

WATERSHED REVIEW

CALLAZON CREEK WATERSHED

Draft March 23, 2012

Ministry Contract No: CS12NRH-011

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
251.0	ESSF wk2 / SBSwk2	NDT 2	732-1853	Coarse textured till	2.2	47.2	12.8	44.0	35.2	8.0

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- Lightly unstable w disturbed fan	4.2	1	1.1	1	1.1	1.06	1.03	5.57	Very High

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
Rifle pool cobble	4	1	1.2	1	1.1	0.8	4.2	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	1.05	0.9	4.55	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 (%)
251.0	0.0	3.82	27.76	0.46	6.07	6.53

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	6.53	0.43	Very 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
251.0	59	48	11	0.2	0.2	0.04	0.99	Very 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

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- Lightly unstable w disturbed fan	1738	0.5	Lightly De-stabilized with old riparian logging
2	D4- Lightly unstable/disturbed	1362	90.0	Lightly De-stabilized with old riparian logging
3	B4- Lightly unstable	2317	65.0	Lightly De-stabilized with old riparian logging
4	B3- Lightly unstable	1259	80.0	Lightly De-stabilized
5	B3- Lightly unstable	3638	80.0	Lightly De-stabilized
6	B3-Stable	1807	25.0	Stable
7	B3-Stable	1061	85.0	Stable
8	B3-Stable	1037	10.0	Stable
9	E4-Stable	1889	0.0	Very Stable
10				
11				
12				
Hazard Scores:			Hazard Rating Score	Hazard Rating
			3	Mod

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	5.57	Very High	0.43	Very Low	2.4	Low
Increase in Production of Fine Sediment	4.22	High	0.99	Very Low	4.2	Low
Loss of Riparian function	4.55	High	3	Mod	13.7	High

Table 9. 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
Callazon Creek	251.0	Very High	High	High	High	4	3	3	10	High

¹Note: The "Fish Values" were assessed and provided by Fisheries Biologists from the Ministry of Forest, Lands and Natural Resource Operations. This report does not describe fish values.

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

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

Callazon Creek watershed, which flows directly into the Upper Pine River, has a mixed topography of rolling/mountainous terrain and some steep mountains dominated by alpine tundra. Elevations in this watershed range between 732 and 1853 m. The watershed is distributed over several 300m elevation bands, with the biggest proportion (47%) being in the elevation band between 1332 and 1632 m. There is an abundance of steep slopes in this watershed with 43% of the watershed having slopes greater than 30% and 8% of the watershed having slopes greater than 60% (Table 1). The dominant biogeoclimatic zones in this watershed are the ESSFwk2 and SBSwk2.

The mainstem of Callazon Creek is a relatively large, moderate gradient, wandering to meandering river. It has a wide floodplain that has been extensively disturbed in the past (Figure 1, 5 and 6). The channel is slightly unstable in sections, although most of the old disturbances appear to have recovered. The surficial geology of this watershed is dominated by a mixture of morainal tills, coarse colluviums and fluvial and glacio-fluvial deposits (Figures 1 and 2). The lower mainstem reaches have been classified as a slightly unstable Rosgen D4 and C4 type channels (Table 7, Figures 4 to 6). Extensive forest harvesting has occurred along the valley bottom of this watershed including extensive removal of the riparian forest (old, past practices).

Sensitivities, Hazards and Risks in this Watershed

The overall sensitivity of the watershed to increases in peak flows has been classified as a Very High (Table 2). This is due to the combination of unstable and sensitive stream reaches in the lower watershed, steep topography and relatively high drainage densities (Table 2). The overall sensitivity to increases in fine sediments and to a loss in riparian function have been assessed as high due mostly to the sensitive reach types and lack of buffering lakes and swamps (Tables 3, 4 and 8).

Although there has been an extensive amount of forest harvesting in this watershed, the current peak flow hazard is very low simply because most of the cut over areas are now hydrologically recovered. The hazard rating for riparian is moderate because of the extensive riparian harvesting that has occurred in the past and this combined with the high sensitivity rating has resulted in a high risk rating for riparian (Table 8).

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

Suggested Special Management Objectives to Protect Fish Habitat Values Above and Beyond Those Already Required by FPPR

1) Risks associated with an increase in peak flows

Given that the current peak flow sensitivity for this watershed is very high, recommendations are as follows:

- a. Maintain peak flow risks to a maximum of a Low level
 - i. Current HEDA= 6.5%
 - ii. Max HEDA to maintain low risk = 15%
 - iii. Available harvest in green timber to maintain low risk = 2,187 ha
 - iv. 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 the risk level below moderate.

2) Risks associated with the accelerated delivery of fine sediments

Given that the current fine sediment sensitivity for this watershed is high, recommendations are as follows:

- a. Minimize erosion and the delivery of fine sediments at all stream crossings and keep the WQEE stream crossing rating to a maximum of a Low hazard level.
 - i. To complete these assessments, use the most recent WQEE protocol which 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>

3) Risks associated with a loss in riparian function

Given that the current riparian sensitivity for this watershed is high:

- a. 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.

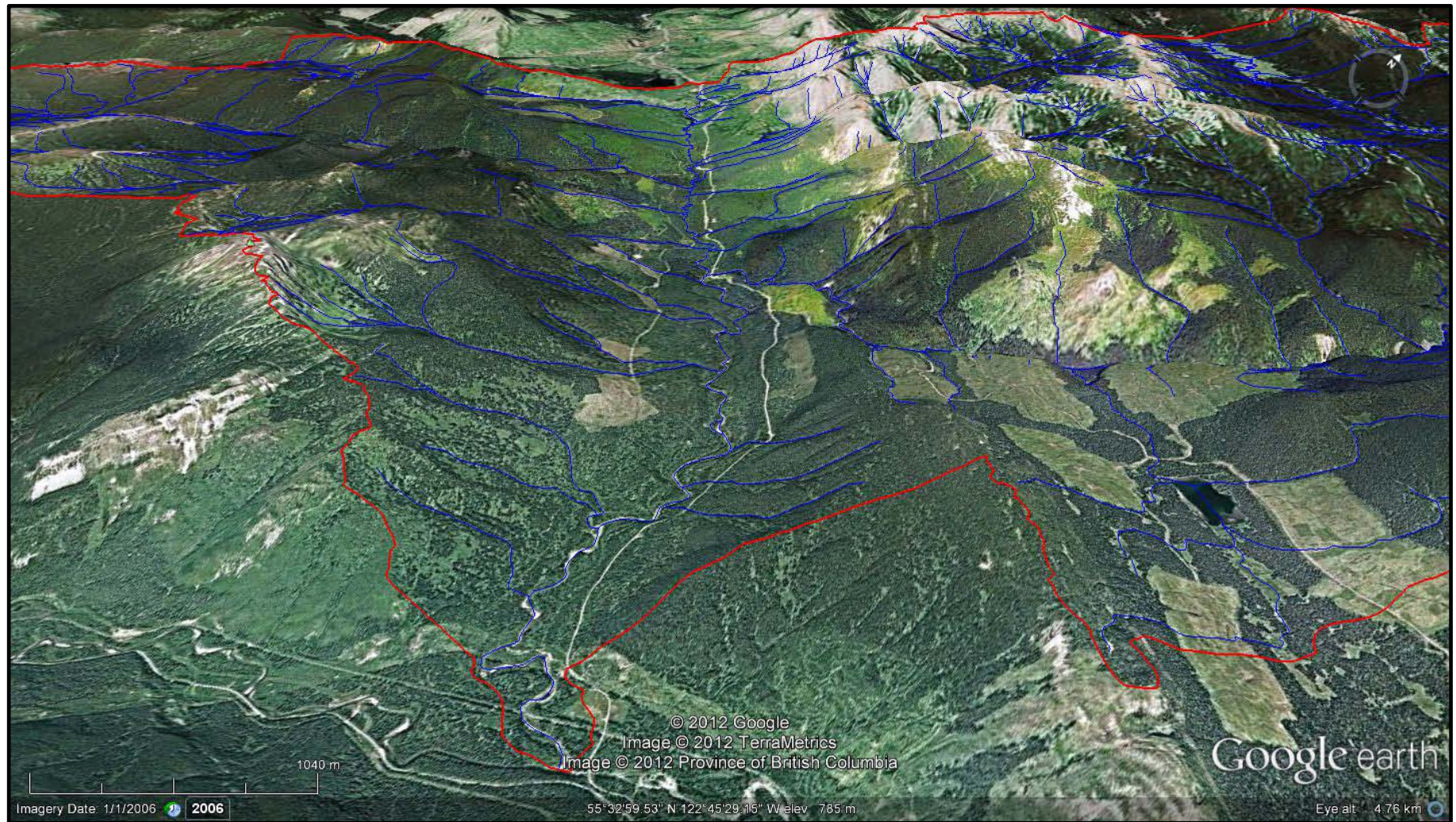


Figure 1. Google earth overview image of Callazon Creek watershed, looking upstream into the watershed.

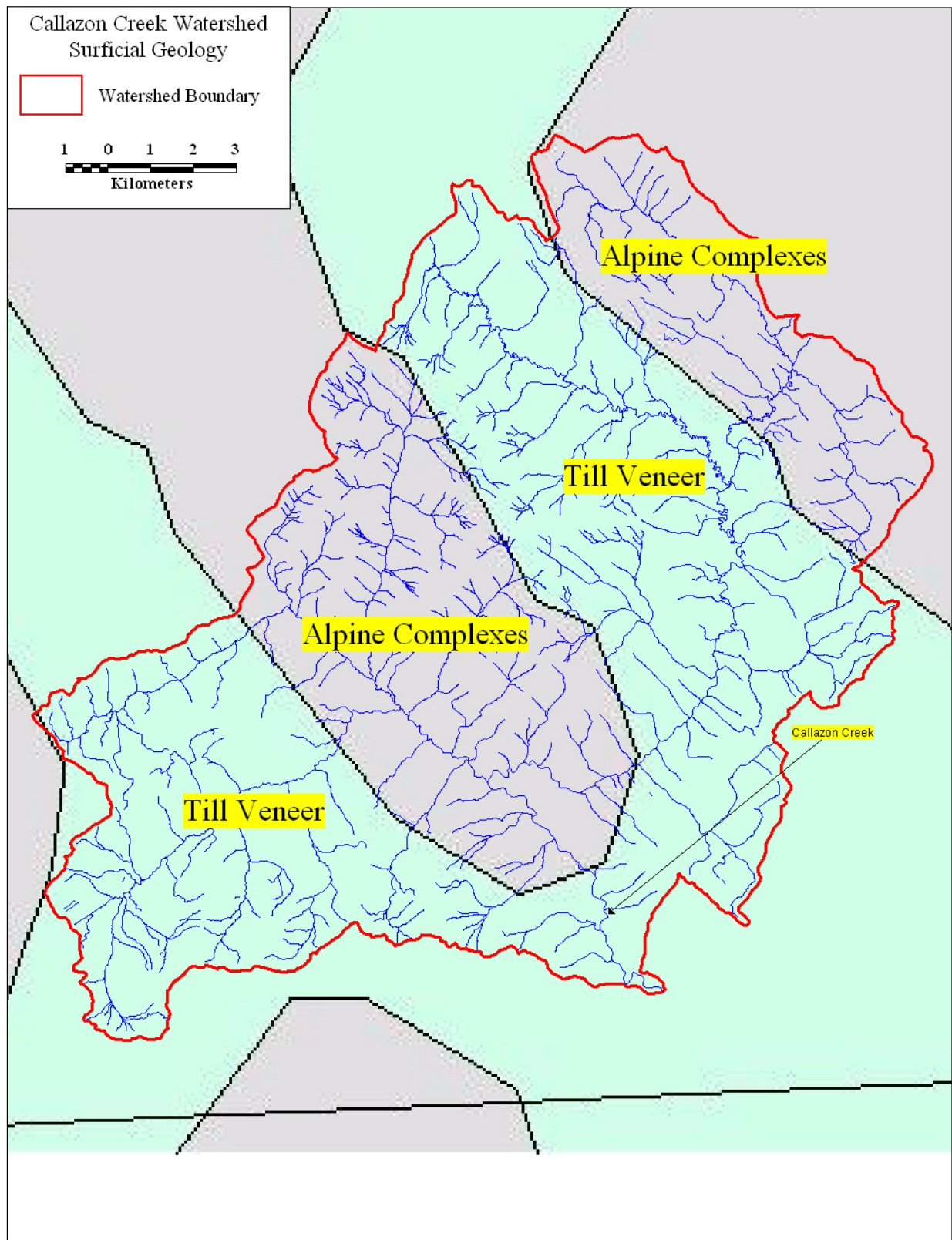


Figure 2. Distribution of dominant surficial geology types in the Callazon Creek watershed (from 1:5M BC Geological Survey Maps).

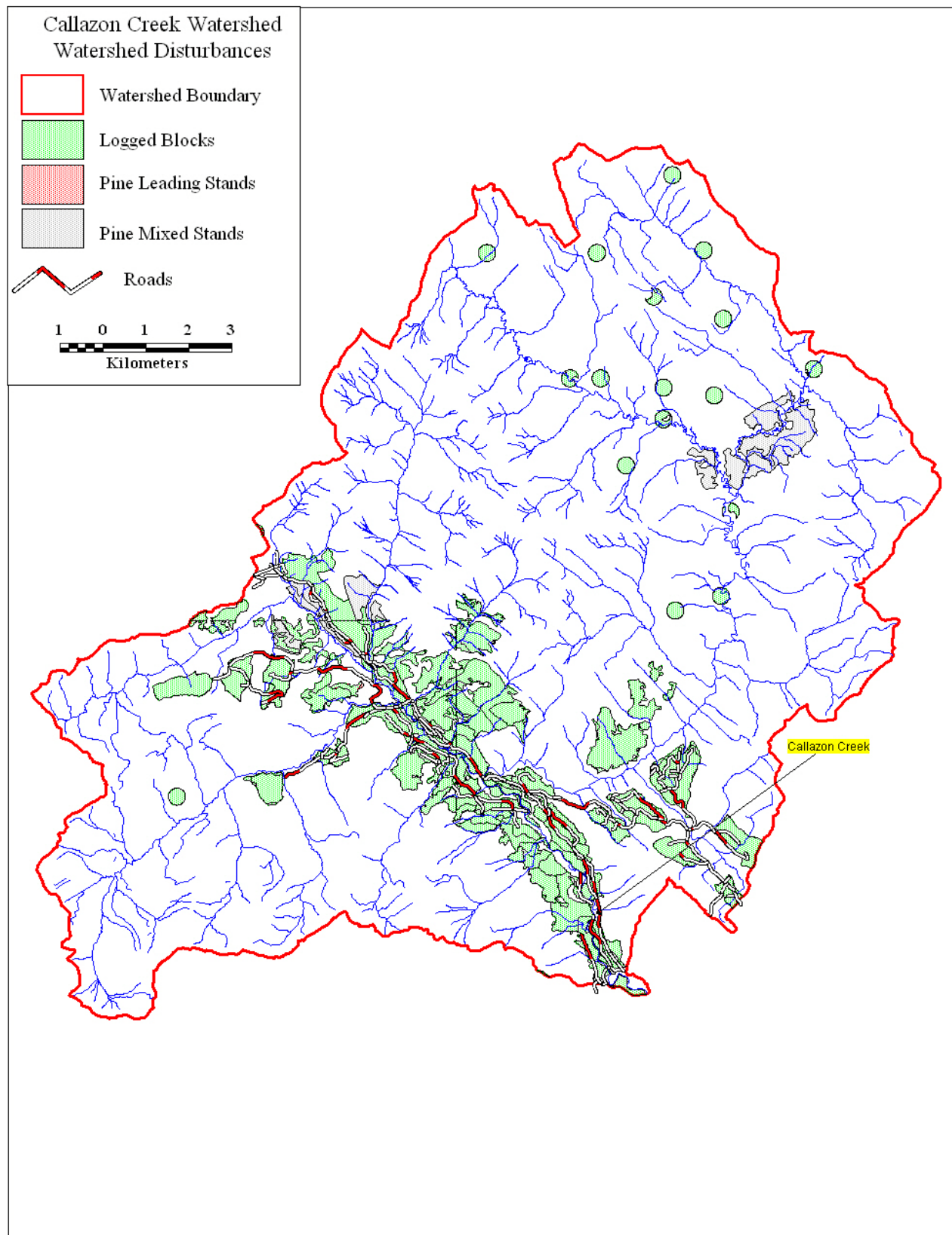


Figure 3. Land-use related and large natural disturbances in the Callazon Creek Watershed

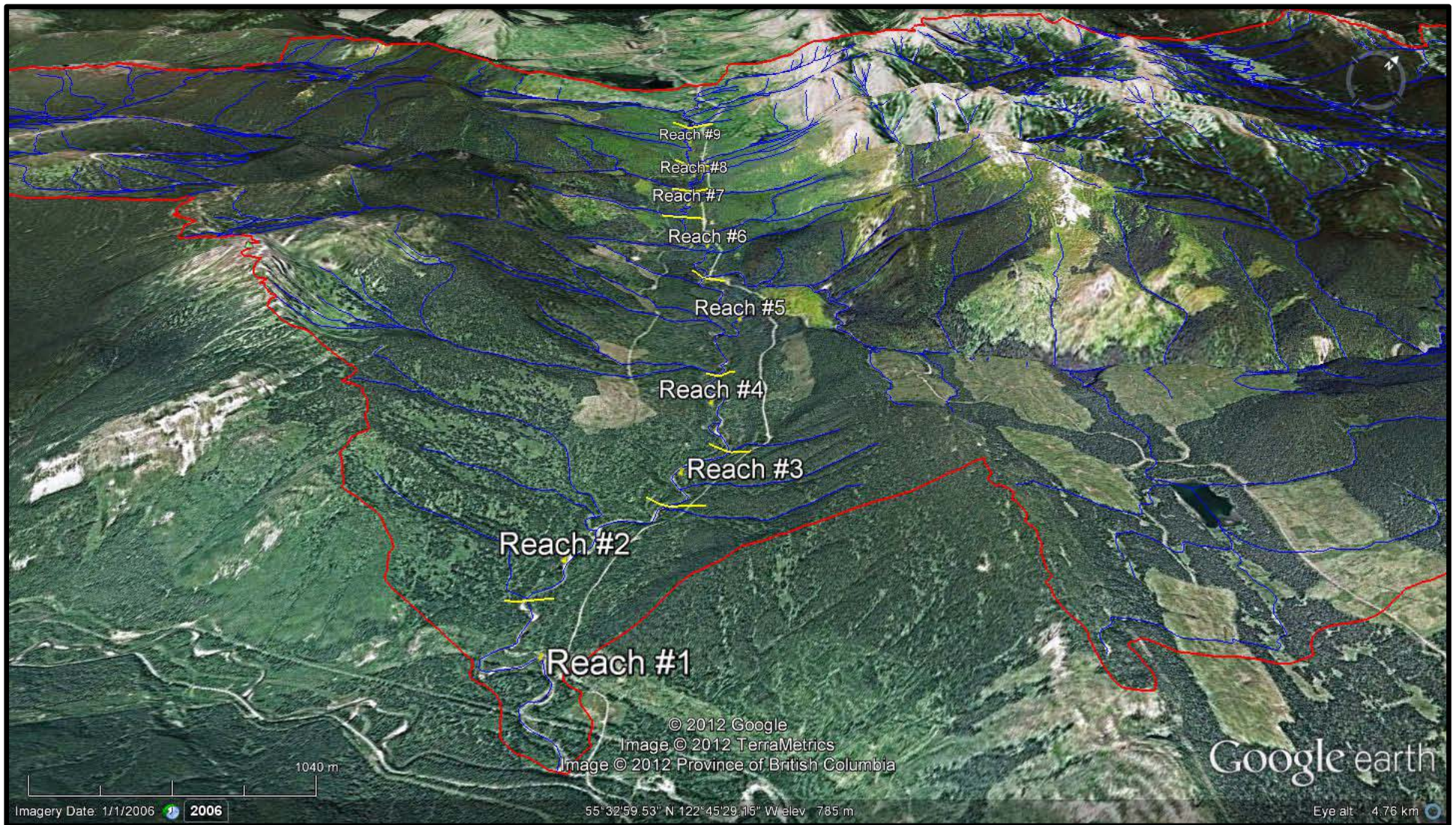


Figure 4. Identification of reaches along the mainstem of Callazon Creek watershed

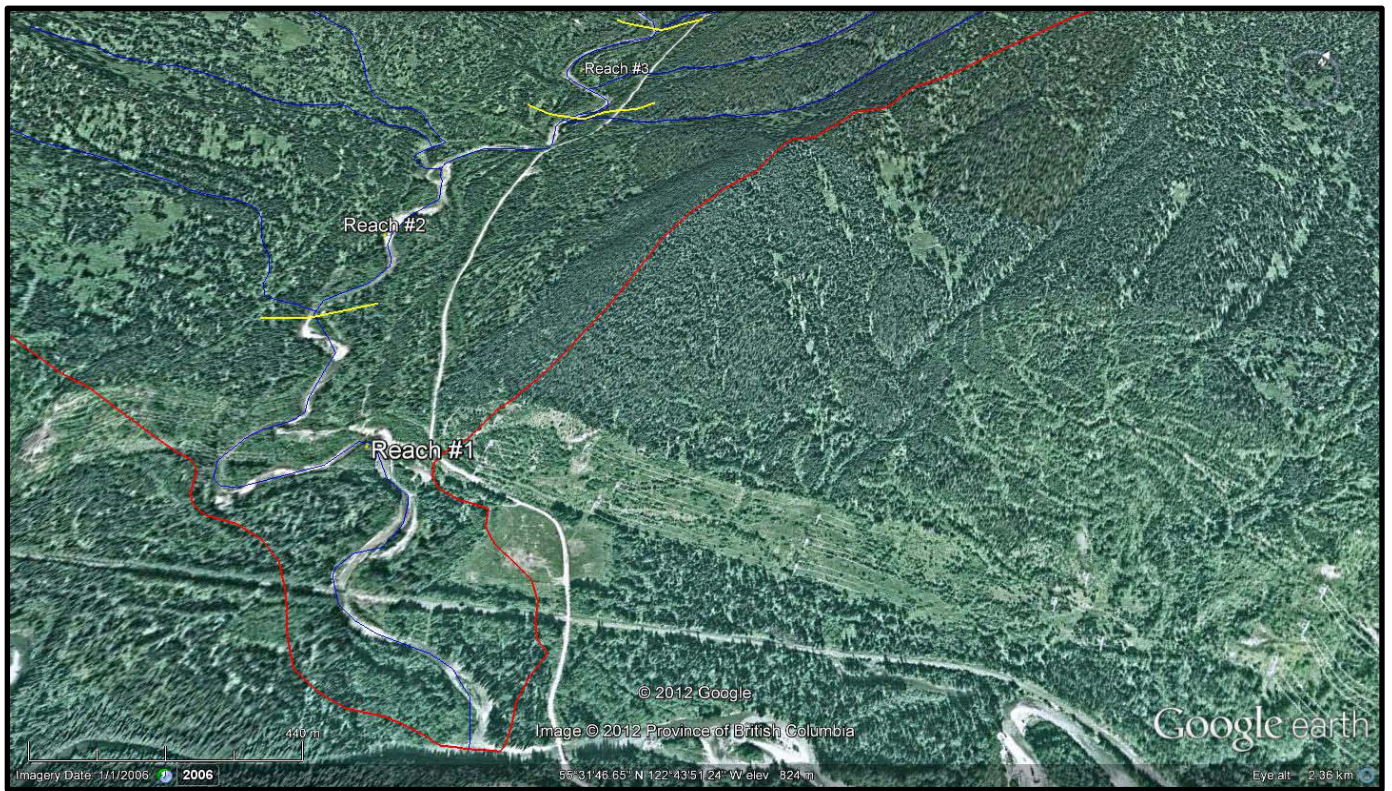


Figure 5. Google Earth image looking upstream along Reaches #1, 2 and 3 of Callazon Creek.



Figure 6. Google Earth image looking upstream along Reaches #4 and 5 of Callazon Creek.

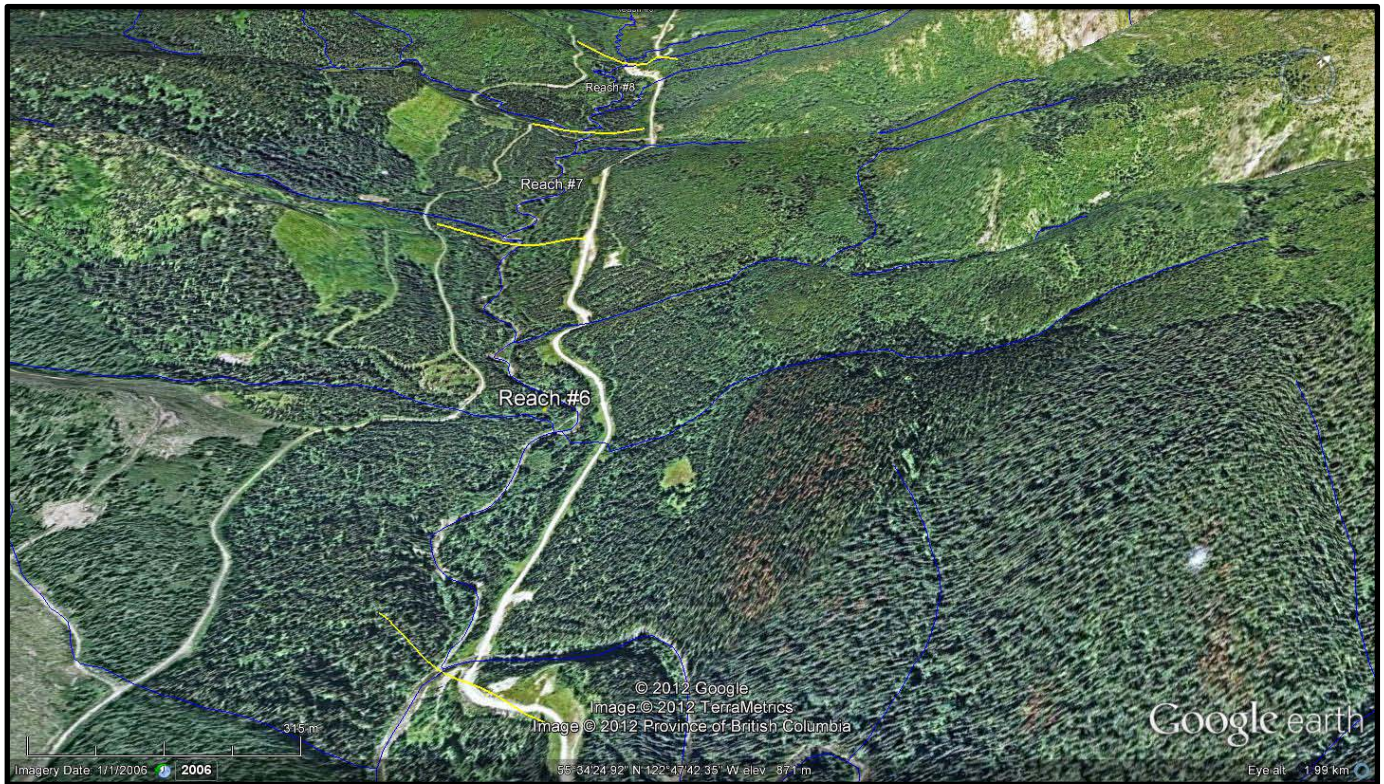


Figure 7. Google Earth image looking upstream along Reaches #6, 7 and 8 of Callazon Creek.

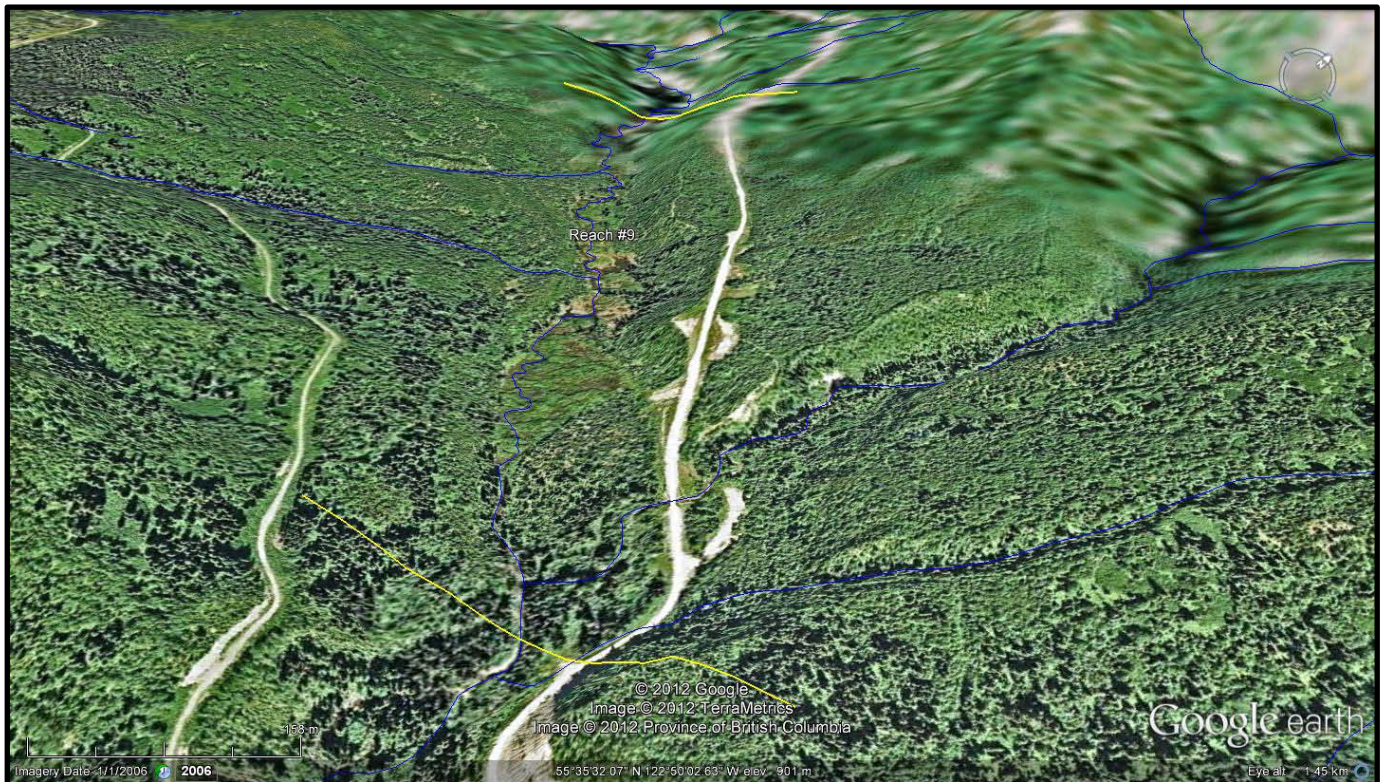


Figure 8. Google Earth image looking upstream along Reach #9 of Callazon Creek.