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VERMONT AGENCY OF TRANSPORTATION WILDLIFE CROSSING TEAM; BUILDING AN INTER-AGENCY PLANNING TOOL TO ADDRESS ECOLOGICAL CONNECTIVITY IN VERMONT

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Abstract: Wildlife movement and related road crossing strategies are becoming an increasingly important factor in the development of transportation projects in Vermont – whether these projects involve reconstruction on existing alignment or new construction. The Vermont Agency of Transportation (VTrans) and the Vermont Department of Fish and Wildlife (VDFW) have identified wildlife movement and habitat connectivity as important factors to consider in the transportation project development process from three perspectives: human safety, environmental stewardship, and fiscal responsibility. Moreover, we have begun to construct wildlife crossing structures, in collaboration with VDFW, in some recent transportation projects. Unfortunately, there is a lack of wildlife road crossing data to support the inclusion, location, design, and construction of these crossings in many parts of the state. Currently, much of the information that is used in the design and location of wildlife crossing structures is from an existing database of road crossing and road mortality information for white-tailed deer, moose and black bear that is maintained by the VDFW. To assist in making, and implementing, these sometimes very expensive project decisions, VTrans desires to have a resource review team to gather wildlife movement, habitat and road mortality data relevant to specific projects.

VTrans, in collaboration with VDFW, Keeping Track, Inc., and Jim Andrews of Middlebury College, has developed an inter-agency Wildlife Crossing Team. The primary objective of this initiative is to develop a data gathering protocol to assess habitat fragmented or otherwise affected by Vermont roads, and to train a group of VTrans staff to utilize that protocol as a project planning tool. The goal of this effort is to gather sufficient data regarding wildlife movement and habitat conditions, in the early stages of the transportation project development process, to make substantive recommendations, in conjunction with VDFW, to project managers and designers so that wildlife movement and ecological connectivity can be considered in the design and construction of appropriate VTrans projects. Through this process wildlife movement and habitat connectivity can become an integral part of the environmental review process at VTrans – similar to how historic, archaeological, and other natural resources are considered. It is hoped that this effort will take wildlife movement and habitat connectivity beyond an issue of compliance and become a more standard consideration for transportation projects in Vermont where appropriate. This paper will discuss the development of this inter-agency wildlife crossing team.

Introduction

Local Vermont wisdom tells us to look for the skid marks on the pavement to identify where the moose are crossing the roads. To some extent this methodology may actually have some merit; nevertheless, VTrans wanted to develop a more scientific and systematic approach to locating wildlife crossings. To that end, VTrans, in collaboration with the VDFW, the nationally-recognized Keeping Track Inc., and Middlebury College research herpetologist Jim Andrews has developed an inter-agency Wildlife Crossing Team. Importantly, the VDFW has collected road crossing and mortality data for white-tailed deer, moose and black bear for nearly 20 years. This information, though insufficient in and of itself, will be used to help direct the efforts of this initiative.

VTrans' Approach

VTrans recognizes habitat connectivity as an important consideration in the development of transportation infrastructure. To date, VTrans has demonstrated this effort in a number of ways. VTrans Director of Program Development, David J. Scott, P. E., has been an active participant in Federal Highway Administration's (FHWA) explorations into the issues of ecological connectivity. He participated in the 2001 FHWA European Scan Tour, the Western Institute wildlife crossing Workshop in Banff in 2002, as well as the ongoing FHWA effort to develop a best practices manual for transportation agencies. As a primary decision maker within VTrans, Director Scott has identified habitat connectivity as an important agenda item for our agency, from a safety as well as stewardship perspective. Ultimately, efforts to consider wildlife crossings and habitat connectivity within the context of VTrans projects and programs is in keeping with our Agency's mission statement as it directs us "to maintain a transportation system that allows for the safe movement of people and goods in a cost-effective, environmentally sensitive and timely manner." The development of this Wildlife Crossing Team is occurring in an institutional climate that supports innovative initiatives and projects, some of which are described below.

Specifically, VTrans and VDFW have undertaken a number of efforts to reconnect, and/or enhance some areas of habitat affected by roads in Vermont. In 1993, as part of the construction of Vermont State Highway 289, also known as the Chittenden County Circumferential Highway, a divided concrete underpass was installed under the roadway to accommodate stream passage on one side and wildlife movement on the other. For a number of reasons, outlined in Wildlife Biologist John Austin's 2001 ICOET paper and presentation, this structure is, at best, a very limited success (Austin and Garland 2001). In addition to design and substrate concerns, the location of this structure is not ideal. Suburban sprawl development has encroached around the habitat that this structure was designed to connect. The placement of this structure was one of the motivating factors in developing the Wildlife Crossing Team. In the future, early evaluation of a potential location for a wildlife crossing structure should identify potential problems such as those at the VT 298 location. Additionally, this type of evaluation can be considered within the context of other potential locations so that wildlife road crossing sites can be prioritized.

In 2003 during the construction of the Vermont State Highway 279, also known as the Bennington Bypass, two bridges were extended well beyond the banks of the watercourses that they span in order to accommodate the movement of wildlife. Other wildlife crossing structures are planned for future segments of the Bennington Bypass. These wildlife corridors were identified by the VDFW who worked cooperatively with VTrans roadway designers and engineers to develop the final bridge designs.

VTrans has committed in concept, after much negotiation and collaboration with the VDFW and other State and Federal regulatory agencies, to the implementation of a permeability plan for the reconstruction of Vermont Route 78 in northwestern Vermont. This road bisects the Missisquoi National Wildlife Refuge. The permeability plan includes a 500-foot bridge that will allow for the movement of wildlife and restore ecological connectivity in an area identified as a significant and unique wildlife linkage area. Road alignment will be shifted away from the Missisquoi River in order to re-establish riparian habitat. Multiple large box culverts will allow for the passage of wetland-dependant furbearers, waterfowl, fish species and other aquatic organisms through deep rush marsh habitat. Finally, new openings in an adjacent railroad bed will be constructed to perforate that parallel wildlife barrier.

VTrans has also undertaken other habitat stewardship initiatives that are much less expensive than those described above. For instance, in 2002 and 2003 the VTrans Environmental Section, in collaboration with VDFW, has been experimenting with recycling of construction silt fencing as a temporary barrier to keep amphibians off of an extremely busy section of roadway that bisects the Sandbar Wildlife Management Area at Lake Champlain in northwestern Vermont. This initiative has reduced amphibian road mortality by more than 60 percent in the fenced sections.

Wildlife Crossing Team

During 2002 and 2003, VTrans earmarked some of Vermont's Federal planning (STP) and research (SPR) funds from the FHWA for the development and training of an inter-agency Wildlife Crossing Team. The team comprising of planners, designers, engineers, biologists, and environmental specialists, has been trained to identify the presence of wildlife and habitat along roads in Vermont where roadway improvements are scheduled or new roadways are planned. The Wildlife Crossing Team consists of 15 VTrans employees from diverse sections of the Agency and a rotation of several VDFW biologists who act as technical advisors. All members of the team went through a specifically designed training program that consisted of 10 sessions (8 field and 2 classroom) over the course of eight months. The design and implementation of the training was a true collaboration that involved VDFW, Keeping Track, Inc., and Jim Andrews from Middlebury College. The field trainings exposed the team to a diversity of landscape and habitat conditions for many taxa and species of wildlife. It focused on habitat conditions associated with roads as well as those not directly associated with roads.

A primary objective of this effort is to address public safety concerns related to animal/vehicle collisions. Wildlife/vehicle collisions in Vermont are frequent in certain parts of the state, and are most noticeable for deer, bear and moose since these species tend to cause the greatest damage and threat to property and lives of the traveling public. According to VDFW, there have been over 64 moose killed on Vermont highways since January 1, 2003. This number may actually be 25 percent higher than what has already been reported because of recording and reporting delays. One of those collisions resulted in a human fatality. The annual number of collisions with white tailed-deer in Vermont is approximately 4,000.

In addition to safety, one of the motivating factors for the development of this team is environmental stewardship. According to the EPA, between 1982 and 1992 development in the State of Vermont consumed 6,500 acres each year of undeveloped land. That number was expected to increase at the time that

information was reported. Vermont is experiencing significant development pressure, including sprawl development, at a rate of 2.5 times the rate of population growth. In addition, according to the Vermont Agency of Natural Resources, approximately 20 acres of wetlands are lost annually on top of a loss of at least 35 percent since European settlement. Other examples of the loss of significant wildlife habitat to development includes deer winter habitat, black bear feeding habitat, and the habitat for threatened and endangered species. Loss of important natural resources such as these is a concern for the long-term conservation of fish and wildlife in Vermont. Unrestricted loss of habitat and its attendant effects on the ability of some species of wildlife to survive affects the long-term viability of populations for some species that can result in extirpation or extinction.

Federal and State regulations and associated permits exist to insure that the impacts from transportation development do not unduly impact natural resources, among others. Compliance with permits is essential to achieve related conservation goals and public interests. However, compliance essentially means no net loss of resources, and in some instances that may be insufficient. Through this initiative the Wildlife Crossing Team is addressing ecological connectivity in situations where State or Federally listed threatened and endangered species and other regulated habitats are not involved, resulting in proactive conservation stewardship.

Vermont Department of Fish and Wildlife

The Vermont Department of Fish and Wildlife also holds the opinion and perspective that it is extremely important to address wildlife movement and ecological connectivity associated with transportation in Vermont. These issues have increasingly become an important component of VDFW's conservation responsibilities and efforts. Since 1990, VDFW has worked to incorporate wildlife movement considerations into Vermont transportation projects as evidenced by the circumferential highway underpass and research, the Bennington Bypass, and most recently the Vermont Route 78 project. Conservation planning at a variety of scales, including transportation planning, is becoming more crucial for state agencies to consider due to development pressures and their attendant effects on wildlife. As a result, the VDFW considers collaboration with VTrans as absolutely essential to properly address wildlife conservation and related public interests as well as public safety.

Similar to VTrans, VDFW has demonstrated a commitment to these issues as evidenced by their regular attendance and participation in many ICOET conferences. A VDFW wildlife biologist participated in the Western Institute Wildlife Crossing Workshop in Alberta, Canada in 2002. In addition, VDFW has offered a strong voice of support to Vermont's U.S. Senators for the reauthorization of the Federal Transportation Bill as it relates to wildlife conservation efforts in Vermont.

Wildlife biologists from VDFW collaborated in the development of this initiative and performed some of the training for the Wildlife Crossing Team. VDFW has served as a technical advisor in the development of this initiative and has performed much of the training in how to examine wildlife and habitat conditions in the context of roads in Vermont.

VDFW has worked to foster a strong collaborative relationship with VTrans through this effort and is an active part of the Wildlife Crossing Team. Data collected by the Wildlife Crossing Team will be reviewed and approved by experts from the VDFW. As such, the work will continue to be collaborative in nature, and have the scientific credibility of VDFW's review and approval. Representatives from VDFW serve as members of an inter-agency steering committee to direct this and other initiatives related to transportation and wildlife in Vermont.

Keeping Track, Inc.

VTrans established a contract with Keeping Track, Inc., a nationally recognized non-profit organization that trains groups in habitat monitoring and wildlife tracking. Keeping Track's monitoring and education programs focus on mammalian species in the following categories: area-sensitive carnivores, threatened and endangered carnivores, keystone species, and species with rapidly shifting populations. Their focus on these generally wide-ranging mammals provides a vital indicator of the ecological health of the landscape as a whole. In a series of meetings the Wildlife Crossing Team, working closely with Keeping Track staff, used the well-established Keeping Track data collection protocol to develop a transportation and wildlife data collection protocol that accounts for the unique environmental context of the state's transportation infrastructure.

Herpetological Concerns

From the start, it was recognized that an important consideration for the Wildlife Crossing Team should be reptiles and amphibians. To that end, research herpetologist Jim Andrews was hired to assist in the development and training of the Wildlife Crossing Team. Reptiles and amphibians are important populations to consider for a number of reasons, seven of which follow. First, there is a very large and growing body of

literature that documents the impacts of roads/traffic on herptile populations. Second, the limited range and multiple habitat requirements of herptiles make them particularly susceptible to habitat consumption, fragmentation, degradation, and direct mortality from vehicles. Third, annual movements to and from breeding, foraging, and over-wintering and denning areas, often require movements across roads. Fourth, local herptile population declines and extirpations as a result of drought, winterkill, other weather anomalies, disease, and anthropogenic disturbances require re-colonization movements which often times take the animals across roadways. Fifth, compared to many game and fur-bearing species, the small size of herptiles makes them difficult to see and avoid on the road surfaces. Four-toed salamanders, for example, are essentially invisible to motorists. Even larger reptiles such as ratsnakes and wood turtles are rarely seen and if seen, rarely avoided. Moreover, the relatively low speed of herptiles makes them particularly susceptible to road mortality. Sixth, the long lives and low productivity of many reptiles make them particularly sensitive to road mortality. And finally, road surfaces, because of their warmth, actually attract and hold some species, thus increasing the likelihood of mortality.

The data collection methodology imparted to the group by Jim Andrews included training in the techniques of night-time road searches (calling of frogs and crossing of amphibians) to be performed twice per month on a site, April through July, to determine significant use areas for all herps; and day-time road searches in September and October to determine snake crossing and basking areas. Mr. Andrews trained the group in identification techniques for herptiles and their egg masses as well as frog calls and choruses. Within selected project areas, efforts to increase permeability will be concentrated on road sections that have rare, threatened, or endangered species crossing; and sections of road where there are concentrations of more common species.

Goals of Inter-Agency Wildlife Crossing Team

One of the primary goals of this effort was to develop a data collection methodology that this team can implement on transportation projects in Vermont. This initial goal was met. A data collection protocol was established, and a team was organized and trained. The team will collect long-term data on habitat and wildlife movement associated with transportation project areas throughout the state.

An interagency steering committee was established to oversee and administer this effort and related wildlife and transportation initiatives. This steering committee will select appropriate projects for the Wildlife Crossing Team to survey, review the team's data collection, make recommendations for treatments as a result of the data gathering, and integrate wildlife crossing, transportation, and ecological connectivity issues. This is a unique strategy for fostering a strong inter-agency relationship. It allows both parties to collaborate on important projects and make decisions with the benefit of multiple perspectives and expertise.

An additional goal that was realized during the development and training of the Wildlife Crossing Team was improved interagency coordination on transportation planning and environmental regulation as it relates to wildlife conservation through collaboration, education, and information. We have collectively accomplished this, and are continuing to move forward with other inter-related initiatives. Collectively, VTrans and VDFW have gained a greater sense of understanding and appreciation for the responsibilities of each respective organization, what each organization does and why they do it.

Conclusions and Future

Ultimately, we accomplished what we set out to do. Collectively, we developed a new survey and data collection technique based, in part, on the Keeping Track model of habitat monitoring.

Since the conclusion of this training, the steering committee has deployed the group to survey several sites around Vermont. In particular, the group will investigate cattle crossings installed on Interstates 91 and 89 that are no longer being used for agricultural purposes. The question we intend to answer is whether wildlife use these passages. Information from this effort will be used to decide whether to investigate these structures further for their value in connecting habitat and reducing wildlife road mortality and vehicle collisions. Additionally, areas along the spine of the Green Mountains associated with major road barriers will be investigated to identify or confirm linkage areas for wildlife. These areas may be identified as priority candidates for wildlife crossing structure investments.

Another important and related initiative involves the development by VDFW of a statewide GIS database for wildlife road crossing, habitat and transportation planning. VTrans is funding a grant proposal by VDFW to complete the development of this statewide GIS database of wildlife habitat, road crossing, road mortality, and transportation information. This database will be utilized in conjunction with landscape data to perform a statewide linkage area analysis. Significant linkage areas associated with highways and town roads will be identified. Moreover, VTrans is currently proposing to utilize STP and SPR funding to develop a pilot

project to investigate aquatic organism passage through State-maintained large culverts. As other states have done, VTrans and VDFW hope to become leaders in performing environmental and transportation planning in a way that is pragmatic, cooperative, and effective. VTrans and VDFW firmly believe, based on our recent collaborative efforts, that through cooperation, we stand to accomplish a great deal more for all the interests we are responsible for, i.e., Vermont's environment, wildlife safety, human safety, fiscally responsible infrastructure decisions. Ultimately, all of this work will allow VTrans and VDFW to make better and more informed decisions and investments in roadway permeability.

Biographical Sketches: Chris Slesar is an environmental specialist at the Vermont Agency of Transportation. He has an M.A. in Environmental Studies from Antioch University Seattle.

Jim Andrews is a research herpetologist at Middlebury College. He serves as chair of the Vermont Reptile and Amphibian Scientific Advisory Group, and is coordinator of the Vermont Reptile and Amphibian Atlas.

John Austin is a senior wildlife biologist with the Vermont Dept. of Fish and Wildlife. John is responsible for administering the department's Habitat Assessment Project, which deals with inter-agency coordination and impacts to wildlife and habitat from development.

Susan C. Morse has studied carnivores and their uses of habitat in the northern forest, southwest, and Rocky Mountains for more than 30 years. Her focus has been on wild felids and black bear. She founded Keeping Track, Inc., in 1994, and today serves as the organization's research and program director.