

WATERSHED REVIEW

TACHEK 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
93.7	SBSmc2/ESSFmc	NDT3	730-1703	Mix of Med and fine Tills	1.91	43.1	80	19.7	0.3	0

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
C4- Stable onto fan	3.8	0.6	1.1	0.95	1.1	1.05	1	2.74	Low

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 gravel	5	0.65	1.2	0.9	1.1	1.05	4.1	High

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
C3-C6	4.82	0.9	1.1	4.77	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 (%)
93.7	30.5	13.03	10.69	20.43	2.22	22.65

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	22.65	1.97	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
93.7	48	48	0	0.5	0.5	0.00	3.47	Mod

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 9)

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	1081	0.0	Stable
2	C4- Stable onto fan	625	0.0	Stable
3	C4- Stable	1039	0.0	Stable
4	B4- Steep banks only	2167	0.0	Stable
5	B4- Steep banks only	1480	0.0	Stable
6	B4-Stable	2079	0.0	Stable
7	B4-Stable	2010	0.0	Stable
8	B4-Stable	2367	0.0	Stable
9	B4-Stable	878	0.0	Stable
10	E4-Stable	2268	0.0	Very 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	2.74	Low	1.97	Low	5.4	Low
Increase in Production of Fine Sediment	4.05	High	3.47	Mod	14.0	High
Loss of Riparian function	4.77	High	0.25	Very Low	1.2	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
Tachek Creek	93.7	7	CT, RB, CO, SK,		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
Tachek Creek	93.7	Low	High	High	Very High	2	4	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)

Tachek Creek watershed, which flows directly into Babine Lake, has a generally flat to lightly rolling topography with slightly steeper sections at the back end of the watershed where it starts to climb up the flanks of Matzehtzel Mountain. Elevations in this watershed range between 730 and 1703 m. The watershed is distributed over several 300 m elevation bands, with the biggest proportion (43%) being in the lowest elevation band between 730 and 1030 m. There are few steep slopes in this watershed with 99.7% of the watershed having slopes less than 30% (Table 1). The dominant biogeoclimatic zone in this watershed is the SBSmc2 and the ESSFmc.

The mainstem of Tachek Creek is generally a low to moderate gradient confined channel that flows through steeply entrenched canyons and finally flows out onto an unconfined alluvial fan at Reach #2 (Figure 1 and 5). There are several unstable slopes and an abundance of flat-over-steep terrain along many of the canyon reaches (Figures 7 to 16). The surficial geology of this watershed is dominated by a mixture of fine and moderately coarse morainal tills with some coarser textured fluvial and glacio-fluvial sections near the mouth and some very sensitive lacustrine soils at the mouth (Figure 1 and 2). The lower three stream reaches are stable C4 type channels (Table 7, Figures 5 and 6). Reaches 4 to 9 are stable and confined B4 type channels, while reaches 10 and 11 are a very low gradient wetland type system (Figures 7 to 13). 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 increases in peak flows has been classified as a low (Table 2). Although the lower three reaches have been classified as C4 sensitive types, this is somewhat offset by the low sensitivity of the other reaches, the generally low topography of the watershed and the deep porous soils (Table 2).

The overall sensitivity to increased production of fine sediments is high (Table 3), while the sensitivity for a loss in riparian function is also rated as high (Tables 3 and 4). This is due to a combination of sensitive reach types at the lower end of the watershed, high drainage density, wetter climate and an abundance of flat over steep terrain.

The current risk rating for sediment is high, while the risk ratings for the other two are low or very low.

When considering both the overall physical sensitivities in this watershed and the fisheries values, the Fisheries Sensitive Watershed (FSW) rating is assessed as high (Tables 9 and 10).

Suggested Management Objectives and Strategic Directions for this Watershed

- 1) Since the highest sensitivities and risks in this watershed are associated with the potential for increased delivery of fine sediments, the most important management recommendation for this watershed is to maintain best management erosion and sediment control practices with the watershed. This includes minimizing erosion and the delivery of fine sediments at all stream crossings and very careful management of flat over steep terrain. If this watershed is designated as fisheries sensitive then 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 Tachek 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) Although the current risk to riparian is very low, the sensitivity has been assessed as high and thus any further forest harvesting in this watershed should consider careful management of riparian forests a priority. I suggest that special attention be given to small streams as they are often inadequately protected. A good objective is to maintain long term large woody debris (LWD) recruitment for all S4 streams wider than 0.5 m 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.
- 3) The overall sensitivity of this watershed to increased peak flows has been classified as only low along with the current peak flow risk. Consequently I suggest that the management of peak flows should not be the main focus of special FSW recommendations for this watershed. I suggest that a reasonable objective for this watershed is to maintain the peak flow risk at a moderate level or lower. This means that the HEDA value for this watershed should be maintained below 52%, which would allow the harvesting of an additional 2800 ha of green stands (more hectares could be harvested if some of the green stands targeted for harvesting were replaced by dead pine stands). 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 peak flow risk level of moderate or less.

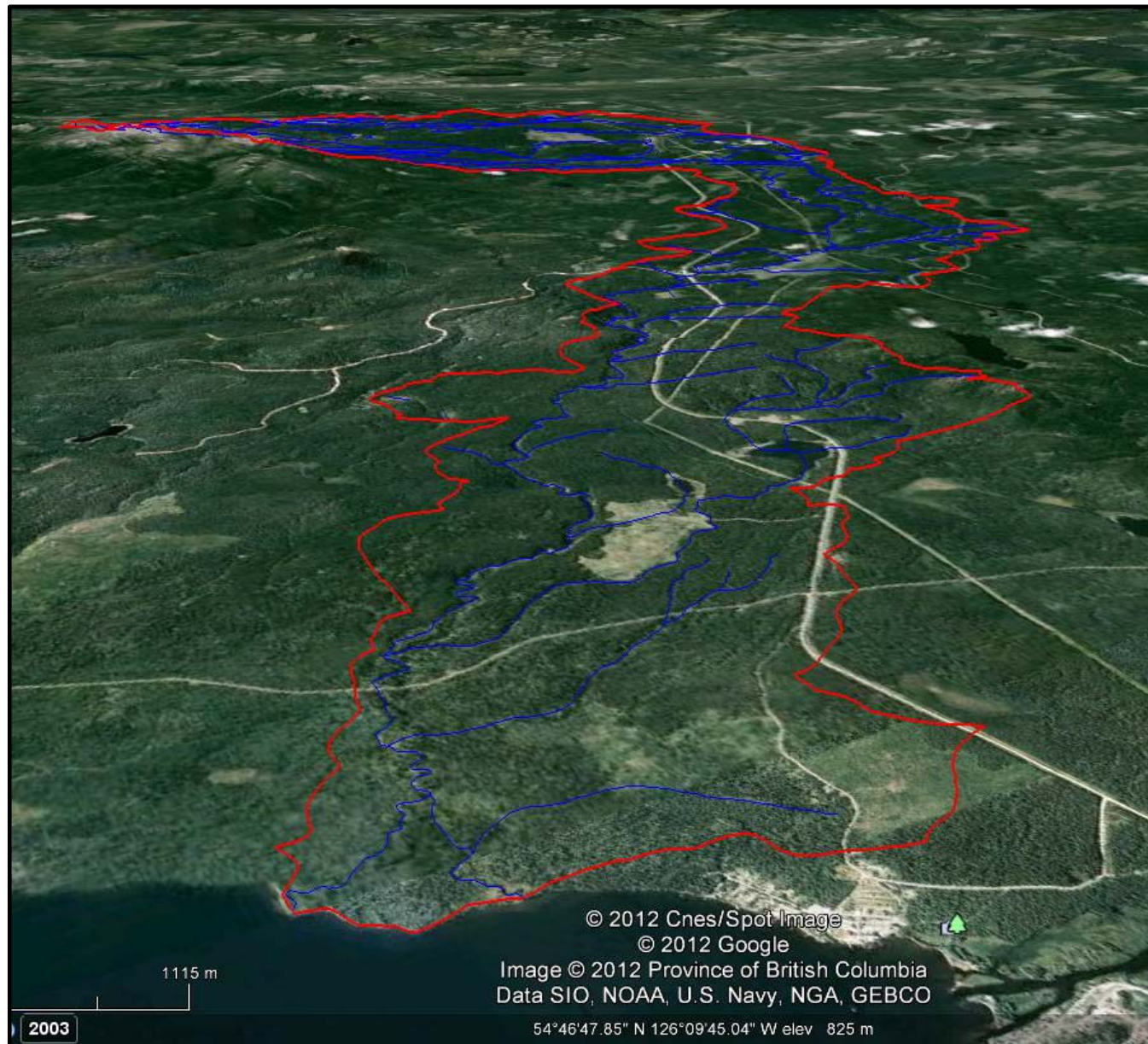


Figure 1. Google earth overview image of Tachek Creek watershed, looking upstream into the watershed.

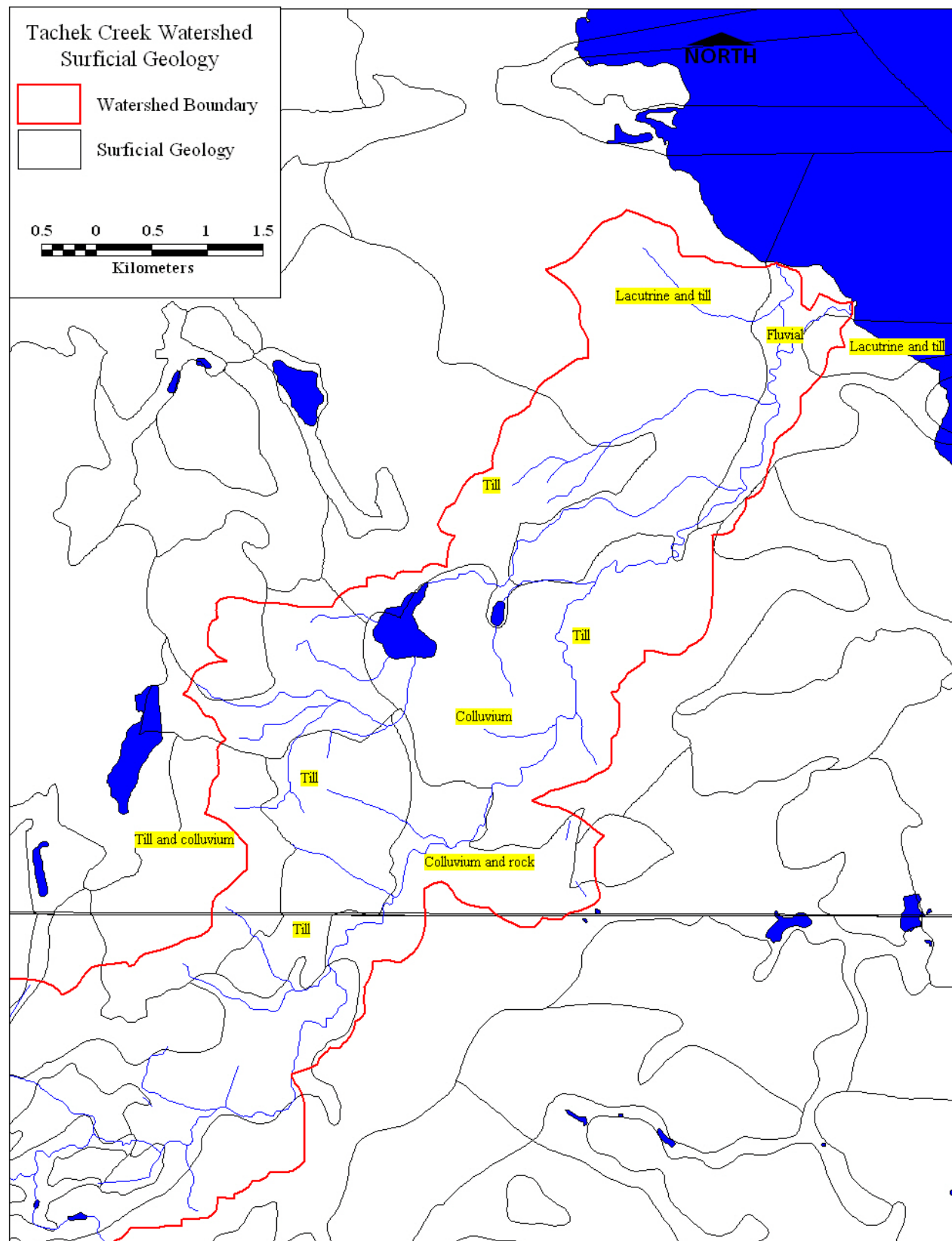


Figure 2. Distribution of surficial geology types near the mouth of Tachek Creek watershed.

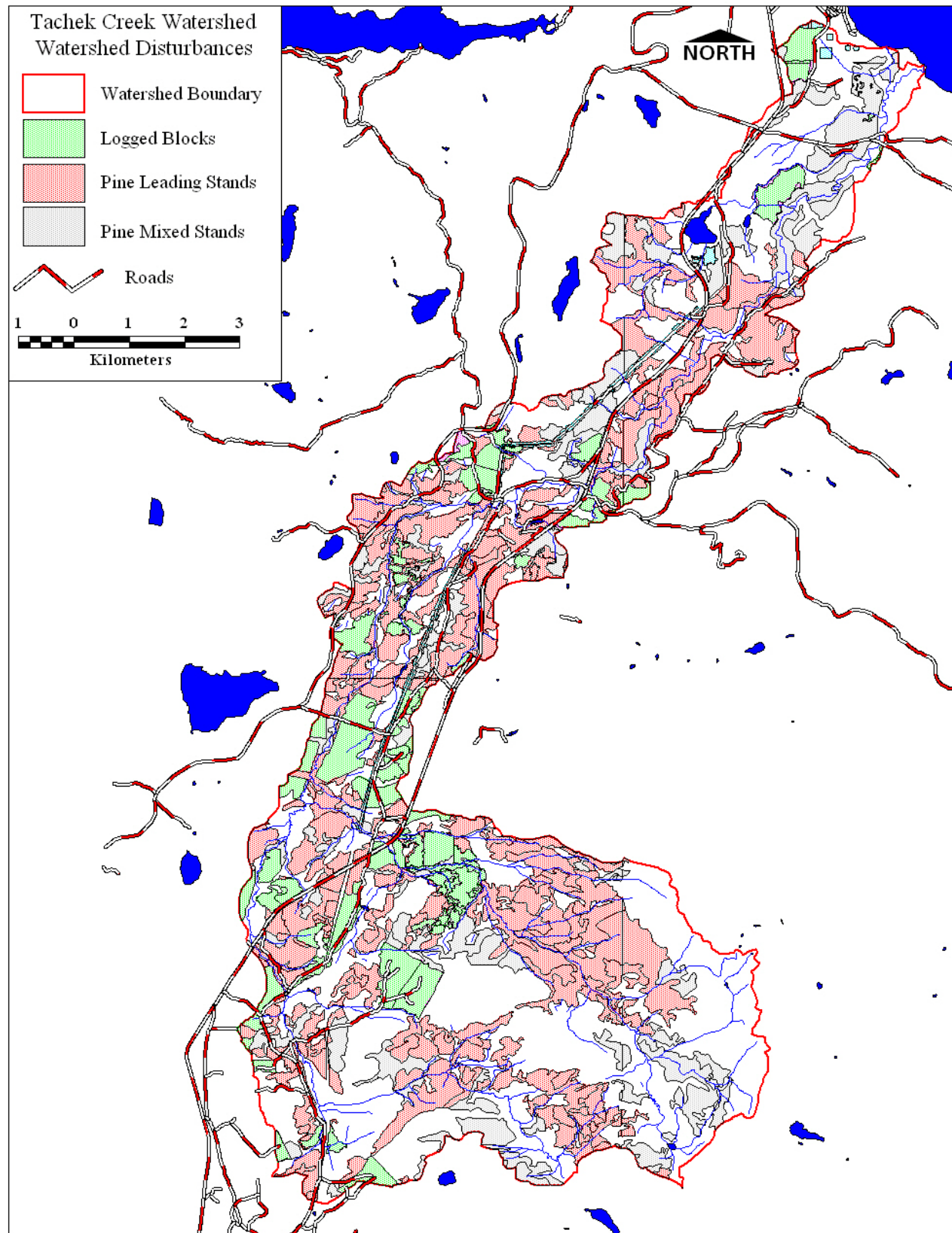


Figure 3. Land-use related and large natural disturbances in the Tachek Creek Watershed

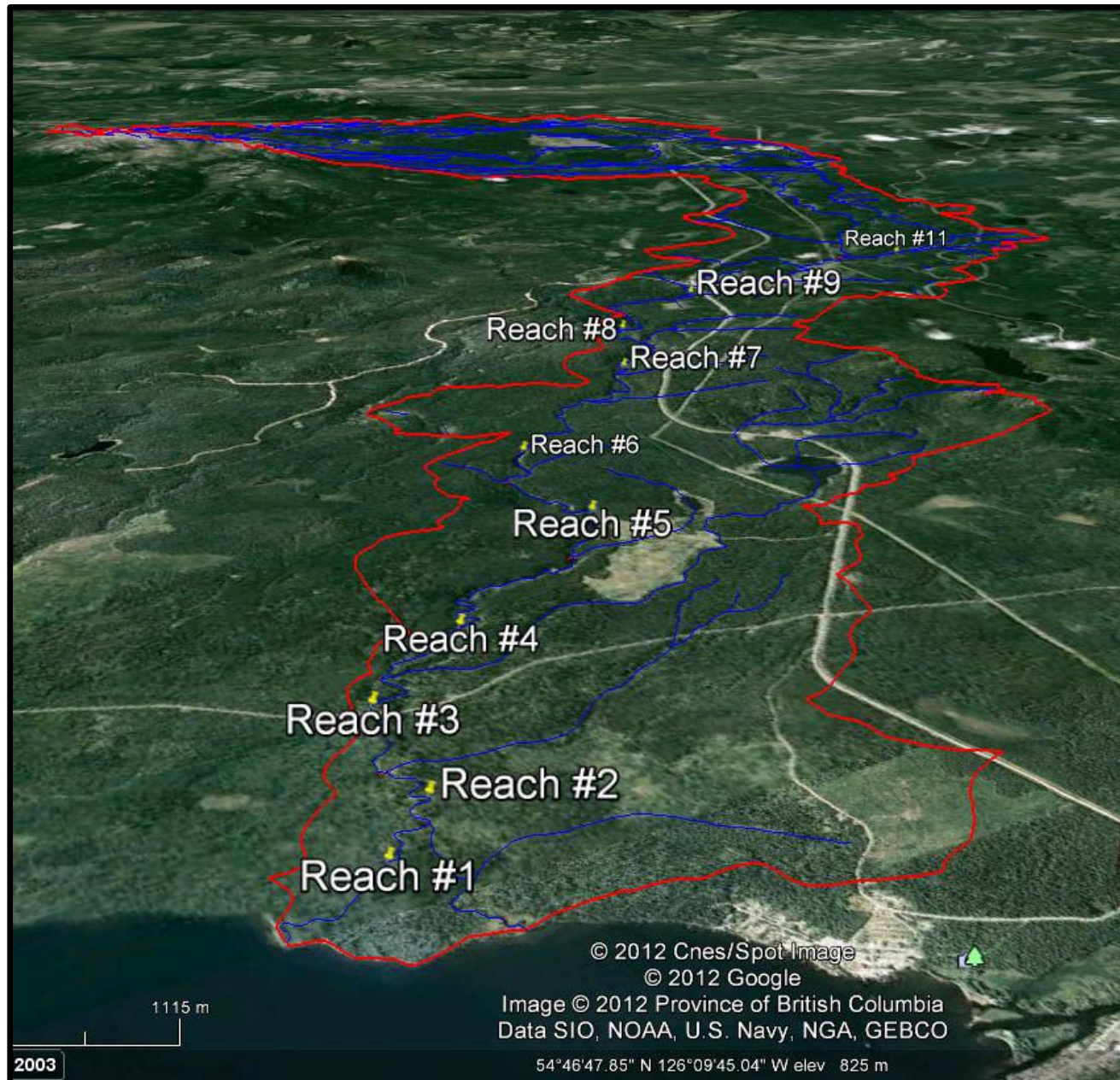


Figure 4. Identification of reaches along the mainstem of Tachek Creek watershed

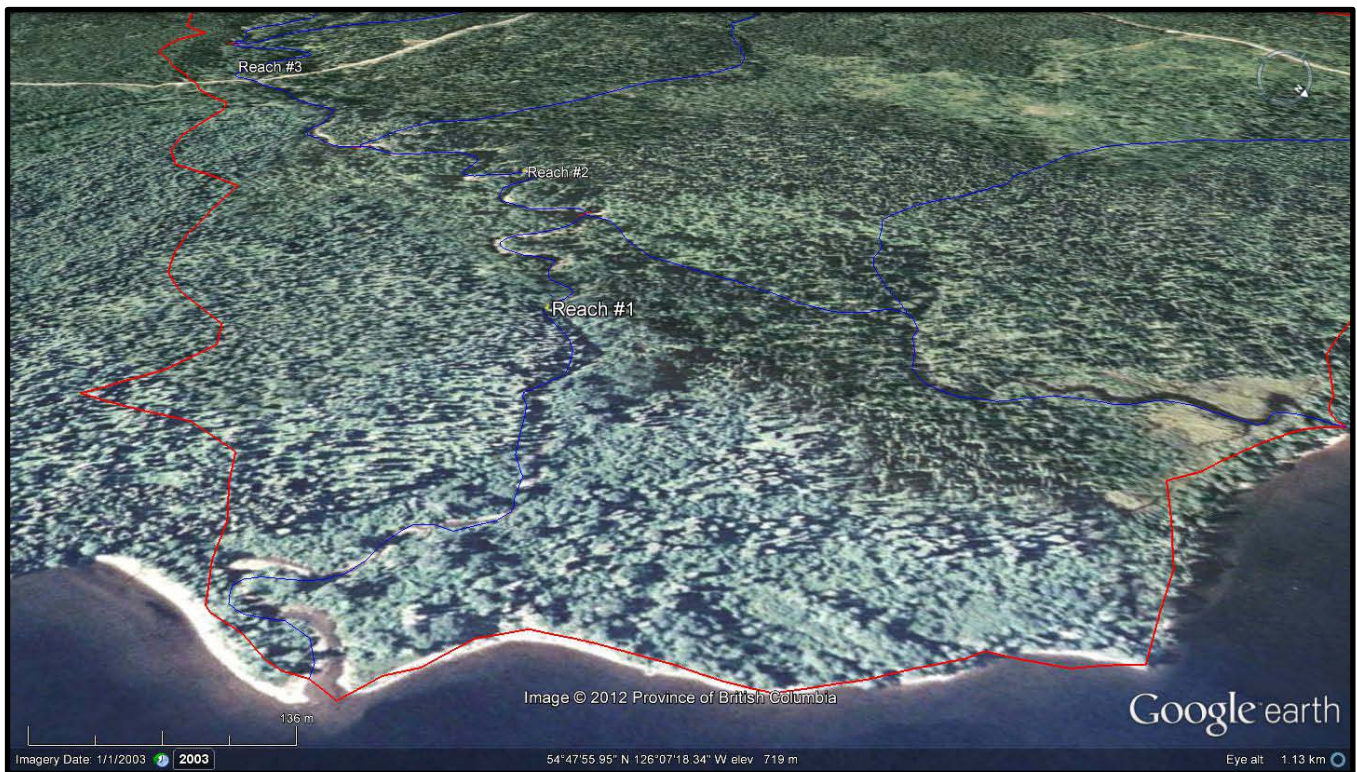


Figure 5. Google Earth image looking upstream along Reach #1 and 2 of Tachek Creek.



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

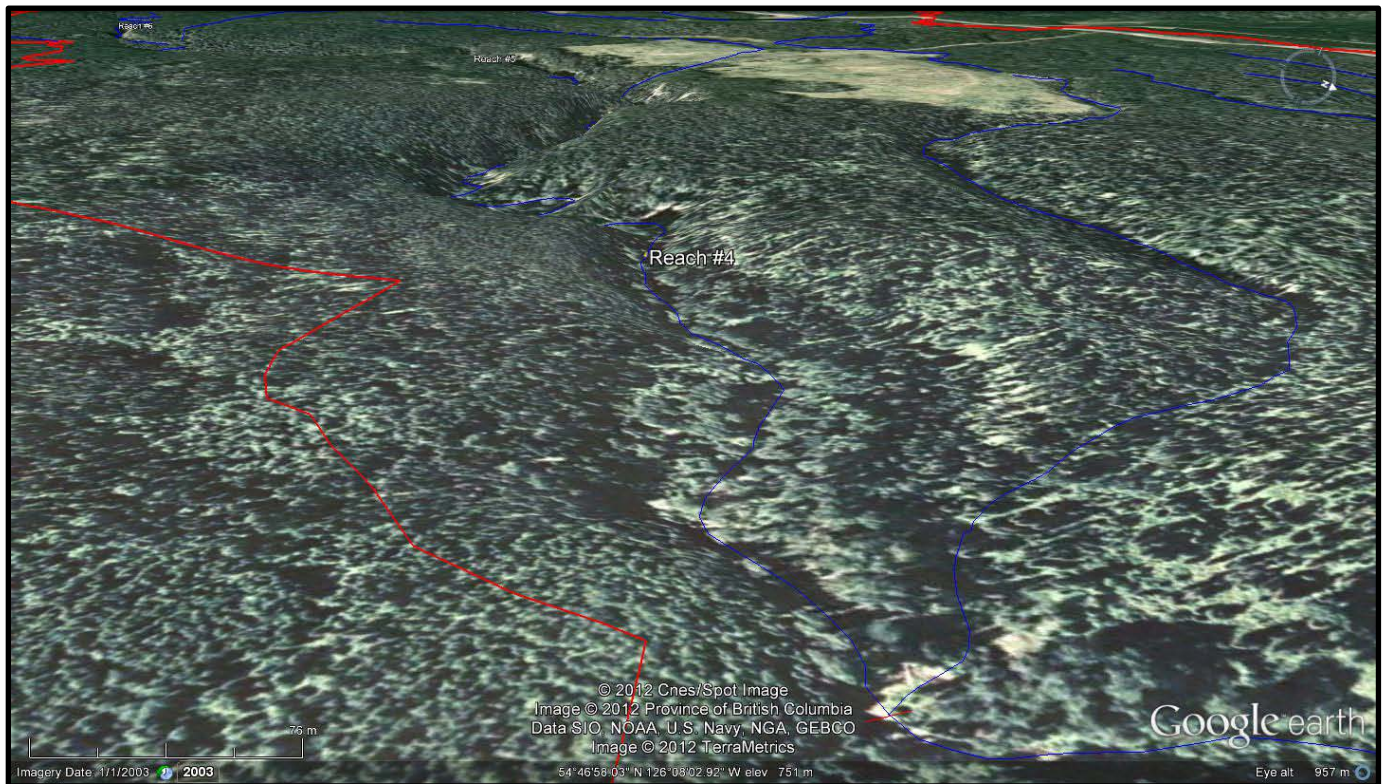


Figure 7. Google Earth image looking upstream along Reach #4 of Tachek Creek.

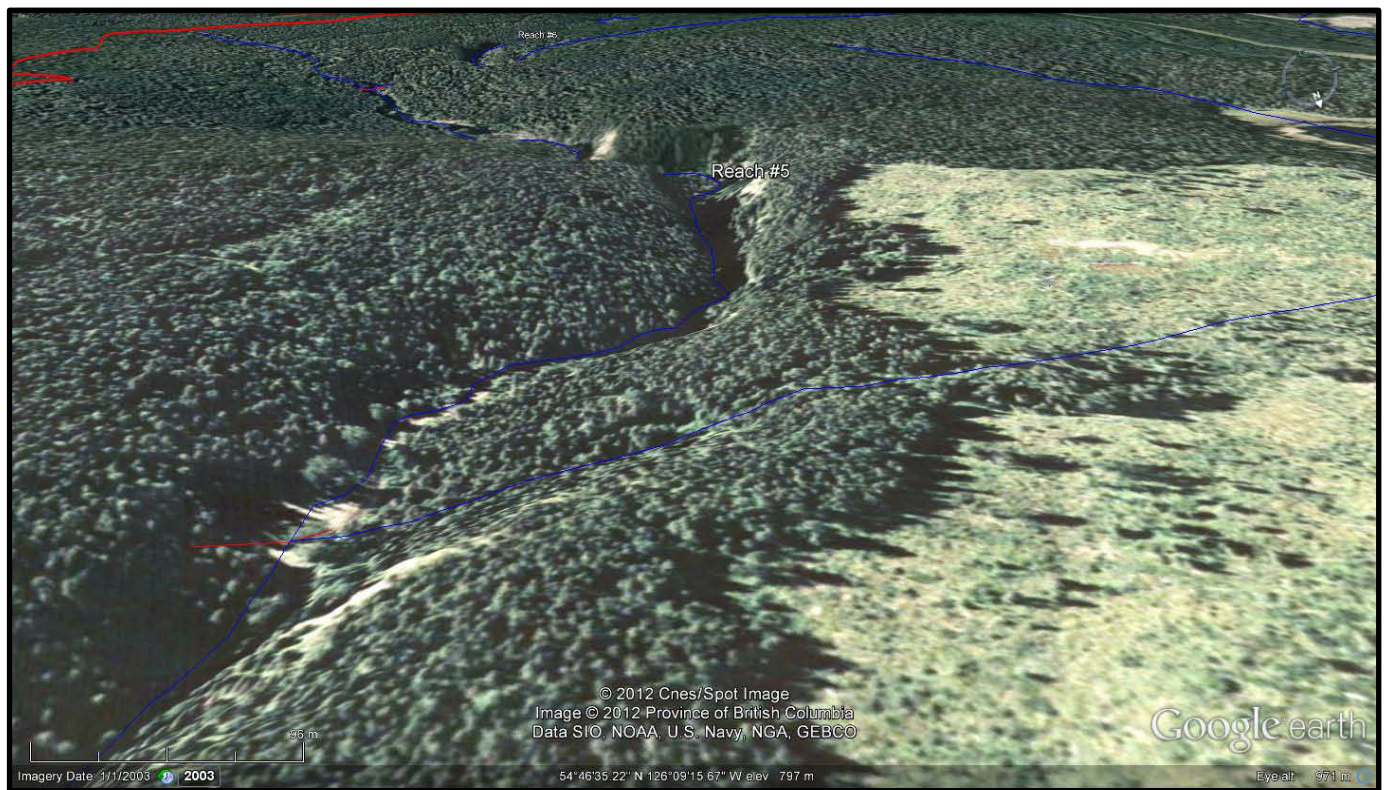


Figure 8. Google Earth image looking upstream along Reach #5 of Tachek Creek.

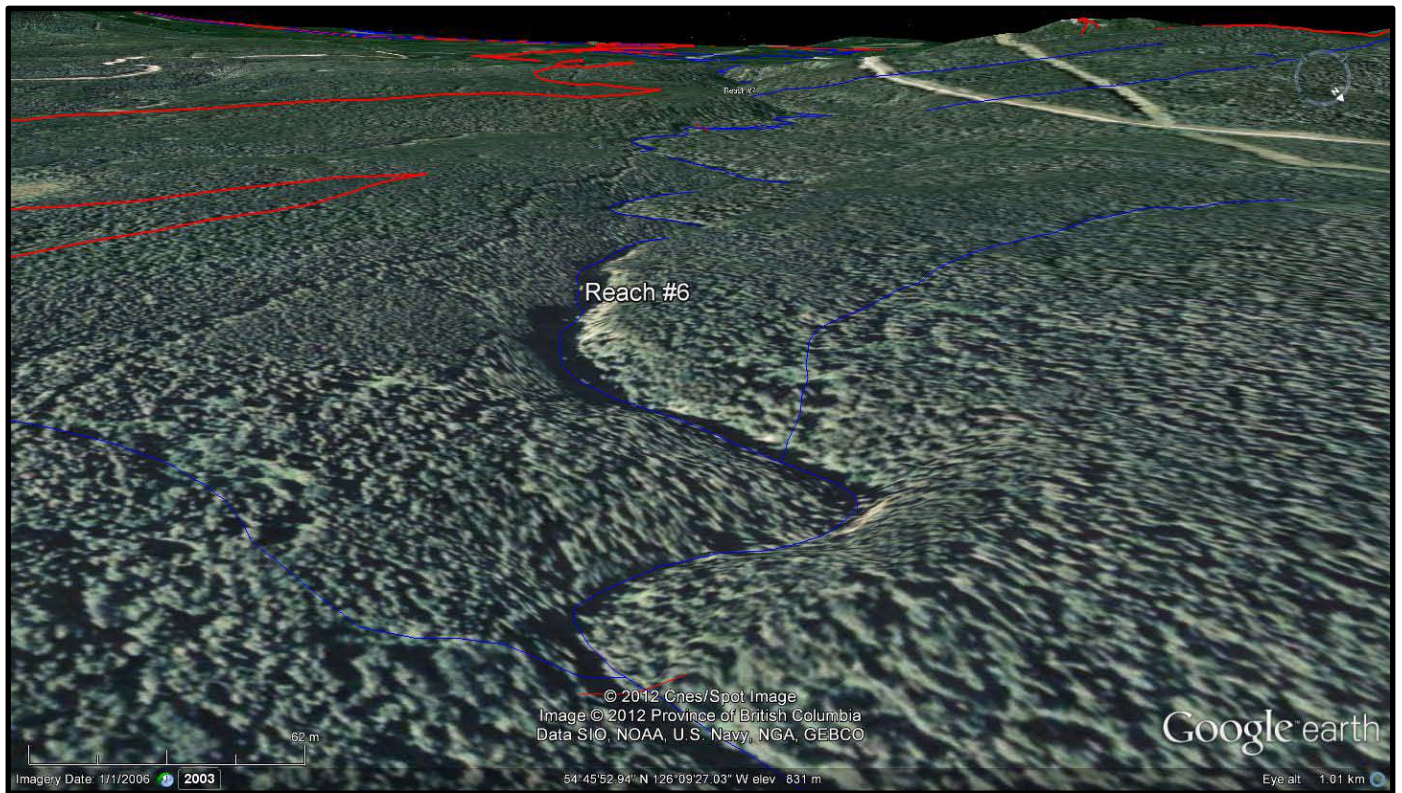


Figure 9. Google Earth image looking upstream along Reach #6 of Tachek Creek.



Figure 10. Google Earth image looking upstream along Reach #7 of Tachek Creek.



Figure 11. Google Earth image looking upstream along Reach #8 of Tachek Creek.



Figure 12. Google Earth image looking upstream along Reach #9 and 10 of Tachek Creek.

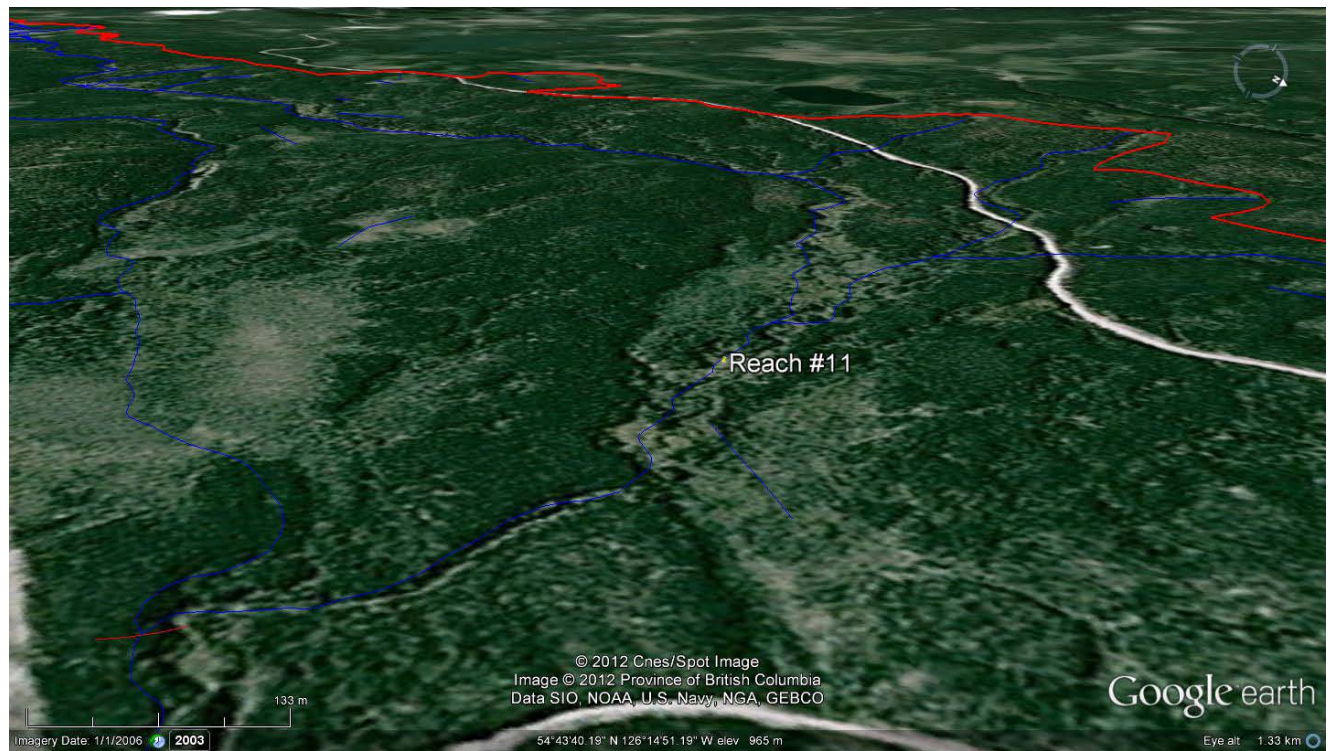


Figure 13. Google Earth image looking upstream along Reach #11 of Tachek Creek.