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ANSTEY AND EAGLE RIVER WATERSHEDS

LEVEL I INTERIOR WATERSHED ASSESSMENT AND REPORT

Prepared for:

Doug Nelson
Evans Forest Products Limited
General Delivery
Malawka, B.C.
V0E 2J0

Prepared by:

Glenn Thiem
Forsite Consultants Limited
Salmon Arm, B.C.

January 9, 1998

In Partial Fulfillment of the FRBC
Integrated Watershed Restoration Plan

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January 8, 1998

Evans Forest Products Ltd.
General Delivery
Malawka, B.C.
V0E 2J0

ATTENTION: Doug Nelson

RE: ANSTEY AND EAGLE RIVER WATERSHEDS LEVEL I INTERIOR WATERSHED ASSESSMENT BRITISH COLUMBIA

Dear Doug:

Forsite Consultants was contracted to carry out a Level 1 Interior Watershed Assessment (IWAP) of the Anstey and Eagle River Watersheds. All work was completed according to the Ministry of Environment Contract 968-42303-2001 WRSH312, Kamloops Regional Office. Afterwards, the channel impact values (CIV's) were added to matrices one, four and five to ten sub-basins.

As requested in a letter from Bill Franz, dated November 13, 1997, I have carried out some of the changes to the Level 1 IWAP report. The recommendations values one to four for interaction matrix 2 and one to four for interaction matrix 3, were changed according to Pierre Rossouw's recommendations (changes recommended to the District Wide IWAP and forwarded by Bill Franz for this project). The ECA has been summarized as a percentage in Table 3 of this report.

Interpretations and recommendations made in this report follow those recommended by the Forest Practices Code, *Interior Watershed Assessment Procedure Guidebook (IWAP)* Level 1 Analysis, and Sept. 1995. Except for interaction matrix two and three.

The Ministry of Environment, Kamloops Region, supplied data sets used in the preparation and completion of this assessment. Therefore, the recommendations made in this report were derived from the supplied data.

I trust you will find the report complete if you have any questions regarding the report please contact me.

Sincerely,

Glenn Thiem

Glenn Thiem, Watershed Restoration Technologist

1.0 WATERSHED DESCRIPTION

1.1 PHSYIOGRAPHY

The Anstey River and Eagle River Watersheds are located within Interior Plateau and Columbia Mountains Physiographic Region. Both watersheds are in the Shuswap Highland and Monashee Mountains hydrologic zone. Together, these watersheds are an assemblage of sub-basins totaling 141,228 ha. The majority of the area is represented by elevated uplands, incised by a dendritic system of valleys. The upland surface topography ranges from flat to undulating to steep, the majority of the upland surface is steep.

Parent materials within the river valley consist mostly of fluvial and glacialfluvial deposits.

1.1.2 Anstey River Watershed

The Anstey River Watershed is located south of the Ratchford Creek Watershed and east of the Hunakwa Lake Watershed. Anstey River lies within the Anstey Mountain Range and has five distinct sub-basins:

- Sixth Creek
- Fifth Creek
- Third Creek
- Second Creek
- First Creek

Anstey River starts at an elevation of approximately 2,025 m and flows south for 33 km to Anstey Arm (Shuswap Lake) at elevation of ± 348 m.

1.1.3 Perry River

Perry River is located south of the Ratchford Creek Watershed and west of the Revelstoke Lake Watershed. Perry River lies within the Anstey and Jordan Mountain Range and has three distinct sub-basins:

- Pyrite Creek
- Bews Creek
- Rocky Creek

Perry River is the largest tributary to the Eagle River and is partially fed from the Bourne Glacier. The main stem starts at an elevation of about 2000 m and flows 42 km to the Eagle River at an elevation of approximately 390 m. The Perry River Watershed starts to broaden after the confluence of Bews Creek. From this point, it braids and meanders through flood plains and is constantly reclaiming river valley through the process of erosion and deposition.

1.1.4 Four-Mile Creek

Four-Mile Creek is located within the Shuswap Mountain Range between Gorge Creek and First Creek drainages. Four-Mile starts at an elevation of 2,000 m and flows 11km west to the Shuswap Lake at an elevation of ± 348 m.

1.1.5 South Pass Creek

South Pass Creek is located between Three Valley Gap and the Wap Creek Watershed. It lies within the Mabel Mountain Range and has one distinct sub-basin (not named). South Pass starts at an elevation of 1,975 m and flows west and then north to the Eagle River (elev. 500 m). South Pass Creek has a total stream length of 12 km.

1.1.6 Crazy Creek

Crazy Creek is located within the Jordan Mountain Range between the Perry River and Jordan River watersheds. It starts from an elevation of 1,800 m and flows 19 km west and then south to the Eagle River (elev. 400 m).

1.1.7 Gorge Creek (Craigellachie Creek)

Gorge Creek is located south of the Anstey Watershed and west of the Perry River Watershed. It lies within the Shuswap Mountain Range and has one distinct sub-basin, West Gorge Creek. Gorge Creek starts at an elevation of 1,400 m and flows 12 km to the Eagle River at an approximate elevation of 380 m.

1.1.8 Yard Creek

Yard Creek is the longest tributary from the south. It is located between the Wap Creek and Owlhead watersheds. This drainage lies within Hunters Range along a north-facing slope. Yard Creek has one distinct sub-basin (no name). This creek starts at an elevation of 1,400 m and flows west then north to the Eagle River. Yard Creek has a total stream length of 20 km.

1.1.9 Eagle River

The Shuswap, Hunters, and Jordan Mountain Ranges feed the Eagle River. All tributaries, except those associated to the Anstey River Watershed, flow into the Eagle River. This river starts at an elevation of ± 553 m (Clanwilliam Lk., Eagle Pass) and flows 81 km west to the Shuswap Lake at an elevation of ± 348 m.

After the confluence of the Perry River, the Eagle River morphology changes from "Step-pool" channel types (degraded) to more "Riffle Bar –pool channel" types (aggraded). The river takes on an irregular meander throughout most of the flood plain, which over time has created oxbow lakes and other wetlands. (CAP, 1994)

1.2 Land Use History and Resource Values

History in the Shuswap area was dominated by the construction of the CP Railway. In 1884, access through the Eagle River Valley was in phases. From the west side of the Columbia River (Revelstoke, B.C.), a wagon trail (Wright's Wagon Road) was used to access a chain of lakes to Eagle Pass. From Eagle Pass, a steamer was used to access the Shuswap area via Savona's Landing. In January 1906, the CP Railway was surveyed from Eagle Pass to the Monashee Mountain Range (Whittaker, 1990).

1.2.1 Logging

Prior to 1912, the passage of the first Forest Act, (Watt, 1983) most of the logging within the Anstey and Eagle River Watersheds was for the construction of the railway, road access and bridges. By 1912 many small mills had establish themselves along the railway for marketing timber. During the late 1800s and early 1900s the main methods of log transport to the mills was done by horses, log flumes, railways, rivers and lakes. Most of the logging took place within lower sections of valleys, close to the four lakes (Summit, Victor, Three Valleys and Griffen Lakes).

After the construction of the railway, many areas were selectively logged for poles. Log transport was similar to those during the construction of the railway up until the mid 1900s. By this time advances in technology had made it feasible to scout out higher ground and more isolated stands.

In 1951, the enactment of the Tree Farm Land (Watt, 1983) encouraged Licensees to practice good forest management through a reduced property tax burden. During the 1970s and 1980s clearcuting was the predominant logging practice throughout the Anstey and Eagle Watersheds, access was limited only to inoperable ground (steep slopes, rock, wetlands, and protected areas). Also during this period, large initiatives to regenerate harvested sites were taking place.

1.2.2 Mining

Mining to this day has been limited to small claims in the Anstey and Eagle River watersheds; at that time most mining activities took place along logging access. Prospecting was common during the 1850s to 1950s, however, most of it occurred outside the Anstey –Eagle River Watershed Area (Revelstoke, Kribyville, and Gold Stream).

1.2.3 Secondary Development

Around 1912, the government set up a commission to adjudicate Dominion lands and timber within the railway belt for homesteading (Cooperman et al., 1989). Since that time, many of the areas logged during the construction of the CP Railway were stumped and cleared of brush for farmland. Farmland within the Anstey – Eagle River Watersheds is limited to the Eagle River Valley; however, range tenures exist in some areas south of the Eagle River.

Malakwa is a small community with some rural homesteads. Based on the 1991 electoral census there are 631 people within the Malakwa-Eagle River area. The following table provides a summary of populations by Electoral Area.

Table. 1 Electoral Statistics

Electoral Area	Area Name	Population Census 1991
417	Perry River	111
416	Malakwa	75
359	Yard Creek	359
141	Cambie	86

All areas east of Yard Creek are not zoned and are out of the building inspection area (pers.com, CSRD). No large developments are proposed at this time, however, a small subdivision is being talked about for the Malakwa area (pers.com, Rhona Martin).

1.3 LANDSLIDES

There are several slides within the Anstey and Perry River watersheds that are a concern to slope stability and natural resources. The sites described in this section reiterate information gathered from site assessments and field visits by an engineer.

1.3.1 Sixth Creek Slide

The Sixth Creek Slide occurred in 1990 because of saturated soil conditions. High rainfall periods during May and June, were blamed for increasing infiltration and recharging groundwater sources. As a result, ground water levels increased to the extent of decreasing slope stability. The slide was described as a debris flow or avalanche with enough force to cross Sixth Creek. (Terrasol, 1995)

1.3.2 First Creek

The First Creek Slide is located about 2.2 km on the First Creek Road. This slide was first assessed during the Level 1 Road Condition Assessment on July 22, 1996. Records indicated that a small creek diverted by a switchback might have initiated the slide. In addition, oversteepened fillslopes and buried wood material contributed to the slope failure, causing a debris flow across First Creek. Real Rousseau (Forsite Consultants Ltd) carried out a review of the slide area.

On September 17, 1996, Forsite Consultants Ltd. carried out a detailed site assessment. This information will be used in preparing prescriptions to mitigate stream channel impacts and restore slope stability.

1.3.3 Four-Mile Creek

The slide on Four Mile Creek is located about 1.5 km on G1:18.05-S1 (Forsite, 1996). The head of the slide is located below the road profile and was probably initiated during spring freshet and/or heavy rainfall periods. The slide started as a debris flow on an open slope and was gradually drawn into a channel where it formed a debris torrent. Aerial photos (1994) indicated that transported sediment had impacted Four-Mile Creek. The slide track is down to bedrock and is not anticipated to deliver any more large amounts of material; however, adjacent sites are showing tension cracks on the road surface and are a concern for slope stability.

1.3.4 Crazy Creek

This slide was identified through a helicopter reconnaissance (Forsite, 1996). The slide initiated about 200 m below road C1:4.5-S4. Photos indicate that the slide is recent (last two years) and that water was the main initiating agent. The slide was identified as a debris torrent and did introduce debris and sediment into Crazy Creek. No site assessments have been carried out in regards to slope stability in and around the slide area. Based on photographs alone, the risk of future slope failures exists.

1.4 Forest Fires

1.4.1 Anstey River Watershed

One large wildfire was indicated between Hunakwa Lake and the Anstey River in 1958.

1.4.2 Perry River Watershed

One large wildfire was identified from forest cover maps. This fire occurred in 1951 burning in mostly the higher elevations north of the Eagle Pass Mountain to headwaters of the Perry River.

1.4.3 Gorge Creek

One small wildfire was identified in the head waters of Gorge Creek, 1971.

1.4.4 Yard Creek

One large wildfire was identified in the headwaters of Yard Creek and the Mount Griffen area, it occurred in 1960.

All recent wildfires in the Anstey and Perry River watersheds are small and contribute little sediment to drainage networks. Many of the larger burns noted above are questionable for slope stability, especially in areas where larger vegetation is not established. Hydrologic recovery in these burned areas has never been assessed.

2.0 Geographical Information Systems

A Level 1 Watershed Assessment has been applied to the Anstey and Eagle River Watersheds to evaluate the type and extent of water related problems and perhaps hydrologic impacts as a result of past harvesting activities. As part of the assessment, Geographical Information Systems (GIS) was used to determine 13 impact indicators as described in Table1.

Table 2. Thirteen Impact Indicators

Indicator	Description
1	The peak flow index.
2	The road density above H60 line.
3	The total road density (used for assessing peak flow changes).

4	The density of roads on erodible soils.
5	The density of roads less than 100m distance from a stream.
6	The density of roads on erodible soils less than a 100m distance from a stream.
7	The density of stream crossings.
8	The total road density (used for assessing surface erosion).
9	The portion of stream that has been logged to the stream bank.
10	The portion of Class A streams that have been logged to the stream bank.
11	The density of landslide in the watershed.
12	The density of roads on unstable terrain.
13	The portion of stream banks that have been logged on slopes that are greater than 60%.

2.1 Watershed Assessment Database Structure

The GIS database contains layers of spatial information that can be set up to answer specific questions about the land base. To run these analysis the data was arranged into three categories:

1. Area based generation
2. Network based generation
3. Feature based generation

Table 3. Summary of Information Utilized

Spatial Layer	Category Type	Information Source
Forest Cover Polygons	Area	MOF Inventory
Ownership Status	Area	MOF Inventory
Operability	Area	MOF Inventory
Streams	Network	MOF Inventory
Slope	Area	TRIM-Elevation Model
Elevation	Area	TRIM
Logging Roads	Network	TRIM
Stream Buffers	Area	Generated from streams
Watershed Sub-basins	Area	Digitized
Stream Road Intersection	Area	Digitized
Landslides	Area	Digitized

2.2 Coverage Description

The coverages produced for this project have had items appended to the .aat and/or the .pat that allow the data to be queried in the production of the statistics. For the most part, these items were added by overlaying multiple coverages to produce a final coverage. The following general descriptions refer to these resultant coverages. The FC1 files for this project were current to approx. November 1995 while the TRIM files were produced around 1990.

HA - Contours
By appending the individual TRIM contour coverages into one single coverage and then clipping it to the study area boundary generated this coverage. This coverage is used in the generation of the H60 lines and for plot file production.

LATT - Elevation Lattice
This is a lattice which covers the entire study area with a resolution of 25 meters. It's a quintic lattice which was generated from the TRIM point data with the TRIM lakes been used as breaklines.

TSLP - Slope
Creating a TIN from the TRIM point data and then converting this to a 25m quintic lattice produced the slope coverage. This lattice was then used to generate a polygon coverage using a look-up table. This coverage was then clipped with the mapsheet neatlines. The slope classes are defined as per the GIS Specifications for Level 1 IWAP. There is one TSLP coverage for each mapsheet in the study area.

TWB - Watersheds
This coverage was created by defining pour-points for each watershed and then using these in a flow-accumulation procedure run in Arc/Info's Grid module. This coverage is used throughout the IWAP process.

TCTR - H60 Line
Clipping the previously generated lattice with the individual watershed boundaries generated the H60 lines. The resultant lattice was then analyzed in GRID to determine the elevation of the H60 line which was then extracted (to the nearest 20m) from the HA coverage and clipped to the watershed boundary. This coverage was then appended to the SHEDS coverage to create a polygon coverage which has an item on the .pat called ABOVE_H60. This item contains either a 'Y' or a 'N' to indicate whether the polygon is above or below the H60 line. This results in a coverage of watersheds that are bisected by their H60 lines, leaving a polygon above and a polygon below the H60 line for each watershed. This coverage is used extensively throughout the analysis.

TCVR - Forest Cover Openings
These polygons were extracted from the forest cover layer of the FC1 maps and assigned the necessary attributes directly from the FIP files. The ECA attribute was calculated according to the IWAP standards. Once this was done the individual maps were appended into one seamless coverage. This coverage was then clipped to the study area boundary and overlayed with the TCTR coverage to allow querying for watershed and H60 information.

TTEH - Unstable Terrain
The areas of unstable terrain was determined through an analysis of air-photos. Areas identified as unstable were then digitized and coded as such.

TERS - Erodible Soils
The areas of erodible soils where determined through an analysis of air-photos. Areas identified as erodible were then digitized and coded as such.

TWTR - Creeks
Appending the TRIM creek data for the study area, unsplitting the arcs and setting the fcode item as per the IWAP standards created this coverage. The coverage was then clipped to the study area boundary. Portions of the creeks that have been logged to edge were identified manually by coding the stream where it passes through an existing cut block, burned area or hydro line. The stream coverage was also overlaid with the 60% slope coverage and the H60 coverage to allow querying of these attributes.

STRMBUFF - CREEK BUFFER

The creek coverage was buffered by 100m to produce a new coverage called strmbuff. This coverage used to determine if roads are within 100m of a stream.

CRKXING - Creek Crossings

This coverage was generated by manually adding a label point where a creek intersected a road. The coverage was then overlaid with the sheds coverage in order to assign a watershed name to each crossing.

TRDS - Roads

The roads coverage was produced by appending the individual TRIM road coverages into one coverage, clipping with the study area boundary and then unsplitting the arcs to remove pseudo nodes. It was then overlaid with the TCTR coverage to transfer watershed and H60 information to the roads. The resultant coverage was then overlaid with the erodible and unstable soils coverages to allow the appropriate querying. This coverage was then overlaid with the streambuff coverage to determine if the roads are within 100m of a stream and with the erodible and unstable soils to allow analysis of these atributes as they relate to the roads.

Ownership – Land Ownership

This coverage was obtained by extracting selected layer from the FC1 files. The coverages were then appended for the entire district and then clipped to the study area boundary.

OPERABLE - Operability Polygons

This coverage was derived from the FC1 files, appended for the entire study area and clipped to the study area boundary.

2.3 SOFTWARE & DATA STANDARDS

Arc/Info version 7.0.4 was the software used by Forsite for the majority of the work involved in the Salmon Arm District IWAP. Microstation PC version 5.5 was used do an initial check of the FC1 files before they were converted to Arc/Info. The TIN module of Arc/Info was used to produce the TINs and Lattices required in the study while the GRID module was used to determine the elevations of the H60 lines. The hardware platform used to run Arc was a Sun Microsystems Sparc Ultra running SunOS version 5.5 (Unix).

TRIM data was converted from MOEP format to Arc/Info in UTM - Nad83 projection. Forest cover data was converted from IGDS format UTM - Nad27 to UTM – Nad83 once it was in Arc/Info. All base data used for the study was derived from TRIM and individual map-sheets were joined into one coverage and clipped with the study area boundary. All data was maintained as single precision coverages with fuzzy tolerances been kept to the minimum allowed for the data. This was generally around 1.5 meters. All lattices produced were generated to a 25 meter grid resolution and were created with the quintic option in Arc/Info. Tins were generated from the TRIM point elevation data using the TRIM lakes as breaklines.

2.4 GENERATION OF STATISTICS

The IWAP statistics for this project were generated through the use of AMLs (Arc Macro Language). The AML programs produced a series of Info database files, the contents of which were entered manually into the supplied Excel spreadsheets and subsequently printed out.

2.5 Sources Of Error

Errors in this project are limited to the accuracy to which the original FC1 and TRIM files were generated. Wrongly coded attributes in the file, i.e. incorrect species or timber age, were not sought out or corrected as this was beyond the scope of the project.

3.0 Field Verification

A Level I Field Assessment and Channel Assessment is presently being compiled by Forsite Consultants Ltd. The results have been reported in a draft copy and describe sediment source problems as identified through the Level 1 Field Assessment and Channel Assessment. The recommendations made in this section are based on field assessments and are in no way final. Through consultation with stakeholders and Ministry Representatives, appropriate recommendations will be approved with considerations to all users and resource values.

3.1 Level I Field Assessment- Road Condition Assessment

The Road Condition Assessment was performed on all the Anstey - Eagle River Watersheds during the Fall 1995 and Summer 1996. Although the Level 1 Field Assessment mainly recognized road-related problems, it did verify downstream impacts identified through the CAP. The Level 1 Road Condition Assessment report is expected to be completed by 1997.

3.2 Channel Assessment, Level 2 IWAP Analysis- Version 1.0

Through the Channel Assessment Forsite Consultants Ltd reviewed the results of the Level 1 IWAP Analysis (Forsite, October 1996). The level of disturbance analysis performed in the Channel Assessment indicated that there were nine watersheds with Channel Impact Values between 0.3 and 1.0.
The following watersheds were identified in the Level 1 IWAP to perform a level 2 field analysis:

- ⇒ Crazy Creek
- ⇒ Four Mile Creek
- ⇒ Gorge Creek
- ⇒ Ledgerwood Creek
- ⇒ Loftus Creek
- ⇒ Perry River South
- ⇒ Three Valley (residual)
- ⇒ South Victor Creek
- ⇒ Wap Creek
- ⇒ Yard Creek

3.2.1 Crazy Creek

The CAP reviewed eighteen reaches within the Crazy Creek Watershed. Field checks showed that many of the roads were constructed on unstable slopes and as a result were causing landslides. It was recommended in the CAP report to deactivate roads within these reach areas to reduce landslide initiation. Fish presence was identified in reach 11535; this reach was also identified to have important rearing habitat and was recognized as a fishery sensitive zone[1].

3.2.2 Four- Mile Creek

According to the CAP report, road related landslides are the largest contributors of sediment within this watershed. The recommendation was made in the CAP report to carry out a detailed site assessment on potentially unstable slopes and prepare prescriptions for road deactivation.

3.2.3 Gorge Creek

Similar to Four-Mile Creek, road related landslides are the largest contributors of sediment within the Gorge Creek Watershed. Specific areas were identified in the CAP report as having unstable slopes. It was recommended in the CAP report to implement a detailed site assessment and prepare prescriptions for mitigating sediment impacts.

3.2.4 Ledgerwood

Several slides were described in the CAP report as having the largest impact to channel stability within the Ledgerwood Watershed. Based on observations in the field, it is anticipated that high flows will result in sediment transport to downstream property. The CAP report recommends that a geotechnical assessment is implemented and that prescriptions are developed to mitigate sediment transport.

3.2.5 Loftus Creek

The CAP report indicates that water flows on unstable slopes has resulted in road related channel diversions. It was noted in the report that there is a high risk for future slide activity on unstable slopes. The CAP report recommends carrying out a detailed site assessment by a geoscientist and preparing prescriptions for road deactivation.

3.2.6 Perry River South

The CAP report indicates that most of the incidences identified in the field as sediment sources, were road related and in most cases maintenance items. Stream bank erosion was identified to be a problem on sections of the Perry River. It was recommended in the CAP report to prepare prescriptions through a detailed site assessment.

3.2.7 Three Valley

The CAP report indicates that the some field checking was done through a sediment source survey and that most of the sediment impacts were road related.

3.2.8 Wap Creek

Road related sources were the main contributors to sediment impacts in the Wap Creek Watershed. The CAP report recommends that deactivation measures be employed to reduce road surface erosion into Wap Creek.

3.2.9 Yard Creek

Similar to Wap Creek, road related components were the main sources of sediment impacts within the Yard Creek Watershed. It was recommended through the CAP report that road repairs are carried out to reduce surface erosion impacts and that a detailed site assessment be carried out on areas having potentially unstable slopes.

4.0 Summary of Recommendations

Recommendations made in this report were based on the criteria set out in the [1]FPC Guidebook. Recommendation Values were determined by interpreting a series of hazard indices from the Level 1 IWAP Analysis and using them in the Interaction Matrix Tables (FPC Guidebook). In total, there are five matrix tables:

- ⇒ Interaction matrix 1. Peak Flow vs. Channel Instability, Level 2 IWAP
- ⇒ Interaction matrix 2. Peak Flow vs. Surface Erosion , Level 1 IWAP
- ⇒ Interaction matrix 3. Peak Flow vs. Mass Wasting (Landslides), Level 1 IWAP
- ⇒ Interaction matrix 4. Mass Wasting vs. Channel Instability, Level 2 IWAP
- ⇒ Interaction matrix 5. Riparian vs. Channel Instability, Level 2 IWAP

Appendix II provides a summary of all interpretations and recommendations. Note that only ten watersheds apply all five-interaction matrixes. The remaining six watersheds indicated no disturbance levels.

TABLE 3 ECA SUMMARY

SUB-BASIN	H_{60} ELEVATION	TOTAL AREA	ECA ABOVE H_{60}	ECA BELOW H_{60}	PERCENT ECA
	(M)	(HA)	(HA)	(HA)	
ANSTEY ARM	1380	1766.9	0	16.3	1
ANSTEY RIVER	1380	23471.2	301.8	1275.4	7
LOFTUS CREEK	1280	1909.2	396.3	92.6	26
PERRY RIVER NORTH	1280	17119.2	225.5	741.5	6
BEWS CREEK	1280	12447.8	614.7	251.7	7
CRAZY CREEK	1280	11365.7	408.4	407.7	7
EAGLE RIVER EAST	1280	12371.7	321.7	47.8	3
EAGLE RIVER WEST	1280	14946.1	1162	1336.2	17
GORGE CREEK	1280	4143.7	492.2	350.1	20
LEDGERWOOD CREEK	1280	1093.9	146.4	58.4	19
PERRY RIVER SOUTH	1280	14153.3	1191.7	1719.9	21
SOUTH VICTOR CREEK	1280	2466.2	217.8	71.1	12
THREE VALLEY GAP	1280	5623.5	261.3	95.5	6
WAP CREEK	1280	3122.8	366.9	148.8	17
YARD CREEK	1280	12471	2288.3	198	20
FOUR-MILE CREEK	1380	2756.4	154.8	98.6	9
TOTALS		**120104.6**	**8549.8**	**6909.6**	**13**

4.1 INTERACTION MATRIX #1 - PEAK FLOW VS. CHANNEL INSTABILITY

Recommendation Value # 1: - No. Of Watersheds in this category: 8 of 10

WATERSHED NAME	WATERSHED NUMBER
Crazy Creek	4
Four Mile Creek	7
Gorge Creek	8
Ledgerwood Creek	9
Perry River South	12
South Victor	13
Wap Creek	15
Yard Creek	16

Recommendation Value #2: - No. of Watersheds in this category: 1 of 10

WATERSHED NAME	WATERSHED NUMBER
Loftus Creek	10

ACTION: Do not increase the current ECA levels unless a level 3 analysis indicates site-specific opportunities.

ACTION: Do not allow logging in high landslide hazard zones.

ACTION: Limit the ECA to 20% in areas that drain into high landslide hazard zones.

4.2 Interaction Matrix #2 - Peak Flow Versus Surface Erosion

Recommendation Value # 1: - No. of Watersheds in this category: 5 of 16

WATERSHED NAME	WATERSHED NUMBER
Anstey Arm	1
Bews Creek	3
Eagle River East	5
Perry River North	11
Yard Creek	16

ACTION: Calculate values and hazard indexes for smaller watershed units or sub-basins to confirm if there is no harvesting or equivalent clear-cut area (ECA) implications.

Recommendation Value #2: - No. of Watersheds in this category: 9 of 16

WATERSHED NAME	WATERSHED NUMBER
Anstey River	2
Crazy Creek	4
Eagle River West	6
Four Mile Creek	7
Gorge Creek	8
Ledgerwood	9
Perry River South	12
South Victor	13
Wap Creek	15

ACTION: Initiate an assessment of sediment sources.

ACTION: Calculate values and hazard indexes for smaller watershed units or sub-basins to confirm if harvesting above and around sensitive soils should be subject to further assessment.

ACTION: Rehabilitate roads near streams, and avoid construction of more roads on sensitive soils or adjacent riparian management areas without conducting further assessment.

ACTION: Minimize stream crossings.

ACTION: Calculate values and hazard indexes for smaller watershed units or sub-basins to confirm that the ECA should not be increased where peak flow hazard scores are high.

Recommendation Value #3: - No. of Watersheds in this category: 0 of 16

Recommendation Value #4: - No. of Watersheds in this category: 1of 16

WATERSHED NAME	WATERSHED NUMBER
Loftus Creek	10

ACTION: Initiate a Sediment Source Survey (Moore, 1994)

ACTION: Permanently deactivate as many roads as possible, consistent with access management requirements.

ACTION: Calculate values and hazard indexes for smaller watershed units or sub-basins and if confirmed, reduce ECA over these watersheds or sub-basins.

ACTION: Calculate values and hazard indexes for smaller watershed units or sub-basins and if confirmed, do not allow additional roads to be established in sensitive areas.

4.3 Interaction Matrix #3 - Peak Flow Versus Mass Wasting

Recommendation Value #1: - No. of Watersheds in this category: 8 of 16

WATERSHED NAME	WATERSHED NUMBER
Anstey Arm	1
Anstey River	2
Bews Creek	3
Eagle River East	5
Eagle River West	6
Loftus Creek	10
Perry River North	11
Wap Creek	15

ACTION: Calculate values and hazard indexes for smaller watershed units or sub-basins to confirm if there is no harvesting or equivalent clear-cut area (ECA) implications.

Initiate a detailed site assessment on any potentially unstable slope.

Recommendation Value #2: - No. of Watersheds in this category: 3 of 16

WATERSHED NAME	WATERSHED NUMBER
Crazy Creek	4
Perry River South	12
South Victor	13

ACTION: Initiate a Sediment Source Survey (refer to Moore 1994 [1])

ACTION: Initiate a detailed site assessment on any potentially unstable slope.

Assess roads as sources of landslides and initiate a road deactivation landslide rehabilitation program as required.

Recommendation Value #3: - No. of Watersheds in this category: 4 of 16

WATERSHED NAME	WATERSHED NUMBER
Gorge Creek	8
Four Mile Creek	7
Ledgerwood Creek	9
Yard Creek	16

ACTION: Restrict harvesting to a maximum of 20% on areas draining onto or above Class IV or V slopes.

ACTION: Calculate values and hazard indexes for smaller watershed units or sub-basins and if confirmed complete terrain mapping at a 1:20,000 scale for all areas of proposed forest development, and complete detailed field assessments on any class IV or V slope before approving harvesting or road building.

Recommendation Value #4: - No. of Watersheds in this category: 0 of 16

4.4 INTERACTION MATRIX #4 - MASS WASTING VS. CHANNEL INSTABILITY

Recommendation Value #1: - No. of Watersheds in this category: 5 of 9

WATERSHED NAME	WATERSHED NUMBER
Loftus Creek	10
Perry River South	12
South Victor	13
Wap Creek	15
Yard Creek	16

ACTION: None, there are no harvesting or equivalent clearcut area (ECA) implications.

Recommendation Value # 2: - No. of Watersheds in this category: 1 of 10

WATERSHED NAME	WATERSHED NUMBER
Crazy Creek	4

ACTION: Initiate a detailed channel assessment.

ACTION: Complete a terrain mapping at a 1:20,000 scale for all areas of proposed forest development, and complete detailed field assessments on any Class IV or V slope before approving logging or road building.

Recommendation Value # 3: - No. of Watersheds in this category: 1 0f 10

Four Mile Creek	7

Recommendation Value # 4: - No. of Watersheds in this category: 2 of 10

WATERSHED NAME	WATERSHED NUMBER
Gorge Creek	8
Ledgerwood Creek	9

ACTION: Allow no further logging until a detailed channel stability assessment is complete.

ACTION: Assess roads and investigate causes of mass wasting in the watershed, and develop and initiate a rehabilitation and road deactivation program as required.

ACTION: Complete detailed terrain mapping and do not allow logging on or above any Class IV or V slope.

ACTION: Reduce the ECA in the watershed to ensure the peak flow hazard score is not greater than moderate.

4.5 Interaction Matrix 5 -Riparian vs. Channel Instability

Recommendation Value # 1: - No. of Watersheds in this category: 6 of 10

WATERSHED NAME	WATERSHED NUMBER
Crazy Creek	4
Four Mile Creek	7
Gorge Creek	8
South Victor	13
Loftus Creek	10
Yard Creek	16

ACTION: None, there are no harvesting or equivalent clearcut area (ECA) implications.

There are no WAP restrictions on logging in the management zones of riparian management areas.

Recommendation Value # 2: - No. Watersheds in this category: 1 of 10

WATERSHED NAME	WATERSHED NUMBER
Ledgerwood Creek	9

ACTION: Do not conduct logging in active flood plain areas.

ACTION: Investigate whether individual, site-specific, landslides are impacting the stream channel, requiring rehabilitation.

ACTION: Investigate causes of channel instability by completing a detailed channel assessment.

Recommendation Value # 3: - No. of Watersheds in this category: 2 of 10

WATERSHED NAME	WATERSHED NUMBER
Perry River South	12
Wap Creek	15

ACTION: Retain higher tree retention in the management zones of riparian management areas along S2, S3, and S4 streams, consistent with windthrow management requirements.

ACTION: Do not conduct logging in active flood plain areas.

REFERNCES

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Sahlstrom, C. David., et al. "Sixth Creek Slide Rehabilitation Stage 1 Report – Site Review and Rehabilitation Options" Terrasol, 1995.

Watt B. Susan. Forestry Handbook for British Columbia. British Columbia: The Forestry Undergraduate Society, Faculty of Forestry, U.B.C., 1983.

Whittaker, A. John. Early Land Surveyors of British Columbia. British Columbia: The Corporation of Land Surveyors of the Province of British Columbia, 1990.

APPENDIX I

Anstey and Eagle River Watersheds

Level 1 IWAP Report Cards

Data Entry Sheet - IWAP Version 1.02 - October 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?	Anstey Arm			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	1766.9	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1380	m.		
ECA above H60?	0	ha.	*	
ECA below H60?	16.3	ha.	*	
Road length above H60?	4526.3	m.	*	
Road length below H60?	9323.3	m.	*	
Surface Erosion				
Length of road on erodable soils?	0	m.	*	
Length of road within 100 m. of stream?	2184.3	m.	*	
Length of road on erodable soils within 100 m. of stream?	0	m.	*	
Number of active stream crossings?	7		*	
Riparian Buffer				
Total stream length?	17356	m.	*	
Length of stream logged?	0	m.	*	
Total length of fish bearing streams?	0	m.	*	
Length of fish bearing streams logged?	0	m.	*	
Landslides				
Number of landslides?	1		*	
Length of road on unstable slopes?	0	m.	*	
Length of stream with logged banks and on slopes > 60%	0	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	100			
Percent area of private land?	0			
Percent area with unstable slopes?	0			
Percent area with erodable soils?	0			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

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.

Summary of Level 1Scores in the file IWAP102.XLS

Anstey Arm					
Watershed area	1767	ha.			
Elevation of H60	1380	m.	**Peak Flow**		
ECA above H60	0	ha.	Index above H60	0.00	
ECA below H60	16.3	ha.	Index below H60	0.01	
Road length above H60	4526	m.	1 Total Peak Flow Index	0.01	0.02
Road length below H60	9323	m.	2 Road density above H60	0.26 km/sq.km.	0.26
			3 Total road density	0.78 km/sq.km.	0.26 0.18
			Surface Erosion		
Length of road on erodable soils	0	m.	4 Roads on erodable soils	0.00 km/sq.km.	0.00
Length of road within 100 m. of stream	2184	m.	5 Roads within 100 m of a stream	0.12 km/sq.km.	0.31
Length of road on erodable soils within 100 m. of stream	0	m.	6 Roads that are both of the above	0.00 km/sq.km.	0.00
Number of active stream crossings	7		7 Active stream crossings	0.40 no./sq.km.	0.50
			8 Total road density	0.78 km/sq.km.	0.26 0.40
Total stream length	17356	m.	**Riparian Buffer**		
Length of stream logged	0	m.			
Total length of fish bearing streams	0	m.	9 Portion of stream logged?	0.00 km/km.	0.00
Length of fish bearing streams logged	0	m.	10 Portion of fish streams logged?	0.00 km/km.	0.00 0.00
			Landslides		
Number of landslides	1		11 Landslide density	0.06 no./sq.km.	0.28
Length of road on unstable slopes	0	m.	12 Roads on unstable slopes	0.00 km/sq.km.	0.00
Length of stream with logged banks and on slopes > 60	0	m.	13 Streams >60% and banks logged	0.00 km/sq.km.	0.00 0.28

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Anstey River			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	23471.2	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1380	m.		
ECA above H60?	301.8	ha.	*	
ECA below H60?	1275.4	ha.	*	
Road length above H60?	14076.6	m.	*	
Road length below H60?	107848	m.	*	
Surface Erosion				
Length of road on erodable soils?	17229.7	m.	*	
Length of road within 100 m. of stream?	46735.8	m.	*	
Length of road on erodable soils within 100 m. of stream?	8593.6	m.	*	
Number of active stream crossings?	132		*	
Riparian Buffer				
Total stream length?	434957.8	m.	*	
Length of stream logged?	20208	m.	*	
Total length of fish bearing streams?	21052	m.	*	
Length of fish bearing streams logged?	1353	m.	*	
Landslides				
Number of landslides?	29		*	
Length of road on unstable slopes?	1898	m.	*	
Length of stream with logged banks and on slopes > 60%	1054	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	NO			
Is there mining close to streams?	NO			
Is there ATV use close to streams?	NO			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	100			
Percent area of private land?	0			
Percent area with unstable slopes?	2.8			
Percent area with erodable soils?	6			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	NO			

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.

Summary of Level 1Scores in the file IWAP102.XLS

Bews Creek		
Watershed area	12448	ha.
Elevation of H60	1280	m.
ECA above H60	614.7	ha.
ECA below H60	251.7	ha.
Road length above H60	1614	m.
Road length below H60	6740	m.
Length of road on erodable soils	0	m.
Length of road within 100 m. of stream	2979	m.
Length of road on erodable soils within 100 m. of stream	0	m.
Number of active stream crossings	7	
Total stream length	3E+05	m.
Length of stream logged	1924	m.
Total length of fish bearing streams	6279	m.
Length of fish bearing streams logged	215	m.
Number of landslides	8	
Length of road on unstable slopes	0	m.
Length of stream with logged banks and on slopes > 60	4	m.

		Indicator	Score	Hazard Index
Peak Flow				
	Index above H60	0.07		
	Index below H60	0.02		
1	Total Peak Flow Index	0.09	0.16	
2	Road density above H60	0.01 km/sq.km.	0.01	
3	Total road density	0.07 km/sq.km.	0.02	0.16
Surface Erosion				
4	Roads on erodable soils	0.00 km/sq.km.	0.00	
5	Roads within 100 m of a stream	0.02 km/sq.km.	0.06	
6	Roads that are both of the above	0.00 km/sq.km.	0.00	
7	Active stream crossings	0.06 no./sq.km.	0.07	
8	Total road density	0.07 km/sq.km.	0.02	0.07
Riparian Buffer				
9	Portion of stream logged?	0.01 km/km.	0.02	
10	Portion of fish streams logged?	0.03 km/km.	0.07	0.07
Landslides				
11	Landslide density	0.06 no./sq.km.	0.32	
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	0.32

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Bews Creek			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	12447.8	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	614.7	ha.	*	
ECA below H60?	251.7	ha.	*	
Road length above H60?	1613.7	m.	*	
Road length below H60?	6740.3	m.	*	
Surface Erosion				
Length of road on erodable soils?	0	m.	*	
Length of road within 100 m. of stream?	2978.9	m.	*	
Length of road on erodable soils within 100 m. of stream?	0	m.	*	
Number of active stream crossings?	7		*	
Riparian Buffer				
Total stream length?	256911	m.	*	
Length of stream logged?	1924	m.	*	
Total length of fish bearing streams?	6279	m.	*	
Length of fish bearing streams logged?	215	m.	*	
Landslides				
Number of landslides?	8		*	
Length of road on unstable slopes?	0	m.	*	
Length of stream with logged banks and on slopes > 60%	4	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	100			
Percent area of private land?	0			
Percent area with unstable slopes?	4			
Percent area with erodable soils?	4.2			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

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.

Summary of Level 1Scores in the file IWAP102.XLS

Anstey River Watershed area	23471 ha.		Indicator	Score	Hazard Index
		Peak Flow			
Elevation of H60	1380 m.		Index above H60	0.02	
ECA above H60	301.8 ha.		Index below H60	0.05	
ECA below H60	1275 ha.	1	Total Peak Flow Index	0.07	0.12
Road length above H60	14077 m.	2	Road density above H60	0.06 km/sq.km.	0.06
Road length below H60	1E+05 m.	3	Total road density	0.52 km/sq.km.	0.17 0.12
		Surface Erosion			
Length of road on erodable soils	17230 m.	4	Roads on erodable soils	0.07 km/sq.km.	0.15
Length of road within 100 m. of stream	46736 m.	5	Roads within 100 m of a stream	0.20 km/sq.km.	0.50
Length of road on erodable soils within 100 m. of stream	8594 m.	6	Roads that are both of the above	0.04 km/sq.km.	0.18
Number of active stream crossings	132	7	Active stream crossings	0.56 no./sq.km.	0.66
		8	Total road density	0.52 km/sq.km.	0.17 0.58
Total stream length	4E+05 m.	**Riparian Buffer**			
Length of stream logged	20208 m.				
Total length of fish bearing streams	21052 m.	9	Portion of stream logged?	0.05 km/km.	0.15
Length of fish bearing streams logged	1353 m.	10	Portion of fish streams logged?	0.06 km/km.	0.13 0.15
		Landslides			
Number of landslides	29	11	Landslide density	0.12 no./sq.km.	0.54
Length of road on unstable slopes	1898 m.	12	Roads on unstable slopes	0.01 km/sq.km.	0.03
Length of stream with logged banks and on slopes > 60	1054 m.	13	Streams >60% and banks logged	0.00 km/sq.km.	0.01 0.54

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Crazy Creek			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	11365.7	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	408.4	ha.	*	
ECA below H60?	407.7	ha.	*	
Road length above H60?	14177.8	m.	*	
Road length below H60?	67598.6	m.	*	
Surface Erosion				
Length of road on erodable soils?	2113.7	m.	*	
Length of road within 100 m. of stream?	25108	m.	*	
Length of road on erodable soils within 100 m. of stream?	775.4	m.	*	
Number of active stream crossings?	57		*	
Riparian Buffer				
Total stream length?	190096	m.	*	
Length of stream logged?	17396	m.	*	
Total length of fish bearing streams?	34.6	m.	*	
Length of fish bearing streams logged?	0	m.	*	
Landslides				
Number of landslides?	16		*	
Length of road on unstable slopes?	3073	m.	*	
Length of stream with logged banks and on slopes > 60%	1290	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	99.8			
Percent area of private land?	0.2			
Percent area with unstable slopes?	4			
Percent area with erodable soils?	4.5			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

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.

Summary of Level 1Scores in the file IWAP102.XLS

Crazy Creek						
Watershed area	11366	ha.		Indicator	Score	Hazard Index
			Peak Flow			
Elevation of H60	1280	m.	Index above H60	0.05		
ECA above H60	408.4	ha.	Index below H60	0.04		
ECA below H60	407.7	ha.	1 Total Peak Flow Index	0.09	0.15	
Road length above H60	14178	m.	2 Road density above H60	0.12 km/sq.km.	0.12	
Road length below H60	67599	m.	3 Total road density	0.72 km/sq.km.	0.24	0.17
			Surface Erosion			
Length of road on erodable soils	2114	m.	4 Roads on erodable soils	0.02 km/sq.km.	0.04	
Length of road within 100 m. of stream	25108	m.	5 Roads within 100 m of a stream	0.22 km/sq.km.	0.54	
Length of road on erodable soils within 100 m. of stream	775.4	m.	6 Roads that are both of the above	0.01 km/sq.km.	0.03	
Number of active stream crossings	57		7 Active stream crossings	0.50 no./sq.km.	0.60	
			8 Total road density	0.72 km/sq.km.	0.24	0.57
Total stream length	2E+05	m.	**Riparian Buffer**			
Length of stream logged	17396	m.				
Total length of fish bearing streams	34.6	m.	9 Portion of stream logged?	0.09 km/km.	0.31	
Length of fish bearing streams logged	0	m.	10 Portion of fish streams logged?	0.00 km/km.	0.00	0.31
			Landslides			
Number of landslides	16		11 Landslide density	0.14 no./sq.km.	0.57	
Length of road on unstable slopes	3073	m.	12 Roads on unstable slopes	0.03 km/sq.km.	0.09	
Length of stream with logged banks and on slopes > 60	1290	m.	13 Streams >60% and banks logged	0.01 km/sq.km.	0.04	0.57

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Eagle River East			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	12371.7	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	321.7	ha.	*	
ECA below H60?	47.8	ha.	*	
Road length above H60?	10497	m.	*	
Road length below H60?	23888	m.	*	
Surface Erosion				
Length of road on erodable soils?	2097.1	m.	*	
Length of road within 100 m. of stream?	9758.8	m.	*	
Length of road on erodable soils within 100 m. of stream?	403.2	m.	*	
Number of active stream crossings?	43		*	
Riparian Buffer				
Total stream length?	196030	m.	*	
Length of stream logged?	2749	m.	*	
Total length of fish bearing streams?	18940	m.	*	
Length of fish bearing streams logged?	0	m.	*	
Landslides				
Number of landslides?	11		*	
Length of road on unstable slopes?	23	m.	*	
Length of stream with logged banks and on slopes > 60%	145	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	95.8			
Percent area of private land?	4.2			
Percent area with unstable slopes?	7.7			
Percent area with erodable soils?	9.3			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

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.

Summary of Level 1Scores in the file IWAP102.XLS

Eagle River East Watershed area	12372	ha.		Indicator	Score	Hazard Index
			Peak Flow			
Elevation of H60	1280	m.	Index above H60	0.04		
ECA above H60	321.7	ha.	Index below H60	0.00		
ECA below H60	47.8	ha.	1 Total Peak Flow Index	0.04	0.07	
Road length above H60	10497	m.	2 Road density above H60	0.08 km/sq.km.	0.08	
Road length below H60	23888	m.	3 Total road density	0.28 km/sq.km.	0.09	0.08
			Surface Erosion			
Length of road on erodable soils	2097	m.	4 Roads on erodable soils	0.02 km/sq.km.	0.03	
Length of road within 100 m. of stream	9759	m.	5 Roads within 100 m of a stream	0.08 km/sq.km.	0.20	
Length of road on erodable soils within 100 m. of stream	403.2	m.	6 Roads that are both of the above	0.00 km/sq.km.	0.02	
Number of active stream crossings	43		7 Active stream crossings	0.35 no./sq.km.	0.43	
			8 Total road density	0.28 km/sq.km.	0.09	0.32
Total stream length	2E+05	m.	**Riparian Buffer**			
Length of stream logged	2749	m.				
Total length of fish bearing streams	18940	m.	9 Portion of stream logged?	0.01 km/km.	0.05	
Length of fish bearing streams logged	0	m.	10 Portion of fish streams logged?	0.00 km/km.	0.00	0.05
			Landslides			
Number of landslides	11		11 Landslide density	0.09 no./sq.km.	0.44	
Length of road on unstable slopes	23	m.	12 Roads on unstable slopes	0.00 km/sq.km.	0.00	
Length of stream with logged banks and on slopes > 60	145	m.	13 Streams >60% and banks logged	0.00 km/sq.km.	0.00	0.44

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Eagle River West			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	14946.1	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	1162	ha.	*	
ECA below H60?	1336.2	ha.	*	
Road length above H60?	53837.4	m.	*	
Road length below H60?	198558	m.	*	
Surface Erosion				
Length of road on erodable soils?	0	m.	*	
Length of road within 100 m. of stream?	37727.5	m.	*	
Length of road on erodable soils within 100 m. of stream?	0	m.	*	
Number of active stream crossings?	93		*	
Riparian Buffer				
Total stream length?	167660	m.	*	
Length of stream logged?	11861	m.	*	
Total length of fish bearing streams?	46047	m.	*	
Length of fish bearing streams logged?	928	m.	*	
Landslides				
Number of landslides?	9		*	
Length of road on unstable slopes?	0	m.	*	
Length of stream with logged banks and on slopes > 60%	733	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	85.1			
Percent area of private land?	14.9			
Percent area with unstable slopes?	1.1			
Percent area with erodable soils?	0.1			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

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.

Summary of Level 1Scores in the file IWAP102.XLS

Eagle River West		
Watershed area	14946	ha.
Elevation of H60	1280	m.
ECA above H60	1162	ha.
ECA below H60	1336	ha.
Road length above H60	53837	m.
Road length below H60	2E+05	m.
Length of road on erodable soils	0	m.
Length of road within 100 m. of stream	37728	m.
Length of road on erodable soils within 100 m. of stream	0	m.
Number of active stream crossings	93	
Total stream length	2E+05	m.
Length of stream logged	11861	m.
Total length of fish bearing streams	46047	m.
Length of fish bearing streams logged	928	m.
Number of landslides	9	
Length of road on unstable slopes	0	m.
Length of stream with logged banks and on slopes > 60	733	m.

		Indicator		Score	Hazard Index
Peak Flow					
	Index above H60	0.12			
	Index below H60	0.09			
1	Total Peak Flow Index	0.21		0.34	
2	Road density above H60	0.36	km/sq.km.	0.36	
3	Total road density	1.69	km/sq.km.	0.56	0.42
Surface Erosion					
4	Roads on erodable soils	0.00	km/sq.km.	0.00	
5	Roads within 100 m of a stream	0.25	km/sq.km.	0.60	
6	Roads that are both of the above	0.00	km/sq.km.	0.00	
7	Active stream crossings	0.62	no./sq.km.	0.72	
8	Total road density	1.69	km/sq.km.	0.59	0.66
Riparian Buffer					
9	Portion of stream logged?	0.07	km/km.	0.24	
10	Portion of fish streams logged?	0.02	km/km.	0.04	0.24
Landslides					
11	Landslide density	0.06	no./sq.km.	0.30	
12	Roads on unstable slopes	0.00	km/sq.km.	0.00	
13	Streams >60% and banks logged	0.00	km/sq.km.	0.02	0.30

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Four Mile Creek			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	2756.4	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1380	m.		
ECA above H60?	154.8	ha.	*	
ECA below H60?	98.6	ha.	*	
Road length above H60?	7765.6	m.	*	
Road length below H60?	9843.7	m.	*	
Surface Erosion				
Length of road on erodable soils?	1699.7	m.	*	
Length of road within 100 m. of stream?	7909.2	m.	*	
Length of road on erodable soils within 100 m. of stream?	381.4	m.	*	
Number of active stream crossings?	24		*	
Riparian Buffer				
Total stream length?	48206.2	m.	*	
Length of stream logged?	4901	m.	*	
Total length of fish bearing streams?	0	m.	*	
Length of fish bearing streams logged?	0	m.	*	
Landslides				
Number of landslides?	16		*	
Length of road on unstable slopes?	61	m.	*	
Length of stream with logged banks and on slopes > 60%	259	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	100			
Percent area of private land?	0			
Percent area with unstable slopes?	2.5			
Percent area with erodable soils?	11			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

Notes:
(2) Enter data in units shown in this column.
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(4) "err" message in this column indicates an inconsistency in the data.

All cells except B6..B44 are protected.

Summary of Level 1Scores in the file IWAP102.XLS

Four Mile Creek		
Watershed area	2756	ha.
Elevation of H60	1380	m.
ECA above H60	154.8	ha.
ECA below H60	98.6	ha.
Road length above H60	7766	m.
Road length below H60	9844	m.
Length of road on erodable soils	1700	m.
Length of road within 100 m. of stream	7909	m.
Length of road on erodable soils within 100 m. of stream	381.4	m.
Number of active stream crossings	24	
Total stream length	48206	m.
Length of stream logged	4901	m.
Total length of fish bearing streams	0	m.
Length of fish bearing streams logged	0	m.
Number of landslides	16	
Length of road on unstable slopes	61	m.
Length of stream with logged banks and on slopes > 60	259	m.

		Indicator		Score	Hazard Index
Peak Flow					
	Index above H60	0.08			
	Index below H60	0.04			
1	Total Peak Flow Index	0.12		0.20	
2	Road density above H60	0.28	km/sq.km.	0.28	
3	Total road density	0.64	km/sq.km.	0.21	0.23
Surface Erosion					
4	Roads on erodable soils	0.06	km/sq.km.	0.12	
5	Roads within 100 m of a stream	0.29	km/sq.km.	0.67	
6	Roads that are both of the above	0.01	km/sq.km.	0.07	
7	Active stream crossings	0.87	no./sq.km.	0.97	
8	Total road density	0.64	km/sq.km.	0.21	0.82
Riparian Buffer					
9	Portion of stream logged?	0.10	km/km.	0.34	
10	Portion of fish streams logged?	0.00	km/km.	0.00	0.34
Landslides					
11	Landslide density	0.58	no./sq.km.	1.00	
12	Roads on unstable slopes	0.00	km/sq.km.	0.01	
13	Streams >60% and banks logged	0.01	km/sq.km.	0.03	1.00

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Gorge Creek			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	4143.7	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	492.2	ha.	*	
ECA below H60?	350.1	ha.	*	
Road length above H60?	15105.9	m.	*	
Road length below H60?	24368	m.	*	
Surface Erosion				
Length of road on erodable soils?	2238.1	m.	*	
Length of road within 100 m. of stream?	8560	m.	*	
Length of road on erodable soils within 100 m. of stream?	777.9	m.	*	
Number of active stream crossings?	21		*	
Riparian Buffer				
Total stream length?	57423.8	m.	*	
Length of stream logged?	4432	m.	*	
Total length of fish bearing streams?	0	m.	*	
Length of fish bearing streams logged?	0	m.	*	
Landslides				
Number of landslides?	16		*	
Length of road on unstable slopes?	1454	m.	*	
Length of stream with logged banks and on slopes > 60%	1001	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	100			
Percent area of private land?	0			
Percent area with unstable slopes?	5			
Percent area with erodable soils?	3.2			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	NO			

Notes:
(2) Enter data in units shown in this column.
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(4) "err" message in this column indicates an inconsistency in the data.

All cells except B6..B44 are protected.

Summary of Level 1Scores in the file IWAP102.XLS

Gorge Creek		
Watershed area	4144	ha.
Elevation of H60	1280	m.
ECA above H60	492.2	ha.
ECA below H60	350.1	ha.
Road length above H60	15106	m.
Road length below H60	24368	m.
Length of road on erodable soils	2238	m.
Length of road within 100 m. of stream	8560	m.
Length of road on erodable soils within 100 m. of stream	777.9	m.
Number of active stream crossings	21	
Total stream length	57424	m.
Length of stream logged	4432	m.
Total length of fish bearing streams	0	m.
Length of fish bearing streams logged	0	m.
Number of landslides	16	
Length of road on unstable slopes	1454	m.
Length of stream with logged banks and on slopes > 60	1001	m.

		Indicator		Score	Hazard Index
Peak Flow					
	Index above H60	0.18			
	Index below H60	0.08			
1	Total Peak Flow Index	0.26		0.44	
2	Road density above H60	0.36	km/sq.km.	0.36	
3	Total road density	0.95	km/sq.km.	0.32	0.44
Surface Erosion					
4	Roads on erodable soils	0.05	km/sq.km.	0.11	
5	Roads within 100 m of a stream	0.21	km/sq.km.	0.51	
6	Roads that are both of the above	0.02	km/sq.km.	0.09	
7	Active stream crossings	0.51	no./sq.km.	0.61	
8	Total road density	0.95	km/sq.km.	0.32	0.56
Riparian Buffer					
9	Portion of stream logged?	0.08	km/km.	0.26	
10	Portion of fish streams logged?	0.00	km/km.	0.00	0.26
Landslides					
11	Landslide density	0.39	no./sq.km.	0.98	
12	Roads on unstable slopes	0.04	km/sq.km.	0.12	
13	Streams >60% and banks logged	0.02	km/sq.km.	0.08	0.98

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Legerwood Creek			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	1093.9	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	146.4	ha.	*	
ECA below H60?	58.4	ha.	*	
Road length above H60?	6357.7	m.	*	
Road length below H60?	4737.3	m.	*	
Surface Erosion				
Length of road on erodable soils?	0	m.	*	
Length of road within 100 m. of stream?	2356.4	m.	*	
Length of road on erodable soils within 100 m. of stream?	0	m.	*	
Number of active stream crossings?	6		*	
Riparian Buffer				
Total stream length?	13100	m.	*	
Length of stream logged?	636	m.	*	
Total length of fish bearing streams?	0	m.	*	
Length of fish bearing streams logged?	0	m.	*	
Landslides				
Number of landslides?	3		*	
Length of road on unstable slopes?	198	m.	*	
Length of stream with logged banks and on slopes > 60%	234	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	97.1			
Percent area of private land?	2.8			
Percent area with unstable slopes?	2.4			
Percent area with erodable soils?	0			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

Notes:
(2) Enter data in units shown in this column.
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All cells except B6..B44 are protected.

Summary of Level 1Scores in the file IWAP102.XLS

Legerwood Creek					
Watershed area	1094	ha.			
				Indicator	Score	Hazard Index
			Peak Flow			
Elevation of H60	1280	m.	Index above H60	0.20		
ECA above H60	146.4	ha.	Index below H60	0.05		
ECA below H60	58.4	ha.	1 Total Peak Flow Index	0.25	0.42	
Road length above H60	6358	m.	2 Road density above H60	0.58 km/sq.km.	0.58	
Road length below H60	4737	m.	3 Total road density	1.01 km/sq.km.	0.34	0.45
			Surface Erosion			
Length of road on erodable soils	0	m.	4 Roads on erodable soils	0.00 km/sq.km.	0.00	
Length of road within 100 m. of stream	2356	m.	5 Roads within 100 m of a stream	0.22 km/sq.km.	0.53	
Length of road on erodable soils within 100 m. of stream	0	m.	6 Roads that are both of the above	0.00 km/sq.km.	0.00	
Number of active stream crossings	6		7 Active stream crossings	0.55 no./sq.km.	0.65	
			8 Total road density	1.01 km/sq.km.	0.34	0.59
Total stream length	13100	m.	**Riparian Buffer**			
Length of stream logged	636	m.				
Total length of fish bearing streams	0	m.	9 Portion of stream logged?	0.05 km/km.	0.16	
Length of fish bearing streams logged	0	m.	10 Portion of fish streams logged?	0.00 km/km.	0.00	0.16
			Landslides			
Number of landslides	3		11 Landslide density	0.27 no./sq.km.	0.79	
Length of road on unstable slopes	198	m.	12 Roads on unstable slopes	0.02 km/sq.km.	0.06	
Length of stream with logged banks and on slopes > 60	234	m.	13 Streams >60% and banks logged	0.02 km/sq.km.	0.07	0.79

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Loftus Creek			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	1909.2	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	396.3	ha.	*	
ECA below H60?	92.6	ha.	*	
Road length above H60?	14431	m.	*	
Road length below H60?	11932	m.	*	
Surface Erosion				
Length of road on erodable soils?	0	m.	*	
Length of road within 100 m. of stream?	5298	m.	*	
Length of road on erodable soils within 100 m. of stream?	0	m.	*	
Number of active stream crossings?	17		*	
Riparian Buffer				
Total stream length?	27959	m.	*	
Length of stream logged?	410	m.	*	
Total length of fish bearing streams?	0	m.	*	
Length of fish bearing streams logged?	0	m.	*	
Landslides				
Number of landslides?	1		*	
Length of road on unstable slopes?	516	m.	*	
Length of stream with logged banks and on slopes > 60%	131	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	98.2			
Percent area of private land?	1.7			
Percent area with unstable slopes?	2.5			
Percent area with erodable soils?	0.9			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

Notes:
(2) Enter data in units shown in this column.
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(4) "err" message in this column indicates an inconsistency in the data.

All cells except B6..B44 are protected.

Summary of Level 1Scores in the file IWAP102.XLS

Loftus Creek Watershed area	1909	ha.
Elevation of H60	1280	m.
ECA above H60	396.3	ha.
ECA below H60	92.6	ha.
Road length above H60	14431	m.
Road length below H60	11932	m.
Length of road on erodable soils	0	m.
Length of road within 100 m. of stream	5298	m.
Length of road on erodable soils within 100 m. of stream	0	m.
Number of active stream crossings	17	
Total stream length	27959	m.
Length of stream logged	410	m.
Total length of fish bearing streams	0	m.
Length of fish bearing streams logged	0	m.
Number of landslides	1	
Length of road on unstable slopes	516	m.
Length of stream with logged banks and on slopes > 60	131	m.

		Indicator		Score	Hazard Index
Peak Flow					
	Index above H60	0.31			
	Index below H60	0.05			
1	Total Peak Flow Index	0.36		0.60	
2	Road density above H60	0.76	km/sq.km.	0.76	
3	Total road density	1.38	km/sq.km.	0.46	0.61
Surface Erosion					
4	Roads on erodable soils	0.00	km/sq.km.	0.00	
5	Roads within 100 m of a stream	0.28	km/sq.km.	0.65	
6	Roads that are both of the above	0.00	km/sq.km.	0.00	
7	Active stream crossings	0.89	no./sq.km.	0.99	
8	Total road density	1.38	km/sq.km.	0.46	0.82
Riparian Buffer					
9	Portion of stream logged?	0.01	km/km.	0.05	
10	Portion of fish streams logged?	0.00	km/km.	0.00	0.05
Landslides					
11	Landslide density	0.05	no./sq.km.	0.26	
12	Roads on unstable slopes	0.03	km/sq.km.	0.09	
13	Streams >60% and banks logged	0.01	km/sq.km.	0.02	0.26

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Perry River North			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	17119.2	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	225.5	ha.	*	
ECA below H60?	741.5	ha.	*	
Road length above H60?	2549	m.	*	
Road length below H60?	46777.5	m.	*	
Surface Erosion				
Length of road on erodable soils?	1065.7	m.	*	
Length of road within 100 m. of stream?	22299.1	m.	*	
Length of road on erodable soils within 100 m. of stream?	225.5	m.	*	
Number of active stream crossings?	71		*	
Riparian Buffer				
Total stream length?	405468	m.	*	
Length of stream logged?	15723	m.	*	
Total length of fish bearing streams?	0	m.	*	
Length of fish bearing streams logged?	0	m.	*	
Landslides				
Number of landslides?	9		*	
Length of road on unstable slopes?	0	m.	*	
Length of stream with logged banks and on slopes > 60%	3939	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	100			
Percent area of private land?	0			
Percent area with unstable slopes?	1.2			
Percent area with erodable soils?	2.8			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

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.

Summary of Level 1Scores in the file IWAP102.XLS

Perry River North Watershed area	17119	ha.
Elevation of H60	1280	m.
ECA above H60	225.5	ha.
ECA below H60	741.5	ha.
Road length above H60	2549	m.
Road length below H60	46778	m.
Length of road on erodable soils	1066	m.
Length of road within 100 m. of stream	22299	m.
Length of road on erodable soils within 100 m. of stream	225.5	m.
Number of active stream crossings	71	
Total stream length	4E+05	m.
Length of stream logged	15723	m.
Total length of fish bearing streams	0	m.
Length of fish bearing streams logged	0	m.
Number of landslides	9	
Length of road on unstable slopes	0	m.
Length of stream with logged banks and on slopes > 60	3939	m.

		Indicator		Score	Hazard Index
Peak Flow					
	Index above H60	0.02			
	Index below H60	0.04			
1	Total Peak Flow Index	0.06		0.11	
2	Road density above H60	0.01	km/sq.km.	0.01	
3	Total road density	0.29	km/sq.km.	0.10	0.11
Surface Erosion					
4	Roads on erodable soils	0.01	km/sq.km.	0.01	
5	Roads within 100 m of a stream	0.13	km/sq.km.	0.33	
6	Roads that are both of the above	0.00	km/sq.km.	0.01	
7	Active stream crossings	0.41	no./sq.km.	0.51	
8	Total road density	0.29	km/sq.km.	0.10	0.42
Riparian Buffer					
9	Portion of stream logged?	0.04	km/km.	0.13	
10	Portion of fish streams logged?	0.00	km/km.	0.00	0.13
Landslides					
11	Landslide density	0.05	no./sq.km.	0.26	
12	Roads on unstable slopes	0.00	km/sq.km.	0.00	
13	Streams >60% and banks logged	0.02	km/sq.km.	0.08	0.26

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Perry River South			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	14153.3	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	1191.7	ha.	*	
ECA below H60?	1719.9	ha.	*	
Road length above H60?	42504.5	m.	*	
Road length below H60?	149472.4	m.	*	
Surface Erosion				
Length of road on erodable soils?	7131.6	m.	*	
Length of road within 100 m. of stream?	46198.9	m.	*	
Length of road on erodable soils within 100 m. of stream?	1141.9	m.	*	
Number of active stream crossings?	105		*	
Riparian Buffer				
Total stream length?	196050	m.	*	
Length of stream logged?	56432	m.	*	
Total length of fish bearing streams?	18240	m.	*	
Length of fish bearing streams logged?	5388	m.	*	
Landslides				
Number of landslides?	17		*	
Length of road on unstable slopes?	0	m.	*	
Length of stream with logged banks and on slopes > 60%	783	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	99.4			
Percent area of private land?	0.6			
Percent area with unstable slopes?	2.3			
Percent area with erodable soils?	3.2			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

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.

Summary of Level 1Scores in the file IWAP102.XLS

Perry River South Watershed area	14153	ha.
Elevation of H60	1280	m.
ECA above H60	1192	ha.
ECA below H60	1720	ha.
Road length above H60	42505	m.
Road length below H60	1E+05	m.
Length of road on erodable soils	7132	m.
Length of road within 100 m. of stream	46199	m.
Length of road on erodable soils within 100 m. of stream	1142	m.
Number of active stream crossings	105	
Total stream length	2E+05	m.
Length of stream logged	56432	m.
Total length of fish bearing streams	18240	m.
Length of fish bearing streams logged	5388	m.
Number of landslides	17	
Length of road on unstable slopes	0	m.
Length of stream with logged banks and on slopes > 60	783	m.

OK

		Indicator		Score	Hazard Index
Peak Flow					
	Index above H60	0.13			
	Index below H60	0.12			
1	Total Peak Flow Index	0.25		0.41	
2	Road density above H60	0.30	km/sq.km.	0.30	
3	Total road density	1.36	km/sq.km.	0.45	0.41
Surface Erosion					
4	Roads on erodable soils	0.05	km/sq.km.	0.10	
5	Roads within 100 m of a stream	0.33	km/sq.km.	0.75	
6	Roads that are both of the above	0.01	km/sq.km.	0.04	
7	Active stream crossings	0.74	no./sq.km.	0.84	
8	Total road density	1.36	km/sq.km.	0.45	0.80
Riparian Buffer					
9	Portion of stream logged?	0.29	km/km.	0.96	
10	Portion of fish streams logged?	0.30	km/km.	0.59	0.96
Landslides					
11	Landslide density	0.12	no./sq.km.	0.53	
12	Roads on unstable slopes	0.00	km/sq.km.	0.00	
13	Streams >60% and banks logged	0.01	km/sq.km.	0.02	0.53

Data Entry Sheet - IWAP Version 1.02 - October 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?	South Victor Creek			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	2466.2	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	217.8	ha.	*	
ECA below H60?	71.1	ha.	*	
Road length above H60?	8276.4	m.	*	
Road length below H60?	7316.2	m.	*	
Surface Erosion				
Length of road on erodable soils?	0	m.	*	
Length of road within 100 m. of stream?	6800.9	m.	*	
Length of road on erodable soils within 100 m. of stream?	0	m.	*	
Number of active stream crossings?	18		*	
Riparian Buffer				
Total stream length?	47711	m.	*	
Length of stream logged?	2556	m.	*	
Total length of fish bearing streams?	0	m.	*	
Length of fish bearing streams logged?	0	m.	*	
Landslides				
Number of landslides?	5		*	
Length of road on unstable slopes?	0	m.	*	
Length of stream with logged banks and on slopes > 60%	236	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	100			
Percent area of private land?	0			
Percent area with unstable slopes?	7.4			
Percent area with erodable soils?	6.2			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

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.

Summary of Level 1Scores in the file IWAP102.XLS

South Victor Creek Watershed area	2466	ha.
Elevation of H60	1280	m.
ECA above H60	217.8	ha.
ECA below H60	71.1	ha.
Road length above H60	8276	m.
Road length below H60	7316	m.
Length of road on erodable soils	0	m.
Length of road within 100 m. of stream	6801	m.
Length of road on erodable soils within 100 m. of stream	0	m.
Number of active stream crossings	18	
Total stream length	47711	m.
Length of stream logged	2556	m.
Total length of fish bearing streams	0	m.
Length of fish bearing streams logged	0	m.
Number of landslides	5	
Length of road on unstable slopes	0	m.
Length of stream with logged banks and on slopes > 60	236	m.

		Indicator		Score	Hazard Index
Peak Flow					
	Index above H60	0.13			
	Index below H60	0.03			
1	Total Peak Flow Index	0.16		0.27	
2	Road density above H60	0.34	km/sq.km.	0.34	
3	Total road density	0.63	km/sq.km.	0.21	0.27
Surface Erosion					
4	Roads on erodable soils	0.00	km/sq.km.	0.00	
5	Roads within 100 m of a stream	0.28	km/sq.km.	0.65	
6	Roads that are both of the above	0.00	km/sq.km.	0.00	
7	Active stream crossings	0.73	no./sq.km.	0.83	
8	Total road density	0.63	km/sq.km.	0.21	0.74
Riparian Buffer					
9	Portion of stream logged?	0.05	km/km.	0.18	
10	Portion of fish streams logged?	0.00	km/km.	0.00	0.18
Landslides					
11	Landslide density	0.20	no./sq.km.	0.67	
12	Roads on unstable slopes	0.00	km/sq.km.	0.00	
13	Streams >60% and banks logged	0.01	km/sq.km.	0.03	0.67

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Three Valley Gap			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	5623.5	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	261.3	ha.	*	
ECA below H60?	95.5	ha.	*	
Road length above H60?	7987.2	m.	*	
Road length below H60?	14974	m.	*	
Surface Erosion				
Length of road on erodable soils?	0	m.	*	
Length of road within 100 m. of stream?	6994	m.	*	
Length of road on erodable soils within 100 m. of stream?	0	m.	*	
Number of active stream crossings?	35		*	
Riparian Buffer				
Total stream length?	99075	m.	*	
Length of stream logged?	2125	m.	*	
Total length of fish bearing streams?	6331	m.	*	
Length of fish bearing streams logged?	0	m.	*	
Landslides				
Number of landslides?	10		*	
Length of road on unstable slopes?	1782	m.	*	
Length of stream with logged banks and on slopes > 60%	88	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	98.1			
Percent area of private land?	1.9			
Percent area with unstable slopes?	12.5			
Percent area with erodable soils?	3.7			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

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.

Summary of Level 1Scores in the file IWAP102.XLS

Three Valley Gap Watershed area	5624	ha.
Elevation of H60	1280	m.
ECA above H60	261.3	ha.
ECA below H60	95.5	ha.
Road length above H60	7987	m.
Road length below H60	14974	m.
Length of road on erodable soils	0	m.
Length of road within 100 m. of stream	6994	m.
Length of road on erodable soils within 100 m. of stream	0	m.
Number of active stream crossings	35	
Total stream length	99075	m.
Length of stream logged	2125	m.
Total length of fish bearing streams	6331	m.
Length of fish bearing streams logged	0	m.
Number of landslides	10	
Length of road on unstable slopes	1782	m.
Length of stream with logged banks and on slopes > 60	88	m.

OK

		Indicator		Score	Hazard Index
Peak Flow					
	Index above H60	0.07			
	Index below H60	0.02			
1	Total Peak Flow Index	0.09		0.14	
2	Road density above H60	0.14	km/sq.km.	0.14	
3	Total road density	0.41	km/sq.km.	0.14	0.14
Surface Erosion					
4	Roads on erodable soils	0.00	km/sq.km.	0.00	
5	Roads within 100 m of a stream	0.12	km/sq.km.	0.31	
6	Roads that are both of the above	0.00	km/sq.km.	0.00	
7	Active stream crossings	0.62	no./sq.km.	0.72	
8	Total road density	0.41	km/sq.km.	0.14	0.52
Riparian Buffer					
9	Portion of stream logged?	0.02	km/km.	0.07	
10	Portion of fish streams logged?	0.00	km/km.	0.00	0.07
Landslides					
11	Landslide density	0.18	no./sq.km.	0.63	
12	Roads on unstable slopes	0.03	km/sq.km.	0.11	
13	Streams >60% and banks logged	0.00	km/sq.km.	0.01	0.63

Data Entry Sheet - IWAP Version 1.02 - October 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?	Wap Creek			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	3122.8	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	366.9	ha.	*	
ECA below H60?	148.8	ha.	*	
Road length above H60?	18202	m.	*	
Road length below H60?	17659	m.	*	
Surface Erosion				
Length of road on erodable soils?	324.7	m.	*	
Length of road within 100 m. of stream?	9390	m.	*	
Length of road on erodable soils within 100 m. of stream?	0	m.	*	
Number of active stream crossings?	18		*	
Riparian Buffer				
Total stream length?	37515	m.	*	
Length of stream logged?	5763	m.	*	
Total length of fish bearing streams?	2796	m.	*	
Length of fish bearing streams logged?	0	m.	*	
Landslides				
Number of landslides?	2		*	
Length of road on unstable slopes?	198	m.	*	
Length of stream with logged banks and on slopes > 60%	0	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	99.3			
Percent area of private land?	0.7			
Percent area with unstable slopes?	3			
Percent area with erodable soils?	1.6			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

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.

Summary of Level 1Scores in the file IWAP102.XLS

Wap Creek		
Watershed area	3123	ha.
Elevation of H60	1280	m.
ECA above H60	366.9	ha.
ECA below H60	148.8	ha.
Road length above H60	18202	m.
Road length below H60	17659	m.
Length of road on erodable soils	324.7	m.
Length of road within 100 m. of stream	9390	m.
Length of road on erodable soils within 100 m. of stream	0	m.
Number of active stream crossings	18	
Total stream length	37515	m.
Length of stream logged	5763	m.
Total length of fish bearing streams	2796	m.
Length of fish bearing streams logged	0	m.
Number of landslides	2	
Length of road on unstable slopes	198	m.
Length of stream with logged banks and on slopes > 60	0	m.

		Indicator		Score	Hazard Index
Peak Flow					
	Index above H60	0.18			
	Index below H60	0.05			
1	Total Peak Flow Index	0.22		0.37	
2	Road density above H60	0.58	km/sq.km.	0.58	
3	Total road density	1.15	km/sq.km.	0.38	0.45
Surface Erosion					
4	Roads on erodable soils	0.01	km/sq.km.	0.02	
5	Roads within 100 m of a stream	0.30	km/sq.km.	0.70	
6	Roads that are both of the above	0.00	km/sq.km.	0.00	
7	Active stream crossings	0.58	no./sq.km.	0.68	
8	Total road density	1.15	km/sq.km.	0.38	0.69
Riparian Buffer					
9	Portion of stream logged?	0.15	km/km.	0.51	
10	Portion of fish streams logged?	0.00	km/km.	0.00	0.51
Landslides					
11	Landslide density	0.06	no./sq.km.	0.32	
12	Roads on unstable slopes	0.01	km/sq.km.	0.02	
13	Streams >60% and banks logged	0.00	km/sq.km.	0.00	0.32

OK

Data Entry Sheet - IWAP Version 1.02 - October 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?	Yard Creek			
Map units are in: (1=km. and sq.km.; 2=m. and ha.)	2			
Watershed area?	12471	ha.	*	
Peak Flow and Surface Erosion				
Elevation of H60?	1280	m.		
ECA above H60?	2288.3	ha.	*	
ECA below H60?	198	ha.	*	
Road length above H60?	93965.3	m.	*	
Road length below H60?	31641.4	m.	*	
Surface Erosion				
Length of road on erodable soils?	441.6	m.	*	
Length of road within 100 m. of stream?	22601.7	m.	*	
Length of road on erodable soils within 100 m. of stream?	433	m.	*	
Number of active stream crossings?	49		*	
Riparian Buffer				
Total stream length?	124547	m.	*	
Length of stream logged?	9233	m.	*	
Total length of fish bearing streams?	1432	m.	*	
Length of fish bearing streams logged?	0	m.	*	
Landslides				
Number of landslides?	27		*	
Length of road on unstable slopes?	4233	m.	*	
Length of stream with logged banks and on slopes > 60%	597	m.	*	
Other Land Use and Watershed Characteristics				
Is there range use next to streams?	No			
Is there mining close to streams?	No			
Is there ATV use close to streams?	No			
Hydrologic zone?	Shuswap Highlands			
Percent area of crown land?	100			
Percent area of private land?	0			
Percent area with unstable slopes?	2.2			
Percent area with erodable soils?	1			
Dominant bedrock geology?	Unknown			
Is there a fisheries (DFO or MoE) thermal concern?	No			

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.

Summary of Level 1Scores in the file IWAP102.XLS

Yard Creek Watershed area	12471	ha.
Elevation of H60	1280	m.
ECA above H60	2288	ha.
ECA below H60	198	ha.
Road length above H60	93965	m.
Road length below H60	31641	m.
Length of road on erodable soils	441.6	m.
Length of road within 100 m. of stream	22602	m.
Length of road on erodable soils within 100 m. of stream	433	m.
Number of active stream crossings	49	
Total stream length	1E+05	m.
Length of stream logged	9233	m.
Total length of fish bearing streams	1432	m.
Length of fish bearing streams logged	0	m.
Number of landslides	27	
Length of road on unstable slopes	4233	m.
Length of stream with logged banks and on slopes > 60	597	m.

		Indicator		Score	Hazard Index
Peak Flow					
	Index above H60	0.28			
	Index below H60	0.02			
1	Total Peak Flow Index	0.29		0.49	
2	Road density above H60	0.75	km/sq.km.	0.75	
3	Total road density	1.01	km/sq.km.	0.34	0.52
Surface Erosion					
4	Roads on erodable soils	0.00	km/sq.km.	0.01	
5	Roads within 100 m of a stream	0.18	km/sq.km.	0.45	
6	Roads that are both of the above	0.00	km/sq.km.	0.02	
7	Active stream crossings	0.39	no./sq.km.	0.49	
8	Total road density	1.01	km/sq.km.	0.34	0.47
Riparian Buffer					
9	Portion of stream logged?	0.07	km/km.	0.25	
10	Portion of fish streams logged?	0.00	km/km.	0.00	0.25
Landslides					
11	Landslide density	0.22	no./sq.km.	0.69	
12	Roads on unstable slopes	0.03	km/sq.km.	0.11	
13	Streams >60% and banks logged	0.00	km/sq.km.	0.02	0.69

OK

APPENDIX II

Interpretations and Recommendation Values Anstey and Eagle River Watersheds Level I IWAP Spring 1997

Interaction		Recommended Assessments	
1 PF/CI	Peak flow/Channel instability	SSS	Perform a Sediment Source Survey
2 PF/SE	Peak flow/Surface erosion	Slope stability	Site Assessment on potentially unstable slopes
3 PF/MW	Peak flow/Mass wasting	Terrain Mapping	Perform Terrain Stability Mapping at 1:20,000 Scale
4 MW/CI	Mass wasting/Channel instability		
5 RB/CI	Riparian Buffer/Channel instability		

Note: Only ten watersheds were identified to have disturbance levels (CAP, 1997). Therefore, only ten watersheds have channel instability information.

W/S No.	Watershed Name	ha.	Interaction	Interaction Matrices Hazard Category 1st Interaction	Hazard Category 2nd Interaction	Values	Rec. Assessments/ Comments
1	Anstey Arm	1766.9	1 PF/CI				
			2 PF/SE	Low	Low	1	
			3 PF/MW	Low	Low	1	
			4 MW/CI				
			5 RB/CI				
2	Anstey River	23471	1 PF/CI				
			2 PF/SE	Low	Medium	2	SSS
			3 PF/MW	Low	Low	1	
			4 MW/CI				
			5 RB/CI				
3	Bews Creek	12448	1 PF/CI				
			2 PF/SE	Low	Low	1	
			3 PF/MW	Low	Low	1	
			4 MW/CI				
			5 RB/CI				
4	Crazy Creek	11366	1 PF/CI	Low	Medium	1	
			2 PF/SE	Low	Medium	2	SSS
			3 PF/MW	Low	Medium	2	SSS, slope stability
			4 MW/CI	Medium	Medium	2	CAP, terrain mapping
			5 RB/CI	Low	Medium	1	
5	Eagle River East	12372	1 PF/CI				
			2 PF/SE	Low	Low	1	
			3 PF/MW	Low	Low	1	
			4 MW/CI				
			5 RB/CI				
6	Eagle River West	14946	1 PF/CI				
			2 PF/SE	Low	High	2	SSS
			3 PF/MW	Low	Low	1	
			4 MW/CI				
			5 RB/CI				

W/S	Sub-basin	ha.	Interaction	Interaction Matrices		Values	Rec. Assessments/ Comments
				Hazard Category 1st Interaction	Hazard Category 2nd Interaction		
7	Four Mile Creek	2756.4	1 PF/CI	Low	Low	1	
			2 PF/SE	Low	High	2	SSS
			3 PF/MW	Low	High	3	SSS, slope stability
			4 MW/CI	High	Low	3	
			5 RB/CI	Low	Low	1	
8	Gorge Creek	4143.7	1 PF/CI	Medium	Medium	2	
			2 PF/SE	Medium	Medium	2	SSS
			3 PF/MW	Medium	Medium	3	terrain mapping
			4 MW/CI	Medium	Medium	2	CAP, terrain mapping
			5 RB/CI	Low	Medium	1	
9	Ledgerwood Creek	1093.9	1 PF/CI	Low	High	1	
			2 PF/SE	Low	Medium	2	SSS
			3 PF/MW	Low	High	3	terrain mapping
			4 MW/CI	High	High	4	CAP, terrain mapping
			5 RB/CI	Low	High	2	
10	Loftus Creek	1909.2	1 PF/CI	Medium	Medium	2	
			2 PF/SE	Medium	High	4	SSS
			3 PF/MW	Medium	Low	1	
			4 MW/CI	Low	Medium	1	
			5 RB/CI	Low	Medium	1	
11	Perry River North	17119	1 PF/CI				
			2 PF/SE	Low	Low	1	
			3 PF/MW	Low	Low	1	
			4 MW/CI				
			5 RB/CI				
12	Perry River South	14153	1 PF/CI	Low	Low	1	
			2 PF/SE	Low	High	2	SSS
			3 PF/MW	Low	Medium	2	SSS, slope stability
			4 MW/CI	Medium	Low	1	
			5 RB/CI	High	Low	3	CAP, terrain mapping / FHAP recommended
13	South Victor	2466.2	1 PF/CI	Low	Low	1	
			2 PF/SE	Low	High	2	SSS
			3 PF/MW	Low	Medium	2	SSS, slope stability
			4 MW/CI	Low	Medium	1	
			5 RB/CI	Low	Low	1	

W/S	Sub-basin	ha.	Interaction	Interaction Matrices		Values	Rec. Assessments/ Comments
				Hazard Category 1st Interaction	Hazard Category 2nd Interaction		
14	Three Valley	5623.5	1 PF/CI	Low	Low	1	
			2 PF/SE	Low	Medium	2	SSS
			3 PF/MW	Low	Medium	2	SSS, slope stability
			4 MW/CI	Medium	Low	1	
			5 RB/CI	Low	Low	1	
15	Wap Creek	3122.8	1 PF/CI	Low	Medium	1	
			2 PF/SE	Low	Medium	2	SSS
			3 PF/MW	Low	Low	1	
			4 MW/CI	Low	Medium	1	
			5 RB/CI	Medium	Medium	3	CAP, terrain mapping
16	Yard Creek	12471	1 PF/CI	Medium	Low	1	
			2 PF/SE	Medium	Low	1	
			3 PF/MW	Medium	Medium	3	terrain mapping
			4 MW/CI	Medium	Low	1	
			5 RB/CI	Low	Low	1	