# Applying Lessons Learned from Wetlands Mitigation Banking to Water Quality Trading

## – White Paper –

*Prepared for:*
Office of Policy, Economics, and Innovation
and
Office of Water
U.S. Environmental Protection Agency
1200 Pennsylvania Ave. NW
Washington, DC 20460

*Prepared Under Contract 68-W-99-042 by:*
Mark Landry, Antje Siems, and Gerald Stedge
Abt Associates Inc.
and
Leonard Shabman, Professor Emeritus
Virginia Polytechnic Institute and State University

**February 28, 2005**

## Disclaimer

This report was prepared by Abt Associates Inc., under contract 68-W-99-042 with the U.S. Environmental Protection Agency. Although the information in this document has been funded wholly or in part by the U.S. Environmental Protection Agency, it has not been subjected to Agency review, and therefore does not necessarily reflect the views of the Agency and no official endorsement should be inferred.

## Acknowledgments

Abt Associates would like to thank Dr. Leonard Shabman, Professor Emeritus, Virginia Polytechnic Institute and State University, for his valuable contributions to this report. Dr. Shabman has been part of the development and execution of wetlands mitigation banking programs for well over two decades, including developing the concept in collaboration with the Army Corp of Engineers, working on the 1995 *Federal Guidance for the Establishment, Use and Operation of Mitigation Banks* and providing training, and serving as vice-chair of the 2001 National Research Council panel on wetlands mitigation. Sections of this report rely on material developed in a 2004 discussion paper by Leonard Shabman and Paul Scodari, *The Past, Present, and Future of Wetlands Credit Sales.*

# Table of Contents

**This page intentionally left blank.**

# 1 Introduction

Water quality trading (WQT) comes in many forms. The primary purpose is to achieve water quality goals on a watershed basis over time. An ideal trading program design will have the market-like properties of providing the flexibility to dischargers to pursue innovative effluent control approaches and offering the incentives that promote such innovation. WQT has been explored through numerous pilot projects and is currently being implemented or actively considered in about ten states. The most common form of WQT is described here as an offset program. Lessons learned from wetlands mitigation banking are most applicable to WQT offset programs.

In an offset program, a regulated point source of a pollutant is expected to achieve the maximum control practicable at the source. Then, if water quality standards still are not met after that control is in place, the regulated source is expected to pay for additional reductions made by either another point source or by an unregulated nonpoint source. Two elements make including reductions from nonpoint sources of pollutants in a WQT program challenging. First, nonpoint sources are generally unregulated under the Clean Water Act (CWA), even though under the Total Maximum Daily Load (TMDL) program such sources may be assigned a load reduction responsibility. Instead, incentives for reductions from these sources are often created through subsidy payments. Second, nonpoint source (NPS) reductions are considered hard to monitor and measure.

Rules governing Section 404 of the CWA (and related state programs) require that "compensation wetlands" be provided whenever a permit is issued to discharge fill material into the waters of the United States. Wetlands mitigation is analogous to the WQT NPS challenges because the offsets used to compensate for the permitted fill of wetlands are difficult to measure and must be secured from landowners who have no regulatory obligation to otherwise restore or create wetlands. The nearly twenty year-old national experiment to develop a market-like approach for securing such compensation wetlands can offer lessons that will help in addressing the challenges of bringing NPS reductions into WQT programs.

The remainder of this paper is organized as follows: *Sections 1.1* and *1.2* present an overview of the current status of WQT and wetlands mitigation banking, respectively. Much has been written about these programs, and this paper is not intended to replicate those materials. Rather, *Sections 1.1* and *1.2* focus on those aspects of the two programs that can further the development of WQT by applying valuable knowledge and experience gained from the evolution of wetlands mitigation banking. *Section 2, Key Issues / Lessons Learned*, presents a detailed discussion of two lessons learned from wetlands mitigation banking that can be applied to WQT. The two important lessons learned are how to address legal and financial liability (*Section 2.1*) and how to deal with investment risk that leads to thin markets (*Section 2.2*). These two sections describe the nature of each lesson in the context of WQT, provide insight into how wetlands mitigation banking has dealt with contributing issues, and suggest potential solutions that could promote the future success of WQT programs.

## 1.1 Overview of Water Quality Trading

### 1.1.1 Background

The U.S. Environmental Protection Agency (EPA) supports implementation of WQT programs to improve or preserve water quality. EPA issued the *National Water Quality Trading Policy* (EPA, 2003) and recently published the *Water Quality Trading Assessment Handbook* (EPA, 2004) to support the assessment of conditions where trading programs may be a useful approach for meeting state water quality standards and to provide guidance to states and tribes for adopting and implementing WQT programs.

### 1.1.2 Types of WQT Programs

Two forms of WQT can be conceptually specified: "cap and trade" systems and "offset" programs. In addition, in a few watersheds, fee-based systems have been used as a particular form of offset program.[1] The lessons learned from wetlands mitigation banking are most applicable to offset programs.

**Cap and trade systems.** A cap and trade system seeks to achieve a prescribed level of water quality by setting a limit on total pollutant discharges or loadings from a group of regulated sources. By definition regulated sources are point sources; thus cap and trade systems are generally applicable to point sources only. A pollutant-loading cap, usually developed as the waste load allocation under a TMDL, is set and divided into individual pollutant "allowances"[2] that are assigned to the regulated sources that comprise the group. Importantly, the allowances can be exchanged among these point sources at an agreeable "price." Equally important, the point sources are given broad discretion in their control decisions. Thus, a source will reduce its own pollutant releases if it can do so at lower cost than it would incur by securing an allowance from another member of the group. If it can reduce loads to less than allowances held, the source is free to sell or rent the pollutant allowance it no longer needs to other sources.[3] In WQT, the practical manifestation of this concept is the watershed group compliance permit issued to multiple dischargers. Within the group, decisions are cooperatively made on where pollutants will be controlled so that the group cap is met. If the group cannot meet the cap then it must acquire allowance credits or offsets from otherwise unregulated sources that will mitigate the adverse water quality effects of the releases in excess of the group cap. Typically, credits or offsets are secured through a fee program, as discussed below. In the TMDL context, the offsets generated must be from reductions that would not be

[1] These different forms are conceptually described in Shabman, Stephenson, and Shobe, 2002 and in Stephenson, Shabman, and Boyd, 2004. For an effort to draw lessons from cap and trade programs in air to water quality trading see Schary and Fisher-Vanden, 2004. Also, this highly conceptual discussion may not reflect some of the unique features of different actual WQT programs.

[2] The WQT literature uses several terms interchangeably for "allowances," including "credits" and "equivalences."

[3] A cap and trade WQT program imposes, either directly or indirectly, a financial cost on regulated pollutant sources for incremental units of pollutant discharged to the environment and expects pollutant sources to determine which, if any, pollution control actions are best suited to their own circumstances. In theory, a regulated pollutant source takes action to avoid the financial cost of paying a discharge fee by either meeting its pollutant allowance requirements internally or through buying or selling pollutant credits as needed.

required under the point source (PS) waste load allocation – or the NPS load allocation, if applicable – specified in the TMDL.

**Offset programs.** Offset programs have been developed mostly in relation to individual NPDES permit reviews. Under EPA's watershed-based trading framework first introduced in 1996, point sources of effluents that have met national technology-based discharge standards – but not stricter water quality-based effluent limits (WQBELs) established by states or EPA – may secure pollutant loading reductions from unregulated nonpoint sources to offset any effluent loadings above their permitted WQBEL. Where applicable, permittees have sought offsets from unregulated nonpoint pollution sources by, e.g., paying farmers to adopt best management practices (BMPs) to control nutrient runoff. Offsets are generally for the same pollutants as would be discharged by the regulated source and should be upstream in the same drainage area and as close to the permitted source as possible. There is an expectation that the offsets will be put in place as installed BMPs, concurrent with the issuing of the permit that allows for the regulated source's discharge. Of special note is that in the TMDL context, the offsets generated must be above and beyond the reductions required under the allocations in the TMDL; this is referred to as the "baseline" concept when defining what reductions may serve as an offset.

In most cases, the individual NPDES permittee must locate the offsets on another entity's property, negotiate the activities (i.e., BMPs) that will be employed to generate the offsets, and negotiate the required payment to the entity providing the offsets. Regulators must approve the form and level of offset that will be required. This three-way negotiation among the permittee, the offset providers, and the regulator can impose significant transactions costs and extend the time to secure the offsets for a year or more. To accommodate uncertainty in estimated load reductions, "equivalency ratios" require that offsets of predicted NPS pollutant reductions exceed the required pollutant reductions from the regulated source.

Offset programs provide regulators with added flexibility to ensure progress towards meeting water quality goals, but they generally provide limited decision-making discretion to regulated entities. In all cases where offsets are used, they are subject to regulator approval. And while regulated entities are free to propose how and where to provide offsets, regulators retain authority to decide on the acceptability of these proposals. In addition, the regulated entities have responsibility for the success of the water quality offsets, even if the offsets are provided by an unregulated source; how they enforce the requirements vis-à-vis offset providers (e.g., side contracts) is their responsibility.[4]

**Fee-based offset programs.** As noted above, in some watersheds, group compliance permits have been issued to multiple dischargers. The group covered by the permit has an obligation to limit its discharges to the group's cap and must pay a fee for each unit of discharge above the cap. A third party who has the responsibility for producing offsets to the group's excess discharge then collects the fee. There are several examples of fee-based programs. In the Tar River watershed in North Carolina, the fee was set at the average cost of a unit of control from agricultural BMPs, using literature-based formulas and general assumptions about the watershed. The fees collected (there have been none to date) would be used to

[4] CWA provision governing the NPDES program generally require keeping the responsibility for the offsets with the permittee. In the case of group- or watershed-based permits, a transfer of legal liability among the members of the group is possible.

expand the agricultural BMP cost share program. In the Neuse River watershed, the North Carolina Ecosystem Enhancement Program (NCEEP) administers a similar program where the collected fees are dedicated to stormwater management upgrades. In Oregon, under a draft plan in a comment period at the time of this report's release, individual NPDES permittees would be allowed to exceed a WQBEL for temperature if they pay a fee that will be used to supplement existing USDA cost share programs to encourage farmers to install riparian buffers along streams.

A fee-based system results in a transfer of financial and legal responsibility for the offset from the permittee to a third party.[5] Once the fee for excess discharges is paid, the permittee has met his permit requirements. The financial and legal burden to secure equivalent pollutant reductions, using the paid fee, then falls on the third party. In most fee-based programs, transaction costs are greatly reduced because the permittee does not have to locate a source of offset and negotiate the terms of the offset, which would then be subject to regulator approval. This burden falls on the third party, which generally has more knowledge than individual permittees about sources of offsets and conditions for offset approval. To assure that water quality goals are met through these programs, the fee structures should be adequate to pay for the practices that will secure the desired water quality offset (including overseeing performance, and maintenance and monitoring – both short- and long-term – of the offset). Also, the collected fees should not replace reductions that would already be required under any PS waste load allocation or NPS load allocation in a TMDL.

## 1.2 Overview of Wetlands Mitigation Banking

### 1.2.1 Background

Section 404 of the Clean Water Act and EPA's Section 404(b)(1) Guidelines (40 CFR Part 230) govern the U.S. Army Corps of Engineers (Corps) program that reviews and issues permits to authorize the discharge of fill material into waters of the United States. These waters include areas delineated as "wetlands." Section 404 permits typically require compensatory mitigation credits[6] such as the ecologically successful restoration of degraded wetlands or creation of new wetlands from uplands.[7] The program-wide goal of compensatory mitigation is to assure that (1) there is no net loss (NNL) of wetlands

[5] In most fee-based WQT programs, the third party is a government entity that has the mission and responsibility for using the fees to secure offsets on a need-only basis with contractual specifications tailored to meet the individual offset requirements. A fee-based WQT program that accumulates standardized offsets in advance, making the offsets available for purchase later, could be considered a bank.

[6] The term "offset" is not typically used in the wetlands program. Instead, the term "credits" is used to describe the results of restoration, creation, enhancement, or preservation. This paper generally uses the term "credit" when referring to the wetlands program and the term "offset" when referring to WQT. However, because the terms have the same meaning in both programs, they are also used interchangeably. Notably, the term "credit" has a slightly different meaning in WQT (synonymous with "allowance" and "equivalence"), where the emphasis is on the definition or standardization of the commodity available for trade and not the process whereby the commodity is generated or produced as an offset.

[7] Ecological success is defined here as the situation where the offset wetlands has the hydrology, soil, and vegetation of a wetlands. Defining and measuring success has continued to be challenging (see NRC, 2001).

acres and functions in a watershed when a fill discharge permit is issued[8] and (2) there is no temporal lag in replacing wetlands lost to a permitted fill.

Compensatory mitigation was historically performed on or adjacent to the development site ("on-site" mitigation). However, over the past 20 years, several alternatives to on-site mitigation have arisen, including single-user offsite mitigation banking, in-lieu-fee (ILF) mitigation, cash donation programs, and private commercial wetland mitigation credit sales programs (NRC, 2001; ELI, 2002). The latter form has also been termed "entrepreneurial banking." The 1995 *Federal Guidance for the Establishment, Use and Operation of Mitigation Banks* (60 Fed. Reg. 228, 58605-58614), hereafter referred to as the "1995 *Federal Guidance*," defines mitigation banking (to include all the forms listed above) generally as:

> "the restoration, creation, enhancement and, in exceptional circumstances, preservation of wetlands and/or other aquatic resources expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources."[9]

Wetlands impacts and the creation of credits are allowed only after a regulatory review called "sequencing." Under this process, the permit applicant has to avoid and minimize fill to the maximum extent possible before wetlands fill is permitted.[10] The attainment of NNL requires credits that provide water quality, hydrologic, and habitat functions equal to the functions at the filled wetlands ("in-kind" requirement). Ideally, the credits are present at the time the fill is permitted so that there is no temporal loss. In addition, there is a preference to locating credits "on-site" to prevent an inappropriate transfer of wetlands services within or across watersheds.

Mitigation banks were developed to provide greater flexibility to permit applicants needing to comply with mitigation requirements and potentially have several advantages over individual mitigation projects, including: (1) consolidation of multiple mitigation requirements into a single project; (2) consolidation of financial resources and of planning and scientific expertise; (3) reduction of permit processing time; (4) reduction of temporal losses by implementing mitigation in advance of project impact; (5) increased efficiency of agency resources for review and compliance monitoring, and (6) contribution towards

---

[8] No net loss (NNL) is a clearly-specified desired outcome of the wetland mitigation banking regulatory approach. Additionally, both the Clinton and Bush administrations have advocated nonregulatory approaches with objectives similar to NNL. A key element of the Clinton administration's 1998 Clean Water Action Plan was the goal of achieving a net gain of 100,000 acres of wetlands annually by the year 2005 (Copeland, 2003). In addition, on Earth Day 2004, President Bush established a new goal of net gain of wetlands, targeting the restoration, enhancement, and protection of three million acres over the next five years. These gains are to be achieved through the Conservation Title of the Farm Bill, the North American Waterfowl Conservation Act, and other federal, state, and local nonregulatory efforts, rather than through federal and state regulatory programs (SWS, 2005).

[9] The reason preservation is only allowed in exceptional circumstances is because the preserved wetlands would exist in the future in any event so the permitted fill cannot be offset by preservation. This is analogous to the argument that offsets in WQT should be above and beyond what is expected in the waste load allocation and should not simply implement the reductions required by the waste load allocation.

[10] The sequencing process is akin to the requirements to adopt all technologically and economically practical control technology as the foundation for defining the allowable effluent discharge in an individual NPDES permit.

attainment of the NNL goal. Wetland mitigation banks should protect wetlands and/or other aquatic resources in perpetuity (*Federal Guidance*, 1995).

### 1.2.2 Key Players and Components in Wetland Mitigation

For clarification and consideration, several elements involved in establishing, operating, and using a mitigation bank are presented in this section (NRC, 2001; ELI, 2002). Key players in wetlands mitigation banking are described below:

The *client* or *permittee* is the entity whose activities will result in a permitted wetland impact for which mitigation is being sought. In single-user mitigation banking, the permittee is responsible for the success of the credits at a site that is located away from the fill impact. In the case of private commercial wetlands banking, once the permittee purchases approved mitigation credits, he is relieved of the financial and legal responsibilities associated with mitigation for his wetland impacts. (For a definition of the different types of wetland mitigation programs, see Section 1.2.3 below.)

The *bank sponsor* is the entity responsible for credit production. The sponsor may be the permittee in the single-user bank case or a certified seller in the private commercial bank case. The bank sponsor assumes the primary legal and financial liability for the successful construction, development, performance, maintenance, and monitoring of the mitigation site. The bank sponsor is also responsible for securing an acceptable form of surety in the form of performance bonds or other financial assurances, for establishing and maintaining an accounting system of all mitigation bank activities, and for setting the price of credits if the sponsor is a private investor.

The *permitting agency*, generally the U.S. Army Corps of Engineers, a state agency, or another regulatory agency with jurisdiction over wetlands impacts, makes determinations about whether a permit will be issued to a proposed project with wetland impacts. The permitting agency is also responsible for determining the level of mitigation required and how the permittee's mitigation obligations should be met.

The *Mitigation Banking Review Team (MBRT)* is primarily responsible for facilitating the establishment of single-user mitigation banks and private commercial banks through the development of mitigation banking instruments. For Section 404 permitted activities, the Corps serves as the chair of the MBRT. The MBRT typically also includes EPA, the Fish and Wildlife Service, and state and local regulatory resource agencies. The MBRT process does not apply to cash donation and ILF programs.

The *long-term property owner* is the entity that holds the fee title to the bank site. The fee title is often transferred from the bank sponsor to the long-term owner after bank establishment and credit sale. Long-term property owners are generally public agencies or non-profit organizations.

In addition to the key players, a number of key components are important in the successful establishment of wetland mitigation banks (ELI, 2002):

*Mitigation banking instruments* are important vehicles in the process of approving single-user and private commercial banks. They outline the establishment, operation, and maintenance of the banks. According to the 1995 *Federal Guidance*, banking instruments should also contain monitoring provisions for the bank. These provisions, including the length of bank monitoring, are generally based on the performance standards established for the bank. Similarly, banking instruments often contain remedial action provisions and specify consequences if these actions are not followed.

*Performance standards* are measurable criteria used to assess wetland functionality. *Design standards* are physical or biological requirements or specifications for how a mitigation site is to be constructed. Both performance and design standards are important components of mitigation banking instruments because they provide essential benchmarks for evaluating whether or not banks are meeting the conditions of the authorizing agreement. In many cases, the success or failure to meet these standards will play a role in defining the credit release schedule and the requirements for financial assurances and monitoring periods. While design standards are easier to define, follow, and measure than performance standards, meeting design standards does not assure that credits will be certified successful and be available for use.

*Replacement ratios* are used in mitigation banking to reflect the comparative value of dissimilar wetland types. High replacement ratios can be used to discourage impacts to certain wetland types.

*Advance debiting*, or use/sale of credits, allows bank sponsors to earn a competitive return on the capital needed to establish and operate a bank. In general, advance debiting is only allowed if the bank has met certain milestones, including the approval of the banking instrument and the securing of financial assurances.

*Financial assurances* are important instruments that help insure against the possibility that banks may not meet their performance standards. Financial assurances are posted by the bank sponsor and provide a source of funds to repair and maintain mitigation banks, if needed. Instruments used as financial assurances might include performance bonds, escrow accounts, letters of credit, irrevocable trusts, casualty insurance, and legislatively enacted dedicated funds for government-operated banks. More financial assurances might be required for projects with more uncertainty. Ideally, three distinct types of financial assurances should be secured for bank establishment, bank oversight, and long-term bank management.

### 1.2.3 Forms of Wetlands Compensatory Mitigation

The three main types of wetlands compensatory mitigation discussed in this report are single-user mitigation banks, fee-based and cash donation programs, and third-party private commercial banks, also known as entrepreneurial banks. This paper focuses on the lessons learned from third-party private commercial wetlands banking for securing water quality credits or offsets, because this type of approach holds the greatest promise in overcoming some of the crucial obstacles often encountered in WQT programs.

As of 2002, the Environmental Law Institute (ELI) documented 219 approved mitigation banks of different forms (not including fee-based and cash donation programs) in 40 states, covering more than 139,000 acres approved for mitigation. The most common type is the private commercial bank (62%), followed by the single-user bank (28%). The forms for securing compensatory mitigation have evolved over time, reflecting lessons learned from the early approaches.

**Single-user banks.** The administrators of the wetlands program initially expected permittees to be responsible for providing credits on or adjacent to the impact site ("on-site" mitigation). However, at times, the required credits were either not provided at all or did not provide the required functionality because of inferior practices for wetlands restoration and creation or because the credit location was not conducive to its long-term success (e.g., the hydrology was compromised by surrounding new development). Even if the permittee succeeded in providing functional credits, there always was a temporal lag in attaining no net loss, because restored or created wetlands take time to become ecologically successful, but a fill permit would not be withheld until a replacement wetland was deemed successful. These considerations made regulators willing to allow some permittees to create credits in advance of the permitted fills elsewhere in the watershed ("off-site" mitigation). Off-site mitigation enabled a consolidation of wetlands projects to provide credits for more than one permitted impact to a "bank account" that are drawn on as "debits" towards future permitted fills. These consolidated sites allowed agencies to target limited monitoring and enforcement resources toward fewer, larger sites. The permittee was responsible for the design and construction of the credit to insure the required functional performance.

The single-user bank is not a practical option if a permittee has few small wetlands fills and therefore cannot justify investing in a consolidated site. This factor led to the development of in-lieu-fee (ILF) and cash donation programs.

**Fee-based and cash donation programs.** In an ILF program, a third-party provider (neither the permittee nor the regulator), who has been certified as a provider by the regulatory agency develops credits in a consolidated location.[11] The permittee makes a payment to this provider, and the provider takes on the financial and legal responsibility for assuring the provision and success of the credits. In most cases, when adequate funds have been collected, investment in the credit provision begins. In a cash donation program, the permittee pays a fee to an entity with on-going wetlands restoration activities that are undertaken outside the regulatory process. The collected fees are then used to expand the activity beyond its original scope. An argument for these programs is the need to have credits readily available in small units (e.g., parts of an acre) for one-time permit recipients. An advantage to the permittee of the ILF and cash donation options is the low transaction costs to secure the credits. After a sequencing review, the permittee is allowed to make an ILF payment or cash donation, buy a credit from a private seller (see below), or create credits on their own land.[12]

[11] Certification generally was based on the provider's capabilities to collect, hold, and manage funds and to oversee credit development projects. Typically ILF administrators were other government bodies or NGOs.

[12] ILF programs were developed for small fills. Permittees for projects of significant size still have to develop their own credits and retain responsibility for their quality.

Proponents of the ILF and cash donation programs argued that these programs have the potential to perform better than permittee-responsible credit provision because most ILF administrators have a mission focus on wetlands restoration and protection. However, ILF and cash donation programs have been criticized as well. Opponents claim that: (1) the fee structures of cash donation programs either may not recover the costs of producing the credits or may be set so high that they discourage use of the program; (2) the programs have poor systems for tracking and keeping records of the created credits and their performance; (3) donations simply substitute for other sources of funding restoration projects with no additional credits being created; and (4) there is an unaccounted temporal loss of wetlands while fees are being accumulated. The problems of lag time, accountability, and price setting attributed to ILF and cash donation programs led to a decline in interest in them by the mid-1990s and to a rise in interest in promoting private credit sales. However, an important result of the early fee programs was the concept and precedent of transferring legal and financial responsibility for providing wetlands credits from permittees to another party.

**Private commercial (entrepreneurial) banks.** In private commercial wetlands banking, entrepreneurs with access to private-sector capital produce credits for sale to future permittees. The credit production process involves acquiring access to public lands or purchasing private lands and then undertaking construction and management activities that restore the hydrology and vegetation of former wetlands, or creating the wetlands from uplands through excavation and water management.

These sellers and their credits are subject to "certification" before credits can be released. Credits are certified if certain performance standards have been met or if sufficient financial assurances are provided. When the permittee purchases credits to offset his permitted wetlands impacts, the responsibility for the successful development and long-term monitoring of the mitigation bank is transferred to the credit seller. Credit sales programs, such as those established through private commercial banks, were expected to resolve some of the problems associated with single-user banks and fee-based programs. Of special interest was the desire to have credits available in advance of the fill permit. Using this approach, the quality of the credits could be ascertained before they were released for mitigation, and there would be no temporal lag between the permitted fill and the offsetting mitigation. To promote private commercial banking, the 1995 *Federal Guidance* set up the rules and conditions that were intended to specify the regulatory and procedural requirements necessary for private investors to make investments in credit creation for prospective sale to permittees (Shabman and Scodari, 2004; ELI, 2002).

Private commercial wetlands banking has been described as an example of a "market-like" approach to environmental management (EPA, 2001). There can be little doubt that the active selling and buying of wetlands credits between private investors, who produced credits for sale, and permit recipients was the vision of the early developers of the program and the drafters of the mitigation banking guidance (Shabman, Scodari, and King, 1996). While the concept of mitigation banks is widely endorsed and numerous public and private banks have been established, many believe that it is too early to assess their success[13] (Zinn and Copeland, 2002).

[13] A federal interagency mitigation action plan workgroup is working to resolve part of this issue through better tracking of performance that can be shared among agencies.

The number of private credit sales ventures has increased from only one in 1992 to 135 in 2002 (ELI, 2002). In addition, private commercial banking projects appear to have resulted in higher quality credits and reduced time lags (NRC, 2001). However, the success of private commercial wetlands banks in contributing towards the goal of NNL of wetlands cannot be documented with the available data and studies (NRC, 2001). The rate of wetland loss has slowed: losses between 1986 and 1997 were only 23% of the losses during the previous decade. According to data compiled by the Corps, approximately 24,000 acres were permitted to be filled annually between 1993 and 2000 compared to 42,000 acres that were required as compensatory mitigation. However, insufficient data are available to ascertain that the permitting conditions in the permits are actually being met. In addition, it is not clear if the mitigated acres provide the same wetlands functions as those that have been lost due to the permitted fill (NRC, 2001).

Some researchers argue that an active market in credit buying and selling has not developed as a result of credit sales program rules that lead to high costs of credit supply and considerable investment risk associated with entering this business (Shabman and Scodari, 2004). The factors that contribute to this investment risk are described in Section 2.2 below.

# 2 Key Issues / Lessons Learned

Two emergent lessons from private commercial wetlands banking, which are important to advancing WQT, are (1) how to address issues of legal and financial liability and (2) how to deal with investment risk that leads to thin markets. These two lessons are detailed below and encompass many key issues and obstacles, such as dealing with uncertainty, defining and validating tradable credits, inducing trades, and monitoring and enforcing transactions.

## 2.1 Legal and Financial Liability

The limitations of single-user mitigation banks led to the rise of third-party providers – ILF and cash donation programs, and private commercial banking. Third-party providers have many different features, but one common characteristic is that there is a transfer of legal and financial responsibility, from the permittee to the provider, for providing successful credits (NRC, 2001).[14]

The assignment of legal and financial responsibility for ensuring that providers deliver the agreed upon number of credits is one major difference between private commercial wetlands banking and current WQT programs. In the wetlands program, the legal and financial responsibility for assuring that the replacement wetlands are constructed and are ecologically successful is transferred from the permittee to a third party (the ILF or cash donation program administrator or the private credit seller). Once the regulator approves the payment for credits as an appropriate method of mitigation, and the permittee makes the cash transfer, the permittee faces no further legal or financial liability. In other words, the permittee is free and clear of all responsibility to provide mitigation, and is relieved of any and all future liability with respect to both the individual mitigation requirement, and to the bank.

In water quality trading programs to date, when offsets are a condition of an individual NPDES permit, legal and financial liability for ensuring that the water quality offsets are implemented and successful remains with the permittee, even after they make the payment to the offset provider. According to the EPA's 2003 *National Water Quality Trading Policy*:

> "Mechanisms for determining and ensuring compliance are essential for all trades and trading programs. These may include a combination of record keeping, monitoring, reporting and inspections. Compliance audits should be conducted frequently enough to ensure that a high level of compliance is maintained across the program. States and tribes should establish clear enforceable mechanisms consistent with NPDES regulations that ensure legal accountability for the generation of credits that are traded. *In the event of default by another source generating credits, an NPDES permittee using those credits is responsible for complying with the effluent limitations that would apply if the trade had not occurred.* EPA also recommends that states and tribes consider providing periodic accounting and reconciliation periods and establishing

[14] A 1990 Memorandum of Agreement established the legitimacy of wetland mitigation banking and, implicitly, the transfer of liability. However, it was the 1995 *Federal Guidance* that encouraged the use of third-party providers.

appropriate enforcement provisions for failure to generate the quantity of credits that are traded." (Emphasis added.)

Without the possibility of transferring liability, buyers of credits must use other means to protect themselves from legal and financial risk in case the seller of credits, often a nonpoint source not subject to NPDES permitting, fails to deliver the quantity of agreed upon credits on schedule.[15] Practical and promising mechanisms can include use of contracts and financial assurances, as demonstrated in the wetlands mitigation experience.

The following is an illustrative example. A publicly owned treatment works (POTW) needs to increase the volume of its annual discharge due to an increase in its population served. However, doing so would cause them to exceed the level of nitrogen discharge approved in their individual NPDES permit. The regulator has required the adoption of the best practical and economically achievable control at the source, but the resulting remaining discharge would still result in a violation of water quality standards. The regulator has the choice of denying the permit (not feasible), allowing water quality to deteriorate (not allowable), requiring the POTW to install additional controls (cost-prohibitive), or requiring the POTW to secure offsets from sources that would otherwise continue to make discharges.

Now suppose that the POTW is told they can finance nitrogen reduction practices at a large cattle-ranching operation. The ranch agrees to implement a series of BMPs that the regulator agrees will more than offset the increased nitrogen load of the POTW. The regulator issues the NPDES permit and includes the expectation that the rancher will implement the BMP on his own land. The POTW enters into an agreement with the rancher who agrees to implement the BMPs in return for a payment.[16] Note that the rancher undertakes the actual BMP installation and operation.

At this point, the POTW is still liable for meeting its NPDES permit conditions, but the rancher is not legally liable for undertaking the BMPs. In addition, if the BMPs are implemented, but fail to result in the predicted level of nitrogen reduction, the POTW is still legally responsible for this shortfall. While the POTW might mitigate against the financial risk of such a shortfall by entering into a contract with the rancher, the legal responsibility will remain with the POTW.

Regulator concerns are that adequate safeguards are in place to take corrective actions against BMP failure (e.g., replanting, soil amendments to encourage plant growth, regrading, repairing water control structures, or other measures to improve nitrogen control functions). Like wetlands banking, every WQT offset agreement should include provisions for a dispute resolution process applicable if the nonpoint source (or rancher in this case) fails to meet his duties under the offset agreement. A financial assurance equal to the present value of the BMP remedial action and maintenance costs may be posted or some other form of surety may be used to ensure performance. While financial assurances cannot remove the legal liability of the POTW, they can provide strong incentives against BMP failure.

[15] It is worth noting that in a few instances of WQT, where fee-based offsets are approved or are being considered, such a transfer does take place. See the previous discussion of fee-based systems.

[16] Recall that in the TMDL context these reductions would have to be above and beyond the reductions called for by the load allocation.

### 2.1.1 The Wetlands Mitigation Banking Approach

In the wetlands program, once the permittee (buyer) makes a payment to an approved private commercial banker, he has fulfilled his obligations under his permit. If the provider or bank sponsor (seller) fails to deliver the required credits in sufficient quantity and quality, the regulator can hold the provider (or surety if applicable) responsible for delivering the required credits. Both legal and financial liability have been transferred from the credit buyer to the credit seller. However, the practice of advance credit sales, necessary to ensure the financial viability of a wetlands banking program, results in a further transfer of financial liability, or financial risk, from the credit seller to the regulator.[17] To mitigate against this risk, the seller posts financial assurances that should be commensurate with the risk of bank failure and should include adequate funding to monitor and maintain the bank throughout its operational life (*Federal Guidance*, 1995). The remainder of this subsection discusses the use of financial assurances in wetlands mitigation banking.

Financial assurances can minimize the risk of credit failure in two ways. First, financial assurances can create an economic incentive for providers to fulfill permit obligations, and do so in a timely manner, since assurances cannot be released until obligations are fulfilled. Second, financial assurances can indemnify regulators against the potential for loss by providing them with the means to complete mitigation bank obligations, including construction and long-term monitoring and maintenance, in the event that bankers are unable or unwilling to do so (Institute for Water Resources, 1995).

While the establishment of financial assurance amounts must be sufficient to cover the costs of fully completing mitigation plans in the event of default, care must be taken to ensure that the amount does not substantially exceed the cost of completion, including long-term monitoring and maintenance, in any particular case. The details of the amounts, types, and schedules for financial assurances are negotiated and established as part of the banking agreement. Careful evaluation of the potential risk of default is warranted in the private commercial banking context precisely to reconcile regulator concerns about mitigation failure with investor concerns for the economic viability of the enterprise (Institute for Water Resources, 1995).

[17] The risk of bank failure would be small if the regulator only allowed credits to be sold after all wetland construction was completed and the wetland was providing all of the expected ecological services. However, the financial viability of a wetlands banking program requires that regulators allow banks to sell at least a portion of the credits much earlier, in some cases before ground is broken (Shabman, Stephenson, and Scodari, 1998). Therefore, providers are authorized to sell some credits before the regulator certifies the success of wetland mitigation projects. The limited right to engage in such "early" credit sales has been important in the development of banking in the wetlands mitigation program as it enables commercial banks to generate a cash flow that assures funding for the later stages of bank construction and maintenance as well as a competitive return on investment.

The conditions established for the release of fully-funded assurances should reflect the fulfillment of mitigation obligations, and may occur in stages as discrete mitigation tasks are successfully completed. Partial release of assurances during the term of the liability period would reflect how much of the required mitigation work has already been successfully completed. For example, if construction and planting of a mitigation parcel was complete in accordance with permit specifications, then the part of the assurance reflecting construction and planting costs may be released to the sponsor. Final release of remaining assurance amounts would then be contingent upon successful completion of the required monitoring and maintenance (liability) period in accordance with specified success criteria for replacement wetlands (Institute for Water Resources, 1995). The performance criteria, measurement, and the incremental release schedule of partial financial assurance payments will vary. For instance, financial assurances could be released earlier for perpetually self-sustaining mitigated wetlands not requiring long-term care whereas financial assurances should remain in place over a longer period of time for sites not fully self-sustaining or requiring regular maintenance and management.

**Measuring the Success of Mitigation Banks**

The success of a mitigation bank is generally measured against the performance and design standards which are agreed upon by the bank sponsor and the Mitigation Banking Review Team (MBRT) and specified in the bank's authorizing instrument. **Performance standards** are measurable criteria used to assess major wetlands functions, including those related to hydrology, vegetation, water quality, wildlife habitat, and soil. These criteria can be general (e.g., evidence of wildlife utilization or native species dominance) or specific (e.g., percent cover or composition of vegetation). Performance criteria can also be staged (e.g., hydrophytic species comprise 40% of vegetation after 1st growing season, 50% after 2nd growing season, etc.). In some cases, standards of functionality are based on high quality and representative natural reference wetlands in the region. **Design standards** are criteria for the construction and operation of the bank, e.g., specifications related to planting schemes or hydrological engineering. They are easier to measure than performance standards but lack the direct link to functionality.

Adapted from ELI, 2002

The negotiated and established banking instruments must also state the conditions for the forfeiture of assurances and what constitutes bank failure. This is usually based on the determination by the regulatory authority that the bank has failed to fulfill its obligations regarding the construction, success, monitoring, and maintenance of replacement wetlands (Institute for Water Resources, 1995). Assurances may be withheld or enforcement action taken if remedial efforts to fully establish or maintain wetland characteristics in accordance with banking instrument requirements do not occur within a reasonable time frame.

It should be noted that in wetlands banking, institutions (sureties) that provide financial assurances (bonding companies, commercial banks, etc.) have typically been very cautious about underwriting the bankers' assumption of liability. Even in the most developed banking markets, it can be challenging for a banker without pre-existing networks of trust within the financial industry to find a bonding agency willing to stand behind selling wetlands. Bankers investing in WQT credits would likely face a similar situation.

### Types of Financial Assurances

The 1995 *Federal Guidance* specifies five types of financial assurance mechanisms for private banks: performance bonds, escrow accounts, letters of credit, irrevocable trusts, and casualty insurance. However, only performance bonds, escrow accounts, letters of credit, and irrevocable trusts are regularly used. The five financial assurance instruments are defined as follows (ELI, 2002):

- **Performance bonds.** The credit producer purchases a bond from a third-party surety (paying a premium and posting collateral), or provides a bond, letter of credit, or other assets that ensure that the site functions properly for the specified period and that all necessary remedial actions will be taken. Once the period has ended and performance has been met, the bond is released. The bond can also be released in stages as different milestones are reached. The bond provides both a source of funds that can be drawn on by the regulatory agency in the event of bank failure and an incentive for the credit producer to take corrective measures so that the bond can be released.

- **Escrow accounts.** The bank sponsor places a predetermined amount of money into a bank account to be held until performance standards or other milestones are met. Often, a set amount of money, for example, $5,000 per wetland credit, is deposited into the account as each credit is sold. The amount of money per credit deposited into the account can be diminished as specified milestones or performance standards are met. If the bank becomes insolvent, the escrow account becomes the property of the regulatory agency, which can use the funds to ensure that the promised mitigation does in fact occur. The funds are released to the bank sponsor once the monitoring period is over.

- **Letters of credit.** An assumption of payment responsibility by a bank or other person made at the request of the bank sponsor that the issuer will honor drafts or other demands for payment upon compliance with the conditions specified in the credit. A credit may be either revocable or irrevocable. The assumption of payment responsibility may be either an agreement to honor or a statement that the bank or other person is authorized to honor. Letters of credit are intended generally to facilitate purchase and sale of goods by providing assurance to the seller of prompt payment upon compliance with specified conditions or presentation of stipulated documents without the sellers having to rely upon the solvency and good faith of the buyer.

- **Irrevocable trusts.** A trust which may not be revoked after its creation, as in the case of a deposit of money by one entity or organization (surety) in the name of another (credit provider) as trustee for the benefit of a third person (i.e., the beneficiary or permittee in this instance).

- **Casualty insurance.** Insurance that is primarily concerned with losses caused by injuries to persons and legal liability imposed upon the insured for such injury or for damage to the property of others. To reiterate, insurers are cautious about underwriting the bankers' assumption of legal liability, particularly injuries to persons.

### Use of Financial Assurances

A survey of mitigation banks found that 66 percent of banks require some type of financial assurance associated with construction of the bank site. This number rises to 75 percent of the banks when only

banks created after 1995 are included. Performance bonds are the most prevalent type of financial assurance required (32 percent of those that required financial assurance) based on successful past experience and transaction ease.

The same survey found that 68 percent of banks require financial assurances for bank oversight. Bank oversight includes funds for monitoring, maintenance, and contingencies. Again, performance bonds were the most common form of financial assurance required (26 percent of those that required financial assurance) (ELI, 2002). The survey found that in several cases, financial assurances for bank oversight are tied to performance standards and are phased out as certain milestones are achieved. As confidence in the success of the bank increases, the amount of financial assurances can decrease accordingly (ELI, 2002). This is a positive evolution of the wetlands mitigation banking program as it provides additional incentive for credit sellers to take steps to move the site towards long-term sustainability as quickly as possible.

Finally, financial assurances are often required for long-term management and maintenance of the site. Fewer than 50 percent of the banks that contain information on long-term management of the site also contain information on financial assurance for long-term management. The most common form of financial assurance for long-term management is the establishment of a trust or endowment fund (41%).

### 2.1.2 Financial and Legal Liability in Water Quality Permitting

The financial and legal relationship among the three principal players – credit buyer, credit seller, and regulator – is quite different in the WQT context than in the wetlands banking program described above. In the case of individual NPDES permit holders, the offset buyer (permit holder) remains legally responsible to the regulator for meeting the permit requirements and ensuring that the seller meets his obligations. One approach that has been successful in transferring or minimizing legal and financial risk, and therefore encouraging broader participation in trading activities, is that of watershed- or other group-based permits. As discussed in Section 1.1.2 above, such programs provide greater flexibility for trades within the group and shift liability from individual point sources to the group as a whole.

Another approach of reducing liability risk used in WQT is the use of contracts. While a contractual agreement between the offset seller and the offset buyer does not relieve the buyer of his legal liability under the NPDES program, it can provide a strong incentive to the seller to meet his obligations. For example, a NPS offset seller might model and have certified potential reductions in nutrient concentrations in runoff as a result of implementation of specific BMPs. These potential nutrient loading reductions are converted into offsets or credits using a trading ratio to account for uncertainty and location. Once the BMPs are installed, the offset buyer periodically inspects the BMPs to ensure they are performing properly or directly monitors nutrient concentration in the runoff or in the affected water body to satisfy regulatory monitoring requirements and to ensure compliance with the NPDES permit. The contract between the offset buyer and seller might stipulate payment amounts or a schedule based on performance indicators such as installing BMPs, properly maintaining BMPs annually, and meeting target water quality testing levels. Failure to meet contract obligations could have consequences on the offset seller's credit rating.

A third important tool for managing legal and financial liability is the use of financial assurances. Current use of financial assurances in WQT is limited but evolving. Financial assurances, modeled after the wetlands program, may be a useful addition to securing quality offsets in WQT programs in order to alleviate financial risk and burden to the offset buyer (i.e., the permittee) for his or her inability to transfer legal liability to the seller. These assurances would be especially important if WQT programs of all types expand the currently limited use of third-party providers through fee-based offsets and encourage entrepreneurial offset selling analogous to a private commercial wetlands credit sales program.

One important distinction between financial assurances required in WQT programs versus wetlands mitigation banking is the period of performance. In the WQT context, provisions for long-term maintenance and management of offsets are different than in the wetlands context. In wetlands banking, wetland credits generally have to be established in perpetuity, so failure in the future is an important concern. In WQT, on the other hand, credits are generally purchased to meet the requirements for a defined period of time, say one or five years or the lifetime of the offset. Therefore, no assurances are needed beyond that defined period. After the period is over, a new offset agreement with new financial assurances would be negotiated and established.

The most beneficial use of financial assurances without a transfer of legal responsibility could take two basic forms. The first form (Option 1) would require the credit seller to post a financial assurance with the credit buyer. The amount of the financial assurance should be negotiated as part of the WQT offset program agreement based on estimated costs associated with potential BMP corrective action and management. A credit seller might secure one of several financial assurance instruments from a third-party surety, such as an insurance company. This financial assurance could be tied to the installation of BMPs used by the seller to generate offsets. Additionally, the credit seller could simultaneously leverage his or her credit rating to access sufficient funding from a bank or receive an advance payment towards future offsets directly from the credit buyer to cover BMP start-up costs. In this case, the credit buyer would make partial payments towards future offsets generated while also releasing the financial assurance incrementally as milestones are achieved. This would provide an incentive for the credit seller to complete installation of BMPs and demonstrate performance as soon as possible. It would also ensure that, in the case of default on the part of the credit seller, the credit buyer would have adequate funds available to complete corrective actions and management of BMPs or purchase credits from another seller. In such a case of default, the regulator should allow the credit buyer enough flexibility to meet his permit conditions, in a reasonable amount of time, by using the forfeited financial assurance funds to create or purchase the required credits. In this manner, regulators could use enforcement discretion and/or put the permittee on a compliance schedule to adjust for offset failures and corrective action. This approach would limit the financial liability of the credit buyer but would not address the high costs associated with government-sponsored, third-party certified, or self-imposed BMP inspections, monitoring, delivery of performance data, and enforcement between two parties that have little knowledge of each other's operations. These costs should be accounted for in the price of the offset and could reasonably be expected to still result in lower total overall costs to credit buyers in meeting regulatory requirements.

A second form (Option 2) would more closely mimic the wetlands banking approach. This form would require the credit seller to post a financial assurance directly with the regulator. In this case, the regulator

would release the financial assurance incrementally as milestones are achieved. This would provide an incentive for the credit seller to complete the BMPs as soon as possible and lock into a long-term maintenance schedule and management activities required over the lifetime of the WQT offset agreement. It would also ensure that, in the case of default on the part of the credit seller, the regulator would have the funds available to complete the BMPs or purchase credits from another seller. Again, the regulator should not penalize the credit buyer as the regulator can use the forfeited financial assurance funds to create or purchase the required credits. Under this approach, the credit buyer would have no role in correcting any deficiencies of the credit seller. Rather, the regulator, presumably with broad expertise at their disposal, would work with the credit seller. Figure 1 compares the use of financial assurance instruments in the wetlands banking program with the most promising WQT Options 1 and 2 described above.

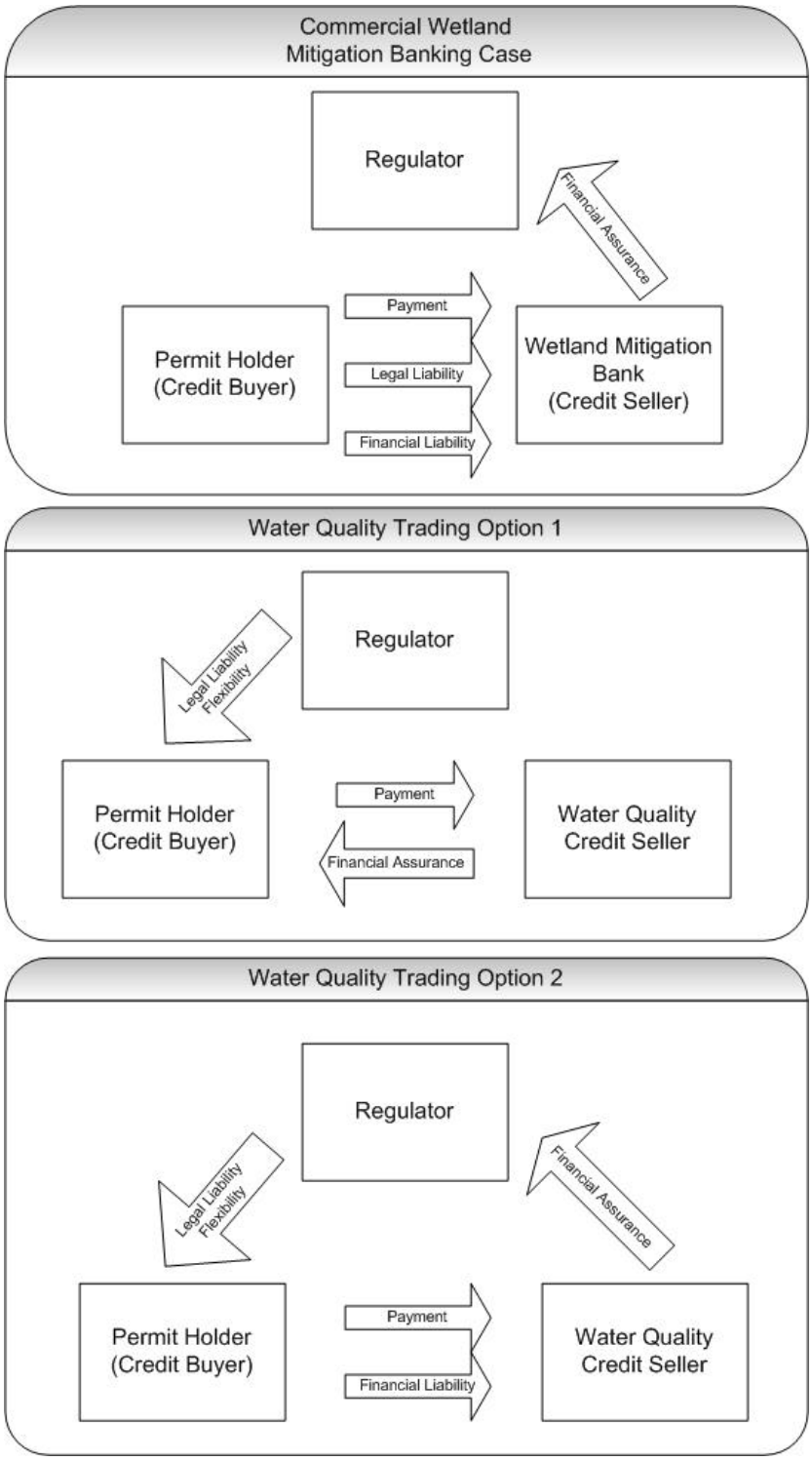


**Figure 1. Comparison of Legal Responsibility and Financial Assurance Between Wetlands Mitigation Banking and Water Quality Trading Options**

### 2.1.3 Conclusion

The wetlands banking program has adopted the use of financial assurance instruments in single-user banks and private commercial banks (posting financial assurances may not always be required in ILF and/or cash donations programs). In WQT programs, financial assurances and bonding could play an important role in incorporating nonpoint sources into a trading scheme. A major reason that including NPS reductions into a trading program has been problematic is the difficulty in monitoring the performance of NPS pollution abatement activities (i.e., the quality of the offset) compared to measuring effluent flows and concentrations from point sources. A second reason is that legal liability cannot be transferred to nonpoint sources, making PS purchasers of NPS offsets vulnerable in the case of offset failure. The use of financial assurances can help address these concerns by only allowing offsets from providers who agree to document performance of their offsets and by requiring those providers to post financial assurances that are only returned when such performance is demonstrated. Even if legal liability cannot be transferred, sufficient financial liability would provide a strong incentive against performance failure. However, the conditions of financial assurances, e.g., the assurance amounts and the release requirements, need to be carefully defined; otherwise, financial assurances can become a disincentive and restrict market entry by nonpoint sources, especially if a seller is unable to obtain the backing of a financial institution.

## 2.2 Dealing with Thin Markets and Demand Uncertainty

Trading programs are built on the premise that it is more cost-effective or feasible to compensate for an environmental impact – be it permitted wetland fill or water quality impairments – if an entity other than the source of the impact undertakes the mitigating activities. These entities, or third parties, can often capitalize on economies of scale, expertise, and cost-differentials in producing the required offsets. For this concept to yield the maximum possible benefit, however, markets need to exist which allow for the sale and purchase of offset credits. The presence of multiple credit sellers serving individual areas can create competition, and competition can drive credit prices down toward production costs. However, widespread market entry and vigorous price competition among credit sellers have not been achieved. To date, one of the major impediments to the success of trading programs is the lack of supply of and demand for mitigation offsets, or "thin" markets.

This section describes the factors that may have contributed to thin markets in the wetlands banking program and how some of these factors might be avoided; how new forms of wetlands mitigation banking programs are emerging to deal with thin markets; and potential lessons from the wetlands mitigation experience for WQT programs.

### 2.2.1 The Private Commercial Wetlands Banking Experience

Private commercial mitigation banks were developed and promoted to overcome some of the shortcomings of single-user banks and fee-based programs. In particular, regulators tried to encourage private entrepreneurs to compete to sell certified wetlands credits to permittees, thus creating wetlands credits markets. The success in achieving such markets has been mixed and is subject to debate. The Environmental Law Institute characterizes the evolution of banking as a private enterprise as "perhaps

one of the most significant changes in wetland mitigation banking in the past decade" (ELI, 2002), citing the increase in the share of private commercial mitigation banks from two percent to 62 percent between 1992 to 2002. A recent paper by Leonard Shabman and Paul Scodari (Shabman and Scodari, 2004) argues that the share of credits provided by private credit sellers is much smaller – between 10 to 20 percent of all wetlands credits required by fill permits in any region of the country[18] – and that uncertainty and regulatory barriers have inhibited private sector investment. The highest rates of private credit supply have been observed in areas where fill permitting and thus mitigation needs are relatively high, including Florida, Louisiana, California, Virginia, and the Chicago region (ELI, 2002). This illustrates the importance of a reliable demand for credits to the growth of the private mitigation banking sector.

While the lack of consistency in permitting and mitigation decisions – one of the major impediments to private commercial banking – was in effect removed through the issuance of the 1995 banking guidance, other impediments still exist. The Environmental Law Institute (ELI, 2002) lists a number of factors that affect the expansion of entrepreneurial mitigation banks. Most of these factors directly affect credit demand and supply. Supply-side barriers to commercial credit sales include (1) poor state agency relations with the Corps, including existing state laws that indirectly or directly discourage mitigation banking; (2) the time-consuming and complex process of designating and approving a mitigation bank; (3) the challenge of creating a wetland program that functions independently and in conjunction with Corps activities; (4) the cost of real estate in the areas best suited for mitigation sites and competing uses of land; and (5) reaching consensus with other state and federal agencies on how to govern banking. Demand-side barriers to commercial credit sales include (1) public perception of entrepreneurial banking; (2) lack of political support; and (3) service area size limiting sufficient demand.

Uncertainty is one of the major factors in creating both supply- and demand-side barriers to market entry. On the supply side, investing in wetlands credits has proven to be financially risky. Entrepreneurs won't make an investment in any business venture if they do not have a reasonable expectation of a timely recovery of their investment and an appropriate rate of return. However, even the most mature banking markets have not generated enough data to indicate what qualifies as a reasonable rate of return and capital recovery that sufficiently addresses some perceived level of acceptable financial risk. With such imperfect information in this type of market and the uncertainty of the science, the Mitigation Banking Review Team (MBRT) can play a vital role in fostering increased banking activity by making determinations and decisions that generate trust and certainty among the trading partners, by coordinating and overseeing wetlands mitigation banking credit sales, and by bringing transactions to completion.

Uncertainty about credit demand is one of the major drivers of insufficient credit supply. A number of factors work together to create significant credit demand uncertainty for prospective wetlands bank investors:

- As discussed in Section 2.1 above, banks have to post financial assurances, which increase the opportunity cost of their total invested funds.

[18] These estimates are based on personal interviews with policy analysts at the Army Corps of Engineers Institute for Water Resources and Corps field office staff reported by Shabman and Scodari (2004). Single use banks and ILF programs account for the remaining mitigation banking schemes that are in place.

- Demand uncertainty can also be associated with MBRT responsibilities and decision schedule (if not well defined and understood), local and state ordinances and restrictions, the changing economics of the project being proposed, and the credit buyer's coordination with the timelines of the credit seller. Addressing and including the opportunity and transaction costs in credit prices can reduce the quantity of credits demanded by permittees (Shabman and Scodari, 2004).

- Uncertainty about future demand can result from uncertainties about the overall land development process in an area and the requirements that will be placed on developers who may want to place fill in wetlands. The sequencing process, which requires that impacts are first avoided and then minimized before mitigation activities can be undertaken, is case specific, and how it is applied in any case will determine whether there is a likelihood of selling credits to permit recipients. Once use of credits is approved, there is a preference for on-site mitigation by the permittee. Only after avoidance, minimization, and on-site mitigation are undertaken, can third-party offsets be used. Also, private credit sellers are generally subject to stricter performance standards relating to the hydrology, soils, and vegetation of the mitigation site compared to permittees engaged in on-site mitigation and compared to what is often required from or achieved through fee-based programs (Shabman and Scodari, 2004). One critical reason for these stricter standards for off-site mitigation is the greater uncertainty that the off-site wetlands will produce the same ecological services as on-site mitigation. However, an important result is to shift credit demand from private sellers to these alternative mitigation options.

- Uncertainty about the future of the wetlands regulatory program is another source of credit demand uncertainty. Ever since the wetlands program started, there has been persistent disagreement over various basic principles of wetlands policy, including what constitutes (1) a "wetland," (2) "fill," (3) "waters of the United States," (4) an activity significant enough to warrant intensive regulatory review, and (5) appropriate mitigation for a permitted fill (Shabman and Scodari, 2004). Such disagreement, and the prospect of potential regulatory changes, creates uncertainty about what kind of mitigation may or may not be required or allowed and thus uncertainty about likely future demand. This instability of the legal environment makes strong but flexible regulatory presence critical. For example, intense cooperation and coordination between bankers and regulators allowed bankers in the Chicago market to survive the crisis in demand precipitated by the Supreme Court's 2001 decision in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers (SWANCC)*, which limited federal authority under the Clean Water Act to regulate certain isolated wetlands (U.S. Supreme Court, 2001).

- Even when a buyer of offsets has been found, there is still risk to potential sellers. Regulators and credit suppliers often disagree over the number of credits produced, especially if the level of production is based on more subjective functional assessments rather than on the number of acres. An additional source of disagreement can be whether in-kind and locational requirements have been met. While regulatory concurrence is clearly necessary to ensure that environmental goals are met, such disagreements can take time to resolve and can lead to lower revenues or a delay in the recovery of invested capital for the seller (Shabman and Scodari, 2004).

- Another factor that has contributed to limited demand for credits is related to the size of so-called service areas of private commercial banks. The service area defines where certified bank credits may be sold. Two competing interests play a role in establishing the size of the service area. On the one hand, a larger service area increases the need for permitted fill and therefore the demand for credits.

> If the service area is too small, an investment that yields more credits than can be sold to a particular permittee may leave the seller with surplus credits that cannot be readily marketed. Larger service areas might also increase the opportunity to find low-cost mitigation sites, a necessary condition for encouraging mitigation bank activities. On the other hand, if the service area is too large, ecosystem traits at the mitigation site might be very different from the fill site, and the requirement for functional equivalency might be compromised. Even if functional equivalency is achieved, a spatial transfer of wetlands functions might lead to hotspots and social equity concerns.[19]

Despite these demand uncertainties, private sector investment in wetlands credit production has occurred in many areas of the country since the mid-1990s. Certain risk management processes might have helped some of these private investors to reduce uncertainty and investment risk and thus overcome barriers to entry into the market. An important element in the credit seller's risk management strategy is an informal understanding with the prospective credit buyer and the regulatory agency – or the conclusion, based on previous regulatory decisions – that the permit applicant will be allowed to meet his mitigation requirement by purchasing credits from that particular seller, if the seller's credits are certified. With such regulatory approval of a credit seller, a limited share of the produced credits can typically be sold before mitigation wetlands have been certified fully successful – in accordance with established performance criteria and in return for the posting of a financial assurance. With this consideration in mind, the credit seller and the permit applicant can negotiate a credit price that is high enough for the seller to recover a significant share of his costs for the whole credit venture, even if only a fraction of the credits produced (those required by the pending fill permit) are eventually sold. However, in many cases, reaching understanding among permittees, credit sellers, and the regulators of what credits will be needed for a specific permit might increase transaction cost (Shabman and Scodari, 2004; Shabman, Stephenson, and Scodari, 1998).

Even though this strategy has helped lower barriers to market entry for some private entrepreneurs in many areas, it has not sufficiently addressed thin markets where there are few sellers of credits. Where advance agreements cannot be reached, private sellers have to set credit prices to recover not only the costs of credit production and the regulatory costs of gaining credit sales approval but also the risk costs associated with future demand uncertainty (Shabman, Stephenson, and Scodari, 1998). It is unclear exactly what premium is placed on credits to account for this type of demand uncertainty, but premiums are evident. As a result, credit prices may exceed what many permit applicants are able or willing to pay for wetlands mitigation (Shabman and Scodari, 2004).

The next section presents a discussion of an emerging program idea that is being developed for securing wetlands credits from private providers.

[19] The definition of service area is especially important in the WQT context, as trades cannot lead to hotspots or the non-attainment of water quality standards. Trading ratios and restrictions on certain trades are promising ways of avoiding hotspots while at the same time not restricting potential demand for credits through small service areas.

## Private Commercial Credit Supply – Examples

To date, much of the total national investment in private credit supply has been concentrated in areas where fill permitting and thus mitigation needs are relatively high, including Florida, Louisiana, California, Virginia, and the Chicago region (see ELI, 2002). Specific outcomes in different areas have been largely shaped by area-specific factors, which in some cases have exacerbated and in other cases mitigated against the barriers to credit sales inherent in the federal program.

- In Florida, state policies have encouraged private credit investment and sales since 1994. However, both supply- and demand-side barriers to credit investment are evident. Supply-side barriers relate primarily to a lengthy and often contentious MBRT approval process for credit ventures; demand-side barriers can be traced to state policies that allow for various types of competing fee-based programs and that serve to limit private credit demand in various other ways. Nevertheless, Florida now has approximately 30 approved private ventures, although it appears that many of these are having trouble selling credits, which might have contributed to falling credit prices in some areas of the state in recent years.

- In the Chicago Corps district area, the barriers to credit investment and use do not appear as great as in Florida. Currently, there are 17 operating private ventures in the district, and multiple ventures are located in three of the five standard service areas established for the district. Nonetheless, the presence of multiple private ventures with coexistent service areas has apparently not resulted in downward pressure on credit prices, and there seems to be limited interest in new private credit investment at this time.[20]

- In Virginia, credit investment has been greatly facilitated by state policies. Virginia now has approximately 30 private credit ventures, with another 15 in various stages of development. Some price competition is evident in several of the standard service areas established in the state. Various factors appear to contribute to this result, including (1) service areas established by state law that span hundreds to thousands of square miles, (2) the existence of state general permitting authority for fills less than one-half acre for which state law encourages the use of off-site and credits as compensatory mitigation, (3) an ILF program that pegs its fees at levels that do not undercut private seller credit prices, and (4) an MBRT process that is widely acknowledged as being minimally burdensome relative to how that process works in many other areas.

Adapted from Shabman and Scodari, 2004.

### 2.2.2 Designing Market-like Programs for Offset Supply

The North Carolina Ecosystem Enhancement Program (NCEEP) is one of the best and most illustrative experiments with a form of credit reselling that demonstrates the practicality of addressing demand

[20] According to another source, prices in Chicago are very close to the cost of credit production and are, in most cases, below the buyers' willingness to pay. This is partially the result of price competition with other forms of mitigation outside of banking. In addition, city and county ordinances dealing with wetlands in Chicago are extensive, and there are state and local permit programs (outside of the Section 404 program) that require mitigation measures. Therefore, there is certain unpredictability between the different scales of governance in the market (Robertson, 2004).

uncertainty and dealing with thin markets (Shabman and Scodari, 2004).[21] This new approach is being developed for securing credits for permitted wetlands and stream fills under Section 404.[22] The logic and design of that emergent model offers lessons for securing offsets for NPDES and other forms of water quality discharge permitting.[23] The NCEEP draws on the strengths of private-sector credit providers (especially as a way to secure quality assurance and timely credit provision) and of the MBRT-like function (to ensure better coordination of reviews and a minimum level of ecosystem quality).

The NCEEP program relies on a dedicated funding source that can be used for planning for credit production needs (including the location and type of wetlands credits) and to pay for credit production before those credits are used as mitigation for a permit. These funds are provided mainly, but not exclusively, by the state Department of Transportation.

The market-like feature of the program is a competitive bidding process where private credit providers compete with each other to sell credits to the NCEEP. The competition is over the quality of the credits to be provided, the assurances offered by the bidder that the credits will be ecologically successful, and the price requested for the credit production. The bidding program is organized through a request for proposal (RFP) process where the NCEEP specifies the number and type of credits needed and sets out the conditions for choosing an award winner. This bidding process can encourage a more vigorous competition on price and quality and in so doing address the thin market problem.

This process, combined with the advanced funding, also addresses the demand uncertainty problem. Some of the program funding supports NCEEP planning efforts to identify anticipated mitigation needs in watersheds where the bids are issued. Once the RFP process is completed for a watershed, the winning bidder is paid on a defined schedule – tied to a credit release schedule and the posting of financial assurances – from the NCEEP's fund. Thus, the competing bidders face a known demand for the credits and are willing to compete to provide high quality credits in all watersheds where an RFP has been issued, at the lowest possible cost. The NCEEP then purchases the credits, resells them to reimburse the fund, and the RFP process begins again, as needed. In effect, the demand risk is carried by the NCEEP when it makes a demand projection and issues an RFP.

[21] The NCEEP is based on partnerships embodied in a Memorandum of Agreement between the N.C. Department of Transportation (NCDOT), the N.C. Department of Environment & Natural Resources (NCDENR), and the U.S. Army Corps of Engineers which established the program's procedures on July 22, 2003 (NCEEP, 2005). See http://www.nceep.net/pages/partners.html.

[22] This is a highly generalized discussion of the ideal form. For details see Shabman and Scodari, 2004.

[23] The NCEEP will be using its program in the future to offer such offsets to permittees. These may be in the form of defined "leases" over specified periods to meet NPDES permit compliance obligations. Given that permitted wetlands fill destroys wetlands in perpetuity and that mitigation wetlands have to be everlasting, the "leasing" of wetlands services is not particularly relevant in the wetlands context.

### 2.2.3 Conclusion

The wetland mitigation experience demonstrates that third-party providers of offsets, especially private sector offsets sellers, could be active in developing and implementing innovative ways to secure NPS offsets and offer the quality assurance that those offsets are "real." However, the same high entry costs and demand uncertainty that initially limited the spread of private commercial wetland mitigation may limit the prospects for investors to develop and seek to sell water quality offsets. Skepticism about the ability of WQT to meet ecological objectives, and the resulting uncertainty about the future support of WQT programs by regulatory authorities, can lead to considerable uncertainty about likely future demand for offsets. Compounding this uncertainty is the current case-by-case nature of the offset requirements. Each permit has a different set of considerations and may take an extended period to negotiate with the regulated source. Under the current system, offsets needs only emerge after such negotiation, so any advanced investment in offset creation has to be based on a guess as to what the offset requirements will be in any given permit.

The wetlands program initially faced similar problems but has evolved to overcome – in some cases and to a certain degree – thin markets and demand uncertainty. Private sector investment in wetlands credit production has occurred in many areas of the country since the mid-1990s. Not surprisingly, areas where fill permitting and thus mitigation needs are relatively high, including Florida, Louisiana, California, Virginia, and the Chicago region, have seen higher rates of private credit supply (Shabman and Scodari, 2004). In addition, certain risk management processes might have helped some of these ventures to reduce uncertainty and investment risk and thus to overcome barriers to entry into the market. For example, prospective credit sellers can reduce their risk by identifying prospective credit buyers and reaching preliminary agreements with the regulatory agency prior to undertaking mitigation activities. While credit certification would still be subject to the successful functioning of the mitigation bank, this process creates some investor certainty because a demand for some number of credits is established before the investment in credit creation begins (Shabman and Scodari, 2004; Shabman, Stephenson, and Scodari, 1998).

One important evolution of the wetlands program, and especially interesting for attempts at improving WQT programs, is the current experimentation with bidding programs that address the thin market and demand uncertainty problems and that still provide for quality assurance of credits. A bidding program may be the most promising approach for securing water quality offsets.

If these lessons are to be applied, important design elements for a WQT offset program should be considered. These are listed in general terms for future detailed consideration.

- There should be an agency of government created with the mission of securing quality assured NPS offsets, akin to the NCEEP. Each state might develop its own approach to meeting this challenge.

- There should be a dedicated fund that can be used by the specified agency for developing estimates of offset requirements in watersheds and then paying for the offsets once they are provided by a winning bidder. There are a number of possibilities for such a fund, including existing independent state revolving fund programs, use of 319 grant funds, or other dedicated funds and changes such as the recent Maryland "flush tax."

- If offsets are solicited, as in issuing RFPs, the bidder will be asked to provide offsets that are specific to the needs of each watershed, likely as the watersheds' TMDLs define these needs. These should

include, but are not limited to (1) the types of pollutants to be reduced, (2) whether the water quality performance of the offsets will be measured or modeled, and (3) the expected financial assurance requirements and the release schedules for those assurances in relation to how offsets will be monitored, assured, and certified over time.

There is one aspect of the water quality problem that differs from the wetlands mitigation problem and that may prove especially promising for the application of a bidding program. Specifically, NPS reductions under a TMDL will be needed for both meeting load allocations and providing offsets for purchase by point sources to meet their waste load allocations. In the wetlands case, there are only credit requirements to be met. The significance is that RFPs aimed at nonpoint sources could be issued to serve two purposes: first, to facilitate meeting load allocation requirements for TMDLs and second, to generate additional NPS reductions above and beyond load allocation requirements, which would be available for offsets to point sources. This should "thicken" the market and create many more opportunities for entrepreneurs to become active in providing NPS load reductions. There should be an accounting process that allocates reductions between meeting the load allocation and being available as offsets. However, to the extent that the number of RFPs expands, the ability to foster competition that promotes innovation in monitoring and enforcing NPS reductions and that keeps costs down is advanced.

# 3 References

Copeland, Claudia. 2003. Congressional Research Service; Resources, Science, and Industry Division. *Clean Water Issues in the 107th Congress.* Issue Brief for Congress. Updated January 9, 2003. The Library of Congress. Order Code IB10069.

Environmental Law Institute (ELI). 2002. *Banks and Fees: The Status of Off-Site Wetland Mitigation In the United States*. Washington, D.C. September 2002.

*Federal Guidance for the Establishment, Use and Operation of Mitigation Banks*. 1995. 60 Fed. Reg. 228, 58605-58614.

Institute for Water Resources. 1995. *National Wetland Mitigation Banking Study: Technical and Procedural Support to Mitigation Banking Guidance*. Institute for Water Resources, Water Resources Support Center, U.S. Army Corps of Engineers. IWR Technical Paper WMB-TP-2. December 1995.

North Carolina Ecosystem Enhancement Program (NCEEP). 2005. http://www.nceep.net/pages/partners.html, accessed on February 25, 2005.

National Research Council (NRC). 2001. *Compensating for Wetland Losses Under the Clean Water Act.* Washington, DC: National Academy Press.

Robertson, Morgan. 2004. *Drawing Lines in Water: Entrepreneurial Wetland Mitigation Banking and the Search for Ecosystem Service Markets.* Dissertation. University of Wisconsin-Madison, Department of Geography. 2004.

Schary, C. and K. Fisher-Vanden. 2004. "A New Approach to Water Quality Trading: Applying Lessons from the Acid Rain Program to the Lower Boise River Watershed." *Environmental Practice* 6 (December 2004) 4:281-295.

Shabman, L. and P. Scodari. 2004. *The Past, Present, and Future of Wetlands Credit Sales*. Discussion Paper RFF-DP-04-48. Resources for the Future. December 2004.

Shabman, L., K. Stephenson, and W. Shobe. 2002. "Trading Programs for Environmental Management: Reflections on the Air and Water Experiences." *Environmental Practice* 4 (September 2002) 3:153-162. Reprinted by the Center for Energy and Environmental Policy Research, Massachusetts Institute of Technology, Reprint Series Number 166.

Shabman, L., K. Stephenson, and P. Scodari. 1998. "Wetlands Credit Sales as a Strategy for Achieving No Net Loss: The Limitations of Regulatory Conditions." *Wetlands* 18.3.

Shabman, L., P. Scodari, and D. King. 1996. "Wetland Mitigation Banking Markets." *Mitigation Banking: Theory and Practice*. Eds. L. L. Marsh, D. R. Porter, and D. A. Salvesen. Washington, D.C.: Island Press. pp. 109-138.

Society of Wetland Scientists (SWS). 2005. *Symposium 15: How Much Science is Enough? Measuring No Net Loss/Gain of Wetlands* to be held at the 26th Annual International Wetlands Meeting, June 5-10, 2005 in Charleston, SC. http://www.sws.org/charleston2005/symposium_ASWM.htm.

Stephenson, K., L. Shabman, and J. Boyd. 2004. "Taxonomy of Trading Programs: Concepts and Applications to TMDLs." In *TMDLs: Approaches and Challenges.* Ed, Tamim Younos, Pennwell Press. Forthcoming.

U.S. Environmental Protection Agency (EPA). 2004. *Water Quality Trading Assessment Handbook.* EPA 841-B-04-001. November 2004.

U.S. Environmental Protection Agency (EPA). 2003. *National Water Quality Trading Policy*. Office of Water. January 13, 2003.

U.S. Environmental Protection Agency (EPA). 2001. National Center for Environmental Economics. *The U.S. Experience with Economic Incentives for Protecting the Environment.* EPA-240-R-01-001. Washington, DC.

U.S. Supreme Court. 2001. Solid Waste Agency of Northern Cook County (SWANCC) v. US Army Corps of Engineers. Case No. 99-1178, U.S. 159 (decided January 9).

Zinn, J. A. and C. Copeland. 2002. Congressional Research Service; Resources, Science, and Industry Division. *Wetland Issues.* Issue Brief for Congress. Updated August 28, 2002. The Library of Congress. Order Code IB97014.