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JIMMIES CREEK COMMUNITY WATERSHED

LEVEL 1 INTERIOR WATERSHED ASSESSMENT PROCEDURE

Prepared by:

Stephen G. Henderson, BSc, RPF
INTEGRATED **WOODS SERVICES LTD.**
Kamloops, British Columbia
January, 1997

Lead Proponent:

AINSWORTH LUMBER CO. LTD., SAVONA DIVISION

Funded by:

FOREST RENEWAL BRITISH COLUMBIA

EXECUTIVE SUMMARY

The objective of the Jimmies Creek Level 1 Interior Watershed Assessment Procedure (IWAP) is to (1) assist forestry managers in understanding the type and extent of current water-related conditions that exist in the watershed and (2) to recognise the possible hydrologic implications of proposed forestry-related development in the watershed. Ainsworth Lumber Co., Savona Division, initiated this IWAP with financial assistance provided by Forest Renewal British Columbia (FRBC).

The Watershed Assessment was conducted in accordance with the procedures in the Forest Practices Code of British Columbia, IWAP Guidebook, Level 1 Analysis, September 1995, and the Community Watershed (CWS) Guidebook, October 1996. Conservative assumptions were utilised to determine the hazard indices.

The Jimmies Creek Community Watershed consists of 10.17 km^2. Jimmies Creek flows north through the community of Walhachin and into the Thompson River, west of Kamloops, British Columbia. The watershed is located in a semi-arid environment where higher fluvial denudation rates are expected.

The results of the IWAP classify Jimmies Creek as a low to medium hazard watershed that has had up to 25 years to recover since the majority of harvesting were completed. The equivalent clearcut area (ECA) does not exceed the threshold level in the watershed. Planned forest harvesting will not increase the ECA above the threshold level.

The following recommendations were developed from both an interpretation of the results and the pre-written recommendations listed in the IWAP guidebook:

- An Access Management Map, Watershed-Level and Component Project Objectives, and a Fish and Fish Habitat Assessments should be completed to fulfil the requirements of an Integrated Watershed Restoration Plan (IWRP) for the Jimmies Creek Watershed. The other field assessments mentioned in the recommendations are prioritised in Table 5.
- Complete a channel assessment procedure (CAP) and a riparian assessment procedure (RAP) to allow for a more detailed assessment of the watershed's condition.
- Minimise harvesting and road construction on and around erodible soils.
- The watershed restoration activities identified in Table 3 should have a priority for funding as they will have the greatest impact at improving the overall watershed condition. In addition, the Sediment Source Survey mentioned in the introduction should be consulted to identify priority areas for watershed restoration activities.
- Deactivate as many roads as possible while maintaining consistency with the access management map.

It is important to emphasise at this point, the pivotal role of the round table in using the recommendations developed through this procedure. They should be viewed as the basis for discussion amongst the stakeholders at the round table, not as firm requirements. They are guidelines only and can be overridden by a level 2 or 3 assessment or, where a consensus is reached, by a decision of the round table.

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1.0 INTRODUCTION

1.1 Project Background

An Interior Watershed Assessment Procedure (IWAP) for the Jimmies Watershed is the first phase in a multi-phase project which is currently in progress. Ainsworth Lumber Company Ltd. initiated this IWAP with the financial assistance provided by Forest Renewal B.C. (FRBC). Other phases of this project include a Sediment Source Survey (active), Terrain Stability Mapping (active), a proposed Riparian Assessment and a Fish and Fish Habitat Assessment (1997). All of these assessments are components of an Integrated Watershed Restoration Plan. An Access Management Map and Watershed Level and Component Project Objectives should be completed prior to initiating watershed restoration prescriptions and major works.

1.2 Objectives

The primary objectives of the IWAP are to:

- Assess the condition of the watershed using the IWAP Guidebook's (1995) hazard indices and develop recommendations which will restore and/or rehabilitate past environmental damage and mitigate further damage.
- Increase the pool of locally available, trained staff for work in the emerging field of watershed planning and assessment.

1.3 Scope of Project

The IWAP was designed to assist forest managers in determining the type and extent of hydrological related conditions within the Jimmies Creek Watershed (east of the North Thompson River) and to identify any water related concerns with respect to planned and future forest developments.

Assessment of hydrologic impacts focused on:

- The potential for change to peak flows.
- The potential for mass wasting.

- The potential for accelerated surface erosion.
- The anticipated changes to the channel riparian buffer.

These impacts were assessed following the IWAP Guidebook, Level 1 Analysis, September 1995.

2.0 STUDY AREA DESCRIPTION

2.1 Characteristics

Jimmies Creek flows northwards into the Thompson River at the community of Walhachin (figure 1). This community is located in a semi-arid environment which has implications for the flow and erosional processes within the Jimmies Watershed. The community watershed encompasses 10.17 km^2 with a mainstem that is 5.4 km long. Jimmies Creek is designated a community watershed. The point of diversion for the community watershed is almost 4 km upstream of the Thompson River.

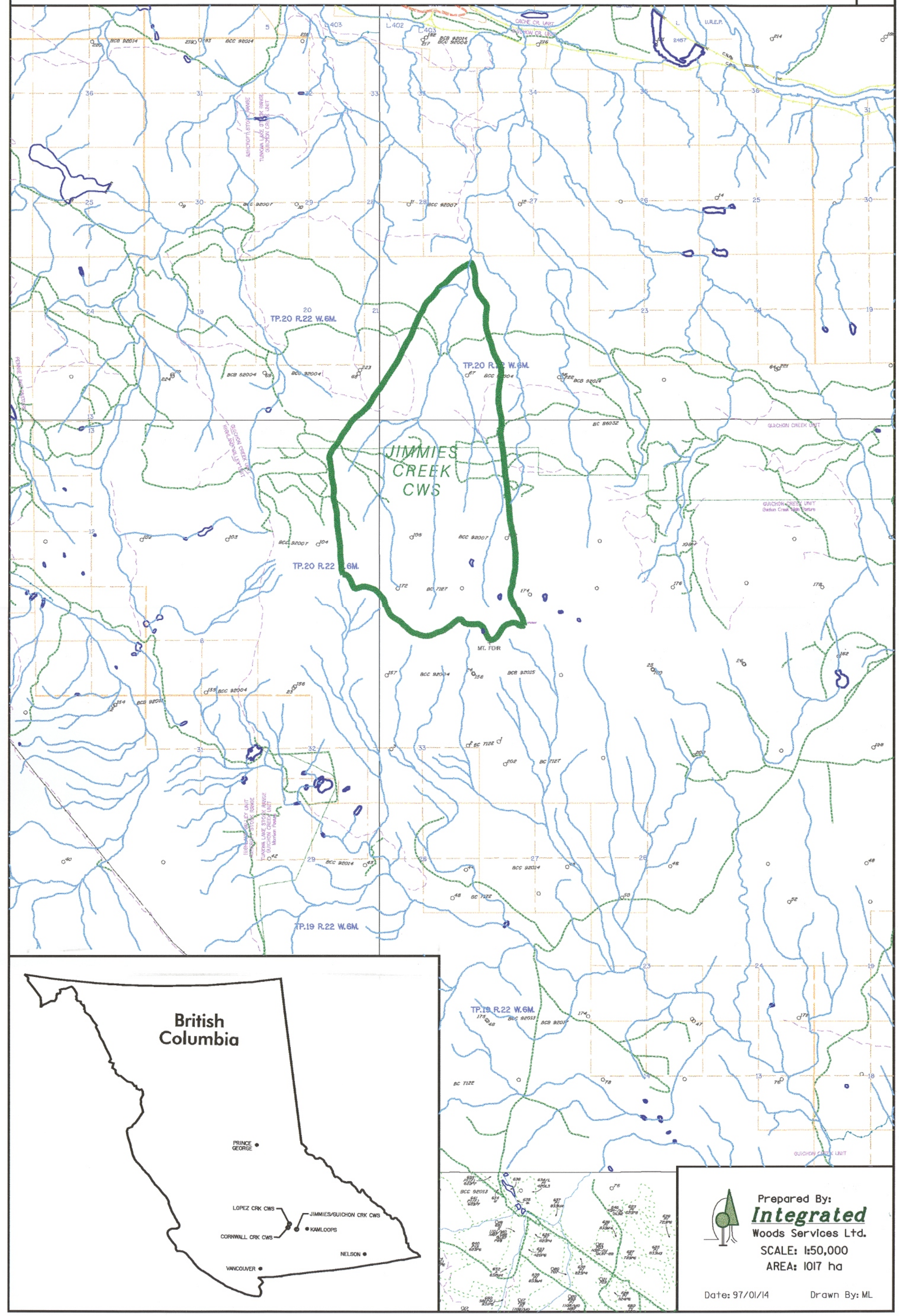
The Jimmies Creek Watershed is located in Hydrologic zone 31, Thompson - Okanagan Plateau (IWAP Guidebook, 1995). The watershed code is 120-6795 (Ministry of Environment Lands and Parks). The minimum and maximum elevations are 700 m and 1600 m respectively. Crown Land comprises 100% of the watershed.

The watershed's forests are located in four biogeoclimatic zones (Lloyd et al. 1990). The Montane Spruce (MS) biogeoclimatic zone encompasses 10% of the watershed, 50% is in Interior Douglas Fir (IDF), 30% is in the Bunchgrass zone (BG) and 10% in the Ponderosa Pine (PP) zone.

The terrain is characterised by moderate to steep slopes. Approximately 10% of the watershed area has erodible soils as identified by the soils maps and report, Soils of the Ashcroft Map Area (1992). A more comprehensive and current terrain stability mapping

JIMMIES CREEK COMMUNITY WATERSHED

Ainsworth Lumber Co. Ltd.



Prepared By:
Integrated
Woods Services Ltd.

SCALE: 1:50,000
AREA: 1017 ha

Date: 97/01/14 Drawn By: ML

project is being completed for the Guichon watershed and will more accurately define the terrain stability hazard ratings in the watershed.

2.2 Fisheries

There is no data available on fisheries in the Jimmies Creek Watershed (B. Chan pers. comm. 1997).

2.3 Kamloops Land and Resource Management Plan

Under the Kamloops Land and Resource Management Plan, Jimmies Watershed has been identified as critical deer and moose range (L. Malkinson pers. comm. 1997).

2.4 Water Licences

There are two licences in the watershed both owned by the Thompson-Nicola Regional District. The licence is used for waterworks purposes (see Appendix A).

2.5 Recreation

There is limited recreational activities in the Jimmies watershed (J. Eastwood pers. comm. 1996). There is some limited All Terrain Vehicle access in the area.

2.6 Quaternary History

The landforms and surficial deposits of the Jimmies Watershed were created during the Quaternary geologic time period approximately 1.65 millions of years ago (my). Most of British Columbia was covered by the Cordilleran icesheet approximately 23,000 years before present (ybp).

The Jimmies Watershed is located within the Thompson Plateau Physiographic Region characterised by gently rolling upland relief between 4-5000 feet (Holland 1976). Prominences of more resistant rock are found above these elevations at Jimmies Hills (6684 feet). Glacial advance lasted for approximately 13,000 years at which point temperatures rose and deglaciation commenced. Downwasting began 10,000 ybp (the Holocene epoch) and glaciers continued to retreat up valleys (including Jimmies) until they were ice-free. Surficial deposits and landforms such as morainal drumlinoids,

fluvial terraces, as well as sections of bedrock are found within the watershed (Fulton 1962).

3.0 DEVELOPMENT IN THE WATERSHED

3.1 Forestry

Ainsworth Lumber Company Ltd. is the only forest licensee in this watershed. They operate under the Forest Licence A18690.

3.2 Agriculture

Ranching is the primary agricultural activity in the watershed. It is regulated by the Range section of the Ministry of Forests. The watershed is located in the Guichon Range Unit (M. Deedles pers. comm. 1997). Gardens Creek has a grazing lease within the area.

3.3 Secondary Development

The secondary development in the area is limited to range improvements and the point of diversion on the creek. There is fence and a cattleguard within the watershed (M. Deedles pers. comm. 1997).

3.4 Mining

There are several mineral claims but no placer claims within the watershed. No placer mining reserve exists along the creek (Elaine pers. comm. 1996).

4.0 METHODS

The methodology within the Forest Practices Code Guidebook, Interior Watershed Assessment Procedure (IWAP) Guidebook, Level 1 Analysis, September 1995 was consulted in the completion of this Watershed Assessment. Technical questions were addressed at the Kamloops Forest Region by Rita Winkler (Regional Hydrologist), and Tim Giles (Regional Geomorphologist).

4.1 Data Collection

Digital information available for the Jimmies Watershed included forest cover maps, Terrain Resource Information Mapping (TRIM) and Forest Development Plans (1996-2000) from Ainsworth Lumber Co. Ltd. These maps were referenced together to create base maps.

The non-digital information available included 1995 aerial photographs (approximate scale of 1:15,000), water licence maps, soils and landform maps and surficial geology maps. The maps and aerial photographs utilised are listed in Appendix C.

4.2 Erodible Soils

Erodible soils were interpreted and digitised from maps called Soils of the Ashcroft Map Area (1992). The percentage of erodible soil in each soils polygon was also included in the GIS database. Erodible soil mapping at a larger scale (1:20,000) is currently being completed as part of the terrain stability mapping project for the watershed. The results of the project were not available for the analysis portion of this report.

4.3 Potentially Unstable Terrain

Terrain stability mapping (Terrain Stability Intensity Level C) for the Jimmies Creek Watershed is in progress and is not available to be incorporated into the results. In order to identify unstable terrain all slopes greater than 60% were designated as potentially unstable terrain and were digitised onto the base maps (IWAP Guidebook, 1995). This temporary method of delineating unstable terrain will likely be an over-estimation and result in a conservative IWAP analysis.

4.4 Identification of Landslides

Methods in the IWAP level 1 Guidebook (1995) suggest that any scar visible on an aerial photograph is to be considered a landslide track. The aerial photographs utilised were at a scale of approximately 1:15,000.

4.5 Equivalent Clearcut Area(ECA) Calculations

To calculate the ECA for the Jimmies Watershed the H_{60} line[1] had to first be determined. The GIS analysis calculated the elevation at 1174m. This line is significant in interior watersheds based on research that indicates all land above this line contributes meltwater during the peak flow season. As a result roads and harvesting above this line are weighted more heavily in the analysis than ones below.

The Equivalent Clearcut Area (ECA)[2] was calculated using the Forest Inventory Planning Data Exchange Files (FIPDEF) to obtain the activity, area, and projected tree height. The tree heights in the FIPDEF files were projected to January 1996. The files were found to contain accurate information when compared to 1995 colour aerial photographs at a scale of about 1:15,000.

The ECA calculations that incorporate planned forest harvesting in the next 5 years (1996 to 2000) do not project regeneration on previously harvested areas. Despite the fact that regeneration will occur on some blocks to improve the hydrologic recovery of the watershed, we have adopted a conservative approach towards the IWAP. We have not projected the regeneration rates. The ECA analysis assumes a rate of hydrologic recovery of harvested blocks based on a tree height as follows: 0-3 m height = 0%; 3-5 m height = 25%; 5-7 m height = 50%; 7-9 m height = 75% and >9 m height = 90% (Community Watershed Guidebook, 1996; IWAP Guidebook, 1995).

The IWAP Guidebook (1995) suggests that an ECA below 30% is acceptable and considered a low hazard. However, if a sub-basin is designated a community watershed the Community Watershed Guidebook (1996) suggests a more stringent 20% ECA threshold applies if water in the sub-basin flows over unstable terrain and/or highly erodible soil.

---

[1] The H_{60} line is an isoline and 60% of the watershed area is above this line.

[2] The Equivalent Clearcut Area (ECA) is defined as the area of a forest disturbed by both harvesting and wildfires with a reduction factor to account for the hydrological recovery from forest regeneration.

4.6 Geographic Information System (GIS) Queries

GIS queries were completed by *Integrated* Woods Services Ltd., Kamloops, BC. The GIS queries resulted in the output of 13 hazard indices, that combine into 4 impact categories. The hazard indices and impact categories include the following:

PEAK FLOW (impact category)

1. Total Peak Flow Index (Equivalent Clearcut Area)
2. Road Density above H_{60}
3. Total Road Density

SURFACE EROSION (impact category)

4. Roads on erodible soil
5. Roads within 100m of a stream
6. Roads on both of above
7. Active stream crossings
8. Total road density

RIPARIAN BUFFER (impact category)

9. Portion of stream logged
10 Portion of fish bearing streams logged

MASS WASTING (impact category)

11. Landslide density
12. Roads on unstable slopes
13. Streams > 60% and banks logged

The analysis gives a score between 0 and 1 for each hazard index. The IWAP guidebook groups the hazard indices into hazard categories based on the following criteria:

Hazard Category	Hazard Index
Low	< 0.5
Medium	0.5-0.7
High	> 0.7

The results of the GIS queries are in km or km^2. All digital map files have been stored on tape media.

4.7 Field Assessments

Field assessments confirmed the existence of a point of diversion located in the lower reach of Jimmies Creek (Appendix B, Photograph 1).

4.8 Problems Encountered

The first problem encountered was with regards to the digital data supplied. In the forest cover maps there is an allowable digitising error of 20 m which could effect the calculation of some hazard indices. In particular, the error could lead to an inaccurate 'Riparian Buffer' and 'Roads within 100 m of a Stream indices. The assumption was made that the error would occur randomly and without bias; and therefore the same number of units would be added as subtracted from a hazard index.

The second problem encountered was incorporating the hardcopy soils maps at a scale of 1:50,000 with the digital forest cover data. The soils maps were NAD27 based while the map base used in the watershed assessment was NAD83. To correct the NAD problem, the National Transformation Software was used to shift the NAD27 data to fit the NAD83 datum. However there is inherent error in transforming data from 1:50,000 to 1:20,000.

A third problem was that a fish presence and absence inventory for streams and lakes was not available for the IWAP analysis. In order to complete the assessment, a conservative assumption was made that all water features were fish bearing.

5.0 RESULTS

The watershed is located within a semi-arid environment. Watershed research indicates that in semi-arid environments there tends to be higher fluvial denudation due to lack of vegetation cover causing higher runoff amounts and surface erosion (Ohmori 1983). This has implications for the ratings within the assessment.

Four impact categories and an ECA was calculated for the Jimmies Creek Community Watershed (IWAP Guidebook 1995). The result of the IWAP including the 13 hazard indices and 4 impact categories are listed on Data Entry Sheet, Version 1.03 in Appendix D.

The ECA and the associated hazard category are listed in Table 1. Depending on the extent that an ECA is above the threshold level it will receive a medium or high hazard rating. The threshold ECA level for this CWS is 20%. It is at this level because it is a community watershed as well as the anticipated higher erosion usually associated with semi-arid environments.

TABLE 1: Equivalent Clearcut Area in the Jimmies River Watershed

CURRENT ECA (hazard category)	FUTURE ECA - after proposed 5 years of development (hazard category)
10% (Low Hazard)	19% (Low Hazard)

5.1 Watershed Results

The Jimmies Creek Watershed encompasses 10.17km^2. Crown land accounts for approximately 100% of the watershed. There is 9.6% of the watershed area that is on erodible soils but only 1.9% of the area is composed of unstable slopes.

Presently, the ECA for the Jimmies Watershed is 10% (refer to Table 1) and considered a low hazard in the IWAP Guidebook (1995). Proposed development could increase the ECA to 19, which remains a low hazard.

The peak flow and mass wasting impact categories are both low ratings based on the IWAP Guidebook (1995).

The surface erosion impact category is currently a high hazard rating. The major contributor to the hazard rating is the active stream crossings and the length of road within 100m of a stream. A high hazard rating is very conservative because the sediment source survey has rated the surface erosion hazard low. In order to reduce this impact category to a low hazard (refer to Table 3), would require the deactivation of 14 active stream crossings and 2.084km of road (IWAP Guidebook 1995).

The riparian buffer impact category is high for the Jimmies Watershed. It is due to harvesting adjacent to a stream for over 3 km. Most of this harvesting occurred over 25 years ago in 1969 and 1970 (FIPDEP Files) and has had time to rehabilitate. A field-based Riparian Assessment would be useful to confirm or deny the high hazard rating from this assessment.

TABLE 2: Impact categories for each sub-basin.

Peak-Flow	*Surface Erosion*	*Riparian Buffer*	*Mass Wasting*
Low	High	High	Low

TABLE 3: Watershed restoration activities and future developments recommended in working towards attaining the following goal.

Requirements to Attain Low Hazard Ratings
deactivate 2.084km of road within 100m of a stream
deactivate 14 active stream crossings

5.2 Interaction Matrices Worksheet

Using the methods in the Forest Practices Code Guidebook for IWAP's the hazard indices are compared in the 'Interaction Matrices Worksheet' (refer to Table 4). In this worksheet a value between 1 and 4 is determined; where a value of 1 is the lowest hazard rating.

TABLE 4: Interaction Matrices Worksheet

JIMMIES CREEK WATERSHED *10.17 km²*

Interaction	Hazard categories for interaction variables (low, medium or high)		Value (1,2,3 or 4)
Matrix 1 Peak flow vs Channel instability	**Peak** Low	**Channels** not available	Require Level 2, IWAP Results
Matrix 2 Peak flow vs Surface erosion	**Peak** Low	**Surface Erosion** High	2
Matrix 3 Peak flow vs Mass wasting	**Peak** Low	**Mass Wasting** Low	1
Matrix 4 Mass wasting vs Channel instability	**Mass Wasting** Low	**Channels** not available	Require Level 2, IWAP Results
Matrix 5 Riparian buffers vs Channel instability	**Riparian** High	**Channels** not available	Require Level 2, IWAP Results

The IWAP Guidebook also lists recommendations which depend on the value received for each Matrix in Table 3. Unfortunately only two of the five interaction matrices, Matrix 2 and Matrix 3, can be completed using the results of a Level 1 IWAP. The recommendations from the IWAP Guidebook (1995) based on the values in the interaction matrices worksheet are listed in section 6.0.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Jimmies Creek is classified as a low to medium hazard sub-basin with an extensive road network. The watershed should be considered sensitive based on surface erosion and riparian buffer impact categories which have high hazard ratings. The ECA will approach its threshold by the year 2000, based on planned development in the watershed. The location of this watershed in a semi-arid environment suggests that relatively high denudation rates in the creek could be expected.

It is important to emphasise at this point, the pivotal role of the round table in using the recommendations developed through this procedure. They should be viewed as the basis for discussion amongst the stakeholders at the round table, not as firm requirements. They are guidelines only and can be overridden by a level 2 or 3 assessment or, where a consensus is reached, by a decision of the round table.

The following are the pre-written recommendations listed in the IWAP guidebook (1995) for each interaction matrix. These recommendations were used as a guideline in developing the actual recommendations for the report:

- Initiate an assessment of sediment sources (completed).
- Do not allow additional harvesting above and around sensitive soils.
- Rehabilitate roads near streams, and avoid construction of more roads on sensitive soils or adjacent to riparian management areas. Minimise additional stream crossings.
- A detailed site assessment is required on any potentially unstable slope.

The following recommendations were formulated by analysing the results of the IWAP and the interaction matrices and by consulting the Forest Practices Code of British Columbia, IWAP and CWS Guidebooks:

- An Access Management Map, Watershed-Level and Component Project Objectives, and a Fish and Fish Habitat Assessments should be completed to fulfil the requirements of an Integrated Watershed Restoration Plan (IWRP) for the Jimmies Creek Watershed. The other field assessments mentioned in the recommendations are prioritised in Table 5.
- Complete a channel assessment procedure (CAP) and a riparian assessment procedure (RAP) to allow for a more detailed assessment of the watershed's condition.
- Minimise harvesting and road construction on and around erodible soils.
- The watershed restoration activities identified in Table 3 should have a priority for funding as they will have the greatest impact at improving the overall watershed condition. In addition, the Sediment Source Survey mentioned in the introduction should be consulted to identify priority areas for watershed restoration activities.
- Deactivate as many roads as possible while maintaining consistency with the access management map.

TABLE 5: Recommended priorities for further assessments in the Jimmies Watershed.

Channel Assessment Procedure	*Watershed Restoration Activities*	*Riparian Assessment Procedure*	*Fish and Fish Habitat Procedure*
Low Priority	Medium	High	Low

The changes to Jimmies Creek Community Watershed's boundary should be updated on the maps and databases of Ainsworth Lumber Co. Ltd. and the various government agencies.

When the terrain stability mapping for the watershed is complete, the mapping should be consulted to determine if the classification of unstable slopes (as slopes >60%) is accurate. The threshold ECA could potentially be increased to 30% from 20% (according to the Community Watershed Guidebook 1996) if there is no unstable terrain or highly erodible soil identified along the lower 4 km of Jimmies Creek. This could result in less restrictive recommendations for the peak flow and surface erosion indices.

The Forest Practices Code of British Columbia, Community Watershed Guidebook, October 1996 should be consulted prior to making management decisions.

Respectfully Submitted by,
INTEGRATED Woods Services Ltd.

S. Henderson

per Stephen G. Henderson, BSc, RPF 3196
Dated: January 31, 1997

7.0 REFERENCES

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Holland, Stuart S. 1976. Landforms of British Columbia: a physiographic outline. British Columbia Department of Mines and Petroleum Resources. Bulletin 48.

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Ohmori, H. 1983. Various estimates of the relationship between (mechanical) denudation rate and mean annual precipitation. Bulletin, Department of Geography, University of Tokyo No. **15.** *In* Global Geomorphology, an introduction to the study of landforms. Michael A. Summerfield. John Wiley & Sons, New York.

8.0 PERSONAL COMMUNICATIONS

Chan, Brian. 23 January 1997. Senior Fisheries Biologist, Ministry of Environment, Lands and Parks.

Deedles, Mike. 23 January 1997. Range Resource Assistant, Kamloops Forest District.

Eastwood, Jennifer. 29 October 1996. Recreational Resource Officer, Kamloops Forest District.

Elaine. 25 November 1996. Customer Services Representative. Ministry of Energy Mines and Petroleum Resources, Kamloops, BC.

Malkinson, Leah. 23 January 1997. Land Use Planner, Kamloops Forest District.

Winkler, Rita. 20 November 1996. Forest Hydrologist, Kamloops Forest Region.

APPENDIX A
Water licences on Jimmies Creek

Select Next Previous Find Pick Options Print Help Exit

RINAWELLS Licence Summary by POD/Source WLIS1200 PROD

Point: Jimmies Creek left of Thompson River

Code: SO7100

Total Number of Licences Found: 2

	Priority Date	Licence Number		File Number	PUC	Quantity/Units	Licensee/Applicant
01	19320304	C065028	C	0105637	WWKLA	7300000.000 GY	THOMPSON-NICOLA REGI
02	19810826	C062086	C	0369137	WWKLA	7300000.000 GY	THOMPSON-NICOLA REGI
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							

APPENDIX B

A listing of maps and aerial photographs for the Jimmies Watershed

Map Coverage for the Jimmies Creek Watershed

92I 065,066,075,076

Aerial Photograph Coverage

BCC95020 #154-156
BCC95021 #140-137

APPENDIX C
Data Entry Sheets, Version 1.03 for each sub-basin

Data Entry Sheet - IWAP Version 1.03 - November 1995

Enter watershed data in column 1.
Read scores and hazard indices in columns 5 and 6 on next page.

	(1)		(2)	(3)	(4)
Watershed Name?	JIMMIES CREEK				
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	1				
Watershed area?	10.175	sq.km.		*	
Peak Flow and Surface Erosion					
Elevation of H60?	1174	m.			
ECA above H60?	0.362	sq.km.		*	
ECA below H60?	0.445	sq.km.		*	
Road length above H60?	4.924	km.		*	
Road length below H60?	7.576	km.		*	
Surface Erosion					
Length of road on erodable soils?	0	km.		*	
Length of road within 100 m. of stream?	4.094	km.		*	
Length of road on erodable soils within 100 m. of stream?	0	km.		*	
Number of active stream crossings?	18			*	
Riparian Buffer					
Total stream length?	16.623	km.		*	
Length of stream logged?	5.956	km.		*	
Total length of fish bearing streams?	16.623	km.		*	
Length of fish bearing streams logged?	5.956	km.		*	
Landslides					
Number of landslides?	0			*	
Length of road on unstable slopes?	0	km.		*	
Length of stream with logged banks and on slopes > 60%	0.015	km.		*	
Other Land Use and Watershed Characteristics					
Is there range use next to streams?					
Is there mining close to streams?					
Is there ATV use close to streams?					
Hydrologic zone?					
Percent area of crown land?	100				
Percent area of private land?	0				
Percent area with unstable slopes?	1.906				
Percent area with erodable soils?	9.601				
Dominant bedrock geology?					
Is there a fisheries (DFO or MoE) thermal concern?					

Notes:
(2) Enter data in units shown in this column.
(3) An asterisk in this column indicates essential data for calculations.
(4) "err" message in this column indicates an inconsistency in the data.

All cells except B6..B44 are protected.

Calculation Sheet

JIMMIES CREEK
Map units were identified as: km. and sq.km.

	Indicator		Score	(5)	(6) Hazard Index
Peak Flow					
Index above H60	0.05				
Index below H60	0.04				
1 Total Peak Flow Index	0.10			0.16	
2 Road density above H60	0.48	km/sq.km.		0.48	
3 Total road density (See note below)	1.23	km/sq.km.		0.41	0.35
Surface Erosion					
4 Roads on erodable soils	0.00	km/sq.km.		0.00	
5 Roads within 100 m of a stream	0.40	km/sq.km.		0.90	
6 Roads that are both of the above	0.00	km/sq.km.		0.00	
7 Active stream crossings	1.77	no./sq.km.		1.00	
8 Total road density (See note below)	1.23	km/sq.km.		0.41	0.95
Riparian Buffer					
9 Portion of stream logged?	0.36	km/km.		1.00	
10 Portion of fish bearing streams logged?	0.36	km/km.		0.72	1.00
Landslides					
11 Landslide density	0.00	no./sq.km.		0.00	
12 Roads on unstable slopes	0.00	km/sq.km.		0.00	
13 Streams >60% and banks logged	0.00	km/sq.km.		0.00	0.00

Notes:
The calculations of scores for #3 and #8 above are slighly different.
This spreadsheet is based on the IWAP Guidebook dated September 1995.
However, the spreadsheet is subject to change. Please contact a Forest Service regional hydrologist to ensure that you are using the latest version.

APPENDIX D
Photographs

Photo 1. Point of Diversion on the Jimmies Creek.

Photo 2. Main channel of Jimmies Creek entering the reservoir at the point of diversion.