MORICE RIVER
WATERSHED ASSESSMENT

1994

Survey of logging related impacts on Cedric, Lamprey, Fenton and Owen Creeks

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for
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1.0 INTRODUCTION

The Morice River, located in north central British Columbia (Figure 1), is one of the main tributaries to the Bulkley River. The Morice watershed has been identified for its fisheries, wildlife, mining and forestry values in the past. This watershed is an important contributor to commercial, native and sport fisheries in the Morice River, the Bulkley River, the Skeena River, and the Pacific Ocean.

The Morice watershed has been impacted by mining activities. Three mining sites are located in the watershed (Equity Silver, Silver Queen [New Nadina] and Dome Mountain). Mining activities at the Equity Silver mine has recently concluded. A large forest fire (Swiss fire) has impacted parts of the Morice River. Evidence of the forest fire itself, and salvage logging are abundant in the lower sections of the Morice River.

Previous logging activities in the Morice watershed have focused around Owen, Fenton, Lamprey and Cedric Creeks. However, logging activities are currently also impacting the northern portion of the Morice watershed. The Fenton, Owen, Lamprey and Cedric systems were chosen for this project due to the presence of past and present logging activities, and due to the availability of historic data from the late 1970's and early 1980's.

The objectives of this study were to:

1. Assess the impacts of past logging related activities on the Cedric, Lamprey, Fenton and Owen Creeks and their tributaries.

2. Recommend possible restoration activities for sites exhibiting impacts of logging related activities.

The Morice Watershed Assessment project was funded by the Watershed Restoration Program, and field work was conducted between August 25, 1994 and October 15, 1994.

2.0 MATERIALS AND METHODS

2.1 Sample site selection

Sample sites within the four systems chosen for this study were selected after careful examination of 1:20 000 forest cover maps, proposed cutblock lay outs, and air photo examination. Examination of maps and air photos allowed for priorization of sites likely to be affected by logging related activities. All areas of creeks or lakes in or near cutblocks were examined. More detailed data was collected on creeks impacted by logging. Creeks which were located well away or were well protected from adjacent cutblocks were briefly examined to ensure that logging had no or negligible impact on the stream. All road crossings of creeks were

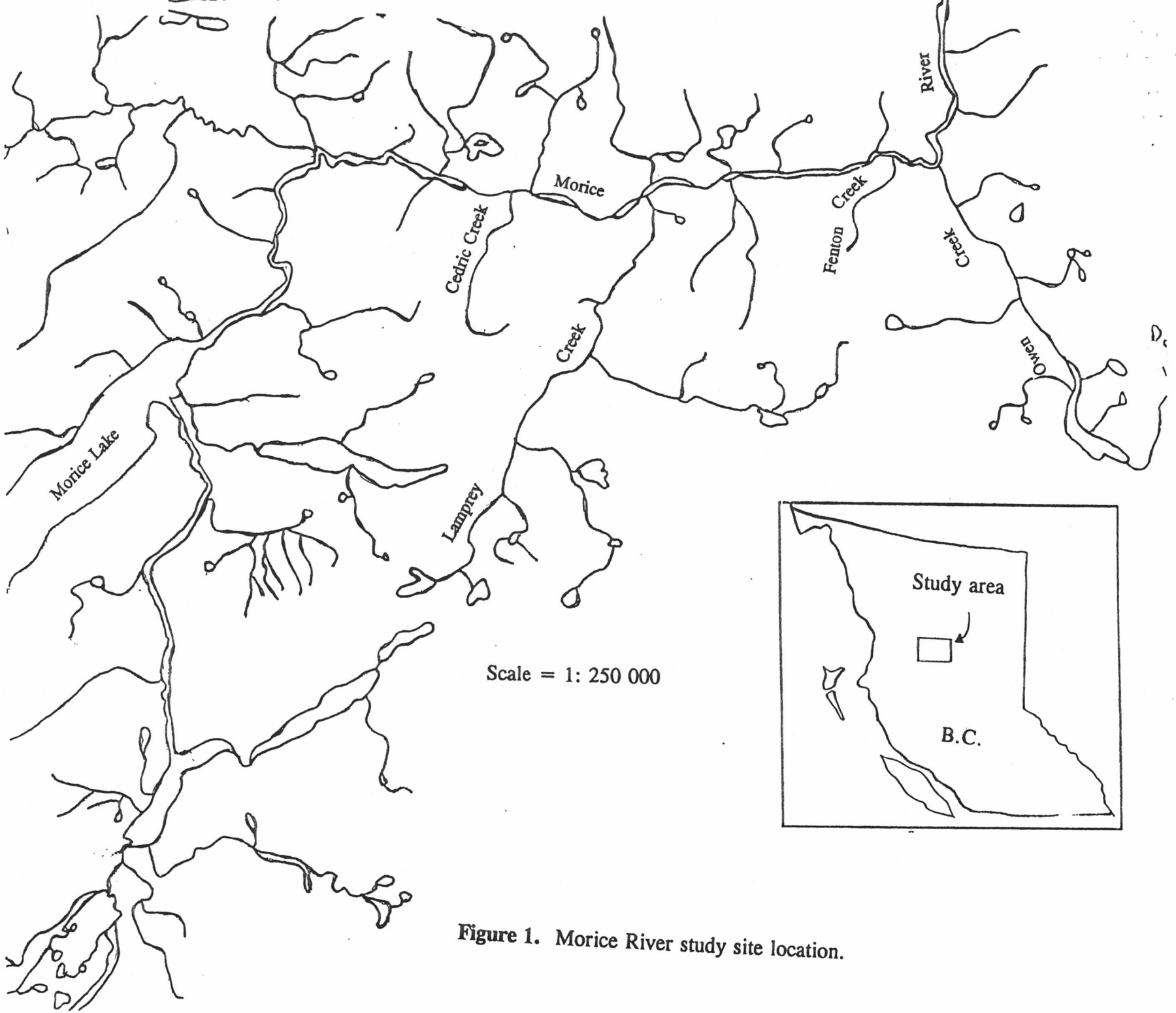


Figure 1. Morice River study site location.

Table 1. Watershed Codes of Lakes and Streams surveyed throughout the Morice Watershed Assessment project.

Cedric Creek	Lamprey Creek	Fenton Creek	Owen Creek	Other
460-6006-418 (Cedric Creek)	460-6006-364 (Lamprey Creek)	460-6006-266 (Fenton Creek)	460-6006-239 (Owen Creek)	460-6006-*1002* *(93L015)*
	460-6006-364-01 (Lamprey Lake)	460-6006-266-728	460-6006-239-130	(Peter Aleck Creek)
	460-6006-364-192		460-6006-239-130-551	
	460-6006-364-202		460-6006-239-172	
	460-6006-364-242		460-6006-239-256	
	460-6006-364-263		460-6006-239-257	
	460-6006-364-263 (S. fork)		460-6006-239-285	
	460-6006-364-263-655		460-6006-239-393	
	460-6006-364-276		460-6006-239-393-308	
	460-6006-364-366		460-6006-239-433-225	
	460-6006-364-397 (Pimpernel Creek)		460-6006-239-524	
	460-6006-364-397-044		460-6006-239-594	
	460-6006-364-324		460-6006-239-626	
	460-6006-364-324-447		460-6006-239-626-800	
	460-6006-364-397-324-447		460-6006-239-399	
	460-6006-364-397-393		460-6006-239-712 (Klate Creek)	
	460-6006-364-397-420		460-6006-239-853	
	460-6006-364-502 (Collins Creek)		460-6006-239-956	
	460-6006-364-502-01 (Collins Lake)		460-6006-239-956-202	
	460-6006-364-502-064		460-6006-239-956-509	
	460-6006-364-889		460-6006-239-*1011*	
	460-6006-364-889-01 (Phipps Lake)		460-6006-239-*1011*	
	460-6006-364-*1003*		460-6006-239-130-*1012*	
	460-6006-364-*1004*		460-6006-239-239-*1111*	
	460-6006-364-*1005*			
	460-6006-364-502-*1006*			
	460-6006-364-502-*1007*			

examined. A list of all creeks examined can be found in Table 1. A detailed account of sites surveyed is located in Appendix 1-4.

2.2 Field Procedure

All preselected sites were accessed to assess the impacts of past logging practices. Road crossings were also accessed to assess the suitability of culverts, examine possible erosion problems, and survey general stream and riparian characteristics. Detailed site data was collected at road crossings, and at sites impacted by logging due to proximity to cutblocks. Some sites not impacted by logging were also surveyed in more detail. Information collected at sites included presence or absence of water, pool:riffle ratio, gradient, riparian vegetation, substrate type, signs of erosion, temperature, stream width, stream depth, stream profile, approximate distance to logged area or road, approximate amount of L.O.D. Minnow traps were set whenever the water level was deep enough. Photographs were taken to illustrate the general stream characteristics, and/or possible impacts due to roads or logging related activities. Stream survey forms were completed for all locations, and are included in Appendix 1-4.

3.0 RESULTS AND DISCUSSION

In general, only minor problems related to logging were found in the area of the Morice watershed examined. The Morice River is located among fairly gentle, rolling hills, with relatively few steep slopes. Due to the low gradient of the system, erosion problems were relatively minor. Although no major problems (e.g. massive landslides) were found, several areas exhibited minor problems related to logging activities. Table 2 illustrates the total number of sites examined, the number of sites near roads or at road crossings, and the number of sites in or near cutblocks. The table also lists the number of sites with logging related impacts or sites which need to be reexamined at higher flows in each of the categories. The majority of assessed sites were located at or near roads. More than half (54%) of these sites have or likely have been impacted by roads. Of the 24 sites examined in or near cutblocks, 13 (54%) exhibited impacts due to logging.

Due to the timing of the Morice watershed assessment work, many of the small, headwater creeks, were dry. However, this is where most of the problems related to logging were found. Dry creek beds tended to be located adjacent to or in cutblocks, with little or no riparian vegetation remaining around the creek bed. L.O.D. was sometimes high, and erosion from banks of the creek was often evident. Although these creeks did not carry any water at the time of the survey, they do serve an important purpose. These small, intermittent streams form the headwaters to productive sections of permanent streams. Debris accumulated in the dry creek beds, and erosion potential around the creeks can lead to debris torrents and silt loading further downstream. In addition, the lack of riparian vegetation along the banks of the creek increases

Table 2. Table summarizing the number and type of sites examined. Sites were divided into two categories: sites at or near roads, and sites in or near cutblocks. The total number of sites is less than the sum of sites in the two categories since some sites were both at or near roads, and in or near cutblocks.

	# of sites examined	# of sites at or near roads	# of sites in or near cutblocks
Total	100	80	24
# sites impacted/ # sites to be reexamined		43	13

the rate of water flow from the surrounding area, thus increasing the chance of silt and debris to be transported downstream. Lack of riparian vegetation has been shown to cause an elevation in water temperature in warm weather, and can increase the rate of drying of the stream. It may be difficult to justify extensive work in and around dry creek beds, however, these creeks form an intricate part of the watershed, and should be protected by leaving the riparian vegetation, hand removing excessive debris from road construction, and by moving boundaries of proposed cutblocks to exclude intermittent creeks.

Recommendations are noted on individual stream survey forms located in Appendices 1-4. A summary of observations and general recommendations follows.

3.1 Cedric Creek

Cedric Creek was dry at the time of the survey. No major problems were found among the sites examined for Cedric Creek. Morris and Eccles (1975) reported Cedric Creek as being a relatively large creek, with four culverts providing for fish passage at all times at the Morice River road crossing. This is the same site as examined in this survey, however, the creek bed was found to be small, and only one culvert was present. In fact, the survey crew searched for an additional 5 km along the Morice River Road in either direction in an effort to find a creek more like the one described in Morris and Eccles, but with no results. After examining the surrounding area, locating Cedric Creek further upstream, and examining relevant maps, the survey crew is certain that the creek surveyed is Cedric Creek. It is surprising to find such a large difference between the present survey and the one conducted in 1975.

Cedric Creek appears to have been impacted by past logging related activities. In particular, there is a lack of riparian vegetation along Cedric Creek for approximately 60m immediately downstream of the crossing of the main logging road (Site B). The riparian vegetation along this stretch consists only of grasses and clover immediately adjacent to the creek bed. This lack of vegetation reduces available cover, probably increases water temperature and likely contributes to decreased water flow during the dry season. Due to the dry nature of the creek bed at the Morice River road crossing, no samples were taken. However, Morris and Eccles (1975) report that this reach of Cedric Creek was productive for rainbow trout. Isolated pockets

of water were found further upstream (Site C), however, no fish were seen. The absence of fish from this area is in agreement with the survey conducted in 1975 (Morris & Eccles, 1975). The creek is well protected from adjacent logging roads upstream of the Morice River road. However, an old cutblock seems to have had some impact on the creek. There was relatively little vegetative cover at Site C compared to sites examined further downstream (Site B).

Due to the intermittent nature of the stream, and the relatively minor impact of logging related activities on the stream, little in the way of restoration opportunities were identified here. It may be of some use to plant riparian vegetation (alder and willow) along the 60m section of the creek running adjacent to the Morice River road (Site A). This would aid in giving cover, stabilizing water temperatures and in protecting the stream from silt carried in the form of dust with traffic on the logging road. It is also suggested that this site be reexamined to identify any siltation or erosion problems during higher run off. A more detailed description of findings and recommendations can be found in Appendix 1.

3.2 Lamprey Creek

Lamprey Creek and its tributaries offer some excellent habitat for steelhead and other salmonids. The system has previously been identified for its importance for steelhead recruitment (Tredger 1981, Bustard 1993). Fish reported from the Lamprey system include rainbow trout, cutthroat trout, steelhead, coho, mountain whitefish, pacific lamprey, dolly varden, chubb and shiners. Fish collected during this survey are consistent with species previously reported from the area (Morris & Eccles 1975, Tredger 1981, Bustard 1993). Bustard (1993) indicates that there has been a decrease in juvenile steelhead numbers from the early 1980's to the present.

As reported in previous surveys, Lamprey Creek was found to provide some excellent steelhead rearing areas. In addition, coho were found near the confluence with the Morice River. Only minor problems related to past logging practices were found in the Lamprey system. A detailed description of findings and recommendations for each site examined can be found in Appendix 2. Most of the problems appear to be related to logging roads and logging road construction rather than actual cutblocks. Logging roads and their construction has increased the amount of debris in the creek, and has lead to an increase in siltation, particularly during higher run off periods. Several creeks influenced by new road construction have been examined (e.g. Creek 460-6006-364-192 Site D [Figure 2]; Creek 460-6006-364-263 Site C [Figure 3]; Creek 460-6006-364-397-324 Site C [Figure 4]), and there has been variable amounts of debris due to tree removal left in the creek bed. It is suggested that some of this debris be removed by hand. In addition, substrate in these creeks near the new road crossings is usually fine and has very low compaction. This will lead to siltation and erosion problems further downstream during higher run off periods. These sites should be reexamined in the spring to evaluate the level of these siltation and erosion problems. Some roads show signs of erosion due to a lack of vegetation on the banks and/or due to the steep nature of the banks. These areas should be reseeded and stabilized after reexamination of the area to establish the extent of the erosion problems during periods of high run off. Pimpernel Creek in particular presents an interesting problem at a road crossing near its confluence with Lamprey Creek (Creek 460-6006-364-397 Site B [Figure 5]).

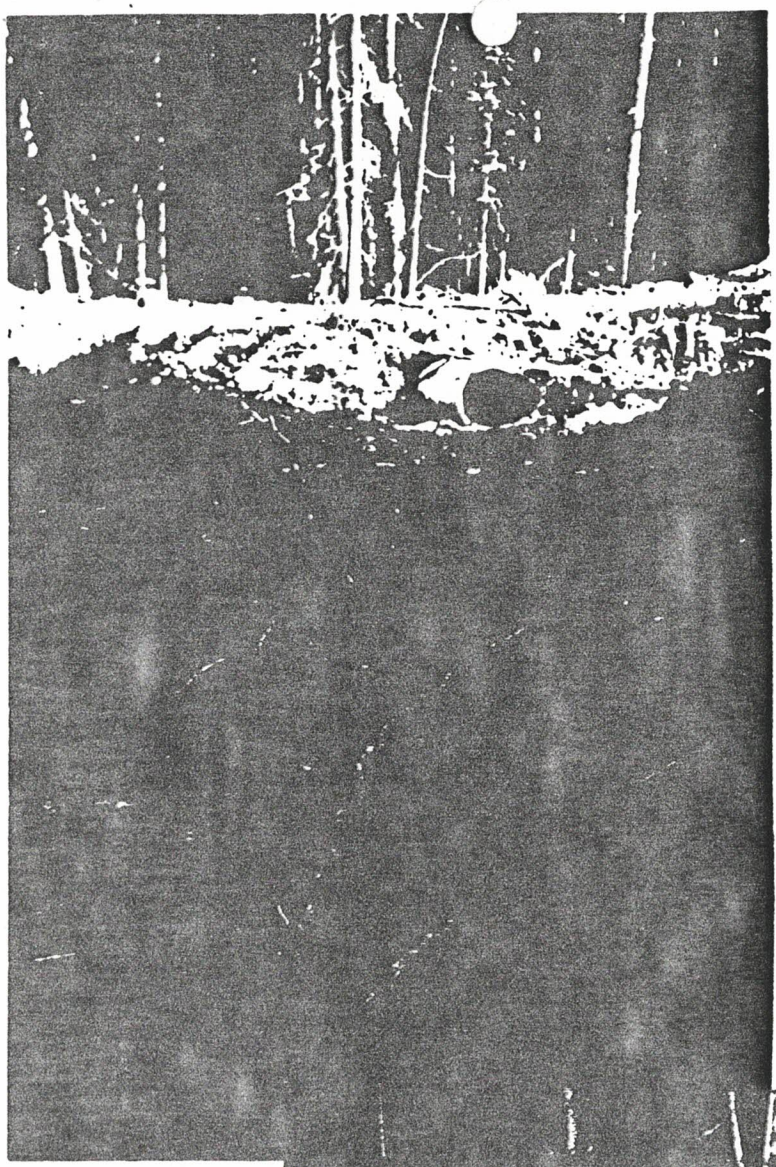
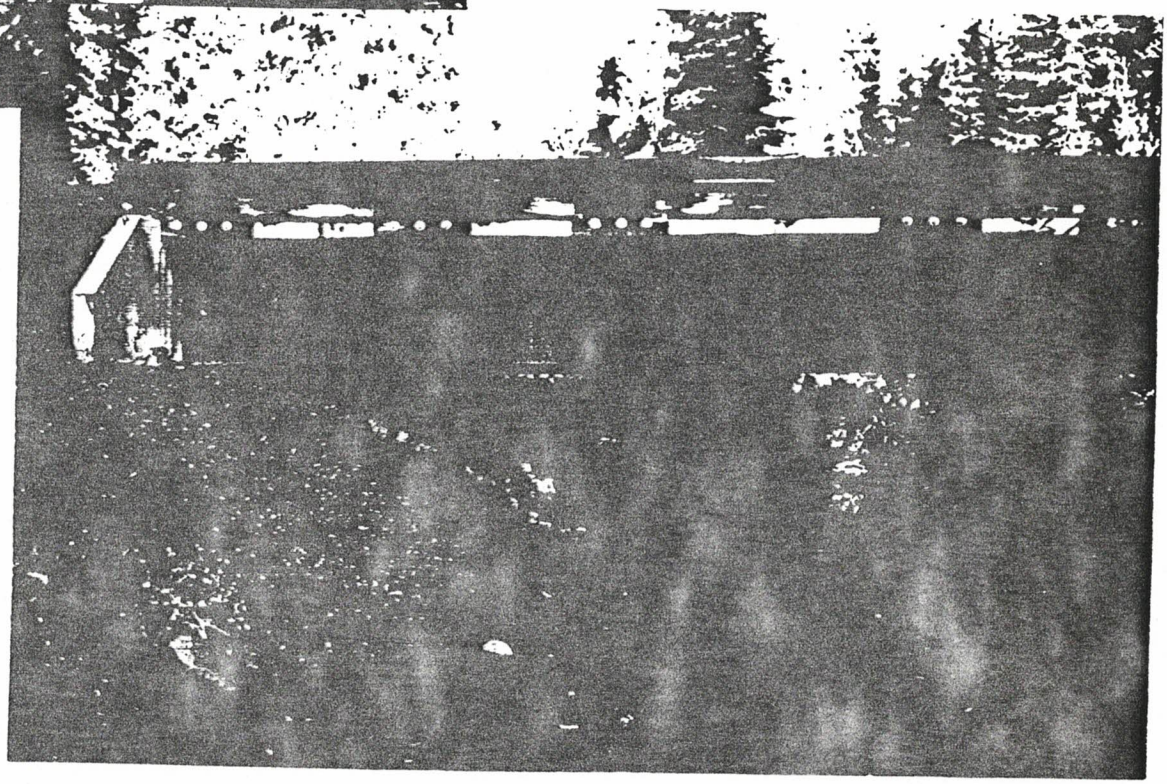


Figure 2 (Left). Creek 460-6006-364-192 Site D, illustrating damage due to recent road construction. Note large amount of debris in creek.

Figure 3 (Below). Creek 460-6006-364-263 Site C. Damage due to recent road construction. Note turbidity of water, lack of riperian vegetation and vegetation on banks of road, soft substrate immediately downstream of culvert.

Figure 4 (Left). Creek 460-6006-364-397-324 Site C. Increased siltation and increased erosion potential due to recent road construction.

Figure 5 (Below). Creek 460-6006-364-397 Site B. Bridge at Pimpernel Creek. Dust from bridge traffic adds to the siltation of Pimpernel Creek at this site.



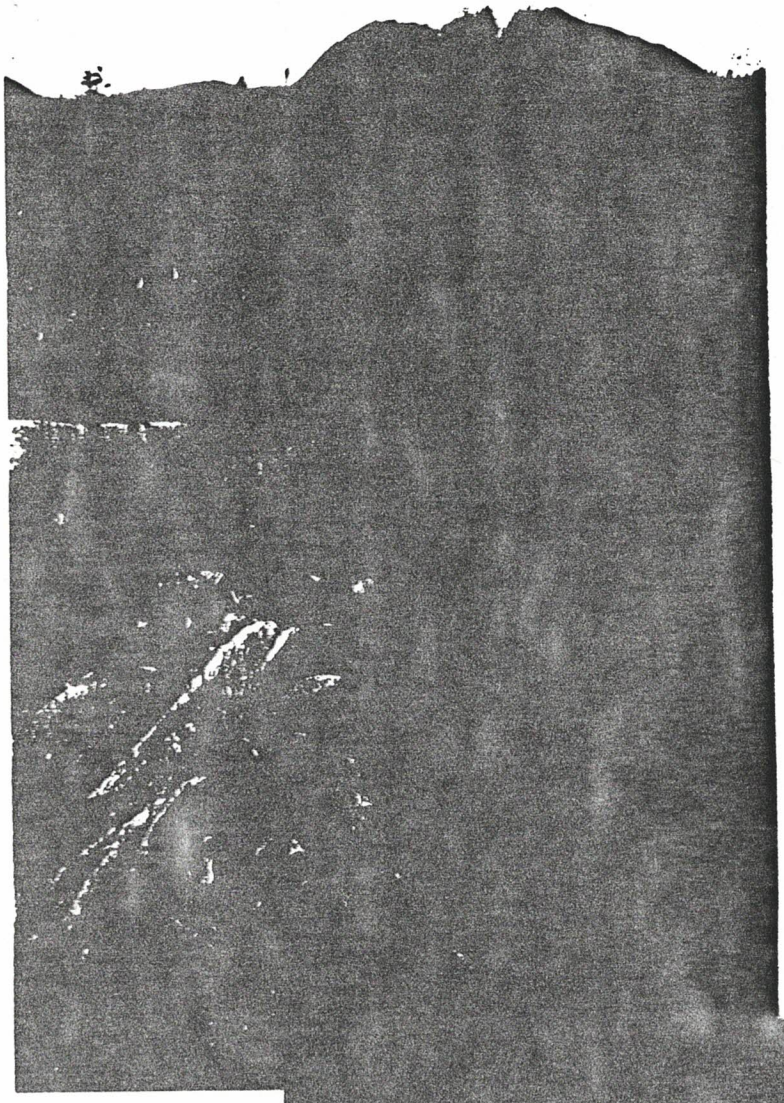
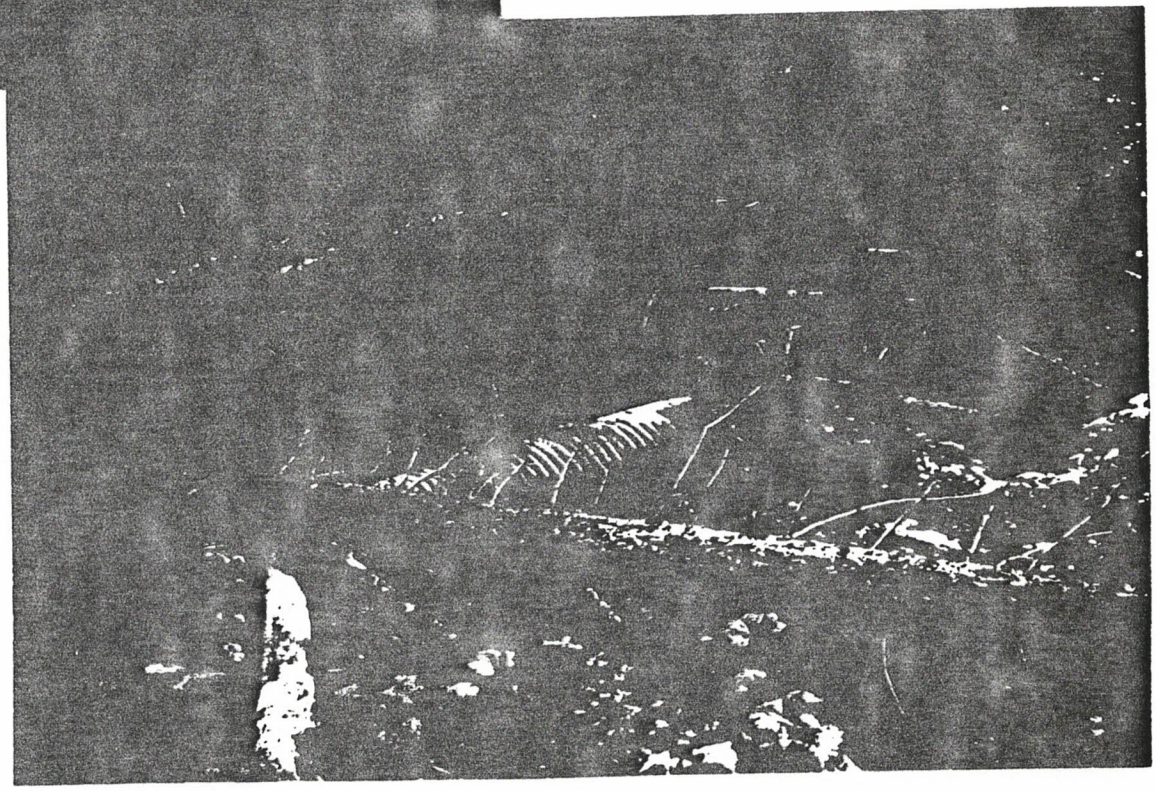


Figure 6 (Left). Creek 460-6006-364-397-324-447 Site C. Road deactivation site. Road crossing via a culvert has been removed, but the culvert remains adjacent to the creek bed.

Figure 7 (Below). Creek 460-6006-364-202 Site B. Culvert in creek bed near road crossing. Also note the large amount of windfall.



Although the bridge does provide adequate access for fish, traffic across the bridge appears to increase sedimentation in the creek immediately below and above the bridge. Dust disturbed due to logging and other traffic enters the creek, and turbidity was observed to increase rapidly due to use of the road. A time of 15 minutes or more elapsed before the turbidity cleared.

Some small, dry, class 1 streams were found to be located in or on the border of cutblocks. These streams have been impacted by logging due to the removal of riparian vegetation. Most of these creeks were dry at the time of the survey, however, it is clear that these creek beds can contribute considerable discharge to larger streams downstream. Debris and increased erosion and siltation will not only affect the dry creek beds, but will likely make their way down to class 2 and higher streams. It is suggested that riparian vegetation at these sites be planted, and that excessive debris be removed by hand.

Few roads were found to be at various stages of deactivation. One of these sites (Creek 460-6006-364-397-324-447 Site C [Figure 6]) was deactivated at the first creek crossing by removal of the culvert. The culvert was excavated, but was left lying beside the creek bed. A culvert was found lying in a creek situated in a ravine near a road crossing. This culvert should be removed, unless removal will cause excessive damage to the stream or riparian vegetation (Creek 460-6006-364-202 Site B [Figure 7]). It is suggested that in future deactivations where culvert or bridge removal is involved, the man-made structure be removed, and that the exposed soil be reseeded as soon as possible.

3.3 Fenton Creek

Fenton Creek exhibits some good salmonid habitat in most of the sections surveyed. However, this creek has not been identified as an important tributary for salmonid spawning and rearing in past reports (Morris & Eccles 1975, Tredger 1981). This can partly be attributed to the culvert at the Morice Main Road which presents difficult passage to the upstream sections of the creek.

Fenton Creek is a relatively small tributary to the Morice River. One culvert is located under the Morice River road. Morris and Eccles (1975) reported that this culvert was a definite barrier to fish movement, and attributed difficulties in fish passage to steep gradient, long smooth flow and the drop from the culvert to the creek bed. Due to the location of the culvert, the surrounding terrain, and the gradient immediately below the culvert, it remains a barrier to fish, at least at some flows. In addition, the sharp turn in the Morice River Road at this location (Creek 460-6006-266 Sites A and B) contributes to siltation of Fenton Creek (Figure 8). Due to the nature of the turn, the road is sloped towards the creek. Water drains across the road, carrying silt directly into Fenton Creek. This is evident after only little precipitation. Signs of are present on the edge of the road, immediately above the culvert. A mower mowed the riparian vegetation and other vegetation around the down stream side of the creek to increase visibility at this sharp turn. This leads to further destabilization of the bank. It is also evident that reseeding of the bank from the road will not aid in reducing erosion and siltation since it will need to be cleared to increase visibility. Due to the siltation problem at

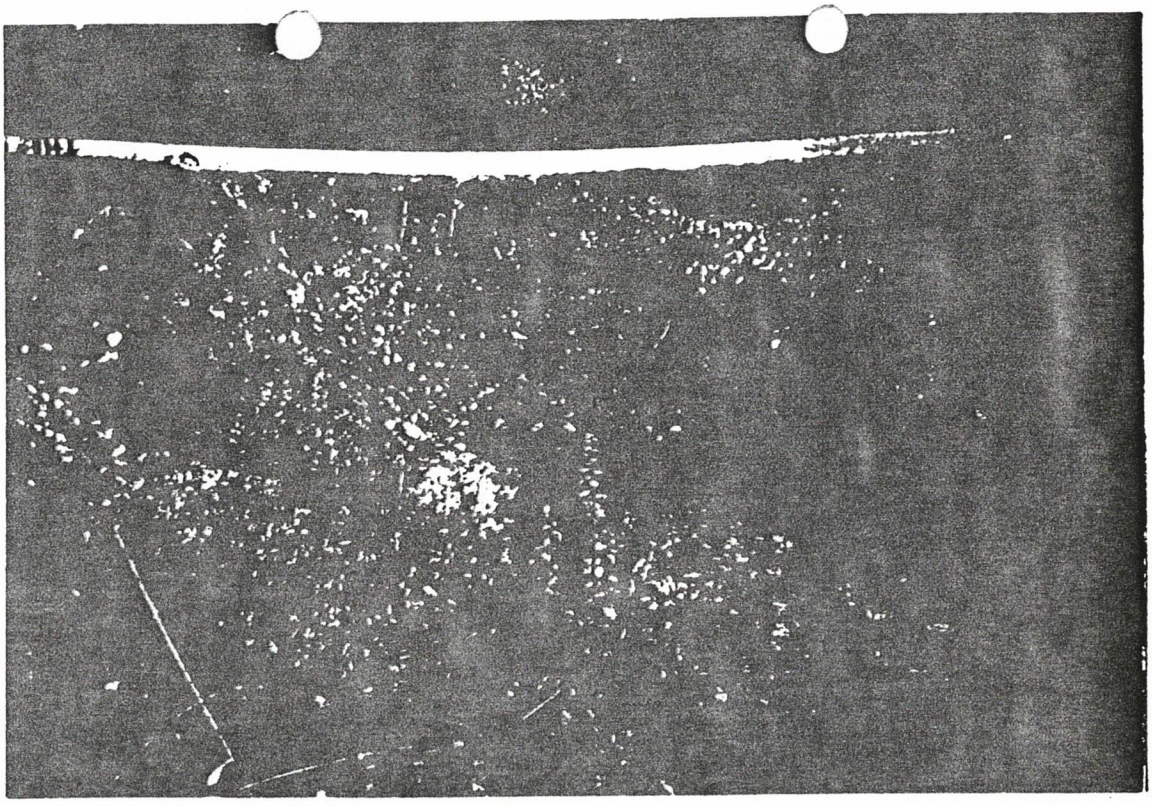
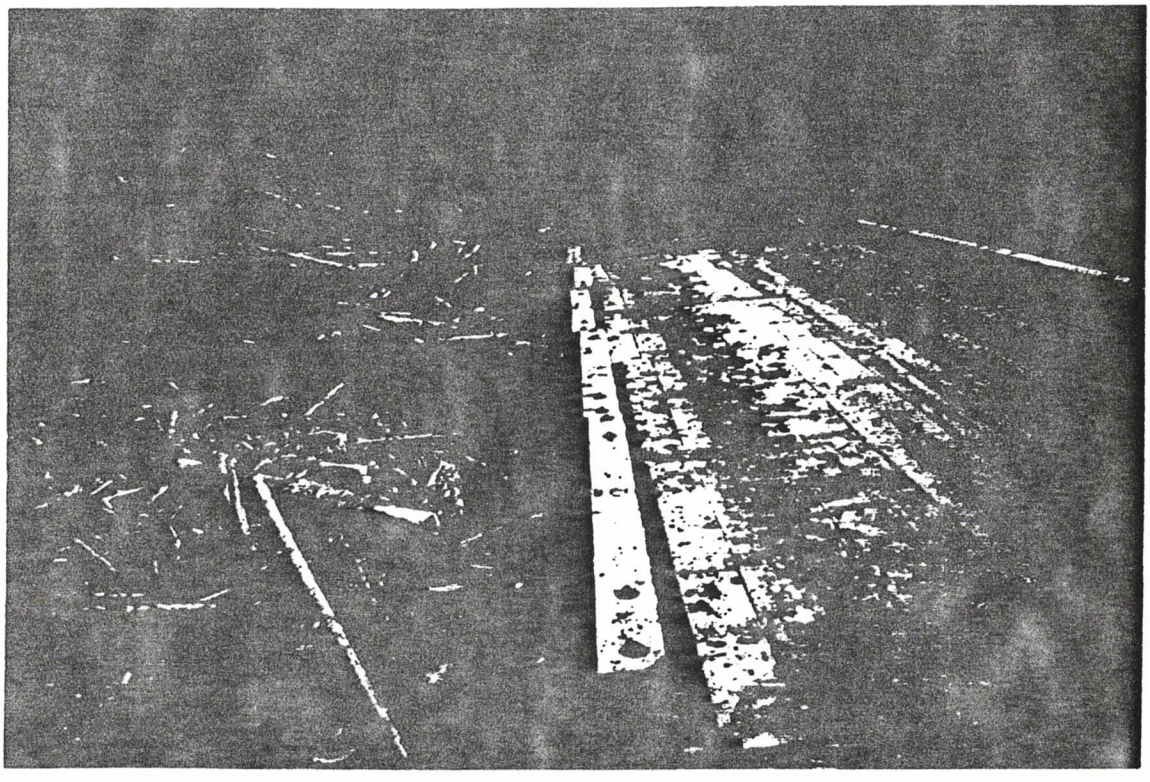


Figure 8 (Above). Creek 460-6006-266 Site A. Erosion problem at Morice Main Road crossing. Note large amount of siltation and signs of erosion.

Figure 9 (Below). Creek 460-6006-266 Site C. New bridge crossing. Note that the bridge is twisted, and the debris in and around the creek.



this site, the difficulty in passage presented by the culvert, as well as dangers associated with a sharp turn on a logging road, it is suggested that a different method for crossing the creek be found. Reseeding the placement of rip-rap will not be sufficient.

A new road was constructed at the upper sections of Fenton Creek to access new logging areas (Site C) (Figure 9). The bridge at this location is twisted and should be stabilized if the road continues to be used. Erosion signs in the surrounding area were present, and this site should be reexamined during higher run offs. At least two old roads, still showing some use, crossed minor creeks with no provisions for water flows. Culverts should be installed at these sites to decrease sedimentation further down stream. In addition, two cutblocks are planned to be logged in the near future (at least one this winter). It is suggested that the areas of Fenton Creek near these cutblocks be reexamined in 1995.

3.4 Owen Creek

Owen Creek provides some excellent Coho and steelhead rearing areas. Since the replacement of the culverts with a bridge at the Morice River road crossing, accessibility of the upper reaches of Owen Creek is ensured. Owen Creek has been identified as an important tributary to the Morice River for the production of steelhead and coho (Tredger 1981, Bustard 1993, Finnegan pers. com.). Of the four tributaries examined, Owen Creek was the only one impacted by past forest fires and salvage logging. Most of the problems were expected in this tributary to the Morice River due to the nature of the substrate and surrounding terrain (Bustard pers.com., Weiland, pers. com.). A detailed description of findings at each creek and recommendations for sites is given in Appendix 4.

As in the previous systems, most of the problems appeared to be related to logging roads. It is suggested that most of the road crossings be reexamined at periods of higher run off to evaluate the extent of erosion/siltation problems. Some of the siltation problems may be mitigated by the construction and maintenance of settling ponds in the ditches just above the creeks. In addition, exposed soils should be replanted, or stabilized by the placement of rip-rap.

Agricultural activities also has some impact on the tributaries of Owen Creek. Cattle signs were abundant around some of the creeks, particularly to the east of Owen Creek. Fences spanned across some of the creeks near the main logging road, indicating extensive use of the area by cattle.

Logging practices have also influenced the tributaries of Owen Creek. Creeks were logged right to the edge in some instances (Figure 10), and riparian vegetation should be replanted at these locations. In addition, in this area, as in others (eg. tributaries to Lamprey Creek), logging close to the edge or into ravines causes and increase in windfalls which in turn increase the debris in the creek. It is suggested that cutblocks remain at least 3m away from the edge or ravines to decrease the likelihood of uprooted trees on steep slopes and soil instability.

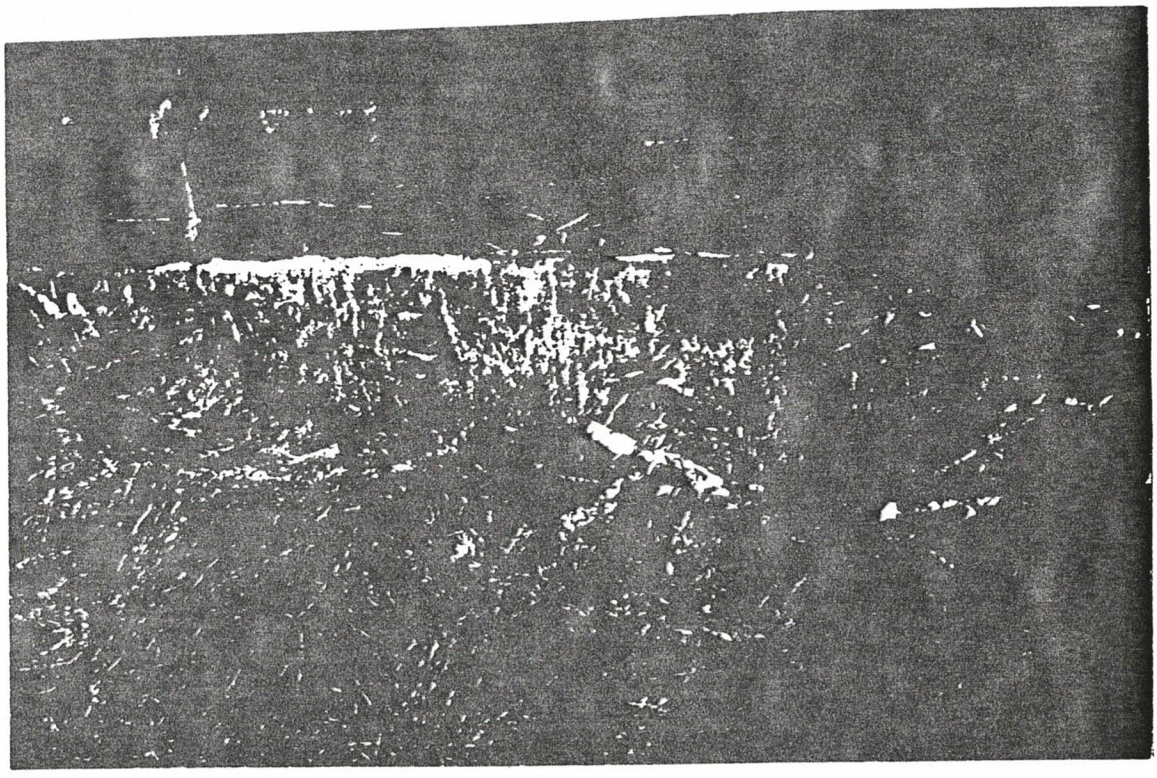


Figure 10. Creek 460-6006-239-433-225. Logging and slash burning around creek. No riperian vegetation remains around the creek. The wetland below has also been impacted by logging and burning.

4.0 Summary

Four tributaries to the Morice River were examined to assess impacts of past logging and logging related activities. In general, most of the problems found were minor. However, the cumulative effect of minor problems can have serious implications for the quality of fish habitat. Most of the problems found in this study were related to logging road construction, maintenance and deactivation rather than cutblocks. However, the lack of riparian vegetation at some intermittent and permanent streams was identified as a problem in the Owen and Lamprey systems in particular. Recommendations with regards the watershed restoration of the system are given in the report.

5.0 RECOMMENDATIONS

1. Sites likely to be impacted by erosion or siltation should be reexamined in the spring or during periods of higher run off. These sites are identified in Appendix 1-4, and include most road crossing of creeks. Recommendations for the reduction of siltation and or erosion should be refined after the second examination of the site.

2. Creeks located in cutblocks should be reexamined in the spring to determine the likelihood of movement of debris further downstream. In addition, the sites where natural regeneration of riparian vegetation is insufficient should be replanted, and banks should be stabilized as assessed during reexamination at higher flows.

3. Sites impacted by new roads should be reexamined to ensure that excessive debris has been removed without further damage to the creek bed. If debris has not been removed, it should be removed. In addition, siltation and erosion from newly constructed road crossings should be evaluated at periods of higher run off. Exposed soils should be reseeded and areas of low compaction in the creek bed near culverts should be monitored.

4. Culverts remaining in creek beds with no purpose (e.g. Creek 460-6006-364-397-324-447 Site C) should be removed with as little damage to the creek as possible. All culverts and bridges of deactivated roads should be removed, and exposed soil should be reseeded.

5. The Morice River road crossing at Fenton Creek should be assessed by a hydrologist and engineer for recommendations as to the alteration of the creek crossing to reduce siltation, erosion, and to allow for the growth of vegetation to stabilize soils on the downstream side of the creek. In addition, an alternative crossing should provide passage for fish at all water levels.

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