**Alberta Conservation Association**
**2008/09 Project Summary Report**

**Project name:** *A Preliminary Investigation of Crossings Structures in the Driftwood River Drainage Basin, Slave Lake, AB*

**Fisheries and Aquatic Program Manager:** Peter Aku

**Project leader:** Tyler Johns

**Primary ACA staff on this project (including seasonals):** Tyler Johns, Jason Leathem, and Chad Lyttle

**Partnerships**

Husky Energy
Tolko Industries Ltd.
Alberta Plywood Ltd/West Fraser Timber Co. Ltd.
Canetic Trust
Canadian Natural Resources Ltd.

**Key findings**

- We identified 129 potential stream crossings in the study area through use of GIS of which we assessed the condition of 29 culvert crossing sites
- Forty-one percent of the 29 culvert crossings had an outfall drop height > 10cm (i.e. distance from culvert to stream surface);
- Approximately 24% of crossings had both an outfall drop height > 10 cm and the culvert passage blocked by debris (by >10%);
- Approximately 52% of crossings showed evidence of bank erosion and sedimentation of the adjacent watercourse.
- In total, 18 of the 29 crossings (i.e., 62%) could benefit from remedial measures that improve stream conditions for fish.
- Importantly, we identified two sites as being fish-bearing, and both crossings had an outfall drop height that may impede fish movements (i.e., height > 10cm).

**Abstract**
The Alberta Conservation Association (ACA) partnered with stakeholders to inventory a sub-sample of stream crossings in the Driftwood River drainage basin north-east of the town of Slave Lake, Alberta. We assessed 29 of approximately 129 stream crossing sites in the study area. All sites were culvert crossings. Forty-one percent of culvert crossings had an outfall drop height that may impede fish movements (i.e. drop height distance from culvert to stream surface was > 10cm). Further, 24% of crossings had both an outfall drop height > 10 cm and had >1 0%

of culvert blocked by debris. In total, 18 of the 29 crossings (i.e., 62%) could benefit from remedial measures such as sediment control or replacement of culvert. Importantly, we identified two sites as being fish-bearing; both crossings had an outfall drop height that may impede fish movements (i.e., height > 10cm). Our work has confirmed that fish habitat in the Driftwood River drainage basin may be fragmented by problem culverts. We recommend a complete inventory of crossings in this basin, in combination with fish sampling to assist resource managers in the identification of threats to local fish populations.

**Introduction**

Poorly designed and maintained stream crossings can result in potential barriers to fish migration, increased sedimentation in stream, and the destruction of important habitats for fish (Harper and Quigley 2000). Further, previous work in Alberta has identified problem crossings as being a likely contributing factor to regional declines in fish populations (Park et al. 2008). It is unknown whether road developments are negatively affecting watercourses in the Driftwood River drainage basin, north-east of the town of Slave Lake, AB. During 2008-2009, the Alberta Conservation Association (ACA) partnered with industrial stakeholders to conduct a preliminary inventory of stream crossings in the Driftwood River drainage basin.

**Methods**

We conducted stream crossing surveys in a sub-basin of the Driftwood River drainage basin, during June 2008 (Figure 1). First, we identified potential stream crossing sites through the use of a Geographic Information System (GIS). Potential crossings were locations where a permanent road crossed a watercourse. The Alberta Fisheries Management Information System (FMIS) was used to assist with the identification of fish-bearing sites in the study area. Using protocols developed by the Foothills Model Forest (McCleary et al. 2006), we collected information on the condition of the crossing and its potential effects on fish and fish habitat. Some of the variables included: type of crossing (bridge or culvert), outfall drop height (distance between the bottom of the culvert and the surface of the water), the condition of the crossing (structural condition), percentage of passage that is blocked (visual estimate), evidence of erosion and sedimentation (visual estimate), and fish-bearing status of the stream. If we saw fish or if FMIS showed that fish have been recorded in the reach, we identified that site as being fish-bearing. We determined that sites with either an outfall drop height > 10 cm or with debris blockages that cover > 10% of the passage as being those that may impede fish movements (McCleary et al. 2006).

**Results**

Based on the GIS exercise we identified 129 stream crossings. We inspected 29 stream crossings, all of which were culverts. Nineteen of the crossings were of those identified in a GIS, whereas 10 were new locations and not previously identified. Of the 29 culvert crossings that were surveyed, 11 (38%) had an outfall drop height > 10 cm. In addition, 14 (48%) had

debris blocking > 10% of the area of the passage. Blockages were a result of woody debris and collapsing culverts. Seven crossings had both a significant outfall drop height and the passage blocked by debris. Fifteen of the 29 crossings showed evidence of bank erosion and sedimentation of the adjacent watercourse. In total, 18 of the 29 crossings (i.e., 62%) could benefit from remedial measures. However, we identified only two sites as being fish-bearing; the species of fish at these locations are unknown. Importantly, both of the fish-bearing stream crossings had an outfall drop that may impede fish movements.

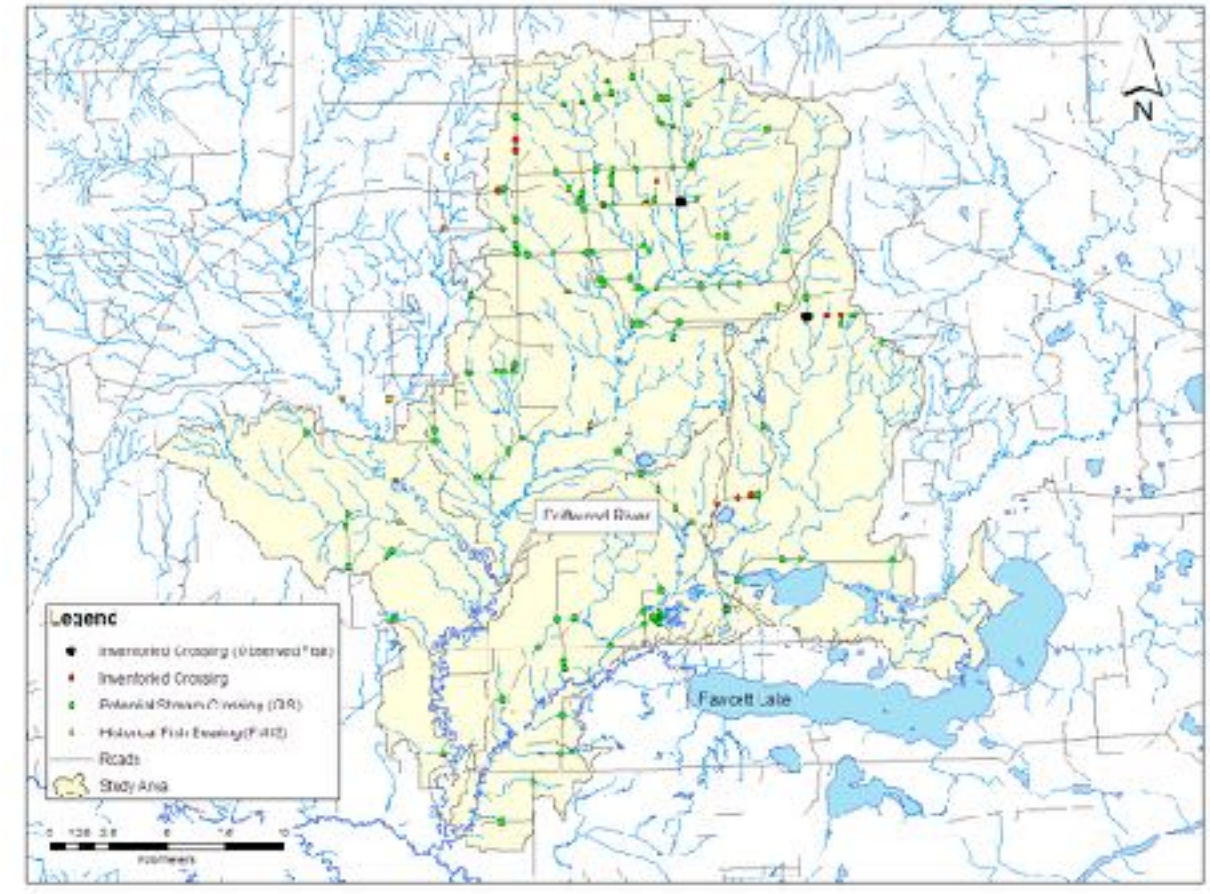


**Figure 1. Stream crossing inspected in a sub-basin of the Driftwood River, north of Fawcett Lake, Alberta, 2008**

## Conclusions

In total, 18 of the 29 crossings (i.e., 62%) could benefit from remedial measures such as sediment control or replacement of culvert. High priority areas include the seven crossings that had both an outfall drop height > 10 cm and > 10% of the passage blocked by debris. Further, stream connectivity should be restored at the two fish-bearing locations that had an outfall drop

that may impede fish movements (i.e., drop heights were > 10 cm). Our work has confirmed that fish habitat in the Driftwood River drainage basin may be fragmented by problem culverts. We recommend a complete inventory of crossings in this basin be conducted in combination with fish sampling to assist resource managers in the identification of threats to local fish populations.

**Communications**

The findings will be reported to the partners of the project.

**Literature cited**

Harper, D.J., and J. T. Quigley. 2000. No net loss of fish habitat: an audit of forest road crossings of fish−bearing streams in British Columbia, 1996−1999. Canadian Technical Report of Fisheries and Aquatic Sciences, Vancouver, British Columbia. 44 pp.

McCleary, R., C. Spytz, H. Schindler, and R. Anderson. 2006. Stream Crossing Inspections Manual. Version 1. C.R. Bamsey, ed. Clear Lake Ltd. Edmonton, AB.

Park, D., M. Sullivan, E. Bayne, and G. Scrimgeour. 2008. Landscape-level stream fragmentation caused by hanging culverts along roads in Alberta's forest. Canadian Journal of Forest Research 38: 566-575.

ACA staff member Jason Leathem collecting data on a culvert crossing in the Driftwood River watershed. (Photo: Chad Lyttle)

A hanging culvert on a tributary to the Driftwood River. (Photo: Chad Lyttle)