INTRODUCTION

This project re-calculates watershed risk ratings to account for recent harvesting in watersheds of interest to Canim Lake Indian Band. The methodology follows that outlined in the 2008 Risk Assessment for 100 Mile House Forest District[1].

In this document, watershed peak flow risk ratings are calculated using the formula: hazard * sensitivity as shown in the screen shot of Table 1 below where:

- **Sensitivity** - inherent to the watershed and taken from the report; and
- **Hazard** - defined by forest harvesting and pine beetle infestation - EDA. This is what we will recalculate in this project.

Table 1. Risk assessment matrix for watershed planning for 100 Mile House Forest District

Watershed Peak Flow Risk Ratings		Hydrologically Equivalent Disturbed Areas in the Watershed (% of Watershed)						
		<15% (None)	15 to 25% (Very Low)	25 to 35% (Low)	35 to 45% (Moderate)	45 to 55% (High)	55 to 65% (Very High)	>65% (Extreme)
Sensitivity of watershed and stream channel to peak flow increases	None	None	None	None	None	None	None	None
	Very Low	None	Very Low	Very Low	Very Low	Low	Moderate	High
	Low	None	Very Low	Very Low	Low	Moderate	High	Very High
	Moderate	None	Low	Low	Moderate	High	Very High	Very High
	High	None	Low	Moderate	High	Very High	Very High	Extreme
	Very High	None	Moderate	High	Very High	Very High	Extreme	Extreme
	Extreme	None	Moderate	High	Extreme	Extreme	Extreme	Extreme

Calculating EDA

To calculate EDA consistent with the 2008 risk assessment, the methodology shown in the example calculation in Table 9 will be used (screen shot below).

[1] P. Beaudry and Associated Ltd. March 2008. Peak Flows Risk Assessment for the 71 Watersheds in the 100 Mile House Forest District. [MoF-Final Report-vers2.pdf].

Table 9. Example of the calculation of the "Hydrologically Equivalent Disturbed" area (HEDA) in a hypothetical watershed of 1500ha in size.

Stand Type	Stand Area in Hectares (a)	Multiplication factor (b)	"Hydrologically Equivalent Disturbed" area (ha) (a) X (b)
Recent Clearcut or other non-recovered land-use related disturbance with a stand height of less than 3 m.	125	1.0	125
Land-use related disturbance with a stand height greater or equal to 3 m and less than 5 m.	85	0.75	63.75
Land-use related disturbance with a stand height greater or equal to 5 m and less than 7 m.	92	0.50	46
Land-use related disturbance with a stand height greater or equal to 7 m and less than 9 m.	65	0.25	16.25
All non-pine stands greater than 9 m in height	390	0.0	0
Mature pine-leading stands (greater or equal to 70% pine composition)	180	0.5	90
Mature pine-mixed stands (pine composition is between 31 and 69%)	78	0.2	15.6
Mature pine-minor stands (pine composition is 30% or less)	132	0.0	0
Other areas in watershed (e.g. lakes, alpine, rivers, swaps, grasslands etc)	353	0.0	0
Total hydrologically equivalent disturbed area (ha)			**356.6**
Total hydrologically equivalent disturbed area (% of watershed)			**23.8**

DATA SOURCES

Data sources are listed in Table 1. A brief description of how each layer was used is also included.

Table 1: Data Source Table

Layer	Name	Year	Source	Usage
VRI	veg_comp_lyr_r1	2012	LRDW	Species composition, Height, harvest date to indicate logged
Watersheds	WSHDS	2008	CLB	Watershed boundaries/names info from 2008 study
Disturbance - fire	bc_fires	2012	LRDW	fire_year used to update height
Disturbance - RESULTS openings	RSLT_OPENING_SVW	2012	LRDW	disturbance_end_code used to update height
Disturbance - RESULTS activity treatment units	RSLT_ACTIVITY_TREATMENT_SVW	2012	LRDW	atu_completion_d used to update height
Disturbance - forest tenure cut blocks	FTEN_CUT_BLOCK_POLY_SVW	2012	LRDW	disturbance_end_code used to update height
WTP - from RESULTS forest cover reserve	RSLT_FOREST_COVER_RESERVE_SVW	2012	LRDW	Not used- this layer was looked at and found to be not complete enough. Replaced with a 20% aspatial reduction.

RESULTS

In re-calculating the EDA values, I checked those in the 2008 report and noticed 3 inconsistencies (no real impact, but listed for the sake of completeness):

- Bridge Creek EDA% calculation looks to be a mistake in the 2008 report. It is listed as 28.25% but when I do the calculation (15,229/83,649) I get 18.2%. This means that the 2008 hazard was incorrectly classed as 'Low' when it should have been 'Very Low'. This has no impact on the 2008 final risk rating which would stay at 'Low';
- I found the same inconsistency for EAGLE-MURPHY LAKE - the report lists the EDA% as 41.87% but I get 40.6%. No change in 2008 hazard classification or final risk rating; and
- I found the same inconsistency for BRADLEY CREEK - the report lists the EDA% as 28.43% but I get 26.12%. No change in 2008 hazard classification or final risk rating.

A map showing harvest disturbances was previously supplied. Because we were not able to locate a comprehensive WTP layer and the fact that the block boundaries from the RESULTS and FTEN_CB disturbance layers include WTP boundaries, a 20% reduction in EDA was applied in these areas.

The excel titled "Wshd_HEDA_calc_20Dec2012.xlsx" in the tab "Watershed Risk Summary" contains the information for each watershed of interest:

- EDA area (ha);
- EDA percentage (%);
- Watershed sensitivity;
- Watershed hazard; and
- Watershed risk.

The same summary table is shown below as Table 2.

Table 2: Results by Watershed

Watershed		2008						2012				
Watershed Name	Watershed Type	EDA area (ha)	EDA pct (%)	Sensitivity	Hazard	Risk		EDA area (ha)	EDA pct (%)	Sensitivity	Hazard	Risk
BRADLEY CREEK	Small	5,190	28	Very Low	Low	Very Low		6,475	32	Very Low	Low	Very Low
BUFFALO CREEK	Small	5,879	25	Moderate	Very Low	Low		7,564	32	Moderate	Low	Low
Boss Creek	Residual	3,328	24	Moderate	Very Low	Low		5,055	36	Moderate	Moderate	Moderate
Bridge Creek	Residual	15,229	28	Moderate	Low	Low		18,383	22	Moderate	Very Low	Low
CANIM LAKE	Small	6,899	15	Low	Very Low	Very Low		9,207	21	Low	Very Low	Very Low
CHRISTMAS CREEK	Small	387	15	Low	Very Low	Very Low		453	18	Low	Very Low	Very Low
COFFEE LAKE	Small	4,461	39	High	Moderate	High		5,186	45	High	High	Very High
DEKA CREEK	Small	2,635	22	Low	Very Low	Very Low		3,135	26	Low	Low	Very Low
Deception Cree	Small	2,531	8	Low	None	None		4,199	13	Low	None	None
EAGLE-MURPHY LAKE	Small	16,061	42	Moderate	Moderate	Moderate		18,701	47	Moderate	High	High
Eagle Creek	Residual	2,884	20	Low	Very Low	Very Low		3,249	22	Low	Very Low	Very Low
HENDRIX CREEK	Small	3,524	22	Low	Very Low	Very Low		4,566	28	Low	Low	Very Low
JIM CREEK	Small	13,179	29	Moderate	Low	Low		14,865	33	Moderate	Low	Low
McKinley Creek	Small	1,506	13	Moderate	None	None		1,837	16	Moderate	Very Low	Low
PENDLETON LAKES	Small	375	9	Low	None	None		340	8	Low	None	None
SUCCOUR CREEK	Small	2,328	26	Low	Low	Very Low		2,744	31	Low	Low	Very Low
Spanish Creek	Small	2,562	14	Low	None	None		3,928	21	Low	Very Low	Very Low
Unnamed A	Residual	984	45	Low	Moderate	Low		1,103	50	Low	High	Moderate
Unnamed B	Residual	472	48	Low	High	Moderate		610	61	Low	Very High	High
Unnamed D	Small	2,345	39	High	Moderate	High		2,265	37	High	Moderate	High