

Interior Watershed Assessment Update

McKinley Above Bosk Watershed (Upper McKinley)

1.0 WATERSHED DESCRIPTIVE INFORMATION

Table 1.1 Summary information – Biophysical

Size (km ²)	BEC Zones	Elevation Range (m)	H ₆₀ Elevation (m)	Stream Density km/km ²	Distribution of slope gradients within the watershed (% of watershed)			
					<10% slope	10 to 30% slope	30 to 60% slope	>60% slope
105.73	ICHmk3 ESSFwk1	999 - 2396	1252	1.29	27.44	49.83	19.62	3.11

Table 1.2. Characteristics of main stream reaches – (assessment is based on a combination of air-photo interpretations, TRIM maps, helicopter over-flight and various reports).

Reach ID	Minimum Elevation (m)	Maximum Elevation (m)	Reach Length (m)	Reach Gradient (%)	Stream Disturbance Assessment
Main-R1	1002	1019.41	4375	0.40%	Stable and undisturbed
Main-R2	1019.41	1039.83	2673	0.76%	Stable and undisturbed
Main-R3	1039.83	1040.37	4345	0.01%	Stable and undisturbed
Main-R4	1040.37	1063.91	1502	1.57%	Stable and undisturbed
Main-R5	1063.91	1078.85	6317	0.24%	Stable and undisturbed
Main-R6	1078.85	1284.51	4942	4.16%	Stable and undisturbed

RPg = Riffle-Pool gravel morphology

2.0 WATERSHED HARVESTING, ROADS AND LAND-USE HISTORY

Table 2.1. McKinley above Bosk Watershed – extent of forest harvesting

Private	Total harvest 2002 (%)	Current ECA (%)	Planned Harvest (%)	Current ECA below H60 (%)	Current ECA Above H60 (%)	Peak Flow Index		Road Density Active (km/km ²)		Stream Crossing density active (#/km ²)		Road Density De-active (km/km ²)	
						Current (2002) (%)	End of FDP (2007)(%)	Current (2002)	End of FDP (2007)	Current (2002)	End of FDP (2007)	Current (2002)	End of FDP (2007)
0	12.01	11.86	3.24	6.3	5.6	14.7	18.6	0.47	0.58	0.32	0.40	0.07	0.07

3.0 SUMMARY OF EXTENT OF RIPARIAN REMOVAL (agriculture and forestry)

Table 3.1. McKinley above Bosk Watershed – extent of riparian removal

Watershed name	Length (km) of riparian removal on small tributaries (<5m in width)	Length (km) of riparian removal on large tributaries (>5m)	% Riparian removal of all tributaries	Length (km) of riparian removal on mainstem	% Riparian removal of mainstem	Total length of all tributaries (from Trim) (km)	Total length of mainstem (km)
McKinley above Bosk	10.31	0.00	8.03	0.31	3.93	128.43	7.96

4.0 SUMMARY OF LARGE SEDIMENT SOURCES

Table 4.1. McKinley above Bosk Watershed – large sediment sources

Watershed Name	Large natural sediment sources		Large natural sediment sources directly connected to a stream		Large land-use related sediment sources		Large land-use related sediment sources directly connected to a stream		Large sediment sources	
	number	density (#/km ²)	number	density (#/km ²)	number	density (#/km ²)	number	density (#/km ²)	number	density (#/km ²)
McKinley above Bosk	2	0.019	0	0.000	1	0.009	0	0.000	3	0.028

5.0 SUMMARY OF LAND-USE ACTIVITIES ON UNSTABLE TERRAIN

Table 5.1. McKinley above Bosk Watershed – activity on unstable terrain

Watershed	Length of road on unstable terrain (km)		Area of cut blocks on unstable terrain (km ²)		Road density on unstable terrain (km/km ²)	Source of information for stability assessment
	Active	Proposed	Harvested	Proposed		
McKinley a bosk	0	0	0	0	0.0000	Class U

6.0 SUMMARY OF ROAD RELATED SOURCES OF SURFACE EROSION

Table 6.1 Upper McKinley Watershed - summary of stream crossing sediment source survey –			
Number of crossings surveyed	Estimated total # of crossings (TRIM maps)	Percentage surveyed	Watershed Size (km ²)
17	31	54.8	105.7

Table 6.2 Summary of Water Quality Concern Ratings (WQCR) – Upper McKinley Watershed							
No Concern		Low		Medium		High	
Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
0	0.0	5	29.4	3	17.6	9	52.9

Stream Width Class	Table 6.3 Summary of Water Quality Concern Ratings by Stream Size – Upper McKinley Watershed								# of streams surveyed per class
	None		Low		Medium		High		
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	
1	0	0.0	0	0.0	0	0.0	0	0.0	0
2	0	0.0	1	50.0	1	50.0	0	0.0	2
3	0	0.0	1	33.3	0	0.0	2	66.6	3
4	0	0.0	3	30.0	2	20.0	5	50.0	10
5	0	0.0	0	0.0	0	0.0	2	100.0	2

Table 6.4 ESC Summary – Upper McKinley	
WQCR	“Equivalent” number of stream crossings
No Concern	0.0
Low	2.7
Moderate	3.8
High	16.4
Total	23

Table 6.5 Surface erosion hazard – Upper McKinley Watershed	
Equivalent stream crossing density (xings/km ²)	Surface Erosion Hazard
0.22	Moderate

7.0 SUMMARY OF MAINSTEM CHANNEL CONDITIONS

Table 7.1 Extent of channel disturbance

Reach ID	Reach Length (m)	Reach Gradient (%)	Length disturbed (m)	% of channel disturbed	Level of channel disturbance	Probable cause of disturbance
Main-R1	9109	0.01%	0	0	Undisturbed	-
Main-R2	4375	0.40%	0	0	Undisturbed	-
Main-R3	2673	0.76%	0	0	Undisturbed	-
Main-R4	4345	0.01%	0	0	Undisturbed	-
Main-R5	1502	1.57%	0	0	Undisturbed	-
Main-R6	6317	0.24%	0	0	Undisturbed	-
Main-R7	4942	4.16%	0	0	Undisturbed	-

8.0 SUMMARY OF FISHERIES RESOURCES IN THE WATERSHED

Table 8.1 Documented fish species presence

Category	Common Name	Latin Name	Species Code	Reference
Freshwater game species	Rainbow Trout	<i>Oncorhynchus mykiss</i>	RB	Fish Wizard ¹
Non-game species	Longnose Sucker	<i>Catostomus catostomus</i>	LSU	Fish Wizard ¹
	Unidentified Species	N/A	N/A	Fish Wizard ¹

¹Fish Wizard available at <http://pisces.env.gov.bc.ca>

9.0 SUMMARY OF HAZARDS FOR THE MCKINLEY ABOVE BOSK WATERSHED

Table 9.1 Watershed assessment hazards

Watershed	Hazard Ratings ²						Generalized Channel Disturbance ¹
	Increases in peak-flows (Current/Proposed)	Reduction in riparian functions	Large logging related sediment sources	Road related sediment sources (field work)	Accelerated surface erosion from GIS (Current/proposed)	Accelerated mass wasting	
McKinley above Bosk	VL/VL	L	VL	M	M/M	VL	1

¹ Note: Generalized channel disturbance codes: 1 = no disturbance identified, 2 = localized channel disturbance, 3 = minor localized land-use related disturbance, 4 = moderate land-use related channel disturbance, 5 = extensive land-use related channel disturbance.

² Note: Hazard ratings: VL=very low, L=low, M=moderate, H=high, VH=very high

10.0 INTERPRETATIONS

10.1 Peakflow Hazards

The peak flow index (PFI) for this watershed is currently 15% (**Very Low hazard**) and will climb to 19% (**Very Low hazard**) by the end of the forest development plan (FDP) (Table 2.1). Considering these low values and the relatively large lakes in this watershed, I believe that there are no peak flow concerns.

10.2 Hazards Associated with a loss in Riparian Functions

The riparian hazard for this watershed has been assessed a **Low**. There has been virtually no forest harvesting along the mainstem of this watershed. The concerns with loss of riparian function are very limited to a few short sections of smaller tributary streams.

10.3 Hazards Associated with Large Sediment Sources

There are no large land-use related sediment sources directly connected to a stream in this watershed (Table 4.1). Consequently, the hazard is **Very Low**.

10.4 Hazards Associated with Roads Related Surface Erosion

We surveyed 17 stream crossings in this watershed, which represents 55% of TRIM stream crossings (Table 6.1). Of these, 5 crossings (29%) had no or low concerns and 12 crossings (71%) had medium or high concerns. This has resulted in an equivalent stream crossing density of 0.22 crossings/km² and a **Moderate** hazard.

10.5 Hazards Associated with Accelerated Mass Wasting (from logging on steep slopes).

There is no steep slope logging in this watershed. Consequently, there is no hazard associated with this IWAP indicator (Table 5.1).

10.6 Watershed Cumulative Effects and Channel Stability

This assessment of the McKinley above Bosk watershed has not identified any cumulative watershed concerns or problems associated with channel stability. Numerous localized problems with accelerated surface erosion at stream crossings were identified. These may have a localized impact on water quality.

11.0 RECOMMENDATIONS

11.1) Recommendations for the Forest Development Plan (landscape level)

There are no significant landscape or watershed cumulative concerns for this watershed, consequently no recommendations are required.

11.2) Recommendations for Site Specific Activities (site level)

The site specific recommendations for this watershed focus on managing sources of surface erosion. A relatively large proportion of stream crossings that were surveyed in this watershed (71%) had a moderate or high water quality concern rating (WQCR). In my opinion erosion and sediment control (ESC) practices could be substantially improved in this area. Stream crossings with a high score should be visited and more effective ESC practices should be implemented.

The forest licensees should maintain effective Erosion and Sediment Control plans for the this watershed. This would include: a) Development of a plan with precise objectives and standards and clear operating procedures, b) clearly define the types of erosion and sediment control practices that need to be implemented, c) regular maintenance of any ESC structure that has been installed, d) regular field monitoring to evaluate the effectiveness of the plan.

APPENDIX 1 – Database of disturbed riparian areas

ID	Channel Width	Stream Type	One or 2 sided	Length of RL (km)	Landuse
McKiBRL-001	3	2	2	0.6646	1
McKiBRL-002	4	2	2	0.2162	1
McKiBRL-003	3	3	2	0.5742	1
McKiBRL-004	3	3	2	0.6503	1
McKiBRL-005	3	2	2	0.7915	1
McKiBRL-006	4	2	2	0.5149	1
McKiBRL-007	4	2	2	0.5267	1
McKiBRL-008	2	1	1	0.313	1
McKiBRL-009	4	2	2	0.9756	1
McKiBRL-012	4	3	2	0.8027	1
McKiBRL-013	4	2	2	2.287	1
McKiBRL-014	4	3	2	0.1652	1
McKiBRL-015	4	3	2	0.6883	1
McKiBRL-011	4	2	2	0.893	1
McKiBRL-010	3	2	2	0.5518	1

APPENDIX 2 – Database of large sediment sources

ID	Type	Cause	Deliver-ability	Degree of Revegetation	Activity Level
UppMcLS-002	4	3	3	1	1
UppMcLS-001	4	5	3	2	2
UppMcLS-003	5	9	1	2	2

APPENDIX 3 – Database of stream crossing survey (surface erosion)

Sub Basin	Crossing ID	UTM Easting	UTM Northing	Structure type	Size of Culvert	Crossing Erosion Score	WQCR	Stream width Class	Stream gradient Class
Up_McKin	P02	659031	5779407	5	1200	0.9	High	3	4
Up_McKin	P08	656579	5779756	5	1000	0.9	High	3	2
Up_McKin	P03	658651	5779404	7	N/A	0.8	High	4	4
Up_McKin	P04	658565	5779138	5	600	0.9	High	4	2
Up_McKin	P06	657260	5779729	5	500	0.9	High	4	3
Up_McKin	P07	656644	5779780	5	600	0.8	High	4	2
Up_McKin	P12	653825	5779147	7	N/A	0.9	High	4	2
Up_McKin	P01	659806	5779351	5	600	1.0	High	5	6
Up_McKin	P09	656663	5778810	5	600	0.9	High	5	3
Up_McKin	P17	652679	5781619	1	N/A	0.3	Low	2	2
Up_McKin	P14	655390	5778466	5	800	0.4	Low	3	2
Up_McKin	P10	655530	5779292	5	600	0.1	Low	4	3
Up_McKin	P11	654782	5779231	5	1000	0.2	Low	4	2
Up_McKin	P15	653880	5780018	5	900	0.3	Low	4	2
Up_McKin	P16	653860	5780473	2	N/A	0.5	Med	2	2
Up_McKin	P05	657455	5779540	5	600	0.6	Med	4	2
Up_McKin	P13	653815	5779121	5	600	0.6	Med	4	4

APPENDIX 4- Inventory of disturbed channel reaches

No disturbed channels identified

APPENDIX 5 – Selected photographs



Photograph #988. McKinley Creek above Bosk Lake



Photograph #992. Large sediment source “UppMcLS003”.



Photograph #997. Large, natural slide (UppMcLS001)



Photograph #210-14. crossing P02, score = 0.9 (high)