

WILDLIFE MANAGEMENT ON ARTERIAL HIGHWAYS IN NEW BRUNSWICK

Mike Phillips

Department of Transportation, New Brunswick, Canada

Abstract

Over the last twelve years the province of New Brunswick has aggressively been developing a system of four lane highways within its primary arterial highway corridors. During that period as well, the department through a more proactive approach to the environment and responding to more environmental legislative and regulatory requirements, has developed a close working relationship with other departments, such as Environment and Natural Resources and Energy. This approach has been very successful in dealing with many diverse environmental issues, one of which has been wildlife management facilities throughout the province. The planning process has built into it a component of avoidance of critical habitat. This approach is part of the departments overall Environmental Protection Plan. To date two projects one in the Sussex area and the other in Lepreau have been constructed to project wildlife as well as the travelling public. One other project, the Fredericton-Moncton Highway Project currently under construction will include a significant amount of wildlife management facilities. A fourth project, Perth-Andover to Woodstock, which will be constructed a number of years from now contains a significant amount of moose habitat that will be a prime consideration at that time. A number of operational issues, as with any facility like this require annual maintenance. The existing structures at both Sussex and Lepreau have experienced drainage problems which in turn have caused icing problems in the winter and on into the spring. The two existing facilities have cost excess of five million dollars. The two additional projects will undoubtedly far exceed this figure in the future. To evaluate these facilities a monitoring program is essential to indicate usage and identify operation issues that not have been addressed in the original design. This paper is intended to give an overview into the approach to wildlife facilities in New Brunswick.

Introduction

Conflicts between the motoring public and wildlife have been a common occurrence on highway systems throughout the world since the advent of the automobile. At the same time, some species of wildlife have experienced a growth in population with reductions in hunting activity, climatic changes and a reduction in freight being transported by rail.

Society's desire to have the ability to move more people, goods, and services over existing and new highway infrastructure at higher speeds increases the potential for wildlife/vehicular collisions. The increased concern for the environment combined with the safety mandate of departments of transportation has resulted in efforts to provide facilities to protect the travelling public and wildlife in areas of significant wildlife populations.

There has been a concerted effort over the past 10-15 years in New Brunswick to upgrade the primary arterial highway system to a 4 lane divided highway. The primary focus has been on Route 1 (U.S. border to Route 2 at Sussex) and Route 2, Trans-Canada Highway, (Quebec border to the Nova Scotia border).

Improvements to environmental legislation over the same time period have resulted in efforts to reduce potential conflicts between highway traffic and wildlife. The focus on reducing vehicle/wildlife conflicts has come about as a result of concerns raised both by the public and regulatory departments and agencies that review plans for new highway corridors, as well as within DOT itself. The concerns are primarily related to the higher design speeds (110 km/hr or 68 mi/hr) on new corridors. The New Brunswick Department of Natural Resources and Energy feels that the issue is one of highway safety rather than one of population management.

Wildlife issues are normally identified early in the planning process through a constraint mapping exercise. The initial attempt at mitigation is one of avoidance of higher populated areas, prime habitat areas, or travel corridors. When avoidance is not possible, other mitigation such as wildlife fencing and associated underpass structures are considered.

There are currently two major highways within New Brunswick that have wildlife fencing and underpasses in place. These projects include Route 1 - Lepreau By-pass and Route 2 B Sussex to Five Points. Within three years a third project will include another a major section of wildlife fencing and underpasses. This segment is the Fredericton BMoncton Highway Project (FMHP). Within eight to fifteen years a fourth corridor located in the northwestern part of the province will impact a significant amount of moose habitat when it is developed. This corridor will be another segment of Route 2 from Perth-Andover to Woodstock. The cost for wildlife mitigation for these four projects will most probably exceed 20 million dollars.

New Brunswick is a province of Canada, approximately 74,000 square km in area with a human population of approximately 762,000, a deer population in the range of 80,000 to 100,000 and a moose population estimated at 25,000. New Brunswick would be slightly smaller than Indiana and Maine in comparison. Figure 1 illustrates the project and their locations within the Province of New Brunswick.

Methodology

The approach to wildlife issues related to arterial highway corridors has been developing over the last 10-15 years through a joint approach primarily between the provincial government Departments of Natural Resources and Energy (DNRE), and Transportation (DOT).

Generally the process begins with DOT developing and mapping a highway corridor up to one kilometer (0.61 miles) in width that would meet the departments guidelines on grades (maximum of 5 %) and curvature (minimum of 750 m radius). Once an acceptable corridor has been established and agreed to at the planning level, it is distributed to a number of provincial and federal departments and agencies for review. This group reviews the corridor location and provides information on various constraints such as sensitive wildlife habitat, plant or aquatic environmentally significant areas, agricultural lands, rare and endangered animal and plant species, Appalachian hardwood forest remnants, etc.

The information retrieved from the reviewing departments and agencies is used to further refine the corridor from 1000 meters down to 110 to 160 meters in width. Constraints have become a major component in the exercise of locating new highway alignments with avoidance where possible being a prime consideration. This is the approach that is indicated in the planning section of the department's Environmental Protection Plan. The project as it is developed undergoes continuous reviews and changes within the Arterial Highway Planning Unit (AHPU). Various committees within management further review the project until it finally reaches Senior Management level, which includes Senior Executives and the Minister of Transportation. After a thorough review and approval by Senior Management the AHPU is given authority to take the project to the local Member of the Legislative Assembly (MLA) and the public for review.

After the public review, any reasonable request to make changes to the alignment for reasons associated with personal property impact and environmental issues is reviewed on its merit. Major project changes require Senior Management approval before they are included in the project. Once

all the issues have been resolved the department gives final approval to the proposed project. It then can be registered with the Department of the Environment (DOE) for Environmental Impact Assessment (EIA) under regulation 87-83 of the Clean Environment Act.

The Department of the Environment has a Provincial Review Committee, made up of both provincial and federal departments and agencies that review projects that affect their mandate.

Each member of the review committee thoroughly evaluates the proposed alignment and makes a recommendation to the DOE on whether or not a full environmental impact assessment is warranted. If a full assessment is not required the committee in their evaluation will determine what environmental studies are required before a recommendation on the environmental assessment is issued. The studies may be in the areas of aquatic surveys, archaeology, water extraction, terrestrial surveys (habitat, vegetation, birds, mammals, and herpetiles), etc. Issues that arise with respect to deer and moose and their habitat are evaluated by DNRE through this provincial environmental review committee. Again it should be reiterated that the development of new arterial highways within the province has never been viewed as a wildlife management issue by DNRE, but rather a safety issue that DOT needs to deal with as part of its mandate.

When the studies have been finalized, the Minister of the Environment issues a Letter of Determination (environmental approval) based on recommendations by the provincial review committee. This process screens the project out of the environmental assessment phase. A number of conditions are usually attached to the determination that requires the DOT to carry out specific mitigation or other specific activities at various stages of the project. Conditions related to wildlife may be a specific condition of approval.

The Sussex area project and the Lepreau By-Pass each had a condition of approval requiring DOT to work closely with DNRE on an approach in managing ungulate movement patterns and providing appropriate safety enhancement measures. This co-operative effort in developing an approach to ungulate movement patterns was well in place prior to the Determination for these projects. It was through this joint effort that these facilities were located. Table 1 illustrates the physical aspects of these projects such as project length, length of habitat affected along the highway, the number of structures (associated with wildlife passage), the length of wildlife fencing, and the spacing of one-way gates.

A third project is the Fredericton-Moncton Highway Project (FMHP), which is approximately 195 km in length. It contains approximately 36 km of highly significant deer habitat in the Coles Island to Havelock section of the overall project. The amount of fencing proposed covers only one-half of the area in question. The fencing will be used to direct deer toward the underpasses in areas identified as travel corridors. Table 1 also illustrates the physical aspects of this project.

TABLE 1

	Sussex	Lepreau	Coles Is. B Have.
Length (km)	22	7.4	46
Habitat (km)	16	6	36
Structures	8	4	14
Fencing (km)	27	15.6	36
Gate Spacing (km)	0.5 B 1.0	0.5 B1.0	?

The FMHP to date is the only highway project out of more than fifty projects to be screened in for a full EIA. This project is now a public-private partnership with an approximate cost in the area of 600 million dollars. The EIA completed in March 1996 indicated that, the western habitat of the section between Coles Island and Moncton contained critical habitat. The EIA indicated that migration of wildlife would take place across the corridor.

The EIA also indicated that mitigative measures would not be recommended until future information on deer populations and movements were available. One year later DNRE, in conjunction with a number of stakeholders completed a study titled, A Deer Movements Across the Trans-Canada Highway Corridor in the Coles Island to Havelock Section. This report covered deer movement patterns and deer migration timing, by using 63 deer fitted with radio collars. An aerial survey as part of the study indicated a population in the study area of approximately 1500 deer. Based on this number and the distribution of collared deer it was estimated that there may be as many as 840 deer crossing the new highway corridor more than two times each winter. A DNRE wildlife biologist believes that as many as 1000 deer could cross the highway corridor many times during the winter because of the storm events and mild periods that typically characterize winter conditions in southern New Brunswick.

As a result of this study it was recommended by DNRE that DOT should pursue options to mitigate wildlife (deer) impacts in this corridor, with full technical assistance being available from DNRE. DOT in consultation with DNRE developed a system of fencing and structures to accommodate wildlife passage under the new highway. This approach is currently being incorporated into the project.

Once the project is operating, monitoring will be required to determine the effectiveness of the fencing on directing wildlife to the underpasses. This information will be used to assess the possible need for expanding these facilities.

A fourth area of concern, which is near the end of the planning phase, is a 70 kilometer section of new highway proposed from Perth-Andover to Woodstock. The majority of the alignment between Perth-Andover and Woodstock is located within a prime agricultural region of the province. Fourteen grade separations and four interchanges will be part of this project. This section is characterized by a significant amount of moose habitat, approximately 29 km total. The project has not yet been registered for an environmental assessment. Undoubtedly this type of habitat will be an important part of the overall assessment and present significant challenges related to mitigation and funding for wildlife management. No funding for the overall project has yet to be established which has been estimated at approximately \$215 million.

Costs

The decision to install a system of fencing and engineered structures to facilitate the passage of wildlife from one side of a highway corridor to the other involves the commitment of significant capital resources. The fencing used thus far on the Sussex and Lepreau is a Frost quality high tensile Wildlife Fence, style 2096, 12 gauge 2440 mm wide. Fence posts are steel, hot dipped, galvanized conforming to ASTM A-53-89a, Schedule 40 in lengths 3 and 3.6 meters, and one-way gates with galvanized steel tines. One-way gate openings are 2.5 meters wide by 2.5 meters high. Structures on the Sussex and Lepreau projects are mainly Structural Plate Corrugated Steel Pipe Arch. Structures from Coles Island to Havelock will primarily be open span structures because of topography and constraints related to aquatic habitat. A portion of the cost of these structures is therefore a result of wildlife passage.

A three to five meter walking path will be included beneath each structure. Table 2 illustrates details on the projects, which have been constructed, as well as estimates for the Coles Island to Havelock area, which is in the early stage of design. The Perth-Andover to Woodstock section is in the final phases of the planning process and significant information on costing is therefore, not available.

TABLE 2

	Sussex (millions)	Lepreau (millions)	Coles Is. B Have. (millions)
Structures	3.4	0.4	3.0*
Fencing	0.9	0.6	4.2**
Total	4.3	1.0	7.2
Cost/km	0.31	0.13	0.38
Cost/mile	0.51	0.21	0.61

*Rough estimate

** Based on average cost for Sussex and Lepreau

Issues Relate to Installation

The installation of fencing and underpass structures presented a number of challenges in establishing controls to wildlife movements. The primary problems associated with both the Lepreau and Sussex areas were ones of drainage and ice build-up within the structures, and the cutting of fencing by both snowmobile and ATV operators. Fence posts and the hinges for the tines on the one-way gates continue to be maintenance issues because the fence posts tend to heave from the frost action and hinges tend to stick because of the cold weather and exposure to the elements.

The ice build up was a result of structure location. Structures were located in fill areas, and therefore the entrances and exits for each was often lower than the existing ground. It was realized during design that drainage would be an issue, so design features were included to direct water away from the bottoms of the structures. However, those efforts were less successful and water did enter into the structures creating massive sheets of ice. The ice sheets, up to 60 cm (2 feet) thick often remained in the structures well into late spring and continued to be a barrier to wildlife travel. Deer would not or could not use them. DNRE regional biologists were becoming concerned about the icing problem, because it could produce serious injury and death to deer or moose that might attempt to venture through the structure. These animals were also being cut-off from their spring ranges.

At Lepreau a major problem occurred in 1996-98 where deer entered the right-of-way at the open ends and at interchange locations. Deer were enjoying the lush grass inside the fencing until passers-by began stopping to admire them. This panicked the animals and caused them to charge the fence in an attempt to escape. They continued this action until they exhausted or seriously injured themselves to the point where they either died or had to be put down. In the panicked state the deer were running past one-way gates apparently unable to recognize them as escape routes. A number of animals died as a result of this problem.

Resolution of Problems

To resolve the drainage problem DOT constructed an earth berm through the structures that would provide gravel surface on which the animals could walk even if some icing problems reoccurred. Additional work at the ends of the structures also further assisted in directing water away from the area to reduce ice build-up.

To resolve the fence-cutting problem DOT met with the local snowmobile club, responsible for developing and maintaining snowmobile trails in the area. They routed their trails to one of the wildlife structures. ATVs now also use the structures to cross the right-of-way, particularly now that the highway is in operation.

DOT also attached signs to the fencing to encourage both operators of snowmobiles and ATV users not to disturb the integrity of the fencing and that there was a wildlife study taking place in the area. This seems to have been effective in reducing the amount of damage caused to the fencing.

Fence posts being lifted by frost action is a continuous problem. The approach to date is to check the posts in the spring after the frost is out of the ground and re-drive them, if they don't settle back into place on their own.

The hinges for the tines on the one-way gates tend to stick open after being exposed to the weather for a period of time or during the winter. It has been recommended that the department maintain these hinges with Chevron low temperature Arctic grease or equivalent.

The issue regarding deer being injured and dying on the fencing was resolved by closing the openings at the ends of the fencing and at the interchange. In both areas the fencing was attached to the guardrail. The only openings that exist now are the road surfaces themselves. Since this action has been taken deer entering the right-of-way from the ends and at the interchange area has been virtually eliminated. The areas around the one-way gates are currently under review to determine if modifications can be made to make the system work more effectively.

Monitoring

To measure the effectiveness of any facility requires a follow-up monitoring program to verify its overall functionality. DOT hired a consultant to undertake wildlife monitoring from the winter of 1996 until the fall of 1997. Monitoring was carried out for both, Route 1 B Lepreau By-Pass and Route 2 B Sussex to Five Points. The objectives of the study were to develop and carry out a monitoring program of ungulate movement and establish additional wildlife fencing requirements associated with the underpasses in Sussex area and the Lepreau By-Pass.

At Lepreau there has been a steady growth in the use of the facilities by deer and moose passing through the underpasses. This project has been open since 1996. At the Sussex to Five Points site, there has also been evidence of increased use of the wildlife crossings. The total project was not completed until the summer of 1997, therefore there has been a relatively short period for the animals to adjust to travel patterns.

A slightly modified monitoring program has been extended to the spring of 2000 to further report on usage of the facilities by wildlife.

Future Challenges

The development of new four lane arterial highways brings many challenges because of a more regulated or proactive approach to environmental protection. The future DOT challenge for wildlife management of wildlife movement will be the new highway from Perth-Andover to Woodstock.

Because of the other constraints, such as topographic features, agricultural land, remnants of the Appalachian Forest, environmentally significant areas, development, etc. it has been very difficult to avoid a significant amount of moose habitat. The funding for wildlife management will be expensive and it will be a significant issue to be dealt within a highway financial program. Costs will likely run into the millions of dollars for fencing alone using the current approach.

Additional work and research will need to be carried out regarding moose, their habitat, and their interaction with highway infrastructure.

Maintenance funding for this infrastructure will also be an important challenge as the allocation of highway maintenance money is constantly under pressure. If maintenance issues are allowed to slip over the long-term, wildlife facilities will eventually become ineffective.

Conclusion

Continued traffic growth and higher speeds will require that DOT, because of its mandate to provide safe highways for the public, provide mitigation in areas of high concentrations of significant wildlife populations, so as to prevent or substantially reduce vehicle/animal collisions.

Monitoring will be important in existing and future projects to determine usage and allow an evaluation of the benefits of the wildlife management program. Further study and/or research will be required to meet future challenges in new highway corridors containing significant wildlife habitat and populations.

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