Past, Present, and Future of Wetlands Credit Sales

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Abstract

In this paper we review the evolution of the wetlands credit sales program developed to support the federal wetlands permit program. Then, we explain how the regulatory rules governing the overall permit program, as well as specific rules governing credit sales, have prevented the development of robust markets in credit buying and selling. Based on this review, we identify an alternative institutional structure that would apply marketlike principles to expand the quantity of and lower the prices of credits while ensuring that wetlands credit sales help move the nation toward its goal: no net loss of wetlands acres and functions.

Key Words: wetlands mitigation, wetlands banking, environmental markets, Clean Water Act

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1. Introduction

Wetlands are natural capital assets that may provide various ecological functions of benefit to people and wildlife, including hydrologic (flood and drought remediation), water quality (sediment and nutrient assimilation), and wildlife habitat (nursery and feeding areas).[1] Analyses conducted during the 1970s found that about 50% of the United States' original wetlands had been converted to agricultural and urban land uses, making wetlands loss a matter of policy concern (OTA, 1984; Dahl, 1990; Dahl, 2000). This concern led to a national commitment to a goal of no overall net loss (NNL) of wetlands acres and functions, to be followed by a net gain.[2]

The NNL goal became a focal point for structuring the nation's principal regulatory program governing wetlands alterations. The federal permit program created by Section 404 of the Clean Water Act (CWA) is administered by the U.S. Army Corps of Engineers (Corps) with

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[1] Wetlands ecosystems are characterized by recurrent shallow inundation or saturation at or near the surface of the soil and, based on the hydrologic regime and vegetative cover, can be categorized into wetlands types such as forested, shrub–scrub, and bogs (Cowardin et al., 1979; NRC, 1995). The specific types and levels of ecological functions provided by any particular wetlands parcel depend on the wetlands type and its location in the landscape (Mitch and Gosselink, 2000; NRC, 2001).

[2] In 1987 the Conservation Foundation convened the National Wetlands Policy Forum, which included representatives from environmental organizations, business, government, and academia. Their report recommended an interim national goal of no net loss (NNL) of wetlands acres and functions, followed by a net gain (Conservation Foundation, 1988). In 1990 the U.S. Fish and Wildlife Service interpreted the NNL goal to mean "wetland losses must be offset by wetland gains in terms of actual acreage and, to the extent possible, ecosystem function" (FWS, 1990). Since 1990 the federal regulatory program has sought to support NNL of wetlands programwide. However, this policy goal has never been codified in law or regulation, nor has it always been clearly defined or articulated by the Corps. Nonetheless, the practical effect of the policy debate over NNL is that it has been widely perceived as a standard to be met for the program as a whole, if not necessarily for each permit.

oversight by the U.S. Environmental Protection Agency (EPA) (Strand, 1995; GAO, 1991).[3] In addition, individual states have wetlands-permitting authorities that either complement or expand upon the federal program and also seek to support NNL as a program goal (Zinn and Copeland, 2001). Under Section 404, anyone wishing to place fill material in an area that is delineated as wetlands and that falls under the legal jurisdiction of Section 404 is required to secure a permit from the Corps.[4] If a permit is issued, the permittee has the legal and financial responsibility to restore degraded wetlands not affected by the permitted fill or create new wetlands from uplands.[5] The expectation is that these "compensation wetlands" will offset the permitted loss of wetlands area and functions and will so support the NNL goal. These compensation wetlands are often called *wetlands credits*. The credits are defined in terms of acres of a wetlands type (e.g., vegetation type and appropriate hydrologic regime), in terms of metrics derived from a functional assessment process that seeks to measure increased ecological function resulting from a wetlands restoration or creation project, or both (Corps, 2002; EPA, March 2004).

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[3] It is worth noting that the federal permit program directly affects only a relatively small amount of the nation's total wetlands acreage. For example, in the years between 1992 and 2003, federal permittees were authorized to fill a total of 237,000 wetlands acres, representing only about 2.5% of the nation's (excluding Alaska) existing stock of approximately 100 million acres (Source: The Quarterly Permit Data System, which is used by Corps Headquarters to roll up data from the Regulatory Analysis and Management System and other automated information systems that are used by Corps districts to record data on permit applications as they are received and processed.). As a result, there is a much richer mix of wetlands policies than just the federal permit program. For example, U.S. agricultural policy includes a provision that denies farm operators access to price and income support programs if they drain or fill a wetlands on their property. Also, the Wetlands Reserve Program purchases perpetual easements from farmers who agree to stop farming former wetlands areas and return the areas to wetlands status (Heimlich et al., 2000). In April 2004, President George W. Bush endorsed a policy to increase the nation's wetlands acreage, largely through incentive payments to encourage wetlands restoration by private landowners.

[4] Much that remains under debate is embedded in this apparently simple sentence. Section 404 does not use the term *wetlands*, instead referring to "waters of the United States." However, court rulings have established that waters of the United States included "wetlands," as that term came to be understood after passage of the Clean Water Act in 1972. These rulings led to other questions, such as "what are wetlands?" and "which wetlands can the Corps regulate?" Agreement on a wetlands definition took over 15 years to achieve and required a National Academy of Sciences panel report (NRC, 1995). However, the popular image of wetlands is a place with visible water at the surface of the land. This image conflicts with a scientific definition in which wetlands may be places where water rarely reaches the surface. This conflict between the general image of a wetlands and the NRC definition remains a source of public contention about the scope of the permitting program. Meanwhile, the scope of wetlands subject to Section 404 regulatory jurisdiction remains in dispute. As recently as 2001, a decision by the United States Supreme Court limited the federal permitting jurisdiction over so-called isolated wetlands in a specific permitting case (NRC, 2001), and the programwide implications of that ruling continue to be debated. A related ambiguity affecting Section 404 implementation is the definition of *fill*. Recall that Section 404 only regulates the placing of fill material in waters of the United States (NRC, 2001).

[5] Recent reviews have argued that restoration of degraded wetlands—for example, by re-flooding former wetlands that had been drained for farmland—is strongly preferable to creating wetlands from uplands (NRC, 2001).

For the most part, the production of credits required to offset a permitted fill has been the responsibility of the permit recipient (permittee). However, for reasons described below, some permittees did not provide either the quantity or quality of credits necessary to offset their development impacts on wetlands area and functions, especially habitat functions. To address this problem, wetlands program administrators at first cautiously allowed, then later actively encouraged, private entrepreneurs to make investments in producing wetlands credits to be sold to permittees in need of compensation wetlands. Regulatory program administrators would certify the ecological quality of credits produced by private entrepreneurs before they could be sold for mitigation. Then, the same regulators would assess the wetlands acres and functions lost when they issued a fill permit and might allow permittees to purchase credits from certified credit sellers to offset the wetlands loss. In this way, credit sales would help the permit program to support the NNL goal.

In conceiving this program, private credit sellers were expected to comply with credit quality assurance requirements when seeking regulatory certification as a credit seller. They would then compete on a price basis when offering credits to permittees. With the minimum acceptable credit quality assured, credit price would fall toward the long-run average cost of production. If the sellers were private entrepreneurs, then the full cost of credits supplied would be included in the credit price, including the opportunity cost of invested capital and returns to management. In principle, competition among credit sellers would drive credit prices toward minimum cost, but there would be no cost subsidy to recipients of fill permits. (For an early paper[6] that makes these arguments, see Shabman, Scodari, and King, 1994.)

The production and sale of wetlands credits has been cited as an example of a marketlike approach to environmental management (EPA, 2001; NAPA, 2000). However, it is more correct to characterize the credit sales program as analogous to the offset requirements developed in the other pollution control programs. Such offset programs require the regulated pollution source to first adopt all reasonable measures to control its own discharges, then to assure that some other pollution source will reduce its discharges by an amount equivalent to offset the regulated source's remaining discharges.[7] Similarly, in the wetlands permitting program, the regulator requires the permit applicant to take all practicable steps to avoid and minimize fill, and only then are credit offsets required for any remaining wetlands impacts.

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[6] Subsequent experience, described in this paper, suggests that these expected results were not realized.

[7] For a discussion of the differences between marketlike programs and offsets, see Shabman, Stephenson, and Shobe, 2002.

In the wetlands application, the goal of the credit sales program has been to improve the availability and quality of compensation wetlands. In many areas of the country, the private sector has provided credits to permittees in need of compensation wetlands. However, the early hope for significant numbers of credits sellers competing through price has not generally been realized. Regulatory conditions have created barriers to market entry and have created thin markets characterized by limited price competition. Today, private credit sellers provide only a small fraction of the total wetlands offsets required by regulators, and credit prices generally appear to be well above credit production costs.

In this paper we first review the evolution of the credit sales program developed to support the federal wetlands permit program, then explain how the regulatory rules governing the overall permit program, as well as specific rules governing credit production and sales, have prevented the development of robust markets in credit buying and selling. Based on this review, we identify and describe an alternative institutional structure that would apply marketlike principles to expand the quantity of and lower the prices of credits while assuring that wetlands credit sales helps move the nation toward the NNL goal.[8]

2. Wetlands Credit Sales: Origins and Current Status

2.1. Compensation Wetlands and the CWA Section 404 Permit Program[9]

Section 404 regulations expect Corps regulators to conduct a review, called mitigation sequencing, before a fill permit is issued. In this review the regulator determines whether the proposed activity has avoided existing wetlands to the maximum extent practicable. If avoidance is not deemed possible, then wetland fill must be minimized. If the regulator determines that the

[8] Many of the observations and conclusions in this paper are drawn from the authors' collective decades-long experience in the development of national wetlands mitigation policy. Citation of particular source material for many of the observations found in this paper would not be possible. At different times, one or both of the authors have completed detailed analysis of varying aspects of the wetlands permit program. We have at other times participated in the design of the rules governing the wetlands program in general and the credit sales program in particular. We have benefited from extensive interviews with regulators, permittees, and mitigation providers over the years and for the development of this analysis. We have also benefited from attending numerous wetlands conferences; reading and participating in congressional hearings; and reviewing the professional literature, agency memos, and articles in the popular press. As a test of the validity of the overall story told in this paper, a draft was reviewed by several people who were active in the development of the programs described here.

[9] Generalizations about the federal permit program are possible, even though administration of the program differs among the regional offices of the Corps. Also, some states have permit programs that affect the execution of the federal program, whereas other states have no such programs.

proposed development project is in the public interest but that wetlands losses will be unavoidable, the permittee may be required to provide wetlands credits to offset the permitted loss. It is worth noting that each of the two main types of permits—individual and general—has its own mitigation expectations and procedures for applying the sequencing logic. At present an individual permit is required for a wide range of activities (such as roads, dams, and residential and commercial development) for wetlands fills of multiple acres as well as fills as small as one-third of an acre. But this was not always the case. For example, before 1996 wetlands fills as large as 10 acres and many types of development activities were exempted from individual permit review.[10]

Corps regulators are directed by a 1990 memorandum of agreement (MOA) between the U.S. Department of the Army and EPA to give first preference for credit offsets that are similar to the wetlands types lost to the permit; it is referred to as in-kind mitigation. In addition, the MOA stated a regulatory preference for credits to be located as close as possible to the permitted fill; it referred to as on-site mitigation.[11] The preference for in-kind mitigation can be interpreted as an effort to use wetlands type (forested, scrub, and so on) as a proxy for ensuring the replacement of habitat functions and values lost to permitted fills. The preference for on-site mitigation reflects a recognition that the values of hydrologic and water-quality functions are largely dependent on watershed location. For example, existing floodwater storage and water-quality functions may benefit people living in areas downstream of the wetlands permitted for fill. If the wetlands credits are located at a distance from the area filled, these functions might be moved to a location that does not benefit the same downstream areas. Typically, permittees contract with wetlands consultants to plan and construct on-site and in-kind mitigation, but permittees retain legal responsibility for project implementation and success.

As the regulatory program matured, critical reviews consistently found that on-site compensatory mitigation was not securing NNL for all wetlands functions.[12] Based on the

[10] A full discussion of the different types of Section 404 permits and their requirements is beyond the scope of this paper; see Strand (1995) and Corps (2002) for details.

[11] On-site mitigation is formally defined as compensation actions undertaken "in areas adjacent or contiguous to the discharge site" (*Memorandum of Agreement between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines,* February 6, 1990).

[12] NRC (2001) concluded that compensation requirements are sometimes not implemented and often are not ecologically successful compared with reference sites. However, ecological success is typically based on comparison of replacement wetlands with ideal reference wetlands at full functional capacity, not the wetlands permitted for fill. In few instances is information available on the quality of the wetlands permitted for fill, which represents the appropriate baseline for comparison. For an exception, see Minkin and Ladd (2003).

identified institutional and ecological reasons for on-site mitigation failure, several arguments were made[13] for increased use of off-site mitigation, that is, mitigation projects located away from the site of the permitted fill.

First, in some instances the required on-site mitigation credits may not have been provided at all, largely because of limited agency resources available for enforcement of the hundreds of individual mitigation projects required by permits issued each year. It suggested that enforcement might be more effective if multiple and spatially dispersed mitigation projects were consolidated in a much fewer number of larger and more easily monitored off-site areas of compensation wetlands.

Second, at times the permittees supplied credits when they or their consultants had little knowledge of—or ability to apply—proven wetlands credit production methods.[14] Sometimes the resulting credits were in the form of open-water ponds (a type of wetlands) that provided hydrologic and water-quality functions (NRC, 2001) but did not replace lost habitat functions. Also, if compensation wetlands were located near the permitted fill, the habitat functions of these credit offsets would often be compromised by polluted runoff and adverse changes in hydrologic regimes from surrounding development. The compensation wetlands would effectively become storm-water ponds that provide hydrologic and water-quality functions but not habitat functions. For habitat functions to be successfully replaced, compensation wetlands must be located within favorable landscape settings, and these locations were likely to be at some distance from permitted fills (NRC, 2001).

Third, even when projects were initiated using sound mitigation practices, there was a lag time of several years between the time of the permitted fill activity and maturation of the mitigation wetlands, resulting in a temporal loss of habitat functions (King, Bohlen, and Adler, 1993). It was argued that advanced investment at a consolidated, off-site mitigation area—even without certain knowledge of the location of future fill permits—could address this temporal loss of habitat functions.

Finally, in some cases the regulatory program did not require credits as a permit condition for small fills usually authorized under general permits. Often it was deemed impractical to require compensation wetlands on parcels of limited size or by fill permittees with

[13] For example, Salveson (1994) argued for off-site mitigation early on.

[14] Credit production is technically challenging but can be feasible if proper planning (including site selection) and construction methods are used (NRC, 2001).

limited financial means. Without credits being required to offset the acres and functions lost to these permitted fills, NNL would be compromised.

2.2. Rise of Off-Site Consolidated Mitigation Options

By the 1990s many observers of the wetlands permitting program agreed that there was too much on-site credit production with inadequate assurance that these credit offsets would adequately replace habitat functions lost to permitted fills. The desire to secure habitat functions and assure that credits were available at the time fills are permitted, combined with a desire to improve regulatory oversight of wetlands credit production, lent support to the concept of single-user mitigation banking.[15] A single-user mitigation bank is created when a single entity (such as a state highway department) creates a large and readily monitored wetlands-restoration or -creation project away from the areas for which it expects to receive multiple fill permits. After the compensation wetlands are constructed and certified as trending toward ecological success, this entity is awarded credits that can be used to offset its own future permitted fills. These off-site consolidated mitigation offsets represent a "deposit" of credits, and the deposit is drawn down as wetland fills requiring mitigation are permitted.

Clearly, the single-user mitigation bank alternative can work only for permittees who expect to have a number of future development projects requiring fill permits and compensation wetlands and who have access to the initial capital to make the investment in advance credit production. Recognizing that credit offsets needed to be more widely available for permittees with only limited offset requirements, some local government agencies began charging a mitigation fee, in lieu of on-site compensation, as a condition of issuing a permit.[16] These in-lieu fees (ILFs) were supposed to be accumulated and used to produce one or more large wetlands-restoration or -creation projects, designed and constructed as a responsibility of a designated public agency. ILF programs were promoted as a means for securing compensation for even the smallest permitted fills. However, ILF programs have been faulted for excessive lag times before credit production is initiated and for not charging fees that covered the full cost of those compensation wetlands projects (Scodari and Shabman, 2001; Gardner, 2000; GAO, 2001). If fees were set below full production costs, then fewer credits than required for NNL would be

[15] Single-user mitigation banks first came into use in the early 1980s. For a discussion of the early history of mitigation banking, see Brumbaugh and Reppert (1994).

[16] In some cases, state or local government agencies secured government funds to establish mitigation banks for general use. Largely due to the difficulty in securing public funds to capitalize banks, few of these public ventures were created (Scodari and Brumbaugh, 1996).

produced, or public funds would be needed to complete the projects. In effect, a failure to properly account for costs was working against NNL, or, if public funds were used, there was an implicit public subsidy to permittees. By the mid-1990s, interest in ILF programs waned as the interest in promoting private credit sales grew. For reasons outlined later in this paper, interest in ILF programs was renewed in the late 1990s.

2.3. Emergence of Private Credit Sellers

Perhaps the most important result of the early ILF programs was the precedent they established for the transfer of legal and financial responsibility for providing wetlands offsets from permittees to another party—an ILF program administrator—in return for cash payment.[17] It was the affirmation by regulatory authorities that they would allow this transfer of responsibility for providing offsets that motivated private investors to produce credits for commercial sale.[18] In turn, the federal government issued mitigation banking guidance in 1995 to encourage the private sector to make such investments.[19] By specifying requirements for certification as a credit seller, the guidance sought to reduce uncertainty that investors might face when assessing the financial viability of entering this business and to reassure skeptics of the ecological value of private-sector off-site credit production (Scodari, Shabman, and White, 1995).

Today, entrepreneurs with access to private-sector capital (borrowing or internal firm equity) have acquired land in areas away from intensive development and made investments in producing wetlands credits for sale to future permittees.[20] These sellers and their credits are subject to certification before credit sales can be used as offsets for permitted fills. Certification requires that either ecological success criteria for credits are met or, if not yet met, financial

[17] Prior to the development of the credit sales program, the Fina Oil Company developed a mitigation bank in coastal Louisiana for use as compensation for its own future permitted fills. After the bank was developed, the company determined that it had no prospective use for some of the credits it had created and proposed selling them to other companies who needed credits. At the time this concept was untested, and the effort to set regulatory rules to govern this credit sale contributed, along with the emergence of the ILF programs, to the development of the private credit sales program (Scodari, Shabman, and White, 1995).

[18] These private credit sales ventures are commonly referred to as private commercial (or entrepreneurial) mitigation banks.

[19] Federal Guidance for the Establishment, Use and Operation of Mitigation Banks; Notice. *Federal Register* 60(228): 58605, Nov. 28, 1995.

[20] For a recent national survey of private credit sales ventures, see ELI (2002).

assurances (e.g., performance bonds) are provided.[21] Monitoring of the status of the credits is the responsibility of the credit seller, and the regulatory authority can exercise random audits and inspections of the compensation wetlands project. In addition, conservation easements, deed restrictions, and transfers to public ownership are expected to ensure that compensation wetlands retain their wetlands status in perpetuity. In some cases, an endowment fund under the control of a resource agency or nonprofit conservation group with interest dedicated to perpetual management must be established.

For wetlands regulators, the credits provided by private investors promise to be successful relative to traditional on-site credits provided by permittees.[22] The access to private capital makes funds available to initiate credit production in advance of fill impacts. Strict rules for quality control that must be met for the seller to be certified to produce and sell credits, combined with the serious attention to cost accounting and pricing in the private sector, were expected to result in credit prices that reflected the full costs of ecologically successful credit production. Private credit sellers would have the flexibility to locate mitigation sites in areas that favor long-term ecological success, and monitoring and enforcement of relatively fewer mitigation projects and responsible parties would be more readily accomplished. Also, the ready availability of credits for sale would reduce the chance that regulators might not require compensation wetlands for relatively minor fills in which on-site mitigation (or other permit-specific mitigation) was not feasible.

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[21] In the event of credit failure, money from the financial assurance would be used to pay for the redevelopment of the promised wetland credits. The financial assurance amounts are set so that any monies collected as a result of default on private-sector obligations would be sufficient for repairing the failed site. In addition to providing indemnification for regulators, financial assurances can facilitate ecological success of compensation wetlands by providing economic incentives for the credit seller to fulfill its credit production obligations, and to do so in a timely manner, because assurance monies could not be released until these obligations were fulfilled. The use of financial assurances recognizes that the profitability of an investment in credit sales requires the opportunity to sell some portion of credit capacity prior to achievement of specified ecological success criteria. Once credit performance has been established, the financial assurance monies are returned (Corps, 1995).

[22] The assertion that private sellers are offering credits of higher quality cannot be documented by available data. Currently, only limited monitoring tracks wetlands-permitting and -mitigation activities (NRC, 2001; Corps, 2001; Corps, 2002). Furthermore, no case studies of mitigation credit provision compare credits provided by permittees with those provided by credit sellers. What can be compared are the legal and other requirements for quality assurance imposed on permittees versus commercial credit sellers. Few of the quality assurance requirements described for the private sellers apply to permittees who do their own mitigation. On this basis many observers believe that private-sector credit production yields greater assurance of ecological success (NRC, 2001). Nevertheless, some of these agencies, as well as many environmental advocacy groups, remain skeptical of private enterprise as a reliable provider of wetlands credits (Corps, 2001a; Sibbing, 2003). More specifically, some critics argue that private credit sellers tend to seek out lower cost land and, in so doing, may provide quality credits but in remote locations that do not replace functions lost in the watershed where the fill permit was issued (see, for example, Salzman and Ruhl, 2004). This location argument is addressed in more detail later in this paper.

At the same time, fill permit applicants and private credit suppliers have been enthusiastic about the potential advantages of the credit sales program. Permittees are relieved of the need to dedicate land at their development sites to compensation wetlands, and uncertainty about the cost of mitigation is eliminated. Wetlands consultants who help permit applicants to navigate the permit process and land developers with experience as permit applicants in that process have recognized the profit potential of adding consolidated credit production to their business models. In fact, the number of private credit sales ventures has expanded across the nation (Environmental Law Institute, 2002; Scodari and Brumbaugh, 1996). The sellers have formed a professional business association, have their own annual conference, and have association activities that promote the business (see http://www.mitigationbanking.org). Nevertheless, private credit sales now account for a relatively small fraction of the compensation wetlands produced and used to meet mitigation requirements.

3. Private Credit Sales in Their Regulatory Context

Private credit sales for permitted wetlands impacts were promoted as a way to help to advance the NNL goal. However, private credit sales still constitute only a small fraction of the total mitigation required by regulators. Today, private credit sellers provide no more than 10–20% of the total wetlands credits required by fill permits in any region of the country, and in many regions the proportion is much less.[23] Several factors—many under the control of regulatory authorities—appear to limit private-sector investment in credit production. Factors that impede private credit investment and sales, as well as the basis for and implications of lingering concerns over this wetlands mitigation option, are reviewed below.

3.1. Regulatory Barriers to Private Credit Offset Supply

Private credit sellers, in seeking a competitive return on invested capital, must have sales revenue sufficient to recover all costs of production. Costs include cash outlays for all purchased inputs; the opportunity cost of invested funds; the opportunity cost of owned assets, land, and labor; charges for management time; and a return to investment risk. However, rules governing the credit sales program may raise the cost of supplying credits beyond what is necessary to secure ecological success. Meanwhile, uncertainties about the scope of the wetlands permitting program, the continuing opportunity for permittees to provide mitigation on-site, and the

[23] This estimate is based on interviews with staff at a number of the Corps field offices and policy analysts at the Corps of Engineers, Institute for Water Resources.

presence of alternative forms of off-site mitigation (such as ILF payments) make the expected future demand for credits highly uncertain. These supply- and demand-side factors limit the expansion of private credit investment and sales in several ways.

First, consider how regulatory approval procedures affect the costs of private credit supply. An intense scrutiny of the credit certification and sales plan of the seller by an interagency mitigation banking review team (MBRT) has raised the administrative costs of gaining approval to produce and sell credits.[24] The MBRT process for gaining approval as a credit seller may take several years to complete and requires extensive expenditures for legal counsel and technical consultants. Land must have been acquired or a purchase option secured. An intensive regulatory review of the techniques will be used to restore or create the wetlands, and strict performance criteria related to hydrology, soils, and vegetation are established for compensation wetlands. Regulators also require sellers to post performance bonds or other financial assurances when established performance criteria for compensation wetlands have not yet been fully met by the time at which they are used as the basis for credit sales. In effect, in seeking to assure ecological success of the wetlands credits, regulators impose significant and possibly redundant costs on the seller, including opportunity costs of funds invested in land while approval is pending, costs for the engineering design and documentation of how the project will be developed, and opportunity cost of the funds used to post performance bonds. Meanwhile, regulatory review must establish the number of credits that can eventually be sold. If the credits are represented as acres of a restored wetlands type, then the determination of credit quantity is rarely a matter of significant dispute between the prospective seller and MBRT.[25] However, where functional assessments are used to assess the level of credit production, there is often a protracted disagreement over how many credits will ultimately be produced. Functional assessment is a process that relies heavily on the professional judgment of biologists in the use of any particular assessment method to score and then place weights on the hydrologic, habitat, and

[24] The 1995 mitigation banking guidance gives EPA, the Corps, and the other federal and state agencies access to and oversight of the MBRT process for approving a private credit seller's production plan.

[25] If credits are based on preservation of existing wetlands, then multiple acres (10 or more) of such preserved wetlands typically are required as compensation for every acre of wetlands lost to permitted fills. The logic for such acreage requirements is that preservation does not add to the nation's wetlands stock and so cannot offset the loss of wetlands acreage resulting from a permit; however, if the wetlands being preserved are deemed to be threatened by imminent development pressure, then the case for preservation as compensation is stronger. In many cases preservation is combined with a restoration requirement as part of a mitigation package for a permitted fill. In the Corps Norfolk District, for example, permittees commonly provide wetlands restoration or creation for every acre of wetlands lost to permitted fills to ensure NNL of wetlands acreage in addition to the preservation of on- or off-site wetlands deemed to be of high value (personal correspondence with Steve Martin, Corps, Norfolk District).

water-quality functions of compensation wetlands. Differences of view between and among biologists in the regulatory agencies and resource agencies (e.g., U.S. Fish and Wildlife Service) and the seller are common,[26] and how such differences are resolved can significantly affect the revenue potential for the seller.

Second, consider how uncertainty about the future demand for credits created by the regulatory program discourages investment in credit production. Entrepreneurs won't make an investment to produce a product if they are not sure when or if they will be able to sell that product. Difficulty in predicting future land development patterns that affect wetlands filling—and therefore the future demand for credits—is always present. However, greater sources of demand uncertainty are embedded in the regulatory program itself. First, uncertainty is created by the ambiguity of national wetlands regulatory policy. When Congress wrote Section 404 of the Clean Water Act, its intent was unclear. As a result of the ambiguity of legislative intent, there has been persistent policy disagreement over matters as basic as what constitutes wetlands, what constitutes fill, what constitutes "waters of the United States" for defining the limits of federal jurisdiction, what constitutes an activity significant enough to warrant intensive regulatory review, and what constitutes appropriate mitigation for a permitted fill. In the absence of legislative clarification, the goals and structure of the permitting program have been defined by executive orders, administrative rulemaking, and rulings by the U.S. Supreme Court and lower courts (Zinn and Copeland, 2001; Strand, 1997; NRC, 1995; NRC, 2001). It is reasonable to assume that the federal wetlands regulatory program will continue to be reshaped in these various ways, and the attendant uncertainty about how the program may change in the future could make investment in credit production a high-risk activity. For example, if prospective private sales ventures believe that future regulatory requirements may not require credits for permitted fill or may limit the wetlands areas or wetlands types for which credits will be required, then they will discount the possibility of making credit sales in future years.[27]

The sequencing process that governs the fill permit review also contributes to credit demand uncertainty. Recall that the sequencing process requires permit applicants to first avoid

[26] For evidence on this in Florida, see Corps (2001a).

[27] A recent newspaper article that includes the perspectives of several private credit sellers on the effects of shifting interpretations of regulatory jurisdiction on credit investment and sales illustrates this point. One credit seller that has multiple credit ventures in the Chicago area and elsewhere is quoted as saying that his firm's revenue in 2001 was only 8% of what it was in 2000 as a result of the U.S. Supreme Court ruling in 2001 that limits regulatory jurisdiction over isolated intrastate waters. In that same article, a former president of the National Association of Mitigation Bankers notes that "because of the obstacles, some companies have left the industry or moved away from mitigation banking and now are focusing on consulting work" (Meyer, 2004).

and minimize wetland impacts as a condition for permit issuance. Then if a permit is to be issued, the regulator will first examine and give preference to available opportunities for the permittee to provide on-site mitigation for permitted wetland impacts (even though, as noted earlier, regulators have been increasingly concerned about the quality of on-site mitigation). However, no standard analytical protocol is followed in applying the sequencing steps, giving the person reviewing the permit application wide latitude in the process. Thus, the regulator's judgment determines whether the proposed activity is water dependent, whether the wetlands can be avoided, whether compensation wetlands should be provided to offset permitted impacts, and whether on-site mitigation is practicable; such judgments can be highly variable among Corps regulators. Then, if the regulator does allow the permittee to seek credits off site, then the kind and location of wetlands credits that will be required is determined for that permit and may not be at the location or for the type of wetlands that have been created by a credit seller in the same general area. So even if a permittee wants to use a specific credit seller (having come to agreement with that seller on credit price), there is no guarantee that the Corps regulator will decide that the proposed credit trade can be used to satisfy the permittee's mitigation requirement.

Finally, the regulatory (MBRT) approval procedures for credit sellers also circumscribe a seller's potential credit demand by limiting the geographic scope of permit impacts for which the seller's credits could potentially be used as compensation wetlands. Recall that wetlands, as a natural capital asset, may provide hydrologic, water-quality, and habitat functions depending on the wetlands type and its location. Also recall that the values from the hydrologic and water-quality functions of existing wetlands are largely dependent on watershed location; therefore, credits to compensate for these functions should typically be near permitted fills. Habitat functions are less site dependent and in fact often might even be enhanced if compensation wetlands were moved away from a developing area (e.g., to adjoin a nature preserve). Requiring that the credits be at or near the location of permitted fills best replaces hydrologic and water-quality functions and values, but habitat functions and values may best be replaced at more distant locations. Because the wetlands-permitting program has been organized around the wetlands asset, and not the three sets of ecological functions, there has had to be a compromise on location of the wetlands credits to balance functional trade-offs inherent in the choice of mitigation location. The compromise has been to limit the area in which wetlands credits can be sold, referred to as the *service area* (or *sales area*). In many cases service areas have been limited to spatially small watersheds, with the effects of both restricting the potential demand for credits for a private seller and limiting the ability of multiple sellers to compete for credit sales.

Despite the high regulatory approval costs for credit sellers and significant credit demand uncertainty, private-sector investment in credit production has occurred in many areas of the country since the mid-1990s. What explains this seeming contradiction? More specifically, how were the significant market entry costs and demand uncertainty risks successfully managed by these market entrants? Some evidence points toward a plausible risk management process (Shabman, Stephenson, and Scodari, 1998). First, before seeking approval as a credit seller, prospective sellers identify prospective applicants for fill permits at specific sites. A prospective permit applicant and credit seller might then reach an informal understanding with the regulatory agency or conclude, based on previous regulatory decisions, that the permit applicant will be allowed to meet its mitigation requirement by purchasing credits from that particular seller, if the seller's credits are certified. Included in this understanding is the kind of credits that will be required to compensate for wetland losses at the fill site and the acceptable location for credits (i.e., the service area and in-kind requirements).[28] Second, regulatory approval of a credit seller typically allows a limited share of the produced credits to be sold before mitigation wetlands have been certified fully successful in accordance with established performance criteria, in return for the posting of a financial assurance. With these two considerations in mind, the credit seller and the permit applicant could negotiate a credit price that was high enough for the seller to recover a significant share of its costs for the whole credit venture, even if only a fraction of the credits produced (those required by the pending fill permit) were eventually sold.[29] Because there are few if any competing sellers, the credit prices paid were based on the permit applicant's avoided cost from buying credits, rather than different sellers' cost of production (including a competitive return on invested capital). The fill permit applicant's avoided cost includes expenditures for producing and maintaining on-site credits, opportunity costs of dedicating part of the

[28] It may be more accurate to say that these understandings are a result of the tacit knowledge of credit sellers about the demand for fill permits and the likely compensation requirements of the regulators. Credit sellers are closely linked to the wetlands consulting and land development sectors that track local development trends and that have experience with the permit application process. This is how the seller can anticipate a demand for wetlands credits and be expert in navigating the often confusing regulatory process, both in securing permits for fill and in getting their credits approved for sale. Meanwhile, as credit sales have become more common, communication among sellers and regulators has increased, such as at the sellers' annual meeting. Presentations at these conferences as well as informal discussions allow credit sellers to infer what will be required to secure approval as a credit seller.

[29] This risk management strategy relates mainly to private credit sellers driven by the profit motive. A recent national survey of private credit sellers asked about their primary objectives in credit investment (Bailey et al., 2004). It found that while profit was by far the most often identified primary objective, a significant share of surveyed private sellers said that they were primarily motivated to improve and conserve lands they owned. Credit sellers motivated by the latter legacy objective thus face different opportunity costs and incentives than profit-motivated sellers, and they may be more willing to invest in credit production in the absence of immediate prospects for credit sales.

development site to mitigation, and legal or administrative costs for securing the fill permit. This last cost item is avoided (or reduced) because the credit seller often includes permitting assistance as a part of the credit price.

This market entry and credit pricing strategy served all concerned parties. Permit applicants who purchased credits benefited for the reasons noted above. The intensive MBRT review required for regulatory approval of credit sellers, combined with requirements for financial assurances and long-term protection and maintenance of compensation wetlands, provides assurance to the regulatory agency that the credits produced will be ecologically successful. Meanwhile, the private seller earns an acceptable return on its entire investment in the credit venture from the immediate sale of just a portion of its credit supply. Hence, past and future costs are covered, and the potential problem of future demand uncertainty is effectively addressed (Shabman, Stephenson, and Scodari, 1998). Investment in credit production in anticipation of making future sales is a high-cost with high-risk business, and the wetlands regulatory program creates the risk. The market entry and credit pricing strategy of credit sellers outlined above minimizes the financial risk of uncertain future credit sales. Note that this strategy requires entrepreneurial and business management skills as much as wetlands restoration expertise. As a result, the wetlands credit sales business attracted sellers with certain characteristics conducive to participating in this market. The sellers have access to capital markets for borrowing. They often already own tracts of land in locations and in conditions suited to wetlands credit production or have business contacts with the owners of such lands. Sellers are also expert in navigating the often confusing regulatory process both in securing permits for fill and in getting their credits approved for sale. The credit price charged is a return to this risk and project management skill as well as for the land, labor, capital, and know-how used for credit production.

Although the risk management strategy described above has helped private entrepreneurs in many areas to effectively overcome barriers to credit investment and sales embedded in the wetlands permitting program, those barriers nevertheless have limited widespread market entry and thus credit sales competition. In most areas where private investment in credit production has occurred, only one or a few private sellers are present, and the credits they have been certified to sell are generally limited to small sales areas. Moreover, in places where private sellers are present, they have to set credit prices to recover not only the costs of credit production but also the regulatory costs of gaining credit sales approval and the risk costs associated with

future demand uncertainty (Shabman, Stephenson, and Scodari, 1998). As a result, credit prices may exceed what many permit applicants are able to pay for wetlands mitigation.[30]

3.2. ILF and Other Programs Reemerge

Given high prices and limited availability of private seller credits, permit-specific, on-site mitigation remained a necessary option for permittees and regulators. Hence, the problems of compensatory mitigation failure from permittee-sponsored mitigation, especially for habitat functions, and the failure to even require compensation for wetland functions lost by some fills, continued to be concerns (NRC, 2001; http://www.mitigationactionplan.gov/). The result was a renewed interest in ILF programs and similar off-site mitigation options beginning in the later half of the 1990s (Environmental Law Institute, 2002; Scodari and Shabman, 2000).[31] Recall that in ILF mitigation, after a permit application has undergone the sequencing review and the

[30] These general conclusions hold for most areas of country, including areas where private credit investment has been relatively significant. 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. These areas include Florida, Louisiana, California, Virginia, and the Chicago region (ELI, 2002). However, specific outcomes in different areas have been largely shaped by area-specific factors, which in some areas have exacerbated the barriers to credit sales inherent in the federal program and in other areas have mitigated against federal barriers. In Florida, for example, where state policies have encouraged private credit investment and sales since 1994, both supply- and demand-side barriers to credit investment are evident. While 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 ILF programs and that serve to limit private credit demand in various other ways. Nevertheless, Florida now has roughly 30 approved private ventures, although it appears that many are having trouble selling credits. This apparent credit surplus may be responsible for reports of falling credit prices in some areas of the state in recent years. In the Chicago Corps district area, by contrast, the barriers to credit investment and use do not appear as great as in Florida. Currently, 17 private ventures are operating 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 coexisting service areas has apparently not resulted in downward pressure on credit prices, and interest in new private credit investment seems to be limited at this time. One area where credit investment has been greatly facilitated by state policies is Virginia. That state now has roughly 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 Virginia specific factors appear to contribute to this result. Service areas established by state law span hundreds to thousands of square miles, a state general permitting authority for fills less than one-half acre encourages the use of off-site credits as compensatory mitigation, the ILF program pegs its fees at levels that do not undercut private-seller credit prices, and the MBRT process is widely acknowledged as being a minimally burdensome relative to how that process works in many other areas.

[31] During this period, Corps headquarters encouraged Corps districts to develop and use ILF systems to provide compensation for relatively minor wetlands impacts authorized under general permits. Indeed, the U.S. Army Corps of Engineers Proposal to Issue and Modify Nationwide Permits (*Federal Register* 64: 39252, 1999) stated, "Mitigation banks, in lieu fee programs, and other consolidated mitigation approaches will be the preferred method of providing compensatory mitigation, unless the District Engineer determines that activity-specific compensatory mitigation is more appropriate."

regulator has determined that the permittee can satisfy mitigation requirements through an ILF program, the permittee pays a fee to an ILF administrator (typically a conservation organization or government resource agency designated by the Corps to receive and use fees) instead of implementing permit-specific compensatory mitigation. The collected fees are accumulated and used by the ILF administrator to plan and implement one or more wetlands mitigation projects. In this way a responsible third party is paid to take on the obligation to provide the necessary credits.

A related motivation for the renewed interest in ILF programs was the increasing emphasis on taking a watershed approach to compensatory mitigation, at least to secure habitat functions (NRC, 2001; Mitigation Action Plan, 2002). A watershed approach means placing compensation wetlands in landscape settings where wetlands functions are most likely to be realized and prove beneficial. Many ILF programs have followed such an approach to mitigation location and design (Scodari and Shabman, 2000).

Despite these apparent advantages of ILF mitigation, various reviews (Scodari and Shabman, 2000; Gardner, 2000; GAO, 2001) concluded that ILF programs might not provide the same high-quality assurances as private credit sellers, in part because the fees charged may not be adequate to cover the costs of credit production. Also, ILF mitigation results in a time lag between the fill activity and the mitigation being initiated, at least at the start of such ventures. Meanwhile, regulators have approved with increasing frequency various other ways of securing off-site compensation. For example, cash donations to ongoing restoration projects of nongovernmental organizations and government agencies have been accepted as credits for permitted fills. Also, permittees have been allowed to conduct off-site mitigation on lands owned by such organizations (ELI, 2002). Many of the same criticisms of ILF programs apply to these other off-site mitigation options.

From the perspective of private credit sellers, on-site mitigation, ILF programs, and cash donation programs provide inferior compensation wetlands and unfair competition. They point out that these mitigation options are held to lower quality control standards, do not bear any costs of credit sales certification and credit demand uncertainty, and may not employ accurate cost accounting—including not reflecting some costs (e.g., donated land and labor) of production in their prices.

Indeed, private credit sellers have voiced concerns about all of the regulatory barriers to entry and the credit demand uncertainty issues outlined earlier[32] and have sought to overcome them in part through the political process. For example, lobbying by credit sellers helped move regulators to issue guidance to agency field offices that impose stricter requirements on ILF programs and that establish a hierarchy for use of mitigation options that favors private credit suppliers over ILF mitigation.[33] Political pressure by private sellers is also evident in recent federal legislation that requires the Corps to issue regulations establishing consistent performance standards and criteria for use of all types of compensatory mitigation.[34] That law also authorizes U.S. Department of Defense agencies to purchase credits from private sellers as compensatory mitigation for agency activities that adversely impact wetlands, thus increasing potential credit demand. Private sellers have also lobbied for ongoing administrative efforts to raise the quality assurance requirements and enforcement activity applied to on-site mitigation projects (http://www.mitigationactionplan.gov).

4. A Proposed Approach to Securing Adequate Wetlands Credits

Over time, different approaches have been used to try to secure an adequate quantity and quality of wetlands credits. Each approach has relative strengths and weaknesses. Permittee-responsible on-site and in-kind mitigation often replace hydrologic and water-quality functions lost to permitted fills but are subject to monitoring and enforcement difficulties and typically do not adequately replace any lost habitat functions. Single-user mitigation banks and ILF programs place credits in a watershed setting that can secure habitat functions but, at times, at the expense

[32] In a recent national survey of certified credit sellers, a stratified random sample of 89 private sellers were asked to comment on key obstacles to credit investment and sales (Bailey et al., 2004). The most frequently cited obstacles (in terms of the percentage of credit sellers that identified them) included changing requirements and regulations (20%), bureaucracy and time required for certification (16%), lack of agency support (15%), cost of the certification process (8%), and competition from ILF programs (5%). Moreover, about 75% of the surveyed credit sellers reported that they had no plans for additional credit investments.

[33] Federal Guidance on the Use of In-Lieu-Fee Arrangements for Compensatory Mitigation under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act; Notice. *Federal Register* 65(216): 66914, Nov. 7, 2000.

[34] Sec. 2694b of the National Defense Authorization Act for Fiscal Year 2004 (H.R. 1588) states, "To the maximum extent practicable, the regulatory standards and criteria shall maximize available credits and opportunities for mitigation … and apply equivalent standards and criteria to each type of compensatory mitigation." In a statement issued when the House passed the defense bill, Rep. Walter Jones (R-NC) commented, "This provides important flexibility when constructing projects. Without statutory certainty, mitigation bankers [private credit sellers] would have had trouble getting money from lenders, new bankers may not have entered the business, and developers would have been hesitant to buy credits."(Quote reported in *Inside EPA's Water Policy Report*, Jan. 12, 2004).

of other functions. However, the single-user bank provides credits only to developers who have multiple future credit needs. ILF and similar programs have been questioned based on time lags and accountability concerns relating to implementation and cost. Finally, although private credit sellers have been able to provide high-quality off-site credits, for reasons already explained, private sellers are located in only a few areas, and credit prices may exceed the ability to pay of many permittees. We believe that the best components of each approach can be combined to build a composite program for wetlands credit provision that could provide an adequate supply of quality-assured and affordable wetlands credit offsets—an approach we call a credit resale program.

4.1. Credit Resale Program: An Overview

Based on the experiences with both private credit sales and ILF programs, a new credit resale program could be designed to provide more affordable and high-quality credits, where production is initiated in advance of fill permits in many more watersheds. Furthermore, the program could be designed so that credit needs are defined in a watershed context to assure the replacement of all wetlands functions compromised by a permitted fill. In this section we discuss the basic structure and operation of a credit resale program. In the next section we illustrate the concept with a discussion of the nascent North Carolina Ecosystem Enhancement Program and discuss the special challenge and importance of defining functional losses resulting from any permitted fill and relating those losses to the establishment and implementation of credit requirements.

Three interrelated elements form the foundation for the credit resale approach. First, funds to capitalize the program and other needed authorities would be provided to a nonregulatory agency with the mission of securing appropriate compensation wetlands for permitted fill impacts (drawing upon the logic of having an ILF administrator). Second, that agency would use some of the program funding to support planning efforts to predict future wetlands credit needs of permittees by type and location over a fixed period of time, as well as watershed priorities to guide the identification of general mitigation locations and designs.[35] In executing this responsibility, the agency would secure the form and level of interagency collaboration needed to assure that all wetlands functions compromised by the fill permit are addressed. (This particular responsibility is further discussed in Section 4.2.) Third, the

[35] As will be explored further in this section, the mitigation requirements of permittees and the location and kind of credits would be defined according to separate categories of wetlands functions.

responsible agency would be given the authority to act as both a credit purchaser and reseller of the purchased credits. In that role, the agency would use a competitive bidding program to secure an inventory of quality-certified credits to meet the projected future mitigation needs of permittees. The credits would be purchased from the winning bidders and sold to future fill permittees, and when the inventory was exhausted, a new round of bidding would be initiated. If properly designed and administered, this program could secure the supply, quality, and price advantages of a competitive market for wetlands credits (numerous credit sellers competing for the business of permittees) necessary for achieving the NNL goal while advancing a watershed approach to selecting the locations and designs of compensation wetlands.

The process would work in the following way. The designated agency (mitigation agency) first estimates (for, say, 10 years) the number and type of credits it anticipates being required to meet the NNL goal in a defined sales area. With that estimate in hand, the mitigation agency issues a request for proposals (RFP) from potential suppliers of credits. The low-cost bidder that provides ecological success assurances, such as those now imposed on private sellers within the existing credit sales program, are awarded the credit supply contract.[36] The price paid for credits by the mitigation agency reflects the full cost of producing and then maintaining ecologically successful credits. The RFP also includes a requirement for long-term site protection and maintenance.[37] The winning bidder immediately begins the mitigation project, and payments for this work by the mitigation agency follow on a defined schedule tied to project construction milestones and the attainment of performance criteria (not to prospective and uncertain future credit sales to individual permittees, as under the current credit sales program). If the mitigation agency overestimated credit demand, then the RFP for the next time period could be delayed. If credit demand was underestimated, then the mitigation agency could immediately issue a new RFP. For this system to work, the mitigation agency issuing RFPs must have access to an initial fund that can be drawn on to pay the winning bidders on an agreed-to schedule. In turn, the agency must resell the acquired credits to permittees at a price that recovers its credit acquisition costs. The price charged for credits by the mitigation agency might be

[36] Preferably, the quality assurances would largely be based on the posting of financial assurances that are held until performance goals for the mitigation wetlands (e.g., attainment of a certain hydrologic regime) are achieved.

[37] The low-cost bidder might be a government agency or a nongovernmental organization (NGO). However, the NGO would need to plan and initiate credit production work up front and would need to have the same quality assurances as all other bidders. If the NGO does not charge for some costs, such as interest on capital or on volunteer labor, it would have a competitive advantage over private-sector bidders. Unless NGOs are prohibited as bidders, this inherent advantage cannot be entirely avoided and would represent an implicit subsidy for wetlands filling.

thought of as an ILF for compensation wetlands, but this fee is based on real projects and real costs elicited from the bidding process. Credit fee revenues obtained from permittees then are used to repay the fund until another round of bidding is required.

The core concept underlying the credit resale program outlined above is taken from the economics literature for managing natural monopoly and is called competition for the field (Demsetz, 1968). In the general case of a natural monopoly, a government body holds a competition where firms compete for the exclusive right to offer a product in a specified area. The winner of the competition would sell the product directly to the consumers and would be responsible for bearing and managing any demand risk. Presumably, they would include recognition of this risk in their bid to provide the service. For example, if a water distribution system were to be built, firms would compete for the right to build the system and then charge user fees that would recover costs. The key to this program is that the government would assure the winning firm that no other competing systems would be built in the area for a specified period of time.

In the wetlands application, the field is the service area and the product to be produced and sold is wetlands credits. However, for this application there must be an accommodation of the demand uncertainty created by the wetlands regulatory structure. Specifically, the mitigation agency would purchase the credits produced by the winning bidder(s) on a defined payment schedule. This has the effect of shifting the credit demand risk from the private to the public sector and in so doing encourages credit suppliers to compete to provide a product with an assurance that there will be a demand for the product.[38] By removing demand risk from the private sector, fostering competition among prospective suppliers, and eliminating some costs of gaining regulatory approval associated with the existing credit sales program, credit prices should move toward full costs of production.[39]

4.2. Defining Credits: The Need for a Watershed Approach

To be most effective, the credit resale approach must address a problem that has plagued wetlands mitigation generally: functional trade-offs inherent in the choice of credit location.

[38] Recall that the public (i.e., the federal government) creates investment risk by the uncertain nature of federal processes for regulatory approval of credit sales ventures and credit sales and by the continuing ambiguities in the wetlands permit program.

[39] Preliminary simulations suggest that prices might fall as much as 75% in some places (Shabman, Stephenson, and Scodari, 1998).

Earlier it was recognized that the water-quality and hydrologic functions of a wetlands area in a watershed setting are largely dependent on watershed location, and if lost to a permitted fill, they often must be replaced on or nearby the fill site. However, the values of wetlands habitat functions to people and wildlife are less site dependent. And importantly, in many cases, it is not possible to replace lost habitat functions through on-site mitigation because the habitat functions of the compensation wetlands are ultimately compromised over time by surrounding development. Therefore, to adequately compensate for habitat functions lost to permitted fills, there generally is no viable alternative to off-site credit production.

In fact, the inability to secure habitat functions through on-site compensation wetlands is largely why past studies of on-site mitigation projects found high rates of ecological failure and served as one major motivation for greater use of off-site credits. But if the wetlands credits were moved away from the fill location to favor habitat functions, then location-specific hydrologic and water-quality functions would be lost. Because mitigation requirements are being defined in terms of the wetlands asset (i.e., wetlands area and aggregate functions) and not its separable wetlands functions, there is a continuing tension over which functions to favor in regulatory decisions about credit location.

In the context of the current credit sales program, this tension generally has been addressed by requiring mitigation projects to be located within the same (usually small) watershed area as the fill sites they serve. But this method of minimizing functional trade-offs has proved less than ideal. Despite constricted service areas and broad support for a watershed approach to compensatory mitigation, allowing credits to be located at some distance from the fill impacts they offset remains controversial (as does the acceptance of out-of-kind credits).[40] Meanwhile, limiting service areas to small watersheds has created other problems that would be expected to affect a credit resale program. One problem has been a thin market; in effect, there is often only one seller in many areas where credits are now sold. A second problem has been that spatially small service areas limit the land parcels suited for a wetlands mitigation project that can provide all wetlands functions. The owners of such parcels can recognize the unique assets they hold in land sale negotiations with prospective credit sellers. The result has been escalating prices for mitigation sites that in turn lead to high credit prices.

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

One way to avoid functional trade-offs and so increase prospects for the success of a credit resale program would involve setting compensation requirements in terms of separate wetlands functions rather than for the wetlands asset itself. Then, the credit resale program could define credits in terms of wetlands habitat functions, separate from other wetlands functions. The habitat functions are the ones that should be the most mobile across the landscape. For both the ability to support habitat (e.g., ensure that it is not in the midst of parking lots) and to add to a landscape mosaic that places wetlands in their upland context, the habitat functions should be replaced away from fill sites using wetlands types that best fit and will persist in that off-site location. Indeed, what may be more appropriate is thinking not at the watershed scale but at larger eco-region scales when seeking compensation for habitat functions. Although habitat functions lost to permitted fills must be offset through off-site credits, the compensation wetlands need not be of the same type affected by the fills they serve. Instead, credit success might be defined by wetlands hydrology and the extent to which the wetlands type that emerges is suited to the chosen landscape setting. The required compensation for habitat functions lost to permitted fills could be defined on an acre-for-acre basis, thus ensuring NNL in wetlands area as well as habitat functions. In sum, if the credit resale program were to focus on wetlands habitat functions, the agency that issues RFPs could seek habitat credits over spatially large and diverse areas, thus increasing the pool of land parcels that would be suitable mitigation sites.[41] This in turn would be expected to increase the level of competition for credit sales contracts while minimizing the extent to which prospective credit sellers might bid up prices for suitable land parcels.

If the wetlands credit resale program were used to secure compensation for only the habitat functions lost to permitted fills, regulators would still need to secure compensation for any lost hydrologic and water-quality functions. In effect, if wetlands regulators determine that a permitted fill would result in the loss of water-quality and hydrologic functions, then the permittee would be subject to a two-part compensation requirement: one for habitat credits secured through the credit resale program, and one for site-dependent functions to be provided on-site or in close proximity to the permitted fill. Some Corps districts are already increasingly

[41] These compensation wetlands secured through the RFP process would be expected to also provide water-quality or hydrologic functions for the area where they are located. However, the RFP process would seek only to replace—and bidders would compete only to provide—wetlands habitat. But if the off-site credits could be demonstrated to provide water-quality or hydrologic restoration benefits to a watershed, these benefits should be identified, and additional payments for these services could be made through other programs. For example, a wastewater treatment plant might purchase water-quality credits as offsets for an increase in permitted discharge (see Shabman, Stephenson, and Shobe, 2001 for a description of this use of offsets).

using such two-part mitigation requirements to ensure adequate compensation for the full suite of wetlands functions lost to permitted fills.[42]

In determining any needed on-site offsets for location-dependent functions, regulators would appropriately consider on-site wetlands mitigation as well as possible non-wetlands means of securing compensation. Site design changes (e.g., low-impact development), storm-water ponds, pervious pavement, riparian buffers, and a host of other methods can be substitutes for the water-quality and hydrologic functions of a wetland area (Center for Watershed Protection, 2000) and can be implemented on or near the sites of permitted fills. Such non-wetlands compensation requirements are already in place in many areas. A variety of local and state regulatory programs governing land development currently require actions to mitigate for the hydrologic and water-quality effects of land development, including EPA storm-water management responsibilities and permitting requirements. These non-wetlands mitigation programs might often obviate the need for wetlands regulators to secure compensation for lost water-quality and hydrologic functions through on-site wetlands mitigation.

Of course, recognition of non-wetlands means of securing compensation for these lost wetlands functions would require wetlands regulators to coordinate with the relevant non-wetlands programs. The responsibility for assuring this coordination could fall to the agency charged as the credit reseller. It would be a logical responsibility given the importance that this separation of functions has for the success of the credit resale program and given the watershed planning function that would be the responsibility of the credit reseller. It would also require that wetlands regulators have access to easy and inexpensive methods for assessing lost water-quality and hydrologic functions and the extent to which potential offsets can replicate these functions. This access should be readily possible since a suite of assessment models applicable at different scales now exists, as well as easily applied rules of thumb that are used in storm-water and other water-quality management programs that could be used to make these calculations of loss and required offsets. At least one Corps district has already begun to encourage and approve mitigation proposals that incorporate low-impact development in conjunction with off-site habitat mitigation, particularly for permitted impacts on streams. That district has also actively

[42] For example, mitigation guidance in the Corps Ft. Worth District states, “In some cases, it may be acceptable to provide partial compensation at multiple locations. For example, compensation for lost flood storage and sediment trapping functions might be required on-site while compensation for lost wildlife habitat might be allowed at another location.” (U.S. Army Corps of Engineers Fort Worth District, *Mitigation and the Section 404 Regulatory Program*. Draft. May 28, 2002. Page 2)

coordinated with relevant state and local agencies on procedures and assessment methods for use in this context.[43]

4.3. The North Carolina Experience: Lessons for a Credit Resale Program

The North Carolina Ecosystem Enhancement Program (NCEEP)[44] is a recent experiment with a form of credit reselling that demonstrates the practicality of the approach while also illustrating pitfalls and challenges. NCEEP was motivated by a widespread dissatisfaction with delays in permit approval for North Carolina Department of Transportation (NCDOT) highway projects, driven in part by the need to develop and approve mitigation proposals for such projects.[45] The regulatory slowdown in construction that resulted was, to a lesser extent, perceived as a general problem for other forms of development as well.[46] The solution was to create a program that would allow for securing mitigation offsets (credits) in advance of fill impacts.

4.3.1. NCEEP Features

The operation of NCEEP is based on four key features. First, the North Carolina Department of Environment and Natural Resources (NCDENR) signed an MOA with the Corps district office that established a preference for use of NCEEP credits for all NCDOT projects, after NCDOT affirms that it has applied the same sequencing (avoid, minimize, then mitigate) as

[43] The Corps Norfolk District Office encourages mitigation packages for stream impacts that include various low-impact development measures to help support stream water-quality and base flows in conjunction with off-site stream restoration or preservation to compensate for lost habitat functions (personal correspondence with Steve Martin, Corps Norfolk District Regulatory Branch). The district, together with several state and local agencies, jointly sponsored five workshops in 2003 that sought public input on how low-impact development practices should be considered in the review of development projects. Since then, this partnership has finalized a report on public comments received; formed a workgroup that includes all relevant agencies and stakeholders; and developed an action plan, a site design checklist, and runoff calculations worksheets (http://www.nao.usace.army.mil/regulatory/lid.htm).

[44] NCEEP covers mitigation for permitted impacts to wetlands, stream, and riparian buffers and offers nutrient offsets to municipal and industrial sources of pollution that exceed their allowed nutrient discharges. The focus here is on program elements that provide mitigation for permitted fills to wetlands.

[45] The discussion that follows draws upon interviews with Ron Ferrell and Suzanne Klimek, former and current administrators, respectively, of NCEEP. In addition, credit providers to NCEEP, Rich Mogensen of Earthmark and George Howard of Restoration Systems, provided valuable comments. More information on the program is available at the NCEEP website (http://www.nceep.net).

[46] The quality of the mitigation that was being done by NCDOT was not the motivation for NCEEP. Instead, many resource agencies felt that too often mitigation was viewed as an afterthought in the development process, and these agencies wanted a more proactive approach to securing mitigation in advance of fill impacts.

any other permittee. In principle, NCEEP could then predict NCDOT credit needs in watersheds across the state. A rough projection of future credit needs by area of the state is possible because NCDOT has a seven-year road-building plan with sufficient detail that likely road corridors, if not specific routes, can be mapped.

The MOA also references an earlier MOA that recognizes NCEEP as an approved ILF administrator, meaning that NCEEP can accept payments for mitigating permitted fills and undertake credit production projects with the collected fees. In the MOA NCEEP agrees that by 2014, it will have mitigation credits in place five years in advance of an NCDOT permit being issued. This advanced mitigation requires up-front capital to invest in the production of needed credits. Therefore, the second program feature that distinguishes NCEEP from traditional ILF programs is the access to funds to support NCEEP credit production responsibilities. At times funds have been provided by the state; however, at this time the bulk of program funding is provided by NCDOT.

Watershed-scale planning to set watershed restoration priorities to establish the kinds of credits desired is a third feature of the program. Related to these plans, programmatic planning by the NCDENR links the projected need for credits of particular types and in particular locations to mitigation projects that can meet those needs. These planning products are expected to match the NCDOT projections of highway development with specific credit needs.

A fourth feature of NCEEP is reliance on RFPs to secure credits in watersheds where fills are projected to occur and for the kinds of projects that will restore wetlands that are identified as high priority by the NCEEP watershed planning process. RFPs are issued for watersheds where impacts are projected to occur and for the kinds of projects that will restore wetlands that are identified as high priority by the NCEEP planning process. The RFPs are for what the program refers to as “full delivery” projects; it is the availability of upfront funding that allows NCEEP to issue RFPs for such completed turn-key projects.[47]

The winning bidders are selected and then paid on a schedule that is built into a contract referenced in the RFP. The requirements in the RFPs are related to and derived from the quality assurance requirements placed on traditional private credit sellers under the MBRT process. To date about 50% of the predicted mitigation credits have contracted out for full delivery by

[47] RFPs can be found at http://www.ips.state.nc.us/ips/deptbids.asp. Look under the Department of Environment and Natural Resources to see RFPs requesting wetland, stream, and buffer mitigation in various river basins. Also see http://www.nceep.net/business/rfps.htm.

NCEEP and its predecessor programs. The rest of the credits are created under the supervision of NCEEP staff, although competitively selected contractors complete individual components of these projects. The winning bidders in the full delivery RFP process are selected and then paid on a defined schedule as ecological success is documented. NCEEP has the responsibility for selling the credits produced by the program to NCDOT and to other permit recipients in need of credits. The payments required of NCDOT (the fee) are tied to the costs of securing the successful wetlands (or stream) restoration or creation through the bid process, addressing the criticism that traditional ILF programs do not always include the full costs of producing credits in the fee rates they charge. The repayment process is expected to work so that NCDOT (the permittee) pays NCEEP for costs it incurs on a schedule that is governed by the outlays NCEEP makes to the successful bidders and for NCEEP's own in-house projects. The payments required for non-NCDOT users are based on an administratively established fee schedule.

4.3.2 Issues and Lessons from NCEEP

The NCEEP program, with its RFP process for offsetting NCDOT impacts, is a truly innovative approach to securing wetlands credits. In its design it appears to aspire to the conceptual ideal of the credit resale program described above. However, several "growing pains" in the program have become matters of controversy and will need to be debated and then addressed. Below we comment on these current debates relating to the role of private credit providers and ways to strengthen the RFP process.[48]

At the current time some NCEEP funds are used for in-house investment, defined as a credit production process under the direction of NCEEP agency staff, with contracts let for each stage of credit production except land identification and acquisition. The RFP process is referred to as procurement for full-delivery projects, where the mitigation provider is responsible for all aspects of credit development. NCEEP will continue to provide in-house credits, but credit providers argue that any in-house credit production thins the demand for private credits and reduces the chance of having a winning bid. This can discourage competition among (and the number of) possible sellers because there is less overall business to secure. In addition, it reduces the likelihood of any single seller being successful, creates uncertainty regarding which areas

[48] An example of a related topic under debate is the needed degree of precision in data and modeling for watershed planning—and the needed planning funds. At present NCEEP spends about 3% of its budget on developing watershed plans designed to identify priority problems in watersheds across the state. This planning is less controversial that another facet of NCEEP planning: identifying and selecting mitigation sites. Credit providers view site identification as a part of their responsibility, while NCEEP staff feels a responsibility to identify the best sites for credit production projects.

will need private-sector participation, and generally diminishes the long-term interest of prospective credit providers in participating in the RFP process. All other factors being equal, maintaining the current trend to full delivery projects will increase the demand for full delivery credits by reducing in-house credit supply. This said, NCEEP staff argues that the future credit demands are far in excess of what the private-sector providers can deliver. In fact multiple credit delivery mechanisms, including payments to resources agencies, may be needed over time to meet credit demands. For this reason they see a need to have multiple mechanisms for the provision of credits.

However the exact split among private and public credit providers develops, there is widespread agreement that full delivery projects built by private credit providers are an essential component for program success. Therefore, the promise of the RFP process as a foundation for a credit resale program requires a continuing competition among private credit providers while securing the quality and quantity of credits identified by the watershed planning process. We now turn attention to current debates over the RFP process.

After several years of using the bidding process in NCEEP and its predecessor ILF program, there is still a debate over whether bid prices are still too high. In the view of some parties, the benchmark has been published state prices for credits based on NCEEP estimates of costs for producing in-house credits. But critics of NCEEP cost estimates assert that these cost estimates do not fully reflect all costs incurred by the state.[49] Another complaint of private credit providers is that the assurance requirements on full delivery projects seem to be redundant; technical reviews, credit release schedules, and financial assurances are all required to address the same issue: the prospect of credit failure.[50] Our own view is that reliance on financial assurances as the primary mechanism for protecting NCEEP against credit failure would be a sufficient safeguard. While disagreement on these issues remain, there is now a common view that NCEEP should continuously review the structure of the RFP process to assure that the process is competitive and does not impose redundant costs for securing the credit quality desired, and all parties should accept the results of a competitive RFP process as the true cost of credit production.

[49] For example, full cost accounting would include employee costs, the opportunity cost of capital, RFP application costs, the market valuation of land (even if the projects are on public lands), and the allocation of costs for NCEEP staff to in-house credit projects.

[50] One possible reason for this redundancy is that the NCEEP does not want to get caught short of credits if the private-sector winning bidder does not deliver. At the same time, there is some unease among staff at the resource management agencies about private entrepreneurs “making money” on environmental improvement.

A second concern is the cost for prospective bidders to participate in the RFP process in relation to the expected returns. There appear to be new participants (willing sellers) in the last round of RFPs, suggesting that new companies may be coming in. But it is unknown how significant or widespread this increase in competing credit sellers will prove to be over time. For the entry of new bidders to persist, the returns to the business must cover long-term costs.[51] Because bidders face uncertain success in winning a bid, the costs to be a qualified bidder are significant in relation to the expected value of the return. NCEEP will need to develop ways to reduce the cost of participating in the RFP process, perhaps by having an early screening process. More generally, the NCEEP process would be more likely to prosper if more states adopted similar credit resale programs. Then there would be more companies operating, more opportunities to win a bid and enhanced competition among companies. North Carolina could perhaps take leadership, regionally and nationally, in expanding the number of similar programs to more states. Such an effort might be coordinated with the Association of State Wetlands Managers or the National Governors Association. Furthermore, a partnership with the Corps, EPA, the Federal Highway Administration, the private mitigation bankers association, and others would be possible and valuable in expanding the credit resale approach to more areas nationwide.

In addition, we believe that prospects for the expansion and success of the credit resale approach would be advanced if compensation requirements were established in terms of individual wetlands functions lost to permitted fills. Currently, the federal wetlands mitigation program defines compensation requirements in terms of the wetland asset itself (area and aggregate functions), rather than in terms of its separable functions. We believe that regulators should recognize the ecological logic for defining compensation by function and seek functional replacement through coordination of multiple programs. Then the wetlands credit resale program could focus on providing compensation for habitat functions, while other programs could be used to secure water-quality and hydrologic functions. This would be environmentally preferable and could support more robust competition in the RFP process. In fact, North Carolina has the ability to quickly move in this direction. North Carolina's Section 401 Water Quality Certification Process and the multiple local watershed protection and storm-water management requirements already secure at least partial on-site compensation for water-quality and hydrologic effects of development in local watersheds. Indeed, another program within NCEEP actually supports

[51] The costs of the RFP process, when compared with the MBRT process faced by private credit sellers (commercial mitigation bankers), favors NCEEP. Clearly, demand uncertainty for the bidder is far lower under the RFP process, if the bid is won. In the RFP process the state is a buyer, but not all bidders can be successful in every competition.

these efforts. Under that program, local governments are expected to require new development (which may include some wetlands filling) to implement on-site storm-water controls and then to make payments to the NCEEP nutrient offset program for the financing of regional storm-water management practices to offset effects that are not mitigated on site. These programs could readily be meshed with the wetlands mitigation program, allowing the wetlands RFP process to focus on securing compensation for wetlands habitat, together with a parallel RFP process to focus on securing water-quality offsets.

Finally, for a credit resale program to work effectively, there needs to be a dedicated fund to capitalize advanced credit production. In NCEEP, NCDOT has provided that capital, which has allowed the state to build the program infrastructure (planning, administrative staff, and so on) for an operating credit resale program. However, the program is mostly limited to providing compensation wetlands for NCDOT impacts. NCDOT provides the funds to pay NCEEP to compensate it for the actual costs to implement the projects that offset NCDOT's own future (predicted) permit impacts. NCDOT may err by overstating their impacts and credit needs, but they (through NCEEP) can save the extra credits for use in future years. However, for non-NCDOT impacts, there is no dedicated funding for advanced credit production. The program does accept fees from permittees, usually from recipients of nationwide permits (small fills), but the fee is fixed by an administrative action and may not be tied to the actual costs of implementing projects. As a result, for non-NCDOT impacts, a time lag remains in implementing credit production, and there is no assurance that the fees charged are linked to the full cost of securing that compensation. Three actions to address this gap would be for the state to draw on revolving fund sources to capitalize this feature of the program and undertake advanced credit production, for the state to replace the fixed fee schedule with cost-based fee rates, and for the state to merge the NCDOT program with the non-DOT program.

5. Conclusions

The wetlands NNL goal is compromised when Section 404 permittees provide low-quality credits to offset the loss of wetlands area and functions caused by their fills. To address this problem, private entrepreneurs have been encouraged to invest in wetlands restoration projects to earn a return on investment by selling the resulting wetlands credits to permit recipients. Quality control requirements, including the posting of financial assurances for ecological success, assure that private credit sellers provide high-quality credits. However, barriers to widespread market entry have limited investment in credit production in many areas of the country, and where credits are available, high credit prices can discourage use of this

mitigation option by permittees. As a result, most compensation wetlands (credits) continue to be provided by permittees, with the attendant problems that have been well documented. An alternative is needed. We call this alternative a credit resale program.

In a credit resale program a wetlands mitigation authority—akin to an ILF administrator—relies on the private sector for supplying quality-assured credits. Private sellers would compete with each other to provide credits that would be purchased by the mitigation authority and then resold to permittees at fee rates sufficient to recover the costs of credit procurement. In this way, the benefits of competition can be secured even when there are few direct buyers and sellers of credits. The administration of a credit resale program requires a planning process to identify watershed restoration priorities for wetlands (habitat) and a process for predicting future permitting and associated demand for credits by type and location. In addition, a credit resale program must be built on a financial foundation that provides up-front capital to pay for the advanced credit production secured through an RFP process. NCEEP represents one promising effort at establishing a form of credit resale program. There are growing pains in the NCEEP program, but it is an effort to combine the strengths of private-sector credit providers and ILF programs to secure adequate compensation wetlands for wetlands fill permits.

We offer three broad suggestions for advancing the expansion and success of credit resale programs across the nation. First, the concept would be more likely to prosper if additional states implemented a credit resale program. Then there would be more companies operating, more opportunities to win a bid, and enhanced competition among companies. The state of North Carolina might take leadership, regionally and nationally, in seeking to encourage credit resale programs in more states. Such an effort might be advanced through a partnership with the Association of State Wetlands Managers or the National Governors Association, the Corps, EPA, the Federal Highway Administration, and the private mitigation bankers association.

Second, for a credit resale program to work effectively, there must be a dedicated fund to capitalize advanced credit production projects. As has been the case in North Carolina, state departments of transportation can be sources of initial capital that can allow states to build program infrastructure (planning, administrative staff, and so on) for an operating credit resale program. However, a fully functional program cannot be limited to wetlands impacts from transportation projects. Each state should draw on revolving fund sources, in coordination with department of transportation funds, to capitalize the program and undertake advanced compensation wetlands projects for credit production and resale to permit recipients.

Third, we believe that a credit resale program would work best (as would any wetlands compensatory mitigation program) if compensation requirements for permitted fills were set for separate functions and if off-site and out-of-kind replacement are allowed for some of those functions. Functional replacement for site-dependent water-quality and hydrologic functions generally needs to be near the fill site. However, for the replacement of these functions, various non-wetlands offsets should be allowed as substitutes for wetlands mitigation, and there should be close coordination between regulatory requirements for wetlands and for other programs (such as storm-water management) that are mutually concerned with mitigating for the negative water-quality and hydrologic impacts of development. For the replacement of wetlands habitat functions, a landscape perspective demands that the compensation wetlands be placed in a hydrologic and uplands setting where the wetlands can self-design and will not be threatened over time by development. Such wetlands habitat replacement can be done in areas that are somewhat remote from the sites of the permitted wetlands fills for which they are used to provide habitat compensation. This is what is meant by a watershed approach to compensatory mitigation.

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