

WATERSHED REVIEW

GULLWING CREEK WATERSHED

Draft March 13, 2012

Ministry Contract No: CS12NRH-012

BIOPHYSICAL AND LAND-USE CHARACTERISTICS OF THE WATERSHED

Table 1. Summary Information – Watershed Characteristics – (see Figures 1 and 2)

Size (km ²)	Dominant BEC Zones	Dominant NDT	Elevation Range (m)	Surficial Geology near the Mouth (i.e. sensitive area)	Stream Density (km/km ²)	Biggest % of watershed in same elevation band ¹	Distribution of slope gradients within the watershed (% of watershed)			
							<10% slope	10 to 30% slope	30 to 60% slope	>60% slope
53.1	SBS	NDT3	730-1402	Mix of Med and fine Tills	2.02	81.9	46.95	42.34	10.01	0.7

¹ The entire watershed is divided into 300 m elevation bands. The less elevation bands there are and the more area is represented by any given single elevation band, then the greater will likely be the effect of forest harvesting on increased peak flows due to the theoretical concept of “synchronization” (i.e. the melt from the cutblocks is synchronized as much of it comes from the same elevation), and the greater sensitivity it will have.

Table 2. Rating of “Sensitivity” of Watershed to Increased Peak Flow at the lower reaches

Rosgen Stream Channel Type	Rosgen Stream Channel Sensitivity Score	Sensitivity score relative to topography	Sensitivity score relative to lateral connectivity	Sensitivity score relative to vertical conductivity	Sensitivity score relative to climate	Sensitivity score relative to flow synchronization potential	Sensitivity score relative to NDT type	Sensitivity Score	Sensitivity Rating
B4- steep banks - out onto fan	3.5	0.8	1	0.95	1.1	1.21	1	3.53	Mod

Table 3. Rating of “Sensitivity” of Watershed to Increased Production of Fine Sediment at lower reaches

Stream Channel Type	Reach Sensitivity Score	Sensitivity score relative to topography	Sensitivity score relative to lateral connectivity	Sensitivity score relative to drainage density	Sensitivity score relative to climate	Sensitivity score relative to soils	Sensitivity Score	Sensitivity Rating
Riffle pool cobble	4	0.75	1	1	1.1	1.05	3.5	Mod

Table 4. Rating of “Sensitivity” of Watershed to a Loss In riparian Function.

Stream Channel Type	Reach Sensitivity Score	Sensitivity score relative to Aspect	Sensitivity score relative to climate	Overall watershed sensitivity to loss of riparian	Loss of Riparian Sensitivity Rating
Deeply incised with trees	4.82	1.1	1.1	5.83	Very High

Table 5. Peak Flow Hazard Rating, as indexed by HEDA – current scenario (i.e. no proposed harvesting considered)

Watershed area (km ²)	Total area Pine Leading (km ²)	Total area Pine Mixed (km ²)	Total area harvest (km ²) ¹	Total HEDA from Pine Beetle alone (%)	Total HEDA from logging alone (%)	Total HEDA from logging and Pine Beetle mortality (%)
53.1	12.3	11.40	4.57	18.02	7.40	25.42

¹Note: This includes openings from VRI database, and non-overlapping openings from RESULTS and FTEN databases.

Table 5 (continued)

Total area in Agriculture (km ²)	Total area in Agriculture (% of watershed)	Total area in Proposed Harvest (km ²)	Total HEDA (%)	HEDA Hazard rating Score	HEDA Hazard Rating
0.00	0.00	0.00	25.42	2.24	Low

Table 6. Fine Sediment Hazard Rating, as indexed by the Stream Crossing Density

Watershed area (km ²)	# of x-ings	#of fish bearing X-ings ¹	#of non-fish bearing X-ings	density of x-ings (#/km ²)	Density of fish bearing X-ings (#/km ²)	Density of non-fish bearing X-ings (#/km ²)	Hazard Rating Score	Hazard Rating
53.1	15	15	0	0.3	0.3	0.00	1.98	Low

¹Note: The information on stream crossings was provided by MoE and was generated with a GIS model, not fieldwork.

Table 7. Loss of Riparian Function Hazard Rating (See Figures 4 to 11)

Reach Number	Rosgen Stream Type	Reach Length (m)	% riparian logged (as interpreted from air photos)	Apparent stability and other comments (as viewed from air photos)
1	C4- Stable onto fan	445	0.0	Stable
2	B4- steep banks - out onto fan	1448	0.0	Stable
3	B3-Stable	1440	0.0	Stable
4	B4-Stable	1858	0.0	Stable
5	B4-Stable	710	0.0	Stable
6	E4-Stable	1343	0.0	Very Stable
7	E4-Stable	767	0.0	Very Stable
8	E5-Stable	2100	0.0	Very Stable
9	B4-Stable	716	0.0	Stable
Hazard Scores:			Hazard Rating Score	Hazard Rating
			0.25	Very Low

Table 8. Risk Rankings for the Different Hazards in the watershed current scenario (i.e. no proposed harvesting considered)

Watershed Hazard Types	Sensitivity Score	Sensitivity Rating	Hazard Score	Hazard Rating	Risk Score	Risk Rating
Increased Peak Flow	3.53	Mod	2.24	Low	7.9	Mod
Increase in Production of Fine Sediment	3.47	Mod	1.98	Low	6.9	Low
Loss of Riparian function	5.83	Very High	0.25	Very Low	1.5	Very Low

Table 9. Summary Table for Fish Values^{1,2}

Watershed Name	Size (km ²)	FID	Species	Productivity	Diversity	Significant Species	Ranking ³	Comments
Gullwing Creek	53.1	14	SK (J Lough), RB, KO, CO,		x	x	VH	

¹ Note: The "Fish Values" were assessed and provided by Fisheries Biologists from the Ministry of Forest, Lands, and Natural Resource Operations. Fisheries value score (High, Very High, or Extreme) is based on the occurrence of (1) exceptional fisheries productivity, or (2) high fish species diversity (more than three species), or (3) notable significance of fish species (i.e. listed species, stock at risk, large piscivorous rainbows), or (4) a combination of 1, 2, and/or 3. If none of these characteristics occurred in the watershed it was not considered for FSW status

² Note: This table was extracted from Tables 26 and 27 provided in Appendix 1 of the methodology document.

³ Ranking System:

- 3x = Extreme (E)
- 2x = Very High (VH)
- 1x = High (H)
- 0x = No rating

Table 10. Fisheries Sensitive Watershed Score and Rating

Name	Size (km ²)	Peak Flow Sensitivity	Sed Sensitivity Rating	Riparian Sensitivity	Fish Value ¹	FSW Score PF vs Fish	FSW Score Seds vs Fish	FSW Score Rip vs Fish	Overall FSW Score	Overall FSW Rating
Gullwing Creek	53.1	Mod	Mod	Very High	Very High	3	3	4	10	High

¹ Note: The fish value class is obtained from Table 9 above.

INTERPRETATIONS AND RECOMMENDATIONS FOR MANAGEMENT STRATEGIES FOR PROTECTION OF WATER RESOURCES IN THIS WATERSHED

Brief Watershed Description (Table 1 and Figures 1 and 2)

Gullwing Creek watershed, which flows south directly into the north side of Babine Lake, has a generally flat to rolling topography with an elevation range between 730 and 1402 m. Most of the watershed (82%) is located within one single 300 m elevation band, i.e. between 1030 and 1330 m. There are limited steep slopes in this watershed with 90% of the watershed having slopes less than 30% (Table 1). The dominant biogeoclimatic zone in this watershed is the SBSmc2.

The headwaters of Gullwing Creek start in a series of small lakes, flow down through an extensive wetland system (reaches 6 to 9), then down a deeply entrenched and relatively steep canyon and finally out onto a well developed alluvial fan in Babine Lake (Figure 1 and Figures 4 to 11). The surficial geology of this watershed is dominated by a mixture of fine and moderately coarse morainal tills with extensive organic soils along reaches 6 to 9 and a few bedrock outcrops (Figure 1 and 2). The mainstem reaches have been classified as a mixture of very sensitive C4 on a fan type and extensive lengths of very stable E4 and B4 types (Table 7). The mainstem has been well protected from riparian harvesting throughout the watershed (Table 7) and thus has a very low riparian function hazard rating.

Sensitivities, Hazards and Risks in this Watershed

The overall sensitivity of the watershed to increased peak flows and fine sediment delivery have both been classified as a moderate which is mostly due to the combination of relatively stable channels and low topography (Table 2, 3 and 8). However, the sensitivity of the watershed to losses in riparian function has been classified as Very High (Tables 4 and 8).

The risk ratings for all three hazard classes have been classified as moderate or less for the Gullwing watershed. This is due, in large part to the low hazards in this watershed where disturbances are not large. (Table 8)

When considering both the physical sensitivities in this watershed and the fisheries values, the Fisheries Sensitive Watershed (FSW) rating is assessed as High (Table 9).

Suggested Management Objectives and Strategic Directions for this Watershed

- 1) Maintain best management erosion and sediment control practices at all stream crossings. I recommend that the Water Quality Effectiveness Evaluation (WQEE) tool be used and that the WQEE rating be maintained below a moderate level for all crossing in the Gullwing Creek watershed (i.e. Low or Very Low). The most recent WQEE protocol can be found at the following web link:
<http://www.for.gov.bc.ca/ftp/hfp/external!/publish/frep/indicators/Indicators-WaterQuality-Protocol-2009.pdf>
- 2) The sensitivity of this watershed to increased peak flows has been classified as only moderate and the current peak flow risk is also moderate. Consequently, I suggest that

management of peak flows should not be the main focus of special recommendations for this watershed, were it to be designated as fisheries sensitive. I recommend that a reasonable objective for this watershed is to maintain the maximum peak flow risk to a moderate level (i.e. maintain moderate or low). This means that the HEDA value for this watershed should be maintained below 42%, which would allow the harvesting of an additional 880 ha of green stands (more hectares could be harvested if some of the green stands targeted for harvesting were replaced by harvesting dead pine stands). The current HEDA is 25.4% (Table 5). Use the peak flow risk calculator to determine the maximum suggested harvest of different combinations of healthy stands and mountain pine beetle affected stands in order to maintain a maximum risk level of Moderate.

- 3) Given the Very High sensitivity relative to a loss in riparian function, special attention in this watershed should be focused on the protection of riparian function. For all S4 streams wider than 0.5 m, maintain long term large woody debris (LWD) recruitment to the stream channel by retaining at least 90% of the riparian area in a state undisturbed by primary forest activities. Note that the riparian area refers to the management area measured from the closest streambank to a distance 15m upslope from the streambank.

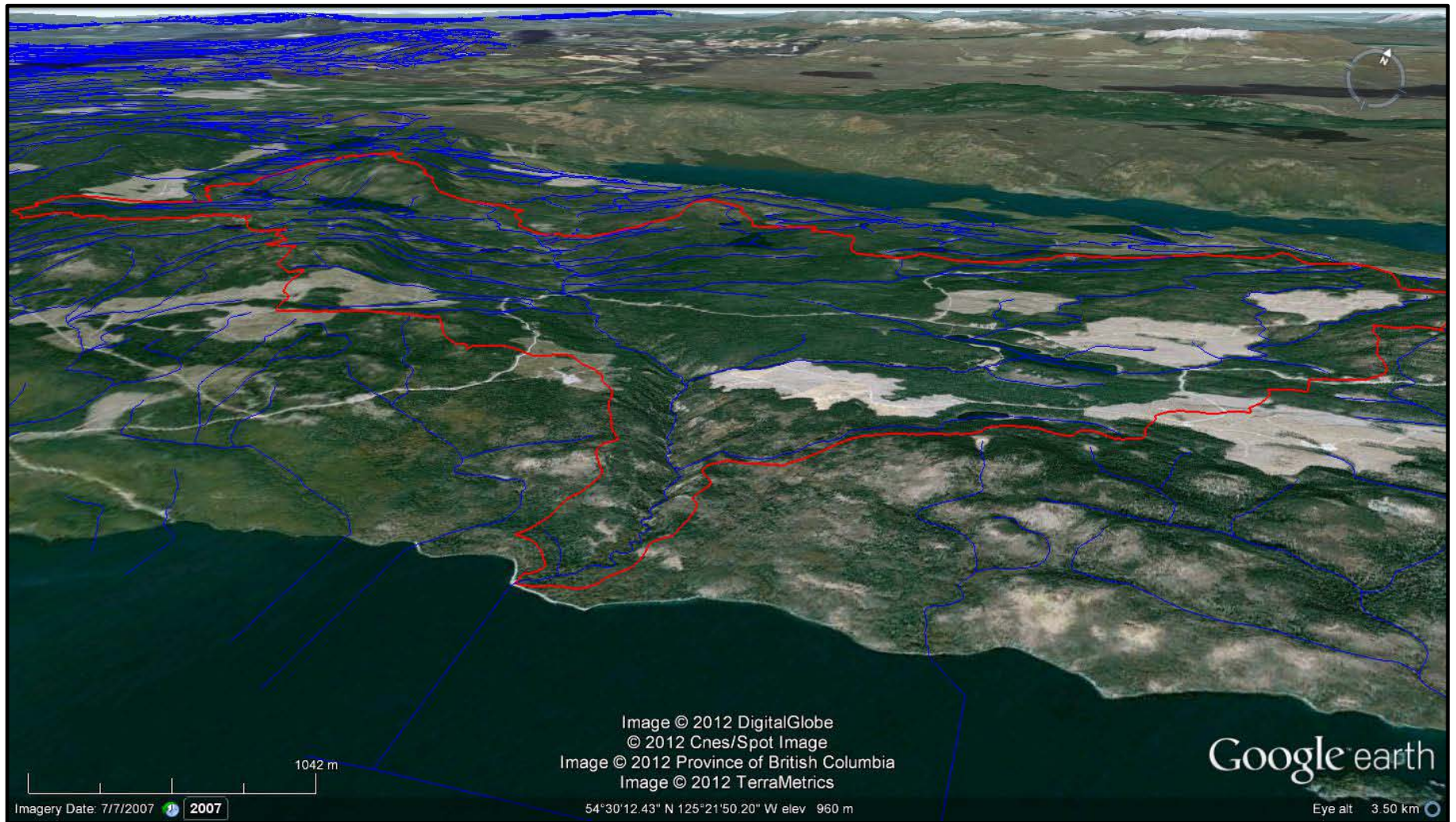


Figure 1. Google earth overview image of Gullwing Creek watershed, looking upstream into the watershed.

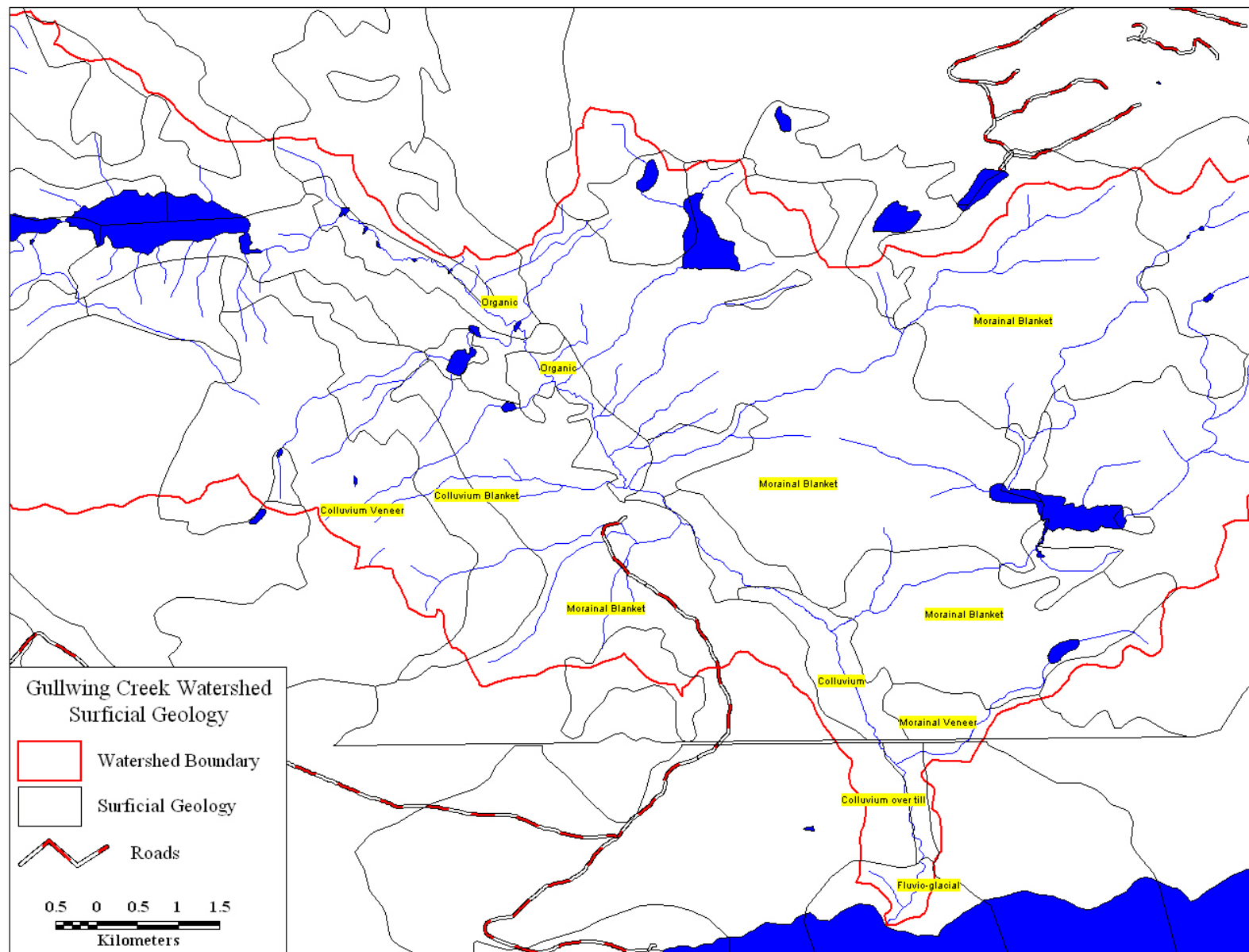


Figure 2. Distribution of surficial geology types near the mouth of Gullwing Creek watershed.

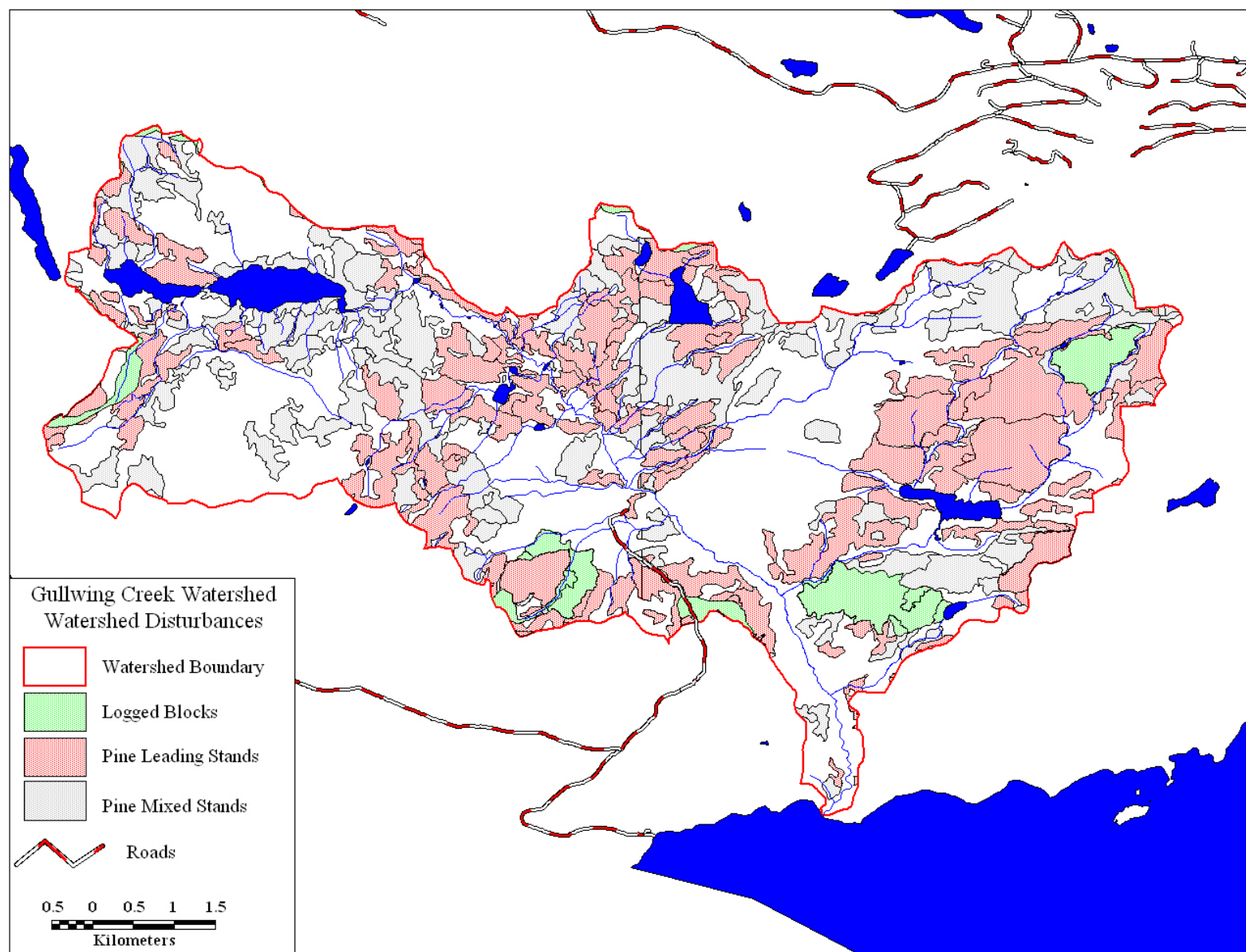


Figure 3. Land-use related and large natural disturbances in the Gullwing Creek Watershed

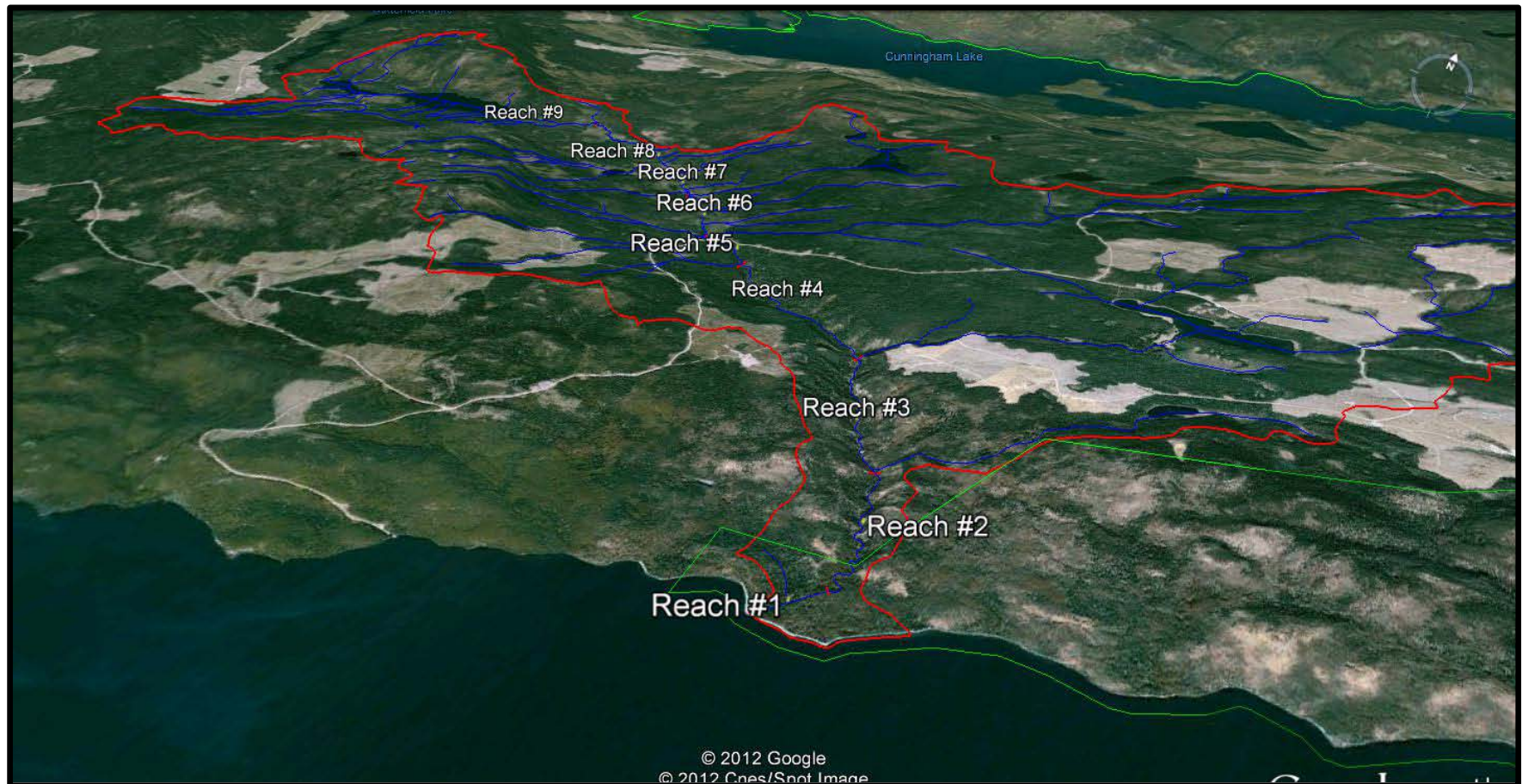


Figure 4. Identification of reaches along the mainstem of Gullwing Creek watershed



Figure 5. Google Earth image looking upstream along Reach #1 and 2 of Gullwing Creek.

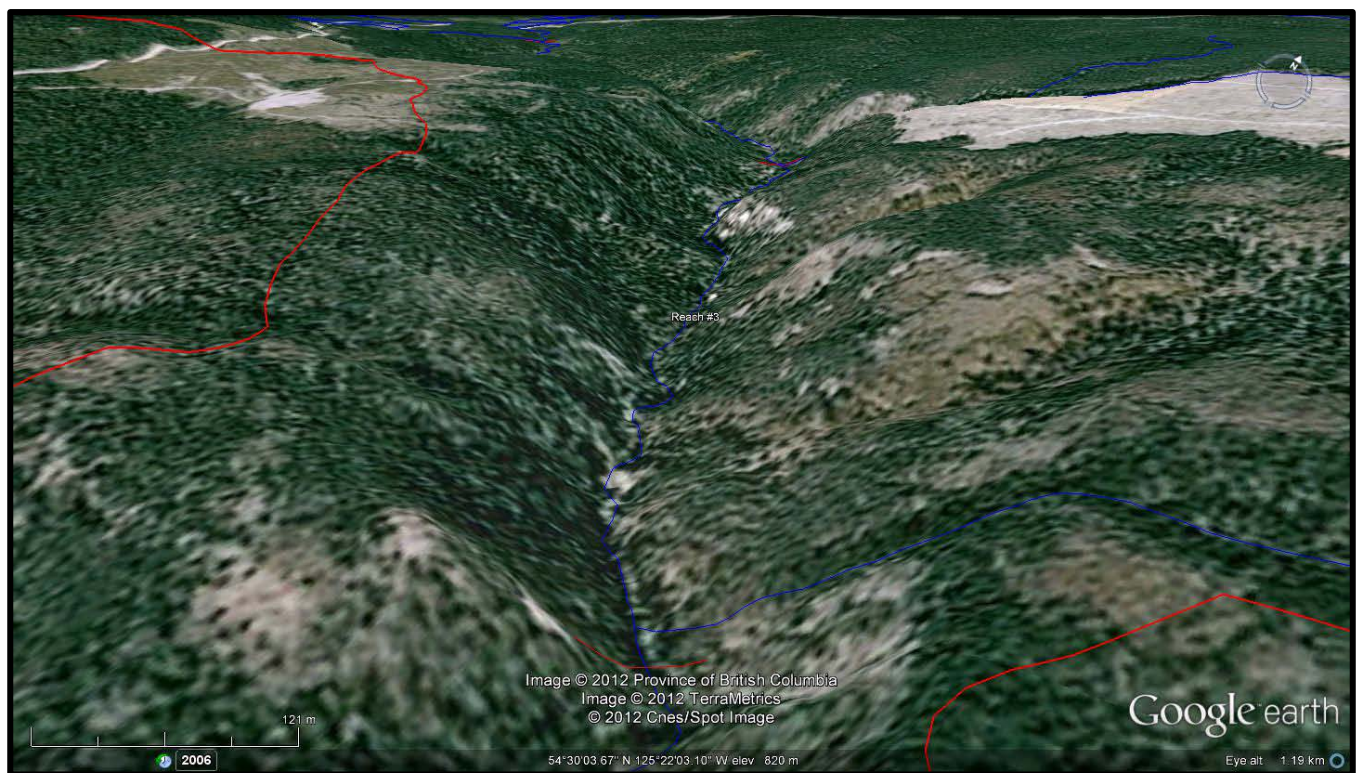


Figure 6. Google Earth image looking upstream along Reach #3 of Gullwing Creek.

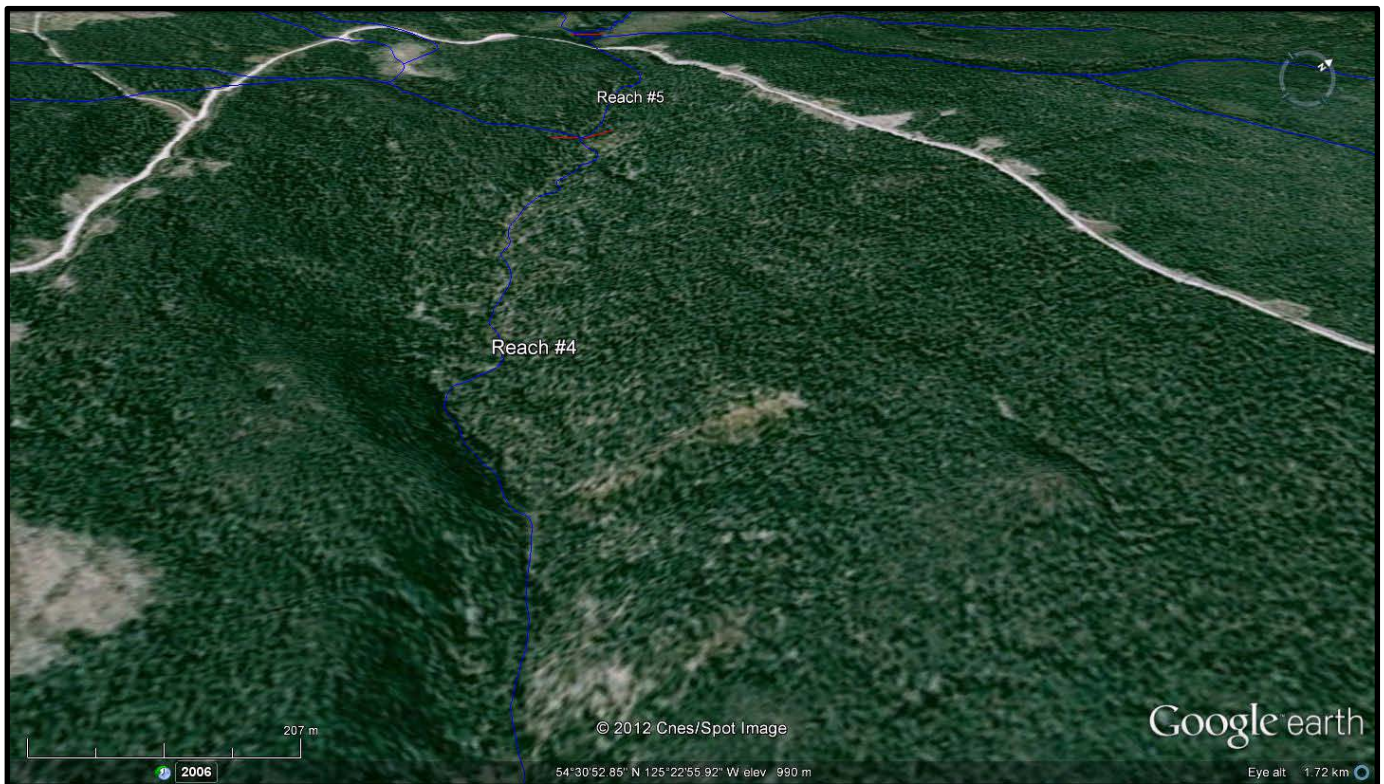


Figure 7. Google Earth image looking upstream along Reach #4 and 5 of Gullwing Creek.

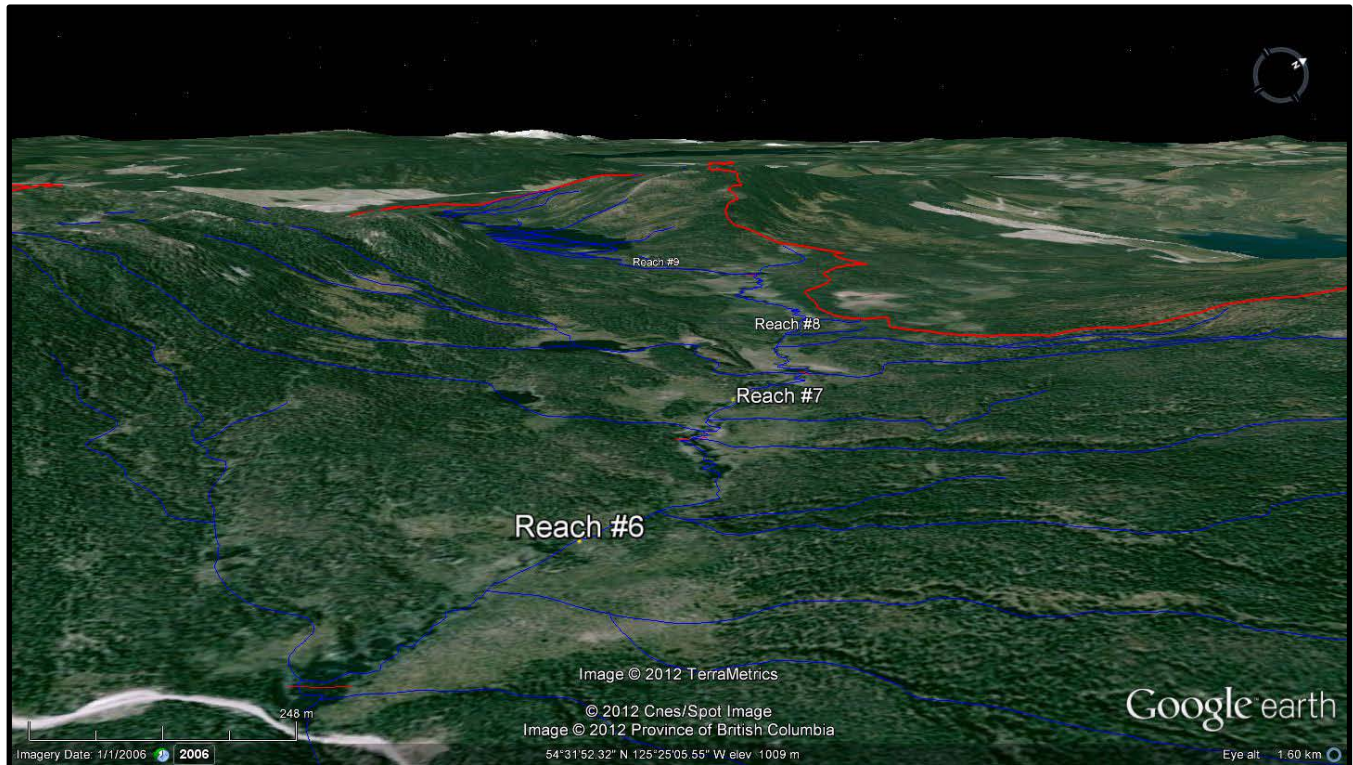


Figure 8. Google Earth image looking upstream along Reach #6, 7, 9 and 9 of Gullwing Creek.



Figure 9. Google Earth image looking upstream along Reach #5 of Gullwing Creek.



Figure 10. Google Earth image looking upstream along Reach #6 of Gullwing Creek.

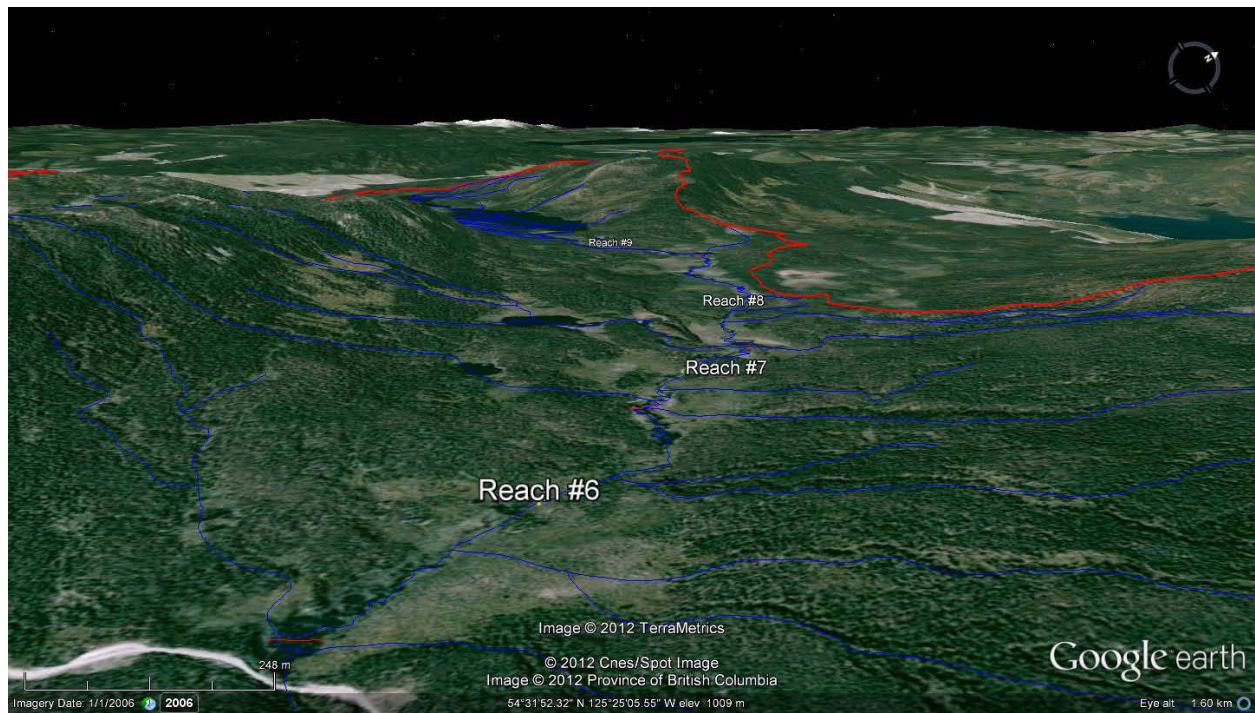


Figure 11. Google Earth image looking upstream along Reach #6, 7, 8 and 9 of Gullwing Creek.