

**EARLY MITIGATION FOR NET ENVIRONMENTAL BENEFIT:
Meaningful Off-Setting Measures for Unavoidable Impacts**



Requested by: American Association of State Highway
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Standing Committee on the Environment

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ABSTRACT

The objective of this National Cooperative Highway Research Program (NCHRP) project is to “develop guidance on the development and implementation of successful alternative/early mitigation strategies to address environmental goals.” Early mitigation/conservation under Section 404 of the Clean Water Act and Endangered Species Act section 7(a)(2) is proving to be a powerful tool to provide net benefits for the environment and greater predictability in the regulatory process and for conservation outcomes. These partnerships have expedited project approvals and drawn partners together in ways that maximize what each can contribute. Together, agencies and private entities are accomplishing more, with less, than any of the partners could have accomplished separately—a “win-win” model of particular relevance in an era of tighter budgets and increasing attention to stewardship.

This NCHRP report describes advance mitigation or conservation, the limits of standard project-by-project approaches, and common trade-offs with and benefits of pursuing earlier, integrated planning and programmatic conservation or mitigation. It examines the regulatory basis of using and funding advance mitigation/conservation, in transportation law and regulation, and in the Clean Water and Endangered Species Acts and associated guidance, regulations, case law, and ongoing agency activities. Key issues and lessons learned are discussed as well. A more detailed version of the regulatory discussion is provided in Appendix A. To facilitate more conservation and partnerships, Appendix B outlines further communication and action that may be taken with and within resource agencies. Appendix C describes steps to implement advance mitigation and conservation partnerships on a state or local level.

Preface

The objective of this National Cooperative Highway Research Program (NCHRP) project is to “develop guidance on the development and implementation of successful alternative/early mitigation strategies to address environmental goals.” While wetland mitigation banking has been well established for over ten years now, conservation banking under the Endangered Species Act is a newer phenomenon, with guidance issued in 2003.

In the approximately 50 interviews conducted in relation to this project, agency professionals (from the U.S. Army Corps of Engineers (Corps), Environmental Protection Agency (EPA), Federal Highway Administration (FHWA), U.S. Fish and Wildlife Service (FWS), state departments of transportation (DOTs), counties, consultants, and metropolitan planning organizations) who are working on advance mitigation initiatives stated that efforts require educating staff at all levels regarding the desirability and benefits of the approach. They further noted that the time-consuming nature of developing such partnerships and lack of familiarity with how it can be done hinder widespread application. Within the FWS in particular, while some regions are forging ahead, working with DOTs to tailor conservation actions and investments to species recovery, other field offices continue to emphasize avoidance and minimization to the exclusion of offsetting measures, under the interpretation that mitigation is not allowed under ESA section 7. Section 7 experts at FWS headquarters are working to provide clarification; since jeopardy means to “appreciably reduce the likelihood of survival and recovery of the species in the wild,” agencies may take actions to counter, “off-set,” or mitigate those reductions, to improve the likelihood of species recovery.¹ FWS encourages actions and conservation measures with “net benefits” for the species.

Roads and capacity improvements are preventable in rare cases, as the vast majority of the nation’s highways are already built; however, as public construction agencies with federal funding and environmental mandates, state DOTs can play an important role in contributing to watershed restoration, species recovery, and the development and conservation of “green infrastructure.” As noted in a recent book by the same title, in the future successful land conservation will have to be more proactive and less reactive, more systematic and less haphazard, multifunctional rather than single purpose, large scale rather than small scale, and better integrated with other planning efforts.² Stream buffers and natural landcover help ensure water quality and flood storage. Conservation partnerships can help address the habitat loss or degradation that has been a contributing factor in the decline of 85 percent of species listed as threatened or endangered. State resource agencies have already set ambitious conservation goals, to protect biodiversity and natural habitats, determining that 20 to 40 percent of each state’s land area requires some level of ecological protection, ideally across a variety of habitats.³ In the context of satisfying permit requirements under Section 404 of the CWA and consultation under ESA section 7, DOTs can play a positive role in achieving these restoration and recovery objectives and overall “net benefits” for the environment.

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Executive Summary

Early mitigation/conservation under Section 404 of the Clean Water Act and Endangered Species Act section 7(a)(2) is proving to be a powerful tool to provide net benefits for the environment and greater predictability in the regulatory process and for conservation outcomes. These partnerships have expedited project approvals and drawn partners together in ways that maximize what each can contribute. Together, agencies and private entities are accomplishing more, with less, than any of the partners could have accomplished separately—a “win-win” model of particular relevance in an era of tighter budgets and increasing attention to stewardship.

This NCHRP report describes advance mitigation or conservation, the limits of standard project-by-project approaches, and common trade-offs with and benefits of pursuing earlier, integrated planning and programmatic conservation or mitigation. It examines the regulatory basis of using and funding advance mitigation/conservation, in transportation law and regulation, and in the Clean Water and Endangered Species Acts and associated guidance, regulations, case law, and ongoing agency activities. Key issues and lessons learned are discussed as well. A more detailed version of the regulatory discussion is provided in Appendix A. To facilitate more conservation and partnerships, Appendix B outlines further communication and action that may be taken with and within resource agencies. Appendix C describes steps to implement advance mitigation and conservation partnerships on a state or local level.

1 Priority Mitigation for Unavoidable Impacts

State departments of transportation (DOTs) have an important role to play in helping achieve public environmental goals. Directing mitigation resources to help achieve ecosystem or watershed restoration and conservation objectives can improve aquatic environments and assist species' viability and recovery—increasing predictability for all concerned and delivering net environmental benefits.

1.1 Alternative, Compensatory, and Advance Mitigation

In the world of environmental impact review of transportation projects, “mitigation” is traditionally understood as a project-specific response to and amelioration of a project’s impacts on the environment. “Alternative mitigation” involves departures from the standard approach. “Advance mitigation” – the main focus of this discussion – involves developing compensatory mitigation strategies and mechanisms in advance of project impacts, on the planning rather than project level.

The agencies have different terms for advance or alternative mitigation or conservation. While Section 404 of the Clean Water Act (CWA) speaks directly to mitigation, the federal consultation process under the ESA section 7 references “conservation measures.” “Off-setting” measures can be “front-loaded” in FWS terminology and incorporated into the project description, to help achieve “net benefits” from the project for the species in question. This report will use the term “advance mitigation/conservation,” or more generally “off-setting measures,” to jointly refer to mitigation under Section 404 of the CWA, off-setting conservation measures under ESA section 7, or the potential to accomplish joint priorities in a regional context.

1.2 Why Do Advance Mitigation/Conservation?

Advance mitigation/conservation on a landscape, ecoregional or watershed combines assessment of impacts over broader areas and time periods with conservation or restoration of key areas for enhancing species viability or watershed function. Impact avoidance and minimization are the usual goals of mitigation, but due to the linear nature of transportation-related projects, most improvements occur to existing alignments, and there are limits to what can be achieved through impact avoidance and minimization. In recognition of this and the efficiencies that may result from off-site mitigation, FHWA, the Transportation Equity Act for the 21st Century (TEA-21), and the National Wetland Mitigation Action Plan (MAP) encourage banking or advance mitigation approaches. The U.S. Fish and Wildlife Service (FWS) encourages conservation banking, “a broader concept of off-setting adverse impacts or providing net benefits to the species as a whole, rather than individual members of that species” that may target “preservation of existing habitat with long-term conservation value,” investment that may offset the loss of isolated and fragmented habitat that, in some cases, may have little long-term value to the species.⁴

FHWA, EPA, and the Corps have interpreted TEA-21’s streamlining provisions as calling for “advanced planning of mitigation efforts, allowing for greater flexibility and, in some circumstances, a broader range of options for compensatory mitigation, including mitigation banking... Early coordination and identification of potential mitigation needs can provide highway sponsors and resource managers with the opportunity to integrate mitigation for impacts to aquatic resources with other project and regional mitigation objectives.”⁵ EPA and the Corps of Engineers have allowed for advance mitigation under Section 404 of the Clean Water Act (CWA) since at least 1990:

In evaluating standard Section 404 permit applications, as a practical matter, information on all facets of a project, including potential mitigation, is typically gathered and reviewed at the same time. The Corps, except

as indicated below, first makes a determination that potential impact have been avoided to the maximum extent practicable; remaining unavoidable impacts will then be mitigated to the extent appropriate and practicable by requiring steps to minimize impacts, and, finally, compensate for aquatic resource values. This sequence is considered satisfied where the proposed mitigation is in accordance with specific provisions of a Corps and EPA approved comprehensive plan that ensures compliance with the compensation requirements of the 404(b)(1) Guidelines (examples of such comprehensive plans may include Special Area Management Plans, Advance Identification areas (Section 230.80), and State Coastal Zone Management Plans). It may be appropriate to deviate from the sequence when EPA and the Corps agree the proposed discharge is necessary to avoid environmental harm (e.g. to protect a natural aquatic community from saltwater intrusion, chemical contamination, or other deleterious physical or chemical impacts), or EPA and the Corps agree that the proposed discharge (action as described) *can reasonably be expected to result in environmental gain or insignificant environmental losses.*(emphasis added)⁶

The watershed, ecoregion, or condition of the species as a whole may benefit from focusing investment where critical needs may be addressed and greater gains achieved. A watershed approach benefits other key wetland functions and values including natural water quality improvement, flood storage, shoreline erosion protection, and opportunities for recreation and aesthetic appreciation.

When agencies come together around the goal of asking, answering, and implementing the question: “what can we do together that would most benefit the resource?” and develop offsetting measures on a programmatic basis, project schedules can be made more predictable and funds directed to on-the-ground ecosystem restoration and recovery, a win-win result. Advance mitigation has the potential to realize both public conservation objectives and more efficient environmental reviews of transportation projects. These approaches help state and federal transportation and resource agencies:

- **Address the greatest threats to imperiled species, habitats, and watersheds.** Advance mitigation/conservation may focus on accomplishing meaningful restoration/recovery objectives, beyond those available on a transportation project site. Such focus can maximize the ecological benefit achieved for the investment, partially due to greater areas that may be acquired off the transportation corridor and the synergistic benefits of greater connection to other less disturbed habitats. In the process of taking a landscape or ecosystem-based approach to conservation of regulated resources, the viability of non-listed species and non-jurisdictional wetlands and decrease habitat fragmentation can also be protected and enhanced. Conservation and permanent protection can occur where it otherwise would not.
- **Improve the temporal and spatial aspects of mitigation and reduce uncertainty regarding effectiveness.** In the past, purchase of mitigation credits before completion of restoration was common and accepted. By siting mitigation according to ecological needs/plans and reducing uncertainty and temporal loss, advance mitigation or conservation may remove risk and lead to reduced mitigation ratios. Consolidating mitigation where it has the greatest chance for success also facilitates management and can enable overall net gain for natural resources.
- **Save time and money, manage workload, and create predictable project schedules.** Time saved in developing a project from scoping to advertising it for construction reduces costs due to inflation (rising energy costs, labor costs, real estate costs, etc.). In addition, integration of natural resource and transportation planning through advance mitigation/conservation initiatives helps ensure public dollars are well spent and project delays are avoided. More creative and ecologically beneficial off-site mitigation options become possible when a regional approach is taken to mitigation across multiple projects, also streamlining workloads.

1.3 Recognizing Limits of Standard Approach and Need for a Larger Scale

Our regulations and how we administer them tend toward project-by-project, species-by-species evaluation, which in turn results in small-scale mitigation or none at all. As the Defenders of Wildlife observe in their award-winning guide, *Second Nature*, “a species-by-species approach to conservation is costly, time-consuming and rarely successful.”⁷ Project by project, designs are tweaked to minimize impacts and achieve “no effect” or “not likely to adversely affect” determinations.

While individual small habitat parcels and wetlands provide important benefits to species individuals, water quality, filtration, storage and other ecological benefits, a larger focus is essential for restoration of watersheds and ecosystems. Species recovery requires protection of the entire suite of species and the habitats on which they depend. Small, isolated patches of natural area in or near the right-of-way are often more vulnerable and can be degraded over time, reducing viability, increasing stewardship costs, and increasing monitoring costs. While most of the time larger mitigation sites are more ecologically viable, it is important to avoid overlooking valuable small sites. In some cases, particular small sites only available in or adjacent to the ROW are the last remaining populations or otherwise particularly valuable or significant to the whole.

1.3.1 Why Project-by-Project Permitting/Consultation Has Predominated

As one resource agency program leader put it, “most permitting processes are structured around an individual permit. It is difficult to get the agencies to think programmatically and not project specifically.” Transportation districts planning on a project by project basis typically have lead times of a few years or less. To move beyond the most familiar approaches to more effective ones, it may be helpful to understand why project-by-project approaches have prevailed in the past.

- The CWA and the ESA reference permitting and consulting on projects; however, the action agency can define what that project is and the scale at which it will be presented.
- Before the advent of GIS, environmental data were primarily available on a site-specific basis only, as species surveys and wetland delineations were conducted. Limited available data and pre-GIS analysis tools made analysis at larger scales difficult or cost-prohibitive.
- Funding for projects has become available on a project by project basis and permitting or consultation begins afterward. As a result, mitigation actions that may result from permitting or consultation may not be built into budget estimates.
- Historically, environmental permitting and consultation for DOTs has occurred during project development and environmental and technical staff have often been located and focused there. Resource agencies became accustomed to design-level detail.
- Both DOTs and resource agencies became accustomed to making minor adjustments to projects and negotiating the limited choices left at the design stage, rather than devoting some of that time and effort to discovering and implementing partnership opportunities to conserve, recover, and restore species, ecosystems, and watersheds.

1.3.2 What is Different Now?

Scientifically and within government agencies, awareness has been growing of the need for more integrated, ecosystem approaches. In 1995, the Departments of Defense, Interior, Commerce, Transportation, six other cabinet level Departments, EPA, and CEQ established a policy that “[t]he Federal Government should provide leadership in and cooperate with activities that foster the ecosystem approach to natural resource management, protection, and assistance.”⁸ An ecosystem

approach is characterized by a primary goal of conserving natural biological diversity and ecosystem integrity, while supporting a sustainable level of human use; development of common goals and management decisions; consideration of the full array of biological and socioeconomic parameters; solutions and management decisions identified for specific geographical areas; and recognition that ecosystems are dynamic and require adaptive management in response to changing biological and societal circumstances. The policy states that “Federal agencies should ensure that they utilize their authorities in a way that facilitates, and does not pose barriers to the ecosystem approach,” which emphasized “forming partnerships between Federal, State, and local governments, Indian tribes, landowners, foreign governments, international organizations, and other stakeholders.”⁹

Other changes over the past decade, and the past five years in particular, include increased environmental stewardship commitment and capacity at transportation agencies and the dramatic expansion of environmental data, analytical tools, and ecoregional planning efforts. Complementing these are emerging understandings that accomplishment of the remaining objectives of the CWA and ESA will depend on innovative partnerships and re-conceptualization of how existing resources and mitigation expenditures can be focused to accomplish the greatest environmental good.

The 2004 [Presidential Executive Order on Facilitation of Cooperative Conservation](#) requires the Departments of the Interior, Agriculture, Commerce, and Defense and the Environmental Protection Agency to implement laws relating to the environment and natural resources in a manner that promotes cooperative conservation. “Cooperative conservation” means actions that relate to the use, enhancement, and enjoyment of natural resources, protection of the environment, or both, and that involve collaborative activity among Federal, State, local, and tribal governments, private for-profit and nonprofit institutions, other nongovernmental entities and individuals.¹⁰ It asks federal agencies to carry out the programs, projects, and activities of the agency that they respectively head that implement laws relating to the environment and natural resources in a manner that: facilitates cooperative conservation; provides that the programs, projects, and activities are consistent with protecting public health and safety; and report annually to the CEQ on implementation actions.

1.3.3 What Are the Trade-offs?

Conservation is not free. Voluntary partnerships require an investment of time and the availability of conservation or restoration plans or the willingness to develop such plans. Early identification of mitigation needs is necessary. Organizing public investments to substantially contribute to watershed restoration, ecosystem conservation, or species recovery requires a focus on the benefits that can be achieved and a willingness to guide the process to that end. The following tradeoffs may emerge:

- More regional scale analysis of impacts vs. dependence on highly detailed project-by-project impact analysis after engineering design.
- More options and alternatives to address regional needs and environmental opportunities up-front vs. mitigation on the project site only.
- Resources focused on regional-scale mitigation/conservation actions and development of programmatic standards for projects vs. numerous rounds of negotiation on the project level.
- Some avoidance and minimization, and most mitigation or off-setting measures in advance, on a plan level with more finely detailed avoidance and minimization afterward, on a project level vs. no advance mitigation, so that *all* avoidance and minimization can be defined before mitigation options are examined and determined.
- Generation of net benefits “on the ground” vs. a more elaborate, less predictable Section 404 or ESA section 7 process in project development.

As Department of Interior Secretary Gayle Norton has observed, win-win approaches can be crafted, through “communication, consultation and cooperation, all in the service of conservation.”¹¹ Everyone wins, but everyone must contribute:

- Regulatory agencies get assurance that avoidance and minimization are occurring to the maximum extent practicable in the planning and design process and that the environment is getting the highest quality, best value mitigation. Locations are chosen for maximal value to the watershed, ecosystem, species viability or recovery, and protection of the targeted resource. Temporal gaps in resource values may be eliminated. More avoidance and minimization options are explored earlier in the process before a project is programmed and budgeted, and the quantity of regulatory review on the project level may be reduced.
- DOTs get assurances that the Section 404 permitting process or section 7 consultation process can be successfully completed without delaying projects; DOTs make significant investments in watershed restoration and develop projects with conservation measures that will provide net benefits for target species and the ecosystems on which they depend.
- Environmental advocacy groups and the public get the assurance that agencies are conforming with existing laws, rules, and regulations while producing better results for the environment. To accomplish this, greater focus is placed on environmental analysis in the planning and programming stage and streamlined processes become the norm in project development/design.

If partners are willing to cooperate many benefits can be achieved:

- **Large scale conservation and mitigation investments may be considered, and more and higher quality areas can be conserved or restored in the highest priority areas.** Financial resources, planning, and scientific expertise not practicable to many project-specific compensatory mitigation proposals may be assembled to mitigation planning. Funds go further with the flexibility to consider more options and leverage other partners’ contributions.
- **Greater ecological and financial predictability** can be achieved. As risk is reduced, mitigation ratios may follow.
- **Process efficiency** may improve with greater predictability in project timelines, the types of on-site measures that will be needed, and the knowledge that off-setting measures can be transferred over time and space. Less administrative work will be required per amount of conserved space. Limited agency resources may be efficiently applied in the review and mitigation quality assurance because of consolidation, thus improving the reliability of efforts to restore, create, or enhance wetlands and other habitats for mitigation purposes.
- **Net benefit** above a business as usual situation. Infrastructure agencies will gain a greater degree of predictability as to the outcome of regulatory decisions and may implement their work at less expense. Regulatory agencies will experience that habitats are conserved earlier, in better locations, or with greater attention to connectivity. Both parties will be able to defend their actions to other government agencies, their environmental constituents, and the public.

2 Regulatory Basis

Most ecological conservation or wetland mitigation projects are performed to comply with specific conditions of the Clean Water Act of 1972 Section 404 permits, State Section 401 Water Quality Certifications, and state wetland permits. Compliance with the Endangered Species Act of 1973 and related state and tribal regulations frequently requires ecological mitigation to minimize impacts to listed species. Mitigation measures are also developed through the National Environmental Policy Act (NEPA) process to minimize effects on natural resources. Federal Executive Orders and interagency agreements govern federal agencies in their implementation of federal laws, regulations, and guidance.

Substantial support for advance mitigation and cooperative conservation approaches can be found in existing law, regulation, and guidance, in addition to major interagency initiatives. Understanding the flexibility the existing regulations offer to agencies to undertake advance mitigation and other cooperative conservation efforts is a key step in implementing such efforts. While it can be challenging for different agencies with different missions and regulations to reach agreement, agency professionals play important roles in identifying where commonality exists. The legal basis of advance mitigation under the Clean Water Act is reviewed in Appendix A, followed by discussion of similar approaches, off-sets or front-loaded Biological Opinions, under ESA section 7.

2.1 Ability to Use Transportation Funds for Advance Mitigation and Statewide or Regional Conservation

The ability to use transportation funding for advance mitigation of habitat and wetlands has been continually clarified over the past five to ten years. On March 10, 2005, FHWA reiterated information on the [Federal-aid Eligibility of Wetland and Natural Habitat Mitigation](#), specifically emphasizing that “wetland and natural habitat mitigation measures, such as wetland and habitat banks or statewide and regional conservation measures, are eligible for Federal-aid participation when they are undertaken to create mitigation resources for future transportation projects.” These activities are eligible for funding “either concurrent with or in advance of the construction of highway or other transportation projects funded under Title 23, or even in advance of completion of project level environmental reviews” (emphasis retained), under 23 CFR Part 710.513 and 23 CFR Part 777, using either National Highway System or Surface Transportation Program Federal-aid funds.¹² TEA-21 and implementing regulations, outlined as follows, provide other important information on the flexibility of FHWA to participate in various aspects of mitigation for wetlands and natural habitat. In addition to the ability of DOTs to fund mitigation separately from transportation projects, Mitigation planning, design, construction, monitoring, establishment, and acquisition of land or “interests therein” are all eligible for funding.(23 CFR § [777.5](#)). Furthermore, funding for long term maintenance can and should be included with investments in mitigation or conservation banks or an In Lieu Fee (ILF) program. DOTs may also acquire lands in cooperation with other parties and may transfer lands to an appropriate resource management agency or third party, providing for “the continued use of the lands for the purpose for which they were acquired”.(23 CFR § [777.11](#)(d). FHWA’s legal sideboards for this flexibility includes that impacts must result from a Federal-Aid project in order to qualify for federal funds and must be considered a “reasonable public expenditure.” DOTs also generally avoid acquiring advance mitigation lands by eminent domain and must comply with federal law and State transportation planning processes.

2.2 Regulatory Basis and Key Issues Relative to the Clean Water Act (CWA)

The regulatory basis for advance mitigation under the Clean Water Act, the established role of mitigation banking, and recent guidance are discussed in Appendix A. As early as 1990 guidance, EPA and the Army “recognized that no net loss of wetlands functions and values may not be achieved in each and every permit action.”¹³ Regional mitigation efforts may achieve conservation or replacement of some of these functions and values in advance. In the years since 1990, EPA, the Corps, other federal agencies, and the National Research Council have advocated a watershed approach. Guidance is currently under development that states that “the best tool for planning compensatory mitigation is a holistic watershed plan”¹⁴ addressing issues of habitat, water quality, hydrology, cumulative impacts, and restoration priorities for a watershed.¹⁵ In the absence of such a plan, the National Research Council and the Corps have said a watershed-based approach to mitigation should be used to develop mitigation proposals. A watershed approach takes into account a wide range of factors such as: site conditions that favor or hinder success; the needs of sensitive species; chronic environmental problems such as flooding or poor water quality; current trends in habitat loss or conversion; current development trends; and the long-term benefits of available options.

According to the 1995 mitigation banking guidance, mitigation banking is particularly helpful and authorized when “on-site compensation is either not practicable or use of a mitigation bank is environmentally preferable to on-site compensation;” it is expected to reduce permit processing times and provide more cost-effective compensatory mitigation opportunities.¹⁶ State-operated ILF programs often guide mitigation investments to the achievement of ecoregional conservation goals and watershed restoration. TEA-21 established a preference for mitigation banking, tempered in guidance by practicability considerations including cost, existing technology, and logistics, in light of overall project purposes.” (23 CFR 777.2) Since mitigation banking became common in the 1990s, lessons learned have included: siting according to a watershed plan and actual provision of mitigation in advance, to achieve lower land costs, greater environmental options, and greater predictability regarding mitigation results.

2.2.1 Avoidance, Minimization, and Compensatory Mitigation Sequencing

The Corps and EPA’s 1990 Memo acknowledges that “It may be appropriate to deviate from the sequence when EPA and the Corps agree the proposed discharge is necessary to avoid environmental harm (e.g. to protect a natural aquatic community from saltwater intrusion, chemical contamination, or other deleterious physical or chemical impacts), or EPA and the Corps agree that the proposed discharge (action as described) *can reasonably be expected to result in environmental gain or insignificant environmental losses.*(emphasis added).¹⁷

States have taken pains to preserve the sequencing process in many advance mitigation efforts. In Washington State and North Carolina’s programs, the Corps and EPA always reserve the right to say that use of a bank or advance mitigation is not appropriate in the case at hand. Likewise, [Caltrans-FHWA’s MOA on Early Mitigation Planning](#) commits that

When an individual transportation project for which a mitigation strategy was developed is undergoing preliminary design and environmental studies, an evaluation will be made to determine if all appropriate avoidance and impact minimization measures have been incorporated. Caltrans will request concurrence from the resource agencies in this evaluation. If concurrence is granted, then the compensation plan as agreed upon in the Agreement of Mitigation Strategy will be the basis for offsetting the remaining unavoidable impacts. This process will be documented in the project Environmental Document.¹⁸

GIS and commitment tracking systems are enabling DOTs to do more documentation and quantification of how they are avoiding and minimizing, throughout the transportation planning,

development, design, and construction process. Texas DOT has gone through a process of demonstrating avoidance and minimization on the planning level and NEPA Tier I for the I-69 corridor, to preserve the sequencing process and consider compensatory mitigation opportunities as well. For both ESA and CWA concerns, illustrating how and where avoidance and minimization occur in the process can allay concerns. Developing and applying BMPs or standards to be achieved on a programmatic basis helps achieve avoidance and minimization. Sequencing problems have become a thing of the past in Florida, now that Florida DOT (FDOT) is doing system-wide early analysis; FDOT is doing avoidance, minimization, and conservation throughout the process, estimating impacts and avoiding and minimizing where conflicts are identified, and then fine-tuning and avoiding and minimizing even more in the final design.¹⁹

Advance mitigation has sometimes meant that credits are not used or needed, a risk that is higher when advance mitigation is funded specific to a project. For example, Michigan DOT contracted with The Nature Conservancy (TNC) to mitigate for Mitchell's satyr butterfly habitat in Blue Creek Fen. MDOT purchased "butterfly mitigation services" in advance at \$2000/acre; however, avoidance measures relocation of the alignment resulted in MDOT not needing or using the mitigation.²⁰

2.2.2 Concern Over Mitigation of Non-Regulated Resources

In recent years, federal agencies involved in permitting and consultation regarding natural resources for transportation projects (FHWA, Corps, EPA, FWS, NOAA Fisheries) have devoted increasing attention to avoiding the perception that they may be regulating or requesting mitigation for unregulated resources. Nevertheless, transportation agencies need the regulatory agencies' input to identify measures that will truly off-set impacts and contribute to recovery of regulated resources, as well as other resources when stewardship commitments and partnerships suggest efficiencies to be gained. An ecosystem approach means that unregulated resources will often be protected in the process. Transportation agencies can, with regulatory agency input, include off-setting measures in their proposal or project description. From the regulatory agencies' standpoint then, those activities become an intrinsic part of the proposed action.

For the Corps, additional flexibility may be found in Regulatory Guidance Letter (RGL) 02-2, which states that riparian areas and, under limited circumstances, upland areas (see Federal Mitigation Banking Guidance and Nationwide Permit General Condition 19) may receive credit within a compensatory mitigation project to the degree that the protection and management of such areas is an enhancement of aquatic functions and increases the overall ecological functioning of the mitigation site, or of other aquatic resources within the watershed. The establishment of buffers in riparian and upland areas may be credited as mitigation if the Corps District determines that this is best for the aquatic environment on a watershed basis. In making this determination, the Corps Districts will consider whether the wetlands, streams or other aquatic resources being buffered: 1) perform important physical, chemical, or biological functions, the protection and maintenance of which is important to the region where those aquatic resources are located; and 2) are under demonstrable threat of loss or substantial degradation from human activities that might not otherwise be avoided.²¹

The FWS allows use of Candidate Conservation Agreements (without assurances) and conference reports for Biological Opinions on candidate or proposed species, as long as the central consultation occurs around an already listed species.

2.2.3 Need for Protection of Priority Mitigation/Conservation Site Before Permit or Consultation is Finalized

Often the very highest conservation priority areas face significant and urgent threats from development or destruction; in some cases, such destruction or the loss of the parcel for conservation

purposes is an imminent threat in the time period before the section 404 permit or the programmatic consultation can be completed. DOTs may not be able to secure the site until the regulatory agency can provide written confirmation on the desirability of the site for its conservation values and, most of all, that the site will qualify as mitigation/off-setting measure for the consultation or permit in question. To address this issue, in California, the federal regulatory agency has provided advance confirmation by letter that the desired parcel has the desired biological values that could offset/mitigate for the project, so the action agency can secure the property. This issue pertains to ESA section 7 as well as Section 404 of the Clean Water Act.

2.3 Regulatory Basis and Key Issues Related to the Endangered Species Act (ESA)

Section 2(b) of the Endangered Species Act states that “[t]he purposes of this Act are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species.” (16 U.S.C.A. § 1531(b)) First and foremost then, the Act is a means to conserve ecosystems and to provide a program to conserve threatened and endangered species and assist their recovery.²² (ESA § 3 (3)), 50 CFR § 402.02 (2000).

The FWS and National Oceanic and Atmospheric Administration (NOAA) Fisheries are charged with developing and implementing recovery plans for the conservation and survival of species (ESA § 3 (f)). The ESA defines “conservation” as “the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided (by the ESA) are no longer necessary.” (16 U.S.C.A. § 1532(3)) “‘Recovery’ means improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in” the ESA; “[T]he Act defines ‘conservation’ to mean recovery of the species”.(63 FR 9968)

Success in protecting and recovering listed species may be measured by securing viable populations, with adequate habitat and distribution within the context of large-scale conservation plans. If this is done on a biologically-comprehensive basis (all natural community types and all at-risk species) and in accord with emerging principles for the long-term viability of such systems, the endangerment and possible listing of thousands of species may be avoided.¹⁰ The success and efficiency of biodiversity conservation efforts increase greatly as such efforts protect viable communities, habitat, and species while conservation opportunities are available, and if possible, before species become threatened or endangered. DOTs can make contributions to these recovery efforts to off-set for actions that may affect listed species.

Section 7(a)(2) states that each Federal agency shall, in consultation with the Secretary, insure that any action they authorize, fund, or carry out is not likely to *jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.* (50 CFR §402). Section 7 consultations are informed by species recovery plans, or recovery strategies or outlines where plans have not yet been developed or approved. In their 2004 Recovery Planning Guidance, the Services state that “[w]herever possible, recovery plans should focus on the broader view of the species’ health, by working to ensure the health of its habitat and ecosystem functions, rather than the narrower view of looking at the species only. As implied in the ESA, conserving the ecosystems upon which a species depends is more likely to ensure that species’ long-term viability. In keeping with the ESA’s directive, this guidance focuses not only on the listed species themselves but also on restoring their habitats as functioning ecosystems.”²³ The Guidance further notes that while single-species recovery plans have been the most common type of plan prepared since the enactment of the ESA, multi-species plans and ecosystem plans have gained

increasing currency since the mid-1990s. The guidance states that “It is important to note that, although the ESA appears to focus on the individual species, subspecies, or distinct population segments, the purposes of the ESA include conserving the ecosystems upon which listed species depend. Recovery plans should aim to address threats by restoring or protecting ecosystem functions or processes whenever and wherever possible (as opposed to actions that require long-term and possibly expensive management programs). This approach is science-based and provides a means for required habitat to be maintained long-term in a dynamic way by natural processes. This broader perspective should be infused into all recovery plans, whether they be for single species (including subspecies and distinct population segments, or multiple species.”²⁴

Important actions and developments in support of advance, off-site, or flexible mitigation to benefit species recovery via the ESA section 7 consultation process have included the following:

- A federal interagency steering group on habitat conservation and connectivity —involving many of the same agencies in the Mitigation Action Plan effort (EPA, Corps, FHWA, FWS, and NOAA Fisheries) and the Forest Service, Bureau of Land Management (BLM), and the National Park Service — began meeting in 2002 and articulated the goals of making decisions using best available data and supporting “flexible mitigation including evaluation of off-site opportunities (watershed- or ecosystem-based, or other) that offer somewhat substantial environmental benefit.”²⁵
- Tiered or plan level consultations have been upheld in recent court decisions. Most recently, an Ohio district court decision found that a programmatic or “tiering” system “is an interpretation of how to go about following the directive of the implementing regulation,” of FWS’s authority to consult with agencies and issue opinions, that is subject to the agency’s discretion and specialization. (*Buckeye Forest Council v. U.S. Forest Service*, 04-259, S.D. Ohio, Western Div.)
- The [Endangered Species Act Consultation Handbook](#) directly addresses “Flexibility and Innovation,” noting that “[t]he section 7 process achieves greatest flexibility when coordination between all involved agencies and non-Federal representatives and the Services begins early...Biologists should be creative in problem solving and look for ways to conserve listed species while still accommodating project goals.”²⁶

2.3.1 Pre-Consultation and Programmatic Consultation under ESA Section 7

Perhaps the most effective manner of streamlining the section 7 consultation process is to engage the Service in pre-consultation during the planning phase. During pre-consultation the Service can provide information regarding the species that might be present, the threats and conservation needs of the species within the project area, potential conflicts that may arise, and unique opportunities to further conservation and recovery. Then the Service and project proponents can work together to try and address these potential conflicts before the project design is set, while design flexibility may still exist, and while the maximum set of conservation or mitigation alternatives are available. During this process action agencies have the option of addressing candidate as well as listed species and of seeking programmatic consultation on an ecosystem approach encompassing all species of concern. Closer to the time of project implementation, if the Service reviews the proposed action and finds it to be consistent with the conservation strategy and design standards previously agreed to, a final biological opinion can typically be issued in an expedited manner. FWS, NOAA, and FHWA headquarters staff are developing guidance.

Programmatic consultations address species, habitat, or project needs on a multiple-project scale, often addressing ecosystems rather than individual species. Consultation must address impacts to

species individuals, but impacts can be addressed “by proxy” in terms of “all individuals associated with or dependent upon” particular habitat, with such association explained. By establishing standards, guidelines, or governing criteria to which future actions must adhere, programmatic consultations can lead to more efficient and effective consultation processes and transportation decision making, in the context of a landscape-based, recovery-oriented approach to consideration of projects and impacts. The action agency can broadly define the project to help estimate potential impacts and identify conservation measures earlier in the process. Projects are briefly evaluated for consistency with the programmatic consultation and impacts tracked for updating of debits-credits and species baseline, before being appended to the initial or programmatic consultation.

[Programmatic Consultation Guidance](#) for transportation was developed in 2000 and more general programmatic guidance is in development. According to that interim guidance:

Programmatic consultation techniques have the greatest potential to increase the efficiency of the section 7 consultation process because much of the effects analysis is completed one time, up front rather than repeatedly each time a new action, or batch of actions, is proposed. By completing this analysis up front in a programmatic consultation document, the anticipated effects of the action agency’s future projects can be added into the environmental baseline prior to the project’s completion, providing predictability for action agencies as they can be assured that the effects of their future actions have already been broadly accounted for. Thus, all other future section 7 consultations (i.e., those not covered by the programmatic consultation document) will be evaluated within the context of these effects having already been added to the environmental baseline. By completing this analysis up front, the process for completing consultation for future actions proposed under the programmatic consultation can be dramatically shortened.²⁷

Federal agencies can consult on designated programs, plans, and strategies, though consultation is optional prior to project development in the transportation process. If future actions are uncertain, the Services must project the potential effects of future actions in order to protect species. Acres of impact are tracked as projects occur, updating the baseline at least annually. Changing information on the status of the species should be updated as well. Related guidance under development advises the consultation partners to develop a “landscape-scale perspective,” to facilitate inventory of target resources using existing information and determine the status and trends of target resources and supporting ecosystem values. From this, a conservation strategy may be developed.

As previously noted, the ability of federal agencies to use a tiered, programmatic consultation system to comply with ESA section 7 was upheld recently (*Buckeye Forest Council v. U.S. Forest Service*, 04-259, S.D. Ohio, Western Div., July 20, 2005). The court ruled that “Defendants’ use of the tiered consultation system has not impeded their fulfilling all requirements mandated by the ESA and its implementing regulations, and, if anything, has increased defendants’ efficiency in fulfilling those requirements.” The Court particularly liked the tiered nature of the programmatic consultation with the “upper” tier consultation analyzing landscape-level effects in a more general manner and the action agency returning to the Service as individual projects are developed for the “lower” tier consultation, during which the Service briefly analyzes the specific effects of the projects and provides project-specific incidental take statements.

Recommendations from other cases relevant to programmatic consultations may be summarized as follows:²⁸

- Provide a rationale for watershed or landscape scale analysis.
- Aggregate the effects of site-specific actions when considering regional scale plans.
- Analyze and verify whether site-specific projects are in fact complying with the Conservation Strategy and that mitigation actually occurs. Assess whether the appropriate elements of the plan’s standards and guidelines are being implemented.

- Explain treatment of short-term effects and their potential to jeopardize listed species.
- Consider resource conditions immediately post-action, not just 10 years down the road.
- Management plans (such as the Northwest Forest Plan and affiliated conservation strategies, in this case) that have already been developed or adopted for the species of concern should not be disregarded, especially where binding standards or guidelines have been developed.
- Show consideration of cumulative effects.

2.3.2 Use of Conservation Banks

With its [Guidance for the Establishment, Use, and Operation of Conservation Banks](#) (68 FR 24753, May 8, 2003), FWS provided yet another tool for pre-consultation and cooperative efforts to assist species recovery. FWS describes a conservation bank as a parcel of land containing natural resource values that are conserved and managed in perpetuity for listed species, and used to offset impacts occurring elsewhere to the same resource values; i.e. in-kind mitigation.²⁹ Conservation banks enable large, contiguous areas of habitat to be preserved, restored, created, or enhanced to compensate for impacts to species and their habitats.

Conservation banking differs from wetland banking in that the goal is not to replace the functions and values of the habitat, but a broader concept of off-setting adverse impacts or providing net benefits to the species as a whole, rather than focusing on individual members of that species. FWS affirms preservation of existing habitat with long-term conservation value as an appropriate target of conservation banks; such investments can offset the loss of isolated and fragmented habitat that may have little long-term value to the species. Higher credit ratios may be employed where chance of success is less secure; i.e. where relying on creation or significant restoration.

Conservation banking works especially well for wide-ranging species, where impacts may be offset by mitigation over a wide area. The price for bank “credits” typically includes funding for acquisition and long-term natural resource protection and management.

Protecting Viable Populations, Improving Chances of Success, Reducing Fragmentation. From the FWS’s standpoint, the important point in establishing a conservation bank is to site banks in areas where viable communities can be preserved, where fragmentation of habitat can be reduced, and where management measures can address other threats that a species might encounter, including invasion of non-native species or disruption of natural disturbance regimes. Species recovery plans, state conservation plans, and ecoregional plans developed by third party conservation organizations may contribute goals, objectives, and target conservation areas for conservation banking.

Greater Efficiency and Predictability, as Desirable Off-Sets Are Secured. From the FWS’s perspective, conservation banking reduces the piecemeal approach to conservation efforts that can result from individual projects by establishing larger reserves and enhancing habitat connectivity. Directing smaller individual mitigation actions into a bank streamlines compliance for the individual permit applicants or project proponents while providing a higher benefit to the target resources. Conservation banking can bring together financial resources, planning, and scientific expertise not practicable for smaller conservation actions. By encouraging collaborative efforts, it becomes possible to take advantage of economies of scale (both financial and biological), funding sources, and management, scientific, and planning resources that are not typically available at the individual project level.

Crediting and Debiting May Use Acres of Habitat, i.e. species associations with identified vegetative communities. FWS allows use of habitat acres as an acceptable crediting method for species associated with those vegetative communities, within species’ ranges. It is desirable to create

a linkage between habitat acres and individuals where possible; however, if the existing research or science does not allow for this, the phrase “all individuals associated with (insert number of) acres” of a certain type of habitat may be used in the incidental take statement. When DOTs are pursuing streamlining through programmatic approaches and impact assessment based on species “presumed presence” maps, the *Arizona Cattleman’s* decision points to the desirability of describing sufficient nexus between the action and impact to the species (i.e. describing how impacts to the species are reasonably likely to occur).

Layering Credits: Use of Credits for Clean Water Act mitigation. According to FWS’s Conservation Banking Guidance, credits from a conservation bank may be used to compensate for environmental impacts authorized under other programs, such as Clean Water Act Section 404.

2.3.3 Key Issues Under Section 7

2.3.3.1 Section 7(a)(1) versus 7(a)(2) — Where Does It Count?

Section 7(a)(1) requires all Federal agencies to utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of species listed pursuant to the Act. A common obstacle FWS and transportation agencies encounter is the misunderstanding that 7(a)(1) is mutually exclusive with 7(a)(2), and that a conservation action FHWA or DOT might propose to undertake is fine under 7(a)(1), but the transportation agency should not expect credit under 7(a)(2) consultation and conservation measures to avoid jeopardizing listed species. DOTs may be legally prevented from expending transportation funds on activities which would not qualify for 7(a)(2)—the primary regulatory mandate for federal agencies under the ESA. A primary criterion and constraint in FHWA/DOT expenditure of transportation funds on mitigation or conservation measures is to satisfy regulatory requirements. Furthermore, recent case law has determined that the action agency’s 7(a)(1) activities in the course of fulfilling the action agency’s mission are not reviewable. In *Washington Toxics Coalition v. EPA*, (01-132C, W.D. Wa.) the judge refused to accept the plaintiff’s allegations that EPA violated ESA section 7(a)(1). The plaintiffs had wanted EPA to use its pesticide registration program to implement specific protection measures for imperiled species. Judge Coughenour said, “It is not the province of this court to judge the substance of EPA’s conservation programs to determine the best way for EPA to promote the conservation of [listed] salmonids. Neither the text of Section 7(a)(1) nor relevant case law provide any appropriate authority or standard for doing so. The record reflects that EPA has used its authority to develop some conservation programs in conjunction with NOAA Fisheries. Agency discretion governs the nature of these programs.”³⁰

An answer may be found in recognizing that while 7(a)(1) and 7(a)(2) have different requirements and standards, each can be used to facilitate successful implementation of the other. The Oregon Bridges Programmatic BO, for example, says that the Opinion and Conservation Strategy satisfy the requirements of both. Per the BO:

ODOT will establish a network of habitat management areas distributed across various ecoregions in the state. The network will be used to help fulfill ODOT’s obligation to mitigate for unavoidable impacts of various projects and to provide additional stewardship and conservation benefits... Many areas will be established before impacts occur, or before specific transportation projects are even planned, to serve as an advance source of mitigation credits against which future impacts will be charged.³¹

As programmatic approaches to section 7 consultation often entail development of conservation strategies, the strategy or guide may be viewed as a 7(a)(1) activity. In this way, the planning that occurs through 7(a)(1) provides context for implementation of actions through 7(a)(2). The measures that implement the plan should be considered as offsets to negative impacts from the project that

might otherwise adversely affect the species and therefore “count” under 7(a)(2).³² It is not appropriate to characterize a conservation investment FHWA/DOT desires to do as part of an off-setting measure for project impacts (even assessed at a plan level) as 7(a)(1) alone.

FHWA considers that the following activities contribute to 7(a)(1) objectives: activities that FHWA has undertaken and continues to undertake include training of FHWA, state DOT, and private consultants; promotion of ecosystem conservation initiatives through the agency’s Vital Few Goals; and sponsorship of conferences such as the International Conference on Ecology and Transportation (ICOET). FHWA has supported a variety of interagency coordination and training efforts. FHWA will also fund staff at federal resource agencies, if a state DOT chooses, and FHWA has helped fund a variety of innovative conservation and recovery activities.³³

2.3.3.2 Reluctance to Presume Presence

Transportation agencies are sometimes reluctant to over-estimate potential impacts because, in general, funding must be found for mitigation of such impacts. The transportation planning process in most states is such that funding for mitigation is not specifically planned, outside of the inclusion of project contingency costs. FHWA funding can be read to be restricted to impacts from transportation, though allowable mitigation for historical impacts provides ample wiggle room. Increasingly, transportation agencies are willing to over-estimate impacts if such estimates will add certainty to the project delivery process. The cost of a potential hold-up in a project that is ready to move forward in communities that are clamoring for improvements outweighs the extra costs from over-estimation of needed mitigation, which is at least estimable and reduces uncertainty.

The FWS is reluctant to assume presence and over-estimate impacts, primarily due to the *Arizona Cattle Growers*. However, as the Court identified, the threshold the FWS must clear in terms of evidence of impacts is very low. But the agency must demonstrate that a species is or could be in an area before regulating it and must establish a causal connection between the land use being regulated and harm to the species in question; mere speculation as to the potential for harm is not sufficient (*Arizona Cattle Growers Association v. United States Fish and Wildlife Service*, No. 99-16102, 273 F. 3d 1229 (9th Cir. 2001)). The Court held that FWS would have to demonstrate that a “take” of protected species was “reasonably certain to occur.”

It may be important for DOTs, FHWA, and FWS to note that this was a case in which the regulated party objected to the terms of the opinion and broader estimation of potential presence. The opinion protects an applicant who desires such protection from having to prove the negative; i.e. absence of the species. The case may have less bearing on an action agency that voluntarily undertakes to estimate where a species might be “reasonably certain to occur” over some portion of its life cycle, in order to achieve gains for the regulated party, in this case, greater certainty in the project development process and the chance to cooperate with other agencies to achieve recovery objectives. Also, the Ninth Circuit has “recognize[ed] that the Service may be ‘required to make projections . . . of the impact of [the agency action] on protected species.’ 848 F.2d at 1454, citing *Roosevelt Campobello Int’l Park Comm’n*, 684 F.2d at 1052-55.”

2.3.3.3 Further Support for a Habitat Approach

The ESA is concerned with two variables in the context of species preservation, the amount of species and the amount of species habitat. 16 U.S.C. §1536(a)(2). The test for whether a habitat proxy is permissible is whether it “reasonably ensures” that the proxy results mirror reality. (*Gifford Pinchot Task Force v. United States Fish & Wildlife Service*, 378 F.3d 1059 (9th Cir. 2004)). In the latter, the judge noted that “as 16 U.S.C §1531 et seq., does not prescribe how the jeopardy prong is

to be determined, nor how species populations are to be estimated, it is a permissible interpretation of the statute to rest the jeopardy analysis on a habitat proxy.” Likewise, FWS has argued that predicting species jeopardy based on habitat degradation is within the realm of agency discretion, is scientifically sound, and has been approved by this court in other contexts. An agency’s scientific methodology is owed substantial deference, *United States v. Alpine Land and Reservoir Co.*, 887 F.2d 207, 213 (9th Cir. 1989), and in the context of deference to scientific methodology, the holding of *Inland Empire Pub. Lands Council v. United States Forest Serv.*, 88 F.3d 754, 761 (9th Cir. 1996), is appropriate, including deference to the agency’s expertise in allowing this “proxy on proxy” approach.

The principle of allowing an agency to use proxy modeling to evaluate species population so long as that proxy has a high correlation with the relevant species’ population is...applicable in the ESA context. The test for whether the habitat proxy is permissible in this case is whether it “reasonably ensures” that the proxy results mirror reality. See *Idaho Sporting Cong., Inc. v. Rittenhouse*, 305 F.3d 957, 972-73 (9th Cir. 2002) (holding that deference to proxy on proxy approaches is not warranted when the proxy method does not “reasonably ensure” accurate results); *Ariz. Cattle Growers’*, 273 F.3d at 1250 (“The use of ecological conditions as a surrogate for defining the amount or extent of incidental take is reasonable so long as these conditions are linked to the take of a protected species.”).³⁴

In the *Pinchot* case the court found that the habitat analysis was not a simplistic “x acres = y species individuals” but was strengthened by taking into account the type of land, extent of degradation of the habitat, relationship between different habitats, the species’ distribution, and the species’ range. The jeopardy analysis also takes into account non-habitat factors, including competition from other species and disease. “This detailed model for owl population is sufficient to ensure that the FWS’s habitat proxy reasonably correlates to the actual population of owls... Bearing in mind the deference owed the FWS’s scientific judgment, *Alpine Land*, 887 F.2d at 213, we cannot say that use of a habitat proxy was impermissible... Focus on actual species count is an overly narrow interpretation of what is required under the jeopardy prong... Because the ESA does not prescribe how the jeopardy prong is to be determined, nor how species populations are to be estimated, we hold that it is a permissible interpretation of the statute to rest the jeopardy analysis on a habitat proxy.”³⁵ The court ruled that “[f]urther, if habitat models are sufficiently accurate and are robust, in the sense that the results are accurate in many cases, then the models function as if the FWS were counting” species individuals.³⁶

2.3.3.4 Uncertainty and Insufficient Information

When developing an effects analysis and associated incidental take statement that includes future actions for which insufficient information is available to make accurate determinations (e.g., when consulting at the plan level and the specific future activities and locations are not yet identified), in the effects analysis the Service must provide the benefit of the doubt to the species and develop reasonable projections of potential conflicts between activities that can occur under the agency’s program and the protection of listed species. From this, the Service must estimate the potential effects and derive the anticipated level of incidental take that is likely to occur, corresponding to the maximum level of impacts that may be caused by the action (see *Conner v. Burford*, 848 F.2d 1441, *Silver v. Babbitt*, *Silver v. Thomas*) or what the Service has called “reasonable worst case assumptions.”

The Service allows for the times when “uncertainty regarding the potential effects of future actions developed through implementation of the action agency’s program may be so great that it is not possible to accurately project the potential effects that may result. To address these situations the Services should work with the action agency to jointly develop ‘assumptions’ that will be used to constrain the effects analysis:”

Both the action agency and the Services must believe that these assumptions will be met as the proposed program is implemented; failure of one of the assumption may result in effects that were not analyzed in the biological opinion and the need to reinitiate consultation ... (l)ike the assumptions themselves, the procedures for monitoring them should be jointly developed and agreed upon. If the monitoring needed to assure the validity of an assumption cannot be agreed upon, then it may not be appropriate to use such assumption. This will depend in part on the sensitivity of the effects analysis to the validity of the assumption. For example, if after further analysis it is determined that failure of an assumption would not change the results of the effects analysis, then the Services should document this analysis to provide justification for not validating the assumption and monitoring would not generally be necessary.³⁷

The biological opinion should identify the procedures to be followed if it is found that an assumption has not been met. When completing consultation, the Services must consider the consequences of making incorrect assumptions; if the consequences are sufficient to result in a section 7(a)(2) violation, then the assumption in question must be closely monitored and accompanied by compensatory measures that can be implemented to avoid such violation in the event of the assumptions failure.

In taking a habitat approach and assuming presence of the species, the Services would establish the justification for this assumption in the biological opinion (e.g., the presence of suitable habitat, the proximity of the action area to known species' locations, the history of the species occurring in similar habitats under similar circumstances, etc.). Then the Services would explain the relative value to the conservation of the species of the habitat within the action area as opposed to the individuals utilizing that habitat. The Services would further explain that due to these relative values the effects analysis and resulting determinations would be relatively unchanged if the assumption holds true or not. Finally, the Services could use this analysis to justify not validating the assumption of species presence through surveys.

2.3.3.5 Ensuring Updating of the Species Status and Environmental Baseline

A biological opinion should address both the jeopardy and critical habitat prongs of ESA section 7 by considering the current status of the species, the environmental baseline, the effects of the proposed action, and the cumulative effects of the proposed action. 16 U.S.C. § 1531 et seq., 50 C.F.R. § 402.14(g)(2)-(3). Update of the species status and environmental baseline has been described as a potential weakness or "fatal flaw" in programmatic ESA section 7 consultations, where conservation measures are often "front-loaded." Per programmatic section 7 consultation guidance that is under development, as individual projects occur, the biological assessment or biological opinion (BA/BO) should:

incorporate by reference the Status of the Species and Environmental Baseline sections from the programmatic biological opinion and an updated description of the environmental baseline incorporating effects that have occurred within the action area of the program (not simply the area affected by the specific project currently under review), since the last environmental baseline update. These effects include both those from other actions implemented under the action agency's program as well as actions unrelated to the program. In this manner each project-level biological opinion will essentially carry the updated environmental baseline for the action agency's program forward for use by subsequent project-level biological opinions.³⁸

For environmental baseline tracking, the BA/BO should:

Provide a statement regarding the specific project's impacts to the environmental baseline (including a restatement of the amount of take that is anticipated) and a tallying of the overall impacts to the environmental baseline (including the overall amount of take) from all projects implemented under the programmatic consultation to date. The results of this section should be used to assist in creating the environmental baseline section for the next project-level biological opinion.³⁹

To assist in updating cumulative impacts on the species from the changing environment, the Services are working to develop a database of additive consultations and all BOs.

2.3.3.6 Reaching for “Net Benefits”

The FWS “net benefits” framework as outlined in their Healthy Forest Initiative Guidance offers a way to “ensure that appropriate factors are considered, consultation workloads are efficiently completed, and project implementation is not delayed.” The memo advocates adoption of a long-term view when consulting on projects under section 7 of the ESA and acknowledgement that some projects may have short term adverse effects on some listed species. At the same time, the memo states,

some projects, especially those which may be able to incorporate measures to address conservation priorities, present opportunities for significant long term benefits to species and their habitats. Imposing overly cautious restrictions to address short term risks, without adequately assessing the long term net benefits to species, can result in the delay of critical projects. The reluctance to engage in programmatic approaches can also lead to lost opportunities to make important conservation investments or to realize state, federal, and non-governmental organization conservation goals...Projects with expected net benefits that outweigh short term adverse effects should be expedited in the interest of the conservation or restoration of native ecosystems and the species that inhabit them. The jeopardy analysis for the section 7 consultation should take into account whether the short-term adverse impacts to the individuals are outweighed by the long-term conservation benefits to the species as a whole.⁴⁰

The Services indicate that the procedures identified “are consistent with the requirements of section 7(a)(2) of the ESA and its implementing regulations at 50 CFR 402.”⁴¹ FHWA, Oregon DOT and FWS describe this “net benefits” approach in their Comprehensive Mitigation and Conservation Strategy (CMCS). The CMCS integrates wetlands mitigation with habitat conservation and allows impacts to be evaluated at the ecosystem level with a single accounting system for assigning mitigation credit and debit across all agencies. It establishes a program-level mitigation and conservation approach along with the establishment of specific conservation and mitigation banks that serve regional ecological priorities:

Habitat management areas and actions will be designed to achieve a meaningful net conservation benefit. Actions should be designed and the overall CMCS program should be implemented so that on-ground benefits to species/resources at the program scale provide greater ecological benefit than typical on-site transportation related mitigation efforts... This additional value will come from focusing not only on compensatory mitigation, but also by providing additional benefits in support of species recovery and conservation goals. While all habitat areas or actions developed through the CMCS should result in some increased benefit, the amount and focus of this additional value is not expected to be equally distributed. Some locations and species/resources will benefit more than others. As described above, the greatest benefits should be realized by species/resources most impacted by projects and by those most at-risk within the subject ecoprovince. For these high-priority species or resources, the increment of surplus benefit should be sufficient to advance recovery and conservation goals by providing a meaningful improvement in the size, distribution, and productivity of species populations, or in amount, distribution, and quality of habitats relative to that which existed prior to implementation of included ODOT projects. Net benefits factor into decisionmaking by the Corps of Engineers for Section 404 permits; in deciding whether to issue a Section 404 permit, the Corps evaluates of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. The decision whether to authorize a proposal, and if so the conditions under which it will be allowed to occur, are therefore determined by the outcome of the general balancing process.⁴²

3 Conclusion

Advance mitigation presents a way to achieve the aquatic restoration goals of the CWA, the recovery goals of the ESA, and streamlining goals outlined by TEA-21. The federal agencies involved in administering these laws are moving toward the collaborative process of identification of transportation, mitigation, and resource needs that has been termed “integrated planning.”⁴³ To support integrated planning and advance mitigation, the Corps, EPA, FHWA, FWS, and NOAA Fisheries have outlined solutions within their own agencies to help bring this approach to ensuring ecologically significant mitigation in the context of an efficient permitting and consultation process.⁴⁴

- The Corps is committed to using regulatory flexibility and new information to work cooperatively with agencies to implement more effective approaches to mitigation in a watershed and landscape context. The Corps’s new organizational framework facilitates a comprehensive, integrated watershed management approach. The Corps’s new enterprise GIS database will provide a unified framework of watershed data and analytic tools that can be accessed by both decision makers and stakeholders. Data will be structured so that they can be used with environmental models, developed by the Corps and others, that predict the impact on the values and functions of the watershed. These tools and procedures will allow the evaluation of alternatives and clarify the trade-offs and balances required among the environment, economy, and social equity.
- EPA has committed to supporting efforts to establish clear, reasonable performance expectations for all parties involved, and where mitigation is required, working with the lead agency and its partners to identify opportunities to build on existing conservation efforts and establish landscape-level conservation areas with long-term ecological value. The agency is interested in working with other agencies to systematize the regulatory flexibility that is available to achieve the best outcomes for the environment and the most efficient permitting and consultation process.
- The FWS is using regulatory flexibility to manage wildlife resources on a landscape and population basis, rather than an individual basis. FWS will help develop and draw upon conservation strategies to provide an integrated framework for addressing a host of species and natural resource values, tailored to meet the needs of the region. FWS has volunteered to assist in developing credit and debit systems for non-traditional banks, to help provide incentives to address landscape-scale issues. NOAA Fisheries is committed to identifying areas that have the necessary attributes of ecosystem conservation areas and determine how to place those areas in that role.
- FHWA is committed to using regulatory flexibility to move beyond the project-by-project approach. Planning focuses on the entire surface transportation system, rather than single improvements and facilities. A programmatic view of transportation projects or analysis at the plan level can facilitate early identification of areas of greatest environmental concern, for avoidance and minimization, as well as an estimate of potential mitigation needs on a system or regional basis. FHWA is promoting ecosystem and habitat conservation through one of the agency’s “Vital Few Goals” and supports a regional approach to mitigation. Partnerships with Non-Governmental Organizations (NGOs) where cash, materials, landowner coordination, and/or land are contributed can serve as part of the required non-Federal match, leveraging available funds.

With interagency commitment and cooperation, state DOTs can play an important role in helping accomplish regional restoration and recovery objectives, while lowering risk and creating more predictability and a more efficient process for all involved. Communication opportunities and strategies for and with regulatory agencies, to extend early conservation and mitigation partnership opportunities and create incentives within current frameworks, are outlined in Appendix B. Appendix C describes how such partnerships can be implemented on a state and local basis, in collaborative fashion. The steps to do this can occur or be accomplished in a variety of orders; however, the steps reinforce each other and for that reason a number of them should be pursued simultaneously. These steps are:

- Identify goals and a common vision of what may be accomplished together, generating net benefits for the environment and meeting the streamlining and stewardship needs of the agencies involved.
- Use best available scientific data, to save public resources and act sooner rather than later on opportunities for conservation, restoration, and recovery that may otherwise vanish.
- Estimate potential mitigation needs associated with transportation improvements. This planning step is now being undertaken by a number of leading DOTs, who in some cases are being assisted by conservation partners at universities or state Natural Heritage Programs.
- Identify priority areas for conservation or restoration. Resource agencies and their partners have generated most of the key plans in this area, though environmental screening tools developed by or with DOTs have also been used.
- Identify how transportation funds may be used ahead of projects, in keeping with the transportation planning and project development process in the given state. Planning should include management as well as on-the-ground mitigation and conservation investments.
- Develop a strategy for providing the DOTs with regulatory credit for conservation and mitigation investments, under ESA section 7(a)(2), Section 404 of the Clean Water Act, and other pertinent sections and environmental laws.
- Given advance mitigation and conservation investments, agencies must decide how individual projects will be reviewed and fit into the whole, ensuring continued avoidance and minimization on the project level and adequate streamlining to maintain initial agreements and incentives.
- Ensure adequate communication with *all* levels of staff who will be involved in implementation of such cooperative conservation efforts, clarifying how new processes may entail change from previous approaches and expectations.
- Plan for and design performance measures for doable, adaptive management, in perpetuity.

Early mitigation has proved useful in improving interagency relationships. It is proving to be a powerful tool to expedite project approvals and provide greater predictability to all parties and net benefits to the environment. Early mitigation has also proved useful in improving interagency relationships. For these reasons, it merits strong interagency support and investment. Advance mitigation and conservation investments by transportation agencies, particularly to satisfy Clean Water Act and ESA section 7(a)(2) requirements, represents a classic “win-win” for all concerned.

Appendix A. Regulatory Basis and Considerations in Advance Mitigation for CWA Section 404 & Conservation for ESA Section 7

Federal Transportation Funding for Advance Mitigation

The Intermodal Surface Transportation Efficiency Act (ISTEA), passed in 1991, included a provision that made the costs of banks established as compensatory mitigation for impacts due to federal aid highway projects eligible for federal aid highway funds.⁴⁵ Since that time, FHWA has boosted its no net loss of wetlands policy to a program wide goal of 1.5 acres of compensatory mitigation for each acre of impact.⁴⁶ According to FHWA's [wetland](#) performance reports, the compensatory mitigation ratio averages 2.6:1 between 1996 and 2004, the last year for which compiled data are available.⁴⁷

On March 10, 2005, FHWA reiterated information on the [Federal-aid Eligibility of Wetland and Natural Habitat Mitigation](#), specifically emphasizing that “wetland and natural habitat mitigation measures, such as wetland and habitat banks or statewide and regional conservation measures, are eligible for Federal-aid participation when they are undertaken to create mitigation resources for future transportation projects.” These activities are eligible for funding “either concurrent with or in advance of the construction of highway or other transportation projects funded under Title 23, or even in advance of completion of project level environmental reviews” (emphasis retained), under 23 CFR Part 710.513 and 23 CFR Part 777, using either National Highway System or Surface Transportation Program Federal-aid funds.⁴⁸ TEA-21 and implementing regulations, outlined as follows, provide other important information on the flexibility of FHWA to participate in various aspects of mitigation for wetlands and natural habitat.

- [TEA-21 \(Public Law 105-178\)](#), allows advance mitigation investments in state and regional environmental planning, restoration, and conservation efforts: “In accordance with all applicable Federal law (including regulations), participation in natural habitat and wetland mitigation efforts related to projects funded under this title, which may include participation in natural habitat and wetland mitigation banks, contributions to statewide and regional efforts to conserve, restore, enhance, and create natural habitats and wetland, and development of statewide and regional natural habitat and wetland conservation and mitigation plans.(Section 1106; 23 U. S. Code 103 (b)(6)(M)) FHWA’s 2000 guidance on ILF notes that TEA-21 implicitly allows participation with Federal aid funds in ILF programs through the above language.
- **Mitigation may be funded separately from transportation projects.** FHWA notes that 23 CFR 777.1 was modified in 1996 because “the FHWA believed this provision was unnecessarily restrictive, because under current law Federal-aid funds may be used to improve or restore wetlands affected by past Federal-aid highway projects, even when no current Federal-aid project is taking place in the vicinity.” ([65 FR 82914](#))
- **Mitigation planning, design, construction, monitoring, establishment, and acquisition of land or “interests therein” are all eligible for funding.** 23 CFR § [777.5](#) Federal participation: a) Those measures which the FHWA and a State DOT find appropriate and necessary to mitigate adverse environmental impacts to wetlands and natural habitats are eligible for Federal participation where the impacts are the result of projects funded pursuant to title 23, U.S. Code. (b) It is FHWA policy to permit, consistent with the limits set forth in this part, the expenditure of title 23, U.S. Code, funds for activities required for the planning, design, construction, monitoring, and establishment of wetlands and natural habitat

mitigation projects, and acquisition of land or interests therein. 777.11(f) reasonable acquisition costs are eligible too.

- **Mitigation planning, design, construction, monitoring, establishment, and acquisition of land or “interests therein” are all eligible for funding.** 23 CFR § [777.5](#) allows funding of “improvements to existing wetlands or natural habitats. Such activities may include, but are not limited to... establishment of natural vegetation, re-contouring of a site, installation or removal of irrigation, drainage, or other water distribution systems, integrated pest management, installation of fencing, monitoring, and other measures to protect, enhance, or restore the wetland or natural habitat character of a site.” 23 CFR § [777.11](#) (h) says “Certain activities to ensure the viability of compensatory mitigation wetlands or natural habitats during the period of establishment are eligible for Federal-aid participation. These include, but are not limited to, such activities as repair or adjustment of water control structures, pest control, irrigation, fencing modifications, replacement of plantings, and mitigation site monitoring. The establishment period should be specifically determined by the mitigation agreement among the mitigation planners prior to beginning any compensatory mitigation activities.
- **Funding for long term maintenance can and should be included with investments in mitigation or conservation banks or an ILF.** “To be eligible for participation with Federal aid funds, public interests in properties acquired with participation with Federal aid highway funds for ILF mitigation programs should be sufficient to ensure that the mitigation site is maintained in its intended conditions, that is, as a wetland which will provide the functions and values conditioned by the project permit. This can be accomplished by a restrictive covenant or easement attached to the title of the property if it is to be retained by a private entity, such as an individual, corporation, or non-profit; or by transfer of title in fee to a public agency. Upfront costs associated with easements, covenants, or property transfers are eligible for Federal aid participation, and should encompass activities necessary to ensure that wetland functions are perpetuated and protected at mitigation sites.”⁴⁹
- **DOTs may acquire lands in cooperation with other parties and may transfer lands to an appropriate resource management agency.** 23 CFR § [777.11](#)(d) “A State DOT may acquire privately owned lands in cooperation with another public agency or third party. Such an arrangement may accomplish greater benefits than would otherwise be accomplished by the individual agency acting alone.” (e) “A State DOT may transfer the title to, or enter into an agreement with an appropriate public natural resource management agency to manage lands acquired outside the ROW without requiring a credit to Federal funds. Any such transfer of title or agreement shall require the continued use of the lands for the purpose for which they were acquired” (or else such lands must revert to the DOT).

FHWA operates within important legal sideboards as well, in funding advance mitigation. In particular:

- **Impacts must result from a Federal-Aid project and be considered a “reasonable public expenditure.”** FHWA’s authority for replacement of the loss of wetlands, natural habitat area, or functional capacity resulting from a Federal-aid project is outlined in 23 CFR §777 and considers “reasonable public expenditure, including consideration of the impacts of the action and the benefits of the proposed mitigation measures.” Compliance with statutes, Executive Orders, regulations, or policies is an important aspect. Specific aspects of reasonableness outlined in §777.7(a), include: 1) the importance of the impacted natural habitats, 2) the extent of highway impacts as determined through an appropriate,

interdisciplinary impact assessment, 3) actions necessary to comply with the CWA, ESA, and other relevant federal statutes, and 4) input from the appropriate resource management agencies through interagency cooperation. The ability of the proposed mitigation to address the impact, whether or not the mitigation is possible and if it is in the best overall public interest are mentioned in 23 USC 109(h). Reasonable Federal Expenditure (Federal-aid participation) is what it would cost to perform project mitigation. According to FHWA's 2000 guidance on use of ILF, "reasonable Federal-aid participation in an ILF program should be determined by comparing the fee with what the cost would be for providing direct compensatory mitigation for specific project impacts permitted under the Section 404 regulatory process. The ILF should reasonably approximate the cost of direct compensatory mitigation that would have been required on the project and be verified by cost estimates from comparable mitigation activities."⁵⁰

- **Avoid acquiring advance mitigation lands by eminent domain.** Acquisitions for ecological mitigation or payments for credits in banks or ILF compensatory mitigation programs that acquire property must comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act) as amended, P.L. 91-646 (42 U. S. C. 4601). If acquisitions are site specific and subject to use of the power of eminent domain, all provisions of the Uniform Act implementing regulations at 49 CFR Part 24 are applicable. If acquisitions are not site specific and eminent domain authority will not be used, the acquisition could be defined as voluntary and only the limited requirement of 49 CFR 24.101 (a)(1) and (2) would apply. If tenant occupants would be displaced, relocation assistance provisions would also apply.⁵¹
- **Comply with federal law and State transportation planning processes.** TEA-21 states that "contributions in advance of project construction may occur only if the efforts are consistent with all applicable requirements of Federal law (including regulations) and State transportation planning processes."⁵²

While federal regulations allow funding of advance mitigation as a "stand-alone" project in a state's Transportation Improvement Program, states are pursuing other methods as well, described further in Appendix C.

CWA and Focus on Consolidated Mitigation in a Watershed Context

The objective of the federal Clean Water Act is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." (CWA Section 101) As the Army and EPA state in their 1990 [Memo Concerning the Determination of Mitigation under the Clean Water Act Section 404\(b\)\(1\) Guidelines](#), "[t]he Clean Water Act and the Guidelines set forth a goal of restoring and maintaining existing aquatic resources," but "it is recognized that no net loss of wetlands functions and values may not be achieved in each and every permit action."⁵³ Decades of experience implementing Section 404 have led EPA and the Corps to advocate a [watershed approach](#). A watershed or landscape approach offers benefits and the ability to assess and deal with functional needs on a larger scale; enabling mitigation to address long-term ecological functioning. While there is a need to replace impacts through in-kind mitigation, and various ways of accomplishing that on a landscape or watershed scale have been developed, a significant National Research Council study stated 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."⁵⁴

Guidance currently under development by the agencies states that “the best tool for planning compensatory mitigation is a holistic watershed plan”⁵⁵ incorporating mitigation or restoration priorities.⁵⁶ Holistic watershed plans are those that: 1) have been developed in cooperation with the appropriate Federal and State agencies; 2) consider multiple stakeholder interests and competing land uses; and, 3) address issues of habitat, water quality, hydrology, cumulative impacts, and restoration priorities for a watershed.⁵⁷ In the absence of a holistic watershed plan, the National Research Council and the Corps have said a watershed-based approach to mitigation should be used to develop mitigation proposals. Such an approach takes into account a wide range of factors such as: site conditions that favor or hinder success; the needs of sensitive species; chronic environmental problems such as flooding or poor water quality; current trends in habitat loss or conversion; current development trends; and the long-term benefits of available options.

Established Role of Mitigation Banking

Mitigation banking has a solid basis in CWA regulations as interpreted by the Corps and EPA, especially the [1995 Wetland Mitigation Banking Guidance](#). TEA-21 supports the concept as well. Mitigation banking involves the restoration, creation, enhancement, and in exceptional circumstances, preservation of wetlands expressly for the purpose of compensating for unavoidable wetland losses. It has been considered beneficial particularly insofar as mitigation is provided in advance of impacts. According to the 1995 guidance, mitigation banking is authorized when “on-site compensation is either not practicable or use of a mitigation bank is environmentally preferable to on-site compensation;” it is expected to reduce permit processing times and provide more cost-effective compensatory mitigation opportunities.⁵⁸

TEA-21 established a preference for mitigation banking. [Implementing guidance](#) for the preference says that to the extent that a mitigation bank will provide suitable compensation for impacts to waters of the U.S. caused by a Federal aid highway project, a bank should be approved for use. In deciding among more than one approved bank “and where other suitable mitigation alternatives have been identified, the FHWA and State DOT will choose among suitable alternatives based on availability and practicability, and will determine whether or not the banking preference has been implemented to the greatest extent practicable in order to establish the eligibility of a project’s mitigation costs for federal-aid funding.”⁵⁹ Practicability considerations utilized by FHWA include cost, existing technology, and logistics, in light of overall project purposes.” (23 CFR 777.2) The Corps and EPA, for Section 404 purposes, define practicability in a similar manner and consider practicability a factor in determining the overall suitability of alternatives and mitigation according to the [404\(b\)\(1\) Guidelines \(40 CFR 230.10\(a\)\(2\)\)](#). Cost and achievable environmental benefit have become key; Washington State (WSDOT), which has used only publicly operated mitigation banks to date, estimated that banks can save 30-80 percent on mitigation project costs— due to economies of scale and the ability to seek creative partnerships — while accomplishing regional conservation goals.

In lieu fee (ILF) mitigation was established somewhat later than mitigation banking and allows a permittee to provide funds to an ILF sponsor instead of either completing project specific mitigation or purchasing credits from a mitigation bank. State-operated ILF programs are typically used to guide mitigation investments to the achievement of ecoregional conservation goals and watershed restoration. Since 2000, establishment and use of ILF programs has been informed by guidance similar to the 1995 banking guidance, [Federal Guidance on the Use of In-Lieu-Fee Arrangements for Compensatory Mitigation](#) (10/00). ILF programs may partner with and draw upon the private sector to provide mitigation in areas with designated needs. For example, Florida DOT provides funding to water management districts on a per acre fee, for unavoidable impacts, established by state legislation. Water management districts conduct water quality and restoration planning within their

districts, identifying preservation as well as restoration needs, which the private sector helps implement. The National Defense Authorization Act of 2004 directs the Corps to promulgate compensatory mitigation regulations ensuring equivalent standards among permittee-sponsored mitigation, ILF, and mitigation banks by the end of the 2005 calendar year.

Learning From Experience: Criteria for Advance Mitigation

The [National Academy of Sciences National Research Council \(NRC\) Wetlands Mitigation Effectiveness Study](#), the Government Accounting Office, and ongoing supporting research by the Environmental Law Institute have identified a number of shortcomings and lessons learned with initial implementation of consolidated mitigation, which current, successful advance mitigation initiatives address.

- **Location and Consistency with Watershed Plan.** In the past, most mitigation bank locations have been chosen by the bank creator or sponsor for practical purposes; i.e. where wetlands can be restored economically. Despite the support of watershed planning by both the scientific community and regulatory agencies, less than one percent of all wetland banking instruments specifically reference consistency with a watershed management plan.⁶⁰ Only two states – Michigan (with its state-administered Section 404 program) and North Carolina – explicitly require in their banking statutes or regulations that mitigation sites be planned in a watershed context. Detailed siting criteria are generally not outlined in the majority of mitigation banking instruments and only ten states have statutes, regulations, or guidelines that outline bank siting criteria. Only 22 percent of all in-lieu-fee program agreements reviewed at that time specified the procedure or plan the sponsor must establish and follow to select mitigation sites.
- **Shortcomings in delivering promised functions.** Though DOTs performed better than most, wetland creation and restoration projects have fallen short in delivering the desired functions, including replacement of occupied natural habitat and over-reliance on easier to construct wetland types (open water, emergent). The NRC recommended greater attention to siting on a watershed basis, to improve achievement of desired functions and to stem losses of the types of wetlands that historically occurred in the watershed.
- **Failure to provide mitigation in advance.** Though wetland mitigation banking is defined as mitigation “in advance of development actions,”⁶¹ early credit release is a common occurrence with traditional wetland mitigation banking. The Environmental Law Institute (ELI) found that as many as 92 percent of the nation’s banks allow credits to be withdrawn from a mitigation bank in advance of bank maturity. On average, banks allow for the advance debiting of 66 percent of credits prior to attaining final performance criteria and 42 percent of credits prior to achieving any performance criteria. Early ILF programs accumulated funds from impacts before plans could be developed and preservation or restoration implemented.

These program reviews and lessons learned provide indicators or criteria for successful advance mitigation efforts: 1) locate mitigation/conservation according to watershed plans/priorities, 2) increase ecological predictability, success, and delivery of desired functions; 3) provide mitigation/conservation in advance.

To respond to agency regulations, successful approaches to advance mitigation must demonstrate avoidance and minimization, in particular:

- Project level practicable alternatives analysis for those with individual permits (40 CFR §230.10(a)).

- Avoidance and “appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem” (40 CFR §230.10(d)).

Greater flexibility exists with permitted impacts that fall under nationwide or other general permits. North Carolina DOT (NCDOT) has effectively dealt with these issues by ensuring project by project reviews for individually permitted actions. The Corps concurs with purpose and need, alternatives, selection of alternatives, and then minimization of impacts and a determination whether on-site mitigation is practicable and environmentally beneficial. North Carolina’s Ecosystem Enhancement Program is used for mitigation only after these steps.

Recent Guidance, Direction, and Agency Initiatives

The interagency [National Wetlands Mitigation Action Plan](#) (MAP) and [EPA/Corps Memo to Field on Partnership for Watershed Management](#) encourage a watershed approach to mitigation, in order to achieve the highest environmental benefits and values. Guidance developed by agencies participating in the MAP answer many of the questions that may be encountered in pursuing larger scale off-site advance mitigation initiatives. Of particular importance are the draft interagency watershed approach guidance, developed in 2004, [guidance on off or on-site, in or out-of-kind compensatory mitigation](#), [guidance on the use of preservation as compensatory mitigation](#), and [guidance on the use of vegetated buffers as compensatory mitigation](#), all in draft form.

Previously, credit could be given to preservation when the preservation was done in conjunction with other forms of mitigation and was demonstrated to augment the restored, created, or enhanced wetland resources; preservation could only be the sole method of mitigation for a given project in “exceptional circumstances.”⁶² The Corps 2001 and 2002 Regulatory Guidance Letters (RGL) move away from this clear preference, allowing that while “restoration efforts provide the best potential for success in terms of providing functional compensation...each type of mitigation has utility and may be used as compensatory mitigation” and that wetland preservation “may be authorized as the sole basis for generating credits in mitigation projects.”⁶³

Preservation has been allowed within ecoregions using larger watersheds or eco- or physiographic regions. Sites must meet high standards for environmental quality and/or contribute to broader environmental goals AND be under “demonstrable threat.” Restoration gains are still achieved in the overall program. EEP contracted with the Conservation Trust of North Carolina to work with the 23 land trusts through the state to identify, assess, and document the natural significance of potential sites and to work with landowners to secure conservation easements where applicable. While the High Quality Preservation (HQP) program has now officially ended, there is support to continue this program into the future so long as HQP augments a robust restoration effort. The HQP program goes far beyond traditional preservation in that buffer widths along streams are a minimum of 300 feet wide on each side. This net 600 foot stream buffer is thought to be one of the most powerful tools to address habitat protection and continuity in the state. To day, NCDOT and EEP have protected 133 miles of stream in some of the state’s most sensitive ecosystems. In addition, the HQP program has added some tracts of land to the state parks system and Wildlife Resource Commission management areas. The program has been a step toward comprehensive management and protection of North Carolina’s natural resources.⁶⁴

EPA’s Office of Water noted that conservation of wetlands, improved monitoring, and restoring impaired watersheds will continue to be a focus.⁶⁵ Likewise, Mark Sudol, Chief of the U.S. Army Corps of Engineers regulatory branch described the agency’s move “toward more ecologically driven” mitigation: “We want to move faster on using a watershed basis for mitigation. We want to look at mitigation from a watershed perspective; where does the mitigation make the most sense?”⁶⁶

Current Federal initiatives call for a wide range of restoration actions, including improving or restoring 25,000 miles of stream corridor; achieving a net increase of 100,000 acres of wetlands each year; and establishing two million miles of conservation buffers.⁶⁷

The Corps and EPA are currently drafting the compensatory mitigation regulations called for in the National Defense Authorization Act of 2004 and plan to release the proposed regulations in the Federal Register for public comment in late 2005.

Focus on Ecosystem Conservation, Species Recovery, and Cooperative Conservation Initiatives under the ESA

Ecosystem conservation and recovery of species, such that listing is no longer necessary, are primary goals of the federal Endangered Species Act (ESA). As described in section 2(b), “The purposes of this Act are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species.” (16 U.S.C.A. § 1531(b)) First and foremost then, the Act is a means to conserve ecosystems and to provide a program to conserve threatened and endangered species and assist their recovery.⁶⁸ (ESA § 3 (3)), 50 CFR § 402.02 (2000)

FWS and National Oceanic and Atmospheric Administration (NOAA) Fisheries are charged with developing and implementing recovery plans for the conservation and survival of species (ESA § 3 (f)). The ESA defines “conservation” as “the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided (by the ESA) are no longer necessary.” (16 U.S.C.A. § 1532(3)) “‘Recovery’ means improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in” the ESA; “[T]he Act defines ‘conservation’ to mean recovery of the species” (63 FR 9968) The ESA and its implementing agencies, FWS and NOAA Fisheries, “encourage the States and other interested parties, through Federal financial assistance and a system of incentives, to develop and maintain conservation programs... to better safeguard, for the benefit of all citizens, the Nation’s heritage in fish, wildlife, and plants.” (Section 2(a)(5)).

Success in protecting and recovering listed species may be measured by securing viable populations, with adequate habitat and distribution within the context of large-scale conservation plans. If this is done on a biologically-comprehensive basis (all natural community types and all at-risk species) and in accord with emerging principles for the long-term viability of such systems, the endangerment and possible listing of thousands of species may be avoided.¹⁰ The success and efficiency of biodiversity conservation efforts increase greatly as such efforts protect viable communities, habitat, and species while conservation opportunities are available, and if possible, before species become threatened or endangered. DOTs can make contributions to these recovery efforts to off-set for actions that may affect listed species.

Interagency Steering Group on Habitat Conservation & Connectivity

A federal interagency steering group on habitat conservation and connectivity —involving many of the same agencies in the Mitigation Action Plan effort (EPA, Corps, FHWA, FWS, and NOAA Fisheries) and the Forest Service, Bureau of Land Management (BLM), and the National Park Service — began meeting in 2002 and articulated the following goals:⁶⁹

- Achieve sound, focused expenditure of public funds. Focus CWA Section 404 mitigation and ESA Section 7 conservation measures where they will contribute the most to the resource (priorities in watershed, ecoregion, or state).

- Identify efficient and effective methods and approaches that are accepted and encouraged by our respective agencies for the conservation of wildlife and habitat while increasing predictability in the development of infrastructure improvements for the public. Enhance and sustain fish and wildlife habitats and ecosystems, accomplish significant habitat preservation and connectivity improvements, and make a contribution to natural resource functionality and recovery while increasing procedural efficiency.
- Increase interagency collaboration and illustrate efficient and effective partnerships, practices, and processes that can be utilized to achieve more sustainable, environmentally-sensitive infrastructure and land management. Base decisions on ecological principles within the current working environment (economic, political and land use) while being open to opportunities.
- Gain support by agency actions when needed, both to effect change and make decisions that are consistent with laws and regulation.
- Make decisions using best available data.
- Support flexible mitigation including evaluation of off-site opportunities (watershed- or ecosystem-based, or other) that offer somewhat substantial environmental benefit.

The team is developing a guidebook to be issued in 2005. The approaches outlined are compatible with those outlined in this document and with numerous state transportation agency, AASHTO, and FHWA initiatives to steward public resources and the environment.

Flexibility, Innovation, and an Ecosystem Approach

According to section 7(a)(2) of the ESA, for any federal action that may affect a threatened or endangered species (or its habitat), the agency contemplating the action (the action agency) must consult with FWS or NOAA to ensure that the federal action is not likely to jeopardize “the continued existence of” an endangered or threatened species and that the federal action will not result in the “destruction or adverse modification” of the designated critical habitat of the listed species.⁷⁰ Those consultations are known as “Section 7” consultations. A recent Ohio district court decision found that the programmatic or “tiering” system “used by FWS is an interpretation of how to go about following the directive of the implementing regulation,” of FWS’s authority to consult with agencies and issue biological opinions, regarding actions subject to the agency’s discretion and specialization. (*Buckeye Forest Council v. U.S. Forest Service*, 04-259, S.D. Ohio, Western Div.).

The [Endangered Species Act Consultation Handbook](#) directly addresses “Flexibility and Innovation,” noting that “[t]he section 7 process achieves greatest flexibility when coordination between all involved agencies and non-Federal representatives and the Services begins early...Biologists should be creative in problem solving and look for ways to conserve listed species while still accommodating project goals.”⁷¹ The handbook addresses shortening timeframes, noting that the Services have been implementing measures to streamline consultation and that “biologists for the Services are encouraged to review examples of these streamlined consultations and to look for ways to incorporate streamlining techniques into other consultation procedures.”⁷²

Section 7 consultations are informed by species recovery plans, or recovery strategies or outlines where plans have not yet been developed or approved. In their 2004 Recovery Planning Guidance, the Services state that “[w]herever possible, recovery plans should focus on the broader view of the species’ health, by working to ensure the health of its habitat and ecosystem functions, rather than the narrower view of looking at the species only. As implied in the ESA, conserving the ecosystems upon which a species depends is more likely to ensure that species’ long-term viability. In keeping

with the ESA's directive, this guidance focuses not only on the listed species themselves but also on restoring their habitats as functioning ecosystems."⁷³ The Guidance further notes that while single-species recovery plans have been the most common type of plan prepared since the enactment of the ESA, multi-species plans and ecosystem plans have gained increasing currency since the mid-1990s. The guidance states that "It is important to note that, although the ESA appears to focus on the individual species, subspecies, or distinct population segments, the purposes of the ESA include conserving the ecosystems upon which listed species depend. Recovery plans should aim to address threats by restoring or protecting ecosystem functions or processes whenever and wherever possible (as opposed to actions that require long-term and possibly expensive management programs). This approach is science-based and provides a means for required habitat to be maintained long-term in a dynamic way by natural processes. This broader perspective should be infused into all recovery plans, whether they be for single species or multiple species."⁷⁴

Pre-Consultation under ESA Section 7

Perhaps the most effective manner of streamlining the section 7 consultation process is to engage the Service in pre-consultation during the planning phase. During pre-consultation the Service can provide information regarding the species that might be present, the threats and conservation needs of the species within the project area, potential conflicts that may arise, and unique opportunities to further conservation and recovery. Then the Service and project proponents can work together to try and address these potential conflicts before the project design is set, while design flexibility may still exist, and while the maximum set of conservation or mitigation alternatives are available. During this process action agencies have the option of addressing candidate as well as listed species and of seeking programmatic consultation on an ecosystem approach encompassing all species of concern. Closer to the time of project implementation, if the Service reviews the proposed action and finds it to be consistent with the conservation strategy and design standards previously agreed to, a final biological opinion can typically be issued in an expedited manner.

Programmatic Section 7 Consultation

Programmatic consultations address species, habitat, or project needs on a multiple-project scale, often addressing ecosystems as well as individual species. Consultation must, in the end, address impacts to species individuals, but impacts can be addressed "by proxy" in terms of "all individuals associated with or dependent upon" a particular habitat area, with such association explained. (See sections 3.5 - 3.7).

Court cases over the past several years have upheld FWS's ability to conduct programmatic or "tiered" consultations.⁷⁵ Agencies can use programmatic consultations to evaluate the potential of future actions to affect ESA-listed species or designated critical habitat. By establishing standards, guidelines, or governing criteria to which future actions must adhere, programmatic consultations can lead to more efficient and effective consultation processes and transportation decisionmaking, in the context of a landscape-based, recovery-oriented approach to consideration of projects and impacts. During completion of the "first tier" consultation the action agency can broadly define the project to help estimate potential impacts and identify conservation measures earlier in the process. During the "second tier" consultation individual projects are briefly evaluated for consistency with the programmatic consultation and impacts tracked for updating of debits-credits and species baseline, before being added to the initial or programmatic consultation. Updated [Programmatic Consultation Guidance](#) for transportation as well as more general programmatic guidance is in development. According to the FWS' interim guidance:

Programmatic consultation techniques have the greatest potential to increase the efficiency of the section 7 consultation process because much of the effects analysis is completed one time, up front rather than repeatedly each time a new action, or batch of actions, is proposed. By completing this analysis up front in a programmatic consultation document, the anticipated effects of the action agency's future projects can be added into the environmental baseline prior to the project's completion, providing predictability for action agencies as they can be assured that the effects of their future actions have already been broadly accounted for. Thus, all other future section 7 consultations (i.e., those not covered by the programmatic consultation document) will be evaluated within the context of these effects having already been added to the environmental baseline. By completing this analysis up front, the process for completing consultation for future actions proposed under the programmatic consultation can be dramatically shortened.⁷⁶

Federal agencies can consult on designated programs, plans, and strategies, though consultation is optional prior to project development in the transportation process. If future actions are uncertain, the Services must project the potential effects of future actions in order to protect species. Acres, or some other measure, of impact are tracked as projects occur, updating the baseline as appropriate. Changing information on the status of the species should be updated as well. Related guidance under development advises the consultation partners to develop a "landscape-scale perspective," to facilitate inventory of target resources using existing information and determine the status and trends of target resources and supporting ecosystem values. From this, a conservation strategy may be developed. Such a strategy enables more efficient and effective identification of fatal flaws, conservation needs, and partnership opportunities.

Lessons Learned from Case Law on Programmatic Section 7 Consultations

The "Rothstein Decisions" in the Ninth Circuit between 1998 and 2001 helped to set legal sidebars for programmatic consultations. The cases involved public land (National Forests) managed for natural resource values under the Northwest Forest Plan, and reviewed timber-cutting activities that constituted the primary and largest threat to the threatened and endangered species in question. Though the high standards that resulted may pertain in part to this situation and context, Judge Rothstein's decisions created a benchmark for all federal agencies with regard to programmatic section 7 consultations; recommendations from those cases relevant to programmatic consultations may be summarized as follows:⁷⁷

- Provide a rationale for watershed or landscape scale analysis.
- Aggregate the effects of site-specific actions when considering regional scale plans.
- Analyze and verify whether site-specific projects are in fact complying with the Conservation Strategy and that mitigation actually occurs. Assess whether the appropriate elements of the plan's standards and guidelines are being implemented.
- Explain treatment of short-term effects and their potential to jeopardize listed species.
- Consider resource conditions immediately post-action, not just 10 years down the road.
- Management plans (such as the Northwest Forest Plan and affiliated conservation strategies, in this case) that have already been developed or adopted for the species of concern should not be disregarded, especially where binding standards or guidelines have been developed.
- Show consideration of cumulative effects.

The ability of federal agencies to use a tiered, programmatic consultation system to comply with ESA section 7 was upheld recently (*Buckeye Forest Council v. U.S. Forest Service*, 04-259, S.D. Ohio, Western Div., July 20, 2005). The court ruled that "Defendants' [FWS] use of the tiered consultation system has not impeded their fulfilling all requirements mandated by the ESA and its

implementing regulations, and, if anything, has increased defendants' efficiency in fulfilling those requirements."

Conservation Banking

With its [Guidance for the Establishment, Use, and Operation of Conservation Banks](#) (68 FR 24753, May 8, 2003), FWS provided yet another tool for pre-consultation and cooperative efforts to assist species recovery. FWS describes a conservation bank as a parcel of land containing natural resource values that are conserved and managed in perpetuity for listed species, and used to offset impacts occurring elsewhere to the same resource values; i.e. in-kind mitigation.⁷⁸ Conservation banks enable large, contiguous areas of habitat to be preserved, restored, created, or enhanced to compensate for impacts to species and their habitats. Conservation banking differs from wetland banking in that the goal is not to replace the functions and values of the habitat, but a broader concept of off-setting adverse impacts or providing net benefits to the species as a whole, rather than individual members of that species. FWS affirms preservation of existing habitat with long-term conservation value as an appropriate target of conservation banks; such investments can offset the loss of isolated and fragmented habitat that may have little long-term value to the species. Higher credit ratios may be employed where chance of success is less secure; i.e. where relying on creation or significant restoration. Conservation banking works especially well for wide-ranging species, where impacts may be off-set by mitigation over a wide area. The price for bank "credits" typically includes funding for acquisition and long-term natural resource protection and management.

Protecting Viable Populations, Improving Chances of Success, Reducing Fragmentation. From the FWS's standpoint, the important point in establishing a conservation bank is to site banks in areas where viable communities can be preserved, where fragmentation of habitat can be reduced, and where management measures can address other threats that a species might encounter, including invasion of non-native species or disruption of natural disturbance regimes. Species recovery plans, state conservation plans, and ecoregional plans developed by third party conservation organizations may contribute goals, objectives, and target conservation areas for conservation banking.

Greater Efficiency and Predictability, as Desirable Off-Sets Are Secured. From the FWS's perspective, conservation banking reduces the piecemeal approach to conservation efforts that can result from individual projects by establishing larger reserves and enhancing habitat connectivity. Directing smaller individual mitigation actions into a bank streamlines compliance for the individual permit applicants or project proponents while providing a higher benefit to the target resources. Conservation banking can bring together financial resources, planning, and scientific expertise not practicable for smaller conservation actions. By encouraging collaborative efforts, it becomes possible to take advantage of economies of scale (both financial and biological), funding sources, and management, scientific, and planning resources that are not typically available at the individual project level. From the perspective of state transportation agencies, increased predictability in the ESA section 7 processes project delivery is a primary incentive to develop or participate in conservation banks. Off-site conservation may offer the possibility for greater environmental benefit. Many DOTs welcome the opportunity to partner with others and contribute to large-scale conservation that may substantially enhance ecosystem conservation or species recovery.

Crediting and Debiting May Use Acres of Habitat, i.e. species associations with identified vegetative communities. FWS allows use of habitat acres as an acceptable crediting method for species associated with those vegetative communities, within species' ranges. This approach is supported by *NWF v. Babbitt*, the court rejected plaintiff's arguments that the Plan was obliged to "estimate the number of individual members of a species within the Permit area" and "then estimate the number of members of the species that will be taken," saying there is "no authority for this

interpretation of the ESA.” The Biological Assessment (2002) and Biological Opinion (2003) for Colorado DOT’s (CDOT) shortgrass prairie conservation initiative and Caltrans’ multi-species programmatic consultation for the kit fox and other species (2004) use acres of habitat type, as does the [Programmatic BO for the Oregon Bridges](#). It is desirable to create a linkage between habitat acres and individuals where possible; however, if the existing research or science does not allow for this, the phrase “all individuals associated with (insert number of) acres” of a certain type of habitat may be used in the incidental take statement. When DOTs are pursuing streamlining through programmatic approaches and impact assessment based on species “presumed presence” maps, the *Arizona Cattleman’s* decision points to the desirability of describing sufficient nexus between the action and impact to the species (i.e. describing how impacts to the species are reasonably likely to occur).

Layering Credits: Use of Credits for Clean Water Act mitigation. According to FWS’s Conservation Banking Guidance, credits from a conservation bank may be used to compensate for environmental impacts authorized under other programs, such as Clean Water Act Section 404.

Credits from a conservation bank may also be used to compensate for environmental impacts authorized under other programs (e.g., State or local regulatory programs, transportation projects, NEPA or State equivalent). In no case may the same credits be used to compensate for more than one activity; however, the same credits may be used to compensate for an activity that requires authorization under more than one program. In other words, once a credit is sold to offset an adverse impact that same credit cannot be sold again.⁷⁹

If impacts occur to the same acre, with multiple species or resource values, resources that provide similar cross-cutting values elsewhere might be conserved at one location – so that multiple acres in multiple locations are not required for a unitary impact.

In some instances a bank may contain habitat that is suitable for multiple listed species. When this occurs, it is important to establish how the credits will be divided. For instance, once a project buys a credit for one species, that credit cannot be sold again for another species. If the proposed project impacts multiple species and the bank contains the same multiple species, then the credits can be sold for in-kind replacement. As a general rule, overlapping multiple species credits can overlap for a single project, but not multiple projects.⁸⁰

Habitat Conservation Plans (HCPs) and Candidate Conservation Agreements with Assurances (CCAAs)

Habitat Conservation Plans (HCPs) and Candidate Conservation Agreements with Assurances (CCAAs) can be used in conjunction with individual or programmatic section 7 consultations; however, as a regulatory vehicle, HCPs and CCAAs are for state, local, and private entities and not federal-aid actions. Federal and state transportation agencies can help implement the conservation agenda outlined in an HCP, as part of off-setting measures for federal-aid projects subject to section 7 consultation; the existence of an HCP can greatly facilitate advance or programmatic conservation measures. Nevada, Wisconsin, and California provide good examples where the DOT is contributing to implementation of an HCP and receiving coverage under section 10 for state actions or section 7 for federal actions, if combined with a consultation. CCAAs are subject to a strict beginning baseline, below which losses cannot occur, one reason this vehicle is not recommended approach for transportation projects. FHWA and DOTs have the option to include candidate species as well as listed species in a programmatic section 7 consultation. DOTs are also encouraged to contact the Services early for technical assistance, for early coordination.

A Net Benefits Approach?

In addition to serving as an important factor in developing and utilizing conservation banks, FWS and NOAA Fisheries set a precedent for [Evaluating Net Benefits](#) in a 2003 guidance memo for

section 7 consultations with the U.S. Forest Service regarding hazardous fuel treatment projects. In the memo, the Services indicate that the procedures identified “are consistent with the requirements of section 7(a)(2) of the ESA and its implementing regulations at 50 CFR 402.” The framework offers a way to “ensure that appropriate factors are considered, consultation workloads are efficiently completed, and project implementation is not delayed.” The memo advocates adoption of a long-term view when consulting on projects under section 7 of the ESA and acknowledgement that some projects may have short term adverse effects on some listed species. At the same time, the memo states,

some projects, especially those which may be able to incorporate measures to address conservation priorities, present opportunities for significant long term benefits to species and their habitats. Imposing overly cautious restrictions to address short term risks, without adequately assessing the long term net benefits to species, can result in the delay of critical projects. The reluctance to engage in programmatic approaches can also lead to lost opportunities to make important conservation investments or to realize state, federal, and non-governmental organization conservation goals...Projects with expected net benefits that outweigh short term adverse effects should be expedited in the interest of the conservation or restoration of native ecosystems and the species that inhabit them. The jeopardy analysis for the section 7 consultation should take into account whether the short-term adverse impacts to the individuals are outweighed by the long-term conservation benefits to the species as a whole.⁸¹

FHWA, Oregon DOT and FWS describe this net benefits approach in their Comprehensive Mitigation and Conservation Strategy (CMCS). The CMCS integrates wetlands mitigation with habitat conservation and allows impacts to be evaluated at the ecosystem level with a single accounting system for assigning mitigation credit and debit across all agencies. It establishes a program-level mitigation and conservation approach along with the establishment of specific conservation and mitigation banks that serve regional ecological priorities:

Habitat management areas and actions will be designed to achieve a meaningful net conservation benefit. Actions should be designed and the overall CMCS program should be implemented so that on-ground benefits to species/resources at the program scale provide greater ecological benefit than typical on-site transportation related mitigation efforts... This additional value will come from focusing not only on compensatory mitigation, but also by providing additional benefits in support of species recovery and conservation goals. While all habitat areas or actions developed through the CMCS should result in some increased benefit, the amount and focus of this additional value is not expected to be equally distributed. Some locations and species/resources will benefit more than others. As described above, the greatest benefits should be realized by species/resources most impacted by projects and by those most at-risk within the subject eco-province. For these high-priority species or resources, the increment of surplus benefit should be sufficient to advance recovery and conservation goals by providing a meaningful improvement in the size, distribution, and productivity of species populations, or in amount, distribution, and quality of habitats relative to that which existed prior to implementation of included ODOT projects. Net benefits factor into decision making by the Corps of Engineers for Section 404 permits; in deciding whether to issue a Section 404 permit, the Corps evaluates of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. The decision whether to authorize a proposal, and if so the conditions under which it will be allowed to occur, are therefore determined by the outcome of the general balancing process.⁸²

Appendix B. Regulatory Agency Communications Opportunities & Strategies — An Implementation Plan

Clarify Legal Interpretations and Regulatory Flexibility

- Consult with headquarters staff and solicitors, if necessary to confirm and refine guidance.
- Identify areas of greatest confusion in the field and where guidance/clarification should be issued.
- Ensure that NMBA-driven wetland mitigation banking “standardization” guidance does not curb or shut off innovative agency and NGO partnerships and watershed/landscape-level restoration approaches.
- Increase awareness of linkage between recovery planning and project review/consultation under ESA section 7. Increase emphasis on ecosystem approach and the desirability of off-setting measures and partnerships/contributions to recovery through a “net benefits” approach to section 7 consultation.
- Explicitly identify opportunities for partnerships, where Districts, Field Offices, or Agencies should look for them, and how to appropriately link existing regulatory processes, where such linkage may help leverage these opportunities (e.g. satisfy regulatory requirements while helping implement partnership efforts that leverage the contributions of all parties). Showcase examples of linkage, partnerships, and environmental and streamlining benefits.
- Issue needed guidance and follow up with support/orientation from headquarters and Regions. Clarify expectations.
- Address fear and hesitancy in head-on fashion.

Utilize Existing Communications Channels

- Present information regarding the concepts contained in this report to FWS Assistant Regional Directors for Ecological Services. Region 4 may be a good lead for this presentation.
- Discuss and coordinate programmatic, advance mitigation approaches, and goals in conference calls with Field Office Ecological Services Supervisors. Specify mitigation within the context of a species or ecosystem “conservation strategy”.
- Work with NCTC trainers to review existing course and identify how material could be efficiently incorporated. If the basic section 7 training course is the only one that most FWS field office staff receive, should it be incorporated there? Are there other opportunities for advanced training in programmatic approaches, for more expansive coverage? Are increased NCTC offerings, e.g., Green Infrastructure course, reaching field office staff who focus on section 7 consultations?

Increase Familiarity with Successful Approaches and Provide Technical Support

- Develop examples of watershed approaches such as NC EEP and SAMPs for incorporation in Corps regulatory training.
- Promote more widespread development of SAMPs and use of tools developed by the Corps.

- Identify programmatic consultation-advance conservation success stories, for use in FWS and NOAA Fisheries NCTC training programs and in other outreach materials and opportunities (to be identified).
- Identify multi-species and ecosystem recovery plans that have been developed.
- Post or link to this information where it can be used by DOT and Service Section 7 Biologists and stakeholders who seek to partner on cooperative conservation initiatives
- Identify cadre of FWS, Corps, and DOT staff who have helped design and implement programmatic, advance mitigation/conservation approaches.
- Introduce cadre to Districts, Field Offices, and Regions.
- Identify and develop technical assistance resources which can be distributed.
- Develop a library of agreements and key elements.
- Develop templates as appropriate.
- Develop and exchange workable performance measurement methodologies, for adaptive management in perpetuity.
- Encourage creativity. Try to start by focusing on end results rather than on how to accomplish them.

Leverage Existing Data and Conservation Plans

- Identify what “recovery outlines” have been developed for which species, when full recovery plan is not available.
- Develop systems for sharing this information with other agency partners who might implement recovery actions.
- Continue to develop tools to implement the National Vegetation Classification standard, in the Service.
- Work with FHWA to attain funding for nationwide species range maps for all listed and candidate species, modeled from vegetational associations and refined with expert input, as needed. NatureServe and a consortium of Natural Heritage Programs estimate this would take only a year or two, and a couple million dollars, yet this information would greatly facilitate section 7 consultations and projection of potential impacts. In conjunction with natural community.
- Explore the extent to which existing, ecoregional conservation plans produced through a scientific, multi-agency planning process with species experts in university and non-university settings may be used as official FWS/NOAA Fisheries Recovery Plans (multi-species or ecosystem).
 - Identify pros and cons of utilizing existing plans.
 - Assess gaps and needed actions to potentially fill such gaps (both for sufficiently similar planning processes and for individual plans, which the Services might tap
- Where information is lacking, consider adaptive management approaches with measurable success criteria and appropriate monitoring.

Appendix C. Addressing Localized Issues in Collaborative Fashion — An Implementation Plan

The steps outlined in this implementation plan may proceed simultaneously or in different orders. Some advance mitigation/ conservation initiatives may start with identification of mitigation needs; others may start with existing watershed or ecoregional plans and opportunistic site identification.

Still others start with an urgent need to develop a streamlined process that will create efficiencies with everyone's workloads. Each step is important to resolve; lack of resolution could prevent an advance mitigation/ conservation effort from moving forward. Hence, these steps often proceed simultaneously and reinforce each other as they are completed.

Decisions on how individual projects within the programmatic section 7 or watershed approach to Section 404 permitting will be handled are often left until later in the process, after the agencies attain agreement on vision and worthwhile tradeoffs to achieve substantially more environmental value in a more efficient fashion, while satisfying existing regulation. An initial and consistent focus on the positive, what the agencies may be able to accomplish working together to maximally draw on what each can contribute to on-the-ground restoration and recovery priorities, can help pull a team through the steps of working out the details of how that can be achieved.

Identify Goals and a Common Vision

Make the time and assemble the decisionmakers. As a resource agency leader of cooperative conservation efforts said, "we need to get people to the table." Despite how pressed everyone is for time and that integrated resource and transportation mitigation planning are not mandated, if participants can come to the table,

Learning From Successful Conservation Partnerships...

Articulating shared goals also enables groups to realize their interdependence. The effort of creating joint mission or vision statements encouraged groups to begin attacking a common problem rather than continuing to attack each other. Such statements can lead participants to imagine solutions to shared problems. In the process, they develop a sense of accomplishment and start to build relationships and faith that the group can work together. Critical to an individual's ability to adopt a problem-solving mindset, however, is the commitment of agency leaders who provide flexibility, support, and follow-through for the collaborative effort. Another way to promote a problem-solving mindset is by pursuing a process of mutual learning—in other words, sharing expertise, acquiring new information, and realizing that creative solutions are to be found by combining the perspectives of many rather than accepting the conclusions of one. In a number of cases, groups engaged in joint research and fact finding to work through differences. Building personal relationships among partners also helps create a shared sense of ownership of the problem. Ownership is important because people take care of and remain committed to what they own. Critical to a sense of ownership was early and substantial involvement.

Individuals involved in successful collaborative processes were entrepreneurial. They established relationships, secured resources and institutional support, marketed the effort, and pushed for effective implementation. They took advantage of opportunities for collaboration and instead of being constrained by existing procedures, they were persistent in their search for solutions. They took a chance on a different course of action and found it worth the risk. Often, a small set of dedicated, energetic individuals catalyze an activity and drive it forward in an entrepreneurial way.

How do you promote entrepreneurial behavior? On an agency level, incentives and reward systems need to support well-intended, creative approaches to problem solving. Leaders who focus on objectives, not procedures, and who evaluate performance in terms of how well progress towards these objectives is being achieved, tend to foster more creative, solution-oriented behavior by their employees. Similarly, budget systems that allow flexibility in the way that funds are made available across program lines and budget cycles are critical to allowing entrepreneurial behavior. Individuals foster entrepreneurial attitudes through a contagious combination of hopefulness and persistence. Individuals who adopted an entrepreneurial approach also looked for "seams in the bureaucratic wall."

From our perspective, the reason to develop collaborative partnerships is to improve the state of the environment. The acid test is whether these approaches promote conservation objectives in the long-run when measured against the baseline of what would realistically have happened otherwise. Our research on collaborative processes indicates that they are achieving ecological results while also improving community-level communication and cooperation. Steven L. Yaffee and Julia M. Wondolleck, "Criteria for Effective Habitat Incentive Programs," *Conservation in Practice*, Spring 2000.

realize what common goals they do have, and identify what they might be able to do together, “once involved, it is very rewarding.” DOT funded positions have assisted some resource agencies in finding the time, apart from project review, to invest in creating a more efficient process, with greater benefit for the environment.

In their report on the Texas Ecosystem Banking Workshop, the facilitators noted: “The composition of this (working) group is critical. It should include agency representatives who have the authority to negotiate on behalf of their agencies and who are open-minded, able to think creatively about what can be done within the context of their respective regulations, and committed to finding solutions that work for all agencies.”⁸³

Identify interests that must be satisfied in order to participate. Organizations or groups that operate under high levels of stress or conflict or understand their missions as mutually exclusive often operate with competitive norms and beliefs, which can even create power struggles and act to undermine their endeavors.⁸⁴ This all changes when we work together to identify goals and seek the means to accomplish common, mutually beneficial objectives.⁸⁵ Developing a mutually established vision entails understanding each agency’s needs and what each can bring to the table to accomplish mutual interests. Example interests that may be brought to the table by partnering agencies include:

- Ensure wetland mitigation contributes to important watershed conservation objectives identified through a public and/or scientific process and conservation investments make a tangible contribution to species protection and recovery.
- Ensure protection in perpetuity.
- Generate greater environmental and process predictability through early consultation/permitting with mitigation-off-setting measures implemented in advance.
- Ensure that the agencies are not put in a position of requiring or appearing to require compensatory mitigation for non-regulated functions or resources.
- Take advantage of the ecosystem opportunities available on a large-scale site, matching ecosystem -level impacts with ecosystem-level mitigation and leveraging credits for compensation for regulated impacts to regulated resources in order to protect non-regulated resources.
- Utilize credit systems that avoid unnecessary complexity yet connect impacts to offsets or mitigated resources. To reduce workloads, all parties have an interest in providing clear and reasonably simple methods for usage, payment, and assigning values in the bank and linking those values with project impacts.
- Track long-term ecological functioning with measures, practical for use over the long-term.
- Enable recognition of additional value to different agencies/programs for separate functions on the same parcel, while ensuring that credit is not given twice for the same function on the same parcel to two different agencies/programs

**Oregon Mitigation and Conservation
Strategy Vision Statement**

The goals of the mitigation/ conservation program are to facilitate ODOT’s desire to achieve positive environmental stewardship, regulatory streamlining, and maximum benefit per unit cost by focusing stewardship and mitigation/ conservation efforts toward ecologically meaningful results. The program will use strategic, geographically based approaches to help reduce ecosystem services losses, and will focus on restoration of properly functioning conditions where appropriate.

One advance mitigation architect commented, “All participating agencies need to benefit in some way...It’s entirely feasible to create incentives for agencies to participate if the conservation plan is aligned with their respective missions, if it doesn’t cost anything, and if they don’t have to give up anything. But whoever pays for the actual development of the plan and its implementation” has to benefit.⁸⁶

Come together around a cooperative vision, of benefit to the resource and a more efficient process. Federal and state agencies in Florida felt they achieved a 100 percent increase in efficiency, with 50 percent less effort.⁸⁷ Questions to ask in developing a common vision and goals may include:

- What are some of the highest priority conservation, restoration, or connectivity needs in a given state, watershed, or region?
- Can impacts to resources be anticipated and environmental investments justified such that those investments and partnerships to address key species, ecosystem, or watershed needs can be undertaken now?
- Will up front mitigation on a watershed, population, or ecoregional scale help achieve important environmental objectives and add predictability to the infrastructure decisionmaking and development process?

Once a cooperative vision is established, partners can feed cooperation and maximize certainty and trust by:

- Giving partners the benefit of the doubt; provide openings to accomplish more than has ever been accomplished previously.
- Developing implementing agreements to clarify roles, relationships (including what is and isn’t done by each), responsibilities (i.e. who is going to do what within various parameters), and results (products and measures of success).

Use Best Available Scientific Data

A great deal of GIS data is available, particularly on vegetational communities, from which species associations may be estimated, and with expert assistance in some cases, species’ ranges established. While data of increasing quality and coverage is coming on-line (sources of such will be discussed in the next section), existing data nevertheless frequently provides less information than is desired.

Neither the ESA nor governing regulations define the term “best scientific and commercial data available;” however, a recent [Endangered Species Act Legal Analysis](#) issued by FHWA and the FWS states that the plain meaning of the term and the modifying word “available” are important: “[t]hat is, this phrase does not say to make, create or formulate the best scientific and commercial data; it states to use what is available,” an interpretation which is supported by case law.⁸⁸

In *Building Industry Ass’n of Superior Cal. v. Norton*, 247 F.3d 1241 (D.C. Cir. 2001), the court decided “the Appellants misread §1533(b)(1)(A): the Service must utilize the “best scientific ... data available,” **not the best scientific data possible.**” The Service may not base its (decisions) on speculation or surmise or disregard superior data, cf. *Bennett v. Spear*, 520 U.S. 154, 176, (1997) (Emphasis added); *City of Las Vegas v. Lujan*, 891 F.2d 927, 933 (D.C.Cir.1 989), but absent superior data and appellants point to none occasional imperfections do not violate § 1533(b) (1)(A).” ‘ Id. at 1246.

Other courts have followed this lead. In *Southwest Center for Biological Diversity v. Norton*, 2002 WL 1733618 (D. D.C. 2002), the court said “Another implication of ‘best scientific data available’ requirement is that the USFWS must rely on even inconclusive or uncertain information if that is what is available at the time...”

Stated another way, there is no requirement under the duty to use the *best scientific and commercial data available* to conduct new research. Southwest Center for Biological Diversity Babbitt, 215 F.3d 58, 60 (D.C. Cir 2000); *American Wildlands v. Norton*, 193 F.Supp. 2d 244, 251 (D. D.C. 2002). Nor does the term mean a scientific certainty. *Center for Biological Diversity v. Lohn*, 296 F.Supp. 2d 1223 (W.D. Wash. 2003).

Further, if a Federal action agency relies on “weak data” from the Services’ biological opinion to support its duty to insure its actions will not cause jeopardy, it will not fail if there is no other data to challenge it. *Resources Ltd. v. Robertson*, 35 F.3d at 304; *Pyramid Lake Paiute Tribe of Indians v. U.S. Dept. of Navy*, 898 F.2d at 1415; *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1335 (9th Cir. 1993).

In sum...the duty to use the *best scientific and commercial data available* does not mean doing new research, nor reaching scientific certainty. Even if there is only limited or weak data available, an action agency can still proceed to use it if it is the “*best scientific and commercial data available*”

Once consultation has been initiated, “The Service’s request for additional data is not to be construed as the Service’s opinion that the Federal agency has failed to satisfy the information standard of section 7(a)(2) of the Act. If no extension of formal consultation is agreed to, the Director will issue a ‘biological opinion using the best scientific and commercial data available.’” 50 CFR § 402.14(f)

“The Service agrees that assessments should be as complete and thorough as possible, but declines to impose strict minimum standards that all biological assessments must satisfy. . . Therefore, a new paragraph (f) [50 CFR § 402.12(f)] only contains suggestions of what a Federal agency may include in a biological assessment. . . Basically, the assessment serves as an analytical instrument and can be used by the Federal agency ‘to build its case’ as to whether a particular action is likely to adversely affect a listed species or its critical habitat.” 51 Fed. Reg. 19947 (June 3, 1986)

When developing an effects analysis and associated incidental take statement that includes future actions for which insufficient information is available to make accurate determinations (e.g., when consulting at the plan level and the specific future activities and locations are not yet identified), in the effects analysis the Service must provide the benefit of the doubt to the species and develop reasonable projections of potential conflicts between activities that can occur under the agency’s program and the protection of listed species. From this, the Service must estimate the potential effects and derive the anticipated level of incidental take that is likely to occur. These estimated levels of effects should correspond to the maximum level of impacts that may be caused by the action (see *Conner v. Burford*, 848 F.2d 1441, *Silver v. Babbitt*, *Silver v. Thomas*).

Leaders of advance mitigation efforts have reported that using available datasets and informing partners about the levels of what can be accomplished with existing data often lays the groundwork for greater enthusiasm for and understanding of the planning effort and its purposes, with ensuing interest in filling in data gaps. Use of best available data allows the team to reach conclusions and move the project forward in a timely fashion that can contribute greatly to the momentum and practicability of the advance conservation/recovery project for all parties.

While all consultations and permitting actions use best available data, many recent advance mitigation/conservation efforts are notable for what they accomplish using planning level maps and information. In addition to the efforts discussed in this document, the programmatic approach used for Clark County, Nevada and 1,100 miles of rights-of-way (ROW), and an estimated 14,700 acres of material sites, and over half of the state for Nevada DOT is notable. The 30 year multi-species habitat conservation plan (MSHCP) covers the Desert Tortoise, 78 non-listed species, and another 154 non-listed species on secondary lists that may be added later. The impact analysis and plan development made use of “best available data,” as allowed, rather than requiring additional surveys or estimating numbers of take of individual species. The potential for incidental take of each species was estimated as the proportion of the known population, range, or potential habitat for the species within areas unmanaged for natural resources (UMAs)—including highway ROW—although it was not expected that all of these areas would be affected.

Identifying Sources of Best Available Data and Existing Data Sets

DOTs and resource agencies have used existing data sets to precede with programmatic advance mitigation efforts in multiple states. DOTs and partners can access knowledge about natural resource restoration and conservation needs and priorities:

- ***Ecoregionally*** from Conservation Plans developed by non-governmental organizations operating in multiple states, such as The Nature Conservancy. TNC's plans are developed with broad input from agency environmental professionals and university researchers. DOTs and partners may convene such expert groups to guide decisionmaking on a corridor level or statewide.
- ***Statewide*** from Natural Heritage Program datasets for occurrences of rare species or from State Wildlife Conservation Plans being developed by state Departments of Natural Resources (DNRs).
- ***Locally*** from wildlife management professionals, conservation groups, watershed plans, and local or regional planners.

Once environmental data is developed, means must be found to maintain and distribute the data, if it is to be used in ongoing fashion.

[NatureServe](#) maintains data on plants and animals collected by State Natural Heritage Programs (NHPs). NatureServe's biodiversity data model reflects a set of inventory and data management standards and protocols referred to as the [natural heritage methodology](#). The GIS data and software utilized by the programs includes geo-referenced element-occurrences, with location and bounds of a species population or community stand, sites of ecological, scientific, or conservation interest, and areas under protective management. NHPs offer assistance to DOTs in developing landscape-scale analysis and mapping, classifying habitats, performing rapid ecological assessments, and assessing viability of species and populations.

Vegetational classifications are the basis for most species associations and prediction of potential habitat. The [U.S. National Vegetation Classification](#), a component of the International Classification, was developed by The Nature Conservancy and NatureServe in collaboration with partners from the academic, conservation, and government sectors. FWS has adopted its use, by [memo from the Director](#). On the agency's website, FWS states:

The usefulness of a standard method for classifying and mapping vegetation has been apparent to natural resource agencies for some time. The problem has been to agree on a standard in as diverse an area as vegetation in the United States. The National Wetland Inventory maps form the wetland vegetation standard, and have been a model for a terrestrial standard. The classification is performed in layers; both land forms and vegetation are used. The National Vegetation Classification System (NVCS) was circulated for review by the Federal Geographic Data Committee. This standard has been tested by the National Biological Survey, the National Park Service, and the U. S. Fish and Wildlife Service (FWS) at various locations. It was originally proposed by UNESCO, has been adopted and updated by the Nature Conservancy, and is being used in the GAP program.

While some states have made huge investments in environmental GIS systems, [Gap Analysis Programs](#) (GAP) in each state have created GIS databases on vegetation, species, land ownership and management. Coverage is now available for 40 states and datasets are being improved all the time. In 2004, GAP program staff met with FWS to incorporate improvements to maximize use of the data and analyses for purposes of administering the ESA and project ranges of listed species.⁸⁹ U.S. Geological Service (USGS) also has a [Land Cover Characterization Program](#), a consortium of federal agencies that developed and have updated a comprehensive land cover database for the nation called

[NLCD 2001](#). [The National Biological Information Infrastructure](#) (NBII) is a broad, collaborative program providing increased access to data and information on the nation's biological resources. Regional nodes are in place for ten area of the United States. New USGS GIS tools, such as GEODE, allow real-time updating of land use changes.

According to NatureServe, whose member NHPs update and continue to refine the data on vegetational communities, the Biotics 4 system offers “the first such consistent classification on a scale fine enough to be useful for the conservation of specific sites” and now includes more than 4,500 vegetation types. NatureServe is building on this work by developing an [ecological systems classification](#), useful for:

- Determining which community types are intrinsically rare or have been severely degraded by human activities.
- Identifying the best remaining occurrences of natural communities across their geographic ranges.
- Conservation planning at multiple scales—local, regional, ecoregional.
- Mapping parks and natural areas in order to manage them more wisely.
- Predicting species occurrences across entire ranges.

Access to site-specific information is regulated by the state NHPs. NatureServe Vista software is a [decision-support system](#) for integrating biodiversity information into development and conservation planning. It can be used to identify the most ecologically sensitive areas that should be conserved, and those places where development presents fewer conflicts. It can then be used to assess the positive or negative implications for the environment of alternative land-use scenarios or highway alternatives. Vista may provide data for direct discussion and decisionmaking or for data input to transportation corridor route optimization and scenario planning tools, such as Quantm, used on portions of the I-69 corridor through several states. [CAPS](#), a computer software program developed by the University of Massachusetts, is designed to assess the biodiversity value of every location based on natural community-specific models, and prioritize lands for conservation action based on their assessed biodiversity value in combination with other data relevant to their prioritization. The tool has been used to evaluate the indirect impacts of proposed highway projects on habitat and biodiversity value for aquatic and wetland communities within the context of other development in the area.

Supplementing Best Available Data With Expert Input, in Efficient Fashion

Expert teams can be used to leverage the best available data in a local area or ecoregion. The Forest Service and TNC have each developed rapid consultation formats where the sponsor assembles best available data for efficient analysis by teams of experts. States also incorporate consultation with experts to analyze existing data and use professional best judgment to answer key questions for programmatic, advance mitigation approaches. These may include:

- Assessment of species range based on vegetational communities
- Identification of wildlife crossing sites
- Identifying good sites for conservation or restoration.

For example, as part of [CDOT's Shortgrass Prairie Initiative](#), experts were shown maps from GIS analyses of existing data and assisted in establishing current range, potential for impact, risk to

species over time, and what actions would most benefit the species in question. Experts met in taxonomic groups to consider the following questions pertaining to at-risk target species:

- How much of the habitat affinity types are likely or known to be occupied by the species? Would we expect that this percentage would change over time? Experts assisted in estimating species ranges, if needed, based on vegetational associations and their knowledge based on research and field work.
- Would the range of project types under consideration be likely to impact the species? To what extent could that impact be predicted?
- What is the sensitivity/severity of impact?
- How severe is the impact?
- Can impacts be replaced or reversed?
- Would species specialists rather see mitigation on-site or off-site? What is going to create the best scenario down the road to minimize or preclude listing?
- Could greater species viability be achieved with focused conservation investments?
- Are there priority conservation areas where viability would be more guaranteed?

Using Existing Regional Ecosystem Conservation Plans

The fastest and often the most scientifically valid way to identify answers to mitigation/conservation siting questions is often to identify and examine existing natural resource conservation or restoration plans. While FWS and NOAA Fisheries are required to develop recovery plans for listed species, much remaining regional planning is voluntary or occurs per state law. In a few states, watershed restoration planning is performed systematically, on a statewide basis. Special Area Management Plans (SAMPs) may be developed by the Corps in areas of special environmental sensitivity under intense development pressure. In other cases, local governments or water management districts may perform some watershed or green infrastructure planning. Given the lack of regulatory mandates for natural resource planning, in the past a significant portion of conservation planning has been formed by non-profit, non-governmental conservation entities. However, increasing availability of GIS data, advocacy by environmental organization, and established conservation planning processes have facilitated greater assumption of responsibility by state resource agencies. Watershed restoration or species recovery plans may constitute the first and best source of information. SAMPs and recovery plans are developed by regulatory agencies and thus have their buy-in from the start.

Federally Developed and Approved Resource Plans

Special Area Management Plans are a comprehensive aquatic resource plans to achieve a balance between aquatic resource protection and reasonable economic development, with the explicit goal of guiding the 404 permitting program. The two main goals of the SAMP process are to establish a watershed-wide aquatic resource reserve program, and to minimize individual and cumulative impacts of future projects in these watersheds. The SAMP process allows the Corps to take into account indirect and cumulative effects on aquatic resources in a way not possible on a project-by-project basis, in order to identify priority areas for preservation and potential restoration, and determine the least environmentally damaging locations, in advance, for proposed projects. The Corps has developed sophisticated planning level wetland delineation and landscape level functional assessment tools, which are described in more detail in the section on “Developing a Crediting Process.”

Recovery plans are developed by NOAA Fisheries or the U.S. Fish and Wildlife Service, for listed species. As habitat loss and degradation are large factors in species' declines, habitat conservation in areas that contribute to the long-term sustainability of viable populations often emerges as a high priority action item in recovery plans. Even when recovery plans have not been developed, FWS and NOAA Fisheries have less formal recovery strategies or recovery outlines that can be shared and/or requested by other agencies; one of their main functions is to guide section 7 consultations.⁹⁰

In general, recovery plans will address the following questions, which may subsequently assist in identifying areas for mitigation/recovery investments. Interim recovery planning guidance includes these questions as "prompts" in developing a recovery plan.⁹¹

Biological Assessment

- How many extant populations appear viable?
- What intrinsic biological factors are limiting to the species recovery?
- Is habitat quantity or quality a limiting factor?
- Is available habitat at carrying capacity? Can potential habitat be identified?
- Is much known about the species' response to management interventions?
- What is the appropriate scale for evaluating and managing species? (e.g., species, population, management unit?)

Threats Assessment

- What threats require the most immediate response?
- What threats are most intransigent?
- Do individual factors have potential for causing further declines or preventing recovery?
- Are some threats, such as climate change or acidification of streams/lakes, beyond the scope of a single-species recovery effort?
- Which threats are rangewide and which are local?
- If threats to habitat are a key listing factor, what are the opportunities for protection?
- Overall, to what extent can the threats facing the species be reduced or eliminated?

Conservation Assessment

- Has any recovery-related research been conducted?
- To what degree have key populations and their habitat been protected?
- Is management of the species and/or its habitat underway? What management measures have been effectively employed for the species?
- Have any conservation measures pursuant to section 7 or 10 been identified?

Recovery Vision

- Does recovery mean that there can be fewer than the number of currently known populations if the remaining populations are fully protected and managed?
- Does recovery include expanding the current range of the species? Increasing the number of populations?

- Does recovery mean the species will live in a threat-free environment, and if not, which threats must be eliminated and which reduced to achieve recovery?
- How much protection, of what types, will be necessary to ensure the species long-term viability after delisting?

Action Plan

- What actions will advance recovery toward the vision?
- What actions should begin immediately?
- What actions can the Service initiate?
- How can it be ensured that section 7 or 10 determinations will not preclude recovery options for the species?
- For multi-species or ecosystem plans, how will each species fit into the larger strategy, and what actions are needed for individual species?
- What actions will address the ESA mandate to conserve the ecosystems upon which species depend?
- What actions are needed to gain and maintain stakeholder support?

As “the preliminary recovery strategy involves preliminary decisionmaking on a regionwide basis,” it constitutes “a valid biological context for making critical habitat and ESA section 7 and 10 determinations,” and includes a vision for recovery – that vision and the resulting action plan can guide section 7 off-setting actions for conservation/recovery of the species.⁹²

The most recent recovery guidance developed by the Services (though only formally issued by NOAA Fisheries thus far, in October 2004), also allows adoption of other existing plans, such as those developed by states or non-governmental conservation organizations; the Services may supplement such guidance by developing any sections that are missing, to bring the conservation/recovery plan up to Service standards. With that said, recommendations in the guidance to improve Service recovery plans track closely with elements already required in the ecoregional conservation plans of The Nature Conservancy (TNC); a 2002 Society of Conservation Biology Study of FWS Recovery Plans praised more frequent use of “scientific tools, such as population viability analysis, adaptive management, and meta-population analysis” and a primary area identified as needing further improvement was explicitly addressing and monitoring threats. TNC’s plans and conservation site/portfolio monitoring take this approach. Recovery plans should be used to guide the development of conservation actions that can be incorporated into project designs in an effort to off-set adverse effects.

State, Local, and NGO-Developed Restoration/Conservation Plans

[The Nature Conservancy](#) (TNC) has been developing ecoregional conservation plans throughout the U.S. since the late 1990s. Some examples include the [Wyoming Basins ecoregional plan](#), the [Osage Plains/Flint Hills Prairie ecoregional plan](#), and the [Cumberlands and Southern Ridge and Valley ecoregional plan](#). The [Southeastern Ecological Framework Project](#) identifies ecologically significant areas and connectivity across eight southeastern states (Florida, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, and Mississippi.) TNC plans, which draw on data maintained by state Natural Heritage Programs and a consultation process with agency staff and other experts in all taxonomic groups, provide a basis for state planning and partnerships with others, both in development and implementation. State DOTs and DNRs have utilized TNC and NHP plans

and analyses as part of state efforts to identify ecological “hotspots” and target mitigation/conservation investments.

[GreenPrint plans](#) developed in conjunction with the Trust for Public Lands are being used by state DOTs. The Maryland State Highway Administration (SHA) is working with local jurisdictions and watershed groups around the state to realize watershed goals and restore stream segments, and contribute to the state’s green infrastructure at the same time. Maryland has two million acres of ecologically significant land that has not been developed, of which almost three-quarters are unprotected. [Maryland’s GreenPrint program](#) conducts planning to preserve the state’s remaining natural resources and to create an extensive, intertwined network of conservation lands. SHA’s planning, environmental, and design staff are able to reference GreenPrint databases and watershed plans in avoiding, minimizing, and mitigating for unavoidable impacts from transportation.

In order to ensure that states are making strategic investment decisions and working effectively to prevent additional species from becoming endangered, Congress mandated that each state prepare a [Comprehensive Wildlife Conservation Strategy](#) by October 2005. Of particular interest to transportation agencies, the plans will include the “distribution and abundance of wildlife species” and “descriptions of locations and relative condition of key habitats and community types,” with areas prioritized for conservation throughout the state. Transportation agencies will be able to draw upon GIS coverage in the planning stage. Information on the [status of and contacts for conservation planning efforts in all 50 states](#) is available on-line and is a good source of conservation action areas for target species and ecosystems. Such plans supplement the services’ recovery plans for listed species and recovery outlines (available to other agencies when recovery plans have not yet been developed.)

Regional conservation plans proactively identify conservation of areas large enough to include whole communities of plants and animals in properly functioning ecosystems. Increasingly, conservation plans are being developed on a metro regional basis. Examples include the [Sonoran Desert Conservation Plan](#) for Pima County, Arizona, Portland Metro’s [Fish and Wildlife Habitat Protection Plan](#), and the Regional Environmental Mitigation Plan for Sarasota County, Florida. The Chicago Wilderness’ [Biodiversity Recovery Plan](#) guides restoration and management of natural systems in the Chicago region. Habitat Conservation Plans may be developed on a municipal or regional basis, and DOTs may contribute to their implementation.

A number of local watershed conservation groups are using the Center for Watershed Protection’s Rapid Watershed Planning approach, based on visual assessment methods, and Rapid Stream Assessment Technique (RSAT), incorporating chemical, physical and biological indicators in order to assess stream corridor health. Specifically, RSAT looks at channel stability, channel scouring/deposition, physical instream habitat, water quality, riparian habitat conditions and biological indicators (macroinvertebrates).

Improving Biological Information Management and Decision Support By Accessing Existing Site Analyses

Whereas past on-site survey information has been collected by the DOTs (or other agencies), too often the information is in filing cabinets. All agencies can benefit from more systematic ways to record and share the information, that are easier to use and build upon, and less vulnerable to institutional loss of memory through retirement or turnover. The following efforts are underway in various agencies, and may be drawn upon by others:

- The interagency Mitigation Action Plan includes an effort to compile and disseminate information on existing mitigation tracking databases. The Federal Interagency Mitigation

Workgroup is partnering with the Association of State Wetland Managers (ASWM) to develop an [inventory of state wetland permit tracking databases and state wetland GIS data](#). An automated information system to collect information on the Section 404 regulatory program is being deployed this year in [certain Corps districts](#) and can track regulatory actions, acres of impact by wetland type, and mitigation type and acreages. The system has a basic built-in GIS and will support a more sophisticated GIS and the exchange of information among regulatory agencies, states, the public and others. Over the long term, implementation will provide the capability to track wetland and mitigation trends and will also support a watershed-based approach for the review of regulatory actions.

- FWS has developed a database structure for existing BOs, to help assess cumulative impacts to species' baselines, but the agency currently lacks the manpower to have the data entered.
- Some DOTs are improving their internal environmental information management and decision support capabilities. For example, Caltrans is implementing a document tracking system that is anticipated to include existing biological reports, scanned and geo-referenced to enhance access.

Identify Potential Mitigation Needs Associated with Transportation Improvements

Avoiding impacts and estimating potential unavoidable impacts entails identifying where planned projects are (or the existing alignment is) in relation to areas of high ecological importance and identifying the adverse environmental implications and potential solutions as early as practical. It may involve presuming presence of species that may be impacted through habitat loss or otherwise, and making an estimate of potential impacts to all natural resources, so that the widest set of mitigation options may be considered, including opportunities to leverage investment and address multiple species, ecosystem, and watershed needs.

DOTs are pursuing a variety of different approaches to estimating impacts and tabulating mitigation needs. Primarily impacts are assessed by overlaying a highway corridor (using the highway right-of-way or a buffered highway alignment) with vegetational communities and making species' associations. GAP and other landcover, vegetative base maps have been useful in developing the National Wetlands Inventory and watershed restoration plans.

DOT-Provided. Examples of four general types of DOT estimating approaches are provided here, programmatic GIS overlay, NEPA Tier I GIS analyses, financially-based projections, and an iterative process.

North Carolina DOT provides EEP an annual Project Impact Report of all anticipated wetland, buffer and stream impacts by year for seven years into the future for each 8-digit watershed and according to TIP project number and/or NCDOT Division operations impacts by year. For anticipated wetland impacts, the units are acres of riverine, non-riverine and coastal marsh; for buffers, the units are square feet; and for streams the units are linear feet. No further wetland type assessment is used or required. Quarterly updates are submitted throughout the year. NCDOT's initial forecasts are made from vegetation and landcover data layers; when more detailed information is available from technical reports in NEPA documents that data over-rides; by the minimization stage, approved permit drawings are available. Thus far, NCDOT's estimates have been 25-30 percent over actual impacts, in part due to further project-specific avoidance and minimization; NCDOT avoids and minimizes to the maximum extent practicable before NCDOT is permitted to go to EEP to mitigate for unavoidable impacts. In accordance with DOT-DENR's [Memorandum of Agreement](#), EEP is responsible for forecasting the amount of compensatory mitigation required to satisfy the annual certified impacts. Based upon the goal of providing a 2:1 ratio of restoration

mitigation to impacts, EEP determines the amount of restoration mitigation that it must obtain by doubling the impacts and grouping them by geographical area. The timing for implementing the mitigation is detailed in Section X of the Tri-Party [Memorandum of Agreement](#) entered into by NCDENR, NCDOT and Corps in 2003.

Maryland State Highway Administration (MDSHA), Texas DOT (TxDOT), Wisconsin DOT, and Indiana DOT (INDOT) are among the states who have used GIS overlays as part of a Tier I NEPA analysis to identify environmental hotspots for avoidance and minimization and estimate mitigation needs over a long corridor. TxDOT used an existing EPA model that draws upon commonly available environmental data and gives ranking for land cover diversity, rarity, and ecological sustainability. These three summary layers may be further combined to give a composite analysis of ecological “importance,” helping to avoid critical areas and providing estimate of potential mitigation needs. Advance mitigation options are being explored. Wisconsin DOT’s Tier I analysis estimated environmental impacts and identified bank sites for 475 acres of compensatory mitigation. Indiana DOT’s Goose Pond mitigation site will serve as advance mitigation for the I-69 corridor.

Oregon DOT made mitigation estimates for the next twenty years off of estimates from past year’s expenditures and an estimation of future transportation demand, based on urban areas and population growth. ODOT staff estimated the likely proportion of projected STIP project cost that is attributable to internal mitigation planning and design efforts for ODOT FTEs. Past region budget activity codes relevant to potential mitigation site work (i.e., wetland delineation reports, preliminary wetland mitigation plans, etc.) were evaluated. Where larger categories existed, estimates of a general percentage of the activity code were made. In regard to the bridge program, ODOT looked at a dozen bridge projects, located in rural areas, and estimated mitigation need based on the effects considered appropriate for programmatic wetland permitting. Oregon DOT’s financially based estimate of potential mitigation needs came to approximately \$22 million (for 3 of 5 ODOT Regions) for the 20-year period.

Colorado DOT ‘s Environmental Planning Manager describes an iterative process of mitigation needs and conservation site identification: “these processes are somewhat interactive - site surveys may inform population estimates which may inform modeling which may require site specific surveys which require a willing property owner...”⁹³ Advance mitigation efforts have employed expert workshops, population modeling, ecosystem and habitat quality modeling and assessments, and site surveys, and have been open to early identification of mitigation opportunities. With regard to wetlands, CDOT assesses function in relation to watershed needs and matches impacts with opportunities.

Partnership with State Natural Heritage Program. The Colorado Natural Heritage Program estimated the impacts from CDOT’s entire transportation program, over a 20 year period, on the eastern shortgrass prairie. CDOT’s 20-year plan anticipated safety, reconstruction, capacity, and other transportation improvements for 22 percent of the highway network in Colorado’s central shortgrass prairie based on funding. Overlay projects were identified as having minimal impacts. New alignments were precluded, because the analysis and estimated mitigation area was based on a buffer of vegetation types around existing roads. As any new alignments would occur in unknown territory, by definition the analysis was not able to accommodate these.

Over a hundred potentially declining species were considered for inclusion in the impact analysis, a list that was narrowed based on potential for impact by CDOT transportation projects, maintenance actions, and bridge replacements and potential for the species in question to be listed as threatened or endangered under the Federal Endangered Species Act. The initial list of species was developed and reviewed by the Director of Conservation for The Nature Conservancy of Colorado, Colorado

Natural Heritage Program (CNHP) biologists, the FWS Colorado Division Manager, and the Colorado Division of Wildlife's Endangered Species Manager. After all existing information was collected and assembled in a geographic information system, CDOT and CNHP met with the top bird, mammal, amphibian, reptile, plant, invertebrate, and fish experts in the state, individually and in groups to gather input.

There were two primary components to the impact analysis: 1) identification of range and distribution and 2) calculation of impacted acres based on defined impact zones. If a species was known to utilize a given vegetative community for any part of its life cycle, the species was presumed present with potential for impact. The impact assessment treated all highway ROW as habitat, regardless of quality or presence of individual species in any particular place, and irrespective of current maintenance practices such as mowing and spraying which degrade the habitat.

According to interagency discussion and decision to use best available data, the analysis was conducted using existing GIS data only, supplemented with consultation with widely recognized experts in each taxonomic group (herpetiles, birds, fish, mammals, invertebrates, and plants) on range and distribution for each species. Current understanding of range and distribution was mapped as "assumed presence." Experts provided guidance and direction on the types of impacts that might be expected from routine highway maintenance and reconstruction on the existing network. This guidance was used to conservatively estimate "impact zones," or spatial representations of assumed impact that can be used to calculate total impacted acres of habitat for each species.

The parties realized that in many cases, most of the "impacted" area—which consisted of the entire ROW—would not be permanently impacted by the CDOT/FHWA action, and in the case of less impactful projects, might not even be affected. Thus the allowed 1:1 mitigation was de facto much higher; very small permanent habitat losses are compensated by very large scale preservation of functioning ecosystems.

University Partnership. Caltrans recently contracted with UC-Davis to develop integrated mitigation need summaries by region, over a ten year time horizon. The project will investigate a variety of past Caltrans mitigation projects to summarize outcomes and compare to costs. Approximately 30 upcoming Minor to Capital projects in each district will be analyzed as well. The analysis will include projects from all 12 Caltrans districts from at least the past 10 years. The effort will identify existing programmatic agreements and mitigation/conservation banks available to Caltrans and work with and make improvements to Caltrans' existing BioMitigation (Access 97) database. UC-Davis will develop long-range (10-year) plans for biological needs for each district. This could include studying a pilot highway corridor to determine mitigation needs based upon ultimate build out. Estimates on the cost-benefit of potential land cover and habitat classification data development will be developed.

Partnership with Regional Planning Organization. The TRANSNET ballot measure for the San Diego Region Impacts estimated mitigation needs from improvement of various transportation corridors, based on vegetation associations with species. Estimated acreages were then associated with general cost values based on whether the area was coastal or inland, wetland or upland. Using mitigation ratios from Habitat Conservation Plans that have been previously developed in the region, ratios varied from 1:1 to 5:1. Several routes are in extremely sensitive areas already set aside as reserves; there the projects are charged with generating a net biological benefit, which partners have agreed will be accomplished by substantial off-site conservation investments and construction of crossings, to ensure the highway does not preclude habitat linkage.

The Sarasota County, Florida Regional Environmental Mitigation Program used GIS overlays of wetlands, vegetational communities, and species range mapping to estimate impacts within expected ROW of projected roadway projects, based on a 20-year projection of State and County projects in Sarasota County. Widening of existing alignments are a primary portion of the program, and thus the projected need for land acquisition and mitigation credit was considered “fairly accurate.” FDOT projects are expected to use and reimburse the mitigation bank.

Partner to Identify Sites for Ecological Action

Mitigation/conservation site identification efforts by DOTs generally include a review of banks available in the needed areas, at the outset of the analysis. However, cost is a practicability consideration. Especially when existing mitigation banks are not available, adequate, or cost-effective, DOTs investigate potential restoration or conservation sites in partnership with other agencies and conservation organizations.

To supplement and guide use of watershed plans, the Corps, EPA, and partner agencies have been developing guidance on siting according to a watershed approach. Already developed are [guidance on off- or on-site, in or out-of-kind compensatory mitigation](#), [guidance on the use of preservation as compensatory mitigation](#), and [guidance on the use of vegetated buffers as compensatory mitigation](#). Given the increased flexibility to utilize preservation, the resource agencies have directed:⁹⁴

- The preserved component should be selected after consideration of watershed objectives, as well as current and future watershed activity.
- Where possible, preservation efforts should also target lands that coincide with governmental or non-profit land acquisition and conservation programs.
- Where possible, preservation projects should attempt to protect lands in or adjacent to areas of national, state, or regional ecological significance in order to build on large contiguous land areas.
- Where possible, preserved lands should provide connectivity to other systems and take advantage of refuges, buffers, green spaces, and other preserved elements of the landscape.
- Preservation may provide a suitable mitigation option when the lands to be preserved are considered to be difficult to acquire parcels and would not likely be preserved by federal, state or local acquisition programs. An example of a difficult to acquire parcel may include coastal wetlands or other parcels in rapidly developing areas where the price of the land may inhibit future acquisition.
- Preservation parcels should be permanently protected with appropriate real estate instruments (e.g., conservation easements, deed restrictions, transfers of title to Federal or state resource agencies or non-profit conservation organizations) and include assurances that the supporting hydrology will also be protected in perpetuity.⁹⁵

DOTs have contributed to watershed planning in states such as Virginia and Washington for many years. Preservation partnerships have conserved some of the most difficult to protect and difficult to restore wetland types. Georgia DOT and Mississippi, for example, saved bottomland hardwood forests from imminent logging threats. In Georgia, the protected sites were conveyed to the Altamaha Bioreserve. In Mississippi, MDOT’s purchase of a large contiguous block of bottomland hardwood forest in the Pascagoula River watershed extended a state wildlife management area and the Sandhill Crane National Wildlife Refuge, providing a vital link in what will be a 47,000 acre public lands corridor along the largest dam-free and unchannelized watershed in the lower 48 states,

protecting rare habitats and plants in the process. Wetland mitigation credits were acquired at \$2400/acre, with management in perpetuity.⁹⁶

From FWS's standpoint, the important point in establishing a conservation bank is to site banks in areas where viable communities can be preserved, where fragmentation of habitat can be reduced, and where management measures can address other threats that a species might encounter, including invasion of non-native species or disruption of natural disturbance regimes.⁹⁷ Considerations may include location, adjacent existing and future land uses, habitat quality, and current species use of the area.⁹⁸ In general conservation biology principles suggest that conserving large, unfragmented habitat blocks is desirable to reduce the edge effect in a reserve network and to help maintain viable populations. A conservation bank could be large enough to maintain a viable population within its boundaries or be situated in a strategic location that would add to an already established conservation area, or connect two priority areas.⁹⁹

State DOTs are now contributing to and developing sophisticated tools for conservation site identification, or partnering with other conservation entities that develop and implement these approaches. For wildlife conservation and joint wetlands-wildlife efforts, the following tools and approaches to identification of priority mitigation/conservation areas have been utilized:

Florida's Ecological Network/Greenways Plan and FDOT's Environmental Screening Tool. A decade ago, the state of Florida compiled a statewide plan which identified lands that must be conserved in order to sustain declining wildlife species and natural communities. The report, *Closing the Gaps in Florida's Wildlife Habitat Conservation System*, assessed the status of species and habitat comprising Florida's biodiversity. The project mapped two categories of strategic land: areas that were already under some form of conservation protection (20 percent of the state's area), and areas that needed additional protection (an additional 13 percent). The first statewide conservation program of its kind, *Closing the Gaps* built upon a sophisticated process with a strong scientific approach. Notably, it included the assembly and analysis of numerous data sets and assessments of focal species and population viability. Florida DOT helped support the development of the extensive wildlife occurrence and habitat geographic information system database, which is used in roadway alignment analysis and impact assessment. *Closing the Gaps* has played a key role in guiding land acquisition decisions, and since publication in 1994, the state has acquired 20 percent of the previously unprotected strategic habitat areas.

Currently, analysis of ecological connectivity and identify areas with priority conservation/landscape linkage significance is conducted through the Florida Game and Fresh Water Fish Commission and the Florida's Greenways program. The objective of the statewide greenways program is to establish an ecological network of green infrastructure to reduce wildlife mortality and restore connectivity to the landscape by restoring natural processes as they originally occurred across the landscape (e.g., wildlife movement and migration, flood, and fire). The proposed network includes habitats for target species, priority ecological communities, wetlands, roadless areas, floodplains, and important aquatic systems. The Florida Greenways Ecological Network includes half of the state's land area, with half of that land already in public ownership.¹⁰⁰

As part of FDOT's DOT's updated environmental policy, approved in February 2002, the agency committed to cooperate in the state's Greenways Program of land acquisition and management through identification and prioritization of important habitat connections. Where alternative mitigation strategies permit, FDOT will support land acquisition activities to help achieve this ecological infrastructure, and will utilize methods to preserve, enhance, and protect trees and other vegetation as valuable natural resources consistent with ecosystem management principles. FDOT

designs habitat mitigation to be assumed by the Florida Game Commission or the Department of Environmental Protection, which has prioritized conservation lands for protection.

The Florida Greenways Commission Ecological Network is also being used in some metro regional partnerships in conservation site identification. As part of their Regional Ecological Mitigation Plan, Sarasota County developed a mitigation model that ranked undeveloped sites across the county based on suitability for wetland creation/enhancement mitigation, regional significance for wildlife, water quality improvement potential, cost per acre, recreational opportunities, proximity to wetlands/waterways, suitability of soil types, and connectivity to greenways and wildlife corridors in the state.

Advance mitigation is increasingly a component of the state's Efficient Transportation Decision Making (ETDM) process as well. While the Environmental Screening Tool was designed for ETDM and to be applied to major projects, some FDOT districts are beginning to use the tool to identify mitigation needs and potential conservation sites in advance. Wetland restoration site identification and wetland mitigation are handled on an ILF basis through the state's water management districts, which develop and implement watershed management plans, and contract and manage restoration activities.

Oregon DOT's Ecoprovince Priorities and Site Selection Tool. In developing its statewide advance mitigation program and estimated transportation program needs over the next 20 years, Oregon DOT has pursued a functional replacement methodology. To maximize the benefit obtained from regional banking projects, the Oregon Mitigation and Conservation Bank Review Team (MCBRT) focused its efforts on regional trends as they pertain to wildlife species, wildlife-habitat types, wildlife functions, and land use activities. Using this trend information, a list of Ecoprovince Priorities was developed for each region of the state (determined upon the grouping of hydrologic units at the 3-digit Hydrologic Unit Code (HUC or basin level). A key element in the analysis was identification of native habitats that have experienced the greatest change or loss over time and identification of focal habitats required to support listed or other species of concern, for each ecoprovince.

Oregon DOT's Comprehensive Mitigation and Conservation Strategy (CMCS) integrates wetlands mitigation with habitat conservation and allows impacts to be evaluated at the ecosystem level and uses a single accounting system for assigning mitigation credit and debit across all agencies. Habitat management areas and actions will be designed to provide meaningful benefits to species and resources affected by projects:

- Landscape-level analyses will be used to identify locations (both at the site scale and watershed scale) where greatest benefits would be realized, to concentrate establishment of habitat management areas and actions in those locations, and to set action priorities.
- Benefits will be commensurate with the impacts from included projects and focus on "in-kind" compensation. However, there will be some accommodation of tradeoffs in light of opportunities to achieve higher-priority conservation objectives. These tradeoffs and opportunities will be identified through use of the CMCS methodology, consultation with the Services and other CMCS stakeholders, consideration of conservation objectives contained in recovery plans and other formal conservation strategies, and in accordance with applicable policies and regulations. In general, the greatest benefits will be realized by species/resources most impacted by projects (in terms of amount and/or significance of impact) and by those most "at-risk" within the subject ecoregion.
- To accommodate risk of failure associated with some habitat projects and in recognition of the long periods of time sometimes necessary for successful habitat projects to provide

desired function or conditions, ODOT may apply correction factors or ratios to the compensation targets for included projects, as necessary.

- For conservation, ODOT will focus on selecting larger, contiguous blocks of habitat, and habitat that is already highly functional or with the greatest potential to be quickly and successfully restored or enhanced. Selected areas will be located and buffered such that desired functions and values are not likely to be significantly reduced by the direct or indirect impacts of management on the adjacent/proximal landscape. Adjacent/proximal land use and land management will be accounted for in the assessment of functional site value.
- Habitat management areas will be secured and protected on a permanent basis, using the legal and procedural tools best suited to doing so. State or Federal ownership of title, and permanent easements and title restrictions will be preferred. Strategies and assurances related to the funding and feasibility of long-term management and maintenance will also be provided.

Oregon DOT developed a functional profile for each ecoprovince, identifying the functions performed by species in the ecoprovince and how those functions have changed over time, including redundancy and functional performance that has been lost, and hence resilience or sustainability. Ecoprovince Priorities provided a means to capture regional ecological conditions and needs during bank site selection, design, and management process, driven by the desire to understand how bank-specific actions contribute and fit within a landscape context. The ecoprovince priorities were developed to better inform decisions regarding out of kind, off-site mitigation and provide guidelines to improve the mitigation/conservation bank site selection, planning, design, and management process. In the event that bank-specific circumstances or agency needs are in conflict with the Ecoprovince Priorities, bank-specific concerns are resolved by the interagency review team and elevated if necessary.

ODOT's Site Selection Tool (SST) is a sequential, procedural tool with four objectives: 1) to guide the consistent collection of appropriate data when researching potential banking sites, 2) to facilitate documentation of the site selection process, 3) to inform decision-making regarding the final selection of regional mitigation/conservation bank sites, and 4) to help the resource agencies verify that siting decisions support agency mitigation and conservation policies. The SST is separated into four components.

- Analysis of a site's baseline conditions, including the current and historic biotic, abiotic, legal, and land use conditions of the property as well as surrounding sites.
- Analysis of the site's mitigation/conservation potential (i.e., specific mitigation/conservation opportunities available). This potential is analyzed and summarized by category (e.g., aquatic, wetland, etc.).
- Comparison of the mitigation/conservation opportunities presented at the site with Ecoprovince Priorities.
- Summary of the first three components and scores each of their primary characteristics. The output of this component is a numeric score that can be used to compare the subject site relative to other potential sites.

General categories addressed and scored in the SST include: 1) Mitigation/Conservation Opportunities, 2) Long-term Viability and Maintenance, 3) Opportunities for Public Involvement, 4) Environmental Uplift Potential, 5) Conservation/Preservation Potential, and 6) Compatibility with Ecoprovince Priorities. These are assigned a numeric score based on a "yes", "no", or "maybe"

answer, based on an assessment of whether desired functionality could be provided at a site. The category scores are summed and “weighted” on a scale of 0 to 1. The method can be used for selecting sites for an individual species as well as sites that have the potential to service many species, wildlife-habitat types, and/or wetland types.

North Carolina DOT funded and co-developed the Ecosystem Enhancement Program (EEP) to site and implement mitigation needs that NCDOT has, after project level avoidance and minimization. EEP was located at the state Department of Environment and Natural Resources, where it was integrated with the state’s watershed restoration program and basinwide planning. The EEP evaluates a variety of data and information on water quality and habitat conditions in each river basin to select Targeted Local 14-digit Watersheds where there are significant stressors, needs, and/or opportunities for restoration, enhancement, or preservation projects.

Water Quality Problems and Land Cover: EEP targets watersheds with existing and potential water quality problems resulting from nonpoint source pollution. To make this determination, use support ratings, the 303(d) list, and water quality Basinwide Assessment reports are considered. EEP uses land cover data to evaluate riparian buffer condition to assess breaks to water quality and habitat degradation. Resource values considered in targeting local watersheds include public water supply, shellfish areas, outstanding or high quality resource waters, aquatic natural heritage elements, and regulated trout waters. As water quality studies suggest that heavily forested watersheds regulate stormwater runoff, thereby reducing the likelihood for severe streambank erosion, nutrient runoff and sediment pollution, EEP uses the percentage of cleared land in a watershed as an indicator of restoration need and opportunity.

Watershed Approach and Partnership Opportunities: North Carolina’s watershed approach advocates concentrating multiple water quality projects in one relatively small watershed to yield a greater cumulative benefit to water quality. EEP aims to tie wetland and stream restoration projects with other efforts such as agricultural best management practices (BMPs), stormwater controls, and riparian buffer preservation to restore or improve entire watershed functions, not just streams and wetlands. For this reason, EEP targets areas with existing watershed planning or protection initiatives already underway and assesses the potential for partnership opportunities at the local watershed scale. EEP reviews existing or planned Clean Water Management Trust Fund and Section 319 projects, and considers if a municipality is located in the watershed, as cities are considered to often own good sites for watershed improvement projects but lack the technical expertise and the resources to implement the projects. In addition, many cities are subject to Phase I or Phase II Stormwater Regulations and gather monitoring information that is useful in designing and measuring the long term benefits of restoration efforts.

Local Resource Professional (RP) Comments/Recommendations: The comments and recommendations of local resource agency professionals including staff with Soil & Water Conservation districts, the Natural Resources Conservation Service (NRCS), municipal planning and stormwater departments, NCDENR regional staff (e.g., Wildlife Resources Commission), and local/regional Land Trusts are considered heavily in the selection of Targeted Local Watersheds. Local resource professionals often have specific and up-to-date information regarding the condition of local streams, wetlands and riparian buffers. Furthermore, local RPs may be involved in local water resource protection initiatives (and the acquisition of funding for such projects) that provide good partnership opportunities for EEP restoration projects and/or Local Watershed Planning initiatives.

High Quality Preservation (HQP). To facilitate EEP’s “in-ground-prior-to-impact” goal during the two year transition period at the inception of the program, the EEP framers agreed that the use of

high-quality preservation, if properly controlled and managed, could be used to complement a 1:1 restoration program, where restoration could be completed after the two year transition. Strict criteria require that any site under consideration meet high standards for environmental quality, and/or contribute to broader environmental goals, and be under “demonstrable threat.” A minimum restoration provision of 1:1 is required to augment HQP acquisitions; however, the restoration can be delayed until the end of the two-year transition period. The provisions of the MOA also broaden the applicability of preservation credits to eco-regions, eight environmentally cohesive regions throughout North Carolina. This facilitates the purchase of larger and more environmentally important tracts of land that meet the criteria.

DENR established a partnership with the Conservation Trust of North Carolina (CTNC) to serve as the program manager for the preservation program. CTNC works with North Carolina’s 23 land trusts to identify, assess, and document the natural significance of potential sites and to work with land owners to secure conservation easements where applicable. In this capacity CTNC locates sites, makes land owner contact, develops initial agreements, at times finds supplemental funding, prepares site documentation, and provides the information to an EEP program contract manager. The actual land acquisitions budget for the preservation program is \$121 million for a three-year period. Continuation of the HQP program will be subject to negotiation after the transition period.

WSDOT’s advance mitigation process, called early environmental investment (EEI), is a corridor-wide process to identify, rank, select, design, and permit environmental investment opportunities to improve aquatic resources, fish, wetlands, water quality, and floodplains. WSDOT’s **watershed characterization efforts** for mitigation site identification have identified thresholds in impervious surface area, from land cover data. The findings have emerged from WSDOT’s broad analysis of mitigation sighting potential, aimed at making a tangible contribution to watershed restoration. To assist this effort, WSDOT is developing landscape-based approaches and tools to systematically examine ecosystem functions and identify core problems leading to degradation of water quality, increased peak flows, declining base flows, and the loss of anadromous fish habitat. Initial indications from WSDOT’s analysis suggest that restoration activities may generate the most benefit and have the greatest chance for success in watersheds with less than 20 percent impervious surface area that are still need in of restoration.

On the watershed scale, WSDOT determines off-site mitigation needs, characteristics of the pre-development landscape, current land use and future build-out, and the condition, location, and extent of aquatic and terrestrial resources and supporting ecological processes. WSDOT then identifies target areas for mitigation at multiple spatial scales. Within each spatial scale, WSDOT identifies the ecological processes necessary for and capable of mitigating project impacts. To qualify as environmentally desirable off-site mitigation, the potential mitigation site and local ecosystem processes must meet targeted threshold criteria, indicating high potential to maintain ecological functions over the long term. The process identifies priority recovery areas for each targeted resource (fish and wildlife, water quality, riparian, and wetland) and then identifies opportunities and priority areas for multi-objective mitigation. Land uses that alter or decrease the success of ecological processes that mitigation would seek to restore or enhance are a primary screen, prior to a comparative environmental cost-benefit analysis of candidate mitigation sites. From this, WSDOT is able to develop a defensible priority list of sites capable of mitigating project impacts and maximizing environmental investment.

WSDOT connectivity assessment. Building on research for the Snoqualmie Pass wilderness area, WSDOT and the Forest Service expanded a habitat connectivity model to examine over 125,000 square miles in Washington and adjacent portions of Idaho, and defined and linked important habitat factors (model parameters) for four endangered, threatened, or sensitive large carnivores: the gray

wolf, wolverine, lynx and grizzly bear. It is expected that the habitat connectivity patterns identified for these species will be important for a wide variety of other species as well. The study looked at needed linkages between large roadless areas and areas designated in recovery or management plans for these four species. Forest cover and human disturbance were found to be particularly important to animals in the selection of their dispersal routes. Based on land cover, road density, human population density, and topography, the study identified six concentrations of large carnivore habitat and highlighted four landscape linkage areas of potential importance for large carnivores, including three in Washington State, 11 miles on Snoqualmie Pass (WA), 141 miles in the Okanogan Valley (WA and BC), and 82 miles in the Upper Columbia River area. These results are being used to identify priorities for regional conservation planning and connectivity improvements.

Colorado DOT's wildlife linkage assessment involved partnerships with The Nature Conservancy, Colorado State University, and the Southern Rockies Ecosystem Project (SERP) to identify, prioritize, and gain resource agency approval of wildlife linkages for easy adoption into future transportation projects and the state's TIP. SERP identified both functioning and degraded wildlife corridors that are vital to wildlife populations, and evaluated the characteristics and existing conditions of each identified linkage. A second analysis layered spatial data about physical characteristics (e.g., topography, rivers and streams) with information about wildlife habitat preferences and movement patterns, to model landscape areas key to wildlife movement. Top priority areas for connectivity improvements via transportation projects are being identified.

Clark County, Nevada's Desert Tortoise Multi-Species HCP criteria for identification of priority acquisition areas included biodiversity and presence of rare species, potential for effective management and protection of ecosystem processes, quality/intactness of remaining habitat, linkage/adjacency to other areas protected or managed for conservation, size, and low presence of non-native and invasive species. Conservation areas were further sited in areas that could be practically managed for natural resource values.

Caltrans' has identified an individual in each District that will be aware of mitigation needs and opportunities and provide a connection with others in and outside the agency.

Identify State Funding in Advance of Projects

Traditionally, mitigation costs have been incorporated into construction projects or the construction contingency. Identifying and drawing upon funding in advance requires estimation of mitigation needs first, and then mobilizing funding to address those estimates and opportunities. In North Carolina and Oregon, the states' advance mitigation initiatives were the first comprehensive look at the overall cost of transportation project mitigation.

As discussed in the section of this report on Federal Transportation Funding, mitigation may be funded as a stand-alone project, a separate "Mitigation Project" purchase, or by purchasing environmental resources (mitigation credits) sufficient to offset future needs by a DOT through an advanced project mitigation planning or needs estimation process. Prior federal approval is necessary for the stand-alone "mitigation project," and upon approval of FHWA, the DOT may proceed with the project, purchase and/or development of environmental resources (mitigation credits). This alternative enables the DOT to immediately seek federal reimbursement upon completion and not have to wait for reimbursement from projects as they came online.

The same can be accomplished with state funds, either by providing an annual lump sum allocation or line item for implementation of mitigation projects, to be reimbursed from future STIP and Operations projects as need is identified through preliminary environmental and design work. As precise mitigation needs are identified and choices made, regarding on or off-site mitigation, the user

project would purchase or be charged for any required mitigation, that would be satisfied by all or a portion of the “Mitigation Project.” The amount to be charged to each user project in direct proportion to required mitigation and the cost of the “Mitigation Project.” Such approaches are sometimes called “revolving funds” because of funds are spent and then reimbursed later. A drawback of this approach is large mitigation efforts can deplete the fund for some time, especially if mitigation is implemented far in advance of projects, and reimbursement does not occur for many years. Federal reimbursement may occur, as appropriate, only on a project-by-project basis, and only when that project comes on line and if federal reimbursement is requested.

State Revolving Loan Funds and Dedicated Line Items for Advance Mitigation

A number of state DOTs have convinced their legislatures or senior administrators to fund advance mitigation revolving loan funds or annual line items for early mitigation by making the case that failure to meet environmental obligations and project-specific regulatory requirements in a timely manner results in project delays, increased costs (construction penalties and economic loss), greater regulatory scrutiny of future projects, and assessment of greater mitigation ratios resulting in higher costs. Solutions that maximize environmental returns while minimizing capital investment steward both types of public resources. Some of the methods used include the following:

- FDOT maintains a line item of \$5 million annually for advance or non-project specific implementation of environmental priorities. Previously FDOT allocated state funds for development of the Platte Branch multi-species conservation bank, which has been reimbursed by projects as credits were used. FDOT, through a fee/acre process authorized by the state legislature, advances funds to Water Management Districts across the state for design and implementation of wetland mitigation on a watershed basis. The current fee rate is close to \$92,000/acre. Significant portions of the latter program are accomplished through private, for-profit wetland mitigation bankers.
- WSDOT: The Washington State Legislature established an Advanced Environmental Mitigation Revolving Account (AEMRA) for WSDOT to do advanced mitigation efforts such as mitigation banking. This fund allows WSDOT to pay for the development of banks in advance of highway construction project money that will not be available for several years. As transportation projects within the bank service area go through permitting and identify their need for mitigation, WSDOT Regions can debit mitigation credits from the bank. As bank credits are debited, project money is used to reimburse the AEMRA account. The fund is mostly depleted at the current time.¹⁰¹
- CDOT set up a \$5 million revolving fund for advance mitigation, enabling stand-alone mitigation projects to be funded in advance and reimbursed by projects as those occur. The fund is mostly depleted at the current time.
- ODOT is looking at identifying funds allocated to each project for environmental compliance and accessing that upfront. Two million dollars in seed money has been set aside for a statewide banking program with an estimated \$22 million in needs over 20 years (6-8 sites).¹⁰² ODOT plans to use state funds, reimbursed by Federal aid projects as credits are purchased (i.e. a revolving fund).
- NCDOT provided start-up funds for the EEP and watershed planning (\$9.5 million) and now funds advance mitigation on an annual basis, based on projected mitigation needs. Restoration assets in the program now include 780,000 ft of stream restoration, 2240 acres of riparian wetlands, 6380 acres of non-riparian wetlands. NCDOT protected 121 miles of

stream buffers and 6985 acres of wetlands, and helped purchase over 24,000 acres overall. Mitigation costs are running at 2.5 to 2.8 percent of construction costs.¹⁰³

Early Release of Right-of-Way Funds

Caltrans allows right-of-way capital funding to be advanced before the Project Approval/ Environmental Document milestone for key components such as strategic land acquisition and mitigation bank credit purchases. Advance funding may cover development of mitigation, property acquisition, and similar activities. This process allows both pre-project funding for the mitigation of impacts caused by individual transportation projects and a mechanism to fund “mitigation-only” projects that can provide mitigation for multiple projects. Caltrans intends this funding flexibility to maximize environmental benefits by taking advantage of time-sensitive opportunities, volume purchasing power, careful planning, and reduced capital costs. While it offers less flexibility than the previously described approaches and higher administrative costs, it has the advantage of requiring less project lead time, less coordination with FHWA to implement, and fewer funding approvals, because funds are still specific to programmed projects, just released earlier than otherwise would be the case. The approach still offers greater opportunity to perform advance mitigation and achieve the attendant benefits.¹⁰⁴

Caltrans has commissioned project specific mitigation needs assessments (what, when, where) with capital costs (acquisition, permits, endowments) for all programmed projects, summarized by District. The identified mitigation-related expenditures needed prior to Project Approval and the Environmental Document are included as a line item of the annual ROW capital allocation needs for pre-project funding and mitigation-only projects during the subsequent fiscal year. Fund reserve availability by program affects opportunities to fund new mitigation-only projects. ROW capital costs that are potentially eligible for mitigation include:

- Capital and Support Costs for Purchase of Mitigation Bank Credits
- Capital and Support Costs for Purchase and Holding of Properties
- Capital and Support Costs for Conservation Elements
- Capital and Support Costs for Purchase Options and Stewardship (Endowment) Funds
- Capital and Support Costs for Purchase and Improvement of Lands for Mitigation-Only Projects, where a separate Environmental Document and Banking Agreement apply.

Capital outlay support costs necessary to implement planned early mitigation acquisition must be included in annual work plan estimates in order to receive resources to do the job. Headquarters Environmental and ROW Division Chiefs review and approve early mitigation on specific and mitigation-only projects identified in the Mitigation Needs Summary submittal, based on the following factors, subject to the strength of the justification and available funding:

- Satisfaction of Mitigation Needs Summary (MNS) needs (e.g., 75 percent of a particular resource)
- Strength of resource agency agreements, permits, and support
- Benefit of mitigation and advancing related transportation projects
- Strategic opportunities and partnerships
- Strength of community support and context sensitivity
- Savings and efficiencies

- Compliance with all environmental laws, regulations, and policies
- Availability of Environmental Document approval
- Preservation of project alternatives
- Revocable commitment of resources, if needed
- Willingness of the seller

Caltrans will be advancing ROW funds for five upcoming interchange improvements on Interstate 10 that impact sand dune habitat that houses two listed species of concern - the Coachella Valley fringe-toed lizard and milk vetch. The advance mitigation strategy will be carried out as each project goes through the environmental process; pre-approval will facilitate more rapid implementation. FWS is issuing a Programmatic Biological Opinion for the first project; later projects will be appended. Participating agencies are preparing a draft cooperative agreement and will begin acquiring land approximately 1,800 acres in target lands from willing sellers as soon as each project completes its environmental document.

Other Financial Tools

Grant Anticipation Revenue Vehicles (GARVEE) allow states to borrow against future Federal-aid funding, to pay for projects. States may repay GARVEE with Federal-aid dollars, over a longer period, allowing investments to be made earlier than the state might otherwise afford them. State Infrastructure Banks (SIB) offer low-cost financing, backed by the state, for up to 35 years. It is not known whether these tools have been employed by state DOTs to cover the costs of advance mitigation.

Develop a Crediting Strategy

Credits have been most often allocated on a (ratio of a) per acre basis for wetlands. The “Federal Guidance for the Establishment, Use and Operation of Mitigation Banks,” provides the following guidance on the procedures used to establish credits and debits at bank sites:

Credits and debits are the terms used to designate the units of trade (i.e., currency) in mitigation banking. Credits represent the accrual or attainment of aquatic functions at a bank; debits represent the loss of aquatic functions at an impact or project site. Credits are debited from a bank when they are used to offset aquatic resource impacts (e.g. for the purpose of satisfying Section 10/404 permit or FSA requirements)...An appropriate functional assessment methodology (e.g., Habitat Evaluation Procedures, hydrogeomorphic approach to wetlands functional assessment, other regional assessment methodology) acceptable to all signatories should be used to assess wetland and/or other aquatic resource restoration, creation and enhancement activities within a mitigation bank, and to quantify the amount of available credits. The range of functions to be assessed will depend upon the assessment methodology identified in the banking instrument. The same methodology should be used to assess both credits and debits. If an appropriate functional assessment methodology is impractical to employ, acreage may be used as a surrogate for measuring function. Regardless of the method employed, the number of credits should reflect the difference between site conditions under the with-and without-bank scenarios.¹⁰⁵

The Corp’s most recent guidance on the use of functions as a currency to calculate debits and credits for compensatory mitigation is contained in RGL 02-02:

Army regulations require appropriate and practicable compensatory mitigation to replace functional losses to aquatic resources, including wetlands. Districts will determine what level of mitigation is “appropriate” based upon the functions lost or adversely affected as a result of impacts to aquatic resources...The Corps has traditionally used acres as the standard measure for determining impacts and required mitigation for wetlands and other aquatic resources, primarily because useful functional assessment methods were not available. However, Districts are encouraged to increase their reliance on functional assessment methods. Districts will

determine, on a case-by-case basis, whether to use a functional assessment or acreage surrogates for determining mitigation and for describing authorized impacts. Districts will use the same approach to determine losses (debits) and gains (credits) in terms of amounts, types, and location(s) for describing both impacts and compensatory mitigation.¹⁰⁶

Increasingly habitat acres are being used to account for species impacts as well. Crediting on a habitat basis facilitates attention to ecosystem processes and functioning that benefits both target resources and other non-regulated resources. In providing a biological opinion on listed species, FWS must justify the case that habitat may serve as an indicator for the species (e.g., the presence of suitable habitat, the proximity of the action area to known species' locations, the history of the species occurring in similar habitats under similar circumstances, etc.). FWS may then explain the relative value to the conservation of the species of the habitat within the action area, as opposed to the individuals utilizing that habitat, in assessing the species likelihood of survival and recovery of the species in the wild and actions that may diminish or enhance the chances for species recovery.¹⁰⁷

In general, FWS lists the following factors for potential consideration in determining credit values: habitat quality, habitat quantity, species covered, conservation benefits (including contribution to regional conservation efforts), property location and configuration, and available or prospective resource values.¹⁰⁸ The credit system must match the system for bank debits (e.g. both in acres or both in breeding pairs). Mitigation ratios may be design for the particular impact and impact assessment method, based on qualitative factors such as the scale of impact or quality of habitat, but quality of habitat need not always be assessed. The Natomas Basin Habitat Conservation Plan and the legal decision on it, *NWF v. Babbitt*, are significant for programmatic approaches and the crediting strategy it employs. The HCP covers the 53,000-acre basin in and near Sacramento and permitted up to 17,000 acres of habitat destruction with a mitigation fee. The mitigation fee funds the Natomas Basin Conservancy to buy a half-acre of habitat for every acre developed, regardless of quality. In defending the plan and crediting strategy, FWS called it an “innovative and biologically sound approach to species and habitat conservation at a regional, ecosystem level.”¹⁰⁹ The court found that the ½:1 mitigation ratio was reasonable, though weakened in this case by failure to identify specific reserve parcels in advance—a weakness that DOT advance mitigation efforts rectify. The judge viewed the “uniform treatment” of essentially “treating all Basin lands as fungible, as equally valuable habitat” as a “strength” in that “mitigation fees are to be collected on all acreage and are used to set aside 0.5 acres of habitat land for each 1.0 acres of gross development that occurs.”¹¹⁰ The court upheld the “assuming presence approach” and confirmed that the plan “overprotects by assuming that any acre lost to development is potential habitat.”¹¹¹ Likewise, mowed or otherwise degraded or impacted habitat in existing DOT ROW has been considered “unmanaged” for natural resource values (Nevada DOT-Clark County MSHCP) and estimates of impacts and mitigation have occurred (CDOT Shortgrass Prairie Initiative) without assessing quality of the habitat.

The primary, most common method of accounting continues to be acres of wetland or habitat type, the latter within species' range; most of the examples cited in this report use this approach. Though this section will briefly review some cutting edge functional assessment approaches that are under development, accounting in acres remains an important method of ensuring that a baseline level of environmental mitigation occurs. Additional goals, requirements, or evaluation criteria may be layered on top as needed.

- NC EEP accounts for acres of freshwater and coastal wetlands and riverine and non-riverine wetlands. The Corps-NCDOT-DENR's tri-party MOA acknowledges the goal of moving to a functional replacement system for mitigation, and provides a mechanism to transition the MOA to functional replacement accounting if and when a scientifically acceptable method is developed by the three agencies. Although initially emphasized, the functional assessment

approach is now on the slow track, as the partner agencies have agreed on the benefits of the simpler, acre-based approach.

- The Corps is experimenting with new landscape level functional assessment tools, for SAMP development. The Corps' Waterways Experiment Station (WES) and the Cold Regions Research and Engineering Laboratory (CRREL), as experts in aquatic resource delineation and wetland functional assessment, have developed a tool to conduct a high precision, planning level wetland delineation (i.e., the identification of aquatic resources) and a landscape level functional assessment (i.e., the characterization of aquatic resources). The tool has been used to assess aquatic resources within large watersheds (over 200 square miles). Using the tool, the Corps has been able to assess hydrologic integrity, water quality integrity, and habitat integrity. Hydrologic integrity refers to the frequency, magnitude, and location of stream water flow and the interaction of the stream with the floodplains — all on the plan level. Water quality integrity refers to the processing of nutrients and sediments within streams. Habitat integrity refers to the quality and quantity of habitat necessary to support functioning riparian systems.
- Oregon DOT's functional assessment determines Habitat Value credits for wetlands and species based, in part, upon acreage. However, in addition to acreage, other values related to habitats, species, and functions are used to derive the Habitat Value number. ODOT's functional assessment approach relies on Key Ecological Functions (KEFs), as a key component of successful ecosystem-based management.
- Oregon DOT's functional assessment determines Habitat Value credits for wetlands and species based, in part, upon acreage. However, in addition to acreage, other values related to habitats, species, and functions are used to derive the Habitat Value number. ODOT's functional assessment approach relies on Key Ecological Functions (KEFs), as a key component of successful ecosystem-based management.

Using species and habitat data, ODOT developed historic and current functional profiles for each Ecoprovince to assess how functions have changed over time. The Ecoprovince functional profile allows for a review of the functional roles played by all species thought to occur within the Ecoprovince. This understanding makes it possible to consider how species' functions contribute to performing ecological functions across a broader, Ecoprovince scale. This information is used to help determine if the focal species play functional roles not generally performed by other species, thus indicating the potential need for species and habitat protection. Changes (lower functioning or fewer redundancies in functions performed) from pre-development conditions were identified and tallied, based on habitat and species changes.

Key Management Activities which affect such functioning were also identified, to determine how to best understand and address potential needs associated with habitat forming processes and assess issues relevant to species recovery. In light of this, each Ecoprovince has a list of land use and land management activities that have the potential to negatively affect species, habitats, and habitat forming processes. This assists in designing conservation areas/regional banks to help offset regional trends. Some of the land use and land management activities that have significantly impacted species, habitats, habitat forming processes, and the potential for species recovery include, but are not limited to: human development, agriculture, grazing, fire suppression, timber harvesting, coastal development, and fragmentation of land ownership.

ODOT has adopted backstops that track impacts in an acreage-based or species specific fashion. Using the backstops, ODOT will be able to show that it meets all of the same requirements as any other entity regulated by the Corps. If, through the Program review and agency reporting process, it is determined that the Program is falling short of no net loss obligations, adjustments to the accounting system will be made and ODOT is committed to performing the mitigation necessary to achieve the ledger balance and ensure regulatory compliance.

Ensure Internal and External Communications

Interagency understandings. Interagency understandings may be formalized in Memoranda of Agreement or Understanding, when their scope exceeds that which would occur in a programmatic consultation or a banking instrument. [CDOT's Shortgrass Prairie Initiative MOA](#) records the roles of the partners and the general approach the agencies agreed to take. Caltrans' [Memorandum of Agreement for Early Mitigation Planning for Transportation Improvements](#) outlines a long-range strategic planning process to improve early coordination and "obtain better results from funds spent for the compensation and enhancement of biological resources." The purpose of the agreement is described as to:

establish a process for identification and evaluation of valuable natural resource and habitats at the earliest stages of transportation improvement planning, and provide a framework to implement coordinated mitigation planning at the beginning of the project development process leading to an Agreement on Mitigation Strategy for guidance during project design. It will facilitate compliance with state and federal environmental regulations and requirements established for the protection of biological resources, but does not replace review of the action at the appropriate time as required by environmental laws or regulations, or assure permit issuance and project endorsement. Early coordination will mean more efficient and effective planning, a high degree of cooperation among involved agencies and successful resolution of conflicts. Some of the advantages of early coordination and mitigation planning for impacts to biological resources will be: 1) increased opportunities to avoid adverse impacts to natural resources; 2) the opportunity to provide "in place" and functioning compensation and eliminate the lag time between loss and replacement of resource values; 3) the opportunity to integrate the mitigation into regional environmental goals and preservation objectives; 4) the establishment of more efficient and effective monitoring and evaluation procedures; 5) the ability to provide the greatest resource benefit for the expenditure of mitigation funds; 6) swift utilization of the diminishing opportunities for habitat conservation and preservation; and 7) the reduction in the potential for delays in project approval due to mitigation concurrence and permit processing.¹¹²

Resource agencies committed to early participation and identification of priority resources. Caltrans committed to develop early mitigation strategies, to be used only after a determination that "all appropriate avoidance and minimization measures have been incorporated."¹¹³

NC EEP's DOT-DENR [Memorandum of Agreement](#) and Tri-Party [Memorandum of Agreement](#) outline the critical details agreed to by all parties, and provided sufficient detail in short format to begin restructuring staff responsibilities at three agencies.

Internal communications. Agency leaders on a staff and executive level play key roles in identifying and knowledgeably speaking about the benefits of both the approach, economically, environmentally, and in terms of freeing and making more efficient use of staff time.

Agency leaders can help avoid deterioration of the agreement by spelling out implications of the intended approach and clarifying that ongoing adjustment and flexibility will be required. Executive managers at the three agencies behind North Carolina's EEP (Corps, NCDENR, NCDOT) realized that:

after stating the priorities and overarching objectives, they stopped short of setting standards for success and products required within the respective organizations. There was a basic assumption that middle management

would ensure the implementation. However, interactions between the executive and middle management levels were not sufficient for such a large change. Although, the concept was explained to all, the implications were not. In retrospect, this led to the EEP being viewed by the (DOT-DENR) workforce as an additional requirement and not as a systemic change. The Corps did not anticipate fully the impacts of the EEP on its regulatory procedures. For example, the Corps discovered late in the process that it needed to develop clearer legal positions on crediting and preservation. Furthermore, the Corps continued to function from the conventional project-by-project view, while simultaneously supporting the ecosystem/watershed-focused system, without defining internally how to meet requirements for permitting and accounting for credits during EEP implementation. This resulted in a disconnect of the fundamental rules that should be applied. To date, development of the new rules is ongoing.¹¹⁴

Implications of the change may include the trade-offs that are being made and how the new process is different, how future permitting and consultations within the programmatic approach will be handled, and how all of this affects individual agencies, professionals, and their responsibilities.

An advance mitigation program leader, now at a resource agency, stated: “a program of this type will succeed only if all agencies agree that this is a better way of doing business and that each agency plays a role in helping it succeed. This means that everyone may have to change some of their processes and address their regulatory issues in different ways...such a change requires the highest level of participation and commitment. This means that Secretary and policy level individuals must participate.” In his opinion, “this can not be done at the practitioner level because most of those individuals are programmed toward their respective policies and procedures.”

Systems should be developed for providing continuous updates/communication to all levels of staff affected by the change, at the agencies involved.

External communications. Communication with external stakeholders helps maintain accountability and credibility with diverse constituencies. External stakeholders include landowners, private for-profit bankers, and environmental organizations. The sponsors of North Carolina’s EEP felt the need to establish external communications with stakeholders, and thus, after consultation with his partners, the secretary of NCDENR established a liaison council for EEP.

The council membership represents the widely diverse interests that need to understand and support EEP to assure its longevity. Current members represent land trusts, private engineering and biological firms, mitigation bankers, the Environmental Defense Fund, the Southern Environmental Law Center, North Carolinians for Business Commerce and Industry, and the Road Builders Industry. The primary purpose of the council is to provide a forum to share information about EEP and to identify issues and concerns that may affect EEP before they become “problems.” For example, the liaison council provided valuable feedback on the draft MOA prior to the formal USACE public notification process.

CDOT’s Shortgrass Prairie Initiative reached out to environmental organizations through steering committee members and through presentations to a statewide Environmental Roundtable. In person meetings were held with county commissions in agricultural communities, where resistance to any government ownership or management was high.

Identify How Individual Projects Will Be Reviewed and Fit Into the Whole, Ensuring Avoidance and Minimization

Identification of how individual projects will be reviewed and fit into the programmatic approach often represents a more difficult part of the negotiation, because it may present a departure from how individuals and agencies normally review projects. While staff may save significant time and see efficiency increases (FWS estimated a 100 percent increase in productivity, with only half the staff time needed to focus on former project tasks in Florida),¹¹⁵ any change in their duties or scope of responsibility can raise concerns, which take time to address and resolve, in the form of interagency

agreements. Such agreements try to create a streamlined approach for project-by-project review and greatly reduce or virtually eliminate the negotiation which otherwise occurs at that stage. However, remember that such agreements cannot be used to change statutory or regulatory requirements.

Under the CWA Section 404 program, individual permits require project review by the Corps. The Corps decides whether to issue an individual permit based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity. According to Corps regulations, permits should not be issued for activities which will create “significant” degradation of the waters of the U.S. or have “significantly adverse effects on wetlands values”. However, the CWA provides no clear definition of “significant.”¹¹⁶ The evaluation process for an individual permit is based on guidelines established under Section 404(b)(1) CWA and on the “public interest review” procedures. Public interest review involves a broad qualitative evaluation of a project’s benefits and detriments. Corps regulations identify twenty-one factors which are relevant to permit review: conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, consideration of property ownership, and the general needs and welfare of the people. The Section 404(b)(1) guidelines, which prohibit a discharge of fill if there is a less environmentally damaging alternative that is still practicable, are often considered the driving force in the Corps permit process.¹¹⁷ Practicability is determined based on technological, economic, social, and logistic considerations. If a proposed project has greater than significant impacts, attempts must be made to avoid and minimize impacts. Impacts, which cannot be avoided, must be mitigated to a level where the net impacts to waters of the U.S. are not significant.

On projects requiring an individual Section 404 permit, state DOTs continue to conduct a project-by-project reviews, though in the case of NCDOT’s process, for example, after avoidance and minimization, the decision to choose off-site mitigation is reduced to a “yes-no” decision; i.e. partial on-site mitigation does not occur. If the permitting agencies determine that on-site mitigation opportunities (in or adjacent to the right-of-way, in conjunction with construction activities) are both practicable and environmentally preferable to existing mitigation available through the EEP program, the permit will be conditioned to require such on-site mitigation; however, the permitting agencies have agreed not to delay the issuance of a permit or certification for a NCDOT project due to such on-site mitigation requirements.

For ESA section 7, each action that may directly or indirectly affect listed species or designated critical habitat (in this case, either adoption of the plan or implementation of any specific project under that plan) must have the appropriate Endangered Species Act effects analysis and associated documentation. In other words, any action that is determined “may affect, but is not likely to adversely affect” a listed species or designated critical habitat must have a written concurrence from the Service, while any action that is determined to be “likely to adversely affect” listed resources must have a complete biological opinion (including an incidental take statement, where appropriate) (*Conner v. Burford*, 848 F.2d 1441 (9th Cir. 1988), *Conner v. Burford*, 605 F.Supp. 107 (D.Mont.1985), *Silver v. Babbitt*, *Silver v. Thomas*,). This is understood to be a “second tier” to the Biological Opinion, though such an opinion, confirming that the project fits within the scope of the original programmatic consultation, may be as brief as a page or two.

For ESA section 7, site-specific BOs may be “appended” to a programmatic consultation to complete a 7 consultation. The degree of project-by-project review that is retained continues to be negotiated separately for each programmatic or advance mitigation approach; for Section 404, the more timeworn paths of mitigation banks and ILF programs, and established individual permitting requirements, leave less in question. DOT biologists and natural resource program managers who

work with the resource agencies on developing programmatic agreements and MOAs say that templates would greatly facilitate their work. Even in states where multiple agreements have been developed though, the agreements continue to evolve, and thus negotiation often continues. Legal review continues to be a challenge for such agreements, as solicitors seek maximum certainty for their own agency and collaborative, early environmental investments are still considered alternative approaches.

Plan for Management in Perpetuity

In general, all sites used to satisfy compensatory mitigation requirements must remain within the public domain in perpetuity, either in fee simple title or subject to appropriate conservation easements. Sites must be managed in accordance with a long-term management plan that preserves the ecological functions of the subject property and as required by the permit, in the case of Section 404 of the CWA. Management needs of a mitigation/conservation site may include restoration or enhancement of habitats, monitoring of resources, maintenance of facilities, public uses, control of public access, start-up funding, budget needs and necessary endowment funds to sustain the budget, and yearly reporting requirements.

A watershed approach helps to address a major challenge in mitigation development and long-term management; ensuring that sites are more environmentally valuable and important to federal and state resource agencies or conservation organizations for protection in perpetuity dramatically increases the chances of finding an appropriate conservation owner. As discussed in the above section on “Using Existing Regional Ecosystem Conservation Plans,” such entities have often developed conservation acquisition plans, and when such plans can be utilized by DOTs and approved by regulatory agencies to guide mitigation/conservation investments, answers and partnerships for long-term management often emerge. DOTs investments in acquisition and initial restoration may mesh with other agency and organizations’ long term stewardship and land management missions. In the examples cited in this report, mitigation/conservation sites are owned by a wide array of entities—federal, state, county, and municipal government, private bankers, and non-governmental, non-profit conservation organizations.

The Center for Natural Lands Management has developed a tool that is widely used in western states to estimate the expense of management in perpetuity. Costs vary with the nature of the land, the type of protection (owned or under easement), and the purpose of conservation (endangered species, visitor services, education). The Center’s Property Analysis Record (PAR) database can be used to analyze the characteristics and needs of the property from which management requirements are derived, consider management tasks and their costs, as well as administrative overhead. The PAR report can then be used as a justification for a certain level of long-term funding from endowments, special district fees, and other sources.

Even with adequate estimation of long-term management costs and high desirability of the parcel according to the resource agencies involved, tight budgets at the latter have made assumption of ownership and management responsibility difficult in some cases. Private entities can go bankrupt. Short-staffing or hiring freezes at resource agencies may prohibit further acquisitions, regardless of the amounts of funding available for site administration or management by contract. Even if the resource agency receives money, staff are sometimes concerned that the resources would not be there when they need it. Some states’ situations are further complicated by state restrictions on transferring conservation easements to private entities or local government agencies.

An appropriate long-term ownership and management arrangement or option must exist, and ideally be secured, before property acquisition makes sense. In most parts of the country, this is not a

problem if the property is part of an environmental agency's or conservation organizations' acquisition plans and priority lists. For a variety of ecological reasons, connectivity improvements are receiving greater attention and emphasis over the past ten years. It is anticipated that sites adjacent to and/or providing connectivity between already protected conservation areas will remain practical and desirable sites for conservation management entities.

Design Performance Measures for Adaptive Management

Mitigation that is included as a commitment in the environmental document becomes an integral and essential part of the transportation project and Record of Decision. FHWA's responsibility regarding the implementation of mitigation measures identified as commitments in environmental documents is stipulated in 23 CFR § 771.109(b): "It shall be the responsibility of the applicant, in cooperation with the Administration, to implement those mitigation measures stated as commitments in the environmental documents prepared pursuant to this regulation. The FHWA will assure that this is accomplished as a part of its program management responsibilities that include reviews of designs, plans, specifications, and estimates (PS&E), and construction inspections."¹¹⁸ DOTs have developed a variety of tracking systems, from simple checklists and spreadsheets to more complex databases and systems for hand-off, from design to construction and maintenance.¹¹⁹ These systems also include commitments and responsibilities derived from Section 404 permits and ESA section 7 consultations. Visual assessment, informal mapping, photographic records, and assessment of spread/prevention of invasive species are common assessment methods for both wetland and species/habitat mitigation/conservation sites.

Measuring success is a key element of any framework for overall conservation success. Measures can establish baselines for ecosystem, biodiversity, or species health; identify and track the status of key threats to conservation; and measure the progress of actions toward conservation. Even in areas and ecoregions where relatively few studies and inventories have been conducted, there is an abundance of data and information that was unfathomable when key environmental protection acts were created in the late 1960s and 1970s, and even the early 1980s as regulations continued to be promulgated.¹²⁰ While the basis for making and refining conservation decisions may be better than ever before, the decisionmaking environment is also polarized with a desire for clarity beyond what may exist or be reasonably attained in many cases. Creating meaningful and practical performance measures, which will be useful in adaptive management, is a key challenge for regulators and conservation practitioners. To refine and improve a manager's ability to monitor conservation progress, performance measurement data should help answer the question: "Are we conserving what we say we are?" and provide a barometer of how well biodiversity is doing, the degree to which it is conserved, and the likelihood of success in achieving conservation goals. In taking an ecosystem approach that can be rolled up to measure conservation status and progress at wider scales, ecoregional measures may rely on focal species and indicators of ecosystem health, such as degree of invasive species and management including natural processes such as grazing or fire.

Adaptive Management is a method for examining alternative strategies for meeting biological goals and objectives, and then, if necessary, adjusting future conservation management actions according to what is learned. The term refers to a systematic approach for evaluating and adjusting management practices based on monitoring of pre-determined evaluation criteria. The six principal components of adaptive management are problem assessment, design, implementation, monitoring, evaluation, and adjustment.

Evaluating Formalized Conservation Efforts

FWS and NOAA Fisheries have provided some guidance for assessing the value of formalized conservation efforts in species recovery. Though FWS and NOAA Fisheries policy was initially developed for Evaluation of Conservation Efforts When Making Listing Decisions (68 FR 15100-15115, 3/18/03), “this policy may also guide the development of conservation efforts that sufficiently improve a species’ status so as to make listing the species as threatened or endangered unnecessary.”¹²¹ Proactive conservation efforts by state DOTs and resource agencies commonly share this goal of improving the viability of one or many species, whether through on-site BMPs or through wetland or upland habitat preservation, restoration, or altered management regimes.

Of the factors that FWS and NOAA evaluate in determining a species to be threatened or endangered, DOTs may most affect (positively and negatively) “the present or threatened destruction, modification, or curtailment of its habitat or range.”¹²² In evaluating formalized conservation efforts, FWS and NOAA look for elimination or adequate reduction of one or more threats to the species identified through the section 4(a)(1) analysis.¹²³

In making an estimate of a species’ future condition and the likely impact or success of a formalized conservation effort, FWS/NOAA assess the level of certainty that the effort will be implemented and the likely effectiveness in elimination or reduction of threats to the species. Advance mitigation ensures the former; adaptive management helps ensure the latter.

In determining a level of reasonable certainty that the conservation effort will be effective, FWS, NOAA Fisheries, and conservation partners may evaluate:¹²⁴

- The nature and extent of threats being addressed by the conservation effort are described, and how the conservation effort reduces the threats is described.
- Explicit incremental objectives for the conservation effort and dates for achieving them are stated.
- The steps necessary to implement the conservation effort are identified in detail.
- Quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, and standards for these parameters by which progress will be measured, are identified.
- Provisions for monitoring and reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided.
- Principles of adaptive management are incorporated.

These criteria should not be considered comprehensive evaluation criteria. The certainty of implementation and effectiveness of a formalized conservation effort may also depend on species-specific, habitat-specific, location-specific, and effort specific factors. The specific circumstances will also determine the amount of information necessary to satisfy these criteria.

Choosing a Monitoring Strategy and Performance Measures

Based on the above guidance on evaluation of formalized conservation efforts, FWS and NOAA Fisheries list the following potential effectiveness measures/considerations:¹²⁵

- Level of participation (e.g., number of participating landowners or number of stream-miles fenced)
- Length of time of the commitment by landowners

- Whether the program reduces the threats on the species.
- Estimated length of time that it will take for a formalized conservation effort to produce a positive effect on the species.

The conservation effort may need to be modified to adequately address an increase in the severity of a threat or to address other new information on threats. FWS's Conservation Banking guidance states that while conservation outcomes are ideal measures, they must be balanced, and in some cases indicated, by management actions over which sponsors have more control.¹²⁶

An indicator is a unit of information measured over time that documents changes in a specific condition. Indicators are often used for communicating measures, as indicators may provide a way to summarize, present, or manage complex information in a clear manner and assess where future action is most critical. The best indicators are measurable, precise, consistent, and sensitive. Sometimes the indicator and the measurement are equal. At other times, an indicator can be an indirect measurement or a compilation of several measures that are believed to be key in revealing something important about a trend or status in conservation. In some cases precision is less than desirable but the indicator remains useful.¹²⁷

Biological goals provide a framework for developing a monitoring program that measures progress toward meeting those goals. Goals or standards should be structured to compare the results from one reporting period to another period, or to compare different areas within the conservation bank. Monitoring provisions to measure and assess habitat protection, restoration, or creation activities should be included in the conservation banking agreement.

According to FWS's conservation banking guidance, monitoring provisions should include components to:

- Evaluate compliance based on current levels of credit authorization.
- Determine if biological goals and objectives are being met.
- Provide feedback information for subsequent management changes and adaptations, including remedial actions if necessary.
- Substantiate and authorize additional credit that could be allowed from the bank, based on habitat restoration accomplishments or phase-in of additional bank lands.

Monitoring presence or absence of species on already conserved sites is sometimes conducted to provide for additional credits through documenting additional species' presence (FL Platte Branch Bank—inventory every five years, CA Rancho San Diego Bank). Annual reporting and baseline tracking for banks focuses primarily on ecosystem intactness, invasive species, changes in (surrounding) land use, and ongoing (revised) recommendations for site management. Photo points, aerial photos, and general observations on wildlife diversity, activity, and general trends may complete the picture. Success may be measured in:

- Acres of habitat perpetually protected
- Number of species/resource values that are protected/benefited over the long term
- Ecological process enhanced or undisrupted.

Beginning to Track Conservation on an Ecoregional Level

Local, state, national and international conservation organizations are exploring the use of ecoregional measures to:

- Track progress toward meeting the goals identified in the Ecoregional Assessment. Ecoregional Assessments may establish minimum goals based on estimates of the historical extent of key vegetation types and different scenarios and what (goals) may be adequate to support populations or occurrences of most species that depend on those types for the foreseeable future. Indicators of this measure include the degree to which each conservation target has an adequate area or number of locations to achieve the degree of success estimated to be viable, under different scenarios.
- Identify major threats within an ecoregion, establish baseline conditions, and develop a method of tracking changes over time.
- Identify and support the most vulnerable and threatened conservation areas within the ecoregion
- Monitor, measure, and communicate conservation status

Measurement may occur in four ecoregional measure categories:

Status of Biodiversity (progress toward meeting ecoregional goals, and biodiversity health measures). Ecoregional goals are established as a means of estimating the numbers or areas needed to resist extinction and degradation factors. The goals are surrogates for viability of conservation targets over the long-term. Therefore, progress toward ecoregional goals is an indicator of *viability or integrity*. Other potential indicators to assess ecoregional biodiversity health include the numbers and composition of species and ecological systems that are rare, imperiled, listed, available for conservation, etc. It is important to know the degree to which adequate areas of the right sizes have been identified, protected, and actively managed. This provides an estimate of the degree to which we conservation actions might contribute toward species recovery. Other potential indicators for measuring biodiversity health:

- Number of known occurrences, acreages or miles for targets known vs. “needed” for viability or recovery.
- Ranking status for targets (e.g., natural heritage ranks – a trend downward in ranks suggests that species or natural communities are getting rarer and therefore is a bad sign of biodiversity health.
- Listing status for species targets in the ecoregion – more listed or candidate species over time also suggests that species are becoming rarer and therefore is a bad sign of biodiversity health.

Conservation Status – (Protected and Managed Area Status and Management Effectiveness) This measure assesses the degree to which land of conservation interest (or need) is legally protected and managed. This is a reflection of the degree of land that can be “guaranteed” to remain as a contribution to conservation should all other lands be removed. While this measure does not incorporate many excellent private and public conservation lands that have no legal protection, it is an important indicator of the progress has been made to secure the conservation of certain species and ecological systems. The data used are important for understanding the level of protection (and conversely threats) to mitigation/conservation areas. Measuring the degree that lands are protected from specific threats (e.g. development, oil and gas exploration) provides strong indices of conservation progress. Within this category are also lands that are protected from specific threats and managed to some degree for biological values. For example, some multiple use federal lands are managed for production of recreational or livestock grazing values in ways that do not insure complete and/or highest quality ecological systems; nonetheless, they have many ecological values

that contribute to the greater picture of conservation success AND are for the most part free from the threat of total conversion to a non-restorable state. Several different ways of assessing protected area status will be discussed as well as other ways of assessing status.

Protected and Managed Area Status: This measure employs the Gap Analysis Program (GAP USGS)) classification system to describe the status of protected lands in the ecoregion. GAP uses 4 categories to identify the relative degree of protection and intended management for biodiversity, where 1 represents the highest, most permanent level of protection, and 4 represents the lowest. IUCN has similar but more categories ranging from strict nature reserves to managed resource protected areas. Neither GAP nor IUCN adequately capture protected status for conservation easements and perhaps for other conservation lands.

Gap Status 1 includes areas having *permanent protection from conversion of natural land cover* and a mandated management plan in operation to maintain a natural state within which disturbance events are allowed to proceed without interference or are mimicked through management. Gap Status 2 includes areas having permanent protection from conversion of natural land cover and a *management plan in operation to maintain a primarily natural state*, but which may receive uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance. Gap Status 3 covers areas having permanent protection from conversion of natural land cover for the majority of the area, but subject to extractive uses of either a broad, low-intensity type (e.g., logging) or localized intense type (e.g., mining). Areas with Gap Status 4 have *no known public or private institutional mandates* or legally recognized easements or deed restrictions held by the managing entity to prevent conversion of natural habitat types to anthropogenic habitat types. Includes all areas not identified above in categories 1-3.

Management Effectiveness indicates the intended management of protected and managed areas and the degree to which the managers can fulfill their goals, including the enabling conditions for effective conservation.

Threat Status. Threats assessments at ecoregional scales provide important *early warning measures* for changes in biodiversity status. The spectrum of threat measures, the status, distribution, and trend of the threats identified in the Ecoregional Assessments may be assessed wherever there are data available. Measures may include:

- Number of acres of each ecological system that is affected by a given threat.
- Where the spatial data are available and of sufficient quality, the severity and scope of the threats will be assessed. Threats may include: altered hydrology, oil and gas development, altered fire regimes, fragmentation, invasive species, climate change, and land use change.

Intactness (Land Cover Status). Ecoregions are important base units for measuring identifying conservation priorities and goals as well as for measuring conservation status. Each ecoregion is dominated by a major vegetation type that is comparable to those found in other ecoregions. The status of these habitat types, indicated by assessing the status in each ecoregion, can be rolled up to provide important information toward a global conservation assessment. Land use change is a prominent factor that alters the integrity of natural diversity throughout the world. The extent, distribution and pattern of land use are primary drivers in conservation planning and implementation. The pattern of land use and land cover is the basis for understanding fragmentation, current and long-term potential connectivity, and likelihood of species and ecosystem viability.

Sample Wetland Restoration & Program Evaluation Criteria

Monitoring methods vary greatly in terms of the level of detail and the frequency of monitoring. The purpose of monitoring is to determine if mitigation is achieving its performance standards or if intervention is required to address a particular problem. According to an Environmental Law Institute study, most wetland banking instruments include some reference to monitoring and maintenance provisions (usually in the 3-10 year range), although 14 percent do not, and only 22 banks indicate that the length of the monitoring period is based on the final achievement of performance criteria.¹²⁸

As state agencies with a high degree of public attention and accountability, DOTs develop detailed site-specific, or in some cases, agency-wide evaluation criteria for wetland restoration success. During the monitoring period, assessment of vegetation and assurance of self-maintaining hydrology are primary objectives. Increasingly, habitat restoration is a key consideration. Per guidance developed by Washington State DOT and resource agency partners, during the monitoring period, a project may be evaluated relative to the goals (wetland functions and values) the mitigation project is intended to achieve, specific elements of that goal (function or value), and performance objectives with corresponding success standards: an observable or measurable benchmark for a particular performance objective, against which the mitigation project can be compared.¹²⁹ If the standards are met, the related performance objectives are considered to have been successfully achieved. Monitoring methods appropriate to the performance objective must be designed and implemented and then contingency measures provide avenues for corrective action.

Caltrans follows the three USACE district's "Habitat Mitigation and Monitoring Proposal Guidelines" (USACE 1996), which were assembled to assist applicants in developing mitigation plans and monitoring programs allowed through Corps permits. The guidelines include a detailed outline of reporting requirements that address issues such as target functions and values, target hydrologic regime, target acreage, performance criteria, monitoring methods, reporting schedule, and contingency measures. The guidelines remain flexible by allowing the applicant to specify the methods used to collect the required data. The guidelines also allow the applicant to develop the success criteria subject to USACE review and approval, with a provision that final success will not be considered met until the mitigation plantings survive a minimum of three years after human intervention has ceased. In addition, the performance criteria emphasize that the presence of a high amount of non-native vegetation will require corrective action prior to final acceptance.

North Carolina's EEP collects, evaluates, and reports data following construction of restoration sites, to determine if the restoration sites are meeting project goals. Post-construction monitoring can lead to remediation if the site is not functioning to meet success criteria. For long-term maintenance and management, periodic site inspections help ensure the protection of sites against unauthorized activities and to identify and implement any further maintenance. EEP's interagency Program Assessment and Consistency Group both visits sites and provides oversight and review of the entire program. DENR-EEP further evaluates program performance via a range of types of measures (process, inputs, outputs, and outcomes) as follows:¹³⁰

Objective 1.1: Provide 100% of required mitigation projects to ensure that no Tri-Party MOA projects are delayed beginning 7-1-04, and that the mitigation projects will enhance ecosystem functions.

1.1.1 Outcome Measure: Number of acres and feet protected contrasted to number of acres and feet of permitted (and accepted) impacts.

1.1.2 Input Measure: Accuracy of projected mitigation needs by 8-digit watershed to permitted mitigation requirements by 8-digit watershed. (Accuracy includes actual versus projected)

1.1.3 Process Measure: Average no. days "acceptance" letters are sent from the request date. (target 30)

1.1.4 Output Measure: Number of DOT requests (as per MOA) that were not accepted within 30 days.

1.1.5 Outcome Measure: Percent of EEP initiated projects consistent with watershed plans.

1.1.6 Outcome Measure: Percent of EEP initiated mitigation projects that meet or exceed success criteria.

Objective 1.2 100% of EEP projects protect, enhance or restore total watersheds beginning 7-1-04

1.2.1 Input/Output Measure: Number of projects consistent with goals established by DENR Agencies and the Wildlife Resource Commission and the Clean Water Management Trust Fund

1.2.2 Outcome Measure: Percentage of preservation project acres and feet that meet or exceed High Quality Preservation Criteria

1.2.3 Outcome/Process Measure: Number of EEP projects that protect, enhance or restore endangered species' habitat

1.2.4 Outcome Measure: Percentage of projects within watersheds containing 303(d) listed streams

1.2.5 Outcome Measure: Number of acres protected

Objective 1.3 Provide 100% of required mitigation projects that enhance ecosystem health by a minimum of 5% to ensure in-lieu fee mitigation requirements are instituted within 12 months of permit issuance.

1.3.1 Output Measure: Number of acres protected contrasted to number of acres impacted

1.3.2 Output Measure: Number of projects instituted on time

1.3.3 Process Measure: Acceptance letter to applicants sent within 5 days of receipt

1.3.4 Process Measure: Projects are congruent to watershed plans

1.3.5 Process Measure: Projects meet or exceed criteria established by USACE Advisory Team

Objective 1.4: EEP projects produce a minimum Return on Investment (ROI) of (12%) in ecological and cost benefits beginning FY 2005. Process Measure: Reduce process cost by 2%. Process Measure: Cost of average project costs are consistent with schedule of fees

1.4.1 Process Measure: Cost avoidance

1.4.2 Outcome Measure: Ratio of project components to schedule of fees (X% land, X% design, X% construction...)

Objective 1.5: Establish watershed planning process based on DWQ basin-wide plan schedule and DOT anticipated impacts beginning July 1, 2004, that identifies opportunities for protection and enhancement of local watersheds at least 10 years in advance.

1.5.1 Outcome Measure: Number of identified EEP watershed planning opportunities that are implemented by other DENR and other agencies.

1.5.2 Outcome Measure: Number of identified EEP watershed planning opportunities that are implemented by EEP.

1.5.3 Process Measure: Percentage of watershed restoration plans that are completed in accordance with Water Quality basin-wide planning schedule. (may change)

1.5.4 Process Measure: Percentage of Local Watershed Plans completed within 18 months or less.

1.5.5 Process Measure: Average time for completion of Local Watershed Plans.

1.5.6 Process Measure: Percentage of plans that are completed within budget.

1.5.7 Input Measure: Number of plans developed by DENR Divisions or Sections, including: Water Quality, Wildlife Resources, Water Quality, Marine Fisheries, Parks and Recreation, Water Resources, Forest Resources, Soil and Water Conservation, and Coastal Management that are available and contain current planning data and information.

1.5.8 Input Measure: Percentage of watershed planning goals that are consistent with goals established by DENR agencies.

1.5.9 Outcome Measure: Number of watershed plans are completed in accordance to 7 year mitigation schedule.

Endnotes

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² Benedict, M.A. and E.T. McMahon. 2002. Green infrastructure: Smart conservation for the 21st century. Sprawl Watch Clearinghouse Monograph Series. Sprawl Watch Clearinghouse, Washington, DC.

³ Defenders of Wildlife, *Integrated Land Use Planning & Biodiversity*, 2003, http://www.biodiversitypartners.org/pubs/landuse/Landuse_report.pdf

⁴ U.S. Fish and Wildlife Service, [Guidance for the Establishment, Use, and Operation of Conservation Banks](#) (68 FR 24753, May 8, 2003).

⁵ FHWA, EPA, Corps - TEA-21 Mitigation Preference Guidance, 2003.

⁶ EPA and U.S. Army Corps of Engineers, Memo Concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines, Washington DC, 1990. <http://www.usace.army.mil/inet/functions/cw/cecwo/reg/mitigate.htm>

⁷ Patricia White and Michelle Ernst, Second Nature: Improving Transportation Without Putting Nature Second, (Defenders of Wildlife and Surface Transportation Policy Project, Washington DC, 2003) www.defenders.org/habitat/highways/secondnature.html

⁸ Council On Environmental Quality, Department of Agriculture, Department of The Army, Department of Commerce, Department of Defense, Department of Energy, Department of Housing And Urban Development, Department of The Interior, Department of Justice, Department of Labor, Department of State, Department of Transportation, Environmental Protection Agency, Office of Science And Technology Policy "Memorandum of Understanding to Foster the Ecosystem Approach," December 15, 1995. <http://www.fhwa.dot.gov/legsregs/directives/policy/memoofun.htm>

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¹⁰ President George W. Bush, Executive Order on Facilitation of Cooperative Conservation, August 26, 2004. <http://www.whitehouse.gov/news/releases/2004/08/20040826-11.html>

¹¹ U.S. Department of Interior, press release, "At Six Months: Secretary Norton's 4-C's Making Positive Impact: By listening to each other and working cooperatively, we are creating a model for lasting solutions and achievement, Norton says," July 31, 2001, <http://www.doi.gov/news/010731.htm>

¹² FHWA, Informational Memo on the [Federal-aid Eligibility of Wetland and Natural Habitat Mitigation](#), March 10, 2005.

¹³ EPA and U.S. Army Corps of Engineers, Memo Concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines, Washington DC, 1990. <http://www.usace.army.mil/inet/functions/cw/cecwo/reg/mitigate.htm>

¹⁴ Holistic watershed plans are those that: 1) have been reviewed and approved by Federal and State agencies; 2) consider multiple stakeholder interests and competing land uses; and, 3) address issues of habitat, water quality, hydrology, cumulative impacts, and restoration priorities for a watershed. Holistic watershed plans could include, for example, a Special Area Management Plan, the "comprehensive conservation and management plans" created as part of the National Estuary Program, a comprehensive state planning effort such as the Louisiana Coast 2050 plan or a basin plan such as the Water Resources Plan being developed for the Delaware River Basin.

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- ¹⁵ National Academy of Sciences. *Compensating for Wetland Losses Under the Clean Water Act*. Washington, DC: National Academy Press, 2001.
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- ¹⁷ EPA and U.S. Army Corps of Engineers, *Memo Concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines*, Washington DC, 1990.
<http://www.usace.army.mil/inet/functions/cw/cecwo/reg/mitigate.htm>
- ¹⁸ Caltrans-FHWA, [Memorandum of Agreement for Early Mitigation Planning for Transportation Improvements](#), November 12, 2003.
- ¹⁹ Personal communication, Josh Boan, Florida DOT, June 27, 2005.
- ²⁰ Personal communication, Peter Ollila, former Michigan DOT Environmental Director, 2001.
- ²¹ U.S. Army Corps of Engineers, *Regulatory Guidance Letter 02-02*, 2002.
- ²² The term “conserve”, “conserving,” and “conservation” means to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary. ESA § 3(3).
- ²³ U.S. Fish and Wildlife Service and NOAA Fisheries, *Interim Recovery Planning Guidance*, issued by NOAA Fisheries only, October 2004.
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