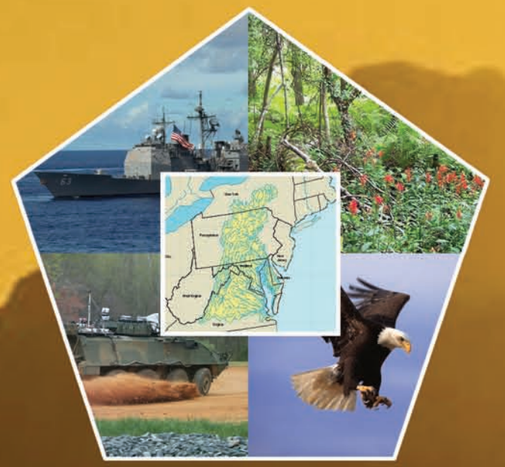
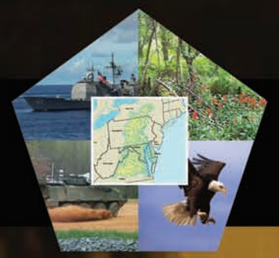


INTEGRATING OFF-SITE MITIGATION BANKING AND TRADING INTO LAND-USE PLANNING

A MANUAL FOR DOD INSTALLATIONS

JANUARY 2009



DEPARTMENT OF DEFENSE LEGACY PROGRAM

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FINAL DRAFT

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Legacy Resource Management Program

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INTEGRATING OFF-SITE MITIGATION BANKING AND TRADING INTO LAND-USE PLANNING: A MANUAL FOR DOD INSTALLATIONS

Heather Cisar, Erica Rohr, and Francis Riley, LMI

FINAL DRAFT JANUARY 2009

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DOD LEGACY RESOURCE MANAGEMENT PROGRAM FUNDING FULL FUNDING
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NOTICE:

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The workshop sponsors, Terry Banks and staff from Fort A.P. Hill, provided support, new ideas, and advice in structuring the workshop and selecting appropriate attendees. Second, MAJ Ethan Bishop from Marine Corps Base Quantico, VA; Thomas Wray from Naval Surface Warfare Center Dahlgren, VA.; and Dr. Bailey from Aberdeen Proving Ground, MD provided insightful assistance and understanding of on the ground installation issues across the Services. Their information played a key role in helping to articulate installation challenges and identify cost effective opportunities for managing lands inside and outside military installations that maximize mission, environment, and community benefits.

Finally, we thank the nearly 35 professionals who spent the day at Fort A.P. Hill and provided a verbal commitment to determining the feasibility of and participation in a pilot water quality nutrient credit-trading project.

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Chapter 1
Introduction

This Manual is designed to encourage Department of Defense (DoD) installations to integrate off-site mitigation banking and trading into land-use planning. Title 10 United States Code (U.S.C.) § 2684a authority is a land-use tool and initiator of important partnerships with eligible entities, such as state and local agencies, non-governmental organizations (NGOs), and private corporations. These partnerships offer mechanisms for off-site mitigation banking and trading to permanently sustain military lands and resources for mission purposes and achieve greater conservation and ecosystem benefits.

The Manual includes an overview of current laws, regulations, and policies related to these activities and definitions to help navigate the complicated world of compensatory mitigation, banking, and trading. This Manual is presented in the context of four emerging ecosystem markets—wetlands, streams, threatened and endangered species (TES), and water quality (WQ)—which have a regulatory driver and can help DoD identify and use regional or landscape planning opportunities and partnerships. Other environmental markets not included—such as forest and non-forest carbon, water quantity, and renewable energy credit trading; recreation; certified forest products; and genetic resource or bioprospecting—may be part of future updates, as needed and applicable.

DoD installations are encouraged to refer to this Manual document during the steps of conservation land-use planning, from the beginning of an encroachment analysis and master planning through the easement closing and long-term management and monitoring arrangements.

BACKGROUND

DoD manages approximately 29 million acres of land. Mission requirements, limited access due to security considerations, and safety buffer zones have, in part, shielded DoD lands from development pressures and large-scale habitat losses. As a result, approximately 380 installations have “significant natural resources,” as defined by the Sikes Act, and more than 250 have at least one federally listed TES. Military lands have inadvertently become refuges of biodiversity, which has resulted in restrictions on their activities. The use of these lands is a critical component of realistic training for our soldiers and effective weapons systems testing, but rapid increases in training and testing for the success of our military forces in combat continue to present challenges. The military has a responsibility to balance evolving mission requirements within the boundaries of existing military lands while preventing encroachment or adverse impacts to neighbors and sensitive natural resources.

When DoD installations unavoidably affect natural resources, compensatory mitigation is usually required. As the largest military land holder, the Army has declared land availability one of its biggest challenges.[1] Preserving land for training and testing is key to the success of military programs like Base Realignment and Closure (BRAC), Grow the Army,[2] and Transformation. As part of overall cooperative conservation planning, consideration of off-site mitigation options can help installation master planners, operators, and natural resource managers maximize the availability of installation lands—and associated resources like water, the electromagnetic spectrum, and air space—for mission purposes.

Cooperative conservation planning involves diverse partnerships that help installations understand the rules for and options available to effectively integrate off-site mitigation into installation master plans, integrated natural resources management plans (INRMPs), storm water plans, and encroachment plans. Taking cooperative conservation planning one-step further, DoD installations are encouraged to build on these relationships to achieve landscape scale benefits through existing federal and state programs and regional partnerships that help provide a foundation and communication network for permanent protection of resources and ensure DoD can continue its mission operations now and in the future.

DoD is not alone in this effort. Corporations are also thinking of ways to use partnerships as vehicles to benefit the environment. Corporations have begun to engage in market-based trading of the value established for natural resources. The term "ecosystem services" is now often used to refer to indirect ecosystem functions—such as water purification, flood control, carbon sequestration, climate regulation, and soil and nutrient cycling—as well as public recreation. Many agencies and concerned citizens are beginning to recognize the important role of these ecosystem services and the benefits of compensating those who manage these lands. By stimulating market demands for these services, corporations and investors recognize that ecosystems have value and that real opportunities exist to invest in an estimated trillion dollar ecosystem service market.[3] Reasonable efforts at economic valuation make ecosystem services marketable goods that can now be traded and monetized.

USING § 2684A

DoD is exploring the uses of 10 U.S.C. § 2684a, "*Agreements To Limit Encroachments And Other Constraints On Military Training, Testing, And Operations,*" which expands its ability to partner with eligible entities toward the purchase of conservation easements or titles from willing sellers for the protection of natural resources or prevention of incompatible land use outside military installations. These lands, also known as buffers, are protected in perpetuity under

[1] 2nd Annual U.S. Army Sustainable Range Program Workshop. July 8–11, 2008, San Antonio, TX.

[2] U.S. Army, *Grow the Army*, http://www.army.mil/growthearmy/.

[3] The Matrix-Ecosystem Marketplace. June 2008.

conservation or restrictive easements. As a federal agency, DoD is not interested in capitalizing on the monetary value of ecosystem services, rather its interests lie in broadening the selection of land use tools available to installations for the primary purpose of securing military lands and associated resources for mission purposes.

Protecting land outside military boundaries could free up thousands of acres of existing military lands for training and testing. In an attempt to use existing innovative land-use tools to achieve this goal, DoD is exploring mitigation opportunities in conjunction with buffers to support a more cooperative conservation planning approach. Further opportunities to consider the value of natural resources on these properties may provide additional incentives to partners or landowners who may be interested in collaborating and/or partnering with DoD installations to capitalize on the increased value of the resources.

MANUAL ORGANIZATION

The remainder of this Manual is organized as follows:

- Chapter 2 broadly describes mitigation banking and trading, partnerships, benefits, and challenges.
- Chapters 3 through 7 describe wetland mitigation, stream mitigation, conservation mitigation, and WQ trading, respectively, including statutes and regulating agencies, DoD or service policy, mitigation approaches, quantification, example projects, benefits, challenges, and summary.
- A list of references; Appendix A, Glossary; and Appendix B, Abbreviations close out the guide.

Chapter 2
Mitigation Banking and Trading

All mitigation projects are compensatory in nature since they are done to compensate for damage or mitigate the effects of an activity. Mitigation banking is compensatory mitigation built in advance of a project and deemed to have met its goals (namely functioning habitat as judged by meeting specific criteria) by the regulating agency.

Mitigation banking allows for the sale of credits (or release of credits in the case of a single user bank) to be used as compensation for unavoidable damage to certain regulated natural resources. An installation can *offset* its adverse impacts on natural resources by improving *other off-site areas* so that no overall net loss of ecological benefits results. The value of the bank is defined in terms of "compensatory mitigation credits." A bank's *instrument* identifies the number of credits available for offset (and thus available for sale or trade) and requires the use of approved ecological assessment techniques to certify that the mitigation project provides the ecological functions required to justify the credits allowed. The party that is adversely impacting need not be the same as the one improving the other off-site areas, and, if different, the parties can negotiate payment for the value of the impact and of the improvements. In general, parties can buy, sell, and trade the value of compensatory mitigation.

Typical programs include nitrogen, phosphorus, and sediments trading for WQ and nitrogen oxides, sulfur dioxide, and carbon trading for air quality. Trading programs allow facilities facing higher pollution control costs to meet their regulatory obligations by buying environmentally equivalent (or even superior) pollution reductions from another source at lower cost, thus achieving the same improvement at lower overall cost.

Determining which land and resources are off site and which are on site is a critical aspect of compensatory mitigation. The definitions depend on the context in which the terms are used. In general, DoD installations consider land and resources within their boundaries as *on site* and those outside the boundaries as *off site*. In the context of compensatory mitigation, however, regulators are more concerned with geographical proximity and hydrological or ecological connectivity relative to the impacted area, species, or other environmental concern. Thus, compensatory mitigation activities must take place within the same ecologically connected resource area as the affected area, whether on or off site. Often, many buffer lands are connected ecologically to sensitive resources on the installation, making them suitable locations for compensatory mitigation and recovery areas for species.

CATEGORIES

Wetland, Stream, and Streambank Mitigation Banking

Making wetland compensatory mitigation into a market-driven commodity has aroused much interest, and businesses are starting to develop financially profitable mitigation banks. Most wetland banks are heavily subscribed to prior to the full development of their credits. The mitigation is usually required to be performed in the same service area as the impact, further limiting the free-market development of mitigation credits. New rule-making does favor the utilization of bank-based compensatory mitigation, and in the interest of developing larger, high-quality wetlands as products of compensatory mitigation, the restrictions on the service area could be eased.

DoD installations have been involved in wetland compensatory mitigation and banking for years, but the majority of projects have been performed on the installation or through the in-lieu fee process (payment to a conservation program because no comparable mitigation site exists). Now, opportunities are available to investigate the use of § 2684a authority to preserve or restore sensitive natural resources on permanently protected lands off site to prevent or reduce training and testing restrictions on site. This authority may enhance or provide for the possibility to bank credits for use as mitigation for unavoidable impacts on areas like wetlands, streams, and other natural resources on the installation. DoD installations may consider the value of partnering with third-party operators, such as for-profit wetland bankers or aggregators, not-for-profit groups operating banks because of the additional kind or in-kind contribution, assistance with willing landowner negotiations and potential assistance with long-term management and monitoring of the mitigation project.

Chapters 3 and 4 provide details for DoD installations to consider when looking to perform wetland, stream, and streambank mitigation banks on buffer lands.

Conservation Mitigation Banking

Conservation mitigation banks are permanently protected private or public lands managed for endangered, threatened, and other at-risk species. Conservation banking offers a range of opportunities for lands used for conservation, recreation, ranching, farming, and timber operations (coincidentally, the same way most buffer lands are used today) that are also compatible with military operations.

Regulated, or compliant, conservation offsets are a category of ecosystem service payments that are driven by the need to comply with government regulation. In this market, an individual, a business, or a government agency that impacts protected biodiversity or habitat is required to compensate for the damage to the environment. The requirements are the same for DoD installations.

Use of the § 2684a authority gives DoD installations another option for addressing unavoidable impacts on endangered species on buffer lands. With this authority, they work with the U.S. Fish and Wildlife Service (USFWS), non-federal entities, and willing landowners to identify suitable habitat in the vicinity of military land that could assist in the recovery of endangered or threatened species. The potential for mitigation credit on these lands needs to be explored further.

Chapter 5 provides details for DoD installations to consider when looking to perform conservation mitigation banking on buffer lands.

Water Quality Trading

WQ trading is a voluntary, market-based approach to improving and preserving water quality. WQ trading, required, or voluntary, reduces the cost of meeting the environmental goal of controlling pollutants. This trading is new to DoD, but not to other federal, state, and private agencies. To date, 40 WQ trading programs have been initiated across the country, in which local municipalities and private developers use trading to cost-effectively meet compliance requirements and offset impacts to water quality.[1]

DoD installations can use the § 2684a authority as a land-use tool to partner with organizations interested in protecting and improving water quality or looking to meet water quality permit requirements cost-effectively. DoD installations can work with partners to apply trading as a supplemental measure on buffer lands. Most of the compatible land uses on buffer lands are agricultural, which offers a platform for nonpoint source (NPS) best management practices (BMPs) to improve water quality in exchange for point source (PS) credits that may also help DoD-owned or privatized treatment facilities comply with permit limits, meet capacity requirements, and promote local and regional watershed goals and objectives.

Chapter 6 provides details for DoD installations to consider when looking to perform WQ trading with partners and willing landowners on buffer lands.

PARTNERSHIPS

Newer testing activities and tactics can create more noise, safety risks, or electronic interference, requiring larger or more isolated training and test areas. This situation can render current or planned land uses outside the military boundaries incompatible (although designed to be compatible with current military training activities). Working with other agencies and partners plays a key role in assisting DoD with land-use planning.

In November 2006, DoD signed a memorandum of understanding (MOU) with the U.S. Department of Agriculture (USDA) Natural Resources Conservation

[1] Reference http://www.epa.gov/waterqualitytrading/tradingmap.html.

Service (NRCS) to promote cooperative conservation and encourage partnerships that retain viable working lands and preserve, enhance, or protect natural resources around military installations. Through the recent reauthorization of The Farm Bill, funds are available to DoD partners to protect these lands, targeting priority working lands that may also provide DoD installations with suitable locations for off-site mitigation opportunities, benefitting the military, environment, and community.

Regional organizations like the Southeast Regional Partnership for Planning and Sustainability and Western Regional Partnership seize opportunities and solve problems to benefit the partners, sustain the individual and collective mission of the partner organizations, and secure the future for all partners, the region, and the nation. To accomplish their mission, they identify opportunities for the mutual gain of all partner groups, effectively address differences among the partners, and focus on identifying solutions to complex problems. These types of partnerships identify and address shared interests and issues across a wide range of stakeholders. DoD installations are encouraged to use these partnerships as a resource when investigating specific partnering opportunities involving mitigation banking and trading on buffer lands.

BENEFITS

Off site, mitigation banking and trading tools can benefit DoD installations and their partners in several key areas:

- Further assistance with mitigation requirements and protection of installation lands for mission purposes.
- Help with offsetting high military construction (MILCON) costs and logistics associated with current and future BRAC requirements.
- Increased predictability in meeting regulatory requirements for mitigation.
- A formal approach to receiving enforcement assurances from the regulating authority.
- Allowance for larger, more contiguous tracks of land to be preserved, thus improving the condition of the regional landscape.
- Support for landowners' way of life (farming, forestry, etc.).
- Promotion of a broader suite of incentives to attract partners.

CHALLENGES

Statewide banking and trading programs are still evolving, and the science is not exact. Many states are starting to implement regulations and guidance to help

property owners like DoD meet stringent mitigation requirements off site and preserve land needed on site for mission purposes. To date, DoD has specific written authority to participate in wetland banking as a consumer, not as a seller. For all banking and trading activities, DoD installations are encouraged to seek legal counsel to ensure that the proposed banking or trading activity is both cost-effective and legally permissible.

The challenges for DoD installations are as follows:

- Lack of explicit DoD authority to allow participation in other types of banking and trading activities.
- Lack of explicit DoD authority to allow participation in banking and trading pools, such as the statewide Virginia Nutrient Exchange Commission.[2]
- Complexities with establishing credit ratios due to imperfections in models.
- Overall scientific uncertainty and subjectivity.
- Lack of standardized approach to mitigation banking and trading from state to state.
- Inability to trade across state lines.

Many states have developed models or methods that can help DoD installations quantify credit ratios. In particular, NRCS worked with the Texas Institute for Applied Environmental Research Outdoor Laboratory to develop a comprehensive environmental and economic optimization tool (CEEOT-SWAPP).[3] The CEEOT-SWAPP is a standardized approach that simulates the economic impacts of a wide range of scenarios on privately owned agricultural operations. These complicated data are turned into easy-to-use reports that provide credit ratios necessary for critical project-level decision making. The model can also be modified easily for other land uses within a watershed (such as forestry and urban).

[2] Virginia Nutrient Credit Exchange Association, Inc. http://www.theexchangeassociation.org/.

[3] The Agricultural Policy/Environmental eXtender (APEX) and Soil and Water Assessment Tool (SWAT) are environmental models used to assess the impact of various BMPs related to PS and NPS pollutants at the field and watershed levels, respectively. These two models can only "simulate a limited number of BMP scenarios individually," and "most computer model applications do not include economic assessments of BMPs, which are critical for optimal practice implementation. An interface program, SWAPP, … simulates SWAT and APEX simultaneously, taking advantage of the strengths of both models for evaluating a greater number of BMPs for different land uses." Source: Ali Saleh, "SWAPP Program Training," *SWCS Chapter Notes*, March 23, 2007, http://www.swcs.org/documents/news/u_chpnotes_03_23_07.doc.

DoD recently published the Natural Infrastructure (NI) Asset Valuation Guide,[4] which provides installations with a suite of decision-making approaches and techniques for identifying, assessing, and leveraging the values of NI (air, land, and water resources, including environmental credits). This guide serves as a voluntary implementation of valuation by the services as a component of NI management, DoD's mission-focused, performance-based approach to environmental management. The guide is published in two volumes: Volume 1 presents an overview of valuation concepts and benefits. Volume 2 provides technical detail on concepts, methods, types, and uses of NI assets, including air emissions reduction credits and cap and trade allowances, carbon credits, water quality trading credits, habitat conservation banking credits, species recovery credits, and wetland and stream mitigation credits.

[4] Natural Infrastructure Management Guide, Office of the Deputy Under Secretary of Defense (Installations and Environment), 2008.

Chapter 3
Wetland Mitigation

STATUTES AND REGULATING AGENCIES

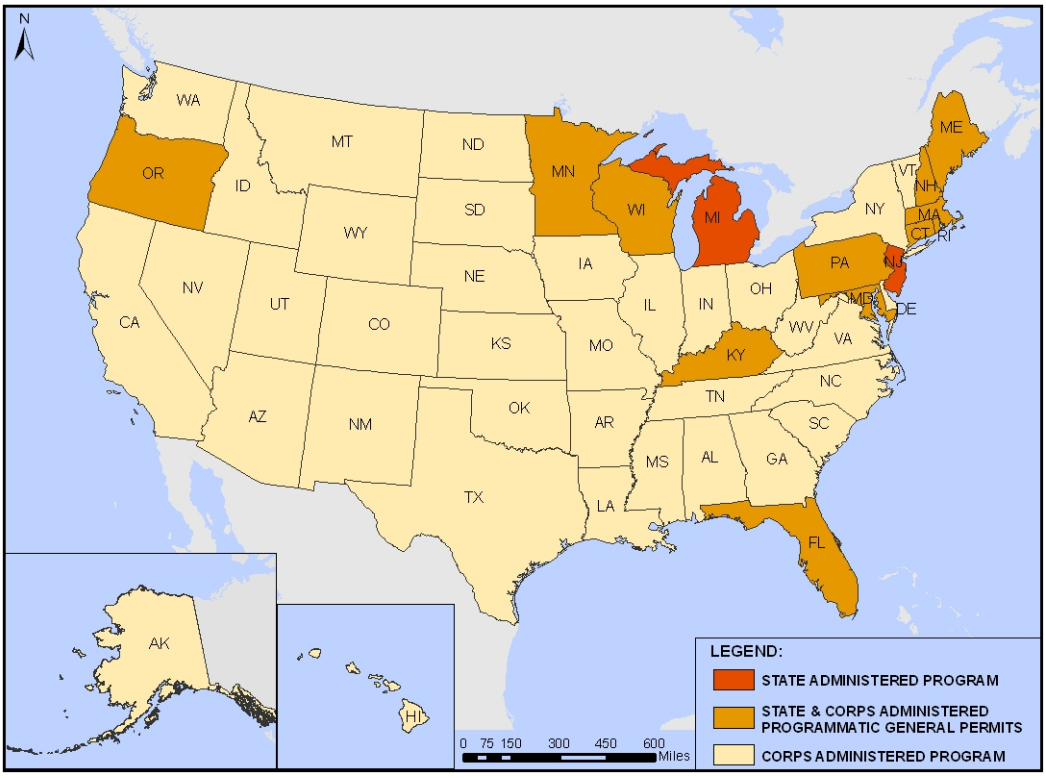
When participating in conventional mitigation approaches, the U.S. Army Corps of Engineers (the Corps) or approved state authority is responsible for determining the appropriate form and amount of compensatory mitigation required.

Wetland protection is mandated by Section 404 of the Clean Water Act (CWA), which establishes programs to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. The U.S. Environmental Protection Agency (EPA) or applicable state agencies oversee CWA regulations, as does the Corps for activities such as dredging and filling according to the Rivers and Harbors Act of 1899. EPA and the Corps share responsibilities for wetland protection under a 1990 memorandum of agreement (MOA), under which the Corps administers wetland jurisdiction, and EPA, as the lead agency, develops guidance and has final say on wetland disputes.

Regulatory purview is often further delegated to state agencies, depending on a number of factors. Michigan and New Jersey are the only two states that have "assumed" the Section 404 permitting program. In these two states, all wetland permitting is performed by the state. The CWA also authorizes the Corps to issue state programmatic general permits, which divide the permitting responsibilities between the state and the Corps. The Corps regulates activities with major impacts, the state directly regulates activities with minor impacts, and the state and the Corps jointly review activities with moderate impacts. Wisconsin, Kentucky, Massachusetts, Minnesota, Maine, New Hampshire, Rhode Island, Connecticut, Maryland, Florida, Pennsylvania, and Oregon have state programmatic permitting authority.

Wetland regulation can also involve local authority, and most states (except New Jersey and Virginia) encourage local wetland jurisdiction. County and township wetland boards often wield considerable power with respect to wetland permitting. However, in DoD installation permitting situations, jurisdictions may be limited to participation on advisory boards to the Corps. Figure 3-1 shows an overview of regulatory authority for wetland compensatory mitigation by state.

Figure 3-1. Clean Water Act (404) Authority by State



Source: Monica DeAngelo, LMI GIS. *Wetland regulatory authority by state* [map]. 1:10,000,000, USA Contiguous Albers Equal Area Conic, NAD83. *Internal databases for OSD74.04 [computer file]*. McLean, VA: September 2008. Using ArcView GIS. Version 9.3. Redlands, CA: Environmental Systems Research Institute, Inc, 2008.

The option to set up and transact from a wetland mitigation bank has historically been from publicly sponsored single-user banks, in which entities such as state agencies (e.g., Departments of Transportation) or large corporations could stockpile wetland credits for their own later use. Entrepreneurial banks established to sell credits to any permittee began in the early 1990s.[1]

In December 2002, the Corps issued Regulatory Guidance Letter (RGL) No. 02-29 which, among other things, established the Corp's "no net loss" position and its watershed-based approach to impacts and mitigation. Later, EPA and the Corps published "Mitigation Sequencing Guidelines," which require the following actions (presented in order):

- *Avoid*. Avoid adverse impacts and do not permit any discharge if a practicable alternative with less adverse impact is available.

[1] "Federal Guidance for the Establishment, Use and Operation of Mitigation Banks," *Federal Register* 60, no. 228 (November 28, 1995): 58605, or "Federal Guidance on the Use of In-Lieu-Fee Arrangements for Compensatory Mitigation," CWA, 40 *Code of Federal Regulations* Part 230 Section 404, and Section 10 of the River and Harbors Act, *Federal Register* 65, no. 216 (November 7, 2000): 66913.

- *Minimize*. If impacts cannot be avoided, take appropriate and practicable steps to minimize adverse impacts.

- *Compensate*. Provide appropriate and practicable compensatory mitigation for the unavoidable adverse impacts that remain.

The guidelines allow the following approaches for wetland mitigation:

- *Establishment*. Creation of wetlands or other aquatic resources.

- *Restoration*. Rehabilitation or reestablishment of wetlands or other aquatic resources.

- *Enhancement*. Improvement of wetlands or other aquatic resources.

- *Protection or Maintenance*. Preservation (only used in exceptional cases) through some legal or physical mechanism that protects existing wetlands or aquatic resources (it is only for exceptional use in that it does not result in any net gain in wetland acreage).

EPA and the Corps have since released a new compensatory mitigation rule (rule), effective June 9, 2008, which further clarifies steps for compensatory mitigation for unavoidable impacts to wetlands and streams and appears to favor the banking approach to compensatory mitigation (Table 3-1). The rule requires a measurable success for *in-lieu* fee programs and allows mitigation banking to take on an expanded role to ensure and preserve the long-term hydrologic benefits of mitigation projects. It marks the first significant congressionally mandated change to wetland law in nearly 30 years and was developed to allow the Corps and EPA to promote greater consistency, predictability, and ecological success for mitigation projects under the CWA.

Table 3-1. The New Rule Requires all Mitigation Plans to Contain These Sections

The rule establishes:
Objectives
Site selection criteria
Site protection instruments (e.g., conservation easements)
Baseline information (for impact and compensation sites)
Credit determination methodology
Mitigation work plan
Maintenance plan
Ecological performance standards
Monitoring requirements
A long-term management plan
An adaptive management plan
Financial assurances

The most significant change the rule requires is that compensation projects provided by the following three compensation mechanisms must have mitigation plans that include 12 fundamental components:

- *Permittee-responsible compensatory mitigation*. Whether on or off site, the success of the mitigation remains the responsibility of the permittee. Compensatory mitigation can be project specific or take the form of a consolidated mitigation reserve.

- *Mitigation banks*. A third party prepares mitigation and for a (monetary) consideration assumes the responsibility for the success of the compensatory mitigation. Mitigation banks generally must achieve certain milestones prior to the sale of any credits.

- *In-lieu fees*. Fees are paid to a third-party program, generally administered by a state or local government or an NGO. Generally, the fees are collected prior to the start of any actual compensatory mitigation projects.

This important change is expected to improve the planning, implementation, and management of all compensation projects and reduce the risk of failure.

DoD or Service Policy

Under 10 U.S.C. § 2694b, Congress explicitly authorized DoD to participate in wetland mitigation banking, at least to the extent of purchasing mitigation credits and paying for *in-lieu* credits.[2]

Wetland Mitigation Approaches

Project-Specific Compensatory Mitigation

A project-specific mitigation plan is part of the work plan and permitting for a project. DoD installations are required to pay for the action (project actions) and are ultimately responsible for implementation and success of the mitigation. Project-specific mitigation compensates for the adverse impacts of a single activity. This type of mitigation is usually designed and implemented by an installation upon the approval of the regulatory agency with jurisdiction. DoD installations are responsible for monitoring the mitigation site, typically for 5–10 years, to ensure the aquatic ecosystem similar to the one that was lost is reestablished or recreated at an appropriate site. A bond may be required, which may be released in part with the achievement of certain goals or in full at the end of the monitoring phase. Even if no bond is required, failure to meet the compensatory mitigation project goals constitutes a violation of the permit.

[2] See Note 1, this chapter, or any successor administrative guidance or regulation.

Given the risk—the large effort to design, construct, monitor, and maintain a project-specific mitigation—and the fact that a project-specific mitigation should probably be on land that remains under the direct control of the DoD installation, this option should probably be reserved for a project with a large impact. The size of the military activity or the value of the ecosystem being impacted by the activity could influence the decision to pursue a project-specific compensatory mitigation. In the past, project-specific mitigation was the preferred practice in many jurisdictions, but initial interpretation of the new rule indicates that participation in consolidated mitigation projects or mitigation banks are now preferred.

Consolidated Compensatory Mitigation

The consolidated compensatory mitigation approach involves a larger area for mitigation prior to the onset of permitted projects. As projects become ripe for construction, "credits" are deducted from the larger, consolidated mitigation project area to compensate for losses at the project area. A larger, perhaps higher-functioning wetland is more advantageous to the environment than numerous, small, pocket wetlands. It can also be advantageous to the installation because a preexisting, functioning mitigation area can speed the permitting process for individual projects. Furthermore, it can offer economy of scale in construction mobilization, real-estate, and maintenance costs.

The rule still adheres to the fundamental sequencing of avoidance, minimization, and mitigation. Establishment of consolidated compensatory mitigation projects may be the best means a DoD installation has for meeting mitigation needs, provided ample and appropriate real estate is available on which to place a project. Using a consolidated mitigation program also avoids the use of a banking agreement, and the success of the mitigation project is ensured by the installation. The use of the mitigation must still be approved by regulatory authorities, but a mitigation bank review team (MBRT) is not used, no banking instruments are drawn up, and only the regulatory agencies and the installation are involved with design and success evaluations. This may eliminate a source of regulatory delay and uncertainty. Often, consolidated mitigation sites are a means of achieving multi-project mitigation and saving costs, compared with many separate, project-specific mitigations.

A consolidated compensatory mitigation area has several advantages:

- If a known set of construction projects is being planned, planning and installing a mitigation area to serve the compensation needs of all of the known projects would be both cost- and labor-effective.

- Preparing a consolidated mitigation area to provide mitigation credits as needed for numerous fairly routine projects—road crossings, power-line installations, etc.—with unavoidable wetland impacts is perhaps even more useful.

- Using a consolidated mitigation area can lessen the compensation ratio. Usually, banking agreements call for a compensation ratio of no less than 2:1, while a consolidated mitigation area can often release credits at a ratio of 1:1.

Establishment of a consolidated mitigation site can aide ongoing DoD installation needs for construction. As individual and generally small projects arise such as stream crossings or disturbance of smaller wet areas, "credit" can be deducted from the larger, pre-constructed consolidated project. Coordination with the responsible agency in advance of the construction is required, and a system much like a "bank" may be established to allow routine drawdown against the credits created in the initial consolidated mitigation site (see "Wetland Mitigation Banking").

Wetland Mitigation Banking

Wetland mitigation banking is an approach to compensatory mitigation similar to consolidated mitigation in that the proposed "bank" area is constructed and considered a successful wetland prior to release of the credits and utilization of the credits to mitigate for impacts. However, mitigation banking involves a third party, the banker, whose role is to ensure the success of the mitigation at a fee. Other differences include increased regulatory scrutiny, ratios for compensation, and cost per credit to offset the banking fees, costs, and (probably) profit accruing to the banker.

To create a mitigation bank, a government agency, corporation, nonprofit organization, or other entity enters into a formal agreement with a regulatory agency to provide compensatory mitigation services. The term "mitigation bank" is often misused, obscuring its distinction from other mitigation approaches. Mitigation banks have four distinct components that clearly differentiate them from consolidated mitigation sites or other forms of mitigation:

- *Bank site*. Physical acreage restored, established, enhanced, or preserved.
- *Bank instrument*. Formal agreement between the bank owners and regulators establishing liability, performance standards, management and monitoring requirements, and the terms of bank credit approval.
- *Interagency review team*. Entity that provides regulatory review, approval, and oversight of the bank.
- *Service area*. Geographic area in which permitted impacts can be compensated for at a given bank.

Mitigation banking is now seen as the most reliable form of compensatory mitigation according to the rule, which established a preference for the use of wetland mitigation banks when appropriate credits are available. Under the rule, wetland

mitigation banking is a mechanism in which certain proposed ecological impacts or losses are offset by the development or improvement of the aquatic functioning of other off-site areas so that no aquatic ecological benefits are lost overall. In the best cases, it results in an overall net gain to the impacted ecological system.

A key feature of wetland mitigation bank is that the party adversely impacting the water resources can, but need not, be the same as the party improving the other off-site areas, and these parties can negotiate payment for the value of the impact of the improvements. In other words, the parties can buy, sell, and trade the value of mitigation. More formally, mitigation banks are a form of third-party compensatory mitigation in which the responsibility for implementation and success of the mitigation is taken on by a party other than the party being allowed to impact water resources. This transfer of liability is the key for Section 404 permitholders, which, in exchange for its permit to impact, would otherwise be responsible for the design, construction, monitoring, ecological success, and long-term protection of the offsetting mitigation site. Another key advantage to the wetland banking approach is speed of implementation. Existing banks, with credits released by the regulatory agency for sale, can convey the mitigation credits very rapidly for a simple fee.

Establishment of a single-user bank (with the installation as the single user) may be the next best choice. DoD installations can plan for projects, construct the compensatory mitigation project, and utilize the credits developed for projects requiring mitigation. This approach requires the development of a banking instrument, which should detail the physical and legal characteristics of the bank and how it will be established and operated. This is in addition to increased regulatory oversight by both the Corps (even in states where the state administers the 404 program) and banking regulators in the state of inception. In addition, the mitigation ratio would be no less than 2:1, and an MBRT would be involved. Participation by an installation in an existing bank may have distinct advantages if an unforeseen project arises that requires mitigation and existing credits in an installation's consolidated mitigation project are not available.

DoD installations are encouraged to purchase wetland credits from existing wetland mitigation banks if doing so is a cost-effective means to satisfy mitigation requirements. DoD installations are not authorized to establish wetland mitigation banks for the purpose of selling credits.

Wetland mitigation banking has a number of advantages over the earlier permittee-responsible compensatory mitigation mechanisms. For example, mitigation banking programs are able to

- reduce uncertainty over whether the compensatory mitigation will succeed in offsetting project impacts (this is covered by the mitigation bank's approval instrument);

- assemble and apply planning and scientific expertise to mitigation, which may not be readily available to the DoD installation or program contemplating the adverse impact, reducing permit processing times; and

- provide a more cost-effective solution to a project's mitigation requirements and, for larger projects, through consolidation enable a more efficient use of limited installation resources in the review and compliance of mitigation projects.

Out-of-Kind Mitigation

Out-of-kind mitigation is a special type of compensatory mitigation, in which the adverse impacts on one habitat type are mitigated through the creation, restoration, or enhancement of another habitat type.[3] In some cases where a watershed approach to wetland protection is being implemented, DoD installations can possibly mitigate unavoidable wetland impacts by establishment, restoration, or enhancement of watershed services. DoD installations can implement low-impact development (LID) structures, streambank restoration, or even riparian buffer restoration as mitigation for wetland impacts. However, the rule discourages any out-of-kind mitigation due to the perception that wetland successes are not guaranteed.

In-Lieu Fee Programs

In-lieu fee mitigation occurs in circumstances where a permittee provides funds to an *in-lieu* fee sponsor instead of either completing project-specific mitigation or purchasing credits from a wetland mitigation bank approved under the banking guidance. Under an *in-lieu* fee agreement, the mitigation sponsor collects funds from an individual or a number of individuals, who are required to conduct compensatory mitigation required under Section 404 or another state or local wetland regulatory program. The sponsor may use the funds pooled from multiple permittees to create one or a number of sites under the authority of the agreement to satisfy the permittees' required mitigation.

Figure 3-2. A Wetlands Mitigation Project in New Jersey

Legally, *in-lieu* fee programs are allowed to operate in accordance

[3] California Coastal Commission, "7. Evaluating the Performance of Out-of-Kind Mitigation Projects," *Procedural Guidance for Evaluating Wetland Mitigation Projects in California's Coastal Zone,* http://www.coastal.ca.gov/weteval/we7.html.

with federal statute.[4] DoD installations have used this approach to achieve off-site mitigation and reduce regulatory responsibility, but it has come at high cost. The *in-lieu* fee program is not always the most cost-effective approach since it typically involves a one-time, single-user transaction, without the guarantee of long-term available credits.

Some states and other entities have established programs where those in need of compensatory mitigation can pay a fee *in lieu* of constructing a mitigation project. Generally, the funds are deposited with a state agency or third party such as an NGO and amalgamated to eventually deliver a larger mitigation effort. Some states have used this method quite successfully. For example, North Carolina administers an *in-lieu* fee program, the Ecosystem Enhancement Program (previously known as the Wetlands Enhancement Program).

QUANTIFYING IMPACTS AND MITIGATION

The amount of compensatory mitigation required by the permitting agency is determined by a number of factors, the most important of which is the amount of disturbance in square feet. The amount of compensatory mitigation often exceeds the footprint of the disturbance. The responsible regulatory agency determines this ratio case by case. Traditional ratios for a given kind of wetland disturbance for each state and county are generally available to the public. Indiana, for example, published Table 3-2, along with several paragraphs of text indicating incremental increases and decreases in the ratio under specific circumstances.[5]

Table 3-2. Indiana Wetlands and Habitat Mitigation Guidelines

Habitat category	Standard minimum
1. Palustrine Emergent Wetland	2:1
2. Non-wetland Forest (more than one acre of disturbance)	2:1
3. Palustrine Scrub/Shrub Wetland	3:1
4. Palustrine Forested Wetland	4:1

Source: Indiana, Natural Resources Commission Information Bulletin #17 (First Amendment), "Wetlands and Habitat Mitigation," *Indiana Register*, December 13, 2006, http://ai.org/legislative/iac/20061213-IR-312060562NRA.xml.pdf.

The types of wetlands being impacted (scrub/shrub or forested, tidal or non-tidal, or emergent) heavily influence the perceived value of the wetland and the resulting ratio of compensatory mitigation to disturbance. For example, in Maryland, a small impact to a scrub/shrub or forested wetland requires replacement compensatory mitigation at a ratio of 2 square feet for every 1 square foot of disturbance;

[4] See Note 1, this chapter.

[5] Indiana, Natural Resources Commission Information Bulletin #17 (First Amendment), "Wetlands and Habitat Mitigation," *Indiana Register*, December 13, 2006, http://ai.org/legislative/iac/20061213-IR-312060562NRA.xml.pdf.

whereas, emergent wetlands require a ratio of 1 square foot of compensatory mitigation per square foot of disturbance.

Reasons for different ratios include

- the value of the wetland debits,
- the value of the preconstruction wetland functions at the mitigation site,
- different levels of risk in various mitigation approaches,
- uncertainty by the regulatory agency, which may increase the ratio as a safety factor approach,
- multiple types of wetlands, and
- wetland functions valued differently than others.

The presence of wetlands of exceptional value (as determined by a state regulatory agency) or rare, threatened, or endangered state or federal species also influences the amount of required compensatory mitigation. The presence of these species should double the compensatory mitigation ratio at the least and may preclude the project altogether. In this case, DoD installations are encouraged to also work with the USFWS and other interested partners to identify local and regional recovery goals and associated actions for the species and refer to the applicable state wildlife action plans, which provide the state's overall plan for conserving wildlife and habitat. (See Chapter 5 for related information.) The additional value of these natural resources will likely be considered during the appraisal when an installation is working with partners on establishing compensatory mitigation on buffer lands.

Factors that determine the costs of compensatory mitigation include the following:

- *Real estate*. The prevailing real-estate costs in the area constitute a significant cost if the compensatory mitigation is off site and land must be acquired. If the site of the compensatory mitigation is on an installation or on the buffer for an installation, these costs can be avoided or minimized.
- *Construction*. Construction costs can be significant since the construction site for the mitigation will be in wetlands or lands slated to become wetlands. The construction phase can be seasonally restricted legally or merely hampered by the soil's inability to bear the load of construction equipment. Special equipment with wide tracks, etc., may be necessary.
- *Permitting*. The type of wetland being impacted (scrub/shrub or forested, tidal or non-tidal, or emergent) heavily influences the perceived value of the wetland and the resulting ratio of compensatory mitigation to

disturbance. If banking is the chosen mitigation method, there may be an additional time lag and complexity in setting up the bank or engaging with a mitigation bank advisory team.

- *Fees for permitting*. State agencies and local jurisdictions with interest in wetland permitting can, and often do, charge fees for granting permits. These fees are often a base amount coupled with a charge based on the area of the impact. They are in addition to any study, banking, or *in-lieu* fees.

EXAMPLES

Most DoD wetland compensatory mitigation projects are constructed on the installation or off site through the *in-lieu* fee process. On-site wetland mitigation projects are not only costly, but dramatically reduce the land available for mission purposes. This section describes several DoD compensatory mitigation projects.

Nearly all DoD compensatory mitigation projects are single users, including the examples that follow. DoD installations are encouraged to apply knowledge and expertise as with traditional on-site mitigation projects. However, they use the investment for buffer lands as the suitable location for mitigation banks and relinquish the restoration and management of the bank to appropriate parties (or partners) for which the primary mission is wetlands restoration and management. DoD installations, in this case, are the sole recipient of the mitigation credits.

Navy—Two Consolidated Mitigation Banks

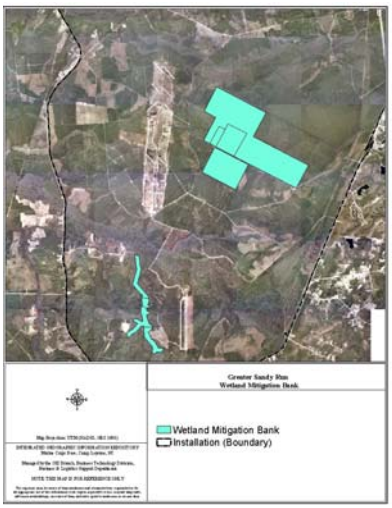
The Naval Amphibious Base Eelgrass Mitigation Bank in San Diego, CA, started in 1986, was the first bank to be federally owned and operated. It has been used to mitigate for damage to eelgrass habitat from base operations in San Diego Bay. Of the 10 acres at this site, 4.2 compensated for one mitigation project and 5.8 were established for future Navy projects. The Navy is responsible for the operation of the bank, but the National Marine and Fisheries Service (NMFS) managed the restoration of the wetlands and was reimbursed by the Navy.

The Pier J Anaheim Bay Mitigation Bank is operated by the Port of Long Beach, CA. It is located in the Seal Beach National Wildlife Refuge, within the perimeter of the Seal Beach Naval Weapons Station. The bank is used to mitigate wetlands degradation due to port development. It has been in operation since 1990, and all but 14 of the 153.12 credits created have been used. The bank was constructed by the Port of Long Beach and initially managed by the port and the Navy, but after the initial contract expired in 1991, the USFWS and Navy assumed maintenance responsibilities.

Marine Corps—Greater Sandy Run Mitigation Bank

A wetlands mitigation bank totaling 1,250.5 acres was established in the Greater Sandy Run Area (GSRA) on Camp Lejeune, NC, in November 2000. The goal of the mitigation bank is to restore, enhance, and preserve pocosin, pine flat, and bottomland hardwood wetland systems and their functions and values to compensate for unavoidable, non-tidal, freshwater wetlands impacts. The GSRA, once owned by the International Paper Company, encompasses vast wetland areas that were ditched and drained to facilitate intensive timber management practices of the time.

Figure 3-3. Greater Sandy Run Mitigation Area



In January 2004, the mitigation bank review team and the Corps agreed that 50.7 percent of the total banking area (633.9 acres) had met performance criteria. The remaining 616.6 acres (49.3 percent) continue to be monitored. Field observations during the 2004 and 2005 growing seasons were positive and indicated the remaining acreage in the bank will meet performance criteria as established in the approved 2002 mitigation banking instrument.

Army—Fort Stewart Mitigation Bank

The Fort Stewart Mitigation Bank on Fort Stewart, GA, was established in 2000 in response to a need to expand firing ranges and maneuver areas to comply with the "no net loss" federal policy. The bank was developed by lowering the water level of the Canoochee Creek Reservoir, a 1,080-acre human-made impoundment at the installation, to its original elevations, thus converting about 1,000 acres of open water habitat back into a hardwood bottom swamp. Fort Stewart now has an approved wetlands bank site and will get about 1,080 credits from the bank as open water is converted back to a bottomland hardwood swamp over time.

Army—Fort Drum Mitigation Bank

Fort Drum, NY, is the first military installation attempting to work with the Corps and its partners to integrate wetlands mitigation into its Army Compatible Use Buffer (ACUB) program for banking purposes outside the installation boundary. Many Fort Drum training lands are difficult to access due to poor road conditions or the presence of wetlands in and along potential access routes. Fort Drum established its mitigation bank, consisting of 130 acres of wetlands and associated upland buffer areas, at three different locations, in response to its need for additional roads, buildings, and training areas. Individual wetlands mitigation projects may be cost prohibitive to some small construction projects. In addition, streamlining the Section 404 permitting process was necessary to better serve the installation's

mission. As a result, Fort Drum developed an acceptable mitigation bank to mitigate a variety of smaller future unavoidable impacts.

DOE—Rocky Flats Mitigation Bank

DOE, in conjunction with the City of Westminster, CO, developed a mitigation bank to compensate for potential future impacts to wetlands during the Rocky Flats Environmental Technology Site cleanup. Twelve acres of wetlands in proximity to Standley Lake were created to provide the anticipated wetlands credits needed during site cleanup.

BENEFITS AND CHALLENGES

Table 3-3 summarizes the benefits and challenges to DoD installations from implementing each of the five wetlands mitigation approaches.

Table 3-3. Benefits and Challenges for Wetland Mitigation Approaches

Type	Benefits	Administrative or legal challenges
Project-specific mitigation	◆ Mitigation funding can be programmed and allocated as part of the construction project or activity ◆ Project-specific mitigation can proceed at a pace dependent on the construction or activity	◆ Individual permitting effort ◆ Liability for success of the mitigation remains with the facility ◆ Can be expensive and time consuming ◆ Can hold up the project if there are failures in the mitigation ◆ Permitting for the project must include the design and construction of the mitigation project ◆ Lengthy (5 to 10 years) monitoring may be required with a performance bond
Consolidated mitigation area	◆ Allows unforeseen projects to proceed without a lengthy permitting exercise ◆ Can be seen as environmentally preferred by regulatory agencies due to larger overall size and wetland functionality ◆ Credit ratio can be as low as 1:1 ◆ In some locations, the permitting effort can be streamlined by interaction with the state agency having 404 jurisdictions	◆ Must be funded in advance of any specific project ◆ Must be completed and deemed functioning by the regulatory agency prior to the use of any acreage for offsetting a construction impact ◆ Liability for success of the mitigation remains with the facility

Table 3-3. Benefits and Challenges for Wetland Mitigation Approaches

Type	Benefits	Administrative or legal challenges
Mitigation banking	◆ Liability for success of the mitigation transferred to bank ◆ Allows unforeseen projects to proceed without lengthy design and construction exercises ◆ Can be environmentally preferred by regulatory agencies due to larger overall size and wetlands functionality ◆ Preferred method subsequent to new rule of 2008	◆ Requires additional permitting steps and interaction with MBRT ◆ Requires Corps involvement ◆ Payments include credit cost, as well as banking fees, and probably profit for the third-party bank ◆ Credit ratio is required to be no less than 2:1 ◆ Requires an existing bank with available credits within the service area
Out-of-kind mitigation	◆ Seen as environmentally preferred by regulatory agencies because it can fill a specific and/or unusual need ◆ Provides an option when other factors preclude mitigation in the same area or service district	◆ Presents permitting uncertainty given the clear guidance favoring in-kind mitigation in the New Compensatory Mitigation Rule ◆ Works as an individual permitting effort ◆ Liability for success of the mitigation remains with the facility ◆ Can be expensive and time consuming ◆ Must include the design and construction of the mitigation project ◆ Lengthy (5 to 10 years) monitoring may be required with a performance bond
In-lieu fee	◆ Liability for mitigation success transferred to third party ◆ Allows unforeseen projects to proceed without lengthy design and construction exercises	◆ Requires Corps involvement ◆ Requires an existing *in-lieu* fee program with available credits within the service area ◆ Future *in-lieu* fee programs likely will be required to have existing projects prior to the ability to sell credits

Chapter 4
Stream Mitigation

STATUTES AND REGULATING AGENCIES

Figure 4-1. Stream Mitigation Construction Phase

The mitigation of streams and streambanks has often been viewed as part of wetland mitigation plans or used as out-of-kind mitigation for wetland impacts. Use of compensatory mitigation and banking approaches to stream mitigation is provided for in accordance with the federal guidance.[1] Section 404 (b)(1) of the CWA guidance specifically identifies a number of "Special Aquatic Sites," including riffle pool complexes, that require a higher level of regulatory review and protection.

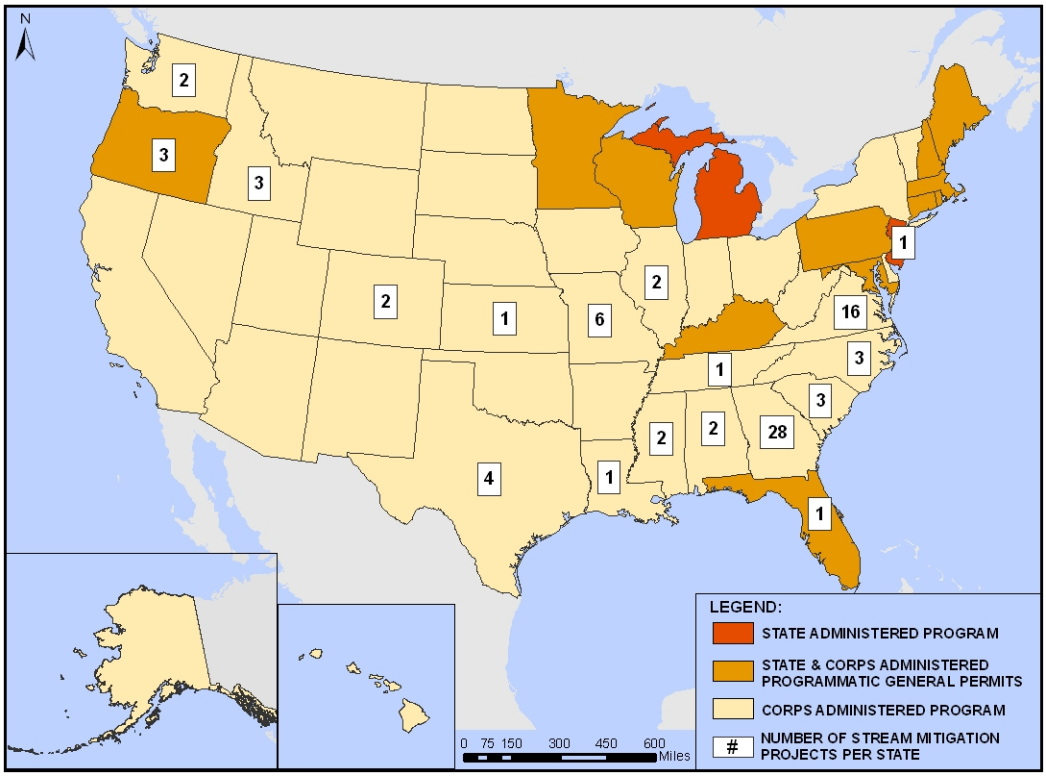
Implementation of only stream mitigation requirements is a fairly recent occurrence. In 2005, less than 1 percent of all compensatory mitigation projects in the United States were stream mitigations, and fewer than 11 percent of all mitigation projects contained stream mitigation as part of the project.[2] Many states have implemented streambank mitigation guidance, but North Carolina and Georgia are the only ones with a history of implementing successful streambank mitigation projects. Current interest in stream and streambank mitigation is a logical outgrowth of the renewed interest in watershed-based management. Some states, such as Maryland, have long encouraged stream mitigation as compensatory mitigation for wetland impacts and out-of-kind mitigation when streams in the mitigation area are severely degraded or when changing flow dynamics can ensure the success of subsequent wetlands compensatory mitigation.

Figure 4-2 shows stream mitigations by state.

[1] See Note 1, Chapter 3.

[2] Jessica Wilkinson and Jared Thompson, *2005 Status Report on Compensatory Mitigation in the United States* (Washington, DC: Environmental Law Institute, 2006).

Figure 4-2. Stream Mitigations by State



Source: Monica DeAngelo, LMI GIS. *Stream mitigations by state* [map]. 1:10,000,000, USA Contiguous Albers Equal Area Conic, NAD83. *Internal databases for OSD74.04 [computer file]*. McLean, VA: September 2008. Using ArcView GIS. Version 9.3. Redlands, CA: Environmental Systems Research Institute, Inc, 2008.

In 2001, the Corps issued RGL 01-1, which emphasized that streamside buffers should be considered as part of any mitigation plan. This established the importance of streambanks in providing protection on a watershed approach. This same guidance also promulgated the idea of allowing out-of-kind mitigation in cases where the watershed ecosystem as a whole could be better served by an out-of-kind mitigation project.

RGL 02-02 requires compensatory mitigation to replace aquatic resource functions unavoidably lost or adversely affected by authorized activities. RGL 02-02 provides important guidance on compensatory mitigation, including requiring increased use of functional assessment tools, improved performance standards, and a stronger emphasis on monitoring with the purpose of improving the success of compensatory mitigation projects.

In June 2007, EPA and the Corps issued joint guidance that clarified the degree to which agencies would enforce jurisdictional control over bodies of water that are

characterized by some as streams under the CWA. The agencies generally will not assert jurisdiction over the following stream-related resources:

- Swales or erosional features (such as gullies or small washes characterized by low-volume, infrequent, or short-duration flow).
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.
- Non-navigable tributaries without a significant nexus based on consideration of hydrologic and ecologic factors.

Since then very few Corps districts have implemented stream mitigation guidance. Those that have include Virginia, North Carolina, Indiana, and Tennessee. The issuance of the 2008 compensatory mitigation rule, however, clarified many issues dealing with compensatory mitigation and emphasized a watershed-based approach, which extends mitigation policy to streams. According to Palmer Hough of the EPA Office of Water, prior to this clarification in the rule, stream mitigation tended to mainly take the form of *in-lieu* fee programs and generally supported wetland restorations rather than lost stream segments.

DoD or Service Policy

Similar to wetlands mitigation, 10 U.S.C. § 2694b is the only statute where Congress explicitly authorizes DoD to make payments to a wetland mitigation banking program or "*in-lieu* fee" mitigation sponsor from an authorized activity that may or will result in the destruction of, or an adverse impact on, a wetland.[3]

Most recently, Section 438 of the Energy Independence and Security Act of 2007 mentions attainment of predevelopment hydrographs, which may further support streambank mitigation and offer LID solutions as the preferred BMP for mitigation of stream impacts. Currently, the services are developing policy and guidance for LID projects and their associated cost-effectiveness and mitigation benefits.

Stream Mitigation Approach

The "mitigation sequencing guidelines" established in a 1990 MOA between EPA and the Corps established that stream and streambank impacts must be avoided, minimized, or if necessary compensated by mitigation. Issues in the watershed—such as stream channelization, streambank erosion, high sediment loading, degraded stream habitat conditions, poor biological conditions, and flooding—are identified triggers for stream and streambank mitigation.

[3] See Note 1, Chapter 3.

Stream mitigation generally follows the wetlands compensatory mitigation approach, namely:

- *Permittee-responsible compensatory mitigation*. Whether on or off site, the success of the mitigation remains the responsibility of the permittee. Compensatory mitigation can be project specific or take the form of a consolidated mitigation reserve.

- *Mitigation banks*. A third party prepares mitigation and for a (monetary) consideration assumes the responsibility for the success of the compensatory mitigation. Mitigation banks generally must achieve certain milestones prior to the sale of any credits.

Mitigation techniques such as engineering the installation of sinuosity (curviness), installation of vegetated submerged swales or stream buffers, installation of various substrate changes (riffle and pool), dam removal, and other widely accepted practices alleviate some stream degradation issues in a watershed. Table 4-1 lists examples of general activities that require stream mitigation.

Table 4-1. Example Activities That Require Stream Mitigation

Culverting or filling	Impoundments	Stream locations	Channel modifications
Culverts for road crossings greater than, for example, 200 feet in length	Impoundments resulting in significant degradation of habitat (such as >500 feet of intermittent stream)	Relocations resulting in loss of stream length	Channel fill, deepening, or straightening
Culverts of any length associated with projects other than road projects	Impoundments that significantly change the downstream hydroperiod	Relocations with an oversized channel designed to accommodate flood flows	Removal of vegetation or sediment for the purposes of flood control that results in a degradation of the resource; channel deepening
Elimination of any stream by filling	Impoundments that significantly change the downstream temperature	Relocations that do not incorporate a natural channel design, including in-stream habitat or a riparian zone	Channel modifications that eliminate in-stream habitat; channel straightening
	Impoundments that significantly change the downstream water chemistry	Relocations requiring armored bottom or bank (synthetic liners, riprap unless it is being used for habitat purposed, or concrete lined channels)	Placement of riprap or concrete in the bottom or sides of a stream channel not otherwise permitted under Corps permits concerning bank stabilization
	Impoundments that significantly change the downstream biotic composition		

These examples point out several important features of stream modification and mitigation. First, it must be possible to determine the difference between streams

and other types of water conveyance such as swales and drainage ditches. Determination that a linear body of water is a stream should not be taken lightly. Recently, local governments have taken the lead in developing tools to differentiate between human-made conveyances such as drainage ditches and swales, and small streams. Fairfax County, VA, has developed guidance and a very robust method for determining how a stream is defined, meaning that not all small bodies are necessarily streams.

Second, many of the requirements call for an understanding of physical resources and habitat in the stream segment slated for modification. The natural channel and normal flood plain of stream segments must be known as well as the habitat in the stream. Hydrologic assessments as well as fish and benthic habitat assessments are required.

Third, many of the traditional engineering treatments of surface water features meant to handle storm water clearly require in-kind mitigation. Previously, many approaches to storm water included methods to move large volumes of water off the land and lower into the watershed as quickly as possible. This has often resulted in streams that have lost flow of water during the time when there is no storm present. This small amount of water, termed base flow, is critical to the maintenance of habitat in the stream. The traditional approach to storm water has resulted in loss of baseflow as well as flashiness of flooding. Mitigation of certain storm water control features is now a stated component of the new rule.

DoD installations are encouraged to reference the state's definition of streams when considering mitigation requirements and, if required, consider the use of the § 2684a authority as a land-use tool to work with partners interested in restoring or protecting streams on buffer lands outside the installation boundary. Buffer lands that contain ecologically suitable habitat for different types of stream and streambank mitigation may also offer DoD installations the opportunity to restore habitat for listed aquatic species or ideal sites for storm water control options such as LID to help maintain stream baseflow on the installation and improve WQ.

QUANTIFYING IMPACTS AND MITIGATION

Stream impacts and stream mitigation are measured in linear feet as the stream runs. Streambank mitigation is generally regarded as a buffer strip and measured in feet back from the water's edge. The compensatory mitigation requirement for unavoidable impacts varies on the basis of such factors as the quality of the stream initially impacted (based on a number of physical and biological determinations) and the type of mitigation proposed. Table 4-2 provides an example of credit ratios required for certain activities and BMPs in Tennessee.

Table 4-2. Example Stream Mitigation Ratios from Tennessee

Alteration	Stream mitigation ratios				
	Replacement	Restoration	Enhancement II	Enhancement I	Preservation
Level III. Alterations that result in lesser impacts (such as loss of riparian canopy and channel modifications that deviate from or degrade the profile, pattern, dimension, or in-stream habitat such as ruffles, pools, structure, and use of synthetic liners along banks). × 1	1:1	1.5:1	3:1	4-6:1	10-60:1
Level II. Activities that result in moderate loss (such as riprap-lined channels, channel modifications, both banks lined, and impoundments). × 0.75	1:1	1.5:1	3:1	4-6:1	10-60:1
Level I. Activities that result in complete or near-complete loss of stream function (such as culverts, loss of stream length from channel relocations of filling, and concrete-lined channels). × 0.50	1:1	1.5:1	3:1	4-6:1	10-60:1

Source: Adapted from Tennessee Department of Environment and Conservation, *Stream Mitigation Guidelines for the State of Tennessee*, July 1, 2004.

The success of a stream mitigation effort entails attainment of hydrologic, geomorphological, and biotic criteria as put forth in the original plan for mitigation. This success is determined by monitoring, the length and frequency of which is contingent on the degree of alteration. For example, in the Tennessee practice detailed in Table 4-2, mitigation for Level I alterations requires 3 years of monitoring of a limited nature and an annual report, while mitigation for Level III alterations require 5 years of monitoring annual channel morphology, vegetation, and habitat and habitat surveys.

Stream and streambank mitigation almost always requires the establishment of buffer strip or streambank mitigation adjacent to each side of the project of no less than 50 feet wide. The buffer can have mixed use, but will generally exclude the following:

- Changes in the restored and natural features of the property

- Introduction of non-native plants or animals
- Destruction of grade control, habitat, bank stabilization, or any other channel restoration and enhancement structures
- Any hard structures, such as roads or walkways, without specific prior approval
- Agricultural, grazing, or horticulture use of property
- Irrigation structures, dams, intakes, and outfalls
- Cutting, mowing, or harming any native vegetation on the easement property
- Filling, excavation, dredging, mining or drilling, diking, or removal of topsoil, sand, gravel, rock, peat, minerals, or other materials and any change in the topography of the land
- Any activity detrimental to water purity or that alters natural flows or water levels, drainage, or increased in-stream sedimentation or causes soil degradation or erosion.

COST FACTORS

Factors that determine the costs for stream and streambank mitigation are also similar to those mentioned for wetlands:

- *Real estate*. In many cases, the real-estate issue for stream mitigation can be exacerbated by different owners on each side of the stream slated for mitigation.
- *Construction*. The construction phase can require special equipment suitable for navigating shallow waters or deep mud, be complicated by seasonal or storm conditions, and have the added difficulty of obtaining access for heavy equipment in the area slated for mitigation.
- *Permitting*. As discussed in Chapter 3, the permitting issues can cause wide variations in cost, depending on the approach (permittee-responsible, banking, etc.) to the mitigation project.
- *Transactional costs*. The banking approach to achieving mitigation results in additional costs for the banking transactions, etc.

EXAMPLES

Stream mitigation is part of the following DoD mitigation projects.

Army and Air Force—Tank Creek

The Army on Fort Bragg and Air Force on Pope Air Force Base have a project for Tank Creek and mitigation of impacted non-tidal wetlands. A meandering stream channel was constructed to mitigate impact from an ammunition loading ramp. The original channel failed during the prescribed monitoring period because sediment transport in a sand channel had not been adequately accounted for during the original design. The stream mitigation took the form of the construction of a series of ox-bow lakes and a more appropriately sized channel for the flow. This construction was completed in February 2006 and is still in the monitoring phase.

DOE–SR Mitigation Bank

Department of Energy (DOE)–Savannah River (SR) implemented a wetland mitigation bank program at its Savannah River Site, near Aiken, SC, to provide a compensatory alternative for unavoidable wetland losses associated with future authorized construction and environmental restoration projects in Savannah River Site wetlands. In addition, the proposed action gives DOE-SR credit for wetland restoration work that would not otherwise be accomplished through alternative programs or means. Future projects—such as the remediation of waste sites and the repair and maintenance of roads and bridges on Savannah River Site—will likely impact some wetland areas. Establishing a wetland mitigation bank prior to such impacts allows DOE-SR to incorporate mitigation efforts required for new projects in a more timely and efficient manner.

CHALLENGES

At this point, the single largest challenge for stream mitigation is the nascent stage of the science backing this practice. Identifying stable practices and implementing them for a stream mitigation project is an area of intense study. Furthermore, the lack of regulatory framework at the local level is likely to cause proposed stream mitigation projects to be costly and time-consuming, and the credits generated from stream mitigation vary widely across Corps districts.

Chapter 5
Conservation Mitigation

STATUTES AND REGULATING AGENCIES

Conservation mitigation is a process where agencies, organizations, and individuals who in the course of their operations (like building a new highway) adversely affect natural resources and habitats and are responsible for restoring, enhancing and protecting an equal or greater amount of these resources and habitats in another location.[1]

The military has increasing management responsibility as the number of endangered species increases and depends more on DoD land. Off-site conservation mitigation and banking are extremely valuable for DoD when the impact of an action on federally listed species on a military installation is unavoidable. If the USFWS biological opinion (BO) determines that the action puts the species in jeopardy or causes an adverse modification, the USFWS can legally stop it. This results in reduced training and testing for the military. If the military action is essential and impacts on the species are unavoidable, off-site mitigation is the best way for the action to continue, as legislative exemptions from the law would otherwise be untimely and unlikely.

The Endangered Species Act (ESA) is administered by the NMFS for marine and anadromous species and the USFWS for all others. Under Section 7 of the ESA, DoD is required to carry out programs for the conservation of federally listed endangered and threatened species and their habitat. The ESA specifically requires that the federal agency (1) avoid actions likely to jeopardize the continued existence of listed species unless provided with an exemption, and (2) consult with the USFWS or NMFS, through a biological assessment, on any action that is likely to impact a listed or proposed listed species or modify its habitat. A formal consultation culminates in a USFWS- or NMFS-issued BO, a written statement that details how the reviewed action affects the species or its critical habitat. If jeopardy or adverse modification of critical habitat is found to be a result of the activity, the opinion contains suggestions for reasonable and prudent alternatives for that action that would minimize its impacts and allow the activity to proceed.

The regulating agency (USFWS or NMFS) requires that impacts on listed species be minimized by including conservation measures for them in the installation's project description. In 2003, the USFWS published additional guidance, *Guidance*

[1] Alameda County Conservation Partnership, "What is Conservation Mitigation?" *Conservation Mitigation Program*, 2008, www.acrcd.org/ForRuralLandowners/ ConservationMitigationProgram/ tabid/84/Default.aspx.

for Establishment, Use and Operation of Conservation Banks,[2] which describes the use and approval of conservation banks to offset adverse impacts on species listed as threatened or endangered under the current amended ESA.

The USFWS acknowledges that effective recovery planning and implementation depend in part on creative processes and agreements with federal partners as well as other non-federal partners in community-based recovery efforts. Examples of innovative conservation tools under the ESA include safe harbor agreements, habitat conservation plans, recovery permits, and conservation banks that can be used in concert or alone.

DoD or Service Policy

The military has been doing conservation mitigation in consultation with the appropriate agencies for many years to meet the needs of the military mission in accordance with the requirements of the ESA for federal agencies. However, the authority is not explicit for the military. Therefore, DoD submitted a FY09 legislative proposal to Congress that explicitly authorizes its participation in conservation banks as off-site land-use mitigation instruments for impacts on species and habitat.[3] The proposal seeks to strengthen and advance DoD's successful model of cooperative conservation by ensuring clear, but flexible, statutory authority for programs that are currently carried out by the military but generally authorized under many disparate authorities.

Each military service has its own implementing instructions for compliance with the ESA and other natural resources laws and regulations:

- DoD Instruction 4715.3, *Environmental Conservation Program*, May 3, 1996
- Army Regulation 200-1, *Environmental Quality: Environmental Protection and Enhancement*, December 13, 2007
- U.S. Air Force Instruction 32-7064, *Integrated Natural Resource Management*, September 2004
- Secretary of the Navy Instruction 5090.8, *Policy for Environmental Protection, Natural Resources, and Cultural Resources Programs,* December 18, 2000
- Marine Corps Order (MCO) P5090.2A, *Environmental Compliance and Protection Manual*, July 10, 1998.

[2] 68 Federal Register (FR) 24753.

[3] See Note 1, Chapter 3.

CONSERVATION MITIGATION APPROACH

Under existing guidance, private, tribal, state, and local government lands are eligible to become conservation banks. These same areas are eligible for the conservation through the military buffer program. However, lands previously designated for conservation purposes through another program are not eligible unless designation as a bank provides an additional conservation benefit to listed species. The current authorities for conservation banks and how they could work with buffers are in development. Federal lands may require special consideration concerning applicability of the lands for mitigation purposes and review and approval by the USFWS for consistency with other regulations and policies. Before the USFWS can approve a conservation bank, landowners are required to

- enter into a conservation banking agreement with the USFWS;
- grant a perpetual conservation easement to an eligible third party, precluding future development of the property and restricting certain land uses;
- develop a long-term management plan for the bank lands; and
- provide adequate funding for monitoring and long-term management of the bank lands.

Once a bank is established, the USFWS approves the sale of credits to those requiring mitigation for species that occur on the bank lands and are within the bank's designated ecological service area. The unit traded is termed a "credit," which may be equivalent to an acre of habitat for a particular species, habitat capable of supporting a breeding pair, or some other measure of habitat or its value to the listed species.

The USFWS only approves projects that would otherwise be permitted and are suitable for off-site mitigation for use of conservation banks. Conservation banking is not a substitute for avoiding and minimizing effects on listed species. The purpose of conservation banking is not to encourage development of listed species' habitats, but rather to provide an ecologically effective alternative to small on-site preserves, which are not defensible.[4] There are more than 70 active species banks; examples include the following:[5]

- *Kimball Island Mitigation Bank, CA.* This is the only bank that provides conservation credits for fish. A fully restored island in the San Joaquin Delta, the bank is managed and owned by Wildlands Inc. Its credits provide mitigation for the Sacramento splittail and Delta smelt.

[4] www.fws.gov/ventura/esprograms/hconservation/cbanks.pdf.

[5] Nathaniel Carroll et al., eds., *Conservation and Biodiversity Banking*, 2008, p. 7.

- *Mobile County Gopher Tortoise Conservation Bank, AL*. Habitat loss is the greatest threat to gopher tortoises in Mobile County due to residential development. The Mobile County Bank set aside 222 acres for protection of the tortoise and its now rare habitat. It has proven to be the most cost-effective means to protect the tortoise.

- *East Plum Creek Conservation Bank, CO*. This bank is owned and operated by the Colorado Department of Transportation to provide for the permanent protection of the endangered Preble's meadow jumping mouse. The department uses credits from the bank to mitigate adverse impacts on mouse habitat resulting from highway construction and development projects on the central front range of Colorado.

- *Palmetto Pear Tree Preserve, NC*. This preserve was established as a partnership between the North Carolina Department of Transportation (NCDOT), USFWS, and The Conservation Fund. The preserve encompasses 9,732 acres of the Coastal Plain of North Carolina and is managed to provide suitable habitat for the red-cockaded woodpecker (RCW). The Conservation Fund manages the preserve as a conservation bank and a public park for recreation, environmental education, and economic development. The NCDOT funded property acquisition and provides ongoing financial support for management of RCW. The USFWS provides oversight and guidance for RCW management.

  Under advisement of the USFWS, NCDOT purchased the land from Pru Timber for approximately $16.3 million. Pru Timber intended to use the land for commercial logging, which would have jeopardized the RCW. NCDOT purchased a conservation easement on the preserve from The Conservation Fund, which entered into a MOA with the USFWS and NCDOT to allow use of mitigation credits from the preserve for NCDOT projects that would not jeopardize the RCW's recovery. Credits can be used only when a state highway project has an unavoidable impact on the RCW and the NCDOT can demonstrate to the USFWS that no alternatives are available for avoiding or minimizing that impact. The credit ratio ranges between 1:1 and 3:1, determined case by case. For any given project, the USFWS can suggest mitigation via the bank is not the best means of mitigation. The agreement does not exclude the sale of credits to third parties.[6]

Private Lands Initiative

The private lands initiative (PLI) began as a result of a 1992 USFWS biological opinion, which significantly restricted training on Fort Bragg, NC, as part of

[6] Patricia A. White and Michelle Ernst, *Second Nature: Improving Transportation Without Putting Nature Second*, 2004, www.transact.org/library/reports_pdfs/Biodiversity/conservation_banking.pdf.

RCW recovery requirements on the installation. The land surrounding Fort Bragg contains rare, mature long-leaf pine forests, ideal habitat for the RCW. Although not a conservation mitigation or bank, it has a similar result: Fort Bragg protected land outside military boundaries for conservation purposes inside and outside its boundaries to meet the requirements of the ESA. Historically, the military would purchase land directly for mitigation when it was needed; Fort Bragg was the first military installation to partner through a cooperative agreement, with nonfederal entities to protect land near its borders to reach recovery of endangered species to alleviate training restrictions on the installation.

The Sandhills Regional partnership, which includes the USFWS, brought stakeholders together to find a habitat management solution that extended beyond Fort Bragg and included critical habitat lands in private ownership. The PLI was successful in protecting almost 14,000 acres of long-leaf pine habitat. Fort Bragg's protection of habitat off site reduced training restrictions, protected critical areas on the installation's southern boundary, enhanced connectivity in the northeast training area, and buffered a new special forces training facility on Camp Mackall. Today, there are 391 RCW family groups and the recovery goal for the North Carolina Sandhills population of the RCW was met 5 years earlier than anticipated. This was achieved under the authority of the USFWS and through cooperative agreements the Army has with the Nature Conservancy and the Sandhills Area Land Trust. In addition to these groups, other stakeholders contributed to the effort by holding the final title to the conservation lands. They include the Wildlife Resources Commission and the North Carolina Division of Parks and Recreation, which added to the Sandhills Game Land and Carvers Creek State Park.

The success at Fort Bragg provided a model for other military installations to follow and resulted in creation of the § 2684a authority. Using the § 2684a authority as a land-use tool for conservation and alleviation of training and testing restrictions, DoD installations are encouraged to consider the following steps to ensure compliance with ESA and review of available off-site options during the encroachment analysis and proposed action planning, development, and implementation stages:

- Work with eligible partners and willing landowners to determine whether listed species or critical habitats are present in the area. For new listings or listing proposals of a species or critical habitat found in or near an installation boundary, determine whether ongoing or proposed actions may affect them. Installations will informally consult with USFWS or NMFS for help in making this determination, if necessary.

- Determine how military activities may jeopardize or adversely modify listed species or critical habitat and clearly articulate how the buffers will prevent the jeopardy or adverse modification determination.

- Determine estimated costs associated with modifying activity or implementing reasonable and prudent alternatives compared with estimated costs of buffers.
- Determine whether your installation has an approved or proposed buffer program or is experiencing incompatible land use, habitat fragmentation, or other encroachment concerns that may compromise military readiness.
- Determine whether the impacted species or habitat can be helped toward recovery by protecting and enhancing the species' habitat.
- Determine whether species at risk are present in or near proposed buffer areas. If so, determine whether suitable habitat is near the installation that can be preserved or enhanced to aid the species' recovery or prevent listing.
- Work with partners to identify common priority areas for habitat protection, possible mitigation, and species recovery.

DoD installations are encouraged to investigate project costs early in the encroachment analysis with a reasonable cost estimate and explanation of restoration and long-term management costs. To the extent possible, the buffer proposal or project may include the following:

- Land costs
- Estimated acreage to be protected
- Potential matching funds or outside contributions
- Management costs (even if covered by the partner)
- Total dollar figure to achieve success.

Recovery Credit System

The Recovery Credit System (RCS) is a voluntary natural resource management program that provides technical guidance and financial assistance to private landowners with qualifying lands that support habitat for wildlife or plant species important to natural resources. The system differs from traditional conservation banks in that it is typically a temporary "bank" for a foreseeable action that may adversely impact a species.

In the July 2008 *Federal Register*, the USFWS published guidance on the use of RCS as one tool that can help improve endangered species habitat. The USFWS reviews each RCS to ensure the net conservation benefits outweigh any potential impacts that could occur during project implementation. Each proposal is

evaluated on its own merit. Some activities related to particular listed species may not be appropriate for this kind of credit system.

The RCS tool was initially established in Texas to allow Fort Hood Military Reservation to accrue credits for recovery measures that it arranged by contract with neighboring landowners. The type of arrangement is still in the trial stages but may provide a model that can be applied by other federal agencies.

Proposed Authority to Participate in Conservation Mitigation Banking Programs

The pending FY 2009 National Defense Authorization Act includes a provision in section 2811 that would authorize DoD to participate in conservation mitigation bank programs. This authority would generally operate under the same terms and conditions as the existing wetlands mitigation bank authority contained in Title 10 U.S.C. § 2694b. If approved, this authority would allow DoD to fund the participation in off-site banks with MILCON dollars if the requirement to obtain credits is driven by MILCON-funded projects.

The ability to do this presents a number of benefits. First, the authority would tie the cost of compensation to the activity generating the requirement (e.g., more accurate life-cycle project costs to MILCON-funded projects.) Because mitigation costs would be tied to the overall project costs, it creates the incentive for project designers to minimize impacts and the need for such offsets at the project startup rather than later as part of the installation operations and maintenance (O&M) budget. Lastly, MILCON funds have an appropriation life of 5 years, as opposed to the 1 year life of O&M. This would provide sufficient time to work out the details of a conservation bank in the interval between authorization and appropriation on the one hand and obligation and expenditure on the other. This greatly increases the predictability of the availability of funding, which reduces the business risk for the putative banker, and makes it much more likely that banks can be created where needed.

QUANTIFYING IMPACTS AND MITIGATION

Conservation mitigation and banking is particularly complicated compared with other natural resource banking procedures such as those used for wetlands. This is primarily due to the uniqueness in requirements for species and their habitat. The location of an acre in relation to other protected sites, developed areas, roads, and other surrounding land uses can profoundly affect the ecological value of that acre to the species that uses it. Determining the value of specific mitigation credits is typically done project by project.

With legislation pending on conservation banking, DoD installations are encouraged to utilize the assistance of higher headquarters, the state, the USFWS, and its partners when considering and determining the costs and benefits of conservation

banking and the opportunities for the bank to serve as a viable and reasonable means to prevent delays in consultation and project implementation and modification. Essential information useful to higher headquarters includes the following:

- How ESA requirements will impact the installation and military readiness.
- How the military activity will jeopardize or adversely modify listed species or critical habitat.
- How conservation banking will prevent the jeopardy or adverse modification determination.
- A summary of estimated costs associated with modifying activity or implementing reasonable and prudent alternatives compared with estimated costs for conservation banking.[7]

COST FACTORS

Credit prices vary widely from bank to bank for the same species due to ambient land value, investment required to create habitat condition, current supply, and current demand for credits in the services area.[8] In addition, not all acres of protected habitat represent the same conservation value to listed species. Sites vary in habitat quality, contribution to regional conservation goals, and distance from other protected areas. Examples of conservation bank credit prices are

- $7,500 per acre for golden-cheeked warbler habitat,[9]
- $100,000 per acre for Delhi Sands flower-loving fly habitat,[10]
- $3,000 for an acre of San Joaquin kit fox,[11] and
- $125,000 for a breeding pair of least Bell's vireo.[12]

The USFWS guidelines typically require landowners to convey a permanent conservation easement over the bank property and provide adequate funding for the bank's perpetual operation. The guidance recommends bank owners establish a non-wasting endowment fund by depositing a fixed amount for every credit sold. For example, the Hickory Pass Ranch Conservation Bank is a privately owned

[7] Reasonable and prudent alternatives are actions identified during formal consultation that can be implemented consistent with the intended purpose of the action and the scope of the federal agency's legal authority and jurisdiction, are economically and technologically feasible, and are those that the USFWS or NMFS believes would avoid the likelihood of jeopardizing the continued existence of listed species or result in the destruction or adverse modification of critical habitat.

[8] Ecosystem Marketplace.

[9] See Note 5, this chapter, p. 8.

[10] Jessica Fox, Presentation to Conservation Markets Roundtable, Willamette University, OR. May 5, 2006.

[11] See Note 5, this chapter, p. 8.

[12] See Note 5, this chapter, p. 8.

3,000-acre ranch in Texas and home to the endangered golden-cheeked warbler. Bank participants must deposit $250 for each credit sold. To ensure that proceeds from credit sales are sufficient, owners set the price per credit to include not only their profit margin but also the costs associated with managing the bank.[13] For DoD installations, the aggregator or banker responsibility relies heavily on the partner since DoD's sole interest is to receive mitigation credit. Conservation banks established by the military cannot sell conservation credits to other entities.

The process for identifying the availability and cost of a conservation bank credit has the following steps:

1. Identify the USFWS species mitigation ratio for the project requiring offsets.

2. Consult the regional USFWS for a list of approved conservation banks for the species that have conservation bank agreements.

3. Determine whether the installation falls within the bank's service area. The service area is based on biological criteria of the species involved outlined in the species' recovery plan and must be approved by the USFWS.

4. Contact the bank owner to find out whether the bank has enough available credits to meet the mitigation needs and to determine the estimated cost per credit.

EXAMPLES

Figure 5-1. Red-cockaded Woodpecker Habitat—A Long-Leaf Pine Savannah

Creating an installation conservation bank outside military boundaries can help landowners ensure that the listed species remains an economic asset to the owner rather than a potential regulatory liability. Banks also preserve the land as a family legacy and sustain the way of life. The bank can either be operated by the landowner or the conservation partner. In addition to protecting and enhancing habitat, conservation partners receive revenue to assist in habitat enhancement and may receive tax breaks.

[13] USFWS, Guidance for the Establishment, Use, and Operation of Conservation Banks 8, 2003.

DoD has done limited work in the area of conservation banking. Opportunities are just starting to be realized at sites like Camp Lejeune, where with its conservation buffer partners, the base is setting up a conservation banking system to obtain credits on buffer lands for RCW. There is potential that, with minor habitat enhancements, some land could become RCW habitat. Similar to Fort Bragg, this novel approach to meeting endangered species recovery goals is another example of how DoD installations can use the § 2684a authority as a land-use tool to preserve the military mission while promoting conservation goals and objectives. Related examples are discussed in the following subsections.

Training Restriction Removal

The ACUB strategy at Fort Polk, LA, addresses encroachment threats through conservation easements on private lands in the region or their partner's acquiring the development rights to parcels adjoining key range and training facilities. The buffers support Fort Polk endangered RCW recovery and habitat management requirements by ensuring continuity of RCW habitat. By protecting RCW habitat and extending RCW populations on the buffers, Fort Polk can achieve its RCW recovery goals more quickly, leading to greater training flexibility.

Training Restrictions Prevention

In 2002, the USFWS added four Puget Lowland prairie species to its roster of candidates for listing under the ESA. To protect important habitat and prevent further population declines, the USFWS could impose training restrictions on large portions of the open training lands at Fort Lewis, WA, if the species are listed because they exist on Fort Lewis. If imposed, restrictions would apply to activities that destroy native vegetation or cause soil disturbance, such as digging, bivouacking, and off-road vehicle maneuvers. As a major power generation platform, this would be problematic for Fort Lewis because it must maintain its ability to train troops in realistic natural environments. The Fort Lewis ACUB program addresses several encroachment issues related to endangered species requirements. It preserves prairie lands in the vicinity of Fort Lewis, acting as a conservation safety net for recovering off-post populations of candidate species.

Lifting of Training Restrictions

Camp Rilea, OR, contains habitat of the threatened Oregon silverspot butterfly (OSB), a federally listed threatened species. Through an agreement with the USFWS, the camp manages 68 acres of butterfly habitat. In 1990, the USFWS required training activities in the OSB habitat to halt. The Oregon National Guard has successfully managed OSB habitat through the 1999 habitat management plan and is permitted to "incidentally take" two to three OSB a year. The USFWS plans to reintroduce the OSB by 2010 on the Clatsop Plains, very close to Camp Rilea. The reintroduced OSB will likely find their way to Camp Rilea within a short time. Of the 43 acres of secure OSB habitat on the Clatsop Plains that are

not on Camp Rilea, only 4 acres are restored sufficiently to support the OSB. This puts an enormous demand on the Camp Rilea habitat.

The Camp Rilea ACUB proposes protecting Reed Ranch, which would otherwise become a golf course. If conserved, this land would provide an additional 126.5 acres of OSB habitat. The Camp Rilea ACUB will assist in the acquisition of this acreage, with the intent of using it to offset Camp Rilea's butterfly habitat, and the USFWS may remove training restrictions on the 68 acres of the Camp. Removal of restrictions will allow expanded military training opportunities, as well as more effective and efficient infrastructure development and use. Due to the requests for an ACUB at this location, the USFWS is already considering modifying the current BO for the current most critical training need in one area of OSB habitat.

BENEFITS

Conservation banking has a number of potential advantages over traditional ESA mitigation. By completing necessary mitigation prior to project impacts, conservation banking ensures that the mitigation is done, and done properly. Conservation banking is performed on a larger scale, consistent with a regional landscape approach to managing natural resources and provides advance mitigation at a single large site for multiple future projects that would otherwise be mitigated at several smaller sites incurring higher costs. In addition, banking creates the opportunity for some landowners to turn endangered species or restorable habitat on their property into assets with value rather than what could be perceived as a liability. Finally, since the number of credits that some banks earn is a function of how successfully the species or habitat is restored, bank owners have a compelling economic incentive to do the best restoration job possible.

Conservation banking can assist DoD installations in offsetting impacts of an action to support a non-jeopardy or no-adverse-modification opinion. The conservation banking program could also be a valuable tool in preventing the listing of a species. DoD installations should consider using conservation banking as a means to avoid impacts that could result in jeopardy or adverse modifications. Other benefits to DoD installations include the following:

- Achieving ESA recovery goals more quickly, leading to greater training flexibility.
- Preventing the listing of a species by preserving high-quality habitat.
- Providing more environmental value through large conservation easements and wildlife corridors between protected habitats than traditional smaller, isolated mitigation measures undertaken at a project site.
- Protecting combinations of different habitat types and species or providing critical wildlife corridors to adjacent areas.

- Streamlining the environmental permitting and review processes by working with the USFWS to conduct ESA Section 7 consultation on a programmatic basis, rather than by project.
- Accelerating project development and minimizing construction delays.
- Reducing costs by mitigating project impacts through flexible, regional approaches rather than isolated, site-specific mitigation plans.
- Fostering predictability in conservation implementation and project development, thereby saving the credit purchaser time, money, and the provision of regulatory certainty.
- Protecting resources with the greatest need as well as the greatest potential for recovery.
- Supporting other uses outside of species conservation, such as recreational opportunities.
- Offering the potential for combining other banking activities, such as wetland mitigation banking, so long as regulators are involved and the credits are appropriately stacked.

CHALLENGES

Conservation banking is a relatively new tool. Some of the challenges associated with conservation banking include the following:

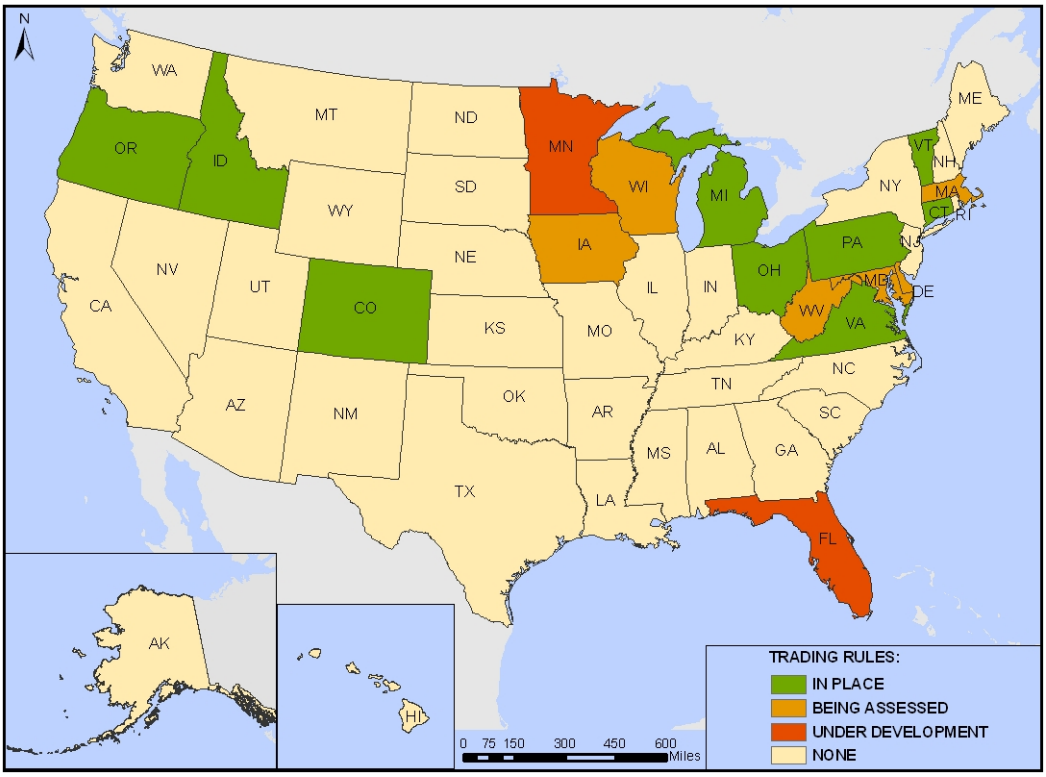
- Lack of available credits in the service area for the species requiring mitigation.
- Time-consuming bank approval, which can delay or halt projects awaiting use of credits.
- Science may be insufficient and subjective.
- Limited focus on the habitat needs of a single species rather than the needs of the larger ecosystem.

Chapter 6
Water Quality Trading

STATUTES AND REGULATING AGENCIES

WQ trading takes place under the regulatory purview of the CWA, specifically the National Pollutant Discharge Elimination System (NPDES) permit program. In most cases, the NPDES permit program is administered by authorized states, and each state is responsible for developing its own WQ trading program. Typically, WQ trading occurs when one party facing higher pollution control costs, such as a wastewater treatment plant (WWTP), is mandated to meet regulatory requirements and chooses to meet them by purchasing environmentally equivalent (or superior) pollution reductions from another party at a lower cost. The party achieves the same WQ improvement at a lower overall cost. Figure 6-1 shows a nationwide snapshot of states with current or developing WQ trading programs.

Figure 6-1. WQ Trading Programs by State



Source: Monica DeAngelo, LMI GIS. *WQ trading programs by state* [map]. 1:10,000,000, USA Contiguous Albers Equal Area Conic, NAD83. *Internal databases for OSD74.04 [computer file]*. McLean, VA: September 2008. Using ArcView GIS. Version 9.3. Redlands, CA: Environmental Systems Research Institute, Inc, 2008.

National WQ Trading Policy

EPA and state regulators accelerated implementation and enforcement of Section 303(d) of the CWA by promoting the protection of water resources on a watershed scale. Managing WQ on a watershed scale addresses the cumulative current and potential impacts to water resources from multiple activities rather than solely on a PS basis. In July 2000, EPA published the total maximum daily load (TMDL) rule to further outline and enforce the CWA requirements. A TMDL is "the amount of a given pollutant that can be allowed to enter a water body without causing the WQ standards to be exceeded." The following equation illustrates how these elements come together to set a TMDL:

Allowable pollutant load = waste load allocation + load allocation + margin of safety + future growth.

TMDLs are a budget for the amount of allowable pollutants for a particular water body. By establishing a pollutant cap on a watershed, the TMDLs serve as a driver for creating a market for WQ trading. Placing value on WQ allows PSs to meet their pollutant allotments by buying credits from other PSs and NPSs, provided that the overall amount of pollutant in the watershed is within the TMDL pollutant cap. Federal activities are not exempt from TMDLs, consequently DoD has committed to cooperating with states and the federal government in enacting changes in natural resource management to help comply with TMDL regulations. Appendix A lists a website with a national list of impaired water bodies with listed sources (*National Summary of Impaired Waters and TMDL Information*).

In 2003, EPA issued a National Water Quality Trading Policy (the policy) that provides specific guidance and the basic rules on WQ trading under the CWA.[1] Compliance with TMDLs is one of the primary drivers for WQ trading. In general, WQ trading works best when

- there is a "driver" that motivates facilities to seek pollutant reductions, usually a TMDL or a more stringent WQ-based requirement in an NPDES permit;
- sources within the watershed have significantly different costs to control the pollutant of concern;
- the necessary levels of pollutant reduction are not so large that all sources in the watershed must reduce as much as possible to achieve the total

[1] This policy describes various requirements of the CWA and implementing regulations relevant to WQ trading, including requirements to obtain permits, Sections 402 and 404; anti-backsliding provisions, Sections 303(d)(4) and 402(o); the development of water quality standards, including anti-degradation policy, Section 303(c); federal NPDES permit regulations, 40 Code of Federal Regulation (CFR) Parts 122, 123, and 124; TMDLs, Section 303d(1); and water quality management plans, 40 CFR Part 130.

reduction needed, in which case there may not be enough surplus reductions to sell or purchase; and

- watershed stakeholders and the state regulatory agency are willing to try an innovative approach and engage in trading design and implementation issues.

The policy assumes that if a TMDL were in place, all trading partners would be covered by the TMDL. In this case, waste load allocations and load allocations under the TMDL form the baseline for trading. In all cases, permits must be designed to meet WQ standards as required under CWA Section 301(b)(1)(C). Inclusion of trading provisions in NPDES permits should facilitate meeting this requirement.

EPA's policy supports trading of nutrients (such as total phosphorus and total nitrogen) and sediment load reductions. The policy does recognize the potential for environmental benefits from trading of pollutants other than nutrients and sediments but emphasizes that these trades warrant more scrutiny. As an action under the CWA, the provisions and regulations contain legally binding requirements. EPA decides case by case on each permit, TMDL, WQ standard, or WQ management plan that includes provisions for trading. It is guided by the applicable requirements of the CWA and implementing regulations and the specific facts and circumstances involved. In 2004, the EPA published the *Water Quality Trading Assessment Handbook* (the handbook) as further instruction for point-to-point-source trading. The handbook provides a good overview of WQ trading markets and ratios for pollutant reduction credit.[2]

State WQ Trading Guidelines

Most states have authority to implement the storm water NPDES permitting program, and they oversee WQ trading activities. For states that do not have NPDES permitting authority, EPA remains the permitter. For construction (and other land disturbing activities) in areas where EPA is the permitting authority, DoD installations must meet the requirements of the EPA construction general permit (CGP). Some states, such as Virginia and Pennsylvania, have published additional state-specific guidance on WQ trading for specific land uses.

WQ Trading Partnerships

The USDA NRCS and EPA Office of Water are working together under an MOU to establish a viable WQ trading market to further promote the importance of WQ improvements.

[2] The definition of a credit may vary from program to program.

As part of this partnership, the agencies agree to

- coordinate both agencies' policies and activities to promote effective use of WQ credit trading;
- develop common WQ trading definitions, standards, and measurement protocols;
- foster early identification of overlapping interests in the agencies' grant and research programs and activities;
- establish a framework for coordination and communication between agency personnel at all levels; and
- identify program and project activities to support the use of WQ credit trading.

DoD or Service Policy

The DoD Clean Water Act Services Steering Committee (CWASSC) encourages DoD installations to take advantage of WQ trading initiatives that could lead to more efficient and cost-effective implementation of CWA requirements, particularly those that reduce compliance costs and provide greater regulatory flexibility in achieving

- NPDES and WQ standards permit requirements,
- load reduction allocations associated with TMDLs,
- NPS reductions, and
- storm water runoff controls.[3]

Service-specific policy and guidance is provided to DoD installations to assist in complying with CWA environmental requirements:

- *DoD Guidance on Minimizing Total Maximum Daily Load (TMDL) Related Impacts to DoD: Understanding and Participating in the TMDL Development Process*, September 2005, www.usma.edu/dhpw/rci/documents/7.20.pdf
- *DoD Installations Watershed Impact Assessment Protocol: A Water Resources Management Guide*, June 2005 update, http://aec.army.mil/usaec/compliance-p2/protocol.pdf

[3] DoD CWASSC, *Information on Water Quality Trading*, September 3, 2003.

- Army Regulation 200-1, *Environmental Quality: Environmental Protection and Enhancement*, December 13, 2007, www.usapa.army.mil/pdffiles/r200_1.pdf
- CWASSC, *Information on Water Quality Trading*, September 3, 2003
- MCO P5090.2A, *Environmental Compliance and Protection Manual*, July 1998, www.miramarems.com/environmental_programs/MCO_P5090.2A.pdf
- Naval Operations Instruction 5090.1B, *Navy Environmental and Natural Resources Program Manual*, September 9, 1999, https://acc.dau.mil/CommunityBrowser.aspx?id=25705
- Air Force Instruction 32-7041, *Water Quality Compliance*, April 2003 with supplement, December 10, 2007, www.e-publishing.af.mil/shared/media/epubs/AFI32-7041_341SWSUP_I.pdf.

WQ TRADING APPROACH

In general, DoD-owned facilities must comply with an NPDES permit limit that lowers the amount of certain pollutants that it may discharge. The facility may also seek to buy pollution reductions in the form of "credits" from a second discharger that might currently be discharging the same pollutant at a level below its own permit level. This could occur if the second discharger has invested in more effective pollution control technology and thus has excess capacity to sell credits to the first facility. DoD installations can also buy credits from an NPS in the same watershed that has installed conservation practices or BMPs, reducing its pollutant discharges below a preset baseline. Credits in such cases refer to pounds of pollutant reduction and are subject to measurement and verification.

The availability of WQ trading options for the implementation of construction and storm water BMPs depends on the state's trading program. Removal of sediment and nutrient loads may provide offsets that can be used by DoD-owned facilities to help meet regulatory requirements. DoD installations are encouraged to work with operators, natural resource managers, and master planners in the land-use planning process—during the preparation of master plans, encroachment plans, and storm water plans—to ensure comprehensive planning and consideration of trading opportunities for regulatory credit where applicable and available.

Figure 6-2. Adapting Best Management Practices on Buffer Lands Can Generate Offsets for WWTP Emissions

DoD installations interested in WQ trading are encouraged to use a local partner or champion that can bring parties together to facilitate trades, such as a third-party broker, state permitting authority, or anyone interested in improving WQ. WQ trading may occur between two NPDES regulated PS facilities or between an NPS and a PS. Any installation with an NPDES permit is considered a PS polluter that may consider the benefits of WQ trading. Other installations that may consider WQ trading include the following:

- A DoD-owned facility looking to offset the risk of noncompliance with permit limits for certain loads by purchasing credits from a municipality located in the same watershed. Typical discharges come from WWTPs, construction and industrial activities, and storm water systems, including municipal separate storm sewer systems.

- A DoD installation with NPS activities looking to implement BMPs to reduce loads and produce offsets, which could then be purchased by a DoD-owned facility or privatized WWTP in exchange for a reduction in costs charged to DoD by the privatized WWTP.

- A landowner on an existing buffer parcel outside a DoD installation looking to implement NPS BMPs, which could then be purchased by a privatized WWTP in exchange for a reduction in costs charged to DoD by the privatized WWTP.

- A landowner on a proposed buffer parcel outside a DoD installation interested in implementing NPS BMPs, which could then be purchased by a privatized WWTP in exchange for a reduction in the purchase price of the buffer property.

NPS pollutants such as sediments, bacteria, nutrients, and metals are caused primarily by runoff from urban areas and agricultural lands. DoD installations incur NPS impacts from a variety of activities, including training, road activities, construction projects, and storm water runoff from cantonment areas. DoD construction activities must meet the storm water BMP requirements in their construction permits.[4] In addition to permits, many DoD installations are required to have storm water pollution prevention plans or storm water management plans. BMPs that mitigate adverse WQ impacts on buffer lands can assist DoD installations in reducing potential restrictions to training and testing, meeting regulatory requirements, and improving WQ in the watershed.

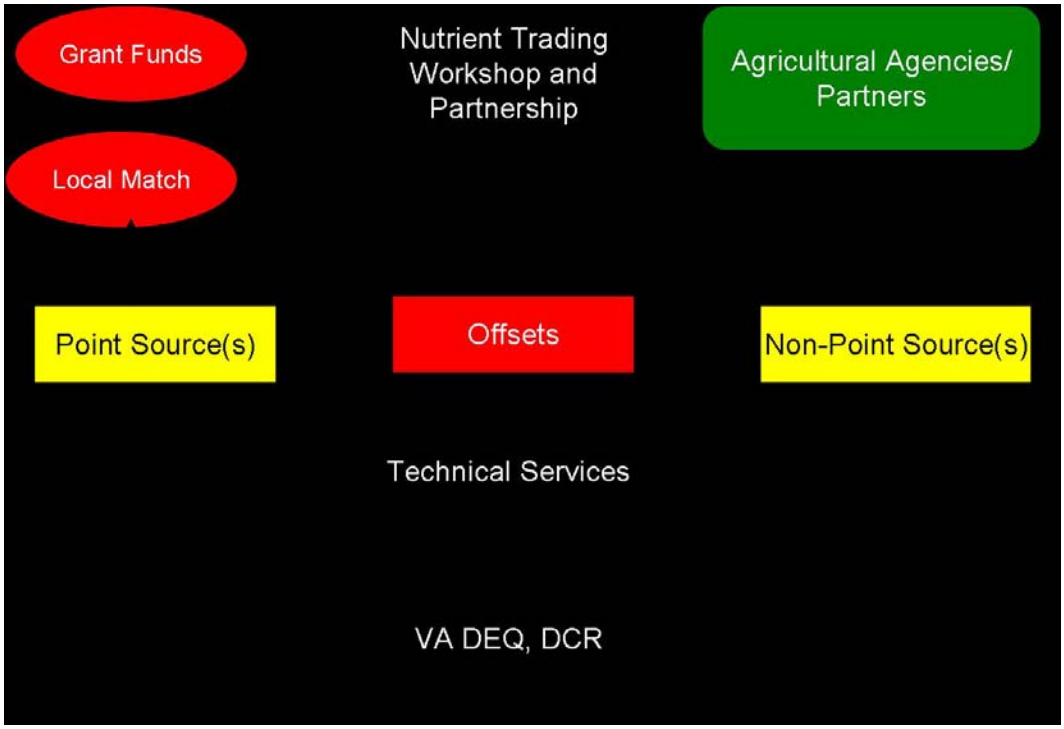
Some DoD installations currently trade storm water credits as part of an MOU with the state regulating authority.[5] In these instances, the regulating authority also serves as the banker. Aside from this, there are no known DoD installations that have formally participated in a WQ trading program. DoD installations are encouraged to look for off-site WQ trading opportunities to guarantee maximum value and cost-effectiveness. Stricter rules and heavier loadings in growing watersheds present challenges for DoD installations, and municipalities as regulators clamp down on loadings from existing plants to meet WQ standards.

A third-party assessor, known as an aggregator, acts on behalf of the landowner or partner and assesses land impacts and potential improvements. Eligible partners also can serve as third-party bankers or aggregators. The aggregator then quantifies the nutrient loads and compares the results with the established ratios for cost-effectiveness. Figure 6-3 shows a project concept for a PS-to-NPS WQ trading scenario using buffer lands as the platform. The partnership and landowner involvement is needed to effectively implement the project off site. DoD installations should not assume the role of aggregator or banker.

[4] Phase I Storm Water Regulations (55 FR 47990) establish the permitting requirements for storm water discharges from large construction activities that disturb five or more acres. Storm water associated with small construction activities that disturb between one and five acres of land were added in December 1999 (64 FR 68722) as part of Phase II Storm Water Regulations. EPA is reissuing the CGP that authorizes storm water discharges from construction activities. Upon reissuance, the CGP will cover storm water discharges associated with both small and large construction activities.

[5] Conversation with Jim Tracy, Maryland Department of Environment, May 2008.

Figure 6-3. Water Quality Trading Concepts: Roles and Responsibilities



Using the § 2684a authority as a land-use tool can help facilitate WQ trading through partnerships and with willing landowners. A willing landowner with verifiable NPS impacts located within an installation's buffer boundary may contract to perform NPS BMPs required generating credits for sale.

The NPS BMPs may also be layered over existing or concurrent conservation measures in a process known as stacking. Credit stacking is the accrual of credits under multiple market-based strategies on a single acre of land where credits can be bought and sold independently. The possibility of credit stacking is an ongoing debate among regulators, bankers, and credit seekers. The desire to maximize land management investments can lead toward getting credit for every ecological benefit from a protected area. However, if stacking is not appropriately regulated, it may create more mitigation complexities and potential incentives for "double-dipping." DoD installations interested in credit stacking should consult with legal counsel before talking to regulators.

Project Examples

Increasingly, states are budgeting and implementing successful WQ trading programs. Table 6-1 shows examples of successful WQ trading projects. Additional evaluations and analysis of WQ trading programs across the United States are available at www.envtn.org/wqt/publications_research.html#case.

Table 6-1. Successful WQ Trading Projects

WQ trading activity	Type of trade	Pollutant traded
San Joaquin Grasslands, CA	NPS-to-NPS trade Emission fees	Selenium
Tar-Pamlico, NC	PS-to-PS trading under a cap-and-trade system PS-to-NPS emission fees	Nitrogen
Wayland/Sudbury, MA	Offsets for PS from NPS	Phosphorus
Rahr Malting, MN	Offsets new PS from NPS	Phosphorus, biochemical oxygen demand
Kalamazoo, MI	Offsets for PS from NPS Development of draft open market rule	Phosphorus

Source: http://www.napawash.org/pc_economy_environment/epafile06.pdf (June 2000).

Hypothetical Case

Currently, local county governments and private developers are the largest users of WQ trading programs. Considering that DoD installations function much like cities and towns, they may warrant WQ credits. The hypothetical case that follows describes options that a DoD installation could consider given a municipal WWTP that is currently discharging to a waterway exceeding in-stream total phosphorus standards of 0.1 mg/l. DoD installations are encouraged to refer to this example and use the portions that apply to their circumstances.

The state requires WWTPs that discharge to phosphorus-impaired waterways to satisfy the in-stream standard at the end of their effluent pipe. The WWTP, which is discharging treated effluent with a total phosphorus concentration of 2.0 mg/l, has several options.

OPTION 1

Upgrade the facility to consistently achieve an effluent concentration of 0.1 mg/l. Although the treatment plant can consistently achieve an effluent limitation of 1.0 mg/l through the addition of chemicals to promote the precipitation of phosphorus, this will generate more sludge and increase annual operation costs, but will not entail significant capital costs to upgrade. To upgrade from 1.0 to 0.1 mg/l, a costly filtration system would be required. For a 3-million-gallon-per-day plant, cost estimates have ranged from $2 to $3 million dollars in capital costs and an increase of $80,000 to $100,000 in annual operating and maintenance costs.

Even if the WWTP adds the costly filtration system with the latest technology available, there is some question whether this system can consistently achieve the

limitation of 0.1 mg/l, thereby placing the treatment plant in jeopardy of violating its permits and subjecting it to fines.

OPTION 2

Enter into a PS-NPS trade that will provide financial incentives to an NPS to implement storm water controls that will achieve the same reductions as upgrading the treatment plant. This option would be preferable to the WWTP, provided sufficient NPSs can be treated with storm water BMPs within the watershed to provide an adequate trade. Due to the uncertainty in the removal rates of storm water BMPs—such as riparian buffers, storm water treatment wetlands, and infiltration systems—the state will require a trading ratio for all PS-NPS trades. Typical ratios range from 1.5 to 3 (that is, if the treatment plant is trading a load reduction of 1,000 pounds per year of total phosphorus, it would be required to purchase credits for 3,000 pounds per year in NPS control for a required trading ratio of 3).

Many trading opportunities will be conducted within the context of a TMDL. If a TMDL already requires NPS reductions in a watershed, a treatment plant will have to implement trades beyond the existing baseline requirements.

OPTION 3

Implement a combination of options 1 and 2. This appears to be the best option. The WWTP upgrades to achieve an effluent concentration of 1.0 mg/l. A PS-NPS trade is conducted to trade the load from 1.0 to 0.1 mg/l to NPS controls. This trade can be with farmers, residential development, or commercial or industrial development. If the treatment plant is owned by the municipality, the municipality can trade with itself and implement NPS controls throughout the municipality to avoid costly treatment plant upgrades, thereby saving the taxpayers money.

The treatment plant can also trade with farmers. USDA's Environmental Quality Incentives Program offers another funding source or increase funding available to farmers for implementing NPS pollution controls, which need not be structural. For example, the treatment plants could fund a certified crop advisor to help the farmers develop and implement comprehensive nutrient management plans (CNMPs) to better manage their fertilizer applications. CNMPs can result in well-documented reductions in phosphorus applied to farm fields. NPS reductions also might be achieved by developing a regional composting facility for small horse farmers, paying farmers to use a winter cover crop to minimize crop erosion, or paying farmers to haul manure to farms that are not near waterways.

Specific Factors

While there is interest in trading as a tool for cost-effective reductions in water pollution, the success of WQ trading depends on watershed-specific factors, which include the number and location of pollution sources and relative cost of pollution reduction, as well as specific trading rules, such as the ratio of exchange

of pollution reductions between sources upstream and downstream.[6] DoD installations are encouraged to do the following:

- Track EPA and state WQ trading programs.
- Identify potential trading opportunities on and off site in these programs.
- Evaluate the advantages and disadvantages of WQ trading opportunities, including
  - fiscal and other legal constraints that may restrict federal agencies from full participation,
  - the ability of DoD installations to generate and trade credits,
  - the cost of administering a WQ trading program (determining whether the potential economic benefits outweigh the costs), and
  - the feasibility of receiving compliance and enforcement assurance from the necessary regulating authority.[7]

Nutrient Trading Workshop

In June 2008, the DoD Legacy program funded a nutrient trading workshop at Fort A.P. Hill, VA, to explore opportunities for DoD, buffer partners, regulators, landowners, and other stakeholders to participate in an installation conservation buffer program and Virginia's nutrient credit trading program using the Fort A.P. Hill ACUB program as a pilot site. The pilot project proposes that Fort A.P. Hill's privatized sewage treatment plant would be the recipient of nitrogen credits generated from a nearby landowner interested in implementing BMPs to sell to the WWTP. The current WWTP owner must upgrade the plant to provide enhanced nutrient removal treatment in accordance with its NPDES permit. Due to projected BRAC growth, the plant may need to add capacity for future wastewater flows.

Under Virginia law and regulation, expanding treatment plants discharging to tributaries of the Chesapeake Bay may offset the increased nutrient discharge by purchasing nutrient credits from NPSs. Agricultural land adjacent to the installation would be valuable as an encroachment buffer, but may also produce nutrient credits, if the owner employs additional BMPs to reduce nutrients in storm water runoff or by converting the land to a meadow. These potential credits could provide an economic incentive for the landowner to partner with DoD and conservation groups to include this land in the installation's buffer program. In addition, the Fort A.P. Hill WWTP owner might also want to partner with the landowner to

[6] A Primer on Water Quality Credit Trading in the Mid-Atlantic Region (http://www.mawaterquality.org/Publications/pdfs/wq_trading_primer.pdf).

[7] DoD CWASSC Information on Water Quality Trading (September 3, 2003).

obtain nutrient credits, allowing him to avoid or delay additional costs associated with treatment plant expansion.

The State of Virginia Department of Environmental Quality must certify the nutrient credit transaction. A contract or easement would be required to ensure the circumstances producing the nutrient credits continued for the period authorized by the certification. An after-action report from the workshop will be final in September 2008.

QUANTIFYING IMPACTS AND MITIGATION

Trade ratios are used to ensure the amount of reduction resulting from the trade has the same effect as the reduction that would be required without the trade. Each state recommends a different method for quantifying and calculating these ratios. Still, it is not an exact science. Potential components of a trade ratio include the following:

- *Location*. Where the sources are in the watershed relative to the downstream area of concern, for example, the Chesapeake Bay.
- *Delivery*. The distance between the buyer and seller if the trade is to meet permit requirements at the outfall.
- *Uncertainty*. The lack of surety of NPS reductions.
- *Equivalency*. The different forms of the same pollutant discharged from the trading partners, such as biologically available phosphorous and bound phosphorous.
- *Retirement.* Additional WQ improvement.

Essentially, the excess pounds of pollutant reduced can be made available for a NPDES permittee to purchase as credits, but ratios are a distinguishable feature among state WQ trading programs. For example, one credit can be equal to one unit of load reduction per time (lb/day) at the location of the buyer and one credit may be greater or less than one unit of load reduction per time at the location of the seller. DoD installations are encouraged to research these ratios when initiating discussion with the state regulating authority. Credit quantification studies, such as the net WQ improvements resulting from certain BMPs, can be found at www.envtn.org/wqt/publications_research.html#economic.

COST FACTORS

WQ trading can offer the potential for cost savings. Hypothetically, the removal of a pound of phosphate in a WWTP using an engineered tertiary treatment can cost over $300 per pound, while reduction of a pound of phosphate loading from a farm field in the same watershed can often be achieved for $4–$6 per pound. In

addition, many of the *externalities* for engineered treatment (such as capital costs and greenhouse gas footprint) are negative, while externalities for improved agricultural practices like grassed buffer strips (such as wildlife habitat and carbon sequestration) are positive. The opportunity for WQ trading can save costs with concurrent preservation of high-quality watershed ecosystems.

BENEFITS

Although WQ trading is a new area for DoD, it has real potential opportunities and benefits. In general, several agreed-upon benefits can be had from trading:

- *Cost savings*. An efficient, cost-effective way to reduce pollution in a watershed, compared with traditional regulatory approaches.
- *Incentive for technological innovation*. The dischargers need adequate monitoring techniques to demonstrate pollutant reduction. Trading can provide incentives for dischargers to explore new reduction and monitoring technologies.
- *WQ emphasis*. Trading emphasizes meeting WQ outcomes rather than the installation of a particular type of control technology. Provides greater flexibility to discharger.
- *Independent group participation*. In a similar fashion, when nonprofit groups purchase open space for preservation, watershed groups can purchase and retire pollutant credits.

CHALLENGES

Even with the necessary components in place, certain challenges must be addressed. Many relate to PS-NPS trades, where the regulated facilities (DoD permit holders) meet the unregulated community (agriculture and other NPSs):

- *Risk*. Working with an unregulated source like NPS on farmlands and a regulated source like a PS may present some risk because the owner of the PS activity cannot transfer legal liability from a regulated PS to an unregulated NPS. This creates the risk that a credit buyer would be held in violation of its permit if an unregulated credit seller defaults on its contract. While the contract between the buyer and seller could protect the buyer financially in this event, it does not transfer the liability. Enforcement actions and public disapprobation will revert to the discharger. This could leave DoD installations (buyers of the NPS credits) open to real risk.
- *Pollutant reductions*. Actual reductions from on-farm activities are difficult to estimate and depend on external factors like weather. Supply is variable and can depend on annual management decisions made by

farmers, who may be unable to guarantee credits for long periods. Current and developing trading programs address this risk primarily through three mechanisms: aggregation of credits, development of credit reserves, and creation of reconciliation periods.

- *Setting pollution caps*. To create demand for trades, a maximum loading or "cap" must be set for a watershed and enforced by the regulatory agency. While public WQ goals are often linked to services a water body provides (such as fish habitat), trading requires that a cap be defined for specific pollutants. This presents a challenge for accurately estimating the amount of pollution reduction necessary to achieve the public goals. In addition, consistent enforcement of the cap is necessary for trading to occur.

- *Establishing baselines pollution load*. An NPS pollution load is spread over large areas and varies by site-specific factors and weather, which complicates the selection of the baseline. For both PSs and NPSs, establishing baselines often raises questions about responsibility for pollution cleanup, property rights of landowners, fairness, and related issues.

- *Complexities in establishing credits*. For NPSs, accurately measuring pollution reduction for a BMP is difficult. The effectiveness of a BMP depends on conditions at the site, its age, its implementation, and how well it has been maintained. Scientific models are often used to estimate load reduction from BMPs. Due to imperfections in almost all models, the estimated reductions from a BMP will likely differ from actual loadings. This creates uncertainty about the magnitude of WQ improvement from a trade.

- *Transaction costs*. The degree of difficulty in finding a buyer or seller and negotiating and implementing a trade are all examples of transaction costs. A beginning point for a market exchange is that buyers and sellers can easily locate one another and negotiate a trade. Because NPSs are widely distributed across a watershed, the transaction costs of making trades involving an NPS will almost always be higher than the costs for PS-PS trades. Authorization to allow DoD to participate in a mechanism that can help DoD installations find each other (such as through a credit bank or pool, or a clearinghouse) may be a way to reduce some transactions costs and increase the potential for trades.

- *Enforcing contracts and liability issues*. For the benefits of trading to be realized, there must be a mechanism to ensure that agreements made in a trade are met (the contract is enforced). When sources with a regulated baseline (such as PSs) buy credits from polluters with an unregulated baseline (such as NPSs), the buyers are legally liable for achieving pollution reductions. In contrast, the only document binding the sellers is the private contract with the buyer. As a result, the buyer is responsible to monitor the seller and enforce the trade agreement. DoD installations are

encouraged to require that the partner perform the monitoring and enforcement actions required by the contract, but consult with legal counsel before entering into any type of arrangement. Some partners require a share of purchased credits go into an "insurance pool" to guarantee that the buyer's regulated baseline is met even if one seller fails to deliver the credits.

Chapter 7
Summary

DoD manages approximately 29 million acres of land. Approximately 380 installations have "significant natural resources," as defined by the Sikes Act, and more than 250 have at least one federally listed TES. DoD's protection of military lands has resulted in many of them becoming refuges of biodiversity, which then resulted in potential restrictions on military activities. However, the use of these lands is a critical component of realistic training for our soldiers and effective weapons systems testing. The military has a responsibility to balance evolving mission requirements within the boundaries of existing military lands while working with local communities on encroachment and any adverse impacts to neighbors and sensitive natural resources.

When DoD installations unavoidably affect natural resources, compensatory mitigation is usually required. As the largest military land holder, the Army has declared land availability one of its biggest challenges.[1] Preserving land for training and testing is key to the success of military programs like BRAC, Grow the Army,[2] and Transformation. As part of overall cooperative conservation planning, consideration of off-site mitigation options can help installation master planners, operators, and natural resource managers maximize the availability of installation lands—and associated resources like water, the electromagnetic spectrum, and air space—for mission purposes.

This Manual provides the guidance necessary to encourage DoD installations to integrate off-site mitigation banking and trading into land-use planning. Title 10 U.S.C. § 2684a authority is a land-use tool and initiator of important partnerships with eligible entities, such as state and local agencies, NGOs, and private corporations. These partnerships offer mechanisms for off-site mitigation banking and trading to permanently sustain military lands and resources for mission purposes and achieve greater conservation and ecosystem benefits.

These buffer lands offer protection from development near military lands, but can also provide many other functions to the community, DoD facility, and the environment. DoD is exploring the uses of 10 U.S.C. § 2684a, "*Agreements to Limit Encroachments and Other Constraints on Military Training, Testing, and Operations,*" which expands its ability to partner with eligible entities toward the purchase of conservation easements or titles from willing sellers for the protection of natural resources or prevention of incompatible land use outside military installations. These lands are protected in perpetuity under conservation or

[1] 2nd Annual U.S. Army Sustainable Range Program Workshop. July 8–11, 2008, San Antonio, TX.

[2] U.S. Army, *Grow the Army*, http://www.army.mil/growthearmy/.

restrictive easements. As a federal agency, DoD is not interested in capitalizing on the monetary value of ecosystem services, rather its interests lie in broadening the selection of land use tools available to installations for the primary purpose of securing military lands and associated resources for mission purposes.

Protecting land outside military boundaries could free up thousands of acres of existing military lands for training and testing. In an attempt to use existing innovative land-use tools to achieve this goal, DoD is interested in exploring mitigation opportunities in conjunction with buffers to support a more cooperative conservation planning approach. Further opportunities to consider the value of natural resources on these properties may provide additional incentives to partners or landowners who may be interested in collaborating and/or partnering with DoD installations to capitalize on the increased value of the resources.

This Manual summarizes the legal authority, techniques, and approach for DoD installations to encourage the use of buffer lands for compatible uses. For example, buffer lands can be used for wetlands and stream compensatory mitigation, endangered species conservation, and to generate water quality credits that can offset base WWTP cap and trade goals. Achieving environmental compliance through the use of adjacent buffer lands offers a safeguard of installation property for mission uses while providing environmental services within the specific service area of the potential impact.

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Appendix A
Glossary

Antibacksliding provisions. Section within the CWA which prohibits the EPA from reissuing NPDES permits containing interim effluent limitations, standards or conditions less stringent than the final limits contained in the previous permit. (40 Code of Federal Regulations 122.33(l)(1)).

Antidegradation policy. The antidegradation policy identifies the steps and questions that must be addressed when regulated activities are proposed that may affect water quality. The steps necessary depend on which tiers of antidegradation apply. Tier 1 maintains and protects the water quality necessary for existing uses, whether the use is designated or not. Tier 2 maintains and protects "high quality" waters, which are fishable/swimmable by setting certain procedures if water quality is to be lowered. Tier 3 maintains and protects water quality in outstanding national resource waters (ONRWs), except in temporary situations water quality cannot be lowered in ONRWs (Section 303(c)).

At-risk species. Species that are at-risk of becoming threatened or endangered.

Biological opinion. An opinion issued by the USFWS/NMFS with a finding that the proposed project is or is not likely to jeopardize the continued survival or recovery of the species, this includes reasonable and prudent measures to minimize take of threatened and endangered wildlife.

Buffer strip. Strip of land adjacent to each side of a body of water that excludes agricultural, horticultural or grazing uses, construction of roads, walkways, etc., without approval, destruction of the grade control, habitat or bank, introduction of non-native species, construction of irrigation structures, and any cutting, mowing, or otherwise harming native vegetation.

Candidate species. A species which may be eligible for Endangered Species Act protection or other state protection and is not yet listed.

Cantonment areas. Temporary living areas on an installation.

Clean Water Act. Passed in 1972, the CWA protects surface water quality in the United States. It includes regulatory and non-regulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. Since 1972 the use of the act has shifted from a focus on PS, program-to-program approach to a watershed approach including incentives for NPS protection.

Combined sewer systems. Sewer infrastructure which includes both wastewater and stormwater, mostly used in urban areas these systems sometimes have problems with Combined Sewer Overflows when wet weather exceeds the capacity of the sewer.

Compensatory mitigation. Required replacing or restoring of a natural resource to compensate for loss in another area.

Compensatory Mitigation Rule. Rule established by the U.S. Army Corps of Engineers and the EPA to require adherence to the "mitigation sequence" or "avoid, minimize and compensate" for anyone wishing to obtain a permit to impact a wetland or other aquatic resource.

Comprehensive nutrient management plans. Conservation plans related to livestock operations which assess site conditions and develop management options and alternatives to conserve land, reduce erosions, and prevent runoff.

Conservation Bank Agreements. An agreement between a landowner and the FWS to create a conservation bank.

Conservation banks. A conservation bank is a geographic area of significant ecological value that has been restored and protected to provide compensation for impacts to other areas of comparable ecological value.

Conservation easement. A legally binding and permanent deed to a property for the purpose of setting it aside in natural form for conservation, precludes future development and restricts certain uses.

Construction general permit. The general permit which authorizes the discharge of pollutants in stormwater associated with construction activities.

Critical habitat. Specified geographic areas with physical and biological features essential to the conservation of a listed species.

Designated uses. Water quality standards require that states and authorized entities specify appropriate water uses to be achieved and protected. These uses are identified by taking into consideration the use, value, and suitability of the water body for public water supply, protection of fish, shellfish, and wildlife and for recreational, agricultural, industrial, and navigational purposes.

Discharge. The outflow or release of water or waste from one place to another.

Ecoregion. Mapped area of relatively uniform landscape characteristics and habitat.

Encroachment analysis. An analysis conducted to measure encroachment upon a property or waterway from damaging or use-altering activities.

Endangered species. Any species which is in danger of extinction.

Endangered Species Act. The ESA is intended to protect and promote the recovery of animals and plants that are in danger of becoming extinct. Threats to a species from habitat destruction, pollution, over-harvesting, disease, predation, and other natural or man-made factors must be reviewed and evaluated before an animal or plant can be placed on the federal endangered or threatened species list.

Engineered WQ treatment. Water quality treatment through an engineered means, which includes constructing wetlands, infiltration basins and trenches, traditional wastewater and sewage treatment facilities, and more.

EPA Phase I Storm Water Regulations (55 FR 47990). Regulations which established permitting requirements from construction activities that disturb five acres or more, also referred to as large construction activities. Phase II Storm Water Regulations (64 FR 68722) regulates stormwater association with small construction activities.

Flow dynamics. The system and nature of how water flows.

Grade control. The protection of the banks of a waterway to prevent erosion and preserve the grade of the bank.

Impaired waterbodies. Waterbodies that do not meet the water quality criteria and require a TMDL, includes excess pollutants as well as an impaired habitat, barriers to fish, and atmospheric deposition.

***in lieu* fees**. A third party prepares mitigation and for a (monetary) consideration assumes the responsibility for the success of the compensatory mitigation. Mitigation banks generally must achieve certain milestones prior to the sale of any credits.

Infiltration systems. Basins or trenches constructed to promote the infiltration of rainwater and snowmelt before reaching the water system to reduce runoff and erosion.

Instream standards. Water quality standards based upon the amount of pollutants in the stream in comparison to an effluent standard which measures what is released by a PS.

Jeopardy or adverse modification determination. The determination about whether an action or plan may jeopardize the continued existence of a species or adversely modify critical habitat.

Listed species. A species which is under protection of the ESA or similar state legislation.

Load allocations. The NPS maximum allowable amount of pollution in a TMDL.

Low impact development. LID is an approach to land development which manages stormwater to as close to its natural state as possible, utilizing principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage, bioretention facilities, rain gardens, and vegetated rooftops.

Market based approach. An approach to management which uses market tools or gives economic value to a resource to simulate market forces, often used to refer to natural resource or emission trading systems.

May affect determination. The determination that an activity or plan may affect endangered species.

Miscellaneous Receipts Act. Feeds paid to a third-party program, generally administered by a state or local government or NGO. Generally, the fees are collected prior to the start of any actual compensatory mitigation projects.

Mitigation Bank Advisory Team. A team of people organized to function in an advisory role for a planned mitigation bank or mitigation banking agreement.

Mitigation Bank Review Team. A team of people, similar to the Advisory Team, which reviews the mitigation banking agreement and planned mitigation bank.

Mitigation banks. Whether on or off site the success of the mitigation remains the responsibility of the permittee, this can be project-specific or be a consolidated mitigation reserve.

Mitigation banks. A third party prepares mitigation and for a (monetary) consideration assumes the responsibility for the success of the compensatory mitigation. Mitigation banks generally must achieve certain milestones prior to the sale of any credits. The success of the mitigation remains the responsibility of the permittee.

Municipal Separate Storm Sewer System. A municipal separate storm sewer system is a type of sewer system which has a separate storm sewer infrastructure from the wastewater infrastructure.

National Pollutant Discharge Elimination System. Controls water pollution by regulating PS facilities that discharge pollutants into waters of the United States. A facility requires an NPDES permit, authorized by the state of the EPA, to discharge directly to surface water.

No effect determination. A finding that a proposed plan or development will not have an effect upon a listed species.

Nonpoint source pollution. NPS pollution comes from many diffuse sources, instead of one or several distinct facilities. NPS includes runoff and stormwater which carries pollutants into the watershed.

Non-wasting endowment fund. Fund that generates enough interest each year to cover the costs of yearly management of the property in perpetuity.

Not likely to affect determination. The determination that an activity or plan is not likely to affect endangered species.

Out-of-kind mitigation. A type of mitigation in which LID, stream bank restoration or riparian buffer restoration is substituted for mitigating wetland impacts, generally discouraged.

Permitting authority. Entity whose jurisdiction is to distribute permits for a specific purpose.

Permittee-responsible compensatory mitigation. Whether on or off site the success of the mitigation remains the responsibility of the permittee. Compensatory mitigation can be project specific, or take the form of a consolidated mitigation reserve.

Point source pollution. PS pollution comes from one of possibly several identified sources, including industrial plants and waste treatment facilities.

Reconciliation periods. The sections of time in which progress with the mitigation bank or trading agreement is measured.

Regulatory purview. The range or limit of authority, competence and responsibility given to an entity by regulation, law, or statute.

Riffle pool complexes. Areas within a stream or creek where the water is deeper and protects a complex habitat.

Riparian buffers. Vegetated areas next to water resources which protect water quality from NPS pollution and also provide bank stabilization and habitat protection.

Section 311. A 2009 NDAA amendment that provides DoD with authority to make payments to conservation banks and “in-lieu-fee” conservation mitigation sponsors to facilitate military testing, operations, training, military construction, or any other military activity. This new authority also authorizes such payments to be treated as eligible military construction costs.

Section 313. A 2009 NDAA amendment that expands DoD’s authority to enter into cooperative agreements under the Sikes Act to fund and participate in off-installation natural resources mitigation projects that have the potential to relieve or eliminate current or anticipated restrictions on military activities. By eliminat-

ing the requirement for an ecological connection to on-installation habitat, this new authority makes it possible for DoD to participate in mitigation projects far removed from the installation, provided only that the project in some way address current or anticipated restrictions on military activities.

Sensitive species. Species that are vulnerable and likely to become endangered or threatened in certain areas, often state specific.

Significant Natural Resources (Sikes Act). A determination of whether an installation requires an INRMP depending on if "significant natural resources" exist, such as if they undertake fish and wildlife management, threatened and endangered species management, hunting and fishing management, or other natural resource management.

Sikes Act. Amended in 1997 the Sikes Act authorizes the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations, including the use of INRMP (16 U.S.C. 670a-670f).

Single-user bank. Where one entity plans for a project, constructs the compensatory mitigation and utilizes the credits developed.

Special aquatic sites. Sites which require a high level of regulatory review and protection under Section 404(b)(1) of the CWA.

State Wildlife Action Plans. State plans for conserving wildlife and habitat.

Stormwater Treatment Wetlands. Constructed wetlands used to control stormwater naturally by collecting and treating stormwater before it reaches a waterway.

Swales. Vegetated open drainage channels which control stormwater runoff, often is an alternative or component of storm sewer pipe systems.

Take. The gaining or taking possession of a certain good, property, or object either lawfully or unlawfully, the Endangered Species Act defines the "take" of protected species to, harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, destroy, or any significant habitat modification which impairs or disrupts essential behaviors.

Threatened species. Any species which is likely to become endangered.

Total maximum daily loads. The amount of a given pollutant that can be allowed to enter a waterbody without causing the water quality standards to be exceeded.

Trade ratios. Ratios that include such components as location, delivery, uncertainty, equivalency, and retirement of the potential tradeable units. These ratios

are used to ensure the amount of reduction resulting from the trade has the same effect as the reduction without the trade.

USFWS Safe Harbor Agreements. Agreements between private and non-federal landowners to conserve threatened and endangered species in exchange for legal assurances from the USFWS that no new ESA-related restrictions will be placed on the use of their land as a result of their voluntary beneficial measures.

Wasteload allocations. A specified amount of a pollutant a facility is allowed to release, a PS, as part of a TMDL.

Water quality trading. Trading programs which allow facilities facing high pollution control costs to meet their regulatory obligations by purchasing environmentally equivalent (or superior) pollution reductions from another source at lower cost, thus achieving the same water quality improvement at lower overall cost.

Watershed. A watershed is a hydrologically defined area, also known as a drainage basin, in which all rainwater and runoff flows to the same waterway. Subwatersheds are basins within a larger watershed that could be as small as a creek or stream which feeds into a river, or a river which feeds into a bay.

Wildlife corridors. Strips of land between wildlife habitats by which wildlife can travel between areas without barrier.

Appendix B
Abbreviations

ACUB	Army Compatible Use Buffer
APEX	Agricultural Policy/Environmental eXtender
BMP	best management practices
BO	biological opinion
BRAC	Base Realignment and Closure
CEOTT-SWAPP	comprehensive environmental and economic optimization tool
CFR	Code of Federal Regulation
CGP	construction general permit
CNMP	comprehensive nutrient management plans
CWA	Clean Water Act
CWASSC	Clean Water Act Services Steering Committee
DoD	Department of Defense
DOE	Department of Energy
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FR	Federal Register
GAO	Government Accountability Office
GSRA	Greater Sandy Run Area
INRMP	integrated natural resources management plan
LID	low-impact development
MBRT	mitigation bank review team
MCO	Marine Corps Order
MILCON	military construction
MOA	memorandum of agreement
MOU	memorandum of understanding
NCDOT	North Carolina Department of Transportation
NGO	non-governmental organization

NI	Natural Infrastructure
NMFS	National Marine and Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NPS	non-point source
NRCS	Natural Resources Conservation Service
O&M	operations and maintenance
ONRW	outstanding national resource water
OSB	Oregon silverspot butterfly
PLI	private lands initiative
PS	point source
RCS	Recovery Credit System
RCW	red-cockaded woodpecker
RGL	Regulatory Guidance Letter
SR	Savannah River
SWAT	Soil and Water Assessment Tool
TES	threatened or endangered species
TMDL	total maximum daily load
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WQ	water quality
WWTP	waste water treatment plant