

# ***WILDLIFE HABITAT POLICY RESEARCH PROGRAM***

## ***2006 RESEARCH PROGRAM***

---

### **1.D.: Design of U.S. Habitat Banking Systems**

#### **WHPRP FINAL REPORT**

##### **1. Abstract:**

The purpose of this project is to assist the states in evaluating whether and how habitat banking can be used to further the conservation of priority habitat areas identified in state wildlife action plans. The central results of the project are a set of recommendations outlined in a technical report. The report's recommendations are targeted toward state wildlife planners and state habitat banking program managers. It gives these decision-makers a concrete set of recommendations on how to utilize existing habitat banking programs, establish new banking programs, or launch new habitat banking systems that will support the protection critical wildlife habitat identified in the state wildlife action plans. The report also provides general recommendations for advancing the use of banking for wildlife conservation purposes. The most important results are in the form of recommendations as follows:

##### *Recommendations for existing habitat banking programs*

*Wetland mitigation banks.* Wetland mitigation banks established in response to the Clean Water Act can support the conservation of priority habitats in the state plans, through: 1) siting and designing banks to protect critical wildlife habitat; 2) managing banks to protect critical wildlife habitat; and 3) incorporating the goals of the wildlife action plans into the watershed approach to compensatory mitigation decision-making.

*Conservation banks.* Conservation banking can support the conservation of priority habitats in state wildlife action plans by influencing the siting and management of conservation banks established pursuant to the Endangered Species Act.

*Recommendations for new banking programs.* New banking programs can be created that support the protection of priority wildlife habitat. This can be accomplished by: 1) establishing state-sponsored banks; and 2) creating incentives for banks to be sited in priority conservation areas.

*Recommendations for new habitat banking systems.* New habitat banking systems can be created that support the protection of priority wildlife habitat include by adopting new laws or regulations that both require compensation for impacts to the environment and favor the use of conservation banking as a means of offsetting those impacts.

*General recommendations.* Future iterations of the state wildlife action plans or ancillary efforts can more effectively support wildlife conservation by: 1) providing greater specificity as to the location of priority habitats so as to increase the likelihood that banks will be established that conserve those habitats; 2) more fully considering the role that banking can play as a conservation action; and 3) providing information on habitat *restoration* opportunities.

## **2. Introduction:**

The 56 recently developed State Wildlife Action Plans set ambitious conservation goals that expand the focus of state wildlife agencies well beyond traditional “game” species and endangered species. Achieving these goals will likely require a major effort to tap new funding sources and to utilize novel conservation strategies. One of the strategies with considerable potential to further Plan goals is more effective harnessing – through habitat banking – of the investments made to meet compensatory mitigation requirements of existing (and potentially new) programs. The amount of funds that are directed to compensatory mitigation on an annual basis in the U.S. is significant. Although there are many opportunities for existing and new habitat banking programs to conserve the critical wildlife habitat identified in the state wildlife action plans, the great majority of plans say nothing at all about the topic of habitat banking. Indeed, only eleven plans make any reference at all to habitat banking, and in five of these states, the only reference to banking is relegated to the appendices rather than the main body of the plan. Nevertheless, habitat banking has the potential to help states conserve many of the priority species and habitats identified in their State Wildlife Action Plans.

## **3. Purpose:**

The purpose of this project is to assist the states in evaluating whether and how habitat banking can be used to further the conservation of priority habitat areas identified in state wildlife action plans. Because the nature and degree of experience that states have with habitat banking varies considerably, the primary purpose of this project was to produce a technical report that serves several related purposes. First, it will serve as a basic reference about habitat banking generally and about the various types of existing habitat banks, information that will be of particular value for state officials with little or no experience with habitat banking. Second, of particular value to states with more extensive habitat banking experience, it will include a detailed examination of the strengths and weakness of particular bank types and particular banking practices. That information is intended to enable states to identify successful banking models and suggest how they might be more broadly applied. In addition to the technical report, the findings of this project will be communicated to a variety of audiences with responsibilities related to state wildlife action plan through presentations at meetings and through non-technical publications.

#### 4. Summary of Results:

The central results of this project are a set of recommendations outlined in a technical report. The recommendations are targeted toward state wildlife planners and state habitat banking program managers. The report outlines a concrete set of recommendations (summarized below) on how to utilize existing habitat banking programs, establish new banking programs, or launch new habitat banking systems that will support the protection critical wildlife habitat identified in the state wildlife action plans. The report also provides general recommendations for advancing the use of banking for wildlife conservation purposes.

##### Wetland Mitigation Banks

Wetland mitigation banks established in response to the Clean Water Act can support the conservation of priority habitats in the state plans, through: 1) siting and designing banks to protect critical wildlife habitat; 2) managing banks to protect critical wildlife habitat; and 3) incorporating the goals of the wildlife action plans into the watershed approach to compensatory mitigation decision-making.

*Influencing the siting and design of banks to protect key wildlife habitat.* Ultimately, decisions about where to site and how to design wetland mitigation banks rest with the bank sponsor. Although federal and state agencies have limited ability to direct these decisions, the bank sponsor interacts with the federal interagency group (the Mitigation Bank Review Team or MBRT) that approves and oversees the operation of banks interacts with the bank sponsor several times before the bank is approved to sell credits. Through these early interactions, the MBRT can have a significant influence on issues related to bank siting and design.

It is up to the discretion of individual states whether or not the state wildlife agency plays a lead role on the MBRT, but the more involved the agency is, the more leverage it will have to provide bank sponsors with feedback on the location and design of proposed banks and to ensure that the bank takes key wildlife habitat and species of greatest conservation concern into account. Banks that propose to provide significant wildlife functions or are located in areas identified as critical wildlife habitat may be afforded additional credits. Finally, MBRTs and Corps districts could incorporate criteria from the state plans into the bank review process. Incorporating references to the state plans or plan goals into bank guidance documents could help guide the design of banks that support the conservation objectives of the state plans.

*Influencing bank management.* Performance standards – the measurable outcomes of wetland compensatory mitigation projects – play a key role in the design and management of wetland mitigation banks. A bank’s monitoring requirements, credit release schedule, and financial assurances are often tied to meeting performance standards. State wildlife agencies can play a lead role in working with or serving on the MBRT and supporting the design of performance standards for wildlife criteria –

particularly those standards that address the needs of the wetland species that are listed as species of concern in the state wildlife action plan and likely to be present at the site.

*Incorporating reference to the state plan in the watershed approach.* A shift in federal policy on how bank siting decisions are made may help to increase the number of banks located on properties identified as priority wildlife habitat. Under the watershed approach outlined in proposed regulations issued jointly by EPA and the Corps, there are many opportunities for wetland mitigation banking to support the habitat conservation objectives of the state wildlife action plans. The proposed rule suggests that the watershed approach should consider, among other things, “habitat requirements of important species.” State wildlife action plans can serve as an excellent source for information for the habitat analysis. The proposed rule describes the type of information on watershed conditions that should be utilized when taking the watershed approach, including current trends in habitat loss or conversion and the presence and needs of sensitive species. The state plans could be an excellent source for information on the presence and needs of sensitive species. Relying upon the watershed approach to guide selection of bank sites can help contribute to maintaining habitat diversity, connectivity, and appropriate proportions of habitat types needed to enhance the long-term stability of the priority wildlife habitat identified in the state plans.

#### Conservation Banks

Conservation banking can support the conservation of priority habitats in state wildlife action plans by influencing the siting and management of conservation banks established pursuant to the Endangered Species Act so as to protect state-identified priority conservation areas.

*Influencing the siting and management of banks established pursuant to the Endangered Species Act.* Although the ultimate responsibility for approving conservation banks under the Endangered Species Act rests with federal agencies, states can be influential in affecting both the siting and management of such banks. To the extent that there is overlap between areas identified in state plans as conservation priorities, and areas that support – or may be capable of supporting – federally listed species, banking offers an opportunity to meet federal regulatory requirements while concurrently advancing state conservation objectives.

The opportunities available to states are greatest when, in addition to the requirements of the Endangered Species Act, there are state regulatory requirements that can be met through the sale of credits from a bank. In these cases, it is clear that the Fish and Wildlife Service’s banking guidance contemplates that states will be invited to help oversee the establishment, use and operation of a bank. However, even if a state does not have regulatory requirements of its own that are to be met through the use of bank credits, states can work informally with their federal counterparts to identify areas where banks would be particularly useful. States can also work with their federal counterparts to ensure that crediting methodologies and management plans for banks take into account state expertise and objectives.

There are, however, limits to how much influence states can have over the siting and management of federally approved conservation banks. If priority habitats identified in state plans do not support federally listed species, or if there is no development pressure stimulating demand for credits associated with the listed species that they do support, there will be no opportunity to use federal conservation banks as a way of protecting those priority habitats. Even when state priority habitats do support federally listed species for which there is development-driven demand for credits, bankers may choose to establish their banks at other sites. As with wetland mitigation banking, neither the states nor the federal agencies can require that a privately initiated bank be sited at a particular location. At most, through their development of a crediting methodology and their ability to require certain management practices, they can hope to influence a banker's selection of a bank site.

#### Creation of New Bank Programs

There are several opportunities for states to develop new bank programs that could contribute to the conservation of priority wildlife habitat identified in the state wildlife action plans. New banking programs can rely upon existing regulatory mechanisms that already require compensation for impacts to the environment. The technical report lays out a set of effective banking practices that should guide any habitat banking program to ensure that the mitigation provided is sustainable and ecologically effective (see Appendix F). New banking programs can support the protection of priority wildlife habitat by: 1) establishing state-sponsored banks; and 2) creating incentives for banks to be sited in priority conservation areas.

*Establishing state-sponsored banks.* If a state agency itself becomes a bank sponsor, then, like other bankers, it can propose the location of its banks. By establishing their own banks, states may be able to leverage funds from private development interests, or as is already the case in several states, from state-sponsored public infrastructure projects. Such banks can harness existing federal or state regulatory programs, such as federal and state wetland laws, environmental impact assessment laws, or endangered species and habitat laws.

State-sponsored banks can help to steer mitigation dollars toward priority wildlife habitat identified in the state wildlife action plans. State wildlife agencies may also be able to work with their landowning sister agencies to establish banks on state lands not currently being managed for conservation purposes. Such an approach, would, of course, be subject to the authorities in existing state law.

For example, North Carolina's Ecosystem Enhancement Program (NCEEP) is considered a national model of a state-sponsored compensatory mitigation program. The North Carolina Department of Environment and Natural Resources and the North Carolina Department of Transportation (NCDOT) established and administer the NCEEP. NCEEP accepts payments in advance of permitted impacts and operates as a quasi banking/in-lieu fee program. One portion of NCEEP conducts mitigation exclusively for impacts resulting from NCDOT activities. The cornerstone of the NCEEP is a detailed

watershed-planning process that is designed to support high-quality, cost-effective projects for watershed improvement and protection and open space preservation.

NCEEP develops River Basin Restoration Priorities, which include the identification of Targeted Local Watersheds. DOT provides NCEEP with information on its anticipated mitigation needs; NCEEP provides DOT with an estimate of the costs it anticipates incurring to offset the impacts; and NCDOT provides funds for NCEEP to carry out mitigation activities. NCEEP currently delivers an estimated 80 to 90 percent of all of the state's required mitigation. Most of the program's funding is generated through the agreement with NCDOT, which averages approximately \$95 million annually.

*Creating incentives for banks to be sited in priority conservation areas.* Many existing state laws impose regulatory requirements that include a duty to provide compensatory mitigation for impacts from certain development activities. Whenever any state environmental law imposes compensatory mitigation obligations, the potential to meet those obligations through banking exists. And since the state itself will design the rules for banking pursuant to the state's own laws, the state can make sure that those rules further the conservation priorities of its state wildlife action plans.

There are a variety of ways in which a state might do this. For example, a state might allow certain conservation banks to be established only in areas designated as priority conservation areas in the state plan. Alternatively, a state might allow the siting of conservation banks anywhere, but reward those sited in priority conservation areas through the use of a crediting methodology that gives extra credit for banks sited in such areas. That same crediting methodology could also discourage development in conservation priority areas by requiring developments there to be offset with more credits than would be required of a comparable development elsewhere.

#### Creation of New Habitat Banking Systems

New regulatory requirements would be necessary to support habitat banking systems that offset impacts to the environment that are not currently captured by existing federal or state regulatory programs. As with new banking programs, new banking systems should also rely upon the set of effective banking practices outlined in the technical report (see Appendix F).

*Adopting laws or regulations to require compensation for currently unaddressed impacts to the environment.* Impacts to the environment from land development and land use practices are widespread and commonplace. Only a small fraction of those impacts, however, require compensatory activities to offset permitted damage. Federal and state wetland, endangered species, environmental assessment, and natural resource damage laws are the most common type of provisions requiring compensation.

By adopting new federal and state provisions that require compensation for impacts to other habitat types or species, public agencies can more effectively seek offsets for impacts to the environment that currently go unaddressed. Several new compensatory

programs have been developed in recent years, largely due to the public's increased understanding of the negative cumulative effects of incremental environmental damage.

For example, California's Environmental Quality Act requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate them. In 2005, a provision was adopted requiring mitigation for projects that result in the "conversion of oak woodlands that will have a significant effect on the environment." The new program allows for several mitigation alternatives, including preserving existing oak woodlands through easements, planting an equivalent number of trees, or contributing funds to an Oak Woodlands Conservation Fund that is administered by the California Fish and Game Commission. The funds may be used for a variety of purposes, including the purchase of conservation easements, land improvement grants and cost-share incentive payments, public education and outreach by local government entities, and for assistance to local governments to incorporate oak conservation elements into local general plans.

#### General Recommendations

Future iterations of the state wildlife action plans or ancillary efforts can more effectively support wildlife conservation by: 1) providing greater specificity as to the location of priority habitats so as to increase the likelihood that banks will be established that conserve those habitats; 2) more fully considering the role that banking can play as a conservation action; and 3) providing information on habitat *restoration* opportunities.

*Provide greater specificity as to the location of priority habitats.* The ability of states to take advantage of many of the opportunities outlined to further the conservation of priority habitats through banking may ultimately depend on the specificity of state plans. Future generations of plans, or ancillary efforts undertaken to supplement existing plans, might more effectively support the use of banking by including more specific information on the location of critical wildlife habitat.

*More fully consider the role that banking can play as a conservation action.* Our review of the 50 state wildlife action plans revealed that only eleven state plans make any reference at all to habitat banking. In five of these states, the only reference to banking is relegated to the appendices and in four states the plans make only a single brief reference to banking. Future iterations of the plans should more fully explore the role that banking can play in meeting their conservation objectives.

*Provide information on habitat restoration opportunities.* For the state plans to effectively direct wetland mitigation banking, they should identify lands with high wetland restoration potential. Virtually all state plans identify wetlands as key habitat types and include maps that identify wetland habitat. In their current iteration, however, most of the wetland acreage that is identified in the plans is existing, high quality wetlands that retain much of their functional capacity. Although this is valuable information for wetland habitat *acquisition*, wetland mitigation providers more generally seek to identify opportunities to *restore* wetland acres, as these sites will generate far more wetland credits for banking.

Few if any state plans identify *potential* wetland acreage or areas with high restoration potential. Future iterations should consider including such information. At least eight states have established programs that seek to identify and/or prioritize wetland acreage for its restoration potential. These restoration prioritization programs could be used to guide the inclusion of wetlands with high wildlife habitat potential in the state plans.

## **5. Approach:**

### Information Gathering

ELI and ED gathered information about banking programs from the following sources:

*Federal, state, and Corps district habitat banking policies.* Formal policies governing federal, state, and Corps district habitat banking programs were gathered and analyzed. This included a survey of Corps district and state wetland mitigation banking policies and a review of the 2003 U.S. Fish and Wildlife Service's national guidance on the establishment and use of conservation banks under the Endangered Species Act, habitat banking provisions in Hawaii's state endangered species act, and the state of California's 1995 policy on conservation banking.

*Existing literature.* Existing literature pertaining to habitat banking and the ecological effectiveness of compensatory mitigation was gathered and analyzed.

*Habitat banking databases.* Databases pertaining to habitat banks were identified and assessed, including ELI's comprehensive wetland mitigation bank database; U.S. Army Corps of Engineer's banking database (the Internet Bank Information Tracking System, or RIBITS); U.S. Fish and Wildlife Service's partial database of conservation banks; conservation bank database maintained by the Electric Power Research Institute; and the soon-to-be launched speciesbanking.com, which is hosted by Ecosystem Marketplace.

*State Wildlife Action Plans.* All of the state wildlife action plans were reviewed to: 1) determine the extent to which they address or discuss banking; and 2) identify representative approaches used in the plans for priority habitat identification. The characterization of habitat identification was developed in partnership with the Association of Fish and Wildlife Agencies.

*Interviews.* A series of interviews were conducted to gather information in the form of opinions, recommendations, insights, and experiences of key individuals who have been involved with banking from positions in federal and state government, the private sector, academics, and others.

### Analysis of Information

*Categorization of banks.* A typology of habitat banks was developed, which includes the broad categories of wetland mitigation banks, in-lieu fee arrangements with designated conservation sites, other habitat conservation banks, and species and multi-species conservation banks. Organizational subcategories were also identified.



*Development of effective banking practices.* A set of effective banking practices were developed. These are practices that have proven to be the most effective at supporting ecologically successful and sustainable habitat banks. The practices draw from existing banking studies, including the 2001 NRC study.

*Identification of problems, opportunities, challenges, and recommendations.* The technical report identifies and summarizes the problems, opportunities, and challenges associated with banking.

#### Translation of Research

ELI and ED directly engaged managers, practitioners, and policymakers at the outset and throughout the project to ensure that results are relevant to the target audience. This was accomplished through the establishment of Project Advisors, a group of habitat banking experts from a variety of sectors. The Project Advisors were called on to review preliminary products and the draft technical report. We will draw from the experience of experts during ELI's meeting July 2007 meeting (funded by EPA), titled *Exploring Opportunities to Integrate State Wildlife Action Plans into Improved Wetland Conservation and Restoration*. The meeting convened state wetland and wildlife program representatives to identify and support opportunities for state wildlife action plans to be used to help prioritize mitigation bank sites, as well as other regulatory and non-regulatory state wetland protection efforts.

### **6. Deliverables:**

#### Technical Report

The principal deliverable for this project is a comprehensive technical report that fully explores the potential of habitat banking to contribute to the conservation of priority habitats in State Wildlife Action Plans. ELI and ED have completed a draft of the technical report, solicited and incorporated comments received from the Project Advisors, and have incorporated the majority of the advisors' comments. Several sets of comments are outstanding. The report will be formatted, published, and distributed primarily in PDF format to the target audiences identified, namely the state officials tasked with implementation of State Wildlife Action Plans, state and federal officials responsible for development and implementation of habitat banking policy; and public and private sector banking interests.

#### Summary of Research Results for Presentations

The project team will provide a summary of research results to be presented at the annual meetings of relevant professional associations, such as: Association of Fish and Wildlife Agencies; AFWA affiliated regional organizations; North American Wildlife and Natural Resources Conference; Association of State Wetland Managers; and National Mitigation Banking Conference. ELI and ED have submitted a proposal to present at the May 2008 National Mitigation & Ecosystem Banking Conference.

### Derivative Articles

Develop one or more derivative articles to be submitted to professional or related journals frequently read by conservation professionals, such as: *Conservation in Practice*; the *Journal of Wildlife Management*; or ELI publications (i.e., *The Environmental Forum*, *Environmental Law Reporter*, *National Wetlands Newsletter*). A short article based on the technical report has been drafted and will be submitted before the end of October, most likely to *Conservation in Practice* or to the *Endangered Species Update*.

### Curricular Materials

Provide the completed technical report to the National Conservation Training Center to explore opportunities to inclusion of the material into appropriate training courses. If NCTC expresses interest, curricular materials will be developed.

### Briefing Materials

Develop a “policymakers” presentation on the research findings that can be offered to a variety of audiences that have a technical understanding of habitat banking and a “decision makers” presentation that can be used by policymakers to communicate the values of habitat banking programs and how a model habitat banking program can be developed to help protect critical wildlife habitat identified in the State Wildlife Action Plans.

### Communication of Results

The principal audiences for the conclusions and recommendations of this study are: state officials tasked with implementation of state wildlife action plans; state and federal officials responsible for development and implementation of habitat banking policy; and businesses and landowners engaged in or interested in habitat banking.

The results of this research will be communicated to the principal audiences through the dissemination of publications, public presentations, development of briefing materials, and development of training course materials, as discussed above.

All of the above materials will also be posted on the websites of both ELI and ED to maximize its accessibility.

## 7. References:

- A. Compensatory Mitigation and Habitat Banking Studies and Reviews**
- B. Studies on the Administrative and Ecological Performance of Banking**
- C. Additional and Noteworthy Habitat Banking Resources**

### **A. Compensatory Mitigation and Habitat Banking Studies and Reviews**

1. Barnett, Harold C. 2000. Mitigation Banking in a Habitat Conservation Plan. (An unpublished paper prepared for the Sonoran Desert Conservation Plan's Implementation Technical Advisory Team.)
2. Bauer, Marybeth, Jessica Fox, and Michael Bean. 2004. "Landowners Bank on Conservation: The U.S. Fish and Wildlife Service's Guidance on Conservation Banking." *Environmental Law Reporter*. 34 ELR 10717. Washington, DC: Environmental Law Institute.
3. Bean, Michael and Lynn Dwyer. 2000. "Mitigation Banking as an Endangered Species Conservation Tool." *Environmental Law Reporter*. 30 ELR 10537. Washington, DC. Environmental Law Institute.
4. Carroll, Nathaniel, Ricardo Bayon, and Jessica Fox. "Conservation and Biodiversity Banking: A Guide to Setting Up and Running Biodiversity Credit Trading Systems." In press.
5. Colburn, James E. 2005. "Trading Spaces: Habitat 'Banking' Under Fish & Wildlife Service Policy." 20 SUM Nat. Resources & Environment 33.
6. Environmental Law Institute. 1993. *Wetland Mitigation Banking*. Washington, DC. Environmental Law Institute.
7. Fox, Jessica and Anamaria Nino-Murcia. 2005. "Status of Species Conservation Banking in the United States." *Conservation Biology*. Vol. 19, No. 4.
8. Gripne, Stephanie. 2005. "Grassbanks: An Evaluation of a Conservation Tool. An unpublished PhD dissertation.
9. Hay, Derald. 2006. "When Sealing the Leaks of Habitat Conservation Banking, Multiple Gaskets Are Needed: The Case for Bog Turtle in Pennsylvania." 14 Penn. St. Env'tl. L. Rev. 299.
10. Hearings on Wetlands Mitigation Banking in the Senate Committee on Environment and Public Works (1996) and the House Committee on Transportation and Infrastructure (1997).
11. Kieser & Associates. 2004. "Ecosystem Multiple Markets: A White Paper." An unpublished draft dated April 2004.
12. McCollum, Michael. 1997. "Conservation Banks: Regional Planning's Newest Tool." *Linkages*. Institute for Ecological Health. Available at <http://www.fscr.org/html/1998-02.html>.
13. Mills, Christopher S. 2004. "Incentives and the ESA: Can Conservation Banking Live Up to Potential?" 14 Duke Environmental Law & Policy Forum 523.
14. National Research Council. 2001. *Compensating for Wetland Losses Under the Clean Water Act*. Washington, DC: National Academy of Sciences.

15. Nevel, Bonnie, Joan Milam, Gwen Arnold, and Rachel Harris. April 2004. "Measuring Mitigation: A Review of the Science for Compensatory Mitigation Performance Standards." Washington, DC: Environmental Law Institute. See: <http://www.mitigationactionplan.gov/PerformanceStandardsReview.htm>
16. Rolband, Michael S., Ann Redmond, and Tom Kelsch. 2001. "Wetland Mitigation Banking." Applied Wetlands Science and Technology. (2d ed., Donald M. Kent, ed.). Boca Raton, FL. Lewis Publishers.
17. Ruhl, J.B. and Salzman, James E. January 2006. "The Effects of Wetland Mitigation Banking on People." FSU College of Law, Public Law Research Paper No. 179.
18. Ruhl, J.B., Alan Glen, and David Hartman. 2005. "A Practical Guide to Habitat Conservation Banking Law and Policy." Natural Resources & Environment 26-32. Available at [www.law.fsu.edu/faculty/profiles/ruhl/2005-HabitatBanking20NRESummer.pdf](http://www.law.fsu.edu/faculty/profiles/ruhl/2005-HabitatBanking20NRESummer.pdf).
19. Salzman, James. 2005. "Creating Markets for Ecosystem Services: Notes from the Field." 80(3) NYU Law Review 870-961.
20. Stratus Consulting Inc. 2003. "A Nationwide Survey of Conservation Banks." Prepared for the Northwest Fisheries Science Center, NOAA Fisheries, Seattle, WA. Available at: [http://www.st.nmfs.gov/st5/abstracts/A\\_Nationwide\\_Survey\\_of\\_Conservation\\_Banks.htm](http://www.st.nmfs.gov/st5/abstracts/A_Nationwide_Survey_of_Conservation_Banks.htm)
21. ten Kate, Kerry, Josh Bishop, and Ricardo Bayon, Biodiversity Offsets: Views, Experience, and the Business Case, IUCN 2004.
22. Thomas, Roxanne, Austin Kane, Sandra Nichols, Rebecca Gruby, Allison Watkins, Rebecca Kihlslinger, and Jason DeRosa. *State Wetland Program Evaluation: Phase IV*. Washington, DC: Environmental Law Institute, In press.
23. Thomas, Roxanne, Rebecca Gruby, Rebecca Kihlslinger, Allison Watkins, and Austin Kane. 2007. *State Wetland Program Evaluation: Phase III*. Washington, DC: Environmental Law Institute.
24. Thomas, Roxanne. 2006. *State Wetland Program Evaluation: Phase II*. Washington, DC: Environmental Law Institute.
25. Thomas, Roxanne. 2005. *State Wetland Program Evaluation: Phase I*. Washington, DC: Environmental Law Institute.
26. Toyon Consulting. "Conservation Banking: A Technical Report." Prepared for the California Department of Fish and Game. Available at [www.dfg.ca.gov/hcpb/conplan/mitbank/CB%20Tech%20Rept.pdf](http://www.dfg.ca.gov/hcpb/conplan/mitbank/CB%20Tech%20Rept.pdf)
27. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office. September 2006. *Valley Elderberry Longhorn Beetle – 5-Year Review: Summary and Evaluation*. <http://www.fws.gov/sacramento/es/documents/VELB%205-year%20review.FINAL.pdf>.
28. U.S. Government Accountability Office. September 6, 2006. *Endangered Species: Many Factors Affect the Length of Time to Recover Select Species*. Washington, DC: GAO. GAO-06-730.
29. U.S. Government Accountability Office. September 2005. *Wetlands Protection: Corps of Engineers Does Not Have an Effective Oversight Approach to Ensure*

- That Compensatory Mitigation Is Occurring*. Washington, DC: GAO. GAO-05-898.
30. U.S. Government Accountability Office. May 15, 2002. *U.S. Army Corps of Engineers: Scientific Panel's Assessment of Fish and Wildlife Mitigation Guidance*. Washington, DC: GAO. GAO-02-574.
  31. U.S. Government Accountability Office. February 15, 2001. *Endangered Species Act: Fee-Based Mitigation Arrangements*. Washington, DC: GAO. GAO-01-287R.
  32. Wilcove, David S. and Joon Lee. 2004. "Using Economic and Regulatory Incentives to Restore Endangered Species: Lessons Learned from Three New Programs." *Conservation Biology*. Vol. 18, No. 3.
  33. Wilkinson, Jessica and Jared Thompson. April 2006. "2005 Status Report on Compensatory Mitigation in the United States." Washington, DC: Environmental Law Institute.
  34. Wilkinson, Jessica, Roxanne Thomas, and Jared Thompson. June 2006. "The Status and Character of In-Lieu Fee Mitigation in the United States." Washington, DC: Environmental Law Institute.
  35. Wilkinson, Jessica, Christina Kennedy, Kelly Mott, Margaret Filbey, Sarah King, and Jim McElfish. 2002. "Banks and Fees: The Status of Off-Site Wetland Mitigation in the United States." Washington, DC: Environmental Law Institute.

## **B. Studies on the Administrative and Ecological Performance of Banking**

1. Allen, A. O., and J. J. Feddema. 1996. Wetland loss and substitution by the Section 404 Permit Program in southern California, USA. *Environmental Management* 20: 263-74.
2. Ambrose, R.F. 2000. Wetland Mitigation in the United States: Assessing the Success of Mitigation Policies. *Wetlands (Australia)* 19: 1-27.
3. Ambrose, R.F. and S.F. Lee. 2004. An Evaluation of Compensatory Mitigation Projects Permitted Under Clean Water Act Section 401 by the Los Angeles Regional Quality Control Board, 1991-2002.
4. Ambrose, R.F., J.C. Callaway, and S.F. Lee. 2006. An Evaluation of Compensatory Mitigation Projects Permitted Under Clean Water Act Section 401 by the California State Water Quality Control Board, 1991-2002.
5. Balzano, S., A. Ertman, L. Brancheau, W. Smejkal, A.S. Greene, M. Kaplan, and D. Fanz. 2002. Creating Indicators of Wetland Status (Quantity and Quality): Freshwater Wetland Mitigation in New Jersey. NJ Department of Environmental Protection, Division of Science, Research, & Technology.  
<http://www.state.nj.us/dep/dsr/wetlands/final.pdf>
6. Bishel-Machung, L., R.P. Brooks, S.S. Yates, and K.L. Hoover. 1996. Soil Properties of Reference Wetlands and Wetland Creation Projects in Pennsylvania. *Wetlands* 16:532-541.
7. Breaux, A. and F. Serefiddin. 1999. Validity of Performance Criteria and a Tentative Model for Regulatory Use in Compensatory Wetland Mitigation Permitting. *Environmental Management* 24(3): 327-336.

8. Brown, S.C. and P.L.M. Veneman. 2001. Effectiveness of Compensatory Wetland Mitigation in Massachusetts, USA. *Wetlands* 21: 508-518.
9. Brown, S. and P. Veneman. 1998. Compensatory Wetland Mitigation in Massachusetts. Massachusetts Ag Experiment Station, University of Massachusetts.
10. Brown, P., and C. Lant. 1999. The effect of wetland mitigation banking on the achievement of no-net-loss. *Environmental Management* 23(3): 333-345.
11. Campbell, D.A., C.A. Cole, and R.P. Brooks. A Comparison of Created and Natural Wetlands in Pennsylvania, USA.
12. Castelle, A.J., C. Conolly, M. Emers, E.D. Metz, S. Meyer, M. Witter, S. Mauermann, M. Bentley, D. Sheldon, and D. Dole. 1992. Wetland Mitigation Replacement Ratios: Defining Equivalency. Adolfson Associates, Inc. for Shorelands and Coastal Zone Managements Program, Washington Department of Ecology, Olympia, Publication #92-08.
13. Chase, V. and V. Davis. 1997. Evaluation of Wetland Mitigation in New Hampshire. Audubon Society of New Hampshire.
14. Cole, C.A. and D. Shaffer 2002. Section 404 Wetland Mitigation and Permit Success Criteria in Pennsylvania, USA, 1986-1999. *Environmental Management* 30(4): 508-515.
15. Cole, C.A. and R.P. Brooks. 2000. A Comparison of the Hydrological Characteristics of Natural and Created Mainstem Floodplain Wetlands in Pennsylvania. *Ecological Engineering* 14: 221-231.
16. Cole, C. A., R.P. Brooks, and D.H.Wardrop. 2001. Assessing the Relationship between Biomass and Soil Organic Matter in Created Wetlands of central Pennsylvania, USA. *Ecological Engineering* 7: 423- 428.
17. DeWeese, J. and C. Gould. 1994. An evaluation of selected wetland creation projects authorized through the Corps of Engineers Section 404 Program. US Department of the Interior, Fish and Wildlife Service, Sacramento Field Office, Sacramento, California, 90 pp.
18. Eliot, W. 1985. Implementing Mitigation Policies in San Francisco Bay: A Critique. California State Coastal Conservancy. Oakland, CA.
19. Erwin, K.L. 1991. An Evaluation of Wetland Mitigation in the South Florida. Water Management District, Vol. 1. Methodology. West Palm Beach, FL: South Florida Water Management District.
20. Fennessy, M.S., J.J. Mack, A. Rokosch, M. Knapp, and M. Micacchion. 2004. Integrated Wetland Assessment Program. Part 5: Biogeochemical and Hydrological Investigations of Natural and Mitigation Wetlands. Ohio EPA Technical Report WET/2004-5. Ohio Environmental Protection Agency, Wetland Ecology Group, Division of Surface Water, Columbus, Ohio.
21. Fennessy, S., and J. Roehrs. 1997. A Functional Assessment of Mitigation Wetlands in Ohio: Comparisons with Natural Systems. Columbus: Ohio EPA Division of Surface Water.
22. Fennessy, M.S., M.A. Gray, and R.D. Lopez. 1998. An Ecological Assessment of Wetlands Using Reference Sites Volume 1: Final Report, Volume 2: Appendices. Final Report to U.S. Environmental Protection Agency. Wetlands Unit, Division of Surface Water. Grant CD995761-01.

23. Fernandez, L. and L. Karp. 1998. Restoring Wetlands through Mitigation Banks. *Environmental and Resource Economics* 12:323-344.
24. Florida Department of Environmental Regulation. 1991. Report of the Effectiveness of Permitted Mitigation. Florida Department of Environmental Regulation Pursuant to Section 403.918(2)(b), Florida Statutes, Department of Environmental Regulation, State of Florida. March 5, 1991.
25. Galatowitsch, S.M and A. van der Valk. 1996b. The Vegetation of Restored and Natural Prairie Wetlands. *Ecological Applications* 6:102-112.
26. Gallihugh, J.L. and J.D. Rogner 1998. Wetland Mitigation and 404 Permit Compliance. Vol. 2. U.S. Fish and Wildlife Service. Chicago, IL. June 1998.
27. Gilman, E.L. 1998. Nationwide Permit Program: Unknown Adverse Impacts on the Commonwealth of the Northern Mariana Islands' Wetlands. *Coastal Management* 26: 253-277.
28. Gwin, S.E. and M.E. Kentula. 1990. Evaluating Design and Verifying Compliance of Wetlands Created under Section 404 of the Clean Water Act in Oregon. EPA/600/3-90/061. Corvallis, OR: Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency.
29. Gwin, S.E., M.E. Kentula, and P.W. Shaffer. 1999. Evaluating the Effects of Wetland Regulation through Hydrogeomorphic Classification and Landscape Profiles. *Wetlands* 19(3): 477-489.
30. Holland, P.V. and D.C. Bossert. 1994. Mitigation Follow-Up Study of Selected Department of the Army Permits in Southern Louisiana. Lafayette, LA: U.S. Fish and Wildlife Service, Ecological Services.
31. Holland, C.C., and M.E. Kentula. 1992. Impacts of Section 404 Permits Requiring Compensatory Mitigation on Wetlands in California. *Wetlands Ecology and Management* 2: 157-69.
32. Johnson, P.A., D.L. Mock, E.J. Teachout, and A. McMillan. 2000. Washington State Wetland Mitigation Evaluation Study. Phase 1: Compliance. Washington State Department of Ecology. June 2000. Publication No. 00-06-016
33. Johnson, P., D.L. Mock, A. McMillan, L. Driscoll, and T. Hruby 2002. Washington State Wetland Mitigation Evaluation Study. Phase 2: Evaluating Success. Washington State Department of Ecology. February 2002. Publication No. 02-06-009.
34. Josselyn, M., S. Chamberlain, K. Goodnight, H. Hopkins, and A. Fiorillo. 1993. Evaluation of Coastal Conservancy Enhancement Projects 1978-1992, Report to the California State Coastal Conservancy, Oakland, CA.
35. Kelly, N.M. 2001. Changes to the Landscape Patterns of Coastal North Carolina Wetlands under the Clean Water Act. *Landscape Ecology* 16: 3-16.
36. Kentula, M.E., J.C. Sifneos, J.W. Good, M. Rylko, and K. Kunz. 1992. Trends and Patterns in Section 404 Permitting Requiring Compensatory Mitigation in Oregon and Washington, USA. *Environmental Management* 16: 109-19.
37. Knapp, M. 2006. Investigations of Invertebrate Communities in Wetlands in the Huron/Erie Lake Plains Ecoregion (2003) and Mitigation Banks (2004). Ohio EPA Technical Report WET/2006-3. An addendum to: Integrated Wetland Assessment Program. Part 8: Initial development of wetland invertebrate

- community index for Ohio. Ohio Environmental Protection Agency, Ecological Assessment Section, Columbus, Ohio.
38. Kunz, K., M. Rylko, and E. Somers. 1988. An Assessment of Wetland Mitigation Practices Pursuant to Section 404 Permitting Activities in Washington State. Pages 515-531 in Proceedings First Annual Meeting on Puget Sound Research, Volume 2. Seattle, Washington, March 18-19, 1988. Seattle, WA: Puget Sound Water Quality Authority.
  39. Kusler, J. and M.E. Kentula. 1990. Wetland Creation and Restoration: the Status of the Science. Island Press, Covelo , CA.
  40. Lowe, G., D.Walker, and B.Hatchitt. 1989. Evaluating Manmade Wetlands as Compensation for the Loss of Existing Wetlands in the St. Johns River Water Management District. Pp. 109–118 in Proceedings of 16th Annual Conference on Wetlands Restoration and Creation, F.J.Webb Jr., ed. Plant City, FL: Hillsborough Community College.
  41. Mack, J.J and M. Micacchion. 2006. An Ecological Assessment of Ohio Mitigation Banks: Vegetation, Amphibians, Hydrology, and Soils. Ohio EPA Technical Report WET/2006-1. Ohio Environmental Protection Agency, Division of Surface Water, Wetland Ecology Group, Columbus, Ohio.
  42. Magee, T.K., T.L. Ernst, M.E. Kentula, and K.A. Dwire. 1999. Floristic Comparison of Freshwater Wetlands in an Urbanizing Environment. *Wetlands* 19(3): 517-534.
  43. McEnespy, M. B., and Z. P. Hymanson. 1997. Examination of Past Wetland Projects Permitted by the California Coastal Commission: A report card on project performance. Unpublished Manuscript. Pp. 1-30.
  44. McKinstry, M.C. and S.H. Anderson. 1994. Evaluation of Wetland Creation and Waterfowl Use in Conjunction with Abandoned Mine Lands in Northeast Wyoming. *Wetlands* 14(4): 284-292.
  45. Michigan Department of Environmental Quality. 2001. Michigan Wetland Mitigation and Permit Compliance Study. Lansing, MI: Land and Water Management Division.
  46. Minkin, P. and R. Ladd 2003. Success of Corps-Required Mitigation in New England, USACE New England District.
  47. Mitsch, W.J. and R.F. Wilson. 1996. Improving the Success of Wetland Creation and Restoration with Know-How, Time, and Self-Design. *Ecological Applications* 6: 77-83.
  48. Mockler, Anna, Laura Casey, Mason Bowles, Nick Gillen, and Jon Hansen. 1998. Results of Monitoring King County Wetland and Stream Mitigations. King County Department of Development and Environmental Services.
  49. Morgan, K.L. and T.H. Roberts. 2003. Characterization of Wetland Mitigation Projects in Tennessee, USA. *Wetlands* 23(1): 65-69.
  50. Morgan, K.L. and T.H. Roberts. 1999. An Assessment of Wetland Mitigation in Tennessee. Nashville, TN: Tennessee Department of Environment and Conservation.
  51. National Research Council. 2001. Compensating for Wetland Losses Under the Clean Water Act. National Research Committee on Mitigating Wetland Losses. National Academy Press, Washington DC, USA.



52. OPPAGA (Office of Program Policy Analysis and Government Accountability) 2000. Policy Review: Wetland Mitigation. Report No. 99-40. Tallahassee, FL: Office of Policy Analysis and Government Accountability.
53. Porej, D. 2003. An Inventory of Ohio Compensatory Wetland Mitigation. Report to U.S. EPA Grant No. CD97576201-0. Ohio Environmental Protection Agency, Division of Surface Water, Wetland Ecology Unit, Columbus, OH.
54. Porej, D. 2004. Faunal Aspects of Wetland Creation and Restoration. Dissertation. The Ohio State University. 120p.
55. Race, M.S. 1985. Critique of Present Wetlands Mitigation Policies in the United States Based on an Analysis of Past Restoration Projects in San Francisco Bay. *Environmental Management* 9: 71-82.
56. Race, M.S., and D.R. Christie. 1982. Coastal Zone Development: Mitigation, Marsh Creation and Decision-Making. *Environmental Management* 6(4): 317-328.
57. Race, M.S. and M.S. Fonseca. 1996. Fixing Compensatory Mitigation: What Will it Take? *Ecological Applications* 6: 94-101.
58. Redmond, A. 1992. How Successful is Mitigation? *National Wetlands Newsletter* 14(1): 5-6.
59. Reimold, R.J. and S.A. Cobler. 1986. Wetland Mitigation Effectiveness. United States Environmental Protection Agency. Region I. USEPA contract no. 68-40-0015.
60. Reiss, K.C., E. Hernandez, M.T. Brown. 2007. An Evaluation of the Effectiveness of Mitigation Banking in Florida: Ecological Success and Compliance with Permit Conditions. Florida Department of Environmental Protection #WM881. EPA Grant #CD 96409404-0.  
[http://www.dep.state.fl.us/water/wetlands/docs/mitigation/Final\\_Report.pdf](http://www.dep.state.fl.us/water/wetlands/docs/mitigation/Final_Report.pdf)
61. Robb, J.T. 2002. Assessing Wetland Compensatory Mitigation Sites to Aid in Establishing Mitigation Ratios. *Wetlands* 22(2): 435-440.
62. Robb, J.T. 2001. Indiana Wetland Compensatory Mitigation: Area Analysis. EPA Grant #CD985482-010-0 Indiana Department of Environmental Management. June 2001
63. Shaich, J.A. and K.T. Franklin. 1995. Wetland Compensatory Mitigation in Oregon: A Program Evaluation with a Focus on Portland Metro Area Projects. Oregon Division of State Lands.
64. Shaffer, P.W. and T.L. Ernst. 1999. Distribution of Soil Organic Matter in Freshwater Emergent/Open Water Wetlands in the Portland, Oregon Metropolitan Area. *Wetlands* 19: 505-516
65. Sheldon, D., T. Hruby, P. Johnson, K. Harper, A. McMillan, T. Granger, S. Stanley, and E. Stockdale. 2005. Wetlands in Washington State - Volume 1: A Synthesis of the Science. Washington State Department of Ecology. Publication #05-06-006.
66. Sibbing, J.M. 1997. Mitigation's Role in Wetland Loss. *National Wetlands Newsletter* 19(1).
67. Sifneos, J.C., F.W. Cake, Jr., and M.F. Kentula 1992. Effects of Section 404 Permitting on Freshwater Wetlands in Louisiana, Alabama, and Mississippi. *Wetlands* 12: 28-36.

68. Sifneos, J.C., M.E. Kentula, and P. Price 1992. Impacts of Section 404 Permits Requiring Compensatory Mitigation of Freshwater Wetlands in Texas and Arkansas. *The Texas Journal of Science* 44(4): 475-485.
69. Smigelski, F. 1996. A Survey of Wetland Mitigation Sites in New England. New England Division, U.S. Army Corps of Engineers. Waltham, MA.
70. Stolt, M.H., M.H. Genthner, W.L. Daniels, V.A. Groover, S. Nagle, and K.C. Harling. 2000. Comparison of Soil and Other Environmental Conditions in Constructed and Adjacent Palustrine Reference Wetlands. *Wetlands* 20: 671-683.
71. Storm, L. and J. Stellini. 1994. Interagency Follow-Through Investigation of Compensatory Wetland Mitigation Sites, Joint Agency Staff Report. US Environmental Protection Agency and US Fish and Wildlife Service. 70 pp
72. Sudol, M.F., and R.F. Ambrose. 2002. The U.S. Clean Water Act and habitat replacement: evaluation of mitigation sites in Orange County, California, USA. *Environmental Management* 30: 727-734.
73. Sudol, Mark F. 1996. Success of Riparian Mitigation as Compensation for Impacts Due to Permits Issued Through Section 404 of the Clean Water Act in Orange County, California. Dissertation for Doctor of Environmental Science and Engineering. University of California, Los Angeles. 215 pp.
74. Turner, R.E., A.M. Redmond, J.B. Zedler (2001) Count It By Acre of Function—Mitigation Adds Up to Net Loss of Wetlands. *National Wetlands Newsletter* 23(6).
75. Utah Division of Wildlife Resources. 2001. Assessment of Section 404 Compensatory Mitigation Compliance in Northern Utah. Salt Lake City, UT.
76. Wilson, Renee F. and William J. Mitsch. 1996. Functional Assessment of Five Wetlands Constructed to Mitigate Wetland Loss in Ohio, USA. *Wetlands* 16(4): 436-451.
77. Zedler, J. B., and R. Langis. 1991. Comparisons of constructed and natural salt marshes of San Diego Bay. *Restoration and Management Notes* 9: 21-25.
78. Zedler, J. B., G. D. Williams, and J. S. Desmond. 1997. Wetland Mitigation: Can Fishes Distinguish Between Natural and Constructed Wetlands. *Fisheries* 22: 26-28.
79. Zedler, J. B., and J. C. Callaway. 1999. Tracking Wetland Restoration: Do Mitigation Sites Follow Desired Trajectories? *Restoration Ecology* 7: 69-73.
80. Zedler, J.B. 1996. Tidal Wetland Restoration: A Scientific Perspective and Southern California Focus. Report T-038. California Sea Grant College System, University of California, La Jolla, California.
81. Zentner, J. J. 1988. Wetland Restoration Success in Coastal California. *Increasing Our Wetland Resource: Proceedings of a Conference*. Eds. J.
82. Zelazny, and J. S. Feierabend, Washington, D.C.: National Wildlife Federation. pp. 216-219.
83. Zentner, J. J. 1987. Wetland Restoration Success in Coastal California: 1975-1985. Wetland and Riparian Ecosystems of the American West. *Eighth Annual Meeting of the Society of Wetland Scientists*, Technical Coordinators K. M. Mutz, and L. C. Lee, 122-24

### **C. Additional and Noteworthy Habitat Banking Resources**

1. California Department of Fish & Game. Various wetland and habitat banking reports at: [http://www.dfg.ca.gov/habcon/conplan/mitbank/cmb\\_pubs.html](http://www.dfg.ca.gov/habcon/conplan/mitbank/cmb_pubs.html)
  - a. "California Wetlands Mitigation Banking - 2005 Report to the Legislature."
  - b. "California Wetlands Mitigation Banking - 2003 Report to the Legislature."
  - c. "California Wetlands Mitigation Banking - 2001 Report to the Legislature."
  - d. "Brief Report on Conservation Banking." 1998.
  - e. "Bucks in the bank .... land bank that is." 1997.
  - f. "Conservation Banks: Regional Planning's Newest Tool." 1997.
  - g. "Conservation Banking - A Technical Report." 1995.
2. Ecosystem Marketplace, SpeciesBanking.com. Ecosystem Marketplace is developing a separate and publicly available web site on species banking. The central focus of the site will be a registry of all species. The site will be launched in 2007. See: [www.SpeciesBanking.com](http://www.SpeciesBanking.com)
3. Forest Trends, Business and Biodiversity Offset Programs. A site that includes a library of articles about banking and related topics at: <http://www.forest-trends.org/biodiversityoffsetprogram/library.php>.
4. California Department of Fish & Game. Reasonably current information on conservation banks approved by the California Department of Fish and Game at: <http://www.dfg.ca.gov/habcon/conplan/mitbank/catalogue/catalogue.html>.
5. Environmental Law Institute, "Banks and Fees" database. The web site includes data on each of the banks identified in the 2002 study, as well as downloadable copies of each of the bank's authorizing instruments. See: <http://www2.eli.org/wmb/index.htm>.
6. U.S. Army Corps of Engineers, RIBITS database. The Regional Internet Bank Information Tracking System (RIBITS) is an interactive website designed to track the status of mitigation banks in the U.S. In the near term, RIBITS will also track DOT banks and will likely include U.S. FWS species conservation banks. The database has been "deployed" in the Norfolk and Portland Districts. The Chicago, Jacksonville, Sacramento, and St. Paul Districts will be populated by end of 2007.
  - a. RIBITS National:  
[http://www.erdc.usace.army.mil/pls/erdcpub/www\\_fact\\_sheet.PRODUCT\\_PAGE?ps\\_product\\_num=114145&tmp\\_Main\\_Topic=&page=All](http://www.erdc.usace.army.mil/pls/erdcpub/www_fact_sheet.PRODUCT_PAGE?ps_product_num=114145&tmp_Main_Topic=&page=All)
  - b. RIBITS Mobile District: <https://samribits.sam.usace.army.mil/ribits/>
  - c. RIBITS Norfolk District: <https://ribits.nao.usace.army.mil/ribits/index.php>
7. U.S. Fish and Wildlife Service. An up-to-date site from the FWS Sacramento Field Office has an extensive list of banks within the jurisdiction of this field office and links to related information at: [http://www.fws.gov/sacramento/es/cons\\_bank.htm](http://www.fws.gov/sacramento/es/cons_bank.htm).

## **APPENDICES:**

**Appendix A: List of Participants/Project Advisors**

**Appendix B: Links to project websites**

**Appendix C: List of publications**

**Appendix D: Hard copies**

**Appendix E: Project outputs**

**Appendix F: Effective Wetland and Habitat Banking Practices**

## Appendix A

### List of Participants/Project Advisors

Mike Harris  
Georgia Wildlife Resources Division  
2070 US Highway 278 SE  
Social Circle, GA 30025  
PH: 770-761-3035  
E-Mail: [mike\\_harris@dnr.state.ga.us](mailto:mike_harris@dnr.state.ga.us)

Daniel Russell  
Chief - Section 7 Branch  
Endangered Species Division  
USFWS, Sacramento Fish and Wildlife  
Office  
2800 Cottage Way, Room W-2605  
Sacramento, CA 95825-1846  
PH: 916-414-6636  
E-Mail: [Daniel\\_Russell@fws.gov](mailto:Daniel_Russell@fws.gov)

Palmer Hough  
U.S. Environmental Protection Agency  
Wetlands Division (4502T)  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
PH: 202-566-1374  
E-Mail: [hough.palmer@epa.gov](mailto:hough.palmer@epa.gov)

John J. Mack  
Cleveland Metroparks  
PH: 440-331-8569  
E-Mail: [jjm@clevelandmetroparks.com](mailto:jjm@clevelandmetroparks.com)

Steve Martin  
Regulatory Branch  
U.S. Army Corps of Engineers, Norfolk  
District  
ATTN: CENAO-TS-G  
803 Front Street  
Norfolk, VA 23510-1096  
PH: 757-201-7787

Ann Redmond  
PH: 850-878-5001  
E-Mail: [aredmond@mindspring.com](mailto:aredmond@mindspring.com)

Gail Presley  
Statewide Banking Coordinator  
Habitat Conservation Planning Branch  
California Department of Fish and Game  
1416 Ninth Street  
Sacramento, CA 95814  
PH: 916-653-9834  
E-Mail: [gpresley@dfg.ca.gov](mailto:gpresley@dfg.ca.gov)

J. B. Ruhl  
Matthews & Hawkins Professor of  
Property  
Florida State University  
College of Law  
B.K. Roberts Hall, Room 324  
Tallahassee, FL 32306-1601  
PH: 850-644-1596  
E-Mail: [jruhl@law.fsu.edu](mailto:jruhl@law.fsu.edu)

## **Appendix B**

### **Links to project websites**

Environmental Law Institute: Wetlands Program  
<http://www2.eli.org/research/wetlands.htm>

Environmental Defense:  
[www.environmentaldefense.org/habitatbankingreport](http://www.environmentaldefense.org/habitatbankingreport)

## Appendix C

### List of publications

Bean, Michael and Jessica Wilkinson. “Opportunities to Further the Goals of State Wildlife Action Plans Through Habitat Banking.” (to be submitted either to *Conservation in Practice* or to the *Endangered Species Update*).

## **Appendix D**

### **Hard copies**

To be submitted upon completion.



## **Appendix E**

### **Project outputs**

See: PowerPoint Presentation. "Habitat Banking Presentation." Emailed to WHPRP program coordinator, Cheryl Horton, 10/26/07.

## Appendix F

### ***WILDLIFE HABITAT POLICY RESEARCH PROGRAM***

#### ***2006 RESEARCH PROGRAM***

---

### **1.D.: Design of U.S. Habitat Banking Systems**

#### **Effective Wetland and Habitat Banking Practices**

- **The Permitting Process**
  - Wetland mitigation banking
    - Fully exhaust avoidance and minimization measures before employing wetland compensatory measures
      - Avoid impacts to wetland habitat to the maximum extent practicable
        - Difficult to replace habitats (i.e, bogs, fens) should be avoided
      - Minimize wetland impacts to habitat to the maximum extent practicable
    - Permit only those impacts for which compensation has a demonstrated track record of replacing lost habitat functions.
  - Habitat banking
    - Carefully consider the relative benefits of avoidance and minimization versus compensatory measures when mitigating endangered species impacts
- **The Bank Approval Process**
  - Impacts to one type of habitat should generally be offset by credits benefiting the same species or habitat type. In the case of wetland mitigation banking, the exception is when it is environmentally preferable to allow out-of-kind mitigation pursuant to an area-wide management plan to restore a particularly vulnerable or valuable habitat type(s).
  - Require banking agreements to be approved by teams comprised of all agencies with regulatory responsibilities for the habitat and/or species of concern.
  - Require banks to conform to rules no less detailed than those that apply to wetland mitigation banks under the Clean Water Act or species conservation banks under the Endangered Species Act and these Acts associated federal regulations and guidance.
  - Ensure that bank service areas are no larger than is necessary to ensure the replacement of the most localized values that the regulatory program is intended to protect.

- **Site Selection**
  - Conduct selection of bank sites at the appropriate scale (i.e., on a watershed scale for wetland banks and ecoregional scale for habitat banks) in order to maintain habitat diversity, connectivity, and appropriate proportions of habitat types needed to enhance the long-term stability of the affected systems.
  - Take larger regional plans and conservation strategies into consideration when selecting sites.
- **Bank Design & Management**
  - Design banks to be self-sustaining to the maximum extent practicable by following the following guidelines:
    - Consider the hydrogeomorphic and ecological landscape and climate
    - Adopt a dynamic landscape perspective.
    - Restore or develop naturally variable hydrological conditions.
    - Whenever possible, choose habitat restoration over creation.
    - Avoid over-engineered structures in the restored or created habitat's design.
    - Pay particular attention to appropriate planting elevation, depth, soil type, and seasonal timing.
    - Provide appropriately heterogeneous topography.
    - Pay attention to subsurface conditions, including soil and sediment geochemistry and physics, groundwater quantity and quality, and infaunal communities.
    - Consider complications associated with habitat creation or restoration in seriously degraded or disturbed sites.
    - Conduct early monitoring as part of adaptive management.
  - Wetland mitigation banking
    - Favor mitigation methods that support no net loss of habitat, such as restoration, over methods that contribute to a net loss, such as preservation.
  - Habitat banking
    - Favor mitigation methods that support no net loss of species survival, which may, in some cases include preservation as a first choice.
    - Require management techniques to ensure that preserved habitat continues to support no net loss of species survival.
- **Legal and Financial Mechanisms**
  - Ensure that bank programs have effective compliance monitoring and oversight provisions.
  - Ensure that bank programs have clear and effective enforcement provisions (i.e., to ensure that liability is transferred from the permittee to the third party banker).
  - Tie monitoring periods to meeting project goals and ecological performance standards, rather than an arbitrary time interval.
  - Require bank sponsors to secure adequate remedial action funds.

- Require bank sponsors to secure long-term stewardship endowments which transfer to the long-term steward.
- Require bank sponsors to secure an appropriate real estate instrument on bank sites as a prerequisite for bank approval.
- Require that bank sites be protected in perpetuity through an appropriate real estate instrument.
- Require bank sponsors to assign a long-term steward prior to bank approval.
- **Functional Assessment**
  - Plan and measure banks using functional assessment tools that adequately address wildlife considerations.
  - Evaluate bank performance in terms of the populations present in reference models for the region and the ecological requirements of those species.
  - Evaluate impact sites using the same functional assessment tools as the bank sites (for species banks, it may be practical to assume species impacts rather than to demonstrate them through functional assessment).
  - Use functional assessment tools that recognize the larger landscape perspective (i.e., watershed or ecoregion, as appropriate).
- **Mitigation Goals**
  - Develop mitigation goals that are clear and specified in terms of measurable ecological performance standards.
- **Performance Standards**
  - Tie credit release schedules, relief from legal and financial assurances, and length of monitoring period to banks meeting ecological performance standards.
  - Use performance standards that are ecologically based and include wildlife measures.