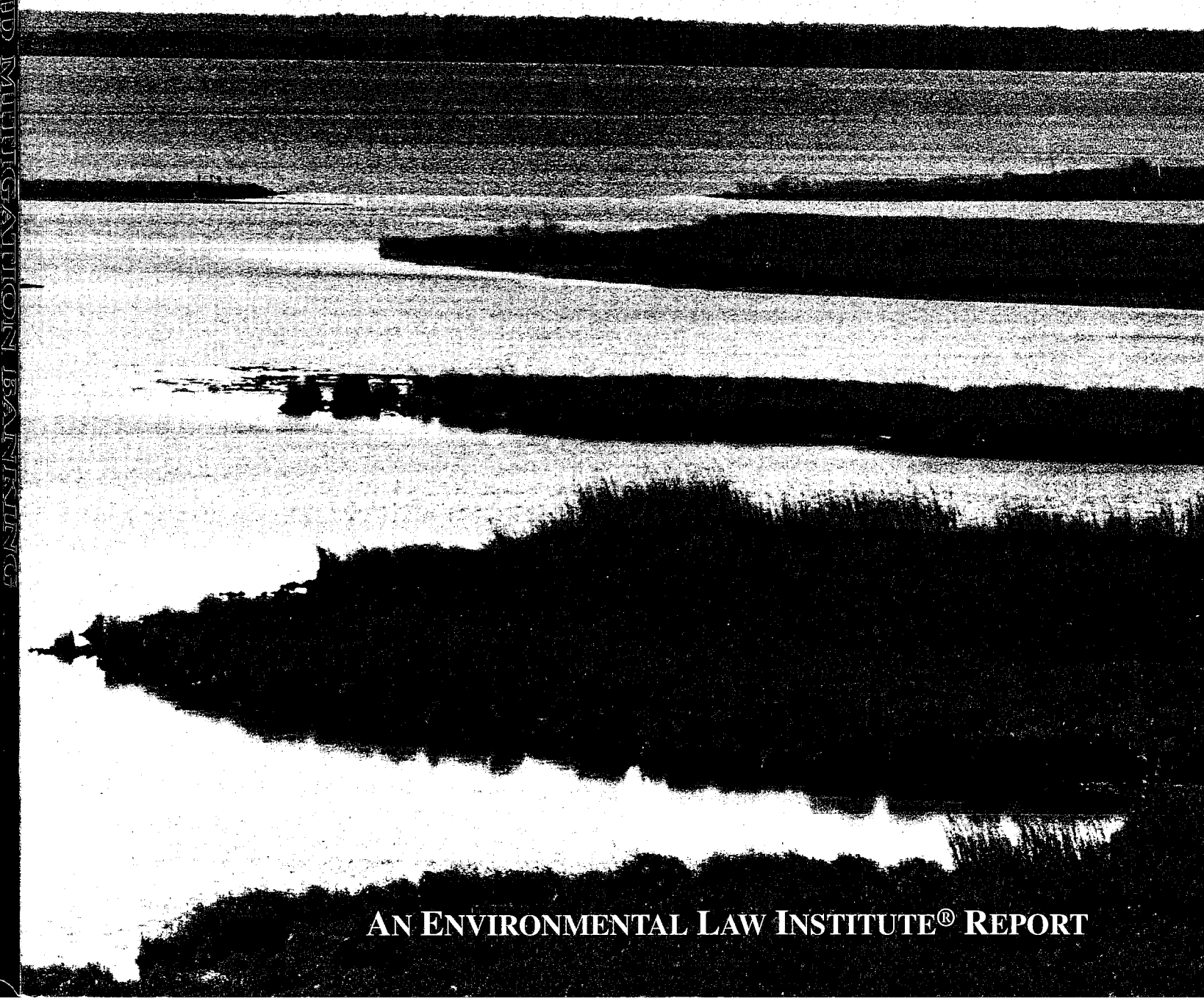
WETLAND MITIGATION BANKING



AN ENVIRONMENTAL LAW INSTITUTE® REPORT

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ACKNOWLEDGMENTS

This study was prepared with funding from the U.S. Environmental Protection Agency's Office of Policy, Planning and Evaluation, its Office of Wetlands, Oceans and Watersheds, and the U.S. Army Corps of Engineers' Institute for Water Resources under Cooperative Agreement CR-815623-02. It does not reflect the views of these agencies and no official endorsement should be inferred.

Environmental Law Institute staff contributing to the project included Jay Austin, Diane Cannon, Jeff Dobbins, Vanessa Grimes, Karen Hester, Steve Mattox, James McElfish, Matt McGinnes, Marcia McMurrin, Sara Nicholas, Lisa Pelstring, Anne Platt, and Lisa Vogel. ELI also gratefully acknowledges the help of Ann Badgely, Donald Baur, and Pat Parenteau of Perkins Coie, as well as the comments of EPA and IWR staff, and Ralph Heimlich. The conclusions are solely those of ELI.

Cover Photograph by Jay Pendergrass

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CHAPTER ONE
WETLAND MITIGATION BANKING

A. Introduction

Land development activities often adversely affect waters protected as wetlands under federal, state, and local regulatory programs. Wetlands are protected by law because they are ecologically important, and because they perform a variety of useful functions, including water purification, sediment trapping, wildlife habitat, flood storage, and groundwater recharge.

Most conversions of wetlands to uplands through development activities require governmental approval. Under several regulatory programs, including §404 of the Clean Water Act, a regulatory agency may impose conditions upon its grant of approval for a developer's conversion of wetlands. The agency may require the developer to make up for the loss of the wetland and its values by substituting replacement wetlands. This process is called compensatory mitigation. The developer is usually required to create, restore, or enhance replacement wetlands on or adjacent to the development site.

Within the last decade an alternative approach to onsite compensatory mitigation has begun to emerge: wetland mitigation banking. In wetland mitigation banking, larger offsite wetland areas are used to mitigate for a number of independent wetland development conversions. The land developer itself need not produce the compensatory wetland values; instead, the developer can purchase them from another entity that has produced and "banked" them for this purpose. The banked "compensation credits" are recognized by the regulatory agency as providing suitable compensation for wetland impacts.

Wetland mitigation banking is based upon the possibility that it may provide greater ecological benefits than onsite, project-specific mitigation. Because banking mitigates for numerous individual wetland conversions, compensation sites are likely to be larger and more likely to be viable hydrologically and biologically. In addition, banked compensation wetlands can achieve functional success in advance of the wetland conversions for which they are to mitigate; and they can be continuously monitored and managed to assure the production of the wetland functions at issue. Wetland mitigation banking offers potential efficiencies and economies of scale, and may offer continuing professional wetland management rather than ad hoc management by the development entity.

This study examines the current status of wetland mitigation banking in the United States. It examines all wetland mitigation banks now in operation, as well as many proposed banks. Its focus is upon the institutional components that affect banking's ability to succeed in ecological and economic terms. The study is intended to serve as a comprehensive reference for regulators, wetland developers, environmentalists, land owners, resource

agencies, and others interested in wetland mitigation banking as a means of wetland management and protection.

B. Study Methodology

ELI identified all existing and proposed wetland mitigation banks using published and unpublished research, surveys (including information from a survey of Corps of Engineers districts conducted by the Corps in February 1992), and staff contacts. The information was compiled and verified in July 1992. Relevant documents were obtained on the existing and proposed banks, including permits, memoranda of understanding, plans, maps, financial information, and correspondence.

ELI also identified and collected federal agency policies on wetland mitigation banking, and wetland planning information -- including state wetland plans and other plans that address wetlands (such as coastal zone management plans and state comprehensive outdoor recreation plans).

In order to supplement the information available on existing and proposed wetland mitigation banks, ELI also examined a number of potential analogues to wetland mitigation banking. These were identified by EPA, the Corps of Engineers, or ELI as having potential relevance to the structuring of mitigation banks. After examining a variety of possible analogues, ELI concluded that none shed any significant additional light on mitigation banking -- either because the analogy was not very close (as in the case of credit unions, and air emissions trading), or because the outcomes were just as uncertain (as in the case of habitat conservation plans under the federal endangered species act).

ELI analyzed all of the data to assess the current state of wetland mitigation banking, and to identify the factors that might influence its development. The study focused primarily on the institutional components of wetland mitigation banking programs. If banks are to serve as a viable instrument of wetlands policy, banks must be structured to succeed in both economic and ecological terms.

C. Organization of the Report

This chapter introduces the methodology and defines the concepts used in the study. It also summarizes statistical findings concerning the current array of banks. Chapter Two reviews the regulatory context for compensatory mitigation. An understanding of current law is essential to an analysis of wetland mitigation banking and to any attempt to design an effective banking system. Chapter Three examines wetland mitigation banking from the perspective of ecology and identifies the structural issues raised by ecological factors.

Chapters Four through Nine analyze the institutional components of wetland mitigation banks: Chapter Four - bank organization and enabling instruments; Chapter Five - types of mitigation allowed for banking; Chapter Six - selection of mitigation sites; Chapter

Seven - mitigation credit valuation methods; Chapter Eight - preventing and correcting mitigation failures and structuring long term land management; and Chapter Nine - bank financing. These are the essential building blocks in all wetland mitigation banking schemes.

Chapter Ten places wetland mitigation banking in the context of land use and wetland planning. Finally, Chapter Eleven offers some conclusions.

Appendix A is an inventory of all existing wetland mitigation banks and all known proposed banks. Appendix B is a detailed matrix of statistical information on the existing banks. Appendix C summarizes extant federal policies and guidance documents concerning wetland mitigation banking.

The report concludes with two bibliographies: a comprehensive bibliography of the literature on wetland mitigation banking, and a supplemental bibliography of selected literature on related topics such as wetland restoration and mitigation.

D. Definitions

Because wetland mitigation banking has been developed *ad hoc*, there are no fully sanctioned or consistent definitions of terms. ELI here defines a number of the more important terms used in this study. These definitions are based either upon commonly used definitions [e.g., Association of State Wetland Managers 1992, NRC 1992] or upon our analysis of practice in the field. In short, these definitions are intended to be practical rather than prescriptive; regulators may decide to adopt different definitions in order to implement differing policy choices, as discussed in this study.

> **Mitigation Bank** means a system in which the creation, enhancement, restoration, or preservation of wetlands is recognized by a regulatory agency as generating compensation credits allowing the future development of other wetland sites.[1]

> **Onsite Mitigation** means creating, enhancing, or restoring adjacent wetlands in an amount sufficient to mitigate for the specific development project needing regulatory approval but not producing "surplus" compensation credits available for use in mitigating other activities.[2]

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[1] In some cases, the future development activities to be compensated for by the bank are already identified. In others, the credits are generated speculatively to compensate for as yet unspecified development activities.

[2] Onsite mitigation is the most common type of compensatory mitigation. It is sometimes erroneously called "concurrent mitigation" because of the usual practice of allowing the compensation activity to occur at the same time as (or after) the development activity, but "concurrent" is really a timing issue. Onsite mitigation may be advance mitigation.

In Lieu Fee System means a program in which a regulatory agency collects fees in lieu of requiring a developer to compensate for wetland losses through onsite mitigation or acquiring credits generated by a mitigation bank. The fees are accumulated for use in future mitigation projects by the agency. In lieu fee systems were not analyzed in this study.

Compensation Credit means the unit of wetland value that is recognized as the basis for comparing the destroyed wetland to the banked wetland offered in compensation. Credits are expressed in units such as acres, habitat units, or numbers.

Creating wetlands means to alter upland environments or shallow aquatic environments to produce wetlands.

Restoring wetlands means to return wetland values and functions to a former wetland or degraded wetland where human or natural activities have diminished or destroyed such values and functions.

Enhancing wetlands means to alter an existing wetland to add, or increase, particular wetland values and functions to levels not present under previous natural conditions, or to slow the natural impairment of existing values and functions.

Preserving wetlands means to provide legal protection to natural wetlands that would otherwise be lost to lawful activities.

In the literature these terms are not always defined consistently; in particular there is frequently disagreement concerning the distinction between restoration of wetlands and enhancement of wetlands. We regard these functions as similar, but note that restoration places a wetland in a prior condition while enhancement may produce a new condition in a wetland.[3]

Some definitions of "wetland mitigation banking" [e.g. Association of State Wetland Managers 1992] do not identify "preservation" as a mechanism that a mitigation bank may use to generate compensation credits, presumably because this would conflict with compensation as a means toward "no net loss" of wetlands. Nevertheless, in practice, some entities operating as mitigation banks with the blessing or acquiescence of one or more regulatory agencies do use this mechanism.

[3] Some definitional schemes suggest that "restoration" should apply to activities that bring land into jurisdictional wetland status, reserving the term "enhancement" for activities that improve already-jurisdictional wetlands. However, this overemphasizes the regulatory rather than the ecological regime, and produces greater overlap between the definitions of restoration and creation - a distinction that is of greater practical importance in the field.

E. Wetland Mitigation Banks: a Current Inventory

ELI identified existing and proposed banks using a cut-off date of July 31, 1992, to assure consistency in the data. We defined existing banks as either (1) having a signed memorandum of understanding or similar instrument (e.g. permit) rendering it "open for business" or (2) having already issued credits with the acquiescence of one or more regulatory agencies. Thus, for purposes of this study, the essential characteristic was regulatory recognition that mitigation could occur through use of the bank.

The information on proposed banks is as complete as possible but undoubtedly excludes some proposed banks. Existing and proposed banks are identified by location and type in Appendix A. Statistical information about existing banks is summarized in Appendix B.

1. Number and Type of Wetland Mitigation Banks

There are only 46 existing wetland mitigation banks in the United States. Four of the existing banks -- Port of Los Angeles-Batiquitos Lagoon (CA), Mud Lake (ID), Washoe Lake (NV), and Northlakes Park (FL) -- were in suspended status at the time of the study for lack of pursuit, failure to construct, or lack of sufficient water to generate credits.

The 46 banks are located in 17 states. Eleven are located in California, which recognizes mitigation banking specifically in state law and regulations. Eight are located in Florida, all but one in the Southwest Florida Water Management District (SWFWMD). The SWFWMD developed an approach to advance mitigation for developers and local governments with repeated mitigation needs that produced these single-user banks. Other water management districts in the state have begun to examine the SWFWMD approach, and the state Department of Environmental Regulation recently authorized its first wetland mitigation bank. California and Florida lead in the number of existing wetland mitigation banks primarily because development pressures in both states were significant throughout the 1980s and state or local regulators were willing to experiment with the concept. No other state has more than 4 existing banks (although the Minnesota Highway bank has over 40 mitigation sites); and there is no consistent federal policy toward banking that would have encouraged its wider use.

Nearly seventy-five percent of the existing banks are state highway banks, port authority banks, or local government banks providing mitigation for public works projects. Indeed, twenty-two of the 46 banks are operated by state departments of transportation to mitigate for highway construction.

Six banks are controlled by private developers and used solely for advance mitigation of their own proposed projects. Only one existing bank is a privately owned bank offering credits for commercial sale to the general public -- Fina LaTerre (LA). Three others are

publicly owned, or nonprofit-agency owned, banks offering credits for general sale; these are Bracut Marsh (CA), Mission Viejo-ACWHEP (CA), and Astoria Airport (OR).

ELI's research identified 64 additional "proposed" banks known to regulators at the time of the study. These ranged from banks that were simply awaiting signatures on a final memorandum of understanding (MOU) or permit with a regulatory agency, to banks that had been proposed to regulatory authorities but not reviewed.

The list of "proposed" banks is understandably somewhat volatile. For example, between the July 31, 1992 cut-off date and the publication of this report, events continued. One of the proposed banks, Millhaven (GA), received its § 404 permit from the Corps of Engineers on December 18, 1992; it will operate as a privately owned commercial bank offering credits for general sale. The Walt Disney World (FL) proposed bank at Walker Ranch, in consultation with regulators, discarded the bank approach and instead converted to a large-scale advance mitigation effort for identified projects (e.g., project-specific, offsite mitigation). The Weyerhaeuser North Spit mitigation project, which we had not classed as a proposed bank because it appeared to be onsite, project-specific mitigation), apparently now will generate surplus credits and operate as a bank.

Of the 64 proposed banks identified in 1992, 15 are private entrepreneurial banks proposing to offer credits for commercial sale generally, and 17 are state or local government banks proposing to offer credits for commercial sale generally. The remainder (public and private) are proposing to reserve credits for their own future mitigation needs. Thus, at least among proposed banks, the percentage proposing to offer credits for commercial sale is substantially higher than that among existing banks (50%, in contrast with 9% for existing banks). It remains uncertain whether regulatory requirements and scrutiny will alter this proportion.

2. Mitigation Allowable and Credit Valuation

Most of the 46 existing banks recognize wetland restoration or enhancement as the basis for compensation credits, although some also recognize wetland creation. Only two of the 45 existing banks use preservation alone as a basis for compensation. However, 10 banks recognize preservation as one among several types of allowable compensation activities.

Although the 46 existing banks use a variety of credit valuation methodologies, 15 of them use habitat-based methods (about 31%) and 12 use acreage (about 26%). The remainder use versions of multiple function valuation schemes, best professional judgment, or idiosyncratic systems.

Most existing banks have been approved with compensation ratios of 1:1 or higher. This means that the developer must provide one or more banked wetland compensation credits for each corresponding unit of impact to the converted wetland. The approach is

designed to produce no net loss (with some margin of safety), or even some net gain. Some of the banks have sliding compensation ratios based on the attainment of certain success criteria -- thus, a fully functioning banked wetland may be authorized to provide credits for use at a lower ratio (e.g. 1:1) than a partially functioning banked wetland (e.g. 5:1)

F. The Future of Wetland Mitigation Banking

Wetland mitigation banking does not now serve as a major instrument of wetlands policy. There are few wetland mitigation banks in existence and nearly all are single-user banks -- public or private developers performing their own mitigation in advance. Virtually all are *ad hoc* arrangements between developers and regulators willing to venture into uncharted territory.

Consequently, the universe of existing banks does not provide sufficient information on which to evaluate the potential utility and performance of mitigation banking. Current experience must be supplemented by analysis of the components of mitigation banks and how they might operate. See Chapters Four through Nine of this study.

Wetland mitigation banking's future utility depends upon two developments: (1) a clear definition by regulators of banking's role in meeting wetland protection objectives, and (2) careful attention to banking's institutional components.

First, wetland mitigation banking only makes sense in the context of a coherent regulatory system. Wetland compensation cannot perform precisely like a traditional free-market good. Demand for compensatory mitigation exists only because it is a government-imposed condition on wetland development. Supply will exist only where the demand can be anticipated. Where the government clearly identifies its objectives, it becomes possible for wetland developers and prospective wetland restorers to anticipate and meet the need for wetland mitigation. Otherwise, *ad hoc* arrangements allowing the use of offsite mitigation or restricting its use are unlikely either to produce good ecological results or to encourage mitigation banking.

Critical in this context is the relationship between mitigation banking and onsite mitigation. A policy initiative that deals with one but not the other will likely produce unintended consequences. For example, if the conditions for mitigation banking are defined by regulators in great detail in guidance documents or regulations, but corresponding provisions are not developed for onsite mitigation, mitigation choices will be made based on these disparities rather than on what will produce the best ecological result. This may produce poor economic and ecological outcomes. Any rational regulatory attempt to frame the use of mitigation banking must, therefore, deal with onsite mitigation.

Second, attention to the institutional components of wetland mitigation banking schemes is essential. Wetland mitigation banking can serve as a powerful ecological tool, foster land development activity while subordinating ecological goals, or fail to serve either

ecological or economic goals. While no single model of wetland mitigation banking is appropriate for all settings and all wetland types, nevertheless, some common features of successful banking schemes can be identified. Future banking efforts must be grounded in a fuller understanding of the strengths and shortcomings of bank design.

CHAPTER TWO
THE REGULATORY CONTEXT FOR MITIGATION BANKING

This chapter sets out the regulatory context in which wetland mitigation banking operates. It examines the laws, regulations, and policies that give rise to a requirement for mitigation in the form of substituted wetlands. The chapter initially discusses the background of § 404 of the Clean Water Act, the primary source of federal regulatory jurisdiction over wetlands. Next, it identifies the sources and evolution of federal mitigation requirements. Third, it examines state wetland regulation schemes that operate independently of the federal § 404 program.

After setting out the regulatory context, the discussion returns to the specific § 404 determinations that lead to compensatory mitigation, including the "sequencing" requirement. Sequencing requires two steps before conversion of a wetland will be allowed to occur with compensatory mitigation: avoidance of the wetland conversion, and minimization of unavoidable losses. The chapter concludes with a discussion of the implications of the current regulatory scheme for wetland mitigation banking.

A. Regulatory Requirements

1. Overview of Section 404 of the Clean Water Act

Section 404 was enacted as part of the Federal Water Pollution Control Act Amendments of 1972. Since 1972, § 404 has evolved into the major federal program regulating activities in the nation's wetlands. By its terms, § 404 regulates discharges of dredged or fill material to wetlands and other waters of the United States. The § 404 regulations define wetlands as "those areas that are inundated or saturated by surface and groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Once an area has been identified as a wetland, it is necessary to determine whether it is a "water of the United States." The courts generally have interpreted the term broadly to include all waters, the degradation or destruction of which could affect interstate commerce.

Section 404 regulates "discharges" of "dredged or fill material" to waters of the United States. Activities that do not involve a discharge, but that might otherwise destroy or degrade wetlands, are not currently regulated under § 404. In addition, § 404(f) exempts certain discharges from the permit requirement discussed below -- such as discharges from normal, ongoing farming, ranching, and silviculture, unless they convert a wetland to a new use and impair the flow or circulation of the waters of the United States or reduce the reach of such waters.

Applicants wishing to discharge dredged or fill material to wetlands or other waters of the United States must first obtain authorization from the U.S. Army Corps of Engineers (Corps), either through issuance of an individual permit or as authorized under a general permit. Section 404(e) authorizes general permits for categories of activities that are similar in nature and will have only minimal adverse environmental impact.

Because of the historical role played by the Corps in regulating dredging and other activities in navigable waters, Congress gave it the principal job of administering the § 404 permit program. At the same time, Congress gave EPA authority to, among other things, establish the standards the Corps would use to issue permits (the so-called § 404(b)(1) Guidelines), as well as the power to veto permits issued by the Corps (§ 404(c)).

2. Brief History of Section 404 Regulation

a. Early Jurisdictional Issues

Initially, the Corps did not implement § 404 as a wetland protection statute. The language of the statute required a permit for any "discharge of dredge or fill material into the navigable waters."[1] The term "navigable waters" was defined, somewhat elliptically, to mean "waters of the United States."[2] Despite legislative history indicating a congressional intent to extend the reach of federal jurisdiction to the limits of the Commerce Clause, the Corps adopted a much narrower definition of waters of the United States that did not include wetlands. A lawsuit ensued, and in *Natural Resources Defense Council v. Callaway*,[3] the court held that the Corps was required to promulgate new regulations covering wetlands. In response, the Corps adopted a phased approach, which gradually brought wetlands under regulation by July, 1977.

Congress essentially ratified this regulatory scheme in the 1977 amendments to the Clean Water Act. As a compromise, however, the amendments created several statutory exemptions to the permit requirement.[4] To provide additional regulatory flexibility, Congress also authorized the Corps to issue general permits for classes or categories of activities deemed to have minimal cumulative environmental impact. These permits are discussed in detail in Chapter Ten.

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[1] 33 U.S.C. § 1344(a).

[2] 33 U.S.C. § 1362(7).

[3] 392 F. Supp. 685 (D.D.C. 1975).

[4] *E.g.*, 33 U.S.C. § 1344(f) (exemption for normal agricultural and silvicultural practices).

b. Current Jurisdictional Issues

Today, the jurisdictional problem continues to be one of the more contentious legal and political issues in federal environmental law. The problem starts with how to define a wetland, and becomes more complicated as one attempts to specify precise wetland boundaries.

Corps and EPA regulations define a wetland as an area that is "inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions."[5] This regulatory definition was upheld by the Supreme Court in *United States v. Riverside Bayview Homes*.[6] In *Riverside*, a developer argued that a wetland near Lake St. Clair was not subject to federal control because it was not periodically inundated by a navigable water body. The Court rejected this argument, holding that as long as there was some hydrologic connection between a wetland and a navigable water body, the wetland was subject to § 404 regardless of the source of the water (i.e., rainfall) that caused the saturation. The Court, however, stopped short of addressing the more difficult issue of whether "isolated wetlands," i.e., those with no hydrologic connection to navigable waters, would be covered.[7]

c. Wetland Delineation Manuals

Another significant issue has to do with the methodology by which wetlands are delineated in the field. There have been several attempts to develop a uniform methodology for wetland delineation. The Corps produced a Delineation Manual in 1987, but EPA, the U.S. Fish and Wildlife Service (FWS), and the Soil Conservation Service (for use in implementing the "swampbuster" provisions of the 1985 Food Security Act) each had their own methodologies for identifying and delineating wetlands. A desire for consistency led to the development of the 1989 Federal Wetland Delineation Manual, which was jointly issued by the Corps, EPA, FWS, and the Soil Conservation Service. The 1989 manual triggered a storm of protest from farmers, developers, mining companies, and regulated landowners who felt that it greatly expanded the scope of the § 404 program.[8]

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[5] 33 C.F.R. § 328.3(b); 40 C.F.R. § 230.3(t).

[6] 474 U.S. 121 (1985).

[7] The difficulty of the isolated wetland issue is illustrated by a recent case. In *Hoffman Homes, Inc. v. EPA*, a panel of the Seventh Circuit ruled that isolated wetlands are not subject to § 404 jurisdiction. However, on the government's motion for reconsideration, the full circuit vacated the panel decision, and, in an unusual move, referred the case to a mediator for possible settlement, leaving the case unresolved.

[8] Much of the criticism came from the agricultural community. The Corps responded by issuing the Regulatory Guidance Letter on Prior Converted Cropland (RGL 90-7). The effect of this RGL was to exclude

In response, the Bush Administration formed a task force, which in 1991 produced a set of proposed revisions to the 1989 manual. This time the dissension came from conservation groups, wetland scientists, and several states, who argued that the revisions would exclude millions of acres of valuable wetlands, including areas such as the Florida Everglades and the Great Dismal Swamp. To evaluate these claims, the 1991 revisions were "field-tested" around the country. The results of the field tests indicated significant problems with the proposed revisions. Meanwhile, Congress mandated, through an appropriations rider to the Water Resources Development Act of 1992, that the Corps use the 1987 Delineation Manual until a new one can be developed. In January 1993, EPA also adopted use of the 1987 Manual to assure consistency. In the meantime, Congress authorized a study by the National Academy of Sciences on wetland delineation methods.

d. Implications for Mitigation Banks

These jurisdictional issues obviously are important to the overall § 404 program, but they are especially important for the mitigation issue. If the "no net loss" goal recommended by the National Wetlands Policy Forum is to be achieved, the cost of doing so will be determined in part by the physical extent of the wetland resource that must be maintained and replaced as losses occur.

It is also important to note that changes to either the geographic scope of jurisdiction or the activities regulated by the § 404 program are likely to have an impact on the market for mitigation banks. If, for example, the jurisdictional scope widens and additional areas are brought under jurisdiction, additional wetland impacts could be expected to occur, thereby increasing the demand for compensatory mitigation and potentially for mitigation banks.

B. Sources and Evolution of Federal Mitigation Requirements

1. The Fish and Wildlife Coordination Act

One of the earliest federal statutes to require mitigation for habitat loss is the Fish and Wildlife Coordination Act,[9] originally passed in 1934, and strengthened by subsequent amendments in 1946, 1958, and 1965. The Act applies to both congressionally-authorized and federally-permitted "water resource development projects," and specifically to issuance of § 404 permits. It requires the Corps to "consult" with FWS and to consider FWS' recommendations for avoiding or compensating for habitat loss, but it does not require the Corps to adopt those recommendations.

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from regulation large areas of disturbed wetlands that otherwise might have met the criteria of the 1989 Manual.

[9] 16 U.S.C. §§ 661-667e (1976).

As a result of its various coordinating and consulting roles under the Coordination Act, the Endangered Species Act,[10] and other laws, FWS has developed and published its own comprehensive mitigation policy.[11] The FWS policy creates four resource categories and ranks habitat according to its scarcity value, with "unique and irreplaceable" habitat receiving highest priority. The policy then prescribes a mitigation planning goal ranging from "no loss of existing habitat value" to "minimize loss of habitat value."

2. NEPA and the CEQ Regulations

Passage of the National Environmental Policy Act (NEPA)[12] in 1969 ushered in a new era of environmental planning and ecological stewardship. Over the years, courts have been vigorous in enforcing NEPA's procedural requirement of the preparation of environmental impact statements to consider the environmental effects of "major federal actions" including § 404 permits, and ways to minimize any resulting harm.

In 1978, the Council on Environmental Quality (CEQ) published regulations, binding on all federal agencies, which spelled out the procedures required to implement NEPA, including mitigation responsibilities.[13] The CEQ regulations define mitigation as follows:

> "Mitigation" includes:
>
> (a) Avoiding the impact altogether by not taking a certain action or parts of an action.
>
> (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
>
> (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
>
> (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
>
> (e) Compensating for the impact by replacing or providing substitute resources or environments.[14]

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[10] 16 U.S.C. § 1531 *et seq.*

[11] 46 Fed. Reg. 7644 (Jan. 23, 1986).

[12] 42 U.S.C. §§ 4321-4335.

[13] 40 C.F.R. §§ 1500-1508.

[14] 40 C.F.R. § 1508.20.

Like the Fish and Wildlife Coordination Act, NEPA is a procedural statute; it does not mandate an outcome. Thus, NEPA does not require that agencies adopt any mitigation measures at all. Nevertheless, the process and the public visibility that it brings do motivate agencies to incorporate mitigation conditions into their permit decisions.

3. The § 404(b)(1) Guidelines

As mentioned, Congress assigned EPA the job of developing the substantive criteria that the Corps uses to evaluate the environmental impact of proposed discharges under § 404. Pursuant to § 404(b)(1), EPA promulgated interim regulations in 1975 and final regulations in 1980.[15] The § 404(b)(1) Guidelines are a critical component of the § 404 program. The Corps cannot issue an individual permit unless it determines that the proposed project complies with the Section 404(b)(1) Guidelines. In terms of mitigation requirements, the Guidelines state that "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem."[16] Under the Guidelines' alternatives analysis, consideration is given to whether the proposed discharge is the least environmentally damaging "practicable" alternative. An alternative is practicable if it is available and capable of being accomplished after taking into consideration cost, existing technology, and logistics in light of overall project purpose.

A more stringent alternatives analysis is required when a "non-water dependent" activity is proposed for wetlands. An activity is considered "non-water dependent" when the activity associated with the discharge does not require access or proximity to, or siting within, wetlands to fulfill its basic purpose. The Guidelines create two rebuttable presumptions for "non-water dependent" activities: (1) that practicable alternative sites which do not involve discharges to wetlands are available; and (2) that such alternatives are less environmentally damaging than the proposed project, unless clearly demonstrated otherwise.

The Guidelines also require that a permit not be issued if the proposed discharge would: (1) violate other environmental statutes/regulations (e.g., Endangered Species Act, State water quality standards); or (2) cause or contribute, either individually or collectively, to significant degradation of wetlands or other waters of the United States.

Moreover, the Guidelines require that the discharger undertake all appropriate and practicable mitigation in order to minimize any potential harm to the aquatic ecosystem. The Corps evaluates permit applications to ensure that mitigation occurs in the following sequence: avoidance of impacts where practicable through the evaluation of alternative sites, followed by minimization of impacts, and finally, appropriate and practicable compensation for unavoidable impacts.

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[15] These regulations are now codified at 40 C.F.R. § 230.

[16] 40 C.F.R. § 230.10(a).

4. Corps Regulations

The Corps of Engineers' regulations state that

> Mitigation is an important aspect of the review and balancing process on many Department of Army permit applications. Consideration of mitigation will occur throughout the permit application review process and includes avoiding, minimizing, rectifying, reducing or compensating for resource losses. Losses will be avoided to the extent practicable. Compensation may occur on-site or at an off-site location.[17]

The regulations further provide that "all mitigation will be directly related to the impacts of the proposal, approximate to the scope and degree of those impacts, and reasonably enforceable."

The regulations acknowledge that additional or different mitigation requirements may be required by the § 404(b)(1) Guidelines. These regulations also preceded the 1990 EPA-Department of the Army Memorandum of Agreement on Mitigation ("Mitigation MOA") discussed below.

5. The 1990 Army-EPA Mitigation MOA

To standardize mitigation requirements under the § 404(b)(1) Guidelines, the Army and EPA entered into a Memorandum of Agreement in February, 1990.[18] Developed as a clarification of existing policy rather than the creation of new policy, the Mitigation MOA nonetheless has had a significant impact upon the § 404 permitting process.

The Mitigation MOA refers to the CEQ definition of mitigation, but condenses it into three phases: avoidance, minimization and compensation. Further, the MOA clarifies that each of these steps should be evaluated in this sequence (the "sequencing requirement"). Thus, permit applicants must demonstrate that they have made every reasonable effort to avoid and minimize wetland losses through careful location and design before compensatory mitigation techniques such as wetland restoration, creation or enhancement can even be considered. Compensatory measures must be "appropriate and practicable." "Appropriate" mitigation is based on the ecological value of the affected wetland. "Practicable" is defined in § 230.3(q) of the Guidelines, and requires consideration of "cost, existing technology, and logistics in light of overall project purposes."

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[17] 33 C.F.R. § 320.4(r).

[18] "Memorandum of Agreement Between the Environmental Protection Agency and the Department of Army Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines," February 6, 1990.

The Mitigation MOA governs standard (individual) permits, including after-the-fact permits, for which applications were filed after February 7, 1990. It does not apply to general permits, including nationwide permits. It specifies a clear preference for on-site, in-kind replacement of wetland functions and values, and establishes a minimum one-to-one ratio as a rule of thumb for replacement. Mitigation banks are recognized as an "acceptable form of compensatory mitigation under specific criteria designed to insure an environmentally successful bank." However, the MOA notes that simple purchase or "preservation" of existing wetlands will not be considered adequate compensation except in "exceptional circumstances."

C. State Permit and Mitigation Requirements

At least twenty states have enacted wetland management programs [World Wildlife Fund 1992]. Like § 404, these statutes generally require permits for specific activities that have adverse effects on wetlands. For example, Oregon regulates both filling and removal activities in all waters of the state including fresh water and tidal wetlands.[19] Michigan, the only state to have fully assumed the federal permit program under § 404(g), requires permits for a wide range of activities, including filling, dredging, draining and excavating in wetlands.[20] It also is possible for states in effect to partially assume the § 404 permitting authority through the Corps' issuance of a general permit; this approach is discussed further in Chapters Four and Ten. Still other states do not have a permit program *per se*, but protect wetlands through "conditional use approvals."[21]

Many states specify mitigation requirements as part of their regulatory program. For example, Maryland requires applicants to "take all necessary steps to first avoid significant impairment and then minimize losses of nontidal wetlands."[22] New Jersey requires that every freshwater wetlands permit contain a condition ensuring that "all appropriate measures have been carried out to mitigate adverse environmental impacts, restore vegetation, habitats and land and water features, prevent sedimentation and erosion, minimize the area of freshwater wetland disturbance and insure compliance with the Federal [Clean Water] Act and implementing regulations."[23]

At least nine states have statutes expressly authorizing wetland mitigation banks; others have explicitly addressed banking through agency guidance or regulation (Table 1).

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[19] *See* O.R.S. §§ 196.800 to 196.900 (1987).

[20] *See* Mich. Comp. Laws. Ann. § 281.705.

[21] *E.g.*, Vermont Wetlands Act of 1986, Vt. Stat. Ann. Title 10, § 905:7, 89 (1986).

[22] Md. Nat. Res. Code Ann. § 8-1209 (1989).

[23] N.J. Stat. Ann. §§ 13:9, 13-13 (1987).

Oregon enacted its Wetlands Mitigation Bank Act in 1987.[24] Under this statute, mitigation banks must be publicly owned and operated, be approved by the Division of State Lands (DSL), and meet a number of criteria. Credits can only be used for mitigation of permit actions within the same "tributary, reach or sub-basin" covered by the mitigation bank, and may not be used until DSL has certified them. The price of any mitigation credit must include all of the costs incurred by the state in setting up and maintaining the bank.

Table 1.

STATE WETLAND MITIGATION BANK LAWS and REGULATIONS

State Statutes Governing Wetland Mitigation Banking
California: Cal. Pub. Res. Code § 30233 (1991). Cal. Fish & Game Code §§ 1775-1793 (1991).
Colorado: Colo. Rev. Stat. §§ 37-85.5-101 to -111 (1991).
Louisiana: La. Rev. Stat. Ann. § 49-214.41. (1991)
Maryland: Md. Nat. Res. Code Ann. §§ 8-1201 to -1211 (1988).
New Jersey: N.J. Stat. Ann. §§ 13.913-13 to -15 (1988).
North Dakota: N.D. Cent. Code § 61-32-05 (1987).
Oregon: Or. Rev. Stat. §§ 196.600 to .665 (1987).
Texas: 1991 Tex. Sess. Law Serv. ch. 3 §§ 6.01-6.07.
Wyoming: Wyo. Stat. §§ 35-11-310 to -311 (1991).
State Agency Regulations and Guidelines Governing Wetland Mitigation Banking
California: California Department of Fish and Game, Draft Guidelines for the Establishment of Wetland Mitigation Banks (July 1991).

[24] O.R.S. §§ 196.600-196.665.

Maine: Code Me. R. ch. 310 (June 1990).
Maryland: 18:9 Md. Reg. .08.05.04.01 to .06 (1991).
Minnesota: Minnesota Department of Transportation, Guidelines for Implementation of Wetland Habitat Mitigation Banking, Technical Memorandum No. 87-28-Env-2 (June 18, 1987).
New Hampshire: New Hampshire Department of Transportation, Policy on Wetlands (October 1990).
New Jersey: N.J. Admin. Code tit. 7:7A §§ 14.1 - 15.7 (1992).
Oregon: Or. Admin. R. §§ 141-85-240 to -262 (1984).
Wisconsin: Wisconsin Department of Natural Resources and Wisconsin Department of Transportation, Compensatory Mitigation Policy for Unavoidable Wetland Losses Resulting from State Transportation Activities. (Amendment to the Interagency Cooperative Agreement between the Wisconsin Department of Natural Resources and the Wisconsin Department of Transportation) (November 7, 1990).

State regulation of mitigation banks has the potential both to build upon and to conflict with federal regulatory efforts. On the one hand, state programs can require compensation for wetlands such as prior converted croplands, which are exempted from § 404, and can more closely regulate those wetlands that are under federal jurisdiction. For instance, the Oregon banking statute utilized a pre-existing statewide system of resource values that sets variable compensation ratios ranging from 1:1 to 6:1 depending on wetland type, a factor that receives little weight in the federal scheme.

On the other hand, precisely because state programs sometimes are based on different objectives, they may prove incompatible with or restrict the market for federally-approved mitigation. It seems likely that state banks will not be entirely successful unless they are able to overcome or reconcile any such differences with federal agencies. Conversely, state approval of wetland mitigation banking, particularly in the context of a comprehensive wetland planning effort, may serve to catalyze federal approval of certain mitigation banks.

D. A Closer Look at the Section 404 Mitigation Requirements

The requirements of the §404 permit program have a profound effect on how mitigation banking will operate. The mitigation sequencing requirements are particularly important because under current law they establish preconditions for compensatory mitigation, and hence for mitigation banking. In complying with the first step of the

sequence (i.e., avoidance of impacts), if less environmentally damaging, practicable alternatives to the proposed project can be found, the fact (or the amount) of the environmental impact will change. This affects the need for (or the amount of) compensation. Similarly, the second step (minimization of impact) will have direct bearing on the demand for compensation. In addition to the sequencing requirements, compliance with the significant degradation requirements of the program often involves the provision of compensatory mitigation. Accordingly, both requirements are worthy of closer examination.

1. The Sequencing Requirements

The 1990 Mitigation MOA formalized a three-step sequencing process for evaluating wetland impacts -- avoid, minimize, compensate. The first step, avoidance, is synonymous with the practicable alternatives test established by the §404(b)(1) Guidelines.

The Guidelines operate from a premise that no discharge should be allowed where there is a "practicable alternative . . . which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences."[25] Further, in the case of non-water-dependent projects, i.e., those that do not need to be located in or adjacent to wetland or other special aquatic sites, the Guidelines create a presumption that there are practicable alternatives. To overcome this presumption, applicants must "clearly demonstrate" that there is no practicable alternative that would have less adverse impact on the aquatic environment.[26]

The Guidelines provide that an alternative discharge site is practicable if it is "available and capable of being done after taking into consideration cost, existing technology and logistics in light of overall project purposes."[27] An alternative site not owned by the applicant may be considered "available" if it "could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity."[28]

Another key factor is how the "basic project purpose" is defined, which in turn will determine the range of alternatives to be considered. Take, for example, a regional water

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[25] 40 C.F.R. § 230.10(a).

[26] 40 C.F.R. § 230.10(a)(3).

[27] 40 C.F.R. § 230.10(a)(2).

[28] Timing is a key consideration in evaluating the availability of alternative sites. In *Bersani v. Environmental Protection Agency*, 674 F. Supp. 405 (N.D. N.Y. 1987), *aff'd*, 850 F.2d 36 (2d Cir. 1988), EPA interpreted "available" to mean available at the time the applicant entered the market looking for a site to develop a shopping mall. The Second Circuit upheld this "market entry" theory despite the developer's argument that at the time he applied for the permit, the alternative location was controlled by a competitor.

supply program. If the purpose is defined as "construction of a new reservoir," the range of alternatives will be limited to structural approaches. If, on the other hand, the purpose is defined as "providing adequate water supply," a broader range of alternatives, including nonstructural alternatives, may come into play, with a corresponding change in impact on wetlands.

Another difficult issue is whether the project purpose and alternatives should be judged from the viewpoint of the applicant or from the viewpoint of the "public interest." From a property owner's standpoint, for example, the objective may be to maximize the dollar return on investment by, for example, building luxury townhouses with water access; whereas from the standpoint of the public, the basic need for housing could be met through development of affordable housing at any number of locations. The Corps is responsible for establishing the "basic project purpose" as it develops the record for each permit review. Interpretation of this requirement has varied over time, as illustrated by the following individual cases.

In one of its earliest decisions, the Corps denied a permit to the Deltona Corporation for a waterfront resort complex on Florida's Marco Island.[29] The applicant claimed that since its purpose was to build an integrated waterfront project, inland locations were not practicable. The Corps disagreed, viewing the purpose of the project as "housing" for which there were many alternate locations. This independent evaluation of an applicant's purpose fell out of favor during the early 1980s, when the applicant's statement of purpose became more or less a given. For example, in *Louisiana Wildlife Federation v. York*,[30] the applicant had purchased hardwood bottomlands to convert to soybean fields. Opponents argued that soybeans could be grown elsewhere, either by the applicant or someone else. The Fifth Circuit rejected this argument, holding that the Corps had a duty to take the applicant's objective into account in setting practicable alternatives.

More recently, Corps policy has shifted back towards the *Deltona* approach. In two cases involving permit "elevations,"[31] Corps headquarters reversed District Engineers' decisions that were deemed too deferential to permit applicants. In the *Plantation Landing Resort* case, the applicant wanted to build a contiguous waterfront resort complex similar to the one involved in *Deltona*. The District Engineer determined that because one component of the project, a marine terminal, was water-dependent, the entire project should be considered water-dependent, with the result that upland sites were not considered

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[29] *Deltona Corporation v. Alexander*, 504 F. Supp. 1280 (M.D. Fla. 1981).

[30] 761 F.2d 1044 (5th Cir. 1985).

[31] Pursuant to memoranda of agreement with the Corps under § 404(q), EPA, the Department of Interior, or the Department of Commerce may "elevate" regional and national policy issues, or individual permit decisions that involve aquatic resources of national importance, for review by the agency's national office.

practicable. The Corps headquarters overruled the District on this point, holding that each component of a multi-purpose project must be evaluated separately, and that components such as hotels, restaurants and stores were not water- dependent. The case was sent back to the District to allow the applicant the opportunity to rebut the presumption that these upland sites were not practicable for other reasons.

The *Hartz Mountain* case involved a residential housing development in the Hackensack Meadowlands of New Jersey. Corps headquarters again reversed the District Engineer on the ground that he had placed too much emphasis on achieving the applicant's objective. Headquarters instructed the District to make its own independent determination of what the housing need was in the region and what the "minimum feasible size" for a housing project in that area ought to be.

Even if an alternative is available and feasible, the Guidelines provide that it may not be considered if it would have a greater impact on the aquatic system than the proposed discharge. The Guidelines also allow for the consideration of other adverse environmental consequences in judging whether an otherwise feasible alternative is the least environmentally damaging. In some cases, this sets up a balancing test which weighs the specific wetland impacts of a proposed discharge against the broader environmental impacts of the alternatives.

The second step of the mitigation sequence, minimization, requires applicants to look for ways to re-design or phase projects to reduce wetland impacts. For example, a parking lot might become a parking garage; a causeway might become a bridge. Subpart H of the Guidelines lists a number of actions to be evaluated in the context of minimizing the adverse effects of discharges.[32] The third step, compensation, requires replacement of unavoidable losses of wetland functions and values to the extent practicable. This is where, under current policy and practice, mitigation banking comes into play.

The sequencing requirements apply to all individual permits, regardless of the type or ecological value of the affected wetland.[33] This has been criticized by permit applicants as unduly restrictive and costly. Others argue that sequencing is impractical in areas where wetlands are abundant (e.g., Alaska) and non-wetland alternatives are scarce. Proponents of sequencing counter that compensatory mitigation does not always succeed and that -- to the extent that out-of-kind or out-of-watershed mitigation is allowed -- it involves "apples to oranges" comparisons of inherently incommensurable wetland functions and values.

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[32] 40 C.F.R. § 230.70.

[33] The Guidelines provide, however, that "[a]lthough all requirements in § 230.10 must be met, the compliance evaluation procedures will vary to reflect the seriousness of the potential for adverse impacts on the aquatic ecosystems posed by specific dredged or fill material discharge activities." 40 C.F.R. § 230.10. See also §§ 230.6(a), (b).

The Mitigation MOA provides for deviations from the sequencing requirements where the requirements have been incorporated in a Corps and EPA approved comprehensive plan,[34] or where necessary to avoid environmental harm (e.g. from salt water intrusion or chemical contamination), or when EPA and the Corps agree that a proposed discharge "can reasonably be expected to result in environmental gain or insignificant environmental losses."

Since the distribution of the 1990 Mitigation MOA, several EPA, Corps, and FWS regional offices have drafted or issued guidelines for establishment and operation of wetland mitigation banks as an acceptable form of compensatory mitigation. EPA Region IX issued final guidelines on December 20, 1991. These guidelines reference the EPA/Army MOA and reinforce the requirement that all impacts must be avoided or minimized before compensatory mitigation is considered. They also identify specific situations where compensatory mitigation in the form of mitigation banking is appropriate. These include water- dependent projects, projects involving small unavoidable impacts, linear projects such as highways which involve many minor impacts, and routine repair and maintenance of public structures such as the cleaning of drainage ditches. EPA Region IV has released draft guidelines that are similar to those issued by Region IX. The most significant difference is that the Region IV guidelines include activities authorized under general permits in the list of projects generally appropriate for mitigation banking.

EPA Regions I, II, and III are developing draft guidelines jointly with the Corps North Atlantic Division and New England Division, Region V of the FWS, and the Northeast Region of the National Marine Fisheries Service. The purpose of this document is to provide guidance on the development and operation of wetland mitigation banks associated with highway construction. Once again, the agencies cite the 1990 Mitigation MOA and require that sequencing be applied before mitigation banking is considered.

Similarly, the Galveston, Texas, and Omaha, Nebraska District Offices of the Corps of Engineers have prepared draft interagency guidelines for the use of mitigation banks in the § 404 permitting process. The Omaha guidelines expressly provide that all projects must follow the five-step sequencing requirement set forth in the CEQ regulations, and incorporate sequencing from the §404(b)(1) Guidelines. The Galveston guidelines adopt the "avoidance, minimization, and compensation" language of the Mitigation MOA.

2. Significant Degradation

The Guidelines prescribe that, even if there is no practicable alternative to the proposed discharge, a discharge may be prohibited if it would "cause or contribute to significant degradation of the waters of the United States." They give four examples of situations where "significant degradation" may occur:

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[34] See Chapter Ten.

1. Significant adverse effects upon municipal water supplies, plankton, fish, shellfish, wildlife and special aquatic sites;

2. Food chain contamination;

3. Significant loss of habitat or water quality functions;

4. Significant adverse effects upon recreation, aesthetic and economic values.[35]

In order to comply with this provision of the Guidelines, permit applicants frequently provide compensatory mitigation as a means of off-setting the environmental impacts of the proposed activity. This has obvious relevance to mitigation banking.

E. Effect of the Regulatory Scheme on Mitigation Banking

Cost and uncertainty appear to be the biggest impediments to widespread use of mitigation banks. Replacing complex ecological functions through wetland restoration, enhancement or creation can quickly become expensive as the cost of the functional assessment, purchase of interests in land and perhaps water, construction, planting, maintenance and monitoring is added up. While this also is true of onsite, project-specific mitigation, it is even more important for banks, which usually are attempting mitigation at a much larger scale with some degree of uncertainty about when, or even if, credits will be used.

The uncertainty resulting from this normal market risk is then compounded by uncertainty about the regulatory regime. In particular, in the absence of clearly-stated, easily-measurable performance standards, bank operators run the risk of not knowing whether the compensatory measures will succeed to the satisfaction of regulatory agencies. There also is a widespread perception that the federal agencies are not fully in agreement on whether banking is viable from a policy standpoint. The recent publication of the regional guidelines mentioned above may serve to provide clearer signals to the regulated community. Issues of regulatory risk and bank financing are discussed further in Chapter Nine.

Under the current regulatory approach, where there is little banking, wetland conservation generally comes about in at least four ways. First, projects affecting wetlands may not be proposed because the regulations send a signal to the marketplace discouraging such development. Second, projects may be withdrawn or significantly reworked as a result of the public review and sequencing process, including evaluation by federal and state agencies. Third, a small percentage (less than 5% per year nationally) of permit applications are denied. Fourth, permits may contain mitigation conditions. (The track record of such

[35] 40 C.F.R. § 230.10(c)(1)-(4).

permit conditions has not been impressive, however. As documented elsewhere in this study, there is a high rate of noncompliance and failure of compensatory mitigation projects associated with individual permits.) If the ecological arguments favoring a threshold size for mitigation projects are credited, banking may produce much better performance under the fourth factor. Banking may also operate consistently with the first three factors.

The following chapters describe how wetland mitigation banks have been and could be structured given the present regulatory regime.

CHAPTER THREE
ECOLOGICAL ISSUES IN WETLAND MITIGATION BANKING

Wetlands are highly diverse, ranging widely in size, species composition, species richness, topography, hydrology, productivity, appearance, and in the functions and values they provide. Wetlands straddle two different worlds -- the terrestrial and the aquatic, encompassing properties of each [National Research Council 1992]. Flood control, erosion control, sedimentation and pollutant filtration, habitat for diverse and rare wildlife, aquifer discharge and recharge are all functions and values magnified in wetlands because of their nexus between wet and dry.[1]

Awareness of wetland functions and understanding of the processes necessary for wetlands to function in the landscape are critical for any program of mitigation banking. These provide the foundation for analyzing the institutional banking choices considered in Chapters 4 through 10.

A. Ecological Considerations Affecting Banking

1. Wetland Types

Wetlands vary substantially from region to region in type and in the functions they provide. Scodari [1992], simplifying the taxonomic system used by the U.S. Fish & Wildlife Service, distinguishes seven major wetland types associated with different regions and the major wetland systems within those regions. See Tables 2 and 3. These include estuarine emergent, estuarine forested/scrub/shrub, estuarine non-vegetated, palustrine forested, palustrine emergent, palustrine shrub, and palustrine non-vegetated wetlands.[2]

There is great variability among wetland types. Isolated prairie potholes of the upper midwest bear little resemblance to the lush grasses of the Everglades or the intertidal zones of the Atlantic coast. Acidic bogs in Massachusetts have virtually no species in common with Massachusetts coastal or estuarine wetlands only 20 miles away. And the functions wetlands perform are diverse and dissimilar. See Table 4. A wetland that provides erosion control

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[1] Wetland functions can be defined as those duties wetlands perform for the ecosystem, regardless of how these are viewed by human society. Functions include storm-wave buffering, biomass production, groundwater discharge, wildlife habitat and food, and many more. Values are those duties wetlands perform that are considered beneficial to society, and can overlap with functions. These can include wetlands' use as spawning grounds and nurseries for commercially important fish, contributions to sedimentation control, aesthetic values, and others.

[2] These seven categories combine some wetland types that are sometimes distinguished, such as riparian systems, and omit some that are primarily deep water habitats - e.g., marine systems.

or flood storage may have little significance for habitat or groundwater recharge, for example. These differences make comparisons (and compensation tradeoffs) among different wetland types quite difficult. Even identical wetland types may provide different levels of functions and values.

Table 2.

MAJOR WETLAND TYPES[3]

WETLAND TYPE (% of all)[4]	DESCRIPTION
ESTUARINE EMERGENT (4%) - Saltwater Marsh - Brackish Marsh	Tidal areas that are usually semi-enclosed by land with some access to open ocean and that are at least occasionally flooded with freshwater runoff. Saltwater marshes occur along coasts behind beaches or barrier islands, and in low-energy coastlines not associated with beaches or barriers. They are characterized by soft-stemmed plants like Pacific cord grass and salt hay, but stiff cord grass often develops near open water. Brackish marshes occur along coastlines where freshwater from rivers and streams meets and mixes with saltwater. They are usually dominated by marshwater hemp, pickerelweed, arrowarum and cattail.
ESTUARINE FORESTED/SCRUB/SHRUB (<1%) - Mangrove swamps	Tidal areas dominated by woody vegetation, mostly young, stunted trees and shrubs. Mangrove swamps, which occur along the south coast of Florida, are perhaps the important type. Red mangroves usually occupy lower, regularly flooded areas and black mangroves occupy higher areas.
ESTUARINE NON-VEGETATED (<1%) - Intertidal flats - Subtidal beds	Tidal areas that occur seaward of tidal marshes and mangrove swamps, at river mouths, and along rocky coasts. Intertidal flats are usually muddy, sparsely vegetated and flooded regularly by tides. Subtidal aquatic beds are continuously submerged and characterized by plants that grow on or below surface waters.

[3] From Scodari 1992, Table 1.

[4] Represents percentage of total wetland acreage found in the conterminous United States.

WETLAND TYPE (% of all)[4]	DESCRIPTION
PALUSTRINE FORESTED (50%) - Wooded swamps - Bottomland hardwood swamps - Riparian wetlands	Mostly non-tidal freshwater areas characterized by woody vegetation at least 20 feet tall that can tolerate prolonged wet conditions, including willow, red maple and white cedar in the north; bald cypress, tupelo gum and oak in the south. Wooded swamps are usually found along rivers and streams and can have standing water for half the year. Bottomland hardwood swamps usually occur in floodplains along rivers and streams in the southeast and are inundated only during flood events. Riparian wetlands are found along streams and upland floodplain terraces in the western states and are often dominated by cottonwoods and sycamore. They are often highly integrated with other communities of flora and fauna that exist within the 100-year floodplain and are dependent upon high water tables and occasional flooding.
PALUSTRINE EMERGENT (24%) - Potholes - Freshwater marsh - Wet Meadows	Mostly non-tidal freshwater areas characterized by perennial grasses and grass-like plants that grow erect partly under and partly above water. They are found along the margins of rivers and lakes, in upland depressions, and in seepage areas on gentle slopes. Potholes are isolated depressions that usually fill with water during the rainy season and then dry out completely. They support a variety of unusual and specialized plants.
PALUSTRINE SHRUB (15%) - Bogs and fens - Pocosins	Mostly non-tidal freshwater areas characterized by shrubs and scrubby trees less than 20 feet tall. Bogs are poorly drained, acidic areas that form in shallow depressions. They contain acid-tolerant plants such as cranberry bushes and venus fly-traps. Pocosins are bogs of the southeast that are found in broad, flat upland areas away from large streams and are characterized by evergreen trees and scrub-shrub vegetation.
PALUSTRINE NON-VEGETATED (6%) - Ponds	Represent freshwater ponds with vegetation cover of less than 30 percent.

Table 3.

WETLAND TYPES BY REGION AND MAJOR SYSTEMS[5]

WETLAND TYPE	REGIONS	MAJOR SYSTEMS
ESTUARINE EMERGENT	Gulf of Mexico South Atlantic Mid Atlantic Pacific	• Mississippi Delta Region (LA, TX) • South Florida • Albemarle/Pamlico Sounds (SC, NC) • Chesapeake Bay (MD, VA)
ESTUARINE SCRUB/SHRUB	South Atlantic and Gulf Coasts	• South Florida mangroves swamps
ESTUARINE NON-VEGETATED	Gulf of Mexico Mid Atlantic South Atlantic Pacific	• Laguna Madre (TX) • Chesapeake Bay (VA, MD) • South Florida • San Francisco Bay & Puget Sound
PALUSTRINE FORESTED	Lower Mississippi Alluvial Plain Upper Great Lakes Basin Gulf Coast Flats South Atlantic Flats Intermontane	• Bottomland hardwoods swamps of the Lower Mississippi Valley (MS, LA, AR) • S. Atlantic wooded swamps (FL, GA, SC) • Western riparian wetlands
PALUSTRINE EMERGENT	Upper Mid-West Atlantic Coast Flats Gulf Coast Flats Arctic	• Praire Pothole Marshes (SD, ND, MT, MN) • Nebraska Sandhills and Rainwater Basin marshes. • South Florida marshes • Alaskan tundra
PALUSTRINE SHRUB	Great Lakes Atlantic Coast Flats Gulf Coast Rolling Plain	• Northeast bogs (MN, ME, MI) • Southeast pocosins (NC, SC, VA)

[5] From Scodari 1992, Table 2.

Table 4.

WETLAND FUNCTIONS AND OUTPUTS[6]

FUNCTION	OUTPUT
NATURAL PRODUCTS	• Provides commercially-used flora and fauna, including timber, hay, cranberries, peat, and fur-bearing animals harvested for their pelts.
FISHERIES PRODUCTION AND SUPPORT	• Provides spawning, nursing, and feeding grounds and nutrient export for freshwater, estuarine and marine fisheries; provides areas for commercial aquaculture.
FISH AND WILDLIFE HABITAT	• Provides nesting and feeding ground for many species of fish, reptiles, mammals, and birds, including migratory waterfowl. Supports consumptive (e.g., hunting) and non-consumptive (e.g., nature study) recreation.
NATURAL AREAS/OPEN SPACE	• Provides aesthetic benefits and areas for archeological, education, and research use.
FLOOD STORAGE AND CONVEYANCE	• Reduces property damage, soil erosion, the need for artificial flood control measures.
SHORELINE ANCHORING/DISSIPATION OF EROSIVE FORCES	• Protects beaches, habitats and property from erosive effects; reduces the need to dredge navigable waterways; maintains health of aquatic systems.
STORM WAVE AND SURGE PROTECTION	• Reduces property damage, beach erosion, and the need for artificially constructed barriers.
GROUNDWATER RECHARGE	• Supplies drinking and irrigation water, protects aquifers from saltwater intrusion in coastal areas.
POLLUTION ASSIMILATION/SEDIMENT TRAPPING	• Improves water quality, reduces pollution damage, reduces wastewater treatment needs.
BIODIVERSITY	• Supports a wide variety of flora, many of which are federally listed threatened or endangered species.
ENERGY FIXATION/FOOD CHAIN SUPPORT	• Provides general ecological support.
NUTRIENT CYCLING	• Provides general ecological support.

[6] From Scodari 1992, Table 3.

Wetlands also differ dramatically in the time and difficulty it takes to restore or replace them -- important considerations in the context of mitigation and mitigation banking. A bottomland hardwood in the southeastern United States, if cut down and drained today, might take up to 100 years or more to regenerate and fully mature [Gosselink, Lee, and Muir 1989]. In contrast, a restored emergent wet meadow can resemble a fully functional wet meadow in about three months with intensive management and planting [Greenhorne & O'Mara, personal communication], although the time to full functional replacement may be considerably longer.

Mitigation banks and, particularly, regional, state, or national banking regulations or policies that ignore these differences among wetland types are likely to short-change the environment. Acre-for-acre replacement of a bog by creating a red-maple swamp, for example, is an unequal trade in terms of rarity, time to maturity, and functions. The ecological issues thus raise a host of institutional issues.

One of these is whether compensatory wetland mitigation should require "in-kind" replacement of wetland types and functions; or, if not, under what circumstances "out-of-kind" compensatory mitigation should be allowed. In-kind mitigation seeks to provide the same wetland type -- usually defined by habitat -- that will be lost to development, and the same array of functions generally. In-kind mitigation requires less understanding of trade-offs because it is based on the assumption that certain wetland functions (both those understood and less well understood) will follow the wetland form.

On the other hand, out-of-kind mitigation may provide a different kind of benefit. It may restore a locally rarer wetland or provide more of a particularly needed function like flood control. It may enable regulators to replace the historic assemblage of wetlands in an area, or to "trade up" by requiring a higher-value compensatory wetland to achieve broader watershed-enhancement or wildlife management goals. The in-kind vs. out-of-kind issue is fundamentally an ecological one that quickly implicates social values and goals. The issue requires a regulatory decision in the mitigation banking context.

2. Wetland Locations

The functions that wetlands perform are not abstract or portable. Indeed, most wetland functions have value because of where they exist in the landscape. A prairie pothole provides necessary habitat support because it is in the flyway of migratory waterfowl. A riparian wetland provides flood control because of its location along a river or stream. An estuarine wetland provides nursery areas for valued species that thrive in a transitional environment between freshwater and marine habitats.

The importance of functions in the matrix of a landscape is one of the primary reasons that most contemporary mitigation is onsite mitigation.[7] Many environmentalists and regulators have viewed onsite mitigation as preferable because, at least in theory, it replaces the same values and functions as were lost to development, and it does so in the same location. Not only is the loss thereby minimized, but there should be less disruption to local hydrology and to local wildlife. The Association of State Wetland Managers argues strongly that onsite replacement should always be given first consideration not only for hydrologic and habitat reasons, but also because draining or filling a wetland without replacing its local hydrologic functions may create potentially serious legal and financial consequences for upstream and downstream landowners and communities -- who may experience localized flooding or dewatering. Regulators also have argued that in many development projects there are remnant onsite wetlands that can, and should, be restored or augmented.

On the other hand, onsite mitigation also has ecological problems that may be avoided with offsite mitigation (and mitigation banking). In many cases, developments in wetlands do not leave an ecologically viable remnant wetland. Onsite wetlands can be created, restored, or enhanced, but the permitted activities tend to leave a smaller wetland base onsite. Adjacent impacts from the new development may degrade what natural wetlands do remain as well as the onsite mitigation wetland; this is the case with many "patch" wetlands and onsite mitigation projects surrounded by housing developments or shopping centers [Lewis 1992]. Indeed, onsite mitigation has a dismal record [Redmond 1990; Erwin 1991].[8] While requiring onsite buffers for mitigation wetlands can help ameliorate these impacts, the buffer itself may cut further into available acreage for replacement wetlands. More importantly, onsite mitigation is almost invariably done concurrently with development or after the fact, meaning that there is a temporal loss of values and functions until the restoration has achieved some level of functional replacement. In many situations, wildlife and plants displaced during development either do not survive or migrate from the site. This makes restoration of the former wetland's original level of biodiversity difficult to achieve.

Offsite mitigation banking offers a number of potential ecological advantages over onsite mitigation. The potential for improved ecological success is one of these; it derives from several sources. First, offsite mitigation allows for greater latitude in choosing a mitigation site that may produce a well-functioning replacement wetland. Onsite mitigation may require replacement wetlands to be built on adjacent upland sites, creating the risk of hydrologic failure. Or it may require restoring remnant wetlands that may suffer the harmful

[7] A secondary reason is that developers have access to their own sites and hence, the ability to undertake mitigation there.

[8] The reasons for this record include other factors than ecological ones, including design problems, lack of monitoring, and poor enforcement. See Chapter 8.

impacts of the adjacent development project. Offsite banks can be located on a former wetland or degraded wetland site to benefit from predisposed hydrology.

Second, banking often requires mitigation success in advance of development. This avoids some of the problems with temporal losses. While not all banking is advance mitigation, advance mitigation is frequently required by banking programs.

Third, freedom to situate a bank within a broader area -- a watershed, sub-basin, county, or even state -- may allow the bank to meet a larger number of ecological goals considered on a regional basis. For example, a bank may be situated adjacent to waterbodies to filter sediment and pollutants. Or it may be placed between two existing natural areas to eliminate edge habitat, increase interior habitat, and provide a corridor for wildlife to move along. A bank may be located along a stream or river to limit erosion, or sited in an urban area to provide badly needed wildlife habitat. The mitigation is not limited to an imitation of the status quo at the development site, but may serve strategic goals which can have greater ecological significance.[9]

Fourth, offsite mitigation also creates the possibility of producing and managing a larger mitigation site than is usually possible with project-specific mitigation (and particularly onsite mitigation). Larger wetland systems are generally more self-sustaining. They can provide habitat for more types of species, a longer and more self-sustaining food chain, more habitat niches, and a wider variety of habitat types -- which, in turn, can better accommodate ecosystem succession, migration, and change [Willard and Hillier 1990]. Larger sites provide more interior habitat for the many species dependent upon such habitat. They may better protect species from inbreeding effects due to the isolation of small populations, and may be more resilient to natural disasters because of their larger size, larger seed banks, and more varied habitat.

Bigger is not better in all cases, however. There are many situations where small wetlands should replace similar small wetlands lost to development and thereby provide habitat for locally displaced species. Many species -- salamanders, for example -- depend on small "patch" wetlands. Other species depend on nearby edge habitat that would be minimized in a large site or in one contiguous to another large natural area. But these size concerns can be met in banks through the use of buffer areas. A small wetland with surrounding upland buffer is more likely to survive (and to migrate) than one surrounded by parking lots or boat ramps.

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[9] Siting a bank between existing natural areas can also make the effective size of the wetlands in the bank much larger by providing buffers and wildlife corridors, and by attracting species with larger range requirements. For example, two banks operated by the Mississippi state highway department - the Malmaison Wildlife Management Area and the Dahomey Wildlife Refuge banks - are sited adjacent to existing wildlife preserves.

Finally, the comparative simplicity of monitoring and enforcement of ecological success in a mitigation bank over multiple onsite projects should also increase the likelihood of ecological success of the replacement wetland, including the opportunity for identifying problems and making mid-course corrections.

The disadvantages of offsite mitigation have already been alluded to. Many of the values and functions provided by wetlands are important primarily because of where they are provided. Flood control on one watershed does not "replace" loss of flood control on another. For this reason, many mitigation banking programs, policies, and proposals specify that banks must be located within some specified distance of the development projects for which they are mitigating -- typically this is stated in terms of a same watershed requirement. Banking programs also sometimes establish priorities or guidelines for when offsite banking or onsite mitigation is preferred.

B. Ecological Difficulties in Assuring Mitigation Success

Ecological issues arise not only in selecting the type and location of mitigation wetland activities, but also in assuring that the mitigation is successful. Two issues are particularly important: the first is the nature of wetlands as dynamic systems, and the second is the fledgling state of current technology in wetland restoration, enhancement, and creation.

1. Recognizing the Transitional Character of Wetlands

While most scientists would agree on the soil types, hydrology, and vegetation necessary to delineate a wetland at a given time, this contemporaneous boundary identification does not incorporate the dynamic nature of wetland systems. Wetlands change over time and over the landscape in response to both internal and external forces [Willard and Hillier 1990].

It is primarily the inevitability of change that makes the regulation of wetlands and the restoration, creation, and enhancement of compensating wetlands so difficult. Imposing an institutional framework such as a compensatory mitigation banking system on dynamic wetland ecosystems is inherently problematic. Where wetland regulation and banking requires a certain degree of certainty, predictability, and adherence to internal rules, wetlands offer only uncertainty. While wetlands, like other ecosystems, obey a set of natural laws, those laws are not fully understood. Even the simplest ecosystem has many feedback loops of which we are not aware, and correcting failures in managed ecosystems involves a great number of unknowns [Ehrenfeld 1992].

An important consideration in mitigation banking is the mobile nature of wetlands. They change over time and over the landscape in response to internal and external forces. An emergent wetland today is speeding toward dry land tomorrow. Erosion and sea-level rise are forcing wetlands to migrate or disappear. Providing adequate buffers and upland areas

for expansion may be the only ways to incorporate this tendency of wetlands to migrate within the landscape [Willard and Hillier 1990]. As banks become established for longer periods of time, the issue of internal change and succession will begin to emerge. Few active banks have been established long enough to experience vegetative succession, in-filling, and the consequent functional changes that may need to be addressed through crediting and debiting reallocations.

Wetlands, like other ecosystems, are subject to a wide range and frequency of stochastic events. Fires, floods, ice storms, hurricanes, even over-consumption of vegetation by wildlife (eat-outs) are, for the most part, random and unpredictable. Yet they can profoundly alter or destroy a wetland system. More predictable impacts, such as pollutant loading from adjacent farms or intentional use of wetlands for wastewater treatment can also degrade wetland systems. In providing valued habitat for many species and, at the same time binding heavy metals, pollutants, and other toxics in their sediments and vegetation, wetlands can accumulate enough toxics that -- magnified through the process of bioaccumulation up the food chain -- can be harmful to some animals and humans.

Although there is nothing institutionally that can be done to prevent stochastic events, and although wetland ecosystems continue to elude our complete ecological understanding, mitigation banking holds some potential to address some of these uncertainties -- through better planning, larger size, detailed design, improved monitoring and enforcement, and other factors. The same potential may mitigate predictable causes of wetland deterioration.

2. State of the Art

From an ecological point of view, all forms of compensatory mitigation have weaknesses. The sciences of wetlands restoration and creation are still inexact and cannot guarantee a successful replacement wetland [Kusler and Kentula 1990]. There is still risk inherent in trading a functioning natural ecosystem for a mitigation effort that may or may not replace those wetland functions and values lost to development -- and a strong likelihood that even "successful" mitigation will not achieve full functional replacement [King 1991].

There are, however, some situations in which the art and science of mitigation is more advanced than in others. For example, prior converted croplands and farmed wetlands under current cultivation are relatively simple to restore. Breaking drainage tiles and restoring wetland hydrology can be much simpler than expensive and time-consuming grading of upland areas. Coastal wetland restorations, too, have proven as a class relatively successful in the limited experience with wetlands restoration to date [IWR 1992].[10]

[10] Of 52 wetland types summarized by the Corps, the wetland restoration, creation, and enhancement efforts achieving "high" levels of success based on medium to high levels of experience include Gulf coast marshes and seagrasses, southeastern brackish and intertidal marshes, Florida mangrove forests and tidal marshes, northeastern tidal freshwater wetlands and coastal salt marshes, and midwestern palustrine emergent and open water wetlands (the last two being the only non-coastal or non-estuarine wetlands with such success)

Because these coastal wetland restorations do not require use of heavy grading equipment or restoration of hydrology, they are generally less expensive. Such wetlands are relatively rare -- only five percent of the nation's remaining wetlands base are coastal -- and they provide tremendous economic benefits as nurseries for commercial and sport fish, shellfish, and as stormwave buffers. Thus the technology of restoration and the ecological benefits suggest that some concentration on these wetland types is worthwhile.

The National Research Council's report on restoration of aquatic ecosystems identifies five wetland systems as ideal candidates for restoration efforts, each for different reasons.[11]

Riparian wetlands, often the most degraded, are ubiquitous, offer high potential for successful restoration based on their location, and contribute many vital functions worthy of restoration, including improved water quality, flood control, wildlife and fish habitat, and erosion and sedimentation control. *Depressional, or isolated wetlands*, are also widespread throughout the country, and may be easily restored, particularly if they were drained rather than filled. *Agricultural wetlands* are ubiquitous and often simple to restore since wetland soils and hydrology often remain; breaking drainage tiles, filling ditches, and ceasing crop production may be all that is needed to mitigate.[12]

Coastal and estuarine wetlands not only have one of the best records to date of restoration success, but are in critical need of replacement; they support the commercial and sport fishing and shellfishing industries and provide numerous other vital and irreplaceable functions. In addition, the many states and territories that are eligible for funding and planning assistance under the Coastal Zone Management Act may consider incorporating banking into their Special Area Management Plans (SAMPs) and other existing planning mechanisms.

Common valuation methods' general bias toward wildlife habitat also undervalues other important values and functions that wetlands provide. Erosion control, sedimentation control, and storm-surge protection are all important functions of higher-energy wetland systems that are not scored at all in a habitat assessment method.

[IWR 1992].

[11] These are nonexclusive categories, and indeed, a number of them overlap. For example, agricultural wetlands generally are freshwater wetlands.

[12] However, minimal data exist to indicate whether these restorations are succeeding over the long term. The USDA Conservation Reserve Program and Wetlands Reserve Program offer some long-term projects that could be followed to gauge the success of agricultural wetlands restoration.

The Case Against Ducks

There is something in the human spirit that loves ducks. There is something in many wetland functional assessment techniques that loves ducks, too. Perhaps too much. Both because of the popularity of ducks, and consequent pressure to rehabilitate duck habitat, and because a predominance of scientific data on wetland species focuses on migratory waterfowl, a number of widely used wetland assessment methods are skewed in favor of duck habitat. Assessment techniques such as the Fish and Wildlife Service's Habitat Evaluation Procedure (HEP) use indicator species to characterize a wetland in terms of habitat suitability for those species. Often at least one--if not most--of the species analyzed is a migratory waterfowl. Because the techniques rate the wetland higher as its suitability to waterfowl increases, ideal duck habitat will generally score highest in these assessment methods.

WETLAND TYPES	SCORE OUT OF 100	VALUE AS DUCK HABITAT
Deep Marsh	95	high
Shallow Marsh	90	high
Open Water	80	high
Shrub Swamp	76	medium
Bottomland Hardwood	76	medium
Fresh Meadow	68	medium
Wooded Swamp	67	medium
Bog	52	low
Seasonally Flooded	28	low

The box above represents a HEP-based habitat suitability index for highway districts in Minnesota that implement the state's highway mitigation bank. The average scores were derived from a formula that assesses individual wetland types as food, cover, and reproductive habitat for 8 indicator species. It is not coincidental that the wetland types scoring highest -- shallow marsh (90), deep marsh (95), and open water (80) -- happen to be ideal duck habitat. In each of the 9 highway districts, between 75 percent and 82 percent of all indicator species used were birds, to the exclusion of most other forms of life, including insects, amphibians, fish, plants, invertebrates, and so on. Only a handful of mammals are represented. Half of the bird species used are ducks. By contrast, wooded swamps, which are ideal habitat for many nonwaterfowl species, including song birds, hare, grouse, and squirrel, scored high with every indicator species except ring-neck ducks, which dropped the total score to 67. Seasonally flooded basins, which provide critical habitat for many wetland-dependent species, are not as attractive to ducks, and scored 28.

In the context of wetland mitigation banking, credit producers wishing to maximize the amount of credits available in the bank would be foolish not to create high-scoring marshes and open water. Similarly, developers seeking to minimize the "debits" they generate by destroying wetlands should concentrate development pressures on wetlands least suitable for ducks. Either way, there is a net gain in duck habitat and a net loss among other wetlands types. Similarly, there is less incentive to develop restoration techniques that improve the experience, success, and reduce the expense of restoring or creating other wetland types.

Finally, *freshwater wetlands*, such as the great deltas of the Mississippi, have suffered the highest percentage of losses as a group, and are the subject of many restoration studies. They are slower to mature, however, and might not appeal to entrepreneurial bankers as much as the faster-growing coastal marshes. Similarly, inland marshes such as the prairie potholes of the upper Midwest also have strong restoration successes to date, but only occur in a limited number of northern states.

In contrast, some wetlands, such as spruce bogs, take centuries to mature and are increasingly rare. These factors make them extremely difficult to reproduce and tend to discourage their restoration or creation in onsite mitigation. The difficulties also discourage such wetland types from appearing in banks. Yet if regulators continue to allow some spruce bogs to be converted through development, the likely outcome will be a net loss of this valuable wetland type.

Because of the difficulty of restoring or creating a spruce bog, wetland policy may need to take into account some form of classification. If private investors are less willing to attempt restoration of difficult wetland types because of the risks, costs, and time involved, there are several possible responses in addition to prohibitions on conversions. One is to make mitigation of difficult or rare wetlands a higher priority for government-operated banks. A second is to create incentives for entrepreneurial bankers to attempt such projects -- such as favorable compensation ratios, or provisions for some credit recognition prior to full functional performance.

Wetland mitigation technologies are improving, but it appears that not all wetland types are equally susceptible of restoration or creation. It is, therefore, necessary to evaluate wetland losses as well as the feasibility of compensatory mitigation projects (whether onsite or banking) with some care. Banking may offer a superior opportunity to test new techniques if the mitigation is in advance of the impact. Some incentive or support for such experimentation, or its utilization by government-operated banks, may be advantageous.

Mitigation banks provide regulators and land managers an opportunity to take into account ecological concerns. Careful attention to bank siting mechanisms, credit definition and evaluation, and banking goals is critical if banking is to succeed in ecological terms.

CHAPTER FOUR
BANK ORGANIZATION AND ENABLING INSTRUMENTS

A. Bank Organization

Like other forms of wetlands mitigation, mitigation banking arises from the need to reconcile two competing sets of interests: those of the private developers or government development agencies whose activities will have some impact on existing wetlands that are protected by law, and those of the government agencies with jurisdiction over the wetlands. Thus, the two prerequisites that set the stage for mitigation banking are, first, a development entity in need of a permit or permits to accomplish its proposed activities; and second, an agency, or group of agencies, that has a mandate for wetlands preservation and the authority to grant or deny permits.

As evidenced by the number of mitigation banking agreements between state departments of transportation and various permitting agencies (22), it is entirely possible for developers and agencies to establish successful banks purely as an offshoot of the existing permitting process, without being involved with complex governance structures or outside parties. However, even in the simplest DOT bank, the two sides play a number of roles and perform several discrete functions which, in more elaborate versions of mitigation banking, often are separated from the permitting process and delegated to a number of other entities in the public, private, or nonprofit sectors. This section analyzes mitigation banks into their functional components, identifies the field of players who might fulfill these functions, and discusses typical combinations of functions and players found in currently existing and proposed mitigation banks.

1. Functions

While mitigation banking schemes vary widely in structure, every bank includes six essential functions:

- client
- permitting
- credit production
- long-term property ownership
- credit evaluation
- bank management

The diversity among banks largely results from the different ways in which these six functions are allocated among the various parties. As just noted, in the simplest banks, the functions are divided (or shared) between a development entity and the permitting agency or agencies. As mitigation banks become more complex and the division of labor in the area of wetlands mitigation becomes more specialized, these same six functions could be

performed by as many as six different parties, some of which may have no connection to the permitting process.

The bank "client" is the entity or entities whose activities will create a wetlands impact for which mitigation is being sought through the bank. A client thus is identical with a would-be permit holder, and can be any private or public development entity whose project meets the permit requirements (as well as any additional requirements for use of the mitigation bank). While these entities typically play several roles in the banking process, in their role as clients they represent market demand for compensatory mitigation credits, and need not have any involvement in the actual mitigation work, or possess any attribute other than a sheer willingness to pay for the mitigation credits. Strictly speaking, then, the client function is not necessarily a function of the *bank*, but it is an essential element in any transaction carried out by the bank.

The "permitting" function involves deciding whether a project affecting wetlands, and for which mitigation may be required, will be allowed to proceed. It generally is exercised by the government agencies, federal, state or local, with jurisdiction over affected wetlands. Often, there are several such agencies with concurrent jurisdiction and varying degrees of oversight; representatives from each agency sometimes form an interagency committee that makes the individual permitting decisions. In the case of wetlands regulated under Section 404 of the Clean Water Act, agency responsibilities can range from commenting (FWS and other federal and state resource agencies) through permit writing (the Corps of Engineers and state water control agencies) to veto power (EPA). By establishing requirements, such as sequencing or proximity restrictions, that determine whether banking will be an acceptable form of mitigation in specific cases, the permitting agencies effectively create the market for mitigation banking, and exert substantial control over the regulatory climate in which banking will occur. Here again, while permitting is a function that can occur on a separate track from the rest of banking, it nonetheless is an essential part of each bank transaction.

A third essential function is creation of mitigation credits, the physical wetlands commodity whose value is traded or sold by the bank. The "credit production" function entails the production of viable wetlands credits on a specific mitigation site or sites by any of the accepted methods: restoration, creation, enhancement and, in certain cases, preservation. In more concrete terms, the credit producer generally is the chief proponent of the plan for creating credits, acquires initial title or other right of entry to the site, and carries out the mitigation work. While some of these tasks may be contracted out or otherwise delegated to an agent, the credit producer bears primary financial and legal liability for successful construction and development of the mitigation site, and often for subsequent monitoring and maintenance as well.[1]

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[1] As the most highly visible entity directly associated with the mitigation work, the credit producer is roughly analogous to what other studies of mitigation banking have referred to as the bank "sponsor." *See, e.g.*, Short (1988).

Credit production can be performed by the client[2] or by the permitting agencies,[3] but it remains analytically distinct from either function; it is also possible for a third party, such as another government agency, a private entrepreneur, or a non-profit organization, to produce and sell mitigation credits acceptable to both of the parties to the permitting process.[4] Indeed, such third parties may become more proficient at acquiring suitable mitigation sites and producing surplus credits than either permitting agencies or full-time builders of highways and condominiums.

Fourth, given the desirability of creating enforceable legal mechanisms which will ensure that the mitigation site is maintained as a wetland for an ecologically useful period of time, it is important to identify and isolate the function of "long-term property ownership." While, as noted, the credit producer often holds fee title, a conservation easement or other right of entry to the mitigation site, ownership of these rights is a separate function which can be transferred to or exercised by parties not otherwise involved in the banking process.

For example, it already is fairly common for credit producers to transfer their property rights to resource agencies or nonprofit groups like the Nature Conservancy, either during the bank's life or after all credits have been used. Conversely, such groups or entrepreneurs that hold a large quantity of land with potential for wetlands creation or enhancement could elect to retain their property rights while allowing "mitigation farming," where credit producers would pay for the right to create credits on a specific parcel without assuming ownership. In each of these cases, the primary function of the long-term property owner is to exclude any other uses of the land that would interfere with its continued existence as a dedicated wetland.

Depending on the precise nature of the property right being held, long-term property ownership may entail other duties assigned by applicable property or contract law. These could include active monitoring and maintenance of the wetland and financial liability for remedying mitigation failure or any damage to third parties -- responsibilities that generally fall to the credit producer, but also can be assigned contractually or as a condition on

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[2] In current banking practice, client-created credits are the rule: 42 of the 46 existing banks are dedicated exclusively to the use of the credit producer. Of these, more than half were created by state departments of transportation, and the remainder have been created by port authorities, county governments, and a small number of private companies. All of these are development entities large enough to have both a need for substantial amounts of compensatory mitigation, and the resources to produce it for themselves.

[3] For instance, the City and Borough of Juneau (CBJ), Alaska, which has a general permit granted by the Corps of Engineers that in essence delegates all permitting authority to the CBJ, also has adopted an ordinance establishing a public fund that will be used to produce wetlands credits in mitigation banks.

[4] This possibility has been realized in the few existing banks, such as Bracut Marsh, California, and Astoria Airport, Oregon, where a state resource agency has produced credits for general use; and hopes for its widespread acceptance are reflected in several recent proposals for "entrepreneurial" mitigation banks.

transfer of property rights. This question of long-term responsibility for maintenance and liability is discussed more fully in Chapter Eight.

Fifth, once the wetlands credits have been produced, both they and the impacts they will mitigate must be quantified to conform to the "currency" in which the bank is trading. "Credit evaluation" determines the value of credits proffered to and impacts mitigated by the bank using one of the many evaluation methods discussed in Chapter Seven. Since credit producers have a financial stake in maximizing valuation of credits and clients have one 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 independent consultant acting as a wetlands "appraiser." Even in banks where the field work underlying credit evaluation is performed by a credit producer or client, final review of this work by one of the permitting agencies is standard, thus ensuring some independence for the credit evaluation function.

For instance, the proposed entrepreneurial Springtown Natural Communities Reserve bank would delegate the credit evaluation function to the California Department of Fish and Game to avoid any potential conflict of interest. Similarly, a model memorandum of understanding drafted by the Federal Highway Administration to assist state DOTs in their banking efforts calls for the creation of a "Technical Subcommittee" which is composed of one member each from the state DOT, the state department of fish and wildlife, and the local office of the Corps of Engineers. This technical subcommittee is charged with assessing proposed impacts using any "appropriate methodologies," including HEP, WET, or best professional judgment. Versions of these evaluation procedures have been adopted by DOT banks in Arkansas, Montana, and Nebraska.

Sixth, "bank management" is the process of determining whether produced credits and proposed debiting projects meet the conditions established for use of the mitigation bank, and recording resulting transactions. In single-client banks, like the existing DOT banks, this function is minimal and largely inseparable from the permitting process itself: the client and the permitting agencies agree in advance on the bank site or sites, subsequent use of which is reflected in an informal ledger kept by one of these parties, which records each "withdrawal" of credits and updates the balance accordingly.

In more complex schemes where several different parties are producing credits and several others are purchasing them, the bank management function may be delegated to a wholly or partially independent individual, board, or trust charged with the fiscal management of funds and banked credits in accordance with criteria that may differ from those considered in the permitting process. For instance, in the proposed wetland banking system for Prince George's County, Maryland, the county government would name a bank manager who would have approval power over proposed debits of one acre or less, and inform the clients and permitting agencies whether mitigation is available from the bank; for larger debits, the bank manager would make a recommendation on the propriety of bank use to an interagency oversight team. This two-tiered process relieves the permitting

agencies from having to review the bank's status each time a routine debit is proposed. Similarly, the Minnesota Department of Transportation bank uses a team of bank managers, with representatives from the DOT and each of the various permitting agencies, to decide which projects will be accepted for bank debits or credits.

2. Typical Combinations of Functions and Players

By assigning the above six functions to different parties and combining them in different ways, it is possible to create a number of different bank governance structures. Among currently existing or proposed mitigation banks, these governance structures tend to fall into four distinct patterns: the "single-client" bank, the resource agency bank, the entrepreneurial bank, and the "banking system." Certain other entities that do not meet the full definition of a mitigation bank -- such as wetlands accounting systems and in-lieu fee mitigation -- also can be analyzed in terms of combinations of these same six functions.

As noted, in most existing banks, including all of the DOT and port authority banks, the client also is the credit producer, while credit evaluation and bank management either are performed by the permitting agencies or are the product of a less formal consensus between the agencies and the client. To the extent that there is variation among these banks, it results from differing assignments of long-term property ownership, as well as the related question of what party will be responsible for maintaining the bank site. (See Figure 1.) The single-client bank reflects the natural division of labor where a large developer's repeated permit applications create an ongoing relationship between the client and permitting agencies. However, the present dominance of this structure could easily fade if the economics of and regulatory climate surrounding mitigation were to change in favor of third-party credit production.

Second, by shifting the credit production function from the client to a state, local, or quasi-public resource agency, a few existing banks have been able to offer credits for sale to the development community at large. This form of banking, which is practiced by the Oregon Division of State Lands at its Astoria Airport site and by the California Coastal Conservancy at Bracut Marsh, gives the resource agency complete control over the actual mitigation work, and provides a source of credits for clients who cannot feasibly enter into the business of wetlands mitigation for themselves. In addition to credit production, the resource agency often assumes the long-term property ownership and bank management functions, and also may play a role in credit evaluation. (See Figure 2.)

Moreover, it is even conceivable that a resource agency could be delegated the permitting function, thus combining all but the client function in a single entity. It also could be accomplished through issuance of a general permit if the Corps were convinced that the effects of the agency's mitigation actions and projects approved by it will be "individually and cumulatively minimal." This mechanism would be used in the proposed wetland mitigation bank for the City and Borough of Juneau, Alaska, and is discussed further in Section B of this Chapter and in Chapter Ten.

Third, the proposals for entrepreneurial banking similarly tend to concentrate bank functions in the hands of a single entity, but one that is privately held. Thus, unlike the resource agency banks, where the credit producer's conservation mandate provides some independent guarantee of the mitigation work, entrepreneurial banks' wetlands activities will require separate oversight by the permitting agencies. (See Figure 3.) For instance, the Neabsco [Virginia] Wetland Bank proposal leaves bank management in the hands of the agencies, who would monitor the bank on a transaction-by-transaction basis.

An example of more attenuated oversight is found in the draft memorandum of agreement proposed by the Home Builders Association of Greater Chicago, which would vest credit production, long-term property ownership, and bank management functions in many smaller banks, including private corporations, that would be issued § 404 general permits for their mitigation activities. The Corps would retain permitting authority over development projects, and evaluate the bank credits by "certifying" them, but otherwise would perform a relatively passive audit role. Bank clientele could include any eligible developer that receives a fill permit from the Corps.

Fourth, and most complex of all, are the proposed "banking systems," in which a government entity or entities manage public and private credit production on multiple bank sites for use in mitigating a wide variety of projects. (See Figure 4.) Placer County, California, proposes to combine its existing state permitting power with management of a banking system that would consist of sites proffered by public and private "bank developers." The "bank developer" role would be limited to producing credits, providing for maintenance and long-term ownership, and receiving money from sale of credits by the bank. In such a system, mitigation banking begins to resemble its financial counterpart, with the individual "depositors" (credit producers) playing no more important a role in administration of the bank than the individual "withdrawers" (clients).

The functional analysis discussed above also can be applied to a number of mitigation schemes which do not fit the definition of a "bank" used in this study. For example, the "North Dakota Wetlands Bank" (not listed in Appendices A and B) is actually a statewide accounting system, created by statute, that tracks wetlands losses and gains without requiring advance mitigation. Instead, the system is designed to ensure -- primarily through production of wetland credits by public agencies -- that total debits never exceed total credits by more than 2500 acres. Credit production in the form of restoration and creation projects has been performed on federal lands by the United States Fish and Wildlife Service, while the credit evaluation and "bank" management functions are performed by the North Dakota Game and Fish Department, the North Dakota State Water Commission, and the Office of the State Engineer.

In-lieu fee systems have all the structural characteristics of resource agency banks, differing only in their willingness to issue permits for which mitigation work has not yet been performed. The Maryland Nontidal Wetlands Compensation Fund collects fees in lieu of requiring project-specific mitigation or mitigation banking, and applies the accumulated funds to mitigation projects carried out by the state Department of Natural Resources and state Water Resources Administration. The DNR decides clients' eligibility to use the fund as part of the permitting process, sets fees based on the type of wetland affected by the development project, and owns the resulting mitigation site.

Figure 1. Typical Single-Client Bank

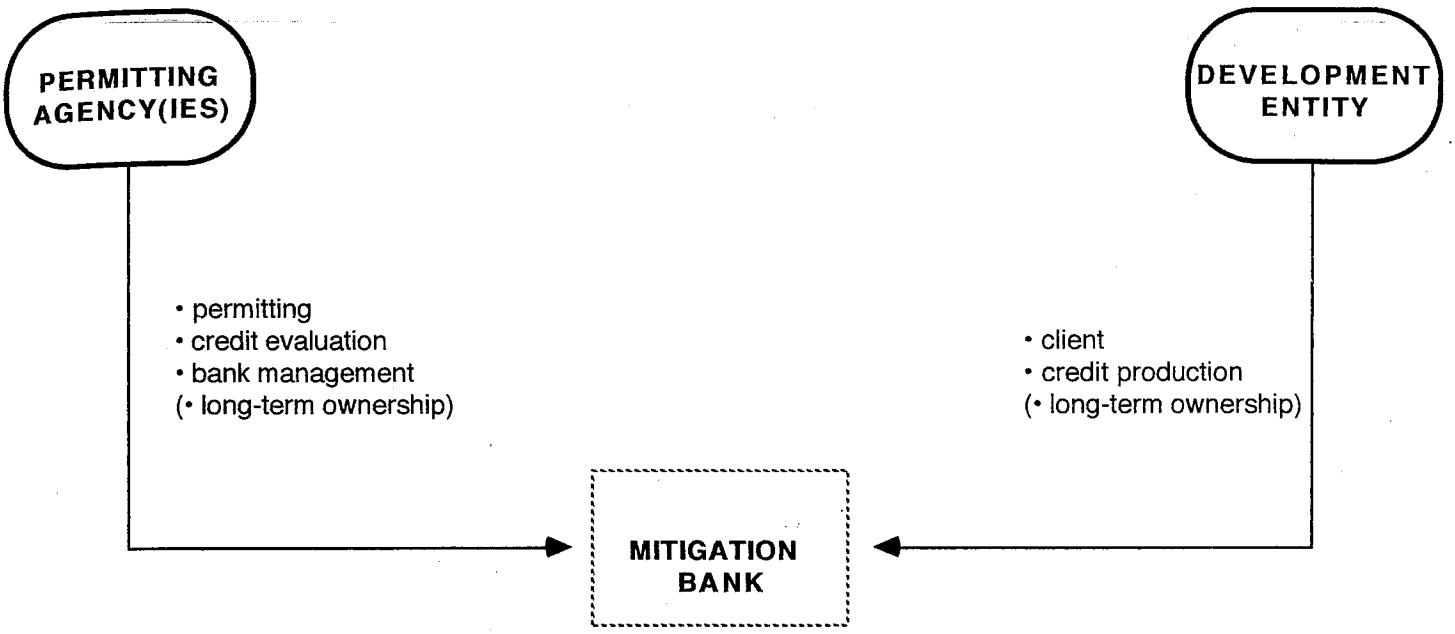
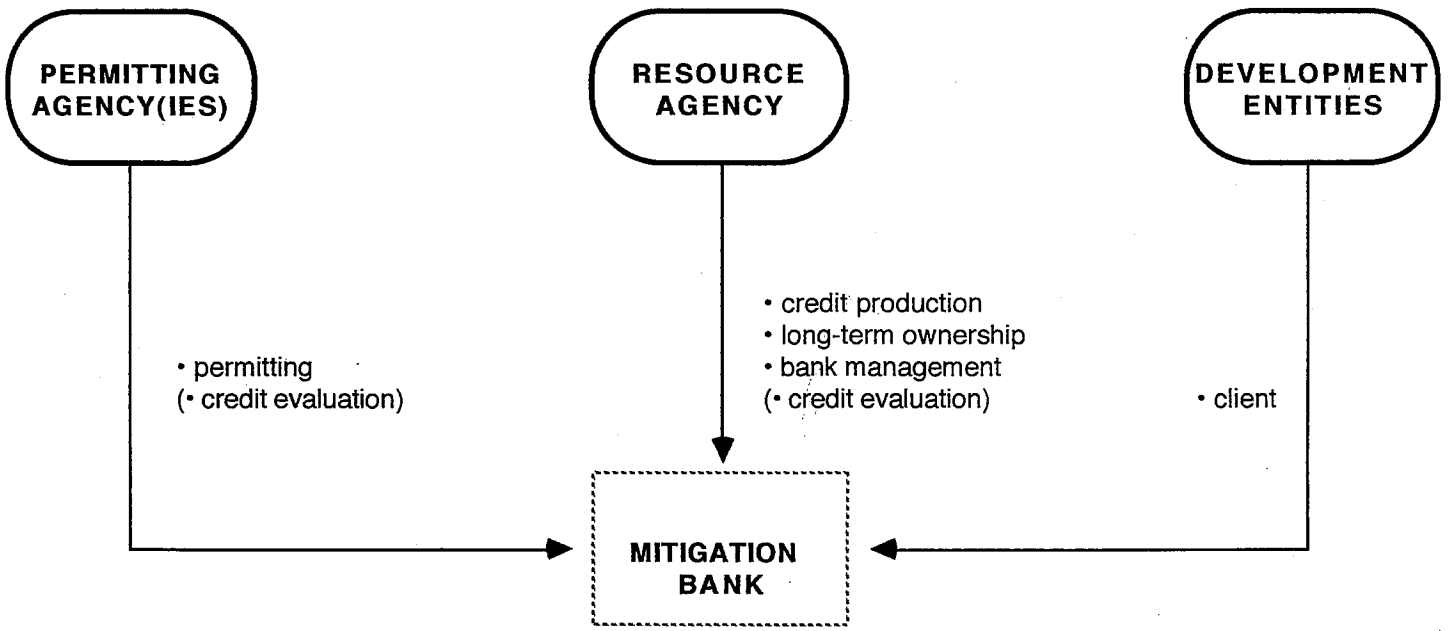


Figure 2. Typical Resource Agency Bank



(Functions in parentheses may be assumed by either of the parties indicated)

Figure 3. Typical Entrepreneurial Bank

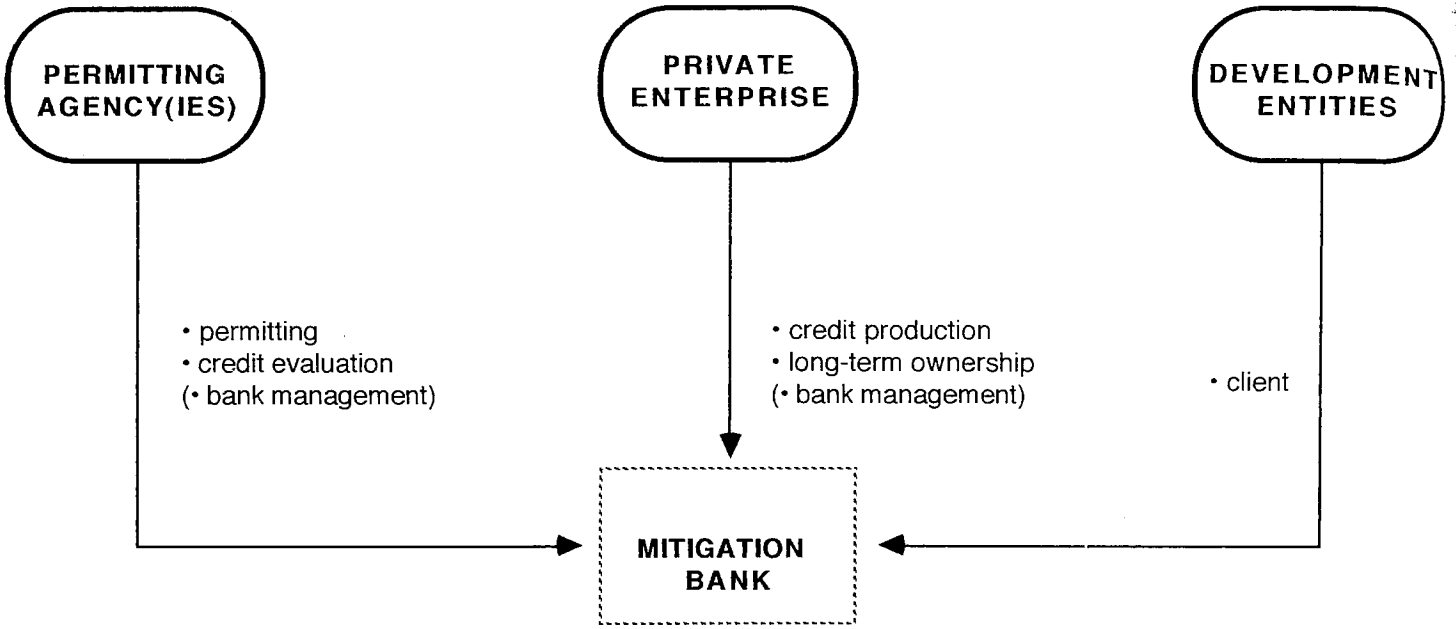
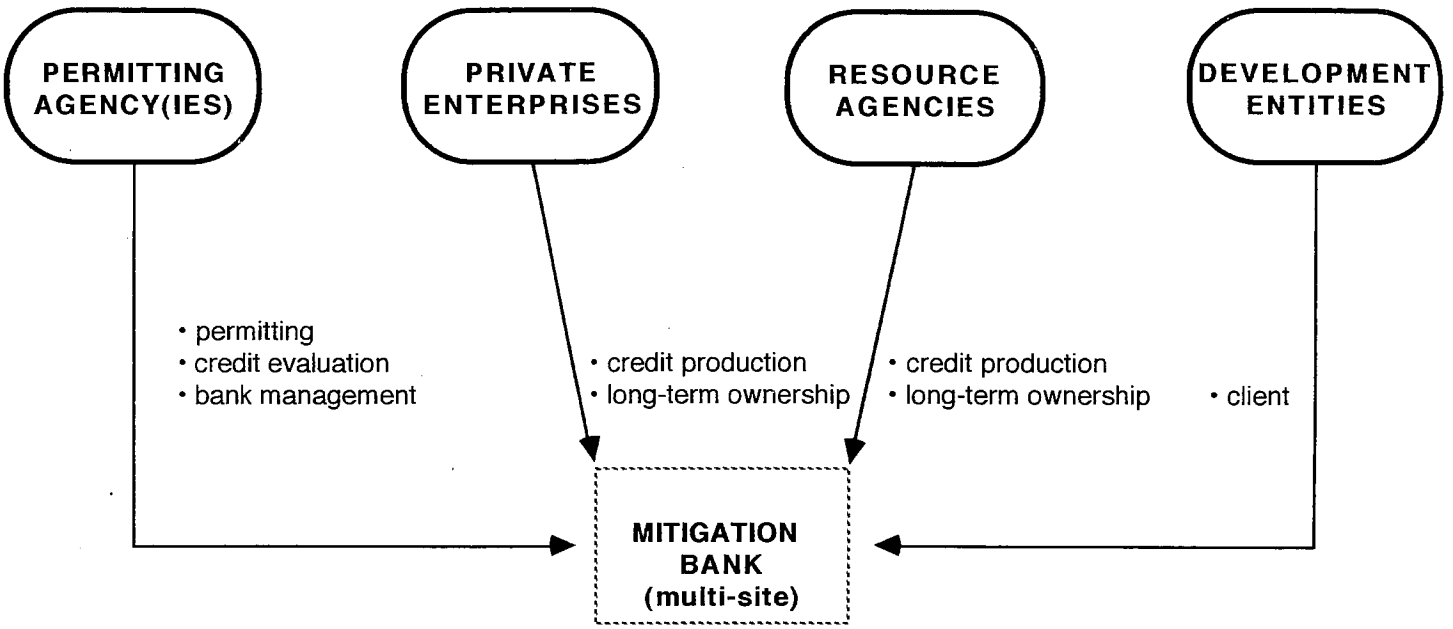


Figure 4. Typical Banking System



Functions in parentheses may be assumed by either of the parties indicated)

B. Enabling Instruments

Whatever its structure, a mitigation bank must be recognized by the appropriate regulatory agencies with jurisdiction over wetlands activities before it can become fully operational. This recognition or official sanction may take a variety of alternative forms. At one extreme are informal "handshake" agreements such as the one that created the Louisiana Department of Transportation and Development mitigation bank, where the lack of a written agreement has been the cause of a great deal of dispute and delay.[5] Perhaps for this reason, virtually every existing and proposed bank employs some type of formal enabling instrument that memorializes the terms under which the bank will operate. At the other extreme are highly detailed planning documents such as the Juneau Wetlands Management Plan, which not only provides for mitigation banking, but also fits it into the larger context of regional wetlands management.

1. Instrument Types

At least six different types of enabling instrument have been utilized or proposed by the banks surveyed in this study:

- memorandum of agreement/understanding
- individual development project permit
- individual bank permit
- general permit
- corporate charter
- legislation or regulation

Each of these instruments will be discussed in turn.

The most common form of enabling instrument is the memorandum of agreement (MOA) or memorandum of understanding (MOU) between the permitting agencies and the credit producer. More than fifty of the existing and proposed banks possess final or draft MOAs or MOUs, and several other proposed banks indicated that one would be drafted later in the planning process. These memoranda recite, in contract-like language, the specific terms under which banking will be conducted, generally at a particular site or sites known to the parties at the time the agreement is signed. Alternatively, the permitting agencies may simply ratify the credit producer's proposed site plan through formal letters of assent in lieu of a separate MOA, as was done with the Patrick Lake bank in Wisconsin.

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[5] Indeed, Short (1988) writes that "[l]ack of a formal written commitment related to the bank and lack of a timeframe within which the bank was to be implemented have resulted in a situation where, 6 years later, the bank still has not been implemented as intended and credits are overdrawn." The deficit has persisted to this day.

Where banking is intertwined with the permitting process, as, for example, where a bank results from project-specific mitigation that created surplus credits, the development project permit often will double as the enabling instrument for the bank. Bank-specific procedures can then be incorporated as conditions on that permit. A variant of this scheme is found in the banks at Geist Reservoir and Morse Reservoir in Indiana, where the surplus credits resulted from mitigation undertaken to remedy existing *violations* of the Clean Water Act. In those two cases, the permitting agencies made the site plan and certain banking procedures conditions of the after-the-fact permits eventually issued to the alleged violators.

Further, since mitigation activities themselves may alter wetlands, banks also can be issued detailed permits independently of any particular development project, a procedure used in the Millhaven Plantation [Georgia] Commercial Wetland Mitigation Bank and several Florida mitigation banks. Whether the permit is issued for a development project or directly to the bank, the subsequent debits to the bank usually are recorded in the permits written for the debiting development projects. The Florida regulations require that each debit also be processed as a formal "modification" of or amendment to the original bank permit.

However, if banking -- particularly entrepreneurial banking -- is to become viable on a large scale, it may require a much less cumbersome enabling mechanism than the present *ad hoc* use of MOAs and individual development project permits. It has been argued that the Army Corps of Engineers has authority to issue Section 404 general permits as bank enabling instruments,[6] and some mitigation bank proposals have adopted this suggestion. The City and Borough of Juneau, Alaska, has been issued a regional general permit which, in addition to delegating permitting power over wetland development projects to the municipal government, also sanctions the operation of a number of public mitigation banks in accordance with criteria specified in the general permit. The Home Builders Association of Greater Chicago draft MOA likewise calls for issuance of general permits to individual banks for their various mitigation activities, but would continue to leave project permitting in the hands of the Corps.

Similarly, corporate charters, which also are a feature of the Chicago Home Builders' proposal, may provide another less intrusive means of regulating mitigation banks. By combining the regulatory floor of existing corporate law or a specialized enabling statute with individual bank charters and bylaws, this scheme might produce the streamlined, flexible permit process desired by entrepreneurial banks, while imposing certain duties on the owners and managers of the corporation. Even those jurisdictions that are skeptical about private mitigation banking could charter banks as public or quasi-public corporations.

Last, banks could be operated directly under the terms of an enabling statute or regulation. The Oregon Mitigation Bank Act, which authorized the Director of State Lands

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[6] See the discussion of the Corps' legal authority in Part B of Chapter Ten.

to create up to four pilot mitigation banks, is one example of a detailed statute that expressly addresses most of the matters usually covered in MOAs or permits. Due to a lack of appropriations, no banks actually were created under the statute.[7] However, the City and Bureau of Juneau adopted an ordinance patterned on the Oregon statute to govern the public mitigation banking called for by its Wetlands Management Plan. Along with establishing substantive policies, the Juneau ordinance creates a Mitigation Banking Board, which is further authorized to "adopt, by rule, standards and criteria for the site selection process, operation and evaluation of mitigation banks."

2. Issues

Generally speaking, the form of the enabling instrument has a number of practical and legal implications for bank operation, with the result that certain kinds of enabling instruments may prove to be better-suited than others for certain kinds of banks. Issues raised by the choice of an enabling instrument include: (1) whether it provides general guidance or is site-specific; (2) the duration of the instrument and the bank it governs; (3) the available means of dispute resolution, particularly where multiple parties are involved; and (4) the enforcement implications of a particular form of instrument.

As suggested above, one of the most important issues is the degree of specificity with which the enabling instrument must be negotiated and with which it governs subsequent bank operations. The vast majority of MOAs and MOUs, the most common instruments, relate to a single site, often incorporating detailed technical specifications for credit production on that site. While careful site planning obviously is desirable, it remains an open question whether each of the signatory agencies needs to be involved in each site proposal to such a degree. These simple memoranda have proven useful for small single-client banks, but the effort involved in obtaining these individualized site-by-site approvals could easily frustrate the proponents of multiple-site, multiple-client banks.

Somewhat more ambitious are the "open-ended" memoranda that set forth general procedures for banking at a number of sites, not all of which will have been identified at the time the agreement is signed. The Minnesota Department of Transportation operates its statewide banking system under a "technical memorandum" agreed to by the DOT, the Minnesota Department of Natural Resources, the U.S. Fish and Wildlife Service, and the Federal Highway Administration; subsequent acceptance of individual banking sites is recorded on a one-page form signed by representatives of each agency. Similarly, a recent amendment to the interagency cooperative agreement between the Wisconsin DOT and the Wisconsin DNR provides generic guidance for mitigation banking, and may become the basis for a proposed multiple-site bank in that state. These memoranda facilitate the process by

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[7] The Astoria Airport mitigation bank, described elsewhere in this study, predates this legislation and is not governed by it, although most of its procedures and policies are consistent with the ones set forth in the statute.

removing site selection and other technical decisions from the "constitutional" language of the enabling instrument and delegating them to bank managers or agency subcommittees.

As presently used, individual development project permits pose some of the same problems as site-specific memoranda of agreement. Even when they focus on mitigation banking, project permits by their nature tend to be *ad hoc* determinations of the merits of a particular mitigation plan for a particular site. As long as the permitting agencies are only being asked to consider the viability of a single proposed mitigation project, there is every reason for them to focus on the technical details of that project, and little reason to establish a broader bank governance structure that could be expanded to include multiple mitigation sites.

Individual bank permits like the Millhaven Plantation permit often have the same site-specific focus as individual development project permits. However, there is no reason why these permits could not incorporate more general provisions allowing the bank to acquire additional sites for credit production in accordance with terms specified in the permit. In this regard, bank permits may prove to be a better vehicle for creating flexible bank structures.

Similarly, the open-ended nature of the general permit for mitigation activities could obviate the need for agency review of each individual site selection or credit production decision made by the permit holder, as long as permit conditions are adhered to. A regional general permit might facilitate the establishment and use of mitigation banks, with a number of potential benefits. First, regional general permits cover a broad geographic area, affording more opportunity to manage wetlands on a landscape scale. Second, regional permits often are an integral part of a larger regional wetlands management plan, which may serve to educate and involve many members of the public. Third, regional permits may involve a large number of clients, thereby maximizing the bank's financial stability. Fourth, regional permits can identify, in advance, the type and scale of construction activity that will be eligible to debit the bank.

Legislative and regulatory instruments clearly could be used to authorize a number of banks in one procedure, as was the intent behind the Oregon Mitigation Bank Act. Nor, in theory, would such instruments necessarily have to be limited to the government and resource agency banks described above. Assuming that the enabling legislation or regulation were drafted with sufficient rigor, it could authorize banking by any entity -- public or private -- that meets certain enumerated criteria, in effect creating a permit-by-rule regime for mitigation banking. More likely, however, site-specific conditions and enforcement issues will continue to dictate that some form of individualized review and certification be given to each authorized bank, and to private banks in particular.

A second issue implicated by the choice of enabling instrument is the duration of that instrument and its effect on bank life. Like contracts, memoranda of agreement can specify any term of validity -- including perpetuity -- agreed to by the parties, with the result that

some banks operate for a certain period, while others have no fixed duration. Still others are renewable through procedures set out in the memorandum itself. These banks commonly are authorized for an initial period, after which the signatories reevaluate bank success and the effectiveness of the agreement, and make any needed modifications. The Montana DOT and Astoria Airport [Oregon] banks both provide for reevaluation and updating after the first five years of bank operation.

Similarly, since development project permits often incorporate conditions on bank operation that have been specifically negotiated and agreed to by the parties, bank duration under these instruments also will vary widely. Permits issued directly to banks, on the other hand, often are issued for a fixed duration that will vary according to the regulatory scheme under which they are issued. General permits under Section 404 may be issued for up to five years, and may be renewed at the Corps' discretion. Statutes and regulations can be drafted so as to establish a uniform duration for all banks in the affected jurisdiction.

Use of a traditional corporate charter would constitute the mitigation bank as a legal entity for as long as it complied with provisions of applicable corporate law. The charter or the bylaws could, of course, provide for frequent review of bank performance, and for dissolution of the bank if it failed to meet specified ecological or financial criteria. For example, the draft Chicago Home Builders' MOA, which proposes incorporation of private banks, provides that the Corps could seize and liquidate banks that become insolvent. While this particular provision is contained in an MOA, bank corporate charters could be required by legislation to include similar enforcement provisions.

The third set of issues arising from the choice of an enabling instrument concerns the resolution of disputes among parties to it. This is especially important where there is multiple agency jurisdiction over the banking process. Since memoranda of agreement typically are signed by several state and federal agencies, they often explicitly provide a mechanism for resolving disputes about decisions that are made under the agreement. The most common such mechanism appears to be a consensus requirement, which effectively gives each agency veto power over any decision. Other agreements, such as the draft MOA for the Prince George's County, Maryland banking system, provide for decision-making by a majority vote. The Pridgen Flats and Company Swamp [North Carolina] and Astoria Airport [Oregon] banks take the novel step of allowing a dissenting party to propose amendments to the MOA *during* its effective period. If the proposed amendment is rejected, the dissenter may withdraw approval of, and cease to participate in, the original agreement.

Precisely because the broader instruments such as corporate charters, general permits, and statutes or regulations are intended to delegate day-to-day decisionmaking to entities other than the permitting agencies, they may be somewhat less concerned than MOAs with the resolution of interagency disputes. To the extent that a credit producer or bank manager's exercise of this delegated power involves it in a dispute with the permitting agencies, such disputes fall under the category of enforcement, which is discussed briefly next, and separately in Chapter Eight.

The fourth, and perhaps most important, consequence of the different forms of enabling instrument is that each necessarily will have different enforcement mechanisms. The Placer County [California] banking system uses MOUs as the enabling instrument for public credit producers, and "operations agreements" for private credit producers; the terminology suggests that the county draws some distinction between interagency agreements and ordinary contracts. On the other hand, several memoranda of agreement or understanding between agencies and private credit producers appear to assume that they will be enforced as contracts: the Springtown Natural Communities Reserve MOU provides for its own enforcement under "contract provisions of U.S. and California law in a court of competent legal jurisdiction," and the Neabsco [Virginia] Wetland Bank draft MOA has similar choice-of-law language, a merger clause and a severance clause, all of which are staples of contract law.

Enforcement of permits generally is handled through the same administrative channels that issued the original permit, and the governing statute or regulation often will prescribe procedures for penalties, including fines and permit revocation or modification. Individual development project permits present the strongest case for strict enforcement, since the party issued the project permit usually will be the same party responsible for success or failure of the mitigation work, and can be amply motivated to comply by the threat of permit revocation. Individual bank permits are much more problematic, since revocation of the bank permit is a weak sanction in cases of total bank failure, and it would be unfair to penalize the client/developer who purchased mitigation from the bank in good faith. In such cases, fines or other legal penalties against the bank permit holder probably are the only effective sanction.

Section 404 general permits may be modified or revoked at the discretion of the Corps of Engineers, but these sanctions also may prove to be problematic if numerous transactions have been carried out under the general permit, with only a few sites constituting enforcement problems. In these cases, Section 404 administrative and legal penalties may be invoked against the specific violations. Statutory and regulatory instruments likewise can provide for their own enforcement, either by following the federal Section 404 model or by incorporating other legal mechanisms and penalties.

A traditional corporate structure would impose a number of fiduciary duties on the corporate officers and board members to act in the interests of the corporation and operate it according to the charter and bylaws; these are enforced through suits in equity or, in some cases, by the state's attorney general. It is unclear how this form might be adapted to the mitigation banking context to ensure, first, that the interests of the corporation can be made to coincide with the interests of the agencies; and second, that an agency would have legal standing to enforce these fiduciary duties. These difficulties suggest that the corporate form would need to be modified through a wetlands-specific "corporate code," or that it at best can only serve as an adjunct to one of the other forms of enabling instrument.

CHAPTER FIVE
MITIGATION ALLOWABLE

While onsite mitigation is shaped both by the regulatory framework and extensive experience, the parameters of mitigation banking are not yet well defined. The determination of what mitigation is "allowable" in a banking system is critical to both its ecological and economic performance.

This chapter examines some of the critical issues involved in defining mitigation for the purposes of banking. What types of mitigation should be recognized? How complete should it be prior to recognition of the credits? How can use of a mitigation bank be evaluated against onsite mitigation? What development activities should be authorized to obtain compensatory mitigation from banks? These and other questions are the subject of great scrutiny by numerous federal and state agencies. Current banking experience, as well as agency guidance documents, suggest possible answers to these questions.

A. Types of Mitigation Allowable

This section examines the banking activities that regulators will recognize as providing compensatory mitigation and the conditions attached to such recognition. It examines, in turn, mitigation methods, onsite/offsite mitigation, banks' service areas, requirements for in-kind or out-of-kind mitigation, and when banking mitigation must be advance mitigation.

1. Mitigation Methods

There are four methods of compensatory wetlands mitigation: creation, restoration, enhancement, and preservation. Creation is the conversion of upland or aquatic environments to wetlands, while preservation is the provision of legal protection to existing wetlands that might otherwise be lost to lawful development activity. The distinction between restoration and enhancement is less clear-cut. Restoration is the attempt to replace a panoply of wetland functions and values where they had ceased to exist, or had existed only in a degraded state; while enhancement generally is a less comprehensive effort that strives to augment or add one or more wetland functions or values.

Identification of different mitigation methods raises issues of priority among them. Restoration of previously existing wetlands is the preferred choice of all federal and most state mitigation policies. This is primarily due to the uncertainty presently associated with wetland creation and concern about the ecological wisdom of enhancement. While there are no studies explicitly comparing the success or failure rates of restoration with those of creation, the Florida DER study examining the overall success of mitigation efforts found better, albeit limited, success with restoration projects than with creation projects, which had a failure rate of nearly 100 percent [Redmond 1990]. The National Research Council concluded that funding priority should be given to restoration of damaged wetlands over

creation because of restoration's superior chances of success [NRC 1992]. In *Wetland Creation and Restoration: The Status of the Science* [Kusler and Kentula eds. 1990], the most definitive work to date on this subject, the editors suggest that restoration --

> will have a greater chance of success in terms of recreating the full range of prior wetland functions and longterm persistence than wetland creation at a non-wetland site. This is due to the fact that preexisting hydrological conditions are often more or less intact, seedstock for wetland plants are often available, and fauna may reestablish themselves from adjacent areas.

Still others have argued that restoration is preferable from both an ecological and an ethical perspective: "Restoration of degraded systems should be the first option to be considered since it would reestablish the natural order and ratio of community composition in the regional ecosystem." [Kruczynski 1990].

Enhancement has not been widely analyzed, in part because of its varying definition; many banks use the term to mean the same thing as restoration. However, where enhancement has been distinguished from restoration, it has been regarded as a mitigation method that requires caution. The introduction of new functions or the stimulation of particular functions over others raises some of the same concerns as wetland creation -- can the new or enhanced functions be sustained and are they ecologically sound? In some cases, enhancements have taken the form of managing for preferred wildlife species. This may not adequately compensate for losses of diverse wetland functions. It also may result in the loss of certain functions formerly performed by the "enhanced" mitigation site, such as habitat for non-preferred species.

Preservation is the most controversial type of mitigation. In general, the issue of preservation as an acceptable mitigation method arises only in the context of banking. Onsite "preservation" is not regarded as compensatory mitigation, but is simply a required product of sequencing. Because the requirement to "minimize" the impact of the development project means to preserve onsite wetlands, it cannot, therefore, produce "credits" that can offset wetland conversions.

In the banking context, however, preservation becomes a legal possibility as well as potentially more attractive. The banked parcels are larger and hence potentially ecologically significant. And they offer the possibility of extending legal protection to rare or unique wetland types or areas that are otherwise vulnerable to lawful destruction (e.g. through non-§ 404 activities like wetland draining, exempt activities like farming and timbering, or dredge and fill activities that are often authorized under general or individual permits).

Awarding credits for preservation is justly discouraged by natural resource agencies and ecologists because it does not replace lost wetland values and functions -- it allows a "net loss." In spite of these concerns about preservation, in some cases preservation has been accepted by regulators. The Company Swamp mitigation bank in North Carolina, for

example, consists of credits recognized for preservation of a mature hardwood swamp that otherwise would have been lost to logging, and that would have been technically impossible to restore or re-create, at least with current technology. Of the 46 existing mitigation banks, only Company Swamp and the Port of Pascagoula bank are "preservation" banks.

If preservation is recognized as an acceptable mitigation method, what criteria should be used to identify instances where it may be acceptable? EPA Region IV's draft wetland mitigation banking guidance allows preservation if there is an "imminent threat" to the mitigation site. Unfortunately, however, an imminent threat can sometimes be manufactured in order to provide impetus to recognize mitigation. Rarity of the threatened wetland may be a better criterion; so is the length of time required for full or partial functional replacement. Rarity and length of time to functional replacement are recognized as criteria for allowing preservation under the EPA Region V draft banking guidance and that of the Corps of Engineers' Galveston District.

Acceptance of preservation as a mitigation method ordinarily requires at least the establishment of a monitoring and maintenance program. Simply preserving a wetland does not guarantee that it will remain a healthy ecosystem. Many wetlands face threats from invading exotic species, such as the Melaleuca tree in Florida, that can rapidly destroy wetland functions and values -- particularly their value as habitat and food for wetland-dependent species. Preservation alone, without the necessary efforts and funding to monitor and maintain the wetland site, may result in diminished values and functions over time.

Current guidance documents and existing bank agreements offer few comprehensive views on mitigation methods. While most prefer restoration to other mitigation methods, only EPA Region IV's draft guidance translates that preference into differential compensation ratios. It sets compensation ratios (mitigation wetlands required compared to wetlands lost) for restoration at 2:1, creation at 3:1, enhancement at 4:1, and preservation at 10:1. EPA Region IX's final guidance and EPA Region V's draft guidance prefer restoration to other mitigation methods. Restoration is also the preferred option in the multi-agency northeast regional guidance drafted by FWS, the Corps, and EPA Region III; this draft guidance bars preservation as a mitigation method. The U.S. Fish & Wildlife Service's national guidance prefers restoration. The Federal Highway Administration's draft model MOA does not address mitigation method or type; neither does the 1990 Corps/EPA Mitigation MOA.

In summary, restoration remains the preferred wetland mitigation method for regulators. It has advantages on technical, ecological, and compensation grounds. The choice of mitigation method will depend in part upon the ecological goals of the banking program. Banking schemes targeted at re-creating the historical assemblage of wetlands necessarily will favor more restoration, while wetland creation may be better suited to some preferred-function systems, such as improving erosion control.

2. Onsite Mitigation or Offsite Banking

Whether, and when, a developer may use credits from a mitigation bank rather than performing onsite mitigation is a critical issue for banking programs. Ecological reasons can be marshaled to support either onsite or offsite mitigation, depending heavily upon case-by-case factors. Most regulators now require developers to perform onsite mitigation where it is feasible to do so. Given the weak record of much onsite mitigation and the potential advantages of banking, this preference may need to be reconsidered.

It is true that onsite mitigation constitutes the most localized replacement of wetland functions and values -- assuming that these can be fully replaced onsite given the hydrological, topographic, and adjacent-use conditions. The Association of State Wetland Managers, in a draft statement of banking needs, states: "Certain wetland functions and values such as flood conveyance are uniquely on-site and destruction of such values on-site will cause nuisances and threaten adjacent landowners." Many development projects do not completely obliterate the wetlands onsite, often leaving a viable remnant wetland that can be restored, enhanced, and protected with buffers from onsite development. As a result, preferences for onsite mitigation are reflected in a substantial number of documents.

For example, Oregon's wetland mitigation banking statute allows use of a wetland mitigation bank only where "all onsite mitigation methods have been examined and found to be impracticable."[8] The draft banking guidances of EPA Regions IV and V have similar requirements. The final banking guidance of Region IX simply expresses a "preference" for onsite mitigation; while the Corps of Engineers' Galveston and Omaha District draft guidances prefer onsite mitigation unless there is a strong "ecological" reason for offsite mitigation. In contrast, the multi-agency northeastern draft mitigation banking guidance takes no position on the onsite/offsite issue; neither does the Department of Transportation's model agreement.

Sequencing is also relevant to the issue of onsite mitigation versus offsite banking. Sequencing requires that a proposed impact be avoided or minimized before compensation is allowed. If onsite wetlands are preserved to the greatest extent feasible, it may be wise to accomplish the remaining compensatory mitigation onsite.

However, as noted above, the onsite compensatory wetlands may suffer from the adverse effects of the surrounding development. Or, the minimization requirement may lead to the preservation of non-viable remnant wetlands onsite, with the remaining compensation credits being purchased from an offsite bank. Some wetland managers argue that, in such instances, it may make more sense not to preserve any of the onsite wetlands and instead to take full advantage of the opportunity provided by banking to create or restore an ecologically self-sustaining system elsewhere. Others, concerned with preserving natural

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[8] O.R.S. § 196.620.

wetlands, have expressed concern that mitigation banking will short-circuit the sequencing process. They fear that banking may make compensatory mitigation a much more attractive option to regulators, and thereby lead to an undue willingness to sacrifice known, onsite, localized wetland values for offsite mitigation.

The sequencing issue is not determinative, however; banking can coexist with sequencing [see Chapter 9]. The real issue is whether and to what extent the preference for conducting compensatory mitigation onsite should apply regardless of whether it comes at the end of a sequencing process or at the beginning.

As noted in Chapter 3, the (primarily ecological) reasons for favoring onsite mitigation do not appear to justify a categorical requirement for onsite mitigation to the exclusion of offsite mitigation banking. Indeed, regulators could, in some circumstances, reasonably elect to reverse the standard presumption and instead require use of mitigation banking as the norm -- particularly for smaller projects or for projects that would likely produce adverse impacts upon onsite mitigation wetlands.[9] This would perhaps maximize the ecological benefits resulting from applying compensatory mitigation requirements to these project sites.

Alternatively, regulators could treat onsite mitigation and offsite mitigation banking equally, and leave the decision between them up to the developer. If banking is adopted on a widespread scale, sequencing is retained, and if the assumptions about economies of scale are correct, it seems likely that this "laissez faire" approach would yield results quite similar to requiring bank use for small projects and onsite mitigation for large ones. This approach has the additional advantage of avoiding any problems that may inhere in "steering" clients to specific banks.

Finally, regulators could determine onsite or offsite mitigation on a case-by-case basis. Without a presumption, regulators would base their decisions on what is ecologically most advantageous, having institutionally leveled the playing field so that neither option would be financially advantageous to the developer. For example, a wetland dredge or fill activity that destroys significant onsite flood-water retention but leaves a remnant wetland would argue for onsite restoration or enhancement to augment local flood storage capacity. However, destruction of a locally abundant wetland that affects primarily wildlife habitat could be mitigated through a bank that replaces similar habitat nearby in a more protected setting or that, through compensation ratios, replaces the wetland with another wetland type more locally rare or valued. By leaving the decision up to the regulator, the offsite/onsite determination can be made to follow the goals of a comprehensive regional plan.

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[9] Onsite mitigation could continue to be preferred in certain classes of situations, such as where the wetland being destroyed could only be reproduced on the same site; or where the only way to save the remaining wetland was through onsite restoration of adjacent wetlands.

3. Proximity Requirements

As discussed in Chapter 3, the location of wetland functions can be as important as the character of the functions themselves. This issue is at the heart of the onsite/offsite decision. It also affects decisions about the geographic range in which development projects may acquire and use credits from mitigation banks.

While a nationwide or multi-state bank of freely transferable credits would be the most economically attractive to developers, it would not serve many of the critically important goals of mitigation. Therefore, every bank studied to date has a much narrower service area. While not all banking instruments define this service area, in general it is limited to related hydrologic units such as watersheds or sub-basins. See Appendix B (matrix of existing banks showing service areas).

The Oregon wetland mitigation banking statute states that credits from a freshwater mitigation bank may be used only to mitigate for development projects within the same "tributary, reach, or subbasin as the mitigation bank," and that credits from an estuarine mitigation bank may be used only within the same estuarine system. The Oregon law further places an outer limit on use of credits, barring their use for projects located more than 40 miles from the bank.[10] The Minnesota highway department bank requires the mitigation to occur within the same highway district. There are nine such districts; however, they are not set up to reflect hydrologic or other ecological boundaries. The new Millhaven (GA) bank is limited to "Chatham County, Georgia and the Savannah River Basin north to the limits of the Coastal Plain." Other banks have service areas of varying sizes.

The relevant service area is best assessed in the context of areawide planning. Absent some limitations on service area, and some understanding of the landscape-scale effects of mitigation banking, the banking program is unlikely to serve ecological goals. If there is no areawide plan, the wisest approach to ad hoc approvals of banks is a hydrologically based or habitat based approach to the service area. In this regard, the Oregon banking law offers a reasonable model.

4. In-Kind or Out-of-Kind Mitigation

The usual preference of regulators has been for the replacement of converted wetlands with wetlands of the same type. This preference is logical particularly in the context of the usual onsite compensatory mitigation -- the values and functions that are being lost should be replicated as nearly as possible.

When removed from the onsite context, however, the issue of wetland compensation type is less clear. The notion that in-kind replacement is desirable on a local or regional

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[10] O.R.S. § 196.620.

basis does have some validity. Habitat values, or flood control capacity are being lost and should be replaced. On the other hand, in-kind replacement essentially requires compensatory mitigation to maintain the current inventory of wetland values and functions regardless of whether these are the ones most needed ecologically. Indeed, it requires replication of what may be a significantly degraded or distorted inventory.

Out-of-kind mitigation, quite feasible with banking, provides a potential opportunity to "trade up" -- to improve upon the wetland inventory through the opportunity provided by compensatory mitigation requirements. Nevertheless, a number of banking schemes and guidance documents strongly discourage or prohibit out-of-kind mitigation. EPA Region V, for example, suggests in its draft guidance that it would require a compensation ratio of up to 5:1 for out-of-kind mitigation. The 7,000-acre Fina LaTerre (LA) bank is limited to transactions that provide in-kind mitigation. Some other banks offer some flexibility by defining in-kind broadly -- freshwater wetlands must compensate for freshwater wetland losses; estuarine wetlands for estuarine losses.

The decision requires consideration of the goals of the banking program. Absent adoption of specific goals that would provide a consistent rationale for selecting out-of-kind mitigation, an in-kind requirement makes sense as a default standard.

5. Advance Mitigation

Wetland mitigation banking is generally considered to be advance mitigation. Compensation credits are not recognized until the credit producer can demonstrate that the banked wetlands have achieved some level of functional replacement. This is the approach taken in most policy and guidance documents and by a number, but by no means all, of the existing banks.

The benefits of advance mitigation accrue directly to the environment. Advance mitigation can produce a short term net gain in wetland values and functions -- there will always be a temporary surplus of wetland functions and values as credits await maturity and sale. Advance mitigation assures that no debiting can take place until existing wetland functions and values can replace those that will be lost, thus avoiding any temporal loss. Advance mitigation also diminishes the risks of mitigation failure involved in debiting before replacement wetlands are in existence, thereby negating the need for complex financial and enforcement arrangements to cover potential failures.

However, not all banking programs require advance mitigation. The primary argument for allowing banking with concurrent mitigation (or with less than full functional replacement at the time of debiting) is that this is the usual practice with onsite mitigation. If full functional replacement is required in advance of credit recognition for banks but not for onsite mitigation, the argument goes, banks will be underutilized or competitively disadvantaged. An additional consideration is that credit producers may not invest in banking if they cannot achieve any return on their investment in restoration until many years

after their costs are incurred. This consideration is particularly pertinent if the expectation is that mitigation banks will produce some of the longer-maturing, ecologically significant wetland types that are being lost. There are, moreover, several issues raised by requiring banks to achieve advance mitigation. What constitutes "advance" mitigation is hard to define. Because of the variation in wetland systems, full functional replacement could mean 100 years for a hardwood swamp or three years for a wet meadow. This extreme range does not fit neatly into a networked banking system.

There are several potential means to resolve these difficulties. Full functional replacement could be viewed as the upper limit of what advance mitigation means. The lower limit could be defined as the work necessary on the part of the credit producer to produce a functional wetland -- design, construction, establishment of the hydrology, soil placement, planting if necessary -- everything but the time necessary for the mitigation project to reach functional maturity. Some financial guarantees and/or provisions for maintenance and monitoring can supplement this initial performance. See Chapter 8.

Adjusting credit ratios and establishing ecological success milestones could also link bank mitigation to the purposes served by advance mitigation. For example, the Chicago Homebuilders Association has proposed that bank clients pay a premium for credits available immediately that have not achieved full functionality. Under this scenario, the higher price for the immediate credits covers the risk of failure, and provides funding for any midcourse corrections or rehabilitation needed. Another approach to allowing use of less than fully functional credits for mitigation is to require a higher compensation ratio for credits used before they reach full functional replacement (e.g., the Weisenfeld Bank in Florida).

Currently, advance mitigation is not required for most onsite mitigation. As a consequence, the many ecological and efficiency advantages of banking may go underutilized because of the competitive disparity. Leveling the playing field by requiring advance mitigation onsite is one solution; another would be to apply to onsite mitigation the same kind of adjustments in compensation ratios used by some banks to account for temporal losses in wetland functions [see King 1991]. In any event, the advance mitigation issue must be considered in the context of both banking and onsite mitigation in order not to create unintended disincentives.

B. Development Project-Related Restrictions

A number of analyses of mitigation banking have explored the notion that some types of development projects may be more suitable for banking than others. One of the issues is whether certain restrictions reflecting this suitability might promote better use of banks.

Commonly nominated projects for use of banking include linear projects, such as roads and highways; fragmentary projects whose small acreage is likely to result in onsite "postage-stamp" mitigation projects doomed to ecological failure; and projects that are

currently exempt from mitigation requirements, such as prior converted croplands no longer regulated by the Corps [RGL 90-7] or expedited under the nationwide permits.[11]

Linear projects -- recommended by the Federal Highway Administration and the Corps as suitable projects for banking -- have a natural appeal because they create impacts that are unavoidable, at least in comparison with many other development projects. Linear projects can, however, stretch over the landscape for miles, involving multiple jurisdictions and wetland types. This may create difficulties associated with multiple land ownership, issues of proximity, and difficulties with in-kind replacement where multiple wetland systems are affected. Impacts may be many miles from the nearest mitigation bank.

There has also been some consideration of limiting the size of wetland development projects allowed to use mitigation banks. A number of existing and proposed mitigation banks do not allow debits of over five acres. The intention, perhaps, is to preserve banks for use by projects where onsite mitigation costs would be exorbitant, or where onsite mitigation is unlikely to reach a threshold of ecological viability. More likely, as is the case in Oregon, the limit is imposed to avoid consuming a large quantity of the limited available banking credits.[12] The proposed Prince George's County bank in Maryland does not prohibit larger projects outright but makes the process for using a bank much more rigorous for parcels of one acre or more. Such a limitation may also make sense in order to heighten the scrutiny of wetland losses that may have a profound local impact that requires mitigation onsite.

It may be appropriate to phase in mitigation banking for different types of development activities (e.g., limiting them initially to mitigation for public works projects, or conversion of agricultural wetlands). Once banks have established a track record, perhaps the range of development activities they can produce credits for can be broadened. Nevertheless, current banking experience does not suggest that such a phase-in is necessary. Indeed, the prevalence of highway banks suggests that such a phase-in may have already occurred.

C. Mitigation Goals

Wetland mitigation banks need not serve ecological goals. Many current banks appear to serve only economic or efficiency goals, with a nod in the direction of ecology by requiring in-kind replacement of destroyed wetland values at no less than a 1:1 ratio. Many proposed banks plan to operate as unrelated entities, satisfying credit demands as they arise

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[11] Some of the newly authorized nationwide permits (NWPs) do carry mandatory mitigation requirements that would make them suitable for banking, but most of the 36 NWPs issued to date do not. These others could be modified to require mitigation if banking became more available.

[12] O.R.S. § 196.620(8).

without reference to any particularly ecological objectives. But this is not the only possible approach to banking.

Banks present an opportunity to deal with ecological issues on a landscape scale in a way that onsite, project-specific mitigation does not. Banks can be sited in critical areas, can seek to produce wetland types of particular value or concern, and can focus compensation for disparate small-scale losses on parcels of genuine ecological significance. Ecologically based approaches may also provide bases for reconciling decisions about onsite mitigation, offsite banking, and fulfillment of the sequencing requirements.

Use of planning approaches is discussed in Chapter 10. Planning implies the establishment of mitigation goals. It appears likely that any determination of "mitigation allowable" undertaken in the absence of clearly articulated goals is likely to produce mixed results on the ground.

CHAPTER SIX
MITIGATION BANK SITING

Siting is a critical component of any wetlands mitigation banking effort.

To a wetland ecologist, bank siting is a matter of maximizing the values and functions of a replacement wetland in a given region by choosing the ecologically optimal site. This might involve applying siting criteria, such as pre-existing wetlands hydrology or adequate buffer space, that would limit available choices. On the other hand, developers of a private, market-driven bank (and prospective clients of a public or private bank), might argue that a wide range of available sites and flexibility in siting criteria should be the primary features of a banking system so that supply and demand can operate unimpeded.

Host communities, neighboring communities, and adjacent landowners will have their own priorities for siting banks and a strong stake in where a bank is sited for a variety of reasons. Establishment of a bank may represent, variously, the loss of potentially significant property taxes, creation of a community amenity, an addition to the value of adjacent properties, an attractive nuisance for wildlife, a significant alteration in water availability, or impacts to adjacent land uses. Finally, the public and public agencies sanctioning banking have a stake in siting to maximize conservation of wetlands.

This chapter identifies goals for productive bank siting, reviews policies and current practices on bank siting, and develops a set of considerations to guide siting determinations.

A. Siting Goals

Although most current practice is ad hoc, the identification of goals is important in mitigation bank siting. Mitigation banks are attractive chiefly because they offer an opportunity to make compensatory mitigation more significant ecologically. Thus, even if a banking system is ultimately to be driven by the private decisions of credit producers and clients, the framework under which they operate should be designed to assure that ecological concerns are captured in siting decisions. The actual method of site selection may vary (e.g., prescription of particular sites, criteria for site selection, performance standards for offered sites, preferential credit ratios for certain siting characteristics), but the system should reflect the underlying goals of the program. In addition to long term land use and planning goals, most siting processes will need to address the following goals:

(1) Maximizing the potential for ecologically successful replacement of wetland values and functions, addressing at least: (a) the site's potential to create, restore, enhance, and maintain adequate wetlands hydrology; (b) the presence or availability of wetland soils, vegetation, and wildlife species; and (c) protection of the site from harmful adjacent land uses.

(2) Providing enough siting flexibility to ensure the participation of private credit producers (if a private banking scheme is desired), and to accommodate the needs of public resource agencies that may wish to accomplish multiple objectives.

(3) Minimizing the potential for public opposition and adverse impacts. This can include design trade-offs, an inclusive site selection process, and assessment of current and future land uses.

(4) Consistency with local, regional, or state wetland or water quality plans or comprehensive development plans.

B. Policies on Siting Mitigation Banks

While no national policies or regulations exist to guide bank site selections, a number of existing and draft guidance documents do address siting. While these guidances have many insights in common, they differ fundamentally in the specificity and prioritization of siting criteria that, in turn, influence how useful they can be to bank siting efforts.

1. Federal Guidance

The multi-agency draft guidance document recently developed by the New England offices of the Fish and Wildlife Service, the Army Corps of Engineers' Baltimore District, and EPA Region III, provides general criteria for siting. It recommends selection of bank sites based on: restoration or creation potential, which in turn depends upon soil type and water availability; existing resource value, size, location and cost; adjacent land uses; presence of contaminants; potential for human intrusion, and long-term site protection. The draft guidance also recommends locating banks in the same watershed or hydrological sub-basin as the impact areas, and particularly on former wetland sites. The guidance does not address who is responsible for choosing the site, and does not prioritize among these criteria.

EPA Region IX's final mitigation banking guidance provides more specific siting criteria and grants the bank operator (the credit producer in our terminology), whether private or public, responsibility for choosing a bank site. The guidance recommends siting within the same watershed or hydrological sub-basin, and prioritizing sites that are adjacent to high value habitats protected from future development and compatibly managed. The guidance gives priority to restorable wetlands sites, particularly those with minimal existing habitat values. Habitat for rare or threatened species populations is one of several specific criteria listed. Like the northeast multi-agency draft guidance, Region IX's final guidance provides a laundry list of possible siting criteria but does not prioritize among them. The guidance emphasizes habitat values more than other wetland values and functions.

EPA Region IV's more recent draft banking guidance closely follows that of Region IX, with a few exceptions. General criteria for siting recommend locating banks near high value habitats to increase the value of bank habitat. Significantly, the draft guidance

advocates the use of corridors between banks and other habitat or using banks as a corridor to connect existing habitat patches. It also cautions credit producers to site and design banks to avoid negative impacts to existing habitats. Site selection criteria provided by the draft guidance address biological considerations first, followed by social, financial, and long-term protection considerations. These criteria include habitat and land use development trends, habitat diversity, regional goals for replacing specific wetland types or values, and habitat for species of special concern. Other criteria give preference to degraded watersheds, sites upstream of floodprone areas, sites with high restoration success potential, sites that serve as wetland-upland corridors or buffers, and sites in areas with high nonpoint source pollution.

EPA Region V's draft guidance on mitigation banking [August 1992] is more specific, ranks its criteria for siting in order of importance, and provides illustrations of each. Of highest importance are sites that have completely lost all functions but where the functions can be restored to their original condition; these include "prior converted" wetlands; after these, severely degraded wetlands such as "farmed wetlands" with high restoration potential should be chosen.[1] Next, upland sites adjacent to existing wetlands where regrading would not harm the adjacent wetland are preferred for wetland creation. After these, the guidance recommends upland sites in good locations within a watershed for wetlands creation. Responsibility for choosing a site would be granted to a committee comprised of interested federal, state, and local agencies.

The Corps of Engineers' Galveston (TX) District draft guidance establishes a presumption in favor of banks that will require little long-term maintenance and will be "ecologically and administratively self-sustaining." This general requirement is considered a prerequisite to bank approval. The guidance also requires a pre-approval site survey to determine if there are any historic properties that could be affected by the bank establishment, and may require an archeological survey. More specific siting requirements in the Galveston guidance include locating a bank within the same geographic area as the wetland loss sites, which could be the same watershed, sub-basin, or regime. Bank selection is influenced by the site's restoration or creation potential, with preference given to sites offering good restoration potential. Other considerations in siting include existing resource value, size, location and cost, adjacent land uses, presence of contaminants, potential for alteration, and "the ability to protect functions over the long term." The guidance lists three types of land ownership that may be considered for bank sites -- state or federal lands with restoration or creation potential; private land with subsequent transfer to a public or non-profit manager; and easements on private lands. In contrast to EPA Region IV's draft guidance, which prohibits banks on federal lands except under limited circumstances, the Galveston District guidance lists public lands as desirable bank sites.

[1] These wetland categories are designated by the Agriculture Department's Soil Conservation Service in connection with the federal "swampbuster" program. 16 U.S.C. § 3821 *et seq.*

In September 1992, the Corps' Omaha district issued a draft guidance that is similar to the Galveston guidance, including the same bases for bank site selection and requirements for a site development plan.

2. State Guidance

A number of state agencies have developed their own guidances for banking that address siting considerations. One of the most thorough was developed by the Washington State Department of Ecology [Castelle 1992], which presents a sophisticated series of siting criteria that examine land ownership, adjacent land uses, and tradeoffs in losing upland functions and values when converted into wetlands. The guidance also strongly recommends inventorying an area for good candidate bank sites, and developing siting criteria as a cooperative effort among agencies, developers, conservation groups, property owners, and others: "Because banking programs often seek to balance economic growth with natural resources protection, selection criteria are best determined by a cooperative review team..."

Of the nine states that authorize mitigation banking by statute [see Chapter 2], few include any guidelines or references to siting goals or criteria. Most defer the issue to implementing regulations which, in turn, say relatively little. Oregon's Mitigation Banking Act includes criteria that should be considered during the site selection process, including: historical wetland trends, current and future loss rate estimates, and potential contributions of the proposed site to wildlife, fisheries, outdoor recreation, surface and groundwater quality and quantity and flood control, research values, and regional economic needs. These criteria, while rather general, incorporate a broader array of wetland functions than most criteria at the federal level or in existing banking agreements.

The California Fish & Game Department's draft 1991 guidelines for mitigation banking outline requirements for siting, including a requirement that banks "be designed to support wetland habitats likely to be impacted within 40 miles of the bank so that in-kind compensation for wetland impacts can be achieved." New Hampshire DOT's Draft Wetland Mitigation Banking Action Plan [October 1990] calls for a state survey of potential sites for wetland banking as an early step toward establishment of a statewide banking system. Wisconsin's DOT and Department of Natural Resources, in an amended interagency cooperative agreement on banking [November 1990], state a preference for sites not already owned by the DNR, and sites located near the development-impacted wetlands or at least within the same watershed.

3. Non-Governmental Guidance

The Chicago Homebuilders Association, which has proposed a mitigation bank for the region, has developed a model Memorandum of Agreement that includes detailed siting criteria applicable to the bank and as a model for similar banks elsewhere. It offers the following criteria for evaluating and approving bank sites:

- sites containing highly disturbed lands or prior converted wetlands, with a preference given to sites with high restoration potential;

- sites with no "high quality wetlands present" where creation is the mitigation method;

- sites containing "some upland area to provide diverse habitat";

- sites where adequate hydrology can be "secured;"

- sites near or adjacent to large public landholdings to increase effective bank size;

The model MOA also recommends that sites should be evaluated to assure that they have no hazardous waste; that no federal or state listed endangered or threatened species would be adversely impacted; and that they would have no adverse impacts on other "high quality ecosystems." The model MOA would require banks to have a restoration or creation plan that incorporates a diversity of habitat types for wildlife and to maximize wetland functions; buffer areas; a "maximum of wetland area, but not without regard for upland inclusions;" provision for public access; aesthetically pleasing vistas; a preference for native species; an accounting of the types and sources of soils; and design and maintenance procedures that minimize the need for active management.

At its best, the Homebuilders' model incorporates the most far-sighted criteria from the federal guidances -- buffers, proximity to other natural lands, sites with high restoration potential -- and adds a number of its own innovative criteria, particularly its emphasis on habitat diversity, native species, aesthetic appeal and public access. On the other hand, a number of the model's criteria raise questions. The prescription for upland buffer does not suggest an upper limit, raising concern that developers may seek to maximize upland at a site at the expense of compensatory wetland. In addition, limiting wetland creation to sites with no "high-quality wetlands present" raises the prospect that sites with "low-value" wetlands may become targets for creation or -- more accurately -- conversion from one type of wetland to another. Conversion provides no additional compensatory wetland acres and displaces existing wetland functions and species; it is, for these reasons, expressly barred in EPA Region V's draft banking guidance.

4. Existing and Proposed Banks

Most mitigation banks in existence today were not sited according to the criteria listed in the guidances discussed above. Many were the product of special circumstances or fairly arbitrary siting decisions. With many DOT banks, the state agency simply mitigates on land it already owns, and is thereby limited in its opportunity. Other banks were created primarily because of the bank sites themselves. The Company Swamp bank, a forested wetland in danger of logging, was used as a bank site because it was considered important enough to preserve. The proposed Springtown (CA) mitigation bank was a housing

development site that was discovered to be endangered species habitat; wetland mitigation banking was considered a way to salvage some value.

The Bracut Marsh (CA) site was chosen with ecological principles in mind. Restoration of a former large marsh site was designed to mitigate for the loss of many small "pocket marshes" nearby. Though not technically in-kind, because pocket marshes sustain different species assemblages than a single large marsh, habitat replacement was a guiding principle, as well as the fact that the site appeared to have high restoration potential. However, site suitability was poorly diagnosed and the resulting wetland restoration suffered from poor soils, poor water quality, and other defects resulting, in part, from the site's former uses.

In Minnesota, the state highway department has approved some 40 scattered sites to mitigate highway construction. Sites can be proposed by "any interested party," including private landowners, with final approval granted by the DOT. Siting criteria include preference for sites within highway rights-of-way, adjacent to rights-of-way, and state or federal land over private lands. Cost-effectiveness of "developing the area as a credit site" is a "major factor" in choosing bank sites. Many of the sites are less than five acres in size, not enormously different in ecological impact than project-specific mitigation might be.

The proposed Placer County (CA) mitigation bank addresses siting criteria in its draft guidelines. The guidance explicitly recommends establishment of "smaller" bank sites that provide localized replacement of wetland values and functions. The guidance recommends initially a bank in the county's eastern and western regions, and adds that sites should be chosen to accomplish regional, state, federal and international fish and wildlife goals -- a clear emphasis on the habitat value of wetlands but within the framework of comprehensive regional goals.

Under Placer County's draft guidelines, bank sites can be proposed by any interested party, but may be approved only by the county. Nominators of potential bank sites must provide detailed information on the site, including a habitat delineation identifying habitat type, acreage and values present. The guidance further states that delineations of wetlands must meet the definition of wetlands provided in the guidance and correspond to the seven wetland subsystems listed in the document as occurring in Placer County, including three subsystems of riparian wetlands; two of palustrine wetlands; and two of lacustrine wetlands. The guidance is helpful in describing where these systems are generally found in Placer County, and where they are located in relation to current development and growth patterns. However, because of the guidance's emphasis on habitat replacement, generally only development activities in palustrine systems will be considered suitable for mitigation through banking and, as a result, bank sites are likely to be established only where palustrine wetlands can be restored or created.

C. Siting Considerations

The criteria listed in federal guidance and experience from banks to date suggest a number of factors that must be considered when choosing a bank site, not the least of which is having well-defined and prioritized siting criteria in place before site selection. In addition, establishing a method for site selection, determining who is responsible for site selection, and providing for a wide range of input into the selection process will improve chances of bank success down the road. The following describe issues that should be addressed in any bank siting plan.

1. Jurisdictional Issues

Jurisdictional considerations must be incorporated into any site decision. Bank agreements often involve multiple agencies and jurisdictions. And because the service area of banks is often ecologically defined -- within a single watershed, for example -- it will likely overlap more than one co-equal governmental jurisdiction (e.g., two counties, six local governments). Different jurisdictions may have differing priorities for a mitigation bank, and priorities may sometimes clash. For example, upstream communities may wish to site a bank for improved habitat, but in doing so may reduce instream flow to a downstream community. Downstream communities, in siting a bank to control flooding, may alter the regional water table with impacts surrounding neighbors.

Bank regulators and clients, too, will have competing interests in where a bank is sited. In general, there will be tension between the desire of natural resource agencies to replace lost wetland values and functions as close to the impacted site as possible, and the interests of bank operators or clients in as wide a geographic range as possible to maximize the size of the market and fluidity of the credits. In the case of the Port of Los Angeles/Pac Tex bank (CA), the proposed siting of a bank 80 miles south of the impact site created great opposition from Port area residents who felt their region was losing values that would accrue to a distant population.

Some communities that are chosen to be the site of a wetland mitigation bank may welcome the rehabilitation of a natural system. Others may resent the loss of potential property tax revenues that would accrue from the site if developed. In the case of a non-bank mitigation joint project in Michigan [Detroit Airport Joint Project], the operator "sweetened" the deal for a local community concerned over potential property tax losses by building into the replacement wetland fishing piers and other recreational benefits [Johnson, Johnson & Roy, personal communication].

In general, banks that operate at a single jurisdictional level, such as the many state DOT banks, may have fewer bank siting problems than areas with independent and competing banks. A state may have a large region from which to choose its bank sites, a broader range of wetland ecosystems to mitigate, and more options for acquiring the sites.

Because bank service areas often overlap jurisdictional boundaries, siting banks should be a process that involves input from all jurisdictions and potentially affected parties, even if the ultimate siting decision is up to a single party. The Port of Pascagoula (MS) SAMP mitigation bank is a good example of multi-jurisdictional cooperation and coordination in wetlands permitting and mitigation.

2. Ownership of the Land

Ownership of the land on which a bank is sited can influence a number of factors. These include the ease and success of monitoring and enforcement efforts, the performance of maintenance activities, the price of credits, and long-term uses of the site. The Washington State banking guidance gives land ownership high consideration in bank siting, generally discouraging the use of privately owned sites. Private landowners may not be willing to sell their lands for a bank, and adjacent owners may oppose the siting for fear of use limitations or loss of property values. The state recommends use of depleted highway borrow pits, right-of-way remnants, and other public lands as preferred bank sites. The Corps' Galveston District draft guidance also recommends public lands before private lands.

Conversely, EPA Region IV strongly objects to the use of federal lands as bank sites. Its concern is, in part, that federal lands are less likely to be threatened by development and may be restored under numerous existing wetland restoration programs, while restoring privately owned wetlands more directly compensates for wetland losses on private lands. In addition, the public land site provides a flow of publicly enjoyed services before restoration, such as open space, recreation, upland wildlife habitat, and other functions. If a private landowner compensates for destroying wetland functions on private land by restoring or creating a wetland on public land, the public may not be fully compensated for the loss of some of these extant publicly-enjoyed values and functions.

On the other hand, while siting banks on private lands allows for a wider range of available sites and hence a more flexible market, restricting siting to private lands alone forgoes numerous benefits. Public lands do not have to be acquired and are more likely be secure in perpetuity. They are already lost to tax rolls, and are not likely to meet as much local or adjacent landowner opposition. Moreover, many public lands are surrounded by compatible uses, improving the chances for ecological success of the mitigation project. Finally, management of mitigation wetlands on public lands can be integrated into ecological management of a suite of adjacent public lands.

In summary, a firm rule against mitigation on public lands appears unduly to restrict mitigation banking. Nevertheless, care must be exercised to assure that mitigation on public lands does not simply displace public funding of restoration efforts that would occur in any event, or fail to compensate the public for extant non-wetland values. Land ownership should be one of a number of factors considered when choosing a bank site, but should not dictate the decision.

3. Bank Size and Number of Sites

Another consideration is the size of a bank, and whether the bank should consist of one parcel or multiple parcels. Most operating banks at present are single parcels, ranging from fewer than 5 acres to over 7,000 (Fina LaTerre). The Minnesota DOT bank is notable for its 40 different sites, scattered across the state's 9 highway districts.

Most wetland ecologists would argue that wetland banks should be as large as possible to avoid the habitat fragmentation and other causes of failure in small, isolated project-specific mitigation patches. Larger wetlands maximize biodiversity by providing habitat for more species that, in turn, form a more complete ecosystem that can self regulate -- assuring the long-term success of the wetland and minimizing long-term maintenance costs [Willard and Hillier 1990]. The California Department of Fish Game wetland mitigation banking guidelines specify that banks should contain no less than 50 acres of new (or restored) habitat, except in exceptional circumstances. The National Research Council's report on restoration [1992] argues for rehabilitation of large, self-sustaining ecosystems; "The objective is to emulate a natural, self-regulating system that is integrated ecologically with the landscape in which it occurs." The Federal Highway Administration's draft guidance for state DOT banks discourages multiple small sites for institutional reasons: "Creation of multiple small sites which are difficult to manage is not conducive to permanent management of mitigation and creates problems regarding maintenance, access control, monitoring, and future conversion to non-wetland. It may also lead to problems with local agencies and private landowners."

Florida wetland consultants Robin Lewis and Kevin Erwin, however, argue that under some circumstances bigger is not better, and that the historical wetland patterns of the region and needs of threatened species should be considered when siting banks. Losses of small wetland areas are more common in many parts of the country than large tracts. If the species being displaced depend upon small wetlands habitat, they may lose out in the creation of a large replacement wetland. Prairie potholes, vernal pools, small isolated wetlands support different communities than do large acreage sites.

The ecological reasons to prefer small compensation sites in some instances, however, can be reconciled with the general preference for larger banks. The small sites may be embedded in a matrix of surrounding lands that ensure their continued longterm function. A half-acre pond in the middle of a condominium development may be hardly worth considering as compensation, but a similarly sized pond may be appropriate as a bank when surrounded by native vegetation and protected from encroachment, or when part of a matrix of such ponds.

Although 16 of the 46 existing banks are larger than 100 acres, more than half of all existing banks (24) are under 40 acres -- most in the 10-30 acre range; these 24 do not include the multi-site highway banks such as Minnesota, North Dakota, and Georgia, which tend to have sites in the same range.

4. Hydrology

Sites must have adequate hydrology to support a wetland ecosystem. No other physical feature is as important. This factor gives strong preference to restoration, and to some extent enhancement, as a form of mitigation. Where wetland hydrology already exists, hydric soils are likely. Sites where wetland hydrology must be created, and hydric soils imported, should be ranked lower than historic wetland sites.

Hydrological fluctuations and long-term meteorological cycles also influence where wetlands will grow and migrate. Droughts and floods can contract and expand the size of wetlands and the sum of their values and functions. Two banks have been suspended to date because of long-term drought conditions [Mud Lake, Idaho and Washoe Lake, Nevada]; and, ironically, one potential bank site was rendered unusable for mitigation purposes because of flood conditions that restored the site's wetlands naturally [North Bank Site, CA]. Siting banks where hydrology is highly uncertain or dependent upon institutional arrangements (e.g.,the ability to limit nearby irrigation to avoid groundwater depletion, subsidence, or saltwater intrusion) increases the likelihood of bank failure.

Understanding a site's hydrology will not only improve the chances of ecological success of the bank, but will also aid in design for buffers and upland to accommodate the migration of wetlands in response to natural hydrologic fluctuations.

5. Buffers

Providing buffers mitigates the impact of adjacent land uses on banked wetlands, protects them from edge effects of adjacent "open" areas that encourage exotic species and predators, and can connect the replacement wetland to other natural areas that serve to enhance the effective size of the wetland (and its biodiversity and self-regulating capacity). Providing ample buffer areas and incorporating some adjacent upland area within a bank can help to accommodate the migratory nature of wetlands in the landscape. This is critical particularly for coastal wetlands and areas of rapid erosion where migration means survival for the wetland. Surrounding bank sites with ample buffers of edge, upland, and deep water habitat can help protect the site and its neighbors -- although this will likely raise the price of credits and pressure regulators to issue some credit for these nonwetland areas of a bank.

The proposed Chicago Homebuilders banking MOA recommends as siting criteria "buffer areas contiguous to the wetlands to protect them from potential adverse affects of adjacent land uses." The Corps' Galveston District draft guidance states that "uplands adjacent to or part of a wetland bank which are shown to give wetlands a value by providing additional seclusion or cover for wetland-using animals or by providing a buffer may be afforded a value in a reduced credit amount."

Buffers should be a mandatory requirement of any mitigation bank or onsite mitigation, much as set-back requirements are now regular features of local zoning and planning ordinances to protect streams and other natural features.

6. Landscape Level Planning

The mitigation site should be located where it is not likely to suffer degradation. By considering a broader swath of area than the bank site itself, and broader goals than credit creation, bank planners should begin to avoid the habitual practice of creating a postage-stamp marsh in a sea of concrete as mitigation. The migratory, successional nature of wetland systems makes siting within the larger landscape critical.

Sites should also be chosen to address a broad range of values and functions as possible, something that landscape-level planning can help with establishing goals and priorities. Habitat replacement is one among many wetland values that should receive consideration during bank siting. Unless habitat is the guiding principle behind bank siting, other values and functions should be guiding bank siting as well. For example, restoring or creating wetlands to improve area flood control has been largely overlooked in banking to date. Restoring wetlands in the 100-year floodplain will expand the floodplain's capacity to retain flood waters and limit flood damage. Many communities already restrict development in floodplains, so acquiring bank sites should be less expensive there. In addition, communities benefit financially through restoration of floodplains and banning development by receiving lower flood insurance rates through the FEMA Community Rating System.

Restoring or creating wetlands along riparian areas, adjacent lakes, ponds, or other waters can serve to filter nonpoint source pollutants and improve water quality. Siting replacement wetlands where they can serve as buffers to existing wildlife areas can mitigate edge effects, expand their effective size, improve the likelihood of self-regulation, augment biodiversity, and further safeguard these areas. Siting wetlands to serve as corridors between existing natural areas expands habitat for many larger species who need wider ranges to survive, and can increase species mobility between habitat patches to avoid isolating populations where they remain vulnerable to natural disasters and inbreeding effects. EPA Region IV's recommendation for use of mitigation banks as greenways, wildlife corridors, and buffers to nearby natural areas makes great sense.

Finally, landscape-level planning can help bank siting consider the effect of the site on neighboring properties. The replacement wetland will have its own impact on the landscape. If the site attracts great numbers of wildlife, for example, it not only affects the wetland site but surrounding properties; adjacent farmers may be subject to greater numbers of Canada geese, nutria, deer, and other wildlife eating row crops, or some livestock predation. Altering hydrology for a bank site may cause flooding or dewatering of neighboring property. For example, wetland restoration by the Fish and Wildlife Service in the Nebraska Sandhills altered local water tables and disrupted overland flow and drainage patterns for surrounding landowners. Planning can help identify bank sites that may be

more compatible with existing or future land uses, and that can diffuse community opposition. Sites adjacent to a river, lake, or other waterbody not only improve water quality for the community, but might be designed to include walkways or other obvious benefits to the community.

7. Site Surveys and Sampling

Site surveys must be a part of any successful regional banking system that seeks to make banking serve wider land use planning goals and minimize bank failures. EPA Region V's draft guidance strongly recommends inventorying possible sites prior to bank establishment by an interagency committee. The Washington state guidance makes inventorying a cooperative venture among all interested parties. Developers and credit producers interviewed for this study argued strongly for a private role in choosing bank sites; because the capital cost of acquiring a bank site is so high, banking may only be profitable for private operators when they already own the site. Nevertheless, private site selection can be coordinated with regional inventories and survey information.

Candidate sites should be thoroughly sampled for the condition of hydrology, soils, and adjacent land-use impacts. Several banks have run into avoidable problems -- most notably the Bracut Marsh bank -- because of inadequate sampling. Apart from determining the condition of soils and hydrology on the site, potential sites should be considered in view of potentially harmful adjacent impacts, and in light of landuse patterns for the area. An ideal site today may be surrounded by light industrial use tomorrow. The West Eugene proposed bank used advance identification to catalogue and anticipate land uses and to identify areas best suited for development, restoration, or preservation.

8. Limited Availability of Sites

The number of potential bank sites that meet reasonable siting criteria within a given area or watershed is limited, although this number will vary widely among regions. As each potential bank site is restored, developed, or otherwise encumbered, the cost of those remaining goes up. The number of available restoration, creation, or enhancement sites in a jurisdiction or a watershed will inevitably influence their price as well as any regional criteria for siting. Areas with a large percentage of acres in prior converted cropland may have a wealth of sites to choose from, while urban areas will have significantly fewer. In general, the more potential sites, the more exacting the siting criteria can be. Where potential bank sites are scarce, other requirements might be relaxed, such as in-kind replacement, or degree of proximity to development sites. Certain siting criteria, however, must remain standard -- including suitable hydrology, potential for ecological success, and adequate upland buffer area.

9. Ranked Siting Criteria

Providing bank operators or regulators with an array of siting criteria that lack prioritization or detail creates the potential for conflicting criteria. Should a large site with a relatively low cost be chosen over a smaller, more expensive site that boasts more compatible surrounding land uses and long-term site protection? Should banks perform double-duty as nonpoint source pollution treatment facilities, even if the nutrient and pollution loading harms the overall quality of the wetland (and thereby reduces credits available, particularly over time)? Should rarity or uniqueness of regional wetland types dictate where banks are sited? A preliminary inventory of potential bank sites in a given area, comprehensive planning, and clearly established goals for the bank will help make some of these choices clearer in a region. Prioritizing siting criteria, however, can make siting guidance more useful.

10. Proximity

Bank sites should preferably be close to impacted sites. Wetlands perform important functions that are directly connected to their location in the landscape. Therefore, banking sites should generally be within the same watershed and as close as possible to impacted sites. While proximity should not be used to omit potential bank sites that offer other features, such as high restoration potential, siting banks as near to the impacted site(s) as possible will, in theory, produce the least disruption of local functions and values within the area, including alteration of instream flow and other hydrological processes.

Proximity to impacts, however, is only one of many important considerations in siting. Its emphasis will depend, in part, on regional mitigation goals and on the functions and values that are to be lost through development. In general, a presumption in favor of proximate bank siting should be rebuttable only by landscape-scale wetlands plans, or by empirical findings for individual cases.

D. Summary

If these ten considerations are taken into account when a banking program is organized -- or at the time of the recognition of the first bank in an area -- the ecological potential of mitigation banking is more likely to be realized. Continuation of the current *ad hoc* approach to mitigation bank approval risks, at worst, replication of the poor record of onsite mitigation, and at best, limitation of mitigation banking to a minor role in wetland policy. Early attention to bank siting considerations is the most important factor affecting the potential usefulness of mitigation banks as an effective instrument of wetland protection.

CHAPTER SEVEN
CREDITS DEFINED AND VALUED

Mitigation banks require systems for valuing the compensation credits produced and for determining the type and number of credits needed as compensation for any particular project. Credit definition and valuation is one of the most complex issues in mitigation banking. It is difficult enough to compare one wetland to another for purposes of mitigating a single project, although many methods of doing so have been developed. It is, however, even more difficult to adapt any of these methods to allow the use of credits as currency available for a variety of transactions. Yet this is essential to a mitigation bank.

Where a banked wetland has been restored or constructed for general purposes, careful matching of values and functions between the converted wetland and the mitigation wetland is difficult. Mitigation bank credit definitions are an attempt to identify those features which allow reasonable approximations of replacement. But unlike dollar bills, one wetland is not equivalent to another. An estuary on the Florida coast differs from a hardwood forest in the Mississippi Valley. Even a riparian wetland on one tributary is not the same as that on another tributary of the same river system. Beyond obvious differences in characteristics such as size, location, or elevation, there are important differences in functions -- flood control, wildlife habitat, water filtering, groundwater recharging, and others.

How can one evaluate two different wetlands so that the degradation of one can be offset by the restoration, enhancement or creation of the other? To answer this question, wetland scientists and managers have developed hundreds of evaluation methods ranging from the complex to the simple. These methods attempt to establish, in either a qualitative or quantitative fashion, the nature and extent of different services which a wetland may provide. Once those services are known, they may be translated into a "currency" which can serve as the medium of trade for a wetland mitigation bank.

Evaluation methods serve two different purposes. First, they define the currency for the bank. Second, they may establish replacement ratios. For example, a bank may use acreage as a "currency," but there may be regulatory concern that an acre of created wetland purchased from the bank will not compensate for the loss of an acre of mature bottomland hardwoods. The credit evaluation system might lead to a determination that mitigating the impact to an acre of hardwoods would require three acres of banked wetland -- a 3:1 ratio.

This chapter identifies the credit evaluation systems now in use for mitigation banks, summarizes their effects upon bank performance, and discusses the use of ratios in accomplishing banking objectives.

A. Types of Credit Systems

Assessment methods used for mitigation banking may be divided into three groups which roughly correspond to greater scopes of ecological comprehensiveness:

- *Simple indices* are derived from quickly and easily observed characteristics of a wetland, and usually serve as surrogate "indicators" of one or more ecological functions.

- *Narrowly tailored systems* attempt to measure directly a limited range of wetland services, such as wildlife habitat, through a detailed procedure focusing on that particular wetland service.

- *Broadly tailored systems* examine a range of wetland functions covering a number of observable characteristics.

Three other approaches -- *best professional judgment*, *combination approaches*, and *economic valuation* -- are also briefly discussed below.

1. Simple Indices

For developers, a primary advantage of a wetland mitigation bank is being able to avoid the complexity of developing project-specific mitigation plans. For speed and clarity, simple indices are greatly preferred, for they involve little in the way of intense field work and therefore consume few resources. They are also advantageous to regulatory agencies because they are not resource-intensive to apply. Typically, simple indices merely describe characteristics of a wetland in question (i.e. size, number of species) rather than defining anything about the ecological services it provides (i.e. wildlife habitat, flood storage, recreation value).

Often they do provide a rough correspondence to the functions in question. At the same time, however, simple indices intentionally ignore the complexities of wetland ecosystems. They may provide a good proxy for some functions or values, but poorly represent others. Bank regulators and managers must remain sensitive to the possibility that the index being used has very little to do with the functions of concern. Careful consideration is probably necessary to ensure that the simplicity and cost-effectiveness of simple indices do not translate into unacceptable losses of wetland functions.

a. Acreage

The most common simple index used in mitigation banking is acreage. Usually, this is superimposed upon a threshold determination of a wetland type. A bank may, for example, contain 30 acres of enhanced estuarine emergent wetlands, and a bank client would

purchase credits represented by those acres to compensate for development impacts on estuarine emergent wetlands elsewhere.

Acreage can be determined without a site study, and is not dependent upon any specialized knowledge. Where the purpose of the bank is to streamline the process of permitting, acreage serves as a highly desirable index because of its low cost of assessment and the speed with which comparisons can be made.

The ease of using an acreage evaluation has been demonstrated in the Company Swamp bank. Although a more complex wildlife habitat analysis is used for mitigation of impacts greater than five acres, for smaller impacts the transactions are done purely on an acreage basis. To date, few projects have used the more sophisticated system; this is not surprising, since the cost of doing so is more than three times the cost of an acreage-based transaction [McCrain 1992].

The Company Swamp experience highlights some difficulties with a pure acreage analysis, however. McCrain notes that in practice the acreage-based transactions compensated for only about 2/3 of the habitat functions destroyed at the impacted sites (as calculated under the more sophisticated system). Such losses are not surprising when the index used (such as acreage) has very little connection with the ecology of the wetland.

Because acreage is so removed from the nature of wetland functions, many banks use it only in combination with other requirements. Many banks that use acreage require, at least, that the banked acreage be of the same broadly-defined wetland type as the impacted wetland. These in-kind transactions purport to pay at least some attention to ecological functions. Many of the state DOT banks use in-kind acreage as the credit definition. The definition of wetland type, however can be quite general -- sometimes as simple as freshwater, estuarine, coastal.

Other simple indices (see below) may be better surrogates for ecological functions, although they may require more detailed information.

b. Diversity

Most ecologists are familiar with the simple indices used to represent the diversity of species in an area. These indices typically take into account both the number of different species and the relative proportions of those different species in a given area. (Thus, for example, in determining the diversity of ducks, a site with ten mallards, three northern pintails, and two northern shovelers would be less diverse than a site with five of each).

To determine a diversity index, data must first be collected on the distribution of species in an area -- clearly a more resource-intensive task than merely identifying a site's acreage. But these measures can, unlike acreage, be tailored to project objectives or resource availability by limiting the diversity measurements to a particular species (i.e.

wetland birds). Diversity indices *could* be used by banks as a currency. Depending on the scale of the index, multiplying diversity by acreage could give "diversity units" which could then be traded by a bank that had diversity as a goal. No mitigation banks presently use such a system.

At the same time, however, diversity *is* used by some banks as a supplemental standard, influencing trades otherwise conducted solely on an acreage basis. The Washoe Lake mitigation bank in Nevada, for example, uses the number and species of wetland birds as a means of guaranteeing the quality of wetlands that are traded on an acreage basis. (Use of this bank is presently suspended due to drought conditions.) Especially where wildlife diversity is an important factor to wetland managers, using diversity indices can be a relatively inexpensive means of focusing bank efforts on that function.

In an interesting twist on diversity concerns, the Seaworld Eelgrass Mitigation Bank in Southern California has considered taking genetic diversity into account as a quality issue. Where the organisms of concern are all members of the same species or set of subspecies, such a method would add an unprecedented level of sophistication to the development of banks and mitigation projects. Of course, such sophistication would require commitment of extensive resources to determining a single wetland characteristic.

The range of simple indices is by no means exhausted by acreage and diversity [EPA 1984]. For example, the Seaworld Eelgrass Mitigation Bank is using the density of eelgrass as a measure of quality.

2. Narrowly Tailored Assessment Methods

While simple indices may or may not correlate with wetland functions, narrowly tailored assessment methods have been designed to predict or measure particular functions. Although they are more complex than the simple indices, they do not attempt to evaluate the entire regime of wetland functions. As a result, these methods may be more accurate in predicting their subject functions. At the same time, however, the use of narrowly tailored methods may encourage a narrow focus on only the evaluated function rather than the range of potentially relevant wetland services. They also require more information than the simple indices.

The most common assessment methods of this type attempt to predict the compatibility of the wetland habitats with desirable wildlife species. Many of these are variations on the Habitat Evaluation Procedures (HEP) developed by the U.S. Fish & Wildlife Service. These methods are used extensively by mitigation banks throughout the nation.

The basic habitat assessment methods rely on the twin notions of optimum habitat and carrying capacity. The latter idea assumes that for any environment, the population of a species can only grow to a certain size before running up against limits of space, food, or

other resource constraints. "Optimum habitat" describes the habitat which could support the largest possible carrying capacity -- i.e. the best possible combination of landscape, vegetation type, vegetation structure, hydroperiod, and other wetland characteristics.

Habitat assessment procedures typically involve field estimates of various characteristics that studies have identified as important to one or more fish or wildlife species selected as indicator species. The model then combines these characteristics and estimates how close the wetland under consideration is to the optimum habitat for either a species or species assemblage.

In addition to habitat-focused methods, other narrowly-tailored methods may examine biological productivity, flood-flow retention, or other specific wetland values.

a. Habitat Evaluation Procedures (HEP)

The Fish and Wildlife Service's Habitat Evaluation Procedures (HEP) have been the starting point for most of the habitat assessment methods now in use. The first version of HEP was released in 1976 (HEP76) and a revision, which is in more common use today, was released in 1980 (HEP80). A description of the latter is a useful starting point for describing other habitat assessment methods, including HEP76 and modified versions of both methods.

The HEP analysis is site-specific. The analyst must first define the study area. The analyst must then delineate the different land covers in the selected area (i.e. grassland, stream, deciduous forest, etc.). Once the area has been chosen and the cover types delineated, the HEP analyst must select the evaluation species. This involves considering those species that might be found in the wetland, and selecting those that have a "high public interest, economic value, or both," or that give a "broader ecological perspective of an area" [USFWS 1980]. Often, the project objectives will determine which species are most appropriate for analysis (for example, if maintaining bass habitat is the goal of a mitigation project). The effectiveness of HEP analysis can be improved by selecting species that are sensitive to human interference, that are themselves critical parts of the wetland ecosystem, or that are representative of a class of species with similar habitat preferences (a "guild"). [USFWS 1980; Oregon DSL 1986].

HEP calculates the suitability of a wetland ecosystem as habitat through the use of a Habitat Suitability Index (HSI) model for each indicator species selected. The models are either numerical models or descriptive "word" models. There are fewer than 200 species models extant. The HSI compares the ecological information gathered by the analyst on each wetland (the impacted wetland or the compensatory wetland), to the optimum habitat for the indicator species.

The HSI for each species is the percentage of the optimum habitat support provided by the land cover in question (values range from 0 to 1.0). This Index is then multiplied

by the number of acres that fall within a distinct vegetation cover type to calculate the number of habitat units (HUs) available as credits. The total number of bank credits is the total of HUs of all cover types in the bank. Where multiple species have been evaluated using HEP, banking objectives will determine whether, and how, the HUs for different species may be summed or otherwise aggregated.

HUs (or some annually adjusted version of HUs) are then used as the currency for the bank. A developer that destroys 100 HUs at a development site must acquire at least 100 HUs produced by the bank.

b. HEP Variations

Many mitigation banks use some version of HEP as their primary assessment method. In most cases, however, the banks have altered the details of HEP to facilitate easier comparison of disparate wetlands. The methods outlined below are a small, but illustrative, set of the available variations.

Minnesota's main innovation was to establish baseline HSIs for different wetland cover types in each DOT region in the state. [Minnesota Department of Transportation 1987]. With these baseline HSIs established, the only site-specific work for crediting or debiting is deciding how the proposed actions are going to affect cover types.

The Astoria Airport Mitigation Bank in Oregon uses a modified HEP(80) [Oregon Division of State Lands 1986]. On the basis of HSI word models, the assessment team compared the available HUs for seven different species at the site both before and after the mitigation activities. The total HUs available as credits in the bank is the difference in the totals of the species' HUs before and after restoration.

Despite their confidence in their pre-project assessment results, the Astoria bank has generated fewer HUs than anticipated. Astoria's experience highlights an important lesson: Because HEP and related methods rely so intensively on the nature and performance of the vegetative cover created or enhanced, regulators must be careful to monitor actual changes. If follow-up indicates that the planned enhancement, creation, or restoration has failed or resulted in a state significantly different than anticipated, the evaluation process will need to be reapplied in order to make mid-course corrections. This is true for most narrowly tailored assessment methods.

c. SUPERBOG

SUPERBOG is a computer program developed by Wyoming's game and fish agency which tracks the balance of wetland credits and debits in six geographic and three biotic regions of the state [Tessman 1989; Hayden-Wing 1988]. Impacts must be mitigated with credits from projects in the same size class and the region within which they occur. The credits are developed as a function of 13 parameters chosen as critical for the provision of

habitat for waterfowl: surface area; emergent vegetation coverage; drawdown exposure; water quality; water supply; sedimentation rate; adjacent cover quality; shoreline sinuosity; area of adjoining marshy zones; number of islands; number of bays; number of peninsulas; and a complexing factor (an adjustment which takes into account the surrounding landscape).

The values for these parameters are collected from office and field work, through experimental data, visual estimates, or other methods. They are combined via a mathematical function into the "wetland value" (parenthetically called "habitat units" in the SUPERBOG manual, though the model does not explicitly or implicitly include HEP analysis).

The model is designed to apply to wetlands no larger than 20 acres. Since the focus is on waterfowl habitat and the wetlands that waterfowl prefer, the model may not be useful for other types of wildlife, functions, or wetlands. It was designed using studies conducted in prairie wetland ecosystems and tailored for use in evaluating abandoned bentonite ponds affected by the state abandoned mine lands program. Wyoming has, however, been using it as a basis for bank site analysis of wetlands throughout the state, although only for assessing waterfowl habitat values. HEP is used for other habitat assessment needs.

d. Habitat Evaluation System

Although conceptually similar to HEP, the Habitat Evaluation System (HES) [U.S. Army Corps of Engineers 1980] examines an entire wetland for the structural indicators of habitat (i.e. number of snags, extent of exposed steep shoreline, etc.) rather than selecting species themselves as function indicators [WWF 1992]. The output, a "wetland quality index," is never associated with individual species. Instead, it provides an indication of the quality of habitat for the entire wetland under analysis. While it avoids direct species tradeoffs, it does depend upon the simplifying assumption that some features are good for most species -- excluding the ecological concept of niche. Despite the single-score output of HES (which makes it amenable to use as a way of assigning currency), the method is not presently used by any banks.

e. Other Narrowly Tailored Assessment Methods

Although habitat is by far the most common function used as the focus of narrowly-tailored assessment methods, and is the only such method currently being used by mitigation banks, other possible methodologies exist.

The Oregon Estuarine Mitigation Process is designed to evaluate an ecosystem's productivity and species richness as well as habitat [Oregon Division of State Lands 1984; Salveson 1990; Oregon DSL 1986]. This system is only used for estuarine areas. The heart of the process is a set of relative values that have been assigned to subtidal and intertidal habitats with different substrates. These values are indicators of "natural biological

productivity and species diversity." [Oregon DSL 1986]. Unlike HUs, however, the values must be used in combination with acreage in order to serve as a currency.

For example, a brackish seagrass habitat with a muddy substrate receives a 6.0 value, while a fresh high marsh with cobble-gravel substrate is assigned a value of 3.0. Filling five acres of the former (6.0 x 5 = 30 mitigation points lost) would require mitigation by creating at least ten acres of the latter (giving 3.0 x 10 = 30 mitigation points gained).

Narrowly tailored assessment methods have been created to address other functions as well, including hydrology, silvicultural value, and recreational or heritage functions. Descriptions of these methods may be found in EPA Region V's review of assessment methodologies [U.S. EPA 1984]. The uncertainty identified with hydrology-based assessment methods still exists. Emphasizing silvicultural value can sometimes conflict with optimizing ecologically successful mitigation; the same may be true for enhancing recreational value. These systems are not currently used by any banks.

3. Broadly Tailored Assessment Methodologies

Recognizing the complexity of wetlands, and uncomfortable with the narrow focus of function-specific methods, wetland scientists have developed assessment methods that attempt to evaluate a broader spectrum of wetland functions. While their scope makes them valuable, their complexity may make them unwieldy and expensive for use in mitigation banking. And for many mitigation banks and other mitigation transactions, the desire for a single quantitative value has led to detailed methods that conclude by sacrificing all of the detail -- combining unrelated functions into a single, dimensionless wetland "value" that has little or no ecological meaning.

A scientifically ideal wetland assessment method would be one that empirically, physically measured each wetland function in the field and presented the results in quantitative form. Even if such exhaustive measurement of all functions were possible, the time and expense of such a method would make its regular use unsuitable for repeated transactions, such as those required for mitigation banking. The broadly tailored approaches attempt to provide a rapid method for estimating these functions. In so doing, however, they must take short cuts; it is primarily in selecting those short cuts that the methods differ from one another.

a. WET and Related Methods

Certain broadly tailored methods are nearly as popular as the habitat-based methods. In particular, the Wetland Evaluation Technique (WET) developed by the Federal Highway Administration, Corps of Engineers, and Environmental Protection Agency has enjoyed widespread use. Perhaps even more than HEP, WET has influenced the development of other methods intended to describe the full spectrum of wetland functions. And, as with HEP, WET has gone through a variety of revisions and modifications.

The Wetland Evaluation Technique first appeared in 1983 as "A Method for Wetland Functional Assessment" [Adamus and Stockwell 1983]. Informally named the FHWA/Adamus method after its sponsor and designer, the method was renamed WET (now "WET1.0"). It underwent extensive modifications and was released as WET2.0 in 1987 [Adamus et al. 1987].

The WET1.0 methodology is the best starting point for exploring these detailed systems. WET1.0 was a Herculean attempt to summarize the functions provided by a wetland and to determine what observable characteristics provided hints indicating the presence and extent of those functions. The methodology requires the analyst to gather information about some 80 different wetland characteristics, or "indicators." Indicators include factors like the gradient (slope) of the basin, soils, land cover in the watershed, and others. Many of the indicators can be derived from maps and other printed information, although field inspection is generally required, and some particularly useful indicators require detailed field measurements.

Once the indicators have been collected, the method combines the indicators into three ratings for each of eleven wetland functions: groundwater recharge; groundwater discharge; flood-flow storage & desynchronization; shoreline anchoring & dissipation of erosive forces; sediment trapping; nutrient retention & removal; food chain support; fisheries habitat; wildlife habitat; active recreation; and passive recreation & heritage value.

The ratings represent for each function the wetland's projected "effectiveness" (can the wetland perform the function?); "opportunity" (does the wetland have the opportunity to be effective?); and "social significance" (how important is the function to society?). The ratings are not numerical, but qualitative -- "low," "moderate," or "high." These qualitative ratings refer to the probability that the wetland supplies that aspect of the function.[1]

Because of its scope, WET must be, at its heart, a "broad-brush screening tool" (Adamus and Clairain 1988). For detailed wetland evaluations, other methods are typically used to fill in the gap. For example, HEP might be used to fill out habitat information for a particular wetland. Even with such supplements to the revised version, the methodology has fallen under continuing criticism. The main complaints have focused on the inability of the method to take regional differences into account [Lawless 1991]; its complexity [WWF 1992]; and its insensitivity to differences in wetlands. Some Corps offices have been so frustrated with WET2.0 that they have simply told their staff not to use it [Lawless 1991].

Its familiarity to wetland managers and the lack of alternatives has made WET the method of choice for mitigation banks seeking an assessment method that examines the

[1] For example, a small, degraded agricultural wetland in a sparsely populated area might have, for the groundwater recharge function, a "low" rating for effectiveness, a "moderate" rating for opportunity, and a "low" rating for social significance.

spectrum of wetland functions. However, most banks using WET and similar methods have converted the broad qualitative ratings into quantitative values.

The Arkansas Highway Department's mitigation banking proposal is one attempt to derive a single value from the multivariate WET analysis [Arkansas Highway and Transportation Department 1992]. After deriving the ratings for the different functions' characteristics (effectiveness, opportunity, significance) the model converts them into numbers (high = 5, moderate = 3; low = 1). These numbers are summed to provide a "Bank Tract Rating" ranging from a high of 120 to a low of 24 (some ratings were deemed unimportant or too complex and not determined). Depending on this value, the wetland is placed into one of three classes (high, medium, or low wetland value). This category and the quality of the impacted tract (farmed, disturbed, or undisturbed) serve as the basis for determining what replacement ratio is to be used.

The City of Juneau Bank takes another approach through a modification of WET1.0. As in WET, each function is rated on a qualitative scale through the use of keys which convert "predictors" unique to each wetland into summary values. The result is a single value for each function (rather than one for effectiveness, etc.) which provides a qualitative probability that the function is provided by the wetland. The range of values is broader than WET, ranging from "very low" to "very high." Each rating has a corresponding numerical value ranging from 1 to 7. A somewhat different set of functions than in WET are evaluated under this system. The rated functions are: groundwater recharge; groundwater discharge; surface hydrologic control; sediment and toxics retention; nutrient export; riparian support; erosion sensitivity; salmonid habitat; disturbance of sensitive wildlife; regional ecological diversity; ecological replacement cost; recreation use potential; recreation use actual; and downslope beneficiary sites. A weighting system is then used to aggregate the individual functional ratings into a single value for the wetland.

b. Other Broadly Tailored Approaches

Even though the following methods address many of the same functions as WET, they may produce very different results.

The Wetland Evaluation Methodology (WEM) follows a process similar to WET, although more analysis is done at the data collection stage [U.S. Army Corps of Engineers 1988]. The number of indicators and functions is also lower. Six functions -- flood-flow characteristics, water quality, wildlife, fish, shoreline anchoring, and visual values -- are analyzed via the collection of ecosystem data. A computer program converts the data into a set of functional ratings ranging from qualitative (very low to very high for shoreline anchoring potential) to numerical (from 33 to 100 for general wildlife diversity and productivity).

The final step in WEM takes the variety of functional assessments and converts them into quantitative values. These "synthesis ratings" are then adjusted based on the

"downstream sensitivity" to the presence of the function. Multiplying this revised synthesis rating (which will range from 1 to 5) by an "importance factor" (ranging from 1 to 3) gives a quantitative value for each function. The values for each function are then averaged to give a final, single, quantitative value for the wetland. This is a "quality" value (like the output of HES for wildlife habitat) and does not take the size of wetland into account.

WEM was developed specifically for the north central United States, and may not be easily applied to other regions. Wisconsin DOT is the only organization that has used WEM in the banking context: the Patrick Lake mitigation bank uses the final wetland value as the basis for determining the requisite replacement ratio. If the bank is of higher quality than the impacted site (i.e., its WEM score is higher than that of the impacted site), then the mitigation will occur at a 1:1 acreage ratio. If the site impacted is of higher quality, however, the ratio is adjusted. Thus, if the banked wetland has a score of 93 and the impacted wetland has a score of 104, the ratio is 1.12 (104 ÷ 93 = 1.12), and for a 10-acre impact site, 11.2 acres would be required from the bank. The proposed Wisconsin statewide bank does not appear to be considering the use of WEM as its valuation method; it is (although simpler than WET) seen as too complex for the variety of projects that need to be dealt with by a statewide bank.

Another approach, developed for mitigation but not yet applied in the banking context, is the Wetland Replacement Evaluation Procedure (WREP) [Bartoldus et al. 1992] developed by a private consulting firm. WREP requires recording various field observations that influence wetland functions. The answers lead to scores for each function. WREP is designed for easy use without heavy analytic resource commitments. The developers of the method claim that it is design-oriented, since it does not rely on a system in which the answers to indicator questions push the analysis over thresholds into high/moderate/low resource ratings. The method is designed to highlight the differences between the wetland to be impacted and the replacement wetland -- the sort of analysis that would be of particular use for mitigation banks attempting to replace specific lost functions, but which may be even more useful for mitigation of specific development projects.

c. Landscape Level Analysis

Even the preceding methods can fall short when impacts of concern take place on the landscape scale, rather than within an individual wetland. Although the methods consider certain landscape-scale issues, the synoptic approach being developed by EPA is specifically designed to look at wetland impacts on this scale [Abbruzzese et al. 1990]. The approach uses mapping to display indicators (such as wetland acreage, presence of hydric soils, population growth, etc.) that are converted to portray hydrologic, water quality, and habitat functions as well as wetland loss on watershed scales [WWF 1992]. The result is a ranking of landscapes rather than wetlands; the method may be a useful complement to information about wetlands on a smaller scale. A similar approach has been identified by the state of Maryland, which is attempting landscape-level assessments using Geographic Information Systems (GIS) technology. The geographic approach to information gathering and

presentation is not, by itself, amenable to use by mitigation banks because it lacks numerical units to compare relative values and assign credits. It is more likely that a method such as this would be useful in siting banks, or in identifying needed functions as the goal for replacing lost values.

4. Best Professional Judgment

Faced with the complexities of choosing, learning, and implementing an assessment method, many mitigation banks have opted for the most commonly applied method for wetland analysis: estimates by people that know their subject. This "best professional judgment" (BPJ) standard simply requires individuals that are familiar with wetlands and their functions to make decisions regarding wetlands based on their own knowledge. Although the replicability of this method is low, knowledgeable individuals can provide a generally consistent perspective on the relative value of similar types of wetlands. Indeed, the lack of a mechanical process may sometimes prevent the ecological missteps that might come with a numerical value output. Best professional judgment is shaped by the same ecological knowledge that drives the formal techniques -- it is simply filtered through a less mechanical process.

Many banks, particularly those that have a limited number and size of credit sites, use BPJ as their way of establishing replacement ratios. For example, an individual familiar with the banked site might walk through the site to be impacted and decide that the former is only half as valuable per acre as the latter. The bank would therefore require the developer to withdraw credits at a 2:1 ratio. The proposed West Tennessee and Northeast Utah banks have suggested just this sort of case-by-case BPJ/acreage evaluation system. This sort of process relies on an established relationship between the parties. Large scale banks would probably find such a system unwieldy, and its necessarily unpredictable results would probably frustrate developers. And even smaller banks would probably want occasionally to inventory wetland values within their jurisdiction with a more exact method as a means of checking for unexpected slippage in certain functions.

Best professional judgment, while requiring case by case assessments without numerical outputs, may also be analogous to appraisals in the commercial banking context. Banks make loans on the basis of credit reports (quasi-objective functional analyses) and on appraisals of particular properties. BPJ may be seen as a version of appraisals. The real issue then becomes holding the appraisers to a standard of quality and loyalty to the ecological objectives of wetland mitigation.

5. Combinations

Many large banks that use more detailed methods do employ BPJ as a check on the results of those methods (see Minnesota DOT), and even the detailed methods usually have a place for individuals to make judgments concerning relative values and their significance

(consider WEM's significance values). Other methods may also be used as checks on and supplements to the more formal systems.

By combining methods, many banks have been able to avoid some problems and increase ecological validity without significantly increasing the resources committed to wetland analysis. Wisconsin's Patrick Lake is typical in the way that it sets a 1:1 acreage floor for mitigation, but requires a greater replacement ratio if WEM indicates that the impacted wetland is of relatively high value. Several methods using BPJ are "combination methods" as well. There room for creativity in combining methods, even where resource constraints limit the number and complexity of the systems. Idaho and Wyoming banks, for example, use both HEP and WET as guidance for establishing ratios to fill in complementary gaps.

6. Economic valuation

Although no wetland banking system values wetland services in terms of their market contribution, an economic analysis of wetland functions is a potential alternative means of assessing wetland functions. If a bank chose to estimate the dollar value of the services provided by the wetland's functions, it could use economic valuation methods. In most cases, no market for such functions exists, and methods such as surveying (contingent valuation), willingness to pay to travel to the wetland and/or to hunt there, or changes in property values with a nearby wetland, would need to be used to estimate the monetary value of the primary services. Flood control, water purification, commercially harvested resources, and others that involve additional steps before going to market, can be estimated with somewhat more confidence by looking at market prices, value added, costs avoided, or other techniques.

But economic valuation of these goods and services is a tricky business. Economic analysis is useful insofar as it collapses all the services of a wetland into familiar units. But the added level of uncertainty and awkwardness of converting different types of services into a single value unit makes economic valuation particularly unreliable. This is particularly true in the case of banking, because the conversion must occur at both the debit and the credit end. Moreover, by converting all functions into the same abstract unit (dollars), any ecologically significant factors are masked.

B. Evaluation of Systems

The selection of methods will be based on the objectives of the banking program and the resources available.

Simple indices have great advantages for making banking easier. Administrative costs are low and credit units are highly fungible. However, these methods are often the least sensitive to wetland values and functions. Also, most simple indices do not take into account scale effects. For example, a larger wetland may be more effective at flood control than the

sum of a number of wetlands, or several small wetlands may provide a greater range of species than one large one.

Habitat-oriented assessment methods are, after acreage, the most common systems used by mitigation banks. Their quantitative outputs are easily converted into "credits" for banking purposes, and the wildlife focus of the methods matches a primary goal of many mitigation systems. Because the habitat assessment methods are in such common use, they have often been fine-tuned to meet bank resource constraints and are well-tailored for swift processing of similar transactions. It is not difficult to find professionals that are familiar with these methods. This familiarity may be one reason that wildlife methods are so common in banks -- they are simply the evaluation methods with which resource managers and scientists are most knowledgeable and comfortable.

HEP results are very sensitive to the species selected for evaluation. In addition, the manager must be aware of the effect that the use of the test will have on the overall mitigation process. Use of one test with certain indicator species may lead to a phenomenon of "mitigating to the test" -- certain cover types give higher HU values, so mitigation projects in the bank naturally want to create that sort of wetland cover type (e.g., open marsh is best for mallards, which are an evaluation species, so mitigation projects, in an attempt to maximize HUs, create open marsh). Minnesota's bank, for example, has found HEP to be biased toward the creation of deep water wetlands, resulting in a mitigation project bias in that direction. The bank has even considered using acreage instead of HUs as part of an attempt to eliminate this trend.

Habitat function methods can also require a relatively significant commitment of resources. Depending upon the variables necessary for the analysis, field testing may require a large team of individuals and extend throughout the year. One review noted that HEP "is generally more time-consuming" than other assessment methods [WWF 1992]. Despite their limited focus, the depth of analysis for these narrowly tailored systems may require information even more detailed than that necessary for more broadly tailored methods. With this detail comes expense, delay, and complexity.

As for the ecological soundness of the methods, it appears that HEP, when well-executed and with its interpretation limited to its proper scope, can be a useful predictor of wetland wildlife functions. Unfortunately, the broader the attempted scope of application, the more uncertain its results become. For example, HEP may do a particularly good job evaluating the habitat of evaluation species, but a poorer job of predicting habitat values for a set of species guilds. Attempts to extrapolate conclusions based on a few species has risks for non-selected species groups (e.g. amphibians, plants, insects). And comparing cumulative HUs for different sets of species involves risks inherent in comparing apples and oranges.

For wetland managers concerned about the spectrum of functions provided by a wetland, there is no substitute for a carefully considered, broadly tailored analysis. The methods that have been presented here are very sophisticated. WET has been called the

"most technically comprehensive method for the assessment of multiple wetland functions" [WWF 1992]. The complex dynamics of wetland functions are better represented by these methods.

While the typically qualitative assessments may be frustrating, their imprecision is also realistic, reflecting the uncertain state of wetland knowledge. The broad results may be the most ecologically sound means of expressing the dynamic mix of wetland functions. Unfortunately, the scope of information provided by these methods is a problem as well as an advantage. The creation of this information consumes extensive resources -- certainly many more than simple indices -- and may require staff with a greater breadth of knowledge than is necessary for the other methods. In some cases, the attempt to evaluate every function may lead to lower quality results than are produced by single-function methods: broadly tailored methods simply cannot address each function with the same detail as can the more limited techniques.

Moreover, many mitigation banks have taken the qualitative results of these broad methodologies and converted them into quantitative values. For many banks the numerical values are easier to work with and more easily handled as the currency of ecological functions. But such conversions are rarely based on ecological rationales. The practice of collapsing results into single numerical values necessarily reduces the amount of information available about the wetland.

Where mitigation is intended to protect a range of wetland values -- a decision implicit in the choice of broadly tailored assessment methods -- collapsing the functions into a single value defeats the purpose of the analysis. Using the intermediate results of the broadly tailored methods -- ratings for each of the functions -- may offer valuable supplemental information in combination with a more narrowly focused method. However, using methods simply because they are highly detailed may be more dangerous to wetland values in the long run than using simple indices.[2]

In summary, in order for a wetland mitigation bank credit currency to work, it must be (1) simple to determine and to monitor, and (2) able to represent a sufficient range of values and functions. None of the existing systems do both of these things well. The multivariate systems are quite useful for onsite, or project-specific, mitigation, but they lack the simplicity for use in banking. The simple systems overlook critical functions. The selection of a currency should reasonably be tied to the purpose of the banking system, regional wetland goals, and the ease of determination.

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[2] This problem suggests the possible need for identification of key features of the particular wetlands facing development, and modification of credit systems so that these are taken into account. "Unique features" are recognized as a WET element, but they are frequently lost when WET is transmuted into a single credit number. A multivariate functional approach may have utility for banking if it can be made simple enough and where the functions are selected in the context of a regional banking plan.

Finally, adjustments in the currency may be necessary over time if the expected results of compensation are not in fact being produced by the system. Banking instruments will need to provide for this potentiality; most currently do not.

C. Compensation Ratios

Even after a currency has been established, it is necessary to identify the ratios at which the currency will be applied. In many present non-bank mitigation schemes (and many banks), habitat units or acres are exchanged one for one. However, it is quite common in mitigation banks to establish a compensation ratio of 1.5:1, 2:1, or even 10:1, depending upon the characteristics of the wetlands and the condition of the credits in the bank.

Ratios are commonly used in mitigation banks for at least five reasons: (1) Some ratios are designed to reflect the comparative value of dissimilar wetland types (e.g. rarer types require a higher ratio of exchange for more common types). A ratio may also be used as a market incentive to encourage the creation or restoration of a particular kind of wetland -- it may favor certain out-of-kind transactions in order to produce a gain in desired wetland types. (2) Other ratios are designed to favor restoration over enhancement or creation. (For example, the EPA Region IV draft guidelines provide that in circumstances where more detailed functional analyses are not possible, restoration is to be at a ratio of 2:1, creation at 3:1, enhancement at 4:1, and preservation at 10:1). (3) Ratios may compensate for the uncertainty that compensation wetlands can provide adequate replacement for the natural wetlands being lost. Thus, for example, a 1:1 acreage ratio is not acceptable to many banking programs because one acre of restored or created wetland is not presumed to be as good as a lost acre of natural wetland. (4) Ratios may compensate for instances where it is known that the fully functioning replacement wetland will not replace all of the functions at the level provided by the impacted wetland. (5) Still other ratios are designed to provide an incentive to delay use of mitigation bank credits until full success has been achieved at the bank site; higher ratios may be required if the client is using credits that are not yet functionally mature.

Particularly where the currency used by a bank is not the result of a sophisticated assessment technique, it may be necessary to use replacement ratios as a means of ensuring that ecological functions are being retained. A wetland mitigation bank can deal with this uncertainty as any other bank would by charging a "risk premium." While a bank's premium might be the interest rate, the wetland mitigation bank's risk premium is the ratio for allowing use of credits in the bank. In this way, the banking scheme guarantees that any miscalculation about the level of services will err on the side of surplus functions rather than too few. As the banked wetlands functions become more stable and obvious, this replacement ratio can drop.

This "sliding scale" method is used in many of Florida's wetland mitigation banks. The Florida DER has developed matrices for wetland types. On one axis, the matrix

requires the user to identify whether the impacted wetland is undegraded, slightly degraded, moderately degraded, or severely degraded. On the other axis, the user must identify the stage of success of the mitigation wetland (e.g., no success criteria met, 2 of 6 success criteria met, 4 of 6, and 6 of 6). For example, compensatory ratios for mangrove wetlands range from a low of 1:1 (where the compensation is for a severely degraded mangrove wetland and the replacement mangrove wetland credits are fully successful), to 2:1 (where the impacted mangrove wetland was undegraded and the banked mangrove wetland has not yet met the success criteria). Ratios for saltmarsh enhancement range as high as 10:1. 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.

Some banks set high replacement ratios for particularly valuable wetlands, or those that are difficult to restore or create. The proposed Placer County (CA) bank sets an in-kind replacement ratio of 3:1 for vernal pools and for climax riparian wetlands; and a replacement ratio of 2:1 for wet meadows and emergent and freshwater marshes.

Ratios can serve an important function in mitigating for uncertainty and assuring ecological improvement. As with offset ratios for excess pollution credits in prevention of significant deterioration (PSD) areas under the Clean Air Act, the replacement ratio can be set high so that there is actually a net increase in the amount of wetland functions. Even if the goal is simply "no net loss," the uncertainties should lead a wetland mitigation bank to have a replacement ratio higher than 1:1.

A fairly typical ratio range for existing banks is between 1:1 and 2:1. In California, the Bracut Marsh Bank has a 1:1 ratio, the Port of Long Beach Pier J Bank has a 1.5:1 ratio, while the Mission Viejo/ACWHEP bank has an initial 3:1 ratio that can be lowered under specific circumstances. DOT banks tend to be between 1:1 and 2:1. For example, the Virginia DOT banks fall in this range; the proposed West Tennessee DOT mitigation bank sets a minimum ratio of 2:1. Although it appears that some present wetland mitigation banks have significant confidence in the validity of their assessment and credit production techniques, this conclusion is placed in some doubt by recent studies suggesting that the ratio necessary to account only for observable failures should be at least 2:1 [Castelle et al. 1992].

Regardless of what currency is chosen and what ratios are selected, banking systems need to deal with whether to recognize underlying functions and values in the mitigation site as part of the "credit" available for sale. For example, if a degraded wetland has 54 habitat units before restoration, and 134 after restoration, what amount should be recognized as available as compensation credit? Most current banking schemes only recognize the net improvement, because the underlying values were not produced as compensation. However, some other schemes allow use of both the underlying values and the added improvement (e.g., the Louisiana DOT bank); and banking systems based on preservation necessarily rely almost entirely on the existing values.

An even more sophisticated consideration of this issue recognizes that even in a wetland creation (as well as wetland restoration or enhancement), the pre-existing bank land had values (e.g., for upland flora and fauna). Should the values created by the bank be offset by a deduction for those values lost? This issue has been raised in connection with a number of wetland creation projects. In general it has been resolved not by a deduction -- a difficult solution given the difference in relevant functions -- but by adjusting the compensation ratio upward. In any event, this factor supports a usual ratio higher than 1:1.

CHAPTER EIGHT
AVOIDING AND CORRECTING FAILURES

This chapter examines issues that frequently arise after mitigation banks are in operation, but that require careful attention at the outset. Specifically, it examines the ways in which banks can fail and how these can be planned for and prevented or remedied; it reviews the causes of project failure, the uses of design and performance standards, contingency planning and monitoring, liability and financial assurance requirements, and enforcement. It also examines how long term bank site ownership can be structured.

A. Planning for Mitigation Bank Project Failure

A critical component in planning for a mitigation bank is to anticipate the ways in which the mitigation project might be unsuccessful and to provide, in advance, institutional capability to address those contingencies. Attention to project failure is important because the science of wetland creation, restoration, and enhancement is still new [National Research Council 1992; Kusler and Kentula 1990].[1] There are few guarantors of success. Even when a project has been properly designed and implemented, both natural and human-caused events can cause failure.

1. Project Failures

In general, mitigation projects fail for two reasons. First, the project may be improperly sited, 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 most common failure is improper design or construction of the mitigation site's hydrology. If a site's elevations are incorrectly surveyed or constructed, for example, few of the anticipated wetland functions will be realized. In one study of onsite mitigation in the South Florida Water Management District, researchers determined that 25% of all mitigation projects were suffering from "significant" hydrologic problems [Erwin 1991]. One of the first mitigation banks approved by the Southwest Florida Water Management District, the Northlakes Park Bank, failed because of improper hydrologic design. Although credits were recognized and debited, the bank failed in its attempt to rehydrate a forested wetland. The Fort Lee Mitigation Bank in Virginia also failed to achieve the expected hydrology. Although this is a common problem, some types of wetlands are more susceptible than

[1] The record is mixed. There has been a relatively higher degree of success with revegetation of coastal, estuarine, and freshwater marshes but less consistent performance with seagrasses and creation or restoration of forested wetlands [Kusler and Kentula 1990].

others to this kind of failure. Emergent wetlands surrounding open water require less precision than, say, forested wetlands or estuarine marshes.

Other common failures include failure to identify existing problems with substrates, soils, and contaminants. The Bracut Marsh bank in California, for example, was sited partly on compacted soils unable to support suitable vegetation, and partly on woody debris that formed an unstable substrate leading to formation of sinkholes in the marsh, and to migration of the debris with tidal flow. The Otterdam Mitigation Bank in Virginia had higher than expected construction costs because of a clay layer at the site that was not identified when the site was selected. A (non-bank) wetland restoration project sited at Sweetwater Marsh in San Diego Bay encountered both a hazardous waste landfill and a construction debris landfill, both of which had to be excavated and removed for disposal at substantial expense [National Research Council 1992].

Site selection difficulties can also arise from failure to consider surrounding land uses that may impair the longterm viability of the mitigation site. Mitigation sites without upland buffers or that are surrounded by impervious surfaces can quickly convert to uplands or become pollution sinks. The Batiquitos Lagoon bank in southern California is subject to heavy siltation from adjacent uses.

Sometimes the site requires more active or continuous manipulation than is practicable. The Mud Lake bank in Idaho failed because designers failed to anticipate the difficulties with keeping the site hydrated. The selected design required continuous pumping of water onto the site. Unfortunately, insufficient water was available for mitigation because of competing irrigation and development uses and drought conditions. Moreover, the water that was pumped to the site rapidly leaked through cracks in the hardpan soils that formed there. The pump then fouled and failed to operate. The bank, which was established in 1990 to mitigate the loss of 16 acres of wetlands, failed to do so; the site is now completely dewatered and the vegetation is predominantly upland.

Poor plant selection, failure to sustain plants during the establishment phase, and improper planting depths are also common startup failures. So is the failure to import a growth medium where the onsite soils are inappropriate for plant establishment. Even if sites are properly selected and well-designed, some initial failure with revegetation can be expected, and should be planned for. Vegetation may not do well initially for a variety of causes. For example, at Pridgen Flats, a pocosin restoration bank in North Carolina, an adequate number of growing plants could not be obtained, so seeds were used for much of the site. However, none of the seeds (sowed in Spring 1992) germinated.

Construction-related accidents also cause problems. During preparation of the site for the 4.2 acre Naval Amphibious Base Eelgrass Bank, for example, the Navy's dredging activities accidentally destroyed 6.2 acres of natural eelgrass. Fortunately, the damaged area recovered on its own three years later. The bank site itself was less successful; initially, only 1.6 acres achieved successful vegetation. Similarly, the (non-bank) Sweetwater Marsh

restoration project had its plant nursery accidentally bulldozed by contractors working on part of the mitigation. The (non-bank) Irvine Company wetland restoration project near the University of California at Irvine had its vegetation killed in successive years first by misapplication of herbicide and then by failure of the irrigation system [Cone 1992].

Other common problems facing mitigation sites include vandalism, natural disasters (e.g., storms, fires, floods), ice damage, offsite activities (oil spills, damage from powerboat wakes, loss of storm protection from barrier islands), accumulation of debris, and invasion by undesirable exotic species, diseases and insect pests. A bank can also be a victim of its own success. For example, a mitigation site may be so attractive to wildlife that all the vegetation is eaten and the site is left vulnerable to erosion or washout of the substrate. Many of these failures are not preventable, but are (at least in the aggregate) predictable. The credit producer's, or long term landholder's, responses to foreseeable failures should be planned in advance.

2. Performance and Design Standards

Most failures can be avoided at the design and construction phase using one of two general approaches: the *performance standard approach* or the *design standard approach*.

a. Performance Standards

In its simplest form, the performance standard approach simply requires the agencies responsible for recognizing the bank credits (or allowing their use) not to allow use of the credits until the project is fully functioning. This is consistent with the notion of mitigation banks as providing advance mitigation for development activities, and saves banking programs from unnecessary complexity. It is simple and effective.

However, it is not fully consistent with much current and proposed practice: many banks and banking schemes allow the use of credits prior to full success of the bank. These schemes simply hold the credit producer liable for correcting problems in the event of failure; some also require a greater compensation acreage ratio for use of credits prior to full functional replacement.

Banks that allow use of credits prior to their full functioning cannot, however, reasonably rely on performance standards alone. While, in theory, enforcement would assure the prompt correction of any failures, enforcement does not always occur. Even when it does, it is not always effective -- especially where the development activity has already been completed. In such cases, the regulatory agency's leverage to obtain corrective action is diminished because the developer has already realized the benefit and has no incentive for rapid compliance; and the credit producer (if a different entity) has already been compensated for the credits and has no incentive for rapid compliance. The Northlakes Park mitigation bank in southwest Florida, for example, has not produced its wetland credits even though they were all expended four years ago, immediately upon

regulatory approval of the bank; the bank is in debit status. This is the same problem that has afflicted onsite mitigation [Redmond 1990].

Nor has the prospect of having to correct a failure always served as a sufficient incentive to assure that due care was used in the construction of the mitigation project. Indeed, where there is no penalty for a siting or design failure but having to do it over again, the incentive for getting it right the first time may be reduced.

The incentive for prevention provided by the prospect of having to correct a failure is, of course, greater where the initial investment is high. It is also greater where the response is not limited simply to enforcement, but also includes the regulator's ability to draw down a trust fund or forfeit an operator's performance bond, as discussed later in this chapter.

In sum, the performance standard approach is quite workable where the credits are not recognized until success is achieved. It is also workable in some instances of advance debiting where there is sufficient incentive in the bank developer's initial sunk costs to encourage proper initial planning and construction, and/or where there is sufficient confidence in the regulator's enforcement capacity to assure correction of the failure.

Even with these factors in place, however, sole reliance on performance standards may not be appropriate in some situations where the failure may not be remediable. For example, in a given watershed, there may be a limited number of sites suitable for mitigation banking. If incompetent design or construction may permanently ruin the utility of one of these scarce sites, it may not be appropriate to rely only on prohibiting the sale of credits or on after-the-fact enforcement.

b. Design Standards

A more prescriptive approach is the use of design standards. Typically, this requires the submission to a regulatory authority of site assessments, plans, and detailed construction and operating information, before receiving approval to generate credits at a mitigation site. The regulatory agency requires sufficient information to assure itself that the mitigation project is likely to succeed.

A number of existing banks submitted detailed design information as a condition of their approval. Others defer this step until after the bank has been approved. The draft MOA for the proposed Neabsco (Virginia) bank, for example, states that initial designs must be submitted and that final designs are to be agreed to by mutual agreement between the credit producer and the Corps. Oddly, however, this draft proposes that in the event of a difference of opinion on design the matter is to be submitted to arbitration. Normally, the permitting agencies retain the final say on design decisions where submissions are required.

Reliance on design standards may impose additional costs and reduce credit producers' flexibility. However, where a regulatory agency has reason for concern about performance (either because it is allowing some drawdown of credits prior to bank success, or because there are few or unique potential mitigation sites) design standards provide a rational approach.

Design standards may include requirements for preliminary site assessments, proposed design parameters, timing of construction activities and identification of materials, substrate, growth medium, and vegetation. They may also require certification of designs by persons with relevant professional training, monitoring of the construction activities, submission of as-built drawings and progress reports, and other information [Garbisch, in Kusler & Kentula 1990]. The Mission Viejo/ACWHEP bank agreement not only provided for agency review and approval of designs, but required a $10,000 payment from the credit producer to the county government to fund a consultant to monitor the bank's adherence to those standards.

Even projects subject to design standards and quality control requirements can experience failure. For example, the Bracut Marsh bank was constructed to exacting engineering specifications. Unfortunately, the specifications proved to be incorrect to allow regular tidal flushing of the bank site. Even after this was first discovered -- six years into the project -- necessary changes were not made. Because of such instances, design standards should be backed by performance standards. The Weisenfeld Bank in Florida, for example, has detailed design specifications backed by success criteria. Some consultants have suggested that where a design has been approved and accurately carried out, if it is unsuccessful, the mitigation should be deemed complete [Garbisch, in Kusler & Kentula, 1990]. However, the regulatory objective is to accomplish functional replacement, not just expenditure of good faith effort. Design standards are not a substitute for success, but a further guarantee.

Quality control can also be effective in preventing unnecessary failures. Mitigation projects designed by competent engineers, biologists, and other experts are more likely to succeed. Wetland restorers consulted for this study suggested that an accreditation process be adopted to distinguish the qualified from the unqualified. The accredited restoration expert would then certify the design and construction of the project.[2] The qualifications cannot simply be professional degrees, however. Because wetland restoration is a fairly new field, many of its qualified practitioners have degrees in the "wrong" fields, or no degrees relevant to an area of work which they have learned primarily by practice. If there is accreditation of persons or firms, it should be based on objective measures such as examination and/or experience requirements.

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[2] If advance mitigation is the rule, this may not be necessary; it is more necessary for cases where credits are available prior to full functioning of the replacement wetland.

Although no existing bank requires accreditation or certification, this is not an unusual way of preventing siting and design failure. For example, virtually all state and federal regulatory programs for reclamation of mining sites require that the reclamation design be certified by a registered professional engineer. Likewise, building codes require that designs and as-built drawings be certified by trained professionals. As a matter of public policy, these laws do not simply rely on design or performance standards, or the threat of liability in the event of a failure. Rather, the laws are designed to assure that a technically trained person is planning the project and overseeing it to prevent a failure.

3. Contingency Plans and Monitoring

An entire class of potential mitigation bank failures arises after construction of the mitigation site. These include disease, weather, third-party damage, accidents, catastrophic events, consumption of the wetland vegetation by wildlife, and others. Banking schemes must anticipate these events. Many of those we studied did not.

a. Contingency Plans

The only rational approach to such sources of failure is to plan for them. The most foreseeable failures are those from natural occurrences. For example, we can expect the occurrence of a 10-year storm event, even a 100-year storm event, during the life of a bank. If the bank has not been designed for these events, it is operating in a fantasyland. It is logical, therefore, for the regulatory agency to insist on knowing what the bank operator intends to do should one or more of these foreseeable ills appear. The advantage of requiring a contingency plan is that it compels the operator to consider these factors at the planning stage and to ascertain what, if any, preventive (as well as remedial) measures can be taken.

The Florida Department of Environmental Regulation, in its wetland mitigation banking policy, requires that mitigation banks have contingency plans. These plans must be updated semiannually. Again, there are useful analogies to mining reclamation. California law, for example, requires mine operators to prepare contingency plans that identify what the operation's response will be if catastrophic events or maintenance failures occur. Plans must be updated periodically as conditions change.

Maintenance can be important in preventing failures. The appropriate level may vary significantly based on the type of bank. The Fina LaTerre bank requires substantial maintenance, because it depends on active management in order to generate credits from the avoidance of salt water intrusion. Others, such as the Company Swamp bank, require little maintenance because they are simple preservation banks. In order to keep maintenance costs down, it may be possible to allow substantial flexibility to bank operators provided that they do sufficient monitoring to promptly detect and correct failures. For example, where a bank consists of emergent wetlands, it may be possible to defer active maintenance for the first several years to determine whether the hydrology and revegetation

is working. Meanwhile, sufficient monitoring should occur to detect as quickly as possible instances where the site has been denuded of vegetation by muskrats or damaged by ORV enthusiasts. One of the major failings of Bracut Marsh was that no monitoring was done for the first six years. This made it difficult to take meaningful corrective action. If there is a reasonable monitoring program, coupled with a set of performance standards, and a contingency plan for future failures, the banking instrument may not need to specify a particular maintenance program.

b. Monitoring

A formal monitoring system is an important element of wetland mitigation banking. Monitoring not only helps ensure the long-term ecological success of a bank, it can lead to better daily management as well. Bracut Marsh's problems could have been solved earlier and easier if there had been systematic monitoring.

The question of who does the monitoring is a serious issue. One option is to require the credit producer to monitor the bank. Requiring self-monitoring of a single-client bank, such as a DOT bank, forces the party causing an environmental impact to be responsible for making sure that its mitigation efforts are successful. Self-monitoring can also makes enforcement easier because the enforcing agency uses the permittee's own data to prove non-compliance.

The Weisenfeld Mitigation Bank in Florida is a good example of how self-monitoring can also be used to promote self-enforcement. Weisenfeld was granted a banking permit from the Florida Department of Environmental Regulation which not only requires Weisenfeld to send regular monitoring reports to the Department and several other agencies, but requires Weisenfeld to police itself. If the bank discovers that it is not in compliance with the permit conditions, Weisenfeld must immediately explain to the Department the type and the cause of non-compliance as well as the expected duration of continuing non-compliance and the steps being taken to return to compliance. The Department expressly reserves the right to inspect, sample and monitor the bank site. The permit also clearly states that all records and monitoring data submitted to the Department may be used as evidence in enforcement cases.

In a multi-client bank, self-monitoring may be more complicated. Self-monitoring can be the responsibility of the credit producer, landowner, or the clients.

The proposed Chicago Homebuilders multi-client bank MOA provides detailed success criteria and specifies that corrective measures must be undertaken. During the construction phase, inspections by "qualified individuals" (presumably employed by the bank) must occur no less than monthly (and within one week of any rain event). The results of the construction inspections must be submitted to the Corps. Then "intensive monitoring" must occur for not less than five years from the date of credit production or three years

from the last sale of credits, whichever is later. "Limited monitoring" then occurs every other year for 15 years from the end of the intensive monitoring period.

While self-monitoring can be a useful enforcement tool, it may make it possible for credit producers to make mitigation efforts appear more successful than they are. An agency check on such monitoring is clearly necessary. Economies of scale (and the requirement of advance mitigation) may make agency oversight more likely with mitigation banking than with onsite mitigation -- where the oversight record is weak.

Typically, existing mitigation banks are monitored on an ad hoc basis by the regulatory agencies permitting the development activities. The responsibility of monitoring can also belong to an interagency team, usually made up of the signatories of a bank's MOA. It is preferable to spell out monitoring obligations in more detail to assure that they are fulfilled.

Another option is to have a state or federal inspector paid for by the credit producer. The Mission Viejo Company, for example, provides funding to Orange County for inspection of the Aliso Creek Wildlife Habitat Enhancement Project (ACWHEP). Bank funding of inspectors is analogous to New York's statutory requirement that commercial operators of hazardous waste treatment, storage, and disposal facilities fund an onsite inspector employed by the state's Department of Environmental Conservation. At least one proposed bank (Prince George's County, Maryland) will assign a bank manager who is responsible for inspecting the bank at least annually, and after all major storms, for at least 5 years. The manager will submit all monitoring reports to an interagency oversight team. This system is appealing because it makes one disinterested individual accountable for monitoring the bank.

A designated bank monitor could easily be required to have professional qualifications -- e.g., biologist, hydrologist, engineer. Requiring certification of bank monitors is one way to try to assure accurate evaluations. Another is to require monitoring reports to be signed and certified by responsible company officials, as is the case with the discharge monitoring reports (DMRs) required under the Clean Water Act. Having certified reports should minimize the falsification of data by credit producers. The Weisenfeld Mitigation Bank in Florida makes it a condition of the banking permit that all monitoring information must include the name of the person responsible for performing sampling, measurements and analysis.

At least as important as who does a bank's monitoring is who gets the results of those evaluations and what they do with the data. Monitoring results can go to the permitting agency, interagency oversight teams, and/or the public. The reports can be used to evaluate or reevaluate credits, to determine whether or not performance standards are being met, and to demonstrate compliance with permit conditions.

4. Assigning the Risk of Failure

Critical to any banking scheme is clarity regarding responsibility for correcting any failures. Banking programs that assume flawless performance by all participants (and perfect cooperation by nature) are too common. The issue arises most often where a bank has been allowed to sell credits prior to achieving full performance. A somewhat different problem arises in instances where the credits were fully functioning when used, but the bank site fails due to subsequent events.

a. Liable Parties

Given the potential for failure even if siting, planning, construction and management are proper, who should bear the risk if the mitigation fails? The assignment of liability should be explicit in any banking scheme rather than implicit or unspecified. Among the options available are the credit producer, the client(s), the site owner, no one, or the regulatory agency.

The most obvious candidate for responsibility is the credit producer. The credit producer undertook to provide the credits and should have planned for contingencies. The regulatory agency and the clients both relied on the credit producer to produce the wetland values and functions now damaged or destroyed. Presumably the credit producer also has the expertise, site access, and resources to take corrective action.

Alternatively, the clients might be liable. They would have been liable had the mitigation been onsite. They are the ones who benefited from the use of the banked credits. Arguably, if the credits turn out to be no good (or less valuable than represented), the clients should make good on them. The difficulties, however, are that the clients may well lack access to the site; they probably relied on the bank in order to avoid longterm issues; and untangling responsibility for corrective action at a multi-client bank may be quite difficult. (Each client is not necessarily responsible for an identified parcel but rather for a set of credits generated as a whole). This makes assignment of responsibility difficult.

Another alternative is to hold no one liable. Natural wetlands experience losses all the time. It may be irrational to expect more from created, restored, or enhanced wetlands than from the wetlands they replaced. A possible approach is to hold no one liable where the event is one that would have (could have) destroyed the wetland for which the mitigation was required -- for example, a 100-year storm event, a hurricane, a regional infestation -- but to require rehabilitation in all other instances.

A related issue is what to do with constructed but unsold credits that are destroyed. Probably the best approach is not to recognize them as available unless they (and the rest of the bank) are rehabilitated. Thus, the credit producer bears the risk of loss for any unsold credits. However, the draft interagency guidelines for wetland mitigation banking prepared by the Corps of Engineers' Galveston District make no one responsible for failed or

destroyed credits. The guidelines provide that "once the credits have been established, they will remain until all of the credits have been withdrawn. Credits will not be adjusted up or down...even if the mitigation bank exceeds expectations or does not meet expectations."

Another possible liability scheme is to make failures the responsibility of the long term owner of the property. The purpose of having a long term owner is to provide some assurance of the status of the wetland; responsibility for maintenance and reconstruction may be a longterm adjunct of this responsibility. One difficulty with this allocation is the difficulty of insisting on rehabilitation if the land owner has no direct relationship to the regulatory agency. How can the regulatory agency compel a state parks agency or a nonprofit conservancy to take action? This would need to be explicit in the authorizing instrument. The funding issue may be particularly acute here. If the land owning entity is not the entity that received funds for the sale of credits, it may be necessary to assure that it has a source of funds sufficient to deal with contingencies.

Finally, the regulatory agency itself may assume the liability. Essentially, once it has recognized credits in mitigation of a permitted activity, the agency may release the other parties from liability. This approach is simple and direct; however, it provides virtually no assurance that rehabilitation of a damaged mitigation bank site will take place. Most regulatory agencies do not have the budget, technical expertise, or staff to undertake an active rehabilitation effort.

Existing banking schemes are not extremely helpful in specifying liability. The 22 existing state Department of Transportation Banks (in 14 states) use several of these approaches. In Minnesota and North Carolina, the Department of Transportation (client and credit producer) remains liable no matter who ultimately gets title to the land. In New Mexico, the DOT is liable for 25 years; and in Wisconsin is liable until the bank site is deemed "successful." Thereafter, no liability remains. In Idaho and Tennessee, the liability shifts to the ultimate landowner (usually a resource agency). In the Louisiana DOT bank, the liability was unstated and remains in dispute between the DOT and the resource agency landowner. The still-proposed Nebraska DOT banking program leaves liability open for negotiation upon disposition of the site, a difficult time to resolve the issue.

Most non-DOT banks are silent as to liability. However, some specifically make the client-credit producer (the same entity in most existing banks) liable. The draft northeast interagency regional guidelines provide that in the event that a bank fails to provide the compensation required, "the permittee remains responsible for compensating for the wetland functions lost as a result of permitted activity."

b. Financial Guarantees

Given the possibilities for mitigation failure and the risks in allocating liability, financial guarantees can serve an important function for mitigation banks. There are

numerous financial instruments that can serve to guarantee mitigation success, and to provide a source of funds in the event of contingencies.

The best of these guarantees serve dual purposes: (1) to ensure that funds will be available to repair and maintain the site in the event of a problem not corrected by the credit producer, and (2) to provide the credit producer with an incentive to design, construct, and maintain the site properly.

Despite their utility, very few existing or proposed banks have any provision for financial assurance. None of the state DOT banks does.[3] Several of the existing and proposed private banks and publicly operated banks do provide for financial assurance, although these are the exception rather than the rule. Like most onsite mitigation projects, most existing banks do not have such assurances.

Some mitigation banking policies and guidance documents require financial assurance, while others do not. The U.S. Fish & Wildlife Service's 1983 interim guidance, while not expressly requiring financial assurance, states that "means for long-term operation and maintenance shall be agreed upon..." In contrast, EPA Region IX's 1992 final guidance document for mitigation banking specifies that "a fund for remedial actions should be established as part of any banking agreement." EPA Region V's draft guidance document does not specify financial assurance; while EPA Region IV's draft guidance for mitigation banks provides that financial assurance "should be established as part of any banking agreement" and should be in such form as to "provide an irrevocable guarantee of availability of the necessary financial resources" to cover "bank needs, including but not limited to remedial actions."

Financial assurance can be provided in a variety of forms: surety bonds, trust funds, escrow accounts, sinking funds, insurance, self-bonds, and corporate guarantees.

The surety bond is the classic approach to assuring performance and preparing for contingencies. The credit producer purchases a bond from a third party surety (paying a premium and posting collateral), or provides a cash bond, letter of credit, or other assets that ensure that the site functions properly for the specified period and that all necessary corrective actions will be taken. Once the period has ended and performance has been successful, the bond is released. (This may also be done in stages. As certain milestones are reached, portions of the bond are released.) The bond provides both a source of funds that can be drawn on by the regulatory agency (or bank manager, if appropriate) in the event of

[3] The rationales for not requiring financial assurance from governmental entities are the assumptions that they will always be around to honor their obligations, that as governmental agencies they are likely to do so without resistance, and that to require a financial assurance is either to incur unnecessary government expense (for a third party bond) or unnecessarily to idle limited government resources (in a fund). The Federal Highway Administration's 1992 draft model banking agreement does not specify financial assurance.

a default by the credit producer, and an incentive for the credit producer to do things right so that the bond can be released.

The Mission Viejo/ACWHEP bank has an $800,000 bond posted by the client/credit producer with the county to assure that construction and vegetation is carried out. The bond is releasable incrementally over five years based on attainment of vegetation milestones. The Millhaven (GA) bank approved by the Corps in December 1992 must post a performance bond of $5,000 per acre. The bond is reduced to $1,000 per acre upon the Corps' verification that the wetland acres are performing; thereafter, the reduced bond remains in effect until the completion of a five year maintenance period.[4]

A second approach is the establishment of a trust fund. Unlike the bond, a trust fund is primarily aimed at providing sufficient funds for maintenance and contingencies, not at providing an incentive to the credit producer or bank manager. The Batiquitos Lagoon mitigation bank provided for a trust fund. (The fund was not created as the client -- Pac/Tex -- withdrew). The client was to have provided a $15 million initial contribution, which was to generate construction, operating, and maintenance funds for the first thirty years. Concurrently, there was to be a separate fund to earn and reinvest interest so that at the end of thirty years the interest on the accrued balance could thereafter generate annual maintenance funds. The Mission Viejo/ACWHEP bank has a client-created $143,000 trust fund which is intended to generate $10,000 per year for operating and maintenance expenses for a 15-year maintenance period. The proposed Springtown mitigation bank, also in California, has proposed a trust fund funded by a surcharge on the sale of credits. Although the trust fund amounts have not been determined, the bank's proponent suggests that $5,000-$10,000 per acre might be an appropriate amount, and that ultimately the fund would generate $60,000-$100,000 per year for operating and maintenance expenses.

The Huntington Beach Mitigation Bank has a "trust fund." The fund is not tied to particular acreage or success criteria, and it is not limited to particular expenditures. The fund is produced primarily through contributions and other funds going to the local nonprofit conservancy that administers the bank and has a balance of between $5,000 and $10,000 for the entire site.

Other approaches include escrow accounts and sinking funds. These combine the trust fund approach with incentives to perform maintenance and other required activities. For example, the proposed Chicago Homebuilders bank would have an escrow account. Upon sale of credits at market price, the credit producer would deposit funds into an escrow account "to ensure the long-term monitoring, management, and maintenance" of the bank. The deposit would be $5,000 for each "fully-certified" acre sold (credits that have been recognized as successful). For "conditionally-certified" credits, the credit producer would

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[4] Each distinct "block" of wetland acres in the bank is bonded separately. The evaluations and reductions are done by "block" in order to avoid the expense and difficulty of bonding (and calculating the bond reductions) for the entire site at one time.

deposit $10,000 per acre. This amount would then be reduced to $5,000/acre once the acres achieved full certification (i.e., a refund). The proposed memorandum of agreement would also allow the sale of credits by a bank that has no assets (viz., that has not yet produced credits or conditional credits). These future credits -- sold at market prices and usable at a proposed compensation ratio of 1.5:1 -- would require the deposit of $30,000 per acre into the escrow account. The credit producer would, however, be permitted to withdraw up to $20,000 per acre to construct the bank credits; and the further reduction of the escrow amount to $5,000/acre would occur when the credits received full certification.[5] Interest on the escrow account would be usable by the bank for monitoring, management, and maintenance. If the bank becomes insolvent, its assets, including the escrow account, would become the property of the Corps of Engineers. The draft agreement does not address the ability of the Corps to use the escrow account in the event of a dispute with the bank or upon particular defaults, nor does it specify what happens to the principal after the conclusion of the 15-year monitoring period that follows the initial "intensive" monitoring period.

Sinking funds are accounts in which the fund balance is allowed to decline over time as the likelihood of failure diminishes. They can be tied to particular success criteria (vegetation diversity and distribution, for example).

Insurance is conceivably an alternative approach. While insurance may not be commercially available to guarantee a credit producer's banking success, it may be possible to purchase insurance against operator accidents, vandalism, and floods, fires, and storms. Insurance is good at dealing with contingencies; unlike surety bonds, trust funds, and sinking funds, however, it does not have a significant incentive function.

A variation on the surety and insurance approaches is the bond pool. Bond pools are risk-sharing mechanisms. The participant in the bond pool posts a site-specific bond in an amount substantially less than that needed to cover all contingency costs, and in addition pays a periodic non-refundable amount (or a one-time premium) into a pool account. The payment to the pool is meant to cover (together with similar payments from other bank operators) the aggregate risk of failures calculated for all participants. If a bank fails and the operator defaults, the site-specific bond is used first for the rehabilitation work and the bond pool pays for all the excess not covered.[6] The advantage of a pool is that it can

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[5] Essentially this part of the proposed scheme resembles a privately operated in-lieu fee program. Money is paid to meet the developer's obligation, with the expectation that future mitigation will be performed with it.

[6] The federal Surface Mining Control and Reclamation Act (SMCRA), 30 U.S.C. § 1201 *et seq.*, requires coal mine operators to post bonds to guarantee their performance of site reclamation. Eight states, however, have enacted bond pool programs that allow operators to post reduced bond amounts so long as they pay into a bond pool account (on a per ton, flat fee, or per acre basis). *See* J. McElfish & A. Beier, Environmental Regulation of Coal Mining (Environmental Law Institute, 1990).

reduce costs to individual operators while still providing an incentive to perform. The difficulty is in setting an appropriate fee or premium given uncertainties in predicting the likely number of bank failures and the costs of correcting them.

Some regulatory schemes allow self-bonding or third-party corporate guarantees. Corporate guarantees can be as effective as sureties if the solvency of the guarantor can be continuously monitored and provided that the regulatory authority can quickly access the guarantee funds without substantial litigation. They are poor substitutes if these factors are not present. Self-bonding, sometimes called the "financial test," is a less reliable guarantee. Bonds, trust funds, and other formal financial instruments are meant to protect the public interest in the event of a default by the credit producer; in contrast, the financial test essentially assumes that no default will occur based on the size or assets of the credit producer. If this assumption is wrong, or the company denies responsibility for a failure, the regulator is no better off than if it had no such guarantee; it will need to file suit, or may need to attempt to extract assets from a bankruptcy without an enforceable security interest that would give it a priority claim.

Government-operated banks often maintain that they should not be subject to financial assurance requirements. Although, presumably, government agencies exist in perpetuity and have the financial credit of the state, local, or federal government behind them, in reality financial difficulties are endemic to governmental agencies. Appropriations may not be made by the legislature to meet obligations that are perceived as non-essential; or, funding priorities may shift. In short, absent a designated source of committed funds, government-operated banks may be even less reliable than some private banks. For example, the Louisiana Department of Transportation bank has suffered from the absence of a trust fund or similar instrument. Eighty-three percent of the credits in the bank were to have been generated by management of the land to enhance wildlife habitat. Although most of the credits were used, the management activities did not occur. The site owner -- the Department of Wildlife and Fish -- received no funding from its own appropriations or from the DOT to conduct these management activities.

If a formal financial instrument is used, it may be funded in several ways. The banking program may simply require a financial instrument to be posted in a given amount, leaving it to the credit producer to recoup this expense in the marketplace. Alternatively, the banking plan can assess a fixed surcharge on each sale of credits. This approach guarantees the fund a certain amount and also links the increase in the fund to the size of the risk at issue; as more credits are issued and relied on, more funding is available to handle failures.

How long should a bonding requirement, trust fund, etc. be in effect? This question has no fixed answer. For example, because banked mitigation wetlands are designed to compensate for a wetland that conceivably would have existed for decades -- if not in perpetuity -- it is not unreasonable from an ecological perspective to require a perpetual

care fund.[7] On the other hand, many types of wetlands do not require longterm care; indeed, if they are truly replacing functions and values, they should, by definition, be self-sustaining. Thus, financial assurance could be for a far more limited duration.

The most logical approach is to link financial assurance requirements to the "ecological success" criteria established for the bank. The guarantee for a successful bottomland hardwood creation project, for example, would need to be for a far greater length of time than that for a duck marsh. Linking assurance to success criteria also provides an incentive for self-monitoring and speedy correction of problems by the credit producer or other responsible entity. The length of time for financial assurances to remain in effect could be determined either (1) by linking it to the achievement of site-specific success criteria, or (2) by establishing a fixed period by wetland and mitigation type, with a provision for release only upon demonstration of success at the end of that period.

5. Enforcement

Rules requiring mitigation do nothing unless they are enforced. Enforcement of mitigation efforts to date has been slim. One California Department of Fish and Game biologist estimates that 90% of the onsite wetlands mitigation projects in Southern California are never completed as required [see Cone 1992]. Studies of mitigation sites in Florida showed that over half of the mitigation efforts could not be called successful, and that many mitigation projects were never even commenced [Redmond 1990; Erwin 1991]. Studies of mitigation in Oregon, Washington, and Gulf Coast states also showed substantial noncompliance [Kentula et al. 1992; Sifneos et al. 1992].

Mitigation banking may provide a way of improving the enforcement record of previous mitigation efforts since enforcement provisions can be written into the banking instruments. Unfortunately, at this time, many mitigation bank instruments do not directly address enforcement issues. Some of the banks have been in debit status for some time with no corrective action or enforcement. The Minnesota DOT bank, for example, has two districts which have been in a debit condition for eight years. Obviously, banking instruments need to be strictly enforced if they are to be useful. Because of their visibility and potential scale, it should be easier to enforce against banks than against many smaller, scattered project-specific sites.

There are a number of key enforcement issues. First, it must be clear what is being enforced -- the § 404 permit of the bank client, the permit or other operating authority of the bank, or an MOA. Second, there is the question of whom the enforcement is to be directed against -- the credit producer, the client, the bank manager, the longterm land owner, or all of them. Finally, what array of tools is available to the enforcement agencies?

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[7] State laws governing the operation of cemeteries, another "perpetual" land use in most states, frequently require such a fund.

a. What Instrument Is Being Enforced?

An issue often overlooked in structuring mitigation banks is upon what legal authority the enforcement will be based. The Corps of Engineers can enforce a § 404 permit against a discharger (i.e., a mitigation bank client). If the permit contemplates the use of mitigation credits, presumably enforcement action can be taken against the client if the credits are not delivered or if they fail. However, this authority may not adequately or fairly address problems with mitigation banks. The desired enforcement may well be against the credit producer, bank manager, or landowner of the bank. Yet they are not party to the § 404 permit, and so are not subject to its terms. Moreover, the Corps may wish to distinguish between the § 404 permittee and the bank operator (credit producer, manager, etc.) if they are not the same. It may be useless to punish a client for the faults of the bank manager, especially if the client lacks any authority to correct the violation.

For most banks, an MOA or MOU is the basis for enforcement. Yet the enforceability of these instruments is not always clear. Are they contracts? Regulatory instruments? The enforceability of an MOA is not well settled, and the resulting ambiguity may give too much negotiating advantage to a credit producer or other party in the event of a controversy. In all likelihood, an MOA would have to be enforced in court using common law contract principles. These might include legal rules concerning the remedy of damages, the availability or unavailability of specific performance, limitations on punitive damages, rules concerning third party beneficiaries, and other obstacles. Moreover, there is no way to impose sanctions for violating an MOA, unless it specifically provides for stipulated penalties. For a standard MOA, a simple contract suit for performance of the mitigation or for damages may be all that is available. This may not provide sufficient leverage to the enforcement agency, and may require levels of pleading and proof that make enforcement difficult.

Moreover, in practice, bank MOAs are not always enforced as they should be. For example, the MOA for the Company Swamp Mitigation Bank required the NC DOT to evaluate the bank site after five years. It never did that evaluation, yet there were no consequences.

Enforcement is easiest when it is part of a bank permit. The permit issued by the Florida Department of Environmental Regulation to the Weisenfeld Mitigation Bank makes it clear that Weisenfeld is subject to enforcement action, including penalties or revocation of the permit.

b. Who Are You Enforcing Against?

In the case of onsite mitigation, it is clearly the developer who remains responsible for faithful performance of the mitigation. As we have noted above, however, the picture is cloudier in the case of mitigation banks. If the bank is limited to sale of fully performing

credits (advance mitigation), enforcement is generally not an issue. The difficulty arises if the banking scheme allows the sale of credits that are in some sense not yet fully mature.

For single-client banks, where one party maintains and uses the bank, enforcement is plainly against the single client/credit producer. In the case of multi-client banks, the regulatory agency, as a practical matter, needs to enforce against the party responsible for the mitigation work and bank maintenance, not necessarily those buying credits from the bank. However, enforcement leverage would increase if clients were jointly and severally liable with the credit producers, or even if clients were proportionately liable for their mitigation credits. Indeed, if clients were held liable for their share of mitigation credits it might make compliance market-driven. Clients might demand a well-run, successful bank (or purchase only fully mature credits) rather than risk being held responsible for a failed venture. Furthermore, liability would provide an incentive for clients to demand regular monitoring and early detection and remediation of any problems.

Such liability might, however, make banking unattractive in comparison with onsite mitigation. Few developers will want to expose themselves to potential longterm liabilities not within their own control.

In general, therefore, banking schemes that are not limited to advance mitigation will probably need to give clients some protection from liability, but will need to provide regulators with other guarantees of performance (such as performance bonds, escrow accounts, or trust funds).

c. Enforcement Tools

If enforcement is based on a bank MOA, the enforceability of that instrument should be clearly spelled out. Indeed, the MOA should specifically provide that it is enforceable by any party -- and/or by the public as third party beneficiary -- and should include the parties' consent to jurisdiction in an appropriate court or courts. Where the MOA is silent or contains few enforcement provisions, enforcement based on implied agreements or general principles of contract law may be difficult or impossible.

Care in draftsmanship is important. For example, the fact that an MOA specifies some types of enforcement consequences and is silent as to others may deprive the enforcing agency of sufficient flexibility to address specific situations. The proposed Chicago Homebuilders MOA is slim on enforcement provisions, and limits those that it provides. For example, it requires that as a precondition to enforcement, the Corps must notify the bank it is out of compliance, and then allow it a reasonable time to comply before taking further action. This provision provides a basis for litigation and delay in enforcement. The MOA further provides that where the bank does not come into compliance, the bank approval is to be revoked. This may not provide a real incentive for corrective action if all of the credits have been sold. Moreover, the absence in the document of other potential sanctions may seriously limit enforcement options.

Some enforcement can be based on the § 404 or state permit allowing the bank client's wetland conversion. The Corps has the power to revoke a permit if the permittee does not comply with the permit conditions. Although the threat of having § 404 permits revoked is serious, in practice it rarely happens. Nevertheless, the threat of revocation can be significant, if the permittee has sufficient control over the bank site to accomplish corrective action.

The threat of being denied future permits can be a very effective enforcement tool. Entities that work on a continuing basis with regulatory agencies (state DOTs, large developers, environmental consultants) realize that it is in their interest to make a bank project successful so that the agencies will react favorably on their next permits.

The Corps also has the authority to assess penalties of up to $25,000 a day for violations of § 404 permits. However, our study has not revealed any cases where the Corps has actually assessed a penalty for failure to perform mitigation.

The strongest guarantor of success, of course, and one that obviates the need for after the fact enforcement, is to require advance mitigation. The Aciquia Mitigation Bank in Idaho, for example, requires that mitigation must be complete and successful before credits can be earned, and does not allow debits to be made until the credits are earned. Other banking schemes attempt to use interim milestones as a partial substitute for complete advance mitigation. The Weisenfeld bank permit makes the compensation ratio for credits dependent on the successive achievement of six specific success criteria. Enforcement becomes more difficult after credits have already been recognized. The Louisiana DOT bank is an example of what can go wrong when a developer is given credits in advance of promised work. The LDOT received 64 annual available habitat units for purchasing (preserving) 3000 acres of wetlands. It needed more credits so it agreed to actively manage and enhance the wildlife habitat of the land in exchange for receiving an additional 300 credits. The LDOT has currently debited all but 70 credits without undertaking any management activities. There has been no habitat enhancement and there is no formal banking agreement through which to enforce the obligation.

Some banks have anticipated this type of problem and have provisions in their banking instruments for the revision of credits after reviewing monitoring reports. The MOA for Prince George's County Bank in Maryland, for example, authorizes the oversight team to recommend revising the credits and debits of the bank, as well as the MOA, after reviewing their monitoring reports. Indeed, it is conceivable that a bank could be penalized not just monetarily for a violation, but through forfeiture of certain credits to the state or federal regulatory authority.

Forfeiture of financial assurance funds can also provide a powerful enforcement tool. The bank agreement for the ACWHEP bank in California, for example, requires the Mission Viejo Company to provide an $800,000 bond to Orange County at the start of the construction of Phase I to ensure the success of habitat value replacement. The proposed

Homebuilders Association of Greater Chicago Mitigation Bank MOA calls for money to be kept in an escrow account. In Georgia, the Millhaven bank must maintain a bond to guarantee monitoring and maintenance of the bank for a five-year period. The key to using a financial instrument as an enforcement tool is that the regulatory agency must be able to access it without a prolonged legal process. The agency should be able to draw on the fund, bond, or letter of credit upon its determination that a violation has occurred and not been remedied. If the agency's ability to access the funds is contingent upon winning a court case, the enforcement utility of the instrument is significantly reduced.

Besides using the forfeiture of a bond as an enforcement tool, the Corps or other agencies could require provisions in banking instruments that would require bank managers to forfeit bank lands if they violate the terms of the instrument.

Citizen suits might also be made a part of mitigation banking schemes. While suits under the Clean Water Act may be brought against § 404 permittees, it is not clear what suits could be brought against mitigation banks where the client is not the same as the credit producer or landowner. In structuring a mitigation program, policymakers might wish to consider legislation that would allow citizens to bring suit to enforce the banking instrument.[8]

There are several other ways that the public can help enforce successful mitigation banking. Private citizens or environmental groups could serve as unofficial bank inspectors, or as representatives on oversight teams. It also might increase compliance if bank managers knew that the results of their monitoring reports would be available to the public. In today's business climate, most developers realize the importance of environmental image. Image protection could become another means of enforcement.

B. Long Term Status of Bank Land

Attention to the long term status of bank land may also be desirable to assure long term realization of the ecological benefits. In most onsite mitigation, the mitigation land remains the property of the developer and is subject to surrounding land uses and future activities in the same way as the original wetland. In a small, but increasing number of cases, however, developers have entered into agreements with regulatory agencies, resource agencies, or non-profit organizations to provide for the longer term protection of onsite mitigation lands. This trend is even more common with mitigation banks.

Mitigation banking may be more competitive with onsite mitigation if no long term landholding requirements are imposed. On the other hand, one of the advantages that mitigation banking offers the public (and resource agencies) is the opportunity to protect

[8] Of course, the potential for exposure to this liability might increase the cost of credits, or reduce the attractiveness of entry into entrepreneurial mitigation banking. This tradeoff would need careful consideration.

units of a reasonable size over a longer period of time. This may militate in favor of imposing such a requirement as a condition of banking. The condition may draw little opposition. Under many circumstances, bank sites may not be subject to immediate development pressures. Indeed, some credit producers may prefer to place bank land in other hands after they have extracted its salable value in the form of credits. They will be relieved of a non-performing asset, and they may be able to realize some compensation credit, tax deduction, or promotional value from the land donation.

There are a number of options for long term bank site land holding. First, the land may be deeded outright to a public resource agency, a nonprofit entity, or an independent banking entity. Second, the land may be retained, but a conservation easement conveyed to a public resource agency (or to a nonprofit entity). Variations on this approach may include deed restrictions or covenants running with the land. Finally, land may be sold for private use, but a reversionary interest may be given to (or retained by) a public agency to ensure that the wetland character of the land is maintained.

The goals of such arrangements are to ensure (1) that there is management of the land over the long term, and (2) that inconsistent land uses are prevented.

Management may be necessary to maintain wetland values and functions. Even if the compensatory wetland is fully functioning and self-sustaining at the point it is turned over to the longterm land owner, it is not certain to continue in that status in perpetuity. Such natural areas as national parks and wildlife refuges require management to cope with external threats (e.g. adjacent development, infestation with diseases or exotic species, or pollution), and even wilderness areas require management. Given the intensity of population pressures and external forces, so too will compensatory wetlands require attention in order to function over the long term.

Prevention of inconsistent uses of the bank site is equally important. While compensatory wetlands may be protected by regulatory schemes -- like § 404, state laws, or § 4(f) of the Transportation Act -- they may also be lawfully degraded, farmed, timbered, used for rights-of-way, or other purposes which may be detrimental to their effective functioning. While some productive uses, such as farming or timbering, may be consistent with long term functioning of a particular wetland, some entity needs power to assure such consistency. Absent some form of monitoring and the ability to eject incompatible uses, the risk is that these compensatory wetlands will be lost to the same kinds of forces that gradually impair natural wetlands on private lands.

The importance of the long term land ownership function has been recognized in EPA Region IV's draft mitigation banking guidance. It provides that the banking agreement should:

> reference the method to be used for perpetual protection of the banking site....Terms of the mechanism should provide for irrevocable and perpetual

protection of the site in its restored or natural state with appropriate restriction of on site permitted activities. Such mechanism should be fully enforceable by the permitting agency, by EPA and the COE...

There are a number of factors influencing the selection of a land holding entity. While longterm ownership by governmental agencies is generally regarded as most desirable for protecting compensatory wetlands, government agencies may not always be willing to accept the attendant responsibilities. Especially if mitigation sites are in many locations and cannot be co-managed with other state lands or federal lands, agencies may see the possibility of ownership as a logistical and administrative burden they are unprepared to shoulder. This concern can be mitigated if the land is transferred together with a maintenance fund or trust fund. But even these are not panaceas; the limiting factor may be personnel or other resources controlled by the state legislature or federal government irrespective of separate funding. Where there is no funding, the land may suffer from neglect. The Louisiana DOT bank, for example, suffers from lack of management funds, even though it is in state resource agency ownership.

Non-profit organizations are other potential landholders. This model has frequently been used in California. However, not all sites will be attractive to such entities. The Nature Conservancy, for example, prefers not to maintain long term ownership or management of lands other than natural heritage sites or other unique resource lands; it tries to hold most conservation lands only long enough for them to be acquired by governmental agencies. Local non-profit entities may be more interested, but may lack sufficient institutional capacity to handle the task long term, even with a trust fund paying for management expenses. Nevertheless, this approach may be quite practical in some areas.

The most important requirement of the long term land holder is that it be able to carry out the two key functions of management and protection. Placing a bank site into the hands of a public entity is not itself a certain guarantee that the wetland will be preserved. If banks are at all sizeable, they may be attractive targets for future public development (siting of transportation and utility corridors, recreational facilities) since they need not be condemned and are already available. Huntley Meadows, a large government-owned wetlands preserve in Virginia, for example, has been frequently targeted as the least expensive and most direct route for additional highways in highly populated and congested Fairfax County. Florida resource and highway officials have noted the same tendency in connection with mitigation lands. Thus, it may be important even if the state holds the land in fee for some other entity to hold a deed restriction or conservation easement on the property. Even though such a restriction or easement could be condemned by the state, its mere existence would tend to thwart inconsistent uses and to assure scrutiny of the decision to abrogate a bank site.

One area of concern to local communities may be the long term effect of having a wetland mitigation bank (viz. "undeveloped land") on the tax rolls. In some areas the existence of a bank might be regarded with particular disfavor because the land may well be

in the hands of the state, the federal government, or a non-profit conservation organization that is exempt from property taxes. This reaction is less likely where the mitigation lands allow the economic development of other wetlands within the same political jurisdiction -- in effect, the same level of development occurs and nothing is lost. But where a mitigation bank primarily supports economic development in another jurisdiction, the local consequences may be perceived as undesirable.

In a few areas, therefore, it may be necessary to overcome local resistance by making payments in lieu of taxes, or providing some revenue stream to the locality from activities still permitted on the bank site. For example, the Patrick Lake wetland mitigation bank in Wisconsin makes payments in lieu of taxes. The payments commenced at $8,100 the first year, and decline by 10% each successive year, terminating after the tenth year. In another example, the Bonneville Power Authority has a wildlife habitat mitigation project (not wetland mitigation) in Idaho; it is purchasing a 60,000 acre ranch which will be donated to the Idaho Department of Fish and Game. The mitigation agreement requires the payment of $35,000 annually for up to two years to Nez Perce and Lewis Counties in lieu of property taxes; thereafter, it is expected that the Idaho legislature will authorize the state to make payments to the counties.

CHAPTER NINE
FINANCING OF BANKS

The economic viability of wetland mitigation banking ultimately depends upon how banking policies address three forms of risk: regulatory risk, market risk, and ecological risk.

Regulatory risk includes the possibilities that regulators or legislators will change the rules so that compensatory mitigation is not required for many wetland conversions, or that regulators will not allow a particular bank to sell credits. Market risk is whether there will be a sufficient demand for mitigation credits at certain times and places. And ecological risk is the risk that a given bank site will not actually produce credits or that the credits may be destroyed.

Risk necessarily affects the economic viability of wetland mitigation banking. If the overall level of risk is high, a very high rate of return will be required to attract private investment in, and development of, banks. And at some risk levels, no reasonably achievable rate of return will be high enough to induce entrepreneurial banking. To a lesser extent, these risk factors may affect publicly operated banks offering credits for general sale -- these banks may be less able to recoup their investments of public moneys. Government policies can directly affect regulatory risk, partially affect market risk, and influence some aspects of ecological risk.

A. Market for Credits

Regulatory and market risk are the greatest impediments to mitigation banking, but can be affected substantially by governmental policy. Government policies primarily affect (1) the demand for mitigation credits, and (2) the costs of producing mitigation credits.[1] This section also looks briefly at competition in the credit market.

1. Demand

Demand for mitigation credits is governed by two factors: pressure for development of wetlands for commercial, industrial, agriculture and other uses; and government requirements for compensatory mitigation. If there is no development pressure, no market for credits will develop. And if governmental agencies either regularly deny approval for wetland development or authorize development activities without requiring compensatory mitigation, no market will develop. Both external development demand and government-generated credit demand must exist in order for there to be a market for mitigation credits. This is a significant risk to potential credit producers.

[1] They also affect supply, but chiefly by adjusting the other two factors; or by producing credits with government funds.

Because a successful entrepreneurial system will depend upon entrepreneurs' perceptions that a reasonable rate of return can be had for their investments in wetland mitigation, government agencies must:

(1) assure that a wetland regulatory system requiring compensation will continue to exist; and

(2) establish clear standards for the definition and use of credits.

If the perception is that wetlands will be deregulated, or that permits will normally be granted without compensation, there is little to foster development of private entrepreneurial mitigation banks. And if there are no clear standards for the definition and use of credits (e.g., in-kind or out-of-kind mitigation; ratios; geographic areas in which credits are usable; success criteria; liability for unsuccessful mitigation; how long must performance be guaranteed), prospective credit producers must shoulder an extremely high level of regulatory risk.

The simplest approach to assuring sufficient, predictable demand would be to adopt a consistent position on what wetlands can and cannot be developed, and a standard approach to evaluating compensatory mitigation. Although the § 404(b)(1) guidelines provide some assurance of the former, there is little certainty of the latter. Most of the governmental guidance documents are in "draft" form, and many regulators are reluctant to innovate without clear direction from senior management.

The use of "sequencing" is neither supported nor discouraged by the mitigation market's need for certainty. If sequencing were always required, there would be a reasonably predictable level of demand for mitigation credits by those projects that satisfied the sequencing requirements. Conversely, if sequencing were eliminated, the demand for mitigation credits would be higher, but would not be substantially more predictable. The market would reach equilibrium in either instance. Only if sequencing resulted in virtually no decisions allowing wetland development might it affect the viability of mitigation banking. This does not appear to be a concern; in fact, even with sequencing a substantial number of § 404 permits and state permits are issued every year. The elimination or modification of sequencing is not, therefore, an economic prerequisite for mitigation banking.

Although both the factors identified above are critical, the more important factor is the existence of certainty in making permitting decisions. Unfortunately, the ongoing regulatory, legislative, and policy debate over wetlands regulation has actually contributed to heightened uncertainty about whether a demand for compensatory mitigation will exist or whether much wetlands development will occur without mitigation. This has discouraged the development of viable mitigation banking systems. So long as the regulatory battle continues unresolved, the development of viable mitigation banks is likely to be tentative and sporadic -- even if the second prerequisite (clear standards for the definition and use of credits) is addressed.

2. Production Costs

The costs of producing mitigation credits consist of the costs of acquiring lands suitable for mitigation work, plus the costs of manipulating such lands to satisfy whatever level of performance is recognized by a regulatory agency as producing mitigation credits. The latter costs include construction costs, operating and maintenance costs, and administration costs (which include interactions with the regulatory authority). Production costs can be strongly influenced by the type of mitigation that is to be performed. For example, earthmoving or intensive planting and vegetation management can be quite expensive.

The time period between performance of the work and the sale of credits also influences the credit producer's costs. These latter costs may be real (interest on borrowed capital) or attributed (the time value of money).

The costs of production are chiefly determined by governmental standards. This is because the costs are incurred solely to satisfy regulatory requirements. The demand for credits is wholly derived from the demand for development permits, not from an intrinsic demand for quality mitigation wetlands. There is, therefore, no competition among mitigation credits on the basis of quality.[2] Government establishment of credit standards is critical.

Mitigation banking is unlikely to develop without such standards because of the regulatory risk that a given bank's credits will be rejected in any particular transaction.

3. Price Competition

The price of credits is primarily determined by the demand for credits on the one hand and production costs on the other. The supply of mitigation credits is also important; where there are many suppliers, prices are likely to be lower. However, the demand side is more important in most wetland mitigation banking situations because it is less likely that for any given transaction there will be a great number of banks producing exactly the right type of credits within a particular geographical area (such as a watershed) where the credits may be used.

On the demand side, the price of mitigation bank credits must always be compared to the cost of alternatives. If a client's alternative is no development, prices for banked credits may be quite high unless there are several competing banks with the right kind of credits available for use. If the alternatives include onsite mitigation, the client may, in some cases, have cost advantages that will tend to drive down the price of banked credits. Where

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[2] In theory, some competition based on quality could be stimulated if the government makes a distinction among credits either by establishing minimum performance standards or by recognizing variable compensation ratios based on quality.

a credit producer or bank manager knows that a client cannot do onsite mitigation, however, prices to that client may be substantially higher than prices offered to clients that enjoy such an option.

The possibility of preferential pricing has led some banking systems to set regulated prices. The difficulty with this approach is that the regulated price (a) may be too low to cover the costs of mitigation, (b) may subsidize wetland development activities, or (c) may be too high and hence result in little or no use of the bank. Regulated prices tend to discourage entry by private credit producers as well. As a consequence, regulated prices are not a desirable approach, with the possible exception of cases where use of the bank (or banks) for all compensatory mitigation is prescribed, and costs for credit production can be accurately determined.

The best guarantee of a rate of return is simply governmental consistency in requiring compensatory mitigation and in setting clear performance standards. This will allow the public or private credit producer to gauge the demand and evaluate its costs accurately. As noted earlier, the greater the uncertainty, the less likely it is that private entities will undertake mitigation banking.

This climate of uncertainty is, in fact, the status quo. There is virtually no entrepreneurial mitigation banking in operation, and little current incentive to enter the area. Almost all existing banks are publicly funded or nonprofit banks, which are less sensitive to risk and which do not have to justify their investment based on rate of return. The array of bank types is discussed in the next section.

B. Bank Types

Funding for wetland mitigation banks can come either from private investment in entrepreneurial banks (based on the expectation of sales to clients), or from governmental agencies or nonprofit organizations. If mitigation banking is to become widely available and ecologically significant, it will need to encourage more entrepreneurial banking and/or substantially increase government-sponsored banking.

1. Entrepreneurial Banks

The only active "entrepreneurial" bank is the Fina LaTerre bank in Louisiana. The company (actually Fina's predecessor Tenneco) needed to exclude saltwater intrusion chiefly in order to protect (and maintain legal ownership of) its oil and gas operations in a coastal marsh, and secondarily to mitigate for its own wetland development activities. The expensive system of dikes and structures it constructed for these purposes generated surplus credits which were offered for sale to third parties. The credit production was not economically dependent upon there being any sales; indeed, the company would have undertaken it even without the prospect of sales. Because most of the costs of the bank were incurred for other reasons, the income from sale of credits to third parties was essentially a bonus.

Another interesting case is the proposed Springtown, California wetland mitigation bank. The owners of the bank site have few options for remunerative development of the land: indeed, by 1992, twelve successive development proposals had been rejected by local planning and governmental agencies -- primarily because of the presence of an endangered plant (Cordylanthus palmatus). Consequently, mitigation banking is primarily a way of attempting to extract some economic return from sites where there is virtually none today. The major investment -- the land acquisition -- has already been made; it is a sunk cost. Thus, any revenue from sale of mitigation credits would provide welcome return on a nonperforming asset.

These two cases help to illustrate the current limited appeal of entrepreneurial banking. At Fina LaTerre, there was little additional cost for the creation of saleable credits; at Springtown, banking may mitigate an expected financial loss. Neither of these is a situation where banking is a free-standing economic opportunity.

Until there is a reduction in the substantial risk from uncertainty over governmental agencies' approach, true entrepreneurial banking is likely to occur now only where the credit producer's alternative development options are quite limited (i.e., opportunity costs are low), and the capital costs of the mitigation are also quite low. There is now no incentive for a land owner to devote substantial financial resources to banking where other activities can produce greater returns or at least a greater certainty of reasonable returns.

The failure of governmental agencies to reduce the regulatory risk (and to affect the market risk) is why many of the *proposed* entrepreneurial banks identified by this study are degraded agricultural wetland sites rather than other types of wetland or upland sites (e.g., Millhaven and Marshland in Georgia; Wetlands Management Inc. in Texas). The current rate of return from farming these sites is low (so there is little opportunity cost), and the projected costs of restoration are low (so the potential return on investment is better than it would for a high-cost restoration). Such agricultural wetland restorations may require only disruption of drainage systems or removal of dikes and some revegetation.

The simplest approach to encouraging entrepreneurial banking was outlined above. It consists of providing greater certainty and consistency in permitting and mitigation decisions. This allows the market to produce an appropriate number of credits with a reasonable expectation of return.

A more complex approach would attempt to manage supply and demand to assure that even more uncertainty is eliminated. Such an approach could include limiting the supply of credits or credit producers. This could be done by limiting the number of potential mitigation sites by predesignating them. It could also be done by establishing a cap on the quantities of mitigation lands allowed to be in the bank at any one time, or by making mitigation banks a public utility or regulated monopoly. An alternative approach would have the government guarantee credit producers a reasonable return even absent an active market. This could be done by guaranteeing a given price (floor price), or by having

the government purchase unsold credits -- like the agricultural commodity support programs.[3]

These approaches would require considerable sophistication and fine-tuning. They are, therefore, less attractive than the simple approach.

2. Nonprofit Banks

The conditions necessary for the development of entrepreneurial mitigation banks are the same as those needed for nonprofit banks that are intended to be self-sustaining. Although nonprofit entities may establish banks for reasons other than return on investment, they nevertheless require a reasonable rate of return, which in turn means that they need regulatory consistency and a standard for the quality of mitigation credits.

Some banks are operated and administered by nonprofit entities. This is the model frequently used in California, where banks are operated by the California Coastal Conservancy and similar entities such as the Huntington Beach Conservancy. The nonprofit organization provides the administration and long term management, while funding comes from the bank's clients. In most of the banks involving nonprofits, startup costs have come from a limited number of previously identified clients -- local government authorities, development companies. In this respect, these banks resemble "joint projects" -- providing mitigation to a limited group for known development activities. Few nonprofit organizations are financially able to finance a bank speculatively.

3. Subsidized Banks

Under existing practice, the lack of a reasonable prospect for a return on investment has meant that apart from the self-subsidization of the Fina LaTerre credits, a number of existing banks offering credits for general sale have been subsidized.

The California Coastal Conservancy was left to swallow the costs of the Bracut Marsh Mitigation Bank, which failed to be self-supporting. The original terms of the agreement that established the bank provided for a fixed price of $0.75 per square foot of mitigation (with a 1:1 requirement). Since 1981, the Conservancy has recouped only 38% of the funds expended; and reports that if the bank were fully sold out at the prescribed rate it would have recouped only 54%. In effect, the Conservancy's donors and supporters have subsidized the mitigation effort (or subsidized the developers, depending upon how you look at it).

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[3] Such supports could be funded by a charge on certain development activities (e.g., permit fees, or state impact fees), or the government could hold the purchased credit for resale at another time.

The Astoria Airport bank, which offers credits for general use, was constructed with public moneys. It is unclear whether it will be able to recoup its costs.

Government banks that are available to mitigate for private development often seek to recover their costs through the sale of credits. Where they do not, they may provide an indirect subsidy to wetland-converting activities. Such a subsidy may resemble that which state and local governments often provide businesses in order to attract development -- i.e., tax breaks, industrial revenue bonds. This concept has already been applied to wetlands mitigation. The proposed Tenth West Corridor bank in Utah is expressly intended to offer free or subsidized mitigation credits as an inducement to new businesses locating in business parks developed in wetlands of the City of Logan.

4. Public Works Banks

Most government banks are meant to mitigate for public works projects. They are financed in the same manner as project-specific mitigation for these projects, although they may achieve some economies of scale. Also, because government public works agencies are repeat players in seeking permits to develop wetlands, they can justify carrying the cost of developing a mitigation bank.

Financing can occur in a number of ways. In the case of a highway bank, the highway department may simply bear the entire cost of the bank from the beginning. As an alternative, the state or other governmental entity may have a conservation resource agency incur bank development and startup costs and recover those costs from the development agencies upon the use of credits. A public bond issue may be an appropriate way of accomplishing the same thing. Some support for state highway mitigation banking may come from the federal government through the Intermodal Surface Transportation Efficiency Act.[4]

Sources of funds for government banks may include federal and state highway funds, sale of credits, permit fees, and general revenues. It may also be possible to place a surcharge on development activities that impair wetlands in order to fund a government restoration effort; this is the approach of many in-lieu-fee systems, such as Maryland's non-tidal wetlands compensation fund.

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[4] Funds apportioned to the states under § 104(b)(1) "may be obligated to wetlands mitigation efforts including wetland mitigation banks." 23 U.S.C. § 103(i)(13); see also § 133(b)(11).

CHAPTER TEN
MITIGATION BANKING IN THE CONTEXT OF LAND USE PLANNING

To the extent that existing wetlands regulation schemes have been criticized for creating a permitting process that often can be protracted and uncertain, land use planning may be a useful tool in the arsenal of the wetlands regulator. The comprehensive advance delineation, classification and evaluation of existing wetlands can decrease permit application evaluation time by providing a ready inventory of wetland resources and identifying sites for potential preservation, development, or restoration. Similarly, wetlands-related planning can be a useful vehicle for mitigation banking.

Several existing mechanisms at the federal, state, and local levels can integrate planning with wetlands regulation and permitting. Each of these has been used to formulate wetlands-related plans. However, only a small number of these plans have explicitly incorporated mitigation banking, and most of those are of recent origin, making it difficult to draw any definitive conclusions about their success.

This chapter outlines the various planning mechanisms and programs, discusses examples of specific plans that incorporate mitigation banking, and explores how plans can use wetland mitigation banking to achieve ecological and social objectives.

A. Wetlands-Related Planning Tools

1. Advanced Identification Program

Section 404(b)(1) of the Clean Water Act includes a provision that allows EPA and the Corps to identify wetlands as suitable or unsuitable for disposal sites even before a permit application has been filed. This Advanced Identification ("ADID") process may be initiated by the agencies or by a request from any other party. The determination of whether an area is a potential disposal site does not guarantee either that a permit will be issued or that disposal will be automatically prohibited; instead, it is meant to provide potential applicants with information to be used in planning development activities. The information gathered through the ADID process also is considered in the subsequent review of permit applications. The ADID process involves the collection of all available water resource information, including data from the public, other agencies, and from approved Coastal Zone Management Programs and River Basin Plans. All EPA/Corps ADID decisions must be issued for public review.

EPA has conducted a number of Advance Identification surveys of wetlands -- a total of 76 to date, including 35 completed, 36 ongoing, and five that are suspended or otherwise incomplete. Of these surveys, three in EPA Region X have explicitly incorporated mitigation banking. The Columbia South Shore Wetlands Management Plan involved a

40,000-acre study area east of Portland, Oregon. It contemplated the issuance of a regional general permit for all required mitigation in the area in conjunction with a mitigation bank. The Corps of Engineers issued the general permit in February 1991, but withdrew it in 1992 at the City's request after environmental groups challenged it as illegal.[1] EPA also has suspended the ADID process for this area.

The Mill Creek Drainage Basin SAMP is another ADID effort involving a 22-square-mile region in King County, Washington. A mitigation bank is contemplated for this project as well, which EPA predicts will meet resistance from regional development and environmental interests. Finally, the West Eugene [Oregon] Wetland Management Plan is an ongoing, EPA-funded local initiative that combines a management plan for an 8000-acre area with a proposed mitigation bank. The plan, although not yet finalized, has become a nationally known model of local wetlands management planning.

Since the ADIDs involve federal agencies only, albeit at local invitation, they generally do not incorporate state and local concerns as effectively as state wetlands planning mechanisms and special area management plans (SAMPs) under the Coastal Zone Management Act. Also, since ADIDs are non-binding, they do not provide any means for making permit decisions, although they can influence such decisions indirectly by providing a source of information to regulators.

These examples suggest, nevertheless, that the ADID program is potentially relevant to mitigation banking in at least two ways. First, an ADID may be the initial step in bringing potential permit applicants and mitigation bank credit producers into contact with one another. For example, if an ADID were to specify a list of approved mitigation banks in the study area, a permit applicant who sought to fill a particular site could be made aware of this option for compensatory mitigation. Thus, the ADID program could, in effect, screen applications for sites that already have been deemed suitable for development. By taking advantage of early planning, the ADID program could work together with mitigation banking by providing better mitigation while reducing the cost and delay associated with the individual permit process.

A second advantage that the ADID program shares with most other forms of advance planning is that it provides some idea of the relative value of wetlands in a given area by indicating which will be unsuitable for development by virtue of their ecological importance, and which may be developed under certain circumstances in compliance with the § 404(b)(1) guidelines. For mitigation banking to be successful, there must be some means whereby credit producers can obtain advance assurance from EPA and the Corps that their bank will meet the relevant criteria for use. EPA and the Corps could use the same tools applied in

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[1] *Northwest Environmental Defense Center v. U.S. Army Corps of Engineers*, Civ. No. 91-476-JE (D. Or. 1992).

the existing ADID program to give bank operators a "stamp of approval" for their banks before a significant investment is made.

2. Special Area Management Plans

The development of special area management plans (SAMPs) under the Coastal Zone Management Act (CZMA)[2] is another means of identifying areas as suitable or unsuitable for the issuance of a discharge permit before a permit application is filed. The CZMA, enacted in 1972 to protect the United States' coastal zone, gives coastal states authority to develop a program regarding activities in the coastal zone. It requires federal actions, including the issuance of permits under § 404 of the Clean Water Act, to be consistent with the states' programs. Persons applying for federal permits to conduct development activities in the coastal zone must furnish a certification that the proposed development activity is consistent with that state's coastal zone management program. The program is administered through the Office of Ocean and Coastal Resource Management in the federal Department of Commerce.

Under the CZMA, the "coastal zone" is defined as "the coastal waters and the adjacent shorelands," including wetlands areas.[3] This zone extends seaward to the outer limit of the United States territorial sea and inland from the shorelines "only to the extent necessary to control shorelands, the uses of which have a direct and significant impact on the coastal waters."

In 1980, the CZMA was amended to provide an express procedure for developing special area management plans. A SAMP is:

> a comprehensive plan providing for natural resource protection and reasonable coastal-dependent economic growth containing 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 specific geographic areas within the coastal zone.[4]

The purpose of a SAMP is to protect the coastal environment while allowing for economic uses. To date, a number of SAMPs have been developed in coastal states with the involvement of federal, state, and local governments and the public. Unlike ADIDs or other nonbinding reconnaissance efforts, SAMPs have formal legal status and can serve as the basis for state coastal wetland permit decisions. Since they are part of a state's coastal zone management program, SAMPs also provide states with a mechanism for reviewing the

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[2] 16 U.S.C. §§ 1451-1464.

[3] *Id.* § 1453(1).

[4] *Id.* § 1453(17).

issuance of § 404 permits through the consistency review process under Section 307 of the CZMA.

The Corps of Engineers has been involved with SAMPs through its participation in the CZMA planning process. In addition, the Corps also has adopted the SAMP procedure for areas which extend beyond the coastal zones.[5] The Corps applies four criteria before participating in a SAMP. First, the area in question must be environmentally sensitive and under strong development pressure. Second, the public must be involved in the process. Third, a sponsoring local agency must participate to ensure that local concerns are addressed. Fourth, all parties must agree to an end result which includes definitive regulatory guidance documents.

Generally, SAMPs cover a relatively small geographical area, and often are developed in conjunction with an ADID or Section 404 general permit. In Jackson County, Mississippi, the Port of Pascagoula SAMP was partially funded through the CZMA. It also involved a request to the Corps for a general permit. This SAMP is noteworthy because it is the only one discovered by this study that explicitly includes a mitigation banking element. In response to rapid harbor development on the Mississippi Gulf Coast, the impacts of shipbuilding and oil and gas refineries, and harbor pollution problems, Jackson County convened a task force to develop a comprehensive plan for the area to guide permitting, land use, and resource protection. It consisted of four federal agencies, three state agencies and two county agencies.[6] The Corps of Engineers, already actively involved in the port through channel dredging activities, became a key participant along with EPA.

The Pascagoula SAMP includes a development plan for the port area, a mitigation plan, and a dredged material disposal plan. The SAMP guides all federal, state, and local permitting decisions for the region, providing varying levels of protection for wetlands based on their type and location. Because both port development and channel dredging have an impact on wetlands, the plan attempts to accommodate growth while preserving remaining wetland resources. A mitigation bank was developed through acquisition and preservation of 3,500 acres of coastal and nontidal wetlands in Jackson County, against which eight area-specific projects, designated through the SAMP agreement, are allowed to mitigate wetland losses. All other projects must do mitigation outside of the bank. The SAMP originally contemplated a limit of 60 acres to be lost through the eight projects, although no absolute limit was codified.

To date, no acres actually have been debited against the preserve. Because of an economic downturn, none of the projects designated for bank use -- a channelization

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[5] RGL 86-10, October 2, 1986.

[6] The participants included the Jackson County Port Authority, the Jackson County Board of Supervisors, the Mississippi Bureau of Marine Resources, the Mississippi Bureau of Pollution Control, the Mississippi Department of Archives and History, the Corps, EPA, U.S. FWS, and the National Marine Fisheries Service.

expansion to reach the county airport, development of a recreational harbor, and several private development efforts -- have been undertaken. Even so, the county plans to augment the original 3,500 acres by acquiring more wetlands in the area. Port officials say the two main goals of the SAMP have been achieved: preservation of dwindling wetlands, and greater predictability in federal, state, and local permitting.

Wetland mitigation banks can be systematically incorporated into the SAMP program in two ways. First, mitigation banks can be established as a part of individual SAMPs, as in the Pascagoula SAMP. Second, the SAMP program may be utilized to coordinate development and mitigation activities with existing banks, and to educate the public about the use of banks as a mitigation option. Because many SAMPs involve small geographical areas, this second approach may prove to be useful as mitigation banking becomes more commonly available.

EPA and the Corps have agreed, in Section II.C. of their MOA, that sequencing does not apply to wetland development activities where an EPA and Corps approved SAMP fully considers and plans for wetland conservation. The SAMP is regarded as a functional equivalent or substitute for sequencing.[7] Thus, mitigation banks that are adopted as part of a SAMP may be authorized to mitigate for wetland development activities authorized under the SAMP that have not undergone sequencing.

While the opportunity to forego sequencing may have some attractiveness to developers, and may make sense ecologically where the plan is truly "comprehensive," this raises the stakes over the consideration and adoption of SAMPS and similar plans. If segments of the public are not persuaded of the bona fides of the regulatory and planning agencies, or the value of any banking scheme provided for in the plan, they have every incentive to oppose the plan. Comprehensive planning has value for wetlands protection and the encouragement of banking, but it requires detailed attention to the institutional factors discussed in this study if it is to succeed.

3. State Land Use Planning

A number of state land use planning methods can affect the wetlands permitting process and mitigation banking. Comparative information about current state wetland planning approaches is summarized in Table 5 at the conclusion of this chapter. Like the federal planning programs, the procedures described in these state plans provide a natural mechanism for including a mitigation bank -- particularly if banking already is authorized under state law.

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[7] The MOA also considers ADID areas and State Coastal Zone Management Plans as "comprehensive plans" that may obviate the requirement for sequencing, provided that they are approved by the Corps and EPA. All three kinds of plans must provide for compensatory mitigation in order to forego sequencing.

EPA is now providing grants to state governments for the development of statewide comprehensive wetlands plans. These plans are intended to provide a flexible means of coordinating both private and public programs and of balancing economic growth with natural resource preservation. A statewide comprehensive plan would embrace the general goal of "no net loss and long-term net gain" of wetlands, and would provide a regional focus for these efforts. Our research found that no state has completed a comprehensive wetlands plan; however, about one third (sixteen) are currently developing one or are requesting EPA funding to do so. Of these, five states (Ohio, Tennessee, California, Missouri, and New Jersey) have plans that are nearly complete.

Despite the lack of a comprehensive plan, many states have developed other more general plans that include wetland protection elements. For example, in 1986, the Emergency Wetlands Resource Act required states to include in their Statewide Comprehensive Outdoor Recreation Plans (SCORPs) a wetlands priority program. For many states, these SCORPs are the only planning programs that include wetland protection. Thus, SCORPs are very important in the development of wetland plans. However, they also tend to be somewhat limited, because their focus is centered around recreational goals.

Other state planning efforts focus on land acquisition for recreational purposes and for habitat protection. Wetlands benefit from these programs, although they may not specifically be referenced in the original plans. For example, in Colorado, Georgia, and Oregon, greenway and river corridor plans along rivers and in flood plains include wetland areas. These types of plans are potentially useful for mitigation banking. Wetland banking on these lands or on adjacent lands has a good chance for success, because management programs often are already established.

More general state plans also could be useful for mitigation banking on a statewide level. These plans often provide guidelines for and coordinate local government planning projects. Florida has a "Conserving Open Space Program" that is neither wetland-specific nor includes mitigation banking. It could be implemented to do so, however, like the greenways programs. In Maine and other states, "Growth Management Plans" require all local governments to adopt local land use plans. If amended, these plans could require, or afford local communities an opportunity to provide for, mitigation banking.

In sum, although few states have existing wetland planning mechanisms that explicitly incorporate mitigation banks, many of them have more general programs that could easily incorporate and complement banking. With the comprehensive state wetland plans now underway, many states could efficiently adopt and implement mitigation banking through existing structures and plans.

4. Local and Regional Land Use Planning

Perhaps the most ambitious wetlands-related planning efforts have taken place at the local and regional levels. Since states' authority over land use typically is delegated to

counties and municipalities in any event, the procedures and forums developed there for general planning purposes often prove amenable to wetlands protection. Two of the more interesting plans -- both for their scope and for their inclusion of a mitigation banking element -- are the West Eugene [Oregon] Wetlands Management Plan and the Juneau [Alaska] Wetlands Management Plan.

As noted above, the West Eugene plan commenced with a special study area of over 8,000 acres, including 1,430 acres of jurisdictional wetlands, that previously was zoned for industrial, commercial and residential use. The study, which was funded with an EPA grant but conducted locally by the City of Eugene and the Lane County Council of Governments, identifies valuable wetland areas for protection and lower value wetlands for possible development, and includes a mitigation bank for compensation. The study was conducted with extensive participation by all sectors of the community and multiple levels of government, and has resulted in a draft management plan which is currently undergoing final review.

The draft plan would protect 1,070 wetland acres and designate the remaining 360 to be filled. Compensation for the filled acres would occur either onsite or through a regional mitigation bank that would be large enough to provide some credits for impacts outside of the study area but within the watershed. Compensatory mitigation would be focused on creating a restored floodplain, a connected system of trails and wildlife corridors, open space, and greenways. Permitting authority for projects within the study area would be delegated to the City of Eugene through the issuance of a general permit by the Corps of Engineers.

Similarly, the Juneau Department of Community Development has surveyed a study area of fifteen square miles, 54 percent of which is occupied by wetlands. Using a detailed analysis of existing functions and values as well as public preferences, these wetlands were classified into four main categories: (1) those unavailable for development because of previous land use restrictions (parks or national forests); (2) those "generally not suited for development" -- valuable wetlands for which compensation will be "more difficult" and usually onsite; (3) those "generally suited to development," for which mitigation banking or other offsite mitigation may be used routinely; and (4) those "most suitable for development," which may be developed using "best management practices" without any separate mitigation requirement.[8]

The City and Bureau of Juneau ("CBJ") has received a general permit from the Corps of Engineers that effectively transfers all permitting authority for the last two categories of wetlands to the local level; the Corps will retain permitting authority for other wetlands, but the plan will be used as guidance for the state's and the CBJ's comments during the Corps'

[8] The plan also designates another category of wetlands with enhancement potential, on which only wetland creation and enhancement will be permitted.

permit evaluation process. Thus, for less valuable wetlands, the plan will make the CBJ a "one-stop permitting agency." Toward this end, the CBJ has adopted a separate ordinance which creates a local agency to administer the permitting process, and also sets forth governance procedures for the CBJ-run mitigation bank called for by the plan. Site selection and development is being carried out under an EPA grant, and the entire permitting process will continue to be monitored by both EPA and the Corps.

B. Implementation of Planning Through General Permits

As seen in the above examples, the various planning mechanisms each carry different weight in the permitting process, ranging from merely being a source of useful information which regulators may consider, to being a set of advance land-use decisions which, at least at the local level, have the force of law. While some planning mechanisms, such as SAMPs, have an indirect legal effect on § 404 permitting through consistency review, it appears that presently the only means of directly integrating local and state planning into the federal permitting process is through issuance of a general permit, as has occurred in Juneau and is being proposed for West Eugene.

This method of delegating the Corps' authority to the local level promises to streamline and expedite the permitting process, but also raises questions on the ecological front. Obviously, permitting decisions made in accordance with an approved comprehensive plan will be no better than the plan itself; this places a heavy burden upon planners (and the Corps) to select goals with care and to build in sufficient safeguards to address the issues identified in the preceding chapters of this study.

Moreover, it is an open question whether such delegation of federal authority to a local body effectively would bypass some of the protections now embodied in § 404 and other environmental laws. Like state assumption of the federal wetlands program under § 404(g) -- itself a controversial topic[9] -- the issuance of a general permit might mean that the locally-issued individual permits no longer will be "federal actions" reviewable under such laws as NEPA, the Endangered Species Act, and the Fish and Wildlife Coordination Act, although the Corps' retained authority to revoke certain permits case-by-case might be. This potential underscores the need for careful decisionmaking at the time a general permit -- which clearly is a federal action subject to these requirements -- is issued by the Corps.

Because the use of general permits for wetland planning and mitigation banking may continue to be subject to court challenges, it is useful to review the Corps' legal authority

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[9] For an overview of the issues involved in state assumption, *see* Wood, "The Forum's Proposal to Delegate § 404 to the States: A Bad Deal for Wetlands," National Wetlands Newsletter, July-August 1989; Kean, "A Reply to Mr. Wood," National Wetlands Newsletter, November-December 1989; Wood, "Section 404 Delegation: A Rebuttal to Governor Kean," National Wetlands Newsletter, January-February 1990; Dawson, "States Need Commitment, Leadership, and Backbone, Not Section 404," National Wetlands Newsletter, January-February 1990.

for issuing general permits, the various types of general permits, and the uses to which they have been put.

1. Legal Authority for General Permits

In the 1977 amendments to the Clean Water Act, Congress authorized the Corps to issue general permits on a "state, regional or nationwide basis" covering certain categories of activities.[10] This amendment codified a practice that the Corps already had adopted by regulation. The statute specifies that general permits may be issued for activities that are "similar in nature" and have only "minimal adverse environmental effects" when measured on an individual and a cumulative basis. The Corps' regulations expand upon this authorization by allowing for issuance of general permits in instances where they "would result in avoiding unnecessary duplication of the regulatory control exercised by another federal, state, or local agency provided it has been determined that the environmental consequences of the action are individually and cumulatively minimal."[11]

The Act also imposes a number of procedural requirements on the issuance of general permits. The Corps must provide notice and opportunity for a public hearing, and a general permit must satisfy the requirements of the § 404(b)(1) guidelines. In addition, general permits must comply with state water quality certification under § 401, coastal zone consistency determinations under the CZMA, and NEPA by preparing at least an environmental assessment; they are also subject to EPA veto under § 404(c). General permits may be issued for up to five years, and may be revoked or modified at the Corps' discretion.

The regulations provide for three types of general permits: nationwide, regional, and programmatic. The Nationwide Permit Program ("NWP") is by far the largest and most heavily used of the general permit categories. Currently, there are 36 nationwide permits under the NWP.[12] However, it is regional and programmatic permits that have provided the greatest opportunity to facilitate the establishment and operation of mitigation banks -- integrating local planning and permitting with § 404.

2. Regional General Permits

Regional general permits are issued by a division or district engineer after notifying the public and providing the opportunity for public hearings. If an activity is covered by a regional permit, the applicant may conduct the activity without obtaining an individual § 404 permit. However, the Corps has authority to impose additional conditions on a permitted

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[10] 33 U.S.C. § 1344(e)(1).

[11] 33 C.F.R. § 322.2(f)(2).

[12] These permits are listed at 33 C.F.R. § 330, Appendix A.

activity to protect the public interest, such as monitoring and reporting on mitigation projects. The Corps also has discretion to override the regional permit on a case-by-case basis where there is a "concern for the aquatic environment," and to "require an individual application and review."[13] This veto authority may provide one answer to professed concerns about the Corps giving up control over individual permitting decisions.

Regional permits may be issued for an area larger or smaller than a state.[14] A limited number of regional permits have been issued -- including the Juneau permit and the Columbia South Shore permit. A regional permit may incorporate a specific wetland mitigation bank as part of a larger plan, or the permit may include generic guidelines for the establishment of a bank in a given area. The Columbia South Shore regional general permit that was withdrawn by the Corps contemplated banking. This permit drew the opposition of citizens groups, who were primarily concerned with their perceived lack of sufficient opportunity to participate in its review and development, as well as the lack of an environmental impact statement on the issuance of the regional permit, and the regional permit's longer term potential to insulate subsequent individual wetland development decisions from federal processes.

3. Programmatic General Permits

A programmatic general permit (PGP), often called a state programmatic general permit (SPGP), is another type of general permit, introduced during the "regulatory reform" era of the 1980s. The SPGP is based on an existing state, local, or other federal agency program and is designed to avoid duplication with that program.[15] The original purpose of this type of general permit was to streamline the permitting process and to coordinate it with the activities of states and other federal agencies. SPGPs may apply statewide or just to a portion of a state. SPGPs currently are being used in several states, including Maryland, Maine, New Hampshire and North Carolina. In addition, an SPGP has been proposed for New Jersey.

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[13] 33 C.F.R. § 325.2(e)(2).

[14] Some have argued that the geographical scope of a regional permit must be larger than a state because the statute refers to general permits on a "state, regional or nationwide" basis. However, the Corps has in fact issued regional general permits for sub-state regions. In the absence of any clear legislative intent on the question, it is likely that a reviewing court would defer to the Corps' broader interpretation.

[15] 33 C.F.R. § 325.5(e)(3). The Clean Water Act does not explicitly authorize the issuance of SPGPs and some have questioned whether they are legal. Because SPGPs often encompass a wide range of activities, it has been argued that these activities are not sufficiently "similar in nature" to comply with the statutory requirement, an argument that also was raised in opposition to the regional general permit in the Columbia South Shore case. *See* 33 U.S.C. § 1344(e)(1). To date, the issuance of a SPGP has been challenged only once, immediately after the Corps began issuing the SPGPs. In *National Wildlife Federation v. Marsh*, No. 82-3632, Envt'l L. Rep. 20262 (D.D.C. 1982) the litigation was settled without deciding whether the Corps was authorized to issue SPGPs. Thus, the issue presumably is still open to litigation.

Although the specific procedures in each state vary, SPGPs generally allow a person seeking a permit to file a single application with the state agency -- or file the same application jointly with the state and the Corps. The application is processed simultaneously by both agencies. The Corps coordinates input from relevant federal agencies and submits its recommended decision and permit conditions to the state, which issues the final permit decision.

Maryland's PGP was issued in 1991, and covers discharges of dredged or fill material into most Maryland nontidal wetlands. It is limited to projects affecting less than five acres of wetlands. Plans submitted under the PGP must meet the sequencing requirements set forth in the Corps/EPA MOA. If wetland impacts cannot be avoided or minimized, then the use of a mitigation bank is authorized; in addition, the state statute allows for monetary compensation to be deposited in a nontidal wetland compensation fund "if is determined that creation, restoration, or enhancement of nontidal wetlands are not feasible alternatives."

Another PGP issued by the Corps' Wilmington, North Carolina, office applies to the twenty coastal counties in North Carolina. It covers activities occurring in salt and brackish marshes and estuarine waters; while it sets forth procedures for consolidating the federal and state permitting processes, it does not reference mitigation banking.

If the legal and policy issues can be resolved, these general permits provide a potential means of integrating traditionally state and local land use planning with federal wetlands permitting. Other approaches can include the types of MOUs that most existing mitigation banks now use; these may incorporate a wetlands plan by reference. Of course, approval for the use of credits from the MOU-authorized banks remains subject to the individual § 404 permits (or general permits) applicable to the development activities.

C. Goal Setting in Wetland Mitigation Bank Planning

This section describes three different approaches to wetland mitigation banking designed to serve specific goals. Banking may simply be adopted to serve the generic "no net loss" goal, or to satisfy development demand. The approaches reviewed in this section take a more aggressive stance toward the role of planning, and then use banking to get to the desired objective. They require more work and greater risk-taking by government regulators than conventional approaches; but they offer the potential to make banking a vital public policy tool and not just an occasional alternative to onsite, in-kind, compensatory mitigation.

The examples of these approaches cited in this section are illustrative only; none of them represents a complete and comprehensive effort centered around achievement of the ecological objectives identified.

1. Recreating the Historic Wetland Assemblage

Attempting to recreate regionally the wetlands that were endemic to an area prior to land development and ecological change is an ecologically-based goal that can involve mitigation banking. This approach begins with the premise that, given the limitations of our ecological knowledge, the pre-existing environment is most likely to guide us toward functional and ecologically meaningful mitigation. This approach requires research to determine what the landscape previously contained, and the funding and political will to designate sites and to acquire and restore wetlands where necessary. This approach, where feasible, appeals to values about what is native and unique about a specific region, and to a sense of restoring what belongs to the landscape.

Banking fits into this approach because it provides an opportunity for large scale, offsite, out-of-kind mitigation. Differential compensation ratios and service area requirements can assure that wetland losses are compensated for in a way that makes sense in the regional landscape.

This approach to banking provides a template for wetland restoration efforts, and has advantages over in-kind compensatory mitigation which may simply tend to reproduce the current degraded wetland assemblage.[16] Advantages of the approach include the greater likelihood of restoration success -- in recreating the same type of wetland where it had existed. The original soils may remain, a viable seed bank may remain or be available nearby, and hydrology can often be restored without major construction work. Advantages also include the possible restoration of unforeseen values because of adherence to the pre-existing pattern.

Disadvantages to this approach to banking include a lack of data to guide in recreating the historic assemblage, as well as the possibility that development demands may be inconsistent with the necessary types and locations of compensatory wetlands. Problems may include existing infrastructure that impedes restoration of hydrology or that has contaminated the restoration area. Other disadvantages may include the unavailability of the original plant or wildlife species or other changes to the landscape that make full restoration impossible.

A current example of the historic assemblage approach is the West Eugene area restoration plan. The staff of the Lane County Council of Governments conducted historical research into the original prairie wetland complexes present before white settlement and widespread agricultural conversion of the area. Based on their research, the Council was able to construct a proposal based on the original assemblage of ecosystems including numerous wetlands, and to compare it to present-day ecosystems and land uses. By dividing

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[16] For example, if the original landscape contained forested wetlands but the remaining wetlands are all emergent cattail marshes, in-kind mitigation would simply reproduce what remains rather than what may be more necessary or desirable in the landscape.

the current map of Lane County into sites ideal for restoration to original wetland complexes, prairie remnants that should be preserved, and degraded areas better suited for development, the comprehensive plan was designed to channel restoration activities and mitigation banking toward achievement of this goal. Although the plan has drawn criticism from both development interests (for targeting certain areas as mitigation sites) and environmentalists (for removing certain historic wetland areas from consideration as mitigation sites), the proposal provides a basis for establishing a banking system that makes sense on an ecological rather than project-by-project scale.

Many restoration projects share at least some characteristics of the historic assemblage approach. For example, the 160 acre Patrick Lake Wetland Mitigation Bank in Wisconsin restored a sizable wetland site to historic configurations and conditions. The state discovered an old photograph of a drained lake showing associated wetlands and upland habitats. The state then sought to recreate the original ecosystem through mitigation banking.

2. Maximizing the Array of Functions and Values

This approach involves structuring wetlands banks to produce a substantial array of functions. Such an approach may be ideal in an area with great wetlands diversity, where losses include different ecosystems that a single bank cannot fully replace. Such an approach can also be an end in itself, seeking to produce the full panoply of wetland functions and values on the premise that they are all important and that one -- such as habitat -- should not be emphasized at the expense of others. A banking program that attempts to produce many different functions will likely require advance comprehensive planning.

In practice, this approach does not require each transaction with the bank or banks to produce a one-for-one replacement of each function, but instead requires an assessment of an array of functions and requires that the entire array show a net increase with each transaction.

Advantages of this approach include, at least in theory, providing the most ecological benefits to the watershed and to society consistent with a scheme of compensatory mitigation. Because this approach is nondiscriminatory toward any one function or value, it may also be the most politically palatable by accommodating certain development demands another system might severely limit. There is also some evidence to suggest that more successful mitigation banks may be those designed to meet multiple objectives -- often regional ecology goals [Riddle 1988].

Disadvantages of this approach are logistical and philosophical. Replacing many functions requires assessing each of those functions and knowing how to replace them -- a process that can be both difficult and expensive. Creating multiple habitats, for instance, requires more costly design and construction, importing more replacement species, more management, and more complex and costly monitoring. With a more complex system, more

can go wrong. In addition, some functions or values may be heightened at the expense of others. Maximizing interior habitat will minimize edge habitat for other species; hydrological requirements of different wetland types may conflict.

Also, seeking to maximize benefits within the array of potential wetland values may not be consistent with a setting or landscape that has a unique or specialized set of wetlands or wetland dependent species. It may be that a more targeted approach is preferable to a broad effort to enhance wetland productivity. Nevertheless, the multivariate approach can offer one basis upon which to operate a wetland mitigation banking system.

The Port of Los Angeles' bank at Batiquitos Lagoon (subsequently suspended) was intended to achieve many different goals, including restoring tidal influence to the lagoon; preserving or enhancing existing fish and wildlife resources; retaining and enhancing habitat for endangered species; maintaining water quality; providing public access to the lagoon shoreline; and maintaining each of these goals achieved in perpetuity. On a broader level, the Springtown Bank in California is proposed as a multi-resource, multi-purpose bank that seeks to create credits for offsetting losses of wetlands habitat, endangered species habitat, open space, and even clean air. A banking system constructed on the model of a multivariate approach need not produce all of the values at one site. Rather, the whole complement of available banks may offer these values.

3. Maximizing One or Several Particular Functions

Maximizing a single function or value, such as providing habitat for an endangered species, is the primary goal of a number of active banks today, and can also serve as the basis for a regional banking system. This approach abandons the idea of maximizing as many different functions as possible, and concentrates instead on emphasizing one or two considered to be the most desired. Banks under this scenario can be designed to meet ecological goals such as improving water quality, or social goals such as reducing flooding in a floodprone area.

This preferred-function approach is generally easier and less expensive to accomplish than trying to maximize and balance many different functions. Because the goal is clearer, monitoring should be easier and less costly; determining success is simpler as well. This approach may be appropriate where the identified need is for flood control, or wildlife corridors, or sediment trapping, or for a particular wetland type. By clearly identifying the function to be maximized, moreover, the banking program can direct more attention toward assuring performance.

Disadvantages include wasting potential opportunities to replace other functions by concentrating on only one or a few preferred ones. Selection of an ecologically valid goal or goals is also critical. Some current banks have inadvertently become preferred function banks through their overreliance on habitat evaluation methods in assessing the banks'

currency and determining the extent of the compensation obligation. This approach also creates the possibility that social goals may be selected in preference to ecological goals.

Examples of the preferred function approach include the proposed Southwest Florida Regional Wildlife and Wetlands Conservation and Mitigation Area in Florida, which is designed to preserve habitat for the endangered red cockaded woodpecker. The Anaheim Bank developed by the Port of Newport Beach, CA, is designed to restore habitat for four different endangered species -- the brown pelican, the light-footed clapper rail, the least tern, and Belding's savannah sparrow. Other banks have been established to serve different single goals, such as preservation of a rare ecosystem (Company Swamp Bank, North Carolina); to restore waterfowl habitat (the Minnesota DOT bank) or to preserve and enhance threatened coastal wetlands (Fina LaTerre Bank).

Wetland banking may be targeted at restoring, creating, or enhancing endangered species habitat. Section 10(a) of the Endangered Species Act allows the U.S. Fish & Wildlife Service to issue permits allowing the incidental taking of endangered species where the impact of the development activity is minimized and mitigated, the effect of the taking does not reduce appreciably the prospects for the species' recovery, and there is a habitat conservation plan (HCP). Recently there has been greater interest in HCPs that attempt to deal with a broader ecological community of endangered species. Wetlands banks might be coordinated with HCP planning, so long as there is some care taken to prevent a single banked parcel from being used twice -- mitigating for a wetland loss in one location and a for a species loss in another. This arguably would produce a net loss because of the displacement of other functions from the banked wetland and the loss of nonwetland functions in the species' original range.

4. Deciding on an Approach

One way to decide among the various landscape-level approaches when developing a mitigation bank is through comprehensive planning. By considering together regional ecological, social, and economic needs, as well as current and likely future land-use patterns, society can develop a plan to guide development, preservation, and mitigation activities where they are most appropriate within the landscape. If an ecologically based wetland mitigation banking program is desired (in preference to onsite, in-kind replacement of wetland functions at a fixed ratio), a planning process is critical.

While no states currently have a comprehensive wetlands plan that can guide bank establishment, many regions and local entities have done resources planning. There are, therefore, models available for making the choices that wetlands planning raises. Wetlands are more difficult perhaps because they involve not only issues of local preferences for land uses, but national regulatory requirements and prohibitions. The need is for a planning mechanism that takes into account local social values, these nationally expressed social values, and regional ecological objectives. And, as the few successful and unsuccessful

wetland planning exercises attempted to date have demonstrated, continuing public input is critical.

Washington State's Department of Ecology suggests that because banking often seeks to balance economic growth with natural resources protection, a cooperative review team comprised of representatives from different interests -- natural resource agencies, developers, conservation groups, property owners, and others -- should make a joint decision about where a bank is established and why [Castelle et al. 1992]. Riddle and Denninger [1986] recommend that comprehensive planning address, at least, regional wetlands loss trends, future loss rates, regional goals for restoration or preservation of specific wetland types, and habitat diversity and creation or enhancement for rare or otherwise valued species. The public is likely to remain skeptical or uncertain about the value or advisability of wetland mitigation banking where there is no planning, or where the planning appears to be done without their involvement.

Table 5.
STATE WETLAND PLANNING

	Statewide comprehensive wetlands plans (as of 9/92)	Current State Planning for Wetlands Protection	Implementing Agency
AL	None-has applied for EPA grant for wetland conservation and management. Huntsville, AL preparing its own management plan.	**Coastal Area Management Plan*** - requires NPDES permits and other activities to be consistent with Coastal Program	Alabama Department of Economic and Community Affairs, Department of Environmental Management
AK	none	**Coastal Management Program*** - requires coastal management programs according to the **Alaska Coastal Management Act of 1977** **Anchorage Wetlands Management Plan** - identifies ecologically or hydrologically important wetlands and plans their protection - encourages planning for wetland mitigation prior to development **Juneau Wetlands Management Plan** - classifies Juneau wetlands for varying protection - establishment of a mitigation bank for projects affecting under 5 acres of wetland	Coastal Policy Commission, Governor's Office Community Planning Department, Anchorage Juneau Wetlands Review Board
AZ	none	**Statewide Comprehensive Outdoor Recreation Plan (SCORP)****	State Parks Department
AR	none	none	none
CA	none-preparing a state wetlands strategy to be presented to the Governor Nov. 1992	**San Francisco Bay Plan** - guides the protection and development of the Bay and its natural resources - attempts to maintain marshes and mudflats - encourages wetland mitigation and banking - suggests extending credit for certain fill removal projects - authorizes the Point Edith mitigation bank **Suisan Marsh Protection Plan** - recommends acquisition of marsh of property to create refuge areas and to provide recreational opportunities	CA Coastal Commission, San Francisco Bay Conservation and Development Commission (BCDC), Fish and Game Department BCDC and Solano County
CO	none	**SCORP**** **The Boulder Valley Management Plan** - an open-space initiative - includes creation of a greenway through the public acquisition of nine miles along Boulder Creek	Division of Parks and Outdoor Recreation

	Statewide comprehensive wetlands plans (as of 9/92)	Current State Planning for Wetlands Protection	Implementing Agency
CT	none-developing state wetlands strategy with EPA and CT DOT	**Conservation and Development Policy Plan for Connecticut 1992-1997** - suggests an avoid/mitigate approach towards the protection of its inland wetlands - would like to encourage the development of "public-trust" lands in the intertidal zone to ensure long-term preservation - plans to evaluate the long-term viability of mitigation approaches	Office of Policy Development and Planning Division
DE	none-preparing state plan to include a section on mitigation banking, to be completed September 1993	**Quality of Life Act and Planning and Property Acquisition Act** - require counties to map inland and tidal wetlands - provide for coordination and criticism of proposed land-use decisions between the county and the state and counties **Coastal Management Program*** - will determine the possibility of establishing a state-wide mitigation bank - encourages the development of a non-regulatory wetland creation, restoration, and enhancement program - could result in the development of a Special Area Management Plan (SAMP)	Department of Natural Resources and Environmental Control (DNREC) DNREC's Division of Soil and Water Conservation
FL	none	**Coastal Zone Management Program*** **Surface Water Improvement Management Plan** - protects Everglades through regulation of upstream activities **Local Government Comprehensive Planning and Land Development Regulation Act** - requires local governments to adopt a comprehensive plan to protect and identify wetlands **Areas of Critical Concern and Resource Planning and Management Committees** - protects areas containing natural or environmental resources of state or regional significance (including wetlands) from inappropriate land uses and development - examples include Everglades National Park/ East Everglades, Charlotte Harbor, and Lower Kissimmee River Basin	Department of Community Affairs South Florida Water Management District

	Statewide comprehensive wetlands plans (as of 9/92)	Current State Planning for Wetlands Protection	Implementing Agency
GA	none	SCORP**	DNR's Parks and Recreation Division
		Comprehensive Planning Act incorporates wetlands protection into planning process. It requires local governments to have plans approved by the Department of Community Affairs within 5 years	DNR
		Metropolitan River Protection Act in 1971 - required a plan for land and water use along a 46 mile stretch of the Chattahoochee River, including extensive wetlands - all local development must be consistent with this plan	Atlanta Regional Commission
HI	none	**Coastal Zone Management Plan*** - defines wetlands as a protected resource - designates certain wetlands as Conservation Areas	Department of Land and Natural Resources
		State Plan Law - all state and local plans must comply with the State Plan Law	
ID	none	none	
IL	none	**Illinois Water Quality Management Plan** - attempts to minimize wetland and floodplain damage by reducing riverbank erosion and channel modifications	Illinois EPA's Division of Water Pollution Control
		Northeastern Illinois Metro Region Strategic Plan for Land Resource Development - encourages protection of environmental resources - developing a greenway plan which will address wetland issues	Northeastern Illinois Planning Commission
		SCORP**	Department of Conservation
IN	none	SCORP**	DNR
IA	none	none	
KS	none	**Kansas Water Plan** - a comprehensive state plan to protect riparian and associated wetland areas - concerned with channel modifications and leaves land use plans and zoning laws to city and county authorities	Kansas Water Office
KY	none	SCORP**	Fish and Wildlife Department, KY Nature Preserves Commission

	Statewide comprehensive wetlands plans (as of 9/92)	Current State Planning for Wetlands Protection	Implementing Agency
LA	none	**Coastal Resources Program** - prevent salt water intrusions due to coastal development - local communities are encouraged to develop their own coastal plans **Coastal-Wetlands Conservation and Restoration Plan** - requires development of a long range wetlands plan and provides annual descriptions of wetlands projects	Coastal Management Division of the Office of Coastal Restoration and Management in DNR Coastal Restoration Division of the Office
ME	none	**Gulf of Maine Program** - includes a ten year action plan addressing wetlands - a regional plan which involves Maine, New Hampshire, Massachusetts, Nova Scotia, and New Brunswick - habitat mitigation efforts (including wetlands) are examined on state and local levels **1988 Growth Management Plan** - requires local comprehensive plans - includes inventory and analysis of state goals concerning wetlands **SCORP****	Gulf of Maine Council Office of Community Development Bureau of Parks and Recreation

	Statewide comprehensive wetlands plans (as of 9/92)	Current State Planning for Wetlands Protection	Implementing Agency
MD	none	**SCORP****	Office of State Planning
		Coastal Zone Management Program* - recently provided funds for three wetlands plans that will become part of the coastal zone plan	Coastal Resources Division
		Chesapeake Bay Critical Area Protection Law in 1984 - requires local governments to develop land-use plans by dividing critical areas into three categories based on intensity of development - advocate the protection of nontidal wetland habitat through a 100-foot or larger buffer zone adjacent to the Bay's shoreline, tidal wetlands, and tributary streams	Critical Area Commission Economic Growth, Resource Protection and Planning Comm. Water Resources Admin.
		Economic Growth, Resource Protection and Planning Act of 1992 requires local governments to include sensitive areas element to wetland plans and state projects required to include growth policy	
		Nontidal Wetlands Protection Act prepares nontidal wetlands watershed management plans	
		The Chesapeake Bay Agreement - requires the development of a regional policy for the protection of tidal and nontidal wetlands - train wetland managers in wetland identification, delineation, functional assessment, and mitigation processes	

	Statewide comprehensive wetlands plans (as of 9/92)	Current State Planning for Wetlands Protection	Implementing Agency
MA	none	**Coastal Zone Management Program*** - designates Areas of Critical Environmental Concern	Environmental Affairs Office
		Gulf of Maine (see Maine)	Gulf of Maine Council
		Nonpoint Source Management Plan (does not specifically include wetlands)	Water Pollution Control
		Watershed Protection Plan - provides general protection to a watershed but does not specifically include wetlands - focuses on non-point source pollution, discharge, hazardous and solid waste	Executive Office of Environmental Affairs Department of Environmental Protection Division of Wetlands
		Waterways Protection Act requires harbor plans	
		Wetlands White Paper - stresses Massachusetts' no net loss of wetlands position - outlines suggestions for further wetland protection including greater planning	
MI	none-developing a statewide wetland strategy under an EPA grant due in 1994	The state's **Coastal Program*** is being finalized by NOAA	NOAA
MN	none	Has Eight Water Planning Areas	Water and Soil Resources board
		Rice County Water Plan - includes protection of wetlands to increase water quality	Department of Natural Resource's Section of Wildlife DNR
		Critical Habitat Private Match - part of the Reinvest in Minnesota Program - matches cash, land, and easement contributions from individuals and private organizations - critical habitat includes wetlands	DNR
		Long Range Plan for DNR's Section of Wildlife - guides policy and acquisition efforts - establishes a goal to increase the quality and quantity of Minnesota wetlands	
MS	none	**Coastal Zone Management Program*** - local governments can establish waterfront and beach plans - incorporates earlier state wetlands protection laws	Bureau of Marine Resources

	Statewide comprehensive wetlands plans (as of 9/92)	Current State Planning for Wetlands Protection	Implementing Agency
MO	none- policy recommendations, wetland conservation goals, and a factual document due August 1992	**Wetland Management Plan** - presents habitat objectives and population expectations of wetland species - promotes recreational use of wetlands - establishes a management philosophy for wetland resources **SCORP****	Wildlife Division DNR for MO's Interagency Council for Outdoor Recreation
MT	none- just received EPA grant for a wetlands strategy	**SCORP****	Parks Department
NE	none-has EPA approval to develop a wetlands strategy to begin July 1993	**SCORP****	Game and Parks Commission
NV	none	**SCORP****	Department of Conservation and Natural Resources
NH	none	**SCORP****	Planning's Outdoor Recreation Program Council on Resources and Development
		Coastal Zone Management Program* - encourages local communities to develop wetlands protection ordinances	
NJ	none-developing a statewide wetland plan under an EPA grant, to be completed fall '92	**Coastal Zone Management Program***	Department of Environmental Protection's Division of Coastal Resources
		SCORP and Green Acres Program** - received 1961 bond money for the acquisition of lands for open space and recreation, including 46,000 acres of wetlands	Department of Environmental Protection New Jersey State Planning Commission
		Development and Redevelopment Plan of 1992 - defines wetlands as environmentally sensitive planning areas - encourages the preservation of large, contiguous tracts of land to protect sensitive natural resources	
		The State Planning Act of 1986 - promotes intergovernmental coordination for the successful formulation of the Plan	

	Statewide comprehensive wetlands plans (as of 9/92)	Current State Planning for Wetlands Protection	Implementing Agency
NM	none	**SCORP** and the 1986 New Mexico Wetlands Priority Plan addendum** - provides a planning framework to guide priority decisions concerning the protection, restoration, or acquisition of wetlands **City of Albuquerque Plan** was required by the **Rio Grande Stat Park Act of 1983.** The Plan suggests recreational use of the Rio Grande Bosque and the protection of its wildlife and habitat.	State Parks and Recreation Division City of Albuquerque
NY	none-requesting EPA funding for statewide plan	**Coastal Management Program*** - decrease the size requirement for wetland protection to ensure the protection of smaller wetlands - authorizes counties to prepare county coastal programs **Conserving Open Space Program** **Great Swamp Management Plan** - inventories Great Swamp resources - assesses regulatory and acquisition options	Office of Coastal Resource Management Regional Plan Association's Open Space Program
NC	none	**Coastal Zone Management Program*** - encourages communities to develop local land-use plans - advocates land acquisition as a management method	Division of Coastal Management in the Department of Natural Resources and Community Development
ND	none	**SCORP 1991-1995**** - includes a small wetlands acquisition program - farmers planting on converted wetlands will receive no support or disaster payments, no farm storage facility, insured, or guaranteed loans, or crop insurance for that year	Parks and Recreation Division, Division of Natural Resources
OH	none-development of a statewide wetland strategy to begin September 1992	**SCORP** and the 1986 Wetlands Priority Conservation Plan Addendum** - will identify potential threats to and damaged wetlands - encourages the acquisition of wetlands through the Land and Water Conservation Fund **Coastal Management Plan*** - draft released in February 1992 - includes wetlands protection goals through land acquisition and mapping for protection, restoration, and use of wetland resources	Division of Wildlife Ohio's DNR

	Statewide comprehensive wetlands plans (as of 9/92)	Current State Planning for Wetlands Protection	Implementing Agency
OK	none-OK Conservation Commission is developing statewide wetlands strategy with an EPA grant	none	
OR	none-draft of a statewide strategy to be released in March, 1993	**Statewide Land Use Planning Program** - seeks to protect and manage estuarine resources and coastal areas including wetlands - includes the Willamette River Greenway which prohibits any change in land use within designated boundaries which often includes wetlands **Wetland Inventory and Wetland Conservation Plans Act of 1989** and the **Wetlands Conservation Plans** are being developed in nine communities. Fifty-five communities plan to develop these - covers land-use activity affecting inventoried wetlands - communities expected to plan for mitigation of all expected wetland losses - includes the West Eugene Special Area Study, a regional planning effort to guide permitting and development away form sensitive areas, includes a mitigation bank **SCORP**** and the **1989 Wetland Priority Plan** - includes identification of priority wetlands to guide land acquisition - establishes criteria to assist wetland management and acquisition decisions - stresses the need for a wetlands inventory and to focus planning on increased land acquisition **Scenic Waterways Program** - provides for the management of scenic rivers and their associated wetlands	Land Conservation and Development Commission Division of State Lands, Department of Environmental Quality, Department of Land Conservation and Development, and Department of Fish and Wildlife Division of State Lands and State Parks and Recreation Division

	Statewide comprehensive wetlands plans (as of 9/92)	Current State Planning for Wetlands Protection	Implementing Agency
PA	none	**Coastal Zone Management Plan*** - includes a wetland strategy which guides policy development for new wetland strategies **Wetland Protection Action Plan** - guides wetland protection efforts and outlines needed regulatory changes **SCORP**** and the **1986-1990 Wetlands Addendum** - to establish wetland protection priorities - will coordinate federal, state, and local wetland permitting and protection activities **Design Criteria for Wetland Replacement** - to guide future Wetland Replacement Plans prepared by planning professionals	Department of Environmental Regulation Department of Environmental Resources Department of Environmental Resources
RI	none	**Coastal Resources Management Plan*** - identifies six water types which aids management of salt, fresh, and brackish water wetlands - a 1992 Addendum which broadens the definition of coastal and freshwater wetlands - includes the 1986 Narrow River Management Plan which encourages land management practices that include conservation easements, zoning, and land acquisition **Guide Plan** - includes general wetland policies	Coastal Resources Management Council
SC	none	**Coastal Zone Management Program*** - divides management authority in two sections: critical areas and the coastal zone - coastal counties are divided into three regions and are developing their own comprehensive plans	SC Coastal Council
SD	none	**Coordinated Soil and Water Conservation Plan** - may indirectly affect wetlands through its water quality improvement objectives	SD Association of Conservation Districts, the Conservation Commission, and the Soil Conservation Service
TN	none-development of statewide wetland plan to be completed in December, 1992	SCORP** - **1990 Recreation Planning Report** - describes wetland acquisition programs - describes **North American Waterfowl Management Program** which is a joint effort between public and private sectors and encourages wetlands protection and management through multiple use of wetlands	Department of Conservation

	Statewide comprehensive wetlands plans (as of 9/92)	Current State Planning for Wetlands Protection	Implementing Agency
TX	none-developing a statewide plan as an outgrowth of the coastal zone management effort that will include mitigation banking, acquisition, and mapping	**Texas Outdoor Recreation Plan** - state's version of **SCORP**** - includes a 1985 wetlands addendum which includes plans for land acquisition and ensures wetland protection **Texas Coastal Management Plan 1990-1991** - monitor the success of enhancement and mitigation plans of state-owned wetlands - coordinating agencies involved in mitigation projects to minimize failure of these efforts - develop guidelines for mitigation banking at local or regional levels - encourage donation of land and money and establish a state fund for the acquisition of wetlands	Parks and Wildlife Department General Land Office
UT	none	none	
VT	none	**SCORP**** **River Basin Plans** **Act 200**	
VA	none	**Chesapeake Bay Wetland Policy Implementation Plan** - addresses protection and restoration of both tidal and nontidal wetlands - guides development of local, state, and federal programs **Chesapeake Bay Preservation Program** - see Maryland's Chesapeake Bay Critical Area Program **Chesapeake Bay Agreement** - see Maryland's Chesapeake Bay Agreement	
WA	none-requesting EPA funding for preparation of statewide wetland strategy	**Puget Sound Water Quality Management Plan** - encourages development of local wetland protection programs **Growth Management Act of 1990** requires fast growing communities to plan extensively. This includes retaining open space, improving water quality, and encouraging economic development according to the states natural resources. No plans have been completed yet. **Shoreline Management Act of 1971** gives permitting and management responsibilities of shoreline to local governments. An executive order resulted in greater scrutiny of former permitting practices and a larger focus on wetlands mitigation	Puget Sound Water Quality Authority, Department of Ecology, and Department of Community Development (DCD) DCD's Growth Management Division Department of Ecology

	Statewide comprehensive wetlands plans (as of 9/92)	Current State Planning for Wetlands Protection	Implementing Agency
WV	none	**SCORP****	Wildlife Resource Division
WI	none	**SCORP**** and the **1987 Wetland Priority Plan** - includes the **Natural Areas Program** which restores areas to their pre-settlement condition and which encompasses a wide variety of wetlands - includes the **Natural Heritage Inventory Program** which identifies and ranks rare or unique communities recommends protection priorities for Natural Areas - include the **Stewardship Program,** a partnership program between the private and public sectors for conservation land acquisitions	DNR Division of State Energy and Coastal Management
		Coastal Zone Management Program* - seeks to balance the need for natural resource preservation and economic development - grants used to fund wetland inventories and for land acquisition	Southeastern Wisconsin Regional Planning Commission
		Chiwaukee Prairie-Carol Beach Land Use Plan - to guide local governments in acquiring environmentally significant open spaces - provides a framework for private development in the area	
WY	none	**SCORP****	Game and Fish Department

* The Coastal Zone Management Act (CZMA) is designed to promote natural resources management of the nation's coastal areas including coasts of the Great Lakes. One goal of coastal management is to preserve important estuarine and wetland areas by acquiring or dedicating land, or to protect them by minimizing adverse impacts from other coastal activities. When a state has an approved coastal zone management program (CZMP), the CZMA requires federal permit applications for activities in the coastal zone to be consistent with the state CZMP

** SCORPs, Statewide Comprehensive Outdoor Recreation Plans, are required by the Land and Water Conservation Fund Act of 1974. Each state must prepare a SCORP every five years to qualify for federal assistance through the Land and Water Conservation Fund. In 1986, the Emergency Wetlands Resource Act required amendments to all SCORPs which would specifically address wetlands and that these amendments were consistent with the 1986 National Wetlands Priority Conservation Plan.

CHAPTER ELEVEN
CONCLUSIONS

Wetland mitigation banking is based upon the concept that in some instances there may be ecologically better ways of providing compensatory mitigation for wetland conversions than onsite replacement. It can also provide economies of scale and greater regulatory certainty for developers and the public. Many developers, government officials, and environmentalists acknowledge that mitigation banking can offer ecological benefits. However, there is little consensus about the proper parameters for banking. This chapter briefly summarizes some of the more important conclusions of this study.

The conclusions fall into two groups. Conclusions (1)-(6) address the utility and operation of wetland mitigation banking generally, while conclusions (7)-(17) suggest specific approaches to structuring viable mitigation banks.

(1) Wetland mitigation banking can provide ecologically sound and viable compensatory mitigation.

Wetland mitigation banking offers an opportunity to make compensatory mitigation more ecologically significant by assuring that mitigation can occur in locations that advance landscape scale ecological goals; mitigation is not limited to where a development project happens to be located. Because mitigation banks are generally larger units than most onsite compensatory mitigation projects and may include buffer areas, they may also offer greater resilience to natural (or development-related) events that can cause the failure of many onsite mitigation projects. To the extent that mitigation wetlands are banked in advance of wetland conversion projects, banking can also provide temporal advantages over onsite mitigation.

(2) A wetland conservation plan that establishes specific goals should ordinarily be the basis for authorizing wetland mitigation banks.

Comprehensive planning can direct wetland preservation, restoration, creation, or enhancement efforts to areas where they are most important. A plan can provide a basis for requiring greater functional replacement, emphasizing particular wetland functions, or restoring historic wetland types. It can provide a basis for out-of-kind mitigation or for targeted mitigation of particularly rare or valued wetland types.

The existence of a watershed-based or other regional wetlands plan can allow private entrepreneurial and public banks offering credits for general sale to devise mitigation credit offerings with greater assurance that their transactions will be approved by regulators - thus reducing their regulatory and market risks. Thus, planning can encourage the development of economically viable mitigation banking. Public works mitigation banks also should ordinarily be based on comprehensive plans. Planning can assure that DOT banks, for

example, are not limited either to diffuse site-by-site mitigation of small sites, nor to centralized mitigation of disparate and dissimilar impacts. Planning is essential to maintain reasonable local replacement and to address landscape-scale issues. Putting public works banking into the context of regional plans also allows governmental resource management agencies to identify and to focus on key areas for restoration with public mitigation monies.

A wetlands conservation plan, while not an absolute prerequisite to banking, provides significant advantages in realizing banking's potential. With a plan, the flexibility inherent in banking can be preserved but rationalized - avoiding the ad hoc approach that has thus far stymied the development of banking systems.

(3) Firm and consistent regulation of wetland conversions is a necessary precondition for a sustainable wetland mitigation banking market to operate.

Because wetland mitigation banking requires a substantial speculative investment of private or public funds in mitigation activities, the stability of the regulatory regimes covering wetland conversions is critical. As noted in this study, it is particularly important that the regulation of wetland conversions be consistent and certain. (This is especially important if wetland banks are expected to produce difficult-to-restore wetland types). To the extent to which wetland definitions remain in flux or a broad variety of wetland conversions escape regulation and compensation, mitigation banking is unlikely to become viable. A consistent § 404 permit program would go a long way toward promoting banking. So would the imposition of compensation requirements on certain conversions now exempt from § 404 regulation or exempt from compensation requirements (e.g., certain nationwide permits that lack compensation provisions).

(4) Regulatory agencies need to promote a transition to mitigation banking.

Regulatory agencies should provide a foundation for mitigation banking (both public and private) by (1) adopting nationally applicable guidance providing clear standards for mitigation banking; (2) undertaking the planning efforts that are essential for mitigation banking; and (3) supporting pilot projects.

Regulatory clarity at the national level is critical. The major obstacle to mitigation banking has been lack of certainty at all levels of government and concomitant uncertainty in the private sector. The Corps, EPA, and state agencies should undertake reviews of wetland restoration sites in areas experiencing significant development pressures, and enlist communities in goal-setting, ADID procedures, and other first steps to accomplish wetland planning that can make use of banking. Finally, pilot projects for mitigation banking should be targeted in these same areas, drawing in part from the current inventory of proposed banks. While these need not be the only banks, pilot banks should include a program of monitoring, reporting, and evaluation to gauge the success of the early approvals.

Current experience has revealed a great deal about public works banks - not all of it affirming the approaches that have been used. Future approvals of public works banks should take advantage of this information. There is virtually no useful experience with public and private entrepreneurial banks; thus, the focus of the pilot programs should be on these banks. The transition to broader use of banking need not be lengthy, but it should be pursued intentionally so that valuable lessons in banking structure can be applied rather than relying entirely upon ad hoc decisions in the field. The ad hoc approach is partly what has brought us to the current situation in which there is little banking, and great uncertainty among regulators, the public, and prospective credit producers alike.

(5) Wetland mitigation banking will be effective only if substantial regulatory attention is given to the terms and conditions (and performance) of onsite mitigation.

Where mitigation banking is subjected to substantial requirements and onsite mitigation is not, the latter may have significant financial advantages - even in cases where it is less desirable ecologically. Any program should consider both forms of compensatory mitigation together. For example, mitigation banking guidance documents to date impose financial assurance requirements, buffer zone requirements, or advance mitigation requirements that are not imposed upon onsite mitigation. While these requirements are necessary, they are also highly relevant to onsite mitigation, which has had a relatively poor record.

Both forms of compensatory mitigation should be considered by regulators at one time. Onsite mitigation and mitigation banking need not be subjected to identical conditions; they simply need to have some parity of treatment. The adoption of a regional or watershed-based wetland conservation plan provides one way of taking these into account. Regional and national wetland mitigation guidance or regulations can also provide criteria, goals, and requirements for onsite and offsite mitigation.

(6) Mitigation banking can operate consistent with sequencing requirements.

There is no inconsistency between sequencing and mitigation banking. Indeed, sequencing remains a reasonable precondition to all forms of compensatory mitigation; it preserves naturally functioning wetland areas to the extent possible in the locations where they exist through avoidance and minimization. The few currently recognized exceptions to sequencing (e.g. comprehensive wetlands plans) apply reasonably well to banking that operates within an approved comprehensive plan. In these circumstances, sequencing may be foregone based on the plan's consideration of the same issues normally considered in project-by-project sequencing. There is, however, no evidence that suggests a need to exempt banking as such from sequencing.

(7) Mitigation banks should prefer wetland restoration to creation and enhancement.

The science of wetland restoration is more advanced than wetland creation, and is therefore more likely to produce successful mitigation and functional replacement. Moreover, restoration sites usually possess at least the occurrence of hydric soils and existing or potentially restorable wetland hydrology - key prerequisites to successful mitigation. Some wetland creation is relatively well understood - e.g., emergent marsh and coastal marsh; these types may be on a par with restoration. For the most part, however, creation of wetlands should be disfavored in comparison with restoration - possibly through the imposition of higher compensation ratios.

Restoration is also generally preferable to wetland enhancement. Enhancement involves the manipulation of a wetland system to produce or improve a particular value or set of values. Society receives a greater aggregate compensation through restoration because it affects not only the values being measured, but also the incidental values produced by the restored wetland. In addition, restoration usually seeks to produce a self-sustaining system, where enhancement merely seeks to augment a particular function, but does not address the whole ensemble of functions and values.

(8) Mitigation banks relying on preservation should be prohibited except for losses of particularly rare and hard-to-replicate systems.

Preservation banking should be prohibited except in order to compensate for unavoidable destruction of irreplaceable wetland types/habitats. Preservation, where recognized, should include adequate funding for long term monitoring, maintenance, and protection of the site; high compensation ratios should also be required. While preservation of a rare wetland may be proffered as compensation for losses of non-rare wetlands, this should ordinarily remain a case-by-case mitigation decision for regulators (e.g., Walker Ranch in Florida) rather than be part of an ongoing banking program.

(9) Guidance documents or regulations should not establish a presumption for onsite compensation over offsite banking.

Deciding between onsite and offsite mitigation involves trade-offs that require case-by-case analysis. Neither is inherently superior ecologically. Onsite mitigation replaces wetland functions in the same landscape setting, but the landscape is itself altered by the development project. Offsite bank mitigation sacrifices localized replacement for better chances of ecological success, better site selection, and a wider range of mitigation goals. Provided that there are established parameters for onsite mitigation as well as for banking, selection of the mitigation site should be governed (1) by the regional wetland conservation plan - which may identify particular areas (onsite or offsite) where mitigation should occur, and (2) absent such a plan, using case-by-case factors.

(10) Out-of-kind mitigation transactions are appropriate within the context of a comprehensive wetland conservation plan.

Mitigation banking need not be limited to in-kind replacement of wetland types. In-kind compensation, while providing some assurance that lost functions and values will be replaced, also tends to lead to the re-creation of the existing inventory of wetlands and wetland types. This may not be the most ecologically valuable or prudent approach. Where there is a wetland conservation plan that establishes goals, out-of-kind mitigation through mitigation banking can be an important policy instrument. Absent such a plan, however, in-kind requirements are reasonable guides to functional wetland replacement.

(11) Wetland mitigation banks should be sited in the same watershed as the development activities for which they provide compensation.

Because many of the specific functions performed by wetlands relate to their location in the landscape, including hydrological and habitat functions, wetland mitigation banks should provide credits only for wetlands that have been lost to development in the same watershed. The definition of the watershed (e.g. basin, subbasin, stream reach) at issue may need to expand or contract depending upon the values or functions of concern. Ideally the definition should occur as part of the comprehensive wetland planning stage. Where unique wetland values cannot be replaced (either onsite or offsite) within the watershed because of physical constraints and the development activity is nevertheless permitted, a more distant bank may be used.

(12) Credit definitions should be linked to the goals of the banking scheme, using a method that is as simple as possible consistent with the goals. Credit ratios should always be greater than 1:1.

There is a great variety among credit valuation approaches. This study was unable to find a single approach that could be endorsed for all purposes. The existing methods do, however, provide an ample array of options for use in mitigation banking for different purposes. It is apparent that in order for any banking program to function, the selected credit definition cannot be too complex. It should also bear some reasonable relationship to the goals of the underlying wetland conservation plan - assuring that the functions of concern are those that are measured.

The inability of any system to assure complete function-for-function replacement of any converted wetland leads inexorably to the conclusion that credit ratios should always be greater than 1:1. Indeed, this conclusion is borne out by practice at a great number of the banks examined for this study. Moreover, ratios serve additional purposes, including compensation for some temporal losses and covering some risks. It is evident that credit ratios for onsite mitigation should also be greater than 1:1 for the same reasons.

(13) Siting criteria or specific bank sites should be identified, with an emphasis on serving the ecological goals of the wetland conservation plan, and viability of the bank site.

Banking schemes may either designate areas where banks are suitable or establish criteria for site suitability. In either instance, the siting criteria should include those discussed in Chapter 6. Among the more important criteria are the consistency of the site with the wetland conservation goals of a comprehensive plan and the likelihood that the bank site will be self-sustaining over the long term (e.g., whether buffers and hydrology are sufficient).

(14) The banking instrument must be legally enforceable.

Many current banking instruments are not clearly enforceable and do not specify who is liable for a variety of acts. The MOU or MOA is particularly likely to suffer from this defect. Without a legally enforceable banking instrument, mitigation banking will be even less sound than onsite mitigation.

(15) Unless full functional performance of the banked credits is achieved prior to their use, the bank should be required to provide financial assurance.

Mitigation banking is typically thought of as "advance" mitigation, and indeed, this accounts for a significant number of the advantages claimed for mitigation banking. But not all banks are advance mitigation banks, and even those that are may not have achieved full functional replacement of all functions and values. Clearly some requirement of completed work (satisfaction of some performance standards) is necessary - not just the deposit of cash or the signing of contracts. Regulators may set standards in terms of what constitutes successful revegetation, for example. Unless full functional replacement is achieved, however, financial assurance (e.g., performance bonds, escrows, collateral bonds) must be provided by the credit producer to guarantee performance. This financial assurance should be in a form that expressly preserves the regulator's or other responsible entity's ability to levy directly on the financial assurance to perform corrective action. (As noted above, the requirement of financial assurance should apply to onsite mitigation as well to provide consistency and a level playing field).

(16) A contingency plan for bank failures should be provided by every bank, with sufficient funding to guarantee performance.

Even where banks are properly constructed and maintained, problems can arise subsequently. A contingency plan that addresses foreseeable problems should be required, and funding should be set aside to cover these contingencies for a given number of years. This funding may be the same financial assurance that guarantees functionality of credits, but may be a separate instrument, particularly if full functionality has been achieved. A

number of banks have such monitoring or contingency funds. (This requirement reasonably applies to onsite mitigation circumstances, as well).

(17) Banking may occur on public lands or private lands; however, a long term land manager should be designated.

There are no strong reasons to bar wetland mitigation banking from publicly owned lands, provided that ratios take into account the benefits gained and lost. Public lands may already be protected from development and may provide significant landscape scale advantages; private lands may better compensate for losses on private lands, and may provide more options for restoration projects. Whether banks are on private or public lands, a long term land manager should be designated and provided with sufficient management funds to assure the performance of the wetland. Third party managers, such as land trusts or nonprofit organizations may be considered as managers.

Conclusion

Wetland mitigation banking offers a promising approach to wetland compensatory mitigation. Like other forms of compensatory mitigation, it presupposes a wetland policy that continues to allow the lawful destruction of certain natural wetlands. Its potential utility must be measured not in comparison with a ban on wetland conversions, but on whether it can improve upon current compensatory methods. It appears that it can.

Wetland mitigation banking offers the potential for restoration and conservation of ecologically meaningful and robust wetland systems, planning on a landscape scale, and the harnessing of entrepreneurial as well as public funding to the task of wetland compensation. It provides some potential for "net gain" in wetland acreage and practical advantages in monitoring and management of compensatory wetlands. The usefulness of mitigation banking will be greatly enhanced if regulators establish equivalent parameters for onsite compensatory mitigation.

Appendix A

LIST OF WETLAND MITIGATION BANKS

EXISTING BANKS

1. California - Bracut Wetland Mitigation Marsh (nonprofit bank for general use)
2. California - California Coastal Conservancy - Huntington Beach (govt. bank for own use)
3. California - Mid City Ranch (state/local government bank for local govt. use)
4. California - Mission Viejo/ACWHEP (private/local govt. bank)
5. California - Naval Amphibious Base Eelgrass Bank (Navy bank for own use)
6. California - Port of Long Beach - Pier A, Newport Bay Mitigation Bank (public bank for own use)
7. California - Port of Long Beach - Pier J, Anaheim Bay (public for own use)
8. California - Port of Los Angeles - Inner Harbor (public bank for own use)
9. California - Port of Los Angeles - Pac Tex, Batiquitos Lagoon (public bank for own use)
10. California - San Joaquin Marsh (public/private bank for own use)
11. California - Sea World Eelgrass Mitigation Bank (private bank for own use)

12. Florida - Cheval Tournament Players Club (private bank for own use)
13. Florida - Hillsborough County Utilities Dept. Mitigation Bank (local govt. bank for own use)
14. Florida - Northlakes Park Mitigation Bank (local govt. bank for own use)
15. Florida - Polk Parkway Bank (local govt. bank for own use)
16. Florida - Polk Regional Drainage Project Bank (local govt. bank for own use)
17. Florida - Southeast Mitigation Bank (local govt. bank for own use)
18. Florida - Turner Citrus Inc./Hay and Mercer Ponds (private bank for own use)
19. Florida - Weisenfeld/Meadow Woods (private for own use)

20. Georgia - Georgia Department of Transportation (single client DOT bank)

21. Idaho - Aciquia (single client DOT bank)
22. Idaho - Mud Lake Wildlife Management Area (single client DOT bank)
23. Idaho - Old Beaver (single client DOT bank)

24. Indiana - Geist Reservoir (private bank for own use, resulting from violation)
25. Indiana - Morse Reservoir WMB (private bank for own and general use)

26. Louisiana - Dept. of Transportation and Development (single client DOT bank)
27. Louisiana - Fina LaTerre (private bank for own and general use)

28. Minnesota - Dept. of Transportation Wetland Habitat Mitigation Bank (single client DOT bank)

29. Mississippi - Dahomey National Wildlife Refuge (single client DOT bank)
30. Mississippi - Malmaison Wildlife Management Area (single client DOT bank)

31. Mississippi - State Line Bog & Dead Dog Bog (single client DOT bank)
32. Mississippi - Port of Pascagoula SAMP (local govt. agency for own use)

33. Montana - Interagency Wetland Committee Bank (single client DOT)

34. Nevada - Washoe Lake Mitigation Bank (state DOT bank for own and general use)

35. North Carolina - Company Swamp (single client DOT bank)
36. North Carolina - Pridgen Flats (single client DOT bank)

37. North Dakota - North Dakota State Highway Dept. (single client DOT bank)

38. Oregon - Astoria Airport (state sponsored bank for general use)

39. South Carolina - Highway Mitigation Bank (single client DOT bank)

40. South Dakota - Wetlands Accounting System Bank (single client DOT bank)

41. Tennessee - West Tennessee Wetland Mitigation Bank

42. Virginia - Bowers Hill/Goose Creek (single client DOT bank)
43. Virginia - Cabin Creek WMB (single client DOT bank)
44. Virginia - Fort Lee WMB (single client DOT bank)
45. Virginia - Otterdam Swamp (single client DOT bank)

46. Wisconsin - Patrick Lake (single client DOT bank)

PROPOSED BANKS

Alabama - State Highway Department (single client DOT bank)

Alaska - City and Borough of Juneau WMB (local govt. bank for general use)

Arizona - Asarco (private bank for own use)

Arkansas - State Highway Dept. WMB (single client DOT bank)

California - Bill Signs Trucking WMB (private bank for own and general use)
California - Dune Mitigation Bank (local/govt. bank for own use)
California - Folsom City (Willow Creek, Humbug Creek Parkway Plan)
California - Mission Bay Eelgrass Mitigation Bank (local govt. bank for own use)
California - Placer County (local government for general use)
California - Sacramento County Caltrans Bank (single client DOT bank)
California - Springtown Natural Communities Reserve (private for general use)

Florida	- Bird Drive Mitigation Bank (local government bank for own use)
Florida	- Dept. of Transportation (single client DOT bank)
Florida	- Disney World (private bank for own use)
Florida	- East Lake/McMullan Booth Road (local govt. bank for own use)
Florida	- Jerry Lake Weir Mitigation Bank (local govt. bank for own use)
Florida	- Mud Lake (local govt. bank for own use)
Florida	- North Trail WMB (local govt. bank for own and general use)
Florida	- Northwest Hillsborough County (local govt. bank for own use)
Florida	- Orlando International Airport Build-out (local govt. bank for own use)
Florida	- Pinellas County (local govt. bank for own use)
Florida	- S.W. Florida Regional Wildlife and Wetlands Conservation Mitigation Area (state bank for private use)
Florida	- Wetlands Land Bank of Florida, Inc. (private bank for general use)
Georgia	- Marshland Plantation Commercial WMB (private bank for general use)
Georgia	- Millhaven Plantation Commercial WMB (private bank for general use)
Illinois	- Homebuilder's Association of Greater Chicago WMB (private bank for general use)
Illinois	- Lake County WMB (local govt. bank for general use)
Illinois	- St. Clair County WMB (local govt. bank for general use)
Louisiana	- Barksdale Air Force Base WMB (federal agency bank for own use)
Louisiana	- Himont Expansion Bottomland Hardwood Bank (private bank for own use)
Louisiana	- Pass A Loutre Deltaic Splay Development (state bank for general use)
Louisiana	- Terrebonne/Point Au Chien Wildlife Management Area (state owned bank for general use)
Maryland	- Prince George's County (local govt. bank for own use)
Nebraska	- Lancaster County WMB (private/public bank for general use)
Nebraska	- Dept. of Roads (single client DOT bank)
New Hampshire	- Dept. of Transportation (single client DOT bank)
New Jersey	- Chimento Mitigation Bank (private bank for public or general use)
New Jersey	- Dept. of Transportation (single client DOT bank)
New Jersey	- Hackensack Meadowlands (public/private bank for general use)
New Jersey	- Passaic River Central Basin Wetlands Bank (public bank for general use)

New Mexico	- Valencia County (single client DOT bank)
Ohio	- Homebuilders's Association of Ohio (private bank for general use)
Oregon	- Dalton Lake (single client DOT bank)
Oregon	- Port of Astoria WMB (local govt. bank for own use)
Oregon	- Turner Mitigation Bank (single client DOT bank)
Oregon	- West Eugene Mitigation Bank (local govt. bank for general use)
Texas	- General Land Commission (state govt. bank for general use)
Texas	- Commercial Mitigation Bank, Arkansas County (private bank for general use)
Texas	- Dow Nature Refuge, Lake Jackson (private bank for own use)
Texas	- Taylor Lake Nature Preserve and WMB (private bank for own and general use)
Texas	- Wetlands Management, Inc. (private bank for general use)
Utah	- Provo City WMB (local govt. bank for own use)
Utah	- Northeast Utah WMB (private bank for general use)
Utah	- Tenth West Corridor WMB (local govt. bank for general use)
Virginia	- Dale City (private mitigation of violation for own and general use)
Virginia	- Lowe's Island (private bank for own and general use)
Virginia	- Neabsco Wetland Bank (private bank for general use)
Virginia	- Northern Virginia - Manassas (single client DOT bank)
Virginia	- Ragged Island Wildlife Management Area (public agency bank for own use)
Virginia	- Creeds (local govt. bank for own and state use)
Washington	- Dept. of Transportation (single client DOT bank)
Washington	- Port of Everett (local govt. bank for own and general use)
Wisconsin	- Statewide WMB (single client DOT bank)
Wyoming	- Highway Dept. (single client DOT use)

Appendix B

EXISTING WETLAND MITIGATION BANKS

BANK	LOCATION	CREDIT PRODUCER	OVERSEEING AGENCIES	CLIENTS	LAND OWNERSHIP current/future
1. Bracut Wetland Mitigation Bank	Humboldt Bay, CA	CA Coastal Conservancy	CA Coastal Commission, CA Dept. of Fish and Game	multiple public & private clients	CA Coastal Conservancy, which had long term management responsibility
2. California Coastal Conservancy - Huntington Beach	Orange County, CA	CA Coastal Conservancy	CA Coastal Commission, CA Dept. of Fish and Game	multiple - CA Transportation (DOT), Orange County Flood Control District	bought by CA Coastal Conservancy and given to Huntington Beach Wetlands Conservancy
3. Mid City Ranch	Humboldt County, CA	CA Fish & Game	CA Fish & Game, City of Eureka, Humboldt County	Humboldt County, City of Eureka	CA Fish & Game
4. Mission Viejo/ ACWHEP	Orange County, CA	Mission Viejo Company & Orange County Dept. of Harbors, Beaches, and Parks	USFWS, CA Dept. of Fish and Game	multiple - general	public- Orange County
5. Naval Amphibious Base Eelgrass	San Diego, CA	Naval Amphibious Base (NAB)	USFWS, NMFS, CA Dept. of Fish and Game	NAB	currently: NAB future: NAB
6. Port of Long Beach - Pier A Newport Mitigation Bank	Newport Beach, Orange County, CA	Port of Long Beach (Board of Harbor Communications)	FWS, NMFS, COE, EPA, CA Dept. of Fish and Game (City of Long Beach)	Port of Long Beach	CA Dept. of Fish and Game
7. Port of Long Beach - Pier J, Anaheim Bay	Long Beach, CA	Port of Long Beach	FWS, NMFS, COE, EPA, CA Coastal Commission, Regional Water Quality Commission, CA Dept. of Fish and Game	Port of Long Beach	public - USFWS (Seal Beach National Wildlife Refuge on Naval Base)
8. Port of Los Angeles - Inner Harbor	Inner Harbor - Cabrilla Marina, CA	Port of L.A.	Board of Harbor Commissioners (Port of L.A.)	Port of L.A.	private - Port of L.A.
9. Port of Los Angeles - Pac Tex, Batiquitos Lagoon	Carlsbad, CA	Port of L.A.	Board of Harbor Commissioners (Port of L.A.), FWS, NMFS, City of Carlsbad, CA State Land Commission, CA Dept. of Fish and Game	Port of L.A.	CA State Land Commission
10. San Joaquin Marsh	Orange County, CA	Irvine Company	USFWS, CA Dept. of Fish and Game	Irvine Company	Irvine Co. & Univ. of CA Natural Reserve System
11. Sea World Eelgrass Mitigation Bank	San Diego County, CA	Sea World	CA Coastal Commission, COE	Sea World (others can apply through Sea World)	Sea World leases the land from City of San Diego

BANK	LOCATION	CREDIT PRODUCER	OVERSEEING AGENCIES	CLIENTS	LAND OWNERSHIP current/future
12. Cheval Tournament Players Club	Hillsborough County, FL	Cheval Associates Partnerships, Inc.	S.W. FL Water Management District	one - private client	
13. Hillsborough County Utilities Dept. Mitigation Bank	Hillsborough County, FL	Hillsborough County Utilities Dept.	S.W. FL Water Management District	one - public; local government	county owned
14. Northlakes Park Mitigation Bank	Hillsborough County, FL	Hillsborough County	Hillsborough County Environmental Protection Commission, S.W. FL Water Management District	Hillsborough County	county owned
15. Polk Parkway Bank	Polk County, FL	local govt. of Polk County	S.W. FL Water Management District	county govt.	county
16. Polk Regional Drainage Project Bank	Polk County, FL	local govt. - Polk City	S.W. FL Water Management District	county govt.	county
17. Southeast Mitigation Bank	Hillsborough County	Hillsborough County, FL	S.W. FL Water Management District	county govt.	unknown
18. Turner Citrus Inc.	DeSoto County, FL	Gene Turner and brother	S.W. FL Water Management District	private	private ownership
19. Weisenfeld/Meadow Woods	Orlando, FL	Joseph Weisenfeld	State Bureau of Wetland Resource Management	private	unknown
20. Georgia Dept. of Transportation	various	GA DOT	FWS, COE, EPA	GA DOT	state
21. Aciquia	Cassia County, ID	ID Transportation Dept. (ITD)	ITD	ITD	currently public - ITD
22. Mud Lake Wildlife Management Area	Jefferson County, ID	ITD, Fish and Game	ITD	ITD	public
23. Old Beaver	Clark County, ID	ITD, Fish and Game	ITD	ITD	currently public - ITD
24. Geist Reservoir	Marion County, IN	Shorewood Corp.	COE	private - Shorewood	private
25. Morse Reservoir	Hamilton County, IN	Shorewood Corp.	COE	private - Shorewood	private
26. Louisiana Dept. of Transportation and Development (DOTD)	Grant and LaSalle Parishes	LA DOTD	LA Wildlife and Fisheries, LA DOTD	LA DOTD	currently - LA DOTD, intended for transfer to Wildlife and Fisheries
27. Fina LaTerre	Terrebonne Parish, LA	Fina LaTerre Corp.	FWS, NMFS, SCS, LA DNR, LA DWF	private	Fina LaTerre

BANK	LOCATION	CREDIT PRODUCER	OVERSEEING AGENCIES	CLIENTS	LAND OWNERSHIP current/future
28. Minnesota Dept. of Transportation Wetland Habitat Mitigation Bank	MN, statewide on DOT district base	MN DOT	MN DOT, MN DNR, FWS, FHWA	MN DOT	credit areas purchased by MN DOT, turned over to MN DNR
29. Dahomey National Wildlife Refuge	Bolivar County, MS	MS State Highway Dept.	FWS, COE, EPA, DEQ, MS Dept. of Wildlife, Fisheries & Parks	State Highway Dept.	bought from private owners by MS DOT; title transferred to MS Dept. of Wildlife, Fisheries, and Parks
30. Malmaison Wildlife Management Area	Grenada County, MS	MS State Highway Dept.	FWS, COE, EPA, DEQ, MS Dept. of Wildlife, Fisheries & Parks	MS State Highway Dept.	bought by private owners from MS DOT; title transferred to MS Dept. Wildlife, Fisheries & Parks
31. State Line Bog & Dead Dog Bog	Green County, MS	MS State Highway Dept.	FWS, COE, EPA, DEQ, MS Dept. Wildlife, Fisheries & Parks	MS State Highway Dept.	bought from private owners by MS DOT; title transferred to MS Dept. Wildlife, Fisheries & Parks
32. Port of Pascagoula SAMP	Jackson County, MS	Port of Pascagoula	USFWS, Port Authority, MS DEQ, MS Bureau of Marine Resources, EPA, State Resource Agencies	Port of Pascagoula	state
33. Interagency Wetland Committee Bank	Stevensville & Ovando, MT	State Highway Dept.	Dept. of Health, USFWS, EPA, COE, MT Dept. of Fish, Wildlife, & Parks	MT Dept. of Transportation	USFWS
34. Washoe Lake Wetland Mitigation Area	Washoe County, NV (near Carson City)	NV DOT	NV DOT, NV Div. State Parks, NV Div. of State Lands	NV DOT	NV Parks - upon completion of credits, bank will become a state park
35. Company Swamp	Bertie County, NC	NC DOT	NC Wildlife Resources Commission, USFWS	NC DOT	state owns bank; now considered part of the Roanoke River National Wildlife Refuge
36. Pridgen Flats	Sampson County, NC	NC DOT	NC Fish and Wildlife Service	NC DOT	FWS owns the bank
37. North Dakota State Highway Dept. Bank	statewide - ND	ND State Highway Dept.	FWS and ND State Highway Dept.	ND DOT	original owner ND DOT; after bank establishment - FWS
38. Astoria Airport	Clatsop County, OR	OR Division of State Lands	EPA, COE, NMFS, Dept. of Land Conservation and Development, Fish and Wildlife Dept., OR Div. of State Lands	open to all	Division of State Lands
39. Highway Mitigation Bank, South Carolina	Black River Farms, central SC	SC DOT	FWS, COE, Dept. of Health, SC Coastal Council, SC Water Resources Comm., SC Wildlife Marine Resources Div.	SC DOT	future - SC DOT (SC Dept. of Highways and Transportation)

BANK	LOCATION	CREDIT PRODUCER	OVERSEEING AGENCIES	CLIENTS	LAND OWNERSHIP current/future
40. Wetlands Accounting System	Arlington, SD	SD DOT	FHWA, FWS, SD Games, Fisheries, and Parks	SD DOT	DOT owns it until all credits used; will then donate to public or private conservation agency
41. West Tennessee Wetland Mitigation Bank	Shelby County, TN	TN DOT	TN Dept. of Environment and Conservation, TN Wildlife Resources Agency	TN DOT	TN DOT currently; at completion - TN Dept. of Environment and Conservation of TN Wildlife Resources Agency
42. Bowers Hill/Goose Creek	Suffolk, VA	VA DOT	EPA, COE, FWS, NMFS, State Water Control Board, VA Game Commission, VA Marine Resources Council, VA Fish & Game	VA DOT	VA DOT
43. Cabin Creek	Prince Georges County, VA	VA DOT	EPA, COE, NMFS, State Water Control Board, VA Game Commission, VA Marine Resources Council, VA Fish & Game	VA DOT	VA DOT
44. Fort Lee Wetland Mitigation Bank	Prince Georges County, VA	VA DOT	EPA, COE, FWS, NMFS, State Water Control Board, Marine Resources Council for Fish and Game, VA Marine Resources Council, VA Fish & Game	VA DOT	Fed. COE owned; granted easement to VA DOT
45. Otterdam Swamp	Greensville County, VA	VA DOT	EPA, COE, FWS, VA State Water Control Board, VA Game Commission	VA DOT	VA DOT
46. Patrick Lake	Dane County, WI	WI DOT	COE, EPA, FWS, FHWA, WI DNR	WI DOT	current - WI DOT; future - perpetual public trust with WI DNR

BANK	AUTHORIZING INSTRUMENT	404 PERM. yes/no	GEOGRAPHIC SCOPE	SIZE IN ACRES	WETLAND TYPE(S) IN BANK
1. Bracut Marsh	FWS says there may have been an MOA, CA Coastal Conservancy says "formal bank mgmt. plan"	yes	in Humboldt County	13	mitigates for 'pocket' marshes (2 acres) with a larger constructed marsh
2. CA Coastal Conservancy - Huntington Beach	8 party mitigation agreement	yes	site was adjacent to impacted areas	17	coastal ecosystem - tidal marsh
3. Mid City Ranch	MOA 1988	yes	in Humboldt County	8.2	freshwater, seasonal wetlands
4. Mission Viejo/ACWHEP	MOA; USFWS & CA Fish and Game are banker/monitors	yes	within Aliso Viejo Greenbelt - 3,400 acre open-space	32.3	freshwater
5. Naval Amphibious Base Eelgrass	MOA	no	same watershed - San Diego Bay	10-11	tidelands, transplanted eelgrass
6. Port of Long Beach - Pier A	MOU 1984	yes	25 miles from Long Beach Harbor	29	salt marsh, estuarine
7. Port of Long Beach - Pier J	MOU 1984	yes	10 miles	116	emergent
8. Port of Los Angeles - Inner Harbor	MOU	yes	within inner harbor	17	deep water
9. Port of Los Angeles - Pac Tex, Batiquitos Lagoon	MOA	yes	Carlsbad is 80 miles south but in same "Area of Ecological Continuity"	lagoon - 600 credit area - 363 actual credits - 363	shallow water, coastal embayment
10. San Joaquin Marsh	MOA between Irvine Co., USFWS, CA Dept of Fish and Game	no	the Irvine Ranch - 65,000 acre wetland system	18	freshwater
11. Sea World Eelgrass Mitigation Bank	MOA	yes	same watershed	less than one	eelgrass
12. Cheval Tournament Players Club	permit with S.W. Florida Water Mgmt. District	not specified	county	26.94	forested wetland
13. Hillsborough County Utilities Dept. Mitigation Bank	permit with S.W. Florida Water Mgmt. District	not specified	county	13	forested wetland
14. Northlakes Park Mitigation Bank	permit with S.W. Florida Water Mgmt. District	no	county	10.95	cypress wetland
15. Polk Parkway Mitigation Bank	permit with S.W. Florida Water Mgmt. District	no	county	3.2	forested wetland
16. Polk Regional Drainage Bank	conceptual permit with S.W. Florida Water Mgmt. District	no	county	24.3	forested wetlands
17. Southeast Mitigation Bank	MOU	no	watershed	31	upland - buffer areas, new wetlands, and enhancement of disturbed areas

BANK	AUTHORIZING INSTRUMENT	404 PERM. yes/no	GEOGRAPHIC SCOPE	SIZE IN ACRES	WETLAND TYPE(S) IN BANK
18. Turner Citrus, Inc.	permit with S.W. Florida Water Mgmt. District	yes	watershed	2 = 47	pine flatwoods
19. Weisenfeld/Meadow Woods	MOA	no	watershed	235	impacted - cypress and mixed hardwood wetlands, forested wetlands
20. Georgia DOT	MOA since 1987	yes	try to stay as close as possible within drainage site - 100 miles from impact	varies	varies
21. Aciquia	MOA	yes	as close to impact site as possible (try for watershed)	21.1	riparian and palustrine, some open water and aquatic-based wetlands
22. Mud Lake Wildlife Management Area	MOA	yes	try for watershed, but not critical	150	palustrine emergent
23. Old Beaver	MOA	yes	try for watershed, or as close as possible	7 - wetland 35.7 total	shrub/scrub, plush
24. Geist River	COE permit with written agreement	yes	not specified	25.4	forested wetland, some scrub/shrub and emergent
25. Morse Reservoir	COE permit with written agreement	yes	not specified	14.5	palustrine forested wetland, mixed hardwood
26. Louisiana Dept. of Transportation and Development	no formal banking agreement exists	yes	statewide	2944	forested wetlands, bottomland hardwood
27. Fina LaTerre	MOA	yes	within same hydrologic unit (within 500,000 acre area); other areas on case-by-case basis	5,000 - owned by Fina LaTerre, 2,014 - adjacent sites owned by others	freshwater marsh, brackish marsh, shallow, open water coastal and estuarine marsh
28. Minnesota Dept. of Transportation Wetland Habitat Mitigation Bank	MOU	yes	within DOT district	1700	hardwood, meadow, marsh, swamp
29. Dahomey National Wildlife Refuge	MOA	yes	usually same watershed	160	bottomland hardwoods
30. Malmaison Wildlife Management Area	MOA	yes	usually same watershed	318	bottomland hardwoods
31. State Line Bog & Dead Dog Bog	MOA	yes	usually same watershed	State Line Bog - 103 Dead Dog Bog - 205	bottomland hardwoods, pine savannah/pitcher plant bog
32. Port of Pascagoula SAMP	special area management plan	yes	same watershed as port	3200	coastal wetlands, nontidal wetlands
33. Interagency Wetland Committee Bank	MOU	yes	MT divided into drainage ways - try to stay within them or as close as possible	Otter Pond - 65 Blackfoot - 105	Otter Pond - was riparian, damned to create shallow water wetland; Blackfoot - prairie pothole complex

BANK	AUTHORIZING INSTRUMENT	404 PERM. yes/no	GEOGRAPHIC SCOPE	SIZE IN ACRES	WETLAND TYPE(S) IN BANK
34. Washoe Lake Wetland Mitigation Area	interagency agreement	yes	within Truckee watershed, next to Washoe Lake	1st site - 85 2nd site - 81	perennial marshes, freshwater marsh
35. Company Swamp	MOU	yes	preferably within coastal plains	1436	bottomland hardwood, cypress-gum
36. Pridgen Flats	MOU	yes	coastal plains area	200	pocosin
37. ND State Highway Dept.	MOU	no	priorities: 1) along project; 2) in biotic sub-region; 3) in biotic region; 4) outside biotic region	FWS: 10 sites ND DOT: 7 sites	palustrine emergent wetlands
38. Astoria Airport	two MOAs	yes	8 mile radius - single watershed	32	freshwater marshes
39. SC DOT	none	yes	statewide	1,000	forested wetlands
40. Wetlands Accounting System Bank (SD)	MOU	yes	watershed, then biotic region or outside biotic region, if necessary	25	palustrine emergent
41. West Tennessee Wetland Mitigation Bank	MOA	yes	same watershed	398	100 acres - bottomland hardwoods, forested wetlands, old creek channels; 298 - cleared and drained for agriculture
42. Bowers Hill/Goose Creek	none; debits reviewed by interagency committee and incorporated into individual permits	yes	Suffolk district, which encompasses the James and York Rivers	10.14	estuarine emergent, palustrine forested, shrub/scrub
43. Cabin Creek	none; verbal commitment with interagency review and comment	yes	general DOT district	9	palustrine forested
44. Fort Lee Wetland Mitigation Bank	none; verbal commitment with interagency review and comment	yes	DOT district with preference to sites close to bank	34	palustrine forested, emergent
45. Otterdam Swamp	none; debits reviewed by interagency committee, incorporated into individual permits	yes	DOT Suffolk district	14	palustrine herbaceous, shrub/scrub, forested
46. Patrick Lake	WI DOT plan, concurred by relevant federal agencies	yes	WI DOT district	160	palustrine emergent

BANK	COMPENSATION METHOD	CURRENCY/EVALUATION METHOD	COMPENSATION RATIOS
1. Bracut Marsh	restoration of former marsh sites by removing lumber operations	acres; cost is 75 cents per square foot	determined by CA Coastal Conservancy on a case-by-case basis
2. CA Coastal Conservancy - Huntington Beach	restoration	HEP	
3. Mid City Ranch	restoration, creation, enhancement	modified HEP	acre-for-acre; determined by CA F&G on case-by-case basis
4. Mission Viejo - ACWHEP	enhancement & creation	acres; about $100,000 per acre to buy a credit	starts at 3:1, can be lowered under certain circumstances
5. Naval Amphibious Base Eelgrass	transplant of eelgrass to bank	habitat evaluation credit system based on mean density of eelgrass	1:1 acreage basis
6. Port of Long Beach - Pier A	restoration & enhancement	"Consensus Habitat Evaluation" analogous to HEP	1.5:1
7. Port of Long Beach - Pier J	restoration, enhancement & creation	modified HEP	1.5:1
8. Port of Los Angeles	creation	water surface acreage at mean high water	1:1
9. Port of Los Angeles - Pac Tex, Batiquitos Lagoon	restoration & enhancement	surface water acres	1:1
10. San Joaquin Marsh	enhancement	HU - modified HEP called HVA - habitat value analysis	1:1 minimum
11. Sea World Eelgrass Mitigation Bank	restoration	survey for density, quality and quantity of eelgrass: impacted and mitigated areas have to have similar eelgrass density	1.2:1 - the 0.2 represents the amount of time (2 years) the habitat is out commission.
12. Cheval Tournament Players Club	creation & enhancement	WET & best professional judgment	sliding scale dependent on success criteria
13. Hillsborough County Utilities Dept. Mitigation Bank	creation	WET & best professional judgment	sliding scale dependent on success criteria
14. Northlakes Park Mitigation	rehydration of drained wetlands	case-by-case; impacts known in advance	1:1 to 2.5:1 - varied depending on impact
15. Polk Parkway Bank	creation	30% canopy closure in forested wetlands; 85% species survival	2.5:1 - immediately after construction began; 1:1 after success
16. Polk Regional Drainage Project Park	creation	WET (reference wetland); type for type	sliding scale dependent on success criteria
17. Southeast Mitigation Bank	creation, enhancement & preservation	PMAs (Potential Mitigation Acres)	high replacement ratio initially with sliding scale
18. Turner Citrus Inc.	conversion, restoration & enhancement	ratio dependent on wetland type and wetland quality	have used various ratios; 1:1 and greater
19. Weisenfeld/Meadow Woods	enhancement & preservation	FL DER valuation questionnaire	sliding scale from 20:1 to 6:1 dependent upon success criteria
20. Georgia DOT	creation, restoration & protection	regulating agencies - professional judgment	2:1 - 1:1

BANK	COMPENSATION METHOD	CURRENCY/EVALUATION METHOD	COMPENSATION RATIOS
21. Aciquia	creation	HEP	1:1 or higher, determined by COE
22. Mud Lake Wildlife Management Area	enhancement	HEP	not specified
23. Old Beaver	restoration of riparian & enhancement	HEP	1:1 or higher, determined by COE
24. Geist Reservoir	restoration	acres	1:1, determined site by site
25. Morse Reservoir	restoration	acres	1:1, determined site by site
26. Louisiana Dept. of Transportation and Development	enhancement & restoration	HEP 76 & AAHU	1:1 ranging up to 4:1
27. Fina LaTerre	enhancement	HEP 76 & AAHU	2:1
28. Minnesota Dept. of Transportation Wetland Habitat Mitigation Bank	restoration, enhancement, creation & preservation	modified HEP 80, based on wetland type rather than species-specific habitat	based on 1:1 HU
29. Dahomey National Wildlife Refuge	restoration, enhancement & preservation	no HEP or WET; use ratios	1:1
30. Malmaison Wildlife Management Area	restoration & enhancement	no HEP or WET; use ratios	1:1
31. State Line Bog and Dead Dog Bog	restoration, enhancement & preservation	no HEP or WET; use ratios	1:1
32. Port of Pascagoula SAMP	preservation	none	none
33. Interagency Wetland Committee Bank	restoration, enhancement, creation & preservation	acres; best professional judgment	none
34. Washoe Lake Wetland Mitigation Bank	creation & enhancement	WET	1:1
35. Company Swamp	preservation	HEP	multiply the acres by average HU/acre of the area to determine the number of HUs they must debit
36. Pridgen Flats	restoration	pure acreage	2:1
37. North Dakota State Highway Bank	restoration, creation, enhancement & preservation	ND DOT = valuation method USFWS = list of replacement options developed using consensus of professional judgment	3:1
38. Astoria Airport	restoration & enhancement	HEP (modified)	sliding scale based on habitat value ranging from 1:1 to 6:1
39. South Carolina Dept. of Transportation	restoration	not specified	not specified
40. Wetlands Accounting System Bank, SD	restoration, creation, enhancement & preservation (restoration preferred)	acres	none
41. West Tennessee Wetland Mitigation Bank	restoration, enhancement, creation, & preservation (in order of preference)	acres	case-by-case; minimum 2:1
42. Bowers Hill/Goose Creek	creation	acreage	1:1, 2:1 where forested wetlands are impacted

BANK	COMPENSATION METHOD	CURRENCY/EVALUATION METHOD	COMPENSATION RATIOS
43. Cabin Creek	creation	acreage	2:1
44. Fort Lee Wetland Mitigation Bank	creation	acreage/square footage	2:1
45. Otterdam Swamp	creation	acreage	1:1
46. Patrick Lake	restoration & enhancement	acreage	ratio determined by Minnesota Wetland Evaluation Methodology (WEM)

Appendix C

FEDERAL BANKING POLICIES

U.S. Army Corps of Engineers and U.S. Environmental Protection Agency Memorandum of Agreement Determination of Mitigation under §404(b)(1) Guidelines Signed - February 6, 1990 Effective - February 7, 1990

This MOA provides the Corps and EPA with policy guidance and procedures to implement the Clean Water Act §404(b)(1) Guidelines. The Corps adheres to this MOA to make a "determination of compliance with the Guidelines with respect to mitigation for standard permit applications." EPA uses the MOA to develop "positions on compliance with the Guidelines for proposed discharges and will reflect this MOA when commenting on permit applications."

Under the Guidelines' sequencing scheme, Section 404 applicants must avoid adverse impacts or prove that the impacts are unavoidable. The applicant is then required to minimize unavoidable adverse impacts. If adverse impacts still exist after minimization, the applicant must perform "appropriate and practicable" compensatory mitigation to offset the impacts. After following this sequence of criteria, mitigation banking "may be an acceptable form of compensatory mitigation under specific criteria designed to ensure an environmentally successful bank." Significantly, the MOA states that once a bank has been approved by EPA and the Corps, use of that bank is "considered as meeting the objectives of the MOA, regardless of the practicability of other forms of compensatory mitigation." This guidance offers little detail of where or how to establish a bank. The guidelines themselves state that national guidance for mitigation banks is forthcoming.

The MOA states a preference for mitigation "adjacent or contiguous to the discharge site." If on-site work is not practicable, however, off-site mitigation should be undertaken in the same geographic area, "in close proximity and to the extent possible in the same watershed." In-kind mitigation is considered preferable to out-of-kind. The guidance cautions that wetland creation or other habitat development should be given careful consideration to the likelihood of ecological success, given the "uncertainty" surrounding the science of wetland creation. Restoration is the preferred form of compensatory mitigation, and "preservation may only in exceptional circumstances be accepted as compensatory mitigation."

Functional values are to be assessed by applying "aquatic site assessment techniques recognized by experts in the field and/or best professional judgment of federal and state agency representatives," provided there is full consideration of ecological functions as described in the Guidelines. The minimum acceptable functional replacement ratio is "one for one...with an adequate margin of safety." The Corps and EPA agree to determine compensation ratios on a specific case by case basis where possible.

U.S. Environmental Protection Agency
Region IX
San Francisco, California
Mitigation Banking Guidance
December 1991

The Region IX guidance, the first developed and adopted by an EPA region, establishes mitigation banking as an acceptable form of compensatory mitigation requiring full compliance with all federal environmental laws, regulations, and policies. Mitigation banking may be used where "off-site mitigation is appropriate." "The goal of mitigation banking should be creation of self-sustaining functional ecosystems, equal in acreage and functions and values to those being lost, which are protected in perpetuity." "Mitigation banking should be undertaken, when practicable, in areas adjacent or contiguous to discharge site" and in areas already under compatible management. Banks should be implemented in the same geographic area, close to the impacts and within the same watershed when practicable.

Under Region IX's guidance, banking may include water-dependent or linear projects as well as projects with small, unavoidable impacts and/or impacted wetlands with minimally existing or potentially restorable functional values. Repair projects for public structures where mitigation might otherwise not occur are also applicable to mitigation banking.

In Region IX, banking is not appropriate to be used when on-site mitigation is practicable or the mitigation would "not lower a project's adverse impacts below the threshold of significant degradation." Likewise, projects impacting "threatened or endangered species or natural communities," "intact remnants of damaged or declining systems," "other regionally significant functional wetland values," or projects for which there is insufficient "knowledge or technology to determine a reasonable likelihood of success" should be considered inappropriate for mitigation banking.

The guidance finds in-kind mitigation generally preferable to out-of-kind, and stipulates that banks should replace the same range of functions and values as the impacted ones. Restoration should be considered the first option for compensation. Purchase or preservation of existing habitats, in the absence of restoration or creation, is generally not acceptable by Region IX. However, preservation of high value or vulnerable wetlands may be an integral part of an overall mitigation banking plan if beneficial to the entire aquatic ecosystem.

Region IX suggests that at minimum, banking should provide a one-for-one replacement of lost functional values. Absent more definitive information, one-for-one acreage replacement may be used. The guidance urges consideration and protection of surrounding areas to the maximum extent. For example, bank design, development and

management should incorporate measures that will enhance upland areas, and reduce negative "edge effects."

Generally, the guidance advocates advance mitigation to offset lost values in advance of impacts. These lost mitigation functional values should be quantified and serve as a baseline for measuring success. The guidance does however, retain some flexibility in the timing of credit issuance. "In some cases, however, it may be acceptable to allow incremental distribution of credits corresponding to the appropriate stage of successful replacement of wetlands functions and values."

Region IX stipulates that mitigation banks must develop a formal, written agreement that establishes "specific guidelines for bank use, and defines required, permitted and prohibited actions and obligations for each participating entity." All involved parties must sign it. Region IX identifies nine requirements for the agreement, including bank life, reporting requirements, success goals, evaluation methodology and credit/debit procedures. In addition, banking agreements must identify procedures for holding the mitigation bank developers/operators accountable for all bank-related project costs.

U.S. Army Corps of Engineers
Galveston District
Galveston, Texas
Interagency Guidelines
for the Development and Use of Mitigation Banks (Draft)
July 31, 1992

The Galveston Army Corps of Engineers Interagency Guidelines provide guidance to ensure mitigation banking programs are implemented with consistency, to encourage interagency agreement in early stages of planning, and to establish procedures to develop mitigation banking Memorandums of Agreement for each mitigation bank. In addition to a signed MOA, a potential wetland mitigation bank site requires authorization by the Department of Army.

The Galveston Guidelines consider restoration as the conversion of a previous wetland site back to functional wetlands. Creation is the process of establishing a functional wetland from a low quality upland (non-wetland site). Enhancement requires improving the function and value of an existing wetland without altering the habitat type. Preservation is the least preferred type of compensation. It is only accepted by the Galveston Corps in rare cases and when combined with other forms of mitigation as well. The area of preservation should be high quality and hard-to-replace wetlands.

The guidelines establish a mitigation bank review team (MBRT) to be composed of federal and state agency representatives. The team will "determine suitability of bank site location, evaluate bank site development plans, approve or determine the functions and value of the wetlands, make periodic site inspections of the mitigation bank and report findings to the Corps, and assist in developing and signing the mitigation bank MOAs." The agencies involved include the U.S. Army Engineer District Galveston, U.S. EPA, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Texas Park and Wildlife Service, Texas General Land Office, and the Texas Water Commission.

Project specific mitigation, including in-kind and on-site replacement, is preferred unless applicant demonstrates that compensatory mitigation from the bank will result in a "higher quality wetland and environmental gain." Additionally, a projects's potential impacts (after sequencing) must not result in significant degradation of the ecosystem. If on-site, in-kind mitigation is not "practicable", credits from a bank can be used provided that the bank is in the same watershed or hydrological basin as the impacts. The Galveston guidelines require that the bank be as self-sufficient as possible.

Credit approval will be determined by the Corps during the Section 404 process, pending MRBT determination that the wetland is functioning. Upon receipt of a mitigation bank proposal, the Corps will make a "preliminary determination as to the likelihood of any

historic properties" which may be affected by the proposal. Further investigation, including an archaeological survey, may be required in the future.

Bank operators must provide the Corps with a documentation of anticipated need, current site evaluation, and feasibility of site development on specific site. A copy of this document will also be given to the MRBT. Assessment methods and replacement ratios will be determined on a case-by-case basis by the MRBT.

The Corps' Omaha District has developed a draft guidance on mitigation banking that is very similar to the Galveston District guidance.

Intermodal Surface Transportation Efficiency Act
Federal Highway Administration
23 U.S.C. §103(i)(13) and
23 U.S.C. §133(b)(11).

Under the National Highway System, funds apportioned to states under §104(b)(1) "may be obligated to wetlands mitigation efforts including wetlands mitigation banks." Federal highway funds can also be applied to state and regional wetlands conservation, restoration, enhancement and creation work. Contributions to mitigation banks "may take place concurrent with or in advance of project construction." FHWA money may be applied toward advance mitigation "only if such efforts are consistent with all applicable requirements of federal law and regulations and state transportation planning processes."

Section 133(b)(11) also allows for states to obligate funds from federally funded surface transportation programs toward wetlands mitigation banks. Contributions can either be concurrent or in advance of project construction.

Northeast Regional Guidelines
on the Establishment and Operation of Wetland Mitigation Banks (Draft)
developed jointly by the
U.S. Army Corps of Engineers
North Atlantic Division
New England Division

U.S. Environmental Protection Agency
Region I
Region II
Region III

U.S. Fish and Wildlife Service
Region V

National Marine Fisheries Service
Northeast Region

March 1992

The draft Northeast Regional Guidelines address wetland mitigation banks associated with highway construction. The guidelines require resource review agencies to comply with all relevant federal laws and policies and to apply mitigation sequencing to all projects under permit review. Unlike most mitigation banking policies or agreements, this one was drafted before any banks were established in most of the area covered by these agencies. There are no existing banks in New England, New York, Pennsylvania, New Jersey, Delaware, or the District of Columbia. Maryland has three proposed banks and Virginia has several existing and many proposed banks.

Under these guidelines, mitigation bank site selection is to be based on "existing resource value, presence of contaminants, size, adjacent land uses, restoration and creation potential and the ability to provide long term protection of the bank." In-kind mitigation is preferable to out-of-kind. Wherever possible, every effort should be made to "reduce negative edge effects," "contribute to overall water quality in the ecosystem" and "provide for fish and wildlife migrational corridors."

The bank should be within the same geographic area as the impacts and "every effort should be made to establish banks on former wetlands" to increase the likelihood of success. Restoration is preferred over creation and enhancement. The guidance defines restoration as establishing a functioning wetland on a "former or degraded wetland site," and creation as establishing a functioning wetland on an "upland (non-wetland site." The guidance does

not define enhancement. Preservation or purchase of wetlands "does not constitute an acceptable mitigation bank."

The guidelines state that credits will be determined by the maximum practicable replacement of lost function. If there is no definitive information available, a minimum one to one acreage replacement ratio will be used.

The multi-agency agreement establishes as a goal that banks should be as "ecologically and administratively self-sustaining" as possible. The permittee seeking compensation credit has the responsibility to demonstrate a successful offset of impacts, and if the bank fails in part or in whole, the permittee is held responsible for compensation. If a bank is not providing the intended functions, "the agency will restrict or prohibit use of the bank for section 404 purposes."

This guidance mandates that mitigation banks must be determined by the appropriate resource and regulatory agencies to be functioning wetlands prior to issuance of credits. Once established, annual monitoring and reporting to resource and regulatory agencies is required. If the credits are completely withdrawn, monitoring can cease, as long as the bank has been successful for five years.

Mitigation bank sites, according to the guidance, must be protected in perpetuity through a legally binding mechanism. In order to implement the bank, there must be a written formal agreement which identifies the sponsor, overseeing agencies and parties responsible for "acquiring, developing, managing, and monitoring the mitigation bank site." The agreement must also identify success criteria, evaluation methodology, and dispute settlement procedures and specify that "bank operators and developers are accountable for all bank related project costs."

U.S. Environmental Protection Agency
Region V
Chicago, Illinois
Generic Mitigation Banking Program Under Section 404 (Draft)
July 10, 1991

In Region V both project specific mitigation and mitigation banking systems must follow the sequence of avoidance, minimization, and compensation. If there are adverse impacts that cannot be avoided or minimized, mitigation banking will be considered only after all possible project specific compensation alternatives have been shown to be "unacceptable." Compensatory mitigation "will first be developed on a project specific basis" with usage of the Bank "a last resort."

The preference for mitigation types are on-site and in-kind wetland areas. Both out-of-kind and off-site compensatory mitigation "generally will require a greater acreage than in-kind or on-site replacement to achieve the same reduction in environmental losses." Compensation ratios will be determined as "a simple ratio based on loss trends for the particular type(s) of wetlands involved." If this information is not available, a ratio between 1:1 to 5:1 will be developed by the interagency team, and approved by the bank sponsor, Corps, and the Environmental Protection Agency. Region V stipulates "a one for one 'credit' for each 0.01 acre of wetlands to be deposited."

Withdrawals from mitigation banks are acceptable if project specific mitigation cannot be "reasonably developed" or there remain small losses of wetlands that cannot be "reasonably replaced" through project specific mitigation. The guidance establishes an interagency work group to audit "deposits" and "withdrawals" into and out of the bank. Before a mitigation site is deposited into a bank, the work group will determine "whether or not the objectives of the compensatory mitigation sites are being met." Region V stipulates that wetlands constructed or restored and "deposited" into a bank "may remain the same or improve in quality (over time)." Wetlands not improving in quality will be reviewed for "any necessary and appropriate remediation."

To assure compliance with the 404(b)(1) guidelines and the mitigation MOA, Region V's guidance defines currency as "acreage of wetlands by type of wetland." The region goes on to require yearly bank monitoring by EPA and the Corps to verify whether or not there is a surplus of acreage. If the balance is negative, the bank will become insolvent. No deposits or withdrawals will be permitted until a positive balance is restored.

This guidance also includes several appendices which outline the region's mitigation sequence, definitions, and acreage replacement considerations.

U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia
Mitigation Banking Guidance (Draft)
1992

Region IV recognizes that mitigation banking has many advantages over project-specific mitigation. Banking provides the opportunity to implement mitigation work in advance of impacts. This reduces regulatory uncertainty; brings resources and expertise together in the planning, bank development, and maintenance stages; maintains integrity of aquatic ecosystems through consolidation of fragmented habitats; and increases ease of monitoring and public awareness of wetlands. Because banks are generally larger than specific mitigation projects, it is also easier to monitor ecological success, maintain management accountability, and preserve the wetland values and functions once the bank has been established.

Region IV's guidance explicitly states that "banks cannot serve to alter the normal sequencing of the §404 permit review process or eliminate obligations of the permittee under that process." It also specifies that "where all the required mitigation cannot be achieved on site, bank credits may be used to complete compensation for the adverse impacts."

In language similar to that offered in Region IX's guidance, Region IV states that "for projects where off-site mitigation has been determined appropriate, mitigation banking may be an acceptable option." These include projects with small unavoidable impacts, linear projects, projects involving maintenance of public structures, and projects for which general permits are issued and/or administered by Army Corps of Engineers or state §404 programs. This last project type is not included in the Region IX guidance. Projects listed as inappropriate for mitigation banking include those affecting rare, threatened or endangered species, "intact remnants of damaged or declining systems," or those affecting "regionally significant functional values of wetland or aquatic habitats."

In general, the guidance urges that banks should be sited as close, if not adjacent, to the discharge site as possible. Where this is not feasible, the project should be in the same geographic area ("in close physical proximity and within the same watershed.") In-kind mitigation is stated as preferable to out-of-kind and restoration should be the first option considered. Region IV clarifies that preservation "is generally not a desirable form" of mitigation: "Only in rare, site-specific cases will Region IV accept preservation as **sole** compensatory mitigation." Preservation may, however, be "an integral part" of the bank plan. Region IV encourages the use of sites with "minimal existing habitat values" to maximize overall ecological benefits, and bank plans that enhance nearby lands.

Potential bank clients should "identify agencies and organizations to participate in planning"; "identify entities responsible for acquiring, developing and managing the bank site"; select potential sites; and "obtain preliminary concurrence from agencies in the early coordination phase of environmental review process." A multidisciplinary team representing resource agencies will "assess pre- and post-mitigation functional value evaluations."

In general, mitigation should be implemented and proven successful in advance of project impacts. Credits may be distributed in phases over time, based on increments of success. In terms of compensation ratios, Region IV requires a minimum of one-for-one replacement of lost functional values. However, where quantitative analyses are not possible, a 2:1 ratio is prescribed to determine credits for restoration, 3:1 for creation, 4:1 for enhancement, and 10:1 for preservation. These ratios may be adjusted according to site specific conditions or in cases "where credits are withdrawn prior to full functional development of the bank."

Region IV's guidance would require every bank to develop a formal, written, banking agreement and a banking contract, which is described in detail in the guidance. It includes bank procedures, identification of all parties and their responsibilities, and "an irrevocable guarantee of availability of the necessary financial resources" for which the mitigation bankers and bank managers are accountable. The financial assurance may be in the form of a "fully funded trust, a letter of credit with standby trust, or a surety performance bond with standby trust." There should also be a mechanism for the protection of the site in perpetuity such as a conservation easement, deed restriction or transfer or dedication to proper entity and remedies for noncompliance with any agreement provisions and requirements.

DRAFT Interagency Memorandum of Understanding
for Conservation of Wetland Resources
Associated with Highway Construction Projects
in the State of _____

Note: This was presented as a "strawman" mitigation banking model at a conference sponsored by the Federal Highway Administration in June, 1992.

This Draft Interagency Memorandum of Understanding provides guidelines to identify and evaluate potential wetland impacts associated with highway construction and maintenance projects, to evaluate these impacts, and to implement mitigation for losses of wetland functions, values, and resources. One of the goals is to "establish a process to ensure the early involvement of concerned agencies" in addressing wetland impacts due to highway construction and to elevate wetland review early on in highway planning.

The MOU will "function under the general guidance and oversight of the Interagency Wetlands Group," which will have at least one representative from the Federal Highway Administration, United States Environmental Protection Agency, U.S. Corps of Engineers, and U.S. Fish and Wildlife Service and representatives from the equivalent state agencies. The Interagency Wetlands Group will identify potential wetland impacts and classify them according to Army Corps regulations, the Endangered Species Act and other federal wetland classification guidelines. Based on the identified impacts and regulatory requirements, the Group will refer the issue to the Technical Subcommittee.

The State Department of Transportation will identify wetland resources that may be impacted and contact the Technical Subcommittee if the resources include any of the following: "navigable waters; wetlands exempted from Corps regulatory authority but subject to review under Executive Order 11990; and wetland habitats containing threatened or endangered species." Following wetland resource identification by the state agency, the Technical Subcommittee, which is composed of technical representatives from federal and state agencies, determines "the extent, functions and values of all wetlands potentially impacted." After these determinations are made, the Subcommittee recommends alternatives and mitigation options, including avoidance and minimization. If there is no final agreement among the representatives of the Technical Subcommittee, the issues are referred back to the Interagency Wetlands Group. The legally defined lead agency has the responsibility to finalize a decision.

The Technical Subcommittee will review mitigation work and advise the state transportation agency when it the mitigation project is "satisfactorily completed." The Subcommittee will ensure that a Project Wetland Resource Inventory/Impacts Assessment is written and kept on record for each project and available for use in project design and development.

A national monitoring and maintenance policy has not yet been developed by FHWA. While the goals of mitigation are to avoid, minimize or replace wetlands impacts, the draft guidance recognizes that "negative or positive balances may accrue and be carried forward from year-to-year." In banks identified by the Technical Subcommittee, balances carried forward "will be directed toward wetland replacement within a similar biotic region or geographical area."

U.S. Fish and Wildlife Service
Ecological Service Instructional Memorandum No. 80
Interim Guidance on Mitigation Banking
June 1983

The 1983 Fish and Wildlife Interim Guidance ("Guidance") uses four resource categories, established in the USFWS 1981 mitigation policy, to establish a mitigation banking policy. The Guidance establishes the types of mitigation allowed for each category and general conditions for consideration of mitigation banking. In brief, resource 1 includes wetlands of highest habitat value grading to resource 4, wetlands of minor habitat value.

The Guidance also establishes that "all losses must be unavoidable and necessary" and "all on-site mitigation alternatives must be pursued first." There must be an ability to acquire the site by "easement, fee title or legal agreement" and site management must increase the naturally occurring habitat value of the site.

For Resource Category 1, the mitigation goal is "prevention of all existing habitat value loss." Mitigation banking is "not an appropriate option." The goal of Resource Category 2 is "no net loss of in-kind habitat value." Following sequencing, in-kind mitigation is required. Habitats must be in the same ecoregion, habitat type and the same State as impacts.

The goal of Resource Category 3 is "no net loss of habitat value and minimization of loss of in-kind habitat value." Out-of kind mitigation is allowed but in-kind is the first priority and banks must be in the same ecoregion and State as impacts are.

The goal of Resource Category 4 is to minimize habitat value loss. In-kind mitigation is still the first priority but "dissimilar mitigation activities may be acceptable in cases of unavoidable losses."

Under the Interim Guidance, the Fish and Wildlife Service (FWS) will formulate strategies "to arrest habitat deterioration, and restore and enhance habitat value." The development entity is required to implement this strategy in advance of project construction. The amount of mitigation required is determined by a HEP analysis or FWS-accepted equivalent habitat based analysis of the areas impacted and the sites selected for mitigation.

Credits may be withdrawn against a development proposal as long as the proposed habitat has either the equivalent in-kind habitat value or the Service or state determines that it has the same or greater out-of-kind value. Credits will generally be effective in perpetuity and at least effective for the life of the bank. Under this Guidance, the FWS does not accept financial contribution to a trust fund for future land acquisition and management as

mitigation banking. Simple purchase of habitat is also not acceptable "unless loss avoidance can be unquestionably demonstrated." For bank management, the Guidance encourages setting up either an interagency team to approve and veto bank transactions or establishing a third party banker, as in public trust property cases.

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