Results of the FHWA Domestic Scan of Successful Wetland Mitigation Programs

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Center for Transportation and the Environment
North Carolina State University

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EXECUTIVE SUMMARY

From March through June 2005, the Federal Highway Administration conducted a domestic scan tour of eight State Departments of transportation that have implemented successful wetland mitigation initiatives involving some form of wetland banking. The scan team members included FHWA headquarters, resource center, and division staff as well as representatives from the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and the Center for Transportation and the Environment at North Carolina State University. The States visited (in chronological order) were Texas, North Carolina, Alabama, Nebraska, Ohio, Pennsylvania, Kentucky, and Minnesota.

Wetland mitigation banking, defined as "the restoration, creation, enhancement and, in exceptional circumstances, preservation of wetlands and/or other aquatic resources expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources," appears to resolve some of the problems associated with project-by-project mitigation. The advantages of wetland banking include greater ecological benefits on larger land areas, reduced reporting and monitoring time, and expedited permit review processing.

Accordingly, the Transportation Equity Act for the 21st Century (TEA-21), authorized in 1998, mandates mitigation banking as the preferred mitigation approach for unavoidable impacts to wetlands caused by Federal-aid highway projects. This banking preference remains unaltered in the recently passed reauthorization, the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). State DOTs using Federal-aid highway dollars must first look at wetland banking for mitigation before implementing project-by-project mitigation.

The purpose of this report is to describe and analyze State DOT successes with using mitigation banking as observed by the scan team members during the tour. The scan team examined the mitigation banking review team (MBRT) process, the monitoring and measurement of mitigation results and effectiveness, and other related topics that have led to successful wetland banking programs. Problems and pitfalls in the mitigation process were also noted.

Below is a brief description of the State DOT wetland mitigation program highlights, followed by the conclusions and recommendations of the scan team.

State DOT Highlights

Texas

Texas Department of Transportation (TxDOT) supports three wetland mitigation banks that are maintained currently, and managed in perpetuity, by the Texas Parks and Wildlife Department (TPWD). Texas is one of four States (North Carolina, Kentucky, and Minnesota being the others) that has utilized a third-party "mitigation agent" to manage both the short-term and long-term tasks associated with wetland mitigation banking. TxDOT bank sites are considered unique and vital natural resources by both the TPWD and the U.S. Fish and Wildlife Service (USFWS); the sites represent highly diverse wetland habitats located within unusually large, contiguous forested tracts. TPWD has assumed complete ownership and long-term/perpetual management responsibilities for TxDOT's mitigation banks, and TxDOT retains the right to debit all credits approved for the sites until they are exhausted. Like Alabama DOT and Ohio DOT, some of TxDOT's wetland bank sites also include credits for endangered species habitat, and TxDOT encourages public use and recreation on the bank sites as an important element of its wetland banking initiative. TxDOT's banking program is challenged primarily by third-party mineral rights and water supply demand issues that may potentially jeopardize the long-term integrity of its bank sites. Ensuring that these issues are addressed adequately in the wetland banking instruments is a persistent concern for TxDOT.

North Carolina

North Carolina DOT (NCDOT) has completely overhauled its wetland mitigation program, contributing financially and administratively to what has become essentially a new State agency charged with providing advance compensatory mitigation for wetland impacts due to transportation and other infrastructure development.

The new program, called the Ecosystem Enhancement Program (EEP), adopts an ecosystem perspective and involves the participation of the NCDOT, NC Department of Environment and Natural Resources (NCDENR), and U.S. Army Corps of Engineers-Wilmington District, whose new roles and responsibilities, and the legal mechanisms supporting them, are detailed in a memorandum of understanding. Since the formation of the EEP, which is administered by NCDENR, no transportation project has been delayed due to insufficient mitigation. One of the hallmarks of the EEP has been the trust established among the agency partners. EEP is still in its start-up phase, and is currently addressing some critical program management issues that include recruiting the private sector, including mitigation bankers, into the EEP and providing business incentives for private sector participation; determining whether and how to include preservation as a viable part of the program objectives; and addressing a shortfall or surplus amount of mitigation in response to projected impacts and/or unforeseen changes and circumstances.

Alabama

Alabama DOT (ALDOT) manages 13 bank sites that support 95 percent of its wetland mitigation needs. ALDOT is one of only three State DOTs (Nebraska and Pennsylvania being the others) on the scan that used Federal-aid dollars initially for its banking initiative. Two of ALDOT's sites have received credits for habitat conservation for the gopher tortoise and the Egret sunflower, both listed species under the Endangered Species Act (ESA). ALDOT encourages public and recreational uses on its sites, including hunting and bird watching. ALDOT has also designed a hunting area on one of its sites for the handicapped. The department believes that when the community shares ownership, the long-term sustainability of its mitigation bank sites is practically ensured. ALDOT continues, however, to seek viable partnerships for the long-term management of its wetland mitigation sites. ALDOT is looking to county governments and environmental organizations to provide the long-term stewardship. Additional challenges include stream mitigation, and ALDOT is seeking more Federal guidance on this issue, as well as enhanced coordination with the new mitigation banking review team (MBRT) recently established in the State. ALDOT has found the MBRT process to be cumbersome initially, although it anticipates more efficiencies in the process as the MBRT matures.

Nebraska

Nebraska Department of Roads (NDOR) wetlands mitigation banking initiative is in the midst of a significant transition with regard to geographic service areas (GSAs). The USACE-Omaha District Office is implementing a watershed approach, preferably at the HUC-8 or HUC-6 level, as the basis for establishing GSAs in the State. NDOR currently manages 18 wetland bank sites, with at least one in each of the State's 13 major land resource areas (MLRA). NDOR believes that shifting from MLRAs to HUC-8 service areas, of which there are 80 in the State, will jeopardize the viability of its banking program. Until this concern is resolved no further banks are being developed by NDOR. NDOR is currently in a dialogue with the Nebraska Game and Parks Department about options for the long-term management and protection of NDOR's wetland bank sites. The sites are functioning well and provide habitat for a variety of wildlife, including waterfowl and migratory birds, but the sites are relatively small in size ($\leq$ 20 acres), with only a few exceptions, and they are located generally along roadsides on former burrow pits, excavation sites, or prior converted croplands. The Game and Parks Department has Stated that it is not interested in assuming long-term management responsibility for a network of small sites situated along the edges of roadsides. Game and Parks is more interested in larger acreage sites that might hold greater value especially with regard to public use and recreation. NDOR is concerned that developing larger acreage sites would not be a possibility if a HUC-8 GSA is adopted, and finding ways to protect a vast network of small wetland bank sites for the long term will continue to be a key point of discussion.

Ohio

Ohio Department of Transportation (ODOT) has 28 wetland mitigation sites, of which only one could be considered a traditional "bank." For more than a decade ODOT has been most successful at using *consolidated sites* (i.e., several projects are mitigated at the same location) and/or *pooled* sites (mitigation site is developed beyond the needs of a single project and extra credits are held for future use). Under this scenario, a compensatory wetland mitigation site proposal and implementation plan is included in the permit application package for a roadway project, and upon approval of the permit application (which can take 8 to 12 months), or through separate mitigation agreement, the mitigation site is constructed

simultaneously with the project construction. Ohio DOT's decision to use consolidated or pooled mitigation emerged from the department's frustration with an MBRT process that was too slow and cumbersome to address adequately the mitigation needs of ODOT's 600+ road projects per year, which incur a combined total of less than 12 acres of wetland impacts. To streamline the efficiency of the permitting process associated with these and other impacts, ODOT has negotiated an agreement with the USACE-Huntington District that would allow the department to fund five new USACE positions in Columbus devoted exclusively to Ohio DOT projects. Ohio shares with Alabama and Texas another innovative measure: ODOT has found that fostering public use of its mitigation sites can contribute positively to the sites' long-term sustainability. One of the most outstanding examples of ODOT's community involvement is found in the New Albany Wetland Conservation Area. The site has become and important educational and recreational resource for the nearby New Albany High School and Middle School and the general public. To date, 3,000 students have used the site for educational purposes, and 180 students continue to use the site annually.

Pennsylvania

Pennsylvania is strikingly similar to Ohio in two regards. Pennsylvania has four USACE district offices with jurisdiction in the State, and the term *banking* has a very distinct, albeit negative, connotation. Opposition to wetland banking in the State, in PennDOT's estimation, has emerged from two schools of thought: one is ecological based, the premise being that after avoidance and minimization, on-site mitigation must be considered first before any consideration of off-site mitigation. Another school of thought, held by some transportation agency officials, is that banking poses a perceived financial obstacle to road design and construction budgets due to the need to program wetland banks as projects on the transportation improvement plan (TIP). PennDOT District 9-0's early experience with banking has shown that individual projects could be expedited and would require less budget if wetland banks were established, and a recent State assessment of wetland mitigation in PA is encouraging PennDOT to expand its program to all engineering districts. Of all the challenges associated with wetland banking, funding is the most critical roadblock to PennDOT's program. Project-specific wetland mitigation as opposed to wetland banking dominates in PennDOT's overall program. To facilitate cost-effective land acquisition, PennDOT attempts to build mitigation on land owned by other Pennsylvania government entities. Right-of-way costs and costs for maintenance are reduced by partnering with State land management agencies to locate mitigation sites on those agencies' lands. The land management agencies retain ownership of the land and long-term maintenance responsibilities. To date, PennDOT has implemented a total of 19 wetland mitigation bank projects in seven of its 11 districts. These projects represent a combined total of 229 wetland acres with 161 approved credits, of which 55 have been debited against the bank.

Kentucky

The Kentucky Transportation Cabinet (KYTC) has been mitigating for unavoidable wetland impacts since 1995. Recently, the KYTC forged a memorandum of agreement with U.S. Fish and Wildlife Service (USFWS) and FHWA to launch the KYTC Stream and Wetland Mitigation Program. Like Texas DOT, North Carolina DOT and Minnesota DOT, KYTC has opted to use a third party (in this case, USFWS) to coordinate its mitigation banking activities. In addition to expediting the 404/401 permitting process, this approach has proven beneficial to KYTC in three regards: USFWS can (1) find potential mitigation bank sites faster than KYTC, (2) quickly draft site proposals and implementation plans that meet regulatory standards, and (3) leverage additional funding and negotiate real eState transactions more effectively with land trusts, conservation organizations, and private landowners. USFWS gains certain benefits as well—most importantly, the opportunity to use funding from KYTC to support high quality conservation projects where the protection and management of vital waters and species is provided in exchange for any mitigation and/or conservation credits that may result. With regard to the long-term management of these sites, however, neither USFWS nor KYTC wants to own mitigation properties in perpetuity. Long-term property ownership is still an issue that needs to be resolved. Currently, both USFWS and KYTC seek out other entities (e.g., Southern Conservation Commission, The Nature Conservancy, etc.) to own the mitigation properties and to assume responsibility for implementing the wetland mitigation and corrective measures or improvements required on site, with funding provided by the KYTC.

Minnesota

In the early 1990s the State of Minnesota passed landmark legislation to protect and conserve wetlands. The Wetland Conservation Act of 1991 (WCA), one of the most sweeping protection laws in the country, became effective January 1, 1992, and was fully implemented in 1994. The Act is administered by the Minnesota Board of Water and Soil Resources (BWSR), implemented by local government units, and enforced by DNR. BWSR's entry into the wetland mitigation development market created an unanticipated problem for MnDOT, who had been establishing bank sites since 1987 and suddenly found itself competing with BWSR for the acquisition of mitigation sites. Accordingly, MnDOT is transitioning presently to a new Statewide umbrella agreement with BWSR, through which MnDOT will transfer funds to BWSR to create wetlands and a bank of wetland credits from which MnDOT can draw for future MnDOT projects with wetland impacts. This is similar to the process that North Carolina DOT uses with the Ecosystem Enhancement Program. Although MnDOT continues to address the numerous administrative issues associated with this transition, the partnership with BWSR offers clear benefits: MnDOT can focus mitigation efforts where needed, particularly in the areas with the highest historical loss of wetlands rather than just within the designated service area or within the watershed; individual DOT districts within Minnesota have the option of placing existing credits in the Statewide collective pot; and all future sites will be created and managed as a Statewide system. One of the hallmarks of MnDOT's wetland mitigation initiatives is the department's expert use of native prairie and sedge meadow seed mixes. MnDOT has invested generous research dollars to determine the best approaches for cultivating these mixes and has achieved a healthy diversity of plant communities on its wetland sites.

Conclusions

Best Practices observed on the scan include the following:

- Flexibility in the establishment of geographic service areas.
- Use of Statewide/umbrella banking agreements to reduce bureaucratic processes and red tape.
- Utilization of public lands owned by resource agencies or credible, non-profit natural resource groups to obtain land for mitigation, to assist with implementation of mitigation plans, and/or to assume responsibility for long-term management.
- Use of Federal-aid highway funds to establish mitigation sites to compensate in advance of future impacts for foreseeable projects.
- DOT funding of positions in Federal regulatory and permitting agencies to expedite the permitting process.
- Use of in-house experts within State DOTs to achieve cost savings for the design, implementation, and monitoring of wetland sites.
- Pooling of mitigation credits for entire State to allow credits to be withdrawn from the banking system even if a bank site is not yet developed within a specific geographic area.
- Provision of credits for upland buffers within the wetland mitigation area that serve a clear ecological benefit to the aquatic system.
- Public use of a State DOT mitigation site, such as hunting, to increase the public benefit for the expenditure of mitigation dollars and to increase the public value of the resource.
- Selection of sites for mitigation that are in a low ecological succession stage (e.g., agriculture sites are often the easiest to convert to wetland areas and often the most ecologically successful sites).
- Selection of restoration sites for mitigation development on lands that were historically wetlands and are thus more responsive to reversion back to a wetland system, rather than creation sites that may require extensive engineering and earth movement.
- Incorporating preservation of existing high quality wetlands into a compensatory mitigation plan.

Innovative Measures observed on the scan include the following:

- The Alabama DOT has used mitigation sites both for compensation for wetland impacts and for endangered species habitat mitigation.
- The Ohio DOT implemented a consolidated banking approach where mitigation for several projects can be performed at a single site without the necessity of going through the lengthy MBRT site-approval process.

- Ohio DOT has turned over the reporting and monitoring requirements (and long-term management) of one of their mitigation sites to a nearby local school district. Educational value is an under-explored and under-utilized benefit of State wetland mitigation programs.
- Ohio DOT is funding an entire USACE regulatory office in Columbus to work on transportation projects. While funding positions for the resource and regulatory agencies is not necessarily a new development, Ohio DOT is funding an entire office that cuts across the four USACE districts in Ohio.
- The Kentucky Transportation Cabinet has delegated the mitigation site selection responsibility to the U.S. Fish and Wildlife Service (USFWS). Among other benefits, the responsibility for site selection by USFWS gives the agency the opportunity to work towards species recovery efforts, as well as general wetlands functions.
- The Minnesota DOT (MnDOT) consolidates its available mitigation credits Statewide into a collective pot administered by an umbrella organization Board of Water and Soil Resources (BWSR). The credits are allocated by wetland type. MnDOT allows credits to be drawn from the collective pool if a particular type of wetland is not within the geographic service area of the highway project site.
- MnDOT is currently focusing mitigation efforts where needed and not necessarily within a particular designated geographic service area.

Continuing Challenges described by the States participating in the scan tour include the following:

- The categorical restriction of mitigation banks to HUC-8 geographic service areas will inhibit mitigation banking.
- The long-term management of mitigation sites is uncertain. Even if the DOT turns the bank sites over to resource agencies that have the expertise to manage natural resources, their limited funding may prevent them from adequately guaranteeing the ecological integrity of bank sites.
- Stream mitigation requirements are vague. DOTs are unsure of how to proceed with stream restoration and definitive Federal guidance is needed.
- DOT management and financial officers are reluctant to fund mitigation banks or sites that will be used to compensate for projects years into the future.
- Federal-aid dollars are not often used to establish mitigation bank sites, and State DOTs should explore all options available to them to meet their mitigation needs.
- The MBRT review process has become more stringent, performance standards have become more austere, and there seems to be subjective interpretations of what constitutes the most reasonable boundaries for geographic service areas. The USACE should provide more guidance for performance standards and service areas.
- The MBRT is difficult to organize for site visits and meetings, and timely responses on new bank sites are often not forthcoming.
- Some USACE districts are averse to wetland banking. The new USACE regulations on banking should provide definitive guidance so that the various USACE districts implement consistent policies.
- As a result of Solid Waste Management Authority of Nothern Cook County vs. U.S. Army Corps of Engineers (SWANCC) (i.e., the 2001 U.S. Supreme Court decision in Solid Waste Management Authority of Northern Cook County v. U.S. Army Corps of Engineers that limited the USACE's jurisdiction over isolated waters of the United States), impacts to isolated waters may not need to be mitigated and, therefore, may have some effect on the construction of wetland mitigation banks. It is FHWA policy to mitigate for all wetlands regardless of whether or not they are under USACE's jurisdiction.
- Invasive and exotic plant species are a persistent challenge in mitigation sites, and permitting agencies and State DOTs are not always in agreement about scientifically acceptable percentages of invasive plant species conditions on mitigation sites.
- Mineral mining rights, water supply needs, and other land use issues are not necessarily abdicated in wetland mitigation areas. Converting banks to other uses threatens the credibility of banking in general, and government-sponsored banks in particular.
- Resource agencies are often reluctant to accept preservation as mitigation, but State DOTs have demonstrated strong support for preservation as a preferred mitigation option in some cases.

Recommendations

The scan team offers the following recommendations to improve the overall effectiveness and efficiency of wetland mitigation banking for State transportation agencies:

- Adopt flexibility where prudent in the use of geographic service areas.
- Improve the effectiveness of the MBRT process.
- Issue guidance on the use of Federal-aid highway funds for mitigation banks.
- Engage inter-agency input in the adoption of functional assessment methodologies.
- Invest more research and technology transfer in invasive plant control and vegetation management.
- Actively promote and share success stories about innovative partnerships.
- Clarify the definition of a "bank."

Matrix of State DOT Wetland Mitigation Banking Data*
(as of December 2005)

	TX	NC	AL	NE	OH	PA	KY	MN
General Information								
First site established	1994	2003	1991	1997	1990	1995	1995	1987
Total # bank sites	3	n/a	13	18	1 (+27)	19	8	20
Total # acres	9,137	25,800	5,397	1,949	268+	279	860	1,389
Total # wetland acres	6,563	5,800	5,000	563	295	229	500	932
Total # credits approved	6,563	tbd	420	141	295	161	259	1,325
Total # credits used	1,198	tbd	310	188	234	55	174	391
Total # credits available	5,365	tbd	110	224	42	106	85	960
Wetland Impacts								
Avg # wetland acres remaining in State	7.6 mil	5.7mil	3.5mil	2.8mil	483,000	404,000	635,000	9.5mil
Avg # acres of wetland impacts per year in State	unknown	300	unknown	unknown	120	90	unknown	325
Avg # acres of wetland impacts per year by DOT	109	250	25	40	12	25	20	65
Bank Administration								
MBRT oversight?	Yes	No	Yes	Yes	No	Yes	Yes	No
Use of third-party mitigation agent?	Yes	Yes	No	No	No	Yes	Yes	Yes
Functional assessment methodology	WHAP and best professional judgment (bpj)	tbd	bpj	Cowardin and bpj	bpj, by wetland water quality standards	bpj, by wetland type	bpj, by wetland function	Cowardin and bpj by wetland type; tbd
Geographic service area (GSA) boundary	11 river basins	HUC-8	9 river basins + coastal area	Major land resource areas (MLRAs)	>HUC-8, negot. by USACE, EPA, etc.	34 sub-basins, per PA Water Plan	>HUC-6/8, negot. by MBRT	tbd, on water-shed basis
Mitigation ratios for	Coastal Bottomlands							
- Restoration	1:1	1:1	2:1	1:1-4:1	Negot., tied to wetland H_2O quality stds	1:1 – 2:1	2:1	1:1
- Enhancement	n/a	tbd	4:1	3:1-20:1		1:1 – 2:1	Negot.	none
- Preservation	6,4,2:1 (H,M,L)	5:1	Negot.	Negot.		10:1	10:1	8:1
- Creation	1:1	tbd	3:1	1:1		1:1 – 2:1	Negot.	1:1
Credits for buffers?	Yes (Partial)	No	No	Yes	Yes	No	No	Yes
Credits for endangered species?	Yes	No	Yes	No	No	No	No	No
Cost Factors								
% mitigation supplied by single-use banks	unknown	n/a	95	100	60	99	100	90
Avg mitigation cost/acre	$2,700	tbd	$7,000	$5,000 rural; $35,000 urban	$40,000	$34,533	$5,000	$4,000 rural; $50,000 urban
Avg annual operating budget	n/a	$90mil/yr, first 2 yrs.	n/a	n/a	n/a	n/a	n/a	$1mil
% Federal dollars applied to annual budget	0	0	0	0	0	60	0	0

* *Note:* This matrix is intended to provide a very surface-level, at-a-glance summary of the data pertaining to the State wetland mitigation programs featured in the scan tour. The DOT wetland mitigation/banking programs in North Carolina, Nebraska, and Minnesota are currently in transition, and thus their data are still evolving. Please refer to the individual State summaries for qualifying information that provides important context for the figures offered in this matrix.

List of Scan Team Members

The following individuals comprised the inter-agency wetland scan team. They participated on one or more of the State site visits and contributed to the development of this report.

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Abbreviations

ALCAB	Agricultural Lands Condemnation Approval Board
ALDOT	Alabama Department of Transportation
BWSR	Board of Water and Soil Resources (Minnesota)
CTNC	Conservation Trust of North Carolina
DNR	Department of Natural Resources
DOT	(State) Department of Transportation
EEP	Ecosystem Enhancement Program (North Carolina)
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FHWA	Federal Highway Administration
HUC	Hydrologic Unit Category
KYTC	Kentucky Transportation Cabinet
MBRT	Mitigation Banking Review Team
MnDOT	Minnesota Department of Transportation
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NCDOT	North Carolina Department of Transportation
NCDENR	North Carolina Department of Environment and Natural Resources
NCWRP	North Carolina Wetland Restoration Program
NDOR	Nebraska Department of Roads
NRCS	Natural Resources Conservation Service
NWP	Nationwide Permit
ODOT	Ohio Department of Transportation
OES	(Ohio DOT) Office of Environmental Services
PADEP	Pennsylvania Department of Environmental Protection
PennDOT	Pennsylvania Department of Transportation
PGC	Pennsylvania Game Commission
SAFETEA-LU	Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users
SHPO	State Historic Preservation Officer
SWANCC	Solid Waste Management Authority of Northern Cook County vs. U.S. Army Corps of Engineers
TEA-21	Transportation Equity Act for the 21st Century
TEP	Technical Evaluation Panel (Minnesota)
TIP	Transportation Improvement Plan
TNC	The Nature Conservancy
TxDOT	Texas Department of Transportation
TPWD	Texas Parks and Wildlife Department
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WCA	Wetland Conservation Act of 1991 (Minnesota)

INTRODUCTION

Avoiding impacts to aquatic resources, including wetlands, and other ecologically sensitive areas, is a priority of the Federal Highway Administration (FHWA). Unfortunately, the linear nature of highway projects makes some impacts to wetlands and other natural areas unavoidable. Throughout the nation, an estimated 1,100 to 2,400 acres of wetlands are impacted annually as a result of federally funded highway projects (*1*). Section 404 of the *Clean Water Act*, administered by the U.S. Army Corps of Engineers (USACE), requires mitigation for unavoidable impacts to aquatic resources (*2*). Additionally, Executive Order No. 11990, *Protection of Wetlands*, requires Federal agencies to avoid undertaking new construction in wetlands while pursuing their charges unless no practicable alternative is available (*3*). FHWA is committed to meeting its responsibilities to avoid impacts to aquatic resources to the extent practicable while meeting the Nation's transportation goals.

Compensation for wetland impacts has traditionally been in the form of wetland creation, restoration, or enhancement of other wetlands at or near the road development site where the impact occurs. The USACE and U.S. Environmental Protection Agency (EPA) policy has expressed a preference for wetland mitigation on-site and of the same type (i.e., in-kind) of wetland impacted (*4*). However, the preference should not preclude the use of a mitigation bank when there is no practicable opportunity for on-site compensation, or when use of a bank is environmentally preferable to on-site compensation. Furthermore, the USACE requires each mitigation site to have its own performance standards, and monitoring and reporting criteria. These project-by-project mitigations, however, have had limited success. The numerous mitigation sites have resulted in limited ecological benefits while taxing the resource demands of transportation agencies and resource agencies (*5*).

Wetland mitigation banking, defined as "the restoration, creation, enhancement and, in exceptional circumstances, preservation of wetlands and/or other aquatic resources expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources" (*6*), appears to resolve some of the problems associated with project-by-project mitigation. Wetland banks are usually established in advance of project impacts and approved by inter-agency mitigation banking review teams (MBRTs). They are generally larger than project-by-project sites. The larger land area is more manageable, often provides more ecological function per unit area, and the reporting and monitoring activities are reduced because many projects can utilize the wetland bank. The permitting processing time is often reduced as well because individual project mitigation plans need not be developed, circulated, and reviewed by resource agencies, or monitored.

Accordingly, the Transportation Equity Act for the 21st Century (TEA-21), authorized in 1998, mandates mitigation banking as the preferred mitigation approach for unavoidable impacts to wetlands caused by Federal-aid highway projects (*7*). This banking preference remains unaltered in the recently passed reauthorization, the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). State DOTs using Federal-aid highway dollars must first look at wetland banking for mitigation before implementing project-by-project mitigation.

State DOTs throughout the Nation are utilizing mitigation banks to expedite the permit review process and reduce the demands on personnel. Because the number of mitigation sites is reduced, banking can be more cost effective, and provide greater ecological and public benefits. There are both private, entrepreneurial wetland banks, as well as State DOT-owned-and-operated banks created specifically to mitigate DOT projects. State DOTs are incorporating both types of banks in their mitigation programs.

The purpose of this report is to describe and analyze how various State DOTs have implemented wetland mitigation banking. FHWA organized an eight-State scan, conducted between March and June of 2005, with participation from the EPA, USACE, and U.S. Fish and Wildlife Service (USFWS), as well as from FHWA environmental staff. The scan team members came to the scan with distinct, yet complementary, interests given their respective agency perspectives. USFWS, for example, because of its interest in the full range of ecosystem values to which wetlands contribute, wanted to learn how State transportation mitigation programs could contribute to the restoration, enhancement, creation, and preservation of healthy, functional wetlands; the role of endangered species in those programs; and to what extent mitigation programs have derived from a State's unique geography.

EPA was interested in observing how the *1995 Federal Guidance for the Establishment, Use and Operation of Mitigation Banks* has been utilized by the States and to what extent water quality functions have been factored into mitigation plans. USACE was also interested in the States' use of the *1995 Federal Guidance*, but most particularly in State discussions regarding the establishment of geographic service area boundaries and the extent to which States are addressing mitigation more holistically at the watershed level. These issues, and more, were discussed in depth during the site visits, where the State departments of transportation (DOTs) hosting the site visits ensured that the scan team members' resource agency counterparts were available on site to participate in discussions regarding their contributions to the evolution of the State DOTs' mitigation banking initiatives.

The scan tour included the following States (in chronological order): Texas, North Carolina, Alabama, Nebraska, Ohio, Pennsylvania, Kentucky, and Minnesota. The scan focused primarily on the State DOTs' successes with using mitigation banking. In addition, the scan looked at the mitigation banking review team (MBRT) process, the monitoring and measurement of mitigation results and effectiveness, and other related topics that have led to successful wetland banking programs. Problems and pitfalls in the mitigation process were also noted.

This report is organized to offer a brief summary of each State site visit, along with a set of notable best practices, innovative measures, and continuing challenges associated with the wetland mitigation programs in the selected States. In addition, the report includes references to the following interest areas, indexed below for quick reference:

STATE SUMMARIES

Individual summaries of each State site visit are provided below and organized in three sections: (1) program history and philosophy, (2) bank site descriptions and operations, and (3) best practices, innovations, and continuing challenges.

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Photo courtesy of Patricia Bacak-Clements, USFWS

Coastal Bottomlands wetland mitigation bank in Brazoria County, TX, includes compensation for bald eagle habitat.

Program History and Philosophy

The Texas Department of Transportation (TxDOT) launched its wetland banking program in 1992, three years prior to the publication of the *Federal Guidance for the Establishment, Use and Operation of Mitigation Banks* (*6*). The start of the TxDOT banking program, including the establishment of two of the department's three banks, also preceded the issuance of other Federal guidance that helped to clarify the use of wetland banks as compensatory mitigation for Federal-aid highway projects. The TxDOT mitigation banks were the first State-owned wetland banks in Texas. Like TxDOT, the State transportation departments that became early champions of wetland banking contributed much to the cause of environmental stewardship, although in doing so they faced notable technical and administrative challenges.

The catalyst for TxDOT's banking program was the department's growing concern about the economies of scale associated with performing project-by-project, on-site mitigation and the possibility of future project proposals impacting the on-site mitigation areas. Where the construction and maintenance of TxDOT highways and bridges led to unavoidable wetland impacts, the relocations of wetland impact sites were often not practical where a highway already existed, and on occasion the most logical sites to compensate for unavoidable wetland losses were not available within the right-of-way or nearby area (*8*). Wetland banking offered Texas a way to efficiently and effectively invest State funds in higher quality wetland acreage that offered multiple uses, such as long-term functioning ecological characteristics at a watershed level as well as increased opportunities for public recreation on State-owned and managed lands.

TxDOT's early pursuit of wetland banking underscored a Statewide initiative to protect and preserve large tracts of wetland acreage, particularly bottomland hardwood forests and swamps. Texas has lost nearly one-half of its original wetlands as a result of agricultural conversions, overgrazing, urbanization, channelization, water-table declines, construction of navigation canals, and other causes. Wetlands currently cover about 7.6 million acres of Texas, approximately 4.4 percent of the State's area. The most extensive wetlands are the bottomland hardwood forests and swamps of East Texas; the marshes, swamps, and tidal flats of the coast; and the playa lakes of the High Plains. (*9*)

TxDOT bank sites are considered unique and vital natural resources by both the U.S. Fish and Wildlife Service (USFWS) and the Texas Parks and Wildlife Department (TPWD) because the sites represent highly diverse wetland habitats located within unusually large, contiguous forested tracts. The very first TxDOT bank (Anderson Tract Mitigation Bank) was designated by USFWS as one of 14 Priority 1 sites of ecological concern in the State of Texas.

Accordingly, TxDOT has forged successful inter-agency partnerships to ensure the stability of the State-owned and managed bank sites. TPWD is identified in the banking agreements as the agency that has assumed complete ownership and long-term/perpetual management responsibilities for Anderson and Blue Elbow upon initial purchase. Twenty years after initial purchase of the Coastal Bottomlands, all of TxDOT's mitigation banks will be under TPWD ownership, and with regard to the credits that have not been debited to TxDOT projects, TxDOT retains the right to debit them until they are exhausted. For TxDOT, who purchased the sites and currently pays TPWD for site monitoring and maintenance over a 20-year period of operation (for Coastal Bottomlands only), the total financial investment for the first two mitigation banks has averaged a remarkable $400-$500 per acre for the Anderson and Blue Elbow banks (no operations and maintenance (O&M) money was agreed upon between TPWD and TxDOT); and $4,000-$5,000 per acre for the Coastal Bottomland Bank (includes O&M money for TPWD), TxDOT's third bank. This amount represents State dollars only. Although the banks are used to mitigate for Federal-aid highway projects, as a matter of practice, TxDOT has opted not to use Federal-aid dollars for advance compensatory mitigation; rather, State dollars are applied to this activity. Federal-aid dollars are reserved exclusively by TxDOT for highway construction.

Banking has proven to be a cost-effective and ecologically sound form of compensatory mitigation for TxDOT. The Texas State Legislature in FY 2003 approved in-lieu fee mitigation for projects outside the service areas of the TxDOT wetland mitigation banks. The in lieu fee program has been used in the Dallas, Houston, and Yoakum TxDOT Districts. TxDOT is currently evaluating the effectiveness of this mitigation approach compared to banking.

Site Descriptions and Operation

TxDOT has financed a total of three multi-project wetland mitigation banks, located primarily in the eastern and coastal regions of the State. The Anderson Tract and Blue Elbow Swamp banks operate under independent memorandums of agreement that involve USACE, USFWS, EPA, TPWD, and TxDOT. The Coastal Bottomlands bank operates under a separate, mitigation banking instrument developed through and approved by the State's MBRT. To date, all of the banks maintain a positive balance of available credits.

- **Anderson Tract** (2,242 acres; 2,200 credits approved) USFWS Priority 1 site
  A highly diverse wetland complex of riverine habitats, oxbow lakes, and many bottomland forest communities. Located in the Tyler District in Smith County and adjacent to Little Sandy National Wildlife Refuge.
- **Blue Elbow Swamp** (3,343 acres; 2,841 credits approved)
  A "national priority wetland" that comprises a complex of habitats including young to mature Cypress-Water Tupelo bottomland forest, isolated pine-oak upland, emergent marsh, and open water. Located in the Beaumont District in Orange County.
- **Coastal Bottomlands** (3,552 acres; 1,522 credits approved)
  A bottomland hardwood forest including willow swamp within the ecosystem of the Gulf Coast Prairies and Marshes and within seven miles of the Peach Point Wildlife Management Area and San Bernard National Wildlife Refuge. Located in the Houston District in Brazoria County. Includes buffer area uplands with 500-year-old live oak trees (diameter breast height, or dbh, in excess of 200 inches). Also includes Endangered Species Act (ESA) compensation for bald eagle habitat in the form of nesting and foraging areas.

Geographic Service Areas. The geographic service areas (GSAs) for the Anderson Tract (*large* = 43-county area within the drainage basins listed below) and Blue Elbow Swamp (*medium* = 8-county area within the Beaumont District, within the drainage basins listed below) were defined on a watershed basis and negotiated between USACE, TxDOT, and the resource agencies prior to the establishment of the mitigation banking review team (MBRT) in Texas. The service areas for the banks do not conform to hydrologic unit category (HUC) designations; they are generally larger than HUC-8 boundaries and fall within the State's 11 river basins. The GSA for the Anderson Tract encompasses highway projects within the Atlanta, Lufkin, Paris, and Tyler TxDOT Districts and within the USACE Fort Worth District, and within the drainage basins of the Sabine River, Sulphur River, Cypress River, Angelina River, and Neches River.

The GSA for the Blue Elbow Swamp encompasses highway projects within the TxDOT Beaumont District and within the boundaries of the USACE Galveston District, and within the drainage basins of the Sabine, Neches, Trinity, and San Jacinto Rivers. The GSA for the Coastal Bottomlands mitigation bank (*small* = one county and partially within 7 adjacent counties within the Houston and Yoakum Districts as well as in the drainage basins listed below) was established under the guidance of the MBRT, and applies to projects within the drainage basins of the San Jacinto-Brazos Coastal Basin, Brazos Basin, Brazos-Colorado Coastal Basin, Colorado Basin, and within the boundaries of the USACE Galveston District.

Functional Assessment Methodology. The USACE and TxDOT agreed to and use best professional judgment, with MBRT concurrence, to assign a rating of high, medium, or low quality for wetlands at the individual impact sites. The functional assessment methodology used when agreement on impact site quality values cannot be reached to establish bank credits and to provide a framework for site monitoring and maintenance is the Wildlife Habitat Assessment Procedure (WHAP), developed by the TPWD. TxDOT mitigation banks are eligible for preservation, restoration, creation, and enhancement credits, although the sites are considered primarily preservation sites. The ratios used for preservation credits at Anderson Tract and Blue Elbow are 7:1, 5:1 and 3:1, for impacts to high, medium and low quality wetlands, respectively. The ratios used for preservation credits on the Coastal Bottomlands mitigation bank, the only TxDOT bank established under the guidance of an MBRT, are currently 6:1 acres for impacts to *high quality* wetlands, 4:1 acres for impacts to *medium quality* wetlands, and 2:1 acres for impacts to *low quality* wetlands. For creation credits TxDOT receives a 1:1 ratio for 40 acres of open water and emergent marsh creation.

Monitoring Protocols. TxDOT and TPWD (along with other agencies) developed a baseline WHAP score when the banks were first established. TPWD will continue to monitor the sites using WHAP. The sites consist mostly of bottomland hardwood forests that do not reach ecological maturity for decades (a 20-year lifespan for each of the banks was the intended goal for when all credits would be debited). The TPWD uses the WHAP framework to document each site's functional level, biological lift or decline, and to help determine how to best implement the management plan to increase function and value of the wetland sites. One point noted by the scan team was that the WHAP is a wildlife habitat assessment approach only, and does not deal with other wetlands functions, such as water quality or surface water storage. This has led to an imbalance in crediting debiting ratios, since the Coastal Bottomlands bank, for example, is serving significant water storage and water quality functions.

Accounting Procedures. In accordance with its banking agreements, TxDOT maintains a ledger of credits and debits that documents the activity of the mitigation bank project accounts. The initial record includes a map of the project area showing the status of the water of the United States and non-water of the United States credits, including valuable uplands. Debits are recorded in the ledger at the point at which approval is received from the USACE that credits from the project may be used as compensatory mitigation for unavoidable adverse impacts from a particular TxDOT project. The debits are recorded by: (1) USACE project or permit number, (2) transaction date, (3) number of credits approved for use, (4) TxDOT project information, and (5) type of habitat impacted. TxDOT also uses the ledgers to record debits from the mitigation bank project as a result of impacts from human development such as oil and gas exploration. A Statement of account is provided annually to the MBRT (for the Coastal Bottomlands) and signatories of the MOA (for the Anderson Tract and Blue Elbow Swamp).

In the case of the Coastal Bottomlands mitigation bank, two ledgers of credits and debits are maintained: one for preservation credits at a 2:1, 4:1, and 6:1 debt ratio, and one for credits resulting from the creation of emergent wetlands and restoration of bottomland hardwood wetlands at a 1:1 ratio.

Maintenance and Management Concerns. All three bank sites are currently operating and are under TPWD management. As a result, TxDOT and TPWD were able to articulate many of the challenges associated with the sites' long-term maintenance and management. Feral hogs have presented some cause for concern at the mitigation bank sites due to the destruction they inflict on seedlings and emergent vegetation. Exotic and invasive plant species, however, pose the most significant maintenance problem, particularly in the Coastal Bottomlands and Blue Elbow Swamp mitigation banks. Both sites were previously disturbed by logging activities. This enabled the introduction of numerous noxious plant species, of which the most difficult to manage has been the Chinese tallow tree. TxDOT uses prescribed burning periodically on grassland areas to help control this invasive plant and is currently sponsoring research with Texas A&M University to identify and implement other weed control mechanisms.

Blue Elbow Swamp mitigation bank in Orange County, TX, is a "national priority wetland."

The two mitigation banks are also affected by vandalism and littering. In the case of Blue Elbow Swamp, prison labor is often utilized to help clean the site and repair damage caused by vandals. Although all three sites are open to the public for recreational activities, such as hiking, fishing, and hunting – which, in fact, is considered a highly valued feature of these sites for the State of Texas – the Coastal Bottomlands and Blue Elbow Swamp bank sites were formerly private lands not well secured and frequently disturbed by trespassing; thus, the enforcement of *proper* public and recreational use of the lands has become an evolving management issue for TPWD. The Anderson Tract mitigation bank, while also formerly private lands, runs contiguous to the Little Sandy National Wildlife Refuge, which has been long-managed by TPWD for both its wildlife habitat and public recreational uses. Due to this ideal location, the site and forest cover have been relatively undisturbed. Thus, vandalism and littering have not been prevalent management issues for this site, nor has exotic or invasive plant species.

The Anderson Tract mitigation bank includes important *mineral resources under third-party ownership*, and an oil pump station is located on site. According to the memorandum of agreement,

> "exploration and development of these minerals is acceptable under the MOA provided that surface alterations are the minimum necessary to accomplish the intended purpose, activities are conducted to minimize adverse environmental impacts, impacted areas are restored to pre-existing conditions as soon as practicable after the surface alteration is no longer needed, and the number of credits available for use in the account is reduced by the number of acres adversely impacted by the activity."

Oil pump station on Anderson Tract

The MOA also requires the development of a mineral management plan as a component of the overall strategic management plan for the mitigation bank. (*8*)

One additional management issue that TPWD brought to the scan team's attention, and that is currently not addressed in the banking agreements, pertains to *regional economic growth and water resource needs*. The State of Texas is experiencing unprecedented population growth, which is expected to place significant increased demands on the State's water supplies. Five new reservoirs are planned, and the TxDOT mitigation banks, as State-owned properties, are not necessarily invulnerable to "reassignment" by the State Legislature for the purpose of supporting the State's growing water supply demands. This raises the important, and as of yet unresolved, long-term management issue of how to mitigate for a mitigation bank site if public need warrants unanticipated use of the bank.

Best Practices and Innovations

- Using a third party (e.g., TPWD) to maintain and manage a mitigation bank site is a prudent strategy. Transportation departments lack the human resources and/or technical expertise required for long-term management of bank sites.
- Allowing public recreational use of a site can significantly enhance the value of a State-owned mitigation bank (although it can also significantly add to the cost of its maintenance), as long as the prescribed public use does not compromise the ecological integrity of the site or the credits that TxDOT is trying to use/enhance.

Continuing Challenges

- Exotic and invasive plants seem to be especially prevalent on mitigation sites previously disturbed by commercial activity, such as farming and logging.

- Mining and use of mineral rights within TxDOT mitigation banks must be addressed within the banking instruments. The implications of managing a bank site in perpetuity must be taken into account for those banks that include third-party mineral rights or that are located in high-growth regions with water supply challenges.
- Texas only uses Federal-aid highway funds for construction and right-of-way acquisition. They have not used Federal-aid highway funds to acquire any of the banks, or for management and monitoring.

NORTH CAROLINA

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Photo courtesy of Patricia Bacak-Clements, USFWS

Jumping Run is a 70-acre forested wetland and stream restoration mitigation site near Fort Bragg, NC, in the Sandhills region. North Carolina's wetland mitigation program has an active stream mitigation component.

Program History and Philosophy

The compensatory wetland mitigation program in North Carolina is embedded within a fundamentally new initiative, called the Ecosystem Enhancement Program (EEP) (www.nceep.net). Launched in July of 2003, the EEP represents the merger of the mitigation agents from three governmental agencies—NC Department of Transportation (NCDOT), NC Department of Environment and Natural Resources (NCDENR), and U.S. Army Corps of Engineers-Wilmington District (USACE-Wilmington District)—into one operating body, administered by NCDENR, that coordinates all of the off-site compensatory mitigation needs of transportation infrastructure and other economic development in the State of North Carolina.

Because of the EEP, the expression "wetland banking" is no longer relevant to North Carolina. The State has essentially tossed out traditional approaches for administering wetland and stream mitigation in favor of a Statewide strategic plan for ecosystem-based mitigation. The mission of the EEP is to "restore, enhance, preserve and protect the functions associated with wetlands, streams and riparian areas, including but not limited to those necessary for the restoration, maintenance and protection of water quality and riparian habitats throughout North Carolina" (*10*). An underlying goal of the EEP is to establish a predictable timetable and a common philosophy for mitigation in the State of North Carolina. The price tag for this new business model is considerable: the first biennial budget to NCDOT for EEP was $189 million. However, nearly a decade ago the State of North Carolina experienced a period of unprecedented transportation infrastructure development that demanded a radically new process for mitigation.

NCDOT is responsible for the second largest State-maintained road network in the United States, assuming ownership and maintenance for more than 78,000 of the State's approximately 101,000 miles of roads. In 1989 the North Carolina General Assembly passed the Highway Trust Fund Act, which mandated the construction of a total of seven outer loops and four-lane divided highways for towns with populations greater than 50,000. While the new Highway Trust Fund was applauded for its economic development objectives, the environmental implications of such an aggressive, Statewide infrastructure initiative were not considered. In the years that followed,

NCDOT experienced tremendous delays in project delivery, of which more than 50 percent were attributed to inadequate compensatory wetland mitigation: North Carolina is 17 percent wetlands, and transportation projects frequently encountered wetland impacts.

Concurrently, the Federal Highway Administration launched numerous efforts at the national level to advance environmental streamlining as one of FHWA's vital few goals. Eleven States, including North Carolina, were identified as environmental streamlining pilot sites. NCDOT was already forging a significant re-design process, called Merger-01, to improve interagency coordination and process efficiency through the integration of the National Environmental Policy Act (NEPA) and 404 permitting processes. Merger-01 was a response to the massive environmental mitigation challenges posed by the 1989 highway bill and proved especially successful in identifying genuinely unavoidable impacts from transportation projects.

In the early to mid 1990s, wetland banking was not a competitive business in North Carolina, as it is today. Without competitive pricing and uniform success criteria in the banking industry, it was not unusual for NCDOT to pay private bankers large sums of money for wetland banks that either failed or demonstrated poor ecological quality. When the first State-operated banking program, the NC Wetlands Restoration Program (NCWRP), was established in 1997, NCDOT anticipated a timelier, more cost-effective, and ecologically sound solution to its mitigation problems. Unfortunately, the NCWRP became mired in the bureaucratic planning processes associated with operating a banking program to the point that it could not achieve an efficient timetable for the implementation of the high quality wetland mitigation necessitated by the State's aggressive transportation construction program. Frustrations escalated between NCDOT and the resource and regulatory agencies, and it became clear that a virtual "sea change" in the State's approach to mitigation was necessary if real progress was to be made.

In the summer of 2001 an inter-agency task force was organized to examine the procedures of NCDOT, NCDENR, and the USACE as they related to permitting transportation projects and associated wetland and stream mitigation. The task force found inefficiencies in the processes of the departments in developing suitable compensatory mitigation and recommended a bold new approach. North Carolina would address the challenge of balancing needed growth with environmental protection by making the State's environmental agency, not its transportation agency, responsible for providing all off-site mitigation to compensate for the unavoidable impacts of transportation projects. In carrying out this mission, North Carolina would base its mitigation on a solid foundation of watershed planning that goes beyond environmental permitting compliance. Furthermore, funding for the program would be invested in advance by NCDOT for environmental protection *before* damage to wetlands and waterways occurs. In this way, North Carolina can stockpile mitigation units years before they would be needed to clear permitting hurdles for transportation improvements.

The proposal to establish the EEP coincided with NC Governor Mike Easley's directive to improve the environmental ethic of NCDOT and to enhance trust and consensus-building among State agencies through Gov. Easley's One North Carolina initiative. As a result, the highest levels of leadership supported the EEP concept from its inception. Today, all of the agencies assert unequivocally that without this high-level leadership, the massive institutional changes created by the EEP would not have succeeded. The programmatic framework and timetable to establish the EEP was developed in six weeks. FHWA subsequently provided $500,000 to create an EEP policies and procedures manual and begin development of a comprehensive information management system. The program was launched in 2003, and to date, no transportation projects have been delayed due to inadequate mitigation. Moreover, the EEP has preserved a total of 2 million linear feet of stream, 5,800 acres of wetlands, and 20,000 acres of high quality habitat.

Establishing what is in essence a new State agency is not without its challenges. First and foremost was the reassignment of the roles and responsibilities of the agencies involved with mitigation. A Memorandum of Agreement (MOA) was developed to specify the legal authorities for NCDOT, NCDENR, and the USACE-Wilmington District. The MOA served ultimately as the regulatory framework for EEP's operations. In addition, a memorandum of agreement was forged between NCDOT and NCDENR to specify EEP's business processes. Educating key mitigation agents and other support staff about the new program philosophy, business plan, and key responsibilities remains an ongoing effort.

Two advisory groups were formed to guide EEP's operations overall. The Program Assessment and Consistency Group (PACG) comprises Federal and State agency officials and technical professionals who review policy decisions made by

EEP management, address ongoing issues affecting EEP's operations, evaluate program accomplishments and shortfalls, and help to manage inter-agency process improvements. In this regard, the PACG's role is somewhat similar to an MBRT. The Liaison Council comprises non-governmental mitigation stakeholders. The council provides recommendations on EEP's structure, mission, and operations, and is briefed on progress three times annually.

One of the biggest challenges has been to standardize the process for making projections about impacts *in advance*. To evaluate and determine project impacts, NCDOT uses several sources of environmental data (e.g., NEPA documents, wetland inventory maps, etc.) from its seven-year transportation improvement plan (TIP), which includes a timetable for project letting. NCDOT provides these projections to the EEP on an annual basis. Of course, as the TIP is modified over time as a result of alternatives analysis and other factors, the impact projections may change, sometimes significantly. These projections greatly influence EEP's costs and budget, and NCDOT continues to improve its processes for generating impact projections.

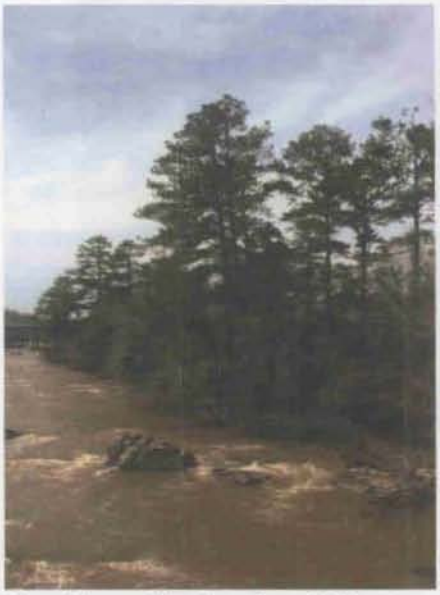

Photo courtesy of Patricia Bacak-Clements, USFWS

Haw River mitigation site, a 950-acre conservation corridor that connects USACE lands with Jordan Lake State Park in Chatham County, NC, was the first preservation site purchased for the EEP through a land trust.

Site Descriptions and Operation

The first two years of EEP's inception were called the "transition period." The transition period was established in order to allow for an orderly transition from the old method of providing compensatory mitigation to the new EEP method. It was not possible just to stop one day and start the new process the next day. A simple analogy would be trying to change the tires on a moving car. Therefore, EEP made a strategic decision to place an emphasis on preservation during the transition period. The program employs an inter-agency, science-based review process for the selection of appropriate, high quality preservation sites. Throughout the transition period EEP also remained committed to meeting a 1:1 no-net-loss requirement for any wetland impacts from TIP projects let during this time. After the transition period, upon provision of the 1:1 restoration component, EEP can allocate the "surplus" preservation credits, originally obtained during the transition period, to highway projects needing mitigation credits and for which preservation credits can be legitimately applied.

North Carolina is the sixth fastest growing State in the country and anticipates a sharp 30-percent spike in population by the year 2020. In addition to having one of the most extensive State transportation programs in the country, the North Carolina also contains 93 natural heritage aquatic areas of national concern and State significance, from the mountains to the coast. About 5.7 million acres of North Carolina is wetland. The Coastal Plain contains 95 percent of the State's wetlands. Before colonization by Europeans, North Carolina had about 11 million acres of wetlands. Nearly one-third of the wetland alterations in the Coastal Plain have occurred since the 1950s; most have resulted from conversion to managed forests and agriculture. The Roanoke River flood plain has one of the largest intact and least disturbed bottomland hardwood forests in the mid-Atlantic region. About 70 percent of the rare and endangered plants and animals in the State are wetland dependent. (*9*) Accordingly, preservation of the State's critical aquatics resources and natural habitats, particularly in the coastal region, is an immediate and vital concern for North Carolina and thus an important objective for the EEP.

With limited staff resources and experience following its 2003 start date, the EEP turned to the Conservation Trust of North Carolina (CTNC), an umbrella network of 22 local and regional land trusts, to assist with identifying critical preservation sites. The partnership has become one of EEP's most immediate success stories. The land trusts have a positive and ongoing relationship with private landowners, as well as robust public education initiatives. As contracting agents to EEP, and in cooperation with the NC State Property Office, the land trusts have been able to negotiate conservation easements and fee-simple land purchases more effectively than the State could have managed on its own. With CTNC's assistance, the EEP has preserved to date a total of 158 miles of stream, 7,500 acres of wetlands, and nearly 35,000 acres of high quality habitat.

The EEP showcased the following two sites for the scan tour:

- **Jumping Run Stream and Wetland Restoration Site**
  A 70-acre predominantly forested wetland system of Southern Yellow pine and bottomland hardwoods, located in Harnett County in the Sandhills region, adjacent to (and owned by) Fort Bragg Military Reservation. EEP anticipates receiving 65-67 acres of wetland restoration and ~4,530 linear feet of stream restoration credits.
- **Haw River Preservation Site**
  A 950-acre conservation corridor that connects USACE lands with Jordan State Park lands, located in Chatham County in the Piedmont region, and provides 893 acres and 32,000 linear feet of credits. A highly scenic recreation area that also supports habitat for a federally endangered fish (Cape Fear Shiner), rare mussel and dragonfly species, 50 species of nesting birds, and 15 species of warblers. For more information, see www.hawriver.org.

Geographic Service Areas. Mitigation sites are acquired on a watershed basis in accordance with USACE's current hydrologic unit cataloging (HUC) guidelines. There are 54 8-digit catalog units (as defined by USGS) in North Carolina, and mitigation is generally restricted to the 8-digit catalog unit where the impact occurs. One noteworthy feature of the EEP's mitigation planning is that it is linked directly to the basinwide plans of each of the State's 17 river basins. Per the EEP's specifications, these watershed plans are carefully utilized by the land trusts and other vendors who assist the EEP with acquiring high quality mitigation sites. In addition, vendors who bid on any EEP requests for proposals to design and implement a mitigation plan must demonstrate in their proposals how they will meet the objectives established in the basinwide plans.

Photo courtesy of Patricia Bacak-Clements, USFWS

NC folk artist Clyde Jones uses driftwood, tires, and metal salvaged from the Haw River to create a colorful menagerie of lawn art. Some of Jones' work is featured on the grounds of the Governor's Mansion.

Functional Assessment Methodology. Current USACE and EPA guidelines are currently being utilized to assess aquatic resource functions. The EEP currently employs a 1:1 no-net-loss ratio for wetland restoration, and a 5:1 ratio for preservation of critical streams and wetlands. Preservation sites that are acquired, per Federal guidelines, are only those sites that offer high quality functional habitat and are under demonstrable threat. Furthermore, stream preservation sites generally include the provision of a 300-foot buffer on either side of the stream.

The current measurement for authorized impacts and compensatory mitigation is set in terms of acres (for wetlands) and linear feet (for streams). EEP's goal is to develop or accept a scientifically acceptable and practicable method of measuring authorized impacts to wetlands and streams on the basis of functions lost and compensatory mitigation in terms of functions gained. Teams have been established to develop functional assessment methodologies for streams and wetlands.

Delivery Methods. Through partnerships with biological, engineering and management firms, EEP outsources the bulk of its program needs to the private sector. EEP's philosophy of doing business is based on strategic planning that determines the size, location and result of known or anticipated environmental impacts from transportation-infrastructure improvements and other economic development in the State. Professional services for planning and engineering are sought through the year on an as-needed basis. Watershed planning studies are awarded to professional firms through a qualifications-based selection process.

EEP utilizes the following delivery methods for procuring mitigation sites:

- *Design/Bid/Build* is the standard delivery method where EEP contracts with a private firm to design the project and then bids out the construction work. EEP selects on-call contractors for engineering and biological services on a two-year cycle. These on-call awards allow EEP to rapidly deploy professional services anywhere in the State.

- *Full Delivery* involves hiring one firm to deliver the full project (acquisition, design, construction, and monitoring). Full delivery contracts are awarded based on programmatic needs, and contractor selection is value based and considers both technical merit and cost. *Full delivery* has taken the place of mitigation banks.

Monitoring Protocols. When an EEP mitigation project is awarded, the vendor assumes responsibility for designing, implementing, and monitoring the site. After the monitoring period is complete, the site will be turned over to one of the land trusts to maintain in perpetuity. Because the EEP is still in its start-up phase, no site has yet surpassed the five-year monitoring period. The PACG is in the process of developing environmental monitoring criteria, as well as uniform mitigation success criteria. In the interim, general USACE/EPA guidance is being utilized.
The PACG discussions have emphasized the need for flexibility in determining what makes a mitigation project successful, particularly as data on the aquatics and habitat functions of the State's 17 river basins and 8 eco-regions become more accessible and as the science of mitigation advances. For example, if one strives to evaluate a mitigation project from an ecosystem perspective, not just a wetland perspective, then, as Stated by the USACE representative who chairs the PACG, "sometimes replacing a wetland with a wetland is neither the most prudent nor ecologically sound approach."

Accounting Procedures. Developing an accounting process for a program as innovative as the EEP has proven to be a tremendous enterprise. Not only are mitigation sites acquired, designed, and implemented *far in advance* of transportation impacts, but EEP is required to track mitigation credits by categories and types. The three categories of wetland mitigation in North Carolina are riverine, non-riverine, and coastal marsh, and the mitigation can be in the form of restoration, creation, enhancement and preservation. Since EEP mitigation projects are implemented based on the projected needs for an entire watershed (each of the State's 54 HUC's are tracked independently), the projects are not directly developed for a specific transportation project as with a traditional State DOT mitigation program. EEP, on the other hand, earmarks the necessary assets created by mitigation projects and links them to the transportation project once a permit is issued for the impact and the assets are debited from the mitigation site in EEP's database. Accordingly, once a regulatory agency permits a transportation impact utilizing EEP mitigation, EEP can report what mitigation site the assets came from.

While NCDOT provides EEP with its best professional judgment regarding projected impacts on an annual basis, these numbers can change as a project nears its let date and additional environmental data are obtained. To date, the NCDOT impact projections, by and large, have come in under the original estimates due to the department's ability to avoid and minimize more effectively through the Merger-01 process. However, addressing surplus or shortfall mitigation in its accounting process remains a special area of concern. EEP program expenditures pertaining to NCDOT mitigation projects are funded in advance by NCDOT, and it is the responsibility of NCDOT to reconcile with FHWA any modifications due to changes in transportation project programming. Currently, the EEP is implementing an automated information management system that has been developed through a contract with the Research Triangle Institute. A future addition to the information management toolkit will be a GIS viewer that allows the EEP staff to identify the pertinent functional data related to a mitigation site throughout all of its life-cycle phases.

Maintenance and Management. During the implementation phase of a mitigation plan, a project manager is assigned to the site and is responsible for performing any required maintenance as well as providing an annual status report on the site's functionality to the PACG. With regard to the EEP's high quality preservation sites, once the sites have achieved their operational lifespan and all credits are debited, the land trust associated with acquiring those sites will become the owner and maintainer of the sites in perpetuity. Many of the preservation sites are located in important headwater and water supply areas; as a result, NCDENR's Division of Water Quality plays an integral role in site selection and design in order to consider these factors early in the process. Another opportunity for the EEP is to explore a way to integrate NCDOT's Statewide planning process with the local watershed plans. By knowing up front where the most environmentally sensitive resources in the State are located, Statewide planning can contribute significantly to the process of "avoiding and minimizing" well before projects are listed in the TIP.

Best Practices and Innovations

- **Adoption of an ecosystem perspective**. North Carolina bases its mitigation on a solid foundation of watershed planning that goes beyond environmental permitting compliance. An ecosystem approach is used for mitigation activities rather than simply meeting the requirements of individual permits. The mitigation work is funded and initiated in advance of the project impacts. Compensatory mitigation is therefore stockpiled perhaps years in advance of project development and already available to clear permitting hurdles.
- **Establishment of trust.** The hallmark of EEP is trust. Without critical partner relationships between the governor's office and the secretaries of Transportation and Environment and Natural Resources, North Carolina's program never would have left the ground. Trust is also critical between the State and Federal regulatory agencies because performing according to regulatory mandates is expected from EEP. The formation of the PACG and Liaison Council has allowed the EEP to foster a constructive and dynamic relationship among the members of these groups that can withstand the impacts of personnel changes over time.
- **Inclusivity**. Contributing to the success of EEP has been the outreach, coordination, and cooperation with all affected parties, including Federal, State and local agencies, non-profit organizations, and the private sector. It is worth noting that in the early days of EEP, the private mitigation bankers were very uneasy with the concept of EEP. EEP appeared to be a direct threat to the continuation and expansion of private mitigation banks. By including the private sector early on, and by explaining and reassuring them that they would still play an integral part (through the full-delivery process), the private mitigation banking industry eventually became supportive of EEP.
- **Procurement of funding commitments for organizational development and implementation.** When EEP unveiled its two-year budget request of $189 million to the NC Board of Transportation, the policy-setting and project-approval body for NCDOT, a palpable "sticker shock" was evident among the board members. Mitigation costs always had been considered part of the costs of doing business, buried in the details of project costs. Since mitigation costs were not clearly tracked, the State really did not know the true cost of providing mitigation. Now, the State is able to discuss mitigation costs in fact, not in concept.
- **Proceeding with the expectation that promoting economic development while also protecting the environment is an achievable goal**. Expansion of the transportation infrastructure can lead to increased economic development opportunities. More predictability in the letting schedule of projects provides stability within the construction industry. All of this can be achieved while protecting the environment through EEP's focus of providing programmatic mitigation on a watershed level in advance of anticipated impacts.

Continuing Challenges

- The EEP is essentially a new State agency. It may not be easy to replicate this measure in other areas. The avoidance of agency turf wars was resolved through a memorandum of understanding that detailed the roles and responsibilities of the participatory agencies, although educating staff on those new roles and responsibilities remains an ongoing challenge.
- The cost of the EEP has been high, at nearly $90 million per year for the first two years.
- In their quest to approach mitigation from an ecosystem management perspective, versus a project-by-project perspective, the EEP staff and advisory groups face many complex challenges, including the following:
  - Addressing a shortfall or surplus amount of mitigation in response to projected impacts and/or unforeseen changes and circumstances.
  - Linking transportation projects to mitigation sites for accounting purposes.
  - Justifying the program expense to government agencies and the general public.
  - Recruiting the private sector, including mitigation bankers, into the EEP and providing business incentives for private sector participation.
  - Determining whether and how to include preservation as a viable part of the program objectives.

ALABAMA

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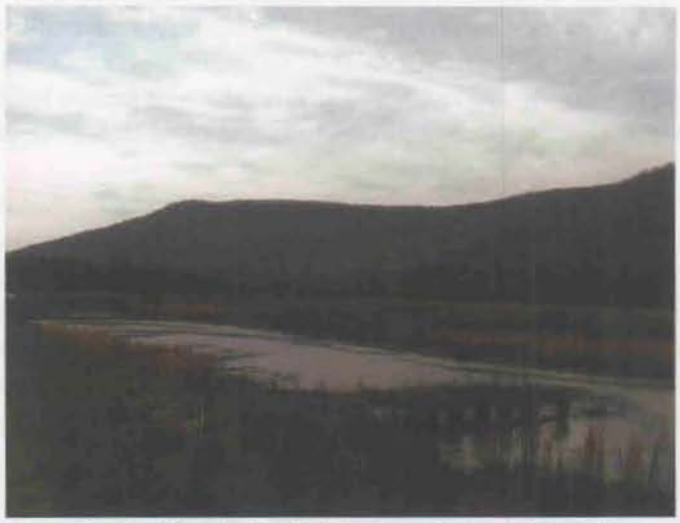

Photo courtesy of Patricia Bacak-Clements, USFWS

Crow Creek mitigation bank in Jackson County, AL, is the restoration of a 470-acre bottomland hardwood forest wetland system that includes the creation of a waterfowl management area.

Program History and Philosophy

The State of Alabama Department of Transportation Wetland Mitigation Bank Program has grown from a single 80-acre wetland bank in 1991 to a total of 13 wetland banks today, covering 5,397 acres. The primary catalyst for the program was an increase in project delays at the permitting stage due to inter-agency differences over mitigation ratios. On-site mitigation had become increasingly more difficult to plan, implement, and maintain. Furthermore, efforts to create high quality, sustainable on-site mitigation were often compromised by pre-existing ecological impediments (e.g., inadequate hydrology, poor soils, invasives, etc.) that had to be addressed continually. Wetland banking offered Alabama DOT the opportunity to dispense with an inefficient project-by-project mitigation approach in order to mitigate for unavoidable wetland impacts through a more efficient programmatic framework that would ensure the conservation of higher quality wetland and habitat resources.

ALDOT has experienced essentially two phases of its banking program: one before the issuance of the 1995 Federal guidance, and one after. During the early years of its "first" banking program, ALDOT experienced good coordination with the resource agencies and local governments that were signatories on the banking instrument. Federal dollars were utilized at that time to purchase and establish one of the department's mitigation sites. The sites were quickly put "on the ground," and the credits generated by the sites were released immediately and pooled, as opposed to being released in phases and assigned to individual sites. The banking program was set up in the department as a "highway fund project" for use by State- and Federal-aid highway projects exclusively. ALDOT's small, dedicated staff of in-house biologists coordinated all aspects of mitigation, from site selection, to design, to implementation, and this generally applies today.

In the mid-1990s, ALDOT's attempts to formulate an updated memorandum of agreement for its banking program were stalled for three years until the issuance of the 1995 *Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks*. The Statewide banking agreement was finalized in April 1996, although changes are being considered currently at the request of EPA to address mineral rights issues, a growing concern in the State. Under the 1996 banking agreement, oversight of ALDOT's banking program became governed by the MBRT, chaired by the Mobile USACE District Office, which covers the largest area of the State, although a second USACE District Office (Nashville) also has jurisdiction in the Tennessee Valley region.

ALDOT believes that the MBRT concept is a sensible step forward and will benefit wetland conservation in the State for the long term; however, the MBRT process is still being refined to reconcile "start-up" challenges related to the introduction of new personnel to the process and to philosophical differences over wetland function definitions and performance standards.

Soon after the establishment of the MBRTs, private banks began to emerge in the State, and the question of how much mitigation should cost became an important issue of concern. One private bank initially charged $35,000/credit per acre fill, while the costs of ALDOT-owned banks at the time typically ranged from $5-$10,000/credit. As a result, for many years ALDOT opted not to purchase credits from entrepreneurial banks because the costs were considered prohibitive and not a reasonable expenditure of public funds. However, as market factors have stabilized these costs over the years, ALDOT has renewed its interest in working with private banks as potential partners. ALDOT recently acquired approximately 50 credits from a private bank and plans to acquire 200 additional credits in the near future.

To date, 95 percent of ALDOT's mitigation is provided by its own banks, which are acquired as fee-simple real eState with deed-restricting covenants. County and local transportation agencies are not eligible to receive credits from ALDOT banks. These agencies and other organizations seeking wetland credits for economic development projects can use entrepreneurial banks or a program operated by the Alabama Wildlife and Freshwater Fisheries Division. The Nature Conservancy (TNC) is also actively buying land in Alabama for wetland preservation with funds from the Natural Resources Conservation Service (NRCS). On occasion, TNC has operated as an in lieu fee provider of wetland credits for private developers and construction contractors. TNC has also assisted ALDOT with finding potential mitigation sites, although no formal collaboration between TNC and ALDOT exists at this time. Some coordination at a broader level would be helpful, ALDOT believes, to guide situations where TNC, for example, conducts a mitigation project at an upstream site location, while ALDOT concurrently conducts a separate mitigation project at a downstream location in the same river basin. Currently, no guidelines exist to help ensure that mitigation projects implemented by different organizations throughout the State are serving broader, complementary objectives.

ALDOT perceives stream mitigation as the next major environmental concern for the department. A consistent approach to addressing stream mitigation has not yet been adopted by the two USACE district offices, Mobile and Nashville, having jurisdiction over ALDOT projects. ALDOT is seeking additional Federal guidance, but in the interim will likely consider bridging its streams as an immediate, although not necessarily cost-effective, solution to avoid and minimize potential impacts.

Site Descriptions and Operations

Wetlands cover about 10 percent of Alabama and range in size from small areas of less than an acre to the 100,000-acre forested tract in the Mobile-Tensaw River Delta. Most of the State's forested wetlands are bottomland forests in alluvial flood plains. Coastal waters support extensive salt marshes. Wildlife habitat is also a critical natural resource concern in the State. With the exception of Hawaii, Alabama contains the greatest number of endangered species in the country. Accordingly, the mitigation sites selected for ALDOT's wetland banking program are designed to serve both wetland and wildlife habitat functions.

Two of ALDOT's sites have received credits for habitat conservation for the gopher tortoise and the Egret sunflower, both listed species under the Federal Endangered Species Act (ESA). The Styx River site in southern Alabama has been designed to manage several varieties of rare pitcher plants and other unique plants such as the Venus flytrap. Because of the scope and diversity of habitat concerns in the State, ALDOT is considering funding a position for a USFWS employee, who would be dedicated entirely to transportation projects, work out of the ALDOT headquarters office, and have the authority to write and approve biological opinions.

Rob Hurt, USFWS (left), and John Shill, ALDOT (right) at Crow Creek mitigation site.

The mitigation sites are also being managed to promote public access and recreation as appropriate. ALDOT is developing a public environmental park in Montgomery County as part of the Catoma Creek wetland mitigation bank, a hunting area for the handicapped in the Dozier bank, and a waterfowl management area in Jackson County in the Crow Creek bank. The Sypsey Swamp site is part of a system that has been designated as a Natural Wonder of Alabama, and ALDOT has permitted limited public access to a number of persons and groups who want to visit the area. ALDOT allows hiking and fishing on most of its sites; however, due to safety issues, hunting is allowed only where ALDOT has agreements in place with the Alabama Wildlife and Freshwater Fisheries Division.

ALDOT has indicated that agricultural sites are the best suited for transformation into a wetland area. These sites are in a low stage of ecological succession so invasive plant species control is easier and more manageable. Clear-cut sites are in a recovering succession stage and more susceptible to invasive species growth. Most of ALDOT's bank sites are still in some stage of development and/or monitoring.

For the scan tour, ALDOT organized field visits to the following three mitigation sites:

- **Crow Creek Mitigation Bank** (470 acres; 150 credits approved)
  Located in Jackson County in the Tennessee River Basin, this site involves the restoration of a bottomland hardwood forested wetland system and the creation of a waterfowl management area.
- **Town Creek Mitigation Bank** (530 acres; 170 credits approved)
  Located in Lawrence County in the Tennessee River Basin, this site involves the restoration of a bottomland hardwood forested wetland.
- **Flint Creek Wetland Mitigation Bank** (650 acres; 430 credits approved)
  Located in Morgan County, this private bank site is owned and managed by Robinsong Ecological Services, Inc. The bank was allocated approximately 215 "pre-credits" available for sale at bank approval. ALDOT recently purchased 50 "pre-credits" at $7,000/credit. ALDOT has entered into an agreement to purchase all remaining credits (approximately 215 maximum) that are released at the end of the prescribed five-year monitoring period in 2005.

Geographic Service Areas. The 1996 banking agreement specifies that the service area for each mitigation bank shall be defined by Alabama's nine river basins in addition to a coastal mitigation area. Currently, ALDOT has mitigation bank sites in eight of the State's nine river basins. The river basin service areas are much larger than the HUC-8 watersheds, allowing more frequent use of the bank sites as compensatory mitigation.

Functional Assessment Methodology. In the USACE-Mobile District, which has jurisdiction over the majority of ALDOT's bank sites, the MBRT designated the following "mitigation acres:credit" ratios: 2:1 for restoration, 3:1 for creation, and 4:1 for enhancement. Preservation credits are negotiated with the MBRT on a case-by-case basis. ALDOT has only one preservation site, the Pea River Mitigation Site, located on the Pike/Barbour county line in the Chattahoochee/Choctawhatchee River Basin. The 600-acre site is a complete preservation of old growth cypress, hardwood, and tupelo gum swamp that was slated for lumbering. The MBRT is still clarifying some ambiguities in the language it uses to define restoration versus enhancement. For example, one dialogue that is ongoing between USACE and ALDOT involves the implications of "clearing" a site on the mitigation. Currently, the act of replanting new trees and seedlings in a recently clear-cut area results in the mitigation being considered a *restoration* site; whereas, replanting a site that has 5 to 10 years of natural re-growth (after having been previously clear-cut for agricultural use, for example) results in the mitigation being considered an *enhancement* site.

Monitoring Protocols. The USACE-Mobile District MBRT has developed a regimented monitoring program that ranges from monitoring the success of plantings to prescribed burns. ALDOT uses an in-house team of environmental specialists to perform the monitoring of its bank sites. In addition, ALDOT has contracted with Tuskegee University, College of Agricultural, Environmental and Natural Sciences, to assist with monitoring both the Town Creek and Crow Creek sites. The university has been particularly helpful with implementing technologies, such as the use of barologger devices, to better document the hydrology of some of ALDOT's mitigation sites.

A barologger is a small, cylindrical pressure transducer device that can be installed within a well and positioned above the highest potential level of the water table to measure groundwater and surface water levels as well as the atmospheric, barometric pressure, and temperature levels. The Crow Creek Site has further release of credits dependent upon a successful demonstration of hydrology, which has been challenged by an invasion of ragweed and beavers. Proper hydrology is particularly important for forested wetland sites to help establish new tree plantings.

Barry Vaughn (center), Tuskegee University, demonstrates barologger device to document hydrology levels.

Accounting Procedures. As some of ALDOT's banks have yet to reach ecological maturity, the credits are released on a phased basis. The credits are increased by the MBRT as ecological performance standards are met over time. The bank ledger is then debited for impacts as per the designated ratios. ALDOT's documentation procedures are evolving in response to guidelines established by the MBRT. Because ALDOT's in-house staff of six biologists coordinates the design and implementation of all mitigation plans, the department has relied historically on a regular schedule of visual site inspections, as opposed to more formal accounting and ledgering processes, to characterize the progress of each site's functionality. However, this is changing now that the MBRTs have established more stringent monitoring protocols and a phased approach to the release of credits. To date, 80 percent of the approved credits from ALDOT's mitigation banks have been released.

Maintenance and Management. Most of ALDOT's mitigation sites are currently in some phase of development and/or monitoring. Restoring proper hydrology is a key maintenance concern for many of the sites. Water control devices and wells are located on many of the properties, and the Clemson beaver dam leveler has been implemented to control impacts from beaver. Tree seedlings are protected from wildlife damage and from ragweed by planting within plastic tubes (see photo, right).

On some sites, hunting is being considered to control increased populations of feral hogs, which cause significant damage to tree plantings and new seedlings. Other mitigation sites are designed for waterfowl management areas where hunting is permissible as well.

ALDOT manages its wetland sites in perpetuity and in the manner required to meet the maximum acreage required by USACE permits issued to ALDOT. However, with an annual maintenance budget of only $30,000, ALDOT has sought additional partners to ensure the sustainability of its sites. The department has a memorandum of agreement with Montgomery County to use the 1,250-acre Catoma Creek wetland mitigation site as a county environmental park. Upon completion of ALDOT's mitigation activities, the site will be given to the county, who will own and manage the site in perpetuity. Similar agreements have been discussed with the Alabama Department of Conservation and Natural Resources, but none have been completed to date. The Crow Creek Site, for example, will be deeded to the Alabama Wildlife and Freshwater Fisheries Division once the waterfowl management area has been established.

Best Practices and Innovations

- Alabama DOT has used Federal-aid highway dollars to acquire mitigation sites.
- The mitigation sites' service areas are within nine river basins throughout the State. The large service area allows for a corresponding large mitigation area up to several hundred acres. Numerous future projects can be mitigated within each site.
- The extensive service areas justify the initial start-up expense of the large mitigation sites. Subsequent to establishing the sites, the overall cost of mitigation per acre of credit is less than project-by-project mitigation or purchase of credits in a private bank.
- The large banks provide more valuable habitat than the small project-by-project mitigation.
- Two of ALDOT's mitigation sites are also used as habitat conservation banks for endangered species.
- ALDOT-owned banks typically have a lower cost per credit than either project-by-project mitigation or purchasing credits in a private bank.
- For mitigation site selection, ALDOT recommends using agricultural lands to facilitate conversion to wetland areas. These sites are in a lower ecological succession stage, which makes invasive species control more manageable.
- While the first objective of any mitigation bank is to provide wetland mitigation credits, the public also is encouraged to make recreational use of the land. Recreational uses include hunting and bird watching. When the community shares ownership, the site's long-term sustainability is practically ensured.
- ALDOT is seeking to fund a USFWS position dedicated to transportation projects to expedite permitting and the Section 7 Endangered Species Act coordination process.

Continuing Challenges

- The MBRT has become more stringent in its requirements for site development and monitoring. This has been a result of the advent of private banks and the requirements imposed on those banks.
- Attempting to organize the MBRT to physically visit a proposed or existing site has been problematic.
- Long-term management of the wetland mitigation sites needs to be resolved. ALDOT is looking to county governments and environmental organizations to provide the long-term stewardship.
- The Federal guidance on stream mitigation is not definitive, according to ALDOT, and the DOT is unsure of how to proceed. Despite having existing streams running through several of ALDOT's mitigation sites, the resource agencies generally have not been receptive to allowing ALDOT to perform stream mitigation within the streams in their banking system. One exception exists. The Sipsey River mitigation bank was allowed to be used for a stream mitigation site in November 2001, and 53,767 stream mitigation credits were released.
- Prior to acquiring any property, it is important to get approval *in writing* from the MBRT, stating that it will accept the site as a mitigation site.
- When using contractors, DOTs should closely monitor all of their activities to make sure they complete the project correctly. Contractors may not be informed about proper mitigation techniques.

NEBRASKA

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Beaver and muskrat actually help support hydrology on this 11-acre roadside mitigation bank site in Nebraska, which was formerly an excavation site.

Program History and Philosophy

Although the Nebraska Department of Roads (NDOR) has been mitigating for unavoidable wetland impacts since 1990, the department's wetland mitigation banking initiative began in 1997, two years after the issuance of the *Federal Mitigation Banking Guidance*. NDOR saw banking as an opportunity to move beyond project-by-project mitigation in order to create higher quality wetland resources in a State that has lost more than one million acres of wetlands in the last 200 years (approximately 35 percent of the State's original wetland acreage) primarily due to agriculture. Nebraska has three wetland complexes recognized as being of international importance as migration and breeding habitat for waterfowl and non-game birds: the Rainwater Basin wetlands in south-central and southeastern Nebraska, the Big Bend reach of the Platte River directly north of the Rainwater Basin, and the Sandhills wetlands in north-central and northwestern Nebraska. (*9*)

Nebraska is a "land rights State" (i.e., State and Federal lands acquisition is restricted in favor of private property rights), and this also contributed to NDOR's decision to adopt banking as a preferred mitigation approach. Nebraska actively seeks to minimize Federal involvement in the NDOR program by not taking Federal funds for mitigation.

Moreover, NDOR uses eminent domain law to procure mitigation sites when necessary, but tries to avoid using it for mitigation bank sites if possible. In 1995 the Nebraska State Legislature passed a Highway Bridge Law that included a provision stating that NDOR could not acquire more than 150 percent of the lands needed to meet its six-year transportation plan, including lands for mitigation.

Given these factors, NDOR decided that wetland banking, conducted in cooperation with property owners who voluntarily sell private lands for mitigation needs, would be a more prudent approach. Accordingly, many of the mitigation sites comprising NDOR's bank program are created from either borrow pits or excavation sites from former road projects, or farmlands or prior converted croplands (PCCs). Some of the sites have been re-acquired through reversionary clauses included in title transfers between NDOR and the Nebraska Game and Parks Department. The Natural Resources Conservation Service (NRCS) has also assisted NDOR with locating sites, particularly on agricultural lands.

A mitigation bank review team (MBRT) was formed, and the first banking instrument was developed in June 1997; however, the language was considered ultimately too vague for proper execution of some of the planning tasks associated with establishing a bank site; therefore, in 1998 the USACE-Omaha District drafted supplemental guidance for the banking instrument. The supplemental guidance included clarification on the following key issues: buffer requirements, how to evaluate potential bank sites, guidelines for in-kind mitigation of forested wetlands, baseline information for bank site plans, and credit determination. Two noteworthy items came out of the supplemental guidance. Credit ratios were established for buffers prescribed by the MBRT (0.25 per successful acre established), although it was noted that determination of buffer credits may change upon the adoption of a functional assessment method. In addition, a cultural resource evaluation and coordination provision was added to the list of baseline information required in the site plan.

For nearly a decade, NDOR and the MBRT have successfully advanced the concept of wetland banking in the State, and the wetland resources developed through the program have become particularly well suited as habitat for waterfowl and migratory birds. Through the years, NDOR bank sites have increased in size from 10- and 20-acre creation sites to 640-acre restoration sites. NDOR has also been recognized for developing some simple but innovative mitigation techniques, such as using goats to remove cedars, cottonwoods, and other woody invasive species on creation and/or disturbed soil restoration sites (e.g., farmed wetland or prior converted wetland sites).

Currently, NDOR is undergoing a major shift in its wetland banking program related to geographic service area boundaries. The 1997/1998 banking instrument States that mitigation banks should be established within each physiographic region of the State, generally the major land resource areas (MLRAs), of which there are 13 in Nebraska. Several bank GSAs are limited to a portion of an MRLA, although NDOR has been able to debit these banks for project impacts occurring outside of the designated GSA at increased ratios. The USACE-Omaha District, following proposed national guidance forwarding a watershed-based approach to assessing impacts and implementing mitigation, is implementing a shift from MLRAs to banks based on hydrologic unit areas, with the base area being a HUC-8 boundary. NDOR believes that such a shift will limit its mitigation options and is satisfied with the current arrangement with the MLRAs.

From NDOR's perspective, adopting a HUC-8 approach for its banking program is neither a practical nor cost-effective solution, particularly when only one road project or only a portion of a project may fall within many of those areas. Likewise, many of NDOR's projects cross several HUC-8 watershed boundaries. NDOR expects that strictly limiting bank GSAs to HUC-8 watersheds would return its compensatory wetland mitigation program to on-site mitigation and the abandonment of banking as a mitigation approach.

While both NDOR and the USACE-Omaha District agree that a watershed approach is beneficial, how to transition to that approach remains an issue of concern. Some of the key questions include the following:

- Is HUC-8 the most reasonable watershed approach for Nebraska?
- Is there ecological justification for using a larger service area in all or some parts of the State?
- How would shifting to HUC-8 affect the size and quality of the bank sites?
- What kind of functional assessment method would need to be adopted?
- Would the costs associated with shifting to HUC-8 necessitate a return to on-site mitigation of wetland impacts for NDOR road projects?

- What would be the timetable established for a transition phase, and what kind of interim guidance should be developed to facilitate a transition?

Other States are already using HUC-8, HUC-11, or HUC-14 service areas. The extent of integration in drainage patterns is a significant factor in determining services areas, as well as population and road density. Nebraska's discussions are just beginning, and the future of banking for NDOR will depend upon the extent to which the MBRT can facilitate a flexible transition phase and harmonize the new guidance with the USACE's current guidance. In a recent discussion with the USACE and MBRT, NDOR noted that the door has been opened to considering larger GSAs than the HUC-8, especially in light of the State's very low road and population densities. A larger GSA, however, would have to be justified on a case-by-case basis and would still need to involve some element tying it to a watershed approach. The MBRT points out that this would be an exception for all linear transportation related banks, not just for NDOR.

Site Descriptions and Operations

To date, NDOR has developed 18 individual bank sites on a total of 563 developed wetland acres. Many of these sites are considered "creation" sites, which is unique to Nebraska whose original wetlands have been degraded or destroyed to such an extent over the last 200 years that very few opportunities exist for true preservation or restoration. As a result, the mitigation sites are usually situated on borrow pits, farmlands, or prior converted croplands.

On average, NDOR projects have impacted approximately 32 acres of wetlands per year between 1997 and 2004. Federal transportation enhancement funds were used for the initial establishment of some of the early wetland banks and then repaid when credits were taken out of the banks. No Federal dollars are used currently for establishing NDOR banks. The mitigation is funded out of individual construction projects. While a handful of private banks exist in Nebraska, NDOR has not purchased credits from any of them, and the credits generated by NDOR's bank sites are used exclusively by NDOR.

Photo courtesy of Patricia Bacak-Clements, USFWS

Rock Creek mitigation bank was formerly row crops. The freshwater and saline wetland restoration site is helping to provide habitat for the Salt Creek tiger beetle, which is listed as endangered at the State level.

The scan tour included field visits of the following mitigation sites:

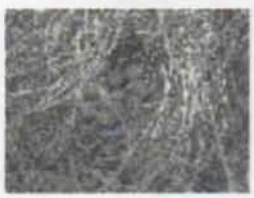
- **Waverly Interchange Wetland Bank** (14.64 acres; 7.81 acres certified)
  Located in the 106 Nebraska and Kansas Loess Drift Hills physiographic region, this wetland was created by excavation and seeded with wetland species. The site is dominated by vegetation that is FACL and OBL. Typical wetland fauna are using the site for feeding, loafing, and reproduction. Soils show low chroma, gleying, and oxidized rhizospheres.
- **Ceresco South Wetland Bank** (11.21 acres; 9.7 acres certified)
  Located in the 106 Nebraska and Kansas Loess Drift Hills physiographic region, this wetland was created by excavation, and the site was in row crops before construction. The site includes a well-established upland buffer. Typical wetland fauna are using the site for feeding, loafing, and reproduction. Soils show low chroma, gleying, and oxidized rhizospheres.
- **Rock Creek Wetland Bank** (96.74 acres; monitoring underway)
  This bank site is a restoration of freshwater and saline wetlands. The bank serves the Eastern Saline Wetlands physiographic region, and freshwater areas of the site will serve the 106 Nebraska and Kansas Loess Drift Hills physiographic region. Most of the site was in row crops. Restoration was achieved by plugging two large erosional headcuts that were draining the wetlands. The site was seeded with a highly diverse mixture for uplands and wetlands. Hydrophytic saline vegetation dominates some of the wetland areas, while others are dominated by freshwater wetland vegetation. The upland areas are still developing desired vegetation. Typical wetland fauna are

present, and hydric soils for the site include Colo silty clay loam, Kennebec silt loam, and Salmo silty clay loam.

- **West Point Wetland Bank** (120.01 acres; monitoring underway; full certification expected in spring 2006) Located in the 102B Loess Uplands and Till Plains Physiographic Region, this wetland was restored by plugging existing surface drainage ditches. The wetland is dominated by FACW and OBL vegetation. Flora and fauna are consistent with that of other wet meadows. Hydric soils include Lamo silty clay loam.

Geographic Service Areas. Since 1997 the service area boundaries for NDOR's bank program have been defined by physiographic regions, or major land resource areas (MLRAs), of which there are 13 in the State. The USACE-Omaha District Office is currently recommending a shift to a watershed approach at the HUC-8 (i.e., stream) level, of which there are 80 in the State. This presents significant financial, administrative, operational, and long-term management concerns for NDOR, which are currently being evaluated by the MBRT in coordination with NDOR and the USACE-Omaha District. No further bank sites are being pursued by NDOR until the new guidance is developed.

Functional Assessment Methodology. Currently, NDOR does not employ a standard functional assessment methodology, but rather uses the Cowardin wetland classification system with acres as the currency. Site plans for each mitigation bank site list ratios for created, restored, enhanced, and preserved wetland acres. Credit certification must meet the criteria found in the USACE's *1987 Wetland Delineation Manual*. Current ratios are 1.5:1 for restoration, 4:1 for enhancement, 2:1 for creation (establishment), 10:1 for preservation, and 4:1 for buffer. *Note: these are the new credit ratios established in recent Omaha district guidance (11)*. Credits for buffers apply only for buffers prescribed by the MBRT, and they must be 50-feet wide and continuous. Credits can be released after three years of monitoring if the success criteria are demonstrated (seven years for forested wetland systems). Invasive species cannot make up more than 10 percent in the third growing season after construction is complete. NDOR is currently receiving training in functional assessment methods and has invited the USACE-Omaha District and other agencies to participate. It is believed that if a HUC-8 service area boundary is adopted, then a functional assessment methodology will need to be employed for accurate assessment of wetland functions and credit determinations.



Documenting species occurrences offers a better gauge of wetland success, according to NDOR biologists who use the Releve field evaluation method as part of their site monitoring plan.

Monitoring Protocols. NDOR's 18 bank sites are maintained by two experienced in-house biologists. Due to limited staff resources, the biologists have implemented a rapid assessment field evaluation method, called the Releve Method, as part of the monitoring plan. The Releve Method, a transect-free method, allows for documenting species composition within a sample community of each wetland type (e.g., PEMA, PEMC, etc.) located in a wetland bank. The evaluator walks the sample site and lists all species encountered; assigns a value to the percent cover of the species identified; notes water depth, aquatic and terrestrial wildlife within the sample; and takes photos. It is believed that documenting species occurrences offers a better gauge of wetland success. Monitoring reports are provided annually to the MBRT.

NDOR currently tracks two specific performance measures: (1) measurement of wetland acres filled versus wetland acres replaced, restored, created, or preserved; and (2) measurement of acres of wetland habitat developed above and beyond the past and present project replacement needs (a measure of temporal *gain*).

Accounting Procedures. NDOR applies to the USACE for certification of available credits from each bank site. The agreed upon credits are then entered into the banking ledger maintained for each site. The ledger reflects the impact site by NDOR project name and USACE permit number; the impacted acreage and certified credits, categorized by the Cowardin classification (or other descriptors as specified by the site plan); and the compensation ratio applied for each withdrawal. Credit withdrawals must be approved by the USACE-Omaha District prior to their utilization by NDOR. NDOR also records all debits in the ledger. An annual copy of the ledger is provided to the MBRT chair each year a bank is in operation.

Maintenance and Management. In general, NDOR's bank sites have maintained sufficient hydrology in spite of drought conditions in the past growing season. Due to the drought, NDOR's two rainwater basin wetland sites are very dry; this could also be said for many of the natural rainwater basin sites.
The Missouri River bank site (Lincoln Bend, designed as a backwater flooding site) is also struggling due to reduced river flows resulting from the drought.

Finding qualified seed contractors has been a persistent problem for NDOR, and in some cases the biologists have had to remove and replant poor seed stock provided by contractors. Mowing, prescribed burns, and periodic use of goats are some of the techniques utilized to manage vegetation growth. Managing vegetation growth is becoming a more critical management problem, in fact, as drought conditions persist.

Overall, NDOR has observed clear differences between its restoration and creation sites. Restored wetlands have a more rapid and diverse vegetative response, and often a greater variety of wetland types. Created wetlands represent more of a management problem for the control of woody invasive species; whereas, restorations typically do not. The soil profile and seed bank are present at restoration sites; whereas, created sites typically entail massive soil moving and disturbance, resulting in sterile subsoil. Unless organic matter with topsoil is introduced, success is difficult. For example, NDOR has achieved much success with stockpiling the hydric soils from the impact sites, mixing these soils with topsoil, and re-spreading the mixture onto the creation site. Small created sites along projects may fulfill acreage replacement requirements, but more quickly change to woody vegetation, Typha, or Phalaris-dominated sites than do restored sites.

NDOR is currently in a dialogue with the NE Game and Parks Department about options for the long-term management and protection of NDOR's wetland bank sites. A compromising factor is the size of NDOR's bank sites. Game and Parks is not interested in assuming long-term management and financial responsibility for a network of 10-acre sites scattered along the edges of roadsides. They would, however, be interested in larger acreage sites that might hold more value especially with regard to public use and recreation. Finding ways to protect a vast network of small wetland bank sites for the long term will continue to be a key point of discussion.

Best Practices and Innovations

- NDOR seeks to partner with private property owners to either voluntarily sell their land or establish conservation easements for NDOR's mitigation needs. Nebraska is a lands rights State, and NDOR is restricted to the amount of land it can legally acquire. Public/private partnerships can ensure that the sufficient and necessary amount of land is obtained for mitigation purposes.
- Credit is given by the MBRT for upland buffers at 0.25 credit per acre of successful buffer established.
- NDOR has determined that restoration sites result in quicker and more diverse vegetation community development than creation sites.

Continuing Challenges

- The MBRT does not meet often enough to facilitate effective communication and timely decisionmaking about bank site proposals and issues of concern.
- The USACE-Omaha District proposal to limit service areas to HUC-8 or HUC-6 is perceived by NDOR as potentially jeopardizing the success of its wetland banks and their usefulness.
- The mitigation sites are constructed from State construction funds. Federal funds are not used to establish new sites within the banking system. No new sites are under development as discussions are ongoing with the USACE regarding GSAs.

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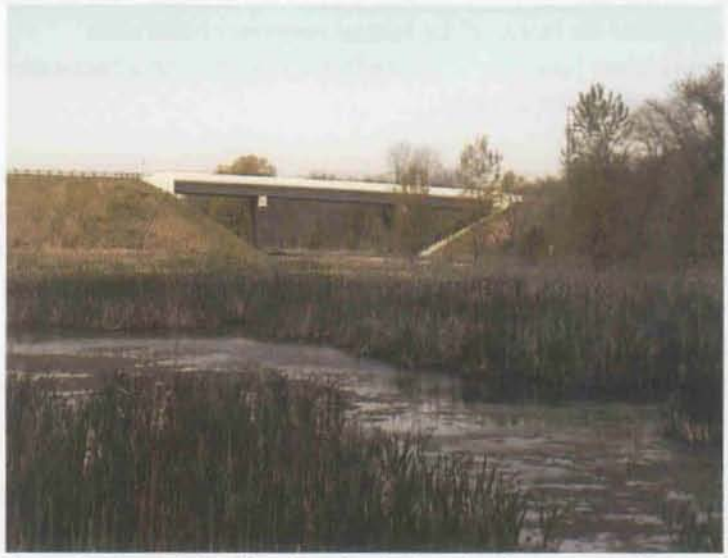

Coon Path, pooled mitigation site designed and constructed by Ohio DOT, transformed over 26 acres of previous farmlands into wetland habitat and preserved approximately 19 acres of forested upland buffer. (3)

Program History and Philosophy

Of the States participating in the scan tour, Ohio is one with three others (Texas, Pennsylvania and Kentucky) that has four USACE district offices with jurisdiction in the State. The lengthy process for establishing an MBRT and the arduous process of getting sites approved as mitigation bank sites are partly responsible for the Ohio Department of Transportation's (ODOT) preference for consolidated or pooled mitigation as opposed to *banking*. Consolidated mitigation is the construction of wetland mitigation areas in excess of permit requirements. The excess wetland area can then be used to offset impacts for other transportation projects. The use of the excess area as mitigation must still be approved by the USACE and local regulatory authorities, but an MBRT is not used.

The term *banking* has a specific meaning in the State of Ohio. It is considered primarily a commercial enterprise designed to sell credits for a profit. The banking industry in Ohio is linked closely to the homebuilders industry, and private banking credits generally sell for $25,000 to $35,000. Although ODOT has and will continue to purchase credits from privately owned wetland mitigation banks, the Department has found that it is more expedient to develop wetland mitigation outside the private banks. Furthermore, according to Ohio DOT, no new private banks are emerging in Ohio due to poor profit margins, rigorous criteria, and a cumbersome MBRT process.

Ohio DOT's first wetland mitigation site was constructed in June 1990 as compensatory mitigation for the U.S. Route 35 four-lane new location highway in Gallia County. At that time, Ohio DOT did not have a legal mechanism to utilize transportation funds to purchase property for the purpose of wetland mitigation and had to secure legislative authority to do so. Since then Ohio DOT has held legislative authority to utilize eminent domain for the acquisition of lands required for wetland mitigation (this does not apply to stream mitigation), although this legal authority has not been tested in court.

Moreover, financing the purchase of mitigation bank sites remains an ongoing problem for Ohio DOT, whose real eState and finance offices have a difficult time justifying the purchase of land for "credits only." While ODOT has and continues to use a debit/credit system for wetland mitigation, a debit/credit system that goes on for years prior to transportation project impacts is not well received by the accounting office. Thus, a full-scale banking program has been impractical to pursue for Ohio DOT. To date, ODOT has only one site that is being called a mitigation bank for wetlands (the permit is pending with the USACE-Louisville District Office).

For more than a decade ODOT has been most successful at using *consolidated sites* (i.e., several projects are mitigated at the same location) and/or *pooled* sites (mitigation site is developed beyond the needs of a single project and extra credits are held for future use).

Under this scenario, a compensatory wetland mitigation site proposal and implementation plan is included in the permit application package for a roadway project, and upon approval of the permit application (which can take 8 to 12 months), or through a separate mitigation agreement, the mitigation site is constructed simultaneously with the project construction. A combination of Federal and State dollars are used to finance the mitigation, which is usually considered a contract line item within a roadway construction project budget.

Ohio DOT has acquired some of its mitigation sites through fee-simple real eState as part of highway rights of way. However, the department prefers to implement compensatory wetland mitigation on sites already owned and operated by other entities such as Ohio DNR, local government agencies, and non-profit organizations. The department is experienced with using conservation easements or deed restrictions to secure such mitigation sites. Ohio DOT has not used in lieu fee mitigation as an alternative to banking. Overall, ODOT estimates that 60 percent of its wetland mitigation projects are developed as pooled mitigation and 40 percent as third-party banks. The third-party banks utilized by ODOT have been both entrepreneurial and public banks, of which the entrepreneurial banks have proven more successful because they are more numerous than public banks and located in more watersheds and available for use.

One of the greatest concerns presently for ODOT is the time lag between submitting a wetland mitigation plan (in the permit package) to the USACE and getting the plan approved and "on the ground." As Stated earlier, it can take up to one year for a permit approval, and with four USACE district offices in the State, and 600 road projects per year, this can create a logistical quagmire. Ohio DOT has negotiated an agreement with the USACE-Huntington District that would allow the department to fund five new USACE positions in Columbus devoted exclusively to ODOT projects. The agreement is not intended to formalize performance measures per se, but rather to streamline the USACE's input on transportation projects, particularly at the permitting stage.

Ohio DOT has successfully implemented many other streamlining measures. It funds the State Historic Preservation Officer (SHPO), Ohio EPA, and USFWS positions, and is currently working on a programmatic agreement with USFWS for the Indiana bat, an endangered species that affects 99 percent of ODOT projects. Although ODOT has attempted a NEPA-404 merger, it has not been successful due to interagency differences regarding the designation of agency leads for concurrence points.

As Federal guidelines establish more firmly a watershed-based approach to wetland mitigation, ODOT perceives that the new USACE positions will become an even more valuable streamlining asset to the Department. Ohio DOT's wetland mitigation sites have HUC-8 service boundaries; however, ODOT does not currently integrate its mitigation plans with local watershed plans. The Department communicates with local watershed groups, but there is no coordinated or comprehensive approach. The new USACE positions can play an integral role in helping ODOT examine viable approaches for integrating its mitigation activities with watershed plans as they develop in the State.

Ohio EPA also has a significant role to play in this regard. In what is perhaps unique to the State of Ohio, Ohio EPA is investigating biological water quality standards (i.e., biocriteria) for wetlands and streams in an effort to establish biological criteria (not just chemical components) for overall ecosystem health. While this initiative is still in progress, its end result will expand the scientific knowledge related to wetland and stream mitigation on a watershed basis.

Like Alabama DOT, Ohio DOT has encountered difficulty in addressing stream mitigation. Ohio DOT is already doing stream mitigation and has determined that the most cost-effective and ecologically sound approach is preservation. While preservation is usually the last option considered for wetland mitigation, ODOT believes that it makes the most sense for stream mitigation because one cannot "create" a stream; one can only preserve or enhance it. Ohio DOT has found that it costs on average $3-10 per linear foot to preserve a stream, compared to $300 per linear foot to restore a stream. The regulatory agencies, however, have not expressed support for stream preservation in lieu of in-stream work. Ohio DOT is eager to see the Federal guidelines for implementing the Department of Defense's new stream mitigation rule required by Congress, and especially any sound science that is available to engineer the construction or restoration of streams.

In the meantime, Ohio DOT continues to build upon its successful consolidated and pooled wetland mitigation initiative. Although it is essentially "project-by-project," or rather multi-project, mitigation, it has proven to be a cost-effective and ecologically sound approach for a department that manages 600 road projects that impact less than 12 acres of wetlands annually. One additional factor that contributes favorably to ODOT's program is that the department's Office of Environmental Services (OES) has centralized oversight authority over wetland mitigation, including design, construction, and post-construction monitoring. OES employs a landscape architect and biologists with wetland experience to oversee all of the department's mitigation projects. With only one minor exception, no ODOT transportation project has been delayed to date due to insufficient mitigation.

Ohio DOT ecological field studies team leader John Baird (center) oversees the design, construction, and post-construction monitoring of the department's 28 wetland mitigation sites.

Site Descriptions and Operations

Canadian geese at Bluebird mitigation area.

Ohio's wetlands cover less than two percent of the State. Swamps, wet prairies, coastal and embayment marshes, peat lands, and wetlands along stream margins and backwaters are the most common Ohio wetlands. Wetland area in Ohio has declined by 90 percent during the last 200 years, from about 5,000,000 acres to about 483,000 acres. Drainage of wetlands for agriculture has been the primary cause of wetland loss, but recreational use, fluctuating water levels, urban development, mining, logging, and fire also have contributed. Ohio designates all remaining wetlands as State resource waters. As such, wetland water quality is protected from degradation that may interfere with designated uses. (*9*)

This history offers another justification for Ohio DOT's preference to build its mitigation sites on properties already owned by other parties. Large, contiguous tracts of quality wetland acreage are difficult to find, and in cases where ODOT must purchase land, build a site, monitor the site, and manage it in perpetuity, the department estimates that mitigation can cost up to $100,000 per acre. For construction costs alone (not including DOT personnel costs), ODOT estimates that it spends $40,000 for mitigation per wetland acre. This figure can range between $12,000 and $100,000 for commercially available mitigation.

Currently, Ohio DOT has established 28 wetland mitigation sites (of which only one is considered a "bank") on more than 268 acres, although acreage for three of the new mitigation sites has not yet been calculated.

The sites observed on the scan tour include the following:

- **Bluebird Wetland Mitigation Area** (7.6 wetland acres constructed; 7.6 acres used)
  Located within ODOT District 6 in Delaware County, this site was constructed in 2000 on property owned and managed as a park (Hoover Nature Preserve) by the City of Columbus to mitigate for a portion of the wetland impacts associated with the FRA-161 New Albany Bypass Project. Originally a bluebird preserve, the site now contains three emergent wetland cells that were constructed in previously *upland old fields* (i.e., abandoned pasturelands or retired croplands elevated above bottomlands in a stage of plant growth between bare ground and forest) to closely integrate with, and enhance, the existing wetlands and pond located on the property.
- **New Albany Wetland Conservation Area** (13.68 wetland acres constructed; 13.68 acres used)
  Located within ODOT District 6 in Franklin County, this site was constructed in 1996 to provide a combination of open water, emergent, and forested pool wetland habitats interspersed with upland buffer areas and existing forested wetlands to compensate for wetland impacts again associated with the FRA-161 New Albany Bypass Project. Vernal pools on site have become breeding areas for smallmouth salamanders and other amphibians, while the emergent and open water areas have become increasingly important

At the request of the community, bluebird boxes were preserved on portions of the Bluebird wetland mitigation site. The site is located on the Hoover Nature Preserve, owned and managed by the City of Columbus.

habitat for flora and fauna diversity in a landscape that is quickly becoming urbanized.

- **Coon Path Wetland Mitigation Area** (26.65 acres; 21.65 acres used to date)
  Located within ODOT District 5 in Fairfield County, this site was constructed in 2002 as a pooled mitigation site to compensate for unavoidable impacts resulting from the Lancaster Bypass and Hill Diley Interchange projects. The site transformed over 26 acres of previous farmlands into wetland habitats and preserved approximately 19 acres of forested upland buffer. The site has been planted with over 32,500 container grown plants, 500 bare root stems, and 200 gallon-container size trees to develop a diverse community of aquatic bed, non-persistent emergent, emergent, and forested vegetation. The berms surrounding the four constructed wetland cells were drill seeded with a wildlife prairie seed mix to enhance the diversity of the vegetation and stabilize the berm soils. To date, 21.65 acres have been used, and ODOT plans to use the additional 5 acres to mitigate for future unavoidable impacts within the watershed.

Geographic Service Areas. All Ohio DOT pooled and consolidated mitigation sites have service areas negotiated with the USACE and EPA through the 404/401 permitting process. The service area of the Department's one mitigation bank will follow the eight-digit watershed hydrologic unit category (HUC-8) for Ohio. For on-site mitigation, sites must be located within one mile of the project or within the HUC-11 or HUC-14 watershed boundaries where the project occurs.

Functional Assessment Methodology. In Ohio mitigation ratios are tied to the quality of wetlands per category; whereas, other States tie the criteria to creation, restoration, enhancement, and preservation. Ohio EPA has established the general criteria for wetland mitigation standards to achieve no net loss in the State. Wetland types are defined as categories (1, 2, 3) with well-defined quality indicators. Category 1 wetlands are the lowest quality wetlands and require the lowest compensatory mitigation ratio. Category 3 wetlands are the highest quality and require higher mitigation ratios. Category 1 wetlands have mitigation ratios of 1.5:1 for non-forested and forested wetlands for both on-site and off-site mitigation projects. Category 2 wetlands have mitigation ratios of 1.5:1 for non-forested wetlands and 2:1 forested for on-site mitigation projects, and 2:1 non-forested and 2.5:1 forested for off-site mitigation. Category 3 wetlands have 2:1 non-forested and 2.5:1 forested for on-site mitigation, and 2.5:1 non-forested and 3:1 forested for off-site mitigation.

The specification, protection, and management of non-wetland buffers have played a minor role in Ohio DOT's program. Buffers are now required on all wetland mitigation projects. Wetland buffers increase the size of the site and, therefore, the cost to purchase the land as well as the costs associated with long-term management. Ohio DOT has received up to 0.25 acres of wetland mitigation credits for each acre of buffer on some mitigation sites. Buffer credits are determined on a case-by-case basis.

Like Alabama DOT, Ohio DOT receives credits for protecting endangered species on its wetland/stream mitigation sites, although States tend not to employ this measure as it may be considered "double counting."

Monitoring Protocols. Ohio DOT has developed a standardized monitoring protocol that includes two site visits per year for five years. Within the last two years, Ohio EPA has developed a new labor-intensive vegetative index of biotic integrity monitoring protocol for wetland mitigation sites. Ohio EPA has been making its use mandatory through the permitting process as a condition of the 401 certification. (When Ohio EPA completes its new biological criteria for water quality standards, it is anticipated that a similar monitoring protocol will be developed for measuring hydrologic conditions.) The new vegetative index specifies that mitigation sites will have no more than five percent cover of invasive plants species by the end of the monitoring period, although ODOT believes that a 20-percent cover may be a more practical standard. The discussions are ongoing regarding this point. Annual monitoring reports are provided to Ohio EPA and the USACE. The reports provide information on the development of plant composition and cover, habitat development, hydrologic conditions, and wildlife use, and include photographic documentation of the sites. Discussions regarding the progress of the wetland's functionality as well as problems or corrective measures taken are also noted.

Accounting Procedures. Mitigation debits are defined through the 404/401 permitting process. Mitigation credits (acres) are tracked and tabulated for each mitigation site. When credits are utilized a mitigation balance sheet is submitted to the USACE and Ohio EPA.

Maintenance and Management. During the operational life of Ohio DOT's wetland mitigation sites, the Department finances all maintenance needs and corrective measures taken, and in some cases ODOT has provided maintenance fees for a site's long-term management. Ensuring that a mitigation site is first established with the best quality soil is a priority, and this involves utilizing sound techniques for establishing proper hydrology and successful seed plantings for specific soil types. Detecting and removing clay tiles previously installed for drainage of agricultural fields is a common site construction issue. Ohio DOT has also had success with using the Agri-Drain™ water control structures to manage hydrology on some of its sites.

For mitigation sites that will eventually be turned over to the original property owners to manage in perpetuity, Ohio DOT invests much time and effort in educating the future property managers on monitoring protocols. For example, at the Bluebird mitigation site, staff from the City of Columbus parks Department routinely work side by side with ODOT biologists during field inspections, becoming well familiar with site features that need to be fostered, as well as those, such as plant invasives that need to be carefully watched for and eradicated.

One of the most outstanding examples of Ohio DOT's community involvement is found in the New Albany Wetland Conservation Area. The site has become an important educational and recreational resource for the nearby New Albany High School and Middle School and the general public. During the site's monitoring phase, ODOT invited teachers and students from the schools' environmental sciences program to assist biologists with field inspections. To date, 3,000 students have used the site for educational purposes, and 180 students continue to use the site annually. Ohio DOT is currently in the process of transferring the deed to the school district, which has already won several national education awards recognizing the scientific and community partnership values associated with the wetland mitigation site. In addition, the school district successfully obtained transportation enhancement dollars to protect a threatened section of the upstream watershed for the mitigation site, securing 22,000 linear feet of greenbelt and saving more than four acres from housing development.

Students from New Albany Middle School show species obtained during a recent field inspection of the New Albany Wetland Conservation Area.

Students of New Albany Schools will become the "owners and perpetual managers" of Ohio DOT's New Albany wetland mitigation site.

One approach to long-term management that Ohio DOT has not yet adopted involves turning over mitigation sites via deed transfers to land trusts. In the State of Ohio, few land trusts have demonstrated an established track record of land management. As a result, Ohio DOT does not have confidence that the sites turned over to the land trusts can be guaranteed protection in perpetuity. If a land trust fails and goes bankrupt, then the sustainability of the mitigation sites entrusted to them may fail as well. However, partnering with land trusts may become an important management strategy for future mitigation sites, and there is currently an initiative underway in the State to bring small land trusts together as a consortium to ensure the trusts' long-term viability.

Best Practices and Innovations

- ODOT is funding five USACE employees in a new office in Columbus. The USACE employees will be dedicated to ODOT projects Statewide regardless of where the projects occur in Ohio's four USACE district offices.
- While ODOT has been discouraged from establishing mitigation banks due to bureaucratic procedural difficulties, the consolidated mitigation sites represent a means of achieving multi-project mitigation and represent a cost savings compared with project-by-project mitigation.

- Ohio DOT's upper management is committed to providing the funding and expertise to develop effective quality wetland mitigation projects.
- The Ohio DOT Office of Environmental Services (OES) employs both a landscape architect and biologists trained in wetland construction. This in-house team reviews all of Ohio DOT's wetland mitigation designs and monitors the projects during and after construction.
- ODOT seeks opportunities to build quality mitigation sites on lands already owned and managed into perpetuity by other agencies and organizations. The land purchase costs saved can be significant, and if necessary, redirected to researching and employing more innovative mitigation techniques to advance the science.
- Effective education, communication, and coordination are undertaken at all phases of a wetland mitigation project. Throughout wetland mitigation projects, OES staff educate engineers and construction personnel on the nuances of quality wetland development. This goes as far as affording OES staff the ability to make changes during construction to improve wetland performance.
- ODOT has turned over the land and monitoring requirements of one of its mitigation areas to a local school district. The monitoring reports are generated by middle school and high school students and submitted to the resource agencies.

Continuing Challenges

- The ODOT accounting office is reluctant to provide funds for a wetland banking system that will provide mitigation for future impacts that may be years away.
- No new banks are emerging in Ohio due to the rigorous performance and monitoring criteria and a cumbersome MBRT process. This applies to both public and private banks. Poor profit margins also inhibit the development of new private banks.
- Even with consolidated mitigation sites, permit applications are taking about 12 months on average to process.
- ODOT mitigation sites are restricted to HUC-8 service areas. This may also partly explain the reluctance to develop mitigation banks.
- As in other States, stream mitigation has proved problematic. ODOT is eager to see Federal guidance implementing stream mitigation. ODOT believes that stream preservation is the best measure since engineering stream restoration is difficult. Furthermore, ODOT estimates it costs approximately $3-$10 per linear foot to preserve a stream compared with $300 per linear foot for stream restoration.
- Although DOT mitigation banks have proved quite successful in a number of States, the low annual impact of wetlands by ODOT Statewide would not justify the expenditure for mitigation banking as required by the HUC-8 service area guidelines.
- Mitigation sites are constructed as a result of project impacts. The ecological success of the project-by-project mitigations is more uncertain than for functioning banks.
- The resource agencies have not been receptive to stream preservation as mitigation. ODOT believes this is the only truly effective stream mitigation to date, as stream restoration is perceived as difficult and costly.
- ODOT would like to see definitive Federal guidance on stream mitigation.

PENNSYLVANIA

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Old Crow wetland mitigation bank site was purchased for $1 from the county correctional facility and serves PennDOT projects in the Juniata sub-basin. This site was designed, constructed, and continues to be maintained by PennDOT District 9-0 maintenance forces under the 1995 memorandum of agreement.

Program History and Philosophy

Pennsylvania is strikingly similar to Ohio in two regards. Pennsylvania has four USACE district offices with jurisdiction in the State, and the term *banking* has a very distinct, albeit negative, connotation. In addition, Pennsylvania Department of Environmental Protection (PADEP) regulations allow for "deminimis" impacts, allow for participation in an in-lieu of mitigation fee program, and are stringent in regard to a hierarchical system for locating mitigation with a preference for on-site, in-kind wetland replacement. These factors have significantly influenced the evolution of the compensatory wetland mitigation program at the Pennsylvania Department of Transportation (PennDOT).

Wetland mitigation was first initiated by PennDOT in the 1980s in response to regulatory requirements. PennDOT's District 9-0 Office, one of the earliest champions of advance wetland mitigation in the State, saw an opportunity in the early 1990s to cooperate with the permitting agencies (i.e., PADEP and the USACE) under a Memorandum of Agreement to develop a compensatory mitigation program for unavoidable wetland impacts caused by transportation projects. The program, launched officially in 1995, was named the *"Interagency Agreement, PennDOT Advance Wetland Compensation Program, PennDOT District 9-0"* and served the PennDOT District 9-0 Office exclusively. PennDOT Engineering Districts 2-0, 3-0, and 12-0 followed suit with similar agreements with the permitting agencies from 1995–2001. The program was intended to resolve requests from regulatory agencies for significant replacement ratios due to anticipated "lag" time in replacing wetland habitats.

During the period of 1997–2002, a Statewide wetland banking instrument, with oversight provided by an MBRT, also referred to as the *Memorandum of Agreement between PennDOT, FHWA, PADEP, USACE (all Districts), USFWS, EPA Region III, the Pennsylvania Game Commission, the Pennsylvania Fish and Boat Commission, and the U.S. Department of Agriculture, Natural Resource Conservation Service, for the purpose of Establishing a Statewide Umbrella Wetland Banking Instrument*, was in development. This agreement utilizes the expression "wetland banking" as opposed to "advanced wetland compensation" and provides procedures consistent with the *Federal Guidance for the Establishment, Use and Operation of Mitigation Banks*.

The advanced wetland compensation agreements established prior to June 2002 have been grandfathered and are still utilized in Districts 9-0, 2-0, 3-0, and 12-0; however, the remaining engineering districts use the Statewide wetland banking agreement.

References to the term *banking* were deliberately avoided in the initial program because several groups in the State, including Metropolitan Planning Organizations, local transportation agencies, one USACE district office, and a handful of PennDOT district offices, were philosophically opposed to the concept of wetland banking. To some extent, this remains true today.

In PennDOT's estimation, opposition to wetland banking in the State, has emerged generally from two schools of thought: one is ecological based, the premise being that after avoidance and minimization, on-site mitigation must be considered first before any consideration of off-site mitigation. An effort to promote or validate banking might be construed, according to some in the regulatory community, as a "free ticket" to bypass on-site mitigation and thereby degrade the existing ecological functions of a given project site. The second school of thought held by some transportation agency officials is that banking poses a perceived financial obstacle to road design and construction budgets due to the need to program wetland banks as projects on the Transportation Improvement Plan (TIP). In fact, efforts to program wetland banking projects on the TIP have mostly failed because Metropolitan Planning Organizations (MPOs) and local transportation/planning officials typically remove them in favor of design and construction needs, which are already under funded. In reality, District 9-0's experience has shown that individual projects could be expedited and would require less budget if wetland banks were established; however, political obstacles have prevented their development. Of all the challenges associated with wetland banking, funding is the most critical roadblock to PennDOT's program. Project-specific wetland mitigation as opposed to wetland banking dominates in PennDOT's overall program.

The PennDOT Engineering District's specific approaches to wetland banking or advanced wetland compensation vary widely. Most of the sites were developed utilizing a pooled approach similar to that used by Ohio DOT, whereby some of the wetland acreage developed mitigates for the project, but additional acres or credits are achieved for future projects. Sites developed in this manner use project-specific Federal funds. Some districts have pursued an in-house design and construction approach with the assistance of partnerships and 100 percent State funds. Some have modified this approach using either consultant design or contracted construction. Yet another district has been successful in programming a wetland bank as a separate project and is utilizing Federal funds for the design phase but not for construction. Finally, one district pursued purchasing credits from a third-party mitigation bank.

A State assessment of wetland replacement programs in Pennsylvania concluded that "wetland mitigation can be a viable method to compensate for permitted wetland impacts, and PennDOT should be encouraged to expand this program throughout all of the engineering districts."

The cost per acre varies as widely as the approaches that have been utilized. Those sites developed in house with 100 percent State funds are the most economical, averaging just over $4,000 per acre. Pooled projects that use consultant and/or contractor services average $40,000 per acre. The third-party wetland bank project averaged $92,456 per acre.

PennDOT remains engaged in communication with various constituencies in hopes of ultimately establishing a common consensus of how to better integrate wetland banking with transportation programs, particularly at the planning level. A recent State assessment of wetland replacement programs in Pennsylvania concluded that "wetland mitigation can be a viable method to compensate for permitted wetland impacts, and PennDOT should be encouraged to expand this program throughout all of the engineering districts" (*12*). This report came less than two years after PennDOT completed the development and execution of the Statewide umbrella wetland banking instrument. The earlier District-specific advance wetland compensation agreements have resulted in the development of nearly a dozen completed mitigation projects, half of these located in District 9-0, which are demonstrating both a financial and ecological case for the value of banking in

the State. One wetland bank site has been established under the Statewide wetland banking instrument, and a half dozen additional sites are in design or construction. One extensive PennDOT wetland bank site was developed under a separate agreement associated with a single major transportation project. In total, 229 acres of wetlands have been developed or are in development under the various agreements mentioned. Of this total, approximately 55 acres have been debited as mitigation for impacts.

PennDOT's District 9-0 Office documented the costs associated with the design, construction, and maintenance of six off-site wetland mitigation projects that were successfully completed as compensatory mitigation for wetland impacts caused by 18 transportation projects in the district (although 38 projects are currently eligible to receive credits from these mitigation sites). PennDOT District 9-0 constructed a total of 74.66 acres of wetlands on these mitigation sites at a total cost of $267,000 (or ~$3,000/acre). The mitigation projects were designed and implemented by District 9-0 environmental staff and maintenance forces, with input and approvals from the permitting agencies (i.e., PADEP and USACE).

By comparing the mitigation costs for these sites with those of comparable on-site mitigation projects in District 9-0, PennDOT calculated an average savings of more than $1.5 million. The majority of cost savings came from not having to contract out the design, construction, and monitoring activities associated with these sites, which are generally included as contractor line items for on-site mitigation activities embedded within road construction projects.

Several additional benefits were gained by using in-house expertise to develop advance wetland mitigation projects. PennDOT has been able to educate its construction and maintenance forces about the value of wetland ecosystems and the importance of protecting these resources. The sites have additionally provided the public with outdoor recreational activities and have been used to educate hundreds of high school students about the importance of wetlands. With site ownership embraced by both PennDOT maintenance forces and the local community, very little attention has had to be directed to vandalism and littering.

The lessons learned from District 9-0's experience with advance wetland compensation have been applied to the wetland mitigation bank sites developed under the 2002 MOA. These include using county maintenance forces to bear the time and cost loads associated with putting mitigation sites "on the ground." Funding remains a persistent obstacle. Transportation maintenance dollars (100 percent State funds) are the primary form of revenue for wetland mitigation banking due to the lack of a more reliable, directly related funding source. When budget constraints play a role, banking projects can suffer. Moreover, PennDOT does not have a large inventory of Federal-aid projects that involve NEPA studies. As a result, the State has been limited in its use of Federal funds in its banking program. Federal funds have been utilized only in the design of one true bank and in pooled project scenarios.

Another persistent obstacle is finding suitable mitigation sites. Only 1.4 percent (~400,000 acres) of Pennsylvania is covered by wetlands. Deciduous and forested wetlands are the most common types, followed by open water, marshes, and shrub wetlands. Wetlands are most densely distributed in the glaciated northwestern and northeastern parts of the State. More than half of the State's original wetland acreage has been lost or degraded due primarily to conversions to cropland, forestry and mining, and urban development. (*9*)

Many potential wetland mitigation bank restoration sites are currently in agricultural land uses (tile-drained, prior converted wetlands) in Pennsylvania. The State, however, has a regulation that requires the engagement of an independent board (governor appointed) to review and approve projects in a hearing setting when condemnation of land in agricultural use is required. The "test" that this approval board must apply in their review is similar to a 4(f) test, otherwise known as the ALCAB Prudent and Reasonable Alternative Test. The approval board has made clear in case law that it will not approve condemnation of agricultural land for the purposes of wetland mitigation. Condemnation of other lands, however, could be pursued for wetland mitigation. To date, PennDOT has pursued voluntary, willing landowners and acquires perpetual conservation easements, deed restrictions, and land purchase agreements to secure mitigation sites.

Recently, PennDOT forged two Memorandums of Understanding with the PA Department of Conservation and Natural Resources (DCNR), the agency responsible for State park and forest lands, and the Pennsylvania Game Commission (PGC), owner and manager of the State's game lands to help facilitate site acquisition.

These MOUs "provide for the use of lands, under the ownership or management of DCNR (or PGC), by PennDOT for the design, development, and post-construction monitoring of wetland mitigation banks, also known as advance wetland compensation sites." The intent of these MOUs is to enable both PennDOT and DCNR or PGC to work in cooperation to increase the value and use of the public lands managed by these other agencies, while providing use of the land to PennDOT *at no cost* for the purpose of constructing wetland mitigation banks to receive credits for transportation impacts. PennDOT views these MOUs as very practical steps forward to address some of its site acquisition and funding challenges.

PennDOT manages 99 percent of the compensatory mitigation required for unavoidable wetland impacts due to transportation. As a result of the difficulty in finding large, contiguous tracts of quality wetland acreage in the State, there are no true entrepreneurial banks in Pennsylvania, and only one in lieu fee program exists, operated by the PA Department of Environmental Protection. In addition, about 50 private conservancy organizations in the State work to protect and preserve natural lands, including wetlands, on a local level. To assist with site analysis and acquisition, PennDOT is developing a Statewide GIS platform for land covers; however, this effort has been temporarily stalled by the Department's re-engineering of its planning and NEPA process linkages.

Site Descriptions and Operations

This third-party bank site provides mitigation for the I-99 project. There are no true entrepreneurial banks in PA due to difficulties with finding large, continuous tracts of quality wetland acreage.

PennDOT is especially interested in restoring seasonal wetlands, versus permanent open water, and is also looking for impaired waters to restore that may offer the best ecological benefits to the State's water plan. The overall objective is to develop emergent, scrub shrub, and forested wetland types within each of the wetland bank sites. To date, under both the 1995 MOA and 2002 MOA, PennDOT has implemented a total of 19 wetland mitigation bank projects in 7 of its 11 districts. These projects represent a combined total of 229 wetland acres with 161 approved credits, of which 55 have been debited against the bank. All of the wetland mitigation bank projects are located in the central and western portions of Pennsylvania. No sites have been implemented in the land use constrained eastern portions of the State.

Six of the sites are located in District 9-0, which is seeking one more additional bank site in order to meet its goal of having at least one mitigation bank site in each of the district's six sub-basins. Many of the sites in District 9-0 are restorations of prior converted croplands. PennDOT works closely with NRCS, USGS, PGC, DCNR, County Conservation Districts and USFWS on site selection and design. The USFWS Partners for Wildlife Program, Western PA Conservancy, and Alleghany National Forest have also informally assisted PennDOT with the analysis and selection of potential bank sites.

The majority of PennDOT's sites are restoration sites; very few opportunities exist for preservation in the State. Attempts were made to preserve a rare balsam fir wetland community, and all agencies save one reached agreement on the approach. PA Department of Environmental Protection regulations prevented use of the site for credits, except in instances where ratios for mitigation would have been greater than 1:1. As a result, PennDOT determined it was not prudent to pursue preservation at the site. The DEP regulations are currently being re-evaluated and may be revised to recognize preservation wetland banks as potential replacement for all impacts, although greater ratios would likely be required. Regulatory changes in this regard are still pending and are uncertain at the writing of this report.

The scan team conducted a field visit of the following mitigation site, developed in District 9-0 under the 1995 MOA:

- **Old Crow Wetland Bank** (9.5 acres; 9.5 credits approved)
  Located in the Juniata River Sub-basin, this site was purchased for $1 from the county correctional facility and serves PennDOT projects in the sub-basin. The 9.5-acre site includes 4.24 acres of emergent wetland, 2.5 acres of emergent/scrub-shrub wetland, 1.51 acres of emergent/forested, 0.44 acres of open water, and a 0.81 buffer area. The site was completed in 1997, and 8.69 credits remain available.

In addition, project-specific wetland mitigation and the third-party wetland bank associated with the I-99 development were visited.

Geographic Service Areas. Both the 1995 and 2002 MOAs establish the State's 34 watershed sub-basins as the service area boundaries for PennDOT's wetland mitigation bank sites. The service areas are based on the PA State Water Plan, which is currently being updated and translated to HUC codes.

Functional Assessment Methodology. The assessment varies and is based upon the specific requirements in the banking instrument for each wetland bank built under the agreement and on wetland monitoring results. Sites are designed with the objective of establishing a diversity of wetland types (e.g., emergent, scrub shrub, forested) on each mitigation bank site. In District 9-0, for example, upon completion of the sites, an as-built plan is developed and wetland acreage and type are estimated based on water elevations and future wetland planting efforts.

To discourage Canadian geese from destroying new vegetation on the Old Crow mitigation bank site, PennDOT District 9-0 maintenance forces line the perimeter of the site with string and ribbon. Geese perceive this as an obstacle to the wide open space they need for landing and taking flight.

Monitoring Protocols. Specific monitoring protocols have not been developed, but rather are dictated by the specifications of the individual banking instruments. There are some variations in the level of effort. In some instances, the resource and permitting agencies accept limited reporting, photography, as-built plans, and field views to document success. A flexible approach to monitoring that is based on best professional judgment is considered more practical. In 1990 PennDOT attempted to develop a comprehensive monitoring guidebook, but the effort was abandoned due to concerns that the guidebook was becoming too data driven, too labor intensive, and, therefore, too costly to implement.

Annual monitoring reports generally include the following information: results from monthly field inspections during the growing season, photo documentation from fixed point locations, water level manipulation, plant and wildlife observations, routine maintenance inspections, invasive/nuisance species management, coordination/communication with recreational and educational users at sites, and agency field views as necessary. On some sites, global positioning system (GPS) surveys are being conducted to further document the vegetative community development.

Accounting Procedures. In District 9-0, upon completion of a bank site, an as-built plan is developed and wetland acreage and type are estimated based on water elevations and future wetland planting efforts. An accounting spreadsheet is then developed, and the sites are used on an acre-for-acre basis by type of wetland. When a project requires mitigation for unavoidable impacts that cannot be mitigated on site, or where it is environmentally preferable to mitigate at an established wetland bank site in the same service area, and the permitting agencies have concurred in this determination, then credits are debited from the site on a wetland type basis related to the nature of the impacts of the transportation project.

Maintenance and Management. No detailed maintenance plans are developed for the advance wetland compensation sites. Decisions are made in the field based on best professional judgment. Each bank site has a manager who oversees the construction and monitoring of the site, as well as corrective measures that need to be made. County maintenance forces typically perform any work required on the sites. Prison labor has also been used in some cases to build shelters and other facilities associated with the sites. Engaging high school students and community groups on annual Earth Day events for the purpose of planting and weeding the sites has been a very successful initiative and has fostered community ownership of the sites, thereby reducing littering and vandalism. The primary maintenance issue for the sites is handling invasive/nuisance plants and wildlife, such as purple loosestrife (*Lythrum salicaria* L.) and Canadian geese.

Shelters like this one, built on District 9-0's Old Crow mitigation bank by prison labor, provide a useful gathering space for community and school groups who frequently visit the site for recreation and educational purposes.

In the instance of wetland banks developed under the Statewide wetland banking instrument the MBRT reviews and approves maintenance and remediation activities. For these sites a proposed maintenance program must be detailed within the final wetland development plan.

To ensure the management of the bank sites in perpetuity, PennDOT attempts to execute agreements to build mitigation sites on properties that are own and managed by other entities, such as PADCNR and the PA Game Commission. PennDOT has also used perpetual conservation easements and fee-simple acquisitions to assume complete management responsibility for its sites. Funding, however, remains an issue, as does land use. For example, the Old Crow mitigation bank site in District 9-0 is currently located adjacent to a piece of property that is under consideration for commercial development. The development could potentially impair the integrity of the wetland mitigation bank. While there exists between the site manager and the county commissioners a verbal agreement that requires the developer to build a wider buffer area between the proposed facility and the wetland bank, there is currently no written provision for such a measure in the 1995 MOA.

Best Practices and Innovations

- Pennsylvania utilizes a Statewide umbrella agreement that covers all mitigation sites.
- To facilitate cost-effective land acquisition, PennDOT attempts to build mitigation on land owned by other Pennsylvania government entities. ROW costs and costs for maintenance are reduced by partnering with State land management agencies to locate mitigation sites on those agencies' lands. The land management agencies retain ownership of the land and long-term maintenance responsibilities.
- Many benefits, including greater success in establishing/restoring wetlands, reductions in costs, cost sharing, equipment sharing, and education and enhancement of agency/partner relationships, can be gained by identifying manpower and partnerships internal and external to the DOT to complete projects.
- Site selection is the key to success – do not force a site into an unsuitable location. Allow the existing landscape to dictate your design.
- Local knowledge is critical – establish and maintain good working relationships with the people who are out in the field and dealing with the local land owners (e.g., NRCS, PGC Land Managers, County Conservation Districts, USFWS Partners for Wildlife staff, Ducks Unlimited biologists, PADEP, USACE, etc.).
- Surface water is the primary source of hydrology for most of the wetlands in Pennsylvania. As long as there exist a proper drainage area (5-10 acres per 1 acre of wetlands), suitable soils, and a relatively flat topography, success is easily achieved with minimal excavation. Most sites have been built using on-site materials and have not required the borrowing or wasting of any soil.
- Having a qualified person who is familiar with wetland construction on site at all times can serve as a safeguard against construction activities that might compromise the integrity of the mitigation site.

Continuing Challenges

- The Philadelphia USACE District seems reluctant to accept mitigation banks.
- A dedicated funding source for mitigation banking is vitally important. In Pennsylvania, road construction and maintenance funds take precedence over mitigation.
- Federal funds have been used in the design of one true wetland bank in Pennsylvania.
- There are no true entrepreneurial wetland banks in Pennsylvania and only one in-lieu fee program.
- The State Department of Environmental Protection prevented the use of a high quality preservation site for mitigation credits unless it was used to increase the ratio beyond 1:1.
- The service areas are designated as 34 watershed sub-basins that are likely too small to justify large-scale mitigation banks.
- Conversely, a low annual wetland impact by transportation projects of 20 to 30 acres might not justify the development of several large banks.
- A funding source for long-term management of the mitigations sites is an issue.

KENTUCKY

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Lee Andrews, USFWS (center), introduces a new wetland and stream mitigation site he recently helped acquire for KYTC. The 60-acre site includes 3,700 linear feet of stream. The site will be owned and managed in perpetuity by the Southern Conservation Corporation.

Program History and Philosophy

More than one-half of Kentucky's original wetlands have been lost primarily as conversion to cropland and pastureland; most conversions have been in western Kentucky. Today, wetlands compose less than 2.5 percent of Kentucky's land area, but they have considerable environmental, socioeconomic, and aesthetic value. Most Kentucky wetlands lie shoreward of rivers, lakes, and reservoirs, and include cypress swamps, bottomland hardwood forests, marshes, and ponds. (*9*)

Most of Kentucky's wetlands are privately owned. The State fosters protection of wetlands through a system of registry and dedication agreements with private individuals and other private entities. In the early 1990s, implementation of mitigation did not meet agency expectations. In 1998 an in lieu fee program was established to improve the performance of mitigation projects. That program has seen limited success in implementing mitigation projects due to difficulty in obtaining suitable sites.

A few entrepreneurial banks exist in Kentucky under the oversight of an MBRT, but credit costs have been problematic for KYTC. As a result, KYTC sought to establish a separate umbrella banking agreement with several agencies to lay out an administrative process for its own mitigation banking initiative. Some of KYTC's mitigation sites were already 10 years old.

Because land costs have been rising quickly in recent years, the cabinet was interested in buying additional sites for advance mitigation before the land costs became prohibitive. Attempts to draft a banking agreement, however, became paralyzed by what-if scenarios and contingency planning.

In 2004 KYTC forged a memorandum of agreement with USFWS and FHWA to launch the KYTC Stream and Wetland Mitigation Program. Like Texas DOT, North Carolina DOT and Minnesota DOT, KYTC has opted to use a third party (in this case, USFWS) to coordinate its consolidated mitigation activities. In addition to expediting the 404/401 permitting process, this approach has proven especially beneficial to KYTC in three regards: USFWS can (1) find potential mitigation bank sites faster than KYTC, (2) quickly draft site proposals and implementation plans that meet regulatory standards, and (3) leverage additional funding and negotiate real eState transactions effectively with land trusts, conservation organizations, and private landowners. USFWS gains certain benefits as well – most importantly, the opportunity to use funding from KYTC to support high quality conservation projects where the perpetual protection and management of vital waters and species is provided in exchange for any mitigation and/or conservation credits that may result.

In place of a banking agreement, KYTC establishes its mitigation sites using a consolidated approach, similar to Ohio DOT. Mitigation for several projects is developed using funding from a single project. Nationwide Permit (NWP) 27 is typically used, although this is not ideal as the NWP 27 expires after five years, and KYTC will need to reapply at that time. Moreover, what typically has been a six-month application process is now turning into 12 to 15 months due to agency discussions over how best to mitigate for unavoidable stream impacts. To help prepare for the challenges the cabinet foresees with stream mitigation, KYTC is working with the University of Kentucky and FHWA to implement mitigation principles adopted by the cabinet for highway project-related stream impacts.

USFWS' Lee Andrews (left) discusses the KYTC/USFWS MOA with scan team leader and FHWA senior ecologist Paul Garrett (right).

The 2004 MOA between KYTC and USFWS is a significant step forward for the cabinet's mitigation program. The agreement is supported by all of the State's four USACE districts. It is anticipated the agreement will greatly facilitate inter-agency discussions regarding the adoption of a functional assessment methodology, particularly for stream mitigation, and help secure mitigation credits more reliably.

Since the enactment of a provision by the Kentucky State Legislature requiring the spending down of all transportation surplus funds, KYTC has been unable to use State funds to purchase land for advance mitigation. For the short term, it is using funds from one transportation project budget to pay for consolidated mitigation required for several projects. Further, while KYTC has been aware of the fact that TEA-21 made funding available for advance mitigation, the process for how to access and utilize those Federal funds has been unclear to the cabinet's financial and legal personnel who cannot find a mechanism for fronting the costs of land purchases and bank credits until Federal reimbursements are received. Current policy is that no reimbursement can be made until actual construction of mitigation occurs. Current budgets do not include a large account for such expenditures. Such accounts can only be established within the program approved by the State Legislature. Since the Kentucky State Legislature only meets every two years, any new funding proposal would inevitably require a three-year implementation phase. As a result, funding advance mitigation remains an ongoing problem for KYTC, and the cabinet is eager to receive additional Federal guidance on how to approach this issue.

Site Descriptions and Operations

KYTC has purchased a total of eight properties for wetland mitigation of highway project impacts. Several more are being considered for purchase using the new MOA with USFWS. The properties, most of which have been acquired as fee-simple real eState, are located throughout the State, with the overall goal of establishing at least one bank in each major watershed.

Scan team tours the Exel Clark wetland and stream mitigation site.

The cabinet prefers to purchase and restore prior converted croplands for its program. These offer a greater chance of success compared to created wetlands, which historically have functioned poorly in Kentucky. KYTC will not consider mitigation sites on coal mining lands due to mineral rights issues.

KYTC's mitigation sites range in size from 60 to 350 acres. Transportation projects impact an average of 20 acres of wetlands per year. KYTC estimates that it spends approximately $5,000/acre for wetland restoration ($100 to $300/linear foot for stream restoration).

The following mitigation sites were visited on the scan tour:

- **Nelson County Mitigation Site** (350 acres; 65 acres restored)
  Located in the Salt River watershed, this site involves the restoration of 65 acres of bottomland hardwood forest habitat on prior converted croplands. Restoration objectives include improving wetland habitat diversity, improving habitat connectivity, and improving wetland functions, including water quality functions, such as increased nutrient and sediment absorption and assimilation.
- **Exel Clark Mitigation Site** (60 acres w/3,700 linear feet of stream)
  This site will be utilized though the new MOA with the USFWS. Located in the Lower Green River watershed within the Muddy Creek basin, this site involves the restoration of bottomland hardwood forest habitat on prior converted croplands. The USACE has verified nine acres of emergent wetlands on site that will be enhanced, and any other wetlands that occur at the end of the monitoring period would be counted as restored wetlands. Stream mitigation credits will be determined based on pre- and post-project functional assessment. The Southern Conservation Corporation is the owner and perpetual manager of the site.

Geographic Service Areas. The wetland bank service areas correspond to Kentucky's major watersheds. HUC-6 and HUC-8 service areas apply for some of the sites. Approval for larger service areas can be granted at the discretion of the MBRT.

Functional Assessment Methodology. Wetland mitigation acreage is based on level of wetland functions. The minimum mitigation ratio is 2:1. Preservation is 10:1. Hydrologic and vegetative criteria must be demonstrated for five years, per the specifications of the individual site plan, before credits can be released.

Monitoring Protocols. A monitoring report is provided annually to the regulatory agencies and includes the following: summary of hydrologic monitoring for previous year (unless hydrologic success criteria have been met previously); analysis of hydrologic monitoring that compares the results to the site's restoration goals and the hydrologic success criteria; graphs of the surface and subsurface water elevation data for all monitoring wells; summary of vegetative monitoring for previous year (unless success criteria have been previously met); analysis of vegetative monitoring; Statement as to whether or not the hydrologic and/or vegetative success criteria were met for the annual monitoring period, and if not met, an analysis of the corrective measures or improvements proposed; and at least four representative photographs of vegetative monitoring plots.

Musk thistles are a common invasive plant in Kentucky in need of control.

Accounting Procedures. KYTC, as 404 permittee for all wetland impacts due to highway construction in Kentucky, is responsible for maintaining an accounting log of all wetland credits generated and utilized for each wetland bank it operates. This information is submitted to the USACE and Division of Water annually or upon request.

Maintenance and Management. In accordance with the new MOA, the USFWS and its partner (e.g., Southern Conservation Corporation, The Nature Conservancy, etc.) assumes responsibility for implementing the wetland mitigation plans and any necessary corrective measures or improvements required on the site. KYTC, however, is still in discussions with USFWS and the cabinet's financial officers about provisions that should be added to the mitigation plans to ensure proper care of the properties over the long term. As the permittee, KYTC remains accountable to the USACE for all activities associated with the site. Therefore, KYTC is considering incorporating the following contract provisions: pay-as-you-go mitigation (i.e., pay only for services successfully rendered), performance bonding, and reversionary clauses.

Best Practices and Innovations

- The USFWS is tasked with finding potential mitigation sites. The use of USFWS to recommend mitigation expedites permitting for three reasons:
  1) USFWS can identify the sites faster than KYTC.
  2) USFWS can quickly draft proposals and implementation plans that satisfy regulatory requirements. Since USFWS is one of the chief agencies that evaluate mitigation plans, it is expeditious to have the agency that is knowledgeable of the resource needs actually develop the mitigation proposal.
  3) USFWS, being recognized as an agency charged with protecting wildlife, can often leverage additional funding and negotiate real eState transactions more effectively with land trusts, conservation organizations, and private landowners.
- USFWS has a vested interest in the success of mitigation.
- Site selection is a primary role of USFWS' involvement.
- USFWS' involvement directs mitigation efforts toward resource needs and the agency's own species recovery goals.
- Geographic service areas are flexible and correspond to Kentucky's major watersheds. While some sites are limited to HUC-8 or HUC-6 areas, larger service areas can be granted at the discretion of the MBRT.
- The mitigation ratio is based on wetland function, with impacts to high quality wetlands requiring a higher mitigation ratio.
- Preservation is allowed as mitigation with a ratio of 10:1.
- USFWS, or other entity acting as owner of the mitigation property (e.g., Southern Conservation Commission, The Nature Conservancy, etc.), assumes responsibility for implementing the wetland mitigation and corrective measures or improvements required on site, with funding provided by the KYTC.

Continuing Challenges

- DOT financial personnel need to be in the communication loop on how to administer cost-reimbursable expenses for advance mitigation with Federal dollars.
- Mitigation that involves stream restoration suffers from a significantly slower permit processing time. The process has gone from an average of 6 months to approximately 12 to 15 months because of the uncertainty of mitigation for stream restoration.
- Funding for long-term stewardship of the mitigation areas is an ongoing issue.
- Neither USFWS nor KYTC wants to own mitigation properties. Long-term property ownership issues must be resolved.

MINNESOTA

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Located in William O'Brien State Park, MN, this DNR-owned site was formerly a minnow farm established by piping spring water through a series of constructed ponds. MnDOT, in partnership with DNR, obliterated the ponds and re-established a trout stream and associated wet meadow and shallow marsh and sedge meadow wetlands.

Program History and Philosophy

The Minnesota Department of Transportation established its first wetland mitigation bank in 1987 after two staff members attended a USFWS course on habitat evaluation procedures and determined that banking offered a more cost-effective approach to mitigation. The Rice Lake Mitigation Bank, one of MnDOT's largest banking projects, involved the restoration of 670 acres of wetlands in the Staples Drain Area to compensate for impacts from a highway project. The land is owned and managed by the MN Department of Natural Resources. MnDOT invested $314,000 for the four-year restoration effort, which included the purchase of 120 additional acres as buffer. Credits remain available today from the site, which has become an exceptional waterfowl area.

This and future MnDOT mitigation bank projects were implemented under a technical memorandum of agreement between MnDOT, DNR, and USFWS (the USACE allowed USFWS to act as its proxy). While the agencies agree that the cooperative effort demonstrated in the Rice Lake Mitigation Bank led to a successful outcome, they discovered early on that confusion over the definition of what constitutes a *bank* would ultimately create challenges for the program, as would the use of habitat units (versus acreage) as a functional assessment methodology. Assumptions about credits and debits were difficult to make based on habitat values alone. The State's 9.5 million acres of wetlands are extremely diverse, ranging from extensive northern peat lands to small prairie potholes, and including nearly 200,000 acres of wild rice beds. Agency perspectives on how to achieve no net loss of these resources were as diverse as the wetland types themselves.

In the early 1990s the State of Minnesota passed landmark legislation to protect and conserve wetlands. The Wetland Conservation Act of 1991 (WCA), one of the most sweeping protection laws in the country, became effective January 1, 1992, and was fully implemented in 1994. The act is administered by the Minnesota Board of Water and Soil Resources (BWSR), implemented by local government units, and enforced by DNR.

The purpose of WCA is to retain the benefits of wetlands – such as water quality, flood/storm water retention, public recreation, commercial uses, fish, wildlife and native plant habitat – and ultimately to achieve no net loss of wetland quantity, quality, and biological diversity. The act requires anyone proposing to drain, fill, or excavate a wetland to first try to avoid disturbing the wetland; if this is not possible, to minimize any impacts; and finally, to replace any lost wetland acres, functions, and values.

The primary benefit of WCA is two-fold: (1) it defines wetlands as a publicly valued resource of critical importance to the State, and (2) it establishes a comprehensive, Statewide approach to wetland conservation.

A major challenge soon surfaced, however, involving implementation of the Act at the local level. Many local transportation authorities (cities, counties, townships) lacked the resources and expertise needed to implement the Act's wetland replacement (mitigation) requirement, and in 1996 additional legislation was passed requiring BWSR to implement local wetland mitigation projects for local transportation agencies using State funding.

BWSR's entry into the wetland mitigation development market created an unanticipated problem for MnDOT, who found itself competing with BWSR for the acquisition of mitigation sites. While private banks existed at the time, and continue to emerge in the State under BWSR's guidance, the credits available often did not meet MnDOT's needs in terms of wetland type, quality, or location. As a result, private banking has not been a viable alternative for MnDOT, which meets 90 percent of its mitigation needs through single-user mitigation sites.

Furthermore, great disparities in land costs and associated tax rates exist in Minnesota. It is not unusual to pay $4,000/acre in one part of the State and $43,000/acre in another. Land costs drove both MnDOT and BWSR to lean heavily on the acquisition of conservation easements on land for bank sites, rather than fee title acquisition. BWSR cannot acquire or own land, but it can negotiate conservation easements, and its experience acquiring easements for incentive-based conservation allows it to do so more effectively than MnDOT. Since the enactment of WCA, BWSR has worked cooperatively with State and federal agencies to successfully restore more than 50,000 wetland acres through both incentives-based and regulatory-driven restoration projects.

For MnDOT it became clear that two independent, Statewide wetland mitigation initiatives would complicate rather than facilitate achieving the objectives of WCA. As a result, MnDOT is now in the midst of a major transition, as it moves to turn over its wetland mitigation program administratively to BWSR. The new memorandum of agreement for the Minnesota Wetland Mitigation Banking Cooperative for Public Roads (www.bwsr.State.mn.us) was five years in the making and signed in the late summer of 2005. Perhaps the most challenging aspect of this transition has been attempting to harmonize the Federal 404 and WCA requirements.

One example is bank service areas. The USACE identifies eight service areas based on watershed area. However, WCA divides Minnesota into three large regions and identifies service areas based on percentage of historical wetlands remaining. The regions are classified as follows: greater than 80 percent wetlands remaining, 50-80 percent, and less than 50 percent of existing historical wetland drainage base. The less than 50 percent of historical wetlands remaining region requires more mitigation for impacts than the 80 percent historical wetlands region. The spatial restrictions to mitigation are such that three WCA service areas cannot be crossed. Discussions are underway to attempt to reconcile the WCA approach and the USACE approach.

Minnesota is seeking to establish mitigation sites not only to serve all geographic areas but also specific wetland types within those the geographic areas. Minnesota pools all the wetland credits available within the State and then separates them into credit by wetland types. Currently, not all regions have in-kind replacement mitigation sites. MnDOT can use credits from a bank site outside of the geographic region if no in-kind bank is available.

Minnesota is attempting to focus mitigation efforts where needed, particularly in the areas with the highest historical loss of wetlands rather than just within the designated region or within the watershed.

In addition to service areas, management and oversight of the mitigation sites needs to be resolved between USACE and WCA. Technical evaluation panels (TEPs) are required under WCA. The TEP functions like an MBRT. With the TEP, however, BWSR is the lead, while USACE is a non-voting member. With the MBRT, USACE is the lead. USACE has generally concurred with the TEP, although a process for resolving any future disputes that may arise needs to be determined.

Under the new agreement, MnDOT will transfer funds to BWSR to create wetlands and a bank of wetland credits from which MnDOT can draw for future MnDOT projects with wetland impacts. This is similar to the process that North Carolina DOT uses with the Ecosystem Enhancement Program. For the period 2006 through 2011, MnDOT will make regular payments to BWSR of up to $1 million per fiscal year ($5 million total). These monies will be used by BWSR to acquire property or develop wetlands that qualify for deposit of corresponding credits, which will be pooled and stored for use in the MnDOT Road Replacement Account.

Also on an annual basis, MnDOT will provide to BWSR a three-year projection of the number of credits that will be needed to fulfill its compensatory wetland mitigation requirements. That figure will be the basis of BWSR's credit development activities. Like North Carolina DOT, MnDOT anticipates an initial learning curve as it refines the process for making these projections as close to target as possible.

Most of MnDOT's existing wetland mitigation banks are currently being transferred to BWSR bank accounts, along with any credits still tied to the bank sites. Although the new banking agreement has not yet been signed, a MnDOT/BWSR/DNR cooperative has already secured and restored an 1,100-acre prairie area with more than 100 separate wetland basins in northwest Minnesota, considered a prized site of significant ecological diversity. The site is located within a few miles of a 50,000-acre property currently being restored by The Nature Conservancy. The MnDOT site contains several species of rare birds and orchids. The Audubon Society and TNC have helped to promote public interest in the mitigation site.

The site is not yet tied to a transportation project; it is considered true advance mitigation (which TEA-21 provides for). DNR and BWSR remain responsible for any site management issues during the five-year bank monitoring period. After that, the Minnesota DNR has agreed to undertake long-term management responsibility for the site as the Wingdahl Wildlife Management Area. The Nature Conservancy's nearby project office has indicated a willingness to assist BWSR and DNR in burning the site because proper management of this site will further the goals TNC has set for its nearby project. Although TNC would not be allowed to directly fund any part of the actual restoration for bank credits, bartering for services may be the a prudent solution to securing services like burning until DNR assumes full management responsibility for the site after monitoring is completed.

Site Descriptions and Operations

MnDOT has established approximately 20 wetland mitigation bank sites throughout the State. BWSR has many additional bank sites that it administers and has calculated that approximately 250 to 400 acres of wetlands are drained or filled each year by WCA-regulated projects, of which 60 to 70 acres are attributable to MnDOT projects.

Purple prairie clover is a native legume common in upland plantings.

One of the hallmarks of MnDOT's restoration initiatives is the department's expert use of native prairie and sedge meadow seed mixes. MnDOT has invested generous research dollars to determine the best approaches for cultivating native prairie grasslands and sedge meadows. From carefully scheduled mowing regimens to native seed harvesting and seed cleaning, MnDOT has learned how to achieve a healthy diversity of plant communities on its wetland sites. MnDOT's on-the-ground successes with high diversity seed mixes support recent research that suggests that including 30+ species of plants in a landscape community stifles the spread of invasives and noxious weeds, and thereby also reduces the use of herbicide.

Native milkweed plants attract butterflies

Another factor contributing to the success of MnDOT's wetland mitigation sites is the rich body of historical data that the University of Minnesota's Center for Urban and Regional Affairs has generated on the location and description of the State's pre-settlement wetlands. The availability of this information allows MnDOT to focus its dollars on true restoration efforts, which have significantly higher success rates than created wetlands (i.e., creating a wetland where one never existed).

The scan team visited the following MnDOT and BWSR mitigation sites:

- **Minnow Ponds MnDOT Site** (7 acres; 3rd-year restoration underway – credits pending)

Located in William O'Brien State Park, this DNR-owned site was formerly a minnow farm established by piping spring water through a series of constructed ponds. MnDOT, in partnership with DNR, obliterated the ponds and re-established a trout stream and associated wet meadow and shallow marsh and sedge meadow wetlands.

- **Woodview Marsh BWSR Site** (23 acres; 2nd-year restoration underway – credits pending)
  This urban, roadside site was formerly a community garden that became overrun with weeds and Canadian geese. BWSR excavated peat from the site to create both wet meadow and shallow marsh habitat. Because the site is located off the roadside, it could have potential water quality functions, although it is not currently being monitored for this.
- **Tiede BWSR Site** (200 acres; restoration complete – credits approved)
  This site, developed by BWSR and now part of a DNR wildlife management area, was a classic restoration of shallow and deep marsh in three prairie potholes and adjacent upland prairie. All credits expected from the site have been approved by both BWSR and USACE, and most remain in the bank for use on future State and local transportation projects in the bank service area.
- **Big Dog Slough MnDOT Site** (61 acres; restoration complete; credits pending)
  This site represents another prairie pothole restoration with some excavation and substantial upland buffer acreage. The regulators have all agreed on the acceptability of wetland and upland acres for deposit in the bank; however, there is disagreement over how much credit to allow for upland buffers. WCA establishes a maximum 1:1 ratio for upland buffers; however, USACE is proposing a maximum 4:1 ratio for sites restored to native vegetation like Big Dog. This issue needs to be resolved before the bank can be approved for credits.

Geographic Service Areas. BWSR and USACE are still reconciling the WCA and Federal guidelines regarding service areas. WCA identifies greater than 80 percent, 50-80 percent, and less than 50 percent of historical wetland drainage base. And three WCA service areas cannot be crossed. USACE has identified eight service areas based on watersheds.

Where new housing development encroaches upon MnDOT mitigation bank sites, the use of and credit for buffers becomes an issue of increasing importance.

Functional Assessment Methodology. A functional assessment methodology and performance standards are still being determined for the new agreement, although wetland type and the Cowardin classification system have been used. It is expected that the agreement will move from counting purely acreage of various wetland and upland types towards establishing qualitative currency for credits. DNR, BWSR, and USACE want to address credits for the purchase and management of buffers more carefully. As new housing starts to creep closer to some of MnDOT's mitigation sites, buffers are becoming more critical. Currently, the program gives credit for upland buffers (public value credit), but only above the 1:1 replacement ratio. In urban areas, a 25-foot minimum is required and in rural areas, a 50-foot minimum is required for wetland mitigation banks. There is ongoing discussion concerning buffer widths, and buffers remain a controversial issue in Minnesota. Buffers are not regulated resources under the Clean Water Act, and it remains unclear how mitigation for buffers can be required or credited.

Monitoring Protocols. Currently, MnDOT conducts a strict regimen of hydrologic and vegetative monitoring, with perhaps an emphasis on vegetation monitoring, for a five-year period on its mitigation bank sites. Again, BWSR and USACE are currently establishing protocols for monitoring under the new agreement.

Accounting Procedures. Under the new agreement, BWSR will handle all accounting related to MnDOT's mitigation bank sites. BWSR is currently working with MnDOT to transfer its current and approved wetland credits into what is being called the MnDOT Road Replacement Account. Credits generated by BWSR through use of MnDOT funds will be placed in the account. Once the Road Replacement Account is officially established and wetland credits have been deposited, MnDOT is authorized to withdraw credits and apply them to satisfy legally required wetlands replacement obligations. This account is a pooled credit bank. MnDOT can draw credits to meet needs that may go beyond a given service area; however, the department cannot withdraw more credits than are actually in the account. If credits are not available in the account, then MnDOT and BWSR can negotiate cash-for-service or service-for-service exchanges.

Maintenance and Management. Invasive plant species pose the greatest maintenance challenge for MnDOT, second only to impacts from new housing constructed near the wildlife refuge properties that support MnDOT wetland mitigation banks. However, MnDOT has made good progress dealing with both issues, the first through research, the second through open discussions with BWSR and USACE regarding the importance of buffers.

Urban roadside mitigation sites, such as this one in Minnesota, could have potential water quality functions, although most sites are not monitored for this currently.

Long-term management of the wetland mitigation banks sites poses a far greater challenge to MnDOT, as it does for nearly all of the States participating in the scan tour. Although DNR is often tagged as the public agency that will serve as the permanent owner and manager of MnDOT's wetland mitigation sites, many of which are constructed on DNR lands, no money is provided to DNR to support their long-term management. In addition, a number of sites have been developed on private lands where a conservation easement has been purchased, and maintenance responsibility would rest either with the landowner or the agency establishing the bank site. MnDOT and BWSR are currently discussing putting aside five percent of MnDOT's annual contribution to BWSR for the purpose of establishing a maintenance fund that could help subsidize these costs. In addition, MnDOT could provide mowing and burning services in perpetuity.

A larger issue is the fate of a mitigation bank site after 10 to 15 years, when the site restoration and monitoring are complete, all credits have been exhausted, and the site is potentially turned over to a new owner. At this point, who ensures that the ecological integrity of the mitigation site is preserved in perpetuity? USACE's enforcement authority expires after 10 years in some cases, although Section 404 requirements may still apply, unless the site is an isolated wetland, in which case it is federally exempt under SWANCC.

MnDOT and BWSR are discussing whether or not a perpetual management clause, including a legal mechanism and financing measure, should be written into the new agreement to address this concern. "Perpetual" management clauses, however, based on use of State or Federal transportation funds, could eventually become an unmanageable problem as funding loads and wetland acreages/projects may increase over time to cumbersome levels. DOTs are not natural resource managers. In mitigating impacts to privately-owned wetlands, it eventually will become necessary to find other managers (private or public) who are self sustaining.

Best Practices and Innovations

- Mitigation bank sites are large in Minnesota, up to several hundred acres. Multiple projects over a long period of time can, therefore, be mitigated per site.
- MnDOT is turning over the wetland bank mitigation program administration functions to BWSR. BWSR has the natural resource technical skills to identify the natural resource needs of Minnesota and plan and design the mitigation areas.
- Minnesota is seeking to establish mitigation sites not only to serve all geographic areas but also of specific wetland types within those the geographic areas. Minnesota pools all the wetland credits available within the State and then separates them into credit by wetland types. Currently, not all regions currently have in-kind replacement mitigation sites. MnDOT can use credits from a bank site outside of the geographic region if no in-kind bank is available.
- Minnesota is attempting to focus mitigation efforts where needed, particularly in the areas with the highest historical loss of wetlands rather than just within the designated service area or within the watershed.
- Minnesota uses one umbrella agreement that covers all mitigation sites.
- MnDOT can receive credit for upland buffers provided that the 1:1 wetland replacement ratio has been met.

- Presently, individual DOT districts within Minnesota have the option of placing existing credits in the Statewide collective pot.
- All future sites will be created and managed as a Statewide system.
- Preservation as mitigation can be used in extreme circumstances; however, the mitigation must include a restoration component.

Continuing Challenges

- No funding for long-term management of the mitigation sites is available. The State WCA program and USACE need to reconcile their processes.
- Performance criteria for the mitigation sites are not well defined. More detailed performance requirements will be developed for future sites.

CONCLUSIONS and RECOMMENDATIONS

The conclusions and recommendations of this scan report highlight common areas of concern expressed by the eight States visited with regard to the experience of establishing and managing wetland mitigation bank sites in perpetuity. In addition, the best practices, innovations, and continuing challenges common or unique to the States are presented.

BEST PRACTICES

The following best practices, which have the potential for national application, were observed:

1. Flexible sizes for geographic service areas (GSAs), appropriate to the drainage and intensity of development, are necessary for banking to continue to be a viable mitigation alternative, both for single-user, agency-funded banks and for private, entrepreneurial banks. Because single-user, DOT-funded banks can only be used for DOT projects, a HUC-8 service area is not always large enough to justify the effort of establishing a mitigation bank, nor are impacts within most HUC-8 boundaries numerous enough. It is generally accepted that larger mitigation sites, such as banks, provide higher quality wetland habitat and support landscape-level functions for aquatic species better than smaller sites which are subject to ecological isolation from continued development and other factors. Concentrating mitigation into fewer large sites also reduces monitoring and reporting requirements, which can represent substantial cost savings, and generally improves management potential and societal benefits (*5*).

2. Use of umbrella mitigation banking instruments (i.e., Statewide banking instruments that cover all DOT mitigation sites within the State) should be utilized whenever possible. The banking approval process is cumbersome. Having one agreement that covers all the various sites throughout the State will limit the bureaucratic process to one initial agreement. An exception to this may be when there are multiple USACE jurisdictions with conflicting policies on banking. In that case, banking instruments for each jurisdiction might be practical.

3. State DOTs have successfully used public lands owned by resource agencies or credible, non-profit natural resource groups to obtain land for mitigation, to assist with implementation of mitigation plans, and/or to assume responsibility for long-term management once the performance requirements have been satisfied. DOTs are not natural resource managers. The organizations with the appropriate expertise should manage those resources.

4. DOT mitigation banks are often more economical than project-by-project mitigation. DOT mitigation banks costs appear to run in the hundreds to several thousands of dollars per acre of impact as opposed to upwards of hundreds of thousands of dollars for project-by-project mitigation. There are exceptions to this generalization, and costs vary widely based on land values.

5. Mitigation is usually funded and initiated in advance of project construction. The mitigation site has already received approval through the MBRT process and no separate mitigation plan need be reviewed for each project.

6. The use of Federal-aid highway funds to establish mitigation sites is permissible to compensate in advance of future impacts for foreseeable projects.

7. DOT funding of positions in Federal regulatory and permitting agencies can expedite the permitting process. State DOTs that fund positions for the USACE and USFWS receive in turn from those agencies, personnel dedicated to work on transportation projects and issues.

8. In-house experts within State DOTs can represent significant cost savings for the design, implementation, and monitoring of wetland sites.

9. Pooling mitigation credits together for entire State allows credits to be withdrawn from the banking system even if a bank site is not yet developed within a specific geographic area within the State.

10. Credit can be given for upland buffers within the wetland mitigation area. Resource agencies often require buffers around wetland mitigation sites. The granting of credit for impacts for these buffers is a positive incentive for the further use of buffers by State DOTs and provides ecological benefits to the aquatic system.

11. Public use of a State DOT mitigation site, such as hunting, increases the public benefit for the expenditure of mitigation dollars and increases the site's value as a public resource. Allowed public uses must be carefully considered to support, rather than impair, the integrity of the mitigation site.

12. Some of the most successful sites selected for mitigation are those that are in a low ecological succession stage. Agriculture sites are often the easiest to convert to wetland areas and are often the most ecologically successful sites.

13. Selection of restoration sites receive priority for mitigation development. Lands that were historically wetlands are typically more responsive to reversion back to a wetland system than creation sites that may require extensive engineering and earth movement.

14. The preservation of existing high quality wetlands have been successfully incorporated into mitigation plans. Preservation as a component of a compensatory mitigation plan encourages the long-term protection of existing wetlands.

INNOVATIVE MEASURES

The State DOTs in the wetland scan tour have encountered obstacles to banking throughout the history of their environmental compliance programs. Some of these problems are the result of particular State laws that restrict the expenditure of State dollars to certain activities, or the limits on the acquisition of private property through eminent domain laws. Other problems are the result of lack of flexibility of other State resource and regulatory agencies that operate within a particular State. Furthermore, the establishment and approval process of banks is uniformly bureaucratic and laborious. The following is a list of some innovative solutions employed by some of the States to further their mitigation goals and/or make the mitigation process more efficient.

1. Alabama DOT (ALDOT) has used mitigation sites both for compensation for wetland impacts and for endangered species habitat mitigation. Credits can be used on their mitigation sites for both 404 impacts and to satisfy their requirements under Section 7 of the Endangered Species Act. Mitigation banks should be examined from an ecosystem perspective from both the wetland functions, as well as functions provided for special management species, such as endangered species, if these are non wetland related. This represents a true landscape approach.

2. Ohio DOT (ODOT) found that attempts to establish mitigation banks in Ohio were an exceptionally arduous and unwieldy process. ODOT is in favor of multi-project mitigation but found the MBRT process onerous. ODOT implemented a consolidated banking approach where mitigation for several projects can be performed at a single site without the necessity of going through the lengthy MBRT site-approval process.

3. ODOT has turned over the reporting and monitoring requirements of one of their mitigation sites to a nearby local high school. The students perform the field monitoring including data collection. Students also prepare the monitoring reports and submit them to the regulatory agencies. This innovative approach provides an educational benefit of wetland mitigation sites. Educational value is an under-explored and under-utilized benefit of government-sponsored wetland mitigation programs. In addition, a direct benefit to ODOT is that they are relieved of the time and expense of preparing monitoring reports for this particular site.

4. ODOT is funding an entire USACE regulatory office in Columbus to work on transportation projects. Currently, there are four separate USACE districts in the State of Ohio. This has resulted in inconsistency in the administration of the 404 program caused by the differences in policy and procedure within each district. While funding positions for the resource and regulatory agencies is not necessarily a new development, ODOT is funding an entire office that cuts across the four USACE districts in Ohio. ODOT's hope is that working with one office will lead to consistency and efficiency in the 404 program.

5. The Kentucky Transportation Cabinet (KYTC) has delegated the mitigation site selection responsibility to the U.S. Fish and Wildlife Service (USFWS). This has resulted in a more expeditious development of the mitigation site proposal. The USFWS, being a resource agency, has the expertise to assess potential and existing habitat. Also, USFWS is knowledgeable of the resource needs for critical species. The responsibility of site selection for USFWS gives the agency the opportunity to work toward its own species recovery efforts, as well as general wetlands functions. In addition, as a commenting agency for the Section 404 program, the USFWS' direct involvement expedites the permitting process, as the agency has a vested interest in the development of mitigation proposals rather than simply critiquing them.

6. The Minnesota DOT (MnDOT) consolidates its available mitigation credits Statewide into a collective pot administered by an umbrella organization (i.e., BWSR). The credits are allocated by wetland type. MnDOT allows credits to be drawn from the collective pool if a particular type of wetland is not within the geographic service area of the highway project site. Additional wetland bank sites will be developed in service areas currently lacking in a specific bank site of a particular wetland type.

7. MnDOT is currently focusing mitigation efforts where needed and not necessarily within a particular designated geographic service area. If a particular watershed is heavily degraded or has suffered large historical wetland losses, mitigation efforts can be implemented within the area of greatest need rather than within the impact service area where the need for wetland mitigation may not be as great.

CONTINUING CHALLENGES

While mitigation banking has helped to reduce the permit processing time and can be an economical alternative to mitigation, challenges still remain for wetland mitigation through banking. Problems with enacting an effective and/or expeditious banking program include the following:

1. The categorical restriction of mitigation banks to HUC-8 geographic service areas will inhibit mitigation banking. The large number of HUC-8 regions throughout most States, combined with their relatively small linear dimensions, will make banking uneconomical for most States. In addition, monitoring and reporting requirements for the numerous banks would be onerous. Many States already have low annual impacts to wetlands, perhaps amounting to only 20 to 30 acres of impacts per year. These impacts spread out over a multitude of HUC-8 areas would eliminate the usefulness of banking programs in all but a very few States. States with the most active and effective banking programs, both from the standpoint of wetlands benefits and program efficiency, are those with flexible and relatively large service area boundaries.

2. The long-term management of mitigation sites is uncertain. Federal-aid funding is not available for long-term management of mitigation sites. Even if the DOT turns the bank sites over to resource agencies that have the expertise to manage natural resources, their limited funding may prevent them from adequately guaranteeing the ecological integrity of bank sites.

3. Stream mitigation requirements are vague. DOTs are unsure of how to proceed with stream restoration and what the requirements are. Definitive Federal guidance is needed to resolve the uncertainty. Stream preservation both on and off existing wetland bank sites should be considered by the resource agencies for stream mitigation. Stream preservation is considered more ecologically sound and far more cost effective than stream restoration.

4. Federal-aid dollars are often not used to establish mitigation bank sites. FHWA regulations in 23 CFR Part 777 allow the use of Federal highway dollars to construct mitigation sites for federally-funded highway projects. State DOTs should explore all options available to them to meet their mitigation needs.

5. DOT management and financial officers are reluctant to fund mitigation banks or sites that will be used to compensate for projects years into the future.

6. The MBRT review process has become more stringent, particularly since the proliferation of private banks. Performance standards have become more austere, and there seems to be subjective interpretations of what constitutes the most reasonable boundaries for geographic service areas. The USACE is developing new regulations to address mitigation performance that should be released by the beginning of 2006. The new regulations should provide more clear guidance for performance standards and service areas.

7. The MBRT is difficult to organize for site visits and meetings. Timely responses on new bank sites are often not forthcoming. Large banks that serve extensive service areas reduce the overall work load and concentrate site visits to one or a few sites. MBRTs should consider workload as one of the factors in determining the most practical number of banks within a jurisdiction.

8. Some USACE districts are averse to wetland banking. The new USACE regulations on banking should provide definitive guidance so that the various USACE districts implement consistent policies.

9. Texas DOT noted that its demand for compensatory mitigation credits was reduced by two-thirds following the 2001 SWANCC decision. In 2001, the Unites States Supreme court issued a decision in Solid Waste Management Authority of Northern Cook County (SWANCC) v. U.S. Army Corps of Engineers that limited the USACE's jurisdiction over waters of the United States. Specifically, isolated wetlands can no longer be regulated by the USACE under the Commerce Clause on the basis of their usage by migratory birds. As a result of SWANCC, impacts to isolated waters may not need to be mitigated and, therefore, may have some effect on the construction of wetland mitigation banks. It is FHWA policy to mitigate for all wetlands regardless of whether or not they are under USACE's jurisdiction. As this mitigation is not mandatory under Federal law or regulation, FHWA can choose a variety of measures to meet this mitigation policy for isolated wetlands. Many States also require that all wetlands be mitigated regardless of Federal jurisdiction. In those States, any loss of required mitigation for wetland impacts due to SWANCC would be negated by State laws that protect wetland resources beyond Federal jurisdiction. FHWA guidance has suggested that credit demands be estimated before banking in undertaken, and that banks be appropriate in scope to meet that demand. In the case of unforeseen events, such as SWANCC, which happen after banks are established and reduce or increase credit needs, there is a mechanism to recover Federal-aid funds through sale of the property where practicable.

10. Invasive and exotic plant species are a persistent challenge on mitigation sites. Permitting agencies and State DOTs are not always in agreement about scientifically acceptable percentages of invasive plant species conditions on mitigation sites. Typically, a five-percent invasive species maximum is Stated in USACE permit conditions. DOTs believe that a 20-percent maximum can be reasonably achieved. Reference sites should be used to establish reasonable plant community composition standards.

11. Mineral mining rights, water supply needs, and other land use issues are not necessarily abdicated in wetland mitigation areas. State laws and/or unspecified legal conservation agreements may allow for unintended uses for mitigation areas. This places the practice of mitigation banking in jeopardy, and eliminates the landscape scale, ecosystem preservation benefits associated with preservation or restoration of large tracts of wetlands. Further, it adds credence to the policy of preferring on-site, in-kind, project-specific mitigation, which, while it does not have the benefits of establishing larger tracts as banks, is not as likely to be threatened with wholesale site conversion to other purposes, such as water supply reservoirs. The benefits of banking include sustainability, stability, and management for public uses. Converting banks to other uses threatens the credibility of banking in general, and government sponsored banks in particular.

12. Resource agencies are often still reluctant to accept preservation as mitigation. The new pending USACE regulations should address this issue and allow the use of preservation of high value wetlands particularly as a component of an integrated mitigation plan.

RECOMMENDATIONS

Based on the best practices, innovative measures, and continuing challenges described above, the scan team offers the following recommendations to improve the effectiveness and efficiency of wetland mitigation banking for State transportation agencies:

Adopt flexibility where prudent in the use of geographic service areas.

Current guidance stresses the use of an ecosystem and watershed basis for establishing service areas. As the USACE district offices help States facilitate Federal guidance to adopt a watershed approach to wetland mitigation, some States have been able to adjust easily, while others are finding that this directive is drastically impacting their wetland programs, particularly with regard to the assignment of geographic service areas. Depending on what makes the best ecological sense for a given State, most States are already using geographic service areas established within river basins or six- to eight-digit hydrologic catalog units (e.g., HUC-6, HUC-8, etc.).

For States like Nebraska, whose bank service areas were originally established as major land resource areas by the MBRT, transitioning to a HUC-8 (or possibly HUC-6) approach is a substantial shift and has launched a series of discussions about the future of banking in the State. Clearly, such a change creates considerable financial, administrative, and long-term management challenges that need to be carefully explored. A close, widespread application of this policy (i.e., implementation of HUC-8 service areas) is inconsistent with TEA-21 and SAFETEA-LU, and may result in drastic reductions in the use of banking in general and in the development of single-user, DOT-funded banks in particular – both for wetlands and for other habitat. This is contrary to the ecosystem-based, landscape-scale concepts now being suggested by ecologists who have looked at these issues carefully from a best practices standpoint.

For States like Minnesota, which is currently trying to harmonize WCA (State-level) service areas with Federal directives, the transition has resulted in a few administrative delays but no significant impediments to the use of mitigation banks in the State. Minnesota would also like to enter into discussions about a protocol for mitigating outside a geographic service area where impacts occur. While the northern portion of Minnesota has a surplus quantity of wetlands, wetlands in the southern part of the State are scarce. From MnDOT's perspective, developing wetland mitigation banks in southern Minnesota as a result of unavoidable impacts that occur in northern Minnesota might be a more prudent use of mitigation dollars. However, the language in the Federal guidance does not currently encourage these kinds of discussions.

In order to further the overall goals of the Clean Water Act, mitigation opportunities in watersheds with the greatest ecological need should be given substantial consideration if the impact is located in a different watershed with less ecological need.

Improve the effectiveness of the MBRT process.

Mitigation bank review teams are established in all but two of the States that participated in the scan tour (Minnesota and North Carolina – which have entities, i.e., BWSR and PACG, that essentially operate as MBRTs). The purpose of an MBRT is to ensure a stable and reliable process in the development of high quality wetland mitigation banks in a State. All of the eight States included in the scan tour agree with MBRTs in concept, but feel that some challenges exist in their execution.

Alabama DOT has noticed, for example, that following the formation of the MBRT in its State, approvals for mitigation bank projects went from 6 months to 12 months – and two years in some cases. Time delays were primarily caused by personnel changes on the MBRT and logistics difficulties in coordinating the schedules of the MBRT members for site visits and regular meetings. For similar reasons, Ohio DOT opted to bypass the MBRT framework altogether for a more time-efficient program given that the department administers more than 600 road projects per year. In addition, when conflicts arise or where new policies or research innovations warrant significant changes in the way wetland mitigation banks must operate in a State, the MBRT should play an instrumental role in helping to reconcile any conflicts or to facilitate operational transitions smoothly. Texas, Nebraska, and Pennsylvania are three States, for example, where more, not less, dialogue among the members of the MBRT could offer greater benefits to their respective wetland mitigation programs.

The size of the geographic service area may be correlated to the efficacy of the MBRT. Large geographic service areas reduce the number of banks throughout the State thereby providing more opportunity for the MBRT to focus on a relatively small number of banks rather than several dozen smaller bank sites.

The scan team recommends that the Federal agencies responsible for the establishment of the MBRTs examine opportunities for streamlining the efficiency of these entities and for providing guidance to them on how to negotiate and facilitate changes in banking agreements and bank operations as new policies and new science continue to impact these programs.

Issue guidance on the use of Federal-aid highway funds for mitigation banks.

The ability to use Federal-aid funds for mitigation banks has been in effect since 1991. State funds have always been available. Of the eight States visited, only two (North Carolina and Pennsylvania) have used Federal-aid dollars to support the establishment and operations of its wetland mitigation initiatives. North Carolina made the decision to utilize Federal-aid funds for its mitigation program due to cash shortages at the State level. While this improved the cash flow, use of Federal funds triggered compliance with Federal laws that perhaps would not have been necessary for some of the mitigation projects.

Most of the States have adopted an informal policy of using State project construction and/or maintenance dollars to finance the establishment of advance mitigation sites, reserving any applicable Federal dollars solely for highway construction use. Minnesota's annual operating budget for its wetland mitigation program, for example, is $3 million ($2 million in State bonding money and $1 million in MnDOT funds). The program is funded by the State general fund, with acquisition, design, construction, administration, monitoring, and site management as the major budget line items.

Kentucky, Ohio, and Pennsylvania DOTs have experienced unique struggles trying to communicate the financial aspects of banking to their accounting and legal personnel, and suggest that additional Federal guidance on this point would be helpful. Real estate transactions that involve using transportation monies to buy land for an intangible such as "credits," and then ultimately turning the land over to another entity, have been hard sells for some State DOTs. Kentucky is also compromised by the fact that its State Legislature only meets every two years. As a result, if a new funding mechanism needs to be approved to facilitate its wetland banking objectives, the cabinet may endure a three-year waiting period before implementation of any new measures are achieved.

Financing the long-term management of wetland mitigation sites established through these programs remains a perpetual challenge. Federal-aid funding is not available for long-term management of mitigation sites. Other State agencies or land/conservation trusts that assume ownership and management responsibilities for the sites in perpetuity are not receiving additional dollars to support their stewardship, and it is unclear how the ecological functions established at these sites will be maintained once USACE's enforcement authority expires. Minnesota is considering allocating a five-percent portion of its annual payment to BWSR, its mitigation agent, to be set aside for a management trust.

Independent studies of mitigation site management costs (e.g., see Center for Natural Lands Management, http://www.cnlm.org/par.html) suggest that the total costs associated with the long-term management of such sites, including the enforcement of conservation easements, can run from $100 to $1,000 per acre per year. Public access and recreational use of the sites can dramatically increase these costs. The center uses a property analysis record (PAR) methodology to help agencies determine the long-term management costs associated with perpetual mitigation site stewardship. An examination of this and other available tools, as well as an improved understanding of how to factor the contributions that volunteers make toward long-term land management, would be a useful resource for State transportation departments engaged in wetland mitigation banking.

In short, mitigation of project impacts is an eligible cost for participation with Federal-aid highway construction funds under both National Highway System and Surface Transportation programs, as well as other construction elements under the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). That remains the basic way in which wetlands mitigation, including banking, can be funded for Federal-aid highway projects. FHWA must work with State DOTs to clarify regulations and guidance regarding the use of Federal-aid construction funds to implement satisfactory procedures for such use in accordance with SAFETEA-LU. This applies to habitat banks as well as wetlands banks.

Engage inter-agency input in the adoption of functional assessment methodologies.

Functional assessment technology is still inadequate in general, or is not being fully implemented when it is appropriate. Assessment methodologies used to characterize wetland types and functions range from "best professional judgment" to meticulous data gathering and analysis based upon a specific methodology such as the Wetland Habitat Assessment Procedure (WHAP) or Habitat Evaluation Procedure (HEP). The *National Mitigation Action Plan* (*13*) outlines strategies for agencies to implement the hydrogeomorphic (HGM) approach to assessing wetland functions, and USACE advocates for its support and implementation. The States' experiences with using a specific methodology, adopting one, or transitioning to a new one (due, for example, to the formation of an MBRT), have suggested three recommendations concerning their use.

First, the USACE and other agencies should be directly involved in discussions and decision making related to the adoption of a functional assessment methodology. This is especially true for stream mitigation, which many States, save Minnesota, believe will be their next major issue of environmental concern. With the involvement of USACE, in particular, site proposals may be rejected or mitigation ratios increased. Nebraska has invited the USACE-Omaha District Office and other agencies to participate in training on functional assessment methods. North Carolina uses an MBRT-like entity called the PACG (Program Assessment and Advisory Group) to regularly discuss acceptable assessment methodologies and performance standards. Good communication about functional assessment methods is critical as this dictates the way in which credits are calculated and released through the course of a mitigation project.

Second, the scan team discovered that some assessment methodologies demonstrated a "bias" for one function over another in the wetland mitigation sites developed. For example, Alabama and Kentucky work very closely with their State and federal wildlife and fisheries agencies, and thus their sites are often designed as waterfowl management areas to be opened eventually for hunting and recreation. TxDOT's adoption of the WHAP methodology reflects a bias for wildlife functions as well. While this is an entirely acceptable objective, the scan team noticed that water quality objectives (e.g., flood/storm water retention, highway runoff filtration, etc.) were usually not considered fully, and in some cases, could add to the functional values of the sites developed. This was especially true for TxDOT's Coastal Bottomlands mitigation

bank site, which has significant water storage and water quality functions, although it does not currently receive credits for these functions.

Some States, like Alabama and Ohio, receive credits for endangered species habitat on their wetland sites, while this is prohibited in other States. Credit for stream mitigation on existing wetland bank sites is also prohibited and considered "double dipping." Failure to recognize the value of these functions on a wetland mitigation site is not always practical from an ecosystem perspective, and regulatory agencies may want to consider on a case-by-case basis when allowing additional credits for wildlife habitat or stream mitigation on wetland bank sites is appropriate.

Third, the value of *buffers* and *preservation* credit ratios should be more carefully scrutinized. Vegetated buffers filter water runoff prior to discharge into an aquatic area. These buffers also can provide a corridor for wildlife migration. An upland buffer can, of course, be valuable habitat in itself. Some States give credit for upland buffers abutting wetlands. Credit should be given to buffers as they are becoming a requirement for mitigation sites and provide definitive ecological benefits. With regard to credit ratios for preservation, current guidance states that preservation should be used only in exceptional circumstances and only in coordination with a restoration activity (*6*). Many of the State DOTs visited on the scan, however, made a strong case for preserving unique or rare habitat types over restoring lesser functioning ones in some watersheds. Bottomland hardwood forest wetlands, for example, which can require 50-100 years to restore might be best pursued as a preservation objective, rather than as a restoration or enhancement activity. North Carolina, which is in the process of developing an extensive network of watershed plans at the local level, is discovering through this process, that sometimes "replacing a wetland with a wetland" does not make good ecological sense from an ecosystem perspective. Similarly, the Ohio EPA is currently establishing biological criteria for water quality that may significantly influence the way the State evaluates mitigation within its watersheds. As science advances and as professionals learn more about the biological aspects of watersheds, it may become necessary to place more value on the role of preservation and other kinds of "exceptional" mitigation in wetland mitigation plans.

Invest more research and technology transfer in invasive plant control and vegetation management.

Of all the technical issues raised with regard to site maintenance, dealing with invasive plant species is by far the most prevalent issue of concern, followed by planting regimens and vegetation management. Nearly all of the States are investing research dollars and project monies into the development of knowledge and tools that can help eradicate invasive plants or noxious weeds (such as the Chinese tallow tree in Texas and purple loosestrife in Minnesota). Minnesota DOT has developed remarkably successful strategies for harvesting native plant species and suppressing the spread of invasives through the establishment of diverse vegetation/landscape communities. Nebraska is utilizing prescribed burning and mowing regimens in combination with the grazing of goats for managing vegetation and controlling weeds on its wetland mitigation sites.

Next to hydrology and soils, vegetation is a critical indicator of a site's sustainability. When a mitigation bank site's operational life cycle is complete, it is invasive plants and noxious weeds, not to mention ecological degradation caused by unforeseen land use changes, that may pose the greatest threat to the long-term ecological integrity of the functions of wetland mitigation sites.

Actively promote and share success stories about innovative partnerships.

Opportunities for enhanced inter-agency relationships and innovative partnerships are where wetland mitigation banking offers the greatest lessons learned. Perhaps the most successful innovative partnerships observed on the scan are those in Texas, North Carolina, Kentucky, and Minnesota where a third-party "mitigation agent" has stepped in to manage the mitigation tasks that the State DOTs may be understaffed or lack the expertise to conduct, or that they may not be required to do. TXPWD, EEP, USFWS, and BWSR all play this role, differing only in the formality of their involvement and level of funding. With their input, State DOTs are able to achieve wetland mitigation objectives that are considered "outside the box" and that ultimately foster a more comprehensive, ecosystem perspective of wetland mitigation for the State.

Clarify the definition of a "bank."

According to the *1995 Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks*, mitigation banking is defined as "the restoration, creation, enhancement and, in exceptional circumstances, preservation of wetlands and/or other aquatic resources expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources."
While the concept was pioneered in the early 1980s by the U.S. Fish and Wildlife Service as a way for State agencies and large regulated entities to consolidate mitigation for many dispersed impacts, it has become an economically important commercial endeavour dominated by entrepreneurial providers of mitigation credits. DOT-established banks remain the largest single sector of non-commercial banks.

Perceptions of what constitutes a bank vary widely among the States visited. In some cases, the term *bank* carries a negative connotation, and some of the resource agencies and transportation agencies refuse to use it in their program name because a wetland mitigation *bank* may be perceived as a purely commercial enterprise. As one State agency staff person remarked, "We are not in the business of making money; we're in the business of getting credits." Moreover, banking can be perceived as a means of bypassing the sequencing requirement under the Section 404 regulations to avoid, minimize, and then compensate for the impacts of transportation projects on wetlands, although it has always been clear in Federal guidance that the availability of bank credits does not affect the sequence of mitigation steps. In States where agency relationships are still maturing, this perception may be evident – and to some extent, may inhibit creative thinking about the ecological benefits to be gained from banking.

On the other end of the spectrum, some States now consider the term "banking" irrelevant. North Carolina and Minnesota, for example, have adopted comprehensive, Statewide approaches to compensatory mitigation at the ecosystem level, moving beyond the usual political, biological, and geographical boundaries inherent in traditional concepts of banking.

In the realm of compensatory mitigation, the desired outcome is ultimately what is most important, and that is economically efficient and flexible mitigation opportunities that replace essential aquatic functions for wetland and other aquatic resource losses in a manner that contributes to the long-term ecological functioning of a watershed.

Technology Transfer Plan

The results of the 2005 FHWA Domestic Scan Tour of Successful Wetland Mitigation Programs will be disseminated broadly throughout the federal and State agencies involved with wetland mitigation banking initiatives. At a minimum the following forms of information exchange will occur:

- Dissemination of final report to scan tour team members and local participants, as well as to the agency managers and decision makers involved in establishing wetland mitigation banking regulations, policies, and guidance.

- Inclusion of a keyword-searchable, accessible version of the final report in electronic format on the FHWA Web site. Other agencies participating in the scan will be encouraged to post the electronic version of the report on their respective Web sites as well.

- Development of a narrative Web summary and photo gallery of the scan tour on the technology transfer section of the Web site of the Center for Transportation and the Environment at North Carolina State University. Links will be established between the CTE site and applicable agency sites.

- Development of articles for inclusion in agency/industry newsletters and professional journals. Example publications include *Public Roads*, *Greener Roadsides*, Environmental Law Institute's *National Wetlands Newsletter*, etc.

- Conduct of a national satellite broadcast and Web simulcast of the scan tour results featuring a panel of scan team members and local scan tour participants. The broadcast will be produced as part of CTE's National Teleconference Series and archived on the CTE Web site as well as made available for distribution via DVD and written transcript.

- Presentation of scan tour results at regional and national wetland mitigation/banking conferences and related events, such as the National Mitigation and Conservation Banking Conference, International Conference on Ecology and Transportation, AASHTO Standing Committee on the Environment Annual Meeting, Transportation Research Board Annual Meeting, TRB Task Force on Ecology and Transportation Midyear Meeting, Annual Wetlands and Watersheds Workshop, and Society of Wetland Scientists Annual Meeting.

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(7) Federal Guidance on the Use of the TEA-21 Banking Preference to Fulfill Mitigation Requirements Under Section 404 of the Clean Water Act. July 11, 2003. Web site: http://www.fhwa.dot.gov/environment/wetland/tea21bnk.htm. Accessed: December 1, 2005.

(8) Memorandum of Agreement for the Anderson Tract Mitigation Project for Highway Impacts to Wetlands Requiring Department of the Army Permits. October 27, 1994. Signatories: U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, Texas Parks and Wildlife Department, Texas Natural Resource Conservation Commission, and Texas Department of Transportation.

(9) U.S. Geological Survey National Water Summary on Wetland Resources. Web site: http://water.usgs.gov/nwsum/WSP2425/State_highlights_summary.html. Accessed: December 1, 2005.

(10) Homepage of the Ecosystem Enhancement Program. http://www.nceep.net/pages/abouteep.html. Accessed on December 1, 2005.

(11) Lawrence, Karen, Robert Brumbaugh, Mike Gilbert, et al. The U.S. Army Corps of Engineers' Guidance for Compensatory Mitigation and Mitigation Banking in the Omaha District. December 2004.

(12) *Report on Compensatory Wetland Replacement Programs, Chapter 105 Water Obstruction and Encroachment Program*. January 2004. Pennsylvania Department of Environmental Protection.

(13) National Wetlands Mitigation Action Plan. Web site: http://www.mitigationactionplan.gov/. Accessed: December 1, 2005.

APPENDICES

Appendix A. List of Local Scan Tour Participants

Texas: March 8-11, 2005

Tom Bruechert, FHWA, Texas Division
Amy Lamson, FHWA, Texas PDP
Josephine (Jo) Jarrell, TxDOT, ENV
Stanley Cooper, TxDOT, HOU
Paul Smith, TxDOT, BMT
Jay Tullos, TxDOT, TYL
Sam Watson, USACE, Galveston
Presley Hatcher, USACE, Ft. Worth
Todd Merendino, TPWD
Jim Sutherlin, TPWD
Nathan Garner, TPWD
Pat Clements, USFWS

North Carolina: March 29-31, 2005

John Sullivan, FHWA, NC Division
Donnie Brew, FHWA, NC Division
Roger Sheats, NCDOT
Craig Deal, NCDOT
David Franklin, USACE, Wilmington District
Dempsey Benton, NCDENR
Melanie Allen, EEP Project Manager
Barb Satler, EEP
Suzanne Klimek, EEP
David Robinson, CTE/EEP
Chris Mitchner, EPA
Pete Benjamin, FWS
Lisa Creasman, Conservation Trust of North Carolina
Elaine Chiosso, Haw River Assembly

Alabama: April 5-7, 2005

John Shill, ALDOT
Bill Van Luchene, FHWA, Alabama Division
Rob Hurt, USFWS
Wade Wittinghill, COE
Ben Davis, Alabama Dept. of Conservation

Nebraska: April 26-28, 2005

Art Yonkey, Head of Planning & Project Development Division, NDOR
Cindy Veys, Environmental Section Manager, NDOR
Leonard Sand, Environmental Analyst Supervisor, NDOR
Jason Jurgens, Environmental Program Manager, Wetlands & Permits, NDOR
Tony Ringenberg, Biologist, NDOR
Steve Duecker, Wetland Biologist, NDOR
Carol Wienhold, Wetland Biologist, NDOR
Wyatt Webster, NDOR
Robert Tusa, Environmental Analyst, NDOR
Dale Vagts, NDOR
Ed Kosola, Environmental/Realty Officer, FHWA-NE
John Snowdon, Environmental Specialist , FHWA-NE
Jennifer Ousley, Nebraska 404/Wetlands Coordinator, USEPA Region 7
Bob Harms, Senior Biologist, USFWS, Grand Island

Ted Lagrange, Wildlife & Wetland Specialist, NE Game & Parks Commission
John Bender, Water Quality Standards Coordinator, NE Department of Quality
John Moeschen, Environmental Specialist, USACE, Omaha District, Regulatory Office
Matt Wray, Environmental Specialist, USACE, Omaha District, Regulatory Office

Ohio: May 3-5, 2005

Dave Snyder, FHWA-Ohio Division
Herman Rodrigo, FHWA-Ohio Division
Bill Cody, ODOT, Central Office
John Baird, ODOT, Central Office
Matt Raymond, ODOT, Central Office
Mike Pettegrew, ODOT, Central Office
Rebecca Rutherford, USACE, Huntington
Ken Lammers, USFWS, Reynoldsburg
Tom Linkous, ODNR, Division of Natural Areas & Preserves
Randy Sanders, ODNR, Division of Real EState & Land Management

Pennsylvania: June 14-16, 2005

Ross Mantione, FHWA-Pennsylvania Division
Danielle Shellenberger, PennDOT
Toni Zawisa, PennDOT
Mark Lombard, PennDOT
Stu Kehler, PennDOT
PA Dept. of Env. Protection
USACE, PA Division
USEPA, PA Division

Kentucky: June 21-23, 2005

Anthony Goodman, FHWA-Kentucky Division
John Dovak, KYTC
David Waldner, KYTC
John Mettille, KYTC
Ricky Young, KYTC
Lee Andrews, USFWS

Minnesota: June 28-30, 2005

Steve Eggers, USACE
Dan Stinnett, USFWS
Sue Ellston, USEPA, Chicago
Tom Mings, BWSR
Greg Larson, BWSR
Dave Weirens, BWSR
Doug Norris, MnDNR
Bruce Gerbig, MnDNR
Larry Zdon, MnPCA
Frank Pafko, MnDOT
Sarma Straumanis, MnDOT
Bob Jacobson, MnDOT
Cheryl Martin, FHWA
Sarah Koepke, FHWA

Appendix B. Summary of Responses to the Preliminary Questionnaire

Each State completed a questionnaire prior to the scan team site visit. The following is a summary of the responses.

1. Please provide the full title of your State's wetland mitigation program.

Texas: Untitled
North Carolina: N.C. Ecosystem Enhancement Program
Alabama: State of Alabama Department of Transportation's Wetland Mitigation Bank
Nebraska: Environmental Permits Unit (EPU)
Ohio: N/A, Ohio DOT has not named its wetland mitigation program.
Pennsylvania: No specific name; the State DOT doesn't consider itself to have a wetland program.
Kentucky: KYTC Stream and Wetland Mitigation Program
Minnesota: Minnesota Wetland Mitigation Banking Cooperative for Public Roads

2. Provide the primary point of contact for information regarding this program.

TX: Duncan Stewart, dstewar@dot.State.tx.us
NC: Bill Gilmore, Director, bill.gilmore@ncmail.net
AL: John Shill, Assistant Environmental Coordinator, Alabama DOT, shillj@dot.State.al.us
NE: Jason Jurgens, EPU Unit Supervisor, jjurgens@dor.State.ne.us
OH: Bill Cody, Assistant Environmental Administrator, ODOT Office of Environmental Services
PA: Stuart Kehler, Environmental Manager, skehler@State.pa.us
KY: John Dovak, John.Dovak@ky.gov
MN: Sarma Straumanis, Minnesota Department of Transportation (MnDOT), sarma.straumanis@dot.State.mn.us

3. If there is a Web site affiliated with this program, please provide the URL.

TX: N/A
NC: www.nceep.net
AL: N/A
NE: N/A
OH: N/A
PA: N/A
KY: N/A
MN: www.bwsr.State.mn.us

4. In what year did your wetlands program begin operation?

TX: The wetland mitigation banking program started in 1992. The general wetland mitigation program was in operation prior to 1992 for on-site mitigation efforts.
NC: The Ecosystem Enhancement Program began operations in July 2003.
AL: We had a small 80 acre bank in 1991 at Wheeler Wildlife Refuge. Our present bank agreement was completed in 1996.
NE: 1990.
OH: ODOT's first wetland mitigation site (Gallia County US Route 35 wetland mitigation area) was constructed in June of 1990.
PA: Wetland mitigation was initiated in the 1980s as response to regulatory requirements. Not viewed as a program. Wetland Mitigation Banking Program – was conceptualized in the early 1990s, initiated with two pilot Engineering Districts under the name "Advanced Wetland Compensation" and a Statewide Agreement for Wetland Banking was executed with the permitting agencies in 2002. Our Engineering District 9-0 and 2-0began an aggressive program in 1995.
KY: KYTC began wetland mitigation in 1995. The new KYTC Stream and Wetland Mitigation Program partnership with USFWS is just now being implemented.
MN: 1991 legislation – Wetlands Conservation Act (WCA), 1994 WCA implementation, 1996 local road wetland replacement program.

5. Who and/or what events served as the major catalysts for the program?

TX: Economies of scale-vs- cost of on-site (piecemeal) mitigation efforts.

NC: During the mid-1990s, the State began to experience increased project delays in transportation-infrastructure improvements because of shortcomings in meeting Federal clean-water permitting requirements. In response, the State began a process-improvement initiative in 2001 that involved input from 10 State and Federal environmental agencies. The task force examined the procedures of two State departments – Transportation and Environment and Natural Resources – working independently to compensate for development through wetland and stream mitigation. The panel found significant inefficiency in both systems and recommended a bold new approach. North Carolina would address the challenge of balancing needed growth with environmental protection by making the State's environmental agency – not its transportation agency – responsible for providing all off-site mitigation to compensate for the unavoidable environmental impacts of new transportation infrastructure. And, in carrying out this mission, North Carolina would base its mitigation on a solid foundation of watershed planning that goes beyond mere environmental-permitting compliance. The most compelling aspect of EEP's fresh approach is the proactive nature of its mission. Funds are invested in advance by the State's transportation leadership for environmental protection, before damage to wetlands and waterways will occur. EEP thus allows North Carolina to stockpile offsets years in advance of the time when they will be needed to clear permitting hurdles for transportation improvements and other economic development.

AL: Projects were being held at the permit stage due to disagreements over mitigation ratios. Mitigation on-site was becoming more and more difficult, not very productive and very difficult to maintain. President George H.W. Bush's policy of no net loss made it easier to negotiate the memorandum for a bank with the resource agencies.

NE: NDOR received a Cease and Desist Order from the U.S. Army Corps of Engineers (USACE).

OH: The Gallia County roadway project required compensatory mitigation under the 404 permit from the USACE.

PA: Requests for significant replacement ratios due to anticipated "lag" time in replacing wetland habitats that are impacted served as a catalyst. Advanced Wetland Compensation was initiated in Pennsylvania by two of our District Environmental Managers/ Assistant Environmental Managers, Stuart Kehler and Sandra Tosca.

KY: The new program will help KYTC expedite the 404/401 permitting process. The driving force behind the development of the new program is the USFWS and their desire to merge the development of KYTC stream and wetland mitigation sites with their agency mission of improving wildlife habitat in Kentucky.

MN: In the mid-1980's, Frank Pafko (Mn/DOT) and Jim St. John (Federal Highway Administration (FHWA) – Minnesota Division Office) attended the United States Fish & Wildlife Service (USF&WS) course "Habitat Evaluation Procedures". After attending the course, they worked with the USF&WS (the United States Army Corps of Engineers (USACOE) allowed the USF&WS to act as their proxy) and implemented in 1987 a Wetland Habitat Mitigation Bank. This bank became the catalyst to include banks in the subsequent WCA legislation in 1991.

6. How many months/years of preparation were required to launch the program?

TX: Approximately 2 years for the banking program.

NC: The process-improvement initiative that led to EEP's creation began in the summer of 2001. Along with NCDOT, NCDENR and USACE, the task force included representatives from State and federal regulatory agencies with interests in water quality, endangered-species protection, coastal resource management, highway-infrastructure development and environmental protection. The task force was charged with finding a new approach to compensating for unavoidable damage from transportation construction and other economic development. Among the problems to be addressed were unacceptable delays because of inadequate or inappropriate mitigation; substandard environmental results of implemented mitigation; and a lack of consistency in mitigation oversight among regulatory agencies.

AL: The memorandum took about 3 years. Our first attempt at a memorandum had approval from all of the agencies in 1994 except EPA. EPA balked at it because they were developing guidance for mitigation banks. We had to wait for them to complete their guidance before we could complete our memorandum.

NE: 1-2 Years for staffing and process development.

OH: The first project was designed and built as part of the major new construction project for the U.S. Route 35, 4 lane new location highway in Gallia County.

PA: It took about 5 years to reach the demonstration project stage, another 5 years to attain the Statewide Agreement and implementation of wetland banks is off to slow start, due primarily to the lack of dedicated project money to wetland banking and competing priorities for staff time. District 9-0 had there program running in approximately 1 year.

KY: MOA under discussion for 6 (?) months and it is now currently being implemented.

MN: Three years after legislation (1994).

7. What were the key obstacles or challenges that had to be addressed at this early stage?

TX: No official guidance was established by the USAC. State owned mitigation banks had never been established before in Texas. Justifying preservation (Blue Elbow) was worthy of consideration in Texas for this type of wetland habitat.

NC: The process-improvement initiative that led to EEP's creation identified early on a key factor that would influence the fate of rethinking mitigation practices in North Carolina. If a bold new approach were to succeed, then the program's sponsors would have to learn to abandon the status quo. Specifically, the collaborating sponsors would need to resist denial of the needed change, avoid direct resistance to moving forward, creatively explore new roles and relationships, and commit fully to the concept of EEP.

AL: Another obstacle was the fact that Alabama has nine river basins and the agencies wanted each basin to have a mitigation area. It would have been impossible to get nine banks on line quickly enough to supply credits in each basin to keep the highway construction program going Statewide. We developed a method where we would commit to developing a site in each basin, but, in the mean time, we were allowed to borrow credits from the completed bank sites to us in the sites that were not complete.

NE: Changing NDOR's corporate attitude that wetlands should not be a key consideration in project design was a very large obstacle. Setting up the process of communication between the Roadway Design, Bridge and Project Development Divisions was a challenge. Obtaining the trust of the USACE was also a challenge.

OH: ODOT had to secure legislative authority to utilize transportation funding for the purchase of property for the purpose of wetland mitigation. Other key obstacles and challenges included our lack of experience with wetland design, construction, and monitoring.

PA: Initial obstacles were the result of wetland banking being a new concept that had not reached acceptance of the permitting agencies at the time, thus the effort to dub it "advanced wetland compensation" as opposed to "wetland banking". The Statewide Agreement languished in development due primarily to one ACOE District being fundamentally opposed to the overall concept. This District remains philosophically opposed and to date no wetland banks have been established in that ACOE District. The critical roadblock to full implementation at this time is the lack of dedicated funding or a mandate to MPOs and LDDs to program wetland banking projects on the TIP. Wetland Banking projects must compete with road projects and therefore under political pressures or budgetary constraints they are bumped from the TIIP.

KY: FUNDING, FUNDING, FUNDING!!!!!

MN: The key challenges were the following: philosophical battle – concentric circles versus quantum leap (i.e. on-site mitigation versus off-site mitigation); northern part of State versus southern part of State; diverse geography; diverse stakeholder perspectives; diverse wetland types; diverse land use; diverse federal and State agency involvement; diverse hydrology; the nomenclature – the system versus sites; making the same assumptions for both debits and credits; commitment to no net loss; equating habitat units with banks. Pre-WCA – habitat function were the most important, other functions and values were ignored.

8. Did any new obstacles/challenges present themselves following the program launch?

TX: The 1995 USACE guidance on establishing wetland mitigation banks. TxDOT had already established two wetland banks prior to the USACE guidance being issued. The third bank that was proposed to be established had to follow the guidance and was therefore approached differently by the MBRT and "new" to contend with. Another issue at times continues to be justifying use of credits from an MBRT approved preservation style bank depending on what USACE District TxDOT is requesting approval from.

NC: Executing the change process did not always go smoothly and some implementation issues have been slow to resolve. The sponsoring agencies have wrestled with integrating new business processes laid out in the memorandum of agreement, which in turn affected EEP's timelines and its ability to carry out its mission. For example, NCDOT did not fully realize the importance of its evolving role in the arrangement in terms of planning, project management and determining accurately the impacts that would require mitigation. USACE needed to adjust for the effects of EEP on its own regulatory procedures involving mitigation crediting and accounting. And, NCDENR was forced to resolve issues including new roles for the department's internal enforcement divisions in mitigation, and creation of effective auditing processes to validate water-quality permitting requirements.

AL: Recently the Mitigation Bank Review Team has really gotten organized. They oversee not just ALDOT's Bank but private and other governmental banks around Alabama and Mississippi. Our documentation of the mitigation plan and our monitoring has really increased. Lately the time needed to get a bank site project underway has really increased.

NE: Yes, a large backlog of projects to be delineated and permitted created an obstacle to getting projects let to construction in a timely manner. Development of a wetland mitigation banking program and banking instrument was a challenge in the infancy of our program as well as it being in its infancy at the USACE. Changing policies, guidance and regulations through the years has always been a challenge. Finding willing sellers of mitigation ground is a lot of work and can be both a challenge or an obstacle late in the acquisition stage. New legislation was needed to allow for condemnation of mitigation sites.

OH: Yes, new challenges included changing regulations, which made planning and implementation difficult. ODOT had to work through a long learning curve. We had to develop a mitigation design, construction and post construction monitoring protocols for the wetland mitigation.

PA: See above and also locating suitable sites.

KY: FUNDING, FUNDING, FUNDING!!!!!

MN: Yes. BWSR worked for the local transportation agencies because it was too extensive for the local agencies to handle themselves. Local governmental units needed to be trained technically to implement the act. Diminimus rules – implementation standards too onerous. Measures to earn replacement credits were expanded. The USACOE perspective was different from the State of Minnesota perspective.

9. What is the annual operating budget for your program? How is it funded? What are the major budget line items?

TX: TxDOT Districts provide mitigation and monitoring funds for each mitigation project from the overall project budget, or in some cases, Right of Way funds may be available. The three mitigation banks were purchased in fee simple and are managed by the Texas Parks and Wildlife Department.

NC: The EEP is funded on a fee structure proportional to demand. The N.C. Department of Transportation authorized spending by the EEP for advance programmatic mitigation as forecasted in the State's seven-year Transportation Improvement Plan at a level of about $189 million for the current biennium. The total included $15 million for administration, $47 million for restoration activities, $121 million for high-quality preservation site acquisition, and $6 million for project research and development. About 60 percent of the EEP's funding derives from this source to offset real and anticipated environmental impacts from transportation-infrastructure improvements.

AL: We develop PE, ROW, and construction budgets for each project as it begins. This money usually has Federal participation. There is no set annual budget for our program except for our maintenance budget which is approximately $30,000 per year. Most of our sites are in some stage of development and are still being covered by the original budgets with Federal participation.

NE: We do not have our annual budget broken down into line items by program. The entire environmental section's portion of the Divisions budget is approximately $900,000/year. Our budget is primarily State funds.

OH: Ohio DOT does not have a stand alone annual operating budget for a wetland mitigation program. Funding is mostly thorough project development. Funds are usually contract line items that are developed as part of the roadway construction project.

PA: An operating budget does not exist. In the absence of dedicated funding attempts are made to identify projects with adequate budgets in each service area requiring mitigation and utilize those project budgets to construct/restore greater amounts of wetland than required for the individual project. In some instances 100% State and or County Maintenance funds have been utilized to establish wetland banks/advanced wetland compensation sites.

KY: Approximately $2 million dollars in Federal and State transportation funds support the program. The major line items are construction and monitoring.

MN: $3 Million ($2 Million in State bonding money and $1 Million MnDOT funds). Funded by the State general fund. Acquisition, design, construction (development), administration, monitoring, and site management are the major budget line items.

10. What kind of partnerships or cooperative agreements are currently in place to support the program's long-term administration and maintenance?

TX: Texas Parks and Wildlife Department manages the three banks and each TxDOT District is responsible for all compensatory mitigation.

NC: The program was created under a memorandum of agreement among the N.C. Department of Transportation, the N.C. Department of Environment and Natural Resources and the U.S. Army Corps of Engineers (USACE) in July 2003. Furthermore, in order to create a spirit of commitment and cooperation critical to EEP's development, a distinctive organizational approach was devised: EEP would rely on the counsel of a program-assessment advisory panel comprised of federal and State regulatory agencies, which reviews policy decisions made by EEP management. The panel addresses ongoing issues affecting EEP's operations, evaluates program accomplishments and shortfalls, and helps to manage interagency process improvements. Finally, to ensure that EEP's accountability and credibility with external stakeholders would not be undermined, the program took the proactive step of establishing a liaison council made up of non-governmental mitigation stakeholders. The panel has provided recommendations on EEP's structure, mission and operations, and is briefed on progress three times annually. Members include representatives of the State's environmental, business, contracting, engineering and land-trust communities.

AL: We have a memorandum with Montgomery County to use our 1250 acre Catoma Creek Wetland Mitigation Area as a county environmental park. Upon completion of our mitigation activities the site will be given to the County. Several are proposed with the Alabama Department of Conservation and Natural Resources, but none of these have been completed. One of these is a site in Jackson County where we have developed a waterfowl management area to be deeded to the Alabama Wildlife and Freshwater Fisheries Division.

NE: Wetland Banking Instrument with the USACE, NEPA Merge Agreement between USACE, U.S. Fish and Wildlife Service (USFWS), Nebraska Game and Parks Commission (NGPC), U.S. Environmental Protection Agency (USEPA), Nebraska Dept. of Environmental Quality (NDEQ).

OH: Ohio DOT does not have any overall formal agreements for a wetland mitigation program with other agencies; projects are developed on a case by case basis. OHIO DOT has worked with the Ohio Department of Natural Resources, School districts, and local governments to build wetland mitigation areas. Long term administration and maintenance, beyond regulatory agency required monitoring periods, is accomplished by the agency that owns the land.

PA: Cooperative agreements to locate sites on State gamelands, parklands and forest land exist, also with a State correctional facility. These agreements eliminate ROW costs and provide a long-term maintenance entity. Note, however, that not all sites are located on these lands although attempts are made to attempt to identify potential sites on these lands first. Perpetual conservation easements and fee simple land purchases are also used. The Statewide wetland banking agreement/instrument provides maintenance and administration requirements. The ACOE Mitigation and Monitoring Guidelines grandfather banks established under this and other similar agreements. In other words the requirements in these documents are controlling in regard to requirements for planning, design, construction and maintenance of wetland banking/advanced wetland compensation sites.

KY: The USFWS Cooperative Agreement.

MN: See attached draft MnDOT/BWSR Agreement. Also, old USACOE/State agreement, new cooperative agreement, and site specific MOU's for MnDOT sites turned over to the Minnesota Department of Natural Resources (MnDNR) for management.

11. Including funded positions, innovative inter-agency cooperation, and functional replacement, are there other non-traditional approaches to wetland mitigation that you credit with helping your program succeed?

TX: The wetland mitigation banks are managed by another State agency.

NC: EEP makes a practice of leveraging funds with other State and federal programs to increase project viability. The program's high-quality preservation aspect employs an interagency, science-based review process for selection of appropriate preservation sites. The program also relies on an advisory panel comprised of federal and State regulatory agencies which reviews policy decisions made by EEP management, addresses ongoing issues affecting EEP's operations, evaluates program accomplishments and shortfalls, and helps to manage interagency process improvements.

AL: The initial inter-agency cooperation was great. We were able to accomplish a lot of good mitigation at a good price; however, with the advent of private banking the MBRT has become increasingly more rigid with their guidelines to the point that agency cooperation is not as innovative.

NE: N/A

OH: Ohio EPA has an ODOT funded 401 review position which streamlines our review process and affords us the opportunity to set agencies priority for the review of our projects. Whenever feasible ODOT works with other State and local government agencies to build wetlands on their property (no land cost for ODOT and they agree to keep and maintain the wetland in perpetuity).

PA: Some technical assistance and support (beyond scoping field views and project review) has been provided through funded position/interagency funding agreement with USFWS. The Partners for Wildlife Program has provided this assistance provided it involves wetland restoration in advance of known wetland impacts (i.e. not directly mitigation related). Some individuals within the ACOE Pittsburgh District provided assistance in locating sites on their lands with designs pre-prepared that they did not have adequate funding to complete. Unfortunately, their Counsel and Management objected to PennDOT constructing these sites as wetland banks – citing inconsistency with their mission. Attempts were made to utilize preservation of a rare/unique balsam fir wetland community and all agencies save one reached agreement on this approach. State DEP wetland regulations prevented the use of this site for credits except in instances where ratios for mitigation would have been greater than 1:1, so it was not prudent for PennDOT to pursue the preservation site. The regulations in question are being revised. PennDOT will attempt to encourage revisions of the DEP regulations that recognize preservation wetland banks as potential replacement for all impacts. In addition, the assistance of The Western PA Conservancy and the Allegheny National Forest was provided in conducting a "bio-blitz" of the potential site – documenting rare species and significant vegetative diversity. In District 9-0 (specifically) there are no detailed design plans for our sites and decisions are made in the field. The District Environmental Unit had a person on site who was familiar with wetland construction to oversee day to day operations and provide guidance to the equipment operators on how to build the sites. We also used our own county maintenance forces to perform the work and were not bound by a written construction contract. This allowed for changes to be made during construction based on the actual field conditions and permitted "rough" grading, tree transplanting, and other wetland construction techniques that made each site unique and diverse. An as-built plan was then developed after each site was constructed.

KY: N/A

MN: Private wetland mitigation banks, active research program (e.g. restoration methods and technologies), BWSR assuming the mitigation responsibilities for local agency road projects and Mn/DOT projects, five-year active site management plans, attempting to restore the wetland type which naturally fits within an area (ecosystem and plant community approach), consistent and standardized reporting, strict hydrologic and vegetation restoration standards, specifying native species only and high biological diversity, specifying weed free mulch, and invasive species management and control.

12. Have you observed clear differences between created wetlands and restored wetlands in your program? How would you characterize these?

TX: Currently, there is a research project underway to assess this question.

NC: Not at this time; five years of monitoring has yet to occur and EEP is in the process of developing mitigation success criteria.

AL: We have some created wetlands that have been very successful, but on the whole restored and enhanced wetlands begin showing their potential in a more timely manner. In some constructed wetlands you have to be very concerned with hydrology regimes, and soils. To have a good constructed wetland, both of these constituents must be present. The hydrology is the most important. Given enough time the soils may develop on their own, but it is best if these soils are there from the beginning.

NE: We have observed clear differences between the two. Restored wetlands have a more rapid and diverse vegetative response, and often a greater variety of wetland types. Created wetlands represent more of a management problem for control of woody invasive species, whereas restorations typically do not. The soil profile and seedbank is present at restoration sites, whereas created sites typically entail massive soil moving and disturbance, resulting in sterile subsoil. Unless organic matter with topsoil is introduced, success is difficult. The secret to our success has been the stockpiling of the hydric soils from the impact sites, mixing it with topsoil and re-spreading it onto the creation site. Small created sites along projects may fulfill acreage replacement requirements, but more quickly change to woody vegetation, typha- or phalaris-dominated sites than do restored sites.

OH: Yes. Created wetlands always require more planning and tend to be more expensive to build (more earth work, concern about hydrology, more plantings). Restoration sites tend to be harder to locate on site with the project (within one mile). Ohio DOT strives to develop wetland restoration and enhancement projects for mitigation projects.

PA: Restoration sites are typically more successful and more cost effective. Restoration sites traditionally do not require liners, require fewer water control structures and other hard engineering components, exhibit wetland characteristics much more rapidly, exhibit greater vegetative diversity, etc. In District (9-0) all sites have been built in drained hydric soils and involved the construction of low level berms to trap and store surface water that normally would have flowed through the drainage systems. Depending on the definition one chooses, the sites could all be classified as wetland restoration sites because they were all most likely wetlands before the drainage systems were installed (late 1950's & early 1960's).

KY: Created wetlands function poorly, may require active management and are generally discouraged by the regulatory agencies. KYTC has chosen to purchase and restore Prior Converted wetlands for its program.

MN: Minnesota defines created wetlands as creation of a wetland where one never existed. Few wetlands in Minnesota are created. Creation means excavation. Most wetland projects consist of a combination of creation and restoration. Those few wetlands that have been created have been successful but they have cost a lot of money and required more attention for the same results as restoration.

13. To what extent, if any, has preservation of existing wetlands, whether adjacent to or independent of other creation or enhancement activities, served a role in your mitigation program successes?

TX: Currently, there is a research project underway to assess this question.

NC: As of January 31, 2005, approximately 5,800 acres of wetlands have been purchased through the high quality preservation initiative. All of these high quality preservation sites are independent of creation or enhancement activities. Transportation improvement projects that were permitted with this wetland preservation as part of the compensatory mitigation package impacted approximately 1,100 acres of wetlands. Preservation that has been acquired adjacent to restoration projects have primarily been an 'add-on' component of the project. In some cases we are purchasing restorable areas that are continuous with functioning streams, buffers, and wetlands and depending on the relative size (length or area) of the preservation we try to include that in the acquisition. For stretches of stream preservation upstream of a project it is most certainly a protective measure. Preservation is especially critical to projects where development pressures are likely to change land use directly next to conservation easement boundaries. Many wetland projects will be a mosaic of restoration, enhancement, and preservation. The benefit is to protect the functions that exist within the continuum of restoration to preservation (e.g., buffer functions).

AL: We were able to preserve a 600 acre site in Barbour and Pike Counties. This site was slated to be cut by a lumber company. It consists of old growth hardwood and cypress with a number of Tupelo gum sloughs. It is a very beautiful site.

NE: Preservation has served a minimal role in our mitigation program success, primarily because of the high mitigation ratios assigned to it (10:1 or greater). Sometimes part of a mitigation site will contain pre-existing wetland where preservation credit is granted. It is rare and minimal.

OH: The preservation of existing wetlands has only played a minor role in our overall program. State law requires that only the highest quality wetlands can be used for preservation. Also, mitigation credits only apply to impacts above the minimum 1 to 1 replacement ratio required by law (no net loss).

PA: Rarely has preservation been pursued as mitigation for a specific project. Generally, the concept has met with limited agency agreement and the potential for other opportunities must be exhausted first. In respect to wetland banking the one related experience is detailed in the response to question 11 above. Preservation was pursued in this instance due to the opportunity to preserve a rare and unique habitat. District 9-0 has preserved existing wetlands at four of our sites as a good faith effort to further demonstrate our commitment to environmental stewardship. The preservation of these wetlands made sense in the overall land agreement for each of the sites because of the location and extent of the wetlands.

KY: In Kentucky, KYTC has several wetland mitigation projects that have preserved existing jurisdictional wetlands as part of the total compensation plan.

MN: Have not used this approach, but could, according to the rule, in unique cases (a tool in the toolbox).

14. To what extent, if any, has the specification, protection, and management of non-wetland buffers served a role in your mitigation program successes?

TX: Currently, there is a research project underway to assess this question.

NC: Non-wetland buffers are protected in association with high quality stream preservation sites. The high quality preservation rules require that tracts meet two or more of a series of stringent criteria, and have mature woody vegetation in the buffer area. 300' of buffer, measured from the top of each stream bank, is protected by the EEP easements or fee simple purchases. All functions of the riparian areas are protected by the wider buffers, including riparian wildlife habitats and connectors.

AL: Non-wetland buffers have been used in only a few of our sites.

NE: Buffers have served a very small role in our success. Project success appears to be independent of buffers.

OH: The specification, protection, and management of non-wetland buffers have only played a minor part in our program. It is now required on all wetland mitigation projects. Wetland Buffers increase the size of the site, the cost to purchase the land, and long term management. We have received up to 0.25 acres of wetland mitigation credit for each acre of buffer on some wetland mitigation sites (case by case, negotiated).

PA: Landscape position seems to contribute to perceived success during monitoring. Sites that are buffered seem to receive acceptance by the resource agencies more readily than those surrounded by populated areas and urban land uses. In some instances it is not necessary to acquire the buffer areas to have a positive benefit to this perception, for example sites on State gamelands, parkland or forestland are provided with existing preserved buffers. Comprehensive, multi-component project specific natural resource mitigation plans have been viewed favorably. In these instances wetland, stream and terrestrial mitigation components are integrated into a package deal whereby stream and terrestrial components may provide buffer for the wetland component. District (9-0) has incorporated non-wetland buffers at four of our sites as a good faith effort to further demonstrate our commitment to environmental stewardship. Again, the buffer areas made sense in the overall land agreement for each of the sites because of their location and ability to provide additional valuable wildlife habitat at the mitigation areas.

KY: Non-wetland buffers have not played a significant role in our current wetlands program but with the implementation of the new program it is anticipated to play a very large role in its success.

MN: The program gives credit for upland buffers (public value credit), but only above the 1:1 replacement ratio. In urban areas, a 25-foot minimum is required and in rural areas, a 50-foot minimum is required for wetland mitigation banks. There is on-going discussion concerning buffer widths (they are possibly too small). Buffers are a controversial issue.

15. Does your State have a policy, position, or experience with using eminent domain laws for procuring mitigation sites and/or banks?

TX: While is would be legal to do so, such action would be under exceptional circumstances.

NC: EEP does not employ eminent domain. Acquisitions associated with our projects are voluntary.

AL: Presently, our policy is not to use eminent domain; however, we have considered changing this policy. We have no plans at this time to change the policy.

NE: NDOR uses eminent domain law to procure mitigation sites when necessary. We have avoided using it for bank sites to date. We try to avoid it for mitigation sites if possible.

OH: ODOT has legislative authority to utilize eminent domain for the acquisition of lands for the purpose of wetland mitigation. To date Ohio DOT eminent domain authority for wetland mitigation has not been tested in court.

PA: Many potential wetland mitigation/wetland bank restoration sites are currently in agricultural land uses (tile-drained – prior converted wetlands) in Pennsylvania. The State however, has a State regulation(s) that require the approval of an independent approval board (governor appointed) that reviews and approves projects in a hearing setting when condemnation of land in agricultural use is required. The "test" that this approval board must apply in their review is similar to a 4(f) test – otherwise known as the ALCAB Prudent and Reasonable Alternative Test. The approval board has been clear in case law that they will not approve condemnation of agricultural land for the purposes of wetland mitigation. Condemnation of other lands could be pursued, however, particularly in the case of wetland banks. To date Penndot' pursued voluntary willing land owners and acquires perpetual conservation easements deed restrictions, and land purchase agreements.

KY: We currently do not use eminent domain in this State for procuring mitigation sites.
MN: Specific project on-site mitigation uses eminent domain. Others, no.

16. Are all your compensatory mitigation sites and/or banks acquired as fee-simple real eState with deed-restricting covenants? Have you experiences with compensatory mitigation being conducted on lands via alternative legal instruments, including conservation easements? If so, have these presented challenges/opportunities not found with fee-simple property?

TX: In FY 2003, the Texas legislators approved fee in lieu for mitigation. The program has been used in Dallas, Houston and Yoakum Districts.
NC: The majority of our acquisitions are through conservation easements, but we have made some fee-simple purchases. Long-term stewardship of all properties acquired by EEP remains a challenge.
AL: All of ours are fee-simple with covenants. We have considered other methods. We are not aware of all the problems these types of arrangements would present.
NE: All of our mitigation and bank site acquisitions have been fee simple except for one. On the one conservation easement site we were invited to join some other natural resource agencies to complete a funding package to restore hydrology to an outstanding wet meadow. The conservation easement was already set up when we joined, so it offered us an opportunity to acquire mitigation credits while participating in an interagency effort.
OH: No. OHIO DOT's compensatory mitigation sites and/or banks are acquired fee-simple & as part of the highway right of way (no restrictions or covenants on the deed unless we partner with a different land owner). OHIO DOT has no experience with compensatory WETLAND mitigation being conducted on lands via alternative legal instruments, including conservation easements. OHIO DOT is currently using conservation easements for compensatory STREAM mitigation.
PA: See above. We have built 6 sites to date and they have involved the following right of way actions. District (9-0) has used the following:
* Cambria – written permission/agreement to build the site on State Gamelands. The property is still owned and governed by the PA Game Commission (PGC).
* Huntingdon – land transfer agreement to transfer the land from the State Correctional Institution at Huntingdon to PENNDOT
* Fulton – Fee simple acquisition
* Somerset - written permission/agreement to build the site on PA Turnpike property.
* Whitsel – perpetual conservation easement
* Mowry - perpetual conservation easement

KY: KYTC has chosen to acquire most of its wetland mitigation sites in fee simple. Stream mitigation on private property requires some form of permanent protection and this has proven to be a difficult issue as many landowners will not agree to permanent stream protection restrictions.
MN: Both fee-simple and easements. MnDOT owned mitigation sites are usually reconveyed to the MnDNR. However, because there are so many sites, the MnDNR is requesting money to maintain the sites. How do we build in an upfront fee system? State parks, State-owned land and MnDOT restoration and mitigation. Easements have presented challenges and opportunities – e.g. maintenance responsibility and long-term care, invasive species management. The system is relatively new (it has not aged), only 15 years old. Sometimes the site has not been engineered so the berm blows up – who is responsible? Maintaining structures – under agreement BWSR Engineer will review all designs. With easements – people can not recreate. With fee owned – people can recreate because it is publicly owned. Cost share money has strings attached, e.g. land owner can not run cattle. Perhaps easements are not followed through with perpetuity with change in ownership. Who enforces these conditions? All real eState documents allow regulatory agencies access to the land.

17. How many banks constitute your program? Where are they located?

TX: Three:
1. Anderson Tract: Tyler District, southeast of Mineola along the Neches River in Smith County
2. Blue Elbow Swamp: Beaumont District, just east of Orange in Orange County
3. Coastal Bottomlands: Houston District, just southwest of Barzoria in Brazoria County

NC: N/A
AL: We have one Memorandum of Agreement for the development of our bank. We have eleven sites which range in size from 30 acres to 1250 acres:
1. The Lillian Swamp Site is approximately 640 acres is located in Baldwin County adjacent to Perdido Bay. We are introducing a prescribed burn regime to return the area to a wet savanna.
2. The Styx River Site which is approximately 30 acres in size is also in Baldwin County. It is an old borrow pit which developed into pitcher plant and other insectivorous habitat. We have introduced a burn regime on this site to maintain the plants.
3. The Fowl River Site is approximately 700 acres in Mobile County. We are also trying to restore this area to a savanna habitat through the introduction of a prescribed burn regime.

4. The Dozier Site is approximately 500 acres on the Conecuh River in Crenshaw County. Our management plan is almost approved by the MBRT. We are enhancing a hardwood bottom wetland. Some of the adjacent uplands have been set aside for hunting by handicapped persons.

5. The Brantley Site is approximately 80 acres on the Conecuh River in Crenshaw County. We have restored a wetland along the banks of the Conecuh River.
6. The Pea River Site is located on the Pike and Barbour County Line. It is totally preservation of old growth cypress, hardwood, and tupelo gum swamp. It is approximately 600 acres.
7. The Catoma Creek Site is approximately 1250 acres in Montgomery County. We proposed to enhance a hardwood bottom wetland. We have a MOA with Montgomery County to develop this area into an environmental park for education and recreation.
8. The Sypsey Swamp is approximately 500 acres and is located in Tuscaloosa County. It is mostly preservation of a tupelo gum swamp with old growth hardwood wetland. This portion of the Sypsey River has been designated as a Natural Wonder of Alabama.
9. The Canoe Creek Site is approximately 100 acres and is located in St. Claire County. This is the restoration of a hardwood bottom wetland with some construction of an emergent wetland.
10. The Crow Creek Site is approximately 450 acres and is located in Jackson County. This is a combination of restoring a hardwood bottom wetland and creating a waterfowl management area.
11. The Town Creek Mitigation Site is approximately 500 acres in Lawrence County. This is a restoration of a hardwood bottom wetland.

NE: 18 sites Statewide.

OH: To date OHIO DOT has only one site that is being called a mitigation bank for wetlands (permit pending with the Louisville ACE). OHIO DOT has been successful at using consolidated sites (several projects are mitigated at the same location) and/or pooled sites (mitigation site is developed beyond the needs of a single project and extra credits are held for future use).

PA: Seventeen Banks exist or are in advanced design/construction. Will provide this upon the teams arrival in HBG. District (9-0) are located in the following: We have six sites on the ground and are looking for at least one more. The sites are located in distinct watersheds, also called sub-basins, based on PADEP mapping (West Branch Susquehanna River, Juniata River, Potomac River, Casselman River, Aughwick Creek, Conemaugh River). The goal of the program is to build at least one site in each sub-basin and multiple sites in our largest sub-basin (Juniata River). Currently we have sites in five of our sub-basins and have been actively looking for something in the sixth watershed (Conemaugh River).

KY: KYTC has 8 properties that were bought for the purpose of wetland mitigation, with several more being considered for purchase. They are located in all parts of the State, with the goal of having at least one per major watershed.

MN: Many BWSR banks. There are approximately 20 MnDOT banks.

18. Is there an active MBRT in your State/region/Corps district? If yes, what role does it play in the review, approval, and oversight of your banks/banking program?

TX: The MBRT reviews the use of the mitigation banks but has no oversight authority.

NC: N/A

AL: We have two separate mitigation bank review teams within the State. The largest area is within the Corps of Engineers' Mobile District. The Mobile District chairs this MBRT. The Nashville Corps of Engineers chairs the MBRT in the Tennessee Valley.

NE: We have an MBRT in our State. In the beginning they played a very important and active role in development of the banking instrument, as well as review, approval and oversight of our banking program. In recent years some of the original proponents of the program have moved on and it is getting more difficult to get many members to visit sites or provide coordinated reviews. To our knowledge the MBRT has not met much within the last 2 years, except occasionally to look at bank sites. It has been our experience that only a couple of the member agencies have shown up to look at our proposed sites. As a result, our most recent bank approval process was extended and difficult without a face to face meeting with the applicant and the MBRT.

OH: Yes there is an active MBRT in Ohio however Ohio DOT has elected not to go through their process. OHIO DOT develops wetland mitigation exclusively for transportation projects and has never tried to sell wetland credits (i.e., mitigation bank).

PA: The MBRT representatives vary depending upon region of the State. The make-up of the MBRT is basically the resource agency representatives that traditionally review PennDOT projects in the State. Many of the participants are funded positions.

KY: Yes, They review, approve, and oversee the wetland banking program.

MN: Technical Evaluation Panels (TEP's) are required under the Minnesota WCA. These TEP's are an MBRT-like team. USACOE has generally concurred with the TEP. The TEP essentially functions as the MBRT in Federal guidance. With the TEP – BWSR is the lead, with MBRT – USACOE is the lead. The USACOE has allowed the TEP to function as an MBRT. The WCA covers all wetlands.

19. What kind of consideration was given to establishing the bank service areas? Are there any spatial restrictions to mitigation?

TX: Bank usage is limited to certain watersheds. These boundaries were negotiated between USACE, TxDOT and the resource agencies.
NC: N/A

AL: The service area for each mitigation area was set at individual river basins and a coastal mitigation bank. We have so many major rivers in Alabama, we felt like that was a good way to start. As bank sites are completed and new ones are needed we try to find sites close to where highway development is anticipated. We also try to find sites which can be used by the public for recreation, fishing, hunting and education.
NE: It took five years to reach agreement among the agencies regarding bank service area boundaries. Initially the EPA proposed the HUC-8 boundaries. NDOR and other agencies felt that those watershed boundaries were too limiting and that the Major Land Resource Areas (MLRA's) used by the NRCS would be more appropriate. After 5 years of discussion and negotiation the MLRA was selected as the official boundary of the bank service areas. Spatial restrictions result in higher mitigation ratios if we propose to mitigate outside of the MLRA boundary.
OH: All Ohio DOT pooled and consolidated mitigation sites have service areas negotiated through the 404/401 permitting process. OHIO DOT's one mitigation bank site (pending approval) will follow the eight digit watershed hydrologic unit's (HUC) for Ohio. The HUC's are based on watershed boundaries.
PA: Considerable consideration by a large interagency team that developed the Statewide Wetland Banking Agreement was given to the establishment of service areas. (9-0) is divided up by specific watersheds called sub-basins as per Department of Environmental Protection.
KY: Wetland bank service areas correspond to the major watersheds of Kentucky.
MN: WCA identifies greater than 80%, 50% – 80%, and less than 50% of historical wetland drainage base. The USACOE has identified 8 service areas based on watersheds. Trying to reconcile the two approaches. Yes, the spatial restrictions to mitigation is that three WCA service areas can not be crossed.

20. What kind of assessment process do you use to determine banking credits or debits?

TX: This is negotiated with USACE on a project by project basis.
NC: N/A
AL: In the Mobile District, the MBRT has developed a template for determining credits. Basically, our credits were designated as two acres of restoration for one credit; three acres of constructed wetlands for one credit; and four acres of enhancement for one credit. For preservation credits we negotiate with the MBRT on a case by case method.
NE: Currently we use the Cowardin wetland classification system with acres as the currency. Site plans for each mitigation bank list ratios for created, restored, enhanced or preserved wetland acres.
OH: Mitigation debits are defined through the 404/401 permitting process. Mitigation credits (acres) are tracked and tabulated for each mitigation site. When credits are utilized a mitigation balance sheet is submitted to the USACE and Ohio EPA.
PA: Assessment is based upon requirements in the agreement/banking instrument that the wetland bank is built under and on wetland monitoring results. (9-0) Upon completion of the sites, an as-built plan is developed and wetland acreage and type are estimated based on water elevations and future wetland planting efforts. An "accounting spreadsheet" is then developed and the sites are used on an acre for acre basis by type of wetland (ie. 0.12 acre PEM).
KY: Wetland mitigation is acreage based depending on the level of wetland functions being lost. The minimum ratio is 2:1.
MN: Acres by wetland type and also functional assessment is allowed.

21. Through TEA-21, Federal funding was made available to purchase mitigation bank credits. Are you using Federal funds accordingly in your program? Why or why not?

TX: No Federal funds were used to establish any of the TxDOT wetland mitigation banks. TxDOT reserves the use of Federal funding for construction of projects, if credits are used from the TxDOT banks no fee is charged, since they own the credits outright. If private bank credits are purchased then the costs for those purchased credits are charged to the Federal-aid highway project number as a part of the construction cost.
NC: N/A
AL: We have bought credits from a private bank with State funds only. We will probably use Federal funds to acquire more of these type credits in the future.
NE: We do not buy credits from private banks. We use State funds for our wetland bank site purchases.
OH: Yes. In Ohio a combination of State and Federal funds are used to develop mitigation.

PA: Not to my knowledge. Entities offering wetland banking credits have not been successful in Pennsylvania. The number of wetland acres impacted by all permit applicants Statewide is too minimal and too scattered over watersheds to entice entrepreneurs. The only existing entrepreneurial wetland bank in the State (that we are aware of) was initiated (propped up) through the existence of a significant highway project. If not for that project the bank would not exist.

KY: Yes, we are trying! TEA-21 was so vague in its explanation of how to go about using Federal funds to purchase banking credits; it has been the hardest obstacle to overcome.

MN: No. The Area Transportation Partnerships (ATP's) control the Federal funds in Minnesota and Minnesota uses their Federal funds primarily for construction. Possibly used some Transportation Enhancement funding.

22. Does your program involve the use of entrepreneurial or public banks? In your estimation, which have more success and why?

TX: As Stated above, the in lieu fee program is relatively new, and has not been evaluated.

NC: N/A

AL: Yes, we have acquired approximately 50 credits from a private bank. We plan to acquire approximately 200 more credits from this bank. There are so few private banks in Alabama that it would be hard to say if they are successful or not.

NE: N/A

OH: ODOT has used both entrepreneurial and public banks. The entrepreneurial banks have been more successful because they are located in more watersheds and are available for use.

PA: Only in one instance. See above.

KY: KYTC has not used entrepreneurial wetland banks in the past as few exist in Kentucky. In the future, we are exploring the use of for-profit stream mitigation banks.

MN: Yes, both. Most are subpar with today's standards. Quality is less consistent and they are smaller sites. Entrepreneurial sites are used minimally. Public sites tend to be better, designed by professionals, held to a higher standard by regulatory agencies. Science has advanced after the first private ones.

23. What percentage of your mitigation needs are met through your own single-use banks? What percentage through purchases at third-party banks?

TX: TxDOT is very decentralized and these figures are not compiled.

NC: N/A

AL: About ninety-five percent of our credits come from our bank and approximately five percent from private banks.

NE: 100% through single-use banks and none through purchases at third-party banks.

OH: Overall we estimate that 60 % of wetland mitigation for OHIO DOT projects are developed as pooled mitigation sites and 40 % at third party banks. Although Ohio DOT utilized single–use banks many of our mitigation sites are developed as consolidated or pooled mitigation areas where multiple projects are mitigated.

PA: 99% through our own project specific or our own wetland mitigation banks. (9-0) Our District's mitigation needs are primarily met through our own AWC sites (~90%). We still need to construct a site in the Conemaugh River sub-basin so we are currently using conventional means of wetland mitigation in those areas. The main intent of our AWC program was to use the AWC sites for our smaller bridge replacement and minor roadway widening projects. Our larger projects on new alignment will involve a combination of new wetland mitigation sites and use of the AWC sites as a comprehensive mitigation package.

KY: 100% through single-use banks and none through purchases at third-party banks.

MN: 90% single-use and 10% third-party approximately. Requirements are tied to funding that restricts BWSR's use.

24. Does your program now, or has it ever, involve(d) the use of in-lieu fee mitigation as an alternative form of banking? If so, who is/was the manager/executor of this mitigation fund?

TX: This program has not been evaluated since it 2003 inception.

NC: N/A

AL: Once ALDOT paid money into programs administered by the Alabama Wildlife and Freshwater Fisheries Division for wetland credits. This was only a one time effort, but we would be receptive to another opportunity.

NE: No in-lieu fee use.

OH: No. Ohio DOT has not used in-lieu fee mitigation as an alternative form of wetland banking. We are currently working on an in-lieu stream mitigation fund with the USACE and ODNR.

PA: Yes, our PA Department of Environmental Resources (State wetland permitting agency) has an in-lieu fee mitigation program that we utilize for minor impacts (only applicable to minor impacts). Ken Reisinger/Kelly Heffner are the program managers for the DEP.

KY: In-lieu fee mitigation has been an option for stream losses in Kentucky since 1998. Jim Townsend of the Louisville Corp District is the head of the Mitigation Review Team.
MN: N/A

25. In your estimation, has the in-lieu fee arrangement produced satisfactory and measurable results in on-the-ground mitigation successes?

TX: This program has not been evaluated since it 2003 inception.
NC: N/A
AL: It worked very well. They were able to develop more wetlands for waterfowl habitat.
NE: N/A
OH: N/A
PA: Yes, DEP reporting documents a fairly successful program.
KY: The expenditure of ILF monies was much more difficult than expected. The question of what form headwater stream mitigation should take and the problem of permanently protecting stream mitigation sites on private property has limited the number of available mitigation sites.
MN: N/A

26. How have other regulatory agencies and the public received the in-lieu-fee mitigation arrangement?

TX: N/A
NC: N/A
AL: For the most part they have been receptive, especially where they are shown up front where the money is going to be spent and what we can expect the results to be.
NE: N/A
OH: N/A
PA: Received favorably.
KY: ILF mitigation is nobody's first choice. It is however a necessary tool for both KYTC and the regulatory agencies so that 404 permits can be processed in a timely manner. Kentucky could do a better job of communicating the successes that the ILF program has already had.
MN: N/A. Private bankers deplore it. Other agencies are skeptical but are not ruling it out for future use.

27. What criteria, if any, have been established to monitor/measure the effectiveness of your program?

TX: N/A
NC: At present, effectiveness is measured on compliance and delays in projects under the State Transportation Improvement Plan (no such delays have occurred since the program became operational in July 2003 because of a lack of mitigation), EEP is moving forward on development of environmental monitoring and success criteria.
AL: The Mobile District MBRT has developed a quite regimented monitoring program which is outlined in their management plan template. It ranges from monitoring success of planting to monitoring success of prescribed burns.
NE: We are currently tracking two performance measures. 1) Measurement of wetland acres filled versus wetland acres replaced, restored, created or preserved; and 2) Measurement of the acres of wetlands habitat developed above and beyond our past and present project replacement needs (a measure of temporal gain).
OH: ODOT has developed a standardized monitoring protocol that includes two site visits per year for 5 years. Recently (within the last two years) OEPA has developed a new labor intensive vegetative index of biotic integrity monitoring protocol for wetland mitigation sites. OEPA has been making its use mandatory through the permitting process (condition of the 401 certification).
PA: ACOE Mitigation and Monitoring Guidelines, permit conditions and/or the Statewide Wetland Banking Instruments control these criteria principal. There are some variations in level of effort. In some assistances the resource and permitting agencies accept limit reporting, photography, as built plans and field views to document monitoring/success. PennDOT had issued a handbook re: wetland monitoring criteria in the mid-late 1990s but in coordination with the agencies levels of effort have been reduced. In some instances the length of required monitoring has been reduced through documentation of success and amendments to permits. We conduct routine monthly monitoring at each of our sites and prepare an annual wetland monitoring report. In addition, we hold interagency field views about every other year to further show the success and development of our projects to the natural resource agencies. Specific monitoring measures have not been developed and instead, the reports and field views allow for ample discussions and information sharing about the sites so that everyone involved can see first hand that the sites are functioning well and providing valuable wildlife habitat and water quality benefits.
KY: N/A
MN: Wetland acres restored versus wetlands impacted by type and acres. Five-year monitoring and vegetation management program. Must be a wetland after five years. MnRAM – assessment tool could be used (functions and values evaluation).

28. What success factors make your program unique from other mitigation programs?

TX: N/A

NC: EEP's accomplishments since its founding are significant. Not a single transportation-improvement project has suffered delay from the lack of offsetting mitigation since the program came on line. More than 26,000 acres of high-quality natural areas already have been protected for future generations because of the preservation alliances that EEP has helped to identify and fund. And, EEP's collaborations with private-sector partners for wetland- and stream-restoration projects have sparked economic activity in the State while protecting water quality and wildlife habitats. The single-most important achievement, however, is the program's continued existence in the face of both internal and external obstacles.

Through the efforts of EEP and its partners in the public and private sectors, North Carolina is changing the way that the State confronts a problem with serious implications for economic growth and the State's overall quality of life, while providing a model for other States to emulate.

AL: The initial cooperation we had with the resource agencies getting our bank off the ground was very important. We do not accept failure at one of our sites as an option; we stay with the site and correct any deficiencies that need correcting.

NE: Not knowing fully other programs in the country, we believe that our program of banks covering most of the State is fairly unique. The success of the program can be attributed to a group of agencies and individuals early in the banking and mitigation process who were earnestly trying to do what was best for the resource. NDOR was closely involved in the development of the process and it was set up as something that was do-able and reasonable expenditure of mitigation dollars. Flexibility was key to overcoming obstacles. In today's restrictive regulatory policy/guidance it is doubtful that this level of success could be achieved.

OH: One of the factors that makes ODOT's program unique from other mitigation programs is that OES has centralized oversight authority over wetland mitigation including design, construction, and post construction monitoring. Ohio DOT Office of Environmental Services employs a landscape architect and biologists with wetland experience to oversee Ohio DOT's wetland mitigation. Multiple visits are made to the mitigation site by OES biologist during construction to be sure the site is developed as planned. If necessary the biologist can ask for changes to fix problems that were unforeseen when drafting the plans.

PA: Several of our wetland banking sites have been constructed utilizing in-house maintenance forces. These efforts have reduced costs, educated maintenance employees and have fostered ownership in wetland avoidance, minimization and compensatory mitigation for those employees involved. In some cases schools, watershed associations, etc. have been partnered with for volunteer man-power to plant sites. These efforts tend to be limited to wetland banks. District (9-0) Our AWC program was the first in Pennsylvania, and because of its success, has been mirrored by other PENNDOT Districts throughout the State. Our program was also used to develop a Statewide wetland banking initiative within PENNDOT.

KY: More timely permits, cost effectiveness, better habitat restoration, and better relationships with resource agencies.

MN: TEP evaluation or holds back credits is unique. Can force mediation. Benchmarks for success are unique.

29. What are the top three lessons learned from your program that should be shared with other States?

TX: N/A

NC: 1) Secure funding commitments for organizational development and implementation. When EEP unveiled its two-year budget request to the N.C. Board of Transportation, the policy-setting and project-approval body for the NCDOT, a palpable "sticker shock" was evident among the board members. Mitigation costs always had been considered part of the costs of doing business in the transportation department, buried in the details of project costs. 2) Avoid political minefields. The success of an EEP-type program will require political support from the top down. The concept by definition is controversial, bringing together bureaucracies that traditionally have highly divergent priorities. 3) Build trust. The hallmark of the Ecosystem Enhancement Program is trust. Without critical partner relationships between the governor's office and the secretaries of Transportation and Environment and Natural Resources, North Carolina's program never would have left the ground. Trust is also critical between the State and pertinent federal regulatory agencies, as performing to regulatory mandates is expected from EEP.

AL: Prior to acquiring any property, get approval in writing from the MBRT that they will accept the site as a mitigation site. If you use contractors, you will probably have to closely monitor all of their activities to make sure they complete the project correctly. When planting trees, use tubes or shelters to protect the young trees. While it costs a little more, you get better survival and less replanting. The trees grow faster for at least the first growing season giving them a head start on the competition of such plants as ragweed and others which will shade out your young plants.

NE: 1) Face to face meetings with the MBRT is essential for proper consideration and reasonable resolution of bank site proposals and questions. 2) The MBRT needs to meet routinely, with agency commitment independent of individual interest. 3) Get wording in agreements and the banking instrument to be clear and direct. We have suffered many changes in policy throughout time as

the Corps has vacillated regarding mitigation ratios, substitutions allowable, inserting HGM functions and values judgement into what was set up as simple acres for acres based upon the Cowardin classification system.

OH: 1) ODOT's top management buy in. Ohio DOT's upper management is committed to providing the funding and expertise to develop effective quality wetland mitigation projects. 2) In house experience. The Ohio DOT Office of Environmental Services (OES) employs both a landscape architect and biologists trained in wetland construction. They review all OHIO DOT's wetland mitigation designs and monitor projects during and after construction. 3) Effective education, communication, and coordination are required during the entire development of the wetland mitigation process. OES staff works throughout wetland mitigation projects to educate engineers and construction personnel on the nuances of quality wetland development. This goes as far as affording OES staff the ability to make changes during construction to improve wetland performance.

PA: The importance of identifying a dedicated funding source. The benefits of identifying manpower and partnerships internal and external to the DOT to complete projects. The benefits of partnering with other State land management agencies to identify sites on their lands to reduce ROW costs and maintenance efforts.

District (9-0) Site selection is the key to success – don't try to force a site into an unsuitable location. Allow the existing landscape to dictate your design. Local knowledge is critical – establish and maintain good working relationships with the people who are out in the field and dealing with the local land owners (NRCS, PGC Land Managers, County Conservation Districts, USFWS Partners for Wildlife staff, Ducks Unlimited biologists, PADEP, USACOE, etc.) Surface water is the primary source of hydrology for most of the wetlands in Pennsylvania. As long as you have the proper drainage area (5-10 acres per 1 acre of wetlands), suitable soils, and a relatively flat topography, success is easily achieved with minimal excavation. We have built all of our sites using on-site materials and have not had to haul or waste any soil. Have a qualified person who is familiar with wetland construction on site at all times.

KY: N/A

MN: 1) If State develops own program make sure the USACOE is involved through the whole process rather than having to have two different processes – WCA vs. Federal. 2) BWSR streamlining – two agencies doing the same thing in parallel processes create problems (competitive bidding). 3) Ongoing changes to vegetation and wetland restoration as technology and knowledge progresses. It is a continuous process. Also, keeping up-to-date on new issues, such as invasive species, can be challenging.

30. Please note any additional comments about your program that you would like to share.

TX: N/A

NC: In mid-March, an announcement will be made by a prestigious government-innovation awards competition concerning the Ecosystem Enhancement Program (we are not at liberty to reveal further details until March 16). This recognition complements earlier designations by the National Association of Development Organizations and the FHWA, both of which have recognized the creativity and innovation represented by the organization and development of EEP.

AL: While our first objective is to provide wetland mitigation credit for ALDOT, we are always looking for ways to use our land for the good of the public. We are developing a public environmental park in Montgomery County, a handicapped hunting area in Dozier, and a waterfowl management area in Jackson County. Our Sypsey Swamp Site is part of a system that has been designated as a Natural Wonder of Alabama. We have given permission to a number of persons and groups who want to visit the area to enjoy its wonder. We allow hiking and fishing on most of our sites. Due to safety issues, we only allow hunting where we have agreements with the Alabama Wildlife and Freshwater Fisheries Division.

NE: We are deeply concerned about the future of banking in Nebraska with the continual changes to mitigation guidance and policy with little input from the user/regulated community. If we are held to HUC-8 watershed boundaries for bank development, we do not feel they are feasible for linear transportation needs and will likely discontinue bank site development. We are very proud of the banks developed to date and feel that they have contributed beautiful and functional wetland mosaics, providing a higher level of value than the many single mitigation sites. Under the initial mitigation policy/guidance of the early banking days, we could purchase a site, develop it and hope to have it certified within three years of monitoring. Today, the guidance lengthens that period to five years or more, when our experience has been that three years has been adequate to achieve the desired results. The extra two added years results in higher ratios through pre-crediting and less benefit for every tax dollar expended in site development. We are concerned about the undocumented policy changes that deeply affect our bank value. For example, during the first several years of banking PEMA and PEMC credits were interchangeable. Because it was agreed early on that such substitution was acceptable, we developed our bank sites with more PEMC credits than PEMA because of the greater chance for long term success. Approximately 2 years ago, the Nebraska office of the Corps decided that PEMC credits could no longer be used to substitute for PEMA impacts and we paid higher mitigation ratios for substitution. This policy change was also never put in writing other than as higher ratios on permits. This change in policy effectively reduced the value of our banks by half. Recently, we received some permits where the ratios were reduced to allow for substitution without higher ratios. When we called the Corps to inquire as to the difference, we were told that they had decided to again allow substitution of PEMC for PEMA. Again, we were not notified in writing and are concerned that this could change again after we would proceed to develop more banks under this policy.

OH: N/A

PA: Assistance in identifying a method of dedicating funding would be helpful – shared information – what have others done. District (9-0) The AWC initiative has proven to be a time saving and cost effective means to streamline PENNDOT projects having unavoidable wetland impacts while at the same time, enhancing the natural environment and providing public outreach and education opportunities. An assessment of the acres of wetlands created, number of projects incorporated, and the size of the impacts to date, it is evident that the sites will offer sufficient opportunities for continuation of the AWC program in the future. By finding suitable sites, using these techniques, and constructing the sites with our own county maintenance forces, we have been able to build our sites at a reasonable cost of $3,000-$5,000 per acre. We also estimate that the program has saved approximately over $1,500,000 when compared to traditional on-site wetland mitigation practices. The sites have additionally provided the public with outdoor recreational activities and have been used to educate hundreds of high school children about the importance of wetlands.

KY: N/A

MN: WCA vs. Federal rules. WCA was legislated and implemented by a "grassroots" effort.

Coastal Bottomlands wetland mitigation bank in Brazoria County, TX, includes compensation for bald eagle habitat.

Photo courtesy of Patricia Bacak-Clements, USFWS

Oil pump station on Anderson Tract

Blue Elbow Swamp mitigation bank in Orange County, TX, is a "national priority wetland."

Photo courtesy of Patricia Bacak-Clements, USFWS

Jumping Run is a 70-acre forested wetland and stream restoration mitigation site near Fort Bragg, NC, in the Sandhills region. North Carolina's wetland mitigation program has an active stream mitigation component.

Haw River mitigation site, a 950-acre conservation corridor that connects USACE lands with Jordan Lake State Park in Chatham County, NC, was the first preservation site purchased for the EEP through a land trust.

Photo courtesy of Patricia Bacak-Clements, USFWS

Photo courtesy of Patricia Bacak-Clements, USFWS

Crow Creek mitigation bank in Jackson County, AL, is the restoration of a 470-acre bottomland hardwood forest wetland system that includes the creation of a waterfowl management area.

Rob Hurt, USFWS (left), and John Shill, ALDOT (right) at Crow Creek mitigation site.

Barry Vaughn (center), Tuskegee University, demonstrates barologger device to document hydrology levels.

Photo courtesy of Patricia Bacak-Clements, USFWS

Beaver and muskrat actually help support hydrology on this 11-acre roadside mitigation bank site in Nebraska, which was formerly an excavation site.

Documenting species occurrences offers a better gauge of wetland success, according to NDOR biologists who use the Releve field evaluation method as part of their site monitoring plan.

Photo courtesy of Patricia Bacak-Clements, USFWS

Rock Creek mitigation bank was formerly row crops. The freshwater and saline wetland restoration site is helping to provide habitat for the Salt Creek tiger beetle, which is listed as endangered at the State level.

Coon Path, a pooled mitigation site designed and constructed by Ohio DOT, transformed over 26 acres of previous farmlands into wetland habitat and preserved approximately 19 acres of forested upland buffer.

Ohio DOT ecological field studies team leader John Baird (center) oversees the design, construction, and post-construction monitoring of the department's 28 wetland mitigation sites.

Students from New Albany Middle School show species obtained during a recent field inspection of the New Albany Wetland Conservation Area.

At the request of the community, bluebird boxes were preserved on portions of the Bluebird wetland mitigation site. The site is located on the Hoover Nature Preserve, owned and managed by the City of Columbus.

Old Crow wetland mitigation bank site was purchased for $1 from the county correctional facility and serves PennDOT projects in the Juniata sub-basin. This site was designed, constructed, and continues to be maintained by PennDOT District 9-0 maintenance forces under the 1995 memorandum of agreement.

Shelters like this one, built on District 9-0's Old Crow mitigation bank by prison labor, provide a useful gathering space for community and school groups who frequently visit the site for recreation and educational purposes.
A State assessment of wetland replacement programs in Pennsylvania concluded that "wetland mitigation can be a viable method to compensate for permitted wetland impacts, and PennDOT should be encouraged to expand this program throughout all of the engineering districts."

To discourage Canadian geese from destroying new vegetation on the Old Crow mitigation bank site, PennDOT District 9-0 maintenance forces line the perimeter of the site with string and ribbon. Geese perceive this as an obstacle to the wide open space they need for landing and taking flight.

Lee Andrews, USFWS (center), introduces a new wetland and stream mitigation site he recently helped acquire for KYTC. The 60-acre site includes 3,700 linear feet of stream. The site will be owned and managed in perpetuity by the Southern Conservation Corporation.

USFWS' Lee Andrews (left) discusses the KYTC/USFWS MOA with scan team leader and FHWA senior ecologist Paul Garrett (right).

Scan team tours the Exel Clark wetland and stream mitigation site.

Musk thistles are a common invasive plant in Kentucky in need of control.

Located in William O'Brien State Park, MN, this DNR-owned site was formerly a minnow farm established by piping spring water through a series of constructed ponds. MnDOT,
in partnership with DNR, obliterated the ponds and re-established a trout stream and associated wet meadow and shallow marsh and sedge meadow wetlands.

Purple prairie clover is a native legume common in upland plantings.

Native milkweed plants attract butterflies.

Where new housing development encroaches upon MnDOT mitigation bank sites, the use of and credit for buffers becomes an issue of increasing importance.

Urban roadside mitigation sites, such as this one in Minnesota, could have potential water quality functions, although most sites are not monitored for this currently.

Students of New Albany Schools will become the "owners and perpetual managers" of Ohio DOT's New Albany wetland mitigation site.

NC folk artist Clyde Jones uses driftwood, tires, and metal salvaged from the Haw River to create a colorful menagerie of lawn art. Some of Jones' work is featured on the grounds of the Governor's Mansion.

Photo courtesy of Patricia Bacak-Clements, USFWS

Scan team members participating on the Minnesota site visit: (seated front, left to right) Bonnie Harper-Lore, FHWA Headquarters; Palmer Hough, EPA Headquarters. (back, left to right) Randal Looney, FHWA-Arkansas Division; Dennis Durbin, FHWA Headquarters; Jennifer Moyer, USACE Headquarters; Patricia Bacak-Clements, UFWS-Corpus Christi, TX, Field Office; Morgan Robertson, EPA Headquarters; Brian Smith, FHWA Resource Center (Chicago, IL).

Canadian geese at Bluebird mitigation area.

This third-party bank site provides mitigation for the I-99 project. There are no true entrepreneurial banks in PA due to difficulties with finding large, continuous tracts of quality wetland acreage.