INCENTIVE-BASED APPROACHES FOR ENVIRONMENTAL STEWARDSHIP

Requested by:

American Association of State Highway
and Transportation Officials (AASHTO)

Standing Committee on the Environment

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Acronyms

AEMRA	Advanced Environmental Mitigation Revolving Account
BART	Bay Area Rapid Transit
BMP	Best Management Practices
CMCS	Comprehensive Mitigation and Conservation Strategy
CSS	Context Sensitive Solutions
CWA	Clean Water Act
DENR	Department of Environment and Natural Resources
DNR	Department of Natural Resources
DOTs	Departments of Transportation
EEP	Ecosystem Enhancement Program
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ETAT	Environmental Technical Advisory Team
ETDM	Efficient Transportation Decision Making
FHWA	Federal Highway Administration
GHG	Green House Gas
GHP	Green Highway Partnership
GIS	Geographic Information System
ITEEM	Integrated Transportation and Ecological Enhancements for Montana
LEED	Leadership in Energy and Environmental Design
MNS	Mitigation Needs Summary
MOA	Memorandum of Agreement
MPO	Metropolitan Planning Organization
NEPA	National Environmental Policy Act
NGO	Non-governmental Organization
NOAA	National Oceanic and Atmospheric Administration

NRCS	Natural Resources Conservation Service
PIP	Partnership in Integrated Planning
RAC	Rubberized Asphalt Concrete
RFP	Request for Proposals
ROI	Return on Investment
ROW	Right-of-Way
RRP	Riparian Restoration Plan
RSAT	Rapid Stream Assessment Technique
SAFETEA-LU	Safe, Accountable, Flexible Efficient Transportation Equity Act: A Legacy for Users
SAMP	Special Area Management Plan
SHPO	State Historic Preservation Officer
SOP	Standard Operating Procedures
STIP	Statewide Transportation Improvement Program
TEA-21	Transportation Equity Act for the 21st Century
TIP	Transportation Improvement Program
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

1 Introduction

For decades, state Departments of Transportation (DOTs) have wrestled with different ways to respond to community and resource agency needs and to go about deciding what environmental benefits or mitigation to include in transportation projects and how that should be decided. All too often, the process and the negotiations have been very contentious. Many DOT professionals have felt other parties have taken advantage, that DOTs are always or regularly treated as the “deep pockets” or as a more easily regulated party, and that DOTs end up mitigating “more than their fair share,” whether out of their stewardship commitments or due to external pressure. Other stakeholders have their own versions of this refrain.

Regardless of the reasonability of the feelings, the perceptions are real. Furthermore, relevant research describes and predicts the process that DOTs have experienced; in repeatable dispute resolution experiments, it has been shown that when parties play or game for their own or their exclusive gain, the results for both parties come out worse.[1] This dynamic characterizes the “stick” approach in “the carrot vs. stick,” as conceptualized in this research statement. A stick approach tries to force the hand of the opponent, using power of one to dominate, whereas a carrot approach is respectful of the power of each and seeks to find and accomplish joint ends, or the ultimate goals, of each, often pooling skills and resources to accomplish surprising things.

While Context Sensitive Solutions (CSS) can “grease the skids” for time-savings, only a few examples have been reported to date where CSS saved money.[2] On US 285 southwest of Denver a residential community declined an interchange, saving funds, but such examples appear to be more “happy accident” than the norm. Caltrans’ broad CSS approach is now finding expression and application in corridor approaches to maintain the effective capacity of transportation investments; local governments will be responsible for “their end of the deal” in implementing denser transit-oriented development and street connectivity, to avoid build-up of demand on recently “fixed” roads — for investments funded out of recent bond monies. More information on the cost-effectiveness of CSS approaches should be forthcoming as these and similar approaches advocated by the Project for Public Spaces gain currency and are evaluated.

1.1 What Are Incentive-Based Approaches?

Incentives involve exchange of benefits between agencies. The word incentive is defined as “something that incites or has a tendency to incite to determination or action,” from Latin, “setting the tune, from *incentus,* past participle of *incinere* to play (a tune).”[3] Thus incentives have much to do with harmonizing interests.

Incentive based approaches have the following attributes:

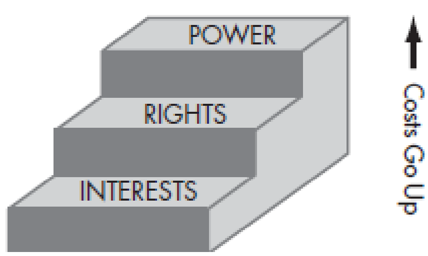
- **“Win-win”** - generating benefits for the DOT as well as other parties, in a “win-win” approach.
- **Proactive** – surprise requirements did not appear at the end of the process and “bite” the DOT or the Federal Highway Administration (FHWA).

- **Straightforward**. The approach understood, pursued, and accomplished the interests of the parties involved. Regulatory processes were not misused, such that one regulatory process was employed as an indirect method to get something completely unrelated to that regulatory process.
- **Cooperative** and **Low Conflict** – a "stick" was not used to force the DOT to produce the benefit achieved; in fact, **sometimes approaches were voluntary**, building partnerships and good will by benefiting resources or **accomplishing objectives that might be reached through no regulatory channel**. The parties each contributed what they could, from data to expertise to resources, and the parties felt good about the ability of the approach to meet mutual interests. The panel envisioned that projects or plans following this approach "could be supported by multiple constituencies—while allowing for consistent, cost-effective delivery."
- **Addressing "broader goals and needs."** Broader spaces in which to consider needs and opportunities allow parties more room to look for creative partnerships and incentive-based resolutions to issues and needs. The Request for Proposal (RFP) talks about "including broader…goals and needs."
- **Creative and innovative**. Incentive based approaches are also often characterized by creative and innovative solutions that incorporate unusual and efficient ways to meet needs and interests that would otherwise be difficult to meet.

1.1.1 Cooperative and Low Conflict: The Carrot vs. the Stick

The federal, state, and local agencies involved in the transportation development, regulatory review, and approval process all have power. How each player wields that power can make all the difference. As illustrated in Figure 1, the "Dispute Resolution Stairway," focusing on the different processes people use to deal with conflict — categorizing all approaches to conflict as being one of three types – Interest-based, Rights-based or Power-based — the costs go up as the parties stress rights and power.[4]

Figure 1: Dispute Resolution Stairway



In commissioning this research, the AASHTO Standing Committee on the Environment titled this project, "*Finding the Carrot Instead of the Stick: Incentive-based Approaches for Environmental Stewardship.*" The Merriam-Webster dictionary defines "carrot and stick" as an adjective for an approach, "characterized by the use of both reward and punishment to induce cooperation," tracing the etymology to the "traditional alternatives of driving a donkey on by either holding out a carrot or whipping it with a stick."[5] The American Heritage Dictionary defines the idiom as "combining a promised reward with a threatened penalty: *took a carrot-and-stick approach to the rehabilitation of juvenile offenders."*

Both internally at DOTs and between agencies, environmental staff routinely use a variety of subtle carrot and stick approaches in negotiating with each other and garnering internal cooperation of design, construction, maintenance, and administration leaders to "do the right thing." This project focused **on finding the carrot instead of the stick**, as a method to improve environmental stewardship, tilting the balance toward what can be accomplished voluntarily and cooperatively.

The research examines incentive based approaches both on the regulatory end of the spectrum, for environmental compliance and emerging wholly voluntary areas of agency response.

Regulatory	Pre-Regulatory	Quasi-Regulatory	Voluntary
Clean Water Act (CWA): • Section 404 • Section 402 (Total Maximum Daily Loads (TMDL), Municipal Separate Storm Sewer System • Endangered Species Act (ESA) • Clean Air Act • State Law • Local Law	Parts of: • TMDLs • ESA	• National Environmental Policy Act (NEPA) • Consensus agreements	• Conservation of non-regulated resources • Hazard mitigation including Green House Gas (GHG) reduction • Social Consciousness • Philanthropy • Economic Efficiency

1.1.2 Creative and "Win-Win"

State transportation agencies are committed to environmental stewardship and context sensitive solutions. Of particular recent interest are "win-win" approaches that creatively generate benefits for all parties, with greater balance and parity. Incentive-based approaches efficiently and effectively meet the needs of the transportation agency, as well as the needs of other partners. For example, agencies may trade right-of-way or other parcels, or make use of special abilities different agencies have, to get the process done more quickly.

Creative, win-win approaches may be contrasted with "positional" arguments, which often occur around rights and duties; the difference between positional and interest-based bargaining are described below, along with an illustrative example:[6]

> Positional bargaining is based on fixed, opposing viewpoints (positions) and tends to result in compromise or no agreement at all. Oftentimes, compromises do not efficiently satisfy the true

interests of the disputants. Instead, compromises simply split the difference between the two positions, giving each side half of what they want. Creative, integrative solutions, on the other hand, can potentially give everyone all of what they want.

There are often many interests behind any one position. If parties focus on identifying those interests, they will increase their ability to develop win-win solutions. The classic example of interest-based bargaining and creating joint value is that of a dispute between two children over an orange. Both children take the position that they want the whole orange. Their mother serves as the moderator of the dispute and based on their positions, cuts the orange in half and gives each child one half. This outcome represents a compromise. However, if the mother had asked each of the children why she wanted the orange -- what her interests were -- there could have been a different, win-win outcome. This is because one wanted to eat the meat of the orange, but the other just wanted the peel to use in baking some cookies. If their mother had known their interests, each child could have both gotten all of what they wanted, rather than just half.

Integrative solutions are generally more gratifying for all involved in negotiation, as the true needs and concerns of both sides will be met to some degree. It is a collaborative process and therefore the parties actually end up helping each other. This prevents ongoing ill will after the negotiation concludes. Instead, interest-based bargaining facilitates constructive, positive relationships between previous adversaries.

1.1.3 Addressing Broader Goals and Needs

In the example with the orange, above, and in many of the cases described in this research, the parties looked for a broader solution set than normally considered. Examination of a broader set of needs increases the group comprehension of each other's interests and expands the playing field on which solutions can be located. In many cases, the "pie" is expanded as well; tradeoffs still occur but do not need to be "zero sum," occurring entirely at the other's expense. Our research focused on examples where different agencies brought to the table what they could do best or contribute most easily — things that other agencies would find harder or have to pay much more to do. One DOT purchased priority conservation lands that were then converted into a new U.S. Fish and Wildlife Service (USFWS) National Wildlife Refuge. DOTs have forged similar partnerships with State Departments of Natural Resources (DNR) and non-governmental organizations such as The Nature Conservancy (TNC). In North Carolina, the state's Ecosystem Enhancement Program (EEP) found similar wetland and stormwater mitigation opportunities with local governments.

1.1.4 Straightforward

In describing what "incentive-based" was and was not, project sponsors relayed examples of the latter. In one case, a local government agency used one regulation and permitting process to produce gains for the municipality in an unrelated area. This case left the DOT feeling highly manipulated. In another case, the jurisdiction withheld a shoreline approval permit until they could extract what they wanted from the DOT. The DOT refused what was perceived as an unreasonable and unrelated request and dropped the project. However, for future projects the DOT is interested in understanding what the parties want, earlier in the process, so creative and cost-effective resolutions could be found. A regulatory nexus is often important as well; typically, projects are 80 percent federally funded and federal funds must be spent for transportation purposes and/or to satisfy regulatory requirements for such projects.

Enhancements may still be achieved for unregulated resources. For example, with an ecosystem approach, 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. Those activities become an intrinsic part of the proposed action and what the transportation agency commits to do with regard to the regulated resources. Accomplishing multiple objectives at once and other interests of the parties involved can help expedite approvals.

1.1.5 Proactive

Many of the best examples of incentive-based approaches were proactive. By uncovering and engaging interests and difficult issues early in the process, DOT environmental managers and practitioners dramatically boost their abilities to find, negotiate, and finalize successful, win-win solutions. Some of the largest, most creative and far-reaching solutions look at problems and alternatives far in the future: regulatory problems that could be prevented for species not yet listed; conservation opportunities unlikely to remain, whether in 6 months or in 20 years.

1.2 Incentives Have a Place in Collaboration

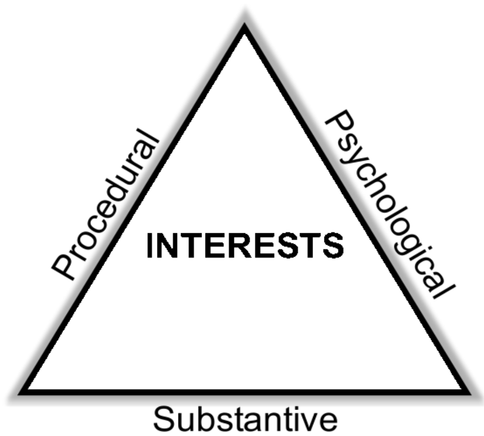
Incentives have a place in collaboration. Use of incentives requires an understanding of the processes and needs of the partners at the table. Defining an incentive or "carrot" as "a benefit that a sponsor could use to offset what they had given up (e.g., money) to include the broader community desires in their project," implies that the stakeholders must understand DOTs' needs, what DOTs find valuable, and what *they* can provide that will assist the overall project development process, such as tax reductions, cost sharing, or reduced permit requirements. The regulatory process and power orientations are not geared to asking these questions, which are more integrative and oriented to wider planning questions and considerations.

Broad sets of interests are often at play and those with a creative and flexible approach may correctly figure these might be tapped as incentives. It should be noted that not everyone feels approach is appropriate and right. Space for incentive-based approaches grows (and may grow further) as recognition of the limitations of standard approaches increases and participants begin asking other questions. For example, are the conventional environmental regulatory processes going to be good and effective enough to ensure that adequate conservation or restoration occurs, especially given the pace of destruction from less regulated sectors?

Incentive-based approaches are much more likely to succeed when they respond to (or at least do not ignore) the multi-faceted interests and needs of each of the individuals and parties involved. The Triangle of Satisfaction, below, is often used to illustrate the interplay of the process/procedural and psychological/emotional interests, along with the more commonly discussed substantive interests. The factors that build resistance to participating in incentive-based approaches to achieving the parties' substantive goals tend to be highly influenced by their procedural and psychological interests.

Use of incentives requires an understanding of the processes and needs of the partners at the table. Defining an incentive or "carrot" as "a benefit that a sponsor could use to offset what they had given up (e.g., money) to include the broader community desires in their project," implies that the stakeholders must understand DOTs' needs, what DOTs find valuable, and what *they* can provide that will assist the overall project development process, such as tax reductions, cost sharing, or reduced permit requirements. However, much broader sets of interests are often at play and thus able to be tapped as incentives, and incentive-based approaches are much more likely to succeed when they respond to (or at least do not ignore) the multi-faceted interests and needs of each of the individuals and parties involved. The Triangle of Satisfaction shown in Figure 2, is often used to illustrate the interplay of the process/procedural and psychological/emotional interests, along with the more commonly discussed substantive interests. The factors that build resistance to participating in incentive-based approaches to achieving the parties' substantive goals tend to be highly influenced by their procedural and psychological interests. Some examples are discussed in the incentive-based approaches reviewed in this report.

Figure 2: Triangle of Satisfaction



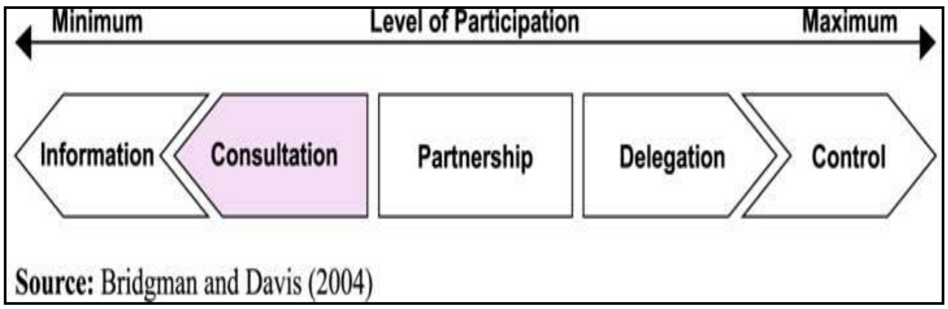
DOTs have experience in carrot approaches, as well as the more common stick experiences. Carrot approaches are often realized where trust and interagency experience are greater and where participants are able or inclined to think creatively about opportunities and solutions, rather than getting mired in yes/no, black/white, or either/or thinking. A carrot approach is evident in the initial title for what ultimately became FHWA's EcoLogical document which was "What Can We Do Together;" the interagency discussions preceding this document and the ultimate document focused on a reasonable parity, understanding and respecting the role of each agency, and seeking to pool agency efforts rather than wield one strong law, such as the federal Endangered Species Act, over other agencies as a weapon.

This project explores a number of examples where the parties involved developed such understandings of each other's needs and developed creative and effective solutions based on those understandings. Examples of creative and effective ways to meet permitting requirements are the incentive-based approaches we found most frequently.

1.2.1 Partnerships and Transparency

Although transportation decisions based on professional expertise and internal policies of the DOT may be entirely credible, the results are rarely unquestionably accepted by affected communities. Interactions with stakeholders which start out on the informing/consulting end of the decision making spectrum in Figure 3 below, are clearly less collaborative than those which involve partnership with other stakeholders, or even delegation and a measure of control. In such cases stakeholder involvement might be more accurately described as a public information process; e.g. the DOT identified the problem within the narrow confines of transportation needs and alternatives were developed to meet given engineering design criteria, after which stakeholders were informed of the decision and rationale.

Figure 3: Decision Making Spectrum7



Incentive-based solutions are characterized by greater partnership and non-traditional delegation of responsibilities. Agencies share their control/leverage in order to jointly develop options and solutions rather than wielding or saving a stick with which to attack the other. Such solutions require effort and initiative; in general, systems have yet to be developed for creative solutions and partnerships to occur with less effort.

1.3 Methodology for the Research

The project started with a kick-off meeting the first week of July, 2008, to better understand the panel's intent and understanding of incentive-based approaches. The research team shared a list of general questions with the panel, for feedback and clarification.

The research for the project was a combination of literature review and targeted outreach to DOTs via email and phone. The panel did not request a survey for this project, which was one of the smaller research efforts authorized under the 25-25 program in recent years.

Most outreach to DOTs and other agency partners occurred between August and November 2008. DOTs were identified from a brief review of the literature and from professional knowledge, focusing on states where innovative, cooperative efforts had occurred, as well as achieving a geographically representative group. Initial contacts occurred in August 2008. The Principal Investigator sent personal emails to various individuals at approximately 20 DOTs with an overview of the effort and what was thought to be a short and easy question, to minimize the burden and inconvenience of the inquiry. The emails, which sometimes varied with the individual, essentially went as follows:

> We are starting a small NCHRP project (25-25/50) where we will be doing case studies of innovative swaps or cost-sharing on transportation projects or among agencies or communities. Ideally for the DOT, these are "exchanges of relatively equal values at the onset of a project" that are mutually beneficial for the agencies involved and essentially incentivize the transportation entity to do something good (they get something out of the deal as well). Can you share some examples of creative exchanges, from your professional experience? If you have contacts, I can follow up with the appropriate parties. Thank you in advance for any suggestions you may have.

Replies and follow-ups occurred later in August and September but generated very few examples that seemed to fit the panel's definition. It appears that "swaps" are very uncommon with regard to environmental compliance and "incentive-based approaches" were largely foreign concepts, despite the research team's efforts to clarify. The RFP states that

> If there were clear, well defined incentives that project sponsors could capitalize on for including the broader community goals and needs, then the project could be supported by multiple constituencies—while allowing for consistent, cost-effective delivery. In this sense, an incentive (or the "carrot") would be defined as a benefit that a sponsor could use to offset what they had given up (e.g., money) to include the broader community desires in their project. Incentives could range from such things as a demonstrated project management strategy to control costs and schedule delays to tax reductions or reduced permit requirements.

Even with additional research and discussions with DOTs between November and February, our effort located very few incentives of this precise type. It appears that benefits are almost never "monetized" like this and that even casting the issue in this fashion can be perceived as a breach of trust or de-valuing the other's role, responsibilities, and interests; parties were able to go much further toward finding and discovering creative and mutually beneficial solutions with a "what can we accomplish together" approach, seeking to make the environment "better than before," with implementation of the transportation investment.

The RFP also asked about and the team did discover examples of incentive-based approaches that "support better integration among the planning phases of different organizations (e.g., environmental groups and transportation agencies)".[8] Innovative examples included "broader community goals and needs," and allowed "support by multiple constituencies—while allowing for cost-effective delivery." The bulk of the report focuses on these types of incentive-based efforts, endeavoring to highlight those that had performed some sort of cost-benefit analysis, projection of benefits or business case, or other "after action" analysis of outcomes. Contacted agencies and individuals are included in Appendix A.

2 Model Incentive-Based Approaches

Incentive-based approaches can be both voluntary and designed in conjunction with regulatory responsibilities. In some of the most creative and productive instances, a mandate or measure of regulation initially prompts the investigation of solutions, but incentive-based approaches are used to extend participation and the change that can be achieved.

2.1 Innovative Cost-Sharing, Land Swaps, or Right-of-Way Assembly

A number of cities have begun to explore cost-sharing and innovative arrangements to enhance a preferred project's stature in a DOT's queue of projects for prioritization and programming or to otherwise negotiate the type of development they would prefer. In other cases, more extensive transit-oriented development or corridors for alternative transportation modes became possible through land swaps.

State DOTs, Metropolitan Planning Organizations (MPOs), and local governments have bartered in such areas as:

- Moving a local safety improvement project up in the Transportation Improvement Program (TIP)/Statewide Transportation Improvement Program (STIP). For many years, a local government was concerned about head on collisions on a 4-lane urban highway. The local government offered $2 million in tax revenues to have the improvement occur years earlier than the TIP/STIP would have allowed.
- Local governments agreeing to significantly raise densities in a transit-oriented development overlay district, as part of an agreement with the DOT and the transportation district over light rail investment in a corridor.
- DOT-local government agreements for installation of more landscaping or more expensive landscaping, in exchange for local government agreement to assume maintenance responsibilities otherwise held by the DOT.
- Cases where a DOT and FHWA provide expertise and in some cases funding to a local jurisdiction and the municipality develops a historic preservation plan or ordinance to protect resources that may be affected by future development, induced by the construction of the transportation facility.
- Property owners donate right-of-way in exchange for DOT construction of a noise barrier.
- An innovative mutual agreement between the Bay Area Rapid Transit (BART) and local agencies permitted BART to swap land in order to assemble a large parcel in close proximity to its Fruitvale station. The swap and joint development effort enabled the community to do something different than the multi-story parking structure BART had originally planned; by implementing a transit village concept, Oakland hoped to reverse loss of population and local businesses. The positive Fruitvale experience led BART to alter planning decisions

elsewhere in the system, which is 104 miles long, with 43 stations and 315,000 weekday riders.[9]

- To help implement what the City of Waco, Texas considered a very important project, the City offered to contribute the following to the DOT:[10]
    - Swap of ownership of 5 miles of roadways, reducing the miles of roadway for which the DOT is responsible for maintenance and upgrades.
    - The city assumed responsibility for 100 percent of the right-of-way acquisition and utility relocation for the proposed project.
    - Financial leverage: $500,000 in discretionary funding

Coordination of local support/publicity, letters of support, and lack of opposition from the MPO, community business interests, city council, and other political representatives supporting development and redevelopment of the Brazos River Corridor, with identification of the corridor as a number-one priority of the community and the city council.

- The Port of Seattle negotiated with King County in Washington State to buy an eastside rail corridor owned by the Burlington Northern Santa Fe railroad. The Port of Seattle had an interest in Boeing Field and the parties were able to strike a deal whereby the Port of Seattle would get Boeing Field in exchange for King County getting the corridor, for use for bike/rail or future transit.

Discussions of examples with more detailed information follow. Many examples combine planning and project development incentives; however, the sections are generally arranged in the order of project phases – planning, development, construction and maintenance.

2.2 Integrating Community Development, Access Planning, and Capacity Expansions

In the following cases, DOTs crafted incentives which maintained the capacity of existing or new transportation investments by incentivizing better development, supportive of access control (in the case of Vermont's Interchange Policy and Planning Initiative), alternative modes, and community development objectives.

2.2.1 New Jersey Route 71 in Avon by the Sea

Route 71 is a major north/south artery for several of the communities located in southern Monmouth County. In the "rightsizing" of NJ Route 71 in Avon by the Sea, the community struck a deal with NJDOT whereby the community conceived, designed and constructed the project on the state route system, with construction funding from NJDOT. The community knew that the project was a low priority for the DOT, and that if NJDOT was asked to design it and oversee the construction without further incentive offered by the town, it might never get done.

Prior to the redesign, Avon's Main Street (NJDOT Route 71) was a 0.67-mile long, four-lane highway with two travel lanes in each direction and parallel parking on both sides of the street. As configured, most of the Borough's residential population as well as the Borough Grammar School reside on the east side of Main Street. The project aimed to improve pedestrian safety for the significant number of residents crossing Main Street on a daily basis. The project also sought to enhance the safety of bicycle and vehicular traffic as well as aesthetically beautify the streetscape.

To accommodate pedestrian safety and promote traffic calming measures, the Borough decided to reduce the effective pavement width of Route 71 by constructing concrete bumpouts at each corner and constructing a center island. Dedicated left turning lanes and a delineated bike lane enhanced the safety of bicycle and vehicular traffic. The result was a reduced roadway corridor from four to two lanes. In addition, the project included new paver sidewalks, street trees, decorative streetlights and street furniture (planters, benches, clock, trash receptacles, etc.).

The Borough officials and business community saw improvement in the volume and types of commercial enterprises on Main Street. The safety improvements and aesthetic upgrades have set the stage for truly realizing a "Downtown Business" center in Avon-by-the-Sea. The business community has overwhelmingly applauded the "new" Main Street and is committed to revitalizing and expanding the business district. In addition to increasing pedestrian safety, the narrowing of the roadway reduces traffic speed, which also increases the overall safety of the highway corridor. With the exception of survey and design, the project was entirely funded by NJDOT.

2.2.2 Cost-Sharing and Creative Collaboration on New Jersey Route 130

The New Jersey DOT gained local investment in an unusual, alternative approach to an intersection safety project on Route 130. In recent years, preservation of the transportation investment has become a critical issue. Smart Growth is viewed as a key way to help preserve those investments and have the local roadway network serve as the transportation mechanism for more of the local traffic.

New Jersey DOT had some concerns about how the area around the targeted improvement on Route 130 was likely to grow. In particular, NJDOT was concerned about the walkability of the development and adherence to Smart Growth principles. The town listened to NJDOT's concerns and partnered with the DOT in developing a solution both for the town and the highway agency. The township approached the developer of one of the quadrants of the intersection and, in conversation with the county, decided to examine what they could accomplish together, leveraging the contributions of each to produce a better result than any could achieve working or developing a solution singly.

As a designated redevelopment authority, the town was able to assemble and contribute needed right-of-way (ROW). NJDOT contributed design resources to help plan the area, including walkways between businesses, trees and sidewalks within, and the location of bus stops; NJDOT provided the money, which was then managed by the township, and the township oversaw the design plans and managed the construction. A roundabout was added to the innovative design.

To identify, negotiate, and then record the agreed incentives, the parties developed a cost sharing agreement and a construction estimate, accompanied by a proposed distribution based on the entity to which benefits accrued. Improvements to a county road were considered a county benefit and various property benefits were included, even a cul-de-sac on a local road. Contributions were sought from all. The DOT benefited by getting construction of a high priority project on the ground 3-4 years ahead of the initial DOT schedule, in addition to the provided funds and ROW. The town was in charge of acquiring ROW. Ultimately, NJDOT provided $16 million, the developer provided $3.5 million, the county provided $1.3 million, and the township provided $150,000.[11]

2.2.3 Ohio DOT Innovative Bridge Development Partnership

One AASHTO awardee boasting a particularly creative approach that resulted in unique benefits for all partners is the Ohio High Street bridge-deck that "caps" the expanded Interstate 670 highway below. For Ohio DOT, the project enabled the agency to address safety and congestion concerns on the highway while reintegrating historic neighborhoods with downtown areas, overcoming a critical issue of concern. For business interests, the unique bridge and retail frontage linked shops, restaurants, and art district to the north of the highway with the convention center and arena to the south. The cap is a highly unusual bridge with new retail buildings built into each side of the overpass, replacing an existing gap in the streetscape with continuous building frontage along High Street. The project created an attractive and highly walkable area, mitigating the impact of the highway while simultaneously adding valuable new retail space. The High Street Cap resulted from a year-long process involving neighborhood and community representatives in the design process for rebuilding the 40-year-old corridor. The project was built through a joint effort of the Ohio DOT, the City of Columbus, and downtown community groups. The community had the vision, Ohio DOT provided the $1.2 million to build the structure, and the City of Columbus teamed with a local developer to build the $6.5 million in shops and restaurants.

Though a cost benefit analysis has not been performed, by providing design features that enhance the community, the project helped "heal old wounds within the community and forge new, better relationships between Ohio DOT and the public," officials said, in addition to prompting subsequent downtown development projects, including a multi-modal center and new housing to the south of the area.[12]

2.3 Programmatic Incentive-Based Approaches

Incentive-based approaches can help the parties involved minimize or dispense with certain project risks, and thus manage cost risks. Risks for environmental costs arise from anything that increases the level of effort, delays the progress of the project, or adds unplanned features to the project. The level of risk increases with the level of unknowns, the level of complexity of the project and the level of control that lies outside the purview of the Project Manager, and outside the DOT. The public involvement process can interject broader solutions than contemplated by the DOT. Regulatory agencies have external control of permits and approvals that translate into greater effort, longer time periods, and added project features.

Programmatic permitting or regulatory consultation efforts offer incentives such as the following, which reduce cost risk for DOTs and improve outcomes for other agencies as well:

- **Improved resource conservation**, across a broader range of projects and/or geographical areas (measurement of environmental uplift is still the area most lacking in data).
- **Time efficiencies** from streamlined environmental processing, pre-negotiated solutions or standards, and reduced paperwork at the project level. For example, programmatic and advance mitigation approaches can reduce section 7 consultations from hundred(s) of pages

to 2-5 pages, and related time-savings for review reduced from 6-24 months to a month or less.[13]

- **Labor efficiencies**, enabling an already over-burdened professional staff to focus time and attention where such individual attention is needed, rather than where provided input might be repeated from that which would be provided on another project.

Primary for DOTs, programmatic approaches typically offer much greater predictability for DOT project timelines by addressing resource needs and resource agency interests at the earliest and most flexible stages. For example, NCDOT was able to move forward 82 projects that had been previously held up waiting for Section 404 permits.

Consideration of environmental needs and opportunities early in the planning process can enable participating agencies to reach agreement on how certain issues will be handled and what tradeoffs may satisfy the interests and regulatory requirements of all participating agencies, while meeting conservation or enhancement objectives of local governments as well. Identifying these needs early in the process assists DOTs and partners in coming to more creative and cost-effective solutions that also deliver more for the environment and the communities. Reaching these deals earlier can significantly reduce the risk of project delay during interagency negotiations that normally occur later in the process. Since construction is usually the largest project cost, project delays can significantly inflate project costs; likewise, when early negotiations streamline later approvals, savings can occur.

From the USACE, EPA, or USFWS's perspective, 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. By involving a diverse array of organizations with interests in protecting recreation areas, game species, threatened, endangered, and other nongame species, as well as associated habitats, 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.

Resource agencies have many interests to which DOTs can respond and leverage. From USFWS'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.[14] Considerations may include location, adjacent existing and future land uses, habitat quality, and current species use of the area. [15] 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.[16]

The following sections describe DOT and resource agency benefits (and cost considerations where available) for a variety of incentive-based approaches.

2.4 Clean Water Act Compliance

Incentive-based approaches to Clean Water Act compliance often seek to accomplish multiple agencies' objectives at once and direct DOT mitigation resources to where they will accomplish the greatest environmental benefits.

2.4.1 North Carolina's Ecosystem Enhancement Program

The North Carolina Department of Transportation (NCDOT) and the Department of Environment and Natural Resources (DENR) designed the Ecosystem Enhancement Program (EEP) in order to deal with a rapidly expanding transportation program with a high volume of new alignments that was estimated to impact 6,000 acres of wetlands and a million feet of streams over a seven year period. The anticipated permit load and a system that was already experiencing difficulties getting proposals and permits approved in a timely way prompted all the parties to design a more efficient system. In addition, the agencies involved aspired to direct the DOT's substantial mitigation investment resources to accomplish much needed preservation and restoration of wetlands and riparian corridors; North Carolina had already done more assessment work in this area than many states, with its long-running wetland restoration program division of DENR.

The EEP evolved from a multi-year effort by NCDOT, DENR, FHWA, USACE, North Carolina Wildlife Resources Commission, U.S. Environmental Protection Agency (EPA) and the USFWS Service to streamline the project delivery process for transportation improvement projects, to reduce environmental impacts in concert with avoidance and minimization, and to produce the most environmentally beneficial mitigation possible. A year of multi-agency process improvement workshops determined that compensatory mitigation should be "de-coupled" from individual permits and project reviews, and performed on a watershed basis, with mitigation projects constructed in advance of permitted impacts. The program was endorsed at the highest levels of participating agencies, in particular, the USACE. NCDOT funded and co-developed EEP to site and implement mitigation needs that remain after project level avoidance and minimization.

EEP was structured to proactively achieve a variety of environmental objectives as well as satisfy NCDOT mitigation requirements in a predictable and streamlined fashion. EEP protects the state's natural resources through the assessment, restoration, enhancement, and preservation of ecosystem functions, and through identifying and implementing compensatory mitigation programmatically, at the watershed level. EEP has produced results and has been notable, nationally, in endorsement of the streamlined process by the USACE. The program has:[17]

- Enabled multiple project impacts (wetlands, stream corridor, water quality, species, and habitat) to be addressed in a comprehensive manner.
- Targeted mitigation resources to better protect the natural resources of the state by assessing, restoring, enhancing, and preserving ecosystem functions and compensating for impacts at the watershed level. The program addresses watershed concerns, including preservation of threatened high quality sites and restoration of wetlands and riparian buffers along impaired streams.
- Exceeded the state and the FHWA's "no net loss" objectives for wetlands.
- Allowed implementation of mitigation years earlier than the current project-letting schedule, expediting projects and eliminating temporal loss of wetland and riparian areas.
- Reduced permit staff workload, rework and duplication of effort, saving time and money.
- Reduced project controversy and improved communication, planning, and environmental stewardship.
- Served as a model for positive interagency relationships.
- Dramatically increased the ecological effectiveness of the investments of public dollars in compensatory mitigation, illustrating better stewardship of public resources, and setting a nationwide standard for mitigation at the ecosystem level for unavoidable impacts resulting from transportation improvements.

2.4.2 WSDOT's Watershed Characterization to Reduce Mitigation Costs

The Washington State Department of Transportation (WSDOT) pioneered a watershed characterization methodology to identify environmental mitigation opportunities. The method identifies options with the highest potential to maximize environmental benefits in the watershed, while simultaneously reducing WSDOT's mitigation costs. Efforts focus on the recovery of ecosystem processes.

WSDOT's initiative involved close communication with local watershed planners, as the DOT worked to target mitigation investments to accomplish locally determined recovery priorities, when such priorities would also satisfy the mitigation needs determined through the regulatory process. Within WSDOT, an interdisciplinary technical team undertook each watershed characterization.

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.

Watershed priorities can be addressed through WSDOT's advance mitigation process, called early environmental investment, a corridor-wide process to identify, rank, select, design, and permit environmental investment opportunities to improve aquatic resources, fish, wetlands, water quality, and floodplains.

Recently WSDOT has explored the use of a riparian restoration plan (RRP) as an alternative to the construction of large stormwater detention facilities for flow management. In one example, buildings, roads, culverts, and other infrastructure will be removed and the land use will be converted back to a riparian forest. A Natural Ecological Benefits Analysis was performed for the proposed riparian restoration plan. Project wide, the RRP approach was found to have 57 percent greater environmental benefit than the conventional treatment approach. The plan has changed some due to additional design work, but it's still an unfunded project (i.e., not built yet). This approach may be considered on some other WSDOT projects, but it's not being considered on a wider watershed or statewide basis yet.[18] The ability of the DOT to mitigate on a watershed basis rather than being forced to mitigate on-site or purchase adjacent lands in highly urbanized areas directly saves money on land costs. Early agreement on what types of environmental solutions will be most beneficial also save on negotiation time and labor costs. They have the side benefit, less directly related to cost, of building good will and facilitating solutions on future projects.

2.4.3 South Carolina Wetlands Mitigation Banking

The South Carolina Department of Transportation (SCDOT) began mitigation banking in the 1990's after encountering delays in project schedules due to mitigation concerns. Establishing mitigation banks for future project impacts was seen as a way of resolving numerous mitigation concerns prior to project completion. In the absence of practicable on-site opportunities, banks helped the DOT avoid or minimize delays in project schedules by providing compensatory mitigation in advance. Statewide mitigation guidance under a state mitigation bank review team was developed in 1996. Over the next five years, SCDOT approved five mitigation sites, with a separate memorandum of agreement (MOA) for each bank.

Debits and credits for the banks were based on the Charleston District USACE Standard Operating Procedures (SOP) (now being used as a model in New York State, among other places) or by preset ratios agreed upon by all signatory agencies. In general, SCDOT's mitigation banks were acquired with federal funds.

SCDOT estimated that their Sandy Island mitigation bank produced a $53 million savings on the Conway Bypass by reducing bridging over marginal wetlands.[19] SCDOT acquired the entire island of sandy uplands surrounded by rivers that encompass high quality, coastal, forested wetlands. Wildlife includes many native and endangered species, such as the red cockaded woodpecker. Such areas have also supported the protection of intact prehistoric and historic archaeological sites and centuries old communities. A portion of the cost savings from the Conway Bypass was then used to acquire Sandy Island. The Sandy Island Mitigation Bank is composed of part of Sandy Island along with parts of three other local plantations. The total cost for purchasing these tracts was $12.9 million, which included a $1 million dollar contribution by TNC. The site contains approximately 17,000 acres of coastal plain habitat. Each acre is equivalent to one credit, with credits and debits applied using the Charleston District USACE of Engineers' SOPs. The bank was developed to provide mitigation for three to four major coastal plain projects. Presently, this bank has mitigated two major coastal plain projects. The remaining credits will be used to offset impacts on future coastal plain projects.

The SCDOT is responsible for the preservation, management, and monitoring of the properties, in perpetuity. While the SCDOT has continuing responsibility, the Department has entered into a management agreement with TNC for long-term management of the properties. According to the Sandy Island Banking Agreement, the SCDOT may convey the fee simple title to the Sandy Island tract and the three additional tracts to a suitable private or public entity. All existing covenants or easements would be conveyed with the transfer of the properties. Sandy Island is open to the public for activities that will protect the natural state of the property, including hiking, bird watching, and fishing. Cultural and sociological studies are proposed to investigate the history of the Sandy Island residents. This community has remained relatively isolated from the outside world, as they continue to live on the island that is accessible only by water.[20]

2.4.4 Maryland Watershed Predictive Stormwater Management and Restoration Registry

The Maryland State Highway Administration (MDSHA) and the interagency, public-private Green Highways Partnership has created a prototype Watershed Predictive Stormwater Management and Environmental Management System Tool which will be tested and finalized through application on the US 301 Waldorf Area Transportation Improvements Project led by MDSHA. This tool incorporates green infrastructure assessment, watershed and stormwater management planning and consideration of use of recycled materials in the regional development of transportation infrastructure.

The project is piloting a Watershed Restoration Registry, which will offer a means to focus mitigation and enhancement in watersheds to deliver the best environmental value, in alignment with the USACE's mitigation rule. MDSHA plans to make use of the Transportation Enhancement Program to accomplish environmental stewardship objectives; since that program requires a 50 percent match and a government partner, MDSHA thinks it is an excellent fit for watershed improvement projects with other sponsors and collaborators. Existing watershed plans are directing the joint mitigation projects.

2.4.5 Reduction of Stormwater Treatment Costs through Alternative Siting

Some state DOTs are exploring collaborative alternatives to wholly BMP-based approaches to treatment of highway runoff. To the extent that such projects creatively meet the DOT's water quality compliance objectives while creatively addressing locally determined environmental enhancement priorities, this may be characterized as an incentive-based approach.

There are multiple drivers behind such approaches. Project costs for stormwater conveyance and control facilities typically vary widely throughout a state, especially from rural to urban environments in association with local land costs. Cost-effective stormwater control options vary with surrounding land use and watershed context. In rural areas where land costs are low, DOTs may rely to a greater extent on dispersions methods, swales, ponds, or wetlands, in that order of preference. In more urban, high expense areas, some DOTs are finding that it makes sense to examine other measures that could cost-effectively address watershed needs, with special consideration of off-site options and municipal or non-governmental organization (NGO) objectives for watershed restoration. In space constrained areas, site-specific constraints such as a lack of available land, presence of protected natural resources, unstable slopes, shallow water tables, excessive costs, and marginal environmental benefits can all point to off-site solutions. Additionally, in-ROW mitigation rarely addresses the most critical needs of the watershed or local priorities.

As NCHRP 25-20/2 noted, “the transportation community generally regulates impacts by analyzing the impacts, negotiating mitigation, and securing permits on a project-by-project basis. This piecemeal approach is not only inefficient, but results in less cost-effective mitigation strategies.”[21] That research found some state DOTs beginning to support efforts to assess surface water quality, groundwater quality, flooding, wetland protection, and stream bank/shoreline erosion within a watershed/ecosystem framework, according to local/regional conditions and watershed needs.

A few states are currently supporting projects that are assessing surface water quality, groundwater quality, floodplain impacts, wetland protection, and streambank/shoreline erosion within a watershed/ecosystem basis. Transportation systems could potentially use the flexibility that watershed-based mitigation provides to reduce project costs, maximize environmental benefits, and address multiple ecological needs and functions. Some efforts have encountered great success, such as MDSHA’s Highway 301 mitigation effort as part of Maryland’s Green Highways Partnership.

2.4.6 Efficiencies Created by Alabama DOT’s Wetland Mitigation System

Alabama DOT’s wetland mitigation banking system has created a number of flexible efficiencies for the agency as well as resource agency partners. With 5,400 acres in 13 banks by 2006, resource agencies allowed ALDOT to borrow credits from one site which has credits and loan them to another site which has none, “since the acreage in the bank sites is so large.”[22] Once a new bank site has been developed, the loan is repaid. Withdrawal credits established by resource agencies, FHWA, and ALDOT become available when certain success criteria are met.

For years ALDOT has been converting low farmland to coastal pine savannahs or inland forested wetlands, achieving a 3:1 ratio in wetland replacement and preserving rare plant and animal species and providing educational and public-service opportunities at the same time, providing benefits and thus incentives to multiple parties, to support duplication of the approach across the state. ALDOT's wetland mitigation banks are community resources. For example, wheelchair accessible hunting will be possible on the 515-acre Dozier mitigation area in the Conecuh River Basin and the Prairie Creek site; and the 1,300-acre Trotman bank in the Alabama River Basin is now an ecological and archaeological park for Montgomery County, thanks to the planning efforts of universities, the local water board, and city, county, and state government. ALDOT manages the wetland sites in perpetuity or donates the properties to a resource agency; resource agencies have been willing to receive the lands because they support larger watershed and ecoregional conservation priorities. For example, USFWS incorporated one bank into their Wheeler Wildlife Refuge Area.

Alabama DOT has gained efficiencies from easy access to already-approved wetland mitigation credits, saving the agency from having to negotiate and build less effective and efficient wetlands on-site or adjacent to the project area.

2.5 Multi-Resource Incentive-Based Approaches

Working with the resource agencies to develop advanced mitigation, DOTs preserved or enhanced wildlife habitat in exchange for reduced costs and risks to transportation project development through streamlined consultation and project specific mitigation.

2.5.1 Florida DOT Helps State Close the Gaps Identified by State's Greenways Program

In the mid-1990s, 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.[23] 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. The approach addressed both regulated and non-regulated species in a wider, ecosystem approach.

Florida DOT (FDOT) helped support the development of the extensive wildlife occurrence and habitat GIS maps, which are used in roadway alignment analysis and impact assessment. FDOT also partnered with FHWA and other government agencies to develop a refined and improved methodology for making transportation decisions while complying with all federal and state environmental regulations. The result, FDOTs Efficient Transportation Decision Making Process (ETDM), redefines how the state plans and builds transportation projects while protecting Florida's natural assets.

As part of FDOT's 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 supports land acquisition activities to help achieve this ecological infrastructure and utilizes 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.

Advance mitigation is increasingly a component of the state's ETDM process as well. An Environmental Screening Tool was designed for ETDM to be applied to major projects and some FDOT districts are beginning to use the tool to identify mitigation needs and potential conservation sites in advance of project construction. Wetland restoration site identification and wetland mitigation are handled on an in lieu fee basis through the state's water management districts, which develop and implement watershed management plans, and contract and manage restoration activities. Prior to implementation of ETDM in Florida, mobility needs were identified by MPOs and FDOT with minimal consideration given to potential impacts of transportation or land use decisions on the community's social and natural resources. MPOs and FDOT identified projects for inclusion in the Long Range Transportation Plan with little input from environmental resource agencies. The majority of agency input did not occur until later in project development, sometimes decades after it had been decided that a transportation facility was needed and significant funds expended. Substantial environmental impacts that could influence the priority of a project were not considered. Often the purpose and need for the project had not been adequately defined. The projects entered the FDOT work program and remained there for five years before any substantial planning and environmental analyses were conducted.

With ETDM, FDOT sought to avoid these problems by re-crafting the process. FDOT's Environmental Manager at the time, Leroy Irwin, told other agencies, "we'll break our process if you break yours!" Several factors motivated FDOT to do this:

- By overlaying maps of strategic habitats with FDOT's short- and long-range transportation plans, the Environmental Technical Advisory Team (ETAT) can easily identify potential environmental concerns at the earliest stage of planning. At that time, options for avoiding or minimizing environmental impacts are greatest and the costs of addressing conflicts are nominal.
- **Greater Efficiency and Better Decisions**. FDOT was never able to merge the 404 process with NEPA, so last minute permit issues were delaying project implementation. FDOT also wanted to engage Federal, State and local governments earlier, to avoid duplication and disconnect between planning and project development. FDOT was interested in reaching better decisions as well as streamlining.
- **Protection and enhancement of Florida's resources**. Environmental protection is very much a part of the ethic in Florida. FDOT felt that its EISs did not focus on the real environmental issues.
- **Design-Build**. FDOT uses design-build and ETDM gives FDOT "cleaner" less problematic projects to deliver to design-build firms. FDOT minimizes risks in advance that it would otherwise have to undertake or pay private firms to engage.

Key features of the ETDM Process include:

- Early and continuous involvement from the agencies and community citizens in decision making.
- Early identification of avoidance, minimization or mitigation requirements (as well as identification of enhanced or positive benefits).
- Reduced duplication of effort by multiple agencies, wherever practicable.
- Linkages between land use, transportation and environmental protection or preservation efforts.
- Access to comprehensive data in standardized formats.
- Early project approvals for less complex projects.
- Reduction in the number of projects subject to detailed reviews.

- Reviews focused on the key issues identified by the ETAT.
- Permit issuance linked to NEPA reviews for more complex projects.
- Maximized use of electronic technology for coordination to minimize burdensome paper trails, to document consideration of potential impacts, and decisions.
- Documented basis for decision making and better legal protection. The system documents the rational basis on which decisions are made, showing the data that were considered, the professionals involved in review, and demonstrating overall that these decisions are not "arbitrary and capricious," the standard under the Federal Administrative Procedures Act.

2.5.2 Colorado Shortgrass Prairie Initiative

Colorado DOT's Shortgrass Prairie Initiative emerged from CDOT, TNC, and USFWS's desire to make a tangible difference for a declining resource and to improve the efficiency of what was all too often a paper consultation process, documenting agency interaction and information about the resource, but generating little on the ground benefit for resources in question. Through a Memorandum of Agreement (MOA), CDOT, FHWA, USFWS, and Colorado Division of Wildlife attempted to effect regional conservation of declining species on Colorado's Eastern Plains by providing proactive advance conservation of priority habitats for multiple species and allow CDOT and FHWA to address compliance under the ESA for listed species, and for declining species that may become listed.[24]

The agencies crafted an approach which greatly reduced and streamlined the "paperwork" end of the existing and potential consultation process for 36 at risk species (3 listed, 33 unlisted), that advanced conservation objectives, and avoided land price increases and potential future difficulties finding mitigation areas, to give CDOT predictability regarding impacts for CDOT's 20-year plan, and promised resource agencies over 30,000 acres of advance mitigation for potential impacts.

Colorado's Shortgrass Prairie Initiative was an incentive-based approach that delivered efficiencies to CDOT, FHWA, and USFWS and helped a declining ecosystem move toward recovery of over 30 species that would be impacted by CDOT projects over a 20 year period. During development of the programmatic approach, CDOT developed an internal working document reviewing cost-benefit drivers.[25] Of primary importance:

- **CDOT decreased uncertainty in negotiations with the U.S. Fish and Wildlife Service.** Whenever a new species is listed, developers, including CDOT, must cope with a period of uncertainty as the USFWS internally develops the approach they will take to conservation of the species at hand. Emergency listings can thrust CDOT projects in construction or in the pipeline into formal consultation with the USFWS, which could stop or delay a project. CDOT reduced this risk by coming to an agreement with USFWS in advance of listings that would significantly impact the agency.
- **CDOT decided it was worthwhile to reduce the risk of potential project shutdowns**, by negotiating an early deal with USFWS. CDOT had faced project shut downs when a species was unexpectedly listed and avoidance and minimization measures were required. CDOT Regional Environmental Managers modestly estimated a 6% annual inflation rate, in

addition to the headaches caused by redesign. Potential project shutdowns, with the contractor already on-site, have even more implications.

Resource agencies, particularly USFWS and the state Division of Wildlife, gained priority conservation investments designed to help recover and improve the viability of 36 species. In turn, CDOT avoided additional regulation, saved time, and built good will. By anticipating and mitigating the long term impacts of the transportation system on species and the imperiled Shortgrass Prairie Ecosystem in advance, both the costs of implementing future necessary transportation improvements and the threat to an endangered ecosystem were reduced. Prevention of listings under the ESA, through improving the adequacy of protection for viable populations benefited the species and reduced costs to the transportation system through streamlining of current, and avoidance of future, consultation requirements and project specific mitigation.

The agreement was considered an excellent deal, delivering on the goals of each participant and capitalizing on what each could contribute. Essentially, USFWS traded reduced permit requirements on potential impacts, over a 20 year period, for tangible benefits for species and habitats, now, regardless of whether all the envisioned transportation improvements were delivered in that period.

2.5.3 Nevada DOT Desert Tortoise Multi-Species Habitat Conservation Plan

The Nevada Department of Transportation (NDOT) joined with municipalities and federal agencies in Clark County, Nevada—a fast-growing area containing 70 percent of the state's population—in a 30-year multi-species habitat conservation plan and Incidental Take Statement covering the threatened Desert Tortoise and 78 other non-listed species. Another 154 non-listed species are included on secondary lists and may be added later. The forward looking conservation plan covers the next 30 years and will expedite all NDOT improvements during that timeframe.

The plan includes maintenance on 1,100 miles of NDOT ROW, and an estimated 14,700 acres of material sites, over half of the state. Additional ROW may be included in the future. The plan covers incidental take of the Desert Tortoise and other Covered Species associated with the construction and maintenance of transportation improvements and material sites outside of identified conservation areas, and maintenance work within conservation areas. Conservation areas identified in the plan are mainly located on federal lands.

The plan depends on conservation actions or best management practices by various partners and funding a system of biological reserves or conservation lands through a $550/acre impact fee on development. 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.

2.5.4 Adaptive Management Approaches

Adaptive management strategies to species recovery or protection take place cooperatively when an agency such as a state DOT agrees to undertake certain research or management activities in cooperation with other state or federal agencies that increases the body of knowledge or understanding relating to a target species or ecosystem. For assuming the financial burden for conducting the research, certain benefits (expedited review or mitigation credits) may become an incentive agreed to by negotiating partners.

Colorado DOT utilized an adaptive management approach on the Shortgrass prairie initiative; efficient annual evaluations will occur and management will be adjusted as needed to reflect current conditions and new learning. Likewise, Maryland SHA agreed to an adaptive management approach on Route 30. Adaptive management approaches save the agencies from having to discern and agree on an end point, and/or assume that certain outcomes will or will not occur, based on very little information. Instead, adaptive management allows a structured, iterative process of optimal decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. In this way, decision making simultaneously maximizes one or more resource objectives and, either passively or actively, accrues information needed to improve future management. Adaptive management is often characterized as "learning by doing."

2.6 Oregon DOT's Programmatic Approach to Bridge Permitting

The Oregon Bridge Delivery Program developed a collection of programmatic permits for 365 bridges with a single set of outcome based performance standards agreed to in advance by all state and federal agencies.[26] This was accomplished through early interagency agreement on priorities and on desired outcomes.

In developing its statewide advance mitigation program and estimated transportation program needs over the next 20 years, Oregon DOT pursued a functional replacement methodology. To maximize the benefit obtained from regional banking projects, the Oregon Mitigation and Conservation Bank Review Team focused its efforts on regional trends as they pertain to wildlife species, wildlife-habitat types, wildlife functions, and land use activities.

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 have been designed to provide meaningful benefits to species and resources affected by projects:

- **Landscape-level analyses** are being 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 are 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 are 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 are 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 applies 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.

The Oregon Department of Transportation analyzed the cost/benefit differences between a traditional project permitting approach and the programmatic permitting process used on the Oregon Transportation Investment Act III State Bridge Delivery Program, an incentive-based approach for the DOT and regulatory agencies, raising the environmental standards for bridge projects and greatly streamlining the regulatory process. That cost analysis showed that the mean return on investment (ROI) for the programmatic permitting process was $3.19 for every $1 expended versus $.75 for every $1 expended on a traditional permitting approach.[27] The results clearly showed that a programmatic approach to permitting a large program has significant cost savings (measured in time and money) over project-by-project permitting; the ROI exceeded benefits projected by ODOT at the beginning of the program, delivering a total of $73 million in realized savings, even without accounting for many benefit areas.[28]

The analysis captured many other qualitative benefits of the programmatic permitting approach, which have been far reaching.

- **Increased interagency trust and collaboration, and efficiencies in other program areas**. The process built trust and a collaborative working environment with regulatory agencies, which has shortened problem solving timelines and allowed the department more flexibility in resolving issues compared to a traditional permitting approach that relies on project specific terms and conditions.
- **Regulatory obligations addressed on the program level have taken interagency negotiations off the critical path for individual projects**. The economies of scale realized by addressing regulatory obligations at a program level have taken negotiations on mitigation and enhancement opportunities off of the critical path for individual projects. This has led to decreased construction schedules and better environmental outcomes.

- **Better avoidance, with better environmental information in planning** reduced interagency conflicts, as well as DOT mitigation expenditures, and produced better environmental outcomes. The expected need for mitigation as a result of bridge construction has been a fraction of what was anticipated at the beginning of the program due to the avoidance of resources during the development process by having baseline information and performance standards for design teams to work with at the beginning of the project development process.
- **Environmental monitoring efforts during construction have led to zero violations over the life of the Program**, building credibility with the regulatory agencies. In addition to building DOT accountability and interagency trust, the education and inspection effort enhanced the environmental and stewardship awareness of both contractors and inspection staff.

2.7 Maryland U.S. 301 and the Green Highways Partnership

The Maryland State Highway Administration aims to make U.S. 301 a "truly green highway." The Green Highways Partnership (GHP) of consultants, contractors, and government entities is looking for opportunities to integrate environmental stewardship components into the planning, design, engineering, and construction of the US 301 Waldorf Area project. These components will be focused on the thematic areas of innovative stormwater management, use of recycled materials or industrial byproducts in construction and also opportunities to encourage the conservation of the "green" assets in the area through conservation and ecosystem protection. The Partnership is seeking to also identify and address, in the context of this project, regulatory and policy challenges or barriers to implementing these "resource protective" or sustainable approaches.[29]

The GHP is looking for opportunities to integrate environmental stewardship components into the planning, design, engineering, and construction of the US 301 Waldorf Area project. These components will be focused on the thematic areas of innovative stormwater management, use of recycled materials or industrial byproducts in construction and also opportunities to encourage the conservation of the "green" assets in the area through conservation and ecosystem protection. The Partnership is seeking to also identify and address, in the context of this project, regulatory and policy challenges or barriers to implementing these "resource protective" or sustainable approaches.

The GHP would like to see research in the following areas:

- Demonstration of water quality benefits at the watershed and project scales
- Development of metrics and measurement tools to show/measure progress and results
- Tests of lifecycle performance of water quality BMPs and other techniques, approaches, and highway models
- Demonstration of institutional economic benefits
- More practices and techniques specifically designed for transportation projects (i.e., soil amendments for toxics, swale BMPs)
- A design manual for Green Highways

- Interim guidelines for multi-resource mitigation, recognized by regulators, including ability to make trade-offs.

Highway 301, like a number of newer transportation projects, incorporated environmental stewardship objectives into the Purpose and Need for the project. The project received interagency concurrence through a streamlined process and used environmental stewardship principles to develop alternatives. In evaluating avoidance and minimization alternatives, the project evaluated overall resource needs and also identified enhancement opportunities, planning actions for and beyond regulatory mitigation. A package of environmental and transportation activities comprised the final alternative, balancing transportation and environmental needs to achieve both gray (traditional) and green infrastructure. The project defines green infrastructure as "Strategically planned and managed networks of natural lands, working landscapes and other open spaces that conserve ecosystem functions, and provide associated benefits to human populations." Improvement/enhancement opportunities were identified in the areas of:

- Stream restoration
- Impervious area reduction
- Land use management – work with local government
- Conventional stormwater management practices (BMPs)
- Reforestation
- Erosion protection
- Fish passage
- Floodplain
- Infiltration
- Wetlands creation
- Historic structure improvements
- Sidewalks

The GHP Stormwater team has created a prototype Watershed Predictive Stormwater Management and Environmental Management System Tool which will be tested and finalized through application on the US 301 Waldorf Area Transportation Improvements Project led by Maryland State Highway Administration. This tool incorporates green infrastructure assessment, watershed and stormwater management planning and consideration of use of recycled materials in the regional development of transportation infrastructure.

The project is piloting a Watershed Restoration Registry, which will offer a means to focus mitigation and enhancement in watersheds to deliver the best environmental value, in alignment with the USCOE of Engineers' mitigation rule. The Transportation Enhancement Program requires a 50 percent match and a government partner, so the program is an excellent fit for watershed improvement projects with other sponsors and collaborators. Existing watershed plans are directing the joint mitigation projects.

2.8 Incentives for Green Roads in California

In California, Green Roads means another thing, focused on waste and emissions reduction. For example, California cities wanting to upgrade their roads and streets with long-lasting, traffic-noise cutting rubberized asphalt concrete (RAC) can count also on incentives from the California Integrated Waste Management Board in the form of multiple funding allocations. In the first half of 2006, the Board approved 20 RAC grants totaling more than $3.1 million.[30] Funds from the Board's Targeted Rubberized Asphalt Concrete Incentive Grant Program help first-time and/or limited RAC users cover the difference in costs of using the material in lieu of conventional asphalt paving. The money comes out of the $1.75 the State collects on the sale of each new tire in California. A portion of the fee—75 cents—is allocated towards air emission programs.

A two-inch thick layer of RAC can save up to $20,000 per lane mile compared to a four-inch thick layer of conventional asphalt and use more than 2,000 waste tires over that distance.[31] Moreover, RAC provides a long-lasting surface and superior wet weather traction, resists cracking, retains its original color so that road markings are more clearly visible, can significantly reduce traffic noise and has the potential to reduce the number and size of illegal waste tire dumpsites in California. California produces more than 40 million waste tires annually, and although approximately 75 percent of this amount is recycled, the state faces the challenge of dealing with roughly 10 million surplus tires annually in which the majority end up in landfills and some of which end up in illegal stockpiles, which can also provide mosquito breeding areas.[32] Over the past few years, California has used nearly ten million waste tires in RAC paving projects, saving them from disposal.[33]

2.9 DOT Incentives to Reduce GHG Emissions

DOTs are beginning to identify incentives to reduce green house gas emissions and improve sustainability and climate change readiness.

2.9.1 Caltrans GHG Reduction Efforts Create Incentives for the Private Sector

Caltrans developed a guide for state transportation practitioners to incorporate energy efficiency and GHG emission reduction measures into the policy framework that governs transportation planning in California. The desk guide will document policies regarding climate change, highlight opportunities to insert climate change into existing processes, and suggest a range of tools and strategies to improve energy efficiency and reduce GHG emissions from transportation sources at each stage of decision making.

In addition, Caltrans' mandates for internal changes have created incentives that have changed the playing field within the private sector. By creating a market for changes in cement mixes, Caltrans' contributions to GHG reduction have been leveraged beyond the transportation sector to influence more sustainable, climate sensitive production of concrete statewide.

2.9.2 Chicago DOT's Activities Incentivize Climate Change Preparation

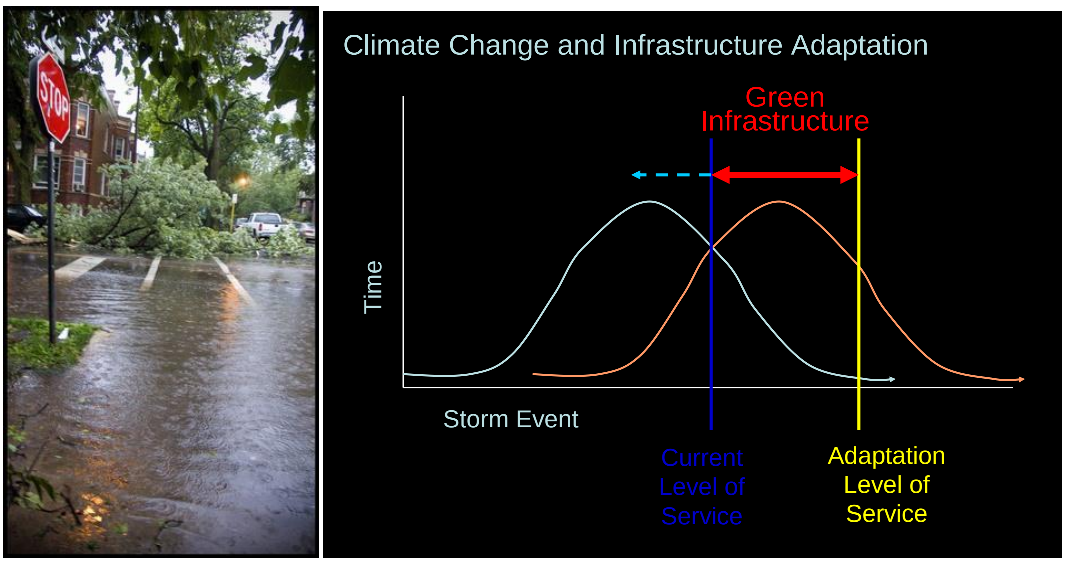
With climate change, Chicago's infrastructure already has to respond to:

- Hotter summers
- More heat waves
- More humidity

- More heavy rain storms and dry periods
- More extreme weather events
- Invasive pests and species
- Changes in agricultural growing conditions
- Negative air quality impacts

The DOT looked at the influence the agency has and what it can change by leading the charge, illustrating needs and possibilities, and incentivizing others by putting pieces in place that will help them get from "A" to "B." With the current level of service of storm sewers not meeting the demands from increased storms and runoff, the City is looking to green infrastructure and green streets to help close the gap, as illustrated by the current level of service in Figure 4, and the level needed for adaptation to the new challenges presented by climate change.

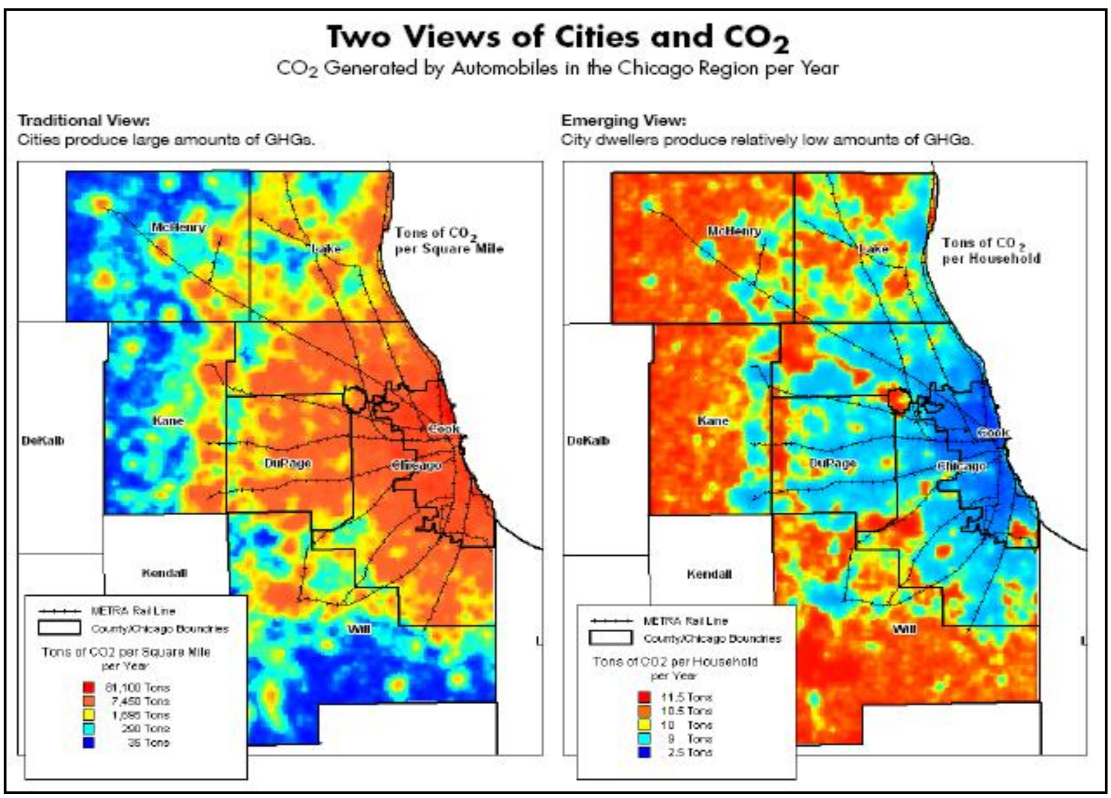
Figure 4: Climate Change and Infrastructure Adaption



For example, the City is pursuing a Green Alley Program, including the use of permeable pavements, recycled materials, high-albedo pavements, and dark-sky lighting. The approach improves stormwater management and energy use through infrastructure improvements. Thus far, implementation and monitoring is occurring on six pilot locations and improvements are scheduled in forty locations citywide. Monitoring for green alleys includes permeability, albedo, surface temperature, and strength. Urban heat island effects have been documented and are being addressed as well. The City is pioneering photocatalytic ("smog eating") cement, LED street lighting, permeable and reflective pavements, and increased use of recycled materials such as ground tire rubber. The City has been exploring existing rating systems for neighborhoods and green streets, with particular attention to LEED-Neighborhood Design as a starting point. The City recently developed a Green Alley Standards manual and points system. Evaluation criteria for the latter include soil permeability, pollution threat (as porous pavements should not be sited where pollution risk from adjacent facilities is too high), adjacent structures, drainage condition, pavement condition, pavement slopes, and pavement preference.

Chicago's Director of the Streetscape and Sustainable Design program is an architect who is very comfortable with the idea that "infrastructure has a direct effect on behavior" and "city governments are at the forefront of sustainable design, and have an obligation to make cities livable places where people want to live, work and play."[34] The City DOT also hopes to build incentives through education, as in Figure 5 below, which depicts the CO2 generated by residents and their autos in the city versus the suburbs and exurbs.

Figure 5: Two Views of Cities and CO_2



2.10 Construction and Maintenance Incentive-Based Approaches

In construction and maintenance, DOTs have developed a variety of incentive-based approaches which may be characterized as “carrots”:

- The Vermont Agency of Transportation’s (VTrans) Erosion Prevention and Sediment Control database includes a performance evaluation on the contractor and subcontractors with 12 environmental questions. This feeds into a rating system for prequalification, giving contractors an incentive to deliver good environmental performance and those with the best environmental performance an advantage.
- Environmental Management Systems and voluntary compliance communication/reporting systems such as the one employed by MDSHA in construction (Environmental Management Toolkit) can notably increase interagency trust, reduce the need for all agencies to meet in the field to decide next steps. Such approaches have the potential to reduce reporting requirements as well.
- Oregon DOT has tried out financial incentive provisions for “above and beyond” environmental performance by contractors in construction. In one case, the contractor split the incentive with equipment operators.
- DOT maintenance contracts are increasingly utilizing financial incentives as well as penalties to ensure successful revegetation or wetland mitigation.

DOTs are trying to spur environmental stewardship in a variety of ways, from policies, to plans, to organizational objectives, role clarification, and internal incentives. Many of these are described in greater detail in AASHTO’s on-line Compendium of Environmental Stewardship Practices, Policies, and Procedures.

2.10.1 Incentive-Based Approaches for Better Control of Invasives

VTrans has been characterizing vegetation along the interstate, using survey quality Global Positioning System (GPS) equipment and Geographic Information System (GIS) mapping technology to create a base map of the vegetation along the roadways, to facilitate the agency’s management and also support relationships with other stakeholders for the DOT’s management activities in the ROW. An emphasis of this project is the identification of invasive species, as the mapping and future updates will be used to help monitor the spread of invasive species along Vermont roadways. VTrans added a general inventory of plants to address sustainable forest management along VTrans ROW and other VTrans owned property. Rare species had already been mapped by the State Natural Heritage Program, which VTrans then used to develop vegetation management plans. Maps generated by other public agencies and water supply agencies were overlaid with highway ROW to identify areas where no spray zones may be needed.

VTrans allowed the Northeast Plant Protection Program to assist with map overlays, monitoring, inventory, and developing management plans, including how to avoid harming rare species through spraying. Paper maps have been entered into the GIS system. VTrans is also collecting rare species and seeds, based on the maps, ahead of construction activities, in addition to utilizing the database for decision support in mowing and invasive species management. VTrans has been able to cultivate good will and partnerships with resource agencies, interest groups, and NGOs, such as the NE Plant Protection Program. The joint effort has also facilitated and created some efficiencies for VTrans' maintenance operations, including in identification of and follow through on "no spray" zones.

2.11 Cost Savings on a CSS Project

Very little information on cost-benefit of context sensitive solutions, a collaborative approach to project development, is available; however, a 2007 TRB report documented a cost-benefit study of Colorado DOT's US 285 project that showed cost savings of $59 million.[35] The panel discussed at the outset of the 25-25/50 project whether CSS projects qualified as incentive-based approaches and did not come to a firm conclusion; "deals" producing benefits for each side were not negotiated in advance of project development. However, the benefits on CDOT's U.S. 285 project were negotiated in the field and arose from community meetings in the course of the NEPA process, as well as from value engineering.

An interesting turn of events occurred at one of the public neighborhood meetings. "During a public meeting, one of the residents came and said 'oh they are putting in an interchange… I live right there, and I don't want to see that bridge.' I said 'we can come to your neighborhood and have a meeting…"[36] As a result, an entire interchange at Wisp Creek was completely eliminated from the design; "the majority of the people who were going to use the interchange said 'no, we don't want to see it,' so we said, 'okay…'"[37]

Project savings were attributed to CDOT's collaborative approaches with the agencies and neighborhoods involved.[38]

- By downgrading the document from an Environmental Impact Statement to an Environmental Assessment, the project saved at least eight months of time and approximately $500,000 in study costs.
- CDOT asked the consultant to use CDOT staff on the project for technical work as they became available, eliminating approximately $200,000 in consultant costs. This close collaboration between CDOT and the consultant also provided improved understanding on resolving issues and realizing opportunities for project improvement.
- Agency field trips with designers found ways to reduce or eliminate wetland impacts while following the design standards developed early on for the roadway, producing further impact minimization and saving $200,000 in mitigation costs.
- Grade-separated intersections were used instead of traditional at-grade intersections. All turning movements are right-in/right-out or traditional interchanges with all access provided by high speed ramps, producing a much smaller footprint and greater flexibility in the layout of turning movements and access roads, at substantially lower cost. ($55 million)
- Community meetings found that one community did not want the increased access to be provided by a grade-separated intersection, because they were concerned about increased traffic, increased noise, and visual impacts due to the overpass. The initial grade-separated

intersection was, therefore, downgraded to an at-grade, right-in/right-out intersection (combined with U-turn areas), and a frontage road connection to another grade-separated intersection, saving CDOT $6 million.

- Six historic sites were completely avoided, thus eliminating the need for Section 4(f) analysis. In some cases, close collaboration occurred between the State Historic Preservation Officer (SHPO) and USACE to balance impacts between historic sites and wetlands. During the scoping process, merger agreements were developed between the USACE (related to Section 404) and SHPO (related to Section 106) that improved collaboration between the agencies and reduced review and approval steps. By including both the USACE and SHPO in the alternatives development process, solutions were developed early on that had buy-in from the agencies and minimized impacts to the resources.
- Additional costs included use of wildlife underpasses additional cost: $2 million, additional culverts for small wildlife crossing: $100,000, and additional aesthetic treatment at bridges: $250,000.

All transportation objectives were achieved and the project realized additional uncalculated benefits from public support, environmental protection, reduction in accidents, and reduction in travel time (improved access) from the improved intersections.

3 Incentive-Based Approaches That Didn't Work: Facing the Barriers

DOTs have many stories of where incentive-based approaches haven't worked. Notably, unless problems are framed on larger scales, solutions may not become evident. Likewise, time constraints and agency's prioritization of their own near term objectives also work against development of collaborative and cross-cutting, incentive based approaches.

As agencies move toward more collaborative decision making, they face obstacles from:

- **Insufficient resources** such as funding, information and communication systems, staff shortages or staff turnover, and inadequate analysis tools—to get to the less usual, more creative analysis.
- **Different perceived missions, priorities, and legal requirements** that can hinder collaboration. A UC Davis analysis of the results of the Partnership for Integrated Planning in Merced found that agencies did not even know what each other's mission statements were and if they conflicted with their own; thus, the effort started by developing a spreadsheet of participating agency mission statements to help establish a foundation of understanding and appreciation.[39]
- **Trust**. Collaboration depends on developing an environment of trust but, if there is a long history of distrust or conflict, establishing such trust can be difficult.
- **Inexperience** and/or lack of familiarity with the processes of others involved and what might assist/incentivize change on their end to enable the whole group to achieve a greater optimum.
- **Reluctance to do anything different, especially if there is no track record of accomplishment or success in those areas**. Established behavior such as "this is the way it has always been done" can be difficult for some individuals to move beyond. This can compound different perceived missions, priorities, and legal requirements and a **hierarchical or *us vs. them* orientation**.
- **Rigidity around what is acceptable for mitigation**. "There is a lot of rigidity around what is acceptable for mitigation. For example, how much mitigation is necessary to restore function in a watershed and then how much restoration credit does the DOT get out of it. Watershed restoration isn't connecting as (able to be implemented for) mitigation."[40]
- **The lack of a common language** between technical specialties can create a barrier to communication.
- **Timely participation/requests**. Transportation development is a goal-directed process. Resource agencies have many reasons for delayed responses or repeated requests for information; staffing and internal policies and norms for dealing with uncertainty are just a couple. What people care about often arises through the planning or engineering process, requiring timely participation given the interdependencies of many tasks.

- **Lack of information** and/or knowledge of what key players want, and
- **Lack of vision regarding larger/longer term goals**.

DOTs need clear plans or indications on the part of the stakeholder community of what is desired, as a starting point for creative thinking and negotiation. As the RFP notes, "the planning, design and construction of transportation projects frequently ignore community goals and needs until there is an adverse reaction." Project design is costly. When project design occurs and then the project needs to be re-designed "in a last ditch effort to get things back on track…[t]his often occurs at a significant cost and/or time delay."

Very often, forward-thinking planning information is not available nor is it a funding priority of the regulatory agency. For example, USFWS regulates FHWA and DOT actions affecting threatened and endangered species through section 7 of the ESA, but too often hasn't developed recovery plans for these same species that positively state what is needed for recovery, not just "harmful" actions to be avoided or resisted. Information is needed on community/stakeholder goals and affected resource needs at the outset, prior to design, as redesign and delay are costly. If adequate plans are not available, this can come from meetings or interviews with stakeholders.

Some staff members feel that by adhering to established methods, they reduce the risk that their decision could be challenged or their agency sued. Some of the most experienced staff argue, however, that landscape level, habitat-based approaches to section 7 consultation (and other programmatic approaches) will always be upheld as reasonable, when decisions are documented and based on the available data.[41]

Other issues from our interview findings are discussed below. Most commonly, interviewees encountered fear of departing from established methods, even when endorsements for more progressive, programmatic approaches (as described in the preceding chapter) were available. Sometimes regulatory agency staff felt they had no authority to work cooperatively or more flexibly, within the regulatory context. Staff may construe their role narrowly.

Faith in the standard regulatory process and stick-based approach persists; it is unlikely to be overcome by a few pilots or good examples. Agency orientations to how the permitting or consultation processes should occur run deep and have been inculcated over decades; agencies are seeing now, that despite a certain level of endorsement for change, the roots of old ways are entrenched. Surfacing interests is one of the best places to start, but this does not always work either. For example, FHWA funded a nationwide meeting of FWS staff working on transportation projects in 2003 and the Volpe Center produced the notes from the closed meeting. One FWS staffer commented that conservation and species recovery were not her job (though the Endangered Species Act and the agency mission imply them as an objective); rather, this staff person saw it as their job to make sure that applicant agencies comply with the process, as outlined.[42] In this case, process compliance, proceeding through a series of steps and preserving the approval process exactly as it is, becomes the end, rather than environmental outcomes, leaving the DOT little to work with in terms of a creative approach to tackling joint objectives.

3.1.1 Participants Adverse to New Approaches

A state DOT project was delayed due to threatened and endangered species issues, wetland mitigation needs, and grassland bird issues (regulated under the Migratory Bird Treaty Act or state protected). The Natural Resources manager noted early in the process that the team was talking about mitigation for three different but overlapping ecological issues. The DOT staff involved felt it was too difficult or time consuming to accomplish mitigation in one place, and the DOT ended up mitigating in three different areas to more readily meet resource agency requirements. As staff described, "The agencies were reluctant to consider a comprehensive, multi-resource solution. Each agency (USFWS, USACE, and State DNR) wants to make sure their needs are met" and accomplishment of overall needs or other agency's needs in an efficient fashion is not a priority. This manager emphasized that the interagency relationships are good, but "when you are trying to push a new concept, everyone is not on the same page."[43] That takes time and training.

3.1.2 Doing Things a New Way Takes Time and Experienced Staff

Lack of time can prevent programmatic approaches or project level incentive-based approaches at the outset. "Cooperation comes to a grinding halt as time pressures increase; time pressures produce non-agreement, decreased information exchanges, and firmer negotiator demands. The perception of available time facilitates cooperation."[44]

Speaking of conditions on the other side of the country, Mark Durham, South Coast Branch Chief, Regulatory Division, USACE of Engineers said:[45]

> Agencies are afraid to get off of the case-by-case approach, which is agonizing but can be accomplished with low level technology and with less experienced and more available staff. Regional approaches take more brain power. Then there is just the resistance to change.

3.1.3 Difficulties Communicating Relevance for Local Decisions

As a USACE District Manager noted, watershed studies and the development of Special Area Management Plans (SAMPs), a watershed and prioritized resource conservation approach to permitting under Section 404 of the Clean Water Act, are difficult, though more effective. Durhan noted that SAMPs offer the benefit of "abbreviated permitting, and assures vast amounts of waters of the U.S. are preserved in the right places. Many state and federal agency staff have a hard time grasping the concept of large scale, big picture studies over local impacts. Old ways die hard."[46]

> The development of a watershed study requires a substantial investment of resources including the involvement and commitment of time and funding from local agencies, natural resource agencies, and the DOT, to bring everyone to the table to work together as a team to understand the collective long-term benefits that won't be realized until later in project development.

3.1.4 Divergent Priorities and/or Increased Budget Pressures

Even at agencies with strong and well-known environmental policies and ethics, agency pressures to prioritize project permitting and environmental processing are strong. Such pressures seem to have increased in recent years, with tight budgets and especially with the rise of performance measurement at DOTs. DOTs typically decide (and are prompted by consultants to decide) that they should only try to measure a limited set of performance criteria, usually transportation-focused. Thus, the most common "environmental" measures DOTs use are turnaround times on permits and consultations. The pressure to stay "on time and on budget," often the agency's highest operational objectives, are strong. The environmental staff role in that is to deliver clearances. Staff are often instructed to devote their attention to quick turn-around, when time runs short.

3.1.5 Difficulty Selling Programmatic or Incentive-Based Approaches

Budget pressures have left many transportation agencies with hiring freezes and vacancies that cannot be filled, leaving already pressed staff even more short-handed. As one DOT natural resource manager commented:

> Doing things up front takes more work and produces better results, but sometimes you don't have time. That's the reality. Time and resource constraints sometimes prohibit this. As long as there is such a steep learning curve every time, it is hard to sell the efficiencies, (when it is inefficient).[47]

This manager went on to underline the need for templates, clear processes, and a good base set of environmental data, showing all resources of concern and conservation and restoration priorities. The agency wants to "create tools out of the lessons learned," including "templates to use more programmatically." It is sometimes considered a risk to invest time and creativity in designing more effective and comprehensive long-run approaches that may, in the end, not be accepted by the other agencies.

3.1.6 "We Can't Make Decisions without More Data"

State DOTs and FHWA have been struggling with how to accomplish more environmental analysis in planning and want local and regional entities to accomplish more integrated planning. The Safe, Accountable, Flexible, Efficient Transportation Act: A Legacy for Users (SAFETEA-LU) asks MPOs to use and consider conservation planning information. A common response, however, is that the data does not exist or is not of the quality to support decision making by resource agencies. Lack of readily available and actionable environmental data for planning with regard to resources of concern, avoidance areas, and conservation and restoration opportunity areas is a key issue. Typically, this information is collected and used on a project by project or corridor by corridor basis, as with MDSHA's Highway 301, increasing the cost and time involved in developing incentive-based approaches.

Federal Endangered Species Act section 7 consultation and Section 404 permitting under the Clean Water Act have historically focused on detailed project review and involved on-site surveys where effects may occur. The USFWS, EPA, and the USACE have become accustomed to having this level of design detail for project reviews, such that sometimes little can be accomplished at planning level meetings without site level wetland delineations and on-site species surveys. Aerial photos have facilitated earlier discussions (during corridor or Tier 1 EIS studies) regarding wetland impacts and mitigation siting for Clean Water Act Section 404 permitting, but the true potential of remotely sensed or widely available continuous data for decision support has not been fully realized. There are a number of reasons that these systems have not been developed on a widespread basis. To date, USEPA, the USACE, National Oceanic and Atmospheric Administration (NOAA) Fisheries, and the USFWS have been hampered by stagnant or declining budgets, little or no programmatic guidance, and other drivers that dominate time allocation and decision making (e.g. lawsuits). Also, until recently, decision support tools have been cumbersome and recovery science has not been formatted for decision making.

DOTs engage in expensive and time-consuming data gathering with regard to natural resources for NEPA, the Clean Water Act, and the Endangered Species Act. Though SAFETEA-LU and best practice suggest that integrated conservation, land use, and transportation planning is desirable, DOTs and resource agencies continue to be hampered by what environmental decisions can really be made at that stage, the availability of data, and resource agency participation during planning. Nearly two-thirds of DOTs now fund positions at resource agencies to increase their capacity and availability, partially addressing this need; thus, the primary challenge centers on data for effective decision making.

3.2 Risks or Challenges Generated for Future Phases

DOTs and resource agencies have expressed concern about the potential risks of early mitigation.

3.2.1 Resource Agencies Reluctance to Commit

Resource agencies have expressed concerns about making decisions on resource conditions far in advance of an individual project; the conditions could change and the resource agencies might want something different in the future. Thus they are concerned about wasting their and others' time on advance mitigation efforts and with living with a commitment they do not want to make.

Resource agencies typically do not take into account that the DOT is taking on a substantial risk too; whereas the resource agency locks in the environmental enhancement now, the DOT project(s) that would cause the need for that mitigation may or may not ever materialize. Projected impacts may also be reduced. However, the environmental enhancement designed by all the agencies as their best take on what would benefit the resource now and in the future remains.

3.2.2 Risk of Over-Mitigation

Early advance mitigation programs often started with "the more mitigation, the better for environmental stewardship purposes and advance mitigation programs were charged with "wasting transportation dollars." It is a challenge to accurately project mitigation. "If trying to estimate far in advance, mitigation estimates may be based on very crude GIS analyses and road location. When you have imprecision, you have the risk of mitigating more than you need."[48] A program audit found that EEP had accomplished too many acres of mitigation when the DOT ended up needing less mitigation than anticipated. Additionally, project designers have often been able to find further mitigation savings (avoidance and minimization opportunities) when they get to the detailed design stage thus reducing the need for mitigation.

3.2.3 Long-Term Stewardship of Property

Long-term stewardship of property is a challenge for DOTs that is often solved by incentive-based approaches and land swaps; however, the receiving entity still has the challenge of how to manage and fund management over the long-term. With growing awareness of these issues, DOTs are on the line as well.

To address this issue in North Carolina, the DENR set up a stewardship program that is endowment driven. Each project using the EEP pays into the endowment. The concept is, once a project is done and through success monitoring and regulatory agencies have signed off in terms of the credits generated, it is transferred to the state stewardship program with a payment, for management in perpetuity. That stewardship program is dedicated to easement integrity. The agency takes on invasive species management and any other particular management issues, but not ongoing functional criteria, in order to minimize the long-term burden. State staff said, "If (the site) meets regulatory success criteria, all (parties) are assuming the project will continue to function."

Oregon DOT's mitigation program manager reported that The TNC would not assume sites with long-term management obligations outlined specifically; rather, TNC maintained that such management was their primary mission and they would maintain sites responsibly.

3.2.4 Reasonable Monitoring and Adaptive Management

Reasonable monitoring and adaptive management requirements over the long-term are a key challenge generated for future phases. This risk can be mitigated somewhat by diligent effort to make the requirements reasonable. For example, Colorado DOT's Shortgrass prairie initiative did manage to negotiate a simple set of annual site assessment requirements in perpetuity, with USFWS that were agreeable to TNC. This portion of the arrangement took longer to negotiate than any other, with USFWS, as the management actions had to be "do-able" and efficient for the entity assuming the responsibility and USFWS had to be able to count on this occurring for many years into the future.

The agencies, TNC, and the state Natural Heritage Program agreed to an annual review of the best available information on type of plant communities/habitats present in the conservation reserve areas, including the estimated acreage, general condition of each (including weed infestations, relative abundance), description of plant communities' present and geographical relationship of communities, and the estimated percent cover of each community. Land use changes would also be briefly reviewed, along with success of suggestions from the previous year, and suggested modifications to management plans, with use of coarse measures to start. A management plan will be developed in the first year after acquisition of the real estate interest and updated at least every five years. General observations on wildlife diversity, activity, and general trends, noting presence or absence of targeted species are to be recorded and photo points at established permanent locations according to protocols to be developed in the management plan. The agencies agreed that this reporting could consist of field notes; surveys and quantitative data are not required. The management entity is asked to acquire new or existing aerial photos as they become available, as applicable and appropriate, and label habitats on existing aerial photos and U.S. Geological Survey topographical quadrangles. Finally, the partners agreed this work must be performed by a qualified person.

4 Assessing Costs and Benefits of Incentive-Based Approaches

A true cost-benefit analysis that quantifies the benefits and adds together all the positive factors of incentive based approaches that proactively bring about a truly collaborative approach to create a quid pro quo win-win solution is not feasible. For one, individuals value the intangible benefits in different ways, to different extents. Florida DOT and nearly 30 cooperating agencies created a vision of a more efficient and environmentally meaningful and effective consultation process, when they crafted the ETDM framework. In later interviews, one federal resource agency representative said he and other federal and state agencies in Florida felt they achieved a 100 percent increase in efficiency, with 50 percent less effort.[49] The extent such intangible benefits are valued depends on the individuals involved. However, monetized values have been developed for a limited set of components. This chapter examines available cost-benefit information on incentive-based approaches, particularly advance mitigation.

4.1 The Desirability of More Cost-Benefit Information Related to Environmental Investments

As a starting observation, it should be noted that DOTs collect, maintain, or record little information on the costs of environmental investments or alternative approaches. DOTs have begun assessing process or consultation time in the past ten years, but this information is tracked in many different ways. Thus, it can be difficult to document or project environmental cost savings.

For many DOTs, one of the biggest obstacles is lack of data on the environment generally, and the expense of collecting environmental data. The long-term nature of environmental programs means that data needed to illustrate effectiveness or for annual performance goals and measures is often not available. As noted in the April 2000 Government Accounting Office Report on *Managing for Results: EPA Faces Challenges in Developing Results-Oriented Performance Goals and Measures*, the limited availability of data on environmental conditions is a major challenge in establishing a relationship between a program's activities and resulting changes in the environment.[50] The John C. Heinz Center has been working on a partnership to develop a common set of indicators among federal agencies and gear data to speak to common environmental indicators.[51] In 2008, the Center issued a comprehensive update on the health of U.S. ecosystems--along with a plea for the U.S. government to coordinate and fund future assessments. [52]

In a 2002 census of all 50 state DOTs collecting data on best practices to produce FHWA's State Environmental Best Practices database, Arizona, Florida, Georgia, Idaho, Ohio, and Washington said they had or were developing systems to track environmental costs and benefits.[53] Decision support tools and information to incorporate costs and benefits of environmental compliance into transportation decision-making and policy development were being developed in Arizona, Florida, Hawaii, Texas, Utah, Washington State, and Wisconsin. [54] However, these initial efforts have advanced little since that time. A 2008 NCHRP study, 25-25/39, attempted to follow up on these leads and re-survey the DOTs, but few DOTs responded that they had been collecting information on environmental costs.[55] Oregon DOT was one of the very few that had and Oregon's information was the most extensive. Importuned by the state legislature, ODOT had undertaken a study designed to estimate the cost of complying with different environmental laws.

NCHRP 25-25/39 found that environmental cost information at most DOTs was designed for cost estimating purposes, which usually meant that if the cost was covered or included in some other way (for engineering functions), no further effort is usually taken to parse out what may be considered environmental costs. The main purpose was to ensure that all costs were accounted for, so cost overruns did not occur. Information on why a bridge span was expanded or a bridge was used rather than a culvert are typically unavailable in a financial database or connected to other databases that could shed light on the question. Other more subtle changes are even less likely to be tracked.

The most commonly kept and utilized environmental cost information centered on erosion and sedimentation control facilities, wetland mitigation sites, site surveys, and the costs of cultural resources documentation studies.[56] Environmental benefits and cost-savings from incentive-based approaches may be particularly unlikely to appear; land swaps, for example, merely reduce real estate costs, unless otherwise recorded, and decisions may be made due to particular qualitative benefits that accrue outside the DOT.

The paucity of information on environmental elements of DOTs' work is illustrated in the quote below from a February 2009 issue of AASHTO's Environmental Technical Assistance Program newsletter, with regard to the availability of cost information in an environmental program area:

> The majority of transportation agencies do not collect data regarding the duration or costs associated with the Section 4(f) process. Prior to the enactment of SAFETEA-LU, 81 percent of the 42 transportation agencies surveyed did not formally collect information on the duration of the Section 4(f) process, while 83 percent reported that they did not collect information regarding costs. Similarly, 71 percent of those surveyed reported that since the enactment of SAFETEA-LU they have not collected data on the duration of the Section 4(f) process, while 81 percent still do not collect any data regarding costs.[57]

4.2 Programmatic, Incentive-Based Approaches to Manage Risks

NCDOT's Ecosystem Enhancement Program operated cooperatively with the Department of Environment and Natural Resources and has successfully produced a system with no delay for Section 404 permitting of transportation projects, including 82 in the first year. The program also tracks the following environmental outcome measures:

- Number of acres of priority conservation areas protected annually by EEP (also contributing to NC's "Million Acres" Program, now "One North Carolina Naturally").
- Amount of watershed improvement achieved after five or more years through appropriate measures.
- Number of acres of wetlands, riparian and non-riparian, and feet of riparian areas (cold, cool, and warm) impacted and replaced.
- Percentage of watersheds enhanced.

- Replacement of all functions lost to impacts from transportation projects (replacement unit less impacted unit is greater than or equal to zero).

Functional replacement will also be assessed and a rapid assessment technique is being developed to help assess project success and overall success rates. A watershed functional assessment system, finished in 2003, primarily addresses water quality needs and guides mitigation siting as well as assessment of overall watershed condition related to water quality, before and after investment. A stream functional assessment system is in the works. A new wetland functional assessment method (NC Wetland Assessment Method) integrates with acreage as the previous accepted method for credits, but also seeks to account for existing function. North Carolina, EPA, and the USACE are currently testing the method (assessing wetland, accounting for existing function) and comparing that to how much mitigation (acres) the USACE has historically required for the function that has been produced. The state is not sure how this is going to be integrated into the regulatory system.

5 Funding & Regulatory Help to Implement Incentive-Based Approaches

There is no incentive like money. As one facilitator of interagency programmatic approaches noted, "Money really talks."[58] In making suggestions regarding what DOTs could do to make programmatic, incentive-based approaches work better and more easily with federal regulatory partners, a USFWS biologist working with the DOT and MPO said "Don't nickel and dime us. Make the deal unquestionably worth it, a no-brainer."[59]

As many interviewees noted, "typically, everyone looks to the transportation agency for money. And the transportation agency's money is typically related to funding for specific projects." The creation of pools of money that can be applied to advance mitigation measures constitute a strong incentive, and resolve a key disincentive. DOTs may also gain by offering to fix things from the past that weren't done well; Maryland SHA is working on this, with regard to watershed restoration and the amount of impervious surface.

Further incentives can arise when a transportation agency's efforts can be linked with the already-existing or planned efforts of other agencies to maximize the effectiveness of the other agencies' programs. For example, in Montana, the Forest Service had a program to open up stream crossings to improve wildlife passage. Where the Montana DOT had a stream crossing downstream of the Forest Service's crossings, the value of what the Forest Service did would be greatly enhanced if Montana DOT removed a downstream barrier at a highway crossing. Such coordinated action requires a sharing of information about goals and programs. Some of these programs are outlined in the final section of this chapter.

Funding may be an increasing issue both in favor of incentive-based approaches and against. On one hand, funding mechanisms do exist, as outlined in this chapter. A manager of at least one incentive-based program wondered if DOTs would invest in advance environmental work to put the agreements in place, in such tight budgetary environments. On the other hand, DOTs are beginning to invest more time and resources in documenting the benefits of these efforts. In addition, incentive-based approaches that are characterized by creative swaps are likely to continue to be possible, and potentially more common as agency staff members respond more creatively to needs, as other avenues dry up.

5.1 Ability to Use Federal Aid Funds for Advance Mitigation

The ability to use transportation funding for advance mitigation of habitat and wetlands has been continually clarified over the past 15 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**" (underlined emphasis in original), under 23 CFR Part 710.513 and 23 CFR

Part 777, using either National Highway System or Surface Transportation Program Federal-aid funds.[60]

The Transportation Equity Act for the 21st Century (TEA-21) and implementing regulations provided other important information on the flexibility of FHWA to participate in various aspects of mitigation for wetlands and natural habitat. FHWA's *Guidelines for Federal-aid Participation in the mitigation of Impacts to Upland Ecosystems and the Establishment of Ecological Mitigation Banks* support the formation of partnerships among levels of government and with non-governmental stakeholders, including partnering with non-profit resource management interests or agencies for land management and ownership. 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 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). According to FHWA's legal sideboards for this flexibility, impacts must result from a Federal-Aid project in order to qualify for federal funds and must be considered a "reasonable public expenditure." DOTs generally avoid acquiring advance mitigation lands by eminent domain and must comply with federal law and State transportation planning processes.

5.2 Early Estimation and Funding of Mitigation Needs

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 previous section, 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 from 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 come online.

5.2.1 Line Item Allocations and Revolving Funds

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 projects as the need is identified through preliminary environmental and design work. As precise mitigation needs are identified and choices made on individual projects, 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 should be in direct proportion to required mitigation and the cost of the “Mitigation Project.” Such approaches are sometimes called “revolving funds” because funds are spent out of the account, reimbursed later, spent again, and replenished. A drawback of this approach is a particularly large advance mitigation project can deplete the fund for years, especially if the mitigation occurs far in advance of projects and reimbursement is not available for 5-10 years or more. 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.

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 higher mitigation ratios, again generating higher costs. Solutions that maximize environmental returns while minimizing capital investment steward both environmental and fiscal resources. Some of the methods used include the following:

- **Florida DOT (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 $100,000/acre. Significant portions of the latter program are accomplished through private, for-profit wetland mitigation bankers.
- **Washington State DOT (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.[61]
- **Colorado DOT (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 Shortgrass prairie initiative largely depleted this fund.
- **Oregon DOT (ODOT)** has looked at accessing project funds up front for environmental compliance. 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).[62] ODOT plans to use state funds, reimbursed by Federal aid projects as credits are purchased (i.e. a revolving fund).

- **North Carolina (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, and 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.[63]

5.2.2 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 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.[64]

Caltrans 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 (MNS) submittal, based on the following factors, subject to the strength of the justification and available funding:

- Satisfaction of 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

5.3 Consistency with Current Regulatory Initiatives

State and local agencies use the long-range planning process to set the transportation vision and a strategy for achieving goals and objectives.

5.3.1 SAFETEA-LU

Section 6001 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) (Pub. L. 109-59, August 10, 2005) increased the emphasis on coordinating transportation and land use at the statewide and metropolitan planning levels. The law also emphasizes the need to consider environmental issues in the planning process. SAFETEA-LU requires transportation agencies to include actions and strategies to protect and enhance the environment, as well as discuss potential mitigation measures and potential sites to carry out these activities. Identifying potential environmental issues during planning and consulting with resource agencies allows the transportation agencies to consider ways to avoid impacts before investing time and money in design, thereby making the overall process more efficient.

An early and interactive agency partnership is promoted through use of FHWA's Planning and Environmental Linkages approach. The approach links early planning efforts and ultimately project-specific goals and objectives through continued coordination. Environmental issues are brought to the forefront through this collaborative partnership, by:

- Improving agency understanding of transportation projects at an early (planning) stage, as well as keeping the agency informed about a project.
- Improving the project proponent's understanding of the agencies' environmental regulatory requirements for the project.
- Serving the community transportation needs more effectively.
- Helping resolve differences and improve transportation decisions.

- Reducing the time, effort, and cost to implement transportation improvements.
- Obtaining a broader, ecosystem-scale perspective.

In February 2007, FHWA and FTA issued final regulations on Statewide Transportation Planning and Metropolitan Transportation Planning (February 14, 2007) detailing transportation planning requirements that relate to land use planning that must be met prior to MPO and state adoption/approval of transportation plans. These are complimentary with and supportive of incentive-based approaches since this sort of early, coordinated planning can be used to identify mutual interests and find mutually beneficial solutions.

- **New Consultations:** MPOs and states must consult "as appropriate" with "state and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation" in developing long-range transportation plans. In developing metropolitan transportation plans and transportation improvement programs (TIPs), the MPOs are supposed to consult with agencies and officials responsible for other planning activities within the planning area that are affected by transportation, which includes state and local planned growth and other activities.
- **Consistency of Transportation Plan with Planned Growth and Development Plans:** SAFETEA-LU revises the previous planning factor related to environment, which is one of eight factors that must be considered in metropolitan and statewide transportation planning. This factor (E) now reads, "protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns."
- **Visualization Techniques in Plans and Metropolitan TIP Development:** As part of transportation plan and TIP development, MPOs shall employ visualization techniques. States shall also employ visualization techniques in the development of the long-range statewide transportation plan.

Appendix A of the Final Rule (p. 7282), 23 U.S.C. 139(f), also supports multi-objective incentive-based approaches. For example, the statement of purpose and need shall include a clear statement of the objectives that the proposed action is intended to achieve, which may include (among other things), supporting land use, economic development, or growth objectives established in applicable Federal, state, local, or Tribal plans. FHWA supports achievement of joint goals with communities through the following transportation programs:

- **Transportation Enhancements** - Federal-aid funding for transportation-related improvements, including sidewalks, curbs, trails, and restoration of historic structures.
- **Transportation and Community and System Preservation Program** - Federal-aid funding for innovative programs to link transportation and land use.
- **Congestion Mitigation and Air Quality Improvement Program** - Federal-aid funding for projects with demonstrated air quality benefits. These funds are often employed to meet multi-modal and "complete streets" or "living streets" objectives.

- **Metropolitan Planning and State Planning and Research** - Federal-aid funding distributed to MPOs and State DOTs to conduct metropolitan planning activities and statewide planning and research activities can also support land use and other planning with local governments.

5.3.2 Ecosystem Conservation

Ecosystem conservation and recovery of species, such that listing is no longer necessary, are primary goals of the federal 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.[65] (ESA § 3 (3)), 50 CFR § 402.02 (2000)

USFWS and 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, USFWS 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.

5.3.3 Advance Mitigation

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 and SAFETEA-LU. 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."[66]

Advance mitigation approaches work out a solution to anticipated regulatory issues earlier in the process when there are greater opportunities to integrate transportation plans and existing natural resource plans, in order to achieve larger scale environmental objectives. For environmental advocates and staff in all agencies, the carrot is tangible environmental benefits for target resources, through on the ground investments in conservation and restoration, rather than paper consultation and permitting processes. For DOTs as transportation development agencies, the carrot is a streamlined and more predictable process, where regulatory issues are positively resolved, without difficult negotiations or the risk of project delays.

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." A recent book by the same title noted that 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.[67] Stream buffers and natural land-cover 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.[68] 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.

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.[69]

5.3.3.1 Commitments by FHWA, EPA, the USACE, USFWS, and NOAA

To support integrated planning and advance mitigation, the USACE, EPA, FHWA, USFWS, 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:[70]

- The USACE 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 USACE's new organizational framework facilitates a comprehensive, integrated watershed management approach. The USACE'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 USACE 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 USFWS is using regulatory flexibility to manage wildlife resources on a landscape and population basis, rather than an individual basis. The USFWS 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. The USFWS 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 NGOs where cash, materials, landowner coordination, and/or land are contributed can serve as part of the required non-Federal match, leveraging available funds.

The agencies' commitments were ultimately formalized in the "permission document" Eco-Logical: An Ecosystem Approach to Mitigation, that authorized and encouraged collaborative and more environmentally effective advance mitigation approaches.

5.3.3.2 Eco-Logical

A multi-agency strategy to integrate planning and decision-making processes and partnering has been established within "Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects." A multi-agency steering committee including FHWA and seven federal environmental agencies developed and signed the "Eco-Logical" guide that establishes a conceptual framework and initiative to integrate planning and project delivery and use an ecosystem-based approach. The "Eco-Logical" framework advances beyond project-by-project, resource-by-resource, site-by-site approaches toward a broad landscape, ecosystem-scale approach that spans across jurisdictions and geographic boundaries. "Eco-logical" is being implemented as a long-term, multi-agency initiative.

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. 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. 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.

5.3.3.3 FHWA's Exemplary Ecosystem Initiatives

Since 2003, FHWA has supported and tried to promote what the agency calls "exemplary ecosystem initiatives." FHWA developed specific criteria for selecting ecosystem and habitat conservation initiatives, and agreed to showcase a minimum of 30 exemplary initiatives on the FHWA website. An exemplary ecosystem initiative uses partnering and collaborative approaches to advance common goals.

> The environmental process requires multi-disciplinary involvement and input from review/permitting agencies that have jurisdiction over the resources that may be impacted as a result of transportation decisions. These agencies need to be engaged during planning and development to define successes and solutions to environmental issues. Many States and review/permitting agencies have recognized that watershed and ecosystem approaches to enhancement, restoration, and preservation of aquatic and upland ecosystems can expedite the environmental review process while maximizing benefit to the environment.
>
> Partnering and collaborative approaches are essential when developing ecosystem and habitat conservation initiatives. Each of the selection criteria depends, to some degree, on successful partnering and collaboration with review/permitting agencies and other stakeholders. Partners should work together to determine resource needs at a landscape scale and identify ways in which all parties can contribute to and benefit from achieving ecosystem objectives. Mitigation and enhancement activities can then be targeted to help advance regional conservation goals. In this way, FHWA shares with its' partners in the development of the initiative, gains their early buy-in, and helps ensure success.

An exemplary ecosystem initiative provides clear examples of innovative environmental solutions by transportation agencies and achieves high standards in the environmental process and has clear goals "both from an ecosystem perspective and a highway perspective, that were met by this solution" and should be "recognized by environmental interests as being particularly valuable or noteworthy."

> Exemplary ecosystem initiatives should clearly demonstrate how an ecosystem approach (e.g., watershed-based mitigation) will generate benefits (e.g., greater predictability in transportation project timelines, ability to address multiple project impacts in a comprehensive manner, more effective habitat conservation, and elimination of temporal loss of wetland and riparian areas).

5.4 Funding from Other Federal and State Agencies

As noted in the North Carolina Ecosystem Enhancement Program overview, NCEEP leverages the investments of other water quality enhancement programs (Clean Water Act section 319 funds), as it targets watershed restoration improvements. The Vermont Agency of Transportation has provided funding for access control planning. Caltrans' Blueprint program incentivizes comprehensive planning by regional entities, considering all resources, identifying and resolving, to the maximum extent possible, issues before programming transportation investments. Some other common federal and state programs we have not yet discussed are briefly summarized below. These may be tapped to further incentivize conservation partnerships and programmatic approaches, leveraging the DOT's investment and those of other public and private entities and thus "sweetening the pot."

5.4.1 State Programs

States sometimes administer conservation incentive programs in a number of categories. Often these are designed to address gaps not met by federal programs. Examples may include incentive programs for:

- **Forest Resources**; e.g. to encourage landowners to establish and maintain healthy forests. There may be incentives for contiguity of protected land and funding for implementing reforestation projects, including site preparation, tree planting, seedling protection and release from competing vegetation.
- **Riparian Restoration or Maintenance.** Many states are addressing water quality improvement needs by improving or extending stream buffers, as state legislatures may decide it is in the best interest of the state to maintain, preserve, conserve and rehabilitate riparian lands to assure the protection of the soil, water, fish and wildlife resources of the state for the economic and social well-being of the state and its citizens. Healthy riparian areas have been recognized as being critical for healthy watersheds and fish populations and states such as North Carolina view riparian restoration as a critical part of the state's TMDL compliance and stormwater remediation strategy. Oregon's Riparian Tax Incentive Program offers a property tax incentive to property owners for improving or maintaining qualifying riparian lands. Complete property tax exemption is available for riparian property up to 100 feet from a stream. To be eligible, a landowner and the Oregon Department of Fish and Wildlife must sign a riparian management plan and agreement. The management plan must detail measures the landowner will implement to preserve, enhance or restore the riparian area.
- **Wildlife Habitat and Conservation Program.** Oregon also provides an incentive to assist in the protection of wildlife habitats on farm and mixed farm-forest lands (ORS 215.800 – ORS 215.808), expanded in 2001 to include all forested lands. This voluntary program removes tax disincentives for increased conservation on private lands within a participating county by reducing property taxes, when a landowner adopts a wildlife habitat conservation and management plan approved by the Oregon Department of Fish and Wildlife. Property tax rates drop from forest or farm to open space values. Currently, landowners in three-quarters of Oregon's counties are participating in this program.

5.4.2 Federal Programs

A number of federal programs are available to promote conservation, primarily under the U.S. Department of Agriculture (USDA) and the Natural Resources Conservation Service (NRCS). USDA has been recently challenged to attach these disbursements to achievement of ecological objectives.

- **Conservation Reserve Program.** Administered by the USDA Farm Services Agency, this voluntary program encourages farmers to take highly erodible and other environmentally sensitive pasture or cropland out of production and to implement a conservation plan that will reduce erosion, improve water quality, and provide or enhance fish and wildlife habitat. Participating farmers receive an annual rental payment for the term of a 10 to 15 year contract. Eligible practices include riparian buffers, field windbreaks, shelterbelts, and shallow water areas for wildlife.

- **Conservation Reserve Enhancement Program**. This program is a pilot expansion of the Conservation Reserve Program on Reserve Enhancement Program, landowners enroll agricultural lands along streams and rivers containing (or flowing into streams and rivers containing) federally listed threatened and endangered fish (e.g., salmon, steelhead). To be eligible, the landowner must agree to improve the functioning condition of the enrolled riparian area by conducting reforestation of the streamside land (up to a maximum of 180 feet from the stream). Participating landowners receive an annual rental payment for the term of a 15 year contract, cost-share assistance for the reforestation work, as well as incentive payments for participating and for getting adjacent landowners to participate.
- **Wetlands Reserve Program**. This voluntary program, administered by the NRCS, offers private landowners a chance to restore and protect wetlands on their property through conservation easements. In return for federal payments, landowners must agree to a restoration plan and place restored wetlands in an easement reserve where they cannot be drained or plowed. Wetlands that provide habitat for migratory birds and other wildlife are given priority.
- **Environmental Quality Incentives Program** . This voluntary program, administered by the NRCS, allows agricultural landowners to enter into five to 10 year contracts for the purpose of receiving cost-share assistance for conducting watershed improvements on their lands. Landowners must develop a written enhancement plan. Approved practices are forest establishment, erosion control (seeding, road improvements), fish and wildlife habitat projects, fencing, riparian restoration and timber stand management (when approved by the appropriate basin working group).
- **The Forest Stewardship Program** is administered by the USDA Forest Service and often implemented by a state division of forestry. Its objective is to provide assistance for the improved stewardship of private non-industrial and tribal forestlands. The program encourages landowners and managers to work with a professional forester to identify their land management goals in written forest management plans (also known as forest stewardship plans). Forest stewardship plans identify management opportunities for environmental protection, resource conservation and income consistent with landowner goals. The Forest Stewardship Program encourages landowners to increase communication and collaboration between citizens and the managers of our public lands to address broader landscape issues including threatened and endangered species, biodiversity, fuels management and fire protection. When funding is available under the Stewardship Incentive Program, landowners can apply for cost-share assistance to hire a consulting forester to complete the management plan as well as to implement the management practices identified in the plan (e.g., fish and wildlife, recreation, timber management and fire protection opportunities).

- **Forestry Incentives Program.** Federal cost-share payments are provided for timber stand management practices under the guidance of the NRCS. Participants can be individuals, groups, associations, or corporations whose stock is not publicly traded. Approved practices include site preparation, tree planting, direct seeding and timber stand improvement thinning.

5.5 Using Existing Regional Ecosystem Conservation Plans

Funding is one question, but the question of what conservation or mitigation is needed and where, is often a preceding question. The fastest and often the most scientifically valid way to identify answers to mitigation or conservation siting questions is to identify and examine existing natural resource conservation or restoration plans. While USFWS 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 USACE 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 organizations, 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.

5.5.1 Federally Developed and Approved Resource Plans

Special Area Management Plans are comprehensive 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 USACE 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 USACE has developed sophisticated planning level wetland delineation and landscape level functional assessment tools.

The USACE is experimenting with new landscape level functional assessment tools, for SAMP development. The USACE Waterways Experiment Station and the Cold Regions Research and Engineering Laboratory, 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 USACE 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.

In addition, 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 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 USACE 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.

Recovery plans are developed by NOAA Fisheries or the USFWS, 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, USFWS 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. [71]

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.[72]

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 range-wide 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 section 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 section 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 decision making on a region-wide basis,” it constitutes “a valid biological context for making critical habitat and ESA section 7 and section 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.[73]

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, suggestions in the guidance to improve Service recovery plans track closely with elements already required in the ecoregional conservation plans of theTNC; a 2002 Society of Conservation Biology Study of USFWS 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.

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

The Nature Conservancy 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 National Historic Park 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. MDSHA 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. MDSHA'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 in-stream habitat, water quality, riparian habitat conditions and biological indicators (macroinvertebrates).

6 Addressing Some of the Barriers

To enable negotiation and implementation of more efficient, effective, and creative incentive-based approaches to environmental compliance, a number of obstacles should be addressed. Funding and consistency with various regulatory initiatives are discussed in Chapter 5.

6.1 Building Trust

As the Caltrans Partnership for Integrated Planning (PIP) initiative found, "trust and a historic lack thereof was a significant hurdle among participants in interagency negotiations… Over time, relationships were built and trust restored, and eventually, the PIP reached an agreement on a joint planning process."[74] Building relationships and respect, and moving from "rights" and "duties" mindsets to identification of mutual interests and options are all helpful steps in building trust.

6.1.1 Build Relationships and Respect

A coordinator of incentive-based approaches, facilitator Louise Smart reported when interviewed for this effort:[75]

> I think that the bottom line of incentives boils down to relationships – both personal and organizational, defined (personal) by past interactions among people and present commitment to building trust, good will, and respect and by the missions and mandates, rules and regulations, that set up organizational dynamics among the agencies and stakeholders. I hear so often, "If there is trust and mutual respect, people can make anything work. If there is antagonism and suspicion, no amount of laid-out procedures can make things work."

Trust and mutual respect are based in cooperative behavior; i.e. even when the feeling isn't there, you can "fake it 'til you make it." The Cooperative Learning Center has been researching and training cooperative skills for over 15 years and has "a research base of over 500 studies dating back to the turn of the century," and has established distinct ways to facilitate cooperation, some of which are adapted below:[76]

- **Share leadership**. Cooperation may be seen as a form of leadership, equally shared by all group members. By sharing the leadership, you allow others to take on initiative and to be integral parts of the group. There is an increased sense of "ownership" of plans and ideas by all members and a more pleasant work environment.
- **Learn cooperative problem-solving or creativity tools and ways of exploring the other's needs and interests**. These include brainstorming, suspending judgment, clarifying goals and objectives before seeking cooperation, and evaluating others' plans in a non-threatening manner. (SAFETEA-LU's new requirement to consider the plans of other agencies and conservation organizations may offer opportunities for this, in the context of identifying prospective conservation/mitigation areas.)
- **Practice reciprocity**. When someone helps you out, make it a point to help them. Express your gratitude by helping them before they expect it. A policy of general reciprocity - people helping people - facilitates cooperation. This particular technique has been shown empirically as one of the few ways to gain an adversary's cooperation.

- **Share resources and information**. When people are vying for knowledge, work space, personnel, or anything to help them get the job done, cooperation decreases. Resource exchange, however, encourages one person to work with another.
- **Reinforce team efforts**. Rather than praising one person for a job well done, utilize a team approach to problem solving. When the team does well, the entire group is rewarded. This minimizes individual competition, and maximizes cooperation.
- **Focus on doing well**. Attempting to do well and trying to beat others are two separate mental processes. It is impossible to concentrate on both. Of the two, cooperating with others to create a positive outcome has more rewards.
- **Allow ample time**. Cooperation comes to a grinding halt as time pressures increase. Time pressures produce non-agreement, decreased information exchanges, and firmer negotiator demands. The perception of available time facilitates cooperation.
- **Use similar language**. This creates what psychologists call 'congruence,' and helps discussants appear more cooperative and interested, even when critically challenging and gathering additional information. To reach across barriers, all parties need to set aside technical lingo and discuss solutions in plain language that everyone can understand.
- **Act cooperatively**. Research supports the fact that individuals who have witnessed a cooperative act will "pass it on," sharing some degree of cooperation with the next person they meet. Anytime you help another person feel better, you have increased the probability that he or she will be cooperative toward you. Actions speak louder than words and encourage another person to cooperate with you.

Additional ways to promote those relationships and respect include the following:

- **Learning, knowledge and experience of your partners' unique capabilities**. Each partner will have resources and expertise to bring to the table; like putting pieces of a puzzle together.
- **Willingness to go beyond what is required**. To get the gains from collaborative approaches DOTs often have to agree to do something beyond the norm or regulatory requirement. Other agencies have to do the same. This requires creativity and a positive attitude or willingness to go outside the box, to try something different.
- **Agreements**. The potential weaknesses of staff turnover and re-visiting decisions can be mitigated by excellent documentation of agreements. In Eugene, Oregon on the I-5 Beltline Interchange project, the committees agreed at the outset to make a reasonable effort to reach consensus at key decision points, and once decisions were made, they were not revisited. ETDM and the Colorado Shortgrass Prairie Initiative offer planning level examples of making and documenting decisions, and planning to avoid re-opening them.
- **Reliability/commitment tracking/contracts**. Parties need to be able to rely on each other to follow through on voluntary commitments. Lack of follow through breeds distrust and reluctance to collaborate on future opportunities.

6.1.1.1 Moving From Rights and Duties Mindsets to Identification of Mutual Interests

Incentive-based approaches are alternative, creative resolutions to conflict and thus may be considered a subset of the field of Alternative Dispute Resolution. Resolution of disputes or coordination and negotiations that could turn into a dispute, if not avoided and creatively resolved, depends on many factors, including "the nature of the difference, the role of the parties in resolving disputes, respective rights and interests of the parties, and most importantly, the procedures applied to settle the differences. The ways the disputes are addressed and solved are equally important as the substantive aspect of the resolution."[77]

"Conflicts arise out of a 'right and duty' situation or out of a feeling that interests and values of a particular party to a deal are challenged or that the needs and expectations are not met."[78] Often parties start to position themselves around their rights and these strong assertions of rights and duties put the parties on each side of a dividing line and the outcome is not always congenial and not truly conducive to building a long-term relationship.

In the examples of incentive-based approaches described in this report, the parties took a step back from "rights and duties" situations, to examine deeper goals and interests. For example, 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,[79] (ESA § 3 (3)), 50 CFR § 402.02 (2000) rather than a narrow regulatory process through which to proceed from transportation approvals. This is a broader and higher objective, providing considerable space in which to consultatively develop mutually beneficial outcomes.

6.1.1.2 Understanding and Taking an Interest-Based Approach

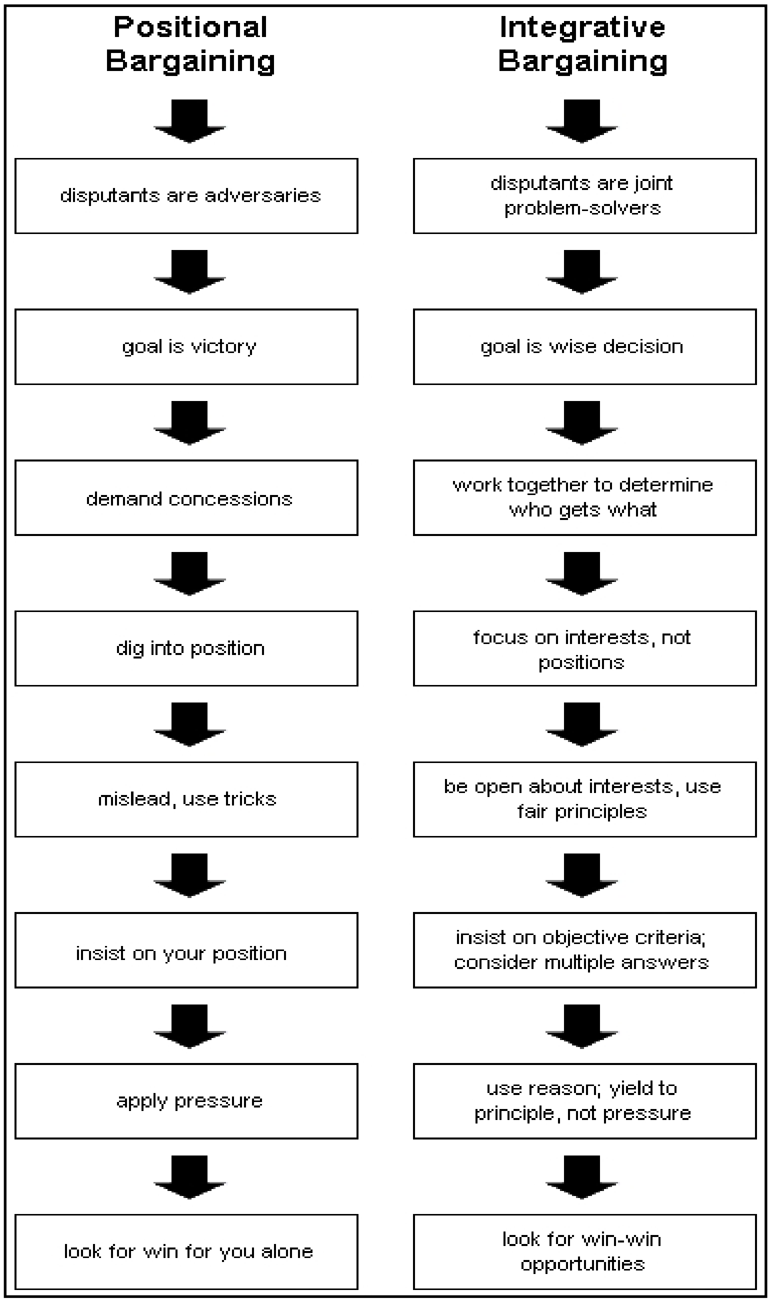
FHWA, EPA, the U.S. Institute for Environmental Conflict Resolution, and many others advocate an interest-based approach to negotiations with other agencies. In *Beyond Intractability*, Brad Spangler described integrative or interest-based bargaining:[80]

> Integrative bargaining (also called "interest-based bargaining," "win-win bargaining") is a negotiation strategy in which parties collaborate to find a "win-win" solution to their dispute. This strategy focuses on developing mutually beneficial agreements based on the interests of the disputants. Interests include the needs, desires, concerns, and fears important to each side. They are the underlying reasons why people become involved in a conflict.
>
> Integrative refers to the potential for the parties' interests to be [combined] in ways that create joint value or enlarge the pie." Potential for integration only exists when there are multiple issues involved in the negotiation. This is because the parties must be able to make trade-offs across issues in order for both sides to be satisfied with the outcome.

As Spangler notes, integrative bargaining is important because it usually produces more satisfactory outcomes for the parties involved than does positional bargaining:[81]

Positional bargaining is based on fixed, opposing viewpoints (positions) and tends to result in compromise or no agreement at all. Oftentimes, compromises do not efficiently satisfy the true interests of the disputants. Instead, compromises simply split the difference between the two positions, giving each side half of what they want. Creative, integrative solutions, on the other hand, can potentially give everyone all of what they want. Figure 6 shows a comparison of positional versus integrative bargaining.

Figure 6: Positional vs. Integrative Bargaining



This chart was derived from a more complex chart in Fisher, Roger, William Ury, and Bruce Patton. (1991) *Getting to Yes: Negotiating Agreement Without Giving In*, Second Edition. New York: Penguin Books. p. 13.

Our research for 25-25/50 found that incentive-based approaches often involved practitioners with a high degree of professional knowledge – experience with multiple agencies and perspectives, an awareness of the abilities and power of each partner, in conjunction with an orientation toward learning and thinking about what each player can contribute, what they might have or be able to do that might be of value to the other, and how the abilities of each might be leveraged to create a whole that is more than the typical sum of its parts. This helps partners or potential partners come to creative agreement on how the greatest benefits may be achieved in the least costly way, for all concerned.

Identify the Interests

Interests are often less tangible than positions and are often not discussed. They lay in the background and their dispute-resolving power may lay untapped if not discovered. It helps to discover the personal and organizational interests of the parties involved in a discussion or organization, because identifying ways to help others achieve their objectives can lead to surprising breakthroughs and creative solutions. Some plans and desires of other agencies can be found with a little digging in the preambles of the main laws or regulations the agencies are implementing, in their longer range plans (recovery plans for species, watershed restoration plans, or comprehensive plans for communities), or in special initiatives and the documents associated with those. Alternatively, a facilitator can help elicit this information either in interviews or in joint sessions. Practitioners can ask questions themselves to learn more about what other agencies or organizations are requesting and why. When asking these questions, it is important to clarify that the intent is to better understand them and potentially how to meet them, rather than being perceived as challenging (the legitimacy of) those interests or figuring out how to get around them. When parties understand each other's interests and underlying motivations, they are better able to pool creativity to find a solution that meet the needs of both. Empathetically trying to understand the consequences of various potential solutions for the different parties involved better equips each to negotiate an acceptable agreement. Satisfying basic needs or issues first, also frees up space to identify other layers of needs and interests and evaluate their importance.

Identify Options

Mediator Silke Hansen recommends focusing on parties' needs to come up with the widest range of possible solutions, after which the parties need to work together cooperatively to try to figure out the best ways to meet those interests.[82] "The goal is a win-win outcome, giving each side as much of their interests as possible, and enough, at a minimum, that they see the outcome as a win, rather than a loss."[83] In this way, an interest-based approach fosters a positive working relationship and trust that your partner at the other agency is creatively thinking about how to get you what you need as well.

Trust can often be built by trying to accomplish something good, together, as described below in Washington State. Other common objectives generating a great deal of cross-agency support have been finding ways to accomplish everyone's jobs more efficiently and effectively and exploration and achievement of a compelling set of objectives that benefit each agency. The benefits need to be (and can be) large to bring all partners to the table and create a sense of urgency to participate and close the deal. Often these are beneficial outcomes that might be achieved in no other way;

e.g. conservation opportunities that might be otherwise lost, an otherwise strict regulatory process, partnerships that bring solutions no one else at the table can bring—development of unique plans, building on years of analysis, or ability to serve as a land manager. Increasingly, resource agencies and conservation NGOs are pooling and analyzing data to identify and prioritize conservation opportunities, based on the highest, scientifically determined needs, as a way of identifying options and satisfying mutual goals and each other's interests.

6.1.2 Identify Joint Goals and Ways to Work Together

Bringing together all the players in a collaborative fashion is the quickest path to overcoming the barriers to development of incentive-based approaches that can meet the objectives of multiple agencies.

6.1.2.1 Make the Time, Recruit Participants

Incentive-based approaches take more time up front, to explore the needs of other parties and identify where joint gains are possible. The approach can take additional work to design and negotiate, though cost savings may be realized in implementation. Additional planning and analysis is needed to identify watershed restoration needs or ecoregional conservation priorities, or mitigation needs and opportunities up front. Additional education and negotiation time is typically needed with resource agencies and/or other permitting partners. Economies of scale may be realized if multiple sites are negotiated at once, or staff education from one area is transferable to other areas; however, staff are often assigned to different geographic regions and staff instruction or management direction at intermediate levels may be lacking.

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, 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. As found in the Merced PIP, "the **one goal that was readily embraced by all participants was the desire to streamline the workload, especially in the face of reduced staff and other budget cuts**. The challenge was in combining divergent expectations and processes."[84]

6.1.2.2 Assemble the Decision Makers

Both the Colorado Shortgrass Prairie Initiative and the Florida ETDM approach benefited from garnering agreement from interagency leaders on a basic approach, which then guided and charged lower level managers with making it happen.

6.1.2.3 Pay Attention to Working Group Composition

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. [85] Florida's ETDM effort also devoted particular attention to finding interagency participants in negotiation of the approach and on the Environmental Technical Advisory Teams that were creative and had interdisciplinary mindsets.

6.1.2.4 Persistence and Entrepreneurial Behavior

DOT environmental managers stressed the importance of persistence and that it often takes a special person, with a high degree of passion, commitment, and creativity, to execute an incentive-based approach, especially on a programmatic level. Yaffee and Wondolleck write that:[86]

> 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.

6.1.2.5 Do the Necessary Advance Work with Your Own Agency

A real incentive in multi-stakeholder incentive-based approaches is if each of the stakeholders is willing to invest in internal negotiations at their home agency, related to the perceived problems and potential opportunities. This enables each agency's at-the-table representatives to participate efficiently and effectively and for the parties to go much further in exploring and identifying what is possible.

Even if higher executives have embraced the approach conceptually (such as with the Integrated Transportation and Ecological enhancements for Montana (ITEEM) working group), if the participants are not able to invest in preparatory internal negotiations to determine possibilities and parameters, the best an interagency group can do is to hold mutual education workshops and explore possibilities. In Montana, because there was an interagency agreement on the ITEEM approach, the Montana Department of Transportation (MDT) hoped that an interagency workshop looking at ecosystem issues on a particular transportation corridor (Swan/Seeley Lake valley) would result in specific agreed-to conservation actions in the corridor. But this was not possible to accomplish in a single workshop, absent sufficient internal advance work to know the parameters for each agency.

6.1.2.6 Link it with Specific and/or Urgent Opportunities

Even with the best of intentions to do good things for the ecosystem in the Swan/Seeley Lake valley, the lack of foreseeable project definition, estimation of impacts, or availability of project dollars made the exercise somewhat academic. In the Montana example above, lack of information about a specific anticipated project and somewhat measurable impacts of that project can lead to a lack of urgency, a lack of clarity of scale for mitigation, and a lack of anticipated dollars to pay for any advance mitigation. The concept was to NOT have the ecosystem discussion connected to a specific transportation project, but the interagency group found it difficult to focus based on a theoretical assumption, according to a facilitator familiar with the effort.

A sense of urgency or even a crisis can be a critical driving factor. In North Carolina and Oregon, programmatic approaches were developed when the agencies discovered they simply could not process all of the required permits and consultations with existing staff, in the old way, and still accomplish the planned program of bridge repairs and highway construction. These crises provided a sense of urgency that was useful in accomplishing new approaches that had lasting benefit beyond the immediate situation the solutions were designed to address.

6.1.2.7 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.[87] This all changes when we work together to identify goals and seek the means to accomplish common, mutually beneficial objectives.[88] 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

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.[89]

6.1.2.8 Come Together around a Cooperative Vision

Typically, incentive-based approaches require that a team comes together around a cooperative vision, one of particular mutual agency benefit in terms or a particular opportunity or swap, or on larger scales, a more efficient process and benefit to the resource(s) in question, perhaps even the viability of whole species, watersheds, ecosystems, or ecoregions.

Florida DOT and nearly 30 cooperating agencies created a vision of a more efficient and environmentally meaningful and effective consultation process, when they crafted the Efficient Decision Making Framework. In later interviews, one federal resource agency representative said he and other federal and state agencies in Florida felt they achieved a 100 percent increase in efficiency, with 50 percent less effort.[90]

Questions to ask in developing a common vision and goals may include:

- 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

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.

watershed, population, or ecoregional scale help achieve important environmental objectives and add predictability to the infrastructure decisionmaking and development process?

- What are some of the highest priority conservation, restoration, or connectivity needs in a given state, watershed, or region?

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).

6.1.2.9 Target Resources Where They Will Produce the Greatest Environmental Good

Sometimes existing conservation plans, whether species recovery plans, Special Area Management Plans for watersheds, state action plans or NGO conservation or watershed restoration plans, can help parties identify where environmental investments will produce the greatest environmental good. In other cases, DOTs and partners have engaged in specific studies to answer these questions, as described in the WSDOT case below.

WSDOT and the Washington State Department of Fish and Wildlife worked cooperatively to inspect over 5,000 stream crossings within the highway system and identify fish passage deficiencies targeted for correction. As a result, over 800 culverts were identified that block significant habitat upstream. WSDOT's Environmental Retrofit Program is designed to prioritize projects based on the ecological priorities, including fish-passage correction, stream-habitat restoration, and water-quality improvements and address deficiencies whether or not they are on a project with culverts.[91]

> Over $26 million has been invested in inventory, design, and construction for stand-alone retrofit projects that restore fish passage at 59 high-priority sites. The program helps to address the top priority sites first. As a result, access to over 400 linear miles of salmonid habitat, once blocked, has been improved.[92]

Washington State DOT viewed this as a successful program with tangible benefits on the ground that demonstrates how transportation agencies can play a meaningful role in ecological-restoration efforts. Future applications of this program are being developed to address priorities for terrestrial habitat-connectivity improvement.[93]

6.1.3 Management Support

Managers often do not provide staff with the feeling that they can take risks, or with authorization to spend their time in less established areas. In their article, "Criteria for Effective Habitat Incentive Programs," Yaffee and Wondolleck write that, "critical to an individual's ability to adopt a problem-solving mindset, is the commitment of agency leaders who provide flexibility, support, and follow-through for the collaborative effort."[94]

Collaborative approaches with highly creative solutions and innovative trade-offs are often realized where trust and interagency experience are greater and where participants are able or inclined to think creatively about opportunities and solutions, rather than getting mired in yes/no, black/white, or either/or thinking. Incentive-based solutions are characterized by greater partnership and non-traditional delegation of responsibilities. Agencies share their control/leverage in order to jointly develop options and solutions rather than wielding or saving a stick with which to attack the other. Win-Win, incentive-based approaches require effort and initiative. DOT leadership can emphasize the benefits and desirability of utilizing innovative trade-offs for mutual benefit, more often.

6.1.4 Promoting Persistence and Entrepreneurial Behavior

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.[95]

6.2 Regulatory Issues and Education Regarding Regulatory Flexibility

Other barriers need to be addressed through guidance or education inside the agency. Internal guidance offers the potential to increase the comfort level with newer approaches. Some components of existing regulations, or persistent troublesome questions, can be examined and answered via such vehicles. Some examples include:

- **Despite high level endorsement for ecosystem and watershed approaches, many front-line staff are still unfamiliar with such approaches and the changes they would entail**. For example, a DOT environmental manager in the Northeast interviewed for this effort relayed a recent conversation with a USACE biologist who thought mitigation sites in the same watershed on the same corridor would not be able to be mitigated in combined fashion on one site. The DOT has worked, on a positive basis, with this individual for some time; however, until informed that consolidated mitigation had been allowed elsewhere in his District, he remained unconvinced.
- **While some functions may be more efficiently and effectively mitigated off-site, other functions are less easy to move; such distinctions should be made and mitigation should be "split"** where appropriate. For example, environmental organizations argued against the Maryland Inter-County Connector in part because certain impacts, such as the higher

temperature of surface water runoff from the highway and developed areas that would grow up around it could negatively impact native fish.

- **Confusion about being asked to "mitigate twice" or "double mitigate"** when the need for certain on-site measures remains, after some mitigation has been negotiated and moved off-site. This confusion usually arises on the DOT end.

6.3 Making Decisions on Best Available Data

For any regulatory agency, one of the most challenging issues is determining whether the data is "sufficient" to adequately evaluate the effects of a proposed action and make decisions on appropriate mitigation measures. Where data gaps exist, DOTs are sometimes seen as one of the few ways/resources to fund needed research. The decision to conduct research to obtain missing data is at the discretion of the action agency, as far as ESA section 7 is concerned and, DOTs usually objected to spending transportation funds such research. However, "where significant data gaps exist there are two options: 1) if the action agency concurs, (wait) until sufficient information is developed for a more complete analysis; or 2) develop the biological opinion with the available information giving the benefit of the doubt to the species." [96]

Benefit of the doubt involves making conservative assumptions to the benefit of the species. One way to do this is to assume species presence and impacts and to develop a conservation strategy that identifies beneficial actions for the species and associated ecosystems, beyond the project footprint and the often unavoidable impacts in that zone.

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 is 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.

The USFWS is also reluctant to assume presence and over-estimate impacts because 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.

More and more often though, 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.

6.3.1 Addressing the Lack of Data

A Florida ETDM-like process is ideal in this regard; significant avoidance, minimization, agreement, and mitigation discussion occurs on planning level data, on both the 20 year plan and later, prior to programming. A project must be environmentally agreeable, without red flags, before being budgeted into the agency work plan. Any further environmental studies (site surveys or other data collection) that are needed at that point is known and budgeted as well. In this way, requests for additional environmental data or studies that may take a year or two do not arise later and delay agency approvals or the project, or present budgetary problems.

Making decisions at an earlier phase, based on best available data, can allow:

- Acquisition of right-of-way earlier when a wider range of options may be available;
- Determination of environmental issues at points earlier in the transportation planning and project development processes, including how to efficiently and effectively address such issues;
- Agency comments to be addressed earlier, including more substantive comments related to project design issues;
- Elimination of delays between National Environmental Policy Act (NEPA) approval and permitting issuance, enabling increased productivity;
- The state DOT to build a more reliable, efficient and cost feasible work program;
- Trust to build between agencies; and
- Avoidance and minimization opportunities to be maximized through early coordination.

Perhaps most importantly, decisionmaking using best available data facilitates focus at a larger scale where species and ecosystem needs may be addressed most efficiently and conservation measures directed to addressing the greatest environmental needs. In general, public employees want to see the public's tax dollars spent wisely and mitigation investments focused where they will address important environmental needs and accomplish the most for the environment. Regulation and national scientific studies are also evolving in that direction. For example, the National Academy of Sciences panel on wetland mitigation decided mitigation should be targeted based on the greatest environmental needs in a watershed. Likewise, species recovery requires identifying and protecting viable communities, preventing ecosystem threats, and preserving and/or restoring intact habitats and important linkages.

The ESA Consultation Guidebook 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." The guidebook also 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."[97] The uncertainties inherent in consulting at the planning level are not insurmountable; however they involve utilizing all available authorities, especially the ability to make decisions in a timely fashion, using best available data.

The initiatives described in Chapter 2 on model incentive-based approaches generally were all collaborative efforts that used best available data to make decisions and conclude interagency consultations earlier in the process than normally occurs, adding predictability for transportation. These initiatives also used best available data to focus mitigation dollars where such investments will produce the greatest environmental good. When decisions are sufficiently conservative for the species and ecosystems in question, decisions can be made on planning level data. By cooperating to achieve joint, public interests, focus resources on conservation outcomes rather than paperwork, and making decisions on best available data, transportation agencies may be able to help preserve wildlife movement corridors, conserve and connect habitat for species and ecosystems where these investments contribute the most, and increase investment in conservation of priority habitats with viable communities of rare species. As a result of such collaboration, agencies may be able to achieve important conservation interests, facilitate recovery of listed species, and prevent the need for listing many more.

Overall, such collaboration brings about more effective and greater habitat conservation, ecosystem functionality and links to species recovery, watershed restoration, and connectivity improvement. At the same time, transportation benefits from more cost-effective mitigation and conservation measures and regulatory assurances and predictability in the development of budgets and transportation projects. All agencies can benefit from savings in staff time via more efficient and effective consultations. Such savings can be diverted to actual implementation of conservation measures that provide tangible improvements to habitats and ecosystems.

With growing acceptance and incorporation of a watershed approach into permitting decisions, agencies are increasing attention to landscape context and the long-term viability and contribution of preservation and restoration areas within the watershed. For example, EPA has piloted an effort to characterize restoration potential, in relation to wetlands and water quality impairment (303(d) listings) in Illinois.[1] This includes assessment of the ecological capacity to regain lost function, exposure to stressors, and the socio-economic context that drives success or failure. There is support for the approach, but the data to accomplish this has not yet been assembled in a large and accessible fashion, and regulatory processes adapted accordingly.

Wetland mitigation investments carry the potential to leverage restoration and conservation priorities for rare plants and wildlife, in both wetland and upland areas. Habitat mapping, land cover analysis, modeling and integrated land use/ transportation/conservation planning help inform this context. Presumed presence maps based on habitat associations are an even greater need for the federal Endangered Species Act section 7 consultation process, if effective and efficient coordination is to occur, earlier in the process. Predictive modeling works well for rare species, and currently gross scale range maps exist, but these maps are not sufficiently tied to habitats at a finer grain, such that presence may be assumed by the state DOTs and FHWA for planning purposes in programmatic consultations with the USFWS.

[1] EPA's project synthesized factors related to recovery from 1500 papers and tests the use of landscape analysis data and tools in screening of recovery potential on a statewide scale, by compiling lines of evidence with geo-spatial expression. Eighty indicators are in use in the test system, which may also be chosen/reduced appropriate to the environment, impairment, or task priorities. The program is also seen as having potential for TMDL results analysis.

6.3.2 Compilation of Data and Priorities from Multiple Agencies

In both the Florida ETDM process and the Merced PIP process, all agencies involved were asked to provide and share up front the maps and data they used in their decision making processes. The PIP process integrated planning model resulted in:[98]

- Development of an Environmentally Sensitive Areas map based on shared information from a variety of resource- agency databases
- Development of a Prime Agricultural Lands map based on input and information from a variety of agricultural interests

With this information, the parties developed a Regional Transportation Plan built on a common conservation vision, with significant backing from the public and regulatory agencies. The partnership paved the way for future collaboration and built a level of trust between the agencies that had not been there before the project.

6.3.3 Work with Interagency Coalitions to Facilitate Such Approaches

The January 12, 2009 Memorandum of Understanding - Partnership for Cooperative Conservation establishes a framework among the six organizations [Department of Interior, EPA, USDA, Department of Defense, Council on Environmental Quality, and Department of Commerce - NOAA] to enable continued collaboration across organizational and jurisdictional boundaries for natural resource and environmental management.[99] The August 2004 Executive Order on Cooperative Conservation (13352) directed the federal agencies that oversee environmental and natural resource policies and programs to promote cooperative conservation in full partnership with states, local governments, tribes, and individuals. These agencies [Departments of the Interior, Agriculture, Commerce (NOAA) and Defense, and the EPA], with the President's Council on Environmental Quality, held a White House Conference on Cooperative Conservation in St. Louis, Missouri , August 29 – 31, 2005. The Cooperative Conservation America Web site has additional information. Transportation agencies have typically not been involved, to date, but a diverse array of other local, state, NGO, and federal participants are common — all potential DOT partners.

6.3.4 Investing in a Basic Set of Nationwide Environmental Data

A national committee on biological mapping approaches found the greatest need and most important information for conservation and management is extent and condition of the population or population segment. This is a resolvable gap. Now, available data and modeling capabilities have evolved so that the data for early environmental decision making could be made available nationally and shared with multiple levels of government at relatively low cost and adapt decision making to the changing environment presented by climate change as well.

Availability and use of the data by DOTs and other partners would substantially reduce the risk of listing for many imperiled but yet unlisted species and enable DOTs and their partners to effectively target conservation/mitigation resources and measure progress in common ways to satisfy multiple environmental laws and regulations. In the United States, over 12,000 species face extinction. For adaptive management, ongoing feedback and refinement of decision making processes based on continually evolving understanding of cause and effect, a variety of information is needed:

- Assessment of current resource condition
- Ecological information on multiple scales
- Benchmarks of ecosystem condition
- Quantification of uncertainty, assessment of risk
- Modeling, decision support, and transparent decisionmaking
- Strategic Planning
- Accountability and reporting

DOTs and transportation and land use planning agencies at all levels could greatly benefit from production of a single set of nationwide data for natural resources environmental decision making and conservation/mitigation at the planning level and make this information available to all DOTs, and to MPOs and local governments. Unrestricted datasets could be made publicly available. All ecoregions, all rare species (ESA listed and not), and ecological communities would be covered, in order to provide sufficient information such that considerable regulatory decision making could effectively occur during planning, for transportation improvements.

These data and the timing of its availability in incorporation in the transportation planning process offer the opportunity to support consultation and permitting in different ways and points in the process than it has historically occurred, removing much pressure from projects' critical path. Access to an agreed set of nationwide data for natural resources environmental decision making generates many benefits, including but not limited to:

- More cooperative decision making and creative solutions to environmental requirements, much earlier in the process.
- Early clearances and/or identification of needed project studies or mitigation, enabling more accurate budgeting and much greater project predictability.
- Better environmental, land use and transportation decision making and local governments and MPOs helped to carry and execute this burden, with better planning products before they get to the DOT.

Continued absence of investment in such a national dataset contributes to ongoing high costs and inefficiencies at all levels of government. Local development decisions will continue to be made on the most limited environmental information (e.g. without species range maps available). MPOs will in many cases lack the plans and data sets they have been asked to consult with resource agencies as part of the environmental provisions of SAFETEA-LU 6001; these new expectations may remain substantially unmet without the resources to assemble this information at each MPO.

Without this data and the negotiations with federal agencies that might be attained with it, DOTs are stuck in "business as usual," engaging in relatively expensive efforts of their own on a project by project basis or even on larger regional or statewide levels, but subject to agency stipulations on the level of data that must be collected. The possibility exists to largely negotiate this and provide the data on a national level, at least to address wetlands, water quality, and wildlife.

7 Conclusion

Our research has found that much more can be accomplished with incentive-based approaches than with partners engaging in adversarial approaches, waiting to negotiate or consult until they absolutely must, or in ignorance of the needs and interests of the other parties involved. Nevertheless, our research found few examples of successful incentive-based approaches for environmental stewardship. A number of interviewees provided examples more closely related to a CSS process rather than the "carrot or stick" approach to project development which was not the purpose of this study. Based on panel feedback, most of these were edited out in the final version of this document.

7.1 Why Don't We Hear More About Incentive-Based Approaches?

A few incentive-based approaches are well-publicized. Many seem not to be and information appears to circulate little, even within a DOT, where they should be considered "good news." In any case, DOTs contacted for this study did not want to talk about incentive-based approaches or generally acknowledge them in their agencies or just did not know of any examples.

Small negotiated items might be relatively forgotten, unless you ask just the right person. A ROW coordinator or DOT construction engineer might arrange for a bulldozer to move a pile on private property, in exchange for more convenient site access. For approaches that might have larger implications, DOTs and resource agencies often do not want to talk about the approach until negotiations have been finalized, approved by attorneys, piloted, and otherwise vetted. For example, MDSHA has had interagency discussions and a pilot regarding "watershed restoration registries" going for some time, but further information has not been available.

DOTs have clear mandates to comply with the law; when alternative arrangements are worked out, there may be questions. The parties involved may consider the arrangement a good one for all concerned and appreciate how, or how easily, they were able to come to agreement in a normally contentious area, but the approaches are not "trumpeted," out of fear of generating questions and opposition. If the approach is generating benefits for the agency, there is little to be gained and something to be lost by choosing not to "fly beneath the radar." Even when approaches receive publicity, such as with Colorado's Shortgrass Prairie initiative, publicity entailed a certain amount of backlash or criticism, within the initial agencies. On the national level within the USFWS, the Colorado Field Office Director was recognized for his creativity and the conservation results achieved, but national regulatory leads and interagency liaisons were critical of some aspects and did not recommend it as a model in their agencies, in internal consultations, even though the approach was promoted via interagency sign-off of *Eco-Logical An Ecosystem Approach to Developing Infrastructure Projects.* In the case of the Shortgrass Prairie Initiative, the FHWA environmental lead made the strategic decision to reinforce high level buy-in at the DOT and FHWA by nominating the project, which ultimately received FHWA and AASHTO's highest environmental awards.

Mutually beneficial, incentive-based were explored in this research project. They will also be explored through Strategic Highway Research Program project C06 on outcome-based approaches to integrating conservation planning, highway planning, and permitting. Initial indications are that resource agencies such as the USFWS do not want to offer “assurances” for DOT “deals” or advance mitigation for environmental impacts. USFWS appears to be advancing a “don’t ask, don’t tell” process where if something is developed locally and is agreeable to all concerned, it may be allowed, but headquarters is not advocating such “carrot”-type programmatic agreements that try to achieve notable and mutually agreeable environmental benefits, out of concern that all aspects of the regulatory process, including withholding regulatory approvals/reserving judgment or the “stick” until late in the design and consultation process, might otherwise not be met.

Clearly, agencies take somewhat of a risk when they publicize or share experiences about “carrot” approaches. The research team theorizes that this dynamic may have been at play in DOT contacts’ difficulty identifying examples of incentive-based approaches in their agencies. Most could not, leading to considerable mining to produce the examples discussed in this report.

7.2 Incentive-Based Approaches: Documenting the DOT Benefit

Some DOTs have found innovative ways to partner or barter with resource agencies, local governments, developers and citizens for mutual benefit; however, documenting the “adequacy” of the DOT benefit is an additional challenge and necessary question for DOTs, engaged in this research project. Innovative arrangements included land swaps, cost sharing and ROW assembly for moving projects up in the TIP, getting project enhancements such as sound barriers or better landscaping. In exchange, the DOTs were able to reduce costs and accelerate project schedules, as well as build goodwill and trust with stakeholders that will likely provide similar benefits for future projects.

Incentive-based approaches tended to occur on a project-by -project basis and usually depended on the innovation of individual internal and external project team members. Characteristically, those individuals had a vision for meeting long-term transportation and resource preservation goals that went beyond the short-term completion of any single project. Successful outcomes were a result of a willingness to be flexible and seek large-scale win-win solutions rather than pursue rigid “this is the way it has always been done” results that often pit the stakeholders against each other and result in project delays or shutdown.

The most common large-scale examples of incentive-based approaches were programmatic agreements that helped the DOT comply with section 404 of the Clean Water Act and section 7 of the Endangered Species Act. Programmatic permitting or regulatory consultation efforts required extra time up front but gave the DOT greater predictability for project timelines and costs in the long term by reaching agreement on how certain issues would be handled early in project planning. Incentives for the resource agencies included improved resource conservation and labor efficiencies that enabled limited staff to focus their time and attention on establishing high quality conservation areas that provided greater benefits to the ecosystem rather than the typical piecemeal, lower quality mitigation done on a project by project basis. It is difficult to quantify the benefits of using a "carrot instead of a stick" approach but the qualitative benefits of accomplishing multiple agency objectives at once are far reaching.

Information is advantage and power, and the more educated DOT negotiators are on the needs and interests of other parties and how their processes work, the better the DOTs will know how to be "in tune" with those and make efficient and mutually beneficial offers that "incite or have a tendency to incite to determination or action".[100] Moreover, the willingness to cooperate and help the other opens the door to a vast number of unexplored possibilities for increasing efficiencies, the ability to satisfy the interests of many, and to set the stage for positive, creative, and beneficial interaction in the future.

Appendix A
DOTs Contacted for the NCHRP 25-25 (50) Research Effort

DOTs Contacted for the NCHRP 25-25 (50) Research Effort

Alabama Department of Transportation, John Shill

Caltrans, Gregg Albright, Gregg Erickson, Amy Pettler, and Mitch Dallas

Colorado Department of Transportation, former Planning Director, George Gerstle

Florida Department of Transportation, Buddy Cunill, Peter McGilvray, George Ballo, Josh Boan

Illinois Department of Transportation, Kathy Ames, Keith Sherman, Barbara Stevens, and Tom Brooks and City of Chicago, Janet Attarian

Maryland State Highway Agency, Raja Veeramacheneni and Sonal Sanghavi

Minnesota Department of Transportation, Frank Pafko and Jennie Ross

Mississippi Department of Transportation, Claiborne Barnwell

Missouri Department of Transportation, Gayle Unruh and Mara Campbell

Montana Department of Transportation, Larry Urban, Tom Martin, Jean Riley, and Bonny Steg

New Jersey Department of Transportation, Planning Director, Gary Toth and Thomas Saylor

New York State Department of Transportation, Mary Ivey, Deborah Nelson, and Kyle Wilson

North Carolina Department of Transportation, Julie Hunkins and Ted Sherrod

Ohio Department of Transportation, Tim Hill and Michelle May

Oregon Department of Transportation, Frannie Brindle and Bill Warncke

South Carolina Department of Transportation, Wayne Hall (former)

Utah Department of Transportation, Shane Marshall, Rebecca Stromness

Virginia Department of Transportation, Earl Robb and Steve Long

Washington, Carol Lee Roalkvam, Megan White, Cyndie Prehmus, Bob Thomas, Carl Ward and Steve Fuchs

Federal Highways Administration, David Carlson, USACE of Engineers, Mark Durham, San Diego District Manager

U.S. Fish & Wildlife, Susan Wynn, San Diego TRANSNET participant

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