NATIONAL WETLAND MITIGATION BANKING STUDY
First Phase Report

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National Wetland Mitigation Banking Study

This report is part of a series of reports which are being published during the National Study. General background information pertaining to wetland mitigation banking and the scope of the national study were the subjects of a report published during the first year of the study.

> *Wetlands Mitigation Banking Concepts IWR Report 92-WMB-1, prepared by Richard Reppert, Institute for Water Resources, July 1992, 25pp.*

A number of reports presenting the results of the first phase of the National Study are expected to published in 1994, in addition to this report. Appendix A of this report includes a full list of expected reports. Among these reports:

> *Wetland Mitigation Banking: A Resource Document IWR Report-94-WMB-2, prepared by the Environmental Law Institute and IWR. This document provides basic information on individual wetland mitigation banks. Included: (1) brief summary profiles of 22 case study banks; (2) brief characterizations of all banks inventoried; (3) brief descriptions of six fee-based compensatory mitigation programs; and (4) an annotated bibliography.*
>
> *Expanding Opportunities for Compensatory Mitigation: The Private Credit Market Alternatives IWR Report 94-WMB-3, prepared by Leonard Shabman, Paul Scodari, and Dennis King. This study looks at the economic forces affecting the market for mitigation credits. A framework that describes the factors affecting the supply and demand of mitigation credits is presented. Interviews with prospective entrepreneurial bankers were conducted along with interviews of respective regulatory and resource officials.*
>
> *An Examination of Wetland Programs: Opportunities for Compensatory Mitigation IWR Report 94-WMB-5, prepared by Apogee Research, Inc. Sixty eight programs that conduct or facilitate wetland restoration or creation were identified that might be applicable to compensatory wetland mitigation. Fourteen programs with the greatest potential were profiled in more detail.*

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EXECUTIVE SUMMARY

This interim report presents the accomplishments during phase one of the two phase National Wetland Mitigation Banking Study authorized by Section 307(d) of the Water Resources Development Act of 1990. The study is being conducted by the Policy and Special Studies Division of the U.S. Army Engineers Institute for Water Resources (IWR). Technical assistance is provided by the Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station. The study began in December 1991 and will be completed in 1995.

The loss of wetlands to development has slowed markedly in the past two decades. The advent of Section 404 of the Clean Water Act, with its provisions for the regulation of construction activities in wetlands, has had an important role in this improved wetland picture. Slowing the loss of wetlands has been achieved by requiring avoidance of losses through the consideration of non-wetland alternatives, the minimizing of losses by design changes and improved construction methods, and the compensation of wetland losses which cannot be avoided.

However, there are practical considerations which stand in the way of total wetland protection or total mitigation of wetland losses. Factors such as the size of individual wetland losses and the available opportunity to mitigate affect the feasibility or practicability of achieving total mitigation of all wetland losses. The mitigation of small wetland losses has traditionally not been required in cases where it is deemed difficult or impossible to mitigate on an individual basis or where there was no possibility for on-site mitigation.

Wetland mitigation banking was conceived as a means to improve on the individual piecemeal mitigation of wetland losses, many of which have gone unmitigated for reasons of practicability. Wetland mitigation banking presented development interests with an opportunity to mitigate such wetland losses by consolidating them and providing for their mitigation in relatively large blocks in an off-site location. This is the conceptual basis for banking. Banks are typically large blocks of wetlands--restored, created, enhanced, or preserved--with estimated tangible and intangible values termed credits. These credits represent a net gain in value over the condition prior to the wetland project. As anticipated development takes place, credits equivalent to the estimated unavoidable wetland losses are withdrawn or debited from the bank to compensate for the losses incurred.

Wetland mitigation banking, although practiced for more than fifteen years, is a concept still in its infancy. Nonetheless, wetland mitigation banks have demonstrated a capability to contribute to national wetland goals. Banking provides an alternative which can improve upon the compensatory wetland mitigation program by overturning some of the program's deficiencies attributed to the past piecemeal approach to mitigation.

Wetland mitigation banking is a concept with much promise. This report shows that banking, as practiced to date, has contributed, for the most part, only to very localized or site-specific goals. While the banking approach provides for a practical ecological approach to wetland regulation, banking can be improved upon. The report looks at the capability of banking as an approach that is sensible for no net loss <u>and</u> for wetland management with a watershed context.

Principal activities for phase one of the study were:

- A nationwide inventory of existing and proposed banks

- Detailed case studies and analysis of representative banks
- Analysis of fee-based compensatory mitigation alternatives
- Examination of the concept of private markets for mitigation banking
- Exploration of potentials for banking within a watershed planning framework
- Evaluation of potential to contribute to nation's wetland goals
- Determination of application of banking to Corps of Engineers programs
- Preparation of preliminary guidelines for the establishment, management and operation of mitigation banks for use in the Corps regulatory program
- Recommendations for the next study phase

The nationwide inventory of existing and proposed banks and subsequent detailed study of 21 of the approximately 44 existing banks provided an important database necessary for: (1) analyzing the institutional, technical, and operational aspects of banking; (2) assessing its utility as an environmental compensation tool for day-to-day use in the Corps regulatory program; and (3) determining its potential to contribute to the national wetland "no net loss" goal. IWR prepared standard procedures, for consistency and completeness, by which to gather information for the initial inventory and for the case studies. The inventories and case studies were conducted in large part by Corps of Engineers districts. However, the inventory was supplemented with data from ongoing surveys by other entities, and several of the case studies were conducted by consulting firms. The case studies provide the most complete information about specific banks. This point is very important since information transfer concerning specific banks has been marred to date by observations that are frequently incomplete or not validated.

Ten years ago there was a mere handful of wetland mitigation banks in existence in the United States. Today there are, by all accounts, more than the 44 identified in the initial inventory in 1992, with probably many more in planning than the 70 or so identified in 1992. All but a few of the banks have been established for the purpose of compensating wetland losses due to construction activity. This activity is regulated under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act and requires a Department of the Army permit issued by the Corps of Engineers.

Basic findings

Variety in arrangements. Existing mitigation banks represent a variety of institutional arrangements, although single-client banks sponsored by state departments of transportation are the most common at this time. Their defining characteristics are: (1) established to compensate for unavoidable wetland losses; (2) develop credits with which to compensate for these losses through one or more credit production methods (i.e., wetland restoration, enhancement, creation, and preservation); (3) provide for the deposit or "banking" of credits against which withdrawals can be made; and (4) compensate for multiple wetland losses by the incremental withdrawal of such credits and corresponding reduction of credit balances. However, beyond these essential traits, existing banks vary widely as to their specific objectives, type of sponsorship and clientele, and their mode of operation.

Performance. When examined individually, many banks seem to have deficiencies, whether in implementation or long-term maintenance. Many banks have operated in a deficit status. However, despite these apparent deficiencies, the majority are generally functioning as planned or have expectations to function. The reality of banking to date is approaching the initial promise of banking. These banks have accomplished much even though their planning often failed to provide for sufficient monitoring, liability, and enforcement. Further, within the last two years, a number of banks have

been established with long-term operation and oversight requirements that are much more specific than many of the early banks. It must be remembered that banks, for the most part, have been developed in a vacuum, in terms of a national policy. As better guidelines are developed and national policy is crystallized, banking should become more successful in terms of wetlands management and achievement of national goals.

Formal documentation. Most banks have some type of formal documentation which sets forth bank objectives, defines the roles and responsibilities of all participants and otherwise serves as the banking instrument or "charter." Memoranda of Agreement (MOAs) or Memoranda of Understanding (MOUs) are the types of formal documentation for most existing banks. Typically, the parties which are signatory to these documents are various Federal agencies, state natural resource and regulatory agencies, and the sponsoring agency or individual. The Corps was signatory to the formal banking instrument for just two of the initial one-dozen banks, and of the 44 banks in operation in 1992, it is signatory to no more than a third (through Corps permits and interagency agreements). Thus, despite the regulatory focus which banks have, with the exception of those banks which have a Department of the Army permit as their "charter," the Corps has not been in a commanding position in developing the ground rules under which the banks operate. The reason for this lack of involvement is that many banks evolved before mitigation banking became officially recognized as a mitigation mechanism and part of the regulatory lexicon.

However, formal documentation often takes another form, mainly general or individual permits. If bank establishment involves an activity which itself is regulated under Section 10 or Section 404, an individual permit is required under such a circumstance. Occasionally, the special conditions in such permits have served as the banking instrument. Not all banks involve regulated activities in their initial establishment. Many involve non-structural activities such as elimination of grazing, acquisition and preservation, or enhancement via timber stand improvement practices. Therefore, Department of Army permits may not serve as the sole type of documentation for banks.

National wetland goals. The 21 case study banks represent a slight "net gain" in wetlands acreage. This is by virtue of the fact that many compensation ratios provide for a greater than 1:1 replacement ratio. Whether this represents a "net gain" in functions is doubtful. The doubt as to whether a greater than 1:1 acreage ratio represents functional net gain is because ratios are used to account for or compensate for a number of factors, among them, the inability to replace all functions provided by the impacted wetland.

Among other study findings

Commercial banking. With very few exceptions, banks to date have not incorporated market-based mechanisms, and few commercial banks have been developed for general use. However, there is an increasing interest in market-oriented commercial approaches around the country. There are a number of prospective entrepreneurial bankers today, and at least two such banks are operational. However, prospective bankers are frustrated with what they believe are regulatory and resource agency postures not supportive of banking. That not withstanding, regulatory attitudes and policy basically will affect the success of entrepreneurial banking on a large scale. For example, in large part, the potential of private commercial banking (i.e., private credit market) hinges on allowing debits (or trades) to occur before wetlands restoration sites have reached full functional maturity. As a second example, some hold that a flourishing private commercial banking program will require strict regulatory enforcement along the entire spectrum

of compensatory mitigation that includes both the individual on-site mitigation efforts and mitigation banks.

An increasing number of wetland experts, environmental organizations, and resource and regulatory agencies are recognizing the significance of wetland mitigation banking and its potential to improve the nation's wetland regulatory programs. A number of organizations (from associations to public agencies) have called for pilot programs. Several public agencies plan to implement pilot programs to demonstrate mitigation banking. Some of these agencies want to promote entrepreneurial banking as way to restore their watersheds.

Wetland management. Part of this increasing awareness of the potential of wetland mitigation banking is the recognition that banking can support the nation's wetland goals if carried out with specific ecological goals in mind and within a context of recognized comprehensive watershed-based plans. Further, some believe that a broad-based trading system (i.e., a watershed-scale banking program or tradeable development rights program) for managing wetlands could maximize ecological benefits of wetlands within watershed contexts. Regulatory and resource programs could focus on health of wetland systems and achievement of wetland goals ("no net loss", "net gain") rather than simply protection of existing wetland landscape.

Wetland assessment and credit valuation. A viable bank contains credit in some form of currency and can be debited in that currency. Evaluation methods, then, define the units of currency, quantify credits and debits, and serve as the basis for many bank decisions. However, bank currency evaluation methods presently are inadequate to quantify many functions for many wetland types. This deficiency presents a significant obstacle especially to development of watershed-scale trading systems. However, improved and more comprehensive evaluation methods are being developed. While implementation of mitigation banking need not wait (and is not waiting) on the availability of structured evaluation methods, additional work is needed in crediting and debiting evaluation methodology as banking initiatives expand into the watershed and comprehensive planning arenas. In addition, tradeoff decisions will require better evaluation methods.

Conclusions.

An overall evaluation of banking thus leads to some important conclusions:

- When properly planned and executed, wetland mitigation banks may provide an effective means to mitigate the unavoidable loss of wetlands. Taken together, they can assist in our attempts to contribute to no net loss of wetlands by providing practicable mitigation alternatives.

- Actual results among existing banks are inconsistent and the overall record is marred by a significant number of failures.

- The Corps, as the principal regulatory authority, should assume a more direct role in bank establishment and the certification of credits, while providing continuous oversight in their operation.

Issues to be resolved and study opportunities

Based on the study findings, further study efforts as part of the mitigation banking study are feasible and well-warranted. There are still many opportunities offered by the mitigation banking concept that at present are not being realized, nor does it appear they will be in the near future. These opportunities and needs could be variously addressed in the next study phase by continued

development of banking guidelines, continued evaluation of commercial banking, modelling demonstrations, and specific topical studies. This report identifies several opportunities that mitigation banking offers to the Corps, other public entities, and the private sector which may not be realized otherwise. Issues to be resolved and potential contributions of the mitigation banking study are:

Continued evaluation of commercial (i.e., general use) banking.

- Commercial banking is seen by some agencies as a way to expand opportunities for accomplishing compensatory mitigation. There are varying ways in which commercial banking can be structured, and new types of arrangements are continually being developed. For example, commercial banking might be undertaken privately for profit (i.e., entrepreneurial), publicly, or by a combination of private and public interests. Prospective commercial bank sponsors are in need of general guidelines as to how to plan, design, and implement banks along with a catalog or list of the critical banking issues and basic components of commercial banks. Public agencies desiring to set up banks for either development or wetland restoration purposes also need to know what arrangements might best fit their respective situations. Also needed is an evaluation of the basis for monetizing credits, for example, for fee-based compensatory mitigation programs.

Assistance in application of a watershed framework and comprehensive planning to mitigation banking:

- Many experts are calling for implementation of wetland mitigation banks within a watershed planning context. There are a number of existing programs that involve or use a watershed framework and planning. The first phase of this study briefly reviewed some programs and found that Advanced Identification Programs (ADIDs) and Special Area Management Plans (SAMPs) have encountered obstacles such as objections of landowners and environmentalists. However, these programs still have the potential to facilitate mitigation banking. A critical evaluation of the potential for watershed planning to facilitate mitigation banking is needed.

- While watershed-based programs such as ADIDs and SAMPs can be utilized to incorporate mitigation banking within a watershed planning framework, there are many planning methodologies developed prior to this recent mushrooming interest in a watershed framework that may have application to watershed-based wetlands management and banking. The renewed interest in watershed-based planning for wetland protection and management could be greatly assisted by a review of the history of river-basin and other watershed planning methods. Watershed planning itself has different meanings.

- A basic issue related to watershed planning and its potential facilitation of banking (including mitigation supply credit markets) is the economic impacts and political viability of wetlands categorization in the context of watershed planning initiatives. An evaluation of the economic and political factors of watershed planning and wetland categorization will assist in the development of watershed frameworks and comprehensive planning approaches to be utilized in consort with mitigation banking.

Assistance in development of general guidance:

- Guidance is needed on issues and elements such as geographic scope and watershed relationships, compliance and financial assurances, systematic monitoring, review and approval procedures, and standardized banking instruments.

Enhancement and application of technical tools:

- Promulgation of wetland mitigation banking on wider scales than presently practiced is partially limited by technical deficiencies in: (a) credit and debit evaluation methodologies; and (b) application of tradeoff analysis methodology.

Information transfer:

- A very strong interest in banking has resource and regulatory agencies (local, regional, state, Federal) as well as prospective bankers and bank users interested in information on how to plan, implement, and operate banks. Much bank-specific information was collected through bank inventory and case studies. This information should be organized and disseminated.

- A number of banking programs that have innovative elements have been implemented within the past year. More are expected to be implemented in the very near future. A program that monitors selected banks around the country would provide invaluable information to the banking and natural resources community.

Corps of Engineers water resources development applications:

- Banking has not been utilized by the Corps water resources development program. There is potential for an expanded Corps role in wetland management. An expanded role could contribute towards the realization of national wetland goals, as well as provide ways of cost recovery for Federal participation in water resources projects. More active participation by the Corps water resources development program however, raises policy questions that require attention prior to expanded Corps involvement. The mitigation banking concept has promise especially for beneficial uses of dredged materials.

Next study phase

To capitalize on the above opportunities, the final study phase will provide the following products.

Evaluation of commercial banking:

- This effort will examine the different arrangements, operations, and possible contributions to achievement of national wetland goals by the full range of commercial compensatory mitigation credit supply ventures. Advantages and disadvantages of each type of system will be identified. Included in this effort will be a detailed economic analysis and evaluation of the components of fee-based compensatory mitigation systems specifically focusing upon setting of fees and the provision of wetland mitigation.

Watershed planning topical studies:

- Specific studies include: Watershed planning--assessing the progress; The watershed management approach; and

Non-regulatory options for watershed planning and wetlands management.

Guidance for Planning, Establishing, and Operating a Bank:

- Assistance to the White House Interagency Wetlands Workgroup in the preparation of unified guidance.

Enhanced Technology:

- Existing functional evaluation methodologies (as well as methodology in development) will be evaluated in terms of application to wetland mitigation banking.

- Other studies include:

  Application and enhancement of decision support methodology to assist in selection of bank objectives and sites based on watershed needs and opportunities.

Information Transfer:

- A Resource Document is already in preparation and is expected to be completed in Spring 1994. The resource document being prepared by the Environmental Law Institute will present a brief summary for each case study along with the generalized bank information. Also included will be an annotated bibliography of mitigation banking.

- A framework and program for monitoring selected banks will be developed to observe and disseminate information for specified banks. Suitable innovative banks (existing and proposed) will be identified and selected. An observation program will be developed for those sites. In addition to an evaluation framework, participating entities and responsibilities would be identified and an information dissemination program designed.

Corps water resources development applications:

- The second phase will continue exploring wetland mitigation banking applications to the Corps water resources development program.

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ACKNOWLEDGEMENTS

This report was prepared as part of the National Wetland Mitigation Banking Study conducted by the Institute for Water Resources (IWR), U.S. Army Corps of Engineers. Section 307(d) of the Water Resources Development Act of 1990 provided authority to the Assistant Secretary of the Army for Civil Works for the study.

The National Wetland Mitigation Banking Study is conducted within the IWR Policy and Special Studies Division, whose chief is Eugene Z. Stakhiv. This report and the national study has benefitted from Dr. Stakhiv's review and guidance throughout the course of the ongoing effort. Kyle Schilling is the Director of IWR. Richard Worthington oversees the study from the Civil Works Policy Division of the Headquarters of the U.S. Army Corps of Engineers (HQUSACE). The study is managed by Robert Brumbaugh, IWR.

Thanks go to numerous people who have helped the IWR study team gather bank information and who have provided invaluable reviews. The preparers of this report--Robert Brumbaugh and Richard Reppert--were assisted by Lynn Martin who directed several specific studies and provided review comments. Other participants on the IWR study team include Jim Comiskey, who also directed several studies, Margaret Gaffney, who helped to organize various bank data bases and assisted in the report production, and Robert Cantave and Brian Chromey, who also helped in the report production. Jean O'Neil of the U.S. Army Engineers Waterways Experiment Station (WES) also was a valuable member of the study team and provided technical assistance, as did Michael Passmore, on detail from the Walla Walla District to WES.

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Many others freely provided information and advice during the course of the study. With apologies to those who are not identified, the IWR study team is grateful for their input.

CHAPTER ONE. INTRODUCTION

This report describes the accomplishments during phase one of the two phase National Wetland Mitigation Banking Study authorized by Section 307(d) of the Water Resources Development Act of 1990. The study is being conducted by the Policy and Special Studies Division of the U.S. Army Engineers Institute for Water Resources (IWR), with technical assistance being provided by the Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station (WES). The study, which officially was initiated in December 1991, is scheduled for completion in 1995.

1. The Mitigation Banking Concept: Practice and Prospect

The loss of wetlands to development has slowed markedly in recent years. In the period from the mid-1950s to the mid-1970s, wetland losses averaged some 450,000 acres per year. By 1985, such losses had decreased by more than a third, to 290,000 per year (U.S. Department of Agriculture, 1987; Dahl and Johnson, 1991; Scodari 1992). The advent of Section 404 of the Clean Water Act, with its provisions for the regulation of construction activities in wetlands, has had an important role in this improved wetland picture. Slowing the loss of wetlands has been achieved by requiring the avoidance of losses through the consideration of non-wetland alternatives, the minimizing of losses by design changes and improved construction methods, and, importantly, the compensation of wetland losses which cannot be avoided.[1] Several Federal and non-Federal agricultural programs have provided incentives for not destroying wetlands and thus played a very important role in slowing the loss of wetlands.

However, regulation of development has not provided a perfect solution to the wetland loss problem--it was never intended to do so. Regulatory policies, which operate in the overall public interest, involve a balancing process in which needs and opportunities for environmental protection are balanced against needs and opportunities for economic development. Also, there are practical considerations which stand in the way of total wetland protection or total mitigation of wetland losses. Factors such as the size of individual wetland losses and the availability of opportunity to mitigate affect the feasibility or practicability of achieving total mitigation of all wetland losses. Under regulatory policies which have existed from the beginning of the "wetlands protection era", the mitigation of small wetland losses traditionally has not been required in cases where it is deemed difficult or impossible to mitigate on an individual basis or where there was no possibility for on-site mitigation.[2]

Enter wetland mitigation banking. Banking was conceived a little over 15 years ago as a means to improve on the mitigation of wetland losses, particularly those which traditionally have, for reasons of practicability, gone unmitigated. Wetland mitigation banking presented construction interests with an opportunity to mitigate such wetland losses by consolidating them and providing for their mitigation *en bloc* in a

[1] This regulatory requirement of avoidance, minimization, and compensation is collectively referred to as sequencing.

[2] As an example of the role of size in the regulatory process, Nationwide Permit #26, issued by the Corps of Engineers, authorizes the discharge of dredged or fill material in headwaters and isolated waters which do not exceed 10 acres in area, and no notification is required of developers when the area involved is one acre or less.

dedicated and specially managed area located off-site. This was, and continues to be, the conceptual basis for banking.

Wetland mitigation banking provides for the advanced compensation of unavoidable wetland losses due to development activities. The banks are typically relatively large blocks of wetlands--restored, created, enhanced, or preserved--with estimated tangible and intangible values, termed credits. These credits represent a net gain in value over a pre-wetland project condition. As anticipated development takes place, credits equivalent to the estimated unavoidable wetland losses are withdrawn or debited from the bank to compensate for the losses incurred.

Regulatory and resource agencies have recognized wetland mitigation banking as most amenable for the compensation of relatively small wetland losses caused by repetitive types of construction activity in which piece-meal losses may be minor but cumulative losses over time may be substantial. By virtue of the small size and usual location (of the losses) within established areas of development, such losses may not be feasible to mitigate on-site.

The National Wetlands Policy Forum (NWPF) in their 1988 report Protecting America's Wetlands - An Action Agenda (Conservation Foundation 1988) specifically advocated the establishment of banks to which permittees could contribute in order to satisfy wetlands compensation requirement. In essence, banks could be a tool contributing to their proposed national goal of "no net loss" of wetlands.

Wetland mitigation banking, although practiced for more than fifteen years, is a concept still in its infancy. Nevertheless, wetland mitigation banks have demonstrated a capability to contribute to "no net loss." This is evidenced by the fact that wetland mitigation banks to date contain more than 20,000 acres. This acreage, accumulated over approximately the last 15 years, is small in contrast to the net loss for that portion of wetlands lost to other than agricultural purposes, which is less than 140,000 per year.[3] However, this ratio is expected to increase rapidly.[4]

Thus, wetland mitigation banking provides an alternative which can improve upon the success of the compensatory wetland mitigation program. Practiced today in many regions of the country, wetland mitigation banking can overturn some of the deficiencies attributed to the past piece-meal approach to mitigation.

However, in spite of this alternative, wetlands still face major problems. A major problem faced by wetland protection and the Section 404 program is that wetlands are directly influenced by land use practices outside of the wetland. Not only activities immediately adjacent to the wetland, but those throughout its contributing watershed can impact it. For example, pollutants from agriculture, urban runoff or industrial facilities, individually or in some combination, can discharge to streams and into wetlands either through natural drainage or deliberate discharge. Development activities within the watershed can alter the hydrologic regime of the wetland in terms of quantity of flow, type of flow (surface or groundwater), flow periodicity, and sediment.

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[3] Agricultural development remains the factor responsible for the majority of wetland degradation and loss in the United States, although the rate of this type of loss has declined markedly over the past two decades. It should be noted that the proportion of actual loss rates for agricultural, urban development, and other types of development are not well established (Scodari 1992).

[4] The use of acres as a measure of wetlands points to a deficiency of a system that seeks to evaluate wetland gains and losses. To date, there are no satisfactory means by which to measure comprehensive wetland functions and net loss of those functions. Thus acreage has been a proxy for functional assessments for the most part.

Existing wetlands--reduced in size--are very susceptible to these non-wetland impacts. In some cases, residual wetlands isolated and fragmented and surrounded by housing, commercial, or industrial development face very limited futures in terms of viability.

Likewise, the success of a wetland project constructed as part of the Section 404 regulatory program in compensation for wetland losses incurred as a result of a development project (and non-compensatory wetland construction as well) may have limited success due to failure to plan the project in a landscape context, as well as technological deficiencies. The wetlands constructed on-site to compensate for wetland impacts may be isolated and fragmented resulting in functional degradation.

The banking concept could be utilized as a tool and contribute towards a larger effort to resolve how to conserve and manage wetlands in the face of these watershed and landscape-scale problems. Banking could contribute to a more far-reaching wetlands management effort than simply contributing to the protection of wetlands that is the hallmark of the contemporary national program. A more far-reaching wetlands management program was called for by the National Wetlands Policy Forum, in addition to advocating the establishment of banks. The Forum called for a national program to focus on the future, one that should consider the larger picture and not just individual piece-meal actions based on protection. Other organizations have called for a similar approach to wetlands conservation.[5]

Wetland mitigation banks may be a means to contribute to the development of a more integrated wetland management program. The means by which banking can be so utilized is furnished by their basic objective which is to replace functions and values of wetlands which are lost or degraded due to developmental activities. Instead of simply replacing what is lost, the replacement could be driven by resource management needs on a broad area-wide basis such as a watershed or designated planning area.

The Bush Administration charged the Domestic Policy Council to develop policies geared to the goal of no net loss of wetlands. The development of a market-oriented banking concept was included as a mechanism to facilitate achievement of the no net loss goal. In a market-based mitigation program, private entrepreneurs would create mitigation credits for sale to permit applicants in need of compensatory mitigation under Section 404. Basically, this concept would mesh development and environmental objectives. A large-scale program might produce market competition that could ensure wetlands [credits] were provided at least cost, and provide incentives for the further development of wetlands restoration science and technology. Market-based banks could pump in funds for restoration and management in locales where public funds are especially in short supply. Basically, no progress was made by the Domestic Policy Council in developing the Administration policy.

Recent developments however, continue to support the role of banking and point to opportunities for banking to enhance the management of our wetlands. In August 1993, the Clinton Administration announced a comprehensive package of improvements to the Federal wetlands program, including an initiative to increase the predictability and environmental effectiveness of the Clean Water Act regulatory program and help attain the no overall net loss goal, for which the Administration endorses the use of mitigation banks. The Administration also strongly supports incentives for States and localities to engage in watershed planning as a means to reduce conflict between wetlands protection and development,

[5] For example, the National Governors Association and the Association of State Wetland Managers.

such as when regulatory decisions are made on a permit-by-permit basis.[6]

Wetland mitigation banking is a concept with much promise. Indeed, as practiced to date, it has been a great improvement over previous compensatory mitigation efforts. However, this report will show that banking as practiced to date has contributed, for the most part, only to very localized or site-specific goals. While the banking approach provides for a practical ecological approach to wetland regulation, banking can be improved upon. Banking has not been utilized as an opportunity to address watershed or extra-local needs. This report reviews banking as practiced to date and explores the opportunities afforded by the banking concept that could contribute towards rational ecosystem management. The report will look at the capability of banking as an approach that is sensible for both no net loss (and net gain) and for ecosystem management.

2. Phase One Study Activities

Phase one of the study comprised the following principal activities which are summarized herein:[7]

- Nationwide inventory of existing and proposed banks
- Detailed case studies of representative banks and analysis
- Review of debiting and crediting methods
- Analysis of fee-based compensatory mitigation alternatives
- Examination of private markets for mitigation banking
- Exploration of potentials for banking within a watershed planning framework
- Evaluation of potential to contribute to nation's wetland goals
- Determination of application of banking to Corps of Engineers programs
- Preparation of preliminary guidelines for the establishment, management and operation of mitigation banks for use in the Corps regulatory program
- Recommendations for the next study phase

[6] White House Office on Environmental Policy, August 24, 1993, "Protecting America's Wetlands: A Fair, Flexible, and Effective Approach", 26pp.

[7] Several reports have been prepared or are expected to be completed as a part of the first phase of the study. A list of those reports is presented in Appendix A.

CHAPTER TWO.
NATIONWIDE INVENTORY

The initial study effort was a nationwide inventory of existing and proposed banks conducted in early 1992. The field phase of inventory was conducted by Corps districts using standard procedures prepared by IWR.[8]

Preparatory to the conduct of the inventory, it was necessary to define the term wetland mitigation bank. In this regard, IWR took the tack that in study of this nature, more can be learned from a broad, all inclusive definition, rather than a restrictive one. Accordingly, the inventory chose to enumerate any wetland mitigation scheme having the following general characteristics:

- possess deposits or a "bank" of credits against which withdrawals can be made for compensation purposes.
- compensate for multiple actions, incrementally.

The attribute of off-site location is frequently included as a defining factor, sometimes seemingly the defining factor. However, banking of credits for compensation of multiple actions need not occur off-site. Some banks provide for on-site, others for both off-site and on-site mitigation.

Another distinction which needed to be made in order to facilitate the inventory was bank status. A bank was regarded as "existing" if it physically existed, was under active management and had formal recognition in the form of a Memorandum of Agreement (MOA)/Understanding (MOU), a Department of the Army permit, or other form of regulatory recognition (however, credits need not to have accrued and be available for withdrawal at this point). A bank was regarded as "under planning" if it did not exist but was a bona fide proposal. At this point, a bank under planning could have some type of formal recognition even though it did not physically exist.

The IWR inventory was confirmed and augmented by inventories conducted by the Argonne National Laboratory and the Environmental Law Institute.[9]

The inventory identified 44 physically existing, actively operating banks and 68 more in the planning stage (as of Summer 1992). Location, sponsorship, and mitigation purpose of these banks are presented in Appendix B. The general location of existing and proposed banks are shown in Figures 1 and 2.

The wetland mitigation banking concept in practice is a relatively recent phenomenon as attested by the fact that the earliest formal agreement, the North Dakota State Highway Department Bank, was only signed in 1975.

[8] A concurrent inventory was conducted by the Argonne National Laboratory in a study prepared for the U.S. Department of Energy, the Gas Research Institute, and the Interstate Natural Gas Association of America. The most extensive analysis of wetland mitigation banking prior to this study was by Short (1988) which provided evaluations of 13 active banks with which the U.S. Fish & Wildlife Service (USF&WS) had an involvement up to that time. One of the earliest inventories was conducted by Comiskey and Stakhiv (1983) for the Institute for Water Resources. A number of surveys have been conducted within the last several years, including Kelley (1992).

[9] The Environmental Law Institute inventory was supported jointly by the U.S. Environmental Protection Agency and IWR (see Environmental Law Institute, 1993).

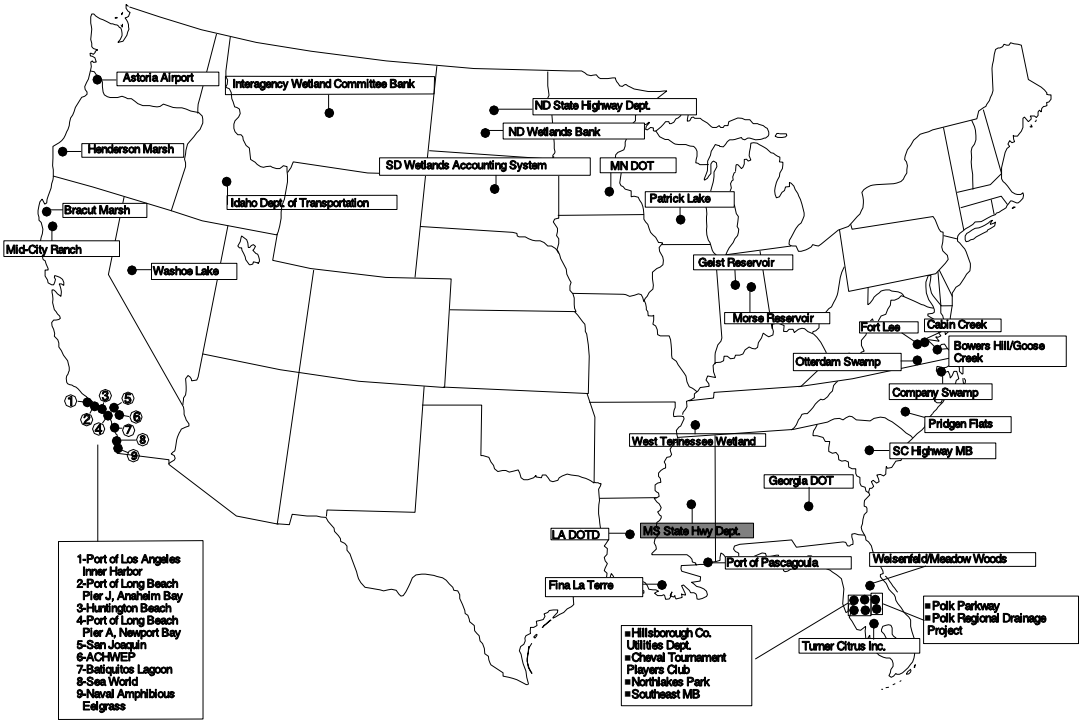

Figure 1. Existing Wetland Mitigation Banks, Summer 1992

Figure 2. Wetland Mitigation Banks Under Planning, Summer 1992

The 44 existing banks represent a more than eight-fold increase in number in 10 years, which attests to the viability of this mitigation tool in the regulation of wetlands development. Banks are expected to increase in number at an even greater rate under the impetus of the February 1990 U.S. Environmental Protection Agency (EPA)-Department of the Army MOA, and the recently manifested entrepreneurial interest in banking. They are also expected to increase in number because of the impetus provided by the 1992 Intermodal Surface Transportation Efficiency Act (ISTEA), which provides for federal funding of banking efforts related to state transportation programs.

Finally, the Clinton Administration comprehensive program for wetlands (announced on August 24, 1993) which includes an endorsement of mitigation banks should open the gates for many more banks and banking programs. As part of the announcement, the Office of the Assistant Secretary of the Army for Civil Works and the EPA released a document which provides general guidance of the use of mitigation banks as a means of providing compensatory mitigation for Corps regulatory decisions.[10]

[10] EPA and Department of the Army, August 23, 1993, Joint Memorandum to the Field on the "Establishment and Use of Wetland Mitigation Banks in the Clean Water Act Section 404 Regulatory Program."

CHAPTER THREE. CASE STUDIES

An important part of the first study phase was the conduct of 22 detailed case studies of existing wetland mitigation banks. This effort, which involved nearly half of the banks in existence at the time, provided a comprehensive data base with which to: (1) analyze the institutional, technical and operational aspects of banking; (2) assess its utility as an environmental compensation tool for day-to-day use in the Corps regulatory program; and (3) determine its potential to achieve the national wetland "no net loss" and "net gain" goals.

The case studies were conducted in large part by Corps of Engineers districts; however, several were conducted by consulting firms. In all studies, information was derived with the use of a standardized format developed by the Institute for Water Resources. The field phase of the case studies took place between May and July 1992. Relevant agencies and organizations were contacted for each of the case study banks.

The 22 case studies were selected so as to represent a cross-section of the various known bank types. Unfortunately, it was not possible to include an operational entrepreneurial bank for case study since none existed at the time. One entrepreneurial bank, the Springtown (California) Natural Communities Reserve, which was known to be close to implementation at the time, was included. However, this did not take place, with the result that the case study program produced usable date and information on a final array of 21 operational banks. The case studies provide the most complete information about specific banks.

Analysis of banking as practiced to date was aided by data gathered through the national inventory and by other study efforts such as the ancillary study conducted by the Environmental Law Institute (Environmental Law Institute, 1993) which was partially funded by IWR and EPA.

Essential findings are as follows:

1. **Types of Banks**

As a group, the case study banks have the defining characteristics of banks in that they: (1) have been established to compensate for unavoidable wetland losses; (2) develop credits with which to compensate for these losses through one or more credit production methods (e.g., wetland restoration, enhancement, creation and preservation); (3) provide for the deposit or "banking" of credits against which withdrawals can be made; and (4) compensate for multiple wetland losses by the incremental withdrawal of such credits and corresponding reduction of credit balances. These common defining characteristics also result in more or less similar roles and responsibilities, which are identified and described in the following section.

However, beyond these essential traits, existing banks were found to vary widely as to their specific objectives, their type of sponsorship and clientele, and their mode of operation. In fact, the extent of variation is far greater than was anticipated at the outset of the studies. The range of variation is sufficiently wide enough that it is legitimately possible to question the status of those which occur at the margin. For example, the North Dakota DOT "bank" developed out of an agreement whereby the North Dakota Department of Transportation would compensate for the loss of wetlands on which conservation easements were held by the U.S. Fish and Wildlife Service (USF&WS). In this case, credits from compensation projects have exceeded losses caused by highway projects so that a substantial

credit balance -- and satisfaction of one of the defining characteristic of banks -- has occurred.

Another example, the Henderson Marsh Management Plan on Coos Bay, Oregon, was developed for the compensation of individual wetland losses attributed to construction projects being carried out by the Weyerhaeuser Company. In this case, the development of credits in excess of those needed to compensate for a single wetland loss was not initially intended. Nonetheless, a "bank" of credits does exist, albeit a very small amount, which can be used to compensate for other wetland losses sometime in the future.

Still another example is the Pascagoula, Mississippi, Special Management Area, which has provided for the advanced compensation of wetland losses projected to take place with port development by preserving a functionally equivalent acreage of wetlands. In this case, existence of a large amount of credits with which to compensate for losses which will occur incrementally allows it to be regarded as a bank.

In none of these examples is the term "bank" actually used and banking as defined in this document was not one of their stated objectives. Nonetheless, IWR carried the case studies to completion and continues to include them in the inventory because they do satisfy the characteristics of banks as used in this study. They also illustrate the range of varied institutional, technical, and operational mechanisms which are embraced within this wetland compensation concept.

Existing banks can be categorized according to:

(1) their stated objectives and mode of operation, and
(2) the nature of their sponsorship and clientele.

Three categories of banks were recognized based on their objectives and mode of operation.

Debit banks. The objective of these banks is the advanced production of wetland credits and the expressed maintenance of positive credit balances which are then incrementally withdrawn for the compensation of piecemeal wetland losses. Because these banks have the defining characteristic of intentionally "banked" credits, they fit the textbook definition of banking and are frequently referred to as classic or *a priori* banks. These banks predominate to date.

Zero-balance banks. This category of banks provide for the piecemeal compensation of wetland losses on a more or less "pay-as-you-go basis" through the equally piecemeal production of credits. The initial intention of such arrangements is the compensation of individual wetland losses as the losses take place; however, such compensation typically takes place within a discrete area. In such banks the advanced production of a large block of compensation credits does not take place and therefore credits are not intentionally "banked." However, wetland management efforts which happen to be in excess of instant mitigation needs often **inadvertently** result in positive credit balances which are then "maintained on the books" as they are in *a priori* banks for the compensation of future wetland losses.

Accounting systems. The basic objective of these systems is to maintain running accounts of all wetland losses due to developmental and agricultural activities and to all wetland gains resulting from wetland restoration and creation projects taking place within a discrete area, normally on a statewide basis. In the single example of this type bank among the case studies, the North Dakota State Wetland Bank, which was established by state law, positive credit balances

may be made available for sale to agricultural interests who drain or fill wetlands as a compensation measure.[11]

Although their objectives and mode of operation may differ widely, the above systems have a single characteristic which qualifies them as wetland mitigation banks: the intentional or inadvertent banking or deposit of mitigation credits which can be incrementally withdrawn for compensation of subsequent wetland losses.

From the sponsorship/client standpoint, four categories of banks are recognized.

Single-client banks. In these banks, the sponsor (e.g., the individual or entity who initiates the bank and produces its credits) is also the principal credit user or client. An example of this category is the many highway related banks which have been established by state departments of transportation and highways for the principal purposes of compensating for wetland losses attributed to their own construction activities. This category of banks is represented by 16 of the 22 case study banks and also predominates in the overall inventory of banks. Another prominent example of the single client bank are those sponsored by port authorities.

Joint project banks. The objective of this type of bank is to compensate the wetland losses attributed to the construction activities of two more public agencies or combinations of public and private agencies. The pooling of resources provides for the more efficient production of compensation credits than would be possible separately and also allows wetland management efforts to be better coordinated with local and regional land use plans. Although joint project banks are relatively common in the overall inventory, among the case studies this category was represented by one, the Huntington Beach, California, bank.[12]

Public commercial (general use) banks. The objective of this type of bank is the compensation of wetland losses caused by a broad range of construction activity taking place within a particular area, usually in accordance with a general plan of development. The area is typically urban. Public commercial (general use) banks are usually sponsored by public entities to compensate for wetland losses caused by a combination of public works projects and private development. In a large sense, such banks are established as a public service function with private developers paying a fee for the use of their credits. Bracut Marsh in Eureka, California, and Astoria Airport, Oregon, are examples of a general use bank among the case studies. A third bank, the North Dakota State Wetlands Bank compensates for private agricultural drainage. Some fee-based schemes (in-lieu fees) may be included in this category. These schemes, which include a variety of institutional arrangements, will be discussed in more detail later.

Private commercial (entrepreneurial) banks. These are sponsored by private entrepreneurs with the purpose of making compensatory credits available for sale on the open market. The market (or clients) for such credits may include public or private interests. The only example of a

[11] The North Dakota State Wetland Bank maintains a large credit balance inasmuch as the accounting system includes the substantial wetland conservation programs of the U.S. Fish and Wildlife Service and the U.S. Soil Conservation Service which clearly are not intended to serve mitigation purposes. For this reason the bank is not officially recognized by the Corps of Engineers for purpose of compensating of wetland losses due to activities authorized under Section 404.

[12] This is truly a multi-party bank in that it was developed to compensate for respective wetland losses attributed to construction projects by the California Department of Transportation and the Orange County, California, Flood Control District. The official sponsor of the bank is the California State Coastal Conservancy and day to day bank management is by the Huntington Beach Wetlands Conservancy.

entrepreneurial bank among the case studies was the Springtown Natural Communities Reserve in California, which is however, not yet in operation.[13] [14]

Table 1 identifies the banks included in the case study program and cross-indexes them according to the above classification system.

Single-client debit banks are the predominant type of bank to date.

Although off-site location (i.e., remote from the site of wetland losses) is often regarded as one of the defining characteristics of banks, three of the case study banks are integral to the wetland losses: Port of Los Angeles Inner Harbor, California; Fina La Terre, Louisiana; and Henderson Marsh (Weyerhaeuser), Oregon.

2. Roles and Responsibilities

While the mitigation banking schemes vary widely as described above, banks generally contain the same basic roles and responsibilities as follows:

> Sponsor, client, and regulatory roles; long-term real estate interest; credit production and maintenance; credit and debit evaluation; and bank operation.[15]

Allocation of these seven roles or responsibilities varies bank to bank.

The sponsor, client and regulatory roles involve an interlocking relationship which can best be described when placed into a market context. The starting point in the development of a bank begins with a realization that a market for wetlands mitigation exists in an area. Demand elements in this market are in the form of (1) permitted construction activity, preferably of a repetitive nature, which results in the unavoidable destruction of wetland losses, (2) a requirement imposed by regulatory authorities (Federal, state or local) to compensate for such losses, and (3) lack of opportunity to compensate on-site. Supply elements are in the form of (1) existence of alternative opportunities located off-site, and (2) the necessary technical, human and financial resources to develop that opportunity. In this scenario, the respective roles of the sponsor, client and regulator are defined.

Sponsor. The sponsor is the conceptual and administrative brains behind a bank. Sponsors foster development of that market in various ways and assume prime responsibility to transform the initial idea for a bank into a physical and operational reality. In some cases, (e.g., a single client bank) the sponsor is a construction entity and has a vested interest in both the production of bank credits and their use for compensation purposes. In an entrepreneurial bank, the sponsor's interest is strictly in the production and sale of credits. Lying between these extremes is a form of sponsorship which resembles a third party relationship. This is best illustrated by general use

[13] As of this writing there are at least two entrepreneurial banks which have been permitted by the Corps--WET, Inc. (Georgia) and Florida Wetlandsbank. These banks have been permitted within the last year and a half. They were not formally recognized banks at the time the case studies were conducted.

[14] Fina La Terre, Louisiana, offers credits for sale to others. However, the majority of its credits are for mitigation of their own oil and gas activities.

[15] These roles and responsibilities were basically identified (although they were termed functions) by the Environmental Law Institute (1993). However those functions were labeled as follows: credit production; client; permitting; long-term property ownership; credit evaluation; and bank management.

Table 1. Classification of Case Study Banks

Sponsor/ client	Operational character		
	Debit banks	Zero-balance banks	Accounting Systems
Single client	Port of Long Beach-Anaheim Bay, CA Naval Amphibious Base Eelgrass, CA Washoe Lake, NV Idaho DOT Minnesota DOT Patrick Lake, WI Fina La Terre, LA Louisiana DOT & Dev Mississippi SHD Pridgen Flats, NC Company Swamp, NC Goose Creek/Bowers Hill, VA	Henderson Marsh (Weyerhaeuser), OR North Dakota DOT Port of Los Angeles, Inner Harbor, CA Montana DOT	
Joint project	Huntington Beach, CA		
Public commercial (general use)	Astoria Airport, OR Bracut Marsh, CA Pascagoula Spec. Management Area, MS (Bangs Lake & Middle River units)	Pascagoula Spec. Mgmnt Area, MS (Hwy 90 unit)	No. Dakota State Wetlands Bank
Private commercial (entrepreneurial)		Springtown Nat. Com. Res., CA (proposed)	

banks and joint project banks where typically a third party organizes a bank and facilitates the production of credits for other using entities (public or private) as a service function. The California State Coastal Conservancy, which has undertaken the establishment of several banks in that state, best illustrates this type of sponsor role.

The role of the sponsor has been described as conceptual and administrative in nature; frequently, this is of a more or less passive nature in which the sponsor functions mainly as a facilitator, with actual work accomplished by others on a contractual or other basis. However, in many instances (the many single client banks, for example) the banks are turn-key propositions with the sponsors actively involved in all facets of the establishment, maintenance, and operation.

Client. The bank "client" is the ultimate bank user, i.e., the entity who withdraws credits with which to compensate for the client's construction-induced wetland losses. The bank client need not have an actual "working involvement" in a bank unless he or she happens also to be the bank sponsor or manager (e.g., in a single client bank), **or** if a substantive role (for example, a requirement for monitoring and responsibility for corrective measures) is dictated under the conditions of a Department of the Army permit which is the client's authority to debit a bank for compensation purposes.

The impact which a Department of the Army Permit can have on the otherwise passive involvement of a client is illustrated by the Port of Long Beach, Anaheim Bay, California, bank. In that case, the terms of the permit issued to the Port

Authority require the Authority to actively monitor the progress of the bank, even though according to the Memorandum of Understanding, that housekeeping function was to be assumed by the USF&WS.

In cases in which the client is also the bank sponsor, both responsibilities are of course subsumed in that dual role. This convergence of roles is typified by the single-client bank described above, particularly the state highway department banks.

The regulatory role. This role is carried out in various ways. The initial development of banks often involves construction features (e.g., levees, dikes and dams and their appurtenances, filling, diversions, etc.) which are regulated under Section 10 and Section 404 and thereby require a Department of the Army Permit. Another level of permitting involves piecemeal construction which require the compensation of wetland losses. It is the special conditions in such permits which authorize the withdrawal of bank credits in order to accomplish such compensation.

In exercising this latter role, the regulator determines if proposed debiting of a bank is an acceptable form of compensation for the particular wetland loss which is involved. This necessitates drawing a comparison between wetland areas which are lost and the restored, enhanced, created or preserved wetlands which are available in a bank. Depending on the outcome of this comparison, the regulator may impose conditions on compensation in the form of proximity restrictions, the nature of replacement wetlands, and specific compensation ratios to accommodate temporal and other factors.

Requirements for monitoring and reporting on the status of compensation wetlands may also be imposed as permit conditions. Case studies indicate that in instances where the bank's authorizing instrument is a Department of the Army Permit, such conditions may be imposed on the bank sponsor, in which case they would apply to the bank in its entirety. However, in cases where the banking instrument is an interagency agreement (particularly one to which the Corps is not a signatory) rather than a Department of the Army Permit, such requirements occasionally are imposed on bank clients coincident with their authorization for the withdrawal of credits. The Anaheim Bay situation which was explained above is a case in point.

It must be pointed out that the regulatory role is a shared responsibility and does not rest with the Corps alone. Federal agencies such as the USF&WS, National Marine Fisheries Service (NMFS), and the EPA have mandated responsibilities in the regulatory process. So do state regulatory and resource agencies. Also, the public interest review process, to which all standard permits are subject, further broadens the regulatory role to include literally anyone with an interest in development of the waters of the United States and the concomitant mitigation of wetland losses.

When wetlands mitigation is viewed in a historical perspective, it reveals that many operational requirements contained in banking instruments, as well as regulatory decisions relating to the bank debiting originated not with the Corps but with other entities, most particularly the U.S. Fish and Wildlife Service which pioneered the early development of banking. Most older banks were developed without direct Corps participation, this point being illustrated by the fact that most older banks involve interagency agreements to which the Corps has not been signatory. However, these circumstances are rapidly changing with the adoption of national wetland protection goals which ultimately led to the 1990 EPA/Corps MOA and to the development of specific Corps policy pertaining to banking.

In explaining the regulatory role in wetlands mitigation, it is important to show how banks fit

into overall permit review and decision-making process. The decision to authorize a permittee to debit a bank for compensation purposes does not come until the work to be permitted is evaluated against a sequence of threshold requirements: water dependence and the availability of alternatives, the avoidance and minimization of environmental impacts, and opportunity to compensate for wetland losses on site. Thus, withdrawal of credits is authorized only following a determination that adverse impacts to wetlands are unavoidable and that opportunities for on-site compensation are lacking.

Land ownership and land use control. The form of ownership and land use control in existing banks is varied. In the majority of banks, sponsors own lands in fee. However, less than fee ownerships and long-term lease agreements between bank sponsors and landowners are also common. There also are cooperative undertakings between bank sponsors and public agencies that involve long-term leases or easements. For example, several banks are located on state and Federal wildlife refuges and on U.S. military reservations.[16] Actually, most of the case study banks are located on public lands of one type or another. However, this is not surprising given that, to date, public agency-single client banks (e.g., State DOTs) have predominated. Restrictive covenants and conservation easements, and reversionary clauses in deeds are also frequently used in banking. The various real estate arrangements generally have proved satisfactory for the effective implementation of banks and no problems specifically related to ownership and land use control aspects have been identified.

Bank longevity is related to the real estate aspect. Most banks have been planned and managed to exist in perpetuity. Life expectancy is explicitly noted in many banking instruments; however, in cases in which such reference is lacking, perpetual life expectancy is assumed based on the existence of conservation easements, restrictive covenants, and public ownership and management. Very few banks specify less than life expectancy.[17]

Credit production and maintenance. The root objective of wetland mitigation banks is to replace wetlands which are lost in either acreage or functional terms. This is done by means of four possible wetland management techniques: (1) restoring damaged or former wetland areas; (2) enhancing the quality of existing wetlands; (3) creating new wetlands in non-wetland areas; and (4) preserving existing wetlands which are under threat of destruction or are of particularly high value when compared to the value of wetlands which are lost.

The various wetland management techniques (or credit production methods) comprise technical specialties which call for the service of experts, and by and large, this is the experience of banking to date. Minimally, bank sponsors retain expert services for planning and design purposes and many rely on others for all work, including actual implementation and long term maintenance. In some cases, particularly banks which come under private auspices, this work is done under contract for a fee. However, banks which are publicly sponsored (the many DOT banks, for example) usually have access to related public agencies with mandated authorities in wetlands management and the necessary expertise to carry out their responsibilities. Commonly in state DOT banks,

[16] Case study banks on state and Federal wildlife refuges include Anaheim Bay (California), Louisiana DOT&D, Idaho SHD, and Mississippi SHD. The Washoe Lake, Nevada, bank is located within a Nevada state park. The Navy Eelgrass bank is located on the Naval Amphibious Base in San Diego, California.

[17] Less than life expectancy is specified for only two of the case study banks, Fina LaTerre (77 years) and the Middle River Unit of the Pascagoula Special Management Area (30 years).

it is the state's fish and game or natural resource agency which performs the credit production function.

Credit and debit evaluation. "Wetland credit" is a standard unit of measurement for quantifying the net gain in acreage or function which results from the various management methods noted above. A wetland credit may be some measure of functional efficiency or value such as a "habitat unit" or an acre of a particular type or quality of wetland. In banking at present, most functional measurement of credits is in habitat terms owing to the inability to properly evaluate other wetland functions. However, it is hoped that ongoing research in wetlands evaluation will soon permit the evaluation of other recognized wetland functions.

"Wetland debit", on the other hand, is the standard unit of measure for quantifying wetland perturbation or wetland losses. In a given banking situation, wetland debits are expressed in the same terms as wetland credits and are determined using the same methodology. Thus, wetland credits and debits constitute the form of currency which is used in banking transactions.

The credit and debit evaluator determines the credit value proffered by a bank as well as impacts (debits) to be mitigated by it. Since credit producers have a financial stake in maximizing credit valuation and clients have a stake in minimizing valuation of impacts, credit evaluation often is done by one of the permitting agencies or by an outside party such as another resource agency or an independent acting as a wetlands appraiser.[18]

[18] A Federal Highways Administration (FHWA) model memorandum of understanding developed in 1992 to assist state DOTs calls for the creation of a "Technical Subcommittee" which is composed of members from the state DOT, state department of fish and wildlife, and the local office of the Corps of Engineers.

Bank operation. A final role is that of bank operator or "banker". The banker maintains accounts of debiting actions and available credits. In **single-client** banks, this function is largely inseparable from the permitting process itself. In more complex schemes where several different parties are producing credits and several others are purchasing them, this role may be delegated to an independent entity. Significantly, the Corps has not undertaken this responsibility for any of the case study banks. Figures 3 and 4 show how roles may vary in two types of banks.

3. **Documentation**

Most banks have some type of formal documentation which sets forth bank objectives, defines the roles and responsibilities of all participants, and otherwise serves as the banking instrument or "charter."

Memoranda of Agreement (MOAs) or Memoranda of Understanding (MOUs) are the types of formal documentation for most existing banks. Typically, the parties which are signatory to these documents are various Federal agencies (the USF&WS almost universally, the EPA, and NMFS), state natural resource and regulatory agencies, and of course, the sponsoring agency or individual.

Despite their regulatory focus, the Corps typically has not been signatory to MOAs or MOUs and therefore has not been at the forefront in developing the ground rules under which they operate. Of the 21 case studies of operational banks conducted by IWR, the Corps is signatory to just five. The reason for this lack of involvement is that most of the long-established banks included in the case study program evolved before mitigation banking became officially recognized as a mitigation mechanism and part of the regulatory lexicon.

However, formal documentation can take another form, mainly general or individual permits, and

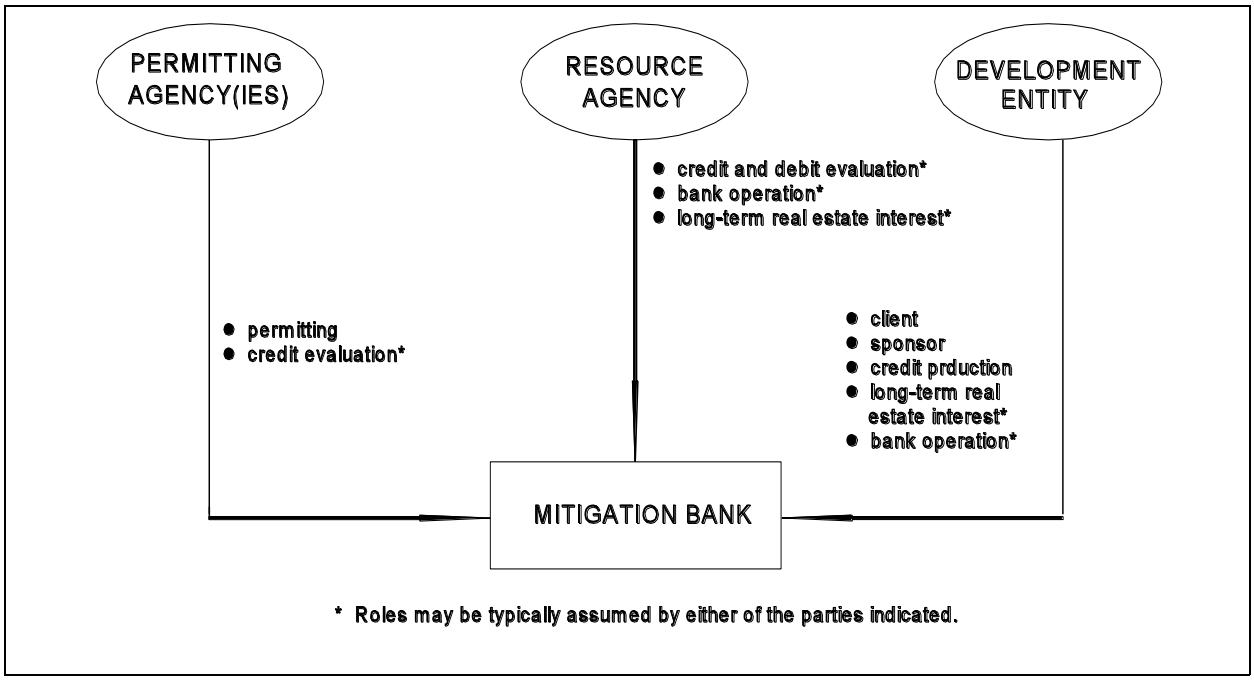

Figure 3. **Roles in Typical Single Client Bank (adapted from Environmental Law Institute, 1993).**

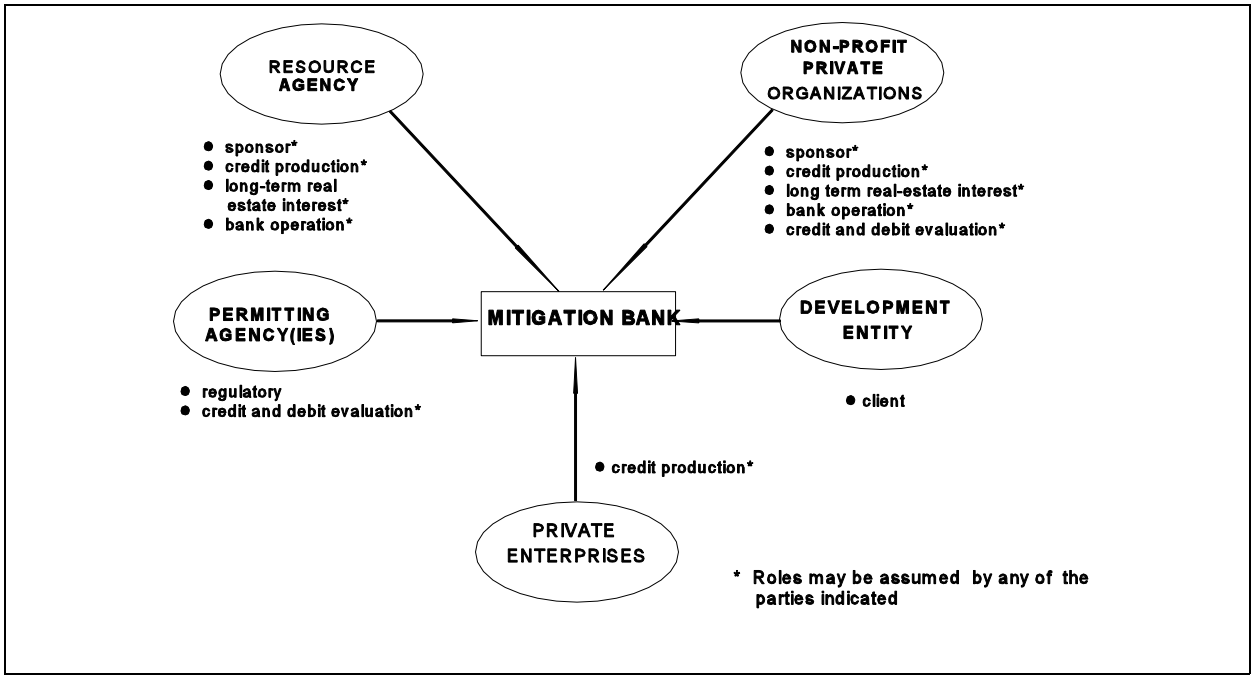

Figure 4. **Roles in a Typical Public Commercial (General Use) Bank (adapted from Environmental Law Institute, 1993).**

several of the newer banks have this kind of banking instrument. If bank establishment involves engineering construction which itself is regulated under Section 10 or Section 404, an individual permit is required under any circumstances. Occasionally the special conditions in such permits have served as the banking instrument. The Vicksburg District of the Corps of Engineers took an innovative approach for the establishment of a bank through its development of a general permit covering minor types of construction activity by the Mississippi State Highway Department. The general permit specifies mitigation of wetland impacts through establishment of a mitigation bank, and a bank management plan to which Federal and state agencies subscribe is included as part of the permit.

A number of banks involve "package deals" whereby permits cover construction work required for bank establishment and also double as authority to withdraw credits associated with subsequent piecemeal construction activity. In some of these cases, the banks were initiated as a result of project-specific mitigation that resulted in surplus credits which were then "banked" for later withdrawal and compensation of subsequent wetland losses. Examples include Goose Creek/Bowers Hill (Virginia), Washoe Lake (Nevada), and Geist Reservoir and Morse Reservoir Banks (Indiana).

Not all banks involve regulated activity in their initial establishment. Many involve non-structural activities such as elimination of grazing, mere acquisition and preservation, or enhancement via timber stand improvement practices. It is therefore evident that Department of the Army Permits could not become the sole type of documentation for banks, and MOAs, MOUs, and other forms of banking instruments will continue to be called for.

While MOA/MOU and Department of the Army Permits constitute two basic administrative alternatives that have been used to implement case study banks, other alternatives have been identified. For example, at least one bank with a corporate charter has been proposed--Chicago Homebuilders (Environmental Law Institute, 1993). As another alternative, banks have been and are being proposed to be operated directly under the terms of an enabling state statute or regulation. By mid 1993, at least nine states had statutes authorizing mitigation banks and at least eight states have explicitly addressed banking in regulations (Environmental Law Institute, 1993). The Oregon Mitigation Bank Act, for example, authorizes the Director of State Lands to create up to four pilot mitigation banks. The Act also says that banks must be publicly owned and operated. On the other hand, Maryland passed a wetland mitigation banking law in 1993 that encourages establishment of private mitigation banks. Also, banks have been established and are being operated according to procedures which have been administratively promulgated. Examples are the Minnesota DOT and Idaho State Highway Department banks.

One of the apparent needs by the regulatory community is a standard format to provide a degree of consistency in the review and approval of such documents. Such a standardized format would help streamline the bank development process.

4. **Credit and Debit Evaluation**

A viable bank contains credit in some form of currency and can be debited in that currency. Evaluation methods, then, define the units of currency, quantify credits and debits, and serve as the basis for decisions such as compensation ratios.

Among existing banks, debiting and crediting transactions are based on two basic currencies--acreage and functional replacement. Specific approaches for determining credits and debits are discussed in Chapter Four.

Functional Replacement. Debiting and crediting for about half of the banks involves the explicit

quantifying and replacement of lost wetland functions. Specific procedures for the evaluation of functions are discussed in the next chapter.

Acreage-based Measurement. For the remaining half of the banks, lost wetlands are replaced on an acreage basis and without the explicit consideration of wetland functions. Both in-kind and out-of-kind replacements take place. For in-kind situations, there is at least the **presumption** that functional replacement is effected at the same time. In out-of-kind replacement, although it is generally acknowledged that functional tradeoffs are involved, such tradeoffs may be unspecified.

A compensation ratio is the number of units of credit (functional units or acres) which must be debited from a bank in order to compensate, or replace, one unit of wetland which is expected to be lost. This points to the need to be able to quantify or determine what is being lost. In effect, the methods by which those losses are determined are used to estimate the compensatory mitigation credit supply, since credits and debits must be expressed in the same currency.

The majority of case study banks have no set ratios specified in the formal agreement. However, in actual practice, the majority of these banks with no set ratios have provided for at least 1:1 replacement. Several provide for a minimum 1:1 replacement ratio, with provision to negotiate upward on a case by case basis. Most ratios fall between 1:1 and 2:1. As a result we can say there is already a "net gain" in wetlands, at least in terms of acreage. Whether this represents a "net gain" in functions is doubtful.

The doubt as to whether a greater than 1:1 acreage ratio represents functional net gain is because ratios are used to account for or compensate for a number of factors. Among those factors are the following:

- Comparative value of dissimilar wetland types
- An incentive to encourage the creation or restoration of a particular type of wetland (e.g., favoring some out-of-kind trades in order to produce a gain in desired wetland type)[19]
- Favor restoration over enhancement or creation[20]
- Account for uncertainty of credit production methods
- Account for inability to replace all functions provided by the impacted wetland
- Comparative replacement time of dissimilar wetland types
- Stage of development of the replacement wetlands[21]

An important issue that has been raised in connection with a number of wetland creation projects is that creation of wetland from uplands may result in ecological losses in terms of upland flora and fauna. Deduction of these values from values created by a bank for such cases is difficult because of the strong difference in functions.

[19] The proposed Placer County, California fee-mitigation program has set high replacement ratios for particularly valuable wetlands, e.g., 3:1 for vernal pools and climax riparian wetlands and 2:1 for wet meadows and emergent and freshwater marshes.

[20] For example, EPA Region IV draft guidelines recommend that restoration have a ratio set at 2:1, creation 3:1, enhancement 4:1, and preservation 10:1, where detailed functional analyses are not possible.

[21] The Weisenfeld Bank in Florida has ratios ranging from 6:1 to 20:1, depending upon the success of the credits at the time of their use (Environmental Law Institute, 1993).

Some schemes may inherently account for the tradeoff in these vastly different types of functions through a relatively higher compensation ratio that may be required for creation.

The issues of uncertainty of credit production methods and the ability to replace all functions provided by the impacted wetlands points is related to the status of wetland science. For one, the science on how to create or restore wetlands is only generally understood. However, wetland restoration and creation experience (as well as success) varies by region and wetland type. Further, the technical and scientific facts about what actually works and what does not, has not been consolidated and made widely available to those that may need it (Lewis 1992). It should be noted that our wetland experience will be greatly expanded in the next few years by new programs underway in several Federal agencies.[22]

To date, restoration projects have been more successful than creation projects. Wetland restoration is believed to have a greater chance of recreating a full range of functions than wetland creation. However, some wetland experts point to the lack of success of creation projects as the result of poor quality of construction and not the result of natural factors.

As a second point, the intricacies of natural systems makes their duplication nearly impossible. However, some types of wetlands can be approximated and certain wetland functions can be restored or created.

[22] For example, the USDA, NMFS, and the USF&WS have developed programs in order to facilitate wetland restoration, creation, or enhancement. The Wetlands Reserve Program, the Forest Stewardship/Stewardship Incentive Program, the Coastal Zone Management Grant Program, and the National Coastal Wetlands Conservation Grant Program are examples of some of the Federal efforts which support wetland restoration, creation, or enhancement.

5. Physical Factors in Bank Siting and Operation

A. **Bank Siting Objectives**. Siting is a critical component of any wetland mitigation banking effort. The bank site has numerous legal, economic, social, and ecological implications and considerations. For example, bank siting may be a matter of maximizing the values and functions of a replacement wetland by choosing the ecologically optimal site. On the other hand, flexibility in siting is of primary importance for market-oriented systems. Bank siting may affect tax rolls, alter existing hydrology, attract wildlife in nuisance proportions, impact upon adjacent land uses, and be affected in turn by adjacent land uses. No national policies or regulations exist to guide bank site selections, although a number of existing and draft guidance documents do address siting and offer detailed recommendations.

Bank siting, to date, has mostly been on an opportunistic or *ad hoc* basis. Siting of many banks can be the product of a special circumstance or a fairly arbitrary decision. For example, many DOT banks involve mitigation on land already owned by the state agency. In some cases, the bank was created because of the site condition itself. Sometimes, banking is sought as a way to salvage value of a site that cannot be developed.

Site selection for most case study banks was not accomplished utilizing any real multiple site evaluation process (i.e., within a regional or watershed context). Typically, a site is chosen to be developed as a suitable bank, because of one or a combination of attributes. Two case study bank sites were identified, more or less, as a result of ecological need. In one case, a wetland was deemed to need protection--the Company Swamp Mitigation Bank in North Carolina. In the other case, banking was viewed as a means by which to accomplish the restoration of a degraded watershed--the Huntington Beach Wetlands Restoration Project in southern California. In other cases, site selection may be first driven by the

expected demand for some specific compensatory mitigation and subsequently by ownership and economics, or restoration potential and ecological need.[23]

For the case study bank sites that were planned and selected with some semblance of a regional or watershed context, site selection was generally based on multiple objectives, including local cooperation and acceptance, regional planning goals, cost, availability of sites (i.e., ownership), expected development, potential for restoration, and various ecological goals (replacement of specific habitats or wetland types).[24]

Several of the case study banks have multiple sites.[25] For these banks, site selection was achieved with varying objectives. In some cases, a number of sites were evaluated based on multiple objectives.

B. **Geographic Factors**. Among geographic factors particularly important in the siting of banks and the focus of much policy dialogue are the distance between the bank and the permitted development activities, hydrologic area limitations, bank size, and debit size.

(1) **Geographic range: distance limitations**. Banks typically specify geographic limits for debiting actions, but the distances vary widely. In general, there is tension between the desire of regulatory and natural resource agencies to replace lost wetland values and functions as close to the impacted site as possible, and the interests of private bank owners or clients in as large a geographic range as possible to maximize the size and fluidity of the market for credits. Banks that operate at a single jurisdictional level, such as the state DOT banks, may have fewer bank siting problems than independent banks. A state has a large region from which to choose its bank sites, a broader range of wetland ecosystems to mitigate, and more options for acquiring sites. A choice of compensation from among several sites would seem to result in relatively small distances between the impacted wetland and the compensatory wetland. If so, state DOT banks should have smaller geographic ranges for compensation than other banks. However, among the case study banks, the greatest distance of a bank from an impact site for DOT type banks was 250 miles, while the greatest distance among non-DOT type banks was 50 miles.[26] [27] The following will attempt to explain this contradiction. Many of the DOT banks are open-ended arrangements with no fixed acreage, and the tendency is to add separate parcels to the banking "system" as highway construction progresses (for example, the Minnesota DOT bank now has over 40 separate parcels located statewide). In their initial development stages, when these DOT banks consisted of just one or two parcels, the distance between sites of loss and mitigation was occasionally great -- up to 250 miles as indicated. However, as new banks or parcels

[23] Approximately two-thirds of the case study banks that are comprised by only one site fit this characterization.

[24] Astoria Airport, Oregon; Bracut Marsh, California; and the Port of Pascagoula SAMP, Mississippi.

[25] Idaho State Highway Department, Minnesota DOT, Mississippi State Highway Department Bank, North Dakota State Wetlands, and North Dakota State Highway Department banks.

[26] There are greater distances among the non-DOT type banks not included among the case studies. For example, the Batiquitos Lagoon Bank (Carlsbad, California) is approximately 80 miles south from the sponsor, the Port of Los Angeles along the southern California coast.

[27] The average distance for the 21 case study banks is about 23 miles, the median about 9 miles.

are added to these statewide systems, the distance factor has tended to narrow accordingly.

In terms of their political jurisdiction, there appears to be no question that wetland resources are the province of the state in which they are located. This fact dictates that normally the mitigation of wetland losses should take place within the same state, unless two adjoining states are parties to a banking agreement or interstate plan that have banks as a component. To date, no wetland mitigation bank has been implemented for compensation of wetland losses outside the state that contains that bank. Neither have interstate banking arrangements been proposed for any of the banks identified in the inventory as under planning.

(2) **Hydrologic area limitations**. Approximately one-half of bank MOA/MOUs specify compensation to wetlands within the same hydrological area as the bank. The remaining banks involve debiting across hydrologic lines.[28]

(3) **Bank Size**. Banks should be sized in accordance with their compensatory objectives, although wetland valuation and associated replacement ratios may also influence bank size. Wetland ecologists generally argue that wetland banks should be as large as possible to avoid habitat fragmentation and other causes of failure which are typical of small, isolated patches and tend to characterize project-specific mitigation. Large bank areas are much more apt to lead to self-sustaining ecosystems.[29]

Wetland mitigation banks range in size from less than one acre to over 7,000 acres,[30] and they are typically single parcels.[31] [32] While almost 20 percent of banks cover more than a square mile,[33] generally, banks are relatively small. While only one bank covers less than one acre, six of the 44 existing banks contain ten acres or less. The 21 case study banks average nearly 600 acres and have a median size of 60 acres. This does not vary much from the entire population of banks. The 44 existing banks average approximately 630 acres and have a median size of 33 acres. Many banks are capable of expansion in size and the corresponding capacity for compensation of wetland losses. This is particularly true of the DOT-type banks which, by and large, are open-ended and frequently add new bank units.

(4) **Debit Size**. The relatively small size of individual banks can be ascribed to the generally small size of individual debits.

[28] The Port of Los Angeles Batiquitos Lagoon bank is several watersheds away (two Accounting Units as defined by the USGS Hydrologic Unit Map of the United States) from the client site.

[29] This view is especially strongly supported by Willard, D.E. and A.K. Hillard. 1990. Wetland Dynamics: Considerations for Restored and Created Wetlands. In Wetland Creation and Restoration: The Status of the Science, Jon A. Kusler and M.E. Kentula (eds); pp.459-466. Island Press, Washington, D.C.

[30] Banks are relatively small. Case study bank average size is nearly 600 acres, with a median of 60 acres.

[31] The Minnesota DOT bank has 40 different sites aggregated into 9 accounts.

[32] The FHWA draft guidance for state DOT banks discourages multiple small sites essentially owing to problems of management, local coordination, and the possibility of future succession to non-wetland.

[33] Eight of the 44 existing banks contain more than 700 acres.

Debit sizes for the case study banks ranged from 0.005 acres (Bracut Marsh, California) to 63 acres (North Dakota DOT). Debits averaged 3.6 acres.

C. **Ecosystem Factors**. Among ecosystem factors particularly important in the siting of banks and equally the focus of much policy dialogue are the type of wetlands to be debited and constructed (basically, the in-kind versus out-of-kind issue) and the inclusion of upland habitat.

(1) **Wetland Replacement Practices: The In-kind Versus Out-of-kind Issue**. Policies relative to the nature of wetland replacements, such as the in-kind/out-of-kind question, vary from bank to bank. Out-of-kind replacement is specifically provided for in nine of the operational case study banks and seven prescribe in-kind replacement. The banking instruments for the remaining five banks state no preference; however, in actual practice, four of these have provided for in-kind replacement.

In-Kind Opportunities	Out-of-Kind Opportunities
• **Provides same habitat lost to development with generally similar set of functions** • **Least alteration of local hydrology**	• **Can replace historic assemblage presently gone** • **Allow "trade up" to a higher-value wetland to achieve broader watershed-enhance-ment or wildlife management goals or to maximize specific desired functions**

Replacement practices are somewhat related to the methodology which banks use for credit and debit evaluation. Thus, those which use a functional evaluation scheme--the Habitat Evaluation Procedures (HEP), for example--generally are better equipped to handle out-of-kind replacement, with the actual replacement of lost habitat units accommodated with varying compensation ratios. Those banks which operate on an acreage basis tend toward in-kind replacement, and with more or less fixed compensation ratios.

The in-kind/out-of-kind question is currently subject to much discussion, particularly when wetland mitigation banking is viewed in a watershed context. There is a growing belief that banking (and similar types of mitigation strategies such as fee mitigation, joint projects, etc.) has the potential to restore the historic wetland assemblages within discrete watershed areas, thereby restoring their lost ecological, economic, and human use values. Moreover, some believe that watershed scale wetlands restoration can best be achieved by adopting flexible rules relative to wetland replacement, and ones which will expressly allow trading off one type of wetland for another.

Although participants in the national symposium on Wetland Mitigation Banking in June 1992 favored presumption in favor of in-kind replacement for function and wetland type, most believed the decision should really be made on a case-by-case basis, that is, out-of-kind might be favored if it made "ecological sense" or provided a wetland not presently in the watershed or region (Association State Wetland Managers, 1993). The Environmental Law Institute presented similar conclusions implying that out-of-kind mitigation is appropriate if there are wetland plans (Environmental Law Institute, 1993). Although case study banks generally have not been designed with a watershed context in mind, IWR believes that in the future, design and implementation of wetland mitigation banks will be strongly influenced by such considerations and related goals.

Central to any discussion of in-kind or out-of-kind replacement of functions are the Section 404(b)(1) Guidelines which emphasize the existence of multiple wetland functions. The ability to replace lost wetland functions and values in-kind may not be possible in all wetland mitigation banking situations. Nor is it necessary or desirable to do so as long as basic compensatory mitigation goals are met. Implicit in this objective is the ability to effect tradeoffs among wetland types, functions, scales of quality, and acreage in the development of bank crediting and debiting arrangements.

(2) **Non-Wetland and Aquatic Inclusion**. Banks should be located within a landscape (including larger land areas with buffers) context that provides a reasonable confidence of success. Inclusion of non-wetland (upland) areas may be especially desirable for a wetland project for which the attainment of its objectives requires a specific wetland-upland interface. Buffers might be considered in the same manner as the need for set-back requirements of local zoning and planning ordinances. Several case study banks consider non-wetland environments in determining debits and credits. Generally, this non-wetland environment consists of upland fringe (e.g., prairie) which provides specialized habitat for wetland species and also serves buffering functions. In these cases, HEP analysis may include evaluation of total species range requirements, both wetland and upland, at both bank and debit areas. For example, the proposed Chicago Homebuilders banking MOA establishes the criterion of "buffer areas contiguous to the wetlands to protect them from potential adverse affects of adjacent land uses" (Environmental Law Institute, 1993).

The inclusion of deepwater habitat within a bank may be planned and credits accorded if beneficial effects can be clearly demonstrated. For example, deepwater areas satisfy the life requisites of many traditional wetland species and provide essential habitat for fish.

In some banks, particularly those in which credits are expressed as functional units (e.g., habitat units), no direct credits are assigned to such habitats. However, the habitats are accounted for in the valuation of adjacent wetland habitats. In other banks, particularly those in which credits are expressed in areal terms, non-wetland habitats frequently are included as part of an overall habitat mosaic and are valued accordingly.

6. Wetland Management Measures: The Preservation Issue

Preservation is generally not regarded as one of the principal wetland replacement objectives, that is, a way of amassing credits in wetland mitigation banks.[34] It is seldom used as the sole basis for credit production. Only three of the 21 operational case study banks use preservation as a sole basis for credits. At Company Swamp, North Carolina, preservation was justified on the grounds that the banked wetlands were under an imminent threat of clear-cutting. At Pascagoula SMA, Mississippi, the banked wetlands had exceptional values assured by preservation through their acquisition and management by a responsible public agency. At Fina LaTerre, credits were justified for marsh management work necessary to prevent conversion of the area to open water naturally. Fina LaTerre utilized structural protection measures to achieve preservation.

Preservation is frequently used to supplement other credit production methods (e.g., in the range

[34] Some groups categorically dismiss preservation as a banking measure on the grounds that it does not result in the net increase in the supply or value of wetlands.

of 10 to 15% of total credits).[35] Such nominal amounts of preservation credit are commonly included to recognize the automatic curtailment of abuse and the "intrinsic public good" which often characterizes the acquisition of wetlands and/or their dedication to banking purposes.

7. Bank Operation and Success

The term "success" refers to the achievement of the technical wetland management goals in a bank and the accomplishment of its wetland replacement objectives. The "success" of each case study bank was evaluated in terms of whether the bank had been implemented and was being operated as originally planned. The case study preparers did not conduct their own functional evaluations. Case study preparers consulted with relevant bank participants in determining bank success.

The majority of case study banks have proven technically successful, at least within the limited time span that many have been operating, and credit balances have been adequate to cover required permit conditions. However, success was not automatic in 8 of the 21 operational case study banks and deficits resulted.[36]

When banks are established, there has been a decided tendency to **presume** the success of wetland restoration, enhancement or creation efforts, and the automatic availability of compensatory credits. Frequently, this has been accompanied by the concurrent approval of credit withdrawal to compensate for wetland losses associated with permitted activities.

To their credit, most of the case study banks, upon failure to produce credits, suspended operation pending remedial efforts. In some cases, such as one of the Idaho DOT bank sites, the cause for bank failure is natural (persistent drought) and thus not capable of a "quick fix." In other cases, the problems result from inadequate planning, engineering, and construction and call for intensive, time-consuming corrective measures. In still other cases, no corrective measures have yet been undertaken to put the banks back into "the black". The net result of these circumstances are deficits and failed compensation efforts, which have persisted in some instances more than 10 years. This is hardly in the public interest.

Five of the eight banks which had questionable credit balances or are known to be in a deficit status have provisions for systematic monitoring written into their banking instruments. In fact, in most cases the technical problems were detected as the result of such monitoring. Some of these same banking instruments also contain provisions for remedial measures in the event of failure.

In general, mitigation projects fail for two main reasons. First, the project may be improperly sized, designed, or constructed. Second, a functioning project may be damaged by subsequent events. Both of these causes of failure require attention at the outset of a banking scheme. The following specific reasons have been cited for bank failure or inability to function as intended:

- Inadequate site analysis, poor engineering, and planning
- Faulty construction which led to poor hydrologic regimen

[35] Six of the 21 operational case study banks include preservation as a basis for credits.

[36] Compared to assessment of the success of individual mitigation efforts, which has been difficult for a number of reasons including appropriate documentation and follow-up monitoring, assessment of success of mitigation banks is a much easier task. The assessment of mitigation banking operations (and success or lack thereof) is based largely on the findings of the 21 case studies which allowed focused documentation and study.

- Inadequate hydrologic conditions (area-wide drought)
- Debiting before monitoring could assure success
- Lack of a formal banking agreement detailing roles and responsibilities

Why mitigation fails:
four general categories

- **Technical (planning, design, and construction)**
- **Physical (hydrology, droughts)**
- **Management (monitoring)**
- **Administration (agreements)**

The most common failure is improper design or construction of the bank's hydrology. This common problem is more prevalent for some types of wetlands than others. For example, emergent wetlands surrounding open water should require less precision than forested wetlands.

Site difficulties also arise from failure to consider surrounding land uses that may impair the long-term viability of the mitigation site. Banks without upland buffers or that are surrounded by impervious surfaces can quickly convert to uplands or become pollution sinks. Other common problems that banks may face (similar to project-specific mitigation) include construction-related accidents, vandalism, natural disasters, ice damage, off-site activities, exotic species infestations (e.g., plants, grazing animals, or insects), diseases, and debris accumulation.

The case study experiences indicate that the risk of total or partial failure runs higher in banks which place a heavy reliance on hydraulic engineering features and uncertain water sources, than on banks that are self-sustaining. The record affirms the value of self-sustainability.

8. Credit and Debit Status of Case Study Banks

The credit and debit status for the 21 operational case study banks was examined. The status for banks in which credits are expressed in acreage was distinguished from those functionally-based credit banks, because of the statistical incompatibility of those two accounting types.

The seven case study banks that utilize functional evaluations to assess credits had been debited for about 15 percent of the accumulated total credits (as of Summer 1992).[37] These banks cover approximately 13,300 acres.[38] Thirteen case study banks that measure credits on an acreage basis had amassed credits of approximately 1,950 acres.[39] About 39 percent of those credits had been debited for compensation purposes.

The fact that credit surpluses range between about 85 and 61 percent may be misleading for several factors. First, one exceptionally large bank, the Fina La Terre bank, comprises over 58 percent of the combined functionally-based credits and over 52 percent of the combined area for those same banks. If this one bank is deleted from the analysis, nearly 30 percent of the amassed credits have been debited for compensation purposes. Second, the credits (and debits) are in various

[37] An additional bank, the Idaho DOT bank uses a habitat rather than acreage basis for crediting and debiting. However, final evaluation has not yet been made. Acreage data are available, and thus is included in the acreage-based group.

[38] See above footnote.

[39] This does not include the North Dakota State Wetlands Mitigation Bank. Its 5,000 acres of credit production represent an amalgam of wetland management measures that are conducted for various purposes and typically not for compensatory mitigation purposes. As of July 1992, there were debits totalling 575 acres against the total credits.

types of functional units. In most cases, they are habitat units (HU) or average annual habitat units (AAHU).[40]

Finally, these credit balances are most likely less, possibly substantially less, because for some banks, the credits which were computed at the time of completion of bank development never did accrue as anticipated owing to various degrees of bank failure. These banks suspended operation.

9. **Monitoring and Responsibility for Success**

A. **Monitoring and Enforcement**. As indicated above, some banks have formal instruments that call for some type of monitoring and remedial action in event of problems or failure. Thirteen of the 21 case study banks provide some **formal** basis for systematic monitoring or evaluation of bank success and for remediation of failures. These specific provisions are borne in MOA/MOUs for nine of the thirteen banks; Department of the Army permits effect monitoring for three case study banks.[41] These formal requirements may have provisions for needed structural improvements and adjustment of crediting and debiting arrangements. However, in an additional seven case study banks, some level of monitoring has been conducted on a more casual basis.[42] In two cases, Bracut Marsh, California, and Fina LaTerre, Louisiana, monitoring resulted in the identification of problems which required extensive remedial measures.

An important issue is determining what legal authority the enforcement will be based upon. Whereas the Corps of Engineers can enforce a Section 404 permit against a discharger (bank client), the bank (e.g., credit producer, bank manager, landowner) may not be a party to the Section 404 permit. A MOA/MOU is the basis for enforcement for some banks, although the enforceability of an MOA/MOU is not well settled. Among the broad array of enforcement tools employed by banks are: use of a milestone clause in the bank agreement; provisions for revision of credits after review of monitoring reports; and financial assurance.

There appears to be broad agreement that responsibility for bank success rests with the permittee. However, the identity of the permittee is often obscured by the fact that banks frequently involve two distinct types of regulated actions; one carried out by the bank sponsor/credit producer in the initial bank establishment and the other by the individual developers who incrementally withdraw credits from the bank (debit) for compensation purposes. With the advent of entrepreneurial banks, a call for assigning the responsibility for compliance to the bank sponsor will likely occur along with requirements for some sort of financial assurances.

B. **Financial assurances**. Few banks have any provision for financial assurance. No case study bank provides such assurance. Financial assurance can be provided in a variety of forms: surety bonds, trust funds, escrow accounts, sinking funds, insurance, self-bonds, and corporate guarantees. For example, the Mission Viejo/ACHWEP bank (California) has an $800,000 bond posted by the client/credit producer with the county to assure that construction and vegetation development is carried out. As certain vegetation milestones are reached

[40] In the case of Astoria Airport, the functional units represent relative ecological values derived through analysis of wetland productivity and diversity.

[41] In one case, monitoring is called for in both an MOU and a Department of Army Permit--Anaheim Bay, California (Port of Long Beach, Pier J).

[42] In two cases, monitoring was in the form of independent studies by outside interests. In the latter situations, there was no assumption of responsibility for success.

over five years, incremental portions of the bond are released. The first permitted private market-oriented bank, the WET Mitigation Bank in Georgia, also has a multi-stage performance bond.

Another approach is through a trust fund which is primarily aimed at providing sufficient funds for maintenance and contingencies, not at providing an incentive. The Batiquitos Lagoon bank provided a trust fund to which the client was to have provided a $15 million initial contribution for construction, operation, and maintenance for the first thirty years. A separate fund administered by the bank operator was to build interest so that thirty years later, the interest of the accrued principal could thereafter generate annual maintenance funds (Environmental Law Institute, 1993).

C. **Summary**. Formal provisions for bank monitoring and evaluation and for the clear assignment of responsibility are essential to the assurance of success in wetland mitigation banking. While case studies show that responsible agencies and private concerns tend to act responsibly in the absence of forcing mechanisms, the public interest in wetland protection can best be served by including such provisions in formal documentation for banks.

Moreover, these requirements and assurances should be stipulations within the basic banking instrument. While studies show that individual Department of the Army Permits authorizing withdrawal of credits can be the vehicle with which to effect monitoring, this runs the risk of taking place too late in the process to be of benefit to bank management. Ideally, monitoring should coincide with initial establishment and continue throughout its formative stage.

10. **Regulatory Impacts**

How has banking affected the conduct of the Corps regulatory program? The thirteen Corps districts which were involved in the case study program most frequently reported no change in regulatory level of effort as a result of the case study wetland mitigation banks. On the other hand, four districts reported a **reduced** level of effort. This was attributed to the fact that the pre-existence of such a mitigation "facility" reduces the time which would ordinarily (i.e., in the absence of a bank) be required for the review, monitoring, and evaluation of individual mitigation efforts. Two other districts reported an **increased** level of effort, but for the exact opposite reasons; the banks with which they are involved actually demand more staff time for review, monitoring, and evaluation purposes than do individual mitigation efforts.

The reliability of this assessment is questionable inasmuch as the Corps as a whole has relatively little experience to date with wetland mitigation banking. However, it is generally speculated that banks bring greater efficiency to the overall regulatory process. The Corps, as well as other public agencies and the general public who participate in the permit review process, should be benefiting by the fact that large bank areas essentially eliminate the need for individualized review of mitigation plans and provide for their collective surveillance, monitoring, and site evaluation. The permit applicant is benefited by the availability of a mitigation alternative which facilitates and lends a measure of predictability to the project planning process.

Related to the impact of banks on the conduct of the regulatory program is the question of how much "up front" involvement in the initial development of banks can the Corps expect? The Corps' involvement to date has not necessarily been typical. In actuality, case studies indicate active Corps participation in early planning and implementation for less than half of today's existing banks. As previously stated, the Corps is signatory to interagency agreements for only five of the 21 operational case study banks. A more common venue for involvement has been through the permit process.

These circumstances have a definite down-side. The absence of Corps participation at the planning and implementation stage, either as a direct participant or in a watchdog role, may have contributed to the incidence of bank failure, particularly among those banks which have involved extensive engineering and hydrologic improvements. Banking is experiencing phenomenal growth and assuring its effectiveness as a mitigation tool dictates that the Corps provide greater leadership and oversight in bank planning, development, and operation.

The case studies sought both working level and executive level input to determining the impact of banks on regulatory rigor. All strongly defended the integrity of the regulatory process and denied any adverse influence on the rigor with which it is conducted. Nor have the districts experienced added pressure to approve permit applications as a result of existing banks.

11. Summary Evaluation

Two characteristics which banks have in common is the fact that they: (1) possess deposits of credits against which withdrawals can be made for compensation purposes, and (2) incrementally compensate for multiple actions. These were previously identified as defining traits for bank inventory purposes at the outset of the study. The result of such indiscriminate selection criteria was a family of banks comprising a wide variety of institutional arrangements. Moreover, these banks are characterized by widely varying mitigation objectives, physical makeups, and styles of operation.

Due to this wide variation, it is difficult to describe the "perfect" bank, and no attempt will be made to do so. Short of representing perfect models, all the banks inventoried and studied in detail possess the initial defining characteristics of banks **and** have achieved or have the potential to achieve the essential mitigation objectives for which they were designed.

However, it is possible to describe the "typical" bank which represents the norm of all institutional, technical, and operational characteristics. First and foremost, the typical bank is a "debit bank" in that its objective is the advanced production of wetland credits and the intentional maintenance of a positive credit balance which is incrementally withdrawn for the compensation of piecemeal wetland losses. Beyond this basic characteristic, the typical bank also:

- has an interagency agreement (MOA or MOU) as the formal banking instrument.
- is a single client bank (also the sponsor/client most probably is a state highway or transportation department).
- involves the restoration of degraded or former wetlands.
- has actual management performed by a public entity other than the sponsor, most probably a state natural resource agency.
- uses acreage based methodology and procedures (as opposed to function based) for crediting and debiting purposes.
- compensates losses at a ratio ranging between 1:1 and 2:1.
- replaces wetland losses occurring within the same hydrologic area or ecoregion as the bank.

When examined one by one, many banks seem to have deficiencies, whether in implementation or long-term maintenance. However, despite these apparent deficiencies, the majority are functioning as planned or have expectations to function. The reality of banking to date is approaching what was promised by the initial banking concept. Within the limited scale that banking has been practiced, banks have contributed much to wetland protection. Banks have accomplished much even

though their planning often failed to provide for sufficient monitoring, liability, and enforcement. Further, within the last year a number of banks have been established with long-term operation and oversight requirements that are much more specific than many of the early banks. It must be remembered that banks for the most part have developed in a vacuum in terms of a national policy. As better guidelines are developed and national policy crystallized, banking should result in increasingly more success in terms of wetlands management and achievement of national goals.

CHAPTER FOUR. CREDIT AND DEBIT METHODOLOGY

The evaluation of currency requires certain decisions during bank planning to define the character of the bank and to set objectives and ground rules. Those decisions require answers to questions such as the following:

- What ecological role does the wetland play?
- What functions are to be considered?
- What values are to be considered?[43]
- How may credits be produced - through creation, restoration, enhancement, preservation, or a combination of practices?
- Can non-wetland areas contribute to credits?
- What is the geographic or physiographic limit of the bank itself; of potential debits?
- What defines baseline conditions?
- How will temporal changes be accounted for?
- What is the most cost-effective way of mitigating (creation, restoration, enhancement)?

Some of these questions cannot be easily answered. For example, our knowledge of wetland processes and therefore of functions is limited[44] so that it may not be feasible to plan for production of all possible functions from a particular wetland system. In addition, managing for certain functions will prohibit management for some others (Marble, 1990). A fall-back position is a holistic approach, to make the bank of sufficient size and connection to sustain a wetland complex; but how large is that? More research is occurring on wetlands than ever before and results will gradually improve our knowledge.

1. Approaches for Determining Credits

Four approaches to determining credits are inventory, subjective scoring, production/diversity indices and measures, and function evaluation methods. Inventory only gives area as an output. The other three approaches can give area or function units such as Habitat Units (HUs).

Function evaluation methods examine the ability of the wetland to produce selected functions. Unfortunately, the technology to support regulatory requirements to consider multiple functions in wetland decisions is incomplete, but two methods are generally used--the Wetland Evaluation Technique (WET) and the Habitat Evaluation Procedures (HEP).

[43] Functions refer to any of the physical or biological processes that take place in wetland. These functions provide goods and services to society and ecosystems. Values are the importance that society places on those functions. For example, wetlands can provide flood storage (a function) which can be measured in acre-feet of flood storage. The importance to society, and the ecosystem downstream, of an acre-foot of flood storage is tightly intertwined with the specific locale and watershed.

[44] Wetlands Research Subcommittee of the Federal Coordinating Committee on Science, Engineering, and Technology, 1992; Federal Agency Wetlands Research: Inventory and Needs, Draft report to the Domestic Policy Council.

The Wetland Evaluation Technique (WET) can provide an indication of probability level that a wetland is able to provide the function. WET does not provide quantitative results, nor does it incorporate temporal considerations. No banks have been identified as using WET for crediting and debiting purposes.

The Habitat Evaluation Procedures (HEP) were developed to quantify fish and wildlife habitat and so facilitate decisions about the impacts of water resource projects. However, HEP does not provide a means to incorporate functions other than habitat for fish and wildlife. An additional shortcoming is that an insufficient number of single-species habitat models (called Habitat Suitability Models (HSI)) exist to cover the United States, although model development is continuing.

Eight case study banks have utilized a functional (essentially habitat) basis for crediting and debiting. Of the remainder, twelve have utilized acreage (areal replacement) methods exclusively. However in one case, a bank utilizes both methods--habitat evaluation for relatively large wetland losses (greater than 5 acres) and acreage for relatively small wetland losses. Also, generally the larger the bank, the more likely it is to use habitat-based methods.

2. Future Development

Many of the shortcomings of the two function evaluation models are in the process of being remedied. Both WET and HEP are in a continuum of evaluation tools. The Corps Waterways Experiment Station (WES) Wetlands Research Program (WRP) is presently developing a functional assessment method to replace WET that will provide improved accuracy and quantitative values. The new method will mimic the HEP accounting system and the HSI concept with Functional Indices for each function and Wetland Functional Units that incorporate area. The objective of WRP is to develop an evaluation procedure that meets the time and effort constraints of 404 regulators, while assuring an adequate evaluation of functions. One tool, the Hydrogeomorphic Classification System, will consider water source, hydrodynamics, and geomorphic setting for the large variety of wetlands across the country. Models for functions are being developed for each general class of wetlands, although as in HEP many more models will be needed.

WRP is preparing a guidance document for the new assessment method that will include definitions and procedures such as determination of appropriate study area, classification of wetland type, and selection of function for evaluation. The resulting assessment method will work for all phases of wetland evaluation from determining baseline conditions, avoiding and minimizing impacts, identifying alternatives, evaluating impacts, designing restoration and creation projects, to planning for mitigation and monitoring.

3. Additional Evaluation Methodology Needs

Additional work in crediting and debiting that is needed and that is not underway in the WRP or other programs includes the following:

A. Selection of appropriate habitat evaluation elements for a bank with a complex of wetland and non-wetland cover types. This step is critical to the outcome of a HEP application. Because of the large range of possible evaluation elements for a complex site and the extra work required when more than a few elements are used, additional thought needs to be given on how to select appropriate evaluation elements for a complete and efficient analysis.

B. Use of an "expert system" and negotiating approach to determine which functions a bank should include and how to quantify those functions. Because of a coincident requirement to consider multiple functions in the Section 404(b)(1) Guidelines and our lack of knowledge and assessment methods for so many functions, an

alternative approach to dealing with functions is advisable. A structured approach to the problem, using wetland and local ecological experts, could serve until our abilities to evaluate and quantify improve.

C. Approaches to determining credits and debits (other than simply area) when intrinsic or holistic attributes of a wetland complex are the objectives of a bank, as opposed to individual functions. Another way of dealing with multiple functions is to assume or assure that they are accounted for as a unit, not individually. At the present time, we have only vague beginnings of a holistic evaluation approach; those are in the "new" area of landscape ecology.

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CHAPTER FIVE. A VARIATION OF COMPENSATORY MITIGATION: THE FEE-MITIGATION ALTERNATIVE

Within the large circle or population of compensatory mitigation measures is the fee-based compensation arrangement. Fee-based compensatory mitigation arrangements, which have some attributes in common with banking, have also been referred to as "in lieu fee" compensation. The nationwide inventory of banks identified several fee-mitigation schemes. A closer examination of fee-mitigation schemes was undertaken as part of the first phase study.[45]

Fee-based compensation arrangements involve programs or ad-hoc agreements where money is paid to a conservation entity for implementation of either specific or general wetland projects. Projects can include wetland restoration, creation or enhancement, as well as various aspects of management of the sites. Such arrangements are usually established to accommodate the mitigation requirements of numerous, often small, wetlands impacts. Formal fee-based compensation programs have been established to accommodate the mitigation requirements through memoranda of agreement and other guiding documents. Fees are usually combined to fund projects that are larger and expected to be more ecologically beneficial than mitigation implemented individually. The fees may be deposited in trusts and special financial accounts.[46] The program managers may either use the mitigation fees alone to fund the wetland projects, or combine them with programmatic or other sources of funds (e.g., penalty fees, voluntary contributions).[47] In instances where the need for alternatives to on-site mitigation is infrequent, ad-hoc arrangements have sometimes been utilized where regulatory agencies determined that fee-based compensation is appropriate.

A key feature of fee-based compensatory mitigation is that the regulatory agency -- whether state, regional, or Federal -- considers a permit applicant's mitigation requirements fulfilled upon payment of the fees. These fees are charged in-lieu of the direct implementation of individual mitigation projects by permittees. At the time of payment, fee-funded wetland mitigation projects typically have not yet broken ground or may be incomplete. In some cases wetland mitigation projects may not have even been specifically identified. Thus, the term "in-lieu" typically connotes a collection of fees for some future, perhaps unidentified program in-lieu of specific

[45] Six fee-based mitigation programs were studied. The findings are presented in Alternative Mechanisms for Compensatory Mitigation: Case Studies and Lessons about Fee-based Compensatory Wetlands Mitigation, a Working Paper prepared by Apogee, Inc. (Institute for Water Resources, 1993).

[46] The use of a wetland trust is allowed as per the Nationwide Permit Conditions which includes the following language:

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"To the extent appropriate, permittees should consider mitigation banking and other forms of mitigation including contributions to wetland trust funds, which contribute to the restoration, creation, replacement, enhancement, or preservation of wetlands" [33 CFR 330, Appendix C(13)(f)(2)]

[47] Trusts have been used as a repository for mitigation fees until they can be used for wetland property acquisition or restoration, for example, Pine Flatwood Wetlands Mitigation Trust in St. Tammany Parish, Louisiana.

compensatory mitigation action.[48] However, in some instances, compensation fees paid into trusts can be used to facilitate the establishment of wetland mitigation banks. In these cases, "credits" may accrue by design in the fee-funded wetland mitigation projects, setting a condition basic to banking.

The record of wetland projects undertaken as part of fee-based mitigation schemes is much too sparse to allow for any conclusions regarding the success of such programs. However, the study of fee-based programs yields the following primary findings.

1. **Documentation**

Implementing documentation ranges from legislation and/or regulation, to MOAs, to letters of agreement between parties, to conditions of individual or general permits. Individual and general permits are the primary legal agreements between the Corps and permittees that detail permittees' obligations to contribute a specified amount to a conservation organization or a specified trust fund.

2. **Public and Private Roles**

Fee-based mitigation involves at least one public agency or non-profit conservation organization in a major role in development and implementation. Public agencies are increasingly looking to this type of program to meet regional wetland management priorities. An example is the melaleuca eradication project in Dade County, Florida, which requires all activities in Dade County requiring permits to use the program for compensatory mitigation.

Public agencies are increasingly looking to private entities as a source of wetlands expertise. For example, in Placer County, California, the local government has developed extensive guidelines for the operation of the private sector to supply restoration credits. The county hopes to reduce uncertainty and encourage private investment in wetlands restoration.

3. **Fee Calculation**

Fee calculation varies, but is almost always calculated on a cost-to-mitigate basis, often including planning-related costs (such as site selection), land acquisition, design, and construction-related costs. However, long range monitoring and management costs are not usually included in fee calculation. This is a serious deficiency that should be addressed in future arrangements if the concept is to be utilized more extensively.

A public agency may want to include land acquisition costs as part of the fee calculation even if they already own the lands that will be utilized for the wetland projects, in order to provide funds for additional wetland projects.

4. **Criticisms of the Concept**

As indicated earlier, the record of wetland projects undertaken as part of fee-mitigation schemes is much too short and sparse to allow critical review of implementation.[49] Fee-based compensation

[48] Fee-based compensation programs can benefit from forging links with institutions already involved in wetlands projects and may even take advantage of opportunities to "piggyback" on such projects. For example, the Dade County program forged such a link, in sending fees toward an ongoing enhancement and restoration effort in nearby East Everglades.

[49] However, in at least one case, mitigation of impacts appears to be occurring at a slower pace than intended. The Maryland Nontidal Wetlands Compensation Fund has faced obstacles in expending monies from the fund due to contracting and procurement requirements (IWR, 1993). Furthermore, the restoration efforts undertaken by

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arrangements have been criticized as merely providing a means for permit applicants to essentially buy the right to degrade wetlands. However, with clear objectives, expertise, and adequate resources, these arrangements, especially in connection with some overarching wetland objective, should suffer less from scientific and technological uncertainties and enforcement deficiencies than individual mitigation efforts.

The above criticism should be tempered since several of the fee-based programs allow for compensation for losses that might ordinarily not be compensated under Nationwide Permit No. 26. For example, several regional or county fee mitigation schemes (existing and proposed) grant permits for losses involving less than one acre of wetlands.[50]

5. **Remaining Questions**

Questions remain about fee-mitigation schemes in general, some simply because these schemes identified during the course of this study have been in existence for only a few years at the most, less than many banks. Among the questions, how do fee systems consider and account for risk and uncertainty with respect to setting fees and the provision of wetland mitigation? Do fee-based programs have procedures for estimating and documenting actual mitigation costs and time to replacement and functional maturity, and mechanisms for feeding this information back into the fee-setting process? How are the fiscal characteristics of the enterprise - costs and revenues - traced to insure that the system is fiscally sound? What have been the financial and ecological results from the operation of the systems?

Finally, a fundamental question is whether a fee collected ostensibly for wetlands degradation by the permitting activity is based on the economic value of the loss of function or whether it is based on some cost of implementing some unrelated ecosystem goal or objective. At the heart of this question is the issue of whether the value of the wetlands lost are recaptured and whether the costs (or fees) levied for development are independent of the wetland impacts.

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monies from the Fund have not been overly successful (Dail Brown, NOAA Chesapeake Bay Office, personal communication, 1993).

[50] For example, the Maryland NonTidal Wetlands Compensation Fund.

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CHAPTER SIX.
PRIVATE CREDIT MARKETS FOR MITIGATION BANKING

Existing banks to date essentially have been designed by private and public developers of wetlands with the goal of reducing the cost and time required to acquire permits for their own projects under existing regulation. Further, virtually all banks have been created with a reasonable certainty of future use of the credits, in essence, a sequence of highly certain wetlands development activities with known users. They were not designed as market-based commercial mechanisms for complying with existing regulations or as incentive-based alternatives to existing regulations.

There is an increasing interest in market-oriented commercial approaches around the country, and there are many prospective entrepreneurial bankers today. During the first study phase, the first two entrepreneurial (private market-oriented) banks were created.[51] Although several more banks may be approved before the end of this year, in general, prospective entrepreneurial bankers have been frustrated with what they believe is a general recalcitrant regulatory and resource agency posture. A survey of the status of entrepreneurial banking was conducted as part of the first study phase.[52] Prospective bankers were interviewed about their perception of the regulatory process and of obstacles that may hinder the market-oriented process.

Interest in developing entrepreneurial banks is being spurred on by a number of reasons, but there is one predominant basis for the pursuit of mitigation banking: the inability for a landowner or developer to develop a wetland area because of Federal or state regulatory controls, with establishment of a wetland mitigation bank being the next best option for protecting his or her investment. However, survey results indicate that many prospective entrepreneurs have experienced difficulty in gaining Federal agency acceptance of banking proposals. In some cases, this has prospective entrepreneurial banks now being attuned to state and local permitting programs rather than the Federal 404 program.

Market-oriented banks offer the opportunity to increase the efficiency and effectiveness of compensatory mitigation by providing the banking option to a wider set of permit applicants. With this in mind, a number of states and localities across the nation have established public commercial banks and public fee-based compensatory mitigation programs. Public commercial banks offer mitigation credits for sale to the general public, and use the proceeds from credit sales to recoup the costs of bank construction and management.

A private commercial bank would have the same roles and responsibilities that characterize other

[51] As per Footnote 13, a Department of Army permit was issued in November 1992 to establish a privately-owned market-oriented bank, the WET Mitigation Bank in Georgia. In 1993, Florida Wetlandsbank received a Department of Army permit to create and sell mitigation credits. Two additional banks in Indiana (Geist and Morse), constructed by a developer have surplus credits (the bank was set up after a violation) with the intention of selling credits to other developers (Environmental Law Institute, 1993). Also, as mentioned earlier, Fina La Terre, Louisiana offers some of its credits for sale to others.

[52] The study was conducted by Shabman, Scodari, and King. The results of that study are presented in Expanding Opportunities for Successful Wetland Mitigation: The Private Credit Market Alternative IWR Report 94-WMB-3, 1994.

banks. The establishment of a bank (and the increase in functions and values over pre-existing conditions), whether through restoration, enhancement, or creation, would be certified for use by regulators. The bank would provide mitigation credits that can be traded for units of a permitted wetland loss. As wetlands development is permitted by the regulatory agency, debits are made to the bank, reducing its credit balance. Regulators would set the terms by which credits can be traded for units of permitted wetland loss.

A market-oriented approach seeks to provide a profit motive for prospective mitigation suppliers who have no development interests of their own. The greater the number of suppliers to sell credits (to many possible buyers), the more likely is the emergence of a market for wetland functions (in essence, a mitigation credits market), with its operations overseen by a wetlands regulatory agency. Market competition could ensure that wetlands functions were provided at least cost, and provide incentives for the further development of wetlands restoration and creation science and technology. However, along with the opportunities that mitigation credit markets could potentially provide, there are barriers to using mitigation credit markets. The barriers are associated with the relationship of regulatory policies and trading rules to the economic viability of private credit markets. A discussion of the economics of credit markets follows.

1. Economics of Wetland Mitigation Credit Markets: Market Forces and Regulatory Policies

The economics of mitigation credit markets are related to the objectives of the three principal agents: credit suppliers, permit applicants, and regulators. To a large extent, the opportunities and constraints faced by credit suppliers and permit applicants depend on regulatory goals and the exchange (trading) rules established by regulators to achieve them.[53] [54]

The objectives of permit applicants and credit suppliers are similar. Permit applicants simply want to maximize the rate of return on investments in wetlands development projects and so try to minimize their cost of providing mitigation. Credit suppliers also want to minimize the cost of providing mitigation so as to maximize their own return on investments in wetlands restoration or creation. The existing market for project-specific mitigation illustrates that where regulators do not enforce design and management, or do not hold either the permit applicant or mitigation supplier liable for project failure, mitigation suppliers and permit applicants can and will reduce restoration expenditures at the expense of long-term mitigation success.

The objective of regulators is to serve the public welfare by protecting wetland functions. The Section 404 program has advanced a policy goal of achieving no-net-loss in wetland function to meet this objective.[55]

These objectives of permit applicants, credit suppliers, and regulators are linked. Given these objectives, what are the effects of fundamental economic forces and regulatory policies on the potential for private credit markets?

The economics of supply and demand for mitigation credits are related to production costs and wetlands development pressure, respectively, which vary locally and regionally. Potential

[53] Trading rules include various credit certification requirements that can affect risk of mitigation failure once compensation has been required.

[54] This discussion is based on the report by Shabman, et. al., prepared for IWR (1994).

[55] As mentioned earlier, difficulties in measuring functions have lent to utilization of acreage as a surrogate for functions.

buyers of mitigation credits will demand credits only if the credit price is less than the cost of alternative forms of mitigation and still offers a positive rate of return from wetlands development. The interaction of supply and demand regionally and locally establish the competitive range where credit markets might operate.

The government has a prominent role in the economics of this market, since, in addition to the fact that the market could not exist in its absence, the regulator: (1) imposes "quality control" through trading rules establishing how and when credits can be certified for sale; and (2) defines the overall wetlands policy goals and structural framework to achieve them.

The pathways through which regulatory policies (overall regulatory framework and trading rules) influence the underlying forces of supply and demand in private credit markets are illustrated in Figure 6.

Regulatory framework influences on the demand (and to a lesser extent, supply) for mitigation credits include policy decisions regarding watershed planning, wetland delineation and jurisdiction, avoidance/sequencing rules, and overall policy goals. Trading rules establish the credit certification requirements that can affect the certainty with which mitigation credit markets can achieve policy goals. Trading rules include design standards, long-term management responsibilities, and cost liability assignment.

The concern for project failure has been addressed in many mitigation banking guidelines by including trading rules which require the permit applicant to avoid the permitted wetlands until a fully functional or self-maintaining wetlands (bank) has been achieved--a zero failure risk strategy. This has discouraged many banks from starting up. Prospective entrepreneurial bankers believe that in many cases, the cost of waiting and bearing strict liability for failure is too high for most mitigation supply firms to be economically competitive. Added to that is the concern of poorly-stated and changing performance criteria even after initial certification. Given this regulatory uncertainty, the prospective entrepreneurs are concerned that the price per credit they would have to charge would be found above the price that permit applicants would be willing to pay. The relationship between ecologic-economic risks and timing of credit approval is shown in Figure 5.

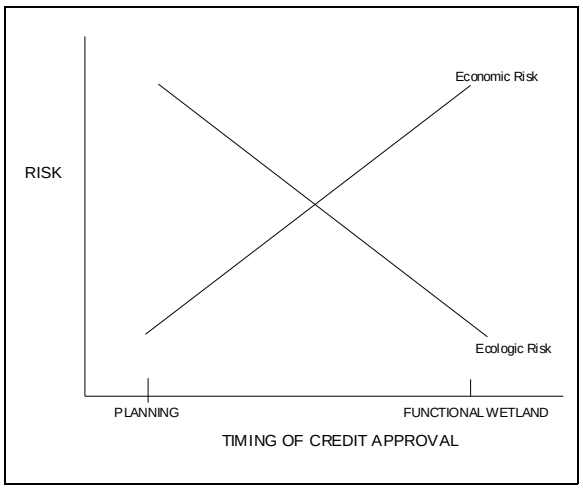

Figure 5. Timing of Credit Approval and Apportionment of Risk

Certainty is a critical concern. There must be a set of guidelines and principles by which an entrepreneurial bank operates for the mutual benefit of the environment and those who invest in their creation. The investor must know in advance the conditions upon which it will be able to use the bank for investment purposes or its own mitigation purposes.

If a market-based trading system is to operate (function economically), there must be opportunities to sell credits before full functional maturity, and perhaps before self-maintenance, is reached at banking/market sites. Permitting of such sales (debits), however, raises regulator's concerns about the risk of project failure and who bears the consequences.

1988; Whigham et. al., 1988; Brinson, 1988; and Klopatek, 1988). This link of landscape approach with assessment of cumulative ecological effects (i.e., cumulative impacts) is a function of the realization that landscape patterns such as wetlands are the expression of complex interactions between geomorphology, hydrology, and vegetation. Essentially then, this points to a misplaced emphasis on individual sites or habitats within a watershed or landscape unit in contemporary environmental (or wetland) assessment. What is of greater importance is the pattern of sites which is considered to be the key to the maintenance of watershed or landscape integrity (Stakhiv, 1991). Hence, the call for greater consideration of the landscape perspective for wetland management that was mentioned in the last paragraph. The basic habitat needs to extend well beyond specific ecological site characteristics to encompass three structural characteristics of a landscape unit: patch size, patch density, and patch connectivity. Resource and regulatory agency decisionmakers, using such biogeographic criteria or objectives could cast incremental losses in terms of landscape measurements. Thus, a landscape-objective approach to wetlands evaluation might be preferred as opposed to an approach that amalgamates wetland values essentially focusing only on ecological properties (Stakhiv, 1991).

A watershed-based approach to effect a more successful wetlands protection and management program will require integrating land use or wetlands-related planning with wetlands regulation and permitting. Watershed plans not only might provide that certain wetland areas not be developed without compensatory mitigation, but might also specify the sites on which the mitigation banking will be conducted. Such a program might not only maximize wetland quality in the system, but also reduce delays and uncertainty in the permitting process by ensuring a steady supply of mitigation credits. Such a program could also provide some assurance that entrepreneurial risks will be rewarded in those cases where credits are privately produced.

2. **Existing Programs**

There are several existing mechanisms at the Federal, state, and local levels for integrating planning with wetlands regulation and permitting. To date, only a small number of the plans have explicitly incorporated mitigation banking. Most of those are of recent origin, which makes it difficult to draw any definitive conclusions about their success.

Among existing mechanisms integrating planning and wetlands regulation and permitting are the Advanced Identification (ADID) program and Special Area Management Plans (SAMPs), as well as a number of state, local, and regional planning methods.

ADIDs allows EPA, with the assistance of the Corps, to identify wetlands as suitable or unsuitable for disposal sites even before a permit application is filed.[61] The process, initiated by the agencies or by a request from any other party, involves the review of all available water resource information, including data from the public, other agencies and from "approved Coastal Zone Management programs and River Basin Plans". The Advanced Identification program has at least two advantages for compensatory mitigation and mitigation banking. By giving some idea of relative values of wetlands in the given area by virtue of their ecological importance, it can provide advanced notice of both bankable and developable and undevelopable sites, factors which can lead to better mitigation/more successful mitigation banking and reduced cost and delay associated with individual permit process. However, a prime stumbling block for the ADID program and related planning efforts is the effect on property values for those properties deemed to be wetlands. EPA has conducted 76 to date with 35 completed and 36 ongoing (Environmental Law Institute, 1993). A number of those have incorporated mitigation banking.

[61] Section 404(b), Clean Water Act

One ongoing effort has become a national model for local wetlands management planning--the West Eugene (Oregon) Wetland Management Plan. The local initiative combines a management plan for an 8000 acre area with a proposed mitigation bank.

Mitigation banks are also logical components of SAMPs.[62] SAMPs are comprehensive plans providing for natural resource protection and reasonable economic growth that contains a detailed and comprehensive statement of policies, standards, and criteria to guide public and private uses of lands and waters, and mechanisms for timely implementation in the specific geographic areas within the coastal zone. The Corps has been involved in these comprehensive plans that provide for natural resource protection and reasonable economic growth.

As of 1992, one wetland mitigation bank--Pascagoula (Mississippi)--had been incorporated in a SAMP and one fee-mitigation scheme-Bird Drive (Dade County, Florida) had been instigated as a result of a SAMP.

A number of state land use planning methods can affect the wetlands permitting process and provide a mechanism for including banks, particularly if banking is already authorized under state law.

Among the opportunities are EPA grants to state governments for the development of statewide comprehensive plans. Many states have developed other more general plans that include wetland protection, such as Statewide Comprehensive Outdoor Recreation Plans. Although few existing state wetland planning mechanisms explicitly incorporate mitigation banks, many of them have more general programs that could incorporate and complement banking. With the assistance of the comprehensive state wetland plans now underway, many states could efficiently adopt and implement mitigation banking through existing structures and plans (Environmental Law Institute, 1993).

Ambitious wetlands-related planning efforts have taken place at local and regional levels as part of county and municipality land use powers. The West Eugene Plan, and the City and Borough of Juneau (Alaska) are examples.[63]

Another regional planning concept that has implications for future mitigation banking development is the Habitat Conservation Plan (HCP). Similar to banking, these plans link environmental with developmental interests. HCPs have been implemented to deal specifically with preservation of endangered species habitat. HCPs enable comprehensive approaches which are more likely to result in the setting aside of ecologically viable and defensible habitat areas.[64]

HCPs and wetland mitigation banks have similar goals in terms of seeking to offset unavoidable loss of wildlife habitat through mitigation and compensation. Both require permits for development, and both use ecological assessment techniques (e.g., HEP) to determine performance standards. However, unlike wetland banks, HCPs are statutorily authorized and heavily encumbered

[62] Authorized by a Coastal Zone Management Act amendment (1980), the program is funded and administered through the Office of Ocean and Coastal Resources Management in the Department of Commerce.

[63] Juneau has developed a local plan in which wetlands were classified into four main categories terms of development potential, including those suitable for banking and off-site mitigation. Juneau received a general permit from the Corps that transfers permitting authority for those wetlands suitable for development (Environmental Law Institute, 1993).

[64] For more discussion of HCPs, refer to Beatly ("Preserving Biodiversity Through The Use of Habitat Conservation Plans", Department of Urban and Regional Planning, University of Virginia, 1990).

with a time-consuming, costly, and standard-less process.[65]

Another resource management technique is the Transfer of Development Rights (TDR). Transfer of Development Rights breaks the linkage between a particular land and its development potential by permitting the transfer of that potential or "development rights" to land where greater density will not be objectionable.

The New Jersey Pinelands is probably the best example of a successful land use TDR program. The plan designates land use categories with specified development densities and channels development from areas designated for limited development. Federal and state enabling statutes provide explicit authority and the program is largely evasion-proof with land use control over both the TDR donor and receiving areas. The resource protection objectives, which are regional in nature, are clearly specified and defined, and the resource is recognized by Federal and state legislation as to be protected. Landowners may sell to anyone, and there is a large area on which credits can be used to increase the level of growth, amidst an area of growing pressure for development. TDRs are allocated by means of a simple system that recognizes three land value categories (based on variation in value and development pressure in the preservation area).[66] Mitigation banking would have to be practiced within a whole watershed comprehensive planning framework for the TDR concept to be applied.

The only means of directly integrating planning into the Federal permitting process is through issuance of a general permit, such as proposed for West Eugene, although such mechanisms as SAMPs effect Section 404 permitting through the consistency review. The other planning mechanisms discussed above can play a role in permitting such as being a source of useful information or having local law behind them.

3. **Analogs**

Mitigation banking has its parallel in a number of natural resources programs. While quantifying the relevant commodity is a central feature and concern for all these programs, these other programs vary substantially from mitigation banking. Typically the commodity is not as finite or immobile as are wetlands.

Two analogs have already been discussed--HCPs and TDRs. Another scheme somewhat analogous to wetland mitigation banking is the banking of offsets, for example, air pollution offsets and water pollution trading.

Under the Clean Air Act,[67] designated airsheds or air quality control areas may participate in the "banking" of offsets or allowances (measures resulting in reductions of emissions) for future industrial expansion. If a particular allowance transaction results in more emission reduction than required by EPA regulations for a region, some of these reductions can be banked and transferred or sold. EPA allows states to let sources meet their emission control obligations under "state implementation plans" through the use of "emission reduction credits". Under this approach, one source reduces its emissions by more than legally required and a second source then applies those "surplus" reductions against its own control obligations.

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[65] McElfish, James (Environmental Law Institute), unpublished note for IWR, 1992

[66] For more discussion of the New Jersey Pinelands TDR program, refer to Tripp and Dudek ("Institutional Guidelines for Designing Successful Transferable Rights Programs," Yale Journal on Regulation Vol 6 (No. 2), pp. 369-391, 1989).

[67] Section 157, Clean Air Act, 1977 and Amendments, 1990

2. **Regional and Comprehensive Watershed-Based Planning**

Where the Corps participates in comprehensive planning with state and other Federal agencies,[74] there are opportunities to identify priority wetland areas for protection and restoration. Those identified for restoration could serve as a list of candidate bank sites for the region or area. The Corps role in these various plans and programs has been on an ad hoc basis, and varied considerably among the districts with either Planning or Regulatory having the lead Corps role. Corps Civil Works environmental planners are being encouraged to integrate their watershed efforts with Corps Regulatory initiatives. The EPA is also pursuing a strategy for adopting watershed management. This concept could also be a consideration for EPA's Multi-Objective River Corridor Planning. The Clinton Administration has endorsed wetland mitigation banking as part of their effort to encourage greater use of comprehensive advance planning and watershed management.[75]

3. **The Relationship to the Environmental Restoration Program**

Not all wetlands restoration or creation projects should be considered as development of credits. Section 1135 (of the Water Resources Development Act of 1986) and other environmental protection and restoration projects are justified on the basis that they provide environmental gains. Debiting these gains would conflict with the project purposes. Nonetheless, it is possible an entity may want to conduct wetlands restoration or creation beyond that planned for and justified by the wetland restoration project alone. In this case, should the additional cost be less than undertaking the development of credits separately, the situation may prove attractive for the development of a bank. The credits would belong to whomever funded their development, whether Corps or other sponsor.

4. **Other Federal Programs That Could Be Linked To Banking**

Many wetlands restoration efforts are conducted to replace degraded wetlands or to enhance specific wetland functions and values. A range of Federal, state, and non-profit programs exists. Some of these programs may have the potential for assisting in the resource management aspects of wetland mitigation banking or other forms of compensatory mitigation. As part of this study, a separate report was prepared by a consultant that details the type and scope of activities for 14 Federal, state, local, and private programs around the country.[76]

Among Federal programs that may offer watershed-based programs that involve wetlands and thus opportunities to those interested in banking or other forms of compensatory mitigation are:

> The National Estuary Program, Coastal America, the Gulf of Mexico Program, and the Upper Mississippi River System Environmental Management Program.

[74] Such as activities included in planning assistance to states and development of Special Area Management Plans (SAMPs) and State Comprehensive Outdoor Recreation Plans (SCORPs)

[75] White House Office on Environmental Policy, August 24, 1993, "Protecting America's Wetlands: A Fair, Flexible, and Effective Approach, 26pp.

[76] Sixty-eight programs were identified that conduct or facilitate wetland restoration or creation that might present opportunities to wetland compensatory mitigation. This information is presented in An Examination of Wetland Programs: Opportunities for Compensatory Mitigation, IWR Report 94-WMB-5 prepared by Apogee, Inc., 1994.

5. **Corps Roles: Present and Future**

The Corps of Engineers regulatory program has embraced mitigation banking. Interest in the field is evident in the several attempts to develop regional guidelines, whether in cooperation with state or Federal agencies. The 1990 MOA between the Department of Army and the EPA has served as a strong stimulus to banking. This interest has been further stimulated by the interim regulatory guidance memo released jointly by the Department of the Army and EPA in August 1993. And, as mentioned in the next chapter, unified Federal guidance is being prepared which should provide the final impetus for widespread adoption of mitigation banking as a tool for regulators and planners.

Looking past the Corps regulatory program, there is no large-scale organized effort within the Corps to implement or participate in banking. Some field office environmental planners have been involved in SAMPs (e.g., Pascagoula, Mississippi and Mill Creek, Washington) and ADIDs (West Eugene and Portland, Oregon). These efforts have called for low-level participation in watershed planning efforts.

Despite the seeming lack of interest in the broader Corps water resources community, there are some applications to Corps Civil Works programs such as beneficial uses of dredged materials. However, before wholesale Corps entry into the mitigation banking process, a number of issues and policy questions need to be addressed. Among them:

- Are there any policies or authorities that prohibit the Corps from adding to the outputs of a restoration project to produce some credits that could be used for compensatory mitigation?

- Could mitigation for a flood control or navigation project be expanded to include "credits" beyond the mitigation requirements for the parent project, that could be used as mitigation for some future project? If so, are there any limitations on this, such as the type of project or on location (within the basin or Corps district)?

- If a bank is established or credits purchased for a set of projects, what would happen if the projects are never built?

- What are Corps authorities and policies on liability for long-term project success for traditional projects? Would this liability be the same for the bank?

- Could a bank be funded as part of the first project (e.g., Construction General funds) to provide mitigation for all specified or speculative projects in the basin? Or would separate funding authority be required for each project?

- For an O&M dredging project, would the Corps need to request the authority to accept funds and establish a revolving account to handle funds?

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CHAPTER TEN. PROGRESS TOWARDS GUIDANCE FOR THE ESTABLISHMENT, MANAGEMENT, AND OPERATION OF MITIGATION BANKS

To date, wetland mitigation banking has developed on a mostly ad hoc basis, one-by-one, with little policy guidance nationally. In a sense, these banks have been creating policy one step at a time. Field regulatory and resource personnel have been calling for a clear national policy and guidelines for bank establishment.

Towards filling that vacuum, the National Mitigation Banking Study set as one of the primary objectives, the setting of guidance for development of mitigation banks. The first phase of the study developed draft technical and procedural guidance that reflect regulatory policies.

During the second study phase, the study team is assisting the White House Interagency Wetlands Policy Workgroup in the development of unified interagency mitigation banking guidance. The draft guidance developed during the first phase is serving as the foundation for the guidance development.

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CHAPTER ELEVEN. SUMMARY OF THE CURRENT STATUS OF BANKING

A summary of the current status of banking follows which provides a background upon which the next study phase is designed.

- Existing banks represent a variety of arrangements regarding sponsorship, land ownership, clients, and credit production, although state DOT banks are the most common at this time.

- When examined individually, some banks seem to have deficiencies, whether in planning and implementation (e.g., faulty hydrology) or in long-term maintenance (monitoring, liability, enforcement).

- Despite these apparent deficiencies, the majority are functioning as planned or have expectations to function. The reality of banking to date is approaching the initial promise of banking.

- These banks have accomplished much, even though their agreements or permits often failed to provide for monitoring, liability, and enforcement. In most cases, agencies involved in those banks without specific provisions in the formal instrument have voluntarily engaged in monitoring activities.

- Within the last year, some banks have been established with long-term operation and oversight requirements which are much more specific than many earlier banks.

- Within the limited scale that banking has been practiced to date, banks have contributed more to wetland protection than would have been the case with individual on-site compensatory mitigation actions.

- With very few exceptions, banks to date have not incorporated market-based mechanisms. However, there is an increasing interest in market-oriented approaches around the country. There are a number of prospective entrepreneurial bankers today. However, they are frustrated with what they believe are general recalcitrant regulatory and resource agency postures regarding banking.

- Regulatory attitudes and policy basically will make or break entrepreneurial banking on a large scale. The potential of private credit markets, for example, hinges on allowing debits (or trades) to occur before wetlands restoration sites have reached full functional maturity. Further, proliferation of mitigation banking and especially entrepreneurial banking may necessitate similar regulatory attention across-the-board for all forms of compensatory mitigation. A potential obstacle to private entrepreneurial banking is nearby public-agency instigated banking where credits are not fully priced.

- There is increasing recognition by regulatory and resource agencies and other experts that banking can best meet the nation's wetland goals if carried out with specific ecological goals and within a context of recognized comprehensive or watershed-based plans.

- Some believe that a broad-based trading system for managing wetlands could maximize ecological benefits of wetlands within watershed contexts. The system could focus on health of wetland systems and achievement of national wetland goals ("no net less" and "net gain") rather than protection of existing wetland landscape.

- Bank currency (credit and debit) evaluation methods presently are insufficient to quantify many functions for many wetland types. However, improved and more comprehensive evaluation methods are being developed. While implementation of mitigation banking need not wait (and is not waiting) on the availability of structured evaluation methods, additional work is needed in crediting and debiting evaluation methodology as banking initiatives expand into the watershed and comprehensive planning arenas. Tradeoff decisions will require better evaluation methods.

- The banking program presently evolving has the potential to contribute to the goal of "no net loss" for those wetlands within the jurisdiction of the Section 404 program. As practiced now however, the program will not contribute, in any significant degree, to the long-term "Net Gain of Wetlands" goal, although any amount would be an improvement over previous program efforts.

CHAPTER TWELVE.
THE NEXT STUDY PHASE

Further study efforts as part of the mitigation banking study are feasible and well-warranted. The character of the next study phase, however, could take any one of several avenues, as well as a mix of types of studies and demonstrations.

One might argue that the recent proliferation of wetland mitigation banks provides more than a sufficient basis by which to evaluate the potential of wetland mitigation banking for meeting the stated purposes of the study. Furthermore, the many banks being planned should benefit from the banking experience of the last decade. These banks, once implemented, will provide additional bases for evaluation. However, as the findings presented in the last chapter, "Summary of the Current Status of Banking" indicate, there are still many issues unanswered. There are also opportunities offered by the mitigation banking concept that at present are not being realized, nor does it appear they will be in the near future. These opportunities and needs will be variously addressed in the next study phase by topical studies and model development.

This section identifies the several opportunities that mitigation banking offers to the Corps, other public entities, and the private sector that require further evaluation. Next phase study elements are identified that will answer remaining issues and explore the identified banking opportunities. The next phase study elements are evaluated in terms of what they will contribute to the Corps and the wider mitigation banking community.

1. **Needs of the Banking Community: Potential Contributions of the Mitigation Banking Study**

There are a number of issues to be resolved that would assist the banking community in applying the banking concept. Also, there are opportunities to explore the potential uses of wetland mitigation banking. Among the issues and opportunities are the following themes:

- Continued evaluation of commercial (i.e., general use) banking
- Assistance in application of watershed and comprehensive planning framework to mitigation banking
- Assistance in development of general guidance
- Enhancement and application of technical tools
- Information transfer--present and future
- Exploration of applications to Corps water resources development program

2. **The Next Study Phase:**

Based on the themes identified above, the next study phase will focus on the following.

A. **Continued evaluation of commercial (i.e., general use) banking.** Commercial banking is seen by some agencies as a way to expand opportunities for accomplishing compensatory mitigation. There are varying ways in which commercial banking can be structured; new types of arrangements are being developed. For example, commercial banking can be undertaken privately (i.e., entrepreneurial) for profit, publicly, or by a combination of private and public interests. To date, prospective entrepreneurial bankers have encountered many obstacles strewn in their paths. Some of them view specific resource and regulatory agency field offices as "anti-bank" or at least "anti-entrepreneurial bank". Entrepreneurial

banking is in need of general guidance as to how to plan, design, and implement banks along with a catalog or list of the critical banking issues and basic components of banks. Public agencies desiring to set up banks for either development or wetland restoration purposes also need to know what arrangements best fit the respective situations. A variant of commercial banking is fee-based compensatory mitigation (in-lieu fee). Although typically not recognized as banking, it similarly requires development of a basis for monetizing credits, i.e., development of a fee schedule.

Next study phase element: Expanding Opportunities for Successful Mitigation Banking: Commercial Credit Markets and Watershed Planning

This study will utilize information gathered during the first phase of the study--on fee-based compensatory mitigation and on private commercial banking--combined with evaluation of other types of commercial banking to look at the full range of commercial compensatory mitigation credit supply ventures. This study will examine the different arrangements, describe their operations and assess their possible contributions to the achievement of national wetland goals. Advantages and disadvantages of each type of system will be identified. Included in this effort will be a detailed economic analysis and evaluation of the technical components of fee-based compensatory mitigation systems--specifically focusing upon the setting of fees and the provision of wetland mitigation, including how fee systems consider and account for risk and uncertainty.

B. **Assistance in application of watershed framework and comprehensive planning to mitigation banking.**

(1) Many experts and resource-oriented organizations and agencies are calling for implementation of wetland mitigation banking within a watershed context. There are a number of existing programs that involve or use a watershed planning framework. The first phase of this study briefly reviewed some programs and found that ADIDs and SAMPs have encountered obstacles such as objections of both landowners and environmentalists. However, those programs still have the potential to facilitate mitigation banking. A critical evaluation of the potential for watershed planning, e.g., ADIDs and SAMPS, to facilitate wetland mitigation banking is needed.

Next study phase element: Watershed Planning: Assessing the Progress

The utility of watershed planning and wetlands categorization for achieving mitigation (and mitigation banking) success is an important issue. This study will address the potentials and limitations of achieving successful watershed planning by examining existing programs that involve or use a watershed planning framework.

Relevant participants in these efforts will be interviewed. The study will document how those efforts were conducted and implemented. Success criteria will be developed and applied to the review. Lessons will be drawn which could be extended to improving the likelihood of success in watershed planning and wetlands classification in other contexts in the nation.

(2) While watershed-based programs such ADIDs and SAMPS can be utilized to incorporate wetland mitigation banking within a watershed planning framework, there are many planning

methodologies, developed prior to this recent mushrooming interest in a watershed framework, that may have application to wetlands management and banking. The renewed interest in watershed-based planning for management could be greatly assisted by a review of the history of river-basin and other watershed planning methods. Watershed planning itself has different meanings.

Next study phase element: The Watershed (Ecosystem) Management Approach

This effort will report on the history of watershed planning and examine the primary watershed planning models--protection and management. This report will look at the different models and focus on a management model and how regulatory and non-regulatory approaches can be integrated.

Next study phase element: Non-regulatory options for watershed planning and wetlands management: Acquisition of Development Rights

This effort will look at the concept of protection through acquisition of development rights, experiences to date, and application to wetlands protection and management.

(3) A basic issue related to watershed planning and its potential facilitation of banking (including mitigation supply credit markets) is that of the economic impacts and political viability of watershed categorization of wetlands. An evaluation of the economic and political factors of watershed planning and wetland categorization will assist in the development of watershed frameworks and comprehensive planning approaches to be utilized in consort with mitigation banking.

Next study phase element: Economic evaluation of watershed categorization of wetlands

This effort will develop a conceptual model of land price formation process over a geographic area, in response to different development pressures and wetland policies. The price formation model will allow an evaluation of economic impacts of wetland policies.

C. **Assistance in development of general guidance.** Guidance is needed on geographic scope and watershed relationships, compliance and financial assurances, systematic monitoring, review and approval procedures, and standardized banking instruments.

Next study phase element: Guidance for Planning, Establishing, and Operating a Bank

As reported in Chapter Ten, the IWR study team is assisting the White House Interagency Wetlands Policy Workgroup in the development of unified interagency guidance. The draft guidance prepared as part of the first phase of the study will be utilized in the preparation of the unified interagency guidance in 1994.

D. **Enhancement and application of technical tools.** Promulgation of wetland mitigation banking on wider scales than presently practiced is partially limited by technical deficiencies in: (a) credit and debit evaluation methodologies; and (b) application of tradeoff analysis methodology.

Next study phase element: Update of Wetland Function Evaluation Methodology

Review and report on function evaluation methodology in terms of application to wetland mitigation banking, including new

methodology being developed in the WES Wetland Research Programs.

Next study phase element: Trade-off Analysis for Banking Decisions: Application of Decision Support Technology

There are several points in the bank planning process at which decisions could be improved with structured trade-off analyses. Among the decisions, for both individual bankers and for watershed planners, are identification and selection of appropriate bank objectives and sites. Multiple objective optimization can assist in the identification of the set of alternatives that best fulfill an array of objectives. Multiple criteria decision making models can be utilized for comparing and evaluating an array of alternatives to determine the most appropriate bank objectives and sites based on watershed needs and opportunities. Multiple criteria decision-making models (MCDMs) and software have been developed for natural resources planning and management applications. This effort will compare and evaluate MCDM software as to the applications to wetland mitigation banking and enhance a user-friendly computer interface. The software will be used to evaluate watershed-based wetland mitigation banking alternatives for a hypothetical case study. A multiple objective programming routine will be developed to assist in development of alternatives. This effort will utilize and build upon a preliminary study conducted in the first phase of the study which evaluated thirty potential tradeoff analysis methods.

E. **Transfer of information on banks and banking**.

(1) Transfer of up-to-date information: A very strong interest in banking has resource and regulatory agencies (local, regional, state, Federal), as well as prospective bankers and bank users interested in information on how to plan, implement, and operate banks. Specific needs are for dissemination of bank-specific information.

Next study phase element: Resource Document

This effort already underway is expected to be completed in Spring 1994. The Environmental Law Institute (ELI) is producing a resource document that will present a brief summary for each case study along with the generalized bank information for all banks inventories earlier (by ELI and IWR). An annotated bibliography of mitigation banking will also be included.

(2) Continued information transfer through observation and reporting of operation of recently implemented banks with sound or innovative components (e.g., entrepreneurial banks). A number of banking programs that have innovative elements have been implemented within the past year. More are expected to be implemented in the very near future. A program that monitors selected banks around the country, especially including these innovative banks that have recently been implemented (and thus likely to incorporate better or more advanced elements of banking), would provide invaluable information to the banking and natural resources community. Some organizations have called for such mitigation bank demonstrations or observations over time (e.g., Jon Kusler of the Association of State Wetland Managers).

Next study phase element: Develop Framework and Program for Monitoring Selected Banks

A framework to observe and disseminate information for specified banks will be developed. Suitable innovative banks (existing and proposed) would be identified and selected. An observation program will be developed for those sites. In addition to an evaluation framework, participating entities and responsibilities will be identified and an information dissemination program designed.

F. **Corps of Engineers water resources development applications**. Banking has not been utilized by the Corps water resources development program. A potential Corps role in wetland management could be expanded and a means to attain national wetland goals developed and demonstrated, as well as ways for cost recovery for Federal participation in water resources projects. More active participation by the Corps water resources development program, however, raises policy questions that require attention prior to expanded Corps involvement. The mitigation banking concept has promise especially for beneficial uses of dredged materials.

Next study phase element: Corps Water Resources Development Applications

The second phase will continue exploring wetland mitigation banking applications to the Corps water resources development program.

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APPENDIX A.
PHASE ONE REPORTS
PREPARED AND EXPECTED

Published:

Wetlands Mitigation Banking Concepts IWR Report 92-WMB-1, by Richard Reppert, Institute for Water Resources, July 1992, 25pp.

This report provides general background information pertaining to wetland mitigation banking--important issues and a preliminary list of operational and proposed mitigation banks.

To be published:

Wetland Mitigation Banking: Resource Document IWR Report 94-WMB-2, prepared by the Environmental Law Institute and the Institute for Water Resources, January 1994.

The report serves as resource document on the individual mitigation banks. The report will include: (1) brief summary profiles of the 22 case study banks; (2) brief tabular characterizations for all existing banks (IWR and ELI inventory data); (3) identification and basic data on banks under planning (as available); (4) brief descriptions of six fee-mitigation schemes (data from Apogee study for IWR); and (5) an annotated bibliography on mitigation banks and banking.

Expanding Opportunities for Successful Wetland Mitigation: The Private Credit Market Alternative IWR Report 94-WMB-3, prepared by Leonard Shabman, Paul Scodari, and Dennis King, January 1994.

This study looks at the economic forces affecting the market for mitigation credits. A framework that describes the factors affecting the supply and demand of mitigation credits is presented. Interviews with prospective entrepreneurial bankers were conducted. Also interviewed were relevant regulatory and resource officials for each of the proposed banks. The report includes a discussion of watersheds and wetlands classification and the link between watershed plans, the successes of wetland mitigation and the financial viability of wetlands credit markets. This report describes the use of market incentive system within the wetlands regulatory program to help the nation achieve its no-net loss and net gain goals for wetlands.

First phase report IWR Report 94-WMB-4, by Robert Brumbaugh and Richard Reppert, Institute for Water Resources, February 1994.

This report summarizes the findings of the first phase of the national wetland mitigation banking study and presents recommendations for the final study phase. Contents include analysis of 22 case study banks and relevant findings from several sub studies.

Examination of Wetland Programs: Opportunities for Compensatory Mitigation
IWR Report 94-WMB-5, prepared by Apogee Research, Inc., expected summer 1994.

Sixty eight programs that conduct or facilitate wetland restoration or creation were identified that might be applicable to compensatory wetland mitigation. Of these programs, 14 that have the greatest potential for accepting mitigation fees and implementing wetland mitigation project were profiled in more detail. Programs that include explicit requirements facilitating operation and maintenance and long-management are most promising.

Wetland Mitigation Banking IWR Report 94-WMB-7, prepared by the Environmental Law Institute, April 1994 (July 1993 release by Environmental Law Institute), expected summer 1994.

This report examines the wetland mitigation banking experience in detail. It draws its information and analysis from an examination of more than 100 banks--existing and proposed. The report contains detailed tables, a comprehensive bibliography on banking, and a compilation of all draft and Federal guidance documents on banking. The U.S. EPA and IWR co-funded this study.

Reports sponsored by IWR:

Massachusetts Wetland Restoration Through Wetlands Banking (M-93-01) by Charles H.W. Foster, Harvard University Environmental and Natural Resources Program.

A wetland mitigation banking workshop was held to explore the potential of mitigation banking for wetlands protection in Massachusetts. The summary report presents the recommendations which are to develop a pilot demonstration restoration program and set up an advisory task force as the first step of a two-step process to implement mitigation banking.

Unpublished studies (on file at IWR)

"Case Studies and Lessons about Fee-based Compensatory Wetlands Mitigation" prepared by Apogee Research, Inc., Working Paper, 1993, 81pp.

Case studies were conducted in 1992 to describe six existing trusts for fee-type programs. The case studies describe the programs, how they were established, how they have been operated, any Corps role, any problem or short-coming to be avoided in developing similar programs, or particular strong points worth duplicating. The study found that fee-based compensation programs vary widely and can be tailored to accommodate the considerations and concerns of various regions, agencies, and applicants. The development of fee schedules varies, as do type and structure of the operating agreements. Four of the case study schemes utilized trusts in the management of fees.

"Trade-off Analysis Methods" prepared by Batelle Seattle Research Center (Seattle, WA) in coordination with WES, Working Paper, 1992.

> This report presents a review of potentially applicable tradeoff analysis methods. Thirty potential methods and supplementary techniques were screened for eight criteria. An overview is provided for those methods selected for testing in two hypothetical case studies. The simple multi-attribute rating Technique (SMART), Analytical Hierarchy Process (AHP), Cascaded Tradeoffs, Decision Analysis, and Objective Structuring surface as the most useful approaches applicable to making bank decisions such as in-kind versus out-of-kind compensation, functions to emphasize, and selection of management practices. Such decisions today are made with relatively little structure and may not incorporate the entire spectrum of pertinent factors.

"Case histories of mitigation banks" by Corps districts and consultants (including Ebasco, Inc.)

> Case studies were undertaken for 22 banks. The case studies represent a comprehensive review and analysis of history and current status for each bank. These efforts provided data for in-depth analysis of technical and policy issues associated with banking. IWR provided detailed instructions for case study managers by means of a Case Study Guidebook. The case studies were completed in summer 1992.

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APPENDIX B.
INVENTORY AND BASIC INFORMATION: EXISTING AND PROPOSED BANKS

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Table B-1. Existing Wetland Mitigation Banks, Institute for Water Resources, Summer 1992 (with assistance from the Environmental Law Institute)

BANK	LOCATION	CREDIT PRODUCER	ACTIVITY
Bracut Wetland Mitigation Bank	Humboldt Bay, CA	CA Coastal Conservancy	Industr Dev., Gov't Fac.
Calif. Coastal Conservancy-Huntington Beach	Orange Co., CA	CA Coastal Conservancy	Highways
Mid-City Ranch	Humboldt Co., CA	Humboldt Co.	Highways, Utilities
Mission Viejo/ACWHEP	Orange Co., CA	Mission Viejo Comp. & Orange Co.	General Land Dev.
Naval Amphibious Base Eelgrass	San Diego, San Diego Co., CA	Naval Amphibious Base	Dredging & Facilities
Port of Long Beach-Pier A, Newport Mit. Bank	Newport Beach, Orange Co., CA	Port of Long Beach	Port Development
Port of Long Beach-Pier J, Anaheim Bay	Long Beach, LA Co., CA	Port of Long Beach	Port Development
Port of Los Angeles-Inner Harbor	Cabrillo Marina, LA Co., CA	Port of L.A.	Port Development
Port of Los Angeles-Batiquitos Lagoon	Carlsbad, San Diego CO., CA	Port of L.A.	Port Development
San Joaquin Marsh	Orange Co., CA	Irvine Co.	General Land Dev.
Sea World Eelgrass Mitigation Bank	San Diego, San Diego Co., CA	Sea World	Shore Dev., Private
Cheval Tournament Players Club	Hillsborough Co., FL	Cheval Assoc. Partnerships, Inc.	Golf Course
Hillsborough County Util. Dept. Mit. Bank	Hillsborough Co., FL	Hillsborough Co.	Utilities
Northlakes Park Mitigation Bank	Hillsborough Co., FL	Hillsborough Co.	Highways
Polk Parkway Bank	Polk Co., FL	Local Gov't Polk Co.	Highways
Polk Regional Drainage Project Bank	Polk Co., FL	Local Gov't Polk City	Highways
Southeast Mitigation Bank	Hillsborough Co., FL	Hillsborough Co., FL	Highways, Utilities
Turner Citrus Inc.	DeSoto Co., FL	Gene Turner & brother	Agriculture
Weisenfeld/Meadow Woods	Orlando, FL	Joseph Weisenfeld	
Georgia Dept. of Transportation	Various	GA DOT	Highways
Idaho Dept. of Transportation			
Aciquia	Minedoka Co., ID	ID Transp. Dept. (ITD)	Highways
Mud Lake Wildlife Management Area	Jefferson Co., ID	ITD, Fish and Game	Highways
Old Beaver	Clark Co., ID	ITD, Fish and Game	Highways
Geist Reservoir	Marion Co., IN	Shorewood Corp.	General Land Dev.
Morse Reservoir	Hamilton Co., IN	Shorewood Corp.	General Land Dev.
Louisiana Dept. Transportation & Dev.	Grant, LaSalle Parishes, LA	LA DOTD	Highways
Fina La Terre	Terrebonne Parish, LA	Fina La Terre Corp.	Oil-Gas explor. & unspec.
Minnesota DOT Wetland Habitat Mit. Bank	MN, statewide (46 Parcels)	MN DOT	Highways, airports
Mississippi State Highway Dept.			
Dahomey National Wildlife Refuge	Bolivar Co., MS	MS State Highway Dept.	Highways
Malmaision Wildlife Management Area	Grenada Co., MS	MS State Highway Dept.	Highways
State Line Bog & Dead Dog Bog	Green Co., MS	MS State Highway Dept.	Highways
Port of Pascagoula SAMP	Jackson Co., MS	Port of Pascagoula	Port Dev., long-term maintenance disposal
Interagency Wetland Committee Bank	Stevensville & Ovando, MT	State Highway Dept.	Highways
Washoe Lake Wetland Mitigation Area	Washoe Co., NV	NV DOT	Highways
Company Swamp	Bertie Co., NC	NC DOT	Highways
Pridgen Flats	Sampson Co., NC	NC DOT	Highways
North Dakota Wetlands Bank	statewide - ND	ND Game & Fish Dept. & Water Commission	Highways
North Dakota State Highway Dept. Bank	statewide - ND	ND State Highway Dept.	Highways
Astoria Airport	Clatsop Co., OR	OR Division of Lands	Development
Henderson Marsh Mitigation Plan	Coos Co., OR	Weyerhaeuser Paper Co.	Dev., highways
Highway Mitigation Bank, South Carolina	Black River Farms, central SC	SC DOT	Highways
Wetlands Accounting System	Arlington, SD	SD DOT	Highways
West Tennessee Wetland Mitigation Bank	Shelby Co., TN	TN DOT	Highways
Bowers Hill/Goose Creek	Suffolk, VA	VA DOT	Highways
Cabin Creek	Prince Georges Co., VA	VA DOT	Highways
Fort Lee Wetland Mitigation Bank	Prince Georges Co., VA	VA DOT	Highways
Otterdam Swamp	Greensville Co., VA	VA DOT	Highways
Patrick Lake	Dane Co., WI	WI DOT	Highways

Table B-2. Wetland Mitigation Banks Under Planning, Institute for Water Resources, Summer 1992 (with assistance from the Environmental Law Institute)

BANK UNDER PLANNING		LOCATION
Alabama State Highway Dept.		Alabama
City and Borough of Juneau WMB		Alaska
Asarco		Arizona
Arkansas State Highway Dept.		Arkansas
Bill Signs Trucking WMB Dune Mitigation Bank Folsom City Goleta Slough Gaviota Creek Mission Bay Eelgrass MB	Placer County Sacramento County Caltrans Bank Santa Ynez Springtown Natural Communities Reserve	California
Florida DOT (Saddle Creek) Disney World East Lake/McMullan Booth Road Jerry Lake Weir Mitigation Bank Mud Lake Wetlands Land Bank of Florida, Inc.	Northwest Hillsborough County Orlando International Airport Build-out Pinellas County S.W. FL Reg. Wildlife & Wetlands Conserv. Mitigation Area	Florida
Marshland Plantation Commercial WMB Millhaven Plantation Commercial WMB		Georgia
Homebuilder's Assoc. of Greater Chicago St. Clair County WMB Lake County WMB		Illinois
Barksdale Airforce Base WMB Pass a Loutre Deltaic Splay Dev.	Himont Expansion Bottomland Hardwood Bank Terrebonne/Point Au Chien Wildlife Mgmt Area	Louisiana
Prince George's County		Maryland
Missouri DOT		Missouri
Lancaster County WMB	Nebraska Dept. of Roads	Nebraska
NH DOT		New Hampshire
Chimento Mitigation Bank Dismal Swamp NJ Dept. of Transportation	Hackensack Meadowlands Passaic River Central Basin	New Jersey
Valencia County		New Mexico
Homebuilder's Association of Ohio		Ohio
Dalton Lake Port of Astoria WMB	Turner Mitigation Bank West Eugene Mitigation Bank	Oregon
US Department of Energy		Tennessee
Texas General Land Commission Commercial Mitigation Bank Dow Nature Refuge, Lake Jackson	Taylor Lake Nature Preserve and WMB Wetlands Management, Inc.	Texas
Provo City WMB Northeast Utah WMB	Tenth West Corridor WMB	Utah
Dale City Lowe's Island Neabsco Wetland Bank	Northern Virginia-Manassas Ragged Island Wildlife Management Area Creeds	Virginia
Washington DOT	Port of Everett	Washington
Wisconsin Statewide WMB		Wisconsin
Wyoming Highway Dept.		Wyoming