of time throughout each day they used the locks in some historical period. The NRC report recommends that permit time slots be broken down into 5-minute increments and allocated to operators evenly over the shipping season. The 5-minute rights to locks on a specific day would be made transferable, thus allowing tow operators to assemble the total time required to get a tow through a lock at the time when that tow needs access. The system administrator would retain the unallocated lock minutes in each day and, before the beginning of the navigation season, any operator could swap an assigned 5-minute time slot for one held by the administrator. Remaining slots held by the administrator would then be available for sale to the highest bidder. Rules would also need to be developed for reserving and allocating slots for lockage times to recreational and other noncommercial users of the waterway (National Research Council, 2001). As with congestion pricing, tradable lockage permits are a potentially effective means for reducing congestion in the short run while helping to signal the potential need for future lock expansion.

5.3.3 Traffic Management Options Considered in Restructured Feasibility Study

In the spring of 2004 the Corps released a draft restructured feasibility study for the UMR-IWW that responds to many of the recommendations of the NRC report (U.S. Army Corps of Engineers, 2004). Among the alternatives for reducing congestion on the system that were formulated and evaluated in the study is a standard lockage fee that would be imposed on all commercial users. Such a fixed lockage fee does not represent a congestion fee of the type recommended by the NRC report and outlined above, however, since it would not involve toll rates that vary according to congestion levels prevailing at any given time. According to the draft feasibility report, the objective of a fixed lockage fee imposed on all commercial traffic is to improve overall system efficiency by inducing marginal users (i.e., those that benefit least from using the system) to leave the system. The study evaluation of the lockage fee alternative found that, under all considered scenario predictions of future traffic demand, this option would result in positive net economic benefits. Nevertheless, the study screened the lockage fee alternative from further consideration because it "fails to fully meet the planning objectives of economic sustainability by limiting growth on the system." (U.S. Army Corps of Engineers, 2004, Page x).

The draft feasibility report also noted that the restructured study investigated the potential for using scheduling options such as tradable lockage permits to manage traffic demand, but these alternatives were "determined not to be practical due to operational and market characteristics of the system" (U.S. Army Corps of Engineers, 2004; Page 499). As one

example, the report states that the way in which tows use the waterway makes it very difficult for most of them to predict in advance of a trip exactly when they will arrive at a lock. In the words of the report,

> "For most tows, each trip involves a different combination of stops for barge pick-up and drop-offs. The number of stops may not be known even when the trip is initiated and even if known would involve variable times for barge pick-up and drop-off. These operational characteristics would make the concept of master-scheduling nearly impossible" (U.S. Army Corps of Engineers, 2004; Page 149).

And importantly, the report concludes that a system of tradable lockage permits and other demand management options would likely fail to alleviate lock congestion and waiting times because the key locks on the system have insufficient unused time available for more efficient spacing of arrival and service times. As evidence, the report cites year 2002 data on lock use as indicating that traffic flow on the lower system is relatively constant across the year.

The draft feasibility report's discussion of characteristics of the UMR-IWW that could limit the potential benefits of demand management options appears to draw from a study by the Volpe National Transportation System Center (U.S. Department of Transportation, 2003) commissioned by the Corps, although some important parts of that study's analysis are not reflected in draft feasibility report. The Volpe study was charged with developing and examining the potential implementation and operational impact of tradable lockage systems and other non-structural measures for alleviating congestion on the system. Toward that end, the study team organized and ran two Focus Groups--consisting of tow operators, lock and dam personnel, shippers and experts in economics and the river transport system--to help develop a "mental model" of the realities of river operations that could aid in the preliminary design and evaluation of a system of tradable lockage permits and other candidate measures for alleviating system congestion. The members of the Focus Groups voiced numerous practical concerns relating to the implementation of a system of tradable lockage permits. And importantly, some members argued that a system of tradable lockage permits (or any other scheduling alternative) could potentially do little to reduce congestion on the existing system since the current situation on the waterway is characterized by lock operations at or near full capacity during the entire shipping year.

The study attempted to test that assertion with a preliminary analysis of monthly use of selected locks during 2000-2002 that examined queuing lengths and aggregate service time as a percentage of total available time. The analysis of queue lengths and their standard deviations provides a picture of what tow operators face upon arrival at the locks, and also indicates whether better predictability could spread demand and shorten some queue times. The "service time" calculations indicate the extent to which the examined locks have unused time which could be better used to schedule arrivals and shorten queues. Based on this analysis, the Volpe study report concluded that there appears to be significant opportunities to reduce lock congestion through a system of tradable lockage permits or other types of demand management options, and further study

of these options should be pursued. This conclusion is thus at odds with the findings of the draft feasibility study, which did not recommend further analysis of a system of tradable lockage permits as part of the final feasibility study report (although it did recommend further analysis of an appointment system for managing demand on the system).

Nevertheless, the Corps Institute for Water Resources (IWR) is currently sponsoring a number of research efforts that are examining several demand management options. For example, IWR is sponsoring with the U.S. Department of Transportation an ongoing effort by researchers at the University of Missouri at St. Louis to develop and evaluate an appointment system for managing lock use on the system. IWR is also sponsoring research involving the development of peak use and other models that would facilitate the examination of behavioral responses of lock users to congestion fees and other demand management options. And IWR has retained researchers at California Technical University to develop and evaluate a system of tradable lockage permits. Given that the NRC committee report favored development and evaluation of a system of tradable lockage permits for the UMR-IWW system, and the IWR is now pursuing such research, research considerations for this incentive-based option are outlined below.

5.4 Considerations for a System of Tradable Lockage Permits

5.4.1 Potential Benefits

The main purported advantage of tradable lockage permit system is that it would allow tow operators to plan and reserve in advance their use of locks for the next shipping season. To the extent there exists time periods when the locks are not heavily used, the effect of such master scheduling would be to smooth tow arrivals at locks throughout the shipping season. A second advantage is that lockage permits would provide an incentive for tow operators to increase the speed at which they pass through the locks, thus increasing the system's capacity to accommodate demand. According to the NRC report, "Allowing operators clear title to specific 5-minute blocks of time throughout each day of the navigation season and then allowing them to trade slots to schedule their own lockage sequences is the simplest, cheapest and most direct way to speed the flow of traffic on the UMR-IWW system" (National Research Council, 2001; page 107). A third advantage is that a system of tradable lockage permits would produce broader efficiency benefits by ensuring that users are able to secure priority access to locks for the highest-valued shipments.

5.4.2 Basic Design and Implementation Issues

A system of tradable lockage permits would be complex relative to the current open access, uncoordinated regime. Such a system would face significant design and implementation challenges relating to defining and allocating permit rights, and to establishing trading rules and facilitating trades. Among the important design and implementation issues that would need to be sorted out include:

- The desirable and feasible number of commercial lock passages per unit of time at specific locks or series of locks,
- The specific lock use rights to be granted by permits, and
- The parties to be allocated permit rights and the allocation method to employ.

In addition to these basic design and implementation issues, a number of political, institutional, and technical considerations affect the feasibility and potential benefits of establishing a system of tradable lockage permits. Some of the more important of these considerations are outlined below.

5.4.3 Political Considerations

The political acceptability of a system of tradable lockage permits depends largely on its expected net benefits to affected stakeholders as perceived by them. A wide variety of stakeholders have an economic interest in the UMR-IWW, including grain shippers and tow operators, other commercial entities that are directly or indirectly linked to the production or use of goods shipped on the system, local communities where affected commercial interests are located, and recreational boaters who use the system. While these entities now benefit from free use of the waterway, this subsidy encourages over-utilization that imposes implicit costs associated with traffic congestion. A system of tradable lockage permits, on the other hand, would impose an explicit cost for use of the waterway while at the same time reduce congestion costs. Stakeholders would thus accept a permit program only if they perceive their expected benefits under that demand management regime would be greater than their expected benefits in the absence of traffic management.

But as the NRC report points out, stakeholders' perceptions about their economic benefits of moving to a permit program would depend upon what they believe the navigation system would look like in the absence of the permit system. If stakeholders believe that they would have to operate within the current lock infrastructure indefinitely, then they would compare their expected net benefits from a permit program against their expected net benefits from the status quo situation. In that case stakeholders might perceive movement to a permit program to be in their economic interest and provide support for such a policy change. However, stakeholders' calculations of economic and political self interest will be much different if they believe the alternative to demand management is eventual expansion of lock infrastructure, largely at government expense. In the words of the NRC report, "If the [permit] program is viewed as delaying, or weakening the case for, lock extensions that otherwise would be forthcoming, it will be bitterly opposed" (National Research Council, 2001; p. 110).

5.4.4 Institutional Considerations

Institutional considerations for a prospective system of tradable lockage permits include questions about what authorities and institutions would be needed to implement and administer the system. The NRC report recommends that Congress, the entity holding ultimate authority and responsibility for determining public policies for inland

navigation, should instruct the Corps to fully investigate and consider tradable lockage permits and other non-structural options for improving traffic conditions on the UMR-IWW (National Research Council, 2001). Such a Congressional mandate may be needed in light of the fact that the draft feasibility study report for the UMR-IWW dismissed the lockage permit option for further consideration.

And to the extent that Congress deems a system of tradable lockage permits an acceptable and desirable means of reducing congestion on the UMR-IWW in the short term, the authority to implement this alternative would need to be explicitly granted by Congress. Such congressional authority would need to specify the implementing public agencies and the potential role of other institutions for policy design and implementation. As outlined above, some organization must assume the responsibility for determining and allocating permit slots, establishing trading rules and systems to facilitate trades, and for monitoring and enforcement. The NRC report suggests that these functions could be filled at least in part by public agencies such as the Corps or Coast Guard, or by a voluntary association formed by navigation interests (National Research Council, 2001). Some entity would also need to be designated as responsible for obtaining and allocating permits for recreational users and for scheduled lock maintenance activities.

The institutional structure of a system of lockage permits would also need to address the mechanics of monitoring and enforcement for the permit regime. Monitoring of tows entering and exiting the locks would be needed to ensure lock use is in accordance with permit rights obtained through initial allocations or trades. Enforcement of the permit regime would require the development and implementation of fines or other penalties for tow operators that violate trading rules or that exceed permit rights for allowable time in the locks, and such fines would need to be set at levels sufficient to discourage violations.

5.4.5 Technical Considerations

As noted earlier, the potential for a system of tradable lockage permits (or any other demand management alternative) to reduce lock congestion depends crucially on the existence of spare capacity on the existing system. To the extent that the UMR-IWW is now characterized by lock operations at or near full capacity during the entire shipping year, then a system of tradable lockage permits could do little to reduce congestion. The draft feasibility study and the Volpe report reached different conclusions on the issue of capacity utilization and thus the ability of lockage permits to smooth arrivals and service times at the locks, although in both cases these conclusions appear to be based only on preliminary analyses. A greater level of analysis of this issue would be needed to fully evaluate the potential benefits of a system of lockage permits.

The potential success of a system of tradable permit for alleviating traffic congestion also depends on the ability of the system to minimize transaction costs of bringing together buyers and sellers of permit rights. Tow operators must be able to readily and inexpensively obtain real-time information on the availability and prices of time-specific permits and executive trades. Currently available technologies such as Global Positioning Systems and the Internet could provide the means for establishing low-cost, real-time

trading mechanisms. The NRC report notes that "Public agency leadership in establishing real-time information channels for navigation users to trade permits would be essential to getting a trading program started" (National Research Council, 2001; p. 110). And experience with permit trading systems in other contexts has shown that transaction costs can be minimized if system design facilitates the emergence of private entities acting as information and trading brokers.

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6. ENHANCING RECREATION OPPORTUNITIES AT CORPS PROJECTS

6.1 Problem Context

The Corps is the nation's largest Federal provider of water-based and related outdoor recreation. Recreation is an authorized Federal purpose at 456 Corps water projects that host about 400 million visits annually, or roughly one-third of all recreation activity on Federal lands. Corps projects include over 4,300 recreation areas covering 12 million acres of land and water in 43 states. The Corps manages about 2,500 of project recreation areas, while state and local governments and other entities operate the rest. Recreation facilities provided by the Corps include campgrounds, picnic areas, swimming beaches, boat ramps, trails, and visitor and interpretive centers. In addition, over 400 private sector concessionaires provide supporting facilities and services such as marinas and bait shops (U.S. Army Corps of Engineers, 2002a).

Public recreational use of water and related resources at Corps lakes has increased dramatically over the last fifty years. In 1952, about 30 million recreation days (a visit by one person during a 24 hour period) of use were recorded (U.S. Army Corps of Engineers, 1990). Current use rates are thus over 10 times greater than rates recorded in the early 1950's. And public recreation use of Federal lakes is expected to continue growing by about 2% annually (National Recreation Lakes Study Commission, 1999).

Despite growing demand for lake-based recreation has grown, recreationists have become increasingly dissatisfied with the quality of recreation opportunities at Federal lakes. In response to these concerns, Congress in 1996 established the National Recreational Lakes Study (NRLS) Commission to review current and anticipated recreation demand at Federally managed, man-made lakes and reservoirs, and to develop recommendations for enhancing recreational use. Among the findings of the NRLS Commission was that the ability of Federal lakes to meet current and anticipated future demand while maintaining the quality of recreational opportunities is severely limited by the large and growing maintenance backlog for aging project facilities (National Recreation Lakes Study Commission, 1999).

Corps projects in particular are often characterized by dilapidated and inadequate recreation facilities. Recreation areas and facilities at over 40% of Corps projects were constructed 40 or more years ago and have not since undergone major rehabilitation. And over time the recreational facilities at many Corps-managed recreation areas have become functional obsolete and thus fail to serve the current needs of users. For example, campsite pads and utilities (e.g., electric outlets) were originally built for tents and tent-trailers, not travel trailers and motor homes now favored by the public that are much larger and require higher amperage electrical service (U.S. Army Corps of Engineers, 2001). And intensive public use of Corps-managed recreation areas has contributed to environmental problems relating to shoreline erosion and water quality degradation (Plunkett, 2000).

6.2 Nature of the Problem

Deteriorating and increasingly outdated Corps-managed recreation areas and facilities are the result of inadequate funding for routine maintenance and needed repairs, and a lack of funding for major rehabilitation. These funding problems can be traced to Federal budgetary constraints and the fact that recreation at Federal projects has generally been given lower funding priority than other authorized project purposes (National Recreation Lakes Study Commission, 1999).

Federal appropriations for the operation and maintenance (O&M) of recreation areas have remained flat over the last fifteen years, providing only for operating expenses and minimal upkeep (U.S. Army Corps of Engineers, 2003; National Recreation Lakes Study Commission, 1999). And importantly, the Corps has not been granted Federal appropriations for the rehabilitation of Corps-managed recreation areas. In 1999 the Chief of Engineers identified the modernization of Corps-managed recreation areas as an agency priority. This initiative, called the "Recreation Area Modernization Program" (RAMP), identified needed upgrades worth an estimated $330 million. The President's FY 2001 budget included $27 million for the Construction General account as an initial installment in the RAMP plan to spend $330 million over five years for recreation area modernization. However, Congress chose not to include funding for RAMP in FY 2001 appropriations (Bryson, 2001). And the Office of Management and Budget did not include RAMP funding in the President's budgets for FY 2002 and FY 2003 (U.S. Army Corps of Engineers, 2003).

6.3 Potential Incentive systems

The NRLS Commission concluded that, given limited Federal appropriations for water-related recreation, Federal agencies must develop alternative revenue sources for maintaining and upgrading the recreation areas and facilities they manage. The Commission pointed specifically to public-private partnerships and user fees as the most obvious opportunities for leveraging Federal O&M funding (National Recreation Lakes Study Commission, 1999). That conclusion appears to be echoed by legislation proposed in the 107th Congress (S.531 and H.R. 1013) that would establish a demonstration program at 20 Federal lakes where Federal managers would have the authority to "conduct any activity to experiment with permits, fees, concession agreements, and innovative management structures." Specific partnership and user fee options are outlined below.

6.3.1 Expand Public-Private Partnerships Through Lease Incentives

Public-private partnerships refer to contractual arrangements between public and private sector partners for the development, financing, ownership and operation of public facilities and associated services (U.S. General Accounting Office, 1997). Examples include the roughly 400 private sector concessionaires that have developed and operate recreation facilities at Corps projects under contractual agreements with the Corps. These facilities include restaurants, bait shops, marinas, and nature and visitor centers. In

principle, expanding these partnerships could help to upgrade recreation facilities at Corps projects at little or no financial cost to the Federal government.

One potential means to induce greater private sector involvement at Corps recreation areas is through lease incentives. Private concessionaires at Federal lakes complain that existing agency policies make it difficult for them to operate efficiently and realize a reasonable return on investment. The most common complaint is that the duration of lease contracts for private sector operations are not long enough to enable developers to amortize investments (National Recreation Lakes Study Commission, 1997). This limits the ability of private developers to obtain financing for investments in recreation facilities at Corps projects. Current Corps policies generally cap the length of concession leases at 25 years. Allowing for lease contract durations of up to 50 years would likely increase private sector investments in recreation facilities at Corps projects. Moreover, the relaxation of other existing lease restrictions, such as those relating to the types activities the private sector can sponsor and the prices they can charge for services, would also be expected provide incentives for greater private sector investment (U.S. Army Corps of Engineers, 1990). Policy reforms to implement some combination of lease incentives would likely expand private sector involvement in the expansion and improvement of commercial recreational facilities at Corps projects. However, such reforms would not address the deterioration of Corps-provided facilities that have no or little commercial potential, such public restrooms, boat ramps, campgrounds and picnic areas, nor would they address land and water quality problems at Corps-managed recreation areas.

6.3.2 Increase Recreation User and Permit Fees

The Corps charges fees for public use of its developed recreation sites and facilities under authority of the Land and Water Conservation Fund Act of 1965 (Public Law 85-578) as amended, and the Omnibus Budget Reconciliation Act of 1993 (Public Law 103-66). Specifically, fees are charged for the use of campsites and specialized “day use” facilities that include swimming beaches and boat launch ramps. Fees are charged for day use facilities individually and also collectively in the form of a day pass for use of all facilities at a project. Annual passes also can be purchased that enable holders and accompanying passengers to use all day use facilities at a project without further charge. Fee revenues are placed in a special recreation account at the U.S. Treasury and used to fund a portion of general appropriations for the operation and maintenance of Corps recreation sites and facilities.

The Water Resources Development Act (WRDA) of 1999 gave the Corps authority to receive back from the US Treasury any annual recreation fee collections in excess of $34 million, without any offset of general appropriations for recreation O&M, as a way to top-off recreation program funding. That is, WRDA 1999 allowed for annual user fee revenues in excess of the $34 million threshold to be returned to the projects from which they were collected on top of regular appropriations for recreation funding. Fee collections slightly exceeded that threshold in 1999, 2000 and 2002 (U.S. Army Corps of Engineers, 2003). The authority to have such “excess” fee collections returned to the Corps recreation program ended in 2002, however, and has not yet been renewed.

In addition to recreation user fees, the Corps charges fees for administering "shoreline use permits" that allow landowners adjacent to Corps projects to develop and use private boat docks at those projects. Permit holders pay a fee for permit processing once every five years. Since these permit fees are not considered recreation user fees, fee receipts are not deposited in the special recreation account at the U.S. Treasury and therefore are not earmarked for recreation program funding.

In 2002, the Office of Management and Budget (OMB) asked the Assistant Secretary of the Army for Civil Works [ASA(CW)] to investigate and implement ways to increase recreation fee revenues by $25 million annually (Tabb, 2002). In response, the Corps in 2003 raised day use fees to reflect the higher cost-of-living since these fees were first established in 1994 (U.S. Army Corps of Engineers, 2002b). Specifically, maximum per vehicle fees for day use of swimming beaches and boat launch ramps were each increased by $1 to $4 and $3, respectively. The fee rate for day use of all facilities in a park increased by $1 to $4, and the rate for an annual pass increased from $25 to $30 (see: ER/EP 1130-2-550, Chapter 9). The Corps expects that the new fee rates will generate an additional $3 million in fee revenue annually (Griffin, 2002). In addition, Corps Headquarters has directed district offices to review and adjust camping fees at individual projects to reflect the level of specific camping amenities provided by those projects and the fee rates for equivalent camping services charged by other recreation providers in the same locality. The Corps currently estimates that, when completed, this initiative will result in increased camping fees at many projects that in aggregate will generate an estimated $5 million in additional annual fee receipts (Griffin, 2002). And the Corps plans to seek legislative authority in the next WRDA round to use increased fee revenues resulting from higher fee rates for recreation funding without any offset from regular Federal appropriations for recreation (Rice, 2003).

Since the new fee rates will increase annual fee revenues by significantly less than the $25 million target sought by OMB, the ASA(CW) in 2002 asked the Corps to develop additional options for increasing fee revenues further (Tabb, 2002). The Corps consulted its Recreation Leadership Advisory Team (RLAT)—comprised of leaders of the recreation business function at the Major Support Commands and district and project levels--regarding options to increase fee receipts. One option favored by RLAT involves introducing an entrance fee at Corps projects as a substitute for existing day use fees. A preliminary analysis of this option concluded that replacing day use fees with a $6 per vehicle entrance fee (and a $40 annual entrance pass) could increase net use fee revenues by roughly $26 million annually (Griffin, 2002).

Another recommended option would re-designate the shoreline use permit (SUP) fee as a recreation user fee and raise the rate charged. The thinking behind re-designation is that SUP fees are charged for activities related to recreation use and thus should be classified as user fees. Such a change would redirect SUP fee revenues into the special recreation account at the U.S. Treasury, thus making them available in appropriations for funding recreation at Corps projects. A 1986 Corps study found that the actual cost to administer shoreline use permits for private docks was roughly 16 times more than the amount of permit revenue received (U.S. Army Corps of Engineers, 1990). Using that study's

estimate of the SUP fee rate needed to recover Corps costs, as updated for inflation, the Corps has preliminarily estimated that increasing SUP fee rates to recover costs would generate about $10 million in additional fee revenues (Griffin, 2002). The Corps' thinking on altering the SUP fee has since changed, however. While the Corps still plans to further investigate and possibly seek an increase in the SUP fee rate, the agency does not envision re-designation of that fee as a recreation user fee. Instead, the current Corps strategy is to seek an increase in SUP fee rates as a means to offset foregone revenue to the U.S. Treasury associated with the Corps' proposal to allow increased recreation user fee revenue to be returned to projects funding without offset of regular Federal appropriations for recreation funding (Rice, 2003).

Together, new initiatives involving 1) the introduction of an entrance fee, 2) an increase in the existing SUP fee, and 3) new authority for the Corps to keep some portion of increased fee revenues on top of general appropriations for recreation, form a promising approach for financing the modernization of recreation sites and facilities. A package of such reforms is considered in more detail below.

6.4 Considerations for Changing the Structure of Recreation User Fees

6.4.1 Potential Benefits

Introduction of an entrance fee to replace existing day use fees, coupled with an increase in the SUP fee to a level sufficient to recover Corps costs of permit processing, could generate substantial additional fee revenues. If some portion of additional fee revenues resulting from a new entrance fee were made available to Corps projects in addition to regular general appropriations for recreation, this could provide needed funding for recreation area and facility modernization while also increasing returns to the U.S. Treasury, as sought by OMB. A preliminary Corps analysis of specific rates for a new entrance fee and a revised SUP fee calculated that together these fees could generate roughly $36 million in additional fee collections annually. This would satisfy OMB's request to increase annual returns to the Federal Treasury by $25 while also providing $11 million in additional annual recreation funding if the Corps were given the authority to retain the remaining extra revenues. Moreover, allowing Corps projects to retain some portion of fee collections would create a strong incentive for project staff to develop an entrepreneurial approach to service delivery that encourages the reinvestment of revenues in facility upgrades and recreations services desired by project users (National Recreation Lakes Study Commission, 1999).

6.4.2 Basic Design and Implementation Issues

The design and implementation of a new recreation fee structure at civil works projects would face a number of important decisions. For example, the establishment of a new entrance fee to replace existing day use fees would need to confront decisions related to determining:

- Whether to charge fixed rates or differential rates for user fees (e.g., for peak versus non-peak periods of site use),
- The specific user and permit fee rate(s) to charge, and
- The fee collection mechanisms to employ.

One way in which the Corps could experiment with different design and implementation features prior to formulating and instituting a new fee structure program-wide would be to secure Corps participation in the existing "User Fee Demonstration Program". The intent of that program, which was established by Congress in 1996 and runs through FY 2003, is to allow certain Federal land management agencies (excluding the Corps) to test new methods of generating and collecting recreation user fees with the ultimate goal of improving customer service. The program gives participating agencies the flexibility to experiment with innovative fees and collection methods at agency-selected demonstration sites and allows participating agencies to retain all demonstration site fee revenues for reducing maintenance backlogs, with 80% of those revenues earmarked for the sites at which they were collected (National Recreation Lakes Study Commission, 1999). The inclusion of the Corps in this program has been proposed in bills introduced in the 107th Congress (S.531 and H.R.1013).

6.4.3 Political Considerations

A major consideration affecting the political viability of a new recreation fee structure at Corps projects relates to public acceptance. The American Recreation Coalition (ARC), a non-profit federation of recreation industry and user groups, supports recreation fees at Federal projects as long as they are fair, efficient, and fee revenues are returned to benefit the resources and facilities utilized by those paying the fees (American Recreation Coalition, 2003). And surveys of recreation users conducted annually by ARC have consistently found that users value their most recent trip to a Federal recreation site by $10-12 more than they actually paid (Crandall, 1998).

Experience with the User Fee Demonstration Program also suggests that the public generally is willing to accept higher fees for recreation services. The NRLS Commission, commenting on experience with that program as of 1999, reported that public acceptance of new and higher fees at demonstration sites had been generally high and levels of site visitation had not changed significantly (National Recreation Lakes Study Commission, 1999). A Corps study of the introduction of day use fees at Corps projects in 1994 found similar results (Calkin and Henderson, 1997). That study evaluated the introduction of day use fees at selected sites by comparing pre- and post-implementation user survey results and visitation levels. In pre-implementation surveys, site users expressed a high degree of opposition to proposed day use fees, with over 50% of respondents reporting that they would visit the site less than in the past if new fees were introduced. However, visitation rates increased at all surveyed sites over the 2 years following introduction of new fees, and in post-implementation surveys, site users reported considerably less opposition to the fee program.

Nevertheless, these general indications may mask considerable variation in the extent to which different segments of the population might oppose new or higher recreation fees at Corps projects. Some evidence on this comes from the "1995 National Survey on Recreation and the Environment", a portion of which examined public opinion toward user fees as a means of funding recreation services on public lands. The survey found that the majority of respondents favored user fees or a combination of fees and taxes to fund public recreation areas. However, logistic regression analysis applied using the survey data to examine socioeconomic factors explaining support for fees found that income has a positive and highly significant effect on public acceptance, implying that lower income individuals are relatively less likely to support user fees. Regression results also found that, independent of income level, African-Americans and Hispanics are less likely to support user fees in general than whites and Asians. These results are relevant for the Corps since lower-income individuals and members of certain ethnic groups account for significant share of total recreation use at some Corps projects (Bowker, et al., 1999).

6.4.4 Institutional Considerations

Among the important institutional challenges associated with introduction of a new entrance fee at Corps projects involves the establishment of adequate fee collection and accounting mechanisms. Prior Corps experience with fee collection suggests that the mechanism employed affects the degree of compliance and thus the level of fee collections. For example, at some projects the Corps now relies on "honor boxes" for the collection of day use fees whereby visitors self-pay by placing the required fee in an envelope that they deposit in drop boxes at day use facilities. While such mechanisms minimize collection costs, they might also encourage noncompliance to the extent that users perceive enforcement to be minimal or nonexistent. Indeed, dealing with noncompliance was the major problem encountered by the Corps in 1995-1996 following the introduction of day use fees (Henderson, 1996). A nationwide program to introduce entrance fees at Corps projects likely would require alternative fee collection mechanisms that strike an appropriate balance between administrative costs and enforcement capability. Allowing some portion of increased fee collections to be returned to the projects at which they were collected could help to pay for the implementation of new or upgraded fee collection mechanisms.

Other important institutional considerations relate to legal authorities. The authority to charge entrance fees at Corps projects would require new legislation, as would the authority to retain some portion of fee revenues at the projects at which they were collected. An increase in the shoreline use permit fee to a level that ensures cost recovery, on the other hand, could be implemented administratively (U.S. Army Corps of Engineers, 1990).

6.4.5 Technical Considerations

Various technical analyses would be required to support a change in the recreation fee structure at Corps projects. These include, for example, more refined analysis of the revenue potential from alternative fees and rates that considers the likely behavioral

response of users. This is in turn requires comprehensive analysis of demographic trends in the use of recreation facilities at Corps projects. Ongoing Corps research is filling this information need. In 1995 the Corps created the Ethnic Culture work unit to develop baseline information on ethnic minority use of Corps recreation areas. In the work unit's final technical report (Dunn and Quebedeaux, 1999) primary emphasis was placed on the development and implementation of focus groups and survey instruments for future data acquisition and evaluation. That research agenda is now underway as part of the Corps Recreation Management Support Program (Dunn, 2003, 2002).

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