

2011 ECO-LOGICAL GRANT PROGRAM ANNUAL REPORT



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METHODOLOGY

The Volpe Center project team collected data for this report through several methods. First, the project team worked with FHWA to develop a questionnaire to collect information from Eco-Logical grant recipients about the progress they have made on their Eco-Logical grant projects as well as their project implementation measures (see Appendix A). The team posted the questionnaire online on [SurveyMonkey](#) in October 2011 and received responses from 14 of the 15 grant recipients. It then conducted 30 to 60 minute telephone discussions with the four grant recipients that completed their Eco-Logical projects in 2011 and the three grant recipients that still had active projects. The team also held telephone discussions with three additional grant recipients whose project performance periods ended prior to 2011, based on their responses to the online questionnaire that merited additional detail. All discussions occurred in October and November 2011. The project team then supplemented the telephone discussions with the data it had collected from grant recipients' quarterly progress reports, final grant project reports, project websites and tools, and completed or draft products summarizing ecological priorities and project methodologies. Finally, the team compiled, analyzed, and synthesized the data into the project summaries and findings presented in this report.

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EXECUTIVE SUMMARY

In 2007, the Federal Highway Administration (FHWA) created the Eco-Logical grant program to pilot a new, ecosystem-scale approach to infrastructure development. The program funded 15 projects nationwide that were aimed at applying the goals and principles outlined in the 2006 multi-agency publication *Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects* (Eco-Logical). Nine of the grant recipients completed their projects prior to Calendar Year (CY) 2011, four grant recipients completed their projects in CY11, and two will complete their projects in CY12.

This annual report documents the progress of the 15 grant projects during January through December 2011, the fourth year of the Eco-Logical grant program. The report focuses on implementation measures for adopting grant products into grant recipient organizations, as well as effective components that can be expanded on a regional or national scale. The findings for adopting the Eco-Logical approach include:

- The need for executive-level manager support both internally and externally at partner organizations is critical for implementing the Eco-Logical approach. Managers can demonstrate support through internal communication to ensure understanding among their own staff, and solicit external support through outreach to partner agencies.
- Relationships between grant recipients and their partners are valuable tools for implementing Eco-Logical projects and integrating the Eco-Logical approach into organizations in the region.
- Nearly all grant recipients are actively working to incorporate their projects into transportation planning and project selection by local governments, metropolitan planning organizations (MPOs), and State Departments of Transportation (DOTs).
- Most grant recipients have clearly documented the processes, partnerships, and implementation strategies related to their Eco-Logical projects, which have helped them to expand the reach of their projects. Well-documented project methodologies are highly suitable project components that other organizations can replicate at a national scale.

The grant program provides several opportunities for replicating the successes of the grant recipients:

- Grant recipients will continue to serve as models for implementation of the Eco-Logical approach for several years after project initiation. Following the grant recipients' progress will likely help transportation and environmental practitioners understand how the Eco-Logical approach works in practice and may help FHWA refine guidance for implementing the approach in the future. This could help instill the Eco-Logical approach as a standard practice for transportation and mitigation planning and project delivery throughout the country.
- The processes that grant recipients used in their grant projects can serve as models for peer organizations. Practitioners around the U.S. can benefit from their methodologies to bring together stakeholders, prioritize data, develop regional ecosystem frameworks, and integrate Eco-Logical into transportation planning.

FHWA's [Eco-Logical program](#) provides several mechanisms for sharing the grant recipients' successes. The Eco-Logical program includes:

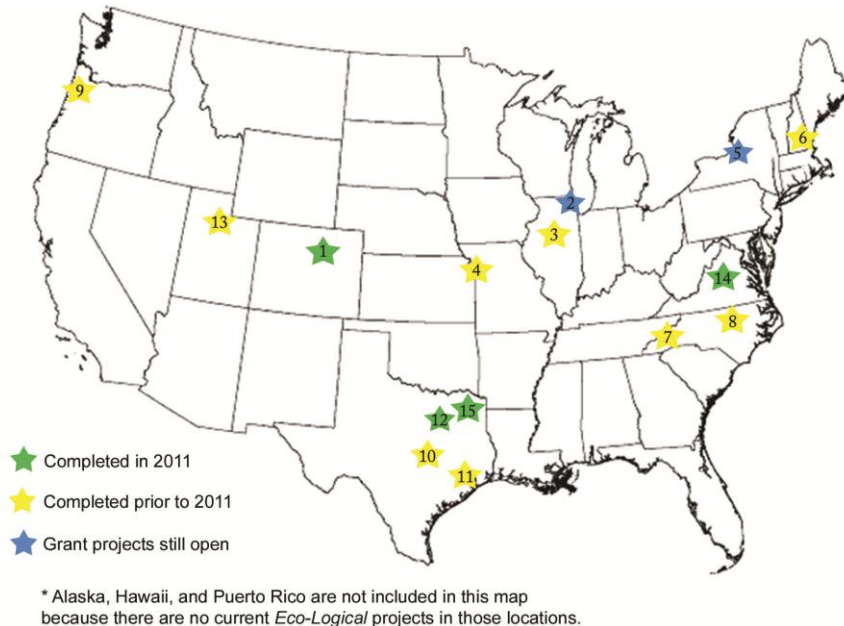
- Webinars;
- Trainings; and
- Guidance materials.

Through these methods FHWA can broadcast this annual report's findings and encourage greater replication of grant project components. Furthermore, FHWA also encourages Federal resource and regulatory agencies to promote a better understanding of the Eco-Logical approach among their Headquarters and field office staffs to broaden the applications of the approach throughout the country.

OVERVIEW

In 2007, the Federal Highway Administration (FHWA) created the Eco-Logical grant program to pilot a new, ecosystem-scale approach to infrastructure development. The program funded 15 projects nationwide that were aimed at applying the goals and principles outlined in the 2006 multi-agency publication *Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects* (Eco-Logical). Nine of the grant recipients completed their projects prior to Calendar Year (CY) 2011, four grant recipients completed their projects in CY11, and two grant recipients will complete their projects in CY12. Figure 1 shows the names and locations of the grant recipients.

Figure 1: Eco-Logical grant projects



1. Colorado Department of Transportation (DOT): Developing a Regional Ecosystem Framework for Terrestrial and Aquatic Resources Along the I-70 Corridor: An Eco-Logical Field Test
2. Chicago DOT: Sustainable Infrastructure Standards for Urban Ecology
3. Tri-County Regional Planning Commission: Regional Transportation, Ecosystem, and Land Use Integration Plan
4. Mid-America Regional Council: An Eco-Logical Approach to Transportation Planning in the Kansas City Region
5. Tioga County Soil and Water Conservation District: Providing Opportunities for Highway Programs to Remediate Natural Resource Concerns in New York
6. New Hampshire Audubon: Creating Tools to Support Integrated Transportation and Resource Planning in New Hampshire
7. Land-of-Sky Regional Council: Linking Lands and Communities in the Land-of-Sky Region of Western North Carolina
8. North Carolina Department of Environment and Natural Resources: Integration of North Carolina's Conservation and Transportation Planning
9. Oregon State University: Using the Eco-Logical Approach to Develop and Implement Conservation and Mitigation Priorities for Oregon
10. Capital Area Council: Central Texas Greenprint for Growth: A Tool for Balancing Sustainable Conservation Goals with the Infrastructure Needs of Our Rapidly Urbanizing Region
11. Houston-Galveston Area Council of Governments: Developing a Regional Decision Support System for the Houston-Galveston Region
12. North Central Texas Council of Governments: North Central Texas Regional Ecological Framework
13. Coalition for Utah's Future/Project 2010: Blueprint Jordan River, A Lake-to-Lake Vision
14. Thomas Jefferson Planning District Commission: Integrating Green Infrastructure and Transportation Planning
15. United States Environmental Protection Agency (EPA) Region 6: A Regional Ecological Assessment Protocol (REAP) for the South Central United States

This report summarizes the progress and lessons learned from all 15 grant recipients during January through December 2011, the fourth year of the Eco-Logical grant program. The report serves the following purposes:

- Tracks the use of implementation measures for adopting grant products into grant recipient organizations;
- Identifies future actions to advance successes in grant projects, including partnerships, organizational adoption, and the use of data and tools;
- Assesses the implications of grant recipients' findings upon the FHWA broader Eco-Logical program and its related activities; and
- Provides recommendations to FHWA on the future of the Eco-Logical grant program and on methods that may be useful for expanding the adoption of the Eco-Logical approach at a national scale.

Appendix B contains a summary of effective tools, resources, and activities for implementing Eco-Logical at the State, regional, or local level, which is derived from the grant recipients' survey responses and interviews. It is designed as a user-friendly tool for practitioners engaging in the Eco-Logical approach.

Background of the Eco-Logical Program and the Eco-Logical Grant Program

The development of infrastructure facilities can adversely impact ecosystems by disrupting wildlife connectivity, degrading plant and animal habitats, and damaging watersheds. Past approaches to avoid, minimize, and mitigate adverse impacts on natural resources may not have always provided sustainable environmental outcomes. An interagency steering team¹ developed a process that is sensitive to wildlife habitat and can enhance ecosystem sustainability, which was documented in the 2006 publication of *Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects*. Eco-Logical encourages flexibility in regulatory processes under existing authorities. Specifically, it sets forth a conceptual framework for integrating plans and data across agency and disciplinary boundaries and endorses ecosystem-based mitigation.

The FHWA Office of Planning, Environment, and Realty developed and established the Eco-Logical Grant Program in 2007. FHWA provided a total of approximately \$1.4 million in funding to the 15 selected projects. Project activities included planning, data collection and analysis, mitigation, public education for sustainable streets, and prioritization of natural and cultural resources. FHWA required grant recipients to provide matching funds greater than or equal to 50 percent of project costs. The grant performance periods ranged from 12 to 40 months. Several grant recipients did extend their performance periods to accommodate unforeseen challenges or changes in project scope.

FINDINGS

The interviews, grant products, progress reports, questionnaire responses, and other data gathered from the grant recipients offer important lessons about the state of the practice for the Eco-Logical approach. The findings fit into four categories:

- Implementing Eco-Logical Regionally and Nationally

¹ The interagency steering team is comprised of representatives from the U.S. Army Corps of Engineers, Bureau of Land Management, Environmental Protection Agency, Federal Highway Administration, Fish and Wildlife Service, Forest Service, National Oceanic and Atmospheric Administration Fisheries Service, National Park Service, Volpe National Transportation Systems Center, Knik Arm Bridge and Toll Authority, North Carolina Department of Transportation, Vermont Agency of Transportation, and Washington State Department of Transportation.

- Integrating Eco-Logical into Organizational Activities
- Partnering for Interagency Collaboration
- Using Data and Tools for Eco-Logical Projects

Each category includes recommendations for other organizations seeking to implement the Eco-Logical approach. These recommendations are intended to guide practitioners on using lessons from the grant recipients to inform their own projects and processes.

Implementing Eco-Logical Regionally and Nationally

Overview

By the end of 2011, nearly all grant recipients were engaged in activities to implement their grant products, as described in the [Project Summaries](#). Grant products include maps, datasets, and spatial analysis tools developed during the grant project, as well as documented regional priorities, outreach materials, methodologies, and final reports. The project team developed a range of measurements to indicate the degree to which grant recipients have implemented their projects to achieve Eco-Logical principles in their organizations and throughout their regions.

An online questionnaire, posted to SurveyMonkey and distributed to grant recipients via email, included eight implementation performance measures to gauge the degree to which grant recipients had integrated Eco-Logical into their standard business practices:

1. Integration of the grant project into the long-range transportation planning process
2. Integration of the grant project into criteria for project selection or for mitigation, avoidance, and infrastructure location
3. Formal adoption of the regional ecosystem framework (REF), tool, or principles by the grant recipient
4. Formal adoption of an REF, tool, or principles by a partner agency or organization
5. Memorandum of Agreement or Understanding signed with partners for implementation efforts
6. Regular meetings of an interagency implementation working group
7. Programmatic agreements to formalize Eco-Logical into the transportation planning process
8. Replication (or feasibility of replication) of the grant project regionally or nationally

The project team developed the measures to reflect important components of integrated planning within the Eco-Logical approach. The measures refine the previous understanding of effective implementation of Eco-Logical as gained through past grant program annual reports and related Eco-Logical research. The principal components of Eco-Logical captured in the implementation measures are:

- A. Integration of ecological resource prioritization with transportation planning and project development
- B. Collaborative development of an REF
- C. Coordinated partnerships for mitigation and related infrastructure planning
- D. Documentation of methodologies and agreements

The online questionnaire allowed respondents to note their own measurements of effective implementation of the Eco-Logical process. Those measurements included outreach efforts, receipt of additional grant funding, and integration of regional transportation and land-use plans.

Findings

- 1. Most grant recipients have adopted an REF and are actively integrating their products into long-range transportation planning and project selection.** Grant recipients, along with some of their partners, have adopted REFs and other priorities for ecological conservation and mitigation. For many grant recipient organizations, these priorities and REFs informed the development of their

Long-Range Transportation Plans (LRTPs) and/or project selection criteria. Most other grant recipients are targeting outreach to transportation planners within their own organizations and within partner organizations to ensure that their grant products are integrated into upcoming transportation plans and projects.

2. **Approximately half of completed grant projects have begun to replicate components of their project regionally or nationally, or plan to do so in the near future.** Many grant recipients have documented project components that may be replicated elsewhere. Organizations that had received additional grant funding from other sources expanded the geographic reach of their data analysis. For example, Houston-Galveston Area Council (H-GAC) is expanding the reach of its Eco-Logical tool to include six additional counties with financial support from the Conservation Fund. Grant recipients have also conducted outreach and promoted their grant projects extensively, presenting at conferences and workshops in their regions and across the U.S., which should help attract the attention of peer organizations that may be interested in reproducing project components.
 - **Recommendation 1: Document the process, partnerships, and implementation of Eco-Logical projects.** Many grant recipients made significant advances in negotiating conservation priorities, overcoming technical data analysis challenges, leveraging limited financial resources, and gaining partner support for their grant projects. Those that documented their progress with detailed methodologies can more directly share their lessons with others wishing to replicate project components. Besides detailed methodologies, documentation may include technical data analysis processes, organization and consensus building for a multi-agency working team, and implementation steps.
3. **Well-documented technical processes for data analysis are project components that other organizations can replicate at a national scale.** Grant recipients noted that their datasets and priorities are unique to their regions, but the methodologies they used to collect and integrate data and to arrive at a set of priorities that other organizations could replicate with the benefit of their predecessors' experiences. In many cases, grant recipients developed thorough methods and processes for analyzing data through a Geographic Information System (GIS) platform and working with partners to appropriately weight data based on priorities and goals. Grant recipients point to these documented methodologies, usually contained within Eco-Logical project final reports, as instruction manuals for others looking to develop similar Eco-Logical tools.
 - **Recommendation 2: Review existing methodologies from grant projects as models for replication.** Several grant recipients developed strategies to overcome common obstacles, such as data with different levels of detail or diverse stakeholder needs, other organizations could adopt to facilitate their own development of Eco-Logical projects.
4. **Grant recipients have expanded or plan to expand their capacity and funding to implement their grant projects by:**
 - **Documenting the capacities that other organizations would need to adopt the grant products or methodologies.** Grant recipients have detailed the types of technical expertise, funding levels, and staff support needed to effectively complete an Eco-Logical grant project. They have shared these capacities through final grant project reports, presentations, and other forms of outreach. Knowledge of the capacities needed to develop and implement Eco-Logical tools is a critical first step for interested organizations.
 - **Integrating their datasets and tools into existing and widely used data analysis programs.** The U.S. EPA Region 6's REAP tool stands to gain increased recognition and use at a national

scale, based upon the EPA's plans to integrate the REAP with the NEPAAssist tool,² depending on funding availability.

- **Working individually with implementing agencies and partners to adapt the tools for use in local agencies.** Implementing agencies include local governments and transportation and environmental organizations that direct the planning and implementation of new transportation and mitigation projects. The Thomas Jefferson Planning District Council (TJPDC) staff has close relationships with local governments and is able to provide targeted technical assistance to them. The grant recipients have begun to help local governments use GIS so that they can apply stream and wetland methodologies to local projects.

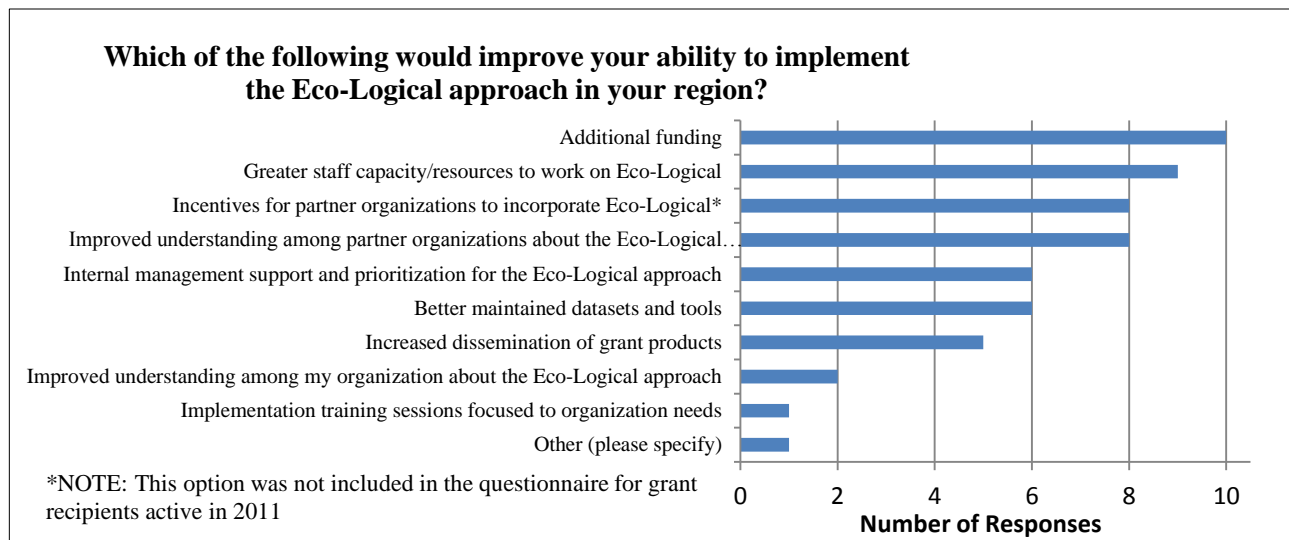
During the fourth year of the grant program, grant recipients not only demonstrated effective strategies for implementing their projects in their own organizations and partner organizations, but they also showed the time and effort needed to achieve specified outcomes, such as formal adoption of tool by local governments and transportation organizations or use for transportation project selection. The integration of conservation priorities into long-range transportation planning and the adoption of REFs are occurring on a widespread basis as grant projects become more mature and as project staff focuses on outreach to metropolitan planning organization (MPO) boards and State DOTs.

Some measures that might prove helpful, such as programmatic agreements, have been implemented infrequently at best. In the context of the Eco-Logical approach, programmatic agreements can include multiagency signed agreements to implement a designated process, as modeled in Colorado DOT's implementation matrix signed by members of its stakeholder group. Other examples of signed programmatic agreements in an Eco-Logical context include [Elkhorn Slough Early Mitigation Partnership](#) in central California, and the Regional Advanced Mitigation Planning/Statewide Advanced Mitigation Initiative through the California Department of Transportation. An area for further study may be barriers to programmatic agreements or the types of technical assistance that can encourage their use.

There are a number of factors that would improve the ability of grant recipients to implement the Eco-Logical approach in their regions. They include additional management support, training for partner agencies, and greater staff resources. Figure 2 shows grant recipient responses to questions regarding what resources would improve their ability to implement the Eco-Logical approach.

² NEPAAssist is an EPA, web-based GIS tool that coordinates information that is essential to the environmental review process.

Figure 2: Resources to improve implementation of the Eco-Logical approach



Integrating Eco-Logical into Organizational Activities

Overview

The Eco-Logical approach represents a shift from the traditional transportation planning, project delivery, and mitigation processes to integrated, ecosystem-based transportation and mitigation planning. For many organizations, embracing the Eco-Logical approach involves a significant change in their organizational practices. The grant recipients have demonstrated several effective means for overcoming resistance to organizational change and for helping their managers and partners better understand the approach's benefits. These findings offer a starting point for organizations working towards adoption of the Eco-Logical approach.

Findings

- 1. Senior-level management that understands the benefits of the Eco-Logical approach and prioritizes its use throughout the organization is one of most valuable ways to ensure implementation.** Supportive senior-level management within transportation and environmental organizations can allocate staff time and financial resources to develop and implement Eco-Logical products. Managers can also integrate Eco-Logical principles into their organizations' programs that may not be directly related to the Eco-Logical project. Several grant recipients with managers that prioritize the implementation of the Eco-Logical approach into their respective organizations have been able to adopt grant products and formally integrate them into transportation plans and programs without organizational resistance. Nearly all grant recipients noted that greater leadership understanding, both within their organizations and in partner organizations, would lead to greater organizational support for the grant project and help to overcome challenges to implementation.

 - Recommendation 3: Promote understanding of the Eco-Logical approach to senior-level managers.** The Eco-Logical approach has brought benefits to many grant recipients, including improved partnerships and processes that can streamline project development. Grant recipients observed that managers may be reluctant to make changes across their organizations to reflect Eco-Logical because they do not recognize these benefits. Also, managers may be reluctant to make changes because the Eco-Logical approach entails a significant philosophical and procedural shift. Grant recipients have expressed that the benefits of their grant projects are

sometimes confined to sub-departments of their own organizations and partner organizations. Through promoting the benefits derived from grant projects or other implementations of the Eco-Logical approach, staff-level practitioners can engage management to better understand and prioritize the approach.

2. **Grant recipients aim to demonstrate the Eco-Logical approach's quantifiable environmental and economic benefits to promote its adoption.** Grant recipients such as Chicago DOT have integrated cost and environmental performance metrics into their grant projects in order to provide peer organizations with concrete evidence of the effectiveness of the Eco-Logical approach. Other grant recipients identified a need for additional research in this area, which would help them to gain the support of managers and partner organizations for Eco-Logical implementation.
 - **Recommendation 4: Demonstrate the quantifiable environmental and economic benefits of the Eco-Logical approach to State DOTs and Federal agency partners.** Grant recipients report that State DOTs may be more willing to adopt new technologies or methods once they see proven benefits. Greater demonstration of the Eco-Logical approach's quantifiable environmental and economic benefits, as evidenced through research on economic benefits of integrated planning and partnerships, can engender State DOT and Federal agency staff support for the approach.
 - **Recommendation 5: Measure the performance of grant projects to gain broader stakeholder support and extend the life of effective grant products.** Performance measures can be established at the outset of the project to help quantify the benefits of the Eco-Logical project and build support from management, partners, and the community. They also allow for adaptive management; if a project component is not performing as expected, staff can make adjustments or reallocate resources away from that underperforming component. Performance measures will vary by type of project but may include tracking elements such as:
 - Number of users of online data tools or downloads of datasets;
 - Counts of constructed mitigation projects that align with the REF;
 - Transportation projects avoided or relocated to avoid ecological priority areas; and
 - Average cost or time for environmental permitting for transportation projects planned using the Eco-Logical approach (as compared to average costs and times for projects using traditional approaches).
3. **Successful grant recipients stated that the day-to-day operations of their organizations now reflect the Eco-Logical approach.** Based on conversations with grant recipients, the organizations that cited examples of the use of the Eco-Logical approach within the context of their core activities are the most successful at implementing the approach. The organizations that have effectively used their grant products for project selection are also those with the greatest management support for the approach. For example, H-GAC has involved its managers in developing and promoting the use of its Eco-Logical tool, and it has begun work on several new projects that expand on the use of the initial tool, including planned application to the LRTP.

Partnering for Interagency Collaboration

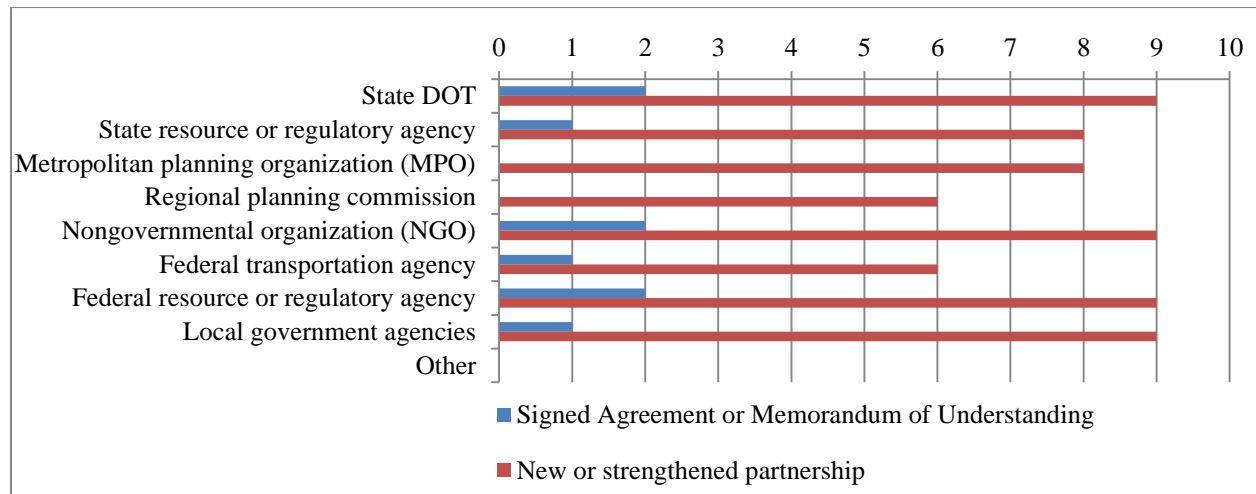
Overview

Throughout the grant program, grant recipients have expressed that the partnerships they have made throughout the course of their grant projects were among the most valuable outcomes. Grant recipients have all forged new relationships, strengthened existing partnerships, and/or opened new lines of communication with partner organizations. As grant recipients implement their projects, these partnerships will become even more valuable to increase the reach of the grant and the Eco-Logical approach.

Findings

1. **When partner organizations adopt Eco-Logical grant products, those products and Eco-Logical principles become more institutionalized in the region.** Through serving as champions, partner organizations that actively use grant products are highly effective at encouraging other regions or organizations to adopt grant products and Eco-Logical principles. Colorado DOT noted that a nongovernmental organization (NGO) partner was the most effective actor in spreading the use of its implementation matrix to other divisions within CDOT.
 - **Recommendation 6: Collaborate with multiple types of agencies to advise project development and implementation.** In past years, grant recipients reported that their multi-agency working groups helped with collecting data, refining methodologies, and arriving at a set of regional ecosystem priorities. In 2011, grant recipients emphasized the importance of partners in implementing the Eco-Logical product, especially in cases where the partners signed a Memorandum of Understanding (MOU).
2. **Partnerships remain a valuable achievement for grant recipients in terms of strengthening and implementing their Eco-Logical grant products.** Grant recipients partnered with a range of organizations and these types of organizations contributed differently to grant projects (see Figure 3).
 - Partnerships with NGOs and resource and regulatory agencies often provided additional capacity, data, and networks to strengthen or promote Eco-Logical products. These organizations provided access to datasets or analysis tools and could help verify resource identification and prioritization.
 - Partnerships with DOTs, MPOs, and local governments led organizations to more directly implement the Eco-Logical projects. These organizations were most likely to adopt products for use in transportation planning and project selection or to select and fund mitigation projects.

Figure 3: Eco-Logical Grant Recipient Partnerships



- **Recommendation 7: Involve transportation decisionmakers at key points throughout the development of an Eco-Logical project.** MPO executive boards and State DOTs often are the funding sources or implementing agencies for transportation and associated mitigation projects. Organizations that develop a tool or process to bring the Eco-Logical approach into transportation decisionmaking can better ensure their product’s implementation through early support from transportation leadership. Grant recipients have effectively worked with these leaders at strategic points in their Eco-Logical projects by making presentations at MPO board meetings, inviting State DOT staff to participate in workshops and advisory committees, and meeting individually

with local government staff. Strategic points include project inception and goal-setting, developing regional priorities, and presentation of draft and final deliverables.

- 3. The process of creating MOUs proved valuable to grant recipients because they were able to communicate their priorities, strengthen relationships, and refine methodologies.** MOUs provided a strong foundation for the signatory agencies to implement the grant projects and grant recipients noted that the process to develop an MOU also had independent relationship benefits. To limit regulatory uncertainty, grant recipients need to develop programmatic approaches and MOUs based on their regulatory frameworks. Grant recipients are not yet at this point, although some expressed that they intended to do so in the future.

Significance

Grant recipients recognized the importance of partnerships early in their projects in helping to develop REFs. Partners are also critical to the implementation of the Eco-Logical approach because organizations that see their peers and partners adopting a new approach may be more likely to adopt that same approach. The relationships gained through working on an Eco-Logical project fostered easier and earlier communication between transportation and environmental organizations, which grant recipients predicted would streamline future transportation and mitigation planning efforts.

Using Data and Tools for Eco-Logical Projects

Overview

Grant recipients use of data and analytical tools varied from project to project, but many faced common challenges related to collecting data, prioritizing resources for analysis, and disseminating products to a large number of users. The following findings relate to the technical processes and applications of data and tools through the grant projects.

- 1. Web-based data tools and maps help grant recipients reach out to implementing agencies and share their products with a wider audience.** Most grant recipients developed informational websites, downloadable datasets and maps, and/or web-based analysis tools that allow the public to access grant products. Grant recipients note that making their products publically accessible broadens their product reach and strengthens their engagement with partners and peers. Several grant recipients posted online versions of their final Eco-Logical project reports, which contain detailed methodologies. These reports can then be easily shared with other organizations wishing to replicate the project's components.
- 2. Some grant recipients developed innovative and flexible methodologies to weigh data with varying scales and to compensate for a lack of data availability.** Several grant recipients recognized challenges in seamless data integration when they encountered data at different scales or found gaps in the datasets available. They had to adjust their methodologies to account for discrepancies without skewing results. For example, TJPDC discovered that one county in its area of jurisdiction had more detailed data than other counties. That finding led TJPDC to reevaluate the inclusion of certain data, which involved a discussion about possibly developing for future use a modified "map algebra" that would incorporate different levels of detail.
- 3. Grant recipients often used national datasets, supplemented with local or regional data, integrated at a regional level to prioritize mitigation sites.** Most grant recipients used datasets from Federal resource agencies or national NGOs. Therefore, much of the foundational data could be expanded to cover a larger geographic area, without significant time or cost investment. Many grant recipients also relied upon specific resource data from State resource agencies. In most cases, grant recipients supplemented national datasets with data that they or their partners collected or verified at

the local or regional level, which varied based on project objectives. H-GAC, for example, used volunteers to collect original data throughout the region at a coarse scale.

Significance

Data collection and analysis contributed to the success of most grant projects, and the most readily accessible data came from national sources. Grant recipients faced uneven data availability, varying levels of detail, and inconsistent cooperation from partner agencies, which often required them to adapt their grant projects. They also reported that many of their partner organizations lacked the technical capacity to use complex analytic tools or datasets.

APPLICATIONS TO THE FHWA ECO-LOGICAL PROGRAM

The findings from the Eco-Logical grant recipients can help FHWA to build upon its efforts to bring the Eco-Logical approach to the mainstream of transportation and mitigation development. The lessons and findings have applications to ongoing or planned activities of FHWA's Eco-Logical program.

Integrated Tools and Pilots for Implementing Eco-Logical

In November 2011, FHWA worked with the Transportation Research Board (TRB) staff and research consultants to host a multi-agency workshop to develop implementation strategies for the capacity components of the Second Strategic Highway Research Program (SHRP2). The "Integration of Conservation Planning, Highway Planning, Environmental Review and Permitting: Multi-Agency Implementation Planning Workshop" (Multi-Agency Workshop) included over 50 participants from Federal resource and regulatory agencies, State transportation and resource agencies, MPOs, NGOs, and academic institutions.

The workshop participants developed two strategies to implement the Eco-Logical approach, both of which the TRB SHRP2 Oversight Committee approved for funding. The first strategy will develop the foundation for a national, multi-agency data integration and accessibility system to support implementation of the Eco-Logical approach in transportation decisionmaking. The second one will fund two pilot projects to test the prototype data integration and accessibility system. One of the pilot projects will be in a locality with advanced practices in environmental data application and the second pilot will be in a locality with limited availability of and applications for environmental data.

Several lessons the Eco-Logical grant recipients shared can help inform the progress of the two implementation projects:

- Many grant recipients used national datasets supplemented by State or regional data, where available, and worked with partners to develop a methodology to prioritize resources and weigh data appropriately. The data integration and accessibility system should start with national datasets but also provide capabilities for links to State and regional data. It may consider guidance for how users could prioritize or weigh datasets to reflect local priorities.
- Grant recipients noted anecdotally that many of their peers or local government agencies may lack the GIS expertise or capacity to replicate integrated data tools. A data integration and accessibility tool could consider a wide range of user capabilities and one of the pilot projects may include a locality with very limited GIS capacity.
- Pilot projects may include an outreach and education component targeted towards management at transportation and resource agencies. Management that understands the benefits of Eco-Logical provides a critical foundation for organizational adoption of the Eco-Logical approach.

Eco-Logical Webinar Series

In 2011, FHWA and the Volpe Center presented six webinars to a national audience of environmental and transportation practitioners, featuring innovative research, applications, and resources related to the Eco-Logical program. FHWA plans to continue to host monthly webinars in 2012 and solicit the participation from grant recipients and signatory agencies. The findings from grant recipients may inform topics for future webinar topics.

- Grant recipients and their partners want to know the Eco-Logical approach's quantifiable economic and environmental benefits. A relevant webinar may feature research on the financial benefits of integrated planning and ecosystem-scale, advanced mitigation. The documented environmental benefits of advanced mitigation and ecosystem-scale planning would help organizations better understand and apply the Eco-Logical approach.
- The grant recipients have developed and documented several resources and methodologies to prioritize ecological resources and integrate those priorities into transportation planning. Through a webinar to share these methodologies, grant recipients can expose more peer organizations to their proven techniques.
- Most grant recipients used multi-agency working groups or advisory committees at some point during their grant projects. Upon implementation, these partners were valuable in expanding the reach of grant products. A webinar featuring successful cooperative planning efforts can help other organizations effectively structure partnerships.

Eco-Logical Signatory Agency Activities

FHWA supports ongoing meetings and collaboration among Eco-Logical signatory agencies to identify opportunities where the agencies can provide guidance and support to organizations shifting toward the Eco-Logical approach. In January 2011, the signatory agencies met to discuss multi-agency outreach for Eco-Logical, including webinars and agency summary updates, and potential roles for SHRP2 implementation. The signatory agencies also participated in the November 2011 Multi-Agency Workshop.

In coordination with the signatory agencies, FHWA developed the [*Eco-Logical Successes* publication](#) (January 2011) with brief summaries of signatory agency programs that implement or include Eco-Logical principles. Future volumes of the *Eco-Logical Successes* document will feature in-depth updates on selected signatory agency programs; FHWA will distribute the first of these volumes, which features programs from the BLM and USFWS, early in 2012.

The ongoing partnerships between FHWA and signatory agencies can further support widespread adoption of the Eco-Logical approach, as the grant project findings demonstrate:

- A variety of organization types throughout the region are more likely to adopt grant products "championed" by partner agencies. As more signatory agency headquarters and field staff promote the benefits of Eco-Logical, they will influence more of their colleagues and partners to adopt the Eco-Logical approach.
- Resource and regulatory agencies helped grant recipients to access datasets or analysis tools and verify resource identification and prioritization. FHWA may consider promoting these specific partnership opportunities to signatory agencies, who can then direct field staff to engage more actively in partnerships that facilitate Eco-Logical implementation.

Expansion of the Eco-Logical Grant Program

As the first 15 Eco-Logical grant projects reach completion, FHWA may consider funding additional applications of the Eco-Logical approach. These applications will likely be continuations of selected grant projects that have demonstrated effective implementation of the approach and have ready opportunities to advance or replicate project components. To prepare for the future of the grant program, FHWA will detail effective strategies for implementation, assess the potential of grant products to advance through the steps of integrated planning, and identify project components that may be most readily replicated by peer organizations. Specifically, FHWA will consider developing performance measures to help determine if projects lead to quantifiable environmental benefits and streamlined project delivery.

The findings from this *2011 Eco-Logical Grant Program Annual Report* will inform FHWA as it refines and strengthens the future of the grant program. The recommendations in the following section will guide the ongoing success of current grant projects and help develop appropriate selection and performance criteria for future funding.

RECOMMENDATIONS

Opportunities for Expanding Current Grant Projects

Each of the 15 grant projects has made progress in testing and documenting applications of the Eco-Logical approach in diverse contexts. Five projects merit consideration, however, for additional funding: Chicago DOT, Colorado DOT, H-GAC, TJPDC, and U.S. EPA Region 6. These projects achieved noteworthy accomplishments during the initial grant period and they show the potential to replicate components of their project, promote further adoption by partner agencies, or test effective strategies in more advanced applications of the Eco-Logical approach.

FHWA could consider a more in-depth conversation with these five grant recipients, either individually or collectively, to discuss how the grant recipients might advance their own implementation of the Eco-Logical approach or help others to replicate project components. A targeted peer exchange would allow FHWA to learn more about potential opportunities among these five grant recipients and also provide them with a chance to learn from each other. Following these conversations, FHWA could develop selection criteria, solicit additional information from grant recipients, and arrive at future funding decisions. FHWA could also consider stronger use of performance metrics, including requiring the measurement of time and costs savings associated with the Eco-Logical approach, for future grants.

Chicago DOT: Chicago DOT established a series of quantitative goals and has carefully tracked its progress. Despite construction delays, Chicago DOT staff has already made concrete findings on sourcing construction materials, soils for appropriate draining, and sustainable technology features, all of which Chicago DOT can apply to new construction projects throughout the city. Chicago DOT can share its documented lessons with technical staff of peer agencies and public user groups, with whom they maintain ongoing relationships. Chicago DOT is also the only grant recipient that works in an urban context and can therefore serve as a model for other urban practitioners.

Chicago DOT could use additional funding for several purposes, including hosting another regional workshop for local governments and MPOs or continuing its partnerships with schools and community groups in the Pilsen neighborhood. Funding may also assist Chicago DOT with reporting on its performance measures and adopting adaptive management techniques to account for low-performing components. Chicago DOT staff may serve as a resource for instructing other organizations adopting the Eco-Logical approach to incorporate more quantitative performance measures.

Colorado DOT: Colorado DOT and its active, multi-agency working group signed an MOU that includes an implementation matrix for all future projects along the I-70 corridor. The process reflects the group's

priorities for context-sensitive solutions and conservation. The signatories of the MOU, including Colorado DOT, have begun to use the implementation matrix on small-scale projects, such as guardrail replacement.

Future funding can help Colorado DOT track and document successes and challenges as the agency implements new and larger-scale projects according to the process outlined in the matrix. Funding may help document the experiences of the signatory agencies and explore the potential for incorporating crediting into the MOU, thus achieving a milestone of partnership as yet unmet by grant recipients. Colorado DOT can also use funding to conduct intra-agency outreach and foster understanding about the Eco-Logical approach; staff note that many of its district offices have limited awareness of Eco-Logical.

H-GAC: H-GAC developed its Eco-Logical tool using spatial data analysis to inform transportation decisionmaking, based on a shared set of priorities and data developed and collected collaboratively with stakeholders. The MPO staff has reached many peer organizations through webinars and conference presentations, and its methodology is available in a user-friendly format on H-GAC's [website](#). It has also received additional funding to expand its tool's reach to six additional counties.

Future funding for H-GAC could help the environmental staff to ensure full implementation of its Eco-Logical products by better integrating those products with transportation planning, especially as the MPO staff develop the upcoming 2040 Regional Transportation Plan (to be completed in 2013). Funding would allow project staff to better educate MPO board members about the Eco-Logical tool and to document its progress in later steps of the Eco-Logical approach. Additional funding could also allow H-GAC to lead a peer exchange or targeted technical assistance in which its staff could help another MPO to adapt the methodology for use in their own region.

TJPDC: TJPDC and its resource agency partners have successfully developed methodologies that overcome the challenges of multiple scales of data and varying data availability. Their products also include GIS maps of conservation priorities that overlay planned transportation projects. TJPDC staff has accelerated the implementation of its grant products by providing direct technical assistance to local governments.

Additional funding for TJPDC would help them reach fuller regional adoption through integrating their tool into the LRTP (to be adopted in May 2014). Funding could also help them to expand the boundaries of their methodologies to other planning districts in Virginia or to work with Virginia DOT (VDOT) to adopt the methodologies for use throughout the State. FHWA support for project expansion could encourage greater engagement from VDOT.

U.S. EPA Region 6: EPA Region 6 developed a tool that has attracted national attention for its comprehensive, multi-State data integration and its broad applications for environmental and infrastructure projects. Furthermore, the success of the Texas Ecological Assessment Protocol ((TEAP) the precedent for the REAP) and its use in MPO transportation planning in Texas suggests that transportation organizations in the other Region 6 States will more widely use the REAP in coming years, as they better understand its applications.

Funding can help EPA Region 6 to expand the tool for use at a national level. The first step would support staff in integrating the REAP with NEPAAssist, which is widely used throughout the U.S. Staff also would like to connect the REAP to a web service, which would allow users to access the REAP from many types of platforms to broaden its availability. Funding can also support additional outreach and targeted technical assistance for the REAP since many of the State and local agencies that stand to benefit most from the REAP have limited technical capacity to understand and apply the tool without outside assistance.

Additional Recommendations for FHWA

This *2011 Eco-Logical Grant Program Annual Report* contains findings and recommendations aimed at practitioners who are seeking effective strategies for implementing the Eco-Logical approach. In many cases, FHWA can leverage the resources and partnerships of its Eco-Logical program to facilitate the adoption of Eco-Logical among transportation and environmental organizations throughout the country. As FHWA continues to support current grant recipients and considers the future of the grant program, the following specific actions, supported by this report's findings, may provide valuable assistance.

- Utilize the FHWA Eco-Logical website and webinar series to share data, analysis tools, research, and targeted trainings.
 - Continue to support projects that use the Internet to expand access of data analysis tools or datasets to users without the technical capacity to develop their own analyses.
 - Consider improved data accessibility and platforms that do not require advanced technical capacity as future technical assistance for Eco-Logical.
- Showcase Eco-Logical through an initiative such as FHWA's "Every Day Counts," which could increase visibility and improve understanding of Eco-Logical among transportation and environmental organizations.

FHWA can also consider the development of tools, guidance materials, and research that help practitioners adopt the Eco-Logical approach. FHWA can use research efforts to develop these products, which can be showcased and distributed via the Eco-Logical website.

- Develop a web-based clearinghouse that allows practitioners to search the final reports, project websites, REFs, and related documents of grant recipients. This tool would improve the accessibility of grant products and allow practitioners to follow the grant recipients' strategies.
- Evaluate and synthesize research on the quantifiable benefits of the Eco-Logical approach. The research would include an analysis of studies that quantify time, cost savings, and other economic benefits of components of the Eco-Logical approach, including interagency collaboration, setting joint regional priorities, and integrated planning. This task would incorporate research on performance metrics for economic benefits.
- Develop guidelines for performance measures, baseline measures, and project reporting to ensure consistent project tracking and improve the transferability of lessons learned. FHWA can consider requiring future grant recipients to set performance measures at project inception to quantify the time savings and economic benefits of their grant projects, as informed by the research task on quantifiable benefits.
- Integrate existing methodologies of organizations that have implemented the Eco-Logical approach (including grant recipients, Integrated Transportation and Ecological Enhancements for Montana Program (ITEEM), and the Maryland Watershed Resources Registry) into a guidance document for practitioners. The research would evaluate individual components of methodologies and arrive at recommendations on how and when to use specific strategies. The research can also include a focus on the collection and use of data, synthesizing lessons captured in grant recipient methodologies. The guidance document could provide targeted models for practitioners seeking methods for the Eco-Logical approach, including guidance on data collection and applications.
- Develop targeted strategies for educating managers about the broad principles of Eco-Logical, the specific benefits of grant products, and the steps for gradually integrating the Eco-Logical

approach into an organization. The research on quantifiable benefits of Eco-Logical and methodology guidance could contribute to these strategy recommendations for managers.

CONCLUSIONS

The findings from this *2011 Eco-Logical Grant Program Annual Report* consider FHWA's goal of widespread national integration of the Eco-Logical approach into transportation planning through national technical assistance and research. The lessons that grant recipients have shared on effective implementation of the Eco-Logical approach can translate into guidance for peer organizations, which FHWA and its partner agencies can then promote and share.

As grant recipients move from project completion to implementation, they are emphasizing the importance of leadership support, demonstrating Eco-Logical's concrete benefits, and creating strong partnerships. With these elements in place, grant recipients can effectively apply their grant products to transportation planning and project selection, and encourage their partners throughout the region to adopt their grant products.

FHWA should continue to engage grant recipients to track their applications of Eco-Logical several years after project initiation. This will likely help practitioners understand how the Eco-Logical approach works in practice and assist FHWA in refining its guidance for applying the approach as standard practice throughout the country. Additionally, the processes that successful grant recipients use to apply Eco-Logical can serve as models for peer organizations. Practitioners around the U.S. can benefit from methodologies that encourage partnerships among stakeholders, prioritize data, develop REFs, and integrate Eco-Logical into transportation planning. FHWA can also support grant recipients to help their peers replicate successful project components.

The future of the FHWA Eco-Logical program is one of significant opportunity for expansion and partnership. The SHRP2 implementation funding and renewed engagement from signatory agencies will broaden the Eco-Logical approach's reach and bring new tools and resources into the program. The ongoing progress that grant recipients are making will bring FHWA new understanding about Eco-Logical implementation. Greater adoption of the Eco-Logical approach throughout the nation's diverse environmental and political contexts should ultimately lead to even more innovative strategies for its implementation as new types of organizations adapt the approach to fit their constraints and priorities.

PROJECT SUMMARIES

Central Texas Greenprint for Growth: A Tool for Balancing Sustainable Conservation Goals with the Infrastructure Needs of Our Rapidly Urbanizing Region

Capital Area Council of Governments. Total cost: \$228,882. FHWA share: \$113,882.

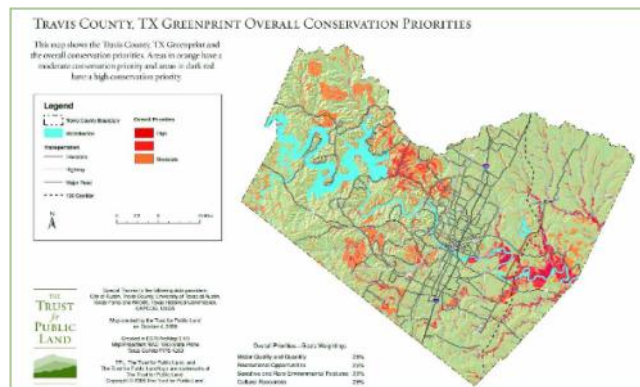
Period of performance: 24 months. Dates: May 16, 2008 – May 16, 2010. Status: Complete.

AOTR: Bethaney Bacher-Gresock. Grant-project website: <http://www.capcog.org/>.

Project Goals

The goal of the Capital Area Council of Governments (CAPCOG) *Eco-Logical* grant project was to create a Greenprint³ for the Central Texas region to help planners and transportation agencies plan for future growth. With input from regional and local stakeholders, CAPCOG's Greenprint for Growth plan prioritized the protection of water quality, ecological resources, farm and ranch lands, recreational and cultural resources, and scenic corridors. The Greenprint expanded on a previous CAPCOG project in Travis County to include three other counties in the Austin–Round Rock metropolitan statistical area. (Williamson County did not participate.)

Figure 4: Travis County Conservation Priority Plan. (Courtesy of CAPCOG)



Project Accomplishments

CAPCOG completed the final report, maps, and opportunity areas for three additional counties in the region in 2010, as part of its Greenprint for Growth plan. The Greenprint integrated data into a GIS model that prioritized conservation opportunities and displayed them in a series of maps, available in print and on the [Greenprint website](#). While CAPCOG was developing the maps, it held a series of meetings with elected officials, technical experts, and county representatives to determine the county and regional priorities that informed the maps and the individual county-based Greenprint reports. The priorities from the Greenprint for Growth were included in the Bastrop County Comprehensive Transportation Plan and informed the selection of conservation easements and mitigation lands in Travis and Hays Counties.

Implementation Measures

CAPCOG successfully enlisted the participation of local and county governments, NGOs, and academia during Greenprint development. It partnered with the Trust for Public Land, which conducted outreach activities for municipalities, and as a result improved its relationships with local governments and promoted its maps and reports. All four counties view the Greenprint as an important guidance document, and Travis County is incorporating its Greenprint into its comprehensive plan. CAPCOG noted that greater COG staff capacity could further improve the application of Greenprint across the region.

Replication Potential and Future Steps

CAPCOG continues to regularly follow up with county government stakeholders to encourage the use of the Greenprint in infrastructure development and land-use planning. Staff has also made presentations on the project at various conferences. CAPCOG plans to improve availability of the Greenprint for wider use among local governments. CAPCOG staff will also continue outreach to the MPO board and transportation planning staff to integrate Greenprint data and opportunity areas into the regional long-range transportation planning and project delivery processes.

³ CAPCOG defines a Greenprint as a tool and a process for balancing conservation goals with infrastructure needs.

Sustainable Infrastructure Standards for Urban Ecology

Chicago Department of Transportation. Total cost: \$146,626. FHWA share: \$73,313.

Period of performance: 40 months. Dates: August 22, 2008 – December 16, 2011. Status: In progress.

AOTR: Kevin Moody. Grant-project website: <http://egov.cityofchicago.org/city/webportal/home.do>.

Project Goals

The Chicago Department of Transportation (CDOT) Eco-Logical grant project supports the outreach and education activities related to its construction of a sustainable streetscape pilot that uses Leadership in Energy and Environmental Design (LEED) principles. These activities include the creation of a sustainable design manual and the production of educational kiosks and brochures. When complete, CDOT will use the Eco-Logical products to inform regional governments and the public about LEED principles in streetscape design and provide residents with information on how to integrate low-impact strategies into their travel and household patterns.

Project Accomplishments

CDOT has completed 75 percent of the streetscape construction for the pedestrian, bicycle, parking, and planter improvements, and expects to be completely finished in the spring of 2012. CDOT staff will incorporate performance measures into educational materials that will be finalized with data it gathers during the final construction period. The CDOT team has updated the draft of its sustainable design manual with technical information from the design phase, such as material sources and construction waste disposal. CDOT has also developed a guided walking tour of the streetscape to supplement the kiosks. As part of its outreach and education, CDOT staff hosted a regional educational workshop in 2009, worked with Benito Juarez High School on educational programs, and met with a neighborhood citizen group, the Pilsen Planning Committee, twice in 2011.

Implementation Measures

The project team continues to monitor construction data on a weekly basis to assess the project's progress against the regional goals outlined in the sustainable design manual. Some example goals include increasing the tree canopy, educating the public about everyday sustainable solutions, and using quantitative metrics for measurement. The project has thus far exceeded the project team's quantitative goals, and CDOT will continue to monitor performance metrics such as landscape coverage and energy use throughout construction and after the project's completion. CDOT plans to continue meeting with community and local government partners, install the kiosks, and distribute finalized walking tour brochures near the pilot area.

Replication Potential and Future Steps

CDOT staff has discussed LEED principles in streetscape design with municipalities and consultants throughout the Midwest. CDOT staff fields inquiries on construction materials as well as political and funding strategies, and reports that municipalities and consultants have begun to use these approaches in their own projects. The project team also shares its specifications with cities outside of the region, though any materials used in those areas would likely vary based on local availability and conditions. Some elements of CDOT's approach to performance design, such as drainage, lighting, reflectivity, and stormwater best management practices along rail corridors, could be replicated nationwide.

Figure 5: Chicago DOT Outreach Materials (Courtesy of CDOT)



Developing a Regional Ecosystem Framework for Terrestrial and Aquatic Resources along the I-70 Corridor: An Eco-Logical Field Test

Colorado Department of Transportation. In *Total cost:* \$361,093. *FHWA share:* \$152,500.

Period of performance: 40 months. *Dates:* May 22, 2008 – September 22, 2011. *Status:* Complete.

AOTR: Dennis Durbin/Michael Lamprecht. *Grant-project website:* <http://i-70wildlifewatch.org>.

Project Goals

The goal of the Colorado Department of Transportation (CDOT) Eco-Logical grant project was to help CDOT identify mitigation projects to improve wildlife connectivity for the Interstate 70 (I-70) corridor. CDOT created a Regional Ecosystem Framework (REF)⁴ for the corridor that incorporates wildlife-habitat and crossing data into a Geographic Information System (GIS) database. CDOT staff brought together multi-agency partners to develop a data tool and implementation framework that could inform planning and mitigation decisions along the corridor.

Project Accomplishments

CDOT staff conducted a GIS analysis to identify 17 priority connectivity zones for wildlife and important aquatic crossings along the I-70 corridor. Throughout the project, CDOT met annually with a multi-agency stakeholder group as part of its larger I-70 Context Sensitive Solutions (CSS) corridor analysis. This group worked with CDOT to complete an Environmental Impact Statement (EIS) that covers projects in the corridor and incorporates data on habitat connectivity opportunities. They then developed, in conjunction with the EIS effort, an implementation matrix for the REF that incorporates project data and analysis. In January 2011, project partners committed to use the matrix to implement future projects proposed along the corridor by amending a Memorandum of Understanding (MOU) associated with the Stream Wetland Ecological Enhancement Program. CDOT also included the matrix in a second MOU for A Landscape Level Inventory of Valued Ecosystem Components (ALIVE), a CDOT-led interagency program to promote environmental streamlining in the I-70 corridor.

Implementation Measures

The signed MOUs ensure that the committed parties will use the REF implementation matrix to guide their transportation activities. To date, subcommittees formed to address wildlife connectivity issues within the corridor have used the matrix to guide their decisions regarding maintenance and upgrade components, such as guardrails, tunnels, and barriers. Performance measures linked to the matrix include transparency in each lifecycle phase of the transportation planning process; stakeholder engagement in environmental review processes; and enhanced connectivity for all corridor target species.

Replication Potential and Future Steps

The project team plans to utilize the data on wildlife connectivity to influence transportation project design, placement, estimates, and the State Transportation Improvement Program (STIP) process as projects and funding become available. The CDOT project's implementation matrix and MOUs helped facilitate collaboration and commitment to CSS among the project partners. CDOT encourages other organizations that are implementing Eco-Logical to use a defined collaborative process, such as the one CDOT used to develop the matrix.

Figure 6: Website for the public to report wildlife sightings on I-70. (Courtesy of [I-70 Wildlife Watch](http://i-70wildlifewatch.org))



⁴ The REF is an element of integrated planning that consists of an overlay of maps of agencies' individual plans, accompanied by descriptions of conservation goals in the defined region. The REF can provide agencies with a joint understanding of the locations and impacts of proposed infrastructure.

Blueprint Jordan River: A Lake-to-Lake Vision

Coalition for Utah's Future/Project 2020. Total cost: \$208,000. FHWA share: \$85,000.

Period of performance: 12 months. Dates: June 9, 2008 – June 9, 2009. Status: Complete.

AOTR: Frederick Bowers. Grant-project website: <http://www.blueprintjordanriver.slco.org/index.html>.

Project Goals

The goal of the Blueprint Jordan River grant project was to develop a collective vision for the Jordan River corridor that integrated transportation planning and natural resource restoration. The project team collaborated with the community, local government, and State and Federal agencies to carry out the grant project. As a result of the collaboration, the project team, coordinated by the public-private partnership [Envision Utah](#), produced the [Blueprint Jordan River](#) vision document to guide development and restoration along the Jordan River.

Project Accomplishments

Envision Utah worked with planners, local government representatives, community members, and NGOs in Salt Lake and Utah Counties to guide the Blueprint Jordan River visioning process. Once the Blueprint document was complete, Envision Utah helped Salt Lake County establish an interim planning committee, which led to the formation of the Jordan River Commission in August 2010. An interlocal agreement created the Commission to implement the Blueprint vision and provide a forum for discussing projects that may impact the river. A Technical Advisory Committee (TAC) helps guide the Commission's decisionmaking.

Figure 7: Vision of a nature preserve and public trail from the Blueprint Jordan River plan. (Courtesy of Envision Utah)



Implementation Measures

Despite the fact that Envision Utah does not have jurisdiction over local municipalities, 17 cities have passed resolutions supporting the Blueprint Jordan River recommendations, including all 15 cities bordering the Jordan River. The Commission is currently considering a project that would outline best practices for low-impact riparian corridor development, which all local governments along the river could use. The Commission is also developing a process through which the TAC will provide a technical review and recommendations for all significant proposed projects within a one-half mile of the river.

Potential Replication and Future Steps

Envision Utah predicted that the Commission would be able to maintain stakeholder support and enthusiasm for low-impact riparian corridor development and regional use of the Jordan River corridor, and the public and media continue to show interest in the Commission's activities. The Jordan River Commission applied for grants to help fund implementation of the Blueprint Jordan River. One grant from the National Park Service's Rivers and Trails Conservation Assistance Program will support the development of an interpretive trail map for the 45-mile long Jordan River Parkway trail to engage and educate the public about the river ecosystem.

The Eco-Logical project helped Envision Utah create new partnerships and start a dialogue with transportation agencies. Envision Utah continues to use Eco-Logical principles in community outreach and planning projects, most recently in the visioning phase of the [Wasatch Choice for 2040](#) regional land-use and transportation plan. The Jordan River Commission and its precursor, the interim planning committee, serve as models of multi-agency approaches for other organizations pursuing long-term implementation of Eco-Logical projects.

Developing a Regional Decision-Support System for the Houston-Galveston Region

Houston-Galveston Area Council. Total cost: \$200,000. FHWA share: \$100,000.

Period of performance: 27 months. Dates: March 14, 2008 – June 14, 2010. Status: Complete.

AOTR: Diane Turchetta. Grant-project website: <http://www.h-gac.com/community/environmental-stewardship/eco-logical/default.aspx>.

Project Goals

The goal of the Houston-Galveston Area Council (H-GAC) Eco-Logical project was to create a GIS tool, known as the Eco-Logical tool, to identify environmental resource priority areas. The tool serves a regional need to balance growth with natural resources conservation, and allows for transportation planners to consider environmental impacts in the project prioritization process. In creating the tool, the project team aimed to develop a methodology that could be replicated in other regions.

Project Accomplishments

H-GAC completed all resource mapping and published a web-based, interactive [Eco-Logical tool](#) in June 2010. The tool comprises over 12,000 mapped features covering six ecotypes that transportation planners can use to overlay proposed projects on mapped resources to evaluate potential impacts. Since completing the project, H-GAC has developed several mechanisms to promote local government and NGO use of the tool within the region, including a brochure for local governments, an interactive website, and an iPhone application. In 2011, H-GAC received a grant from the National Association of Regional Councils to conduct additional outreach, including two webinars targeted at regional and national environmental and transportation organizations.

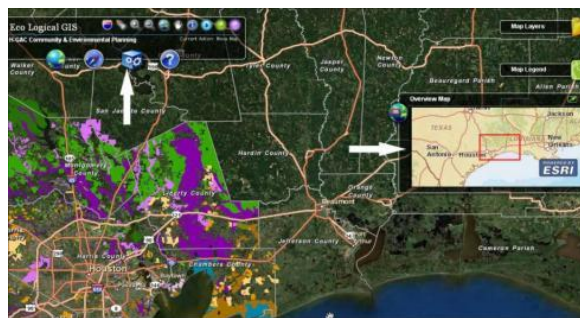
Implementation Measures

H-GAC continues to incorporate the use of their Eco-Logical tool in regional transportation activities. Staff is working to educate MPO board members on the tool's purpose and benefits to facilitate its inclusion as a required component of the 2040 Regional Transportation Plan (RTP). They are also working to incorporate the tool into the concurrent Regional Sustainable Development Plan, which is part of a Department of Housing and Urban Development (HUD) Sustainable Communities Grant. To further support these efforts, H-GAC staff will apply a methodology that The Conservation Fund (TCF) is developing to show the monetary benefits of ecological processes upon regional transportation planning. H-GAC staff anticipates that more formally integrating the tool with transportation planning will increase its use among local governments.

Replication Potential and Future Steps

TCF is using funding from local and regional foundations to apply H-GAC's project methodology for green infrastructure planning for six counties outside of H-GAC's boundaries. TCF's project will also contribute to the Regional Sustainable Development Plan. The H-GAC project team and members of their advisory committee serve on the TCF's project advisory committee. H-GAC's final report documents the methodology for developing the Eco-Logical tool, which other local or regional government agencies could replicate. Staff notes that the tool's metrics are based on national datasets that would be applicable throughout the country. H-GAC staff notes that organizations with GIS technical capacity and a collaborative culture for consensus building in the environmental community may have greater success at replicating the tool. It also emphasizes that others who may wish to replicate the project should focus on the connection between tool design and policy goals.

Figure 8: H-GAC online decisionmaking mapping tool. (Courtesy of H-GAC)



Linking Lands and Communities in the Land-of-Sky Region

Land-of-Sky Regional Council (Western North Carolina). Total cost: \$208,000. FHWA share: \$104,000. Period of performance: 24 months. Dates: March 17, 2008 – March 17, 2010. Status: Complete. AOTR: Mary Gray. Grant-project website: <http://www.linkinglands.org/>.

Project Goals

The goal of the Land-of-Sky Regional Council (LOSRC) Eco-Logical grant project was to develop a green infrastructure framework to identify priority ecological resources and areas suited for future development in a four-county region of Western North Carolina. Based on stakeholder involvement and data analysis, LOSRC expanded the initial project to encompass a larger boundary and created several publicly available resource maps. The infrastructure network presents data on water resources, agricultural and recreational lands, wildlife habitat, and cultural resources.

Project Accomplishments

LOSRC developed resource assessments and a Regional Green Infrastructure map, using State and local GIS data and national spatial data integration tools. Its staff noted that the assessments and maps help LOSRC and its partners streamlining environmental review and permitting for transportation projects. The French Broad River MPO (FBR MPO), housed within LOSRC, incorporated information and maps from the green infrastructure network into the “Environmental Analysis” chapter of its LRTP. The FBR MPO uses that information to analyze the environmental impacts of transportation projects and identify mitigation opportunities.

LOSRC engaged State and local resource agencies, local developers, and landscape architects to assist in data collection and in applying the framework to local and regional plans and projects. It also enlisted the expertise of regional biologists and ecologists for the wildlife habitat and corridor maps. In addition, LOSRC partnered with the Renaissance Computing Institute at the University of North Carolina–Asheville and a GIS consultant to conduct the analysis and produce maps.

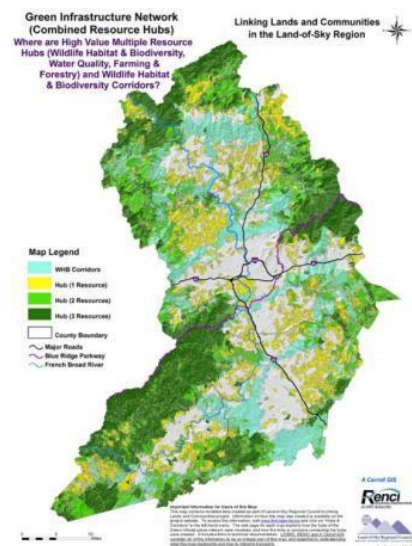
Implementation Measures

LOSRC focused on outreach efforts to expand access to its data and green infrastructure framework. Staff developed an online viewing tool and provided technical assistance to local and regional land trusts, local governments, and local landscape design and engineering firms upon request. Two regional land trusts have since become the most active users of the data and products. LOSRC initially encountered challenges in communicating with some local and State agencies, several of which held different conservation and planning values. LOSRC continued inviting these agencies to participate in the development of the resource assessments and green infrastructure network design, and the agencies eventually became active project partners.

Replication Potential and Future Steps

In 2011, the team presented at the National Association of Regional Councils (NARC) and the National Association of Development Organizations (NADO), which featured the LOSRC Eco-Logical project in its [*Regional Approaches to Sustainable Development*](#) publication. LOSRC continually updates the resource assessments and green infrastructure framework and map. Its staff is now including all the Eco-Logical data and tools in a new regional planning project, [GroWNC](#), which a public-private steering committee plans to complete and eventually adopt in approximately two years.

Figure 9: Green infrastructure map with biodiversity corridors and hubs. (Courtesy of LOSRC)



An Eco-Logical Approach to Transportation Planning in the Kansas City Region

Mid-America Regional Council. Total cost: \$180,000. FHWA share: \$90,000.

Period of performance: 24 months. Dates: March 18, 2008 – March 18, 2010. Status: Complete.

AOTR: Mary Gray. Grant-project website: <http://www.marc.org/transportation/conservation.htm>.

Project Goals

The Mid-America Regional Council (MARC) Eco-Logical grant project was aimed at building a framework for an efficient and sustainable transportation system in the Greater Kansas City region.

MARC developed a plan titled, “Linking Environmental and Transportation Planning: An Action Plan” (Action Plan), which included the goals of formalized collaboration with regional partners, creation of a regional mitigation strategy, and alignment of transportation decisionmaking with a regional sustainability vision. Through their Action Plan, MARC sought to frame transportation priorities in the context of natural resource conservation and community goals.

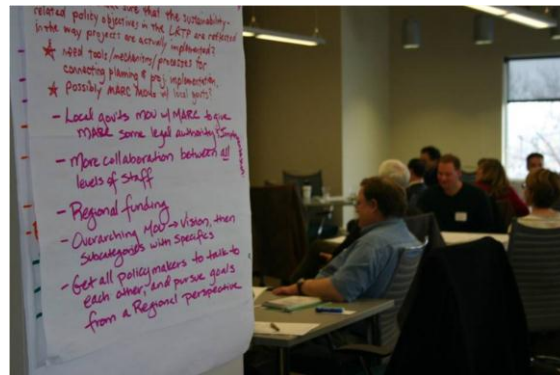


Figure 10: Stakeholders participate in meetings to devise the Action Plan. (Courtesy of MARC)

Project Accomplishments

MARC’s board of directors adopted the Action Plan in May 2009. The Eco-Logical project team worked with MARC staff to integrate the Action Plan into its 2040 LRTP, which the MPO adopted in June 2010. The plan includes policy direction to implement climate protection, energy, and natural resource conservation measures as a part of future transportation investments. Staff also revised project selection criteria for MARC’s planning and programming processes to include environmental considerations.

Implementation Measures

To help implement the Action Plan in 2011, The Conservation Fund worked with MARC’s Linking Environmental and Transportation Planning Advisory Group to host a series of workshops titled “Above and Beyond Mitigation: Advancing the Eco-Logical Action Plan.” The goal of the workshops was to develop a model mitigation process specific to transportation planning and programming and determine how to implement it. Through the workshops, participants developed an attribute tree, which is a method to help them identify environmental mitigation sites. MARC is continuing to work with The Conservation Fund and the Advisory Group to detail criteria and metrics to incorporate into the attribute tree.

MARC is also working with consultants to finalize Phase I of the Natural Resources Inventory (NRI) update. The NRI is an inventory of digital map data showing valuable natural resource assets and ecological features in the Kansas City region. MARC can utilize this tool to fulfill some of the recommendations outlined in the Action Plan. Phase I of the NRI includes the development of an approach for the land cover classification system and recommendations for future maintenance and updates.

Replication Potential and Future Steps

MARC anticipates that the attribute tree will be finalized in spring 2012, after which it will be tested across the nine-county MARC region to determine the locations that will be most suitable for mitigation sites. In 2012, MARC will work with consultants to develop ecosystem services data for the region. This data will be produced by taking the updated land cover data for the NRI and defining a methodology to equate those land cover classes with the ecosystem services they provide, such as clean water and carbon sequestration and storage.

Creating Tools to Support Integrated Transportation and Resource Planning in New Hampshire

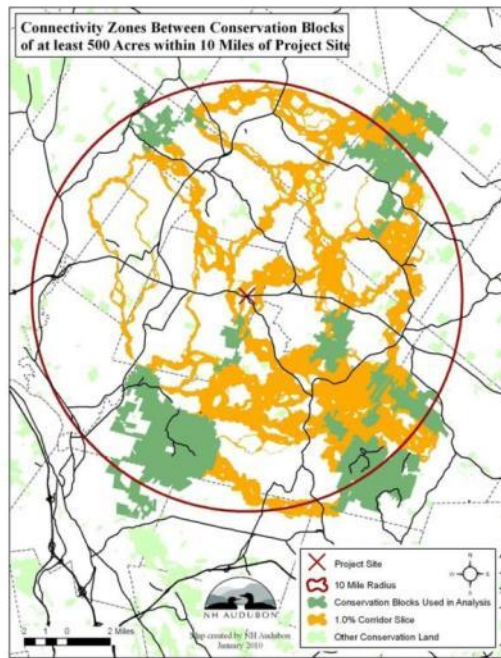
New Hampshire Audubon. Total cost: \$48,939. FHWA share: \$24,464.

Period of performance: 20 months. Dates: September 1, 2008 – April 30, 2010. Status: Complete.

AOTR: Dennis Durbin/Bethaney Bacher-Gresock. Grant-project website:

<http://www.nhaidubon.org/index.php>.

Figure 11: GIS-based wildlife-connectivity model with conservation lands and connectivity zones. (Courtesy of NHA)



Project Goals

New Hampshire Audubon (NHA) developed a connectivity framework to integrate transportation and land-use planning for its Eco-Logical grant project. NHA predicted that MPOs and Regional Planning Associations (RPAs) would use the model and framework for environmental screening of transportation projects before they submit their connectivity framework to New Hampshire DOT (NHDOT).

Project Accomplishments

NHA and the New Hampshire Fish and Game Department developed a GIS-based wildlife-connectivity framework to evaluate the impact of transportation projects on wildlife species. To create the model, NHA convened a working group with representatives from State and Federal agencies and conservation organizations. The working group developed an impact assessment framework that rated the resistance for 16 wildlife species by measuring how natural and unnatural barriers impacted the species' abilities to move across the landscape. The analysis incorporated information on species proximity to traffic, riparian areas, land cover, and slope. As part of its outreach, NHA partnered with the Rockingham Planning Commission to apply the impact assessment framework to transportation projects.

Implementation Measures

While NHA has a long-standing relationship with State conservation agencies, the Eco-Logical grant program provided a new opportunity to initiate discussions with State and regional transportation-planning staff. A major challenge for NHA was engaging planners at NHDOT to incorporate the connectivity framework into State transportation planning. NHA addressed this challenge by suggesting that FHWA offer incentives to State transportation agencies. Initially, NHA planned to apply the wildlife data to a transportation corridor to determine connectivity in the landscape. Due to staff and financial limitations, it was unable to carry out this level of analysis within the grant timeframe. However, NHA is able to use the wildlife data in its work with local communities to improve wildlife protection through municipal planning ordinances and regulations. NHA also shared its model and framework with other organizations that develop connectivity frameworks.

Replication Potential and Future Steps

NHA intends for its wildlife connectivity model to be integrated into highway and transmission-corridor planning and community development in New Hampshire and other States. The Maine Audubon Society applied a similar connectivity model and shared its lessons and outcomes with NHA. Maine Audubon and NHA plan to work with conservation commissions, volunteers, and residents on a GIS analysis of wildlife-connectivity data to inform future culvert replacement. Culvert replacements provide wildlife species a safe location to cross the roadway.

Integration of North Carolina's Conservation Data and Transportation Planning Process
North Carolina Department of Environment and Natural Resources. *Total cost: \$274,257.*
FHWA share: \$136,689. Period of performance: 25 months. Dates: April 3, 2008 – April 30, 2010.
Status: Complete. AOTR: Dennis Durbin. Grant-project website: <http://www.onencnaturally.org/>.

Project Goals

The goal of the North Carolina Department of Environment and Natural Resources (NCDENR) Eco-Logical grant project was to produce a Strategic Conservation Plan for North Carolina that included wildlife-habitat and vegetation data. NCDENR intended to apply this project to improving the integration of conservation data into the transportation-planning process, in coordination with NCDOT. State and regional planning agencies can use the data to inform their long-range planning.

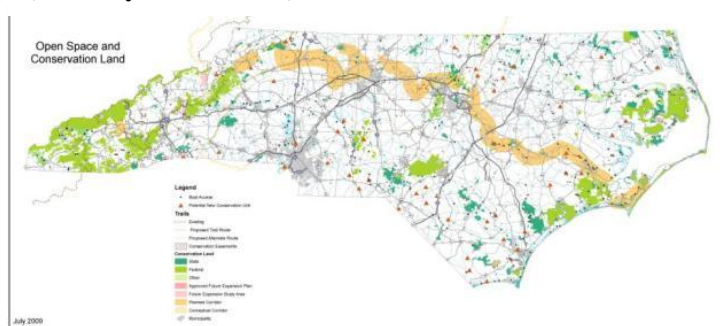
Project Accomplishments

The grant project provided data on upland and non-riparian wetland habitats that enhanced the State wildlife action plan. NCDENR also digitized cultural resource features to demonstrate their role within the State's ecosystems. The project team integrated the data into a conservation-planning tool, [One NC Naturally](#), which is available online to the public. NCDOT began to apply the tool to transportation projects and North Carolina's Green Growth toolbox. In the past year, NCDENR added wildlife habitat data to the tool and presented the tool to various State Metropolitan and Rural Planning Organization (MPO/RPO) staff, who responded positively to the centralized availability of such data.

Implementation Measures

NCDOT aims to better integrate its Long-Range Transportation Plan (LRTP) with project development so that it can better support Federal and State environmental review processes. As part of this effort, NCDOT is working with NCDENR to eventually integrate into its planning procedures the Green Growth toolbox, which includes the conservation planning tool and its Eco-Logical data. NCDENR also plans to discuss with NCDOT including cultural resource data into the LRTP. The State's multi-agency (NCDENR, NCDOT, and USACE) Ecosystem Enhancement Program also relies on Eco-Logical data for the site selection criteria of its in-lieu fee (ILF) program and to identify priorities for preservation and restoration. NCDENR presented its project to multiple RPOs, and the Piedmont Authority for Regional Transportation (PART) and the Piedmont Regional Council are now using the Eco-Logical data to carry out green infrastructure mapping in a 12-county region as part of a Sustainable Communities Regional Planning grant. The project team continues to monitor how other agencies are adopting the data as part of their outreach efforts.

Figure 12: Sample open-space and conservation-assessment map from the project's [Conservation Planning Tool](#). (Courtesy of NCDENR)



Replication Potential and Future Steps

NCDENR's project methodology is replicable in other States, particularly in areas where there is access to high-quality wildlife data and comprehensive biological expertise among State wildlife departments. NCDENR also intends to continue to engage the North Carolina Wildlife Resource Commission (NCWRC) to adopt the data so that wildlife issues are considered at the landscape level. To promote expanded tool access and usage, NCDENR is seeking software that will improve the user experience and accommodate users who do not have GIS capabilities. NCDENR is also interested potentially formalizing and documenting the process of developing the dataset.

North Central Texas Regional Ecosystem Framework

North Central Texas Council of Governments. *Total cost:* \$400,000. *FHWA share:* \$200,000.

Period of performance: 37 months. *Dates:* May 9, 2008 – June 9, 2011. *Status:* Complete.

AOTR: Michael Culp/Michael Lamprecht. *Grant-project website:*

http://www.nctcog.org/TRACES/Reg_Ecosystem_Framework.asp.

Project Goals

The goals of the North Central Texas Council of Governments (NCTCOG) Eco-Logical project were to develop an REF (see footnote on page 21) to help agencies assess environmental impacts of proposed infrastructure projects and to enhance multi-agency understanding of critical resource-protection areas. NCTCOG's REF is an overlay of the individual plans of local, State, and Federal agencies, from which NCTCOG developed a unified dataset. NCTCOG also aimed to analyze resource-agency management plans and GIS data to assess potential effects on the environment by watershed.

Project Accomplishments

NCTCOG utilized a watershed-scale approach to integrate regional conservation data and infrastructure planning into a REF dataset. Specifically, NCTCOG used the regional data to develop ten base maps and one composite map of resource priorities by watershed. The project team developed an REF user guide to introduce the public to the watershed concept and a technical overview document to help other COGs replicate the process. The guide focuses primarily on watershed information with some guidance on applications for transportation infrastructure. This past year, the team collected feedback from regional resource agencies, including EPA, FWS, and Texas Parks and Wildlife, to refine the priority weightings assigned to different criteria in the REF methodology. NCTCOG also solicited feedback from the resource agencies in vetting the environmental policies included in the Metropolitan Transportation Plan (MTP).

Implementation Measures

The final dataset product will be a high-level planning tool that uses the REF to locate transportation projects within watersheds and to create environmental policies for the MTP, which is unprecedented for the region. NCTCOG was unable to reach a finer level of detail due to obstacles with data currency, resolution, and willingness of partner agency contributions. The Eco-Logical project has also led to improved relationships and collaboration between NCTCOG's transportation department and resource agencies, which will be beneficial to them when they undertake new projects.

Application and Next Steps

NCTCOG intends to incorporate the dataset into corridor planning and the project-level analysis that occurs prior to the NEPA process to identify data gaps. A longer-term goal is to use the dataset to develop a regional program for avoiding impacts and selecting strategic mitigation sites for transportation projects. As a first step, the MPO policy board has provided seed money for this program and NCTCOG staff has started a regional mitigation bank. Staff also plans to conduct a complementary "greenprinting" process, in which they will identify areas with the highest conservation benefit for water quality protection. Greenprinting will build on the REF and leverage new partnerships to identify critical water quality resources in two specific sub-watershed areas. Other COGs in Texas can replicate NCTCOG's process to identify priorities for mitigation and avoidance. When funding becomes available, NCTCOG plans to develop an online version of the user guide and the final dataset to increase accessibility to the public and organizations throughout the region.

Figure 13: Recommended roadway projects in the MTP.
(Courtesy of NCTCOG)



Using the Eco-Logical Approach to Develop and Implement Conservation and Mitigation Priorities for Oregon

Oregon State University. Total cost: \$101,552. FHWA share: \$49,962.

Period of performance: 20 months. Dates: June 11, 2008 – February 11, 2010. Status: Complete.

AOTR: Mary Gray. Grant-project website: <http://orbic.pdx.edu/>.

Project Goals

Two project goals of the Oregon State University (OSU) Eco-Logical grant were to identify Oregon's conservation priority areas and to consolidate disparate data from each area into an online Regional Ecosystem Framework (REF) tool (see footnote on page 21). The project built on the [Oregon Conservation Strategy](#), an action plan for long-term conservation of wildlife and habitats developed by the Oregon Department of Fish and Wildlife, and the [Comprehensive Mitigation/Conservation Strategy](#) developed by the Oregon Department of Transportation (ODOT).

Project Accomplishments

The REF will help agencies throughout the State plan for mitigation and conservation projects that will be conducted in association with transportation projects; the online tool characterizes projects relative to conservation priority areas. OSU completed a pilot study to apply the online tool to the Willamette Valley, where the region's two MPOs began to use the REF to inform their planning activities.

The U.S. Environmental Protection Agency (EPA), Oregon Department of State Lands (ODSL), and Oregon Department of Environmental Quality (ODEQ) have informally agreed to adopt OSU's methods to identify and implement important wetland mitigation sites. OSU anticipates formalizing this agreement, contingent upon the U.S. Army Corps of Engineers' participation. Additionally, OSU helped ODSL to develop a wetlands database based on REF data. OSU also assisted USFWS in determining areas to avoid for bridge projects, and then applied the project methodology to develop endangered species maps for USFWS. OSU provided data and tool access to environmental staff at Oregon Department of Transportation (ODOT), but ODOT has had limited opportunity and capacity to use the tool due to engagement with other major initiatives.

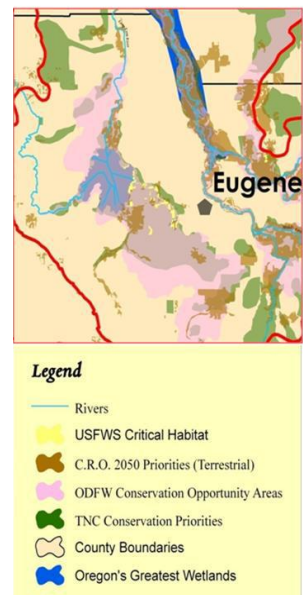
Implementation Measures

OSU received funding through the Transportation Research Board's (TRB) Strategic Highway Research Program (SHRP2) to pilot the methodology at other locations around the U.S. One finding of the pilots is that identifying a small number of avoidance and restoration priorities in a large area may hinder the completion of mitigation projects because decisionmakers prefer options for selecting a project. Based on this finding, OSU staff is using EPA funding to update the REF with ranked mitigation priorities throughout Oregon. The priorities in the REF provide the most functionality and cost-benefit, but OSU also identifies alternative sites to provide more options to ODOT. OSU will apply its revised REF to the Medford and Deschutes watersheds in Oregon. The revised REF will allow transportation planners to identify a range of ranked mitigation while emphasizing the most critical opportunities. The Portland MPO also funded OSU to apply the REF to the Portland urban area.

Replication Potential and Future Steps

OSU conducted a successful pilot in the Willamette Valley, but OSU staff found it more difficult to apply the same approach across the country due to varying interpretations among wetland professionals of acceptable levels of avoidance. From its work in Oregon, OSU noted that State and Federal agencies are hesitant to move mitigation off-site; demonstration of the benefits of off-site mitigation through more example projects may help to encourage its use. OSU also found that it is easier to embed the Eco-Logical approach into the LRTP and mitigation planning process of agencies, but it is more challenging to integrate the approach into daily operations.

Figure 14: Integrated conservation priorities in the Willamette Basin. (Courtesy of OSU)



Opportunities for Highway Programs to Remediate Natural Resource Concerns in New York Tioga County Soil and Water Conservation District. *Total cost: \$132,390. FHWA share: \$112,490. Period of performance: 48 months. Dates: March 4, 2008 – March 4, 2012. Status: In progress.*
AOTR: Bethaney Bacher-Gresock. Grant-project website: <http://www.tiogacountyny.com/agencies/soil-water-conservation-district.html>.

Project Goals

The goal of the Tioga County Soil and Water Conservation District (TCSWCD) Eco-Logical project is to work with the New York FHWA Division Office and New York State DOT (NYSDOT) staff to develop an REF (see footnote on page 21), consisting of natural resource maps covering the county's watersheds. TCSWCD planned to use the REF to assist planners in making better conservation and mitigation decisions in the Susquehanna Basin and the Finger Lakes–Lake Ontario Basin. Due to project delays, the project team developed an interim goal of establishing an in-lieu fee (ILF) program in the Upper Susquehanna River Basin.

Project Accomplishments

In 2009, the project team collected natural resource, transportation-project, and conservation GIS data to identify priority mitigation sites, which can be applied to future infrastructure development. NYSDOT signed a Memorandum of Understanding (MOU) with the New York State Department of Agriculture and Markets in 2011. The MOU allows NYSDOT to distribute funding to the soil and water conservation districts, including TCSWCD, and for the districts to provide environmental support to NYSDOT.

In 2010, the nonprofit Upper Susquehanna Coalition (USC) developed the region's first ILF program for the Susquehanna River watershed, which entailed identifying sites that NYSDOT and other agencies can utilize for mitigation. USC is a network of soil and water conservation districts in New York and Pennsylvania whose mission is to protect and improve water quality and natural resources in the Upper Susquehanna Basin. USC acted on behalf of TCSWCD through the ILF program to review and identify mitigation priorities.

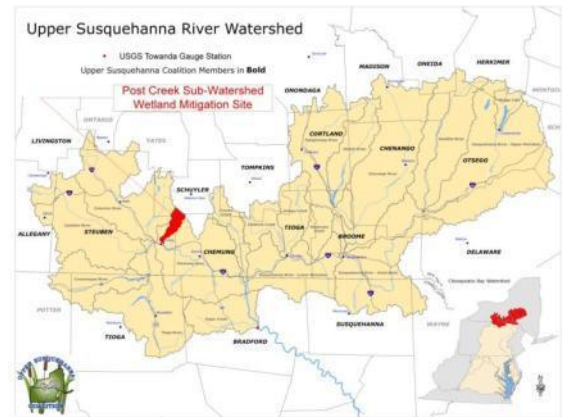
Implementation Measures

With the funding enabled by the signed MOU, TCSWCD will create maps that identify high-priority wetlands and species that will then be integrated into the ILF program by March 2012. As TCSWCD completes its maps, USC will concentrate on maximizing property purchases for the ILF program. USC used its endowments to establish the nonprofit Wetland Trust, which is designed to protect wetlands and pay for long-term maintenance. The Trust will own the mitigation lands and manage the ILF, and USC will be responsible for the restoration work. USC developed the ILF program with the support, feedback, and expertise of a multi-agency alliance of universities, Federal and State agencies, and the Wetland Trust. TCSWCD anticipates that NYSDOT, USC, and other multi-agency working groups in the State will adopt the REF. The relationships gained during the ILF development will strengthen implementation of the REF.

Replication Potential and Future Steps

TCSWCD plans to complete a report with recommendations to NYSDOT on how it can improve its approach to mitigation using Eco-Logical. TCSWCD will also identify for NYSDOT mitigation sites that are on State lands or that cross USC boundaries. TCSWCD hopes its improved relationship with NYSDOT will help overcome systematic barriers to project implementation. For example, the NYSDOT funding and contracting procedures make it difficult to manage and fund one collective mitigation site for multiple transportation projects. TCSWCD also hopes to incorporate sustainability and climate-change concerns into mitigation decisionmaking, including monitoring the impacts of transportation projects on natural gas drilling areas, to maximize the long-term benefits of mitigation investments.

Figure 15: Upper Susquehanna River watershed. (Courtesy of NHA)



Integrating Green Infrastructure and Transportation Planning

Thomas Jefferson Planning District Commission (Virginia). Total cost: \$155,683.

FHWA share: \$77,841. Period of performance: 37 months. Dates: May 20, 2008 – July 1, 2011.

Status: Complete. AOTR: Michael Lamprecht. Grant-project website: <http://www.tjpd.com/index.asp>.

Project Goals

The goal of the Thomas Jefferson Planning District Commission (TJPDC) Eco-Logical project was to develop a green infrastructure plan that integrates transportation, development, and natural resource plans in the five-county planning district. The project team developed two GIS-based methodologies to help transportation planners prioritize mitigation projects for streams and wetlands.

Project Accomplishments

TJPDC staff created tools to help the Charlottesville-Albemarle MPO and local governments to prioritize projects based on potential environmental impacts during the Long-Range Transportation Plan (LRTP) process. TJPDC staff used methodologies they had developed for stream and wetland prioritization to finalize a set of GIS maps that prioritize mitigation sites around the region. In developing the methodologies, TJPDC staff had to carefully weigh data and select appropriate types of data to overcome multiple scales and availability that varied by county. Staff discussed a modified “map algebra” to incorporate different levels of detail, which they may complete for future use. One of the maps includes an overlay of proposed transportation projects so that the MPO and local governments can prioritize projects based on potential impacts. TJPDC also created a “Least Environmental Cost Analysis” framework to use in developing alternatives in construction projects. It plans to share this latest analysis tool with the Virginia Department of Transportation (VDOT). In addition to the tools, TJPDC strengthened relationships with State agencies, particularly the Departments of Conservation and Recreation and Games and Fisheries, as well as the GIS and agency practitioners in the region who provided feedback and guidance on weighting the different datasets.

Implementation Measures

TJPDC will integrate the methodologies and maps into the region’s LRTP, which will be adopted in 2014. TJPDC will use the project tools and maps to provide policymakers with information on the potential habitat and environmental impacts of new transportation projects in the Transportation Improvement Program. Due to the level of technical expertise necessary to implement the tools, TJPDC plans to work closely with local governments to help them adopt products for use at the local level. TJPDC anticipates strong interest from local government partners, as the mitigation priorities identified by the tools are also useful to land-use planning and stormwater management.

Potential Replication and Next Steps

TJPDC’s stream and wetland prioritization methodology is easily replicable due to its flexibility in accommodating various types of datasets. The methodology’s flexible approach means that jurisdictions adopting the tool for their own use can weigh different datasets according to their particular priorities. TJPDC is conducting outreach for the project findings with various stakeholders, including rural counties within the planning district, the Virginia Association of MPOs (VAMPO), and the National Association of Development Organizations (NADO), to increase the number of dataset users in the region. TJPDC will continue providing targeted assistance to local governments, which will ensure greater adoption and use of its grant products.

Figure 16: A page from the 2009 TJPDC Green Infrastructure Study. (Courtesy of TJPDC)



Regional Transportation, Ecosystem, and Land-Use Integration Plan

Tri-County Regional Planning Commission (Illinois). Total cost: \$218,954. FHWA share: \$109,477.

Period of performance: 24 months. Dates: April 4, 2008 – April 4, 2010. Project status: Complete.

AOTR: Neel Vanikar. Grant project website: <http://www.tricountyrpc.org/>.

Project Goals

The goal of the Tri-County Regional Planning Commission (TCRPC) Eco-Logical grant project was to complete an integrated planning document known as “The Big Plan,” which focuses on methods to improve the sustainability of the transportation system with respect to ecosystems in the Peoria, Illinois region. The Big Plan includes regional priorities and strategies for land-use and infrastructure development, policy concepts, GIS-based scenario-planning models, and technical implementation.

Project Accomplishments

In September 2010, TCRPC completed The Big Plan, which put forth a regional vision focused on five themes: agricultural preservation, balanced growth, economic development, environmental stewardship, and transportation infrastructure. The plan contains regional data, discussion of the themes, and concept plans that integrate transportation, land-use, and environmental planning. TCRPC engaged in public education and outreach to encourage local governments to adopt the plan’s findings and worked closely with MPO staff to integrate sustainable transportation strategies into federally funded projects.

Figure 17: The Big Plan analysis of Illinois Route 336 between Peoria and Macomb. (Courtesy of TCRPC)



Implementation Measures

TCRPC has integrated the plan’s themes and concept plans into the Long-Range Transportation Plan (LRTP) process. TCRPC staff has fostered relationships with the MPO Board to facilitate future integration of the plan’s elements into project selection for the Transportation Improvement Program (TIP) and the LRTP. All three counties in the region adopted the plan’s recommendations. Other municipalities support specific plan elements, such as green infrastructure projects and mode shifts, but have yet to adopt the plan.

TCRPC staff notes how important it is for partner organizations to understand and support the Eco-

Logical approach. Support and prioritization from both the RPC management and transportation and environmental organizations will improve future implementation of the plan and other related projects, as leaders of TCRPC and partner organizations can prioritize application of the plan’s principles in their daily activities.

Application and Next Steps

TCRPC leveraged the results of its Eco-Logical project to obtain additional grant opportunities, including a Sustainable Communities Regional Planning Grant in 2010. This grant funding is now supporting TCRPC to implement some of “The Big Plan” recommendations, such as the integration of green infrastructure into the existing infrastructure of Peoria’s Warehouse District, the completion of a regional housing plan with a focus on green housing, and the development of a Local Food Sustainability Plan. As TCRPC continues to implement its Eco-Logical project through the Sustainable Communities grant, its staff is engaging a broader audience of transportation and environmental organizations and community members. The MPO continues to work with regional stakeholders through the Heart of Illinois Sustainability Consortium to further expand the scope of sustainability planning in the region.

A Regional Ecological Assessment Protocol for the South Central United States

U.S. Environmental Protection Agency, Region 6. *Total cost: \$170,500. FHWA share: \$100,000.*

Period of performance: 36 months. Dates: May 1, 2008 – April 10, 2011. Status: Complete.

AOTR: Mark Sarmiento. Grant project website: <http://www.epa.gov/region6/index.htm>.

Project Goals

U.S. Environmental Protection Agency (EPA) Region 6 developed a Regional Ecological Assessment Protocol (REAP) that uses a GIS analysis to classify land on the basis of its ecological significance. This project expands on the Texas Ecological Assessment Protocol, which collected and analyzed data for the State of Texas. The REAP now includes all five States in Region 6 (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas) and portrays significant ecological relationships across State boundaries.

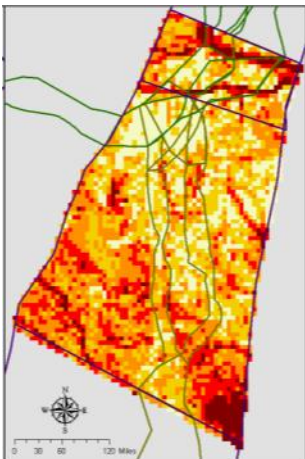
Project Accomplishments

EPA Region 6 completed data collection for the REAP in 2011. EPA Region 6 staff collected data by ecoregion, which is an area of land and water defined by climate, geology, and species, rather than political boundaries. While most data in the REAP are subsets of national datasets, EPA Region 6 staff also worked with State wildlife agencies to acquire coarse rare species data to aggregate in the REAP model. Datasets included in the REAP are now available on an [environmental data gateway](#) that expands access to any users with GIS capabilities.

Implementation Measures

The REAP is a valuable tool for a variety of user groups, including planners, MPO staff, and GIS practitioners. Planners and MPO staff use the REAP to identify potential impacts of and mitigation for transportation projects in early planning. GIS practitioners can use the data to analyze potential mitigation areas in more depth. For example, the MPOs in Austin and Dallas, Texas both used the REAP in their Long-Range Transportation Plans to identify mitigation avoidance areas in corridors. The REAP also enables MPOs to use the data in preliminary screening for environmental permitting, although EPA Region 6 staff does not track its use in that capacity. At the State level, Texas DOT (TxDOT) uses data from the REAP to enhance its use of the GIS Service Tool (GISST), which is a screening tool that EPA Region 6 developed that incorporates additional attributes such as habitats and toxicity.

Figure 18: Integration of REAP tool into GISST. (Courtesy of EPA Region 6)



TxDOT has contracted EPA Region 6 to integrate NEPAAssist and the REAP, which will further enhance the information and data available to transportation agencies and organizations. NEPAAssist is an EPA, web-based GIS tool that coordinates information that is essential to the environmental review process.

Replication Potential and Future Steps

In order to expand the REAP's accessibility, EPA Region 6 eventually will make the tool available as a web service where it can be utilized in other platforms such as NEPAAssist. Incorporating the REAP into NEPAAssist will also help expand usage among NEPA practitioners without GIS capacity and improve the transportation planning process. EPA Region 6 staff plans to continue promoting the REAP and other GIS tools at conferences and among MPOs and State regulatory agencies to attract the executive-level commitment that they believe is necessary for the tool's full adoption. MPOs in other EPA regions have inquired about how to establish REAPs in their own areas, but so far the tool has not been replicated. States could replicate the REAP by following Region 6's documented methodology and programming information. EPA Region 6 staff encourages leadership commitment to support the capacities needed for REAP implementation, which are GIS expertise, funding, and staff availability.

APPENDIX A

**Grantee Interview Questions for CY11 Eco-Logical Interview
ACTIVE DURING CY11
Federal Highway Administration
Office of Project Development and Environmental Review
October 21, 2011**

Status and Application of Grant Project

1. How would you describe the status of your grant project?
 - a. The grant project is moving forward but is not close to conclusion.
 - i. Date for conclusion _____
 - b. The grant project will conclude shortly and the grant products will be completed soon.
 - c. The grant project is delayed due to an unexpected barrier.
 - i. Please state reason for delay: _____

2. Describe the ways that the grant project or Eco-Logical has affected your organization?
 - a. Our organization's daily activities directly incorporate findings or products from the grant project.
 - b. Our organization's operations reflect the principles of the Eco-Logical approach.
 - c. Our organization is not actively using the grant products at this time.
 - d. Our organization has not yet incorporated the grant project, but we expect to do so in the future.

Tools and Data Resources

3. Have you used any of these resources to help complete your Eco-Logical project? Where did you find them? (National source / State source / Local or regional source / Did not use / Did not use but would be highly useful)
 - a. GIS data
 - b. Spatial data integration tools
 - c. Technical assistance from FHWA or State DOT
 - d. Databases

Collaboration

4. In the past year, have you formed new or strengthened relationships with any of the following partners? (Formed new partnership / Strengthened existing partnership / Signed agreement or Memorandum of Understanding)
 - a. State Department of Transportation (DOT)
 - b. State resource or regulatory agency
 - c. Metropolitan planning organization (MPO)
 - d. Regional planning commission
 - e. Nongovernmental organization (NGO)
 - f. Federal transportation agency
 - g. Federal resource or regulatory agency
 - h. Local government agencies
 - i. Other _____

5. Can you provide an example of a partnership that helped you accomplish a milestone with your Eco-Logical project? *Note that we can follow up by phone interview for more details, as needed.*

6. How has your project been received by politicians and civic leaders?
 - a. Positively
 - b. Neutral
 - c. Negatively

Opportunities

7. Which of the following would improve your ability to implement the Eco-Logical approach in your region?
 - a. Additional funding
 - b. Improved understanding among my organization about the Eco-Logical approach
 - c. Improved understanding among partner organizations about the Eco-Logical approach
 - d. Internal management support and prioritization for the Eco-Logical approach
 - e. Greater staff capacity/resources to work on Eco-Logical
 - f. Better maintained data sets and tools
 - g. Increased dissemination of grant products
 - h. Other

Measures of Eco-Logical Implementation

8. Please select which of the following your organization, or your partner organizations have accomplished to date: (Accomplished / Planned for future / No action)
 - a. Integration of project into the long-range transportation planning process
 - b. Integration of project principles into criteria for project selection or for mitigation, avoidance, and infrastructure location
 - c. Adoption of regional ecosystem framework (REF) by your organization
 - d. Adoption of regional ecosystem framework (REF) by a partner agency or organization
 - e. Memorandum of Agreement or Understanding signed with partners for project completion
 - f. Meetings of interagency implementation working group, on a regular basis
 - g. Programmatic agreements
 - h. Replication of project components regionally or nationally

Applicability of Grant Projects

9. What elements of your grant project (such as data tools, partnership models, or REF development) do you consider most valuable for streamlining environmental review and permitting of transportation project? Could these elements be replicated elsewhere with similar results?
-

Other Comments

10. What are ways that FHWA could better facilitate the success of your grant project?
 - a. More frequent site visits
 - b. Regular calls with AOTR
 - c. Attendance at milestone meetings/events
 - d. Connection with transportation technical assistance resources
 - e. Connection with technical assistance resources from other Federal agencies (FWS, EPA, etc.)
 - f. Help improve coordination with State DOTs
 - g. Help make connections with non-transportation Federal agencies
 - h. Other _____

11. Have you presented your grant project at meetings, conferences, and/or peer exchanges in 2011? If so, please list.

Name of conference:

Date of conference:

Audience: (Local/Regional/State/National)

Audience: (Transportation/Environmental/Data Technicians/Governmental/Other _____)

**Grantee Interview Questions for CY11 Eco-Logical Interview
POP ENDED PRIOR TO CY11
Federal Highway Administration
Office of Project Development and Environmental Review
October 19, 2011**

Status and Application of Grant Project

1. Describe the status of your grant project or Eco-Logical in your organization?
 - a. The grant project has directly influenced our organization's daily business activities.
 - b. Eco-Logical principles have been incorporated into the operations of our organization.
 - c. The grant project is not active and/or our organization is not actively using the grant products at this time.
 - d. Our organization is not presently implementing the Eco-Logical approach.

Tools and Data Resources

2. Which of the following resources have you used to implement your Eco-Logical project? From what source did you find them? (National source / State source / Local or regional source / Did not use / Did not use but would be highly useful)
 - a. GIS data
 - b. Spatial data integration tools
 - c. Technical assistance from FHWA or State DOT
 - d. Databases

Collaboration

3. With what partners is your organization actively and directly engaged for grant project implementation: (*Primary partners have a very significant or leadership role in your project; secondary partners may offer support or feedback on a more limited basis*) (Primary partner / Secondary partner / Have signed agreement or MOU with partner)
 - a. State Department of Transportation (DOT)
 - b. State resource or regulatory agency
 - c. Metropolitan planning organization (MPO)
 - d. Regional planning commission
 - e. Nongovernmental organization (NGO)
 - f. Federal transportation agency
 - g. Federal resource or regulatory agency
 - h. Local government agencies
 - i. Other _____
4. Describe a successful partnership that has helped you implement your Eco-Logical project? *Note that we can follow up by phone interview for more details, as needed.*
5. How has your project been received by politicians and civic leaders?
 - a. Positively
 - b. Neutral
 - c. Negatively

Opportunities

6. Which of the following would improve your ability to implement the Eco-Logical approach in your region and why?

- a. Additional funding
- b. Improved understanding among my organization about the Eco-Logical approach
- c. Improved understanding among partner organizations about the Eco-Logical approach
- d. Incentives for partner organizations to incorporate Eco-Logical
- e. Internal management support and prioritization for the Eco-Logical approach
- f. Greater staff capacity and resources to work on Eco-Logical
- g. Better maintained data sets and tools
- h. Increased dissemination of grant products

Measures of Eco-Logical Implementation

- 7. What has your organization accomplished to date: (Accomplished / Planned for future / No action)
 - a. Integration of project into the long-range transportation planning process
 - b. Integration of project principles into criteria for project selection or for mitigation, avoidance, and infrastructure location
 - c. Adoption of regional ecosystem framework (REF) by your organization
 - d. Adoption of regional ecosystem framework (REF) by a partner agency or organization
 - e. Memorandum of Agreement or Understanding signed with partners for project completion
 - f. Meetings of interagency implementation working group, on a regular basis
 - g. Programmatic agreements
 - h. Replication of project components regionally or nationally
 - i. Integration of project into multimodal elements of transportation planning and project delivery

- 8. What are other ways (not listed above) that your organization has implemented your Eco-Logical project? Please briefly describe the most effective or innovative implementation strategies? *Note that we can follow up by phone interview for more details, as needed.*

Applicability of Grant Projects

- 9. What elements of your grant project (such as data tools, partnership models, or REF development) do you consider most valuable for streamlining environmental review and permitting of transportation project? Could these elements be replicated elsewhere with similar results?
-

Other Comments

- 10. What are ways that FHWA could have better facilitated the success of your grant project?
 - a. More frequent site visits
 - b. Regular calls with AOTR
 - c. Attendance at milestone meetings/events
 - d. Connection with transportation technical assistance resources
 - e. Connection with technical assistance resources from other Federal agencies (FWS, EPA, Help with State DOT coordination)
 - f. Provide contacts with non-transportation Federal agencies
 - g. Other _____

- 11. Have you presented your grant project at meetings, conferences, and/or peer exchanges in 2011? If so, please list.
 - Name of conference:
 - Date of conference:
 - Audience: (Local/Regional/State/National)
 - Audience: (Transportation/Environmental/Data Technicians/Governmental/Other _____)

APPENDIX B

IMPLEMENTING THE ECO-LOGICAL APPROACH: RECOMMENDATIONS AND GUIDANCE FROM FHWA ECO-LOGICAL GRANT RECIPIENTS

The 15 recipients of the Federal Highway Administration (FHWA) Eco-Logical grant developed unique and diverse pilot projects to test a new, ecosystem-scale approach to infrastructure development. Over a four-year period, the grant recipients have overcome challenges and discovered opportunities to facilitate the Eco-Logical approach's adoption within their organizations and throughout their regions and States.

The progress the grant recipients made generated several recommendations and guidance for peer organizations attempting to implement the Eco-Logical approach:

1. BUILDING SUPPORT

- **Promote understanding of the Eco-Logical approach to senior-level managers.** Grant recipients observed that many managers are reluctant to make changes across their organizations to reflect Eco-Logical because its approach entails a significant philosophical and procedural shift. Engaging management from the outset to better understand and prioritize the Eco-Logical approach helps integrate the approach throughout the entire organization.
- **Demonstrate the quantifiable economic and environmental benefits of the Eco-Logical approach to State DOTs and Federal agency partners.** Grant recipients report that State DOTs may be more willing to adopt new technologies or methods once they see proven benefits. Greater demonstration of Eco-Logical's quantified economic and environmental benefits can help more State DOTs and Federal agency staff to support the Eco-Logical approach.

2. COLLABORATING WITH PARTNERS

- **Collaborate with multiple types of agencies to advise project development and implementation.** Grant recipients convened multi-agency working groups to help with collecting data, refining methodologies, and arriving at a set of regional ecosystem priorities. In 2011, grant recipients emphasized the importance of these partners in implementing the Eco-Logical products, especially in cases where the partners signed a Memorandum of Understanding.
- **Involve transportation decisionmakers at key points throughout the development of an Eco-Logical project.** MPO board members and State DOT staff often are the funding sources or implementing agencies for transportation and associated mitigation projects. Organizations that develop a tool or process to bring the Eco-Logical approach into transportation decisionmaking can better ensure their product's implementation through early support from transportation leadership. Actions to involve transportation leaders include:
 - Making presentations at MPO board meetings;
 - Inviting State DOT staff to participate in workshops and advisory committees; and,
 - Meeting individually with local government staff.
- **Partner with non-governmental organizations and resource and regulatory agencies, which may provide additional capacity, data, and networks to strengthen or promote Eco-Logical products.** These organizations and agencies provided access to datasets and analysis tools, and could help verify resource identification and prioritization.

3. DEVELOPING A METHODOLOGY

- **Review existing methodologies from grant projects as models for replication.** Several grant recipients developed strategies to overcome common challenges, such as integrating datasets with data quality issues or responding to diverse stakeholder needs, that would help others undertaking similar processes.

Most grant recipients documented methodologies in their final reports, which are available on project websites and can be accessed from the [FHWA Eco-Logical Grant Program website](#).

- **Create flexible methodologies that can respond to varying scales of data and lack of data availability.** Several grant recipients recognized challenges in seamless data integration when they encountered data at different scales or found gaps in the datasets available. These grant recipients had to adjust their methodologies to account for discrepancies without skewing results. The following questions may aid organizations in developing robust and flexible methodologies:
 - What are the priorities for including and analyzing natural resource data?
 - What partners should help decide which data to prioritize?
 - Are there any areas where data is unavailable? Are there other types of data that can be substituted for these areas, or should we remove them from our analysis?
 - Does the level of detail of our data vary throughout the study area? Can we use weighting to compensate for this data quality issue?

4. DOCUMENTING SUCCESSES

- **Document the process, partnerships, and implementation of Eco-Logical projects.** Many grant recipients made significant advances in negotiating conservation priorities, overcoming technical data analysis challenges, leveraging limited financial resources, and gaining partner support for their grant projects. Documentation allows organizations to easily share their lessons with others wishing to replicate project components. Documentation may include technical data analysis processes, organization and consensus building among a multi-agency working team, and implementation steps.
- **Assess the capacities needed to develop and adopt the grant products or methodologies.** Several grant recipients detailed the types of technical expertise, funding levels, and staff support needed to effectively complete an Eco-Logical grant project. They have shared these capacities through final grant project reports, presentations, and other forms of outreach. Knowing these capacities can help interested organizations prepare themselves to develop Eco-Logical tools and to most effectively use tools others have created.
- **Measure the performance of grant projects to gain broader stakeholder support and extend the life of effective grant products.** Performance measures help quantify the benefits of the Eco-Logical project, and positive results can help build support from management, partners, and the community. Performance measures also allow for adaptive management; if a project component is not performing as expected, staff can make adjustments or allocate resources away from an underperforming component. Performance measures will vary by project type but may include tracking elements such as:
 - Number of users of online data tools or downloads of datasets;
 - Counts of constructed mitigation projects that align with the REF;
 - Transportation projects avoided or relocated to avoid ecological priority areas; and
 - Cost or time saved in environmental permitting for transportation projects planned within the Eco-Logical approach (as compared to average costs and times).

5. HELPING OTHERS TO USE THE ECO-LOGICAL APPROACH

- **Work individually with implementing agencies and partners to adapt the tools for local agencies to use.** Implementing agencies include local governments and transportation and environmental organizations that direct the planning and implementation of new transportation and mitigation projects. Sufficient staff capacity and close relationships with local governments allowed some grant recipients to provide tailored technical assistance to implementing agencies, including applying the Eco-Logical approach or tools to local projects.

- **Develop web-based data tools and maps to share Eco-Logical products with a wider audience.** Most grant recipients developed informational websites, downloadable datasets and maps, and/or web-based analysis tools that allow the public to access their grant products. Grant recipients note that this broadens their product reach and strengthens engagement among partners, peers, and the public. Developing web-accessible grant products or final reports is an easy way to facilitate their use by implementing agencies throughout the region.
- **Integrate datasets and tools into existing and widely used data analysis programs.** Organizations can create analysis tools, datasets, and project methodologies that complement existing analysis systems or planning processes. In doing so, the final products can be more seamlessly and cost-effectively integrated into the systems and tools that implementing organizations and agencies already use.