US 93 Post-Construction Wildlife-Vehicle Collision and Wildlife Crossing Monitoring and Research on the Flathead Indian Reservation between Evaro and Polson, Montana

Quarterly Report 2010-3

by

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EXECUTIVE SUMMARY

This report contains a brief description of the progress on the tasks for the US93 wildlife mitigation evaluation project on the Flathead Indian Reservation between Evaro and Polson, Montana. The mitigation measures consist of wildlife fencing combined with wildlife underpasses and overpasses, jump-outs, and wildlife guards at access roads. The research objectives relate to investigating the effect of the mitigation measures on human safety (an expected reduction in wildlife-vehicle collisions), habitat connectivity for wildlife (wildlife use of the crossing structures), and a cost-benefit analysis for the mitigation measures. This report documents the work conducted 1 July 2010 and 30 September 2010.

In this quarter, additional wildlife cameras were purchased and installed at the crossing structures, including in the Evaro section, with monitoring beginning immediately after installation. Sand tracking beds were installed at the jump-outs in the Evaro section, and outside four crossing structures with monitoring starting in August. The tracking beds outside four structures allow for calibration of the post-construction data with the preconstruction data as the latter depended on tracking beds exposed to the elements. Deer pellet group counts were conducted in August and September in the Ravalli Curves and Ravalli Hill area.

1. INTRODUCTION

1.1. Background

The US Highway 93 (US 93) reconstruction project on the Flathead Indian Reservation in northwest Montana represents one of the most extensive wildlife-sensitive highway design efforts in North America. The reconstruction of the 56 mile (90 km) long road section includes the installation of 41 fish- and wildlife crossing structures, 2 underpasses for live-stock, 1 bicycle/pedestrian underpass, and approximately 8.3 miles (13.4 km) of road with wildlife exclusion fencing on both sides (excluding future mitigation measures in the Ninepipes wetland area). The mitigation measures are aimed at improving safety for the traveling public through reducing wildlife-vehicle collisions and allowing wildlife to continue to move across the landscape and the road. Other examples of relatively long road sections in North America with a high concentration of wildlife crossing structures and wildlife fencing are I-75 (alligator alley) in south Florida (24 crossing structures over 40 mi; Foster & Humphrey 1995), the Trans-Canada Highway in Banff National Park in Alberta, Canada (24 crossing structures over 28 mi (phase 1, 2 and 3A); Clevenger *et al.* 2002), State Route 260 in Arizona (17 crossing structures over 19 mi; Dodd *et al.* (2006)), and I-90 at Snoqualmie Pass East in Washington State (about 30 crossing structures planned over 15 mi; WSDOT 2007). Both the road length and number of wildlife crossing structures of US 93 on the Flathead Indian Reservation makes it the most extensive mitigation project of its kind in North America to date. If the section of US 93 south (south of Missoula, Bitterroot valley) is included, the mitigation measures along US 93 are even more substantial.

The magnitude of the US 93 reconstruction project and associated mitigation measures provide an unprecedented opportunity to evaluate to what extent these mitigation measures help improve safety through a reduction in wildlife-vehicle collisions, maintain habitat connectivity for wildlife (especially deer (*Odocoileus* spp.) and black bear (*Ursus americanus*)), and what the monetary costs and benefits are for the mitigation measures. In addition, the landscape along US 93 is heavily influenced by human use. This is in contrast to the more natural vegetation along most of the other road sections that have large scale wildlife mitigation in North America. As the roads with most wildlife-vehicle collisions are in rural areas, the results from the US 93 project are expected to be of great interest to agencies throughout North America (Huijser *et al.* 2008).

In 2002, prior to US 93's reconstruction, the Western Transportation Institute at Montana State University-Bozeman (WTI-MSU) was funded by the Federal Highway Administration (FHWA) and the Montana Department of Transportation (MDT) to initiate a before-after field study to assess the effectiveness of the wildlife mitigation measures and to document events and decisions that shaped the process of planning and designing the mitigation measures. Preconstruction field data collection efforts were completed in the fall of 2005 and a final report on the preconstruction monitoring findings was published in January 2007 (Hardy *et al.* 2007).

In 2010 MDT contracted with WTI-MSU to conduct the post-construction research with regard to the effectiveness of the mitigation measures. For this project, the Confederated Salish and Kootenai Tribes (CSKT) act as a subcontractor to WTI-MSU.

1.2. Objectives

Consistent with the direction provided by MDT, the project has the following objectives:

- Investigate the effect of the mitigation measures on human safety through an anticipated reduction in wildlife-vehicle collisions;
- Investigate the effect of the mitigation measures on the ability to maintaining habitat connectivity for wildlife (especially for deer (white-tailed deer [*Odocoileus virginianus*] and mule deer [*Odocoileus hemionus*] combined) and black bear (*Ursus americanus*) through the use of the wildlife crossing structures; and
- Conduct a cost-benefit analyses for the mitigation measures.

This document is the third in a series of quarterly reports detailing the progress on these tasks.

1.3. Milestones

This project covers a period of 5.5 years (15 January 2010 – 30 June 2015). The table below provides an overview of the most important milestones.

Table 1: Overview of Milestones.

Description Milestones	Date accomplished
Contract signed between MDT and WTI-MSU and in effect	15 January 2010
Kick-off and 1st technical panel meeting	2 February 2010
Subcontract signed between WTI-MSU and CSKT	13 May 2010
Subcontract in effect between WTI-MSU and CSKT	15 April 2010
Field visit and presentation preliminary data 2008-2010 for technical panel	24 June 2010

1.4. Related Activities

Jeremiah Purdum is taking classes at University of Montana in Missoula, and Len Broberg of the Environmental Studies Program will most likely be the chair of his committee as he pursues his Master of Science degree. His research topic is on various aspects of the US 93 research project, but with an emphasis on presence, abundance and behavior of animals in the landscape surrounding the wildlife crossing structures and how these factors can help us get a better understanding of what the appropriate type and dimension of crossing structures is for selected species, and the importance of their location in the landscape.

WTI-MSU was awarded a $3,000 grant by Y2Y for education and outreach activities related to the US 93 project. Kylie Paul is coordinating these activities through Defenders of Wildlife and has provided draft brochure for review by MDT on 23 September 2010. Comments from MDT on the draft brochure were received on 30 September 2010.

CSKT received a Tribal Wildlife Grant (TWG) from the US Fish and Wildlife Service. About $40k of this grant will be dedicated to activities and materials related to the investigation of the effectiveness of the mitigation measures along US 93 (personal communication Dale Becker, CSKT).

2. MITIGATION MEASURES AND HUMAN SAFETY

No activities regarding human safety data analyses took place in this quarter.

WTI will request the new safety data from MDT by 1 March 2011. These data should include crash and carcass data through 2010, with additions for carcass data from the preceding years, especially 2008 and 2009 (see Huijser *et al.* 2010).

3. MITIGATION MEASURES AND HABITAT CONNECTIVITY FOR WILDLIFE

3.1. Road Sections with Continuous Fencing and Crossing Structures

The preconstruction research measured the number of animals, especially deer and black bear, that crossed the road before the road was widened and before the mitigation measures were put in place. For this purpose dozens of tracking beds (100 m long, 2 m wide) were installed along the road, covering about 30% of the road sections that would later be fenced. Now that the road has been widened and the fences and crossing structures are in place, the animals can only cross the road by using the underpasses (although some animals may cross wildlife guards or climb fences). The wildlife use of the underpasses is measured through wildlife cameras. Because cameras may have a different detection probability for wildlife than sand tracking beds, a relationship between crossings measured through camera images and crossings measured through tracking beds must be established. Therefore 4 crossing structures have a tracking bed placed outside the structures (exposed to the elements, similar to pre-construction methods). These 4 crossing structures have a relatively high use by deer and black bear, which should result in a high enough sample size to establish this relationship.

There are several wildlife guards (similar to cattle guards) to discourage ungulates from entering the fenced road corridor at access roads. Wildlife guards that receive relatively little use by humans are monitored to measure how much of a barrier they really are to different wildlife species. Two structures were monitored starting in 2008. Additional structures for monitoring were selected in summer 2010.

Animals that do end up in the fenced road corridor may escape by using one of the jump-outs. These jump-outs allow animals to walk up to the height of the fence and then jump down to safety. Ideally, the jump-outs should be low enough so that animals readily jump down to safety but high enough to discourage them from jumping into the fenced road corridor. To investigate appropriate jump-out height, jump-outs in the Ravalli Curves and Hills sections have already been monitored through tracking since 2008 (summer only). Fortunately relatively few animals end up in the fenced road corridor, but this also means it takes time to collect a high enough sample size. In summer 2010 the jump-outs in the Evaro section were included in further monitoring. One of the jump-outs also has a camera installed.

Activities:

- Reconyx cameras (PC 900 Hyperfire) were ordered, received and installed at crossing structures (partial replacing some older models, partial new installation, e.g. in Evaro section), mostly in August 2010.
- Images of wildlife using wildlife structures were made into “near video” files that show a selection of wildlife species going through the structures. The images can be viewed at: http://www.mdt.mt.gov/research/projects/env/wildlife_crossing.shtml
- Reconyx cameras (PC 900 Hyperfire) were ordered, received and installed at wildlife guards.

- With MDT's help, sand was deposited at the top and bottom of the 23 jump-outs in the Evaro section on 20 July 2010. The beds were raked and weekly tracking on some beds started on 4 August 2010. Monitoring of all 23 jump-outs in the Evaro section started on 18 August 2010.
- With MDT's help sand was deposited at 4 crossing structures on 20 July 2010 (RC 396, RC 427, RC 432, RH 459). The beds were raked and tracking (twice per week) started on 9 August 2010.
- Deer pellet group counts were conducted in the Ravalli Curves and Ravalli Hill section between 23 August and 15 September 2010.

The status of the field work and the dates or periods that data were collected are summarized in Table 2.

Table 2: Activities Road Sections with Continuous Fencing and Crossing Structures.

Description Activities	**Date or period monitored**
Crossing Structures Ravalli Curves and Ravalli Hill	
Tracking on tracking beds in the wildlife crossing structures in Ravalli Curves (9 wildlife crossing structures) and Ravalli Hill (2 wildlife crossing structures) took place from May 2008 until 26 February 2010. These data were supplemented by images from a limited number of cameras.	23 May 2008 – 26 February 2010
Wildlife cameras were installed at all remaining crossing structures in Ravalli Curves and Ravalli Hill. The cameras, battery status and memory card status were checked once a month from 26 February 2010 onwards. Tracking in the structures coincides with the camera checks, and is supplemental to the images from the cameras from this date onwards. Note: most of the cameras were positioned outside the structure to be able to collect data on animal behavior as they approach the crossing structures.	26 February 2010 - present
The structures RC 396, RC 427, RC 432, and RH 459 had a tracking bed installed outside the structures. Tracking, twice a week, on the beds outside as well as inside the structures took place between 9 August 2010 and 2 November 2010.	9 August 2010 - 2 November 2010.
Crossing Structures Evaro	
Partial coverage wildlife overpass (partial coverage with 4 cameras; 6-29 July) (full coverage 1 approach with 7 cameras; 29 July- 18 August, full coverage both approaches 8 August-present).	6 July 2010 – present
Montana Rail Link underpass (partial coverage with 2 cameras 8 September 2010) full coverage from 18 September 2010 onwards.	18 September 2010 - present
The other structures in the road section with continuous fencing in Evaro had cameras installed 3 September 2010 with full coverage from 8 September 2010 onwards	8 September 2010 - present

Wildlife guards	
Maintenance of the two wildlife cameras at two wildlife guards in Ravalli Curves section took place on a biweekly basis from July 2008 until 26 February 2010.	July 2008 – 26 February 2010
Maintenance of the two wildlife cameras at two wildlife guards in Ravalli Curves section continued on a monthly basis from 26 February 2010 onwards.	26 February 2010 - present
Jump-outs	
Tracking beds in Ravalli Curves and Ravalli Hill were monitored from May 2008 until September 2009 (summer only).	July 2008 – September 2009
Tracking beds were restored (removal weeds, fluffing sand on tracking bed) in Ravalli Curves and Ravalli Hills (29 jump-outs in total) on 13 June 2010. Monitoring continued on a weekly basis until 8 November 2010. Further monitoring to start in May 2011.	13 June 2010 – 8 November 2010
Tracking beds were installed in the Evaro section on 20 July 2010. Monitoring took place on a weekly basis between 4 August 2010 and 2 November 2010. Further monitoring to start in May 2011.	4 August 2010 - 2 November 2010.
Maintenance of the one wildlife camera at one jump-out continued on a biweekly basis until 26 February 2010.	July 2008 – 26 February 2010
Maintenance of the one wildlife camera at one jump-out continued on a monthly basis from 26 February 2010 onwards.	26 February 2010 - present
Pellet group counts	
Pellet group counts were conducted in the Ravalli Curves and Ravalli Hill section between 23 August and 15 September 2010	23 August 2010 - 15 September 2010

3.2. Road Sections with Isolated Underpasses

A large part of North America consists of landscapes heavily altered and used by humans. Wildlife-vehicle collisions still occur in such landscapes, and such landscapes may also be important for nature conservation. However, because of the human use and presence long sections with wildlife fencing are not always possible or appropriate. While crossing structures may still allow for safe crossings by wildlife, there may only be limited fencing, or sometimes no fencing, associated with such structures. Ten of such "isolated" structures are monitored for this project to evaluate their effectiveness. The structures and periods they were monitored are listed in Table 3.

Activities:

- Continued monitoring of the isolated structures.

Table 3: Isolated Structures Monitored.

Structure name	Date or period monitored through December 2009	Date or period monitored from 1 Jan 2010 onwards
North Evaro	None	6 July 2010 – present
Schley creek	None	29 June 2010 – present
Pistol creek 1 (station 498+55.7)	November 2007-1 January 2008 27 August 2009- 31 December 2009	1 January 2010 – present
Pistol creek 2 (station 501+63)	August 2009- 31 December 2009	1 January 2010 – present
Mission creek (station 528+90)	September 2009 – 31 December 2009	1 January 2010 – present (south bank)
Post creek 1 (station 550+56.6)	November 2007 - May 2009	29 June 2010 – present
Post creek 2 (station 555+06)	November 2007 – October 2008 January 2009 – May 2009 August 2009 – 31 December 2009	1 January 2010 – present
Post creek 3 (559+98.4)	November 2007 – 31 December 2009	1 January 2010 – present
Spring creek 1 (774+00)	May 2009 - December 2009	1 January 2010 – present
Spring creek 2	None	11 March 2010 – present
Mud creek	23 June 2009 – 23 July 2009	None

3.3. Anticipated Activities 4th Quarter 2010

1. Install cameras at 2 additional wildlife guards.
2. Install cameras at selected fence ends.
3. Install 1 camera at human access point.

4. COST-BENEFIT ANALYSIS

No activities regarding cost-benefit analysis took place in this quarter.

WTI anticipates collecting data on the costs for planning, construction, and maintenance from MDT in the 4th quarter of 2010.

WTI recognizes that not all data may be available at that time yet, and additional data will be collected later during the course of the project.

5. OTHER FINDINGS

No specific other findings to report.

6. SCHEDULE AND BUDGET

The planned and the actual schedule through 2011 are shown in Table 4. The percentage completion for each task is shown in Table 5.

Table 4: Planned Schedule through 2011.

	2010				2011			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1. Deer and black bear vehicle collisions								
Summary crash and carcass data through 2009								
2. Wildlife use of underpasses								
Cameras operational structures RC and RH								
Cameras operational structures EV								
Cameras operational isolated structures								
Tracking beds operational outside 4 structures								
Cameras operational fence ends								
Cameras operational 2 guards RC								
Cameras operational additional guards								
Camera operational at people access point RC								
Camera operational 1 jump-out								
Tracking beds operational jump-outs RC and RH								
Tracking beds operational EV								
Deer pellet group counts								
3. Cost-benefit analyses								
Obtain cost data from MDT								

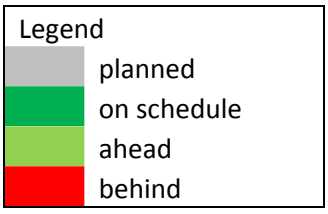

Table 5: Percentage Complete.

Task	Planned Percentage complete	Actual Percentage complete
1. Deer and black bear vehicle collisions	15%	15%
2. Wildlife use of underpasses	15%	15%
3. Cost-benefit analyses	0%	0%

The monitoring of fence ends, additional wildlife guards, and the people access point was not a priority compared to monitoring the structures in the three areas with continuous fencing and the 10 isolated structures. Time was taken to select suitable locations for the fence ends and wildlife guards (minimize theft and vandalism risks). Soil conditions permitting, cameras will be installed at these points in 4th quarter.

Through 30 June 2010 the amount spent on the MDT account for the project was $29,790 (Figure 1). This was less than the $74,815 budgeted. The difference is explained by bills that have not been received yet (e.g. from CSKT) and slight delays compared to the original anticipated start date of the project.

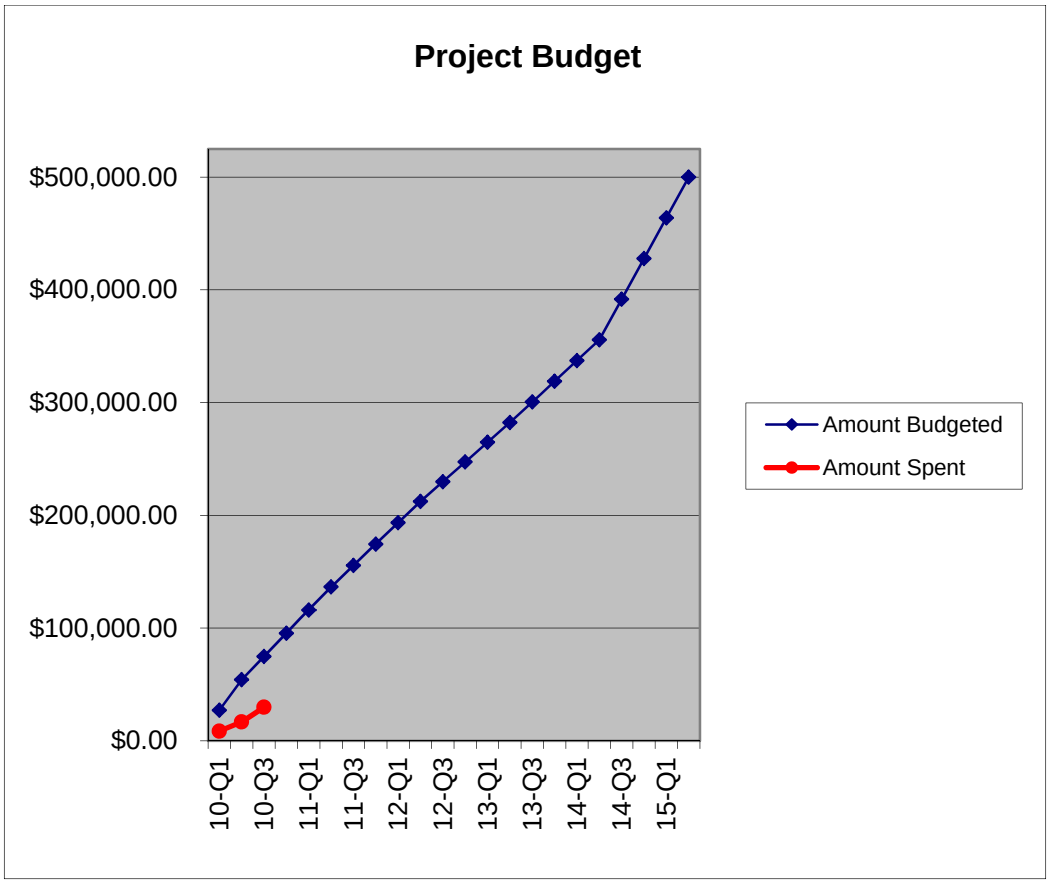

Figure 1: Project budget; amount budgeted and amount spent per quarter through 30 June 2015.

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