The Road Not Taken

A Conservation Title for Transportation

TransWild Alliance

The TransWild Alliance is a coalition of conservation advocacy organizations dedicated to reducing the impacts of highways on wildlife and natural resources.

TransWild Alliance Member Organizations
Alaska Transportation Priorities Project
American Wildlands
Association for the Conservation of the Amazon Basin
BC Conservation Foundation, Wildlife Collision Prevention Program
Berkshire Environmental Action Team
Center for Native Ecosystems
Coalition for Sonoran Desert Protection
Concord Wildlife Passages Task Force
Conservation Northwest
Defenders of Wildlife
Desert Watch
Florida Wildlife Federation
Hells Canyon Preservation Council
Humane Society of the United States
I-90 Wildlife Bridges Coalition
Jaguar Conservancy
Keeping Track
Lewis Creek Association
Maine Audubon
Miistakis Institute
Nevada Wilderness Project
Ninemile Wildlife Workgroup
Pronatura
Round River
Sky Island Alliance
SOS Glenshire
Southern Rockies Ecosystem Project
The Wilderness Society
Tijeras Canyon Safe Passage Coalition
Two Countries, One Forest
UTSB Research
Virginians for Appropriate Roads
Western Environmental Law Center
Western Wildlife Conservancy
Wild Canada Conservation Alliance
Wild Things Unlimited
Wildlands Network
Wildlife Protection Society
Yellowstone To Yukon Conservation Initiative

TRANSWILD ALLIANCE **transportation platform**

PLATFORM OVERVIEW

ADAPT TO CLIMATE CHANGE BY PROTECTING CORRIDORS

Rising sea level, flooding and intense heat will wreak havoc on our infrastructure and ecosystems. While the transportation sector struggles to adapt our grey infrastructure, natural resource managers are struggling to adapt our green infrastructure. Infrastructure inventories and habitat connectivity analyses can identify opportunities to preserve or restore essential corridors via a number of measures including wildlife crossings, expanded culverts, viaducts and elevated roadways. Measures to assist wildlife adaptation should be considered during climate change planning for transportation agencies.

"GREEN LIGHT" PROACTIVE CONSERVATION and ECO-LOGICAL MITIGATION

Transportation agencies can work with resource agencies to audit their five-year work plans to find obvious conflicts or confluence with conservation and connectivity plans. Projects with potential conflicts can be revisited and projects found to have positive benefits for conservation could be given a "green light" status, moved forward in the work plan and given a higher funding match ratio. Projects can be bundled, combining the compensatory mitigation for greater conservation gain, as proscribed in Eco-Logical. Transportation agencies can use a revolving fund to finance Eco-Logical mitigation projects.

IMPROVE INTEGRATED PLANNING

SAFETEA-LU included a new planning provision (Section 6001) requiring transportation planners to consult with natural resource planners, compare transportation and conservation maps and discuss mitigation options, forever changing how we plan roads and protect habitat. Early indications suggest this collaboration is successful, but will need ongoing training and support for transportation and natural resource planners. State and federal resource agencies need support to complete the mapping of conservation plans that are essential to successfully integrating conservation and transportation planning .

STANDARDIZE CRASH DATA

The number of wildlife-vehicle collisions (WVCs) has increased dramatically in the U.S. over the last two decades, now comprising 1 in 20 of all reported motor vehicle crashes. States vary widely in how WVC data are collected, if at all. Systematically collected WVC data, using standard procedures, GPS and centralized databases will help identify and prioritize mitigation measures and locations. FHWA should develop and implement a standardized methodology for acquiring, sharing and analyzing wildlife-vehicle collision data.

PROTECT PUBLIC LANDS

Federal lands embody one quarter of the United States, welcoming millions of visitors and supporting local economies through wildlife recreation. America's public lands are increasingly threatened by vehicle overcrowding, traffic, pollution and WVCs, ruining the visitor experience and threatening wildlife populations. Without wildlife and the quality habitat they need, our public lands will cease being suitable destinations for visitors and the economic engine for gateway communities. Transportation funding on public lands should be 100 percent eligible for maintenance, habitat connectivity restoration efforts and alternative transportation.

BUILD BETTER BRIDGES

Thousands of bridges will be replaced and rehabilitated in the United States over the next few decades, presenting an exceptional opportunity to incorporate design modifications that reestablish or improve habitat connectivity. Using habitat connectivity plans, the National Bridge Inspection Standards program should include a thorough assessment of each bridge's ecological impacts, including its effect on wildlife, habitat and movement. Where appropriate, bridges should be extended to span uplands that provide habitat and a movement corridor for terrestrial wildlife.

UPGRADE ENHANCEMENTS

TEA-21 included a new activity in the Transportation Enhancements program for "Environmental Mitigation to address water pollution due to highway runoff or reduce vehicle-caused wildlife mortality while maintaining habitat connectivity." Because fish are not directly killed by vehicles, FHWA interpreted the language to only include terrestrial wildlife, rejecting fish passage restoration projects. TE Activity 11 should be amended to include all wildlife, both terrestrial and aquatic species, in order to ensure fish passage project eligibility.

IMPLEMENT INTEGRATED ROADSIDE VEGETATION MANAGEMENT

Seventeen million acres of land are contained within public rights-of-way, making transportation agencies land managers on a grand scale. While rights of way are not always high quality habitat, they have substantial conservation value when managed correctly. All transportation agencies manage roadside vegetation but few have the resources to fully implement an IRVM. With direction, guidance and incentives, IRVM programs can be the standard and all transportation projects can comply with Executive Order 13112.

SUPPORT ESSENTIAL RESEARCH

Over the past decade, an increasing amount of transportation research has focused on the impacts of roads on wildlife and developing mitigation measures. These ongoing efforts and the institutions that produce and distribute the results should be fully funded at the highest tier level. The research title should emphasize rigorous distribution efforts, technological transfer, training and professional venues such as the International Conference on Ecology and Transportation (ICOET).

PREPARE FOR ADAPTATION BY PROTECTING CORRIDORS

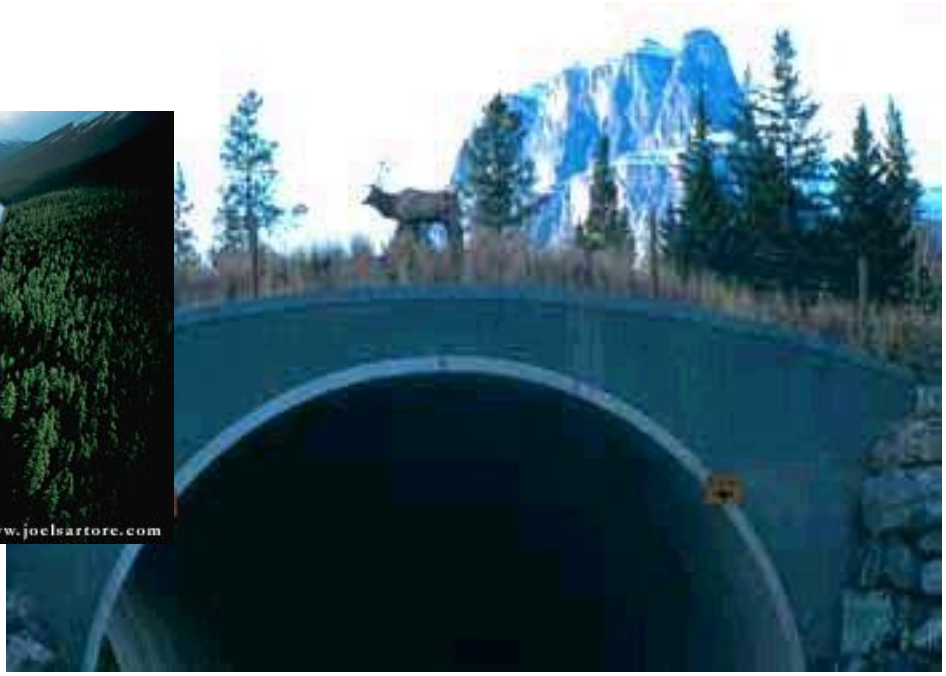
While the transportation sector struggles to adapt our grey infrastructure, natural resource managers are struggling to adapt our green infrastructure. Global warming is shuffling plants and animals in new and unpredictable ways, resulting in significant shifts among a variety of species and ecosystems. Some species will lose habitat altogether as their ranges shift or disappear due to climate change.

As highways and associated development continue to expand, many wildlife species must face the difficult challenge of crossing unnatural and often dangerous environments as they attempt to move between habitat areas. A new or expanded highway through natural areas will destroy, degrade or fragment ecologically important habitats. Fragmentation is among the most major threats to the health and viability of many species, as well as to biodiversity as a whole, and contributes to the loss of habitat connectivity.

Protecting and restoring core habitats and corridors remains one of the best known strategies to helping wildlife adapt to climate change. When temperatures rise, species will try to follow their preferred climates north or upslope, inevitably running into manmade barriers such as highways. Remaining habitat should be protected and existing fragmentation should be corrected to connect wildlife habitats and allow species to move to suitable habitat when local climate changes. Where wildlife movement corridors are fragmented by highways, transportation agencies can restore habitat connectivity via a number of measures including wildlife crossings, expanded culverts, viaducts and elevated roadways.

We also need vastly improved coordination and collaboration among scientific disciplines, government agencies and private landowners to ensure the habitat connectivity that allows species to move to suitable habitat as conditions change. Ensuring habitat connectivity across management unit borders will require federal, state, tribal, local and private land managers to cooperate. Many more species will survive global warming if management agencies can ensure there are large areas of protected habitat to serve as climate "refugia" in a warming world. Measures to minimize roads, urban sprawl, agricultural development and other human activities that reduce and fragment habitat are essential.
Fortunately, Congress, the states and the federal scientific agencies are beginning to recognize the importance of helping wildlife and ecosystems adapt to and survive global warming's unavoidable impacts. Over the past year, they have held hearings, advanced legislation, issued reports and established the National Global Warming and Wildlife Science Center under the U.S. Geological Survey.

Photos: Joel Sartore and Tony Clevenger



Wildlife overpass Banff National Park, Canada/John Beard

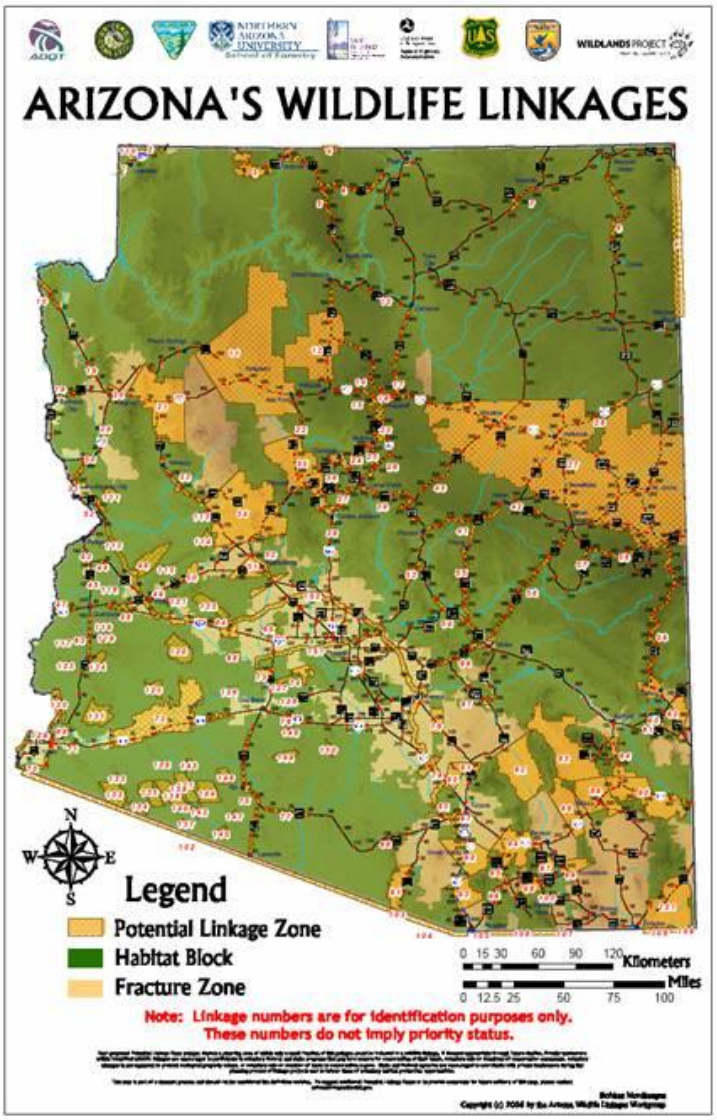
Wildlife overpass in Banff National Park

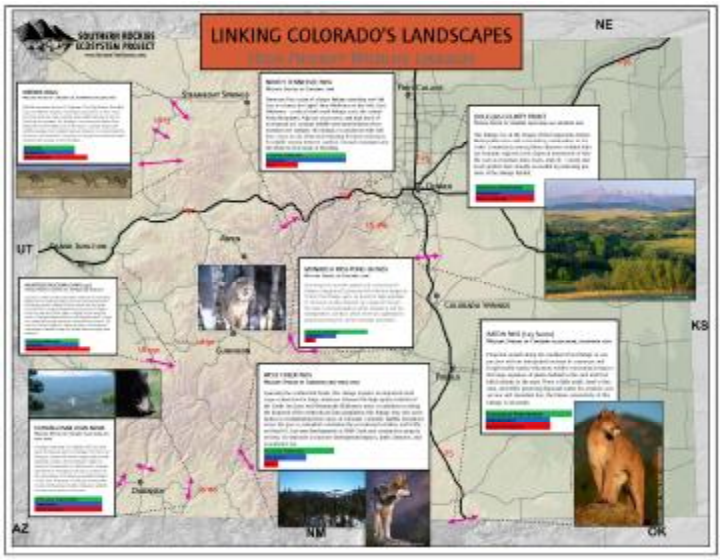
Wildlife underpass, Banff National Park, Canada/Patricia White

Wildlife underpass on US 93 in Montana

Photos: Contech and Montana Department of Transportation

A handful of state transportation agencies have conducted **habitat connectivity analyses** for the purposes of determining the locations of wildlife crossings across highways to restore corridor integrity between core habitats. Habitat connectivity analyses identify the most important habitat areas and wildlife movement corridors across the state as they intersect with existing and proposed highways. By integrating wildlife movement patterns, protected natural areas, and transportation infrastructure into one statewide plan, states can use this data to begin to reverse the trend of fragmented habitats and reduced wildlife populations. As of spring 2007, eleven states have created, or are in the process of creating, a statewide habitat connectivity analysis by identifying the most important natural linkage areas which connect core habitat for vulnerable wildlife, and integrating this data into transportation planning.





RECOMMENDATIONS

- **Require all states to complete a habitat connectivity analysis**. Transportation planners should work with natural resource agencies to inventory critical wildlife movement corridors in light of climate change projections to determine whether, when, and where existing or planned highways might impact wildlife movements in response to climate change.
- **Climate change inventories of transportation infrastructure should include an assessment of the wildlife habitat connectivity needs, as identified in the habitat connectivity analyses**
- **Integrate measures to assist wildlife adaptation to climate change in transportation planning.**
- **Federal planning regulations should require that climate change be included as a factor in the development of public-sector long-range transportation plans;** eliminate any perception that such plans should be limited to 20 to 30 years; and require collaboration in plan development with agencies responsible for land use, environmental protection, and natural resource management to foster more integrated transportation–land use decision making.
- **Incentives incorporated in federal and state legislation should be considered as a means of addressing and mitigating the impacts of climate change through regional and multistate efforts.**

INFORMATION

Feinberg, Jesse. 2007. Conserving the connections: A nationwide inventory of state-based habitat connectivity analysis. In *Proceedings of the 2007 International Conference on Ecology and Transportation*, eds. C. Leroy Irwin, Debra Nelson, and K.P. McDermott, 313-327. Raleigh, NC: Center for Transportation and the Environment, North Carolina State University. http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1380&context=jmie/roadeco

ICF International. 2008. Integrating climate change considerations into the transportation planning process. Washington, DC: Federal Highway Administration. http://www.fhwa.dot.gov/hep/climatechange/index.htm

Peters, Robert L. 2008. *Beyond cutting emissions: Protecting wildlife and ecosystems in a warming world*. Washington, DC: Defenders of Wildlife. http://defenders.org/resources/publications/programs_and_policy/gw/beyond_cutting_emissions.pdf

Transportation Research Board Committee on Climate Change and U.S. Transportation. 2008. *Potential impacts of climate change on U.S. transportation*. Transportation Research Board Special Report 290. Washington, DC: National Academy of Sciences. http://onlinepubs.trb.org/onlinepubs/sr/sr290.pdf

"GREEN LIGHT" PROACTIVE CONSERVATION & ECO-LOGICAL MITIGATION

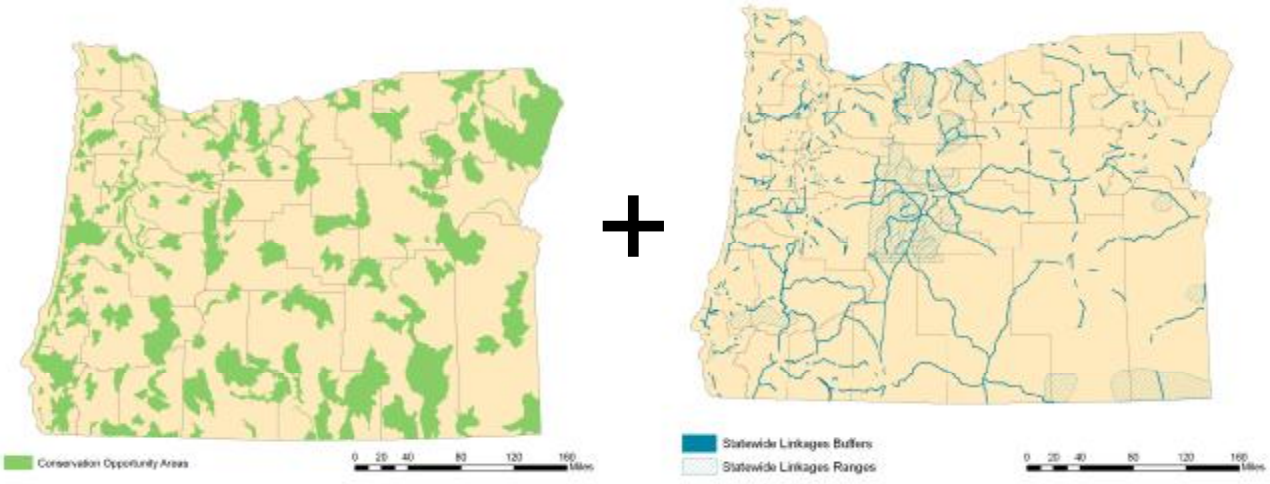
Following the advances made in SAFETEA-LU, Section 6001 has heralded a new era of integrated planning. In 2008, the American Association of State Highway Transportation Officials (AASHTO) surveyed practitioners, and found that "the philosophy of 'better than before' transportation and conservation planning and stewardship is taking root." Transportation agencies and conservation agencies are working actively to build effective, mutually beneficial approaches to planning and project development. While these efforts are driven in part by new regulatory requirements, an increasing number of transportation and conservation professionals are finding that integrated planning is helping both sectors achieve their missions more effectively. Interdisciplinary collaboration – as part of planning processes – enables agencies to address complex environmental and mobility challenges early, establishing the framework for programs that will achieve both transportation objectives and environmental stewardship.

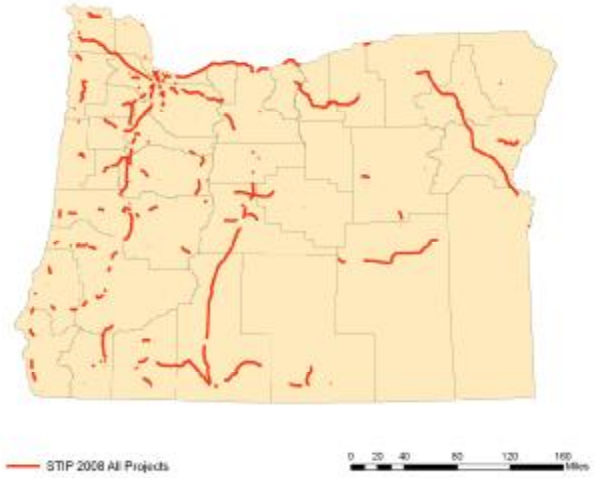
However, due to the slow and deliberate nature of transportation planning, several years may pass before we are able to see the full benefits of early coordination and integrated planning. Transportation projects that are being built today may have been planned and designed a decade or more ago. Even the projects in the current five-year work plans (State Transportation Improvement Program – STIP) were planned without the advantages of an integrated planning process. Many of these projects could be doomed to delays because of unforeseen conflicts and public controversy.

Moreover, these projects may conflict with existing state and federal conservation plans. To make state and federal investments in conservation only to negate those investments with poorly planned transportation projects is fiscally wasteful and irresponsible. Alternatively, there may be transportation projects that complement or benefit other priorities but are lower on the list or underfunded. It is in the best interest of Congress and state leadership to encourage coordination among the various plans and priority-setting exercises within each state to leverage funding and resources.

But it's never too late. Just because these projects are on the work plan does not mean they can't be improved or corrected before they enter project selection and development. Transportation agencies can work with resource agencies to audit their work plans to find obvious conflicts or confluence with conservation and connectivity plans. By overlaying transportation plans with conservation and connectivity maps, we can easily see where transportation projects will impact identified priority habitat. Currently, transportation agencies don't take this extra step because they have no incentive to do so.

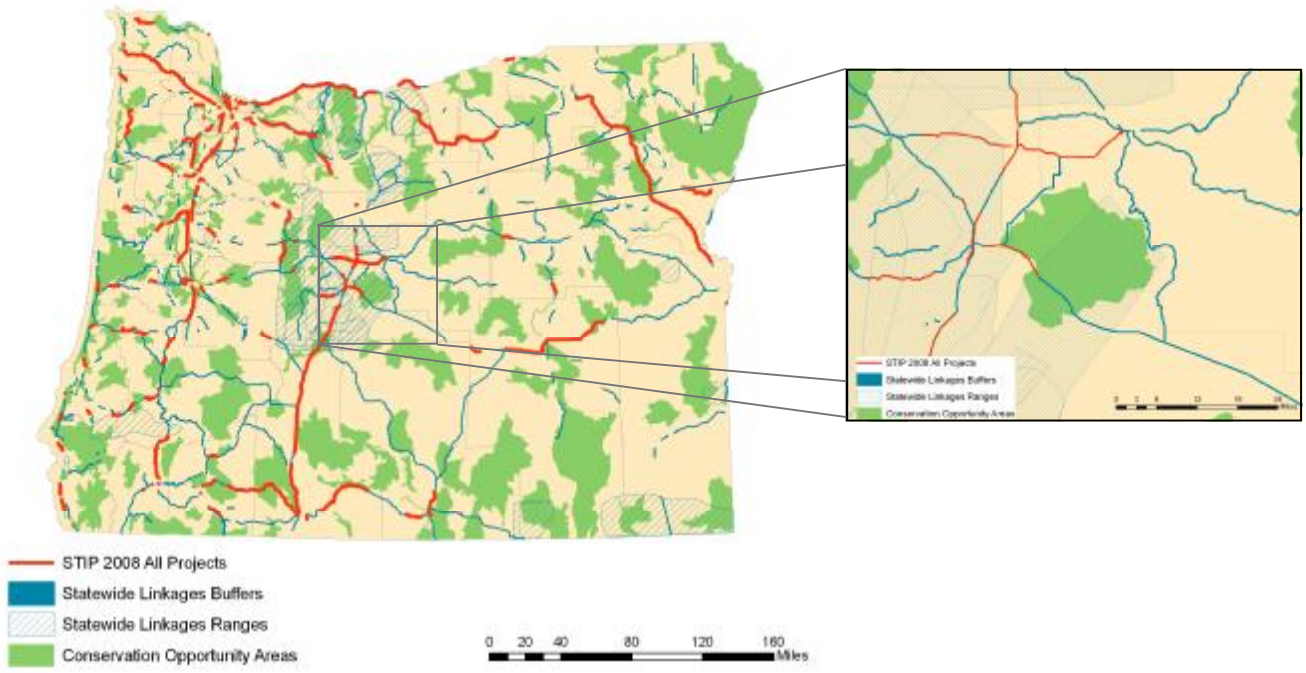
Through this voluntary program, projects found to have positive benefits for conservation could be given a "green light" status and moved forward in the work plan.* Projects found to conflict with conservation and connectivity plans could be revisited in consultation with the appropriate resource managers to update the project in a way that meets the purpose without impacting the resource, thereby reaching the green light status.





Using Oregon as an example, this shows how the Green Light audit works. The conservation opportunity areas, as identified by the State Wildlife Action Plan are in the top left corner. The habitat connectivity plan is top right and the 5-year workplan is center left. When they are all combined, the potential conflicts are easily identified.

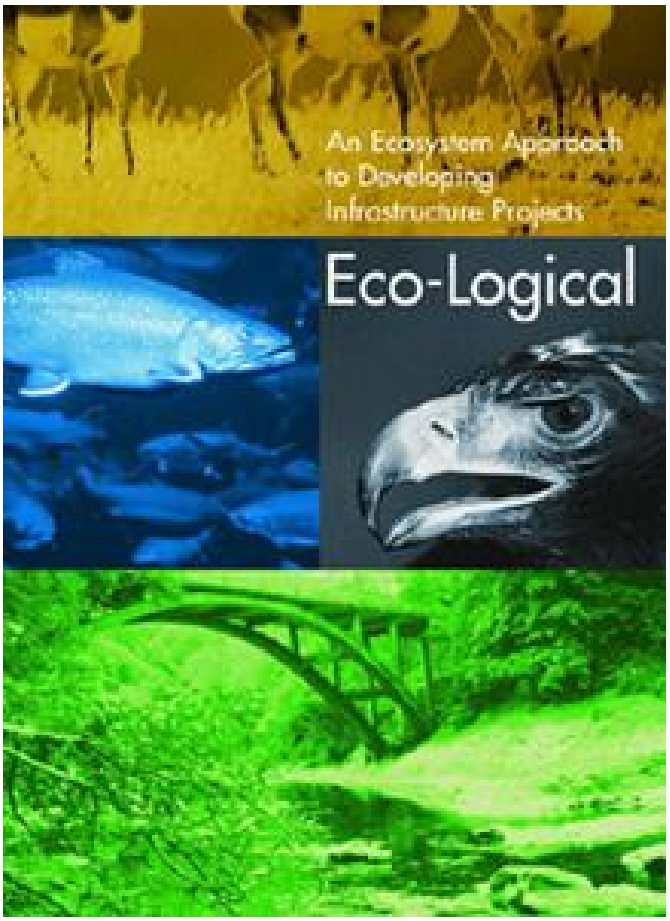
This also provides the perfect opportunity to bundle projects in order to bundle mitigation dollars. Looking more closely at one area, Oregon DOT could group mitigation needs from several projects and focus on this conservation opportunity area. This meets the needs of the DOT while simultaneously helping implement the State Wildlife Action and connectivity plans.



Due to the way transportation projects are funded and executed, agencies engage in project-by-project mitigation, usually near the end of a project's environmental review, with insufficient consideration of conservation priorities. When appropriate mitigation measures are not easily identified and agreed upon, projects can be mired in delays, costing the transportation agency in more than one way. The price of mitigation land often increases between the time the project is planned and funded and the time the mitigation land is acquired. Despite the high price tag, the results of traditional mitigation rarely meet conservation expectations. Project-by-project mitigation overlooks regional and ecosystem scale impacts to sensitive species and habitat, thereby missing critical opportunities for efficient and reliable environmental mitigation.

The Green Light audit allows transportation agencies to partner early with resource agencies to anticipate the environmental impacts of several projects at once, identify and bundle regional mitigation opportunities. Early coordination not only prevents permitting and regulatory delays, it stretches public mitigation dollars further by securing and conserving valuable natural resources on a more economically efficient scale and before related real estate values escalate.

Additionally, these green light projects would be eligible for a more attractive federal to state funding match. Currently, highway projects are funded at an 80 percent federal to 20 percent state ratio. Green light projects could be given a 90-10 funding ratio. With the streamlining and funding incentives of the green light audit program, project managers are more likely to strive for the best possible project.



The Green Light audit can also facilitate the implementation of Eco-Logical mitigation, as proposed in the 2006 report by FHWA, USFWS, USFS and several other federal agencies. *Eco-Logical* endorses ecosystem -based mitigation, the process of restoring, creating, enhancing, and preserving habitat and other ecosystem features in conjunction with or in advance of projects in areas where environmental needs and the potential environmental contributions have been determined to be

* Green light projects would still be required to go through necessary environmental review and permitting.

RECOMMENDATIONS

- **Charge FHWA with developing a "Green Light" audit methodology**
  - The process should be voluntary, easy, automated and web based.
  - FHWA should begin by examining existing examples.
- **Charge transportation agencies with providing their work plans in a spatial layer, to be used in the audit process**
- **Establish a revolving fund for Eco-Logical mitigation**, providing loans to state transportation agencies to acquire priority conservation areas in advance of project delivery
  - The revolving fund should be capitalized with $75 million of contract authority in each year over the life of the bill
  - The revolving fund would be administered by FHWA and loans would be distributed to state transportation agencies based on demand with a cap on the amount that any one state could receive.
  - When a surface transportation project draws credits from a bank, funds from the project would be used to repay the revolving fund with the expectation that each mitigation bank created by the fund would repay the principal from the fund within 20 years. There would be no interest on the loans.
  - All of the mitigation activities (including acquisition of land or interests in land, restoration of habitat and hydrological functions, and long-term maintenance) authorized by 23 CFR 777 would be eligible expenditures
  - Eligibility for Eco-Logical loans is based on the conservation value of the outcome of the compensatory mitigation. Eco-Logical mitigation sites are to be based on state and federally sanctioned conservation plans such as State Wildlife Action Plans and habitat connectivity plans.
- **Support the development of habitat connectivity plans**
- **Support the efforts of state fish and game agencies to complete priority habitat mapping (SWAPs)**

INFORMATION

Cambridge Systematics, Inc. 2008. *Linking environmental resource and transportation planning.* American Association of State Highway and Transportation Officials, Standing Committee on the Environment. http://www.trb.org/NotesDocs/25-25(32)_FR.pdf

Steering Team comprised of representatives from Federal Highway Administration, Forest Service, Bureau of Land Management, Fish and Wildlife Service, National Park Service, Environmental Protection Agency, National Oceanic and Atmospheric Administration, Army Corps of Engineers. 2006. *Eco-Logical: An ecosystem approach to developing infrastructure projects. Washington DC: U.S. Department of Transportation.* http://www.environment.fhwa.dot.gov/ecological/eco_index.asp

Western Wildlife Habitat Council. 2008. WGA Wildlife Corridors Initiative Report. Paper presented at the Western Governors' Association annual meeting, June 29, in Jackson, WY. http://www.westgov.org/wga/publicat/wildlife08.pdf

IMPROVE INTEGRATED PLANNING

Highway projects are often planned without detailed information on core conservation areas, sensitive resources or important habitat that might lie within the selected corridor. Conflicts do not come to light until the environmental review process, which then becomes more expensive and time consuming as transportation and resource officials attempt to reconcile infrastructure and conservation activities.

Recognizing this inherent conflict between highway planning and wildlife conservation, Congress included a small but profound provision (Section 6001) in SAFETEA-LU that requires:

1. Transportation planners must **consult** with state, tribal and local agencies responsible for land use management, natural resources, environmental protection, conservation and historic preservation.
2. The consultation shall involve **comparison** of transportation plans to conservation plans or maps and comparison of transportation plans to inventories of natural or historic resources.
3. In consultation with federal, state and tribal land management, wildlife and regulatory agencies, each long range transportation plan shall include a **discussion of potential environmental mitigation activities and potential areas** to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the long-range statewide transportation plan.

This tiny provision created a revolutionary change in how we plan roads and protect habitat. Early indications suggest this collaboration enables agencies to address complex environmental and mobility challenges early and establishing a framework to meet transportation objectives and environmental stewardship.

However, practitioners have noted the need for **additional technical support, standardized data, financial and staff capacity to fully realize the spirit and intent of Section 6001**. According to AASHTO's 2008 report "Linking Environmental Resource and Transportation Planning," planners need:

1. consistent and accurate data, updated and available to all partners;
2. environmental and transportation planning expertise; and
3. increased financial and staff capacity

Congress and stakeholders have begun a legacy of incorporating conservation interests into transportation policy and practice. The upcoming reauthorization should continue this legacy by retaining these good provisions and building upon their success.

RECOMMENDATIONS

Congress should retain the following provisions in reauthorization:

- **Retain Section 6001** which requires transportation planners at the state and metropolitan levels to consult with resource agencies, compare their long range transportation plans with conservation plans and conduct a discussion of how to mitigate for the impacts of all future planned highways.

- **Upgrade Section 6001** by continuing training and support for transportation and natural resource planners.

    - **Charge FHWA with providing training workshops for transportation planners and natural resource managers**
    - **Charge FHWA with establishing and implementing a system whereby consistent and accurate data is generated, updated and available to all partners**
    - **Support the efforts of state and federal resource agencies to complete the mapping of conservation plans that are essential to successfully integrating conservation and transportation planning**
    - **Increase funding to support the financial and staff capacity increases necessary to fully realize integrated planning**

INFORMATION

Cambridge Systematics, Inc. 2008. *Linking environmental resource and transportation planning.* American Association of State Highway and Transportation Officials, Standing Committee on the Environment. http://www.trb.org/NotesDocs/25-25(32)_FR.pdf

Defenders of Wildlife. Section 6001: The conservation professional's guide to integrating conservation and transportation planning. http://www.section6001.org

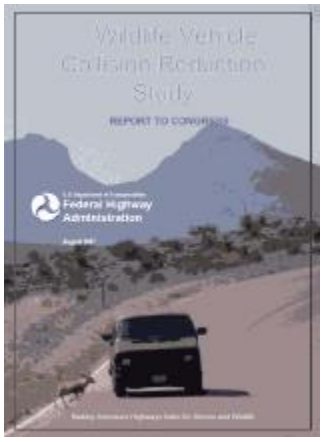
U.S. General Accounting Office. 2004. *Transportation planning: State and metropolitan planning agencies report using varied methods to consider ecosystem conservation*. Publication No. GAO-04-536. United States General Accounting Office. http://www.gao.gov/new.items/d04536.pdf

STANDARDIZE CRASH DATA

Recent estimates indicate between one and two million wildlife vehicle collisions (WVCs) occur every year in the United States, leading to 200 human fatalities and 29,000 injuries. The Western Transportation Institute estimates the total annual cost associated with WVCs, including property damage, medical costs and public services, is $8.4 billion. Game and resource management agencies also feel the impact, losing the monetary value of the lost animal associated with hunting license fees or recreational attraction for wildlife viewing.

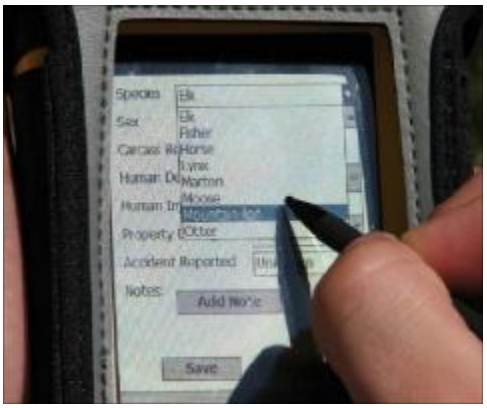
In addition to the human cost, wildlife vehicle collisions pose a serious threat to the long term survival of certain species at the population level. Road mortality is a major threat to 21 federally listed threatened or endangered species in the U.S. The number of WVCs has increased dramatically in the U.S. over the last two decades. From 1990 to 2004, the number of all reported motor vehicle crashes has held steady at just over six million per year, while reported collisions with animals has increased by nearly 50 percent, now comprising 1 in 20 of all reported motor vehicle crashes.

Wildlife underpass, Banff National Park, Canada / Patricia White



Under Section 1119 (n) of the Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), Congress charged the Secretary of Transportation to conduct a study of wildlife vehicle collisions, the causes and impacts, and identify potential solutions. The resulting report, "Wildlife Vehicle Collision Reduction Study" identified challenges that prevent a systematic, nationwide approach to reducing wildlife vehicle collisions, the first of which is the lack of standards or guidelines for the collection of data on wildlife vehicle collisions. The executive summary says, "**A major challenge that must be addressed before WVCs can be systematically reduced is improving the consistency and precision of data collection on WVCs.** Inconsistent and imprecise data make it difficult to identify and prioritize road sections that require mitigation."

In some states, transportation agencies collect no WVC data at all. In others, WVC data are collected inconsistently and haphazardly, using varying methods among states and agencies. Without reliable, consistent data, transportation and resource agencies have little to guide them in finding adequate mitigation methods and locations.



The Western Transportation Institute at Montana State University (WTI) is working with the Virginia Transportation Research Council and the Washington State Department of Transportation to develop a tool to help standardize accurate data collection of wildlife vehicle collision occurrences. This tool integrates a handheld computer or personal digital assistant (PDA) with a global positioning system (GPS) that is supported by customized software to aid in easy, spatially accurate and consistent wildlife-vehicle collision data collection.

RECOMMENDATIONS

- **Charge the Federal Highway Administration to develop and implement a standardized methodology for acquiring, sharing and analyzing wildlife-vehicle collision data.**
- **The methodology should be based on existing sources:**

  Huijser, M.P., J. Fuller, M.E. Wagner, A. Hardy & A.P. Clevenger. 2007. Animal vehicle collision data collection. NCHRP Project 20-05/Topic 37-12. Western Transportation Institute – Montana State University. Prepared for the Transportation Research Board of the National Academies, Washington DC.

  Huijser, M.P., P. McGowen, J. Fuller, A. Hardy, A. Kocioiek, A.P. Clevenger, D. Smith & R. Ament. 2007. Wildlife-vehicle collision reduction study. Report to congress. U.S. Department of Transportation, Federal Highway Administration, Washington D.C., USA.

- **Standardized WVC data collection and analysis should be phased in over a three year period and encompass data collected by law enforcement and natural resource agencies as well as transportation agencies.**

INFORMATION

American Association of State Highway and Transportation Officials, and Federal Highway Administration. 2007. *Animal–vehicle collision data collection: A synthesis of highway practice.* National Cooperative Highway Research Program, Synthesis 370. Washington, DC: Transportation Research Board. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_370.pdf

Calspan. 1998. *Expert systems for crash data collection.* Publication No. FHWA-RD-99-052. McLean, VA: Office of Safety and Traffic Operations R&D, Federal Highway Administration. http://www.tfhrc.gov/safety/final_rpt.pdf

PROTECT PUBLIC LANDS

Federal lands, including, national parks, forests, wildlife refuges and monuments embody one quarter of the United States and provide habitat for nearly two-thirds of all threatened or endangered species. Twelve percent of these species are restricted largely to federal public lands, on which they depend for survival. Federal land management agencies, such as the U.S. Fish and Wildlife Service, U.S. Forest Service and National Park Service have different missions and are guided by different regulations, but all are mandated to conserve and sustain the natural resources found on their lands. More than **300 million people** visited national parks in 2008 alone. More than 37 million visitors came to national wildlife refuges and hatcheries in 2006. Refuge visitation is expected to increase to more than 51 million by 2015. Most federal lands are open to the public and to vehicle traffic. The task of providing safe and adequate access to public lands is shared by the individual agencies and the Federal Lands Highway Program (FLHP), which is responsible for some **138,000 miles of roads** that are owned by public authorities or the federal government and are not under state or local responsibility.

Because the FLHP has been largely devoted to building roads instead of providing access and mobility, America's public lands are increasingly threatened by **vehicle overcrowding, traffic congestion and air pollution**. As outdoor recreation becomes more popular, millions of Americans flock to public lands every day. However, transportation options within public lands are limited, diminishing the overall visitor experience and environmental quality. Many areas are readily accessible only by personal vehicle, leaving visitors mired in traffic jams, rather than enjoying the activities and scenery. In Great Smoky Mountains National Park, it can take three to four hours to drive an 11-mile loop.

Without wildlife and the quality habitat they need, our public lands will cease being suitable destinations for visitors who come from across the country and the globe to enjoy America's natural wonders. Gateway and surrounding communities rely heavily on public lands for overflow tourist dollars. Wolf watching continues to attract record numbers of visitors to Yellowstone National Park and adds an additional $35 million annually to the local economy. In 2006, more that 35 million refuge visitors generated $823 million of sales in regional economies. As this spending flowed through the economy, more than 19,000 people were employed and $320 million in employment income was generated.

The interests of gateway communities, tourism, taxpayers, visitors and wildlife will be best served by improvements that recognize their interdependence. Instead of continuing with the roadbuilding agenda that has precipitated these problems, resources would be better spent on a system designed to meet the current and future needs of both human visitors and non-human residents. In order to address traffic congestion, air pollution, and continued threats to biodiversity, resource agencies and the FLHP should consider providing more visitor-friendly and environmentally sensible transportation options on public lands. It is possible to improve mobility and visitor experience, and at the same time mitigate the impacts of existing roads on America's wildlife.

RECOMMENDATIONS

- **Safeguard America's biodiversity on public lands.** Rather, funding and attention should be focused on maintenance backlogs, providing environmentally sensible alternatives and retrofitting existing roads to mitigate damage to resident wildlife populations and ecosystems.
- **Change the name of the Federal Lands Highway Program to Federal Lands *Transportation* Program.** Highway construction should no longer be the sole focus of the program. The program should be renamed to better reflect the program's full scope and mission.
- **Make transportation funding for public lands eligible for habitat connectivity restoration efforts such as wildlife crossings.** Currently, transportation dollars can be used to resurface and widen roads through wildlife refuges, national parks and forests, but cannot be used to restore habitat connectivity across those same roads. Such an exclusion is dangerous, nonsensical and contrary to the purposes of our public lands.
- **Reauthorize and fully fund the Paul S. Sarbanes Transit in Parks Program.** By providing visitors with more options beyond the personal vehicle, we improve their experience while simultaneously protecting the resource.
- **Expand the proxy of the Refuge Roads Program**. The definition of Refuge Roads should be modified to include other USFWS facilities like fish hatcheries and the National Conservation Training Center.

INFORMATION

National Wildlife Refuge System. Roads and Trails: USFWS Refuge Roads Program. U.S. Fish & Wildlife Service. http://www.fws.gov/refuges/roads/

National Wildlife Refuge System. What Does SAFETEA-LU Mean For The National Wildlife Refuge System? U.S. Fish & Wildlife Service. http://www.fws.gov/refuges/roads/SAFETEA-LU.html

BUILD BETTER BRIDGES

Bridges are essential to our transportation infrastructure, built to span over a valley, road, railroad track or body of water for the purpose of providing passage over the obstacle. Bridge design varies depending on the function of the bridge and the nature of the terrain where the bridge is to be constructed. As of 2008, there were over 600,000 highway bridges in the U.S. and we spend $5 billion on bridge construction, replacement, and rehabilitation.

By law, each bridge is inspected every two years for structural efficiency. Bridges found to be structurally deficient are included in a schedule for bridge replacement or rehabilitation. In 2008, over 71,000 bridges in the U.S. were considered structurally deficient by FHWA. The National Bridge Inventory reports that we are building 60,000 to 80,000 new bridges every decade and each year 2,000-3,000 bridges undergo major repairs or replacement.

Riverine systems serve as habitat and movement corridors for both aquatic and terrestrial wildlife, as well as provide essential ecosystem services. Land use regulations may protect waterways and wetlands with narrow buffers, but those buffers lose ecological effectiveness when highway bridges span just the water but not the land connections on either side. The flow of water continues, yet the movement of terrestrial wildlife is severed.

Both human and wildlife movement corridors will need to adapt to global climate change. The threats that climate change poses to transportation systems include flooded roadways, bridge damage, increased stormwater and drainage failures and accelerated pavement deterioration.

Wildlife movement will also be challenged by global climate change. As ecosystems change, so too will the needs of species as they adapt to new conditions. Protecting and restoring habitat connectivity – such as those provided along rivers -- will be essential to their ability to adapt. Bridges crossing rivers and riparian systems that extend beyond the waterway, including a portion of unsubmerged land for wildlife use and movement can maintain or reestablish terrestrial habitat connectivity.

As we begin the task of revisiting our transportation infrastructure with an eye to climate change adaptation, we should also consider the need for wildlife to adapt by moving throughout the landscape as well. Fortunately, the changes needed to upgrade bridges for climate change are complementary to those needed to allow wildlife adaptation.

Thousands of bridges will be replaced and rehabilitated in the United States over the next few decades. Bridge replacement and rehabilitation presents an exceptional opportunity to incorporate design modifications that reestablish or improve habitat connectivity. Using habitat connectivity plans, the National Bridge Inspection Standards program should include a thorough assessment of each bridge's ecological impacts, including its effect on wildlife, habitat and movement. If a bridge is causing habitat fragmentation or constitutes a high risk area for roadkill collisions, this factor should be noted in the bridge evaluation, rating and priority ranking. Where appropriate, bridges should be extended to span uplands that provide habitat and a movement corridor for terrestrial wildlife.

This was a double-box culvert which blocked fish passage for migratory and native fish species, located on Bronson Brook in Worthington, MA.

Photos courtesy of Massachusetts Riverways Program, Department of Fish & Game.

RECOMMENDATIONS

- **Charge the FHWA with conducting a crosscheck of the National Bridge Inventory with habitat connectivity plans to determine which bridges constitute barriers to terrestrial wildlife movement and contain potential for restoring habitat connectivity**
- **Charge AASHTO with including habitat connectivity in the AASHTO bridge sufficiency rating formula**
- **Add protect and restore habitat connectivity to the purpose and policy statements under 23 USC 650 Bridges, Structures, and Hydraulics**
- **Add consultation with resource agencies and conservation/connectivity plans**
- **Include habitat conservation and connectivity in bridge design standards**
- **Add habitat connectivity to bridge inspections**
- **Make habitat connectivity eligible under the Highway Bridge Replacement and Rehabilitation Program**

INFORMATION

Bates, Ken. 2003. *Design of road culverts for fish passage*. Olympia, WA: Washington Department of Fish and Wildlife. http://wdfw.wa.gov/hab/engineer/cm/

Better Roads. 2008. Better Roads Magazine 2008 Bridge Inventory. *Better Roads* 78, no. 11 (October). http://betterroads.gcnpublishing.com/content/fileadmin/user_upload/issues/pdfs/Bridge_Inventory/bridge2008.pdf

Federal Highway Administration. National bridge inventory: December 2008 count of bridges. U.S. Department of Transportation. http://www.fhwa.dot.gov/bridge/nbi/yrblt08.cfm

Federal Highway Administration. Structure type by year built: December 2006 count of bridges. U.S. Department of Transportation. http://www.fhwa.dot.gov/bridge/nbi/yrblt06.cfm

Hong, Tae-Hoon, Seung-Hyun Chung, Seung-Woo Han, and Sang-Youb Lee. 2006. Service life estimation of concrete bridge decks. KSCE Journal of Civil Engineering 10, no. 4: 233-241. http://www.springerlink.com/content/a67m43231780371n/fulltext.pdf

Macdonald, Laurie A., and Sietske Smith. 1999. Bridge replacements: An opportunity to improve habitat connectivity. Paper presented at the 1999 International Conference on Wildlife Ecology and Transportation, September 13-16, in Missoula, MT. http://www.icoet.net/downloads/99paper28.pdf

UPGRADE ENHANCEMENTS

Recognizing that transportation is more than just concrete and steel, Congress created the Transportation Enhancements (TE) program in 1991 to fund a broad array of projects to complement and improve existing infrastructure while enhancing the overall transportation experience. Enhancements projects come in twelve categories, including bicycle and pedestrian facilities, scenic or historic easements, welcome centers and roadside beautification. Since its inception, the TE program has funded over 23,000 community-oriented transportation-related projects across the country.

States are required to set aside **10 percent** of their surface transportation funds for their TE projects. The federal government reimburses 80 percent of a TE project's costs, and the project sponsor pays the nonfederal 20 percent match.

As part of the 1998 Transportation Equity Act for the 21st Century (TEA-21), Defenders of Wildlife and other conservationists worked with Congress to include a new TE activity for "Environmental Mitigation to address water pollution due to highway runoff or reduce vehicle-caused wildlife mortality while maintaining habitat connectivity." Activity 11 allows communities to use TE funding to decrease the negative impacts of roads on the natural environment, such as wildlife habitat fragmentation and wildlife-vehicle collisions. Connectivity ensures that wildlife is given the chance to move freely in order to complete life cycle functions and maintain long-term population viability. Strategies used to counteract roadkill and habitat fragmentation range from site specific projects such as underpasses to regional models that combine landscape ecology, conservation biology and human safety concerns with long-range transportation planning.

While Activity 11 has been successful in its first decade, some minor changes in the wording are necessary. Unfortunately, Activity 11 language specifically states "…to reduce vehicle-caused wildlife mortality while maintaining habitat connectivity." Because fish are not directly killed by vehicles, the Federal Highway Administration (FHWA) interpreted the language to only include terrestrial wildlife, and not aquatic species. As a result, some excellent fish passage restoration projects have been rejected. (fish passage photo)

The exclusion of aquatic species and fish passage does not reflect the spirit or intent of TE Activity 11. During this reauthorization of the transportation bill, Congress can correct this problem by including specific language to expand eligibility under Activity 11 to include aquatic habitat connectivity and fish passage.

RECOMMENDATIONS

- **Upgrade the Transportation Enhancements program, Activity 11 Environmental Mitigation to include all wildlife, both terrestrial and aquatic species, in order to ensure fish passage project eligibility.**

- **Amend Activity 11 language in TE legislation to authorize:**
  - **Environmental mitigation to address water quality degradation due to highway runoff; and**
  - **Environmental mitigation to reduce transportation-related wildlife mortality and to restore or maintain habitat connectivity, including land and aquatic species.**

- **Share funds among all 12 TE activities by ensuring that selection committee representatives are familiar with issues of wildlife habitat connectivity.**

Jones Hole National Fish Hatchery, Utah
U.S. Fish and Wildlife Service

INFORMATION

Hotchkiss, Rollin H., and Christopher M. Frei. 2007. *Design for fish passage at roadway-stream crossings.* Publication No. FHWA-HIF-07-033. McLean, VA: Office of Infrastructure Research and Development, Federal Highway Administration. http://www.fhwa.dot.gov/engineering/hydraulics/pubs/07033/07033.pdf

Jackson, Scott D. 2003. Design and construction of aquatic organism passage at road-stream crossings: Ecological considerations in the design of river and stream crossings. In *Proceedings of the 2003 International Conference on Ecology and Transportation*, eds. C. Leroy Irwin, Paul Garrett, and K.P. McDermott, 20-29. Raleigh, NC: Center for Transportation and the Environment, North Carolina State University. http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1158&context=jmie/roadeco

White, Patricia A., and Jesse Feinberg. 2008. *The $61 Million Question: How Can Transportation Enhancements Benefit Wildlife?* Washington, DC: Defenders of Wildlife. http://www.defenders.org/resources/publications/programs_and_policy/habitat_conservation/habitat_and_highways/how_can_transportation_enhancements_benefit_wildlife.pdf

IMPLEMENT INTEGRATED ROADSIDE VEGETATION MANAGEMENT

Seventeen million acres of land are contained within public rights-of-way, making transportation agencies land managers on a grand scale. While rights of way are not always high quality habitat, they have substantial conservation value when managed correctly. Environmental quality issues surrounding erosion control, stormwater management, protection of wildlife habitat, control of noxious and invasive weeds, and needs of special plant communities combine with highway aesthetics to dictate vegetation management programs.

Poor roadside vegetation management practices range from blatant neglect to blanket applications of herbicides. Mowing, herbicides and road-salt runoff are harmful to roadside vegetation and deadly to resident wildlife. Small animals and ground-dwelling birds often nest and fledge in roadside vegetation. In Nebraska, where 25 percent of all pheasants are hatched on roadsides, the Nebraska Department of Roads signed an MOU with the game commission to limit and schedule roadside mowing.

Just as the highway system serves as a transportation link for movement of people and materials, roadsides serve as a transportation link for the spread of invasive weeds. Since roadbuilding began, our rights-of-way have been inundated with non-native species – mostly by accident, sometimes by design, and often in well-intentioned but harmful attempts to "beautify" the roadside. By preventing disturbance in the first place, self-sustaining native plant communities can naturally discourage the establishment of unwanted plant species. Emerging best practices can reduce these impacts and actually reduce maintenance costs. In the last few decades, roadside managers have developed Integrated Roadside Vegetation Management (IRVM), employing manual activities, mechanical tools and chemical applications combined with cultural and biological methods to develop a vegetation community that requires minimal maintenance and benefits wildlife and its habitat.

All transportation agencies manage roadside vegetation but few have the resources to fully implement an IRVM. With direction, guidance and incentives, IRVM programs can be the standard, resulting in more sustainable roadside vegetation patterns, meeting identified goals.

Pheasant/ Natural Resources Conservation Service

RECOMMENDATIONS

- **Implement a national standard for Integrated Roadside Vegetation Management (IRVM)**
  - Develop a national database on costs for various types of vegetation management activities to improve the projections of economic impacts among methods of control
  - Develop a database on assigned dollar values for the benefits of environmentally sensitive methods of managing vegetation. Roadside managers could be assisted in justifying the use of the more costly methods of vegetation management in environmentally sensitive areas.
  - Provide training on IRVM best management practices
  - Support communication and coordination at the regional level
  - Map existing native remnants within rights of way and manage accordingly
  - Seed native grass and forb species typical to the region
  - Monitor wildlife and pollinator use of roadsides and manage accordingly
  - Establish the carbon sequestration values within rights of way
  - Reduce the rural mowing requirement to one swath on a regular basis and the full right of way only once annually
  - Require 1 percent of project budgets be spent on ecological roadside vegetation and maintenance, including prevention and control of invasive plants and native grass and forb restoration

- **Require all transportation projects comply with Executive Order 13112 of 1999**, "to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause."

- **Adopt the EO 13112 definitions, as agreed upon by all federal agencies**
  - Rural – outside municipal limits
  - Native wildflower – one that occurs naturally in a particular region, state, ecosystem and habitat without direct or indirect human actions
  - Invasive plant – an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health

- **Change the wildflower requirement to 10% native for rural projects**

INFORMATION

Berger, Robert L. 2005. *Integrated roadside vegetation management: A synthesis of highway practice*. National Cooperative Highway Research Program, Synthesis 341. Washington, DC: Transportation Research Board. http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_syn_341.pdf

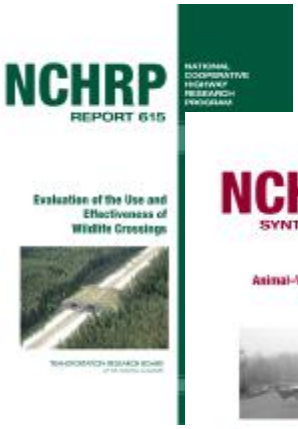
Minnesota Department of Transportation. 2006. *Integrated roadside vegetation management plan*. Metro District, Minnesota Department of Transportation. http://www.dot.state.mn.us/metro/maintenance/IRVM2006.pdf

Tallgrass Prairie Center Roadside Office. Integrated roadside vegetation management: Iowa's roadside resource. University of Northern Iowa. http://www.uni.edu/irvm/

SUPPORT ESSENTIAL RESEARCH

In an effort to continually improve our transportation systems, the transportation sector invests billions in research, seeking innovations in procedures and practices that can be practically applied on our roads and highways. Funded primarily through the transportation bill, ($823 million annually) transportation research is conducted by both government and private organizations, analytical and experimental. Other bodies are responsible for stimulating research and distributing results.

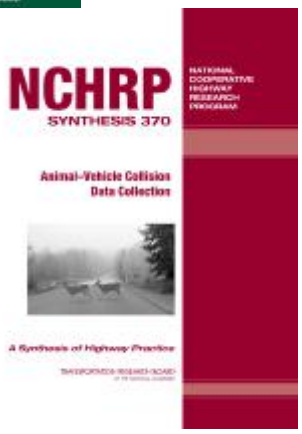
Over the past decade, an increasing amount of transportation research has focused on the impacts of roads on wildlife and developing mitigation measures. Some of the most notable success stories include:



Surface Transportation Environment and Planning Cooperative Research Program (STEP) is the sole source of federal transportation funds available to conduct all FHWA research on planning and environmental issues, authorized at **$16.9 million per year for fiscal years 2006 through 2009**.

National Cooperative Highway Research Program
NCHRP 25-27 *Evaluation of the Use and Effectiveness of Wildlife Crossings* developed guidelines for the selection, configuration, location, monitoring, evaluation, and maintenance of wildlife crossings and developed an interactive web-based decision guide protocol offering guidance on the selection, configuration, and location of crossing types, along with suggestions for their monitoring, evaluation, and maintenance. www.wildlifeandroads.org.

NCHRP 37-12 *Animal-Vehicle Collision Data Collection* examines the extent to which data from AVC accident reports and animal carcass (AC) counts are collected, analyzed, and used throughout the United States and Canada.



Our investment in research is only as good as our ability to meaningfully distribute the results. Congress should continue investing in these ongoing and proven research and development efforts to advance our understanding of how highways impact our environment. In addition, Congress needs to support the methods and mechanisms to put this good research to work. Research loses meaning when we fail to apply our findings. Practitioners are often too busy to seek out research and results on a regular basis. Academia, non-governmental organizations, professional associations and the private sector offer a variety of opportunities for technological transfer and professional development. Research spending and programs should include rigorous distribution efforts including publications, web sites, listserves, training, workshops, distance learning and conferences.

University Transportation Centers

The following UTCs are engaged in research of particular importance:

Center for Transportation and the Environment (CTE) at North Carolina State University conducts research, education and technology transfer concerning the impacts of surface transportation on the environment from air quality and climate change to hazardous materials. CTE has a wildlife and terrestrial ecosystems initiative that examines the impacts of roads on wildlife and mitigation measures such as wildlife crossings. CTE also manages the biennial International Conference on Ecology and Transportation (ICOET).

Western Transportation Institute (WTI) at Montana State University focuses on rural transportation safety and operations, winter maintenance and effects, road ecology, infrastructure maintenance and materials, systems engineering development and integration, mobility and public transportation, logistics and freight management and transportation planning and economics.

University of California at Davis, Road Ecology Center brings together researchers and policy makers from ecology and transportation to design sustainable transportation systems based on an understanding of the impact of roads on natural landscapes and human communities.

International Conference on Ecology and Transportation (ICOET)

Since 1996, the mission of the International Conference on Ecology and Transportation (ICOET) has been to identify and share quality research applications and best management practices that address wildlife, habitat and ecosystem issues related to surface transportation systems. The conference is the primary gathering of experts in the field of transportation development, research and administration with the goal of enhancing both the project development process and the ecological sustainability of transportation systems. The conference is funded by a variety of partners, including state transportation agencies, the U.S. Fish and Wildlife Service, USDA Forest Service, Defenders of Wildlife and engineering firms, with a significant contribution from

TABLE 1 Title V -- Authorized v. Actual Funding Levels

	FY 2005		FY2006–2008			
UTC categories	Authorized	Actual	Authorized	FY 2006 Actual	FY 2007 Actual	FY 2008 Actual
National	$2,000,000	$1,560,000	$3,500,000	$3,010,000	$2,858,000	$2,950,400
Regional	$1,000,000	$780,000	$2,000,000	$1,720,000	$1,633,200	$1,686,000
Tier I	$1,000,000	$780,000	$1,000,000	$860,000	$816,000	$843,000
Tier II	NF	NF	$500,000	$430,000	$408,300	$421,500

NOTES: NF = Not funded.

SOURCES: SAFETEA-LU Title V

RECOMMENDATIONS

- **Fully fund the University Transportation Centers (UTC) that focus on transportation and the environment, wildlife and road ecology and fund them at the highest tier level**
  - Center for Transportation and the Environment (North Carolina State University)
  - Western Transportation Institute (Montana State University)
  - UC Davis Road Ecology Center (University of California at Davis)
- **Fully fund the Surface Transportation Environment and Planning Cooperative Research Program (STEP)**
- **Within the research title, include an emphasis on rigorous distribution efforts** including publications, web sites, listservs, training, workshops, distance learning and conferences
- **Provide funding for the International Conference on Ecology and Transportation (ICOET)**
  - $300,000 ($100,000 per conference, biennially over life of the bill)

INFORMATION

Bissonette, John A., and Patricia C. Cramer. 2008. *Evaluation of the use and effectiveness of wildlife crossings.* National Cooperative Highway Research Program, Report 615. Washington, DC: Transportation Research Board. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_615.pdf

Center for Transportation and the Environment. Center for Transportation and the Environment home page. North Carolina State University. http://itre.ncsu.edu/CTE/index.asp

Federal Highway Administration. State planning and research guide to the National Cooperative Highway Research Program. U.S. Department of Transportation. http://www.tfhrc.gov/sprguide/nchrp.htm

Federal Highway Administration. Surface Transportation Environment and Planning Cooperative Research Program home page. U.S. Department of Transportation. http://www.fhwa.dot.gov/hep/step/index.htm

Huijser, Marcel P., Julie Fuller, Meredith E. Wagner, Amanda Hardy, and Anthony P. Clevenger. 2007. *Animal-vehicle collision data collection: A synthesis of highway practice.* National Cooperative Highway Research Program, Synthesis 370. Washington, DC: Transportation Research Board. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_370.pdf

National Academy of Sciences. Overview of the National Cooperative Highway Research Program. Transportation Research Board. http://www.trb.org/CRP/NCHRP/NCHRP.asp

Road Ecology Center. UC Davis Road Ecology Center home page. University of California, Davis. http://roadecology.ucdavis.edu/

In 2007, the Western Governors' Association (WGA) adopted the policy resolution *Protecting Wildlife Migration Corridors and Crucial Wildlife Habitat in the West* (07-01) to protect "wildlife corridors" and crucial habitat. The resolution instructs WGA to "identify key wildlife migration corridors and crucial wildlife habitats in the West and make recommendations on needed policy options and tools for preserving those landscapes." At the end of June 2008, the governors reviewed and adopted a suite of policy recommendations aimed at protecting wildlife corridors and committed themselves to implementation. WGA's policy recommendations fall within five main issue areas: climate change, transportation, renewable energy development, oil and gas development, and land use planning.

The Transportation subcommittee of the WGA Wildlife Corridors Initiative identified four specific action items for the protection of wildlife corridors: 1) Make the preservation of Wildlife Corridors and Crucial Habitat priorities for transportation planning, design and construction, 2) Integrate conservation and transportation coordination, planning and implementation across jurisdictions, 3) Manage and coordinate data information systems and methodology to increase efficiency and reduce redundancy, and 4) Establish long-term capacity to staff and fund these initiatives. To implement these four action items, the Transportation subcommittee made the following recommendations to protect wildlife corridors and crucial habitats in the reauthorization of the Federal Transportation Act:

* Support the continuation of Section 6001 and 6002 of SAFETEA-LU and support provisions that will strengthen the institutionalization of Sections 6001 and 6002. As highlighted in the 2005 transportation legislation report issued April 25, 2008 by the Government Accountability Office, process improvements are occurring but the full scope of improvements may not be realized for several more years.
* Request that wildlife corridors and crucial habitat information become more of a priority for the State Planning and Research set-aside.
* Create an appropriate balance for projects that do not adversely impact wildlife corridors and crucial habitat, or which protect or restore such habitats. Increased federal matching funds should be provided for projects that address current needs but do not impact, and perhaps even restore, wildlife corridors and crucial habitat.
* Recommend new provisions that require standardized wildlife-vehicle collision data collection and support the sharing and analysis within and among states.
* Ensure that their state transportation enhancement programs prioritize eligibility for wildlife related crossing projects.