

# STAKEHOLDER FORUM *on* FEDERAL WETLANDS MITIGATION



**Environmental  
Law Institute  
Research Report**

# Stakeholder Forum on Federal Wetlands Mitigation

## Forum Report

*by the*

Environmental Law Institute®  
Washington, DC

April 2002

## *Acknowledgments*

The Mitigation Stakeholder Forum was sponsored by the U.S. Environmental Protection Agency, Maryland Department of the Environment, and the National Aquarium in Baltimore. Funding for this report was provided by the U.S. Environmental Protection Agency. Environmental Law Institute staff on the project included Jessica Wilkinson, Sarah King, and Dorigen Fried.

*Stakeholder Forum on Federal Wetlands Mitigation (Forum Report)*

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ISBN No. 1-58576-035-8. ELI Project No. 0001-05.

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## EXECUTIVE SUMMARY

On October 1-2, 2001, a Mitigation Stakeholders Forum was held at the National Aquarium in Baltimore. The U.S. Environmental Protection Agency, Maryland Department of the Environment, and the National Aquarium in Baltimore sponsored the event. The forum brought together a diverse group of individuals from federal and state government, non-profit environmental organizations, third party mitigation providers, and others (e.g., academia, home builders, representatives of the oil and gas industry, non-governmental organizations, etc.) from the private sector. The 2-day meeting was designed to provide an opportunity for the participants to discuss issues associated with improving the implementation of ecologically effective wetlands mitigation under the Clean Water Act Section 404 program.

A particular focus of the forum was the series of recommendations issued in recent reports by the National Academy of Sciences and the General Accounting Office on compensatory mitigation. Forum participants reviewed these 31 recommendations and added their recommendations for consideration. The group then identified 15 recommendations, five in each of three categories - technical, policy, and programmatic - that were the focus of the majority of the remaining discussions.

The forum was designed to capture a variety of opinions on a range of topics associated with compensatory mitigation to help guide the formulation of effective national mitigation guidance. It was not designed to generate consensus opinions or develop consensus-based recommendations.

However, several themes emerged from the forum that are worth mentioning.

Many of the recommendations discussed by forum participants revolved around the development and application of ecological success criteria or performance standards. Below is a summary of some of the opinions that surfaced.

- Federal agencies should work cooperatively to develop ecological success criteria for mitigation.
- Ecological success should be defined regionally and be based on watershed priorities.
- All forms of compensatory mitigation should be held to the same ecological success standards.
- More research is needed on the development of shorter-term, measurable performance standards.

Several of the recommendations discussed addressed the need to make mitigation decisions in the context of watershed plans. Participants stated that wetland mitigation decisions, particularly those that relate to conducting off-site and out-of-kind mitigation, should be made in the context of regional watershed evaluation and planning. Several participants felt that the preference for on-site mitigation should not be revoked, but could be modified if decisions are made in the context of an informed watershed plan. However, participants had differing opinions on the role of the federal government in watershed planning.

Participants acknowledged that hydrologic performance criteria are difficult to develop. However, such criteria should reflect conditions at reference wetlands. Hydrologic criteria also should be adaptive, achievable, and self-sustaining and should

reflect trends in climatic and hydrologic variability.

Participants felt that long-term monitoring research is needed on a diversity of reference sites, a range of wetland types, and wetlands in a range of ecological conditions.

Participants stated that functional assessment of wetlands should take into account a broad range of functions including non-ecological functions and wildlife habitat, and should go beyond vegetation standards.

Forum attendees stated that the federal agencies should work together to develop minimum submission design standards for mitigation. This effort should be distinguished from the development of a design standards manual, which should be developed regionally to reflect geographic differences.

Participants felt that the federal agencies should work together to track additional information on wetland acres and functions over time. This data collection should be incorporated into the permitting process and may require additional training.

Finally, attendees stated that in addition to making permitting decisions, the federal agencies should devote additional resources to enforcement and monitoring of mitigation.

This report is designed as a representative record of the issues discussed at the Mitigation Forum. It can serve as a resource and for those interested in improving compensatory wetland mitigation under §404 of the Clean Water Act. It can also serve as a foundation for federal and state agencies and others to develop specific and concrete actions for improving mitigation success.

An audio recording of the Mitigation Forum is available through the Environmental Law Institute's web site at: <http://www.eli.org/research/wetlandsmitigationforum.htm>. In addition, many of the policy and technical documents discussed in this report can be accessed through the web site of EPA's Wetlands Division at: <http://www.epa.gov/owow/wetlands>.

## INTRODUCTION

On October 1 - 2, 2001, the U.S. Environmental Protection Agency (EPA), in partnership with Maryland Department of Environment and the National Aquarium in Baltimore, convened a comprehensive group of stakeholders at the Aquarium for a Mitigation Stakeholder Forum (see Forum Participants and Appendix D). Stakeholders were invited to discuss the effectiveness of current federal mitigation policies and other issues associated with the implementation of ecologically effective wetlands mitigation. Participants had the opportunity to discuss the conclusions and recommendations of recent reports on compensatory mitigation under Section 404 of the Clean Water Act.

The forum sponsors designed an open and inclusive format. A diversity of sectors were invited and represented at the event. Representatives included the regulated and environmental community, third party mitigation providers, non-governmental organizations, and federal and state regulatory and resource agencies. An audio recording of the forum is available on-line. Readers may also comment on the forum proceedings directly. Information on how to locate the recording or submit comments can be found at the end of this report.

The objectives of the Mitigation Stakeholder Forum were to:

- Review recent studies on wetland mitigation including the National Academy of Sciences study and the General Accounting Office study;
- Solicit feedback from participants on conclusions and recommendations of these studies; and
- Discuss how the recommendations could be most effectively translated into

guidance to increase the ecological effectiveness wetlands mitigation required under federal law.

### Background

In June 2001, the National Academy of Sciences (NAS) released a study, “Compensating for Wetland Losses Under the Clean Water Act.” The NAS study was designed to evaluate “how well and under what conditions compensatory mitigation required under Section 404 is contributing towards satisfying the overall objective of restoring and maintaining the quality of the nation’s waters.”<sup>1</sup> The report includes 29 recommendations for improving the effectiveness of compensatory mitigation.

In May 2001, the General Accounting Office (GAO) released a report titled “Wetlands Protection: Assessments Needed to Determine Effectiveness of In-Lieu-Fee Mitigation.” The GAO report was designed to determine the extent to which “(1) the in-lieu-fee option has been used to mitigate adverse impacts to wetlands, (2) the in-lieu-fee option has achieved its intended purpose of mitigating such impacts, and (3) the in-lieu-fee organizations compete with mitigation banks for developers, mitigation business.”<sup>2</sup> The report includes two recommendations for improving the ability of in-lieu-fee mitigation to compensate for adverse impacts to wetlands and to ensure the ecological success of mitigation efforts under ad hoc arrangements.

In addition to these two reports, several other recent studies and federal guidance have addressed the effectiveness of compensatory mitigation. Together, the recommendations in these reports have sought to address the ability of compensatory mitigation techniques to meet the national goal of “no net loss” of wetland area and function. These recommendations, and other issues

identified by forum participants, were at the center of the two-day discussion.

### **Stakeholder Forum Format**

Forum participants were presented with a list of the recommendations contained in the NAS and GAO reports. These 31 recommendations were divided into three categories: technical, policy, and programmatic. Forum participants were then given the opportunity to add additional issues of interest to the three lists. The entire list of recommendations and their rankings appear in Appendix B. Following the addition of these new recommendations, forum participants were asked to rank the top five recommendations in each category that they were most interested in discussing.

Three separate facilitated discussions were devoted to discussing the top five recommendations in each category (see Appendix C). On day one, participants addressed the top five technical recommendations. On day two, participants discussed the top five policy recommendations in the morning and the top five programmatic recommendations in the afternoon. During each of the three facilitated discussions, every recommendation was addressed in turn. In the time devoted to discussing each recommendation, participants: defined and discussed the recommendation, ensuring that there was common understanding of the issue; identified roadblocks to implementation and steps for addressing the issue; and clarified and summarized the discussion.

Prior to the facilitated discussions about technical, policy, and programmatic recommendations, there were presentations by the National Academy of Sciences and the General Accounting Office. In addition, there was a presentation on the State perspective on the recommendations and a presentation on wetland stewardship. Summaries of these presentations and the discussions that followed are below. At the conclusion of the two-day forum, Glenn Page, Director of Conservation at the National Aquarium in Baltimore, gave participants a tour of the Fort McHenry tidal wetland mitigation site.

In the following summary of the presentations and facilitated discussions, points made by participants are summarized and attributed where appropriate by a parenthetical citation of the person's surname. The meeting facilitators have summarized the comments of participants based on notes and tapes of the discussion. We apologize in advance if any misrepresentation of the speakers, meaning or intent.

## SUMMARY OF PRESENTATIONS AND DISCUSSION

On day one, Suzanne van Drunick, Program Officer at the National Academy of Sciences, discussed the conclusions and recommendations of the National Academy of Sciences report, “Compensating for Wetland Losses Under the Clean Water Act.” Also on day one, Peg Reese, Assistant Director of the General Accounting Office, discussed the conclusions and recommendations of GAO’s report, “Wetlands Protection: Assessment Needed to Determine Effectiveness of In-Lieu-Fee Mitigation.”

On day two, James Robb, Environmental Manager at Indiana Department of Environmental Management, gave a presentation on the State perspective on how proposed recommendations could affect State wetland protection programs. Later on day two, Glenn Page, Director of Conservation at the National Aquarium in Baltimore, spoke about his institution’s commitment to the Chesapeake and how it serves as a model for wetland stewardship. Below are summaries of each of these presentations and the discussions that followed.

## Conclusions and Recommendations of National Academy of Sciences Report

### Presentation: *Suzanne van Drunick*

In June 2001, the National Academy of Sciences released its report, “Compensating for Wetland Losses Under the Clean Water Act.” The report was conducted by two parts of the National Research Council: the Environmental Studies and Toxicology Board and the Water Science Technology Board. The U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and the National Marine Fisheries Service sponsored the two-year study. The study focused on the third step of the sequencing process in the Section 404(b)(1) guidelines - compensatory mitigation conducted through restoration, creation, enhancement, and, in some cases, preservation. Although the study did not address avoidance and minimization, the first two steps in the sequencing process, the Committee did make recommendations on specific wetland types that should be avoided.

The study followed standard NAS procedures. A 13-member committee with broad expertise was established (see box). NAS also set forth a stringent and thorough review process. An independent panel was established to conduct this review.

### NAS Committee on Mitigating Wetland Losses

Joy Zedler (Chair), University of Wisconsin, Madison, WI	Botany
Leonard Shabman (Vice Chair), Virginia Polytechnic Institute, Blacksburg, VA	Economics
Victoria Alvarez, California Department of Transportation, Sacramento, CA	Wetland Permitting
Robert O. Evans, North Carolina State University, Raleigh, NC	Wetland Restoration
Royal C. Gardner, Stetson University College of Law, Petersburg, FL	Environmental Law
J. Whitfield Gibbons, Savannah River Ecology Lab, Aiken, SC	Vertebrate Ecology
James W. Gilliam, North Carolina State University, Raleigh, NC	Soil Science
Carol A. Johnston, University of Minnesota, Duluth, MN	Soil Science
William J. Mitsch, The Ohio State University, Columbus, OH	Wetland Ecology
Karen Prestegaard, University of Maryland, College Park, MD	Geology/Hydrology
Ann M. Redmond, WilsonMiller, Inc., Tallahassee, FL	Mitigation Banking
Charles Simenstad, University of Washington, Seattle, WA	Fisheries
R. Eugene Turner, Louisiana State University, Baton Rouge, LA	Coastal Ecology

The Committee's task was to:

- Review the scientific, technical, and institutional literature on wetland structure and functioning;
- Review options for mitigating wetland losses through restoration, enhancement, creation, and where applicable, in-lieu fee programs;
- Evaluate the current ability of practitioners to restore various aspects of wetland functioning in a variety of environments;
- Evaluate options for mitigating wetland loss; and
- Conduct on-site visits to wetland mitigation sites (including wetland mitigation banking, in-lieu-fee mitigation, and permittee-responsible mitigation) in Florida, Chicago and California.

The Committee began the study by analyzing existing Corps data from 1993 - 2000. These data assert that on average 24,000 acres of wetland were permitted for fill and 42,000 acres were required for compensation each year. These figures

demonstrate a net gain of 18,000 acres, or a 1.8:1 ratio of acres that were supposed to be mitigated for every acre of permitted loss. Some of the 42,000 acres required for compensation included preservation. However, the Committee determined that the data were inadequate for evaluating the status of required compensation. The data only reported the number of acres permitted and the acres required; they did not report if the mitigation was initiated or completed, nor did it contain information on the functions of the wetlands filled or the functions of the wetlands offered as compensation. As a result, the data did not allow the Committee to assess whether compensatory mitigation is adequately compensating for lost wetland functions.

One of the Committee's conclusions is that the Corps needs to accurately track wetlands area and function over time in a national database. Although some data are collected on wetland area, limited information is available on wetland function. The Committee recommended that the Corps work cooperatively with other states and organizations, particularly other federal

agencies, to improve their data collection and tracking.

Because the necessary data were lacking, the Committee analyzed 25 peer-reviewed studies on wetland mitigation, which included data on over 600 individual sites. The Committee also sponsored field trips to three areas and visited over 25 sites to evaluate different types of compensatory mitigation.

The Committee heard presentations from a diversity of groups. Among environmental groups, the Committee heard presentations by National Audubon Society, Audubon of Florida, Environmental Defense, and The Nature Conservancy. Representing state and regional management organizations, the Committee heard from representatives from Maryland, Florida, Wisconsin, and California. From the development community, the Committee heard presentations by Greater Orlando Aviation Authority, Irvine Ranch Water District, and Rancho Mission Viejo. The Committee also heard presentations by wetland consultants.

There were a total of five meetings, four of which had public information, presentations, and field trips. The final meeting was a closed executive session held in Washington, DC.

From the studies, field reviews, and presentations, the Committee was able to conclude that of the compensatory mitigation projects required by the Corps, some are never initiated. Of those that are initiated, some are not completed. Of those that are completed, most are typically not evaluated comprehensively. And of those evaluated comprehensively, scientists find shortcomings relative to nearby reference systems. In other words, the created and restored wetlands are not meeting the functions of the ones they were intended to replace.

The Committee reviewed two studies conducted by the U.S. Fish and Wildlife

Service, s National Wetland Inventory (NWI).<sup>3</sup> It should be noted that the data collected and reported by the U.S. Fish and Wildlife Service and the data reported by the Corps were developed for different purposes and there are important differences in how the wetlands are inventoried. The Committee concluded that the goal of no net loss of wetlands is not being met for wetland functions by the mitigation program, despite progress in the last 20 years. From the mid-70,s to mid-80,s approximately 255,000 acres of wetlands were lost per year. From 1986-1997, about 58,500 acres were lost per year. This is a 78 percent decline in the acres of wetlands being lost each year. This data includes wetlands restored and created. Although these numbers do not reveal a net gain of wetlands acreage, they do show that the rate of wetland loss has slowed.

The Committee concluded that compensatory mitigation under Section 404 of the Clean Water Act might be discouraging requests for permits. However, there is no way to track how many potential applicants never apply for permits because the permit process deters them from doing so.

The Committee found that some wetlands are relatively easy to recreate, such as freshwater emergent marshes. However, some types of wetlands are difficult to create or restore because they have unique features. Sedge meadows and wet prairies may be more difficult to recreate, while fens, bogs, vernal pools, bottomland hardwoods, and riparian wetlands are extremely difficult to create. The Committee strongly recommended that impacts to certain wetland types - such as fens, bogs, and riparian wetlands - should be avoided.

The Committee was concerned to find that open water ponds are favored as compensatory mitigation and are replacing other wetland types nationwide. Although

open water wetlands meet the jurisdictional definition of a wetland, they may have limited hydrologic variability and do not replace all the functions of other wetland types.

The Committee also found that wetlands are often placed in atypical landscape settings. This raised concerns about the long-term sustainability of these wetlands. In addition, highly functional wetlands may be inadvertently degraded by development elsewhere in the watershed. As a result, the Committee recommended that site selection for wetland conservation and mitigation should be conducted on a watershed scale. The Committee did not advocate against the current preference for on-site, in-kind mitigation. The Committee concluded that a preference for on-site and in-kind mitigation should not be automatic, but should follow from an analytically based assessment of the wetland needs in the watershed and the potential for the compensatory wetland to persist over time.

Many of the mitigated wetlands the Committee observed were not self-sustaining and only had monitoring periods of five years. The Committee felt that this was insufficient; up to 20 years may be needed for some wetland restoration or creation sites to achieve functional goals.

One of the most well received parts of the NAS report was the list of operational guidelines for achieving self-sustaining wetlands. These recommendations were as follows:

1. Consider the hydrogeomorphic and ecological landscape and climate
2. Adopt a dynamic landscape perspective
3. Restore or develop naturally variable hydrological conditions
4. Whenever possible, choose wetland restoration over creation

5. Avoid over-engineered structures in the wetland, s design
6. Pay particular attention to appropriate planting elevation, depth, and soil type, and seasonal timing
7. Provide appropriately heterogeneous topography
8. Pay attention to subsurface conditions, including soil and sediment geochemistry and physics, groundwater quantity and quality, and infaunal communities
9. Consider complications associated with creation or restoration in seriously degraded or disturbed sites
10. Conduct early monitoring as part of adaptive management

The Committee concluded that concerns about mitigation sites being too dry often lead to the design and establishment of sites that are too wet. The Committee recommended that hydrological functionality should be based on comparisons to reference sites during the same time period, even if natural sites are dry for 3 out of 5 years. The Committee also found that the plant species required in mitigation plans are often not the right type or too many plants are required for planting.

The Committee concluded that performance expectations in Section 404 permits have often been unclear, and compliance has often not been assured nor attained. As such, the Committee recommended that:

- Impact sites should be evaluated using the same functional assessment tools as used for the mitigation site;
- Structure and function should both be considered in the goal setting;
- Subjective, best professional judgment should be replaced by science-based,

- rapid assessment procedures in assessing wetland function;
- The Corps and other responsible authorities should improve the effectiveness of compliance monitoring before and after project construction; and
- Compensatory mitigation sites should receive long-term stewardship, *i.e.*, a time frame expected for other publicly valued assets, such as parks.
- The Committee concluded that responsible regulatory authorities should establish and enforce clear compliance requirements for permittee-responsible compensation to assure that: (1) Projects are initiated no later than concurrent with permitted activity, (2) Projects are implemented and constructed according to established design criteria and use an adaptive management approach specified in the permit, (3) Performance standards are specified in the permit and attained before permit compliance is achieved, and (4) Permittees provide a stewardship organization with an easement on, or title to, the compensatory wetland site and a cash contribution appropriate for the long-term monitoring, management and maintenance of the site.

The Committee concluded that support for regulatory decision-making is inadequate. Several recommendations were offered on how the Corps, role in compensatory wetland mitigation should be improved:

- The Corps and other responsible regulatory authorities should commit funds to staff participation in professional activities and technical training programs that allow for the opportunity to share experiences across districts;

- The Corps should develop region-specific reference manuals (based on the “Operational Guidelines”) to help design projects that will restore different wetland types, hydrological conditions, and functions;
- The Corps and other responsible authorities should establish a research program to study mitigation sites to determine what practices achieve long-term performance;
- States and other federal agencies should work together to prepare technical plans or initiate interagency consensus processes for setting wetland protection, acquisition, restoration, enhancement, and creation project priorities on an ecoregional (watershed) basis.

The Committee did not endorse a particular form of compensatory mitigation. Although, the Committee did acknowledge that third-party approaches (*i.e.*, mitigation banks, in-lieu fee programs) offer some advantages over permittee-responsible mitigation, four institutional mechanisms need greater attention if third-party mitigation is to help attain the no net loss goal:

- Mitigation must be timely and assure compensation for all permitted activities;
- All fills must be compensated for;
- Mitigation must be integrated into a watershed approach; and
- Long-term sustainability and stewardship for restored, created, enhanced, or preserved wetlands must be assured.

The Committee’s overarching recommendation was that the Clean Water Act Section 404 program should be improved to achieve the goal of no net loss of wetlands for both area and function. It is of paramount importance that the regulatory

agencies consider each permitting decision over broader geographic areas and over longer time periods.

### *Discussion and Questions*

What kind of wetland classification system did the Committee use and why were riparian wetlands singled out for greater protection (Strand)? The Committee used the wetland definitions outlined in the U.S. Fish and Wildlife Service's classification system.<sup>4</sup> The Committee recommended that riparian wetlands deserve greater protection because of their role in water quality and stream health and because their position cannot be duplicated in the landscape (van Drunick).

The Committee recommended that vernal pools and other sensitive wetland types should be avoided. Were these recommendations based on land use pressures on these habitats or based on difficulties restoring the functions of specific wetland types? Recent studies have demonstrated that vernal pool restoration can achieve a high degree of diversity and success (Denisoff). It is difficult to restore vernal pools structure and function, however these wetland types are also under strong land use pressures, especially in areas where real estate is at a premium (van Drunick). There are no presumptive requirements in the federal permitting program to avoid sensitive areas, such as bogs and fens. Unless this exists, we will see attempts to mitigate landscape features that we cannot compensate for adequately (Hausmann).

The watershed approach will be driven by the states and water quality plans, which are developed with EPA, and will not be driven by the Corps. In the current Nationwide Permit proposal<sup>5</sup>, there is no mention of watershed planning or viewing the environment holistically. Wetland mitigation

sites that have failed in Wisconsin have failed because there has not been any monitoring (Hausmann).

How broadly did the Committee define "watershed" (Sutliff)? The Committee gave suggestions for a variety of approaches for different sized watersheds (van Drunick). The Committee suggests duplicating the impacted wetland, but many of the impacted wetlands are very low quality and very small. Does the Committee want to see these wetlands duplicated (Sutliff)? The Committee does not intend this and as a result, did not support a preference for on-site, in-kind mitigation. It concluded that restoring a higher quality wetland in the watershed is more valuable than mimicking a degraded wetland (van Drunick).

Did the Committee quantify its recommendation for broadening the geographical service areas? For example, could impacts occurring in San Francisco be compensated for on the North Slope of Alaska (Streever)? The report focused on limiting the geographic area on a landscape scale (van Drunick).

The Committee felt that the watershed approach should not be standardized for the entire country. People in each subject area should decide what is appropriate for their watershed. It is less important that mitigation occurs on-site or off-site than that the mitigation is sustainable and has a designated long-term steward. The Committee's recommendation for assigning a long-term steward may be one of the most difficult to achieve. Although mitigation banking may meet more of the Committee's operational guidelines, there are still shortcomings in the mitigation banking guidance (Redmond).

Did the Committee distinguish between the different types of mitigation in making its recommendations (Sutliff)? The Committee did highlight the different attributes of the

available compensatory mitigation mechanisms in Table 5-1 of the report.<sup>6</sup> The Committee did not endorse one type of mitigation over another, although it did feel that third-party mitigation mechanisms had some advantages over permittee-responsible mitigation. The Committee concluded that with some modifications, permittee responsible mitigation could be brought up to the same standards as third-party mitigation (van Drunick).

Did the Committee distinguish mitigation banking from other forms of compensatory mitigation when conducting field studies? Mitigation banking, which is viewed by some as superior, should not be considered along with other compensatory mitigation techniques (Bleichfeld). The Committee did distinguish between different forms of mitigation in the field, but did not detail the strengths or weaknesses of each site it visited. The Committee did not endorse one mitigation method over the others because there are no endpoints against which the sites could be compared. Instead, the Committee chose to highlight overall goals of what mitigation should achieve, giving regulators the ability to decide which mechanism best meet their watershed needs (van Drunick).

How did the Committee resolve who should be responsible for compliance monitoring and how it will be achieved (Reese)? In Corps memoranda and standard operational procedures, the agency identifies the activities that should be a priority (above the line items) and those that should not be a priority (below the line items) for their employees. Conducting site visits and monitoring permit conditions are below the line items. Reviewing and issuing permits are above the line items. To change this directive, the Corps must issue memoranda to the field. NAS can only suggest that monitoring be

considered an above the line item (van Drunick).

Often, when restoring seasonally wet forested wetlands, the hydrologic criteria in the permit lead to the establishment of a mitigation site that is wetter than the natural wetland (Rolband). The Committee did note that permits often require that replacement wetlands are wetter than they need to be and recommended that hydrological functionality should be based on comparisons to reference sites during the same time period (van Drunick).

Prescriptive design criteria can inhibit innovation. If design criteria are dictated to mitigation providers, there will be no opportunity or leverage for adaptive management (Robb). The Committee did deliberate about what a permittee should be held responsible to - the design or the performance. There are pros and cons of both approaches (van Drunick). Design criteria would be more preferable to homebuilders. In addition, there must be a mechanism to turn long-term maintenance over to another entity for the long-term (Asmus).

## Conclusions and Recommendations of General Accounting Office Report

### Presentation: *Peg Reese*

The findings of the GAO study, "Wetlands Protection: Assessments Needed to Determine Effectiveness of In-Lieu-Fee Mitigation," parallel and complement the NAS report, however the report focuses specifically on in-lieu-fee mitigation. Issues related to other forms of compensatory mitigation were also addressed.

GAO is an arm of Congress and conducts research upon Congressional request. This report was conducted for the House Transportation and Infrastructure

Committee and went to six requesters: Chairman and ranking minority of the Committee, Chairman and ranking minority of the subcommittee on water and natural resources, and Chairman and ranking minority from the previous Congress. The House Transportation and Infrastructure Committee held a hearing in September, and although both the NAS and GAO reports were discussed in detail, neither organization was invited to attend the hearing.

GAO was asked to determine the extent to which:

- The in-lieu-fee option has been used to mitigate adverse impacts to wetlands;
- The in-lieu-fee option has achieved its intended purpose of mitigating such impacts; and
- In-lieu-fee organizations compete with mitigation banks for developers, mitigation business.

GAO found that 17 of the 38 Corps districts have in-lieu-fee mitigation options available. Since the late 1980s, 63 such agreements have been established. The GAO study utilized data through the end of September 2000. Most in-lieu-fee mitigation is used to restore, enhance, and/or preserve wetlands. Through Fiscal Year 2000, developers used the in-lieu-fee option to compensate for permitted impacts to over 1,440 acres and paid over \$64.2 million to in-lieu-fee organizations.

The GAO study relied on Corps data and encountered enormous difficulty obtaining the data. What typically would have been a 3-4 month project took a year because of the difficulty of working with the Corps, Regulatory Analysis and Management System (RAMS) database. GAO was unable to trace the fees collected over time or conduct trend analysis on the acres intended to be mitigated

using in-lieu fees. In order to collect the data for the study, GAO conducted a two-phase telephone survey of Corps officials from the 38 district regulatory offices. In the first part of the study, GAO conducted a telephone survey of all districts and requested copies of all in-lieu-fee agreements. In the second part of the telephone survey, GAO asked for more specific information about the existing in-lieu-fee arrangements. GAO conducted significant follow-up because of the large number of incomplete answers.

GAO concluded that there are pros and cons to in-lieu-fee mitigation. Federal agencies and others agree that this option serves as a useful mitigation tool. From the Corps, perspective, using in-lieu-fee mitigation may be timelier and less burdensome. However, federal agencies and others expressed concern about whether fees are being spent in a timely manner. In October 2000, an interagency group released an in-lieu-fee guidance, which provides a framework for in-lieu-fee mitigation.<sup>7</sup> However, GAO concluded that the guidance does not go far enough either to bring consistency to how determinations of ecological success should be made or to establish appropriate monitoring and oversight activities.

The central theme of the GAO report was that the effectiveness of in-lieu-fee mitigation is uncertain. This is due to the fact that the Corps has not developed criteria against which to track whether or not the functions and values lost from the adversely affected wetlands are replaced through in-lieu-fee mitigation. In addition, data submitted by the Corps does not support their claim that the number of wetland acres mitigated by in-lieu-fee equaled or exceeded acres adversely affected. Over half of the Corps districts were unable to provide GAO with the data to support their claims that their

in-lieu-fee programs are meeting no net loss goals.

Many Corps districts acknowledged that they have not tried to assess ecological success due to definitional and resource constraints. Approximately six Corps districts indicated that they use simple acreage as a measure of success. In addition, some districts consider in-lieu-fee mitigation to be a success as soon as the developer pays the fee to the in-lieu-fee organization, even if no mitigation has been performed. As a result, the Corps lacks assurances that in-lieu-fee mitigation has been effective.

GAO's investigation of the competition between in-lieu-fee organizations and mitigation banks found that in 9 of 17 districts where in-lieu-fee mitigation was an option, in-lieu-fee organizations and mitigation banks were competing with each other by providing services in the same geographic areas. GAO was unable to compare the fee differences between mitigation banking and in-lieu-fee mitigation. Some mitigation bankers raised concerns that they bear greater costs and are at a disadvantage in competing with in-lieu-fee programs. GAO pointed out that while the October 2000 guidance gives preference to mitigation banks, it also allows for flexibility.

Throughout the study, GAO struggled with the definition of in-lieu-fee mitigation. GAO concluded that there are a number of ad hoc or gray area mitigation projects that cannot be easily classified. They found that 24 Corps districts allow ad hoc arrangements (typically for one-time projects without a formal agreement between the Corps and the third party receiving the funds). GAO found it near impossible to quantify the number of ad hoc in-lieu-fee mitigation projects that have been conducted. Corps oversight is lacking in almost half of the districts using ad hoc arrangements. GAO found that the

transfer of responsibility for ecological success of ad hoc arrangements is unclear. Of the 24 districts that had ad hoc arrangements, officials in 13 said ad hoc fund recipients were not liable for the failure of their mitigation efforts and officials in 9 said they did not know whether ad hoc recipients were liable.

GAO concluded that the effectiveness of ad hoc arrangements is unknown. Corps headquarters officials stated that ad hoc mitigation is not covered under the October 2000 guidance. EPA disagreed with this conclusion. However, Corps districts disagree about whether or not ad hoc arrangements are covered by the guidance. Six Corps districts felt these arrangements were covered by the guidance and 11 indicated they did not know whether or not they were.

### *GAO Conclusions*

GAO concluded that in-lieu-fee arrangements have the potential to be an effective compensatory mitigation tool that benefits the environment and provides developers with flexibility. It is not clear, however, whether such arrangements have, in practice, been an adequate method for mitigating adverse impacts to wetlands.

Corps districts supplied GAO with contradictory information or were not able to provide data to support claims that acreage and/or functions and values of wetlands that had been restored, enhanced, created, or preserved, equaled, or exceeded those that had been lost through development. Several districts have never taken steps to assess whether in-lieu-fees have adequately mitigated for adverse impacts, and those that did make assessments used varying criteria. Similarly, oversight of ad hoc mitigation has been lacking.

GAO concluded that the Corps lacks assurance that mitigation efforts under

in-lieu-fee or ad hoc arrangements have been effective. Instead, the Corps sometimes relies on the “good faith” of the organizations performing the mitigation. The October 2000 guidance does not go far enough to bring consistency to how determinations of ecological success should be made or to establish appropriate monitoring and oversight activities. This should be a major focus of future activities.

GAO found that the Corps and state and federal partners need adequate success criteria in order to measure whether progress is being made toward achieving the national goals of no net loss of the nation's remaining wetlands. Once the agencies establish success criteria for in-lieu-fee arrangements, extending those criteria to all compensatory mitigation options would provide the agencies with the opportunity to assess mitigation success more broadly.

### ***GAO Recommendations***

GAO's two recommendations are:

- To ensure that in-lieu fee organizations adequately compensate for adverse impacts to wetlands, GAO recommends that the Administrator of EPA, in conjunction with the Secretaries of the Army, Commerce, and the Interior, establish criteria to determine the ecological success of mitigation efforts and develop and implement procedures for assessing success.

All the agencies, with the exception of the Corps, strongly agree with this recommendation and believe it to be achievable. GAO is not advocating national criteria and acknowledges the need for a regional or watershed approach. The Corps wants to be the lead agency in the

development of criteria and would like criteria to determine whether wetland functions have been adequately compensated. They did not feel that developing criteria for ecological success was needed.

- To better ensure the ecological success of mitigation efforts under ad hoc arrangements, GAO recommends that the Secretary of the Army instruct the Corps to establish procedures to clearly identify whether developers or recipients of funds are responsible for the ecological success of mitigation and, using the same success criteria applicable to in-lieu-fee arrangements, to develop and implement procedures for assessing success.

### ***Discussion and Questions***

Did GAO find that the assumption of immediate success led to the thwarting of avoidance and minimization (Sibbing)? GAO heard that when there was a transfer of funds, the Corps often assumed immediate success, and therefore felt there was no need to monitor (Reese).

The Hydrogeomorphic (HGM) assessment methodology is a viable procedure for the Corps to use to assess success, however it is not a fast procedure. A streamlined and quick approach is not necessarily a solution. HGM can be adapted regionally and on a watershed basis. With some patience, HGM could be developed adequately to meet the first recommendation (Cole). The GAO survey concurred with these comments. Not all districts were familiar with HGM and most were concerned with the time it takes to conduct an HGM assessment. The interagency group developing ecological success criteria should be reinstated, as was suggested during this

forum by John Meagher, and the federal partners should work to promote consistent implementation of the October 2000 guidance (Reese).

Several of the findings in the GAO report did not present in-lieu-fee mitigation in a good light. The GAO and NAS reports focused only on wetlands, while there are requirements to mitigate other aquatic resources. The North Carolina data were presented in a manner tilted against the in-lieu-fee program. The North Carolina in-lieu-fee program is in compliance with the in-lieu-fee guidance. However, the conclusions of the GAO report were used to advocate against the state's program (Ferrell). Much of these problems rest with the inadequacies of the data and the way they were presented. There can be a long lag time between when fees are collected and when the actual mitigation takes place. It was difficult for GAO to present this data and this difficulty is captured in a footnote (Reese). The North Carolina program has done good work. It would be helpful if in-lieu-fee programs issued site-specific accounting reports on their program. This would eliminate many of the data discrepancies (Carroll).

The private wetland mitigation banking sector felt that the in-lieu-fee mitigation program in North Carolina has an unfair advantage over mitigation banking. It does not need to go through the mitigation banking review team (MBRT) process or provide mitigation in advance of impacts (Preyer).

Did the in-lieu-fee arrangements analyzed require mitigation to be performed in the same watershed as the impacts or require the submission of monitoring reports (Hausmann)? Some of the agreements provided adequate information about service areas, and others did not. The requirements for monitoring differed widely; in several

districts, the Corps considers a project a success as soon as fees are collected (Reese).

The Buffalo Corps district has 27 in-lieu-fee mitigation programs and has no idea what has been mitigated. Did the GAO analysis determine whether in-lieu-fees were being used for preservation or restoration projects (Sutliff)? GAO would have liked to determine how the funds are being used; however the data were inadequate (Reese).

Did GAO determine the percentage of compensatory mitigation that is made up of in-lieu-fee contributions relative to other forms of compensatory mitigation (Piel)? GAO was unable to determine this due to data limitations (Reese). In New Jersey, 80 percent of all mitigation is on-site, 8-10 percent goes to banks, and about 2 percent is in-lieu-fee mitigation. Given limited resources and the need to prioritize, it is more appropriate to focus staff time on on-site requirements than mitigation banking or in-lieu-fee mitigation (Piel).

Did the GAO consider the findings and considerations of the Institute for Water Resources, in-lieu-fee study (Mulrooney)?<sup>8</sup> Yes. There was a lot of commonality in the findings between that report and the GAO report (Reese).

## The State Perspective

### Presentation: *James Robb*

The Indiana Department of Environmental Management (IDEM) inventoried all of the mitigation sites required between 1986 and 1996 statewide. Each mitigation site was classified as constructed, incomplete, or no attempt was made to mitigate impacts. Each site was recorded using a Global Positioning System (GPS) and a digital photo was taken. The study found that 62 percent of all required mitigation was

conducted, 20 percent was incomplete, and no attempt was made to conduct mitigation on 14 percent of the sites. Information was lacking for 4 percent of the sites.

The study also attempted to analyze mitigation acreage. Thirty-one mitigation sites were randomly chosen. IDEM found that of the 34.3 hectares required, 15.21 hectares were built. For these 31 sites, this led to a net loss of 13.7 hectares. Of those sites that were constructed, there was a no net loss of wetlands, but over 30 percent of the sites were not constructed. Very little open water was permitted at the 31 sites, however a lot of open water was produced.

From these findings, failure ratios can be calculated. In order to achieve 1:1 replacement, the following ratios would need to be required: 3.4:1 for forested wetlands; 7.6:1 for wet meadows; 1.2:1 for shallow wetlands; and 1:1 for open water. IDEM concluded that some wetland types are more difficult to replace than others. This is also one of the NAS findings. IDEM currently requires the following replacement ratios: 4:1 for forested wetlands; 2:1 for shallow wetlands; and 3:1 for scrub shrub wetlands.

Several of the NAS findings reinforce IDEM policies. Although the NAS recommends avoidance of certain wetland types, such as bogs and fens, IDEM does require up-front mitigation for these wetland types. The NAS recommended higher ratios to overcome the risk of failure, which IDEM has instituted. NAS recommended the establishment of long-term research programs, which IDEM has in place. Finally, as the NAS recommended, IDEM does have a wetland mitigation banking program in place.

Several of the NAS findings contradict some of the state's policies. IDEM stresses performance over process, or design criteria. There is a trade-off with design criteria from

an enforcement standpoint. When design criteria are dictated to an applicant, if those criteria are met and the project fails, there is no opportunity for enforcement, as the permittee has met their requirements. IDEM does have a preference for in-kind and on-site mitigation and success criteria are based on structure (vegetation). Finally, IDEM does not accept payment in-lieu of mitigation because of the lack of accountability. If the state's Department of Natural Resources were to establish an in-lieu-fee program, and sites did not meet success criteria, IDEM would have difficulty enforcing against a sister agency.

IDEM plans to implement several policy changes. The agency will require financial assurances for all mitigation. However, this approach will only work if the amount of the bonds required is high enough. IDEM is also going to move from a preference for on-site mitigation to a watershed emphasis. IDEM has begun to conduct staff training programs and has instituted database tracking, increased follow-up, and enforcement. Eventually, IDEM will implement basin-wide restoration planning.

There are several limitations to achieving the above policy changes. The Supreme Court decision in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps (SWANCC)* created a great deal of uncertainty, which the state is currently trying to address. Funding is also a limitation. Indiana would like to see a reduction in the state match for federal grants, an increase in the amount of money and the length of grants, and finally, the agency will need operational grants. Indiana also needs greater access to training on proper restoration, delineation, technical, and policy techniques, and how to build an effective enforcement case. Finally, there are legal limitations to achieving the state's goals.

*Discussion and Questions*

In Florida, the Department of Environmental Protection chose not to institute an in-lieu-fee program because they did not feel that the money would be safe from the state legislature (Redmond). Ensuring adequate enforcement opportunities is not the only way to have a successful in-lieu-fee program. State agencies should not need to enforce against themselves; they should be able to have a successful mitigation program through greater cooperation (Venner).

Wisconsin has a cooperative agreement with the state department of transportation, which conducts the majority of wetland mitigation banking in the state. The Department of Natural Resources is often in negotiations or in court with the transportation agency. The state's parks department and the wildlife department have been the two most common violators of public water and public trust laws. Wisconsin does not have an in-lieu-fee program, but the Corps has allowed in-lieu-fee mitigation on an ad hoc basis. Most of these funds have gone to The Nature Conservancy. Bringing enforcement action against The Nature Conservancy is extremely difficult and unpopular (Hausmann).

If the correct replacement ratios are selected and adequate financial assurances are in place, will we be yielding a net gain of wetlands (Brumbaugh)? As the NAS report concludes, we are nowhere near achieving a net gain in wetland functions. Even if ratios and financial assurances are established to ensure that there is not a net loss in wetland acreage, it is still doubtful that we will be achieving a net gain in wetland functions (Bostwick). The goal of Indiana's performance standards is not to achieve a no net loss of wetlands, but rather to ensure that

required mitigation is completed. However, financial assurances could be tied to performance standards (Robb).

Is Indiana planning to require performance bonds for very small compensatory mitigation projects (Reisinger)? Indiana does plan to require financial assurances for all compensatory mitigation not completed in advance, although the hope is that very small mitigation projects will go to mitigation banks in the future. These small impacts are the type of projects that need assurances (Robb). Since April 2000, Michigan has required financial assurances, such as a performance bond or letter of credit, for any mitigation that is not performed in advance (Bostwick). Do the state's financial assurances include funds for the long-term stewardship of mitigation sites (Denisoff)? No (Robb). Bonding requirements can ensure that sites are more successful. The Norfolk district has established a state release program under which the financial assurances are reduced over a five-year period as success criteria are met (Rolband).

For a number of reasons, many Nationwide Permit applicants are submitting applications for project that would have impacts below .01 acres. What will the consequences be if these criteria are applied to small sites (Brumbaugh)? If requirements are too cumbersome and costly, many potential applicants will conduct their activities illegally (Yanchik).

Is Indiana planning to implement these proposed policy changes, such as the requirement for financial assurances, through legislation or through rule-making? How has the state handled SWANCC (Sutliff)? IDEM will implement the financial assurances through rule making and the agency already has enforcement authority. Indiana is currently trying to pass rules to address SWANCC (Robb).

Does Indiana have administrative penalties, or is the state relying on civil and criminal penalties? (Setzer) Indiana does have administrative penalties (Robb).

The NAS recommendations expressed a lot of confidence in the states. They recommended that states fill SWANCC gaps, develop recommendations for watershed-based priorities for wetland restoration, and develop bioassessment and functional assessment tools. However, due to funding limitations, these recommendations will be difficult to meet. In some regions of Michigan, there are very few wetland permits issued. Mitigation bankers are not interested in these watersheds because of a lack of demand. The state will most likely not develop watershed plans statewide, particularly in areas where demand for mitigation is low. The state will continue to conduct mitigation on a permit-by-permit basis. Watershed plans will probably be developed by the state, s non-point source program. In order for the states to meet some of the NAS recommendations, they will need prodding and support from EPA (Bostwick). States can participate in the Corps, training programs, including regulatory and technical courses (Mooney).

One of the obstacles to establishing wetland mitigation banking in some states, such as Michigan, Indiana, and Wisconsin, is very small service areas. However, these states have expressed interest in encouraging the establishment of more banks. These states could attract the development of more wetland mitigation banks if they were to couple several watersheds (Ryan).

Pennsylvania found that the replacement of small wetlands (less than 1/2 acre) ultimately fails or these sites are not maintained. In response, the state regulatory agency developed an in-lieu-fee program. The agency has had more success than individual

landowners would have achieved. Because of low numbers of permits issued and the number of service areas, the state is not attractive for private wetland mitigation banks. Changing service areas is not just a state decision; it involves the public as well (Reisinger).

### **The National Aquarium, s Commitment to the Chesapeake - A Model for Wetland Stewardship**

#### **Presentation: *Glenn Page***

The National Aquarium has taken a significant step toward tidal wetland restoration beyond the requirements of their five-year permit. The project is both science- and community-based.

The Aquarium is conducting long-term data collection and monitoring and developing field guides for community-based stewardship. The institution is about 20 years old and its primary focus has been education. In the past year, the Aquarium has been moving beyond captive breeding and other traditional activities and becoming involved in action-oriented conservation. The Aquarium has been designated as a "Learning Center" by Coastal America.

The Aquarium felt it was important to establish a local field station. Impacts related to construction of a tunnel in the Baltimore port area required mitigation. The 7-acre mitigation site (10 acres, including uplands) was designed 20 years ago and built 17 years ago adjacent to Fort McHenry. Because of the proximity to a national park, there is parking and very good public access, a function that was not part of the original design. The mitigation site receives water from a 540-square mile, urban watershed and it accumulates a tremendous amount of trash. The site once had three large pipes for

conveying water. Two of the three pipes have now been silted up, and there is very little flushing. Although there has been a targeted attempt to control phragmites at half of the site, its dominance has gone up from 18 percent to 22 percent in the past three years of monitoring. The Aquarium is interested in the impacts of garbage on wetland functions and the establishment of phragmites. The mitigation site did not have permit requirements for long-term monitoring, nor any performance standards.

The Aquarium sees the site as a platform for inspiring action, building watershed awareness and a long-term sense of stewardship for a local resource, building capacity, and improving wetlands and watershed health. The hope is that the project will be a model for community-based participation in urban, tidal wetland restoration, maintenance, and monitoring and the development of functional trajectories.

From a policy perspective, the site can help build awareness of beneficial uses of dredge materials. The Chesapeake Bay Program and the state of Maryland have set restoration goals. The Governor set a goal of restoring 60,000 acres and has put together a wetlands restoration steering committee. There are a lot of challenges and opportunities in Maryland for wetland restoration. One restoration opportunity may be through the disposal and placement of 5.3 million cubic yards of material generated by maintenance dredging every year. The Corps is supportive of utilizing dredge materials for wetland restoration, but beyond the construction phase, there is no programmatic instrument for long-term assessment of these sites to ensure that they are moving along a trajectory toward functional equivalency. The Aquarium hopes to improve wetland function at these sites.

Getting the public involved at the planting stage is one of the project goals. It engenders connection to the long-term success of the site. Getting the public involved at the design stage would also be an excellent way to build long-term public connection to restoration sites. The Aquarium has developed a program for training volunteer field supervisors who can help to guide other volunteers. Public field days are also critical for maintenance activities, such as trash removal, phragmites control, and maintenance of habitat structures.

Although hydrologic conditions at the site are not ideal, it does have a tremendous degree of diversity. However, without on-going maintenance, the site would be 100 percent phragmites in 20 years. There are very few remaining tidal wetlands in the area that are not monoculture phragmites. Once phragmites is removed, the site is revegetated and vegetation survival monitoring is conducted.

One difficulty with developing a long-term ecological trajectory is locating a reference site in the Petapsco watershed. Reference sites are also needed to set performance standards. Monitoring of topography is important to evaluate the effect of sea level elevation.

The goals of the Aquarium's restoration program include: development of performance standards for hydrology; establishing tidal datums for evaluating sea level rise; fish and bird utilization as habitat; water quality and weather monitoring; targeting minority serving institutions; development of public-friendly environmental data.

The Aquarium's community-based restoration and monitoring program has allowed it to successfully serve as a partner to federal, state, and local governments on restoration projects.

## SUMMARY OF DISCUSSION ON PRIORITY RECOMMENDATIONS

The following section provides a summary of the three facilitated discussions on priority recommendations identified by the participants for discussion purposes. One facilitated discussion was devoted to each category: technical, policy, and programmatic. During each session the top five recommendations in that category were addressed in turn. In the time devoted to discussing each recommendation, participants further defined the recommendation and framed the issue, ensuring that there was common understanding; identified roadblocks to implementation; and discussed steps for implementing the recommendation. In some cases all five of the priority recommendations were not discussed during each of the three facilitated sessions due to previous discussions addressing the recommendation or time constraints.

It is important to note that this forum was not designed to capture consensus opinions. Rather, it was designed to stimulate discussion among and capture the range of opinions of a diverse audience.

### A. Compensatory Mitigation Technical Issues

#### TECHNICAL ISSUE 1

*Hydrological variability should be incorporated into wetland mitigation design and evaluation. Except for some open-water wetlands, static water levels are not normal. Because of climatic variability, it should be recognized that many wetland types do not satisfy jurisdictional criteria every year. Hydrological*

*functionality should be based on comparisons to reference sites during the same time period.*

#### Defining the issue

- When mitigation projects are designed and constructed, natural hydrological patterns for that type of system should be incorporated.
- This recommendation is meant to address the fact that mitigation projects often create wetlands that are too wet.

#### Roadblocks

- Measuring hydrological variability, defining hydrologic conditions, setting monitoring requirements, and writing permit conditions is difficult, especially for drier end wetlands or wetlands that are a combination of wet and dry.
- There is an inherent conflict in how dry end wetlands should be mitigated. Consultants and applicants generally seek wetter conditions. This is partially a public perception problem - the public thinks that projects are a failure if they don't see standing water (Rolband, Yanchik).
- It is difficult to build economical and achievable criteria into permits for small, on-site mitigation projects. There should not be lower standards for these sites or we will be encouraging failure (Ryan, Sutliff).
- Government oversight of small sites is inefficient. In New Jersey, permittees are encouraged to buy into a mitigation bank to mitigate for small impacts (Piel).
- An adaptive management approach may make sense scientifically to help build in natural variability. However, it lacks

certainty and may not support public or permit holder confidence (Strand).

#### Steps for success/recommendations

- Performance criteria that rely upon an adaptive management approach in implementation should be developed. Compensatory mitigation success should not be tied to design standards.
- Hydrologic performance criteria should be based on watershed conditions, climatic conditions and patterns, and reference sites (Denisoff, Mann).
- Hydrologic performance criteria should be adaptive, achievable, and self-sustaining.
- A method for adopting adaptive management principles to permit writing should be developed in an effort to capture hydrologic and climatic variability.
- Performance goals should reflect the conditions that reference wetlands actually exhibit.
- Mitigation requirements should be decoupled from the permit through the use of wetland mitigation banks and in-lieu-fee programs. This would allow for greater flexibility and adaptive management (Ferrell).
- Longer-term monitoring is necessary to capture climatic variation and successfully restore drier end wetlands (Nevel).
- A long-term set of reference wetlands is needed to assess whether mitigated wetlands are failing or are following trends in climatic and hydrologic variability.
- Monitoring requirements that are achievable and affordable are needed.

Participants provided several examples of how hydrological variability and adaptive management are incorporated into wetland mitigation design and evaluation.

- In North Carolina, permits have statistical success criteria, which are primary, and reference site criteria, which are secondary (Carroll).
- In New Jersey, the state conducts multiple site visits during design and construction. Adaptations to the approved plan are made to take changes into consideration (Piel).
- California has several examples of permits that allow for the dynamic nature of wetlands (Denisoff).

#### **TECHNICAL ISSUE 2**

*The science and technology of wetland restoration and creation need to be based on a broader range of studies, involving sites that differ in degree of degradation, restoration efforts, and regional variations. Predictability and effectiveness of outcomes should then improve.*

#### Defining the issue

- The causes of degradation, whether the effects are linear, and whether the effects are the same for different wetland types, need to be better understood (Redmond).
- More research on a range of wetland types and wetlands in a range of ecological conditions, including more degraded wetlands, is needed (Streever).

#### Roadblocks

- Mitigated sites are often compared to natural reference sites that are far more pristine (Streever).

- Most mitigation takes place on degraded sites with little connection to reference sites in a historic or watershed context (Hausmann).

#### Steps for success/recommendations

- In Ohio, a study was recently conducted that looks at a range of functioning wetlands - from very degraded to pristine - as the natural reference.<sup>9</sup> More studies such as this are needed (Sibbing, Streever).
- Additional research on a range of wetland types and conditions in a watershed context should be conducted. This analysis should include watershed trends, what is achievable over time, and reference sites (this recommendation relates to policy recommendation #10) (Bostwick, Christie, Redmond).
- Long-term monitoring research is needed on networks of reference sites and a range of wetland types. This could be integrated into an on-going federal effort to develop a national scorecard (Kusler).

### TECHNICAL ISSUE 3

*To ensure that in-lieu-fee organizations adequately compensate for adverse impacts to wetlands, we recommend that the Administrator of EPA, in conjunction with the Secretaries of the Army, Commerce, and the Interior, establish criteria to determine the ecological success of mitigation efforts and develop and implement procedures for assessing success.*

#### Definition

- In-lieu-fee projects should be held to the same success criteria and release schedule as other kinds of mitigation (Carroll, Piel).

- Ecological success for all mitigation must be defined (Sibbing).

#### Roadblocks

- Defining performance standards is a technical issue, while defining ecological success is a policy issue (Streever).
- It is difficult to get regulatory agencies to enforce against in-lieu-fee providers because they often are sister agencies or non-profit organizations (Robb).
- If in-lieu-fee mitigation and wetland mitigation banking have the same release schedule, there will be little distinction between the two (Stedman).
- Which agency or combination of agencies should be responsible for developing ecological success criteria is not defined (Denisoff, Streever, Brumbaugh).

#### Steps for success/recommendations

- Federal agencies should define ecological success for mitigation. Ecological success should be defined regionally, by type, in the context of regional restoration priorities, and should be spelled out in the permit (Brumbaugh, Conant, Streever).

### TECHNICAL ISSUE 4

*Mitigation projects should be planned with and measured by a broader set of wetland functions than are currently employed, including non-ecological functions.*

#### Definition

- Performance standards should go beyond vegetation standards (Koenig, Streever).

#### Roadblocks

- Wildlife habitat and corridors may not be easily transferable and are functions that should be considered (Denisoff, Koenig).
- Habitat functions and corridors can be specific requirements in wetland banking siting and agreements. As a result, on-site mitigation is not the only way to achieve these functions (Ryan).
- The measurement of wetland acreage must be meaningful and should be tied to performance standards (Streever).
- Assessing, tracking, and measuring functions will be difficult given our inability to track and measure acreage accurately. We should start with tracking the basics and then move on to more sophisticated levels of analysis (Robb, Rolband).
- Given limited resources, enforcement must be prioritized. It is easier to measure the compliance of acreage requirements than it is to measure and enforce against ecological success criteria (Robb).

#### Steps for success/recommendations

- Current assessment procedures focus on ecological criteria, but do not address other wetland functions, particularly non-ecological functions, such as flood storage, flood conveyance, erosion control, water quality, wave attenuation, historic and archeological significance, recreation, groundwater recharge, aesthetics. Guidance is needed for when different assessment methodologies should be applied to measure these other functions (Kusler).
- Restoration should be conducted on-site and off-site to replace all wetland functions. Wetland functions cannot always be replaced on site. Where

restoration occurs in the landscape determines what functions the wetland can provide (Kusler, Sibbing).

- An interagency group that includes state agencies and academics - the Biological Assessment Working Group (BAWG) - is analyzing a broad range of biological indicators. The group could possibly address this recommendation and the previous recommendation about developing ecological success criteria (Meagher).
- There are a number of functions that uplands provide that wetlands also provide. Replacing non-functioning wetlands with functioning uplands might make sense in some circumstances (Asmus).
- An enforcement hierarchy is needed. For example, enforcement agencies could chose to enforce acreage requirements first and then ecological success criteria (Christie).
- There are no national standards on what mitigation data should be recorded and tracked. We need common terms, definitions, and criteria on what should be collected and recorded nationally (Hausmann).

#### **TECHNICAL ISSUE 5**

*To assist permit writers and others in making compensatory mitigation decisions, a reference manual should be developed with specific design standards to help design projects that will be most likely to achieve permit requirements. The manual should be organized around the themes developed in this report. The Corps of Engineers should develop such a manual for each region, based in part on the careful enumeration of wetland functions in the 404(b)(1) guidelines and in part on local and national expertise regarding the difficulty of restoring different wetland types,*

*hydrological conditions, and functions in alternative restoration or creation contexts.*

### Steps for success/recommendations

The discussion on developing a design standards manual yielded constructive recommendations with much agreement among participants. Several participants felt that the Army Corps, in consultation with other federal agencies, should develop minimum submission design standards (Hausmann, Rolband, Stedman). New Jersey has developed a checklist for submission requirements for mitigation projects that was offered as an example (Piel). Participants made it clear that a minimum submission design standards manual or checklist must be distinguished from a design standards manual. While there was strong agreement about the need for a minimum submission checklist there was more debate about the value and scope of a design standards manual. Participants felt that a minimum submission checklist could be developed nationally, with some regional specifications, while prescriptive design standards should be developed regionally, especially for enforcement reasons (Hausmann, Redmond, Rolband, Stedman, Venner).

Additional recommendations on developing a design standards manual follow:

- Permit processors should be asked what design/reference/performance standards manual would be most useful to them in evaluating permits (Redmond).
- A design standards manual should build on existing manuals (i.e., U.S. Army

Corps of Engineers, Waterways Experiment Station).

- A design standards manual should not be prescriptive. A manual that is too prescriptive will stifle innovation (Peloso, Yanchik).
- A design standards manual should not be more than 2-3 pages (Streever).
- Under the Clinton Administration, s Clean Water Action Plan, an interagency group was charged with developing a design standards manual. The group decided that they could not write technical guidance for wetlands across the country. However, they did develop planning guidance that will be released shortly. This guidance does not include minimum submission design standards (Stedman).
- If one type of mitigation - in-lieu-fee mitigation, wetland mitigation banking, or permittee mitigation - is more ecologically effective, we should determine which of these three is the most effective. The standards for the other options should then be similar to the option that is most effective (Preyer).

## **B. Compensatory Mitigation Policy Issues**

### **POLICY ISSUE 1**

*Site selection for wetland conservation and mitigation should be conducted on a watershed scale in order to maintain wetland diversity, connectivity, and appropriate proportions of upland and wetland systems needed to enhance the long-term stability of the wetland and riparian systems. Regional watershed evaluation would greatly enhance the protection of wetlands and/or the creation of wetland corridors that mimic natural distributions of wetlands in the landscape. Move away from strict adherence to on-site mitigation.*

Definition

- Site selection on a watershed scale means moving away from strict adherence to on-site mitigation (Redmond).
- This recommendation promotes the establishment of a framework within which all types of mitigation must function. It does not mean that mitigation should be sited at great distances from the impact site (Denisoff, Sibbing).
- Regional wetland managers should be defining the appropriate watershed scale for the region. States, federal agencies, and other parties should work in partnership to develop watershed plans (i.e., Tampa Bay National Estuarine Sanctuary Watershed Plan) (Redmond).

Roadblocks

- Our current system of strict adherence to sequencing leads to avoidance on-site. Avoidance and minimization often lead to a secondary loss of wetlands. These losses are not accounted for (Strand, Sutliff).
- Watershed planning is difficult when watersheds don't respect state lines. In addition, in states where protection is local, such as Massachusetts, watersheds don't respect town lines. To make watershed planning effective, inter-state and inter-community coordination will be necessary (Nevel).
- The size of the service area or watershed must reflect the functions you are trying to replace (Christie).
- Conflicts often arise when the state has a watershed planning process that demands

one service area boundary and the Corps has another service area boundary (Carroll).

- Defining “an appropriate watershed” is a roadblock if watershed planning is a prerequisite for moving away from preference for on-site mitigation. Moving away from on-site mitigation can be done without dependence on a watershed plan (Bleichfeld).
- Many areas of the country do not have watershed plans in place and therefore, they must be developed before moving away from on-site mitigation (Sibbing, Ferrell).
- Identification of appropriate restoration sites is difficult as site-specific opportunities are limited. It is difficult and costly to identify areas suitable for restoration where the local community supports restoration over other forms of economic development and where money is available to purchase those properties (Bostwick, Yanchik).
- Significant resources should not be spent on developing mitigation plans for small impacts or small sites (Reisinger). Small individual impacts can have significant cumulative impacts in the long-term (Sibbing).

Steps for success/recommendations

- If we are to effectively advance the goals of mitigation while moving away from on-site mitigation, we must be wise about prioritizing our restoration needs (Mann).
- On-site mitigation does have value that should be recognized, especially for areas that have unique microtopography (Mauney).
- Wetland mitigation must be conducted where it has long-term sustainability and

- compatible contiguous uses. Once the correct location for mitigation is identified, we must be sure that we are willing to send impacts there (Collins).
- The watershed or service area must be clearly defined. In North Carolina, the Corps district clearly defines the service area as the 8-digit U.S. Geographic Survey hydrologic unit (Carroll).
  - Watershed planning does not have to be an obstacle. Much of the data is already on hand and developing the plans is not costly. Existing state plans can be used to develop regional watershed evaluation plans (Bostwick, Ferrell, Venner).
  - Watershed planning can help agencies prioritize funding. The plans can help target funding to areas where the greatest positive environmental benefits can be achieved (Venner).
  - U.S. Fish and Wildlife Service has been practicing watershed planning for managing ecological resources. Agency staff might be a good resource in helping prioritize wetland mitigation with respect to biological resources to achieve the most cost effective restoration (Nims-Elliott).
  - Federal agencies need to do a better job of establishing unified databases for ecological data. Such an interagency approach could yield good baseline environmental data for developing watershed planning and setting restoration priorities (Yanchik).
- Forum participants expressed several different views on the role of the federal government in watershed planning:
- Federal oversight and guidance is not mandatory for developing effective watershed plans. It can be an impediment and stifle innovation (Reisinger).

- Federal oversight for the development of watershed planning is important to ensure consistency with larger regional goals and to provide consistency between mitigation needs and the administration of mitigation programs (Collins, Mann).
- Federal oversight is necessary to coordinate requirements under the Oil Pollution Act, CERCLA, and other federal laws. The National Marine Fisheries Service restoration programs also provide an opportunity for the development of regional watershed plans. These programs can lead to the identification of areas that are appropriate for restoration (Stedman).

Forum participants also discussed the role of state water quality programs in developing watershed plans:

- Watershed planning will most likely be conducted on a state or regional basis. However, it will be driven by the federal government tying watershed planning to water quality program requirements (Hausmann).
- Water quality should not be the only consideration in watershed plans. Water quality implies a focus on chemical parameters and not the underlying biological processes (McGoldrick).
- Water quality managers may not have the necessary qualifications for addressing wetlands concerns (Nevel).

## POLICY ISSUE 2

*The Corps of Engineers and other responsible authorities should establish and enforce clear compliance requirements for permittee-responsible compensation to assure that (1) projects are initiated no later than concurrent with permitted activity, (2)*

*projects are implemented and constructed according to established design criteria and use as specified in the permit, (3) the performance standards are specified in the permit and attained before the permit compliance is achieved, and (4) the permittee provides a stewardship organization with an easement on, or title to, the compensatory mitigation wetland site or a cash contribution appropriate for the long-term monitoring, management and maintenance of the site.*

### Definition

- This recommendation outlines four components that should be clearly indicated in permits for permittee-responsible mitigation, rather than third-party mitigation (Strand).
- The recommendation is less about leveling the playing field than ensuring that mitigation - in every form - is ecologically effective. All of these components should be applied to all forms of compensatory mitigation (Redmond).
- Mitigation projects should not only be sustainable, but should have assurances that they will be ecologically functioning wetlands in the long-term. Because impacts are permanent, the mitigation for those impacts should be permanent. The committee felt that the most effective way to ensure long-term sustainability is to require that a stewardship entity with a vested interest in the mitigation site take responsibility for long-term management. This recommendation would represent the biggest single change in the wetlands program (Redmond).
- The recommendation should clearly state that a legally responsible party must be identified for long-term monitoring, management, and maintenance (Denisoff).

### Roadblocks

- The Army Corps routinely allows permittees to delay on-site mitigation for years following permitted impacts (Rolband).
- It is an incorrect assumption that mitigation banking is mitigation performed in advance. Current federal guidance and pending legislation do not require that all mitigation conducted under wetland mitigation banking be performed in advance (Sibbing). In practice, wetland mitigation banking may not mean that all mitigation is performed in advance. However, before pre-sale of credits can occur, mitigation bank sponsors must have in place a site-specific mitigation plan, financial assurances, and a conservation easement. As a result, pre-sale of credits of a bank is not the same as an in-lieu-fee arrangement (Carroll, Denisoff).
- The last section of this NAS recommendation on stewardship may be too stringent. In Michigan, the state requires that a conservation easement must be placed on mitigation sites. The NAS recommendation suggests that we must go beyond this and turn mitigation sites over in-fee title to a stewardship agency or organization. This may be a significant roadblock. No state or private entity will want to manage a large number of isolated parcels. We need to be reasonable about the degree of stewardship we require for mitigation sites. A conservation easement may be sufficient (Bostwick).
- Public land management agencies have many restrictions and limitations on what properties they can accept and under what conditions (Yanchik).

Steps for success/recommendations

- The recommendation states that permittee-responsible mitigation should be initiated no later than concurrent with permitted impacts. However, “initiated” is very ambiguous. Initiate can just mean developing a watershed plan. It does not address the important aspects of mitigation, such as meeting design criteria and construction standards. More clarity is needed on the term “initiation” (Carroll).
- The same standards need to apply for all forms of mitigation (Denisoff, Sibbing). In addition, all mitigation standards must be raised (Sibbing).
- There should be different standards for wetland mitigation banking, in-lieu-fee mitigation, and on-site mitigation to reflect their inherent differences (Ferrell).
- The Nature Conservancy would support and endorse more stringent long-term monitoring and maintenance for all forms of mitigation (Mulrooney).
- If banks operated by The Nature Conservancy are turned over to another entity for long-term monitoring, management, and maintenance, an endowment in perpetuity is passed along (Mulrooney).
- Pennsylvania requires that the wetland must be constructed concurrent with the project (Reisinger).
- Timing of credit release should be tied to the realization of wetland functions rather than a construction schedule (Mann).
- We need to retain the flexibility of permittees to decide between wetland mitigation banking, in-lieu-fee mitigation, and on-site mitigation (Asmus).

- Having minimum submission requirements would help ensure that NAS, four criteria are met. If the New Jersey checklist of minimum submission requirements were incorporated into all permits, we would see higher quality mitigation on 98 percent of the problem mitigation projects we currently see. However, it may need to be adjusted regionally (Rolband).
- The New Jersey checklist and standard permit conditions have been in place for two years. The state just completed a study on the effectiveness of mitigation. Unless monitoring and enforcement are coupled with these provisions, we may still be seeing failures (Piel).

**POLICY ISSUE 3**

*Mitigation goals must be clear, and those goals carefully specified in terms of measurable performance standards, in order to improve mitigation effectiveness. Performance standards in permits should reflect mitigation goals and be written in such a way that ecological viability can be measured and the impacted functions replaced.*

Definition

- If off-site mitigation is tailored so it is appropriate for the location, the impacted functions may not be replaced. As a result, it may lead to more out-of-kind mitigation. To ensure that impacted functions are replaced, out-of-kind mitigation must have appropriate performance standards that are designed for the specific location (Cole).

Roadblocks

- The Army Corps conducted a review of the performance standards used by different Corps districts.<sup>10</sup> The review found that most of the standards are structural and relate to plant cover (Cole).
- It takes a long time for biological communities to become equivalent to a natural system. To ensure that these standards are being met, we need very long monitoring periods. However, agencies may not be willing to require monitoring on individual sites for the amount of time it takes to achieve biological equivalency to natural systems, which is sometimes as much as 20 years (Bostwick).

Steps for success/recommendations

- A shorter-term tool is needed to measure whether wetlands are on the right trajectory toward meeting functional equivalency (Bostwick).
- EPA should fund research on indicators that could be developed into performance standards (Sibbing).
- More work on collecting information on reference sites that can be translated into design criteria is needed (Cole).
- EPA's state grants program will provide funding for research on compensatory mitigation. This provides states with the opportunity to conduct research on performance standards (Goodin, Robb). This priority should be translated down to the regional level so that states seeking to improve their programs have the funding to do so (Setzer). EPA wetland program managers have an annual meeting in November 2001; the topic of

compensatory mitigation will be a focus (Goodin).

- EPA has a national workgroup that is working on building state and tribal monitoring and assessment programs (Robb).
- Proper siting and physical construction of wetlands can improve mitigation. Mitigation should strive to mimic the natural design of the wetlands that are being replaced. Using design criteria that come from reference sites can improve mitigation success (Cole).
- Performance standards should be tailored to the specific site and should set reasonable expectations (Yanchik).
- Research shows that wetlands follow a particular trajectory. This trajectory can be used to predict future conditions (e.g., research conducted by EPA's Office of Research and Development in Corvallis, Oregon) (Robb).
- Soil characteristics should be included in performance standards. Vegetation should not be the only indicator of success (Mann).

Participants provided several state examples of how performance standards are incorporated into permits:

- Pennsylvania has had success including clear goals and objectives in permits. The permits require monitoring for 5 years and mostly require monitoring vegetative criteria (Reisinger).
- Virginia banks usually have a 10-year monitoring period. Monitoring is required every year for the first 5 years, then monitoring in year 7 and year 10. Monitoring continues if success is not met by year 10. Vegetative diversity, in addition to vegetative cover, must also be

monitored. Some sites require that certain target species be established (Rolband).

- In Indiana, the state is struggling with developing adequate performance criteria. The monitoring period has not been decided upon. Permits include a requirement for meeting performance criteria in two consecutive years. For this strategy to be successful, good performance criteria must be developed and included in the permits. Survival is not a good performance criterion. The state requires that a delineation be conducted on the site. Other performance criteria include density of trees per acre and a limit on exotic species (Robb).
- North Carolina has very well defined performance standards in permits. The permits include hydrologic and vegetative success criteria. Credit release is predicated on achieving these success criteria (Carroll).

#### POLICY ISSUE 4

*Dependence on subjective, best professional judgment in assessing wetland function should be replaced by science-based, rapid assessment procedures that incorporate at least the following characteristics: effectively assess goals of wetland mitigation projects; assess all recognized functions; incorporate effects of position in landscape; reliably indicate important wetland processes, or at least scientifically-established processes; scale assessment results to results from reference sites; are sensitive to changes in performance over a dynamic range; are integrative over space and time; and generate parametric and dimensioned units, rather than non-parametric rank.*

#### Definition

- The committee felt that science-based rapid assessment is preferable to relying upon best professional judgment (Redmond).

#### Steps for success/recommendations

- The target functions of a mitigation site should be based on watershed needs, not on the functions lost at the permitted site (Bostwick).
- Functional assessment can be used to track the functions permitted for loss and document functions that mitigation is intended to restore. Watershed plans may or may not show a preference for exact functional replacement on a site-by-site replacement. In some cases, a watershed plan may acknowledge a disproportional historic loss or gain of certain wetland types. The plan may therefore show a preference for out-of-kind mitigation in an effort to replace a certain wetland type (Redmond).
- Best professional judgment should not be rejected, but should be used to complement functional assessment (Conant).
- Some states (such as Washington, California, Florida, South Carolina, Georgia) have developed functional assessment methodologies, areas associated with Special Area Management Plans, and others. However, they still rely heavily on best professional judgment (Brumbaugh). The Mobile and Omaha Corps districts are using Hydrogeomorphic (HGM) assessment methodology. The Mobile district is using HGM to evaluate pre-site

conditions, site conditions, and success (Mooney).

### **POLICY ISSUE 5**

*Commit additional resources to all agencies and the states for improving the effectiveness of mitigation.*

Due to time limitations and a general agreement that discussion would not add further information, participants did not discuss this final recommendation.

## **C. Compensatory Mitigation Programmatic Issues**

### **PROGRAMMATIC ISSUE 1**

*States, with the participation of appropriate federal agencies, are encouraged to prepare technical plans or initiate interagency consensus processes for setting wetland protection, acquisition, restoration, enhancement, and creation project priorities on an ecoregional (landscape/watershed) basis.*

#### Definition

- States should work with federal agencies to determine restoration priorities for their designated unit area, whether on a watershed or landscape scale (Redmond).

#### Roadblocks

- North Carolina is prioritizing wetland protection needs on a watershed basis. However, the federal agencies still insist on on-site and in-kind mitigation. If states are to set watershed priorities to guide mitigation activities, they need the assurance that federal agencies will recognize their watershed planning priorities (Carroll, Ferrell).

- Additional federal guidance may not solve the problem, as differences from Corps district to Corps district may lead to different interpretations (Yanchik).

#### Steps for success/recommendations

- The 1990 MOA could be changed, or additional guidance could be issued, to remove the preference for adherence to on-site, in-kind mitigation to recognize wetland planning (Bleichfeld). The on-site preference outlined in the 1990 MOA was designed to address individual permits only (Brumbaugh).
- There should not be federal oversight in developing regional watershed plans. The plans should be developed through a consensus building process (Redmond). Federal oversight is not necessary, but federal participation is (Conant).
- On-site should be given first consideration. Off-site mitigation should be guided by a watershed plan that states this as a priority. Confidence in off-site mitigation would go up significantly if it were conducted in the context of a watershed plan (Mann, Sibbing).
- States and federal agencies should develop ecoregional or watershed plans that are the basis for setting ecosystem protection, restoration, and enhancement priorities. This might require federal involvement and a change to the 1990 MOA.

### **PROGRAMMATIC ISSUE 2**

*The wetland area and functions lost and regained over time should be tracked in a national database. This database should include the Corps of Engineers, RAMS database.*

Forum participants identified several parameters that should be tracked in a national database. Participants recommended that the following data be collected:

Data to be collected at the impact site

- Number of acres at each site
- Wetland type at each site (needs to be better defined, i.e., subclass)
- Location (GPS locations, including impacts approved under Nationwide Permits)
- Functions (high ° low)
- Permanent impact, temporary impact, or conversion
- Status of the impact site (did the impact occur and how much)

Data to be collected on mitigation site

- Number of acres required and achieved (periodically updated)
- Location (GPS locations)
- Wetland type
- Functions (high ° low)
- Wetland type mitigated
- Type of mitigation that is occurring: preservation, creation, enhancement, or restoration
- Performance criteria (record of when they are being met)

Other issues to track:

- The size of the wetland that has been avoided and minimized to determine if secondary losses are occurring (Sutliff).
- Where wetland loss is occurring relative to other wetlands in the area (Nevel).
- Deadlines for mitigation construction, when monitoring reports are due, and other administrative issues (Robb).

Roadblocks

- It is very difficult to get field staff to enter information into a national database (Christie).
- More funding is needed to improve data tracking on wetland mitigation over the long-term.

Steps for success/recommendations

- Data entry should be incorporated into the daily routine of permit writers and into the permitting process (Hausmann, Redmond).
- Corps staff need to be trained to enter data into a database (Brumbaugh).
- The permit application process should be changed to require more data up front (Morales).

**PROGRAMMATIC ISSUE 3**

*The Corps of Engineers and the EPA should work with the states to expand their permitting and watershed planning programs to fill gaps in the federal wetland program.*

Forum participants felt that this recommendation had already been addressed and decided not to discuss it further.

**PROGRAMMATIC ISSUE 4**

*To better ensure the ecological success of mitigation efforts under ad hoc arrangements, we recommend that the Secretary of the Army instruct the Corps to establish procedures to clearly identify whether developers or recipients of funds are responsible for the ecological success of mitigation efforts and, using the same success criteria applicable to in-lieu-fee arrangements, to develop and implement procedures for assessing success.*

Definition

- Ad hoc arrangements are mitigation projects that do not fall into the in-lieu-fee mitigation or wetland mitigation banking definitions (Denisoff).
- The intent of the interagency guidance was to recognize three distinct categories of mitigation: wetland mitigation banking, in-lieu-fee mitigation, and permittee responsible mitigation. A central feature of in-lieu-fee mitigation is the transfer of liability. The guidance was meant to define all non-banking mitigation that transfers liability as in-lieu-fee mitigation (Goodin).

Roadblocks

- There is a lot of inconsistency in the interpretation of the in-lieu-fee mitigation guidance (Ryan).
- If in-lieu-fee mitigation and wetland mitigation banking requirements are brought into line with one another, there will be no disincentive for permit applicants to choose ad hoc off-site mitigation, such as consolidated mitigation (Carroll).
- The intent of the recommendation is commendable, but difficult to realize because of the frequency of ad hoc arrangements. Ad hoc in-lieu-fee mitigation often occurs when an agency comes into a small amount of money that they use to conduct mitigation (Mulrooney).
- The wetland mitigation system as constructed is very data based. Data collection requirements are a severe limitation to achieving mitigation goals. We need a more simple way to assess success (Miller).

- If mitigation is too inexpensive, applicants won't bother to avoid wetland impacts. It is more attractive to purchase a property with wetlands on it if it is inexpensive to mitigate (Sibbing).

Steps for success/recommendations

- Part of the statement has already been achieved, as the in-lieu-fee guidance will bring these ad hoc arrangements into a more formalized program (Yanchik).
- The Corps, intent is to identify the responsible party in all compensation decisions and will be working to ensure that is the case (Brumbaugh).
- Equal standards and preference should be given to all forms of mitigation (Denisoff, Yanchik).
- In order to achieve mitigation success, we need to remain goal oriented instead of process oriented. The research that has been conducted in Indiana - monitoring what mitigation has occurred on the ground- should be replicated across the country (Reisinger).
- Applicants should be offered mitigation options that are similar in cost. In Pennsylvania, the fees for the state in-lieu-fee program are very low compared to individual project mitigation (Mann).
- There is a higher likelihood of mitigation success if an applicant provides the same amount of funds to the state for mitigation than if they conduct the mitigation on their own (Reisinger).
- The fee schedules that are set in Maryland and Pennsylvania are done in an attempt to get applicants to avoid and minimize their impacts (Setzer).
- Wetland regulatory programs should base their priorities on where significant

wetland impacts are occurring. For example, most impacts are probably small and the majority of the impacts are due to public works projects (Yanchik).

**PROGRAMMATIC ISSUE 5**

Enforce existing and future federal policies.

Definition

- Achievement of the national no net loss of wetland functions policy should be enforced (Mann).
- The goals of the Clean Water Act should be met (Yanchik).

Roadblocks

- The discretion given to Army Corps districts is unreasonable. The Corps needs to set baseline standards but must also allow flexibility for local implementation (Sibbing).
- There is no accountability in the federal regulatory program (Hausmann).

Steps for success/recommendations

- Agencies should set priorities to ensure that policies are enforced. The sole focus of regulatory programs should not be on permitting. We need attention to enforcement and monitoring of mitigation requirements (Piel).
- To improve adherence to new federal policies, federal agencies should hold regional interagency regulatory meetings to present new policies to agencies (Stedman).



## SUMMARY OF CLOSING REMARKS AND NEXT STEPS

Following is a summary of closing remarks provided by John Goodin. Goodin thanked attendees for their participation in the Forum. He also extended his thanks to conference sponsors, Glenn Page, Gary Setzer, and Lisa Morales for organizing the forum and conference facilitators Jessica Wilkinson, Sarah King, and Dorigen Fried.

Goodin remarked upon the diverse interests represented by the forum participants and stated that EPA took to heart many of the suggestions that came out of the first federal mitigation forum. One of the recommendations from that forum was that future events were more than one day and were held in more hospitable accommodations. The first forum was narrower; this second forum sought to address more issues. This may have led to an inability to discuss in depth some pressing issues, but the forum planners worked long and hard on the format to ensure that the forum was as productive as possible.

Goodin asked forum participants to complete a feedback form on how to improve the success of future wetland mitigation forums. He welcomed the development of white papers by participants on particular issues of concern. The federal agencies would welcome stakeholder leadership on these issues.

Goodin identified several possible next steps for moving forward on the recommendations addressed. In the short term, EPA will fund development and dissemination of the facilitator's report on the forum. This report can serve as a resource and will seek to capture the substantive issues expressed in this forum. This forum is a foundation for federal and state agencies to develop specific and concrete actions for improving mitigation success.

He identified several short-term and longer-term actions that appeared to garner broad support among the forum participants. For example, in the short-term, the federal agencies could work to adopt mitigation submission criteria for the application process. Implementation of some of the longer-term items may involve the generation and circulation of white papers on issues such as translating the objective of a watershed approach to practical on the ground mitigation. The states should play a significant role here. There are potential limitations and successes that could be explored more thoroughly in a white paper. The federal desire for predictability must be balanced with the need to ensure an appropriate level of flexibility in achieving mitigation goals.



## **LOOKING FORWARD**

This mitigation forum was the second in a series sponsored by the Wetlands Division of the U.S. Environmental Protection Agency, s Office of Wetlands, Oceans and Watersheds. For more information on this and future mitigation forums, please contact:

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An audio recording of the Mitigation Forum is available through the Environmental Law Institute, s web site at:  
<http://www.eli.org/research/wetlandsmitigationforum.htm>. In addition, many of the policy and technical documents discussed in this report can be accessed through the web site of EPA, s Wetlands Division at:  
<http://www.epa.gov/owow/wetlands>.



## ENDNOTES

- <sup>1</sup> National Academy of Sciences. 2001. "Compensating for Wetland Losses Under the Clean Water Act." Washington, DC: National Academy Press.
- <sup>2</sup> General Accounting Office. May 2001. "Wetlands Protection: Assessments Needed to Determine Effectiveness of In-Lieu-Fee Mitigation." GAO-01-325. See <[www.gao.gov](http://www.gao.gov)>.
- <sup>3</sup> Dahl, T.E. and C.E. Johnson. 1991. "Wetlands, Status and Trends in the Conterminous United States, mid-1970,s to mid-1980,s. Washington, DC: U.S. Department of Interior, Fish and Wildlife Service.
- <sup>4</sup> Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. "Classification of Wetland and Deepwater Habitats of the United States." FWS/BS-79/31. Washington, DC: U.S. Fish and Wildlife Service.
- <sup>5</sup> Department of the Army, Corps of Engineers. August 9, 2001. "Proposal to Reissue and Modify Nationwide Permits; Notice." Federal Register: 42070-42100.
- <sup>6</sup> National Academy of Sciences. 2001. "Compensating for Wetland Losses Under the Clean Water Act." Washington, DC: National Academy Press. pp. 84-85.
- <sup>7</sup> U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration. 2000. Federal Guidance on the Use of In-Lieu-Fee Arrangements for Compensatory Mitigation under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.
- <sup>8</sup> Scodari, Paul and Leonard Shabman. November 2000. Review and Analysis of In Lieu Fee Mitigation in the CWA Section 404 Permit Program. Alexandria, VA: Army Corps of Engineers, Institute for Water Resources. See [http://www.wrsc.usace.army.mil/iwr/pdf/IWRReport\\_ILF\\_Nov00.PDF](http://www.wrsc.usace.army.mil/iwr/pdf/IWRReport_ILF_Nov00.PDF).
- <sup>9</sup> Fennessy, S. and J. Roehrs. 1997. "A Functional Assessment of Mitigation Wetlands in Ohio; Comparisons with Natural Systems." Columbus, OH: Ohio EPA Division of Surface Water.
- <sup>10</sup> Streever, W.J. 1999. "Examples of Performance Standards for Wetland Creation and Restoration in Section 404 Permits and an Approach to Developing Performance Standards. Tech. Notes WRP WG-RS-3.3. Vicksburg, MS: U.S. Army Engineer Research and Development Center.



# **APPENDICES**



## **APPENDIX A**

### **Forum Agenda**

#### **STAKEHOLDER FORUM ON FEDERAL WETLANDS MITIGATION**

Sponsored by the U.S. Environmental Protection Agency,  
Maryland Department of the Environment, and the National Aquarium in Baltimore

October 1 - 2, 2001  
National Aquarium in Baltimore  
Knott Harbor View Room  
Baltimore, Maryland

#### **Day One: October 1, 2001**

- 8:00 - 8:45 Continental breakfast
- 8:30 - 9:00 Registration
- 9:00 - 9:25 Welcome  
\* John Meagher, U.S. Environmental Protection Agency  
\* Gary Setzer, Maryland Department of the Environment  
\* Glenn Page, National Aquarium in Baltimore
- 9:25 - 9:35 Review of Agenda and Discussion of Ground Rules  
\* Jessica Wilkinson, Environmental Law Institute
- 9:35 - 10:20 Presentation: Conclusions and recommendations of National Academy of Sciences report, Compensating for Wetland Losses Under the Clean Water Act  
\* Suzanne van Drunick, Program Officer, National Academy of Sciences
- 10:20 - 10:50 Questions and Discussion: NAS conclusions and recommendations
- 10:50 - 11:05 Break
- 11:05 - 11:35 Presentation: Conclusions and recommendations of General Accounting Office report Wetlands Protection: Assessment Needed to Determine Effectiveness of In-Lieu-Fee Mitigation  
\* Peg Reese, Assistant Director, General Accounting Office

**Day One: October 1, 2001 (Continued)**

- 11:35 - 12:00 Questions and Discussion: GAO conclusions and recommendations
- 12:00 - 12:30 Facilitated Discussion: Identification of additional technical, programmatic, and policy issues
- 12:30 - 2:00 Lunch  
Ranking Exercise: Participants will be asked to rank the top technical, programmatic, and policy issues to guide further discussion
- 2:00 - 4:00 Facilitated Discussion: Top Technical Issues/Recommendations
- 4:00 - 6:00 Private tour of National Aquarium in Baltimore
- 6:00 - 7:30 Reception
- 7:30 Adjourn

**Day Two: October 2, 2001**

- 8:00 - 8:45 Continental breakfast
- 8:45 - 9:00 Review of ground covered and remaining discussions  
\* Jessica Wilkinson, Facilitator
- 9:00 - 9:30 Presentation: The State perspective on how proposed recommendations could affect State wetland protection programs  
\* James Robb, Environmental Manager, Indiana Department Environmental Management
- 9:30 - 9:45 Questions and Discussion: State perspective
- 9:45 - 10:00 Break
- 10:00 - 12:00 Facilitated Discussion: Top Policy Issues/Recommendations
- 12:00 - 1:00 Lunch  
Speaker: Glenn Page, Director of Conservation, National Aquarium - Commitment to the Chesapeake: Model for Wetland Stewardship
- 1:00 - 2:45 Facilitated Discussion: Top Programmatic Issues/Recommendations

**Day 2, October 2, 2001 (Continued)**

2:45 - 3:00 Summary, proceedings, and next steps

3:00 - 4:30 Tour of Fort McHenry tidal wetland mitigation site

4:30 Adjourn



## APPENDIX B

### Recommendations

Below are the 31 recommendations from the GAO and NAS reports and the additional recommendations participants wished to consider. Information in bold indicates changes participants made to the recommendations and the recommendations added by participants for consideration. Following each recommendation is the number of votes that the recommendation received.

#### *Programmatic Recommendations*

1. The wetland area and functions lost and regained over time should be tracked in a national database. This database should include the Corps of Engineers, RAMS database. (21)
2. The Corps of Engineers should expand and improve quality assurance measures for data entry in the RAMS database. (2)
3. The Corps of Engineers, in cooperation with states, should encourage the establishment of watershed organizations responsible for tracking, monitoring, and managing wetlands in public ownership or under easement. (5)
4. The Corps of Engineers and other responsible authorities should commit funds to allow staff participation in professional activities and in technical training programs that include the opportunity to share experiences across districts. (4)
5. States, with the participation of appropriate federal agencies, are encouraged to prepare technical plans or initiate interagency consensus processes for setting wetland protection, acquisition, restoration, enhancement, and creation project priorities on an ecoregional (landscape/watershed) basis. (25)
6. The Corps of Engineers and the EPA should work with the states to expand their permitting and watershed planning programs to fill gaps in the federal wetland program. (21)
7. To better ensure the ecological success of mitigation efforts under ad hoc arrangements, we recommend that the Secretary of the Army instruct the Corps to establish procedures to clearly identify whether developers or recipients of funds are responsible for the ecological success of mitigation efforts and, using the same success criteria applicable to in-lieu-fee arrangements, to develop and implement procedures for assessing success. See Programmatic #13. (17)
8. **Develop next steps for implementing recommendations from GAO and NAS reports. (4)**
9. **Permit decision-making should be conducted on a broader geographic scale and longer time frame. (15)**
10. **Enforce existing and future federal policies. (16)**
11. **Develop clear guidance and commit resources for administration to ensure implementation. (3)**
12. **Improve inter-agency coordination on mitigation approval for all forms of mitigation. (5)**
13. **Apply same standards for all forms of mitigation: construction timing, service area, and performance criteria. (13)**

*Policy Recommendations*

1. Site selection for wetland conservation and mitigation should be conducted on a watershed scale in order to maintain wetland diversity, connectivity, and appropriate proportions of upland and wetland systems needed to enhance the long-term stability of the wetland and riparian systems. Regional watershed evaluation would greatly enhance the protection of wetlands and/or the creation of wetland corridors that mimic natural distributions of wetlands in the landscape. (Technical) **Move away from strict adherence to on-site mitigation.** (36)
2. All mitigation wetlands should become self-sustaining. Proper placement in the landscape to establish hydrogeological equivalence is inherent to wetland sustainability. (Technical) **See Programmatic #13.** (8)
3. Avoidance is strongly recommended for wetlands that are difficult or impossible to restore, such as fens or bogs. (10)
4. Riparian wetlands should receive special attention and protection, because their value for stream water quality and overall stream health cannot be duplicated in any other landscape position. (8)
5. The committee recommends that compensatory mitigation sites receive long-term stewardship, i.e., a time frame expected for other publicly valued assets like parks. See Programmatic #13. (5)
6. The Corps of Engineers and other responsible authorities should establish and enforce clear compliance requirements for permittee-responsible compensation to assure that (1) projects are initiated no later than concurrent with permitted activity, (2) projects are implemented and constructed according to established design criteria and use as specified in the permit, (3) the performance standards are specified in the permit and attained before the permit compliance is achieved, and (4) the permittee provides a stewardship organization with an easement on, or title to, the compensatory mitigation wetland site or a cash contribution appropriate for the long-term monitoring, management and maintenance of the site. **See Programmatic #13.** (27)
7. Mitigation goals must be clear, and those goals carefully specified in terms of measurable performance standards, in order to improve mitigation effectiveness. Performance standards in permits should reflect mitigation goals and be written in such a way that ecological viability can be measured and the impacted functions replaced. (Technical) (19)
8. Impact sites should be evaluated using the same functional assessment tools as used for the mitigation site. (2)
9. Dependence on subjective, best professional judgment in assessing wetland function should be replaced by science-based, rapid assessment procedures that incorporate at least the following characteristics: effectively assess goals of wetland mitigation projects; assess all recognized functions; incorporate effects of position in landscape; reliably indicate important wetland processes, or at least scientifically- established processes; scale assessment results to results from reference sites; are sensitive to changes in performance over a dynamic range; are integrative over space and time; and generate parametric and dimensioned units, rather than non-parametric rank. (Technical) (20)

10. The Corps of Engineers, and other responsible regulatory authorities, should use a functional assessment protocol that recognizes the watershed perspective to establish permittee compensation requirements. (Technical) (3)
11. The Corps of Engineers and other responsible regulatory authorities should take actions to improve the effectiveness of compliance monitoring before and after project construction. (Technical) (14)
12. The taxonomy developed by the committee is recommended as a reference point for discussions about compensatory mitigation. In practice, however, a compensatory mitigation mechanism may not fit neatly into one of the listed categories (e.g., mitigation bank v. in-lieu-fee v. cash donation). Accordingly, the committee recommends that when an agency reviews mitigation options, it is most important to focus on their characteristics or attributes (e.g., who is legally responsible, the timing of the mitigation actions, whether the MBRT process is used, and whether stewardship requirements are in place). (4)
13. Institutional systems should be modified to provide third-party compensatory mitigation with all of the following: timely and assured compensation for all permitted activities, watershed integration, and assurances of long-term sustainability and stewardship for restored, created, enhanced, or preserved wetlands. (3)
14. **Develop guidance on SWANCC. (15)**
15. **Revisit 1990 Mitigation MOA. (15)**
16. **Move away from strict adherence to sequencing. (8)**
17. **Classify wetlands on a sliding scale for permit review and approval. (4)**

18. **Future guidance should address all aquatic resources. (3)**
19. **Commit additional resources to all agencies and the states for improving the effectiveness of mitigation. (21)**

### *Technical Recommendations*

1. The biological dynamics should be evaluated in terms of the populations present in reference models for the region and the ecological requirements of those species. (0)
2. The science and technology of wetland restoration and creation need to be based on a broader range of studies, involving sites that differ in degree of degradation, restoration efforts, and regional variations. Predictability and effectiveness of outcomes should then improve. (22)
3. Hydrological variability should be incorporated into wetland mitigation design and evaluation. Except for some open-water wetlands, static water levels are not normal. Because of climatic variability, it should be recognized that many wetland types do not satisfy jurisdictional criteria every year. Hydrological functionality should be based on comparisons to reference sites during the same time period. (Policy) (25)
4. Because a particular floristic assemblage might not provide all of the functions lost, both restoration of community structure (e.g., plant cover and composition) and restoration of wetlands functions should be considered in settings goals and assessing outcomes. Relationships between structure and functions should be better known. (17)
5. Mitigation projects should be planned with and measured by a broader set of wetland functions than are currently

- employed **including non-ecological functions**. (21)
6. To assist permit writers and others in making compensatory mitigation decisions, a reference manual should be developed **with specific design standards** to help design projects that will be most likely to achieve permit requirements. The manual should be organized around the themes developed in this report. The Corps of Engineers should develop such a manual for each region, based in part on the careful enumeration of wetland functions in the 404(b)(1) guidelines and in part on local and national expertise regarding the difficulty of restoring different wetland types, hydrological conditions, and functions in alternative restoration or creation contexts. (20)
  7. The Corps of Engineers and other responsible regulatory authorities should establish a research program to study mitigation sites to determine what practices achieve long-term performance for creation, enhancement, and restoration of wetlands. (13)
  8. To ensure that in-lieu-fee organizations adequately compensate for adverse impacts to wetlands, we recommend that the Administrator of EPA, in conjunction with the Secretaries of the Army, Commerce, and the Interior, establish criteria to determine the ecological success of mitigation efforts and develop and implement procedures for assessing success. (22)
  9. **Develop standard monitoring protocols**. (10)

## APPENDIX C

### Priority Recommendations

#### *Programmatic Recommendations*

1. States, with the participation of appropriate federal agencies, are encouraged to prepare technical plans or initiate interagency consensus processes for setting wetland protection, acquisition, restoration, enhancement, and creation project priorities on an ecoregional (landscape/watershed) basis. (25)
2. The wetland area and functions lost and regained over time should be tracked in a national database. This database should include the Corps of Engineers, RAMS database. (21)
3. The Corps of Engineers and the EPA should work with the states to expand their permitting and watershed planning programs to fill gaps in the federal wetland program. (21)
4. To better ensure the ecological success of mitigation efforts under ad hoc arrangements, we recommend that the Secretary of the Army instruct the Corps to establish procedures to clearly identify whether developers or recipients of funds are responsible for the ecological success of mitigation efforts and, using the same success criteria applicable to in-lieu-fee arrangements, to develop and implement procedures for assessing success. (17)
5. Enforce existing and future federal policies. (16)

#### *Policy Recommendations*

1. Site selection for wetland conservation and mitigation should be conducted on a watershed scale in order to maintain wetland diversity, connectivity, and appropriate proportions of upland and wetland systems needed to enhance the long-term stability of the wetland and riparian systems. Regional watershed evaluation would greatly enhance the protection of wetlands and/or the creation of wetland corridors that mimic natural distributions of wetlands in the landscape. Move away from strict adherence to on-site mitigation. (36)
2. The Corps of Engineers and other responsible authorities should establish and enforce clear compliance requirements for permittee-responsible compensation to assure that (1) projects are initiated no later than concurrent with permitted activity, (2) projects are implemented and constructed according to established design criteria and use as specified in the permit, (3) the performance standards are specified in the permit and attained before the permit compliance is achieved, and (4) the permittee provides a stewardship organization with an easement on, or title to, the compensatory mitigation wetland site or a cash contribution appropriate for the long-term monitoring, managed and maintenance of the site. See Programmatic #13. (27)
3. Commit additional resources to all agencies and the states for improving the effectiveness of mitigation. (21)

4. Dependence on subjective, best professional judgment in assessing wetland function should be replaced by science-based, rapid assessment procedures that incorporate at least the following characteristics: effectively assess goals of wetland mitigation projects; assess all recognized functions; incorporate effects of position in landscape; reliably indicate important wetland processes, or at least scientifically-established processes; scale assessment results to results from reference sites; are sensitive to changes in performance over a dynamic range; are integrative over space and time; and generate parametric and dimensioned units, rather than non-parametric rank. (20)
  5. Mitigation goals must be clear, and those goals carefully specified in terms of measurable performance standards, in order to improve mitigation effectiveness. Performance standards in permits should reflect mitigation goals and be written in such a way that ecological viability can be measured and the impacted functions replaced. (19)
2. The science and technology of wetland restoration and creation need to be based on a broader range of studies, involving sites that differ in degree of degradation, restoration efforts, and regional variations. Predictability and effectiveness of outcomes should then improve. (22)
  3. To ensure that in-lieu-fee organizations adequately compensate for adverse impacts to wetlands, we recommend that the Administrator of EPA, in conjunction with the Secretaries of the Army, Commerce, and the Interior, establish criteria to determine the ecological success of mitigation efforts and develop and implement procedures for assessing success. (22)
  4. Mitigation projects should be planned with and measured by a broader set of wetland functions than are currently employed including non-ecological functions. (21)
  5. To assist permit writers and others in making compensatory mitigation decisions, a reference manual should be developed with specific design standards to help design projects that will be most likely to achieve permit requirements. The manual should be organized around the themes developed in this report. The Corps of Engineers should develop such a manual for each region, based in part on the careful enumeration of wetland functions in the 404(b)(1) guidelines and in part on local and national expertise regarding the difficulty of restoring different wetland types, hydrological conditions, and functions in alternative restoration or creation contexts. (20)

### ***Technical Recommendations***

1. Hydrological variability should be incorporated into wetland mitigation design and evaluation. Except for some open-water wetlands, static water levels are not normal. Because of climatic variability, it should be recognized that many wetland types do not satisfy jurisdictional criteria every year. Hydrological functionality

## APPENDIX D

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**APPENDIX E**

**New Jersey Checklist of Completeness**

*(next page)*



# State of New Jersey

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*Acting Governor*

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Robert C. Shinn, Jr.  
*Commissioner*

## NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

### CREATION, RESTORATION OR ENHANCEMENT FOR A FRESHWATER WETLAND MITIGATION PROPOSAL

#### CHECKLIST FOR COMPLETENESS

(11/01/01)

These are the application requirements for an administratively complete proposal package for an onsite or offsite freshwater wetland mitigation proposal. Please read each section and check the box next to each area after you have fully completed the information for each requirement that applies to you.

Please provide five copies of the following information and plans.

- 1. An introduction describing the wetland mitigation proposal. The introduction must include the following:
  - a. The type of permit that requires you to perform wetland mitigation (include a copy of the permit);
  - b. How many acres of wetland mitigation are you required under N.J.A.C. 7:7A-15 or permit to create, enhance and/or restore;
  - c. The goals of the mitigation project in terms of wetlands types, values, and functions, and a discussion of how the mitigation proposal will satisfy those goals. (e.g., The goal of the wetlands mitigation project is to establish a young palustrine forest surrounding an emergent wetland and open water pond, which provides flood water retention in the impacted watershed, fish and wildlife habitat, etc.);
  - d. The reason why the mitigation site is an appropriate site for meeting the goals in c. above, and the aspects of the site that will ensure the success of the mitigation project; and
  - e. A copy of USGS quad map(s) showing the location of the permitted activity and showing the mitigation site with the state plane coordinates of the mitigation site. The accuracy of these coordinates should be within 50 feet of the actual center point of the site. For linear mitigation projects, the applicant shall provide

State plane coordinates for the end-points. For linear mitigation projects 2000 feet in length and longer, the applicant shall supply additional coordinates at each 1000 foot interval.

- 2. A description (e.g., size, type, vegetation, hydrology, wildlife use, etc.) of the wetlands that are being destroyed or disturbed by the permitted activity.
- 3. Photos of the proposed mitigation site, showing topographic, vegetative, stream and wetland features.
- 4. The names and addresses of all current and proposed owner(s) of the proposed mitigation site.
- 5. The lot, block, municipality and county of the proposed mitigation site. This information must be clearly visible on the front page of the proposal and must also be placed on the mitigation plans as required under item 14.
- 6. A description (e.g., size, type, vegetation, hydrology, wildlife and adjacent land use etc.) of the proposed mitigation site. Avoid the need for hard engineering controls such as concrete spillways and dams when designing the mitigation project. If such structures are necessary to retain sufficient wetland hydrology then the Program recommends the applicant examine the suitability of the site for wetland mitigation.
- 7. A projected water budget for the proposed mitigation site. The water budget should detail the sources of water for the mitigation project as well as the water losses. The budget should include the following regional information:
  - the daily rainfall for a non-event driven, normal, wet and dry year;
  - if appropriate the depth of the seasonal high water table from collected monitoring well data. The data should be taken several times a week between February and July and then weekly for the rest of the year;
  - if appropriate, the water levels of the stream that supplies water to the mitigation area. The water levels should be collected from stream gauge data taken at least weekly following any major storm event. This should include the average high and average low for the stream; and the mean monthly temperature.

The projected water budget should document that an ample supply of water is available to create, enhance, or restore wetland conditions, as applicable. The water budget must contain sufficient data to show that the mitigation project will have sustained wetland hydrology indefinitely in the future. It is strongly suggested that you obtain a copy of following publication: Pierce, Gary J. 1993. *Planning hydrology for constructed wetlands*. Wetland Training Institute, Inc. Poolesville, Md. WTI 93-2. 49pp. This publication is currently being used by the Department as guidance when evaluating a proposed water budget and may be purchased from the Wetlands Training Institute located at P.O. Box 1022, Poolesville, MD 20837-0099 phone number (301) 972-8112.

- 8. Existing soil profiles including the location of soil borings on the proposed mitigation site.
- 9. A detailed discussion of the substrate you propose to create for the mitigation site (e.g. How will the substrate of the site be prepared? How much topsoil will be added? Is the pH appropriate?). Successful mitigation requires that a minimum six inches of topsoil or A-Horizon be used or retained on the mitigation site. If the natural top soil from the site is to be used, it must have at least 8% organic carbon content (by weight) incorporated into the A-horizon for sandy soil and for all other soil types the topsoil must have 12%

organic carbon content. If topsoil is imported onto the site it must consist of equal volumes of organic and mineral materials. Do not include the application of lime in your planting specifications unless absolutely necessary (liming a site may cause a more favorable environment for invasive species).

- 10. A landscape plan showing the proposed vegetative community on the proposed mitigation site that includes the following:
  - the species;
  - quantity of each species;
  - the spacing of all plantings;
  - the stock type (bare root, potted, seed); and
  - the source of the plant material.

The transition area required as part of the mitigation site under N.J.A.C. 7:7A-14. must also be planted. The landscape plan must identify the proper time to plant and must indicate any appropriate substitutions. If bare root stock is used, it must be planted in the spring while the plant is still dormant.

- 11. A preventive maintenance plan detailing how invasive or noxious vegetation will be controlled, and how predation of the mitigation plantings will be prevented. The plan shall explain the measures that will be taken if a problem with invasive or noxious plants or predation presents itself during the construction or monitoring period. If there is a problem with *Lythrum salicaria* (purple loosestrife) in the watershed in which the proposed mitigation site is located, the Program may not approve mitigation involving the establishment of an emergent freshwater wetland system because of the likelihood of failure due to invasion by this species. If this is the case, contact Virginia Kop'Kash at (609) 777-0454 or at [gkopkash@dep.state.nj.us](mailto:gkopkash@dep.state.nj.us) to discuss possible options. Listed below are several devices/structures that may be incorporated into your plan to control problems resulting from the presence of deer, geese, rodents, and rabbits on the mitigation site;
  - deer fence
  - goose fence
  - snags for raptors
  - snake hibernaculum

- 12. A metes and bounds description of the proposed mitigation site. The metes and bounds description shall include the transition area required under N.J.A.C. 7:7A-15.
- 13. An estimate of the actual cost of carrying out the construction of the mitigation project. The cost estimate should include but is not limited to the value of the land, engineering costs, environmental consultant fees, attorney fees, site preparation costs, construction costs, planting costs, supervising construction fees, and monitoring costs. The cost estimate of the project will be used when determining the amount of the financial assurance required.
- 14. A site plan for the mitigation project which includes:
  - i. Project location within the region;
  - ii. The lot and block number of the mitigation project location;

- iii. Existing and proposed elevations and grades of the mitigation site and, when necessary off-site elevations and grades. All existing and proposed elevations and grades must be shown in at least one foot intervals. The slope shall be no greater than 10:1 along a created transition area as well as along any berms that are intended to function as water control structures or berms created along a stream;
  - iv. The transition area required under N.J.A.C. 7:7A-15 (50/150 foot) shown clearly;
  - v. A detail that shows, or a statement indicating, the soil amendments and the seed stabilization mix to be used on the mitigation site. The seed mix shall not include any fescue, deer tongue or reed canary grass. The seed mix shall either be a mixture of native non-invasive plant species or shall include an annual rye grass;
  - vi. A statement certifying that, following grading of the site, a disc will be run over the site to eliminate compaction;
  - vii. An explanation of how micro-topography will be created on the mitigation site. For example a cultivator or a bedding harrow could be used to create micro-topography;
  - viii. Pre and post construction plan views and cross sectional views of the mitigation site; and,
  - ix. Location of monitoring wells and/or stream gauges that will be used to monitor and record the hydrology of the mitigation site before and after construction is complete.
- 15. A construction schedule including projected dates of excavation, planting, fertilizing, etc.
  - 16. A draft conservation restriction that meets the requirements of N.J.A.C. 7:7A-15 . Contact Virginia Kop’Kash at (609) 777-0454 or email her at [gkopkash@dep.state.nj.us](mailto:gkopkash@dep.state.nj.us) for a model that has been approved by the Department.
  - 17. Financial assurance that meets the requirements at N.J.A.C. 7:7A-15. .
  - 18. Certify the proposed mitigation will not adversely affect properties, which are listed or are eligible for listing on the National Register of Historic Places. If the mitigator before or during the course of mitigation work encounters a probable historic property that has not been listed or determined eligible for listing on the National Register, but which may be eligible for listing on the National Register, the permittee shall immediately notify the Department and proceed as directed by the Department.

**Proposal packages shall be submitted to:**

New Jersey Department of Environmental Protection  
Land Use Regulation Program  
P.O. Box 439  
Trenton, New Jersey 08625-0439  
Attn: Virginia Kop’Kash