





Huu-ay-aht First Nations

huu ay aht

ANCIENT SPIRIT, MODERN MIND

Sarita and Pachena Watershed Renewal:

Fish Habitat Assessment in the Sarita and Pachena River Watersheds, 2017

Prepared by

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Executive Summary

Fish habitat surveys were completed by Stefan Ochman with the help of Huu-ay-aht First Nations (HFN) technicians in the Sarita and Pachena rivers from August to October 2017. The objectives of this project were to carry out a salmon habitat assessment and to identify high priority and cost-effective rehabilitation treatments for the Sarita and Pachena River watersheds.

The detailed fish habitat assessment was completed on ~22 km (22,075 m) of Sarita River and ~11 km (10,960 m) of Pachena River watersheds. Habitat limitations appeared primarily in the percent of wood cover in pools, percent of riffles comprised of boulders, and percent overhead cover in pools for all reaches surveyed. Spawning habitat was also limiting in many reaches. The relatively poor gravel quality and, in some cases, poor percent pools ratings in both the Sarita and Pachena River watersheds suggest that the high sediment transport rates, as evidenced by high bank erosion rates and extensive areas with mid-channel gravel bars and sediment wedges in the tributaries and mainstems, have resulted in moderately to severely aggraded stream channels. As a consequence of high sediment loads and numerous channel avulsions, fine sediments have infilled spawning gravels reducing their quality for egg incubation, and coarse and fine sediments have infilled pools reducing total pool area. Also, fine and coarse sediments have infilled riffle habitats reducing the apparent percent boulder content and cover.

The historic riparian logging along most of the surveyed reaches of the Sarita and Pachena River watersheds has reduced LWD recruitment to the streams and therefore the amount of LWD cover in pools. As an interim and mitigative measure to compensate for the reduced cover in pools, construction of LWD structures was proposed for suitable pools sites within the tributaries.

Survival during early freshwater life stages is considered critical for the maintenance of Coho and Chinook populations, especially at the low marine survival rates currently occurring. Key habitats for early life stages of anadromous salmon, such as high quality summer rearing and overwintering habitats, are limited within the Sarita and Pachena rivers and their tributaries. Consequently, rehabilitation projects were proposed to provide high quality salmon rearing and overwintering habitat in these high priority watersheds. Recommended restoration works for the Sarita and Pachena River watersheds included:

- LWD structures were recommended in Frederick Creek of the Sarita River watershed (Reaches F13, F15 and F16), and for Pachena River (Reaches P2, P4, P6), Rousseau Creek (Reach R1), Shaky Bill's Creek (Reach S2), Tributary G (Reach G1), and Tributary F (Reach F1F); and
- Works were also proposed at two off-channel habitats in the lower Sarita River: 1) maintenance of the existing Thlaa-Thlaa-Chis (IR#1) groundwater channel on the left bank of the river; and 2) construction of a new side channel immediately downstream of the Blenheim Bridge (Gaboury 2018).

It was also recommended that regular monitoring, similar to the Routine Effectiveness Evaluation conducted in 2017, be repeated every five years to determine if constructed LWD and riffle structures, and off-channel habitats require maintenance.

In comparison to the Level 1 Fish Habitat Assessment (FHAP) for the Sarita River watershed conducted in 1997, the 2017 FHAP showed similar results for the eight habitat condition parameters. Both years had good habitat condition ratings for pool frequency, holding pools, and gravel quantity. Predominantly poor to fair habitat condition ratings were found in 1997 and 2017 for percent pools, percent boulder in riffles, and percent overhead cover suggesting that sediment loadings have not declined appreciably or historic sediment loads are still migrating through the stream channels. LWD density within the surveyed sections increased appreciably for Sarita River S1, South Sarita River SS30, Sabrina Creek SC34, SC35 and SC37 and Hunter Creek H50, but decreased for Sarita River S2, and Frederick Creek F13 and F14. Increased densities in Sabrina and Hunter creeks is likely due to LWD structures constructed in 1999-2001 that have persisted to the present day, as well as additional LWD that have migrated downstream and lodged onto the constructed structures.

In comparison to the FHAP for the Pachena River watershed conducted in 2001, the 2017 FHAP showed fairly similar results for the eight habitat condition parameters. Both years had good habitat condition ratings for pool frequency, holding pools, and gravel quantity. Predominantly poor to good habitat condition ratings were found in 2001 and 2017 for percent pools, percent boulder in riffles, and percent overhead cover suggesting that sediment loadings have not declined appreciably or historic sediment loads are still migrating through the stream channels. Gravel quality had declined slightly in 2017. LWD density within the surveyed sections decreased appreciably for all reaches except Pachena River P2. The decreased LWD density again suggests that LWD recruitment of large conifers from the riparian corridor to stream habitats has been impacted by historic riparian logging.

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1 Introduction

A Level 1 Fish Habitat Assessment (FHAP) of stream and riparian habitat conditions in the Sarita River (Figure 1) and Pachena River watersheds (Figure 2) was conducted in 2017. This report summarizes the findings of detailed habitat assessments in priority reaches. Specific suggestions to restore stream habitat in these reaches were also described.

Previous studies in the watersheds included an Overview Assessment of the Sarita River watershed in 1996 which prioritized reaches with important fish habitats for detailed field investigations (Bocking et al. 1997). The overview recommended that assessments be conducted for all anadromous fish-bearing sections of the stream network. A Level 1 Fish Habitat Assessment of the Sarita River watershed followed in 1997 (Ochman 1998).

A Coastal Watershed Assessment (CWAP) of the Sarita River watershed was also completed that described the general hydrologic condition of the watershed, identified impacts of past forest harvesting, and outlined priority areas of the watershed for Sediment Source Surveys and Fish Habitat Assessment surveys (Horel 1997). In addition, Ostapowich (1997) summarized the access management plan and sediment source assessment.

Through interviews with stakeholder and resource experts, Barry (2010) documented current views on the highest value and most limiting fish habitats in the Sarita River watershed (Table 1). Overall, those interviewed believed the poor condition of spawning, holding and rearing habitats in the mainstem rivers and creeks, and the paucity of suitable off-channel habitats were the main limiting factors to production of dominant salmonid species, including Steelhead.

A Level 1 Fish Habitat Assessment of the Pachena River watershed was conducted in 2001 (Morgan 2002). Selected reaches were assessed in Pachena River: Reaches P2, P6, and P7, Shaky Bill's Creek, Rousseau Creek and Tributaries F, G, H, and U. From these assessments, salmonid habitat condition in the Pachena River watershed was considered good for pool frequency and gravel quantity but poor for number of holding pools and percent boulder in riffles (Appendix 3). Diagnostic condition ratings ranged from poor to good for percent pools, percent wood in pools, percent overhead cover, gravel quality and off-channel habitat.

Between 1998 and 2009, approximately $1.5M was spent on projects to restore fish habitat and populations in the Sarita, Pachena, and Sugsaw watersheds (S. Ochman unpubl. data; Table 2). Restoration projects were focused on repairing or mitigating the habitat impacts caused by channel over-widening, loss of instream cover, bank instability and erosion, and degraded spawning, rearing and overwintering habitats. Between 1997 and 2001, restoration works in these watersheds followed from Overview, Level 1 and Level 2 fish habitat assessments conducted under the direction of the Huu-ay-aht First Nations (HFN) (Bocking et al. 1997; Ochman 1998; Ochman and Gaboury 1999; 2000; 2001; Gaboury 2000).

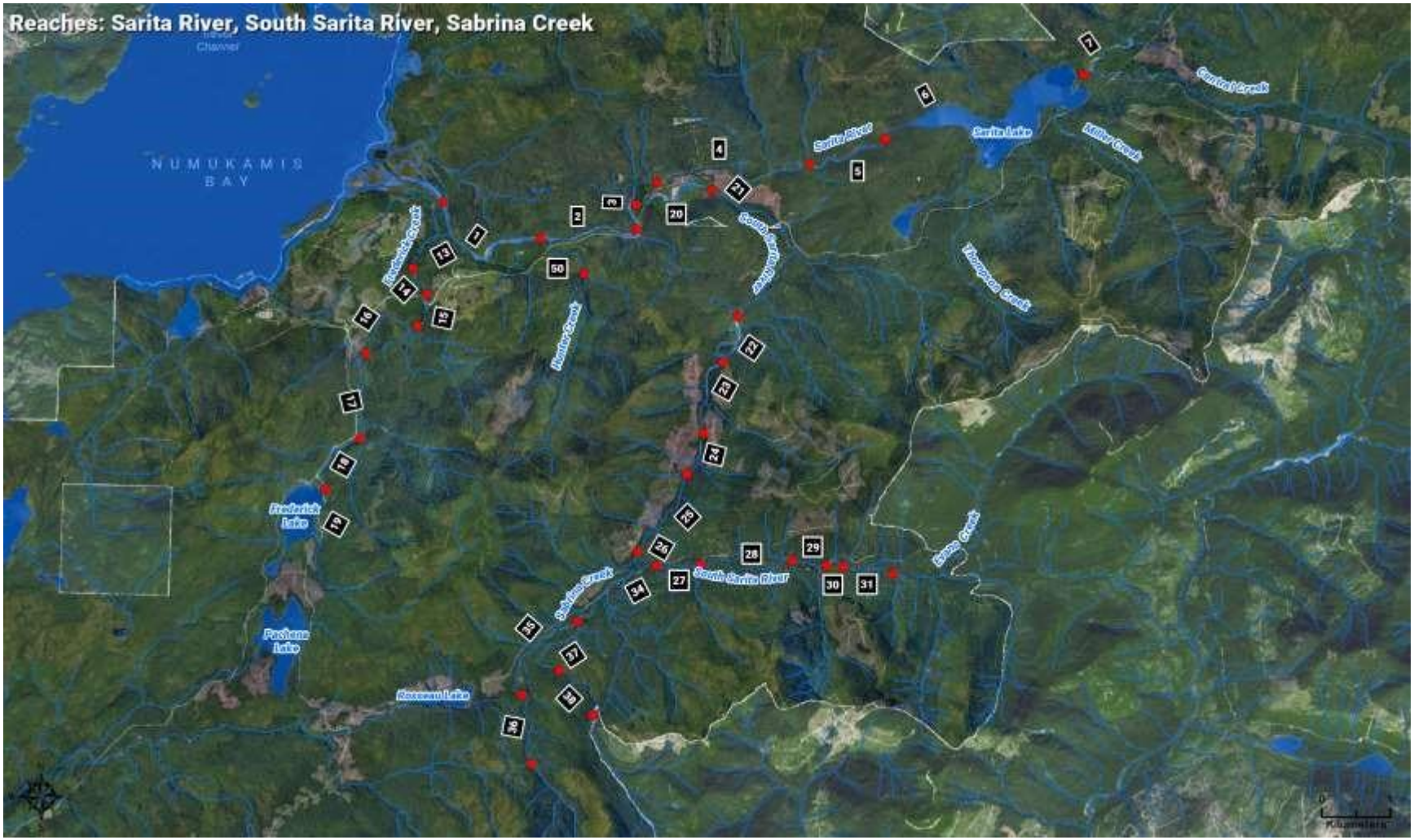


Figure 1. Map of the Sarita River watershed showing stream reach boundaries in the mainstem and tributaries.



Figure 2. Map of the Pachena River watershed showing stream reach boundaries in the mainstem and tributaries.

Table 1. Highest value and most limiting habitat conditions in the Sarita River watershed for the three dominant salmon species, as compiled by Barry (2010).

Species	Highest Value Habitats	Most Limiting Habitats
Chinook	• Sarita River has abundant gravel as potential spawning substrate but stability is a problem and it is compacted in many areas	• Lack of stable spawning habitat in Sarita River and Lower South Sarita River
	• A few deep pools in Sarita River for adult holding ("Deep Hole", "Cable Car", "Corner Pool", Blenheim Bridge, base of Sarita Falls)	• Deep pools for adult holding in Sarita River are lacking
	• Lower Sarita River has some good habitat (pools and spawning)	• Lack of summer rearing habitat for juveniles in both the estuary and in the Sarita River
Chum	• Lower Sarita River has some good habitat (pools and spawning). Marshy off-channel juvenile rearing habitat in Frederick Creek	• Lack of stable spawning habitat in South Sarita and Sarita rivers
	• Spawning habitat in the lower section of Hunter Creek	• Lack of rearing habitat in the estuary
	• Frederick Creek has high quality spawning and rearing habitat	
Coho	• Side channel rearing areas off Sarita and South Sarita rivers	• Lack of viable off-channel rearing areas during summer low flow conditions
	• Most of Frederick Creek provides high quality habitat for rearing & spawning. Marshy off-channel habitat at Frederick Creek for rearing	• Lack of juvenile overwintering habitat
	• Off-channel beaver pond/swamp overwintering habitat on Sarita River near of confluence with South Sarita River	• Lack of access to off-channel refuge areas, especially in lower South Sarita River
	• Sabrina Creek has several areas of good rearing habitat	

Table 2. Summary of fish habitat restoration works constructed in HFN watersheds (1998-2009).

Year	Location	Description
1998	Lower Sarita	To increase habitat complexity and create pools for Coho salmon fry, log cover structures were installed at two sites in the Sarita River.
	Sarita	Log cover structures were at one site at the confluence of the Sarita & South Sarita rivers.
	South Sarita	Construction of a 1,500 m^2 side channel in Reach SS20.
1999	Lower Sarita	To increase off-channel rearing habitat for Coho salmon fry in low flow conditions, a fishway was installed in 1999 to provide access to the beaver pond in Reach S3. Log structures were installed at six sites in Reach S3, and at four sites in Reach S4 to enhance habitat complexity and pools for rearing Coho fry.
	South Sarita	In 1999, large woody debris structures were installed at two sites in Reach SS20.
	Sabrina Creek	Four riffle structures and eight large woody debris structures were installed in Reach SC34.
		Two log jams were lowered and large woody debris structures were installed at 25 sites in Reach SC35.
2000	South Sarita	The side channel previously built in Reach SS20 was extended by 115 m to provide summer and winter off-channel habitat for Coho salmon fry and large woody debris was added.
		Five structures were constructed to protect an eroding bank in Reach SS20, and three structures previously built were repositioned and re-cabled.
		Large woody debris was added to nine sites in Reaches SS30-SS31.
	Sabrina Creek	Small woody debris was removed from a logjam in Reach SC35.
		Twenty new large woody debris structures were installed in Reach SC37.
	Hunter Creek	Large woody debris was placed at nine sites in Reach H50 to increase habitat complexity and provide cover for rearing juvenile Coho.
2001	South Sarita	Rip-rap armouring was added to the upstream corner of the berm in Reach SS20.
		Large woody debris was added to 10 sites in Reaches SS30-SS31.
	Sabrina Creek	Small woody debris was removed from a logjam in Reach SC35.
		Eighteen new large woody debris structures were placed in Reach SC34.
		Four new large woody debris structures were installed in Reach SC35.
		Small woody debris was removed from a logjam and six new large woody debris structures were installed in Reach SC37.
2004	Sugsaw	Installation of six riffles and spawning platforms, and 11 LWD structures in Reach 1.
2005	Pachena	Thirteen LWD structures were constructed in Rousseau Creek. De-built log jams in Rousseau Creek and backwatered falls impediment in Pachena River to provide fish passage.
2006	South Sarita	7,500 m^2 of new side channel (56 km) rearing habitat was created in Reach SS20 and a 3,420 m^2 pond.
	Sarita	Construction of the 6,550 m^2 I.R. 1 side channel.
2007	Sarita	Repairs to side channel on I.R 1.
2008	Sarita	Repairs to side channel on I.R 1.
2009	South Sarita	The Reach SS20 side channel and the protection berm were rehabilitated due to flooding damage.

2 Study Area

2.1 Fish Populations

The Sarita River watershed supports Coho (*Oncorhynchus kisutch*), Chinook (*O. tshawytscha*), Chum (*O. keta*), both summer and winter Steelhead (*O. mykiss*), Rainbow Trout (*O. mykiss*), Coastal Cutthroat Trout (*O. clarkii clarki*), and Dolly Varden Char (*Salvelinus malma*) (Ochman 1998). Pink (*O. gorbuscha*) and Sockeye (*O. nerka)* occur sporadically with escapements averaging ~50 and ~80 fish, respectively, in the period 2014-2017 (DFO 2018). Frederick Creek, a tributary to Sarita River, supports populations of Coho, Chum, Steelhead, Rainbow Trout, Cutthroat Trout, and Dolly Varden Char (Ochman 1998). Other fish include Prickly Sculpin (*Cottus asper*), Pacific Lamprey (*Lapetra tridentata*), and Three-spine Stickleback (*Gasterosteus aculeatus*) (Barry 2010).

During the spawning period, Chum are present in the lower reaches of the Sarita River while Coho occur in the upper reaches and smaller tributaries. Chum salmon are the most abundant species present in the Sarita River with runs of up to 75,000 fish and a mean annual escapement of approximately 20,000 fish. Recent Chum escapements from the Sarita River have averaged 11,420 fish (2014-2017) and 9,960 fish (2006-2017) (DFO 2018). Coho escapements in the Sarita River peaked at 1,500 between 1967 and 1975 and then declined to an average of 104 for the period 1983-1993. Recent Coho escapements from the Sarita River have averaged 890 fish (2014-2017) and 740 fish (2006-2017) (DFO 2018). In 2017, Coho escapements were estimated for Frederick Creek at 177 (McCulloch and Plate 2018).

Chinook are restricted to the Sarita River mainstem and lower reaches of the South Sarita River (Barry 2010). Chinook counts are highly variable with a maximum count of 750 fish from1953-1973, appearing to decline after 1974 to as low as 90 in 1984 but up to 1,200 returning in 1993. The number of Chinook in recent years has averaged 1,830 fish (2014-2017) and 1,450 fish (2006-2017) (DFO 2018). Higher Chinook escapements in recent years are attributed to the enhancement efforts of the Huu-ay-aht First Nations and Nitinat Hatchery. In fact, it was found that ~80-95% of the fish returning to spawn were from hatchery origin.

The Pachena River hosts Coho, Pink, Chum, Steelhead and resident Rainbow Trout, Cutthroat Trout, as well as Dolly Varden Char (Morgan 2002). In general, the watershed is known as a Coho watershed having many small tributaries for spawning and excellent mainstem rearing opportunities. Chum are present in the Pachena River mainstem (Reaches P1 to P4 and into Rousseau Creek - Reach R1) but do not appear to use the upper Pachena River much. Pinks have only been observed in small numbers in the lower part of Rousseau Creek - Reach R1 in late August and not during swims later in the fall. Upper portions of some tributaries such as Tributary F provide good Steelhead habitat and above the many barriers one will find Rainbow, Cutthroat and Dolly Varden populations. Pachena Lake hosts Cutthroat, Rainbow and Three-spine Stickleback, while Rousseau Lake is only known to host Cutthroat Trout and Three-spine Stickleback. Both Prickly and Coastrange (*Cottus aleuticus*) sculpins are present throughout the watershed. Pacific Lampreys have also been observed (Reaches U1, R1 and P4).

Historical Coho escapement estimates for the Pachena River ranged from 75 to 3,500 (Brown et al. 1979). In 2017, Coho escapement in the Pachena River was estimated at 899 (McCulloch and

Plate 2018). Supplementing this population estimate with Adaptive Resolution Imaging Sonar (ARIS) results from Rousseau Creek revised the Pachena River estimate to ~1,223 Coho (McCulloch and Plate 2018).

Sarita River Coho and Chinook, and Pachena River Coho are part of the West Vancouver Island stock group and are harvested in Northern British Columbia and West Vancouver Island troll and net fisheries, as well as ocean and river sport fisheries. Sarita and Pachena River Steelhead are taken incidentally in commercial fisheries.

2.2 Sarita River Watershed

Sarita River is located 12 km northeast of the village of Bamfield on the central west coast of Vancouver Island. Its drainage basin area is 189.72 km^2 with the majority of the watershed below the 800 m elevation. The Sarita River, Central Creek, Miller Creek, Thompson Creek and two unnamed tributaries comprise most of the flow entering Sarita Lake. From the lake, the Sarita River flows for 9 km before entering Numukamis Bay and the Trevor Channel in Barclay Sound. Approximately 1 km downstream from Sarita Lake, a series of three falls (8-15 m high), impede upstream fish migration.

Frederick Creek enters the Sarita River approximately 1 km from the river mouth. It drains Frederick Lake, located approximately 5.5 km upstream of the confluence. Frederick Creek is fish-bearing throughout its entire length including the lake.

Hunter Creek flows into the Sarita River approximately 4 km from the river mouth. This creek is approximately 3 km long with only the lower 700 m being fish-bearing. Horel (1997) noted that erosion and small torrents have occurred on the gullied slopes of Hunter Creek.

The South Sarita River enters the Sarita River approximately 5.5 km from the river mouth. The South Sarita River is comprised of three main sub-basins: Lower South Sarita (8.5 km), Upper South Sarita (including Evans Creek) and Sabrina Creek. The lower section of the South Sarita River is very wide, of low to moderate gradient (1.2% average) and fish-bearing throughout its length. The upper South Sarita River is moderately confined with large substrate for most of its length and fish-bearing for approximately 7 km to the confluence with Evans Creek. Evans Creek is relatively steep with gradients ranging from 4-7%, and is fish-bearing for only 1.4 km. Sabrina Creek consists of two branches. Both branches flow northeast before joining together and flowing 1.5 km to the South Sarita River. Sabrina Creek is moderately steep with gradients ranging between 1% and 3% and is fish-bearing at least up to the falls.

2.3 Pachena River Watershed

The Pachena River watershed is located on the southwest Coast of Vancouver Island, and enters the Pacific Ocean at Pachena Bay, site of the Huu-ay-aht Village of Anacla and approximately 4 km southwest of the town of Bamfield. The 4th order watershed lies in a west-southwest to east-northeast direction, and is 4,915 ha (49 km^2) in size. The highest point in the watershed occurs on the southern headwaters of the Rousseau Basin at an elevation of 840 m. This area is the only part of the watershed to exhibit unstable and potentially unstable terrain (apart from a small area in the headwaters of Tributary F). Of the total watershed area, 76% (3,735 ha) lies below 300 m

in elevation, and 24% lies within the 300-800 m range. Less than 0.5% of the watershed area is above an elevation greater than 800 m. Most of the watershed has a low to moderate gradient (1.2% average) and is fish-bearing throughout its length.

Three lakes are present in the Pachena River watershed. Pachena Lake is the largest and is located 8.8 km from the mouth of the Pachena River. Rousseau Lake is the second largest and is located approximately 10.6 km from the mouth of the Pachena River. Calamity Lake is the smallest and is located 3 km from the mouth of the Pachena River.

The Pachena River bifurcates into Reach P3 to the north and Reach P4 to the south of the floodplain. Reaches P3 and P4 are quite inaccessible on foot due to dense and bushy vegetation. Further upstream, Reaches P3 and P4 rejoin where Tributary T1 outlets to the Pachena River at Reach P5. Rousseau Creek enters the Pachena River near the downstream end of Reach P5, located ~5.6 km upstream of the Pachena River mouth. Reach P5 extends approximately 200 m upstream to and under a giant 3 m diameter and 20 m long cross-channel cedar with rootwad (Photo 30), after which Reach P5 becomes a 10-20 wide channel within a broad wetland for approximately 250 m. Reaches P6, P7 and F1F are more confined and have a steeper gradient with large substrate and bedrock in the upstream sections.

Additional descriptions of the Sarita and Pachena River watersheds including climate, hydrology, geology and logging history can be obtained in the report 'Sarita and Pachena Watershed Renewal Framework' prepared by LGL Limited (2017).

3 Level 1 Assessment Methodology

The Level 1 surveys were conducted on foot and involved a crew of two or three people. Detailed fish-habitat surveys involved complete sampling of all habitat units within each reach, including photo documentation. Left and right river banks were determined facing downstream. Within each habitat type (pool, riffle, glide, cascade), physical attributes were measured and recorded according to methodologies and procedures either described or referenced in Watershed Restoration Technical Circular No. 8 (Johnston and Slaney 1996). We modified those reported methodologies and procedures as described below. Fish habitat field assessments were conducted from August to October 2017. Information was collected, recorded and analyzed for the following biophysical parameters:

3.1 Stream Habitat Condition

The characteristics and condition of the existing fish habitat were described by the following attributes:

- classification of habitat types – riffle, pool, glide, cascade, and other,
- potential fish migration barriers,
- percent pools, residual pool depth, quality and quantity of adult holding pools,
- type and effectiveness of cover for juvenile summer rearing and adult escape cover during spawning,

- extent of and access to off-channel habitat,
- quality and quantity of anadromous spawning habitat, and
- riparian stage and canopy cover.

3.2 Photography

Photographs of selected habitat units and significant features were taken with a digital camera. Each picture was labelled with:

- chainage of the habitat unit or feature,
- date, and
- description of the habitat unit or feature.

3.3 Data Analysis and Interpretation

Detailed habitat assessment data for the Sarita and Pachena rivers were analyzed to determine salmonid habitat condition and to identify potential physical habitat limitations to salmonid production. Habitat characteristics were compared to observed natural stream morphologies (Newbury and Gaboury 1993) and bio-standards for undisturbed salmonid streams (Johnston and Slaney 1996) to detect habitats that are degraded or at risk, and which may be improved through rehabilitation. A summary of diagnostic values for salmonid habitat condition in the Sarita and Pachena rivers was prepared based on bio-standards for the following parameters:

3.3.1.1 Diagnostic Value for Percent Pools and Pool Frequency

Ratings for percent pool habitat and pool frequency (spacing) were determined for each reach with gradients less than 5%. A poor rating was given if percent pool was less than 30%, a fair rating was given if less than or equal to 40%, and good rating was given if greater than 40%. Similarly, for pool frequency, a poor rating was given if the number of bankfull widths per pool was greater than 15, a fair rating was given if less than or equal to 15, and good rating was given if less than 10. Rating of pool frequency was different in Ochman (1998) where a poor rating was given if the number of bankfull widths per pool was greater than 4, a fair rating if less than or equal to 4, and good rating if less than 2.

3.3.1.2 Diagnostic Value for Deep Pools (Holding Pools)

All pools with a depth greater than 0.85 m were defined as a "good" holding pool for adult fish. However, for shallower pools, this ignores the importance of cover within the pool for creating good fish holding habitat. To account for the inter-relationship between pool depth and cover, the number of adult holding pools (≤0.85 m deep) was identified using the following criterion:

holding pool, if (deep pool cover > 0 and maximum depth x % total overhead cover >= 30)

where total overhead cover includes large woody debris (LWD), boulder, undercut bank and overhanging vegetation. Maximum depth was measured during summer low flows. This diagnostic was developed to better reflect the interaction of cover and pool depth in providing suitable habitat to adult salmonids.

The diagnostic value used to assess adequacy of adult holding pools within a reach was then the total number of deep pools per 1000 m of stream within each reach. A rating of poor was given if the number of deep pools as defined above was less than 1 per 1,000 m of stream, a rating of fair was given if greater than or equal to 1, but less than or equal to 2, and a rating of good was given if greater than 2.

3.3.1.3 Diagnostic Value for overhead cover (woody debris, boulder and overhead cover)

Ratings were made for woody debris and overhead cover for all pools, and boulder cover for all riffles. Woody debris cover in pools was rated as good if the mean percent of large woody debris was greater than 20%, fair if less than or equal to 20% and greater than or equal to 6%, and poor if less than 6%. Boulder cover in riffles was rated as good if greater than 30%, fair if less than or equal to 30% and greater than or equal to 10%, and poor if less than 10%. Overhead cover in pools was rated as good if greater than 20%, fair if less than or equal to 20% and greater than or equal to 10%, while a poor rating indicated less than 10% overhead cover in pools. Overhead cover includes LWD, boulders, undercut banks and overhanging vegetation.

3.3.1.4 Diagnostic Value for Spawning Gravel Quantity

Spawning gravel quantity was calculated as 100% of the stream wetted area with available gravels (2-64 mm), plus 20% of the stream wetted area with cobbles (64-256 mm). In Ochman (1998), this diagnostic value was calculated using available gravels plus 25% of the stream wetted area with cobbles. Gravel quantity was rated as poor if the spawning area was less than 10% of the total wetted area, fair if greater than or equal to 10%, but less than or equal to 25%, and good if greater than 25%.

3.3.1.5 Diagnostic Value for Spawning Gravel Quality

Spawning gravel quality was rated as good, fair or poor based on the degree of compaction and embeddedness (percent fines). Loose and clean substrates (fines ≤15%) providing excellent spawning opportunity received a rating of good, while compact and embedded substrates (fines > 25%) received a ranking of poor. A fair ranking refers to moderately embedded and uncompacted gravel (15% < fines ≤ 25%). Rating spawning gravel quality was different in Ochman (1998) where loose and clean substrates (fines ≤25%) received a rating of good, while compact and embedded substrates (fines > 50%) received a ranking of poor. A fair ranking referred to moderately embedded and uncompacted gravel (25% < fines ≤50%).

3.3.1.6 Diagnostic Value for Off-channel Habitat

Off-channel habitat was rated as good if there was more than two off-channel areas (of any type), fair if there was at least one off-channel area but less than two, and poor if no off-channel areas were present. Note that this diagnostic as currently defined in Watershed Restoration Program Technical Circular No. 8 (Johnston and Slaney 1996) does not account for the amount of off-channel habitat (i.e., length or area). However, for an off-channel area to be included, it had to be considered, in the opinion of the field biologist, as important habitat. Minimum length or area was not considered.

3.4 Recommendations for Rehabilitation

Rehabilitation methods and procedures are described in several sources in the literature. The most frequently used references in this study included Adams and Whyte (1990), Newbury and Gaboury (1993), Koning (1999), Hogan et al. (1996) and Slaney and Zaldokas (1997).

3.5 Riparian Condition

During this assessment for each hydraulic unit, the riparian stage (shrub, young, mature) and species (deciduous, conifer, mixed) was noted and was summarized in Appendix 1F. This riparian assessment was from the perspective of a fisheries biologist and was not intended to replace the requirement for a site level riparian assessment by a forest ecologist.

4 Sarita River Watershed

4.1 Assessment Results

On the basis of gradient, channel pattern, channel morphology and location of major tributaries, 47 reaches were established in the Sarita River watershed during the overview assessment (Bocking et al. 1997). Reach designations used in this study are illustrated for the Sarita River watershed in Figure 1. This Level 1 Fish Habitat Assessment describes 19 high and medium priority reaches over a distance of 22,075 m in the Sarita River watershed.

4.1.1 Stream Habitat Condition

A diagnostic summary of salmonid habitat condition is presented in Table 3. Detailed habitat condition results are presented in five tables located in Appendix 1 as follows: Appendix 1A is a spreadsheet listing detailed habitat attributes in each reach surveyed; Appendix 1B is a summary of area surveyed and percentage of each primary habitat type present in each reach; Appendix 1C is a summary of cover attributes in each reach surveyed; Appendix 1D is a summary of bed material and spawning attributes for surveyed reaches; and Appendix 1E is a summary of LWD attributes for surveyed reaches. Riparian type and canopy cover of all units surveyed are presented in Appendix 1F. Representative photos for the habitats observed in the Sarita River watershed are presented in the Photoplates section.

4.1.2 Reach S1 Sarita River

Reach S1 extended 3,770 m upstream from Numukamis Bay in Barclay Sound to the mouth of Hunter Creek (Figure 1). Tidal influence extended upstream of the mouth ~2.4 km. Only 1,445 m of channel length was assessed, extending from the Mine Pool to the mouth of Hunter Creek. Mean gradient was 0.3%. The Sarita River was a meandering channel with a mean bankfull width of ~53 m in the first kilometre upstream from its mouth. Mean bankfull channel width over the entire reach was 44.2 m. Channel type in Reach S1 was riffle-pool, dominated by gravel (RPg) and cobble (RPc) (Hogan et al. 1996; Table 3; Photo 1). Channel disturbances included: 1) a road within the south (left) bank riparian zone where bank erosion was occurring, 2) riparian logging of both streambanks during the 1950's, and 3) logging in a section of the reach adjacent to the right bank floodplain in 2017.

Table 3. Diagnostic summary of salmonid habitat condition within the Sarita River watershed.

	% Pools[1]		Pool Frequency[2]		Holding Pools[3]		% Wood in Pools[4]		% Boulder in Riffles[5]		% Overhead Cover[6]		Gravel Quantity[7]		Gravel Quality[8]		Off-channel Habitat[9]	
Reach Number	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating
S1	5.3	Poor	16.4	Poor	1.4	Fair	0.0	Poor	2.6	Poor	1.6	Poor	45.6	Good	10.0	Good	3.0	Good
S2	20.7	Poor	4.9	Good	4.0	Good	0.0	Poor	11.1	Fair	3.8	Poor	44.5	Good	19.9	Fair	0.0	Poor
S3	23.4	Poor	3.2	Good	6.5	Good	0.5	Poor	0.0	Poor	2.3	Poor	33.7	Good	38.2	Poor	2.0	Good
S4	25.3	Poor	6.1	Good	3.7	Good	0.0	Poor	9.3	Poor	10.9	Fair	43.6	Good	12.1	Good	7.0	Good
F13	35.0	Fair	2.5	Good	11.6	Good	4.2	Poor	0.7	Poor	17.5	Fair	31.5	Good	64.4	Poor	7.0	Good
F14	35.5	Fair	1.8	Good	14.7	Good	12.0	Fair	0.0	Poor	18.7	Fair	34.1	Good	65.9	Poor	4.0	Good
F15	36.2	Fair	1.4	Good	10.9	Good	4.0	Poor	0.3	Poor	8.9	Poor	42.1	Good	54.5	Poor	2.0	Good
F16	34.4	Fair	1.0	Good	9.2	Good	3.2	Poor	0.0	Poor	15.3	Fair	31.2	Good	68.7	Poor	7.0	Good
F17	24.5	Poor	1.9	Good	10.0	Good	9.3	Fair	3.5	Poor	14.0	Fair	54.2	Good	31.7	Poor	0.0	Poor
SS20	61.9	Good	2.5	Good	3.7	Good	0.9	Poor	3.9	Poor	1.2	Poor	30.5	Good	57.2	Poor	1.0	Fair
SS21	17.1	Poor	6.7	Good	4.0	Good	0.0	Poor	19.4	Fair	10.6	Fair	41.7	Good	26.3	Poor	0.0	Poor
SS27	29.4	Poor	5.3	Good	10.3	Good	0.4	Poor	54.1	Good	41.8	Good	18.8	Fair	9.7	Good	0.0	Poor
SS30	30.5	Fair	1.2	Good	10.5	Good	5.4	Fair	12.5	Fair	16.5	Fair	29.8	Good	21.1	Fair	3.0	Good
SS31	9.4	Poor	11.1	Fair	3.9	Good	0.0	Poor	22.6	Fair	23.1	Good	38.7	Good	12.1	Good	0.0	Poor
SC34	16.8	Poor	5.3	Good	6.0	Good	3.6	Poor	13.3	Fair	11.0	Fair	23.6	Fair	37.1	Poor	0.0	Poor
SC35	28.6	Poor	4.2	Good	5.0	Good	10.4	Fair	7.5	Poor	21.5	Good	22.0	Fair	36.2	Poor	1.0	Fair
SC36	10.8	Poor	23.5	Poor	4.7	Good	0.0	Poor	24.0	Fair	22.0	Good	23.5	Fair	15.1	Fair	0.0	Poor
SC37	17.7	Poor	5.1	Good	4.1	Good	7.1	Fair	20.3	Fair	23.5	Good	22.6	Fair	29.8	Poor	0.0	Poor
H50	24.6	Poor	3.0	Good	5.9	Good	13.3	Fair	18.3	Fair	27.5	Good	29.3	Good	23.1	Fair	1.0	Fair

[1] Value is percent pools (%P = total pool area / total wetted area). Poor < 30%, Fair <= 40%, Good > 40% (for gradients 2-5%). Modified from Burt and Horchick (1999) and Griffith (1993).

[2] Value is number of bankfull widths per pool (PF = mean bankfull width / total number of pools). Good < 10, Fair <= 15, Poor > 15.

[3] Value is the number of pools per 1000 m for which the deep pool cover > 0 and maximum depth x % total instream cover >= 30. Poor < 1, Fair <= 2, Good > 2.

[4] Value is the mean percent wood cover in pools. Poor < 6%, Fair <= 20%, Good > 20%.

[5] Value is the percent boulder cover in riffles. Poor < 10%, Fair <= 30%, Good > 30%.

[6] Value is the percent overhead cover in pools. Poor < 10%, Fair <= 20%, Good > 20%.

[7] Value is percent spawning area (%Quantity = spawning area / total wetted area). Poor < 10%, Fair <= 25%, Good > 25%.

[8] Value is the percent of substrate in <2 mm category (fines). Poor > 25%, Fair >15% and uncompacted, Good < =15% and uncompacted.

[9] Value is the number of off-channel habitats. Poor < 1, Fair <= 2, Good > 2.

In Reach S1, substratum was approximately 10% fines, 34.6% gravel, 54.9% cobble, and 0.5% boulder. Approximately 14,403 m^2 of suitably sized spawning substrate was present in Reach S1 (Appendix 1D). Based on the high proportion of gravel content, substrate quality was ranked as good, in terms of utilization for spawning, incubation and winter refuge. However, redd scour was anticipated due to the flashy nature of the discharge and the high transport volumes of fine and coarse sediments.

A total of 12 primary habitat or hydraulic units were recorded in Reach S1, including 4 riffles, 6 glides and 2 pools (Appendix 1A). In terms of wetted area, riffles, glides and pools made up ~19.9%, ~74.8% and ~5.3%, respectively, of the reach (Appendix 1B). According to Cederholm et al. (1997) an inadequate number of LWD (> 0.2 m diameter) was present in the reach with only 42 individual pieces (Appendix 1E).

Total percent instream cover (% of wetted habitat area) for habitat units in Reach S1 was 5.9% (Appendix 1C). Deep pools with maximum depth >1.0 m were a major source of instream cover for all habitat units (5.1%). LWD and boulder cover combined provided only 0.7% of total instream cover. Among habitat types, total percent instream cover was least prevalent in glides (2%) and most prevalent in pools (72.9%). However, insufficient cover in the pool habitat units prevented them from being classified as "good" holding pools. Thus the holding pool rating was fair. Percent pool area, pool frequency and percent wood cover in pools were all rated as poor (Table 3). Off-channel habitat was rated as good because of the presence of two sloughs with good access, 20 and 40 m long, and a 300 m long side channel on the left bank that was only accessible during high flow events.

4.1.3 Reach S2 Sarita River

Reach S2 extended 1,265 m with a mean gradient of 1.0%. Channel type was riffle-pool dominated by either gravel (RPg) or cobble (RPc) (Hogan et al. 1996; Photo 2). Channel disturbances included: 1) a road within the south (left) bank riparian zone where bank erosion is occurring, and 2) logging of both streambanks during the 1950's.

Stream wetted width during the survey ranged from 4 to 40 m, while mean bankfull width measured 43.3 m (Appendix 1A). Substratum was approximately 19.9% fines, 34.7% gravel, 39.5% cobble, and 5.1% boulder and 0.8% bedrock (Appendix 1D). A total of 16,617 m^2 of suitably sized spawning substrate was available. Based on the amount of fines, substrate quality was rated fair in terms of utilization for spawning, incubation and winter rearing habitat (Table 3).

A total of 17 habitat units were recorded in Reach S2, including 4 riffles, 7 glides and 6 pools (Appendix 1A). In terms of wetted area, riffles, glides and pools made up approximately 15.1%, 64.2% and 20.7%, respectively, of the reach (Appendix 1B). A total of only four individual pieces (>0.2 m diameter) of LWD were found in Reach S2 (Appendix 1E), which was considered an inadequate number of functional LWD (Cederholm et al. 1997). Total percent instream cover was highest in pool habitats (Appendix 1C). Major sources of instream cover were pools with depth >1.0 m and boulders in riffles. Among habitat types, total percent instream cover was least prevalent

in glides (2%) and most prevalent in pools (78%). Habitat condition parameters receiving poor ratings included percent pools, percent wood cover in pools and percent overhead cover (Table 3). The Holding Pools rating for this reach was good. Off-channel habitat was rated as poor as no side channels were present in this reach.

4.1.4 Reach S3 Sarita River

Reach S3 extended 930 m upstream with a mean gradient of 1.0%. Channel disturbances included: 1) streambanks logged in the early 1950's and early 1970's, 2) road in the riparian zone on the left bank, and 3) a bridge crossing at the 900 m mark. In 1999, log structures were installed at six sites in Reach S3 to enhance habitat complexity and pools for rearing Coho fry (Table 2). All these structures were dislodged and washed downstream during a major flood event in 2006.

Stream wetted width during the survey ranged from 1 to 28 m. The channel was a riffle-pool type (RPg and RPc) with predominantly gravel or cobble substrate. Bankfull width averaged ~48.5 m. Substratum was approximately 38.2% fines, 27.4% gravel, 31.7% cobble, 1.3% boulder and 1.5% bedrock (Appendix 1D). Only 6,301 m^2 of suitably sized substrate was available for spawning. Based on a low degree of embeddedness and compaction, substrate quality was rated poor in terms of utilization for spawning, incubation and winter refuge.

A total of 19 habitat units were recorded, including 6 riffles, 7 glides, 6 pools (Appendix 1A). In terms of wetted area, riffles, glides and pools made up approximately 8.3%, 68.3% and 23.5%, respectively, of the reach (Appendix 1B). Only 28 pieces of functional LWD (>0.2 m diameter) were found in this reach (Appendix 1E), which was considered an inadequate number of functional LWD (Cederholm et al. 1997).

Pools with depth more than 1.0 m provided the major source of instream cover (Appendix 1C). However, percent pools, percent wood in pools, percent boulder in riffles and overhead cover were rated poor (Table 3). Side channel habitat was rated good with one accessible side channel and one slough/beaver pond accessible only at high water.

4.1.5 Reach S4 Sarita River

Reach S4 extended upstream 3,270 m to an elevation of approximately 18 m above sea level where a ~15 m falls impeded upstream fish migration. Mean gradient was 1.6%. The channel contained numerous side channels and off-channel ponds. Channel type was riffle-pool (RPg and RPc) with a mean bankfull width of 41.4 m (Photo 3). Channel disturbances included: 1) both streambanks were logged during the 1950's and 1960's as well as in 2015 and 2017, 2) road within the riparian zone on right bank at the foot of the falls providing access to the future micro-hydro generating station, and 3) piles of LWD on both banks.

Wetted width during the survey ranged from 7-40 m for the majority of the reach, except for one 95 m long glide beginning at chainage ~1,360 m where wetted width was 70 m

and a pool downstream of Sarita River falls at chainage ~3,200 m where wetted width was 60 m.

Substratum was approximately 12.1% fines, 35.3% gravel, 41.2% cobble, 6.7% boulder and 4.7% bedrock (Appendix 1D; Photo 4). Approximately 32,755 m^2 of suitably sized spawning substrate was present in Reach S4. Based on an acceptable proportion of fines (12.1%), substrate quality was rated as good in terms of utilization for spawning, incubation and winter rearing habitat.

A total of 52 primary habitat or hydraulic units were identified comprised of 17 riffles, 22 glides and 13 pools (Appendix 1A) making up ~21.2%, ~53.5%, and ~25.3%, respectively, of the wetted area of the reach (Appendix 1B). Only 49 individual pieces of LWD (>0.2 m diameter) were situated in Reach S4 (Appendix 1E), which was considered an inadequate number of functional LWD (Cederholm et al.1997).

Total percent instream cover was most prevalent in pool habitat types (Appendix 1C). Boulders and pools with depth >1.0 m were the main sources of instream cover. Boulder cover ranged from ~4 to ~10% in all three habitat units, providing good rearing for lotic species such as Steelhead and Chinook. This reach also offers marginal habitat for pool dependent species such as Coho fry due to 'poor' percent pools and 'poor' percent wood cover in pools (Table 3). Nevertheless, Reach S4 was much better in terms of habitat for fry than the lower three reaches since it was the only one with fair (10.9%) overhead cover (Table 3). Off-channel habitat was rated as a good habitat condition, with five side channels, one pond and one slough. All off-channels had good access for fish at most flows.

4.1.6 Reach F13 Frederick Creek

Frederick Creek entered the Sarita River close to the river's mouth (at chainage 1200 m on Reach S1). Reach F13 on Frederick Creek extended upstream 1,725 m with a mean gradient of ~1.1%. Pilings from an old bridge were seen in the streambed at chainage ~300 m (Photo 5). Channel morphology was described as riffle-pool (RPg) with predominantly gravel substrate. Channel disturbances included: 1) both streambanks logged in the 1950's, 60's, 80's and more recently in the 2010's, and 2) a logging road close to the riparian zone on the left bank.

Stream wetted width during the survey ranged from 2.0 to 22 m, while mean bankfull width measured 22.7 m (Appendix 1A). Substratum was approximately 64.4% fines, 30.6% gravel, 4.3% cobble and 0.8% boulder. Approximately 4,402 m^2 of suitably sized spawning substrate was present in Reach F13 (Appendix 1D). Based on the high proportion of fines, substrate quality was rated as poor in terms of utilization for spawning, incubation and winter rearing habitat (Table 3). Some glides and pools had ≥70% fines. These high fines percentages were generally found in areas of clay undercut banks.

Reach F13 was a very complex system in terms of the number of habitat types. A total of 88 habitat types were recorded in 1,725 m of channel length, including 30 riffles, 27

glides and 31 pools (Appendix 1A). In terms of wetted area, riffles, glides and pools made up ~16.8%, ~48.2% and ~35.0%, respectively, of the reach (Appendix 1B). A total of 123 pieces of functional LWD (>0.2 m diameter) were found in Reach F13 (Appendix 1E), which was considered an inadequate number of functional LWD (Cederholm et al. 1997).

Total percent instream cover was highest in pools (23.3%) followed closely by glides (16.6%). Instream cover was least prevalent in riffles (4.7%). On average for all habitat types, major sources of instream cover were pools with depth >1.0 m (13.7%) and LWD (2.2%).

Habitat condition parameters receiving poor ratings included percent wood in pools, percent boulder in riffles and gravel quality (Table 3). Percent pool and overhead cover rating were rated as fair. The frequency of adult holding pools, pool frequency, and gravel quantity were all considered good. Off-channel habitat was rated as good with seven side-channels from 15 to 100 m long and two ponds. Although access to the side channels was good at most flows, the ponds connected with Frederick Creek only at high flows. The intermittent connection was due to an accumulation of sediments in the channels connecting the ponds to Frederick Creek.

4.1.7 Reach F14 Frederick Creek

Reach F14 on Frederick Creek extended upstream for 545 m with a mean gradient of ~1.0%. A number of large, dispersed, Sitka spruce dominated the riparian area. Channel disturbances included: 1) both streambanks logged during the 1960's and 1970's, 2) log jams in the lower sections, and 3) a bridge on the Bamfield Mainline crossing the creek at the upstream end of the reach.

The first 50 m of Reach F14 was an extensive beaver pond with a dam ~1.5 m high and a pond at least 75 m wide. Depth was 0.8 m on average, but in places was over 2 m. Stream wetted width ranged from 3 to 22 m. Channel morphology was riffle-pool (RPg-w) with predominantly gravel substrate and functional LWD (Photo 6). Mean bankfull width was ~27.4 m. Substratum was approximately 65.9% fines and 34.1% gravel with no cobble or boulder substrates present. This reach provided a maximum of 1,800 m^2 of suitable spawning gravel area (Appendix 1D). Based on a high degree of embeddedness and compaction and a very high percentage of fines, substrate quality was considered poor in terms of utilization for spawning and incubation.

A total of 31 habitat types were recorded, including 12 riffles, 8 glides and 11 pools (Appendix 1A). In terms of wetted area, riffles, glides and pools made up approximately 12.3%, 52.2% and 35.5%, respectively, of the reach (Appendix 1B). Only 63 pieces of LWD (>0.2 m diameter) were functional in the reach (Appendix 1E), which was considered an inadequate number of functional LWD (Cederholm et al. 1997).

Total percent instream cover was highest in pools (49.8%). Instream cover was least prevalent in glides (2.8%). On average for all habitat types, major sources of instream cover were pools with depth >1.0 m (12.8%) and LWD (6.0%).

Habitat condition parameters receiving poor ratings included percent boulder in riffles and gravel quality (Table 3). Percent pool, percent wood in pools, and percent overhead cover were rated as fair. The frequency of adult holding pools, pool frequency, and gravel quantity were all considered good. Off-channel habitat was rated as good with three side channels, 15 to 30 m in length, one pond and one wetland. Access to all off-channels was considered good at most flows. There were few intermediate sized trees with the majority of the understory and floodplain covered with salmonberry and herbaceous vegetation in the off-channels.

4.1.8 Reach F15 Frederick Creek

Reach F15 on Frederick Creek extended upstream only 640 m to elevation 20 m above sea level. Mean gradient was ~1.0%. There is quite good overhanging cover coming from an old growth riparian buffer. The main channel disturbance was clearcut logging, which occurred on the left side of the bank in the late 1970's.

Stream wetted width ranged from 2 to 16 m. Channel morphology was riffle-pool (RPg) with predominantly gravel substrate (Photo 7). Mean bankfull width was ~40.9 m. Substratum was approximately 54.5% fines, 41.4% gravel, 3.7 % cobble and 0.1% boulder. Only 1,654 m^2 of suitably sized spawning substrate was present in Reach F15 (Appendix 1D). Based on high percentage of fines and compaction, substrate quality was rated as poor in terms of utilization for spawning and incubation.

A total of 35 primary habitat or hydraulic units were identified (Appendix 1A), with 9 riffles, 15 glides and 11 pools making up approximately 16.8%, 47.0% and 36.2%, respectively, of the wetted area of the reach (Appendix 1B). A total of 47 functional LWD (>0.2 m diameter) were found in Reach F15 (Appendix 1E), which was considered an inadequate number of functional LWD (Cederholm et al. 1997).

Total percent instream cover was highest in pools (32.8%). Instream cover was least prevalent in riffles (0.8%). On average for all habitat types, major sources of instream cover were pools with depth >1.0 m (10.1%) and LWD (2.1%).

Habitat condition parameters receiving poor ratings included percent wood in pools, percent boulder in riffles, percent overhead cover and gravel quality (Table 3). Percent pool was rated as fair. The frequency of adult holding pools (9.2/km), pool frequency, and gravel quantity were all considered good. Off-channel habitat condition was rated as good, with three side channels 20-130 m long with two out of three having little or no connection to the mainstem at low flows, and a wetland at the upstream end with a very good connection to the mainstem of Reach F15.

4.1.9 Reach F16 Frederick Creek

Most of Reach F16 on Frederick Creek was a wetland with numerous braids in the downstream section and numerous and extensive gravel bars in the upstream section. Most of the channels in the braided area had only subsurface flow in the summer. In 1997, Reach F16 was confined to a channel only at the upper and lower end of the wetland, and was considered intermediate in size. In 2017, there was a semi-defined

channel to the east of the wetland, which was followed for 1,298 m and described in Appendix 1A. Measurements of the deep channel in the 400 m long by 120 wide wetland were not made.

The heights of both banks in the measured reach were <1 m. Mean gradient was 2.2%. Dominant channel morphology type was riffle-pool (RPg) with predominantly gravel substrate (Photo 8). Channel disturbances included: 1) both streambanks logged during the 1930's, 1940's and more recent clearcuts in the 2010's, and 2) mainstem channel alignment shift from the west to the east side of the wetland. The exact cause of this apparent shifting was unclear, but could be attributed to gravel and log accumulations at the upstream end of Reach F16.

Mean bankfull width of the semi-defined channel was ~50 m. Wetted width varied from 1 to 20 m. Substratum was approximately 68.7% fines and 31.2% gravel with 1,642 m^2 of suitably sized substrate available for spawning (Appendix 1D). Based on a high degree of embeddedness and compaction, substrate quality was rated as poor in terms of utilization for spawning, incubation and winter refuge.

A total of 94 hydraulic units were recorded with 32 riffles, 35 glides and 27 pools (Appendix 1A) making up approximately 16.1%, 49.5% and 34.4%, respectively, of the wetted area of the reach (Appendix 1B). Only 98 pieces of LWD (>0.2 m diameter) were present in this reach (Appendix 1E), which was considered an inadequate number of functional LWD (Cederholm et al. 1997).

Total percent instream cover was highest in pools (42.9%). Instream cover was least prevalent in riffles (3.2%). On average for all habitat types, major sources of instream cover were pools with depth >1.0 m (10.9%) and instream vegetation (5.5%).

Habitat condition parameters receiving poor ratings included percent wood in pools, percent boulder in riffles, and gravel quality (Table 3). Percent pool and percent overhead cover were rated as fair. The frequency of adult holding pools (9.2/km), pool frequency, and gravel quantity were all considered good. Off-channel habitat condition was rated as good, with one extensive wetland and six side channels, 30 to 140 m in length. Only some of the side channels were accessible at low flows. The majority of the understory and floodplain in the side channels and depressions was covered with salmonberry and herbaceous vegetation. There was little to no canopy cover over the entire wetland area in Reach F16 and few intermediate sized trees on both banks of the mainstem.

4.1.10 Reach F17 Frederick Creek

Reach F17 on Frederick Creek extended upstream from elevation 38 m to elevation 62 m over a distance of 1,500 m. The reach started just downstream from an old bridge crossing and extended to the beginning of the bedrock where the valley narrows, about 1 km downstream of Frederick Lake. Mean gradient was 1.4%. Channel disturbances included logging of both streambanks during the 1940's, 1950's and more recently in the 2010's.

Channel type was riffle-pool (RPg) with predominantly gravel substrate. Bankfull width averaged ~25.3 m and wetted width ranged from 2 to 13 m during the survey (Photo 9). Substratum was approximately 31.7% fines, 51.3% gravel, 14.8% cobble and 2.2% boulder providing approximately 4,942 m^2 of suitably sized spawning substrate (Appendix 1D). Based on a high degree of embeddedness and compaction, substrate quality was rated as poor in terms of utilization for spawning and incubation.

A total of 79 habitat types were identified with 36 riffles, 12 glides and 31 pools making up approximately 60.6%,14.8% and 24.5%, respectively, of the wetted area of the reach (Appendix 1A; Appendix 1B). A total of 112 individual pieces of LWD (>0.2 m diameter) were situated in Reach F17 (Appendix 1E), which was considered an inadequate number of functional LWD (Cederholm et al. 1997).

Total percent instream cover was highest in pools (30.1%). Instream cover was least prevalent in glides (0.5%). On average for all habitat types, major sources of instream cover were pools with depth >1.0 m (5.0%) and LWD/SWD (2.8%).

Habitat condition parameters receiving poor ratings included percent pool, percent boulder in riffles, and gravel quality (Table 3). Percent wood in pools and percent overhead cover were rated as fair. The frequency of adult holding pools (10.0/km), pool frequency, and gravel quantity were all considered good. Off-channel habitat condition was rated as poor, with no wetlands or side channels found. Riparian vegetation, consisting mostly of red alder, provided cover to approximately 9% of the creek.

4.1.11 Reach SS20 South Sarita River

Reach SS20 on the South Sarita River extended 1,070 m from its confluence with the Sarita River. Mean gradient was ~1.0%. In 1999, large woody debris structures were installed at two sites in Reach SS20 (Table 2). In 2000, five structures were constructed to protect an eroding bank in Reach SS20, and three structures previously built were repositioned and re-cabled. All these LWD structures were washed away during a high flood event in 2006. A 1,500 m^2 side channel was constructed in 1998. It was extended 115 m and LWD added for cover in 2000. Extra rip rap armoring was placed along the upstream berm in 2001. A major flood in 2014 destroyed the berm and this side channel (starting at chainage 174 m) is now a large distributary channel of the mainstem. Some 100 m upstream of this side channel, a second 7,500 m^2 groundwater side channel was constructed in 2006 at KM 56 on the Bamfield Mainline along the left valley wall. In 2009, the berm at the upstream end of the channel was rehabilitated and LWD was added. This side channel continues to provide good off-channel habitat for Coho and steelhead fry. However, a massive gravel bar at the outflow of this channel allows access only during high water events. The upstream berm of this side channel is at chainage ~280 m on Reach SS21. The main channel disturbances were: 1) roads in the riparian zone on both sides of the river, 2) large eroding banks, 3) very wide channel (in some places over 100 m wide), where most of the flow is sub-surface during low flows, 4) a bridge on Bamfield Mainline, and 5) clearcut logging in the 1950's and 2010’s.

Morphology of the channel was riffle-pool (RPg) with predominantly gravel substrate (Photo 10; Photo 11). Stream wetted width varied from 0 to 17 m, while mean bankfull width measured 39.7 m (Appendix 1B). Substratum was approximately 57.2% fines, 27.9% gravel, 12.9% cobble and 1.9% bedrock (Appendix 1D). The prevalence of fine sediment and the absence of boulders suggested that this reach was a major deposition area for sediment coming from the upper South Sarita River. Only 1,348 m^2 of suitably sized spawning substrate was available (Appendix 1D). Based on the amount of fines, substrate quality in this reach was rated as poor in terms of utilization for spawning and incubation.

A total of 23 habitat types were recorded including only 2 riffles, 10 glides and 11 pools with six of these pools being secondary isolated pools (Appendix 1A). In terms of wetted area, riffles, glides and pools made up approximately 1.7%, 36.4% and 61.9%, respectively, of the reach (Appendix 1B). Flow was subsurface in several glides. A total of 54 LWD (>0.2 m diameter) were found in Reach SS20 (Appendix 1E), which was considered an inadequate number of functional LWD (Cederholm et al. 1997).

Total percent instream cover was highest in pools (27.3%). Instream cover was least prevalent in glides (0.2%). On average for all habitat types, the major source of instream cover was pools with depth >1.0 m (16.5%).

Habitat condition parameters receiving poor ratings included percent wood in pools, percent boulder in riffles, percent overhead cover, and gravel quality (Table 3). The frequency of adult holding pools (3.7/km), percent pools, pool frequency, and gravel quantity were all considered good. However, there was only one pool in this reach that had adequate deep pool cover. Off-channel habitat condition was rated as fair, with one constructed side channel having a surface area of approximately 7,500 m^2. However, connection between this side channel and the bedrock mainstem pool at 690 m on Reach SS20 can occur only at high flows. The constructed side channel with its outlet 70 m upstream of the Bamfield Mainline bridge is now the mainstem of the South Sarita River. In some manner, the former mainstem can now be considered as a side channel where water flows only during flood events and is sub-surface the rest of the time.

4.1.12 Reach SS21 South Sarita River

Only the lower ~1,240 m of the reach was assessed in 2017. Approximately 2,980 m was assessed in 1997. Mean gradient in Reach SS21 was 1.1%. The main channel disturbances were: 1) a road on the north side of the South Sarita River within the riparian zone, and 2) clearcut logging in the 1950's, and 60's. Also, there was a recent clearcut in ~2010 on the north side of the river between Reach SS21 and Reach S4.

Stream wetted width ranged from 0 to 28 m and mean bankfull width was 37.2 m. Morphology of the channel was riffle-pool (RPg) with predominantly gravel substrate (Photo 12). Substratum was approximately 26.3% fines, 36.3% gravel, 26.9% cobble, 9.9% boulder and 0.5% bedrock, with 10,511 m^2 of suitably sized substrate available for spawning (Appendix 1D). Based on a high proportion of embeddedness and compaction, substrate quality was rated poor in terms of utilization for spawning and incubation

A total of 20 habitat types were found, including 7 riffles, 8 glides and 5 pools (Appendix 1A). In terms of wetted area, riffles, glides and pools made up approximately 30.1%, 52.8% and 17.1%, respectively, of the reach (Appendix 1B). The number of LWD in this reach was extremely low. In fact, only 14 pieces of functional LWD (>0.2 m diameter) were present in the reach (Appendix 1E), which was considered an inadequate number of functional LWD (Cederholm et al. 1997).

Total percent instream cover was highest in pools (36.2%) followed by riffles (19.4%). Instream cover was least prevalent in glides (3.1%). On average for all habitat types, major sources of instream cover were boulders (9.9%) and pools with depth >1.0 m (3.7%). There was very little overhanging vegetation throughout this reach (mean of 0.7%).

Habitat condition parameters receiving poor ratings included percent pool, percent wood in pools, and gravel quality (Table 3). Percent boulders in riffles and percent overhead cover were rated as fair. The frequency of adult holding pools (4/km), pool frequency, and gravel quantity were all considered good. Off-channel habitat condition was rated as poor, with no wetlands or side channels found.

4.1.13 Reach SS27 South Sarita River

Reach SS27 started 100 m upstream from the bridge on the South Sarita River and extended 580 m with a mean gradient of 1.5%. Reach SS27 had an elevation of 110-120 m. It was an intermediate sized channel and its morphology was described as riffle-pool (RPg). The main channel disturbance related to logging to the streambanks during the 1970's.

Wetted width ranged from 5 to 15 m and mean bankfull width was 18.3 m (Appendix 1A; Appendix 1B). Substratum was approximately 9.7% fines, 12.9% gravel, 29.2% cobble, 40.9% boulder and 7.3% bedrock with only 1,348 m^2 of suitably sized spawning substrate (Appendix 1D). Based on a low degree of embeddedness and compaction, substrate quality was rated as good in terms of utilization for spawning and incubation.

A total of 25 habitat or hydraulic units were identified (Appendix 1A) with 11 riffles, 8 glides and 6 pools making up approximately 40.7%, 29.9% and 29.4%, respectively, of the wetted area (Appendix 1B; Photo 13). Only nine individual pieces of LWD (>0.2 m diameter) were found in this reach (Appendix 1E), which was considered an inadequate number of functional LWD (Cederholm et al. 1997).

Total percent instream cover was highest in pools (63.9%) followed by riffles (56.7%). Instream cover was least prevalent in glides (35.7%). On average for all habitat types, major sources of instream cover were boulders (40.6%) and pools with depth >1.0 m (10.7%). There was no overhanging vegetation throughout this reach (mean of 0.0%).

Habitat condition parameters receiving poor ratings included percent pool, and percent wood in pools (Table 3). Gravel quantity was rated as fair. The frequency of adult holding pools (10.3/km), pool frequency, percent boulders in riffles, percent overhead

cover, and gravel quality were all considered good. Off-channel habitat condition was rated as poor, with no wetlands or side channels found.

4.1.14 Reach SS30 South Sarita River

Reach SS30 on the South Sarita River was only 380 m long and approximately 200 m above sea level. Mean gradient was calculated at 1.6%. Morphology was riffle-pool (RPc) with predominantly cobble substrate (Photo 14). LWD structures were added to nine sites in 2000 and to 10 sites in 2001 in Reaches SS30-31 (Table 2). Most of these structures were still in place and functioning in 2017 (Gaboury 2017). The downstream end of this reach is very wide (up to 60 m) and has numerous channels, gravel wedges and eroding banks. The main channel disturbance included clearcut logging down to the streambanks on the north side in 1968 and 1991, and on the south side in 1995.

Even though only 380 m long, Reach SS30 has great potential for supporting spawning, summer and winter rearing, particularly for Steelhead. Wetted width ranged from 3 to 30 m and mean bankfull width was 53.7 m. Substratum consisted of approximately 21.1% fines, 19.8% gravel, 49.8% cobble and 9.1% boulder, providing only 961 m^2 of suitably sized spawning substrate (Appendix 1D). Based on the amount of fines, substrate quality was rated as fair in terms of utilization for spawning and egg incubation.

A total of 18 habitat types were identified in Reach SS30 with 8 riffles, 4 glides and 6 pools. This reach was dominated by riffle habitat (~51.1%) followed by pool (~30.5%) and glide habitat (~18.4%). A total of 57 individual pieces of LWD (>0.2 m diameter) were documented in this reach (Appendix 1E), which was considered an inadequate number of functional LWD (Cederholm et al. 1997).

Total percent instream cover was highest in pools (39.3%) followed by riffles (13.5%). Instream cover was least prevalent in glides (9.0%). On average for all habitat types, major sources of instream cover were boulders (9.1%) and pools with depth >1.0 m (9.0%). Overhanging vegetation averaged 4.9%.

Habitat condition parameters receiving fair ratings included percent pool, percent wood in pools, percent boulders in riffles and gravel quality (Table 3). Gravel quantity, frequency of adult holding pools (10.5/km), pool frequency, and gravel quantity were all considered good. Off-channel habitat condition was rated as good, with three side accessible channels found.

4.1.15 Reach SS31 South Sarita River

Reach SS31 was 760 m long with a mean gradient of 1.3%. Dominant channel morphology type was riffle-pool (RPc) with predominantly cobble substrate (Photo 15). Channel disturbances included: 1) logging clearcut to the streambank on the north side in 1991 and on the south side in 1995, and 2) extensive eroding banks.

Wetted width ranged from 4 to 18 m and mean bankfull width was 22.9 m (Appendix 1B). Substratum was approximately 12.1% fines, 31.0% gravel, 38.3% cobble and 18.6% boulder, providing 3,164 m^2 of suitably sized spawning substrate (Appendix 1D).

Based on a low proportion of fines, and low incidence of embeddedness and compaction, substrate quality was rated as good in terms of utilization for spawning.

A total of 17 habitat types were identified in Reach SS31 with 7 riffles, 7 glides and 3 pools (Appendix 1A). In terms of wetted area, riffles, glides and pools made up approximately 64.1%, 26.5% and 9.4%, respectively, of the reach (Appendix 1B). A total of only 13 individual pieces of LWD (>0.2 m diameter) were found, which was considered an inadequate number of functional LWD (Cederholm et al. 1997).

Total percent instream cover was highest in pools (46.9%) followed by riffles (22.9%). Instream cover was least prevalent in glides (13.0%). On average for all habitat types, major sources of instream cover were boulders (18.6%) and pools with depth >1.0 m (3.6%). Overhanging vegetation averaged 4.3%.

Habitat condition parameters receiving poor ratings included percent pool and percent wood in pools (Table 3). Pool frequency and percent boulders in riffles were considered fair. Gravel quantity and quality, percent overhead cover, and frequency of adult holding pools (3.9/km) were all considered good. Off-channel habitat condition was rated as poor as no side channels or wetlands were found.

4.1.16 Reach SC34 Sabrina Creek

Reach SC34 of Sabrina Creek stretched ~1.51 km from its confluence with the South Sarita River to the confluence of the two main branches of Sabrina Creek, Reaches SC35 and 37. Mean gradient was 1.3%. Channel morphology was riffle-pool (RPc) with predominantly cobble substrate (Photo 16). In 1999, four riffle structures and eight LWD structures were installed in Reach SC34 (Table 2). In 2001, 18 new LWD structures were placed in Reach SC34. In 2017, the riffles were still intact and most of the LWD structures were still in place (Gaboury 2017). Channel disturbances included: 1) both streambanks logged during the 1950's and 60's; 2) a logging road within the riparian zone and 3) a bridge crossing at 800 m.

Wetted width ranged from 2 to 20 m, while mean bankfull width was 25.9 m (Appendix 1B). Substratum was approximately 37.1% fines, 15.7% gravel, 39.7% cobble, 6.1% boulder and 1.4% bedrock with 3,212 m^2 of suitably sized spawning substrate (Appendix 1D). Based on a high degree of embeddedness and compaction, substrate quality was rated as poor in terms of utilization for spawning and incubation.

A total of 61 habitat types were identified with 25 riffles, 24 glides, 11 pools and 1 cascade making up approximately 34.1%, 48.1%, 16.8% and 1.0%, respectively, of the wetted area of the reach (Appendix 1A; Appendix 1B). A total of 200 pieces of instream and partially submerged LWD (>0.2 m diameter) were found, which was considered an inadequate number of functional LWD (Cederholm et al. 1997; Appendix 1E).

Total percent instream cover was highest in riffles (16.1%) followed by pools (8.6%). Instream cover was least prevalent in glides and cascades (5.0%). On average for all

habitat types, major sources of instream cover were boulders (6.0%) and LWD/SWD (2.7%). Overhanging vegetation averaged 1.7%.

Habitat condition parameters receiving poor ratings included percent pool, percent wood in pools and gravel quality (Table 3). Percent overhead cover, gravel quantity and percent boulders in riffles were considered fair. Pool frequency and frequency of adult holding pools (6.0/km) were considered good. Off-channel habitat condition was rated as poor as no side channels or wetlands were found.

4.1.17 Reach SC35 Sabrina Creek-West Branch

Reach SC35 was ~1.6 km long with a mean gradient of 1.9%. Channel morphology was riffle-pool (RPc) with predominantly cobble substrate (Photo 17). The main channel disturbances included: 1) roads in the riparian zone on both sides of the creek, 2) bank erosion especially around the 1,000 m mark, 3) a bridge at 1,450 m, 4) a logging clearcut down to both streambanks in 1987, and 5) up to 5 m high log jam at chainage 1,565 m. In 1999, LWD structures were installed at 25 sites and a log jam at chainage 1,500 m was lowered (Table 2). A significant volume of small woody debris was removed from the logjam at 1,500 m in 2000 and again in 2001. Four new LWD structures were added in 2001. Gravel held back by the logjam had moved downstream and spread out, creating a gravel accumulation from about chainage ~760 to ~1,110 m. In September 2017, the creek bed was totally dry between 760 and 1,110 m with only three small isolated pools. The logjam at 1,565 m was still present and extended for about 35 m with about 100 LWD and a very large volume of gravel upstream of the jam. The logjam represented a barrier to upstream fish migration.

Wetted width ranged from 0 to 10 m and mean bankfull width was 15.1 m (Appendix 1B). Substratum was approximately 36.2% fines, 13.1% gravel, 44.4% cobble and 5.8% boulder with 1,311 m^2 of suitably sized spawning substrate (Appendix 1D). Based on a very high percentage of fines, substrate quality was rated as poor in terms of utilization for spawning and incubation.

A total of 88 habitat types were identified in Reach SC35 (Appendix 1A) with 29 riffles, 34 glides and 25 pools making up approximately 26.4%, 45.0% and 28.6%, respectively, of the reach (Appendix 1B). A total of 335 individual pieces of LWD (>0.2 m diameter) were counted (Appendix 1E), equating to 26 pieces per bankfull width, a condition considered inadequate according to Cederholm et al. (1997).

Total percent instream cover was highest in pools (21.1%) followed by glides (11.6%) (Appendix 1C). Instream cover was least prevalent in riffles (8.7%). On average for all habitat types, major sources of instream cover were boulders (6.1%) and LWD/SWD (5.3%). Overhanging vegetation averaged 8.6%.

Habitat condition parameters receiving poor ratings included percent pool, percent boulders in riffles and gravel quality (Table 3). Gravel quantity and percent wood in pools were considered fair. Pool frequency, frequency of adult holding pools (6.0/km)

and percent overhead cover were all considered good. Off-channel habitat condition was rated as fair with one accessible side channel found.

4.1.18 Reach SC36 Sabrina Creek-West Branch

Reach SC36 on the West branch of Sabrina Creek stretched 430 m and had both riffle-pool (RPc) and cascade-pool (CPb) morphology types dominated by cobbles and boulders, respectively (Photo 18). Mean gradient was 3.0%. At the upstream end of this reach, a 4 m high falls impeded upstream fish migration. The main channel disturbances were logging clearcuts down to the streambanks that occurred in 1965 and 1982.

Wetted width ranged from 0 to 7 m and mean bankfull width was 9.1 m (Appendix 1B). Substratum was approximately 15.1% fines, 15.4% gravel, 40.2% cobble, 20.8% boulder and 8.5% bedrock. With only 345 m^2 of suitably sized substrate available for spawning purposes (Appendix 1D), gravel quantity was rated as fair. Based on the amount of fines (15.1%) substrate quality was rated as fair for spawning and incubation (Table 3).

A total of 14 habitat or hydraulic units were identified (Appendix 1A) with 5 riffles, 6 glides, 2 pools and 1 cascade making up approximately 51.4%, 31.0%, 10.8% and 6.8%, respectively, of the wetted area of the reach (Appendix 1B). Only six individual pieces of LWD were found in Reach SC36 which provided inadequate cover (Cederholm et al. 1997).

Total percent instream cover was highest in pools (76.6%) followed by cascades (30.0%) (Appendix 1C). Instream cover was least prevalent in glides (13.6%). On average for all habitat types, major sources of instream cover were boulders (20.8%) and pools with depth >1.0 m (4.9%). No overhanging vegetation was found.

Habitat condition parameters receiving poor ratings included percent pool, pool frequency, and percent wood in pools (Table 3). Percent boulders in riffles, and gravel quantity and quality were considered fair. Percent overhead cover and frequency of adult holding pools (4.7/km) were considered good. Off-channel habitat condition was rated as poor with no side channels or wetlands found.

4.1.19 Reach SC37 Sabrina Creek-East Branch

Reach SC37 was 1,225 m long with a mean gradient of 1.7. Channel morphology was riffle-pool (RPc) with predominantly cobble substrate (Photo 19). In 2000, 20 LWD structures were constructed (Table 2). A major log jam at 650 m was also de-built in 2000. This logjam has totally disappeared over the years, releasing a massive amount of gravel to downstream habitats. As in Reach SC35, gravel accumulations stretched about 300 m (from 460 to 760 m) which caused extensive areas of subsurface flow. In 2001, six additional LWD structures were installed. The main channel disturbances were: 1) clearcuts down to the streambanks in the 1960's and 1970's, 2) eroding banks, and 3) excessive gravel accumulations in the channel.

Wetted width ranged from 0 to 8 m and mean bankfull width was 14.1 m (Appendix 1B). Substratum was approximately 29.8% fines, 15.1% gravel, 37.6% cobble, 16.9% boulder

and 0.7% bedrock. Only 803 m^2 of suitably sized spawning substrate was present (Appendix 1D), giving gravel quantity a rating of fair. Based on a high amount of fines, substrate was rated as poor in terms of utilization for spawning and incubation (Table 3).

Fifty eight habitat types were identified in Reach SC37 (Appendix 1A), including 16 riffles, 25 glides and 17 pools making up approximately 44.3%, 38.0% and 17.7%, respectively, of the reach (Appendix 1B). A total of 152 individual pieces of LWD (>0.2 m diameter) were counted in Reach SC37 (Appendix 1E). This equates to 11.7 pieces per bankfull width, a condition considered inadequate according to Cederholm et al. (1997).

Total percent instream cover was highest in riffles (20.6%) followed by glides (21.5%) (Appendix 1C). Instream cover was least prevalent in pools (16.7%). On average for all habitat types, major sources of instream cover were boulders (16.8%) and LWD/SWD (1.7%). Overhanging vegetation averaged 4.1%.

Habitat condition parameters receiving poor ratings included percent pool and gravel quality (Table 3). Percent wood in pools, percent boulders in riffles, and gravel quantity were considered fair. Pool frequency, percent overhead cover and frequency of adult holding pools (4.1/km) were considered good. Off-channel habitat condition was rated as poor with no side channels or wetlands found.

4.1.20 Reach H50 Hunter Creek

Reach H50 was a main tributary flowing into the Sarita River at the beginning of Reach S2. Reach H50 extended 675 m upstream to a ~5 m high falls which was a barrier to anadromous fish migration. Mean gradient was 2.1%. Channel morphology was riffle-pool (RPc) with predominantly cobble substrate (Photo 20). In 2000, LWD structures were constructed at nine sites in Reach H50 to increase habitat complexity and provide cover for rearing juvenile Coho. Channel disturbances were: 1) clearcut logging in the late 1970's and early 1980's, 2) a bridge over the Bamfield Mainline at the downstream end of H50, 3) excessive bank erosion, and 4) two massive log jams downstream of the falls.

Wetted width ranged from 1 m to 7 m, except for a 15 m by 15 m pool at the foot of the falls. Mean bankfull width was 22.2 m. Substratum consisted of approximately 23.1% fines, 21.7% gravel, 37.9% cobble, 15.8% boulder and 1.5% bedrock providing 782 m^2 of suitably sized spawning substrate (Appendix 1D). Gravel quantity was rated as good while gravel quality was rated as fair (Table 3).

Hunter Creek had 47 habitat units with 20 riffles, 17 glides and 10 pools (Appendix 1A) and was dominated by riffles (~53.4%), followed by pools (~24.6%) and glides (~22.0%) (Appendix 1B). A total of 159 individual pieces of LWD (>0.2 m diameter) were found in this reach. This equated to 8.6 pieces per bankfull width, which is inadequate according to Cederholm et al. (1997).

Total percent instream cover was highest in pools (28.9%) followed by riffles (21.5%) (Appendix 1C). Instream cover was least prevalent in glides (18.1%). On average for all habitat types, major sources of instream cover were boulders (15.8%) and LWD/SWD (5.4%). Overhanging vegetation averaged 6.1%.

Habitat condition parameters receiving poor ratings included only percent pool (Table 3). Percent wood in pools, percent boulders in riffles, and gravel quantity and quality were considered fair. Pool frequency, percent overhead cover and frequency of adult holding pools (5.9/km) were considered good. Off-channel habitat condition was rated as fair with one accessible side channel found.

4.2 Stream Rehabilitation Options

The Level 1 Assessment results and diagnostic summary indicate that Chinook, Coho and Steelhead production in the Sarita River watershed was likely limited by available rearing habitat during low flow conditions. Pool habitat was quite limited, as are cover elements. There seems to be an abundance of good spawning habitat, although spawning habitat is most abundant in the lower reaches of the river (Sarita River: Reaches S1-S4, South Sarita River: Reaches SS20-SS21) and decreases further upstream. However, even in Reaches SS30-SS31 of the South Sarita River, Reaches SS13-SS17 of Frederick Creek and Reach H50 of Hunter Creek, gravel quantity is rated as good, indicating that spawning habitat is not limiting. Gravel quality was rated as poor in Reaches F13-F17 of Frederick Creek because of the fines content in the substrate. Gravel quantity was rated as fair and gravel quality was rated as poor in Reaches SC34-37, indicating that spawning habitat was limited in Sabrina Creek. In fact, the only reaches surveyed that had good ratings for both gravel quantity and quality were Reaches S1 and SS31.

Due to the limited amount of good quality juvenile rearing habitat, Coho and Steelhead should be the primary target of stream rehabilitation in the Sarita River watershed. This Level 1 Assessment has identified a number of stream rehabilitation measures that would enhance rearing habitat (and to a lesser extent, stabilize spawning habitat) in this watershed. All species of salmon would benefit from improvements to adult holding habitat throughout Reaches S1-S4 and SS20-SS21. Steelhead and Coho fry would also benefit from an increase in available pool habitat (with cover) in all reaches.

4.2.1 Reach S1 and S2 Sarita River

Reach S1 and S2 were deficient in pools (area and frequency) and wood cover. This limits the capacity of these reaches to provide productive juvenile rearing habitat as well as holding habitat for spawning fish. However, these reaches provided abundant spawning habitat and were extensively used by Chum and Chinook for spawning.

Only the previous LWD placements just upstream of Blenheim Bridge remain to this day. Just about all the LWD structures constructed from 1998 to 2001 in the Sarita and South Sarita River mainstems were displaced and carried downstream during major flood events, most notably during the winter of 2006. Therefore, it is recommended that no

additional LWD placements be made in Reaches S1-S4 of the Sarita River and Reaches SS20-SS21 of the South Sarita River.

Reaches S1 and S2 of the Sarita River have a number of large, unvegetated bars. Measures to promote re-vegetation of these bars would assist in stabilization of the stream channel. The techniques typically involve anchoring LWD onto the bars to promote sediment deposition around the structure and subsequent regeneration of vegetation.

The Sarita River IR#1 side channel was designed by DFO in January 2006 and constructed during the summer of 2006 (Table 2). An as-built drawing of the 6,550 m^2 side channel was completed in November 2006. The side channel is located on the left bank of the Sarita River in Reach S1. The channel discharges to the river at Mine Pool. Floods during the 2006-2007 winter caused some damage to the berms that surround the off-channel area which resulted in considerable sediment inputs to the channel. Floodwaters originated from two tributaries with headwaters on the south side of the Bamfield Mainline. Flows from the west tributary discharge continually into the south side of the off-channel while the east tributary only discharges into the east side of the channel during freshets. Off-channel infilling with fine sediments has been documented as a result of these tributary breaches (Gaboury 2017). Continued in-filling of the off-channel will reduce, over the long term, the functional effectiveness of the channel as fish rearing habitat. Gaboury (2017) recommended that remedial measures should be developed to reduce sediment inputs from these tributaries into the off-channel habitat.

Colquitz Engineering has prepared a preliminary rehabilitation design to manage sediment inputs to the off-channel habitat (Gaboury 2108). The rehabilitation design involves:

1. Stabilizing the existing channel through the berm breach to reduce chronic erosion of berm materials;
2. Removal of the accumulated sediments in the off-channel located immediately west of the breach; and
3. Construction of a sediment trap on the east side of the breach to trap sediments transported by the east tributary during floods.

The armored channel will connect the sediment trap to the off-channel and will allow floodwaters from the tributary to enter the channel. Implementation of this project is scheduled for 2019.

4.2.2 Reach S3 and S4 Sarita River

Reaches S3 and S4 were deficient in pools and wood cover, and exhibited numerous eroding banks. Due to the level and force of flood events, no fish habitat rehabilitation is suggested, apart from the construction of a side channel in Reach S3, just downstream of Blenheim Bridge. The intent of the side channel is to provide a short term, low velocity habitat to allow for the acclimation and imprinting of enhanced Sarita Chinook pre-smolts from the Nitinat Hatchery.

The proposed Blenheim Bridge Side Channel site lies on the left bank of the Sarita River immediately downstream of the Blenheim Bridge crossing. On the surface of the land at the proposed side channel site, there are several shallow, undefined channels that only carry floodwaters from the Sarita River. The existing land topography is ~0.5 to ~3 m higher than the Sarita River.

Colquitz Engineering has prepared a preliminary design for construction of the side channel habitat, tentatively scheduled for 2019. The rehabilitation design involves:

1. Construction of an inlet structure immediately downstream of Blenheim Bridge. The structure will have a 0.4 m diameter culvert with sluice gate to manage flows. The inlet structure will have a riprap weir on the upstream side of the inlet to reduce sediment inputs to the channel; and
2. Construction of a ~400 m long side channel with ~0.5 m deep pools and ~0.4 m high riffles. Channel cross sections would typically have a 1.5 m base and 1.5h:1v side slopes. Soils excavated during channel construction would be side-cast to create a soil berm adjacent to the channel. The outlet of the channel will be located on the outside bank of a meander of the Sarita River, immediately upstream of the confluence with the South Sarita River.

4.2.3 Reach F13-F17 Frederick Creek

Situated within the Sarita River floodplain, Reach F13 of Frederick Creek has a number of side channels that offer rearing habitat for juvenile salmonids. However, many of the side channels and ponds have gravel bars and mud mounds which restrict flows during summer months. One such side channel/pond that receives no flow during the low water period begins on the right bank at the 130 m mark of Reach F13, and extends about 100 m. A gravel mound at the entrance does not allow water to flow through the side channel during low flow periods. The restoration opportunity here is to provide access to the side channel/pond even at low flows. A detailed Level 2 assessment to determine the feasibility of ensuring constant flow to the side channel during low water periods should be undertaken. Other side channels and ponds in this reach (at 514 m, 980 m, 1,024 m and 1,187 m) should also be assessed and appropriate restoration work identified.

Reach F15 has some old growth conifers in the riparian zone. The remaining riparian buffer is second growth from logging in the late 1970's. This reach seems to be functioning relatively well. The riparian buffer zone has maintained crucial cover and provides a more constant stream temperature, input of invertebrates and erosion control. Low priority restoration opportunities in this reach would be: 1) to construct new LWD structures, and/or 2) to secure existing instream LWD to maintain habitat complexity.

The detrimental effects of logging and road building are clearly demonstrated by the presence of a braided channel and the apparent shifting of the channel in the upper section of Reach F16. This channel instability appears to be the result of gravel accumulations upstream of extensive, full-spanning log jams causing channel widening at the ~1,807 m mark. A high priority restoration opportunity would be to remove these

gravel accumulations and log jams and restore the creek to its original channel. The Level 2 Assessment should determine the feasibility of this opportunity by:

1. Conducting a geomorphic assessment to identify upstream sources of gravel and to estimate future supply;
2. Survey cross sections and longitudinal stream profiles along each channel braid; and,
3. If appropriate, design a new single-thread mainstem channel profile with channel complexing (i.e., LWD structures, boulders, etc.).

Also, the riparian vegetation in Reach F16 provides a limited recruitment source for instream LWD. A moderate priority restoration recommendation would be to conduct a riparian assessment and develop silvicultural prescriptions to increase the growth rate and number of large conifers.

Most of Frederick Creek has an insufficient number of pools and only a few of those with cover. Instream rehabilitation measures are proposed for 21 sites within Reach F13 (Sites 85-90), Reach F14 (Sites 83 & 84), Reach F15 (Sites 70-75) and Reach F16 (Sites 76-82) (Gaboury 2018). The rehabilitation design incorporates five logs with rootwads at each site. Each LWD structure will be placed in a relatively deep pool, typically located on the outside of the meander. The biological objective at these sites is to provide instream cover for rearing and holding salmonids. Bank height ranges from 2.5 to 3.0 m. A total of 105 logs and ~210 boulders (0.8 m dia) will be required for the 21 LWD structures. Construction is scheduled for 2019.

4.2.4 Reaches SS20, SS21 and SS22 South Sarita River

No fish habitat restoration is proposed for Reaches SS20 and SS21. Upstream in Reach SS22, there is an opportunity to develop a side channel. However, the preparation of designs for this side channel has been deferred.

4.2.5 Reach SS30 and SS31 South Sarita River

Historical (1960s) and very recent (1995) logging in the area has seriously impacted both Reach SS30 and Reach SS31. In particular, Reach SS30 shows signs of increased bar formation and channel movement. The percent pool rating for Reach SS30 is fair and for Reach SS31 is poor. Some of LWD structures constructed in 2000 and 2001 could be rehabilitated by adding more LWD. Furthermore, extensive silvicultural works should also be undertaken, as a high priority, in the riparian area of these reaches to accelerate growth of conifers. Once rehabilitation works in Reaches SS30 and SS31 are completed, fish distributions, habitat assessments and the identification of restoration opportunities in Reaches SS32 and SS33 should be undertaken.

4.2.6 Reach SC34 Sabrina Creek

Reach SC34 of Sabrina Creek shows signs of channel aggradation in the form of extensive unvegetated bars, channel widening and eroding banks. These aggraded sections are interspersed with stream sections that are confined by the road. The resulting

effect on stream habitat is evident in limited pool frequency and a lack of LWD and other cover elements. Further investigations should be undertaken to determine feasible habitat rehabilitation measures to improve fish habitats.

4.2.7 Reaches SC35, SC36 and SC37 Sabrina Creek

These three reaches in Sabrina Creek have been scoured and the LWD is not evenly distributed throughout these reaches. A total of 75 LWD structures were placed in these reaches in 1999 and 2000 (Table 2). Most of these structures are still functional (Gaboury 2017). For now, no additional LWD structures are proposed. Eventually, some of the existing structures will need to be reconstructed.

Two major logjams, one situated at 1,500 m in Reach SC35 and the other at 650 m in Reach SC37 were lowered in 1999-2001 (Table 2). However, gravel held back by these log jams has moved downstream and has created long stretches (up to 300 m) of gravel accumulations where subsurface flows prevail during low flow periods. No remedial work is proposed to address this but the gravel dominated sections should be monitored to assess the feasibility of implementing rehabilitation measures in the future.

4.2.8 Reach H50 Hunter Creek

This reach provides good juvenile Coho rearing habitat. However, Hunter Creek exhibits extensive areas of scour and eroding banks. The nine LWD structures placed in this reach in 2000 are still providing cover and bank protection. No fish habitat restoration works are proposed for this reach.

5 Pachena River Watershed

5.1 Assessment Results

On the basis of gradient, channel pattern, channel morphology and location of major tributaries, 27 reaches were established in the Pachena River watershed. Reach designations used in this study are illustrated in Figure 2. The location of work for this Level 1 Fish Habitat Assessment was over a distance of 10,960 m in nine high and medium priority reaches, as described below. Reach P1 and P3 to and including Reach P5 were not assessed in 2017.

5.1.1 Stream Habitat Condition

Detailed habitat condition results are presented in five tables located in Appendix 2 as follows: A diagnostic summary of salmonid habitat condition is presented in Table 4. Appendix 2A is a spreadsheet listing detailed habitat attributes in each reach surveyed; Appendix 2B is a summary of area surveyed and percentage of each primary habitat type present in each reach; Appendix 2C is a summary of cover attributes in each reach surveyed; Appendix 2D is a summary of bed material and spawning attributes for surveyed reaches; and Appendix 2E is a summary of LWD attributes for surveyed reaches. Riparian type and canopy cover of all units surveyed are presented in Appendix

Table 4. Diagnostic summary of salmonid habitat condition within the Pachena River watershed.

Reach	% Pools[1]		Pool Frequency[2]		Holding Pools[3]		% Wood in Pools[4]		% Boulder in Riffles[5]		% Overhead Cover[6]		Gravel Quantity[7]		Gravel Quality[8]		Off-channel Habitat[9]	
Number	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating
S1N	28.8	Poor	2.5	Good	7.5	Good	2.9	Poor	-	-	19.5	Fair	46.3	Good	54	Poor	0	Poor
S1S	47.6	Good	1.6	Good	3.7	Good	10.6	Fair	0.0	Poor	30.2	Good	37.7	Good	62	Poor	0	Poor
S2	27.8	Poor	2.6	Good	6.8	Good	5.0	Poor	14.9	Fair	23.9	Good	37.4	Good	19	Fair	1	Fair
R1	28.1	Poor	2.9	Good	7.7	Good	9.8	Fair	2.6	Poor	10.9	Fair	43.9	Good	42	Poor	15	Good
R2	40.8	Good	3.0	Good	14.0	Good	3.5	Poor	8.4	Poor	5.3	Poor	31.6	Good	32	Poor	0	Poor
F1W	18.7	Poor	5.1	Good	3.2	Good	18.7	Fair	0.0	Poor	25.3	Good	23.0	Fair	73	Poor	1	Fair
F1E	39.4	Fair	2.2	Good	18.2	Good	13.7	Fair	0.0	Poor	13.3	Fair	52.4	Good	28	Poor	1	Fair
F1F	69.0	Good	2.2	Good	23.1	Good	1.0	Poor	33.2	Good	12.2	Fair	33.7	Good	24	Fair	1	Fair
P2	24.5	Poor	4.6	Good	8.6	Good	9.4	Fair	0.7	Poor	9.1	Poor	35.8	Good	49	Poor	0	Poor
P6	31.1	Fair	2.7	Good	8.6	Good	16.8	Fair	0.0	Poor	29.8	Good	36.5	Good	61	Poor	4	Good
P7	24.4	Poor	3.7	Good	6.2	Good	9.5	Fair	3.7	Poor	36.3	Good	40.2	Good	36	Poor	1	Fair

[1] Value is percent pools (%P = total pool area / total wetted area). Poor < 30%, Fair <= 40%, Good > 40% (for gradients 2-5%). Modified from Burt and Horchick (1999) and Griffith (1993).

[2] Value is number of bankfull widths per pool (PF = mean bankfull width / total number of pools). Good < 10, Fair <= 15, Poor > 15.

[3] Value is the number of pools per 1000 m for which the deep pool cover > 0 and maximum depth x % total instream cover >= 30. Poor < 1, Fair <= 2, Good > 2.

[4] Value is the mean percent wood cover in pools. Poor < 6%, Fair <= 20%, Good > 20%.

[5] Value is the percent boulder cover in riffles. Poor < 10%, Fair <= 30%, Good > 30%.

[6] Value is the percent overhead cover in pools. Poor < 10%, Fair <= 20%, Good > 20%.

[7] Value is percent spawning area (%Quantity = spawning area / total wetted area). Poor < 10%, Fair <= 25%, Good > 25%.

[8] Value is the percent of substrate in <2 mm category (fines). Poor > 25%, Fair >15% and uncompacted, Good < =15% and uncompacted.

[9] Value is the number of off-channel habitats. Poor < 1, Fair <= 2, Good > 2.

2F. Representative photos for the habitats observed in the Pachena River watershed are presented in the accompanying Photoplates section.

5.1.2 Reaches S1N and S1S – Shaky Bill's Creek

Downstream of the Bamfield Mainline bridge, the mainstem channel split into a north channel (S1N) (Photo 21) and a south channel (S1S) (Photo 22) for ~270 m before joining again into a deep and defined channel among a wetland before flowing into Reach P2 - Pachena River. Mean bankfull width was 21.0 m for Reach S1N and 24.6 m for Reach S1S. Both reaches, located in the floodplain of the Pachena River, had a gradient of 0.5% or less. The channel in both reaches was highly aggraded and not very well defined. Channel disturbance was dominated by the high bedload transported in the reaches. There was only one short 5 m long riffle in Reach S1S. Reach S1S was comprised of approximately 47.6% pools and 51.9% glides while Reach S1N was comprised of approximately 28.8% pools and 71.2% glides (Appendix 2B). Since these reaches were experiencing a high rate of sediment deposition, bed material was dominated by fines (~53.7% in S1N and ~62.3% in S1S), and gravel. The prevalence of fine bed material in both these reaches resulted in a poor rating for spawning quality (Appendix 2D). However, spawning gravel quantity was rated good (Table 4).

Total percent instream cover in Reach S1N was highest in pools (2.9%) followed by glides (1.7%). Total percent instream cover in Reach S1S was highest in pools (28.1%) followed by glides (3.3%). On average for all habitat types, major sources of instream cover were LWD/SWD (2.1%) in Reach S1N and pools with depth >1.0 m (8.3%) in Reach S1S. Overhanging vegetation averaged 17.4% in Reach S1N and 25.1% in Reach S1S.

Habitat condition parameters receiving poor ratings included percent pool, percent wood in pools, percent boulders in riffles and gravel quality. Gravel quantity, frequency of adult holding pools (7.5/km), and pool frequency were all considered good while percent overhead cover was considered fair. Off-channel habitat condition was rated poor with no channels found. However, it is anticipated there are numerous side channels during flood events.

5.1.3 Reach S2 – Shaky Bill's Creek

Reach S2 extended 585 m from just downstream of the Bamfield Mainline bridge to a 1.2 m diameter cedar sill log embedded in the channel next to a pile of LWD. In 2005, five LWD structures were constructed in this reach including a large structure with LWD taken from a massive log jam (chainage 185 to 265 m) that represented an impassable barrier to upstream fish migration (Table 2). This structure redirected flows towards the right bank where a new channel formed. Channel disturbances included logging and the bridge on the Bamfield Mainline.

Mean bankfull width for Reach S2 of Shaky Bill's Creek was 16.3 m, with similar proportions of riffle (37.3%), pool (27.8%) and glide (34.9%) habitat types (Photo 23). Channel gradient averaged 1.4%. The predominant substrates found were cobble (37.7%) and gravel (29.9%) (Appendix 2D). The moderate content of sand (18.6%)

resulted in a fair rating for spawning quality. Channel type for Reach S2 was characterized as relatively stable riffle-pool morphology with cobble and gravel substrate (RPcg: S; Hogan et al. 1996) (Photo 23). Spawning quantity (888 m^2) was rated as good (Table 4). The number of functional instream LWD pieces totaled 117 (>0.2 m diameter) (Appendix 2E) but habitat condition rating for percent wood in pools was considered poor.

Total percent instream cover in Reach S2 was highest in pools (30.6%) followed by riffles (17.0%). On average for all habitat types, major sources of instream cover were boulders (10.0%) and LWD/SWD (3.2%). Overhanging vegetation averaged 9.9%.

Habitat condition parameters receiving poor ratings included percent pool and percent wood in pools. Gravel quantity, frequency of adult holding pools (7.5/km), percent overhead cover, and pool frequency were all considered good while percent boulder in riffles and gravel quality were considered fair. Off-channel habitat condition was rated fair with one accessible side channel found.

5.1.4 Reach R1 – Rousseau Creek

Reach R1 extended 3,266 m from the confluence with Reach P5 (at large downed cross-channel cedar) to 30 m upstream of the 3.5 m deep and 25 m long plunge pool and (former) log jam. In 2005, 13 unballasted LWD structures were built in Reach R1 of Rousseau Creek (Table 2). Only a four of these LWD structures remained and were evaluated as highly functional in a Routine Effectiveness Evaluation conducted in 2017 (Gaboury 2017). Two enormous log jams at the upstream end (one from chainage ~2,480 m to ~2,530 m and the other from 3,410 m to 3,440 m) of this reach were de-built. From 2005 to November 2017 these log jams did not reform at these locations, as documented in this fish habitat assessment. However, during a swim count in December 2018, a log jam extending some 30 m upstream from chainage 2,480 m had reformed. This once again impeded upstream fish migration. This log jam was de-built in September 2018 and fish access was restored.

Channel type for Reach R1 was characterized as riffle-pool morphology with predominantly fines (41.8%) and gravel (41.1%) substrate (Appendix 2D). The channel was considered as over-widened and severely aggraded with eroding streambanks and evidence of channel avulsions (RPg-w: A3; Hogan et al. 1996). Mean bankfull width for Reach R1 was 29.1 m, with instream habitat dominated by glides (52.0%), followed by pools (28.1%) and riffles (20.0%) (Photo 24). Channel gradient averaged 1.4% in Reach R1. The relatively high content of sand resulted in a poor rating for spawning quality. Spawning gravel quantity was 10,125 m^2 and rated as good. In fact, this reach was second to Reach P2 of the Pachena River in available spawning gravel area. Functional instream LWD (>0.2 m diameter) totaled 407 pieces (Appendix 2E). Habitat condition 'percent wood in pools' was rated as fair.

Total percent instream cover in Reach R1 was highest in pools (53.0%) followed by glides (4.1%). On average for all habitat types, major sources of instream cover were

pools with depth >1.0 m (11.6%) and LWD/SWD (4.6%). Overhanging vegetation averaged 4.8%.

Habitat condition parameters receiving poor ratings included percent pool, percent boulder in riffles and gravel quality (Table 4). Gravel quantity, frequency of adult holding pools (7.7/km), and pool frequency were all considered good while percent overhead cover and percent wood in pools were considered fair. Off-channel habitat condition was rated good with 15 accessible side channels and wetlands from 10 to 190 m long.

5.1.5 Reach R2 – Rousseau Creek

Reach R2 extended 645 m upstream where the channel narrows and the substrate became mostly cobble and boulders. Logging was the main cause of channel disturbance in this Reach.

Channel type for Reach R2 was characterized as riffle-pool morphology. The channel was considered as over-widened and aggraded with eroding streambanks and evidence of channel avulsions (RPg-w: A; Hogan et al. 1996) (Photo 25). Mean bankfull width was 21.5 m, with instream habitat dominated by pools (40.8%), followed by glides (37.0%) and riffles (22.2%). Channel gradient averaged 1.9%. Substrates were comprised of cobble (~37.3%), fines (~32.4%), gravel (~24.1%), boulders (~3.7%) and bedrock (~2.4%) (Appendix 2D). The relatively high content of fines resulted in a poor rating for spawning quality. Spawning gravel area was estimated at 1,070 m^2. Functional instream LWD (>0.2 m diameter) totaled only 51 pieces (Appendix 2E). Habitat condition 'percent wood in pools' was rated as poor.

Total percent instream cover in Reach R2 was highest in pools (28.1%) followed by riffles (9.3%) (Appendix 2C). On average for all habitat types, major sources of instream cover were pools with depth >1.0 m (9.4%) and boulder (2.4%). Overhanging vegetation averaged 0.6%.

Habitat condition parameters receiving poor ratings included percent wood in pools, percent boulder in riffles and gravel quality (Table 4). Gravel quantity, percent pool, pool frequency, frequency of adult holding pools (7.7/km), and gravel quantity were all considered good. Off-channel habitat condition was rated poor with no side channels found.

5.1.6 Reaches F1W and F1E – Tributary F

At the downstream end of Reach F1F, Tributary F split into a west channel (F1W) and an east channel (F1E). Reach F1W extended 308 m and Reach F1E was 275 m long before flowing into Reach R1 – Rousseau Creek. Mean bankfull width was 20.1 m for Reach F1W (Photo 26) and 25.0 m for Reach F1E (Photo 27). Both reaches had mean gradients of ~1%. Reach F1W was comprised of 76.1% glides, 18.7% pools and only 5.2% riffles while F1E was 46.5% glides, 39.4% pools and 14.1% riffles (Appendix 2B). Functional instream LWD (>0.2 m diameter) totaled only 113 and 53 in Reach F1W and F1E, respectively (Appendix 2E). Channel type of both these channels was characterized by

having extensive gravel deposition areas and a few deeper pools in a poorly defined channel. The oversupply of gravel and fines in these channels indicated a channel morphology type of moderate to severely aggraded riffle-pool (RPg-w: A2-A3) (Hogan et al. 1996). Bed material was dominated by fines (73.5%), followed by gravel (22.2%) and cobble (4.3%) in Reach F1W, and gravel (47.7%), fines (28.4%) and cobble (23.5%) in Reach F1E. The high percentage of fine bed material in both these reaches resulted in a poor rating for spawning quality (Appendix 2D). Spawning gravel quantity was rated fair for Reach F1W and good for Reach F1E. It was noteworthy that F1W was the only reach in all the reaches examined during this assessment of the Pachena River watershed that received a rating of fair for spawning gravel quantity.

Total percent instream cover in Reach F1W was highest in glides (26.7%) whereas Reach F1E was highest in pools (25.3%) (Appendix 2C). On average for all habitat types, major sources of instream cover for Reach F1W and F1E were LWD/SWD (23.5% and 7.6%, respectively) followed by pools with depth >1.0 m (0.5% and 4.6%, respectively). Overhanging vegetation averaged 1.7 and 3.5%, respectively.

For Reach F1W, habitat condition parameters receiving poor ratings included percent pools, and percent boulder in riffles (Table 4). Pool frequency, frequency of adult holding pools (3.2/km), and percent overhead cover were all considered good. Percent wood in pools was considered fair.

For Reach F1E, percent boulder in riffles received a poor rating. Pool frequency and frequency of adult holding pools (18.2/km) were considered good. Percent pools, percent wood in pools, and percent overhead cover were considered fair. Both reaches had one side channel each, giving a rating of fair for off-channel habitat.

5.1.7 Reach F1F – Tributary F

Reach F1F was 607 m long from just upstream of the log jam to two impassable falls, ~10 m and ~30 m high. Channel disturbances included logging, and the presence of a massive historic logjam ~70 m long at the downstream end of this reach.

Channel type for Reach F1F was characterized as aggraded riffle-pool morphology with predominantly gravel and sand substrate (RPg-A2). The channel was considered as over-widened and moderately aggraded with eroding streambanks and evidence of channel avulsions (RPg-w: A2; Hogan et al. 1996). Mean bankfull width for Reach F1F was 18.1 m, with instream habitat dominated by pools (69.0%), followed by riffles (19.9%), glides (10.0%) and cascades (1.1%) (Photo 28). Channel gradient averaged 2.6%. Functional instream LWD (>0.2 m diameter) totaled only 51 pieces (Appendix 2E). The predominant substrate was gravel (31.1%) and fines (23.7%), followed by bedrock (20.8%), cobble (13.0%) and boulders (11.3%) (Appendix 2D). The relatively high content of sand resulted in a fair rating for spawning quality. Spawning gravel quantity was 1,148 m^2, which was rated as good (Table 4).

Total percent instream cover in Reach F1F was highest in pools (52.3%) followed by riffles (33.7%). On average for all habitat types, major sources of instream cover were

pools with depth >1.0 m (31.5%) and boulder (11.2%). No overhanging vegetation was found influencing instream cover.

Habitat condition parameter percent wood in pools received a poor rating. Percent pool, pool frequency, frequency of adult holding pools (23.1/km), and percent boulder in riffles were all considered good. Percent overhead cover was rated fair. Off-channel habitat condition was rated fair with one side channel found.

5.1.8 Reach P2

Reach P2 extended 2,450 m from 70 m downstream of the Bamfield Mainline bridge to an area where the channel deepened into a glide 8 m wide and 1.2 m deep, and riparian vegetation changed from mature forest to deciduous shrubs (Photo 29). Channel disturbances in Reach P2 included: 1) recent logging, and 2) the Pachena River bridge.

Channel type for Reach P2 was characterized as riffle-pool morphology with predominantly sand and gravel substrate. The channel was considered as over-widened and moderately aggraded with eroding streambanks (RPg-w: A2; Hogan et al. 1996). Mean bankfull width for Reach P2 was 21.1 m. Instream habitat types were glides (63.1%), pools (24.5%) and riffles (12.5%) (Appendix 2B). Channel gradient averaged 1.1%. The predominant substrate found was sand (49.1%) followed by gravel (32.7%) (Appendix 2D). As a result of the high fines content, spawning quality was generally poor. Spawning gravel quantity was estimated at 13,190 m^2. This was the most of any reaches documented during this Pachena River watershed fish habitat assessment.

Functional instream LWD (>0.2 m diameter) totaled 362 in this reach (Appendix 2E), which included numerous large, full-spanning Douglas fir that were wind thrown following recent logging in the downstream end of this reach. Even with this high number of LWD present in this reach, habitat condition rating for percent wood in pools was considered fair (Table 4).

Total percent instream cover in Reach P2 was highest in pools (35.3%) followed by riffles (13.3%) (Appendix 2C). On average for all habitat types, major sources of instream cover were pools with depth >1.0 m (5.9%) and LWD/SWD (5.2%). Overhanging vegetation averaged 2.5%.

Habitat condition parameters receiving poor ratings included percent pools, percent boulder in riffles and percent overhead cover. Pool frequency and frequency of adult holding pools (8.6/km) were considered good. Off-channel habitat condition was rated poor with no side channels found.

5.1.9 Reach P6

Reach P6 extended 1,043 m upstream of the wetland to approximately 30 m upstream of a bridge on the Sugsaw hook-up logging road (BM2600) where Tributary G entered Reach P6. Channel disturbances included historic and recent logging, as well as the BM2600 bridge. Mean bankfull width for Reach P6 was 24.4 m. The channel was considered as over-widened and moderately aggraded with many eroding streambanks

(RPg-w: A2; Hogan et al. 1996) (Photo 31). Dominant instream habitat types included glides (63.5%) and pools (31.1%) (Appendix 2B). Channel gradient averaged 1.0%. The predominant substrate found were fines (61.2%) followed by gravel (35.9%) (Appendix 2D). As a result of the high fines content, spawning quality was generally poor. Functional instream LWD (>0.2 m diameter) numbered 114 in this reach (Appendix 2E). Habitat condition rating for percent wood in pools was considered fair (Table 4).

Total percent instream cover in Reach P6 was highest in pools (30.6%) followed by riffles (10.8%) (Appendix 2C). On average for all habitat types, major sources of instream cover were LWD/SWD (6.6) and pools with depth >1.0 m (4.2%). Overhanging vegetation averaged 22.9%.

Habitat condition parameter percent boulder in riffles received a poor rating. Habitat condition parameters receiving fair ratings included percent pools and percent wood in pools. Pool frequency, frequency of adult holding pools (8.6/km) and percent overhead cover were all considered good. Off-channel habitat condition was rated good with four 10 to 30 m long accessible side channels.

5.1.10 Reach P7

Reach P7 stretched 975 upstream from the confluence with tributary G to an approximately 3 m high falls. In 2005, to provide fish passage during high flows, the falls were backwatered by dropping a 3 m diameter spruce LWD onto the streambed (Table 2). There was now a small log jam downstream of the pool at the foot of the falls which provided LWD cover for fish and helped backwater the falls during high flow events. The predominant channel disturbance in this reach was logging.

Channel type for Reach P7 was characterized as riffle-pool morphology with predominantly gravel and sand substrate. The channel was considered as over-widened and moderately aggraded with eroding streambanks (RPg-w: A2; Hogan et al. 1996). Mean bankfull width for Reach P7 was 13.3 m, with dominant instream habitat types of glide (56.3%) and pool (24.4%) (Appendix 2B; Photo 32). Channel gradient averaged 1.8%. The predominant substrate found was gravel (38.2%) and fines (36.0%) (Appendix 2D). Bedrock represented 11.7% of this reach. The relatively high content of fines resulted in a poor rating for spawning quality. The total number of functional instream LWD (>0.2 m diameter) was 132 (Appendix 2E). Habitat condition rating for percent wood in pools was considered fair (Table 4).

Total percent instream cover in Reach P7 was highest in pools (23.0%) followed by glides (9.9%) (Appendix 2C). On average for all habitat types, major sources of instream cover were LWD/SWD (5.7%) and pools with depth >1.0 m (2.1%). Overhanging vegetation averaged 27.5%.

Habitat condition parameters receiving poor ratings included percent pools and percent boulder in riffles. Pool frequency, percent overhead cover, gravel quantity, and frequency of adult holding pools (6.2/km) were considered good. Percent wood in pools

was considered fair. Off-channel habitat condition was rated fair with one 20 m long accessible side channel.

5.2 Stream Rehabilitation Options

5.2.1 Reaches S1N and S1S - Shaky Bill's Creek

These two branches of Shaky Bill's Creek downstream of the Bamfield Mainline bridge were within the floodplain of the Pachena River mainstem. However, restoration work could involve re-defining the channels of both branches and adding some LWD cover. Reaches S1N and S1S should be re-examined in 2019.

5.2.2 Reach S2 – Shaky Bill's Creek

The construction of a double DJ-5 LWD structure was proposed at one site at chainage 103 m of Reach S2, measured upstream from the bridge crossing on the Bamfield Mainline (Gaboury 2018). Bank height at the rehabilitation site was ~1.0 m. A total of 10 logs and ~20 boulders (0.8 m diameter) will be required for the LWD structure.

5.2.3 Reach R1 – Rousseau Creek

Instream LWD structures were proposed for 25 sites within Reach R1 (Sites 35 to 59) (Gaboury 2018). These sites were located from chainage 25 to 200 m downstream of the Bamfield Mainline and 108 to 1,452 m upstream of the Bamfield Mainline. Bank height ranged from ~0.4 to ~5.0 m. A total of 125 logs and ~250 boulders (0.8 m diameter) will be required.

Potentially, the logjam at 2,480 m may reform during the 2018-2019 winter. De-building the log jam at this location will be a priority when building the LWD structures in Reach R1 in 2019.

5.2.4 Reach R2 – Rousseau Creek

No LWD structures were proposed for Reach R2 because access for an excavator is very difficult due to a deep and confined plunge pool and remnants of a massive log jam at chainage ~3,240 m in Reach R1.

5.2.5 Reaches F1W and F1E - Tributary F

The restoration design for Sites 60, 61 and 62 in Reach F1E involved the construction of a DJ5 structures at each site (Gaboury 2018). Bank height ranged from 0.2 to 0.5 m. Logs from the log jam at the upstream end of these reaches were available onsite for construction of structures at Sites 61 and 62.

5.2.6 Reach F1F - Tributary F

Seven LWD structures were proposed for Reach F1F at Sites 63-69 (Gaboury 2018). Bank heights ranged from ~0.6 to ~5.0 m. Logs were available onsite for construction of some of the structures in this reach.

5.2.7 Reach P2 – Pachena River

Instream rehabilitation measures were proposed for seven sites within Reach P2 (Sites 1-7) (Gaboury 2018). The seven sites extended from chainage 175 to 927 m in Reach P2, measured from the bridge crossing at the downstream end of the reach. Bank heights ranged from ~2.0 to ~3.0 m.

5.2.8 Reach P6 – Pachena River

Instream rehabilitation measures were proposed for 22 sites within Reach P6 (Sites 10-31) (Gaboury 2018). The rehabilitation design for these sites incorporated one DJ-5 LWD structure at each site. Bank height ranged from ~0.5 to ~4.0 m. A total of 110 logs and ~220 boulders (0.8 m diameter) will be required for the 22 LWD structures.

5.2.9 Reach P7 – Pachena River

No LWD structures were proposed for this reach.

5.2.10 Other Habitats Not Assessed in 2017

5.2.10.1 Reach P4- Pachena River

Instream LWD structures were proposed for two sites within Reach P4 (Gaboury 2018); one at Site 8A at 250 m and another at Site 8 at 304 m (measured downstream from where Reach P5 and Rousseau Creek merge under the large cross-channel cedar) (Photo 30).

5.2.10.2 Tributary G

Two LWD structures were proposed for Tributary G at chainage 17 and 53 m, measured upstream from the P7-G1 reach break (Gaboury 2018). Bank height at the rehabilitation sites ranged from ~0.6 to ~2.0 m. A total of 10 logs and ~20 boulders (0.8 m diameter) will be required for the LWD structures with one DJ-5 LWD structure per site.

6 Discussion

6.1 Sarita River Watershed

In summary, salmonid habitat condition ratings for 2017 surveyed reaches within the Sarita River watershed were generally considered fair to good for pool frequency, holding pools and gravel quantity (Table 3). Percent pools (total pool area / total wetted area) were considered predominantly poor in Sarita River mainstem reaches S1-S4, South Sarita River reaches SS21, SS27, and all reaches of Sabrina and Hunter creeks. Cover in the form of LWD in pools and boulders in riffles were rated poor to fair for most reaches. Gravel quality was quite variable ranging from poor to good in the surveyed reaches.

Poor gravel quality and percent pools suggested that the high sediment transport rates, evident in the tributaries and mainstems, have caused extensive channel aggradation. As a consequence, fine sediments have infilled spawning gravels reducing their quality for

egg incubation, and coarse and fine sediments have infilled pools reducing total pool area. Also, fine and coarse sediments have infilled riffle habitats reducing the apparent percent boulder content and cover.

The historic riparian logging along most of the surveyed reaches in the Sarita River watershed has reduced LWD recruitment to the streams and therefore the amount of LWD cover in pools. As an interim and mitigative measure to compensate for the reduced cover in pools, LWD structures should be constructed (as proposed in Gaboury 2018) in suitable pools sites within the tributaries. Restoration recommendations for the Sarita River watershed are:

- LWD structures are recommended for 21 sites within Reach 13 (Sites 85-90), Reach 15 (Sites 70-75, 83, 84) and Reach 16 (Sites 76-82) of Frederick Creek (Gaboury 2018). The plan is to construct these LWD structures during the summer of 2019. The biological objective of the LWD structures is to provide instream cover for rearing and holding salmonids. At each site, the rehabilitation design incorporates one DJ-5 LWD structure, which will be placed in a relatively deep pool, typically located on the outside of the meander. Each structure will consist of five Cedar logs 0.5 m in diameter at breast height (DBH) with 10 - 0.8 m diameter rocks as ballast.
- Works are also proposed at two off-channel habitats in the lower Sarita River: 1) maintenance of the existing Thlaa-Thlaa-Chis (IR#1) groundwater channel on the left bank of the river; and 2) construction of a new side channel immediately downstream of the Blenheim Bridge (Gaboury 2018).

Further monitoring similar to the Routine Effectiveness Evaluation conducted in 2017 (Gaboury 2017) should also be repeated in five year increments to determine if constructed LWD and riffle structures, and off-channels require maintenance.

In comparison to the FHAP conducted in 1997 (Ochman 1998), the 2017 FHAP showed similar results for the eight habitat condition parameters (Table 5). (Note: except for substrate composition, the raw data from the 1997 FHAP were re-analyzed using the same habitat condition criteria as the 2017 FHAP. Consequently, only the ratings for gravel quantity and gravel quality were reproduced from Table 5 in Ochman (1998)). Both years had good habitat condition ratings for pool frequency, holding pools, and gravel quantity. Predominantly poor to fair habitat condition ratings were found in 1997 and 2017 for percent pools, percent boulder in riffles, and percent overhead cover suggesting that sediment loadings have not declined appreciably or historic loads are still migrating through the stream channels. Gravel quality was generally considered poorer in 2017 but this could be due primarily to the difference in criteria categories for poor, fair and good between the two years. LWD (>0.2 m diameter) density within the surveyed sections increased appreciably for Sarita River S1, South Sarita River SS30, Sabrina Creek SC34, SC35 and SC37 and Hunter Creek H50, but decreased for Sarita River S2, and Frederick Creek F13 and F14 (Table 6). Increased densities in Sabrina and Hunter creeks is likely due to LWD structures constructed in 1999-2001 (Table 2) that have persisted to the present day, as well as additional LWD that have migrated downstream and lodged onto the constructed structures.

Table 5. Comparison of habitat condition for Sarita River watershed in 1997 and 2017.

Stream	Reach Number	% Pools[1]		Pool Frequency[2]		Holding Pools[3]		% Boulder in Riffles[5]		% Overhead Cover[6]		Gravel Quantity[7]		Gravel Quality[8]		Off-channel Habitat[9]	
		1997	2017	1997	2017	1997	2017	1997	2017	1997	2017	1997	2017	1997	2017	1997	2017
Sarita	S1	Fair	Poor	Fair	Poor	Fair	Fair	Poor	Poor	Poor	Poor	Good	Good	Fair	Good	Good	Good
	S2	Poor	Poor	Good	Good	Good	Good	Poor	Fair	Poor	Poor	Good	Good	Fair	Fair	Good	Poor
	S3	Poor	Poor	Good	Good	Good	Good	Poor	Poor	Poor	Poor	Good	Good	Good	Poor	Good	Good
	S4	Fair	Poor	Good	Good	Good	Good	Poor	Poor	Poor	Fair	Good	Good	Good	Good	Good	Good
Frederick	F13	Fair	Fair	Good	Good	Good	Good	Poor	Poor	Fair	Fair	Good	Good	Fair	Poor	Good	Good
	F14	Fair	Fair	Good	Good	Good	Good	Poor	Poor	Poor	Fair	Good	Good	Poor	Poor	Good	Good
	F15	Poor	Fair	Good	Good	Good	Good	Poor	Poor	Poor	Poor	Good	Good	Fair	Poor	Good	Good
	F16	Poor	Fair	Poor	Good	Good	Good	-	Poor	Poor	Fair	Fair	Good	Poor	Poor	Good	Good
	F17	Fair	Poor	Good	Good	Good	Good	Poor	Poor	Fair	Fair	Good	Good	Fair	Poor	Good	Poor
South Sarita	SS20	Poor	Good	Good	Good	Good	Good	Poor	Poor	Poor	Poor	Good	Good	Fair	Poor	Poor	Fair
	SS21	Poor	Poor	Good	Good	Good	Good	Fair	Fair	Poor	Fair	Good	Good	Good	Poor	Fair	Poor
	SS27	Poor	Poor	Good	Good	Good	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Good	Poor
	SS30	Poor	Fair	Good	Good	Good	Good	Poor	Fair	Poor	Fair	Good	Good	Good	Fair	Poor	Good
	SS31	Poor	Poor	Fair	Fair	Good	Good	Good	Fair	Good	Good	Good	Good	Good	Good	Poor	Poor
Sabrina	SC34	Poor	Poor	Good	Good	Good	Good	Fair	Fair	Fair	Fair	Good	Fair	Fair	Poor	Fair	Poor
	SC35	Poor	Poor	Good	Good	Good	Good	Poor	Poor	Poor	Good	Good	Fair	Good	Poor	Fair	Fair
	SC36	Poor	Poor	Poor	Poor	Good	Good	Good	Fair	Good	Good	Good	Fair	Good	Fair	Poor	Poor
	SC37	Poor	Poor	Good	Good	Good	Good	Fair	Fair	Good	Good	Good	Fair	Good	Poor	Good	Poor
Hunter	H50	Poor	Poor	Good	Good	Good	Good	Fair	Fair	Good	Good	Good	Good	Good	Fair	Fair	Fair

1997 2017 [1] Value is percent pools (%P = total pool area / total wetted area). Poor < 30%, Fair <= 40%, Good > 40% (for gradients 2-5%).

1997 2017 [2] Value is number of bankfull widths per pool (PF = mean bankfull width / total number of pools). Good < 10, Fair <= 15, Poor > 15.

1997 2017 [3] Value is the number of pools per 1000 m for which the deep pool cover > 0 and maximum depth x % total instream cover >= 30. Poor < 1, Fair <= 2, Good > 2.

1997 2017 [5] Value is the percent boulder cover in riffles. Poor < 10%, Fair <= 30%, Good > 30%.

1997 2017 [6]Value is the percent overhead cover in pools. Poor < 10%, Fair <= 20%, Good > 20%.

1997 2017 [7] Value is the percent spawning area (%Q = spawning area / total wetted area). Poor < 10%, Fair <= 25% and Good > 25%.

1997 [8] Value is the percent of substrate in <2 mm category (fines). Poor > 50%, Fair <=50% and Good <25% and uncompacted.

2017 [8] Value is the percent of substrate in <2 mm category (fines). Poor > 25%, Fair >15% and uncompacted, Good < =15% and uncompacted.

1997 2017 [9] Value is the number of off-channel habitats. Poor < 1, Fair <= 2, Good > 2.

Table 6. Comparison of LWD density in Sarita River watershed streams in 1997 and 2017.

Stream	Reach	Surveyed Length (m)		LWD Density (#/km)	
		2001	2017	1997	2017
Sarita	S1	3770	1445	11.1	29.1
	S2	1300	1265	11.5	3.2
	S3	946	930	24.3	30.1
	S4	3275	3270	11.3	15.0
Frederick	F13	1285	1725	145.5	71.3
	F14	647	545	202.5	115.6
	F15	360	640	86.1	73.4
	F16	2263	1298	74.7	75.5
	F17	1321	1500	99.9	74.7
South Sarita	SS20	1163	1070	26.7	50.5
	SS21	2957	1240	3.0	11.3
	SS27	689	580	17.4	15.5
	SS30	337	380	20.8	150.0
	SS31	787	760	8.9	17.1
Sabrina	SC34	1436	1510	32.7	132.5
	SC35	1742	1600	68.9	209.4
	SC36	260	430	11.5	14.0
	SC37	1236	1225	62.3	124.1
Hunter	H50	700	675	71.4	235.6

6.2 Pachena River Watershed

In summary, salmonid habitat condition ratings for 2017 surveyed reaches within the Pachena River watershed were generally considered good for pool frequency, holding pools and gravel quantity (Table 4). Percent pools (total pool area / total wetted area) were considered poor to good in Pachena River mainstem and tributary reaches. Cover in the form of LWD in pools, boulders in riffles and gravel quality were rated either poor or fair in all reaches.

Similar to the streams in the Sarita River watershed, the relatively poor gravel quality and, in some cases, poor percent pools ratings suggests that the high sediment transport rates, evident in the tributaries and mainstems, have caused extensive channel aggradation. As a consequence of the high sediment loads and numerous channel avulsions, fine sediments have infilled spawning gravels reducing their quality for egg incubation, and coarse and fine sediments have infilled pools reducing total pool area. Also, fine and coarse sediments have infilled riffle habitats reducing the apparent percent boulder content and cover.

The historic riparian logging along most of the surveyed reaches in the Pachena River watershed has reduced LWD recruitment to the streams and therefore the amount of

LWD cover in pools. As an interim and mitigative measure to compensate for the reduced cover in pools, LWD structures should be constructed (as proposed in Gaboury 2018) in suitable pools sites within the tributaries. Restoration recommendations for the Pachena River watershed are:

- LWD structures are recommended for Reaches P2, P4, P6 and R1, as well as Reach S2 of Shaky Bill's Creek, and tributaries G and F1F (Gaboury 2018). The plan is to construct about 70 LWD structures in these reaches during the summer of 2019. The biological objective of the LWD structures is to provide instream cover for rearing and holding salmonids. At each site, the rehabilitation design incorporates one DJ-5 LWD structure, which will be placed in a relatively deep pool, typically located on the outside of the meander. Each structure will consist of five Cedar logs 0.5 m in diameter at breast height (DBH) with 10 - 0.8 m diameter rocks as ballast.
- Sufficient side channel habitat exists within the watershed, and additional side channel projects are not recommended.

Further monitoring similar to the Routine Effectiveness Evaluation conducted in 2017 (Gaboury 2017) should also be repeated in five year increments to determine if constructed LWD structures require maintenance.

In comparison to the FHAP conducted in 2001 (Morgan 2002), the 2017 FHAP showed fairly similar results for the eight habitat condition parameters (Table 7). Both years had good habitat condition ratings for pool frequency, holding pools, and gravel quantity. Predominantly poor to good habitat condition ratings were found in 2001 and 2017 for percent pools, percent boulder in riffles, and percent overhead cover suggesting that sediment loadings have not declined appreciably or historic loads are still migrating through the stream channels. Gravel quality had declined slightly in 2017. LWD density within the surveyed sections decreased appreciably for all reaches except Pachena River P2 (Table 8). The decreased LWD (>0.2 m diameter) density again suggests that LWD recruitment of large conifers from the riparian corridor to stream habitats has been impacted by historic riparian logging.

Table 7. Comparison of habitat condition for Pachena River watershed in 2001 and 2017.

Stream / Reach	% Pools[1]		Pool Frequency[2]		Holding Pools[3]		% Wood in Pools[4]		% Boulder in Riffles[5]		% Overhead Cover[6]		Gravel Quantity[7]		Gravel Quality[8]		Off-channel Habitat[9]	
	2001	2017	2001	2017	2001	2017	2001	2017	2001	2017	2001	2017	2001	2017	2001	2017	2001	2017
Shaky Bill's	Poor	Poor-Good	Good	Good	Good	Good	Fair	Poor-Fair	Poor	Poor-Fair	Fair	Fair-Good	Good	Good	Fair	Poor-Fair	Good	Poor-Fair
Rousseau	Good	Poor-Good	Good	Good	Good	Good	Poor-Fair	Poor-Fair	Poor	Poor	Poor-Fair	Poor-Fair	Good	Good	Poor-Good	Poor	Good	Poor-Good
Trib F	Good	Poor-Good	Good	Good	Good	Good	Poor-Fair	Poor-Fair	Poor	Poor-Good	Poor-Good	Fair-Good	Good	Fair-Good	Good	Poor-Fair	Good	Fair
Pachena-P2	Poor	Poor	Good	Good	Good	Good	Poor	Fair	Poor	Poor	Poor	Poor	Good	Good	Good	Poor	Poor	Poor
Pachena-P6	Good	Fair	Good	Good	Good	Good	Fair	Fair	Poor	Poor	Good	Good	Good	Good	Poor	Poor	Good	Good
Pachena-P7	Good	Poor	Good	Good	Good	Good	Poor	Fair	Poor	Poor	Good	Good	Good	Good	Poor	Poor	Good	Fair

[1] Value is percent pools (%P = total pool area / total wetted area). Poor < 30%, Fair <= 40%, Good > 40% (for gradients 2-5%).

[2] Value is number of bankfull widths per pool (PF = mean bankfull width / total number of pools). Good < 10, Fair <= 15, Poor > 15.

[3] Value is the number of pools per 1000 m for which the deep pool cover > 0 and maximum depth x % total instream cover >= 30. Poor < 1, Fair <= 2, Good > 2.

[4] Value is the mean percent wood cover in pools. Poor < 6%, Fair <= 20%, Good > 20%.

[5] Value is the percent boulder cover in riffles. Poor < 10%, Fair <= 30%, Good > 30%.

[8] Value is percent spawning area (%Quantity = spawning area / total wetted area). Poor < 10%, Fair <= 25%, Good > 25%.

[7] Value reflects the percentage of spawning gravel in all habitat areas of each reach. Poor < 10%, Fair <= 25%, Good >25%

[8] Value is the percent of substrate in <2 mm category (fines). Poor > 25%, Fair >15% and uncompacted, Good < =15% and uncompacted.

[9] Value is the number of off-channel habitats. Poor < 1, Fair <= 2, Good > 2.

Table 8. Comparison of LWD density in Pachena River watershed streams in 2001 and 2017.

Stream / Reach	Surveyed Length (m)		LWD Density (#/km)	
	2001	2017	2001	2017
Shaky Bill's	826	1120	362.0	158.0
Rousseau	5425	3911	296.1	117.1
Trib F	844	1190	419.4	182.4
Pachena-P2	1495	2450	112.4	147.8
Pachena-P6	929	1043	315.4	109.3
Pachena-P7	972	975	227.4	135.4

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APPENDICES

Appendix 1. Fish habitat assessment data for Sarita River watershed.

Appendix 1A. Detailed habitat descriptions for selected reaches in Sarita River watershed.

														Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)						Off-channel Habitat				
Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)	Channel Disturbances[12]	Barriers[13]
Sarita	S1	0	P	1	50		1.50	4.00	0.3	50.0	24.0	1200	70	30				AR	M	360	4.0	0.6	3.4	R	Y	2	2						70		70		SL	G	40	DW WG	
Sarita	S1	50	G	1	390		0.50	1.00	0.3	70.0	20.0	7800	20	20	60			AR	H	2496						40	10	10	20	1			5		6					EB PD WG	
Sarita	S1		P	3	60		1.50	3.00	0.3	60.0	8.0	480	50	50				AR		240	3.0	0.2	2.8	R	Y	1	1						80		80		SL	G	20		
Sarita	S1	440	R	1	30	1.0	0.15	0.20	0.5	50.0	5.0	150		100				AR		150						0									0						
Sarita	S1	470	G	1	205		0.40	0.80	1.0	60.0	18.0	3690		30	70			AR	M	1624						7	3	3	1						0					EB DW WG	MB FP PD
Sarita	S1	675	R	1	215	1.0	0.20	0.25	3.0	65.0	15.0	3225		5	90	5		AR	L	742						0					5				5					EB FP MB	
Sarita	S1	890	G	1	125		0.40	0.50	2.0	40.0	38.0	4750		50	50			AR	H	2850						2		2							0					EB FP	
Sarita	S1	1015	G	1	170		0.35	0.45	2.0	32.0	12.0	2040		30	70			AR	M	898						5		5							0		SC	G	300	EB MB PD FP DW	
Sarita	S1	1185	R	1	40	1.0	0.20	0.30	3.0	27.0	28.0	1120		70	30			AR	H	851						0									0	2				EB FP	
Sarita	S1	1225	G	1	90		0.70	1.20	3.0	25.0	30.0	2700		80	20			AR	M	2268						1	1								0	2				EB FP	
Sarita	S1	1315	R	1	60	1.0	0.20	0.25	3.0	11.0	30.0	1800		20	80			AR	L	648						1			1						0	10				EB	
Sarita	S1	1375	G	1	70		0.40	0.50	3.0	40.0	38.0	2660	20	40	40			AR	L	1277						0									0						
Sarita	S2	0	P	1	15		1.50	2.20	2.0	40.0	34.0	510	50	50				AR	L	255	2.2	0.4	1.8	O	Y	0							100		100	5					
Sarita	S2	15	G	1	150		0.50	0.80	2.5	40.0	34.0	5100	30	40	30			AR	H	2346						0									0					EB	
Sarita	S2	165	R	1	70	1.0	0.10	0.20	3.0	42.0	40.0	2800		80	20			AR	H	2352						3	3								0					EB DW	
Sarita	S2	235	G	1	340		0.40	1.00	3.0	50.0	33.0	11220		40	55	5		AR	M	5722						0									0					EB	
Sarita	S2		P	3	35		1.50	2.50	3.0	50.0	40.0	1400		80	10		10	AR	H	1148	2.5	0.8	1.7	R	Y	0							70		70	2					
Sarita	S2	575	G	1	75		0.20	0.30	2.0	45.0	10.0	750		20	60	20		AR	L	240						0									0	5				MB	
Sarita	S2	650	P	1	85		1.00	2.50	2.0	40.0	30.0	2550	60	20	20			AR	M	612	2.5	0.3	2.2	O	Y	1		1					90		90	5					
Sarita	S2	735	G	1	55		0.35	0.70	2.0	33.0	28.0	1540		10	80	10		AR	L	400						0					10				10						
Sarita	S2	790	R	1	95	1.0	0.10	0.20	2.0	35.0	22.0	2090			70	30		AR	N	293						0					30				30	5					
Sarita	S2	885	G	1	110		0.50	0.70	2.0	40.0	28.0	3080	70	10	10	10		AR	M	370						3	3				10				10						
Sarita	S2		P	3	20		1.20	1.50	2.0	40.0	4.0	80	70	10	10	10		AR	L	10	1.2	0.5	0.7	R		0					10		50		60	5					
Sarita	S2	995	R	1	30	1.0	0.10	0.20	2.0	38.0	9.0	270			100			AR	L	54						0									0					MB EB	
Sarita	S2	1025	G	1	87		0.30	0.70	3.0	58.0	12.0	1044		5	90		5	AR	L	240						1		1							0					MB EB	
Sarita	S2	1112	R	1	43	1.0	0.10	0.20	4.0	50.0	11.0	473		70	30			AR	H	359						0									0					EB MB	
Sarita	S2	1155	G	1	40		0.30	0.50	3.0	40.0	30.0	1200		90	10			AR	H	1104						0									0						
Sarita	S2		P	2	55		1.00	1.30	1.5	45.0	20.0	1100			80	10	10	AR	N	902	1.3	0.0	1.3	R	Y	0							30		30					MB	
Sarita	S2	1195	P	1	70		2.00	3.50	1.5	50.0	30.0	2100	90	10				AR	L	210	3.5	0.3	3.2	R	Y	2		2					90		90					EB	
Sarita	S3	0	P	1	40		0.80	1.40	1.0	40.0	28.0	1120		80	20			AR	H	941	1.4	0.8	0.6	O	Y	1		1							0	5				EB WG	
Sarita	S3	40	G	1	200		0.70	0.90	2.0	70.0	27.0	5400	60	10	30			AR	L	864						2			2						0		SC	N	120	MB EB BC	
Sarita	S3	240	R	1	67	1.0	0.20	0.30	2.0	50.0	10.0	670		10	50		40	AR	L	134						3		3							0	5				MC MB	
Sarita	S3	307	G	1	133		0.50	0.80	1.0	65.0	18.0	2394	20	30	50			AR	L	958						0									0					WG	
Sarita	S3		P	3	20		1.00	3.00	1.0	65.0	23.0	460	50	20	30			AR	L	120	3.0	0.8	2.2	O	Y	2		2					60		60		PD	P	50	WG	
Sarita	S3	440	R	1	10	1.0	0.10	0.20	1.0	60.0	10.0	100	20	70	10			AR	H	72						0									0						
Sarita	S3	450	G	1	18		0.25	0.50	1.0	60.0	20.0	360	30	60	10			AR	M	223						0									0						
Sarita	S3	468	R	1	12	1.0	0.10	0.15	1.0	45.0	21.0	252		80	20			AR	H	212						0									0		SC	G	120	EB WG	
Sarita	S3	480	G	1	127		0.70	1.20	0.2	35.0	20.0	2540	70	10	15	5		AR	L	330						0					5				5	5				EB BC	
Sarita	S3	607	R	1	26	1.0	0.20	0.40	2.0	45.0	20.0	520		90	10			AR	H	478						2		1	1						0					BC	
Sarita	S3	633	P	1	47		1.00	2.30	1.0	50.0	12.0	564	20	70	10			AR	M	406	2.3	0.3	2.0	R	Y	1		1					30		30		SC	N	200	BC MC EB	
Sarita	S3	680	R	1	2	1.0	0.10	0.15	1.0	50.0	1.0	2		50	50			AR	L	1						0									0					WG	
Sarita	S3	682	P	1	53		3.00	5.00	1.0	50.0	10.0	530	80	10	10			AR	L	64	5.0	0.1	4.9	R	Y	3		3					90		90					WG MC BC	
Sarita	S3	735	G	1	60		0.60	1.00	1.0	40.0	18.0	1080		30	70			AR	M	475						3		2	1						0	5				EB	
Sarita	S3	795	P	1	30		1.00	2.20	1.0	40.0	18.0	540	10	30	60			AR	M	227	2.2	0.6	1.4	W	Y	6		3	3	2			50		52					WG EB	
Sarita	S3	825	G	1	55		0.50	0.80	1.0	30.0	18.0	990		30	60	10		AR	M	416						0									0					WG	
Sarita	S3	880	P	1	50		1.20	5.00	2.0	30.0	23.0	1150	60	30	8	1	1	AR	L	363	5.0	0.5	4.5	R	Y	5		4	1	1	1				2						
Sarita	S4	0	R	1	62	1.0	0.15	0.20	0.5	60.0	12.0	744	20	80				AR	M	595						3			3						0	15	SC	G	320	MB EB BC	
Sarita	S4	62	G	1	72		0.60	0.80	3.0	60.0	25.0	1800		30	70			AR	H	792						5		3	2						0					EB BC	

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)					Overhanging veg.	Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover		Type[10]	Access[11]	Length (m)		
Sarita	S4		P	3	30		1.50	2.00	3.0	60.0	15.0	450	40	30	20	10		AR	L	153	2.0	0.2	1.8	W	Y	5		3	2		10		90		100					EB
Sarita	S4	134	R	1	18	2.0	0.10	0.15	3.0	60.0	29.0	522		10	80	10		AR	M	136						0					10			10					EB
Sarita	S4	152	G	1	98		0.40	0.60	3.0	50.0	16.0	1568	20	10	60	10		AR	l	345						0					10			10	5				EB
Sarita	S4	250	R	1	13	1.0	0.15	0.20	3.0	50.0	15.0	195			80	20		AR	L	31						0					20			20	10				EB
Sarita	S4		P	3	30		1.00	1.20	3.0	50.0	15.0	450	30	10	50	10		AR	L	90	1.2	0.6	0.6	W	Y	4	1	1	2		10		80		90	10				EB
Sarita	S4	263	G	1	57	9.0	0.60	0.80	3.0	50.0	20.0	1140	10		80	10		AR	L	182						2		2			10			10					EB
Sarita	S4	320	R	1	74	1.0	0.10	0.15	2.0	50.0	18.0	1332			80	20		AR	L	213						0					20			20	10				EB SC
Sarita	S4	394	G	1	259		0.25	0.60	1.0	40.0	20.0	5180	10	10	70	9	1	AR	L	1243						0					9			9	5				
Sarita	S4	653	P	1	57		1.50	2.50	3.0	35.0	25.0	1425	70		10	20		AR	L	29	2.5	0.8	1.7	R	Y	0					20		80	100	5				
Sarita	S4	710	G	1	45		0.30	0.40	2.0	33.0	19.0	855		10	70	20		AR	L	205						0					20			20					
Sarita	S4	755	R	1	70	1.0	0.20	0.30	2.0	33.0	24.0	1680	20	30	50			AR	M	672						0								0	5				MB DW EB
Sarita	S4	825	G	1	40		1.00	1.50	1.0	36.0	20.0	800	10	10	60	20		AR	L	176						0					20			20	5				
Sarita	S4	865	P	1	30		1.50	2.00	2.0	35.0	20.0	600	10	10	70	10		AR	L	144	2.0	0.8	1.2	O	Y	0					10		70	80					
Sarita	S4	895	G	1	168		0.45	0.65	2.0	35.0	23.0	3864	10	10	70	10		AR	L	927						0					5			5	2				
Sarita	S4	1063	P	1	77		1.00	2.50	2.0	35.0	20.0	1540	10	10	70	10		AR	L	370	2.5	0.8	1.7	R	Y	0					10		70	80	2				
Sarita	S4	1140	G	1	23		0.30	0.40	3.0	33.0	16.0	368	10	10	60		20	AR	L	81						0								0	10				
Sarita	S4	1163	R	1	21	1.0	0.20	0.30	3.0	35.0	15.0	315			10	10	80	AR	L	6						0					10			10					
Sarita	S4	1184	G	1	76		0.50	1.20	2.0	35.0	15.0	1140	10	60	20	5	5	AR	H	730						0					5		10	15					
Sarita	S4	1260	R	1	40	2.0	0.15	0.20	2.0	30.0	15.0	600		50	50			AR	L	360						0								0					WG
Sarita	S4	1300	G	1	27		0.50	0.90	2.0	30.0	15.0	405			70		30	AR	L	57						0								0					
Sarita	S4	1327	R	1	33	1.0	0.20	0.30	2.0	30.0	5.0	165		10	70	10	10	AR	L	40						0								0					
Sarita	S4	1360	G	1	95		1.00	1.50	1.0	100.0	70.0	6650	30	30	40			AR	M	2527						0						5		5	5	2	SL	G	80	
Sarita	S4	1455	R	1	35	1.0	0.20	0.25	2.0	60.0	8.0	280			100			AR	N	56						0								0					MB
Sarita	S4	1490	G	1	10		0.30	0.40	0.5	35.0	15.0	150		10	90			AR	L	42						0								0					EB
Sarita	S4	1500	R	1	55	1.0	0.15	0.25	1.0	35.0	13.0	715	10	10	80			AR	L	186						0								0					EB
Sarita	S4	1555	G	1	15		0.30	0.80	1.0	50.0	19.0	285	10	20	70			AR	M	97						0								0	2				EB
Sarita	S4	1570	P	1	230		1.20	2.00	2.0	35.0	18.0	4140	20	70			10	AR	H	2898	2.0	0.6	1.4	R	Y	0						1		1					EB
Sarita	S4	1800	G	1	100		0.50	0.70	2.0	35.0	25.0	2500	20	50	30			AR	H	1400						4		2	2					0	1				EB
Sarita	S4	1900	R	1	30	1.0	0.10	0.20	1.0	30.0	15.0	450	10	70	20			AR	H	333						3		3						0	20				EB
Sarita	S4	1930	G	1	112		0.40	0.60	2.0	30.0	25.0	2800		90	10			AR	H	2576						4		2	2					0	2	SC	G	30	
Sarita	S4	2042	R	1	234	1.0	0.10	0.10	1.0	25.0	8.0	1872	10	80	10			AR	M	1535						0							10	10	10	SC	P	70		MB BC
Sarita	S4	2276	G	1	18		0.30	0.40	1.0	60.0	15.0	270		10	80	10		AR	M	70						1	1			10				10	50	SC	P	50		MB BC
Sarita	S4	2294	P	1	28		1.20	2.00	1.0	30.0	9.0	252	50	20	30			AR	L	66	2.0	0.4	1.6	W		1			1			70		70	60				MB BC
Sarita	S4	2322	R	1	3	1.0	0.10	0.20	1.0	30.0	7.0	21		80	20			AR	M	18						0								0					MB
Sarita	S4	2325	P	1	20		1.00	2.00	0.5	30.0	25.0	500	30	20	50			AR	L	150	2.0	0.1	1.9	W	Y	1		1				70		70	30	SC	G	270		MB EB
Sarita	S4	2345	R	1	20	1.0	0.15	0.30	0.5	30.0	18.0	360		80	20			AR	H	302						6	5	1						0	20				WG MB EB
Sarita	S4	2365	G	1	32		0.30	0.70	1.0	25.0	18.0	576		70	30			AR	H	438						0								0	20				WG MB EB
Sarita	S4	2397	R	1	65	1.0	0.20	0.30	1.0	25.0	12.0	780		80	20			AR	H	655						0								0	40				MB EB
Sarita	S4	2462	G	1	31		0.40	0.70	1.0	30.0	20.0	620		70	30			AR	H	471						0								0					EB
Sarita	S4	2493	P	1	30		0.80	1.20	1.0	30.0	16.0	480		60	40			AR	H	326	1.2	0.6	0.6	R	Y	3		2	1			40		40	10				EB
Sarita	S4	2523	G	1	30		0.30	0.40	1.0	30.0	10.0	300		30	70			AR	M	132						0								0	20				EB
Sarita	S4	2553	P	1	92		2.00	4.00	1.0	50.0	42.0	3864	20	50	30			AR	L	2164	4.0	0.1	3.9	R	Y	3	1	1	1			90		90	10				
Sarita	S4	2645	R	1	91	1.0	0.05	0.15	4.0	42.0	40.0	3640		20	50	30		AR	L	1092						0						30		30					MB EB
Sarita	S4	2736	P	1	10		2.00	5.00	4.0	30.0	27.0	270	10		40	40	10	AR	N	22	5.0	1.0	4.0	R	Y	6	2	3	1		40	80	5	125					
Sarita	S4	2746	G	1	216		0.70	0.70	20.0	64.0	27.0	5832		60	40			AR	H	3966						9	3	3	3					0	5	SC	P	25		
Sarita	S4	2962	R	1	100	1.0	0.15	0.20	20.0	60.0	23.0	2300	10	70	20			AR	M	1702						0								0	5				WG
Sarita	S4	3062	G	1	33		0.30	0.50	30.0	33.0	27.0	891	10	50	40			AR	M	517						2			2					0	2				MB
Sarita	S4	3095	P	1	31		1.00	2.00	20.0	37.0	27.0	837	10	50	40			AR	M	485	2.0	0.3	1.7	R	Y	0						30		30	2				

Appendix 1A continued.

													Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)							Off-channel Habitat				
Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)	Channel Disturbances[12]	Barriers[13]
Sarita	S4	3126	G	1	74		0.60	1.00	20.0	38.0	30.0	2220		10	70	20		AR	L	533						0					20			20						WG	
Sarita	S4	3200	P	1	70		3.00	5.00	30.0	80.0	60.0	4200	10	10		20	60	AR	L	420	5.0	1.0	4.0	R	Y	0					20		80	100							F
Frederick	F13	0	G	1	100		1.00	2.00	1.5	20.0	20.0	2000	90		10			AR	L	40						5	2	3				50	50	10					EB	
Frederick	F13	100	P	1	30		1.20	1.50	1.0	17.0	17.0	510	80		20			AR		20	1.5	0.8	0.7	O	Y	4	2	2				70	70							
Frederick	F13	130	G	1	80		0.45	0.80	0.5	50.0	11.0	880	50	30	20			AR		299						4	4						0	30	PD	G	100		WG	
Frederick	F13	210	G	1	47		0.25	0.45	2.0	15.0	7.0	329	30	65	5			AR		217						2	2						0	50					EB	
Frederick	F13	257	R	1	50	1.0	0.10	0.25	1.0	60.0	3.0	150	29	70		1		AR		105						4	3	1			1		1			PD	G	60	EB	
Frederick	F13	307	G	1	51	1.0	0.20	0.40	1.0	60.0	10.0	510	70	29		1		AR		148						10	6	4		1	1		2	10				EB	
Frederick	F13	358	G	1	17		0.20	0.40	0.2	60.0	6.0	102	50	50				AR		51						4	3	1					0	5				WG	EB
Frederick	F13	375	P	1	12		0.70	1.10	0.2	60.0	9.0	108	80	20				AR		22	1.1	0.1	1.0	W		4	2	2		5		5	10	5					
Frederick	F13	387	G	1	7		0.25	0.40	0.2	18.0	7.0	49	60	38			2	AR	M	19						1	1						0	5					EB	
Frederick	F13	394	R	1	14	1.0	0.10	0.20	0.2	18.0	6.0	84	20	80				AR	H	67						4	3	1		1			1	10				EB	
Frederick	F13	408	G	1	18		0.25	0.40	0.2	15.0	7.0	126	20	80				AR	H	101						5	4	1					0	15					EB	
Frederick	F13	426	P	1	20		0.50	0.80	0.5	15.0	5.0	100	10	85	5			AR	H	86	0.8	0.2	0.6	W		5	3	1	1	2			2	2					EB	
Frederick	F13	446	R	1	14	1.0	0.10	0.20	0.5	18.0	4.0	56	20	80				AR	H	45						1		1		5			5	5				MB	EB
Frederick	F13	460	G	1	14		0.15	0.25	0.5	18.0	7.0	98	50	50				AR	M	49						2	2						0	20					EB	
Frederick	F13	474	R	1	26	1.0	0.10	0.25	0.5	20.0	5.0	130	30	70				AR	H	91						8	5	3		5			5	5					EB	
Frederick	F13	500	G	1	14		0.30	0.60	0.5	20.0	9.0	126	50	50				AR	M	63						0							0	5					EB	
Frederick	F13	514	P	1	8		0.45	0.60	0.5	20.0	9.0	72	60	40				AR	L	29						3	1	2		5			5	10	SC	N	50		EB	
Frederick	F13	522	G	1	19		0.30	0.45	0.5	20.0	8.0	152	70	28	2			AR	L	43						2	2			1			1	20					EB	
Frederick	F13	541	P	1	29		0.80	1.40	0.5	20.0	12.0	348	70	25	5			AR	L	90	1.4	0.3	1.1	W	Y	5	1	2	2	2			2		SC	N	100		EB	
Frederick	F13	570	R	1	32	1.0	0.15	0.30	0.5	20.0	4.0	128	5	90	5			AR	H	116						4	3	1					0	20				EB	WG	
Frederick	F13	602	G	1	23		0.45	0.70	0.3	20.0	7.0	161	40	60				AR	M	97						0							0	15					EB	
Frederick	F13	625	R	1	15	1.0	0.05	0.10	1.0	20.0	5.0	75	20	80				AR	H	60						2		2					0	10						
Frederick	F13	640	G	1	20		0.30	0.50	0.5	20.0	7.0	140	30	70				AR	H	98						2	1	1					0	10					EB	
Frederick	F13	660	P	1	13		0.50	0.95	0.5	20.0	8.0	104	60	40				AR	L	42	1.0	0.3	0.7	W		5	4	1		1			1	10						
Frederick	F13	673	G	1	27		0.35	0.55	0.5	20.0	9.0	243	80	20				AR		49						0							0	10					EB	
Frederick	F13	700	P	1	23		0.60	0.90	0.5	20.0	7.0	161	80	20				AR		32	0.9	0.5	0.4	W	Y	5	3	2		1			1	5					EB	
Frederick	F13	723	G	1	20		0.30	0.40	0.5	20.0	7.0	140	70	30				AR		42						3	2	1					0	30					WG	EB
Frederick	F13	743	R	1	10	1.0	0.15	0.25	0.5	20.0	2.0	20	30	70				AR		14						1	1						0	20						
Frederick	F13	753	P	1	29		1.25	2.00	1.0	20.0	11.0	319	90	10				AR		32	2.0	0.2	2.0	W	Y	8	3	2	3	2		60	62	15					EB	
Frederick	F13	782	R	1	15	1.0	0.10	0.15	0.5	20.0	5.0	75	40	60				AR		45						0							0	5					EB	MB
Frederick	F13	797	P	1	29		0.60	1.10	0.5	20.0	12.0	348	30	70				AR		244	1.1	0.3	0.8	W	Y	0						5	5	5					EB	
Frederick	F13	826	R	1	12	1.0	0.15	0.30	0.3	20.0	6.0	72	30	70				AR		50						0							0	5					WG	EB
Frederick	F13	838	P	1	26		0.90	1.60	0.2	20.0	8.0	208	90	10				AR		21	1.6	0.1	1.5	W	Y	2		2				60	60	10	SC	P	15		WG	EB
Frederick	F13	864	G	1	16		0.55	0.60	0.2	20.0	5.0	80	40	60				AR		48						0							0	30					EB	
Frederick	F13	880	P	1	26		0.90	1.50	0.5	20.0	5.0	130	80	20				AR		26	1.5	0.5	1.0	W	Y	4	2	1	1	1		80	81	20					EB	
Frederick	F13	906	R	1	24	1.0	0.15	0.40	1.0	20.0	6.0	144	20	80				AR		115						4	2	2			2		2	20	SC	G	50		EB	
Frederick	F13	930	G	1	50		0.20	0.40	1.0	20.0	8.0	400	30	65	5			AR		264						2		1	1				0	10						
Frederick	F13	980	R	1	6	1.0	0.15	0.30	1.0	20.0	5.0	30	10	10	30	50		AR		5						1		1			50		50						
Frederick	F13	986	G	1	38		0.25	0.50	0.5	20.0	7.0	266	60		10	30		AR		5						0					30		30	60					
Frederick	F13	1024	P	1	7		0.60	1.10	0.5	20.0	7.0	49	70	10	20			AR		7	1.1	0.6	0.5	O	Y	1		1					0	60						
Frederick	F13	1031	R	1	5	1.0	0.05	0.10	0.2	20.0	2.5	12.5	10	90				AR	H	11						0							0	40	SC	G	60		WG	EB
Frederick	F13	1036	P	1	24		0.35	0.80	0.2	20.0	5.0	120	70	30				AR	L	36	0.8	0.3	0.5	W		3	1	2		2			2	30						
Frederick	F13	1060	G	1	15		0.20	0.35	0.2	20.0	7.0	105	50	50				AR	H	53						1		1					0	20						
Frederick	F13		P	3	2		0.50	0.80	0.5	20.0	6.0	12	60	40				AR	M	5						2	1		1				0	70						
Frederick	F13	1075	R	1	6	1.0	0.15	0.25	0.5	20.0	6.0	36	60	40				AR	M	14						0							0						WG	EB
Frederick	F13	1081	G	1	26		0.20	0.50	0.5	20.0	3.0	78	60	40				AR	M	31						2		2					0	25					EB	

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)						Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Frederick	F13	1107	R	1	20	1.0	0.25	0.40	0.5	20.0	3.0	60	30	70				AR	H	42						0								0					WG	
Frederick	F13	1127	P	1	12		0.35	0.70	0.5	20.0	12.0	144	70	30				AR	L	43	0.7	0.3	0.4	W		5	3	1	1	2				2	20				WG	EB
Frederick	F13	1139	P	1	13		0.50	1.10	0.3	20.0	7.0	91	20	70	5	5		AR		65	1.1	0.4	0.7	W	Y	4	3	1		15	5		10		30	10				WG	
Frederick	F13	1152	R	1	5	1.0	0.10	0.20	0.3	20.0	3.0	15	50	50				AR		8						1	1							0					EB	
Frederick	F13	1157	P	1	30		0.60	1.30	1.0	20.0	7.0	210	90	10				AR		21	1.3	0.2	1.1	W	Y	8	2	5	1	2		5	10		17					JM	EB
Frederick	F13	1187	R	1	3	1.0	0.20	0.30	1.0	20.0	5.0	15	30	70				AR		11						5	3	2						0					WG	
Frederick	F13	1190	P	1	16		0.50	1.10	0.5	20.0	12.0	192	70	30				AR	L	58	1.1	0.4	0.8	W	Y	7	2	3	2	2			5		7	5	SC	P	70		EB
Frederick	F13	1206	R	1	16	1.0	0.10	0.20	0.5	20.0	2.0	32	40	60				AR	M	19						2		1	1	1				1	20				EB	
Frederick	F13	1222	P	1	16		0.50	0.90	0.5	20.0	3.0	48	80	20				AR	L	10	0.9	0.3	0.6	O		2	1	1						0	30				WG	EB
Frederick	F13	1238	P	1	28		0.50	0.90	0.5	20.0	6.0	168	90	10				AR	N	17	0.9	0.6	0.3	O		2	1	1						0					WG	EB
Frederick	F13	1266	R	1	6	1.0	0.15	0.30	0.3	20.0	5.0	30	70	30				AR	L	9						1		1						0					EB	
Frederick	F13	1272	P	1	8		0.65	1.00	0.5	20.0	8.0	64	80	20				AR	N	13	1.0	0.3	0.7	W	Y	2			2	5				5	10				EB	
Frederick	F13	1280	R	1	5	1.0	0.20	0.50	0.5	20.0	8.0	40	90	10				AR	N	4						7	7			20				20	5					
Frederick	F13	1285	P	1	19		0.40	0.90	0.7	20.0	3.0	57	70	30				AR	L	17	0.9	0.2	0.7	O	Y	1			1	5				5	40				WG	
Frederick	F13	1304	R	1	12	1.0	0.15	0.40	0.5	20.0	3.0	36	50	50				AR	L	18						10	10			10		5		15	40					
Frederick	F13	1316	P	1	18		0.40	0.80	0.5	20.0	4.5	81	50	50				AR	L	41	0.8	0.3	0.5	W		5	5			5				5	30	SC	G	35	WG	MB EB
Frederick	F13	1334	R	1	12	1.0	0.20	0.30	1.0	20.0	2.0	24	70	30				AR	L	7						0								0	80				EB	
Frederick	F13	1346	P	1	7		0.80	1.30	1.0	20.0	15.0	105	90	10				AR	L	11	1.3	0.2	0.6	W	Y	1			1				20	20	5				EB	
Frederick	F13	1353	G	1	24		0.35	0.50	0.7	20.0	2.5	60	60	40				AR	M	24						0					20			20	20				MC	EB
Frederick	F13	1377	R	1	8	1.0	0.15	0.40	0.5	20.0	2.5	20	70	30				AR	M	6						0								0	20				EB	
Frederick	F13	1385	P	1	10		0.60	0.80	0.5	20.0	12.0	120	90	10				AR	N	12	0.8	0.3	0.6	W		3			3	30				30	20				JM	EB
Frederick	F13	1395	G	1	19		0.30	0.40	0.5	20.0	4.0	76	80	20				AR	L	15						3		2	1	5				5	30					
Frederick	F13	1414	R	1	10	1.0	0.20	0.40	0.5	20.0	22.0	220	60	40				AR	L	88						6	2	3	1	30				30					JM	EB
Frederick	F13	1424	P	1	16		0.80	1.30	0.5	20.0	4.0	64	90	10				AR	N	6	1.3	0.4	0.9	W	Y	1			1	50				50	70				MB	
Frederick	F13	1440	P	1	11		0.75	1.20	0.5	20.0	15.0	165	90	10				AR	N	17	1.2	0.3	0.9	W	Y	10	5	4	1	10				10	5				JM MB	MC EB
Frederick	F13	1451	G	1	17		0.20	0.50	0.5	20.0	8.0	136	70	30				AR	M	41						0								0	5				MC	
Frederick	F13	1468	R	1	20	2.0	0.10	0.15	0.5	20.0	3.0	60	50	50				AR	M	30						2		2						0					MC	EB
Frederick	F13	1488	P	1	12		0.70	1.00	0.5	20.0	22.0	264	90	10				AR	N	26	1.0	0.1	0.9	W	Y	10	2	3	5	15			5	20					JM	MC EB
Frederick	F13	1500	R	1	17	1.0	0.10	0.20	0.5	25.0	4.0	68	50	50				AR	M	34						0								0	50				WG	MC EB
Frederick	F13	1517	P	1	15		0.60	1.20	1.5	25.0	16.0	240	90	10				AR	N	24	1.2	0.1	1.1	W	Y	2		1	1	2			5	7	50				WG	MC EB
Frederick	F13	1532	G	1	13		0.25	0.50	0.5	25.0	6.0	78	90	10				AR	L	8						0								0	5				WG	EB
Frederick	F13	1545	R	1	27	1.0	0.20	0.35	0.5	25.0	2.5	67.5	50	50				AR	M	34						3	3							0	20				MC	EB
Frederick	F13	1572	G	1	24		0.30	0.65	0.5	25.0	4.0	96	50	50				AR	M	48						0					10			10	20				MC	EB
Frederick	F13	1596	R	1	15	1.0	0.05	0.15	0.5	25.0	12.0	180	70	30				AR	H	54						0								0	5				MC	
Frederick	F13	1611	P	1	19		0.40	1.00	0.5	25.0	7.0	133	80	20				AR	L	27	1.0	0.2	0.8	W	Y	3		2	1	10			10	20	10				MC	EB
Frederick	F13	1630	R	1	3	1.0	0.05	0.10	0.5	25.0	2.0	6	70	30				AR	M	2						0								0	5				MC	WG EB
Frederick	F13	1633	G	1	19		0.35	0.70	0.5	25.0	10.0	190	70	30				AR	M	57						2		1	1					0	5				MC	WG MB
Frederick	F13	1652	P	1	13		0.50	1.10	1.0	25.0	12.0	156	90	10				AR	N	16	1.1	0.3	0.8	W	Y	1			1				10	10	5				MC	
Frederick	F13	1665	G	1	6		0.25	0.35	1.0	25.0	8.0	48	90	10				AR	N	5						2		2		2				2	10				MB	MC EB
Frederick	F13	1671	R	1	10	2.0	0.10	0.15	1.0	25.0	2.0	20	60	40				AR	M	8						1		1		5				5					MB	MC EB
Frederick	F13	1681	G	1	16		0.20	0.50	1.0	25.0	5.0	80	50	50				AR	M	40						1	1			3				3	5				MB	MC EB
Frederick	F13	1697	R	1	28	1.0	0.20	0.50	1.0	25.0	16.0	448	50	50				AR	M	224						9	4	5						0	5				MB	MC EB BD
Frederick	F14	0	G	1	50		0.80	2.00	0.5	25.0	20.0	1000	100					AR	L	0						0								0		PD	G	50		
Frederick	F14	50	G	1	20		0.25	0.35	0.5	50.0	7.0	140	40	60				AR	H	84						0								0	5					
Frederick	F14	70	P	1	10		0.75	1.10	0.2	25.0	17.0	170	50	50				AR	M	85	1.1	0.3	0.9	W	Y	4		2	2	5			20	25	10	SC	G	15	WG	MB
Frederick	F14	80	R	1	5	1.0	0.15	0.15	0.2	25.0	7.0	35	20	80				AR	H	28						0								0	25				MB	
Frederick	F14	85	P	1	3		0.40	0.60	0.2	25.0	6.0	18	20	80				AR	H	14	0.6	0.2	0.4	W		3		3						0	60					
Frederick	F14	88	R	1	10	1.0	0.20	0.40	0.2	25.0	4.0	40	50	50				AR	L	20						3	2	1						0	70				MC	

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)					Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Frederick	F14	98	P	1	20		0.75	1.10	0.2	25.0	17.0	340	80	20				AR	L	68	1.1	0.2	0.9	W	Y	5		2	3	30			60		90	30				MC JM	
Frederick	F14	118	R	1	4	1.0	0.10	0.15	0.5	25.0	4.0	16	60	40				AR	M	6						2	2							0	90				MB	
Frederick	F14	122	P	1	3		0.35	0.85	0.5	25.0	8.0	24	90	10				AR	L	2	0.9	0.2	0.7	W	Y	5	3	2		20					20	70				MB MC JM	
Frederick	F14	125	R	1	7	1.0	0.20	0.35	0.3	25.0	3.0	21	80	20				AR	L	4						2	1	1							0					MC	
Frederick	F14	132	G	1	17		0.50	0.75	0.3	25.0	7.0	119	90	10				AR	L	12						2		1	1	25					25	5	WL	G	30	WG	
Frederick	F14	149	R	1	7	1.0	0.10	0.20	0.2	25.0	4.0	28	30	70				AR	H	20						1			1						0	50					
Frederick	F14	156	P	1	14		0.80	1.70	0.2	25.0	8.0	112	70	30				AR	L	34	0.8	0.2	0.6	W		3		2	1	5					5	70				WG JM	
Frederick	F14	170	R	1	27	1.0	0.25	0.50	0.3	25.0	3.5	94.5	30	70				AR	H	66						0									0	20				WG JM	
Frederick	F14	197	P	1	13		0.60	0.90	0.4	25.0	22.0	286	50	50				AR	M	143	0.9	0.2	0.7	W	Y	5	2	2	1	15					15	5	SC	G	20	JM MC	
Frederick	F14	210	R	1	7	1.0	0.15	0.30	0.4	25.0	10.0	70	40	60				AR	M	42						0									0	20				MB EB	
Frederick	F14	217	G	1	6		0.25	0.40	0.2	25.0	15.0	90	50	50				AR	L	45						0									0	20					
Frederick	F14	223	R	1	7	1.0	0.15	0.25	0.2	25.0	7.0	49	20	80				AR	H	39						5	2	2	1	15					15	5				MB MC	
Frederick	F14	230	P	1	35		1.10	1.50	0.2	25.0	8.0	280	30	70				AR	H	196	1.5	0.2	1.3	W	Y	11	6	2	3	5			70	5	80	20	SC	G	30	MC MB JM	
Frederick	F14	265	R	1	27	1.0	0.20	0.50	0.2	25.0	5.5	148.5	10	90				AR	H	134						0									0	20					
Frederick	F14	292	G	1	16		0.30	0.45	0.2	25.0	6.0	96	10	90				AR	H	86						0									0	2					
Frederick	F14	308	P	1	14		0.50	0.90	0.2	30.0	4.0	56	10	90				AR	H	50	0.9	0.4	0.6	W		1		1		1			15		16					WG MC	
Frederick	F14	322	R	1	4	1.0	0.15	0.30	0.2	30.0	3.0	12	10	90				AR	H	11						0									0						
Frederick	F14	326	P	1	18		0.80	1.30	0.2	30.0	4.0	72	20	80				AR	H	58	1.3	0.2	1.1	W	Y	8	5	2	1	10			50	1	61	2				WG	
Frederick	F14	344	G	1	9		0.20	0.30	0.2	30.0	4.0	36	20	80				AR	H	29						1			1	5					5	5				WG	
Frederick	F14	353	P	1	32		0.90	1.40	0.2	30.0	7.0	224	80	20				AR	L	45	1.4	0.4	1.0	W	Y	12	2	3	7	15				5	20	30				WG MB JM MC EB	
Frederick	F14	385	R	1	27	1.0	0.15	0.25	0.2	30.0	4.0	108	30	70				AR	H	76						8	2	3	3	15	5		1	21	20				WG MC EB	
Frederick	F14	412	G	1	63		0.45	0.70	0.2	30.0	12.0	756	70	30				AR	M	227						6	2	3	1	5			1	6	10				MB MC	
Frederick	F14	475	R	1	9	1.0	0.10	0.20	1.0	30.0	3.0	27	50	50				AR	H	14						0									0					WG	
Frederick	F14	484	P	1	21		1.00	1.70	0.3	30.0	14.0	294	80	20				AR	L	59	1.7	0.3	1.4	W	Y	7	2	3	2	2		70			72	5				WG JM EB	
Frederick	F14	505	G	1	40		0.20	0.30	0.5	30.0	13.0	520	80	20				AR	L	104						6	6								0	5					
Frederick	F15	0	R	1	16	1.0	0.12	0.25	0.5	15.0	3.0	48	30	70				AR	M	34						2		2							0	5					
Frederick	F15	16	G	1	17		0.20	0.50	0.5	15.0	6.0	102	50	50				AR	H	51						0									0	10				WG	
Frederick	F15	33	P	1	13		0.90	1.30	0.5	20.0	6.0	78	60	40				AR	M	31	1.1	0.5	0.6	W	Y	5		3	2	5		40			45	20				WG	
Frederick	F15	46	G	1	24		0.50	0.80	0.5	20.0	6.0	144	60	40				AR	H	58						3	2		1	2	5				7	2				WG MB EB	
Frederick	F15	70	P	1	7		0.70	1.10	0.5	18.0	7.0	49	80	20				AR	L	10	1.1	0.5	0.6	W	Y	2		1	1	10		10			20					WG	
Frederick	F15	77	G	1	45		0.45	0.65	0.5	20.0	5.0	225	50	50				AR	H	113						5		2	3					5	5	5	SC	N	70	WG	
Frederick	F15	122	R	1	48	1.0	0.15	0.25	7.0	20.0	6.0	288	10	90				AR	H	259						0									0	5					
Frederick	F15	170	P	1	22		0.70	1.40	7.0	20.0	10.0	220	50	40	9	1		AR	H	92	1.4	0.2	1.2	W	Y	2		1	1	1	1	25			27						
Frederick	F15	192	G	1	17		0.20	0.40	5.0	55.0	4.0	68	90	10				AR	L	7						1			1						0					MB	
Frederick	F15	209	P	1	19		0.40	1.00	5.0	50.0	10.0	190	90	10				AR	L	19	1.0	0.2	0.8	W		7	3	3	1	5					5	5				EB	
Frederick	F15	228	R	1	22	1.0	0.20	0.35	5.0	45.0	4.0	88	10	20	69	1		AR	L	30						3	2	1		2	2				4	2					
Frederick	F15	250	G	1	35		0.25	0.40	5.0	35.0	3.0	105	25	70	3	2		AR	H	74						0									0	1				MB MC EB	
Frederick	F15		P	2	15		0.30	0.50	5.0	50.0	2.0	30	70	30				AR	M	9	0.5	0.2	0.3	W		2			2	10					10					WG MB	
Frederick	F15	285	R	1	15	1.0	0.10	0.15	5.0	50.0	4.0	60	90	10				AR	H	6								1							0		SC	N	100	WG MC	
Frederick	F15	300	P	1	31		1.00	1.50	5.0	50.0	4.0	124	20	50	20		10	AR	M	67	1.5	0.2	1.3	R	Y	1			1	1		50			51	30				WG	
Frederick	F15	331	R	1	5	1.0	0.05	0.08	5.0	50.0	10.0	50	50	50				AR	H	25						0									0	2				EB	
Frederick	F15	336	G	1	20		0.20	0.40	5.0	50.0	10.0	200	30	60	10			AR	H	124						3	3						2	2	2					
Frederick	F15	356	R	1	7	1.0	0.10	0.15	5.0	50.0	3.0	21	5	90	5			AR	H	19						0									0						
Frederick	F15	363	G	1	24		0.30	0.50	3.0	50.0	4.5	108	15	80	5			AR	H	87						3		3		10		2			12					EB	
Frederick	F15	387	R	1	10	1.0	0.20	0.30	3.0	50.0	4.0	40	50	50				AR	M	20						1			1	5					5						
Frederick	F15	397	G	1	10		0.20	0.30	5.0	50.0	7.0	70	90	10				AR	L	7						5	2	2	1	10					10					EB PD	
Frederick	F15	407	P	1	7		0.50	1.00	5.0	50.0	16.0	112	70	20	10			AR	L	25	1.0	0.2	0.8	W		4	1	2	1	10		10			20						
Frederick	F15	414	G	1	16		0.15	0.30	5.0	50.0	6.0	96	90	10				AR	L	10						1		1		1					1		SC	G	20	MC	

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)						Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Frederick	F15	430	P	1	13		0.80	1.40	5.0	45.0	5.0	65	90	10				AR	L	7	1.4	0.3	1.1	W	Y	6	3	2	1	12			40	5	57	5				WG	EB
Frederick	F15	443	G	1	12		0.20	0.50	5.0	45.0	3.0	36	90	10				AR	L	4						1			1	2					2	5				WG	EB
Frederick	F15	455	R	1	10	1.0	0.15	0.25	10.0	40.0	1.0	10	50	50				AR	M	5						0									0	5				WG	EB
Frederick	F15	465	P	1	20		0.80	1.30	10.0	40.0	15.0	300	90	10				AR	L	30	1.3	0.2	1.1	W	Y	3		2	1	1		2	60		63					WG	EB
Frederick	F15	485	G	1	23		0.20	0.30	10.0	40.0	4.0	92	50	50				AR	H	46						0									0	30				WG	EB
Frederick	F15	508	P	1	20		0.80	1.10	10.0	40.0	10.0	200	90	10				AR	L	20	1.1	0.2	0.9	W	Y	1			1	5			10	1	16	10	SC	N	130	WG	EB
Frederick	F15	528	G	1	8		0.30	0.35	10.0	40.0	4.0	32	50	50				AR	H	16						0								1	1					WG	
Frederick	F15	536	P	1	9		0.60	1.00	10.0	40.0	6.0	54	90	10				AR	L	5	1.0	0.3	0.7	W		1		1					10		10	10				WG	
Frederick	F15	545	G	1	15		0.30	0.60	10.0	40.0	5.0	75	90	10				AR	L	8						0									0	20					
Frederick	F15	560	R	1	28	1.0	0.10	0.15	10.0	40.0	2.0	56	10	90				AR	H	50						0									0	90				MB	
Frederick	F15	588	G	1	26		0.20	0.40	5.0	40.0	4.0	104	10	90				AR	H	94						0									0	5				MB	
Frederick	F15	614	G	1	26		0.30	0.60	0.0	100.0	15.0	390	50	50				AR	M	195						0									0	2	WL	G	450		
Frederick	F16	0	R	1	4	1.0	0.10	0.15	0.2	100.0	2.0	8	10	80	10			AR	H	7						0									0						
Frederick	F16	4	G	1	16		0.40	0.60	0.2	100.0	4.0	64	80	20				AR	L	13						0									0					MB	EB
Frederick	F16	20	G	1	22		0.35	0.55	0.2	100.0	7.0	154	50	50				AR	H	77						5	2	2	1	5					5	40				MB	EB
Frederick	F16	42	R	1	16	1.0	0.10	0.30	0.2	100.0	5.0	80	50	50				AR	H	40						2			2	5					5						
Frederick	F16	58	G	1	8		0.20	0.30	0.2	100.0	4.0	32	50	50				AR	M	13						0									0	20					
Frederick	F16	66	P	1	6		0.60	0.90	0.2	70.0	4.0	24	60	40				AR	M	7	0.9	0.2	0.7	W		2		2		2					2	10					
Frederick	F16	72	G	1	28		0.35	0.45	0.5	70.0	4.0	112	70	30				AR	L	11						2		2							0						
Frederick	F16	100	P	1	15		0.70	1.00	0.5	70.0	5.0	75	90	10				AR	L	38	1.0	0.3	0.7	O		0							5		5						
Frederick	F16	115	G	1	10		0.30	0.40	0.3	70.0	3.0	30	50	50				AR	M	9						10	10			10					10						EB
Frederick	F16	125	P	1	5		0.40	0.60	0.5	70.0	3.0	15	70	30				AR	M	5	0.6	0.3	0.3	W		0				5					5						
Frederick	F16	130	R	1	13	2.0	0.15	0.25	0.5	70.0	2.0	26	40	60				AR	M	16						2	2								0					WG	
Frederick	F16	143	G	1	7		0.20	0.30	0.5	70.0	6.0	42	50	50				AR	M	21						1	1								0						
Frederick	F16	150	P	1	20		0.80	1.30	0.5	70.0	6.5	130	60	40				AR	M	52	1.3	0.2	1.1	W	Y	11	5	5	1	10			30		40					WG	MB EB
Frederick	F16	170	R	1	10	2.0	0.10	0.20	0.5	70.0	1.0	10	70	30				AR	L	3						0									0	2				WG	MB
Frederick	F16	180	P	1	6		0.45	0.90	0.2	70.0	4.0	24	90	10				AR	L	2	0.9	0.2	0.8	W	Y	1			1	20					20	30					EB
Frederick	F16	186	G	1	7		0.35	0.50	0.5	70.0	5.0	35	90	10				AR	L	4						5	5								0	50					
Frederick	F16	193	R	1	17	1.0	0.10	0.15	0.5	70.0	3.0	51	20	80				AR	H	41						0						1			1	5					EB
Frederick	F16	210	G	1	8		0.20	0.30	0.5	70.0	3.0	24	70	30				AR	L	7						1	1			15					15	20					
Frederick	F16	218	P	1	13		0.70	1.20	0.5	70.0	4.0	52	90	10				AR	L	5	1.2	0.3	0.9	W	Y	0							50		50		SC	G	70		MC
Frederick	F16	231	P	1	22		0.80	1.30	0.5	70.0	5.0	110	90	10				AR	L	11	1.3	0.1	1.2	W	Y	0							60		60	5				MC	EB
Frederick	F16	253	G	1	13		0.30	0.55	0.5	70.0	5.0	65	70	30				AR	M	20						0									0	10				MC	
Frederick	F16	266	R	1	9	1.0	0.30	0.45	0.5	70.0	3.0	27	50	50				AR	L	14						7	6	1		15					15	10				MC	WG
Frederick	F16	275	P	1	11		0.50	1.00	0.7	50.0	3.0	33	70	30				AR	L	10	1.0	0.2	0.8	W		4	2	2		5					5					MC	
Frederick	F16	286	R	1	19	1.0	0.10	0.20	0.5	50.0	4.0	76	60	40				AR	M	30						5	3	2							0	5				JM	MC EB
Frederick	F16	305	G	1	15		0.20	0.40	0.5	50.0	4.0	60	60	40				AR	M	24						1			1						0	3					
Frederick	F16	320	P	1	14	9.0	1.00	1.50	0.2	50.0	6.0	84	40	60				AR	H	50	1.5	0.2	1.3	W	Y	4		2	2	5			80		85	5					
Frederick	F16	334	G	1	20	9.0	0.35	0.50	0.2	40.0	2.0	40	50	50				AR	M	20						2		1	1	2					2	40					EB
Frederick	F16	354	R	1	5	1.0	0.25	0.40	0.2	40.0	1.0	5	30	70				AR	H	4						2		2		2				5	7	5					
Frederick	F16	359	P	1	12		0.75	1.10	0.2	40.0	3.0	36	50	50				AR	M	18	1.1	0.2	0.9	W		2	1	1					20		20	70	SC	G	40			
Frederick	F16	371	G	1	8		0.45	0.60	0.3	40.0	4.0	32	70	30				AR	L	10						1		1							0	5					EB
Frederick	F16	379	R	1	6	2.0	0.10	0.15	0.3	40.0	2.0	12	10	90				AR	H	11						0									0	5					
Frederick	F16	385	G	1	9		0.30	0.50	0.3	40.0	3.0	27	50	50				AR	M	14						1	1								0	15					EB
Frederick	F16	394	R	1	11	2.0	0.15	0.30	0.5	40.0	3.0	33	60	40				AR	M	13						1	1					20			20					WG	MC EB
Frederick	F16	405	G	1	15		0.35	0.70	0.5	40.0	9.0	135	80	20				AR	L	27						1		1							0						MC
Frederick	F16	420	P	1	26		0.65	1.40	0.5	40.0	4.0	104	50	50				AR	M	52	1.4	0.6	0.8	W	Y	4		2	2			10	5		15	5				MC	EB
Frederick	F16	446	R	1	5	2.0	0.15	0.20	0.7	40.0	1.5	7.5	50	50				AR	L	4						0									0					MC	MB EB

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)						Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Frederick	F16	451	G	1	18		0.35	0.60	0.5	40.0	3.5	63	70	30				AR	L	19						3	3					10			10				MC	EB
Frederick	F16	469	P	1	9		0.40	0.75	1.0	40.0	4.0	36	50	50				AR	L	18	0.8	0.2	0.6	W		4	2	2		20					20	10				MC	EB
Frederick	F16	478	R	1	5	5.0	0.10	0.15	0.3	40.0	2.0	10	30	70				AR	M	7						2	1	1		5					5	10	SC	G	140	MC	EB
Frederick	F16	483	P	1	12		0.45	0.70	1.0	40.0	6.0	72	90	10				AR	L	7	0.7	0.2	0.6	W		5	2	2	1	5				1	6	5				WG MB MC	EB
Frederick	F16	495	R	1	21	1.0	0.15	0.30	0.7	40.0	2.0	42	50	50				AR	M	21						0									0	10				WG MB MC	EB
Frederick	F16	516	G	1	12		0.30	0.60	0.7	40.0	3.0	36	50	50				AR	L	18						1	1					10			10	20				MC	EB
Frederick	F16	528	R	1	39	2.0	0.15	0.25	0.7	40.0	3.0	117	40	60				AR	L	70						0									0					MB MC	EB
Frederick	F16	557	P	3	10		0.50	0.70	1.0	40.0	5.0	50	60	40				AR	M	20	0.7	0.2	0.6	W		5	2	2	1	5					5	2				MC	
Frederick	F16	567	G	1	31		0.35	0.80	0.3	40.0	6.0	186	50	50				AR	M	93						2	1	1							0	3				MC	EB
Frederick	F16	598	R	1	8	2.0	0.10	0.15	0.3	40.0	4.0	32	30	70				AR	H	22						1	1					2			2	5				MC	EB
Frederick	F16	606	G	1	18		0.30	0.80	0.3	40.0	5.0	90	70	30				AR	L	27						1	1								0	5				MC	EB
Frederick	F16	624	R	1	4	2.0	0.10	0.15	0.3	40.0	1.0	4	50	50				AR	L	2						0									0	10				MC	EB
Frederick	F16	628	P	1	13		0.60	1.20	0.3	40.0	5.0	65	50	50				AR	M	33	1.2	0.2	1.1	W	Y	2		1	1	1			10		11	20				MC	EB
Frederick	F16	641	G	1	49		0.35	0.50	0.3	40.0	4.0	196	60	40				AR	M	78						1	1				2				2	25				MC	EB
Frederick	F16	690	R	1	11	2.0	0.10	0.15	0.5	40.0	2.0	22	60	40				AR	M	9						2			2	2					2	60				MC	EB
Frederick	F16	701	G	1	14		0.40	0.70	0.3	40.0	5.0	70	60	40				AR	M	28						4	2		2	5					5	50				MC	EB
Frederick	F16	715	G	1	16		0.35	0.50	0.3	40.0	3.0	48	60	40				AR	M	19						0						10			10					WG MC	EB
Frederick	F16	731	R	1	7	2.0	0.10	0.15	0.2	40.0	1.0	7	60	40				AR	M	3						1		1							0	30				WG MC	EB
Frederick	F16	738	P	1	29		1.00	1.80	1.0	40.0	4.5	130.5	70	30				AR	M	39	1.8	0.2	1.6	W	Y	4	2	2					70		70	70				WG MC	EB
Frederick	F16	767	R	1	11	2.0	0.15	0.20	0.2	40.0	1.5	16.5	70	30				AR	L	5						0									0	50				WG MC	EB
Frederick	F16	778	G	1	11		0.20	0.60	0.2	40.0	3.0	33	80	20				AR	L	7						3	2		1	5					5	20				MC	EB
Frederick	F16	789	R	1	2	2.0	0.05	0.10	0.2	40.0	1.5	3	90	10				AR	N	0						1	1								0	20				MC	EB
Frederick	F16	791	G	1	47		0.35	0.60	0.5	40.0	3.5	164.5	90	10				AR	N	16						1	1								0	20				MB MC	EB
Frederick	F16		P	3	5		0.50	0.70	1.0	40.0	2.0	10	90	10				AR	N	1	0.7	0.4	0.3	W		0									0	30				MB MC	EB
Frederick	F16		P	3	3		0.60	1.00	1.0	40.0	2.0	6	90	10				AR	N	1	1.0	0.5	0.5	W		1		1		2	10	10			22	30				MB MC	EB
Frederick	F16	838	R	1	5	1.0	0.07	0.10	1.0	40.0	1.0	5	80	20				AR	N	1						0									0		SC	P	100	MC	EB
Frederick	F16	843	P	1	18		0.75	1.00	1.5	40.0	3.0	54	90	10				AR	N	5	1.0	0.2	0.9	O		0							5		5					MC	EB
Frederick	F16	861	R	1	10	1.0	0.20	0.40	1.0	40.0	3.0	30	90	10				AR	N	3						0						5			20					MC	EB
Frederick	F16	871	P	1	7		0.45	0.70	1.0	40.0	3.0	21	90	10				AR	N	2	0.7	0.2	0.5	W		5	2	2	1	10					10					MC	EB
Frederick	F16	878	R	1	21	4.0	0.15	0.20	0.5	40.0	2.5	52.5	50	50				AR	L	26						4	2	2							0	10				MC	EB
Frederick	F16	899	G	1	31	1.0	0.25	0.45	1.0	40.0	2.5	77.5	70	30				AR	L	23						3		2	1	5	2				7	20				WG MC	EB
Frederick	F16	930	R	1	6	4.0	0.10	0.20	1.0	40.0	1.0	6	90	10				AR	N	1						0									0					MC	EB
Frederick	F16	936	G	1	32		0.30	0.50	1.0	40.0	5.0	160	90	10				AR	N	16						0						10			10		SC	P	30	MC	EB
Frederick	F16		P	3	10		0.50	0.75	1.0	40.0	4.0	40	100					AR	N	0	0.8	0.1	0.7	W		1			1	20					20					MC	EB
Frederick	F16	968	R	1	14	1.0	0.15	0.25	0.5	40.0	2.5	35	50	50				AR	L	18						1		1		1	5				6					MC	EB
Frederick	F16	982	G	1	11		0.30	0.45	1.0	40.0	3.0	33	90	10				AR	N	3						0						10			10	5	SC	G	110	MC	EB
Frederick	F16	993	P	1	5		0.70	0.90	1.0	40.0	4.0	20	50	50				AR	L	10	0.9	0.5	0.4	W		4	2	2		5					5	5				MC	EB
Frederick	F16	998	G	1	8		0.25	0.35	1.0	40.0	3.0	24	80	20				AR	N	5						1	1					10			10	5				MC	EB
Frederick	F16	1006	P	1	6		0.50	0.70	1.0	40.0	3.0	18	80	20				AR	L	4	0.7	0.3	0.4	W		0						5			5	5				MC	EB
Frederick	F16	1012	R	1	8	1.0	0.20	0.25	1.0	40.0	1.0	8	90	10				AR	N	1						0									0					MC	EB
Frederick	F16	1020	G	1	15		0.30	0.50	1.0	40.0	2.0	30	80	20				AR	L	6						1	1								0					MC	EB
Frederick	F16	1035	R	1	14	1.0	0.10	0.15	1.0	40.0	2.5	35	80	20				AR	L	7						0									0	2				MC	EB
Frederick	F16	1049	G	1	7		0.25	0.45	0.5	40.0	3.0	21	90	10				AR	N	2						2		1	1						0	5				MC	EB
Frederick	F16	1056	R	1	9	1.0	0.15	0.25	0.5	40.0	1.0	9	90	10				AR	N	1						1			1	5					5	5				MC	EB
Frederick	F16	1065	G	1	28		0.25	0.40	0.5	40.0	2.0	56	90	10				AR	N	6						15	10	3	2	2					2	10				MC	EB
Frederick	F16	1093	R	1	12	3.0	0.10	0.20	0.3	40.0	3.0	36	90	10				AR	N	4						0									0	20				MC	EB
Frederick	F16	1105	P	1	12		0.70	1.20	0.3	40.0	4.5	54	90	10				AR	N	5	1.2	0.2	1.1	W	Y	2	2						20	5	25	5				WG MC	EB
Frederick	F16	1117	R	1	7	2.0	0.05	0.10	0.3	40.0	1.0	7	80	20				AR	N	1						0									0	15				WG MC	EB

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)						Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Frederick	F16	1124	G	1	8		0.45	0.80	0.3	40.0	3.5	28	90	10				AR	N	3						1	1			2					0	15				MC EB	
Frederick	F16	1132	R	1	8	1.0	0.15	0.25	0.3	40.0	1.0	8	90	10				AR	N	1						0									0	15				MC EB	
Frederick	F16	1140	G	1	6		0.35	0.75	0.3	40.0	6.0	36	90	10				AR	N	4						1		1							0	10				WG MC EB	
Frederick	F16	1146	P	1	12		0.70	1.20	0.3	40.0	3.0	36	90	10				AR	N	4	1.2	0.2	1.0	W	Y	1		1				50			50	50				MC EB	
Frederick	F16	1158	G	1	37		0.20	0.45	0.3	40.0	3.0	111	80	20				AR	N	22						5	3	2		2					2	70				WG MC MB EB JM	
Frederick	F16	1195	R	1	18	1.0	0.10	0.20	0.3	40.0	1.5	27	90	10				AR	L	3						1			1	5					5	10				WG MC EB	
Frederick	F16	1213	G	1	23		0.45	0.70	0.3	70.0	4.0	92	30	70				AR	H	64						1			1						0					MC EB	
Frederick	F16	1236	P	1	37		0.80	1.50	0.3	70.0	7.0	259	50	50				AR	L	130	1.4	0.4	1.1	O	Y	8		8		1		70			71	10				MC EB	
Frederick	F16	1273	G	1	10		0.20	0.30	0.3	50.0	20.0	200	100					AR	N	0						2		2					80		80					MC EB	
Frederick	F16	1283	P	1	15		0.80	1.10	0.5	50.0	17.0	255	100					AR	N	0	1.1	0.3	0.8	O	Y	4		2	2	2		20	50		72		SL	G	30		MC EB	
Frederick	F17	0	R	1	37	2.0	0.20	0.50	0.1	40.0	9.0	333	60	40				AR	H	133						10	8	2		2					2	10				WG MB MC	
Frederick	F17	37	P	1	7		0.40	0.85	0.1	30.0	10.0	70	70	30				AR	H	21	0.9	0.3	0.6	W		2	2								0	30				MB MC JM	
Frederick	F17	44	G	1	23		0.40	0.65	0.2	30.0	8.0	184	50	50				AR	H	92						2		1	1	2					2	20					
Frederick	F17	67	P	1	15		0.50	0.90	0.2	25.0	4.0	60	70	30				AR	M	18						1	1					60			60	10					
Frederick	F17	82	R	1	11	1.0	0.20	0.85	0.2	25.0	9.0	99	30	70				AR	H	69	0.9	0.4	0.5	O		2	2								0	5				WG MB MC	
Frederick	F17	93	G	1	7	1.0	0.30	0.50	0.2	25.0	7.0	49	90	10				AR	N	5						1		1							0	5				MC MB	
Frederick	F17	100	P	1	9		1.00	1.60	0.2	25.0	4.0	36	80	20				AR	L	7	1.6	0.5	1.1	W	Y	3	1	2		5					5	5				MC MB	
Frederick	F17	109	R	1	3	1.0	0.15	0.30	0.2	25.0	2.0	6	100					AR	N	0						3	3			40					40					MC MB	
Frederick	F17	112	G	1	8		0.40	0.80	0.2	25.0	3.0	24	70	30				AR	M	7						6	3	3		2					2					MC MB	
Frederick	F17	120	R	1	4	2.0	0.25	0.35	0.2	25.0	5.0	20	90	10				AR	L	2						9	7	2		30					30					MC MB JM	
Frederick	F17	124	P	1	6		0.80	1.30	0.2	25.0	10.0	60	50	50				AR	M	30	1.3	0.3	1.0	W	Y	2		2		20		50			70	30				MC MB JM	
Frederick	F17	130	R	1	25	1.0	0.15	0.30	0.2	25.0	11.0	275	30	70				AR	H	193						7			7						0						
Frederick	F17	155	P	1	13		1.00	1.40	0.1	25.0	7.0	91	70	30				AR	L	27	1.4	0.2	1.2	W	Y	0				20		80			100	5					
Frederick	F17	168	R	1	32	1.0	0.20	0.30	0.1	25.0	6.0	192	30	70				AR	H	134						0									0	30				WG MC	
Frederick	F17	200	G	1	52		0.25	0.50	0.1	25.0	5.0	260	60	40				AR	H	104						2	2								0	25				MC	
Frederick	F17	252	R	1	48	1.0	0.20	0.60	0.1	25.0	5.0	240	40	60				AR	H	144						5	3	2		2					2	5				WG MB	
Frederick	F17	300	P	1	14		0.80	1.10	0.1	25.0	5.0	70	50	50				AR	H	35	1.1	0.3	0.8	W	Y	3	2	1		10		70			80					MC	
Frederick	F17	314	R	1	24	1.0	0.25	0.50	0.1	25.0	4.5	108	30	60	10			AR	H	67						0									0	10				MC MB	
Frederick	F17	338	P	1	12		1.10	1.60	0.1	25.0	5.5	66	50	40	10			AR	L	28	1.6	0.2	1.5	W	Y	17	6	10	1	25		75			100					MC JM	
Frederick	F17	350	R	1	7	1.0	0.10	0.20	0.2	25.0	4.0	28	30	70				AR	H	20						1	1								0	5				MC	
Frederick	F17	357	P	1	8	1.0	1.00	1.50	0.2	25.0	5.0	40	70	30				AR	L	12	1.5	0.2	1.4	W	Y	1			1	10		60			70	5				MC	
Frederick	F17	365	R	1	27	1.0	0.20	0.40	0.1	25.0	4.0	108	50	50				AR	M	54						0									0	30				MC WG MB	
Frederick	F17	392	P	1	14		0.80	1.20	0.7	25.0	9.0	126	60	40				AR	L	50	1.2	0.2	1.0	W		11		10	1	20		50			70	5				MC WG JM	
Frederick	F17	406	R	1	10	1.0	0.15	0.25	0.5	25.0	4.0	40	70	30				AR	M	12						0									0	10				MC	
Frederick	F17	416	P	1	6		0.50	0.85	0.5	25.0	5.0	30	70	30				AR	M	9	0.9	0.3	0.6	W		4		2	2	10					10	5				MC MB	
Frederick	F17	422	R	1	28	1.0	0.15	0.30	0.2	25.0	7.0	196	30	70				AR	H	137						2		2							0					MC WG MB	
Frederick	F17		P	3	10		0.50	0.80	0.2	25.0	2.5	25	60	40				AR	M	10	0.8	0.2	0.6	W		1		1							0					MC JM	
Frederick	F17	450	P	1	10		0.60	1.00	0.2	25.0	8.0	80	70	30				AR	L	24	1.0	0.2	0.8	W	Y	15		15				10			10					MC JM	
Frederick	F17	460	R	1	32	1.0	0.20	0.30	0.2	25.0	7.0	224	20	80				AR	H	179						0									0	5				MC	
Frederick	F17	492	P	1	7		0.70	0.90	0.4	25.0	9.0	63	50	50				AR	M	32	0.9	0.2	0.7	W		7	3	2	2	20					20	5				JM MC	
Frederick	F17	499	R	1	29	1.0	0.20	0.40	0.2	25.0	7.0	203	30	70				AR	H	142						2		2		1					1	10				MB MC	
Frederick	F17	528	P	1	5		0.45	0.70	0.2	25.0	3.0	15	70	25	5			AR	L	4	0.7	0.2	0.5	W		8	6	2		5					5					JM MC	
Frederick	F17	533	R	1	10	1.0	0.10	0.15	0.1	25.0	5.0	50	25	70	5			AR	H	36						0									0					WG MB MC	
Frederick	F17	543	P	1	7		0.60	1.10	0.1	25.0	6.0	42	30	70				AR	H	29	1.1	0.2	1.0	W	Y	0									0	30				WG MB MC	
Frederick	F17	550	R	1	48	1.0	0.15	0.45	0.1	25.0	4.0	192	10	70	20			AR	H	142						0							1	1	5				WG MB MC	
Frederick	F17	598	P	1	9		0.70	1.00	0.1	25.0	4.0	36	60	40				AR	L	14	1.0	0.4	0.7	O	Y	3	2	1		5	5				10	5				WG MC EB	
Frederick	F17	607	R	1	18	1.0	0.10	0.20	0.5	25.0	5.0	90	10	90				AR	H	81						0									0	5				WG MC	
Frederick	F17	625	P	1	15		0.70	1.10	0.2	25.0	4.0	60	40	60				AR	M	36	1.1	0.2	0.9	O	Y	0							5		5	5				WG MC	

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)						Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Frederick	F17	640	R	1	10	1.0	0.10	0.20	0.2	25.0	5.0	50	30	70				AR	L	35						0								0					WG MB JM MC	
Frederick	F17	650	P	1	10		0.70	1.00	0.3	25.0	7.0	70	70	30				AR	L	21	1.0	0.2	0.8	W		13	8	5		20				20					MB JM MC	
Frederick	F17	660	R	1	20	1.0	0.15	0.30	0.3	25.0	6.0	120	30	70				AR	H	84						0								0	15				MC WG	
Frederick	F17	680	G	1	26		0.20	0.30	10.0	25.0	4.0	104	50	50				AR	H	52						0								0	30				MC	
Frederick	F17	706	P	1	14		0.50	1.20	10.0	25.0	3.0	42	70	20	5		5	AR	L	9	1.2	0.2	1.0	R		0							30	30	5				MC	
Frederick	F17	720	R	1	17	1.0	0.15	0.40	10.0	25.0	4.0	68	25	70	5			AR	H	48						0								0	5				MC WG	
Frederick	F17	737	P	1	8		0.50	0.90	0.3	25.0	2.0	16	70	25	5			AR	L	4	0.9	0.3	0.7	R		1			1	5				5	5				MC	
Frederick	F17	745	R	1	7	1.0	0.20	0.50	0.3	25.0	5.0	35	10	90				AR	H	32						0								0	5				MC	
Frederick	F17	752	P	1	12		0.45	0.90	0.3	25.0	5.0	60	30	40	30			AR	L	28	0.9	0.2	0.7	W		4	2	1	1					0	5				MC	
Frederick	F17	764	R	1	8	1.0	0.20	0.30	0.3	25.0	3.0	24	20	70	10			AR	H	17						0								0	40				MC WG	
Frederick	F17	772	P	1	20		1.00	1.50	0.3	25.0	5.0	100	60	30	10			AR	L	32	1.5	0.2	1.3	W	Y	3		2	1	10			50	60	10				MC WG	
Frederick	F17	792	R	1	13	1.0	0.15	0.25	0.3	25.0	5.0	65	10	90				AR	H	59						0								0	5				MC	
Frederick	F17	805	G	1	31	1.0	0.20	0.30	1.0	25.0	4.0	124	10	70	20			AR	H	92						0								0	10				MC WG	
Frederick	F17	836	R	1	18	2.0	0.15	0.25	1.0	25.0	4.0	72	10	80	10			AR	H	59						0								0	10					
Frederick	F17	854	G	1	29		0.25	0.55	0.2	25.0	3.0	87	5	90	5			AR	H	79						0								0	25					
Frederick	F17	883	R	1	11	1.0	0.10	0.25	0.2	25.0	6.0	66	10	80	10			AR	M	54						3	3							0					MC MB EB	
Frederick	F17	894	P	1	8		0.55	0.80	0.1	25.0	12.0	96	20	70	10			AR	L	69	0.8	0.2	0.6	W		9	6	2	1	70				70					MC WG JM	
Frederick	F17	902	R	1	15	2.0	0.15	0.40	0.5	25.0	6.0	90	10	70	20			AR	H	67						2		2						0	5				MC WG MB	
Frederick	F17	917	G	1	24		0.25	0.45	0.2	25.0	6.0	144	10	80	10			AR	H	118						0								0	30					
Frederick	F17	941	P	1	12		0.60	0.80	0.1	25.0	6.0	72	10	80	10			AR	H	59	0.8	0.3	0.5	R		1		1						0	10					
Frederick	F17	953	R	1	31	1.0	0.15	0.30	0.1	25.0	6.0	186	15	80	4	1		AR	M	150						0				1				1					MC WG	
Frederick	F17	984	G	1	13		0.25	0.45	0.1	25.0	3.0	39	40	60				AR	M	23						0					5			5					EB	
Frederick	F17	997	P	1	19		0.75	1.10	0.2	25.0	7.0	133	20	70	10			AR	H	96	1.1	0.2	0.9	O		0						10		10	40				MC	
Frederick	F17	1016	R	1	32	2.0	0.15	0.30	0.3	25.0	4.5	144	15	80	5			AR	H	117						0								0	30				MC EB	
Frederick	F17	1048	P	1	10		0.55	1.10	1.0	25.0	6.0	60	20	20	60			AR	L	19	1.1	0.2	0.9	O		0						30		30					MC EB	
Frederick	F17	1058	R	1	136	2.0	0.10	0.25	0.2	25.0	6.0	816	10	40	50			AR	M	408						6	4	2						0	5				WG MC EB	
Frederick	F17	1194	P	1	22		0.75	1.10	1.0	25.0	5.0	110	35	30	30	5		AR	L	40	1.1	0.3	0.9	W	Y	1		1			5			5					WG MC EB	
Frederick	F17	1216	R	1	29	3.0	0.15	0.25	1.0	25.0	6.0	174	10	50	40			AR	M	101						2	1	1						0	15				MC WG 1441DS	
Frederick	F17	1245	G	1	17		0.20	0.30	1.0	25.0	4.5	76.5	10	40	50			AR	L	38						1		1						0	5				MC EB	
Frederick	F17	1262	P	1	13		0.40	0.70	0.5	25.0	4.0	52	20	35	40	5		AR	L	22						0					5			5	5				MC EB	
Frederick	F17	1275	R	1	30	1.0	0.20	0.35	0.1	25.0	9.0	270	10	20	70			AR	N	92						1		1						0					WG MB EB	
Frederick	F17	1305	P	1	15		0.65	0.95	0.6	25.0	13.0	195	70	20	10			AR	M	43	0.7	0.3	0.4	O		3		3		5				5					WG MB JM MC EB	
Frederick	F17	1320	R	1	11	2.0	0.20	0.35	0.2	25.0	8.0	88	50	50				AR	H	44						1	1						1	1					WG MB MC EB	
Frederick	F17	1331	P	1	13		0.65	1.20	0.2	25.0	10.0	130	70	30				AR	M	39	1.0	0.3	0.7	O	Y	0						20		20					MB MC EB	
Frederick	F17	1344	R	1	9	2.0	0.10	0.20	0.2	25.0	7.0	63	30	70				AR	H	44						0							10	10					WG MC EB	
Frederick	F17	1353	G	1	21	1.0	0.30	0.50	0.2	25.0	6.0	126	30	70				AR	H	88	1.2	0.7	0.6	O	Y	2	2							0	50				MC	
Frederick	F17	1374	R	1	9	2.0	0.10	0.20	0.2	25.0	10.0	90	30	70				AR	H	63						2	2			1			20	21	10				MC	
Frederick	F17	1383	G	1	11		0.35	0.45	0.2	25.0	12.0	132	30	40	30			AR	L	61						0								0	5				MC	
Frederick	F17	1394	R	1	6	2.0	0.15	0.30	0.2	25.0	10.0	60	30	40	30			AR	L	28						8	2	5	1	20				20	5				MC	
Frederick	F17	1400	P	1	20		0.65	1.20	0.2	25.0	6.5	130	30	20	50			AR	L	39	1.2	0.2	1.0	O	Y	3	3			2				2					MC	
Frederick	F17	1420	R	1	80	3.0	0.15	0.30	0.2	25.0	8.0	640	10	30	30	30		AR	N	230						4	2	2		1	30			31						
South Sarita	SS20	0	G	1	28		0.20	0.40	1.0	50.0	13.0	364	40	30	30			AR	M	131						0								0					EB	
South Sarita	SS20	28	P	1	52		0.80	1.20	1.0	37.0	7.0	364	50	40	10			AR	M	153	1.2	0.2	1.0	W	Y	1			1	5		15		20	5				EB	
South Sarita	SS20	80	G	1	23		0.25	0.45	3.0	37.0	7.0	161	20	10	70			AR	N	39						0								0	2				DW EB	
South Sarita	SS20	103	R	1	20	1.0	0.10	0.15	3.0	37.0	3.0	60		25	70	5		AR	L	23						0					5			5	2				DW EB	
South Sarita	SS20	123	P	1	3		0.30	0.80	3.0	38.0	10.0	30	30	40	30			AR	L	14	0.8	0.1	0.7	W		1			1	10				10	5				DW EB	
South Sarita	SS20	126	G	1	32		0.20	0.40	3.0	38.0	4.0	128	20	30	50			AR	H	51						1			1					0					DW EB	
South Sarita	SS20	158	R	1	16	1.0	0.05	0.10	2.0	38.0	1.0	16	80	20				AR	L	3						0								0					DW EB	

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)					Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
South Sarita	SS20	174	P	1	37		0.50	1.20	3.0	35.0	17.0	629	60	35			5	AR	H	220	1.2	0.1	1.2	O	Y	2		2					20		20					WG MB EB	
South Sarita	SS20		P	2	10		0.20	0.40	3.0	25.0	3.0	30	10	80	10			AR	L	25	0.4	0.0	0.4	W					2	5										
South Sarita	SS20		P	2	12		0.20	0.45	3.0	15.0	5.0	60	10	70	20			AR	L	44	0.5	0.0	0.5	W			3	3	3	2									DW EB	
South Sarita	SS20		P	2	6		0.10	0.25	3.0	20.0	2.0	12	10	20	70			AR	L	4	0.3	0.0	0.3	W					1	5									DW EB	
South Sarita	SS20		G	2	200		0.00	0.00	2.0	22.0	0.0	0	5	25	70			AR	L	0									1										DW EB	
South Sarita	SS20		P	2	25		0.30	1.50	3.0	20.0	5.0	125	30	40	30			AR	L	58									1										DW EB	
South Sarita	SS20		G	2	15		0.00	0.00	1.0	20.0	0.0	0		10	90			AR	L	0							4	1										DW EB	
South Sarita	SS20	211	G	1	59		0.20	0.40	1.0	40.0	15.0	885	60	30	5		5	AR	H	274						0							0					WG MB EB	
South Sarita	SS20	270	G	1	40		0.00	0.00	0.5	36.0	0.0	0	30	50	20			AR	M	0						0							0					DW WG MB EB	
South Sarita	SS20	310	P	1	28		0.30	0.75	1.0	35.0	12.0	336	80	10	10			AR	N	40	0.8	0.0	0.8	R	Y	0							0					DW WG MB EB	
South Sarita	SS20	338	G	1	352	1.0	0.00	0.00	3.0	40.0	0.0	0	50	30	10	10		AR	L	0						10		7	3		10				10			FP DW WG MB EB	
South Sarita	SS20		P	2	11		0.20	0.40	2.0	55.0	2.0	22	10	10	80			AR	N	6	0.4	0.0	0.4	W		1		1					0					DW WG MB EB	
South Sarita	SS20	690	P	1	73		1.20	2.20	1.0	40.0	15.0	1095	80	20				AR	M	219	2.5	0.0	2.5	R	Y	0							50		50		SC	P	596	DW WG MB EB	
South Sarita	SS20		P	2	18		0.20	0.30	1.0	110.0	2.0	36	40	40	20			AR	L	16	0.3	0.0	0.3	W				20	5									DW WG MB EB	
South Sarita	SS20	763	G	1	307	1.0	0.00	0.00	1.0	110.0	0.0	0	50	20	30			AR	L	0						0							0					FP DW WG MB EB	
South Sarita	SS20		G	2	35		0.10	0.20	2.0	15.0	2.0	70	10	30	50		10	AR	L	28							3	1											
South Sarita	SS21	0	G	1	50		0.00	0.00	1.0	32.0	0.0	0	10	20	70			AR	L	0						1			1				0					DW EB	
South Sarita	SS21	50	G	1	20		0.50	0.80	1.0	20.0	12.0	240	40	30	30			AR	M	86						1			1				0					DW EB	
South Sarita	SS21	70	R	1	34	1.0	0.15	0.30	1.0	55.0	4.0	136	5	10	80	5		AR	N	35						0					5		5	5				DW EB	
South Sarita	SS21	104	G	1	33		0.25	0.20	1.0	55.0	0.0	0	20	50	30			AR	H	0						2		2					0	20				DW EB	
South Sarita	SS21	137	R	1	11	1.0	0.10	0.15	0.5	55.0	5.0	55	5	40	50	5		AR	M	28						0					5		5	60				PD DW EB	
South Sarita	SS21	148	G	1	30		0.15	0.40	0.5	60.0	8.0	240	30	30	40			AR	M	91						6	4	2					0	5					
South Sarita	SS21	178	R	1	12	1.0	0.10	0.15	0.5	60.0	15.0	180	10	20	65	5		AR	L	59						1	1				5		2	7					
South Sarita	SS21	190	G	1	190		0.40	0.65	0.5	60.0	28.0	5320	50	30	20			AR	M	1809						6		1	5				0						
South Sarita	SS21		P	2	10		0.60	1.00	1.0	45.0	14.0	140	10	20	70			AR	L	48	1.0	0.5	0.5	W	Y	1			1				0						EB	
South Sarita	SS21	380	R	1	90	1.0	0.12	0.22	0.5	40.0	18.0	1620	15	30	50	5		AR	L	648						2	1	1			5		5	5				EB	
South Sarita	SS21	470	G	1	230		0.25	0.40	1.0	30.0	28.0	6440	20	65	10	5		AR	M	4315						0					5		5						
South Sarita	SS21	700	R	1	100	1.0	0.20	0.30	1.0	30.0	27.0	2700	10	20	50	20		AR	L	810						0					20		20						
South Sarita	SS21	800	P	1	36		0.50	1.50	2.0	25.0	18.0	648	20	30	30	20		AR	L	233	1.5	0.2	1.3	R	Y	0					20	20	40						
South Sarita	SS21	836	R	1	52	2.0	0.10	0.30	2.0	25.0	15.0	780	10	30	35	25		AR	L	289						0					25		25	5				EB	
South Sarita	SS21	888	G	1	27		0.20	0.40	2.0	25.0	23.0	621	60	20	10	10		AR	H	137						0					10		10						
South Sarita	SS21	915	P	1	57		0.70	1.30	2.0	25.0	22.0	1254	50	25	20	5		AR	L	364	1.3	0.3	1.0	R	Y	0					5	30	35						
South Sarita	SS21	972	R	1	141	1.0	0.20	0.40	2.0	25.0	15.0	2115	10	10	50	30		AR	N	423						0					30		30					EB	
South Sarita	SS21		P	2	25		0.30	1.00	2.0	25.0	7.0	175	20	30	40	5	5	AR	L	67	1.0	0.3	0.8	R	Y	0					5	10	15						
South Sarita	SS21	1113	G	1	22		0.20	0.40	20.0	27.0	20.0	440	20	30	40	5	5	AR	L	167						0					5		5						
South Sarita	SS21	1135	P	1	105		0.50	2.50	20.0	25.0	20.0	2100	20	40	15	20	5	AR	L	903	2.5	0.5	2.0	R	Y	0					20	20	40						
South Sarita	SS27	0	R	1	38	2.0	0.10	0.30	8.0	20.0	14.0	532			30	70		R	N	32						1			1		70		70					EB	
South Sarita	SS27	38	G	1	26		0.20	0.40	15.0	20.0	12.0	312			50	50		R	N	31						2	1	1			50		50						
South Sarita	SS27	64	P	1	53		3.50	4.00	15.0	14.0	10.0	530	25	20	25	10	20	R	H	133	4.0	0.3	3.7	R	Y	0					10		10						
South Sarita	SS27	117	R	1	25	2.0	0.20	0.40	25.0	17.0	15.0	375		5	15	80		R	N	30						0					80		80						
South Sarita	SS27	142	G	1	22		0.35	1.00	20.0	15.0	12.0	264	70	10		15	5	R	M	26						0					15		15						
South Sarita	SS27	164	R	1	9	1.0	0.20	0.40	20.0	15.0	12.0	108		5	25	70		R	L	11						0					70		70						
South Sarita	SS27	173	G	1	13		0.30	0.50	10.0	15.0	12.0	156	5	5	10	60	20	R	L	11						0					60		60						
South Sarita	SS27	186	R	1	7	2.0	0.25	0.40	10.0	15.0	11.0	77			20	80		R	N	3						0					80		80						
South Sarita	SS27	193	P	1	8		0.75	1.30	3.0	15.0	6.0	48			20	60	20	R	N	2	1.3	0.3	1.0	R	Y	2	2				60		60						
South Sarita	SS27	201	R	1	16	1.0	0.15	0.35	3.0	15.0	5.0	80		5	5	80	10	R	N	5						0					80		80						
South Sarita	SS27	217	G	1	25		0.25	0.60	3.0	15.0	12.0	300		15	15	35	35	R	L	54						1		1			35		35						
South Sarita	SS27	242	R	1	9	1.0	0.15	0.30	3.0	15.0	10.0	90		10	30	30	30	R	L	14						0					30		30						

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only					Functional LWD Tally				Cover (%)					Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
South Sarita	SS27	251	G	1	36		0.45	0.70	20.0	16.0	8.0	288			10	70	20	R	N	6						2		2			70				70						
South Sarita	SS27	287	P	1	46		1.00	1.80	20.0	13.0	12.0	552	25	10	15	30	20	R	L	72	1.8	0.5	1.3	R	Y	0					30		70		100						
South Sarita	SS27		R	2	19	2.0	0.30	0.50	20.0	15.0	12.0	228		10	40	50		R	L	41						1	1				50				50						
South Sarita	SS27	333	P	1	33		1.50	2.00	20.0	15.0	12.0	396	35	60		5		R	H	238	2.0	0.2	1.8	R	Y	0					5		50		55						
South Sarita	SS27	366	R	1	63	1.0	0.35	0.80	3.0	27.0	12.0	756	5	5	40	50		R	L	98						2			2	10	50				60						
South Sarita	SS27	429	G	1	42		0.40	0.80	3.0	27.0	7.0	294		10	60	30		R	L	65						0					30				30						
South Sarita	SS27		R	3	15	1.0	0.20	0.35	20.0	28.0	5.0	75			30	70		R	N	5						0					70				70						
South Sarita	SS27	471	G	1	19		0.30	0.60	20.0	28.0	7.0	133		80	20			R	H	112						1			1	2					2						
South Sarita	SS27	490	P	1	27		0.90	1.30	20.0	25.0	15.0	405	5	10	10	70	5	R	L	49	1.3	0.2	1.1	R	Y	1			1	2	70		15		87						
South Sarita	SS27		R	2	30	1.0	0.15	0.30	20.0	20.0	15.0	450		10	70	20		R	N	108						0					20				20						
South Sarita	SS27	517	G	1	33		0.35	0.75	20.0	20.0	12.0	396		25	50	25		R	N	139						0					20				20						
South Sarita	SS27		R	2	15	2.0	0.20	0.40	20.0	18.0	10.0	150	10	10	50	30		R	M	30						0					30				30						
South Sarita	SS27	550	P	1	30		1.50	2.00	20.0	15.0	6.0	180	10	10	50	10	20	R	L	36	2.0	0.3	1.7	R	Y	0					10		70		80						
South Sarita	SS30	0	P	1	35		1.00	1.50	0.5	40.0	16.0	560	50	25	20	5		AR	M	162	1.6	0.3	1.4	W	Y	8		5	3	2	5		30		37	5	SC	G	30		MC EB
South Sarita	SS30	35	P	1	15		0.60	1.00	0.3	36.0	4.0	60	50	40	5		5	AR	L	25	1.0	0.2	0.8	R	Y	1			1				20		20	30	SC	G	120		MC EB
South Sarita	SS30	50	R	1	52		0.25	0.55	0.1	50.0	12.0	624	10	20	50	20		AR	L	187						0					20				20	5				WG MB MC EB DW
South Sarita	SS30		G	2	10		0.30	0.50	0.1	50.0	30.0	300	10	20	60	10		AR	L	96						2			2	2	10				12					MC EB DW JM
South Sarita	SS30	102	P	1	24		0.45	0.80	0.5	60.0	4.0	96	10	20	60	10		AR	L	31	0.8	0.3	0.6	W		6	5		1	5	10				15	5				WG MB MC EB DW BC
South Sarita	SS30	126	R	1	18	3.0	0.20	0.30	0.5	60.0	3.0	54	5	10	80	5		AR	L	14						21	5	15	1	30	5				35	10				WG MB MC EB DW BC JM
South Sarita	SS30	144	G	1	22		0.20	0.35	0.5	60.0	6.0	132	10	10	80			AR	L	34						0									0					DW WG MB MC EB
South Sarita	SS30	166	R	1	26	1.0	0.20	0.35	0.5	60.0	4.0	104	10	10	65	15		AR	L	24						0					15				15					DW WG MB MC EB
South Sarita	SS30	192	P	1	21		0.80	1.20	0.5	60.0	5.0	105	25	20	50	5		AR	H	32	1.2	0.2	1.0	R	Y	9	5	3	1	5	5	40			50	10				DW WG MB MC EB
South Sarita	SS30	213	G	1	28		0.25	0.60	0.5	60.0	4.0	112	10	20	60	10		AR	L	36						2	2				10				10	2				WG MB MC EB
South Sarita	SS30	241	R	1	5	1.0	0.10	0.20	0.5	60.0	3.0	15			90	10		AR	N	3						0					10				10					WG MB MC EB
South Sarita	SS30	246	P	1	11		0.40	1.20	0.5	60.0	6.0	66	60	20	20			AR	L	16	1.2	0.2	1.0	W		4		1	3	5		30			35	90				WG MB MC EB
South Sarita	SS30	257	R	1	21	1.0	0.10	0.20	0.5	50.0	12.0	252	10	20	60	10		AR	L	81						0					10				10					WG MB MC EB
South Sarita	SS30	278	G	1	7		0.30	0.40	0.5	60.0	7.0	49		30	60	10		AR	L	21						1			1	3	10				13					WG MB MC EB JM
South Sarita	SS30	285	R	1	15	1.0	0.15	0.30	0.5	50.0	4.0	60			90	10		AR	N	11						0					10				10					WG MB MC EB JM
South Sarita	SS30	300	P	1	8		0.70	2.00	15.0	50.0	12.0	96	20	20	60			AR	L	31	2.0	0.2	1.9	W	Y	30	10	15	5	30		50			80					WG MB MC EB JM
South Sarita	SS30	308	R	1	12	3.0	0.10	0.20	1.0	50.0	5.0	60		10	80	10		AR	N	16						0					10				10		SC	P	70	WG MC EB
South Sarita	SS30	320	R	1	60	1.0	0.25	0.50	1.0	50.0	8.0	480	25	20	50	5		AR	L	144						0					5				5					MC EB
South Sarita	SS31	0	G	1	13		0.15	0.40	0.5	20.0	10.0	130	10	30	50	10		AR	M	52						0					10				10	20				
South Sarita	SS31	13	R	1	22	2.0	0.10	0.30	1.0	20.0	18.0	396		30	60	10		AR	L	166						0					10				10					EB
South Sarita	SS31	35	G	1	55		0.35	0.80	0.5	20.0	10.0	550	10	40	30	20		AR	H	253						5	2	2	1	1	20				21					EB
South Sarita	SS31	90	P	1	21		0.35	1.10	0.5	15.0	4.0	84		30	60	10		AR	L	35	1.1	0.5	0.6	R	Y	0					10		10		20					EB
South Sarita	SS31	111	R	1	18	1.0	0.10	0.20	1.0	30.0	18.0	324		10	80	10		AR	L	84						0					10				10					WG EB
South Sarita	SS31	129	G	1	44		0.30	0.60	2.0	30.0	6.0	264	10	20	50	20		AR	L	79						0					20				20					WG
South Sarita	SS31	173	R	1	20	1.0	0.15	0.25	2.0	30.0	7.0	140	10	10	70	10		AR	L	34						0					10				10					
South Sarita	SS31	193	G	1	22		0.50	0.85	2.0	30.0	8.0	176	15	15	60	10		AR	L	48						3			3	2	10				12					
South Sarita	SS31	215	R	1	20	1.0	0.20	0.50	0.5	25.0	6.0	120		10	80	10		AR	L	31						0					10				10					
South Sarita	SS31	235	P	1	19		0.50	1.20	0.5	25.0	7.0	133	10	20	50	20		AR	M	40	1.2	0.3	1.0	W	Y	1			1		20		10		30					
South Sarita	SS31	254	R	1	47	1.0	0.15	0.30	0.5	25.0	15.0	705	10	40	30	20		AR	M	324						0					20				20					WG
South Sarita	SS31	301	G	1	17		0.10	0.40	0.5	25.0	15.0	255	10	50	30	10		AR	M	143						1			1		10				10	10				WG
South Sarita	SS31	318	R	1	40	1.0	0.15	0.35	2.0	25.0	15.0	600	10	20	60	10		AR	L	192						1			1	2	10				12					
South Sarita	SS31	358	G	1	52		0.20	0.40	2.0	20.0	10.0	520	20	50	25	5		AR	M	286						2			2		5				5					
South Sarita	SS31	410	R	1	247	2.0	0.20	0.40	2.0	25.0	12.0	2964	15	25	30	30		AR	M	919						2			2		30				30	10				EB
South Sarita	SS31	657	G	1	34		0.20	0.60	6.0	14.0	8.0	272	20	60	10	10		AR	H	169						0					10				10					
South Sarita	SS31	691	P	1	69		1.00	3.00	8.0	10.0	8.0	552	15	50	30	5		AR	H	309	3.0	0.3	2.7	R	Y	0					5		50		55					

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)						Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Sabrina	SC34	0	C	1	35	4.0	0.30	0.60	3.0	14.0	4.0	140		10	15	15	60	AR	N	18						0					5				5					
Sabrina	SC34	35	R	1	40	2.0	0.15	0.30	2.0	25.0	12.0	480	5	5	30	60		AR	N	53						5	2	3		1	60				61					EB
Sabrina	SC34		P	2	10		0.30	0.40	2.0	30.0	10.0	100			20	30	50	AR	N	4	0.4	0.0	0.4	R		0					30				30					EB
Sabrina	SC34	75	G	1	21		0.30	0.70	2.0	15.0	10.0	210	10	40	30	10	10	AR	L	97						5	2	3		1	10				11					EB
Sabrina	SC34	96	R	1	18	2.0	0.20	0.30	2.0	18.0	5.0	90	5	10	80	5		AR	L	23						0					5				5					
Sabrina	SC34	114	G	1	21		0.30	0.60	3.0	28.0	4.0	84	30	10	40	15	5	AR	L	15						4	2	2		1	15	5			21					EB
Sabrina	SC34	135	R	1	12	2.0	0.10	0.15	4.0	35.0	4.0	48		20	50	30		AR	L	14						0					30				30					
Sabrina	SC34	147	P	1	13		0.60	1.20	2.0	30.0	7.0	91	50	10	40			AR	L	16	1.2	0.1	1.1	W	Y	1			1	2					2	5				WG	EB
Sabrina	SC34	160	R	1	20	5.0	0.10	0.10	3.0	25.0	10.0	200	10	30	60			AR	L	84						8		8		2					2				WG	EB
Sabrina	SC34	180	G	1	13		0.20	0.30	3.0	30.0	3.0	39	50	10	40			AR	L	7						6	1	5		2					2	5				
Sabrina	SC34	193	G	1	19		0.40	0.80	2.0	30.0	12.0	228	50	30	20			AR	M	78						2		1	1	2					2					
Sabrina	SC34	212	P	1	21		0.80	1.30	2.0	30.0	20.0	420	50	15	30	5		AR	L	88	1.3	0.2	1.1	W	Y	12		12		2	5				7					
Sabrina	SC34	233	G	1	34		0.30	0.70	1.0	20.0	8.0	272	15	20	60	5		AR	L	87						7		7		1	5				6					
Sabrina	SC34	267	R	1	10	2.0	0.10	0.15	2.0	20.0	3.0	30			100			AR	N	6						0									0					
Sabrina	SC34	277	G	1	5		0.20	0.30	2.0	20.0	5.0	25	20		80			AR	N	4						1		1							0	20				EB
Sabrina	SC34	282	P	1	3		0.70	1.20	1.0	20.0	8.0	24	50		50			AR	N	2	1.2	0.7	0.5	W	Y	10		8	2	20					20	10				EB
Sabrina	SC34	285	R	1	53	1.0	0.15	0.20	1.0	22.0	17.0	901	30	15	50	5		AR	L	225						3		3			5	5			10	5				
Sabrina	SC34	338	G	1	35		0.35	0.90	1.0	20.0	13.0	455	80	10	9	1		AR	L	54						7		7		5	1				6	5				EB
Sabrina	SC34	373	R	1	9	1.0	0.15	0.20	0.2	20.0	10.0	90		5	75	20		AR	N	18						0					20				20					EB
Sabrina	SC34	382	G	1	13		0.20	0.50	0.2	25.0	6.0	78	70		30			AR	N	5						2	1		1	5					5	5				
Sabrina	SC34	395	R	1	40	1.0	0.10	0.20	1.0	50.0	11.0	440	15	15	65	5		AR	L	123						10		10		10	5				15	5			MB	EB
Sabrina	SC34	435	G	1	10		0.20	0.30	1.0	40.0	12.0	120		15	80	5		AR	L	37						0					5				5	5				EB
Sabrina	SC34	445	P	1	40		0.70	1.60	0.2	35.0	12.0	480	90	5	5			AR	L	29	1.6	0.3	1.3	W	Y	5	2	1	2	5					5					
Sabrina	SC34	485	R	1	30	1.0	0.15	0.20	2.0	35.0	5.0	150	5	5	90			AR	N	35						0									0					
Sabrina	SC34	515	G	1	40		0.25	0.40	1.0	25.0	6.0	240	70	30				AR	H	72						16		16		5					5					
Sabrina	SC34		R	2	25	1.0	0.10	0.15	1.0	25.0	20.0	500	10		90			AR	N	90						0									0					
Sabrina	SC34		P	3	3		0.70	1.20	1.0	25.0	5.0	15	100					AR	N	0	1.2	0.4	0.8	W		10	5	5		20		70			90					EB
Sabrina	SC34	555	G	1	103		0.20	0.55	1.0	25.0	15.0	1545	60	30	9	1		AR	L	491						6		6			1	2			3					EB
Sabrina	SC34	658	R	1	39	1.0	0.20	0.30	1.0	20.0	8.0	312	15	15	60	10		AR	L	84						0					10				10					PD
Sabrina	SC34	697	P	1	40		0.50	1.20	1.0	20.0	8.0	320	10	65	20	5		AR	H	221	1.2	0.2	1.0	O	Y	0					5				5				WG	PD
Sabrina	SC34	737	G	1	25		0.25	0.30	2.0	15.0	6.0	150	55	10	30	5		AR	M	24						0					5				5	15				EB
Sabrina	SC34	762	R	1	10	1.0	0.10	0.25	1.0	15.0	12.0	120			10	90		AR	N	2						0					90				90					
Sabrina	SC34	772	G	1	20		0.25	0.30	1.0	15.0	6.0	120	20	10	70			AR	L	29						1		1							0					
Sabrina	SC34	792	P	1	20		1.00	2.50	1.0	15.0	12.0	240	50	40	10			AR	H	101	2.5	0.3	2.2	W	Y	0									0					
Sabrina	SC34	812	R	1	9	1.0	0.20	0.25	1.0	15.0	8.0	72		10	20	70		AR	L	10						10		8	2	15	70				85					
Sabrina	SC34	821	G	1	27		0.20	0.30	3.0	15.0	5.0	135	20		80			AR	N	22						0									0					
Sabrina	SC34	848	R	1	20	1.0	0.15	0.20	4.0	17.0	3.0	60		10	30	60		AR	N	10						7	3	4			60				60	5				
Sabrina	SC34	868	P	1	32		0.70	1.50	2.0	15.0	6.0	192	60	10	10	20		AR	M	23	1.5	0.2	1.3	O	Y	0					20				20	10				
Sabrina	SC34	900	G	1	65		0.20	0.35	1.0	18.0	5.0	325	60	30			10	AR	H	98						10	2	6	2	5					5					
Sabrina	SC34	965	R	1	15	1.0	0.15	0.20	2.0	20.0	2.0	30		40	60			AR	N	16						0									0	50				WG
Sabrina	SC34	980	P	1	15		0.40	1.70	1.0	25.0	13.0	195	30		70			AR	N	27	1.7	0.1	1.6	W	Y	15		15		20					20	5				WG
Sabrina	SC34	995	R	1	10	1.0	0.05	0.10	1.0	20.0	7.0	70	30		70			AR	N	10						0									0					
Sabrina	SC34	1005	G	1	20		0.20	0.30	1.0	20.0	10.0	200	20	10	70			AR	L	48						0						5			5					MC
Sabrina	SC34	1025	R	1	10	1.0	0.10	0.15	1.0	20.0	18.0	180	20		80			AR	N	29						2		2							0					
Sabrina	SC34	1035	G	1	55		0.30	0.60	0.2	50.0	12.0	660	45	5	50			AR	N	99						14	2	12		5					5					
Sabrina	SC34	1090	R	1	23	1.0	0.15	0.20	0.2	20.0	9.0	207	10		90			AR	N	37						4	4			5					5					
Sabrina	SC34	1113	G	1	50		0.15	0.20	0.2	20.0	8.0	400	80		20			AR	N	16						8		7	1	20					20	5				
Sabrina	SC34	1163	R	1	12	1.0	0.10	0.15	0.2	50.0	8.0	96		10	90			AR	N	27						1			1	5					5				WG	EB

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only					Functional LWD Tally				Cover (%)					Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)	
Sabrina	SC34	1175	G	1	71		0.30	0.60	0.2	50.0	6.0	426	30	20	50			AR	L	128						10	3	7							0	5				EB
Sabrina	SC34	1246	R	1	17	1.0	0.15	0.20	2.0	30.0	3.0	51	10	10	80			AR	L	13						6	2	2	2	5					5				EB
Sabrina	SC34	1263	G	1	33		0.50	1.00	1.0	25.0	5.0	165	40	50	10			AR	H	86						1		1							0					EB
Sabrina	SC34	1296	R	1	38	1.0	0.10	0.20	1.0	25.0	7.0	266	10		90			AR	N	48						0									0					
Sabrina	SC34	1334	G	1	42		0.30	0.90	1.0	50.0	8.0	336	60	10	30			AR	L	54						12		12		2					2					EB
Sabrina	SC34	1376	R	1	4	1.0	0.10	0.15	2.0	50.0	3.0	12		20	80			AR	L	4						1	1								0	20				
Sabrina	SC34	1380	G	1	8		0.20	0.30	2.0	40.0	4.0	32	30	5	65			AR	N	6						2	1	1		2		10			12	10				EB
Sabrina	SC34	1388	R	1	5	1.0	0.10	0.15	1.0	25.0	2.0	10		10	90			AR	N	3						1			1	10					10				
Sabrina	SC34	1393	G	1	31		0.30	0.70	1.0	25.0	8.0	248	40	20	40			AR	L	69						6		4	2	5					5					EB
Sabrina	SC34	1424	R	1	46	1.0	0.10	0.20	1.0	25.0	4.0	184	20	10	70			AR	L	44						1		1							0					EB
Sabrina	SC34	1470	G	1	8		0.30	0.80	2.0	25.0	6.0	48	70	10	20			AR	L	7						1			1						0					
Sabrina	SC34	1478	R	1	7	1.0	0.10	0.15	2.0	25.0	4.0	28	10	10	80			AR	L	7						0									0					
Sabrina	SC34	1485	P	1	25		0.60	1.20	1.0	25.0	8.0	200	50	10	40			AR	L	36	1.2	0.1	1.1	O	Y	0									0					
Sabrina	SC35	0	R	1	36	1.0	0.15	0.25	1.0	10.0	4.0	144	20	0	70	10		AR	N	20						0					10				10				WG
Sabrina	SC35	36	G	1	17		0.30	0.60	1.0	12.0	8.0	136	70		30			AR	N	8						3			3	5					5				
Sabrina	SC35	53	P	1	7		0.60	1.30	1.0	12.0	8.0	56	70	10	20			AR	L	8	1.3	0.4	0.9	W	Y	1			1	5			5		10				
Sabrina	SC35	60	R	1	5	1.0	0.10	0.15	1.0	12.0	5.0	25	10		90			AR	N	5						0									0					
Sabrina	SC35	65	G	1	13		0.20	0.35	1.0	12.0	5.0	65	30	20	50			AR	L	20						5		4	1	2					2					WG
Sabrina	SC35	78	P	1	3		0.60	0.70	1.0	12.0	7.0	21	30		70			AR	N	3	0.7	0.3	0.4	W		0									0					
Sabrina	SC35	81	R	1	12	1.0	0.15	0.20	1.0	12.0	3.0	36	20		80			AR	N	6						0									0					
Sabrina	SC35	93	G	1	16		0.25	0.50	2.0	12.0	6.0	96	20	10	70			AR	L	23						0									0					WG
Sabrina	SC35	109	R	1	7	1.0	0.05	0.10	2.0	14.0	8.0	56		80	15	5		AR	H	46						0									0					
Sabrina	SC35	116	P	1	21		0.60	1.50	2.0	15.0	10.0	210	80	10		10		AR	N	21	1.5	0.1	1.5	R	Y	0						20			20					
Sabrina	SC35	137	R	1	21	1.0	0.15	0.30	2.0	15.0	4.0	84	10	10	80			AR	L	22						0									0					
Sabrina	SC35	158	P	1	4		0.30	0.50	2.0	15.0	2.0	8	30		70			AR	N	1	0.5	0.1	0.4	W		6		3	3	5					5					EB
Sabrina	SC35	162	G	1	8		0.30	0.50	3.0	12.0	3.0	24	10		90			AR	N	4						10		8	2	5					5					
Sabrina	SC35	170	R	1	23	1.0	0.20	0.35	3.0	20.0	3.0	69	5	5	90			AR	N	16						1		1							0					WG MC BC EB
Sabrina	SC35	193	P	1	17		0.60	1.20	3.0	25.0	7.0	119	20	10	30	40		AR	L	19	1.2	0.1	1.1	W	Y	21	5	10	6	50	40		5		95	30				JM MC EB
Sabrina	SC35		P	2	15		0.60	1.20	3.0	30.0	6.0	90	10		90			AR	N	16	1.2	0.1	1.2	W	Y	2			2	30			5		35	10	SC	G	20	WG MB JM EB BC
Sabrina	SC35	210	G	1	10		0.10	0.25	2.0	30.0	2.0	20	50		50			AR	N	2						0						10			10	90				EB
Sabrina	SC35	220	R	1	10	1.0	0.10	0.20	1.0	30.0	2.0	20		10	90			AR	L	6						0									0					
Sabrina	SC35	230	G	1	3		0.20	0.40	1.0	20.0	3.0	9	20	10	70			AR	L	2						0									0	20				WG EB
Sabrina	SC35	233	R	1	1	20.0	0.05	0.15	1.0	20.0	3.0	3			100			AR	N	1						1			1	20					20				
Sabrina	SC35	234	G	1	6		0.20	0.40	1.0	20.0	3.0	18	50		50			AR	N	2						0									0	50				WG
Sabrina	SC35	240	R	1	22	1.0	0.10	0.20	1.0	15.0	3.0	66	50		50			AR	N	7						3			3	2		5			7	60				
Sabrina	SC35	262	G	1	8		0.20	0.30	1.0	15.0	4.0	32	30	30	40			AR	M	12						0									0	60				
Sabrina	SC35	270	P	1	6		0.60	1.20	2.0	15.0	1.0	6	60	10		30		AR	L	1	1.2	0.1	1.1	W	Y	3		2	1	10	30				40	10				WG
Sabrina	SC35	276	R	1	20	1.0	0.15	0.20	1.0	15.0	4.0	80	30	40	30			AR	M	37						3	2	1		5					5	5				WG
Sabrina	SC35	296	G	1	32		0.20	0.40	2.0	15.0	4.0	128	65	5	30			AR	N	14						9	3	6		5					5	10				
Sabrina	SC35	328	R	1	29	1.0	0.15	0.25	1.0	10.0	5.0	145	20	10	70			AR	L	35						4	3	1							0					
Sabrina	SC35	357	G	1	16		0.30	0.40	1.0	12.0	6.0	96	50		50			AR	N	10						6		6							0					MB
Sabrina	SC35		P	3	5		0.30	0.70	1.0	12.0	5.0	25	70		30			AR	N	2	0.7	0.0	0.7	W		8		3	5	15					15					WG EB BC
Sabrina	SC35	373	R	1	17	2.0	0.10	0.20	1.0	30.0	3.0	51	50		50			AR	N	5						3		2	1	5					5					WG MB EB BC
Sabrina	SC35	390	G	1	14		0.20	0.40	4.0	27.0	10.0	140	50		50			AR	N	14						0									0					WG MB EB BC
Sabrina	SC35		P	2	7		0.40	0.70	3.0	25.0	5.0	35	30	20	50			AR	L	11	0.7	0.2	0.5	W		2			2	10					10					WG MB EB BC JM
Sabrina	SC35	404	P	1	14		0.70	1.50	3.0	25.0	10.0	140	80	10	10			AR	L	17	1.5	0.1	1.5	W	Y	12	5	5	2	10	10	20			40	10				WG MB EB BC JM
Sabrina	SC35	418	R	1	2	1.0	0.10	0.15	1.0	22.0	2.0	4			100			AR	N	1						0									0					WG EB
Sabrina	SC35	420	P	1	25		0.60	0.80	12.0	15.0	8.0	200	50		50			AR	N	20	0.8	0.2	0.7	W		5		3	2	10					10	10				WG EB

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only					Total LWD tally	Functional LWD Tally			Cover (%)					Overhanging veg.	Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]		10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover		Type[10]	Access[11]	Length (m)		
Sabrina	SC35	445	R	1	20		0.10	0.30	2.0	15.0	3.0	60	50		50			AR	N	6						1			1					0	20					
Sabrina	SC35	465	G	1	10		0.20	0.30	1.0	15.0	4.0	40	20	70	10			AR	M	29						0								0					
Sabrina	SC35	475	P	1	5		0.50	0.75	1.0	15.0	7.0	35	40		60			AR	N	4	0.8	0.3	0.5	W		5		2	3	10				10					
Sabrina	SC35	480	R	1	4	2.0	0.10	0.15	1.0	15.0	5.0	20	10	40	50			AR	M	10						0								0					
Sabrina	SC35	484	G	1	17		0.30	0.45	2.0	15.0	4.0	68	20	50	30			AR	M	38						0					10			10	40				EB
Sabrina	SC35	501	R	1	4	2.0	0.10	0.20	2.0	15.0	4.0	16		50	50			AR	M	10						0								0					EB
Sabrina	SC35	505	G	1	17		0.30	0.50	2.0	15.0	10.0	170	70	20	10			AR	L	37						14	2	6	6	50				50	10				JM EB
Sabrina	SC35	522	R	1	15	1.0	0.10	0.15	2.0	15.0	2.0	30		20	80			AR	L	11						2	1		1	20				20	5				MB EB
Sabrina	SC35	537	G	1	47		0.20	0.30	2.0	15.0	4.0	188	10	40	50			AR	M	94						6	2	2	2	2				2	10				WG EB
Sabrina	SC35	584	P	1	10		0.50	0.80	1.0	15.0	3.0	30	10	30	60			AR	M	13	0.8	0.3	0.5	W		1			1	5				5					
Sabrina	SC35	594	R	1	9		0.10	0.15	0.5	16.0	2.0	18	10	20	70			AR	L	6						0								0	20				EB
Sabrina	SC35	603	G	1	36		0.20	0.30	1.0	16.0	6.0	216	30	30	40			AR	M	82						2	1	1						0	30				
Sabrina	SC35	639	P	1	6		0.30	0.70	1.0	15.0	3.0	18	90		10			AR	N	0						6	5		1	15				15	60				
Sabrina	SC35	645	G	1	20		0.00	0.00	1.0	15.0	0.0	0	30	30	40			AR	M	0						0								0	20				
Sabrina	SC35		P	3	5		0.15	0.30	1.0	15.0	2.0	10	5	5	90			AR	N	2	0.3	0.0	0.3	W		0								0	40				
Sabrina	SC35	665	G	1	40		0.20	0.45	1.0	12.0	3.0	120	20	20	60			AR	M	38						5	1	3	1	2				2	20				WG EB
Sabrina	SC35	705	P	1	10		0.30	0.70	3.0	10.0	8.0	80	70	30				AR	L	24	0.7	0.1	0.7	W		15		10	5	25				25	5				WG JM EB
Sabrina	SC35	715	G	1	45		0.02	0.30	3.0	15.0	2.0	90	30	40	30			AR	L	41						3			3	2				2	5				WG EB
Sabrina	SC35	760	G	1	350	1.0	0.00	0.00	2.0	15.0	0.0	0	20	10	70			AR	N	0						0								0	5				SC WG MB FP MC EB BC
Sabrina	SC35		P	3	3		0.15	0.20	1.0	15.0	1.0	3	50		50			AR	N	0						11		10	1	10				10					
Sabrina	SC35		P	3	2		0.01	0.02	2.0	15.0	1.0	2	20	40	40			AR	N	1						9		4	5					0					
Sabrina	SC35		P	3	3		0.05	0.15	2.0	15.0	2.0	6	40	20	40			AR	N	2						6		3	3					0					
Sabrina	SC35	1110	G	1	46		0.03	0.35	2.0	30.0	2.0	92	10	20	70			AR	L	31						5		3	2			10		10	10				WG EB
Sabrina	SC35	1156	R	1	9	2.0	0.05	0.10	2.0	12.0	2.0	18	20	10	70			AR	N	4						0						5		5					WG EB
Sabrina	SC35	1165	G	1	39		0.20	0.35	2.0	10.0	5.0	195	20	20	55	5		AR	L	60						4		4				5		5					
Sabrina	SC35	1204	R	1	4	1.0	0.05	0.10	2.0	10.0	4.0	16		20	70	10		AR	L	5						0						10		10					
Sabrina	SC35	1208	G	1	12		0.10	0.20	2.0	10.0	3.0	36	10		80	10		AR	N	6						6	2	2	2	5	10			15					
Sabrina	SC35	1220	R	1	6	1.0	0.05	0.10	2.0	10.0	2.0	12		10	80	10		AR	N	3						0					10			10					EB
Sabrina	SC35	1226	P	1	12		0.50	1.10	1.0	15.0	7.0	84	80	5	15			AR	L	7	1.1	0.2	0.9	W	Y	4		1	3	5		30		35	5				EB
Sabrina	SC35	1238	R	1	15	1.0	0.10	0.15	1.0	10.0	7.0	105	10	20	70			AR	L	36						0								0					EB
Sabrina	SC35	1253	G	1	10		0.20	0.30	1.0	10.0	5.0	50	40	10	50			AR	N	10						0								0	5				EB
Sabrina	SC35	1263	P	1	12		0.40	0.50	2.0	10.0	8.0	96	50		50			AR	N	10	0.5	0.2	0.3	W		2		2						0	5				EB
Sabrina	SC35	1275	R	1	11	1.0	0.05	0.10	2.0	12.0	4.0	44	20	10	70			AR	N	11						0								0					EB
Sabrina	SC35	1286	P	1	18		0.40	0.70	3.0	16.0	7.0	126	40	10	50			AR	L	25	0.7	0.2	0.5	W		2		2						0	10				EB
Sabrina	SC35	1304	R	1	26	1.0	0.15	0.20	3.0	16.0	7.0	182		20	80			AR	L	66						0								0	30				
Sabrina	SC35	1330	G	1	10		0.20	0.30	1.0	12.0	6.0	60	20	10	70			AR	L	14						5		5						0					
Sabrina	SC35	1340	P	1	7		0.40	0.60	1.0	12.0	5.0	35	20	10	70			AR	L	8	0.6	0.2	0.4	W		6		6						0	20				
Sabrina	SC35	1347	G	1	18		0.20	0.30	1.0	16.0	4.0	72	20		80			AR	N	12						5		3	2	5				5	30				
Sabrina	SC35	1365	R	1	11	1.0	0.05	0.10	1.0	15.0	2.0	22	10	10	70	10		AR	N	5						5	2	3			10			10	20				WG
Sabrina	SC35	1376	P	1	14		0.30	0.60	2.0	15.0	7.0	98	70		20	10		AR	N	4	0.6	0.1	0.6	W		9		3	6	5	10			15					WG EB
Sabrina	SC35	1390	R	1	14	1.0	0.10	0.15	1.0	15.0	1.0	14	10		60	30		AR	N	2						1			1	2	30			32					EB
Sabrina	SC35	1404	G	1	10		0.10	0.25	2.0	15.0	3.0	30	20		70	10		AR	N	4						5			5	10	10			20					
Sabrina	SC35	1414	G	1	11		0.20	0.30	2.0	15.0	6.0	66	20	5	50	25		AR	N	10						2		2			25			25	5				EB
Sabrina	SC35	1425	G	1	11		0.25	0.35	1.0	10.0	3.0	33	85		10	5		AR	N	1						3		1	2	5	5			10	5				
Sabrina	SC35	1436	R	1	25	1.0	0.10	0.20	1.0	10.0	5.0	125	5	5	30	60		AR	N	14						3		3			60			60					
Sabrina	SC35	1461	G	1	16		0.20	0.40	1.0	10.0	6.0	96	40	5	5	50		AR	L	6						6	1	5			50			50					EB
Sabrina	SC35	1477	G	1	22		0.15	0.20	1.0	10.0	6.0	132	15	15	30	40		AR	L	28						1	1				40			40	5				
Sabrina	SC35	1499	R	1	11	1.0	0.20	0.35	1.0	10.0	5.0	55	30	10	30	30		AR	N	9						1			1		30			30	5				

Appendix 1A continued.

														Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)						Off-channel Habitat				
Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[2,5]	<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)	Channel Disturbances[12]	Barriers[13]
Sabrina	SC35	1510	G	1	17		0.30	0.40	4.0	7.0	7.0	119	50	10	10	30		AR	L	14						2			2		30				30						
Sabrina	SC35	1527	R	1	7	2.0	0.10	0.15	2.0	10.0	7.0	49	5	20	70	5		AR	L	17						0					5				5						
Sabrina	SC35	1534	P	1	17		0.50	1.20	2.0	15.0	10.0	170	90		10			AR	N	3	1.2	0.1	1.2	W	Y	35		25	10	5					5					JM EB	
Sabrina	SC35	1551	G	1	14		0.25	0.35	4.0	12.0	3.0	42	50		50			AR	N	4	0.4	0.0	0.4	W		15		10	5	5					5					JM	
Sabrina	SC35	1565	G	1	35		0.00	0.00	4.0	10.0	0.0	0	20	5	10	65		AR	N	0						70	20	30	20	60	40				100				Estimated number of LWD in JM		
Sabrina	SC36	0	G	1	46	1.0	0.00	0.00	4.0	8.0	0.0	0	20	20	50	10		R	L	0						0					10				10				JM WG MC EB BC		
Sabrina	SC36	46	G	1	86		0.10	0.30	0.2	14.0	2.0	172	20	20	50	10		R	L	52						0					10				10				MC WG BC		
Sabrina	SC36	132	R	1	46	2.0	0.15	0.30	0.2	15.0	7.0	322	20	20	50	10		R	L	97						0					10				10				WG EB		
Sabrina	SC36	178	P	1	23		0.40	0.90	1.0	10.0	3.0	69	10	20	60	5	5	R	L	22	0.9	0.1	0.8	W	Y	3	2		1		5	15			20				WG EB		
Sabrina	SC36	201	R	1	8	4.0	0.10	0.20	0.5	10.0	4.0	32	30	30	35	5		R	L	12						0					5				5						
Sabrina	SC36	209	G	1	28		0.20	0.35	0.5	10.0	4.0	112	20	15	60	5		R	N	30						6	1	2	3	1	5				6						
Sabrina	SC36	237	R	1	27	5.0	0.15	0.35	1.0	10.0	5.0	135	5	10	30	50	5	R	N	22						0					50				50						
Sabrina	SC36	264	G	1	12		0.15	0.30	2.0	8.0	3.0	36	5	5	15	25	50	R	N	3						0					25				25						
Sabrina	SC36	276	R	1	33	2.0	0.30	0.50	10.0	9.0	7.0	231	10	10	40	30	10	R	N	42						0					30				30						EB
Sabrina	SC36	309	G	1	22		0.20	0.30	15.0	8.0	5.0	110	25	25	25	25		R	L	33						3	3				25				25						
Sabrina	SC36	331	R	1	9	2.0	0.20	0.30	15.0	7.0	4.0	36	15	10	25	30	20	R	N	5						3	3				30				30						
Sabrina	SC36	340	G	1	10		0.30	0.40	15.0	8.0	2.5	25	5		5	5	85	R	N	0						1	1				5				5						
Sabrina	SC36	350	C	1	50	5.0	0.30	0.50	15.0	7.0	2.0	100	5	5	25	25	40	R	N	10						0					25	5			30						
Sabrina	SC36	400	P	1	30		1.20	2.50	15.0	4.0	3.0	90	15	15	25	40	5	R	N	18	2.5	0.5	2.0	R	Y	1	1				40		60		100						F
Sabrina	SC37	0	R	1	17	1.0	0.05	0.10	1.0	17.0	1.0	17		10	90			R	L	5						0									0	2				WG	
Sabrina	SC37	17	G	1	28		0.30	0.50	0.2	22.0	4.0	112	10	20	70			R	L	38						1	1								0	5				WG EB	
Sabrina	SC37	45	R	1	30	1.0	0.05	0.15	1.0	17.0	3.0	90	10	10	80			AR	N	23						5			5	1					1				WG EB	
Sabrina	SC37	75	G	1	27		0.10	0.40	1.0	35.0	1.5	40.5	10	10	80			AR	N	11						0									0				WG MB MC EB		
Sabrina	SC37	102	G	1	56		0.00	0.00	0.5	30.0	0.0	0	20	10	70			AR	N	0						20		15	5						0				WG MB MC JM BC EB		
Sabrina	SC37		P	2	3		0.30	0.40	1.0	30.0	3.0	9	90		10			AR	N	0	0.4	0.0	0.4	W		3		3		30					30					JM EB	
Sabrina	SC37	158	G	1	49		0.00	0.00	2.0	16.0	0.0	0	15	10	70	5		AR	N	0						7		5	2		5				5	5				WG MB	
Sabrina	SC37	207	G	1	26	1.0	0.02	0.10	0.5	15.0	3.0	78	10	10	80			AR	N	20						3		3							0	5				WG	
Sabrina	SC37	233	P	1	11		0.20	0.40	0.5	16.0	2.0	22	50	20	30			R	L	6	0.4	0.1	0.3	W		7	3	2	2	10					10	5				EB	
Sabrina	SC37	244	G	1	16		0.02	0.05	0.5	16.0	1.0	16	10	20	70			R	L	5						3	1	1	1						0						
Sabrina	SC37	260	P	1	16		0.20	0.60	1.0	16.0	3.0	48	20	10	70			AR	N	12	0.6	0.1	0.6	W		6	1	2	3						0					EB	
Sabrina	SC37	276	G	1	15	1.0	0.00	0.00	0.5	16.0	0.0	0	15	5	80			AR	N	0						0									0						
Sabrina	SC37	291	P	1	12		0.15	0.50	1.0	16.0	2.5	30	80	5	15			AR	N	2	0.5	0.0	0.5	W		6			6	10					10	5					
Sabrina	SC37	303	R	1	11	1.0	0.02	0.10	1.0	16.0	3.0	33	20	10	70			AR	N	8						0									0						
Sabrina	SC37	314	G	1	15		0.20	0.50	1.0	15.0	5.0	75	70	20	10			AR	H	17						5		5							0						
Sabrina	SC37	329	P	1	14		0.50	0.70	1.0	10.0	5.0	70	60	10	30			R	L	11	0.5	0.5	0.0	W		3			3	5					5						
Sabrina	SC37	343	R	1	9	1.0	0.05	0.10	2.0	10.0	1.0	9	10	5	80	5		AR	N	2						1	1					5			5					EB	
Sabrina	SC37	352	G	1	20		0.20	0.35	1.0	12.0	2.0	40	50	10	40			AR	N	7						7			7	5					5						
Sabrina	SC37	372	R	1	3	1.0	0.00	0.00	1.0	12.0	0.0	0	10		90			AR	N	0						1			1	5					5						
Sabrina	SC37	375	G	1	12	1.0	0.15	0.25	1.0	10.0	3.0	36	10		90			AR	N	6						1			1	2					2						
Sabrina	SC37	387	P	1	9		0.40	0.60	1.0	10.0	3.0	27	20	10	70			R	L	6	0.6	0.2	0.4	R	Y	0									0	10					
Sabrina	SC37	396	R	1	16	1.0	0.05	0.10	2.0	12.0	1.0	16	10	10	80			R	L	4						0									0	5					
Sabrina	SC37	412	P	1	18		0.70	1.50	3.0	10.0	8.0	144	5	90	5			AR	**H**	131	1.5	0.1	1.4	W	Y	4			4	2			20		22						
Sabrina	SC37	430	R	1	2	1.0	0.01	0.04	2.0	10.0	3.0	6	10		90			AR	N	1						0									0						
Sabrina	SC37	432	G	1	15		0.20	0.55	3.0	10.0	2.0	30	70	10	20			AR	L	4						0									0						
Sabrina	SC37	447	G	1	8		0.05	0.12	2.0	12.0	3.0	24	20	10	70			AR	L	6						0									0						
Sabrina	SC37	455	P	1	7		0.25	0.50	2.0	12.0	6.0	42	50	10	30	10		AR	M	7	0.5	0.1	0.4	W		2			2	30	10				40	10					
Sabrina	SC37	462	G	1	28		0.00	0.00	0.5	15.0	0.0	0	20	10	70			AR	L	0						0									0						
Sabrina	SC37	490	P	1	7		0.15	0.50	1.0	20.0	5.0	35	60	10	30			AR	L	6	0.5	0.0	0.5	W		8		3	5	30					30	10				WG EB JM	

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)						Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Sabrina	SC37	497	G	1	72		0.00	0.00	0.5	20.0	0.0	0	10	10	80			AR	N	0						8		5	3					0	30				WG	
Sabrina	SC37	569	P	1	10		0.00	0.00	1.0	15.0	0.0	0	50	10	40			AR	M	0	0.0	0.0	0.0	W		5		3	2	5				5	20					
Sabrina	SC37	579	G	1	46	1.0	0.00	0.00	1.0	15.0	0.0	0	10	10	80			R	L	0						0								0						
Sabrina	SC37	625	P	1	8		0.00	0.00	1.0	12.0	0.0	0	70	10	20			R	L	0	0.0	0.0	0.0	W		4			4	5				5	5					
Sabrina	SC37	633	G	1	85	1.0	0.00	0.00	3.0	15.0	0.0	0	15	5	75	5		AR	N	0						4		3	1		5	5		10	10				WG MB EB	
Sabrina	SC37	718	P	1	2		0.05	0.20	3.0	15.0	2.0	4	25	5	70			AR	N	1	0.2	0.0	0.2	W		2			2	70				70						
Sabrina	SC37	720	G	1	27	1.0	0.00	0.00	3.0	12.0	0.0	0	10	10	80			AR	N	0						4			4					0					EB	
Sabrina	SC37	747	R	1	12	10.0	0.05	0.10	4.0	12.0	0.2	2.4	20	5	55	20		AR	N	0						4		2	2		20			20					WG EB	
Sabrina	SC37	759	P	1	15		0.40	0.70	4.0	12.0	4.0	60	60	5	30	5		R	L	7	0.7	0.1	0.7	W	Y	7		4	3	5	5	5		15						
Sabrina	SC37	774	R	1	14	1.0	0.10	0.20	4.0	12.0	3.0	42	15	10	70	5		R	L	10						0					5			5	10				WG EB	
Sabrina	SC37	788	P	1	19		0.40	1.00	4.0	10.0	4.0	76	40	30	30			AR	H	27	1.0	0.1	1.0	W	Y	1			1			5		5	10				EB	
Sabrina	SC37	807	G	1	9		0.15	0.40	4.0	12.0	2.0	18	50		50			AR	N	2						0								0						
Sabrina	SC37	816	R	1	8	1.0	0.10	0.20	4.0	12.0	3.0	24	5	5	75	15		AR	N	5						1			1		10			10						
Sabrina	SC37	824	G	1	11		0.15	0.25	4.0	12.0	2.0	22	5	5	80	10		AR	N	5						0					10			10					WG MB EB	
Sabrina	SC37	835	P	1	8		0.35	0.50	4.0	15.0	3.0	24	10	10	60	20		AR	N	5	0.5	0.2	0.3	W		3		1	2	5	20			25	10				MB MC FP EB BC	
Sabrina	SC37	843	R	1	27	1.0	0.15	0.20	0.5	15.0	4.0	108	10	20	60	10		AR	N	35						2		2			10			10	10				MB MC FP EB	
Sabrina	SC37	870	G	1	25	1.0	0.15	0.25	2.0	10.0	3.0	75	20	15	60	5		AR	L	20						1	1				5			5					MB MC FP EB	
Sabrina	SC37	895	R	1	6	1.0	0.05	0.10	2.0	12.0	3.0	18		10	80	10		AR	N	5						3	1	1	1	15	10	5		30	5				FP	
Sabrina	SC37	901	G	1	15		0.20	0.40	3.0	12.0	4.0	60	15	5	70	10		AR	N	11						0					10			10	30				FP	
Sabrina	SC37	916	R	1	14	1.0	0.10	0.15	2.0	12.0	2.0	28	10	15	70	5		AR	N	8						0					5			5	30				FP	
Sabrina	SC37	930	G	1	20		0.30	0.60	1.0	12.0	4.0	80	30	5	60	5		AR	L	14						4			4		5	5		10	5				FP	
Sabrina	SC37	950	R	1	97	3.0	0.10	0.20	1.0	10.0	6.0	582	60	10	20	10		AR	N	81						0					10			10	10				FP	
Sabrina	SC37	1047	G	1	30	1.0	0.25	0.40	1.0	10.0	5.0	150	60	10	20	10		R	L	21						14	4	3	7	5	10	5		20	5				FP	
Sabrina	SC37	1077	R	1	4	7.0	0.10	0.20	1.0	10.0	6.0	24	10	10	30	50		AR	N	4						0					50			50					WG FP	
Sabrina	SC37	1081	G	1	34	1.0	0.10	0.30	1.0	10.0	8.0	272	20	10	20	50		R	L	38						0					50			50					FP EB	
Sabrina	SC37	1115	R	1	72	2.0	0.15	0.30	1.0	12.0	8.0	576	15	15	30	40		R	L	121						2			2		40			40					EB	
Sabrina	SC37		P	3	3		0.20	0.35	2.0	12.0	3.0	9	60	20	10	10		R	L	2	0.4	0.1	0.3	W		3		1	2	5	10			15						
Sabrina	SC37	1187	G	1	28		0.30	0.60	2.0	12.0	8.0	224	10	10	30	40	10	R	L	36						0					40	5		45					EB	
Sabrina	SC37	1215	P	1	10		0.50	1.05	2.0	12.0	3.0	30	20	20	20	30	10	R	L	7	1.1	0.1	1.0	R	Y	0					30		10	40						
Hunter	H50	0	R	1	23	3.0	0.10	0.20	2.5	11.0	3.0	69	5	30	60	5		AR	N	29						0					5			5	5				EB	
Hunter	H50	23	G	1	13		0.20	0.40	1.5	8.0	5.0	65	15	20	60	5		AR	L	21						0					5			5						
Hunter	H50	36	R	1	50	2.0	0.15	0.30	1.0	8.0	5.0	250	10	20	60	10		AR	L	80						0					10			10	20					
Hunter	H50	86	P	1	20		0.40	1.00	1.0	8.0	4.0	80	20	20	50	10		AR	L	24	1.1	0.2	0.9	O		0					10		5	15	30					
Hunter	H50	106	R	1	25	1.0	0.10	0.20	1.0	8.0	4.0	100	5	30	60	5		AR	M	42						1			1		5			5	20				EB	
Hunter	H50	131	G	1	26		0.35	0.75	1.0	8.0	4.0	104	20	20	55	5		AR	L	32						3			3	5	5			10	20					
Hunter	H50	157	R	1	5	1.0	0.10	0.15	1.0	10.0	3.0	15	10	40	30	20		AR	L	7						0					20			20	5					
Hunter	H50	162	P	1	12		0.30	0.65	1.0	10.0	4.0	48	50	20	30			AR	L	12	0.7	0.2	0.5	W		10		2	8	5				5	5					
Hunter	H50	174	R	1	31	1.0	0.05	0.20	1.0	10.0	3.0	93	10	20	40	30		AR	L	26						1			1		30			30					EB MB	
Hunter	H50		G	2	8		0.25	0.50	1.0	15.0	2.5	20	10	10	70	10		AR	N	5						22		20	2	40	10			50					WG MB EB	
Hunter	H50	205	P	1	16		0.30	0.60	1.0	15.0	4.0	64	20	10	60	10		AR	N	14	0.6	0.1	0.5	W		10		5	5	20	10			30					EB	
Hunter	H50	221	R	1	52	1.0	0.05	0.30	1.0	12.0	2.0	104	5	20	70	5		AR	L	35						2			2		5			5					WG EB	
Hunter	H50		G	2	7		0.10	0.25	1.0	12.0	3.0	21	10	10	80			AR	N	5						3		3		30				30	5				EB	
Hunter	H50		G	2	12		0.15	0.30	1.0	12.0	2.0	24	15	15	70			AR	N	7						2			2	5				5					EB	
Hunter	H50	273	P	1	16		0.80	1.40	1.0	6.0	4.0	64	30	40	20	5	5	AR	M	28	1.4	0.3	1.1	R	Y	0					5		20	25	5				EB	
Hunter	H50	289	G	1	12		0.15	0.30	1.0	8.0	3.0	36	10	30	50	10		AR	L	14						2			2		10	5		15	5				EB	
Hunter	H50	301	R	1	5	2.0	0.10	0.20	1.0	15.0	3.0	15	10	30	40	20		AR	L	6						0					20			20					FP EB	
Hunter	H50	306	G	1	9	1.0	0.15	0.25	1.5	15.0	4.0	36	20	20	40	20		AR	L	10						2			2	5	20			25					FP EB	
Hunter	H50	315	R	1	48	3.0	0.15	0.25	0.5	30.0	6.0	288	30	30	30	10		AR	L	104						5			5	2	10			12					FP EB	

Appendix 1A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only					Functional LWD Tally				Cover (%)						Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Hunter	H50	363	G	1	9		0.25	0.40	2.0	25.0	3.0	27	30	15	30	25		AR	L	6						0					25				25						FP
Hunter	H50	372	R	1	2	1.0	0.15	0.20	2.0	25.0	2.0	4		20	30	50		AR	N	1						0					50				50						FP WG
Hunter	H50	374	G	1	3		0.20	0.40	2.0	35.0	4.0	12	20	10	20	50		AR	N	2						1			1	5	50				55						FP
Hunter	H50	377	R	1	3	1.0	0.10	0.15	2.0	35.0	2.0	6	10	30	20	40		AR	N	2						0					40				40						FP
Hunter	H50	380	G	1	8		0.20	0.40	2.0	35.0	4.0	32	20	40	20	20		AR	L	14						3		3			20				20						FP
Hunter	H50	388	R	1	6	2.0	0.20	0.25	20.0	35.0	5.0	30	15	30	20	35		AR	L	10						24	10	10	4	65	35				100						FP
Hunter	H50	394	G	1	6		0.10	0.20	20.0	30.0	2.0	12	10	30	30	30		AR	N	4						2			2	5	30				35	5					FP
Hunter	H50	400	R	1	38	1.0	0.15	0.30	20.0	14.0	4.0	152	10	30	35	20	5	AR	L	56						2			2		20				20	5					FP
Hunter	H50	438	G	1	10		0.25	0.55	20.0	18.0	2.0	20	10	20	60	10		AR	L	6						4	3	1			10				10	5					FP
Hunter	H50	448	R	1	13	2.0	0.15	0.20	15.0	25.0	2.0	26	10	30	50	10		AR	L	10						0					10				10	5					FP
Hunter	H50	461	P	1	16		0.60	1.30	15.0	35.0	4.0	64	50	10	20	20		AR	L	9	1.3	0.2	1.1	W	Y	3			3	5	20				25	5					
Hunter	H50	477	R	1	10	2.0	0.15	0.25	15.0	35.0	2.0	20	70	20		10		AR	N	4						2			2	5	10				15						MB
Hunter	H50	487	P	1	5		0.40	0.65	15.0	30.0	2.0	10				30	70	AR	N	0	0.7	0.1	0.6	W		2			2	2	30				32						JM EB
Hunter	H50	492	R	1	8	1.0	0.05	0.10	20.0	35.0	1.0	8	10	20	70			AR	N	3						0							2		2	30					EB
Hunter	H50	500	G	1	2		0.20	0.30	20.0	35.0	3.0	6	40	40	20			AR	N	3						0									0	20	SC	G	25		JM EB
Hunter	H50	502	R	1	15	1.0	0.10	0.20	10.0	35.0	2.0	30	10	20	70			AR	N	10						0								25	25	5					MB
Hunter	H50	517	G	1	11		0.30	0.40	12.0	35.0	4.0	44	70	20	10			AR	N	10						2		2							0	5					MB EB
Hunter	H50	528	P	1	6		0.50	0.90	12.0	30.0	5.0	30	75	10	10	5		AR	N	4	0.9	0.2	0.7	W		1			1	2	5				7	5					MB
Hunter	H50	534	R	1	4	2.0	0.10	0.20	12.0	30.0	3.0	12		20	70	10		AR	L	4						0					10				10	40					EB
Hunter	H50	538	G	1	7		0.20	0.40	12.0	30.0	3.0	21	50	20	25	5		AR	N	5						0					5				5	10					WG MB EB
Hunter	H50	545	P	1	10		0.60	1.30	12.0	30.0	3.0	30	60	20	15	5		AR	N	7	1.3	0.3	1.0	W	Y	8		3	5		5	10			15						JM EB
Hunter	H50	555	G	1	12		0.20	0.45	4.0	30.0	3.0	36	70	10	10	10		AR	L	4						14	2	10	2	5	10				15						WG JM
Hunter	H50	567	R	1	35	5.0	0.20	0.40	1.0	30.0	4.0	140	10	20	20	50		AR	L	34						0					50			5	55	5					
Hunter	H50	602	P	1	14		0.40	0.70	1.0	40.0	3.0	42	25	5	20	30	20	AR	N	4	0.7	0.2	0.5	W		1			1	1	30				31						
Hunter	H50	616	R	1	29	7.0	0.20	0.30	5.0	30.0	2.0	58		15	20	60	5	AR	L	11						20		5	15	5	60				65						JM
Hunter	H50	645	G	1	10		0.20	0.60	4.0	20.0	7.0	70	10	20	30	40		AR	L	18						0					40				40						JM EB
Hunter	H50	655	R	1	5	5.0	0.20	0.40	4.0	20.0	1.0	5			30	70		AR	N	0						2		1	1	5	70				75						
Hunter	H50	660	P	1	15		1.00	1.60	4.0	16.0	15.0	225	55	15	10	15	5	AR	N	38	1.6	0.2	1.4	W	Y	35	15	5	15	30	15				45						JM F

[1] Reach location denotes the distance upstream from the lower reach break.

[3] Habitat types are: pool (P), riffle (R), glide (G), cascade (C), other (O).

[4] Habitat categories are: primary habitat type (1), side channel (2), tertiary scour pool (3).

[5] Habitat area is calculated for rearing salmonids as length multiplied by wetted width.

[6] Spawning gravel type codes are: suitable for anadromous salmon (A), suitable for resident trout and char (R), suitable for both salmon and trout (AR), not suitable (N).

[7] Spawning gravel quality codes are: low (L), moderate (M), high (H), none (N).

[8] Control element codes are: boulder (B), bedrock (R), wood (W), beaver dam (D), culvert (CV), riffle (RI), glide (G) and other (O).

[9] A pool is classified as a good adult holding pool (Y) if the product of the maximum depth times the total overhead cover is >= 30. Overhead cover is the sum of LWD, boulder, cutbank and overhanging vegetation.

[10] Off-channel habitat codes are: alcove (ALC), side channel (SC), slough (SL), pond (PD), wetland (WL), spring (SP), other (O).

[11] Off-channel access codes are: no access (N), high flow only (P), most flows (G).

[12] Disturbance indicator codes are: scour (SC), unvegetated bar (DW), sediment wedge (WG), middle-channel bars (MB), extensive riffle zone (LR), road crossing thru creek at riffle crest or pool tailout (RC), multiple channels (MC), eroding banks (EB), back-channels (BC), LWD parallel to bank (PD), LWD jams (JM), avulsion (AV), >50% silt content (E), other (O).

[13] Potential barrier codes are: none (N), log jam (X), falls > 2 m (F), culvert (CV), bridge (BR), beaver dam (BD), land slide or bank failure (LS), cascade or chute (C), other (O).

Appendix 1B. Area surveyed and percentage of each primary habitat type in the Sarita River watershed.

Reach Number	Mean Bankfull Width (m)	Surveyed Length (m)	Surveyed Area (m^2)	Percent Habitat Type			
				Pool	Riffle	Glide	Cascade
S1	44.2	1445	31615	5.3	19.9	74.8	0.0
S2	43.3	1265	37307	20.7	15.1	64.2	0.0
S3	48.5	930	18672	23.4	8.3	68.4	0.0
S4	41.4	3270	75193	25.3	21.2	53.5	0.0
F13	22.7	1725	13994	35.0	16.8	48.2	0.0
F14	27.4	545	5282	35.5	12.3	52.2	0.0
F15	40.9	640	3930	36.2	16.8	47.0	0.0
F16	49.9	1298	5268	34.4	16.1	49.5	0.0
F17	25.3	1500	9111	24.5	60.6	14.8	0.0
SS20	39.7	1070	4423	61.9	1.7	36.4	0.0
SS21	37.2	1240	25204	17.1	30.1	52.8	0.0
SS27	18.3	580	7175	29.4	40.7	29.9	0.0
SS30	53.7	380	3225	30.5	51.1	18.4	0.0
SS31	22.9	760	8185	9.4	64.1	26.5	0.0
SC34	25.9	1510	13585	16.8	34.1	48.1	1.0
SC35	15.1	1600	5951	28.6	26.4	45.0	0.0
SC36	9.1	430	1470	10.8	51.4	31.0	6.8
SC37	14.1	1225	3558	17.7	44.3	38.0	0.0
H50	22.2	675	2668	24.6	53.4	22.0	0.0

Appendix 1C. Summary of cover attributes for the Sarita River watershed.

		Percent Instream Cover Types						
Reach Number	**Habitat Type**	**LWD / SWD**	**Boulder**	**Undercut Banks**	**Deep Pool**	**Instream Vegetation**	**Total Percent Instream Cover**	**Overhanging Vegetation**
S1	P	0.0	0.0	0.0	72.9	0.0	72.9	0.0
S1	R	0.0	2.6	0.0	0.0	0.0	2.6	3.2
S1	G	0.3	0.0	0.0	1.6	0.0	2.0	0.2
S1	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S1	All	0.2	0.5	0.0	5.1	0.0	5.9	0.8
S2	P	0.0	0.1	0.0	78.1	0.0	78.2	2.4
S2	R	0.0	11.1	0.0	0.0	0.0	11.1	1.9
S2	G	0.0	1.9	0.0	0.0	0.0	1.9	0.2
S2	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S2	All	0.0	2.9	0.0	16.2	0.0	19.1	0.9
S3	P	0.5	0.3	0.0	27.3	0.0	28.1	1.3
S3	R	0.0	0.0	0.0	0.0	0.0	0.0	2.2
S3	G	0.0	1.0	0.0	0.0	0.0	1.0	1.4
S3	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S3	All	0.1	0.7	0.0	6.4	0.0	7.2	1.4
S4	P	0.0	8.1	0.0	60.1	0.3	68.5	4.7
S4	R	0.0	9.3	0.0	0.0	1.2	10.4	7.0
S4	G	0.0	4.4	0.0	0.3	0.8	5.6	3.3
S4	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S4	All	0.0	6.4	0.0	15.3	0.8	22.5	4.5
F13	P	4.2	0.1	0.2	18.7	0.0	23.3	11.4
F13	R	3.8	0.7	0.2	0.0	0.0	4.7	9.4
F13	G	0.2	1.3	0.3	14.8	0.0	16.6	18.0
F13	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F13	All	2.2	0.8	0.3	13.7	0.0	16.9	14.2
F14	P	12.0	0.0	0.0	36.0	1.8	49.8	20.2
F14	R	3.6	0.0	0.8	0.0	0.2	4.6	23.4
F14	G	2.5	0.0	0.0	0.0	0.3	2.8	4.9
F14	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F14	All	6.0	0.0	0.1	12.8	0.8	19.7	12.6
F15	P	4.0	0.2	0.4	27.8	0.4	32.8	6.4
F15	R	0.6	0.3	0.0	0.0	0.0	0.8	10.7
F15	G	1.2	0.0	0.5	0.0	0.8	2.6	4.7
F15	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F15	All	2.1	0.1	0.4	10.1	0.5	13.2	6.3
F16	P	3.2	0.0	0.7	31.8	7.2	42.9	11.9
F16	R	1.3	0.0	1.3	0.0	0.0	3.2	7.1
F16	G	1.1	0.0	1.6	0.0	6.1	8.8	14.3
F16	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F16	All	1.8	0.0	1.2	10.9	5.5	19.6	12.3

Appendix 1C continued.

		Percent Instream Cover Types						
Reach Number	**Habitat Type**	**LWD / SWD**	**Boulder**	**Undercut Banks**	**Deep Pool**	**Instream Vegetation**	**Total Percent Instream Cover**	**Overhanging Vegetation**
F17	P	9.3	0.4	0.1	20.4	0.0	30.1	7.2
F17	R	0.7	3.5	0.0	0.0	0.5	4.7	6.7
F17	G	0.3	0.0	0.1	0.0	0.0	0.5	21.2
F17	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F17	All	2.8	2.2	0.0	5.0	0.3	10.3	9.0
SS20	P	0.9	0.0	0.0	26.6	0.0	27.3	0.7
SS20	R	0.0	3.9	0.0	0.0	0.0	3.9	1.6
SS20	G	0.0	0.0	0.0	0.0	0.0	0.0	0.2
SS20	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SS20	All	0.6	0.1	0.0	16.5	0.0	17.0	0.5
SS21	P	0.0	14.4	0.0	21.9	0.0	36.2	0.0
SS21	R	0.0	19.4	0.0	0.0	0.0	19.4	2.1
SS21	G	0.0	3.1	0.0	0.0	0.0	3.1	0.1
SS21	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SS21	All	0.0	9.9	0.0	3.7	0.0	13.7	0.7
SS27	P	0.4	26.9	0.0	36.5	0.0	63.9	0.0
SS27	R	2.6	54.1	0.0	0.0	0.0	56.7	0.0
SS27	G	0.1	35.6	0.0	0.0	0.0	35.7	0.0
SS27	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SS27	All	1.2	40.6	0.0	10.7	0.0	52.5	0.0
SS30	P	5.4	4.4	0.0	29.5	0.0	39.3	12.3
SS30	R	1.0	12.5	0.0	0.0	0.0	13.5	2.2
SS30	G	1.3	7.8	0.0	0.0	0.0	9.0	0.4
SS30	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SS30	All	2.4	9.1	0.0	9.0	0.0	20.5	4.9
SS31	P	0.0	8.1	0.0	38.7	0.0	46.9	0.0
SS31	R	0.2	22.6	0.0	0.0	0.0	22.9	5.6
SS31	G	0.4	12.6	0.0	0.0	0.0	13.0	2.4
SS31	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SS31	All	0.3	18.6	0.0	3.6	0.0	22.5	4.3
SC34	P	3.6	4.6	0.0	0.5	0.0	8.6	1.6
SC34	R	1.8	13.3	1.0	0.0	0.0	16.1	1.9
SC34	G	3.0	1.2	0.7	0.0	0.0	5.0	1.6
SC34	C	0.0	5.0	0.0	0.0	0.0	5.0	0.0
SC34	All	2.7	6.0	0.7	0.1	0.0	9.4	1.7

Appendix 1C continued.

		Percent Instream Cover Types						
Reach Number	**Habitat Type**	**LWD / SWD**	**Boulder**	**Undercut Banks**	**Deep Pool**	**Instream Vegetation**	**Total Percent Instream Cover**	**Overhanging Vegetation**
SC35	P	10.4	4.3	4.1	2.3	0.0	21.1	7.4
SC35	R	0.9	7.5	0.3	0.0	0.0	8.7	7.8
SC35	G	4.5	6.4	0.7	0.0	0.0	11.6	9.8
SC35	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SC35	All	5.3	6.1	1.5	0.6	0.0	13.5	8.6
SC36	P	0.0	24.8	6.5	45.3	0.0	76.6	0.0
SC36	R	0.0	24.0	0.0	0.0	0.0	24.0	0.0
SC36	G	0.2	13.3	0.0	0.0	0.0	13.6	0.0
SC36	C	0.0	25.0	5.0	0.0	0.0	30.0	0.0
SC36	All	0.1	20.8	1.0	4.9	0.0	26.9	0.0
SC37	P	7.1	3.5	1.1	5.0	0.0	16.7	3.7
SC37	R	0.2	20.3	0.1	0.0	0.0	20.6	5.3
SC37	G	0.8	19.0	1.7	0.0	0.0	21.5	3.0
SC37	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SC37	All	1.7	16.8	0.9	0.9	0.0	20.3	4.1
H50	P	13.3	12.6	0.5	2.6	0.0	28.9	5.2
H50	R	2.2	18.3	0.0	0.0	1.0	21.5	6.9
H50	G	4.4	13.4	0.3	0.0	0.0	18.1	5.2
H50	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
H50	All	5.4	15.8	0.2	0.6	0.5	22.6	6.1

Appendix 1D. Summary of bed material and spawning attributes for study area reaches.

Reach Number	Bed Material Composition (%)					Spawning Quantity (m^2)[1]	Spawning Quality[2]
	<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock		
S1	10.0	34.6	54.9	0.5	0.0	14403	Good
S2	19.9	34.7	39.5	5.1	0.8	16617	Fair
S3	38.2	27.3	31.7	1.3	1.5	6284	Poor
S4	12.1	35.3	41.2	6.7	4.7	32755	Good
F13	64.4	30.6	4.3	0.8	0.0	4402	Poor
F14	65.9	34.1	0.0	0.0	0.0	1800	Poor
F15	54.5	41.4	3.7	0.1	0.3	1654	Poor
F16	68.7	31.2	0.0	0.0	0.0	1642	Poor
F17	31.7	51.3	14.8	2.2	0.0	4942	Poor
SS20	57.2	27.9	12.9	0.1	1.9	1348	Poor
SS21	26.3	36.3	26.9	9.9	0.5	10511	Poor
SS27	9.7	12.9	29.2	40.9	7.3	1348	Good
SS30	21.1	19.8	49.8	9.1	0.1	961	Fair
SS31	12.1	31.0	38.3	18.6	0.0	3164	Good
SC34	37.1	15.7	39.7	6.1	1.4	3212	Poor
SC35	36.2	13.1	44.4	5.8	0.4	1311	Poor
SC36	15.1	15.4	40.2	20.8	8.5	345	Fair
SC37	29.8	15.1	37.6	16.9	0.7	803	Poor
H50	23.1	21.7	37.9	15.8	1.5	782	Fair

[1] Value = (%gravels (2-64 mm) + 20 % cobbles (64-256 mm))*length*wetted width (surveyed area only).

[2] Poor is fines (<2 mm) >25%, Fair if fines >15% and uncompacted, Good if fines < =15% and uncompacted.

Appendix 1E. Summary of large woody debris (LWD) attributes for study area reaches.

Reach Number	Habitat Unit	Surveyed Length (m)	Mean Bankfull Width (m)	Number of Functional LWD [1]				Recommended Number of LWD Pieces [2]		
				<20 cm	20-50 cm	>50 cm	Total	10m x 0.35m pieces	10m x 0.5m pieces	10m x 0.75m pieces
S1	All	1445	44.2	17	20	22	59	602	295	131
S2	All	1265	43.3	6	4	0	10	527	258	114
S3	All	930	48.5	0	20	8	28	388	190	84
S4	All	3270	41.4	13	27	22	62	1363	667	296
F13	All	1725	22.7	124	89	34	247	719	352	156
F14	All	545	27.4	37	35	28	100	227	111	49
F15	All	640	40.9	16	27	20	63	267	131	58
F16	All	1298	49.9	87	68	30	185	541	265	117
F17	All	1500	25.3	88	92	20	200	625	306	136
SS20	All	1070	39.7	10	35	19	64	446	218	97
SS21	All	1240	37.2	6	6	8	20	517	253	112
SS27	All	580	18.3	4	4	5	13	242	118	52
SS30	All	380	53.7	27	39	18	84	158	78	34
SS31	All	760	22.9	2	2	11	15	317	155	69
SC34	All	1510	25.9	33	181	19	233	629	308	137
SC35	All	1600	15.1	56	206	129	391	667	327	145
SC36	All	430	9.1	11	2	4	17	358	176	78
SC37	All	1225	14.1	13	64	88	165	510	250	111
H50	All	675	22.2	30	70	89	189	281	138	61

[1] To be termed functional, a piece of LWD must be providing cover, a control element for a pool or modifying channel morphology.

[2] Modified from Cederholm et al. (1997) such that recommended volume of LWD per 100 m of stream is 80 m^3 for streams with less than or equal to 10 m bankfull width and 40 m^3 for streams with greater than 10 m bankfull width.

Appendix 1F. Detailed canopy and riparian stage descriptions for selected reaches in the Sarita River watershed.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Sarita	S1	0	P	50	0	M	YF
Sarita	S1	50	G	390	0	M	YF
Sarita	S1	0	P	60	0	M	YF
Sarita	S1	440	R	30	0	M	YF
Sarita	S1	470	G	205	0	M	YF
Sarita	S1	675	R	215	0	M	YF
Sarita	S1	890	G	125	0	M	YF
Sarita	S1	1015	G	170	0	M	YF
Sarita	S1	1185	R	40	0	M	YF
Sarita	S1	1225	G	90	0	M	YF
Sarita	S1	1315	R	60	2	M	YF
Sarita	S1	1375	G	70	0	M	YF
Sarita	S2	0	P	15	2	M	YF
Sarita	S2	15	G	150	0	M	YF
Sarita	S2	165	R	70	0	M	YF
Sarita	S2	235	G	340	0	M	YF
Sarita	S2	0	P	35	0	M	YF
Sarita	S2	575	G	75	0	M	YF
Sarita	S2	650	P	85	0	M	YF
Sarita	S2	735	G	55	0	M	YF
Sarita	S2	790	R	95	0	M	YF
Sarita	S2	885	G	110	0	M	YF
Sarita	S2	0	P	20	0	M	YF
Sarita	S2	995	R	30	0	M	YF
Sarita	S2	1025	G	87	0	M	YF
Sarita	S2	1112	R	43	0	M	YF
Sarita	S2	1155	G	40	0	M	YF
Sarita	S2	0	P	55	0	M	YF
Sarita	S2	1195	P	70	0	M	YF
Sarita	S3	0	P	40	0	D	SH
Sarita	S3	40	G	200	0	M	YF
Sarita	S3	240	R	67	0	C	MF
Sarita	S3	307	G	133	0	M	YF
Sarita	S3	0	P	20	0	D	YF
Sarita	S3	440	R	10	0	D	SH
Sarita	S3	450	G	18	0	D	SH
Sarita	S3	468	R	12	0	D	YF
Sarita	S3	480	G	127	0	D	YF
Sarita	S3	607	R	26	0	D	SH
Sarita	S3	633	P	47	0	D	YF
Sarita	S3	680	R	2	0	D	YF
Sarita	S3	682	P	53	0	D	YF
Sarita	S3	735	G	60	0	D	YF
Sarita	S3	795	P	30	0	D	YF
Sarita	S3	825	G	55	0	D	SH
Sarita	S3	880	P	50	0	D	SH
Sarita	S4	0	R	62	0	M	YF
Sarita	S4	62	G	72	0	M	YF
Sarita	S4	0	P	30	0	M	YF
Sarita	S4	134	R	18	0	D	SH
Sarita	S4	152	G	98	0	M	YF
Sarita	S4	250	R	13	0	M	YF
Sarita	S4	0	P	30	0	M	YF
Sarita	S4	263	G	57	0	M	YF
Sarita	S4	320	R	74	0	M	YF
Sarita	S4	394	G	259	0	M	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Sarita	S4	653	P	57	0	M	YF
Sarita	S4	710	G	45	0	M	YF
Sarita	S4	755	R	70	0	M	YF
Sarita	S4	825	G	40	0	M	YF
Sarita	S4	865	P	30	0	M	YF
Sarita	S4	895	G	168	0	M	YF
Sarita	S4	1063	P	77	0	M	MF
Sarita	S4	1140	G	23	0	M	MF
Sarita	S4	1163	R	21	0	M	MF
Sarita	S4	1184	G	76	0	M	MF
Sarita	S4	1260	R	40	0	M	MF
Sarita	S4	1300	G	27	0	M	MF
Sarita	S4	1327	R	33	0	M	MF
Sarita	S4	1360	G	95	0	D	MF
Sarita	S4	1455	R	35	0	D	YF
Sarita	S4	1490	G	10	0	D	SH
Sarita	S4	1500	R	55	0	D	SH
Sarita	S4	1555	G	15	0	D	SH
Sarita	S4	1570	P	230	0	M	YF
Sarita	S4	1800	G	100	0	M	YF
Sarita	S4	1900	R	30	0	D	SH
Sarita	S4	1930	G	112	0	D	SH
Sarita	S4	2042	R	234	0	D	SH
Sarita	S4	2276	G	18	0	D	SH
Sarita	S4	2294	P	28	0	D	SH
Sarita	S4	2322	R	3	0	D	SH
Sarita	S4	2325	P	20	0	D	SH
Sarita	S4	2345	R	20	0	D	SH
Sarita	S4	2365	G	32	0	D	SH
Sarita	S4	2397	R	65	0	D	SH
Sarita	S4	2462	G	31	0	M	YF
Sarita	S4	2493	P	30	0	M	YF
Sarita	S4	2523	G	30	0	M	YF
Sarita	S4	2553	P	92	0	M	YF
Sarita	S4	2645	R	91	0	M	YF
Sarita	S4	2736	P	10	0	M	YF
Sarita	S4	2746	G	216	0	M	YF
Sarita	S4	2962	R	100	0	M	YF
Sarita	S4	3062	G	33	0	M	YF
Sarita	S4	3095	P	31	0	M	YF
Sarita	S4	3126	G	74	0	M	YF
Sarita	S4	3200	P	70	0	M	YF
Frederick	F13	0	G	100	0	M	MF
Frederick	F13	100	P	30	0	M	YF
Frederick	F13	130	G	80	0	M	YF
Frederick	F13	210	G	47	0	M	YF
Frederick	F13	257	R	50	4	M	YF
Frederick	F13	307	G	51	0	M	YF
Frederick	F13	358	G	17	7	M	YF
Frederick	F13	375	P	12	7	M	YF
Frederick	F13	387	G	7	2	M	YF
Frederick	F13	394	R	14	0	M	YF
Frederick	F13	408	G	18	2	M	YF
Frederick	F13	426	P	20	2	M	YF
Frederick	F13	446	R	14	0	M	YF
Frederick	F13	460	G	14	2	M	YF
Frederick	F13	474	R	26	0	M	YF
Frederick	F13	500	G	14	0	M	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Frederick	F13	514	P	8	4	M	YF
Frederick	F13	522	G	19	4	M	YF
Frederick	F13	541	P	29	2	M	YF
Frederick	F13	570	R	32	2	M	YF
Frederick	F13	602	G	23	2	M	YF
Frederick	F13	625	R	15	0	M	YF
Frederick	F13	640	G	20	0	M	YF
Frederick	F13	660	P	13	0	M	YF
Frederick	F13	673	G	27	0	D	SH
Frederick	F13	700	P	23	0	D	SH
Frederick	F13	723	G	20	0	D	SH
Frederick	F13	743	R	10	0	D	SH
Frederick	F13	753	P	29	0	M	YF
Frederick	F13	782	R	15	0	M	YF
Frederick	F13	797	P	29	0	M	YF
Frederick	F13	826	R	12	0	M	YF
Frederick	F13	838	P	26	0	D	YF
Frederick	F13	864	G	16	0	D	YF
Frederick	F13	880	P	26	7	D	YF
Frederick	F13	906	R	24	0	D	YF
Frederick	F13	930	G	50	0	M	YF
Frederick	F13	980	R	6	0	M	YF
Frederick	F13	986	G	38	0	M	YF
Frederick	F13	1024	P	7	0	M	YF
Frederick	F13	1031	R	5	7	M	YF
Frederick	F13	1036	P	24	0	M	YF
Frederick	F13	1060	G	15	7	M	YF
Frederick	F13	0	P	2	9	M	YF
Frederick	F13	1075	R	6	0	D	PS
Frederick	F13	1081	G	26	0	D	PS
Frederick	F13	1107	R	20	0	D	PS
Frederick	F13	1127	P	12	0	D	PS
Frederick	F13	1139	P	13	0	M	YF
Frederick	F13	1152	R	5	0	M	YF
Frederick	F13	1157	P	30	7	C	MF
Frederick	F13	1187	R	3	0	M	YF
Frederick	F13	1190	P	16	7	M	YF
Frederick	F13	1206	R	16	7	M	YF
Frederick	F13	1222	P	16	4	M	YF
Frederick	F13	1238	P	28	4	M	YF
Frederick	F13	1266	R	6	4	M	YF
Frederick	F13	1272	P	8	4	M	YF
Frederick	F13	1280	R	5	4	M	YF
Frederick	F13	1285	P	19	4	M	YF
Frederick	F13	1304	R	12	4	M	YF
Frederick	F13	1316	P	18	4	D	SH
Frederick	F13	1334	R	12	0	D	SH
Frederick	F13	1346	P	7	0	D	SH
Frederick	F13	1353	G	24	0	D	SH
Frederick	F13	1377	R	8	0	D	SH
Frederick	F13	1385	P	10	0	D	SH
Frederick	F13	1395	G	19	0	D	SH
Frederick	F13	1414	R	10	0	D	SH
Frederick	F13	1424	P	16	0	D	SH
Frederick	F13	1440	P	11	0	D	SH
Frederick	F13	1451	G	17	0	D	SH
Frederick	F13	1468	R	20	0	M	YF
Frederick	F13	1488	P	12	0	M	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Frederick	F13	1500	R	17	0	M	YF
Frederick	F13	1517	P	15	0	M	YF
Frederick	F13	1532	G	13	0	M	YF
Frederick	F13	1545	R	27	0	D	SH
Frederick	F13	1572	G	24	0	D	SH
Frederick	F13	1596	R	15	0	D	SH
Frederick	F13	1611	P	19	0	M	YF
Frederick	F13	1630	R	3	0	M	YF
Frederick	F13	1633	G	19	0	M	YF
Frederick	F13	1652	P	13	0	M	YF
Frederick	F13	1665	G	6	0	M	YF
Frederick	F13	1671	R	10	0	M	YF
Frederick	F13	1681	G	16	0	D	PS
Frederick	F13	1697	R	28	0	D	PS
Frederick	F14	0	G	50	0	M	YF
Frederick	F14	50	G	20	2	M	YF
Frederick	F14	70	P	10	4	M	YF
Frederick	F14	80	R	5	2	M	YF
Frederick	F14	85	P	3	7	M	YF
Frederick	F14	88	R	10	7	M	YF
Frederick	F14	98	P	20	2	M	YF
Frederick	F14	118	R	4	7	M	YF
Frederick	F14	122	P	3	7	M	YF
Frederick	F14	125	R	7	2	M	YF
Frederick	F14	132	G	17	0	M	YF
Frederick	F14	149	R	7	0	M	YF
Frederick	F14	156	P	14	7	M	YF
Frederick	F14	170	R	27	0	D	SH
Frederick	F14	197	P	13	0	D	SH
Frederick	F14	210	R	7	4	M	YF
Frederick	F14	217	G	6	2	M	YF
Frederick	F14	223	R	7	2	M	YF
Frederick	F14	230	P	35	0	D	SH
Frederick	F14	265	R	27	0	C	YF
Frederick	F14	292	G	16	0	D	SH
Frederick	F14	308	P	14	0	D	SH
Frederick	F14	322	R	4	0	M	PS
Frederick	F14	326	P	18	0	M	PS
Frederick	F14	344	G	9	0	M	YF
Frederick	F14	353	P	32	0	D	SH
Frederick	F14	385	R	27	0	D	SH
Frederick	F14	412	G	63	4	M	YF
Frederick	F14	475	R	9	2	M	YF
Frederick	F14	484	P	21	7	M	YF
Frederick	F14	505	G	40	2	M	YF
Frederick	F15	0	R	16	4	M	YF
Frederick	F15	16	G	17	7	M	YF
Frederick	F15	33	P	13	7	M	YF
Frederick	F15	46	G	24	7	M	YF
Frederick	F15	70	P	7	0	C	YF
Frederick	F15	77	G	45	0	C	YF
Frederick	F15	122	R	48	0	C	YF
Frederick	F15	170	P	22	0	C	YF
Frederick	F15	192	G	17	0	M	YF
Frederick	F15	209	P	19	2	M	YF
Frederick	F15	228	R	22	0	M	YF
Frederick	F15	250	G	35	0	D	SH
Frederick	F15	0	P	15	0	D	SH

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Frederick	F15	285	R	15	0	D	SH
Frederick	F15	300	P	31	0	D	SH
Frederick	F15	331	R	5	0	M	MF
Frederick	F15	336	G	20	0	M	YF
Frederick	F15	356	R	7	0	M	YF
Frederick	F15	363	G	24	0	M	YF
Frederick	F15	387	R	10	0	M	YF
Frederick	F15	397	G	10	0	M	YF
Frederick	F15	407	P	7	0	M	YF
Frederick	F15	414	G	16	0	C	MF
Frederick	F15	430	P	13	0	C	MF
Frederick	F15	443	G	12	7	C	MF
Frederick	F15	455	R	10	9	M	YF
Frederick	F15	465	P	20	2	M	YF
Frederick	F15	485	G	23	0	M	YF
Frederick	F15	508	P	20	0	M	YF
Frederick	F15	528	G	8	0	M	YF
Frederick	F15	536	P	9	0	M	YF
Frederick	F15	545	G	15	0	M	YF
Frederick	F15	560	R	28	0	D	YF
Frederick	F15	588	G	26	0	D	YF
Frederick	F15	614	G	26	0	D	YF
Frederick	F16	0	R	4	4	M	YF
Frederick	F16	4	G	16	7	M	YF
Frederick	F16	20	G	22	7	M	YF
Frederick	F16	42	R	16	2	M	YF
Frederick	F16	58	G	8	4	M	YF
Frederick	F16	66	P	6	2	M	YF
Frederick	F16	72	G	28	0	M	YF
Frederick	F16	100	P	15	7	M	YF
Frederick	F16	115	G	10	4	M	YF
Frederick	F16	125	P	5	7	M	YF
Frederick	F16	130	R	13	4	M	YF
Frederick	F16	143	G	7	4	M	YF
Frederick	F16	150	P	20	2	M	YF
Frederick	F16	170	R	10	4	M	YF
Frederick	F16	180	P	6	4	M	YF
Frederick	F16	186	G	7	4	M	YF
Frederick	F16	193	R	17	4	M	YF
Frederick	F16	210	G	8	2	M	YF
Frederick	F16	218	P	13	2	M	YF
Frederick	F16	231	P	22	7	M	YF
Frederick	F16	253	G	13	2	M	YF
Frederick	F16	266	R	9	2	M	YF
Frederick	F16	275	P	11	7	M	YF
Frederick	F16	286	R	19	7	M	YF
Frederick	F16	305	G	15	4	M	YF
Frederick	F16	320	P	14	7	M	YF
Frederick	F16	334	G	20	2	M	YF
Frederick	F16	354	R	5	4	M	YF
Frederick	F16	359	P	12	4	M	YF
Frederick	F16	371	G	8	4	M	YF
Frederick	F16	379	R	6	4	M	YF
Frederick	F16	385	G	9	7	M	YF
Frederick	F16	394	R	11	9	M	YF
Frederick	F16	405	G	15	9	M	YF
Frederick	F16	420	P	26	7	M	YF
Frederick	F16	446	R	5	9	M	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Frederick	F16	451	G	18	7	M	YF
Frederick	F16	469	P	9	7	M	YF
Frederick	F16	478	R	5	7	M	YF
Frederick	F16	483	P	12	9	M	YF
Frederick	F16	495	R	21	9	M	YF
Frederick	F16	516	G	12	7	M	YF
Frederick	F16	528	R	39	7	M	YF
Frederick	F16	557	P	10	7	M	YF
Frederick	F16	567	G	31	9	M	YF
Frederick	F16	598	R	8	2	M	YF
Frederick	F16	606	G	18	7	M	YF
Frederick	F16	624	R	4	7	M	YF
Frederick	F16	628	P	13	7	M	YF
Frederick	F16	641	G	49	4	M	YF
Frederick	F16	690	R	11	7	M	YF
Frederick	F16	701	G	14	9	M	YF
Frederick	F16	715	G	16	2	M	YF
Frederick	F16	731	R	7	7	M	YF
Frederick	F16	738	P	29	7	M	YF
Frederick	F16	767	R	11	7	M	YF
Frederick	F16	778	G	11	4	M	YF
Frederick	F16	789	R	2	4	M	YF
Frederick	F16	791	G	47	4	M	YF
Frederick	F16	0	P	5	4	M	YF
Frederick	F16	0	P	3	4	M	YF
Frederick	F16	838	R	5	7	M	YF
Frederick	F16	843	P	18	9	M	YF
Frederick	F16	861	R	10	7	M	YF
Frederick	F16	871	P	7	7	M	YF
Frederick	F16	878	R	21	9	M	YF
Frederick	F16	899	G	31	9	D	YF
Frederick	F16	930	R	6	9	D	YF
Frederick	F16	936	G	32	7	D	YF
Frederick	F16	0	P	10	7	D	YF
Frederick	F16	968	R	14	9	D	YF
Frederick	F16	982	G	11	7	D	YF
Frederick	F16	993	P	5	7	D	YF
Frederick	F16	998	G	8	7	D	YF
Frederick	F16	1006	P	6	7	D	YF
Frederick	F16	1012	R	8	7	D	YF
Frederick	F16	1020	G	15	7	D	YF
Frederick	F16	1035	R	14	9	D	YF
Frederick	F16	1049	G	7	9	D	YF
Frederick	F16	1056	R	9	7	D	YF
Frederick	F16	1065	G	28	9	D	YF
Frederick	F16	1093	R	12	9	D	YF
Frederick	F16	1105	P	12	9	D	YF
Frederick	F16	1117	R	7	9	D	YF
Frederick	F16	1124	G	8	9	D	YF
Frederick	F16	1132	R	8	9	D	YF
Frederick	F16	1140	G	6	9	D	YF
Frederick	F16	1146	P	12	7	D	YF
Frederick	F16	1158	G	37	7	D	YF
Frederick	F16	1195	R	18	4	D	YF
Frederick	F16	1213	G	23	7	D	YF
Frederick	F16	1236	P	37	4	D	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Frederick	F16	1273	G	10	0	D	YF
Frederick	F16	1283	P	15	0	D	YF
Frederick	F17	0	R	37	7	M	YF
Frederick	F17	37	P	7	4	M	YF
Frederick	F17	44	G	23	4	M	YF
Frederick	F17	67	P	15	2	M	YF
Frederick	F17	82	R	11	2	M	YF
Frederick	F17	93	G	7	4	M	YF
Frederick	F17	100	P	9	7	M	YF
Frederick	F17	109	R	3	7	M	YF
Frederick	F17	112	G	8	9	M	YF
Frederick	F17	120	R	4	7	M	YF
Frederick	F17	124	P	6	7	M	YF
Frederick	F17	130	R	25	7	M	YF
Frederick	F17	155	P	13	2	M	YF
Frederick	F17	168	R	32	2	M	YF
Frederick	F17	200	G	52	4	M	YF
Frederick	F17	252	R	48	2	M	YF
Frederick	F17	300	P	14	2	M	YF
Frederick	F17	314	R	24	2	M	YF
Frederick	F17	338	P	12	2	M	YF
Frederick	F17	350	R	7	9	M	YF
Frederick	F17	357	P	8	9	M	YF
Frederick	F17	365	R	27	2	M	YF
Frederick	F17	392	P	14	7	M	YF
Frederick	F17	406	R	10	2	M	YF
Frederick	F17	416	P	6	2	M	YF
Frederick	F17	422	R	28	4	M	YF
Frederick	F17	0	P	10	4	M	YF
Frederick	F17	450	P	10	2	M	YF
Frederick	F17	460	R	32	2	M	YF
Frederick	F17	492	P	7	0	M	YF
Frederick	F17	499	R	29	0	M	YF
Frederick	F17	528	P	5	0	M	YF
Frederick	F17	533	R	10	0	M	YF
Frederick	F17	543	P	7	0	M	YF
Frederick	F17	550	R	48	0	M	YF
Frederick	F17	598	P	9	74	M	YF
Frederick	F17	607	R	18	0	M	YF
Frederick	F17	625	P	15	0	M	YF
Frederick	F17	640	R	10	0	M	YF
Frederick	F17	650	P	10	2	M	YF
Frederick	F17	660	R	20	0	M	YF
Frederick	F17	680	G	26	0	M	YF
Frederick	F17	706	P	14	4	M	YF
Frederick	F17	720	R	17	0	M	YF
Frederick	F17	737	P	8	0	M	YF
Frederick	F17	745	R	7	0	M	YF
Frederick	F17	752	P	12	2	M	YF
Frederick	F17	764	R	8	2	M	YF
Frederick	F17	772	P	20	4	M	YF
Frederick	F17	792	R	13	0	M	YF
Frederick	F17	805	G	31	0	M	YF
Frederick	F17	836	R	18	2	M	YF
Frederick	F17	854	G	29	0	M	YF
Frederick	F17	883	R	11	0	M	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Frederick	F17	894	P	8	0	M	YF
Frederick	F17	902	R	15	0	M	YF
Frederick	F17	917	G	24	0	M	YF
Frederick	F17	941	P	12	7	M	YF
Frederick	F17	953	R	31	4	M	YF
Frederick	F17	984	G	13	7	M	YF
Frederick	F17	997	P	19	2	M	YF
Frederick	F17	1016	R	32	0	M	YF
Frederick	F17	1048	P	10	4	M	YF
Frederick	F17	1058	R	136	2	M	YF
Frederick	F17	1194	P	22	2	M	YF
Frederick	F17	1216	R	29	4	M	YF
Frederick	F17	1245	G	17	4	M	YF
Frederick	F17	1262	P	13	7	M	YF
Frederick	F17	1275	R	30	4	M	YF
Frederick	F17	1305	P	15	2	M	YF
Frederick	F17	1320	R	11	2	M	YF
Frederick	F17	1331	P	13	2	M	YF
Frederick	F17	1344	R	9	2	M	YF
Frederick	F17	1353	G	21	0	M	YF
Frederick	F17	1374	R	9	0	D	SH
Frederick	F17	1383	G	11	0	D	SH
Frederick	F17	1394	R	6	0	D	SH
Frederick	F17	1400	P	20	0	D	SH
Frederick	F17	1420	R	80	0	D	SH
South Sarita	SS20	0	G	28	0	M	YF
South Sarita	SS20	28	P	52	0	M	YF
South Sarita	SS20	80	G	23	0	M	YF
South Sarita	SS20	103	R	20	0	M	YF
South Sarita	SS20	123	P	3	0	M	YF
South Sarita	SS20	126	G	32	0	M	YF
South Sarita	SS20	158	R	16	0	M	YF
South Sarita	SS20	174	P	37	0	M	YF
South Sarita	SS20	211	G	59	0	M	YF
South Sarita	SS20	270	G	40	0	M	YF
South Sarita	SS20	310	P	28	0	M	YF
South Sarita	SS20	338	G	352	0	M	YF
South Sarita	SS20	0	P	11	0	M	YF
South Sarita	SS20	690	P	73	0	M	YF
South Sarita	SS20	0	P	18			
South Sarita	SS20	763	G	307	0	M	YF
South Sarita	SS20	0	G	35	0	M	YF
South Sarita	SS20	0	P	10	0	D	YF
South Sarita	SS20	0	P	12	0	D	YF
South Sarita	SS20	0	P	6	0	D	YF
South Sarita	SS20	0	G	200	0	D	YF
South Sarita	SS20	0	P	25	0	D	YF
South Sarita	SS20	0	G	15	0	D	YF
South Sarita	SS21	0	G	50	2	D	PS
South Sarita	SS21	50	G	20	0	D	PS
South Sarita	SS21	70	R	34	0	D	PS
South Sarita	SS21	104	G	33	0	D	YF
South Sarita	SS21	137	R	11	2	D	YF
South Sarita	SS21	148	G	30	0	D	YF
South Sarita	SS21	178	R	12	0	M	YF
South Sarita	SS21	190	G	190	0	M	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
South Sarita	SS21	0	P	10	0	M	YF
South Sarita	SS21	380	R	90	0	M	YF
South Sarita	SS21	470	G	230	0	M	YF
South Sarita	SS21	700	R	100	0	M	YF
South Sarita	SS21	800	P	36	0	M	YF
South Sarita	SS21	836	R	52	0	M	YF
South Sarita	SS21	888	G	27	0	M	YF
South Sarita	SS21	915	P	57	2	M	YF
South Sarita	SS21	972	R	141	0	M	YF
South Sarita	SS21	0	P	25	0	M	YF
South Sarita	SS21	1113	G	22	0	M	YF
South Sarita	SS21	1135	P	105	2	M	YF
South Sarita	SS27	0	R	38	2	M	MF
South Sarita	SS27	38	G	26	0	M	MF
South Sarita	SS27	64	P	53	0	M	MF
South Sarita	SS27	117	R	25	0	M	MF
South Sarita	SS27	142	G	22	2	M	MF
South Sarita	SS27	164	R	9	2	M	MF
South Sarita	SS27	173	G	13	2	M	MF
South Sarita	SS27	186	R	7	0	M	MF
South Sarita	SS27	193	P	8	0	M	MF
South Sarita	SS27	201	R	16	0	M	MF
South Sarita	SS27	217	G	25	0	M	MF
South Sarita	SS27	242	R	9	0	M	MF
South Sarita	SS27	251	G	36	2	M	MF
South Sarita	SS27	287	P	46	7	M	MF
South Sarita	SS27	0	R	19	0	M	MF
South Sarita	SS27	333	P	33	0	M	MF
South Sarita	SS27	366	R	63	0	M	MF
South Sarita	SS27	429	G	42	0	M	MF
South Sarita	SS27	0	R	15	0	M	MF
South Sarita	SS27	471	G	19	0	M	MF
South Sarita	SS27	490	P	27	0	M	MF
South Sarita	SS27	0	R	30	0	M	MF
South Sarita	SS27	517	G	33	0	M	MF
South Sarita	SS27	0	R	15	0	M	MF
South Sarita	SS27	550	P	30	0	M	MF
South Sarita	SS30	0	P	35	2	M	YF
South Sarita	SS30	35	P	15	7	M	YF
South Sarita	SS30	50	R	52	4	M	YF
South Sarita	SS30	0	G	10	0	M	YF
South Sarita	SS30	102	P	24	2	D	PS
South Sarita	SS30	126	R	18	0	D	PS
South Sarita	SS30	144	G	22	0	M	YF
South Sarita	SS30	166	R	26	0	M	YF
South Sarita	SS30	192	P	21	0	M	YF
South Sarita	SS30	213	G	28	0	M	YF
South Sarita	SS30	241	R	5	0	M	YF
South Sarita	SS30	246	P	11	0	M	YF
South Sarita	SS30	257	R	21	0	M	YF
South Sarita	SS30	278	G	7	0	M	YF
South Sarita	SS30	285	R	15	0	M	YF
South Sarita	SS30	300	P	8	0	M	YF
South Sarita	SS30	308	R	12	0	M	YF
South Sarita	SS30	320	R	60	0	M	YF
South Sarita	SS31	0	G	13	0	M	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
South Sarita	SS31	13	R	22	2	M	YF
South Sarita	SS31	35	G	55	2	M	YF
South Sarita	SS31	90	P	21	0	M	YF
South Sarita	SS31	111	R	18	0	M	YF
South Sarita	SS31	129	G	44	2	M	YF
South Sarita	SS31	173	R	20	2	M	YF
South Sarita	SS31	193	G	22	2	M	YF
South Sarita	SS31	215	R	20	0	M	YF
South Sarita	SS31	235	P	19	2	M	YF
South Sarita	SS31	254	R	47	2	M	YF
South Sarita	SS31	301	G	17	2	M	YF
South Sarita	SS31	318	R	40	0	M	YF
South Sarita	SS31	358	G	52	0	M	YF
South Sarita	SS31	410	R	247	2	M	YF
South Sarita	SS31	657	G	34	4	M	YF
South Sarita	SS31	691	P	69	4	M	YF
Sabrina	SC34	0	C	35	0	M	YF
Sabrina	SC34	35	R	40	4	M	YF
Sabrina	SC34	0	P	10	7	M	YF
Sabrina	SC34	75	G	21	2	M	YF
Sabrina	SC34	96	R	18	2	M	YF
Sabrina	SC34	114	G	21	2	M	YF
Sabrina	SC34	135	R	12	0	M	YF
Sabrina	SC34	147	P	13	0	M	YF
Sabrina	SC34	160	R	20	0	M	YF
Sabrina	SC34	180	G	13	0	M	YF
Sabrina	SC34	193	G	19	2	M	YF
Sabrina	SC34	212	P	21	0	M	YF
Sabrina	SC34	233	G	34	0	M	YF
Sabrina	SC34	267	R	10	2	M	YF
Sabrina	SC34	277	G	5	2	M	YF
Sabrina	SC34	282	P	3	2	M	YF
Sabrina	SC34	285	R	53	0	M	YF
Sabrina	SC34	338	G	35	4	M	YF
Sabrina	SC34	373	R	9	0	M	YF
Sabrina	SC34	382	G	13	2	M	YF
Sabrina	SC34	395	R	40	2	M	YF
Sabrina	SC34	435	G	10	0	M	YF
Sabrina	SC34	445	P	40	7	M	YF
Sabrina	SC34	485	R	30	0	M	YF
Sabrina	SC34	515	G	40	7	M	YF
Sabrina	SC34	0	R	25	4	M	YF
Sabrina	SC34	0	P	3	7	M	YF
Sabrina	SC34	555	G	103	4	M	YF
Sabrina	SC34	658	R	39	2	M	YF
Sabrina	SC34	697	P	40	2	M	YF
Sabrina	SC34	737	G	25	7	M	YF
Sabrina	SC34	762	R	10	7	M	YF
Sabrina	SC34	772	G	20	2	M	YF
Sabrina	SC34	792	P	20	4	M	YF
Sabrina	SC34	812	R	9	0	M	YF
Sabrina	SC34	821	G	27	0	M	YF
Sabrina	SC34	848	R	20	4	M	YF
Sabrina	SC34	868	P	32	4	M	YF
Sabrina	SC34	900	G	65	4	M	YF
Sabrina	SC34	965	R	15	4	M	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Sabrina	SC34	980	P	15	2	M	YF
Sabrina	SC34	995	R	10	4	M	YF
Sabrina	SC34	1005	G	20	2	M	YF
Sabrina	SC34	1025	R	10	2	D	YF
Sabrina	SC34	1035	G	55	2	D	YF
Sabrina	SC34	1090	R	23	2	D	YF
Sabrina	SC34	1113	G	50	2	D	YF
Sabrina	SC34	1163	R	12	0	D	PS
Sabrina	SC34	1175	G	71	0	D	PS
Sabrina	SC34	1246	R	17	0	D	PS
Sabrina	SC34	1263	G	33	2	M	YF
Sabrina	SC34	1296	R	38	2	M	YF
Sabrina	SC34	1334	G	42	0	M	YF
Sabrina	SC34	1376	R	4	0	M	YF
Sabrina	SC34	1380	G	8	0	M	YF
Sabrina	SC34	1388	R	5	0	M	YF
Sabrina	SC34	1393	G	31	2	M	YF
Sabrina	SC34	1424	R	46	0	M	YF
Sabrina	SC34	1470	G	8	0	M	YF
Sabrina	SC34	1478	R	7	2	M	YF
Sabrina	SC34	1485	P	25	0	M	YF
Sabrina	SC35	0	R	36	9	M	YF
Sabrina	SC35	36	G	17	9	M	YF
Sabrina	SC35	53	P	7	9	M	YF
Sabrina	SC35	60	R	5	7	M	YF
Sabrina	SC35	65	G	13	9	M	YF
Sabrina	SC35	78	P	3	9	M	YF
Sabrina	SC35	81	R	12	9	M	YF
Sabrina	SC35	93	G	16	7	M	YF
Sabrina	SC35	109	R	7	9	M	YF
Sabrina	SC35	116	P	21	9	M	YF
Sabrina	SC35	137	R	21	7	M	YF
Sabrina	SC35	158	P	4	7	M	YF
Sabrina	SC35	162	G	8	2	M	YF
Sabrina	SC35	170	R	23	2	M	YF
Sabrina	SC35	193	P	17	2	M	YF
Sabrina	SC35	0	P	15	4	M	YF
Sabrina	SC35	210	G	10	4	M	YF
Sabrina	SC35	220	R	10	4	M	YF
Sabrina	SC35	230	G	3	4	M	YF
Sabrina	SC35	233	R	1	4	M	YF
Sabrina	SC35	234	G	6	4	M	YF
Sabrina	SC35	240	R	22	4	M	YF
Sabrina	SC35	262	G	8	4	M	YF
Sabrina	SC35	270	P	6	4	M	YF
Sabrina	SC35	276	R	20	4	M	YF
Sabrina	SC35	296	G	32	4	M	YF
Sabrina	SC35	328	R	29	9	M	YF
Sabrina	SC35	357	G	16	9	M	YF
Sabrina	SC35	0	P	5	4	M	YF
Sabrina	SC35	373	R	17	2	M	YF
Sabrina	SC35	390	G	14	4	M	YF
Sabrina	SC35	0	P	7	2	M	YF
Sabrina	SC35	404	P	14	2	M	YF
Sabrina	SC35	418	R	2	2	M	YF
Sabrina	SC35	420	P	25	4	M	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Sabrina	SC35	445	R	20	4	M	YF
Sabrina	SC35	465	G	10	4	M	YF
Sabrina	SC35	475	P	5	2	M	YF
Sabrina	SC35	480	R	4	2	M	YF
Sabrina	SC35	484	G	17	2	M	YF
Sabrina	SC35	501	R	4	7	M	YF
Sabrina	SC35	505	G	17	4	M	YF
Sabrina	SC35	522	R	15	4	M	YF
Sabrina	SC35	537	G	47	4	M	YF
Sabrina	SC35	584	P	10	4	M	YF
Sabrina	SC35	594	R	9	7	M	YF
Sabrina	SC35	603	G	36	2	M	YF
Sabrina	SC35	639	P	6	2	M	YF
Sabrina	SC35	645	G	20	2	M	YF
Sabrina	SC35	0	P	5	4	M	YF
Sabrina	SC35	665	G	40	4	M	YF
Sabrina	SC35	705	P	10	9	M	YF
Sabrina	SC35	715	G	45	4	M	YF
Sabrina	SC35	760	G	350	2	M	YF
Sabrina	SC35	0	P	3	2	M	YF
Sabrina	SC35	0	P	2	2	M	YF
Sabrina	SC35	0	P	3	2	M	YF
Sabrina	SC35	1110	G	46	2	M	YF
Sabrina	SC35	1156	R	9	7	M	YF
Sabrina	SC35	1165	G	39	7	M	YF
Sabrina	SC35	1204	R	4	7	M	YF
Sabrina	SC35	1208	G	12	7	M	YF
Sabrina	SC35	1220	R	6	7	M	YF
Sabrina	SC35	1226	P	12	7	M	YF
Sabrina	SC35	1238	R	15	7	M	YF
Sabrina	SC35	1253	G	10	7	M	YF
Sabrina	SC35	1263	P	12	7	M	YF
Sabrina	SC35	1275	R	11	7	M	YF
Sabrina	SC35	1286	P	18	7	M	YF
Sabrina	SC35	1304	R	26	9	M	YF
Sabrina	SC35	1330	G	10	7	M	YF
Sabrina	SC35	1340	P	7	7	M	YF
Sabrina	SC35	1347	G	18	9	M	YF
Sabrina	SC35	1365	R	11	7	M	YF
Sabrina	SC35	1376	P	14	4	M	YF
Sabrina	SC35	1390	R	14	4	M	YF
Sabrina	SC35	1404	G	10	4	M	YF
Sabrina	SC35	1414	G	11	7	M	YF
Sabrina	SC35	1425	G	11	7	M	YF
Sabrina	SC35	1436	R	25	9	M	YF
Sabrina	SC35	1461	G	16	9	M	YF
Sabrina	SC35	1477	G	22	4	M	YF
Sabrina	SC35	1499	R	11	2	M	YF
Sabrina	SC35	1510	G	17	0	M	YF
Sabrina	SC35	1527	R	7	2	M	YF
Sabrina	SC35	1534	P	17	0	M	YF
Sabrina	SC35	1551	G	14	2	M	YF
Sabrina	SC35	1565	G	35	4	M	YF
Sabrina	SC36	0	G	46	4	M	YF
Sabrina	SC36	46	G	86	9	M	YF
Sabrina	SC36	132	R	46	9	M	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Sabrina	SC36	178	P	23	9	M	YF
Sabrina	SC36	201	R	8	7	M	YF
Sabrina	SC36	209	G	28	9	M	YF
Sabrina	SC36	237	R	27	4	M	YF
Sabrina	SC36	264	G	12	7	M	YF
Sabrina	SC36	276	R	33	7	M	YF
Sabrina	SC36	309	G	22	7	M	YF
Sabrina	SC36	331	R	9	4	M	YF
Sabrina	SC36	340	G	10	7	M	YF
Sabrina	SC36	350	C	50	7	M	YF
Sabrina	SC36	400	P	30	4	M	YF
Sabrina	SC37	0	R	17	9	M	YF
Sabrina	SC37	17	G	28	9	M	YF
Sabrina	SC37	45	R	30	4	M	YF
Sabrina	SC37	75	G	27	4	M	YF
Sabrina	SC37	102	G	56	4	M	YF
Sabrina	SC37	0	P	3	9	M	YF
Sabrina	SC37	158	G	49	4	M	YF
Sabrina	SC37	207	G	26	7	M	YF
Sabrina	SC37	233	P	11	4	M	YF
Sabrina	SC37	244	G	16	4	M	YF
Sabrina	SC37	260	P	16	2	M	YF
Sabrina	SC37	276	G	15	7	M	YF
Sabrina	SC37	291	P	12	7	M	YF
Sabrina	SC37	303	R	11	4	M	YF
Sabrina	SC37	314	G	15	4	M	YF
Sabrina	SC37	329	P	14	4	M	YF
Sabrina	SC37	343	R	9	7	M	YF
Sabrina	SC37	352	G	20	7	M	YF
Sabrina	SC37	372	R	3	7	M	YF
Sabrina	SC37	375	G	12	7	M	YF
Sabrina	SC37	387	P	9	4	M	YF
Sabrina	SC37	396	R	16	4	M	YF
Sabrina	SC37	412	P	18	4	M	YF
Sabrina	SC37	430	R	2	4	M	YF
Sabrina	SC37	432	G	15	9	M	YF
Sabrina	SC37	447	G	8	9	M	YF
Sabrina	SC37	455	P	7	4	M	YF
Sabrina	SC37	462	G	28	4	M	YF
Sabrina	SC37	490	P	7	7	D	PS
Sabrina	SC37	497	G	72	4	D	PS
Sabrina	SC37	569	P	10	4	D	PS
Sabrina	SC37	579	G	46	2	D	PS
Sabrina	SC37	625	P	8	4	M	YF
Sabrina	SC37	633	G	85	7	M	YF
Sabrina	SC37	718	P	2	7	M	YF
Sabrina	SC37	720	G	27	7	M	YF
Sabrina	SC37	747	R	12	7	M	YF
Sabrina	SC37	759	P	15	7	M	YF
Sabrina	SC37	774	R	14	4	M	YF
Sabrina	SC37	788	P	19	4	M	YF
Sabrina	SC37	807	G	9	4	M	YF
Sabrina	SC37	816	R	8	4	M	YF
Sabrina	SC37	824	G	11	4	M	YF
Sabrina	SC37	835	P	8	7	M	YF
Sabrina	SC37	843	R	27	7	M	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Sabrina	SC37	870	G	25	7	M	YF
Sabrina	SC37	895	R	6	7	M	YF
Sabrina	SC37	901	G	15	4	M	YF
Sabrina	SC37	916	R	14	4	M	YF
Sabrina	SC37	930	G	20	7	M	YF
Sabrina	SC37	950	R	97	4	M	YF
Sabrina	SC37	1047	G	30	7	M	YF
Sabrina	SC37	1077	R	4	4	M	YF
Sabrina	SC37	1081	G	34	4	M	YF
Sabrina	SC37	1115	R	72	7	D	YF
Sabrina	SC37	0	P	3	4	D	YF
Sabrina	SC37	1187	G	28	7	D	YF
Sabrina	SC37	1215	P	10	9	D	YF
Hunter	H50	0	R	23	7	M	YF
Hunter	H50	23	G	13	4	M	YF
Hunter	H50	36	R	50	9	M	YF
Hunter	H50	86	P	20	4	M	YF
Hunter	H50	106	R	25	7	M	YF
Hunter	H50	131	G	26	4	M	YF
Hunter	H50	157	R	5	4	M	YF
Hunter	H50	162	P	12	2	M	YF
Hunter	H50	174	R	31	0	M	YF
Hunter	H50	0	G	8	2	M	YF
Hunter	H50	205	P	16	4	M	YF
Hunter	H50	221	R	52	4	M	YF
Hunter	H50	0	G	7	4	M	YF
Hunter	H50	0	G	12	4	M	YF
Hunter	H50	273	P	16	7	M	YF
Hunter	H50	289	G	12	7	M	YF
Hunter	H50	301	R	5	4	M	YF
Hunter	H50	306	G	9	4	M	YF
Hunter	H50	315	R	48	4	M	YF
Hunter	H50	363	G	9	4	M	YF
Hunter	H50	372	R	2	7	M	YF
Hunter	H50	374	G	3	7	M	YF
Hunter	H50	377	R	3	4	M	YF
Hunter	H50	380	G	8	7	M	YF
Hunter	H50	388	R	6	7	M	YF
Hunter	H50	394	G	6	9	M	YF
Hunter	H50	400	R	38	4	M	YF
Hunter	H50	438	G	10	4	M	YF
Hunter	H50	448	R	13	4	M	YF
Hunter	H50	461	P	16	4	M	MF
Hunter	H50	477	R	10	4	M	YF
Hunter	H50	487	P	5	4	M	YF
Hunter	H50	492	R	8	7	M	YF
Hunter	H50	500	G	2	4	M	YF
Hunter	H50	502	R	15	2	M	YF
Hunter	H50	517	G	11	4	M	YF
Hunter	H50	528	P	6	4	D	PS
Hunter	H50	534	R	4	4	D	PS
Hunter	H50	538	G	7	4	D	PS
Hunter	H50	545	P	10	4	D	PS
Hunter	H50	555	G	12	2	M	YF
Hunter	H50	567	R	35	2	M	YF
Hunter	H50	602	P	14	2	M	YF

Appendix 1F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Hunter	H50	616	R	29	2	M	YF
Hunter	H50	645	G	10	0	M	YF
Hunter	H50	655	R	5	0	M	YF
Hunter	H50	660	P	15	0	M	YF

[1] Reach location (in meters); denotes the distance upstream from the lower reach break.

[2] Habitat types are: pool (P), riffle (R), glide (G), cascade (C) and other (O).

[3] Habitat length is the length (m) of the habitat unit being assessed.

[4] Canopy code is: 0 = 0-20%; 2 = 21-40%; 4 = 41-70%; 7 = 71-90%; 4 = 71-90%; 9 = > 90%

[5] Riparian type denotes the dominant type within 20 m of the stream: D=deciduous, C=coniferous, M=mixed, N = largely bare, S =shrub / herb and G = grasslands / bog.

[6] Riparian stage of the dominant vegetation: IN = non vegetated, SH = shrub / herb, PS = pole sapling, YF = young forest and MF = mature forest.

Appendix 2. Fish habitat assessment data for the Pachena River watershed.

Appendix 2A. Detailed habitat descriptions for selected reaches in the Pachena River watershed.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[2,5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only					Functional LWD Tally				Cover (%)						Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Shaky Bill's	S1N	0	P	1	15		0.60	0.9	0.2	25.0	6.0	90	95	5				AR	N	5	0.9	0.3	0.6	W		6	2	3	1						0					MC
Shaky Bill's	S1N	15	G	1	15		0.10	0.3	0.2	25.0	10.0	150	80	20				AR	N	30						19	10	5	4	10					10					JM MC
Shaky Bill's	S1N	30	P	1	25		0.60	1.0	0.2	25.0	4.0	100	80	20				AR	N	20	1.0	0.2	0.8	W	Y	4	1	3		5					5	80				MC
Shaky Bill's	S1N	55	G	1	21		0.20	0.3	0.2	25.0	3.0	63	60	40				AR	M	25						0									0	70				MC
Shaky Bill's	S1N	76	P	1	7		0.35	0.6	0.2	25.0	6.0	42	30	70				AR	H	29	0.6	0.2	0.4	W		7		5	2	15					15	20				MC
Shaky Bill's	S1N	83	G	1	103		0.15	0.2	0.2	25.0	5.0	515	20	80				AR	H	412						0									0	20				MC
Shaky Bill's	S1N	186	P	1	11		0.70	0.9	0.5	10.0	5.0	55	90	10				AR	L	6	0.9	0.1	0.8	W	Y	1			1						0					MC
Shaky Bill's	S1N	197	G	1	31		0.10	0.2	0.5	10.0	3.0	93	20	80				AR	H	74						3		2	1						0					MC
Shaky Bill's	S1N	228	P	1	17		0.40	0.8	0.5	20.0	6.0	102	90	10				AR	H	10	0.8	0.2	0.6			0									0					MC
Shaky Bill's	S1N	245	G	1	20		0.30	0.6	0.5	20.0	7.0	140	90	10				AR	M	14						4	3	1		1					1					MC
Shaky Bill's	S1S	0	P	1	20		1.10	2.2	0.5	25.0	6.0	120	95	5				AR	N	6	2.2	0.4	1.8	W	Y	11	2	7	2	5			70		75	20				MC
Shaky Bill's	S1S	20	P	1	32		0.35	0.7	0.5	25.0	5.0	160	90	10				AR	N	16	0.7	0.2	0.5	W		4	1	3		5					5	5				MC
Shaky Bill's	S1S	52	G	1	8		0.15	0.3	1.0	20.0	2.0	16	90	10				AR	N	2						0									0					MC
Shaky Bill's	S1S	60	P	1	5		0.30	0.9	1.2	20.0	3.5	17.5	90	10				AR	N	2	0.9	0.3	0.6	W		4		3	1	10					10	5				MC
Shaky Bill's	S1S	65	G	1	81		0.15	0.3	0.5	20.0	2.0	162	90	10				AR	N	16						9	5	3	1				10		10	80				MC
Shaky Bill's	S1S	146	P	1	9		0.35	0.6	0.3	20.0	2.0	18	100					AR	N	0	0.6	0.3	0.3	G		6	3	2	1	5					5	20				MC
Shaky Bill's	S1S	155	G	1	30		0.10	0.2	0.2	25.0	2.0	60	80	20				AR	N	12						0									0					MC
Shaky Bill's	S1S	185	P	1	8		0.40	0.7	0.2	25.0	4.0	32	100					AR	N	0	0.7	0.2	0.4	W		4	2	1	1	5					5					MC
Shaky Bill's	S1S	193	G	1	44		0.20	0.3	0.2	25.0	6.0	264	20	80				AR	H	211						0									0	10				MC
Shaky Bill's	S1S	237	P	1	7		0.45	0.8	0.5	25.0	3.0	21	80	20				AR	L	4	0.8	0.3	0.5	W		6	3	2	1	50					50	5				MC
Shaky Bill's	S1S	244	G	1	7		0.20	0.3	0.5	30.0	3.0	21	20	80				AR	H	17						0								5	5					MC
Shaky Bill's	S1S	251	P	1	14		0.20	0.6	0.5	30.0	8.0	112	20	80				AR	H	90	0.6	0.2	0.4	W		4		2	2	20					20	50				WG MC
Shaky Bill's	S1S	265	R	1	5	1.0	0.05	0.1	1.0	30.0	1.0	5	10	90				AR	H	5						0									0	80				WG MC
Shaky Bill's	S2	0	G	1	12		0.20	0.5	2.0	12.0	6.0	72	20	60	15	5		AR	H	45						0					5				5	20				
Shaky Bill's	S2	12	P	1	5		0.50	1.0	1.5	12.0	6.0	30	90	10				AR	N	3	1.0	0.2	0.8	C	Y	3	2	1		10					10	20				
Shaky Bill's	S2	17	G	1	12		0.20	0.5	2.0	12.0	6.0	72	20	60	15	5		AR	H	45						0					5				5	20				
Shaky Bill's	S2	29	R	1	11	1.0	0.05	0.1	0.3	25.0	5.0	55	10	70	20			AR	M	41						0									0	30				
Shaky Bill's	S2	40	G	1	20		0.15	0.3	0.3	25.0	5.0	100	10	60	30			AR	M	66						1	1								0	30				BC WG
Shaky Bill's	S2	60	P	1	4		0.30	0.6	0.3	20.0	2.0	8	20	60	20			AR	L	5	0.6	0.2	0.4	W		0									0	20				WG
Shaky Bill's	S2	64	R	1	4	1.0	0.05	0.1	0.3	20.0	1.0	4		70	30			AR	M	3						3	1	1	1	20					20	5				
Shaky Bill's	S2	68	G	1	24		0.20	0.5	0.3	20.0	2.0	48	10	30	60			AR	M	20						0									0	5				
Shaky Bill's	S2	92	P	1	12		0.30	0.6	1.0	20.0	5.0	60	20	80				AR	H	48	0.6	0.1	0.5	W		6	1	2	3	5					5	5				
Shaky Bill's	S2	104	R	1	5	1.0	0.05	0.1	0.5	20.0	2.0	10	10	80	10			AR	L	8						0									0					WG MB MC EB
Shaky Bill's	S2	109	P	1	9		0.50	0.7	0.5	20.0	3.0	27	20	30	50			AR	L	11	0.7	0.1	0.6	W		3	2	1		5					5					WG MB MC EB
Shaky Bill's	S2	118	G	1	8		0.40	0.6	0.5	20.0	3.0	24	10	30	60			AR	L	10						0									0					WG MB MC EB JM
Shaky Bill's	S2	126	R	1	7	1.0	0.05	0.1	0.5	20.0	1.0	7	10	10	80			AR	L	2						2		2		5		10			15					
Shaky Bill's	S2	133	G	1	12		0.20	0.3	0.5	30.0	4.0	48	40	50	10			AR	M	25						6			6	15					15	15				
Shaky Bill's	S2	145	R	1	2	1.0	0.10	0.1	0.5	30.0	1.0	2	5	5	90			AR	L	0						1			1	5					5					
Shaky Bill's	S2	147	G	1	20		0.20	0.4	0.5	20.0	7.0	140	30	40	30			AR	H	64						4			4	1				1	2	5	SC	G	70	
Shaky Bill's	S2	167	R	1	3	1.0	0.05	0.1	0.5	20.0	5.0	15	20	70	10			AR	M	11						0									0					EB
Shaky Bill's	S2	170	G	1	20		0.20	0.3	0.5	20.0	4.0	80	30	40	30			AR	M	37						0									0	20				
Shaky Bill's	S2	190	P	1	10		0.50	0.8	0.5	20.0	3.0	30	60	10	30			AR	L	5	0.8	0.4	0.4	W		16		10	6	10					10					
Shaky Bill's	S2	200	R	1	3	1.0	0.05	0.1	0.5	20.0	5.0	15	10	80	10			AR	M	12						1			1						0					EB
Shaky Bill's	S2	203	P	1	21		1.00	2.2	1.0	20.0	6.0	126	30	20	20		30	AR	M	30	2.2	0.1	2.1	B	Y	1			1				10	40	50	1				
Shaky Bill's	S2	224	R	1	7	1.0	0.05	0.1	1.0	20.0	4.0	28		20	50		30	AR	L	8						0									0	5				
Shaky Bill's	S2	231	G	1	10		0.20	0.4	1.0	20.0	3.0	30	10	40	40	5	5	AR	L	14						0					5		5		10					
Shaky Bill's	S2	241	R	1	17	1.0	0.10	0.2	2.0	25.0	3.0	51	20	25	50	5		AR	L	18						12		9	3	5	5				10	5				
Shaky Bill's	S2	258	P	1	18		0.80	1.5	1.0	25.0	4.0	72	80	10	5		5	AR	L	8	1.5	0.1	1.5	G	Y	1		1					10	20	30	15				
Shaky Bill's	S2	276	R	1	14	1.0	0.10	0.2	1.0	15.0	4.0	56	10	30	60			AR	L	24						0									0	40				
Shaky Bill's	S2	290	G	1	13		0.20	0.4	1.0	15.0	3.0	39		40	50	10		AR	L	20						1		1		10					10	5				EB
Shaky Bill's	S2	303	R	1	51	1.0	0.10	0.2	0.5	15.0	3.0	153	4	20	70	1	5	AR	L	52						0					1				1	5				
Shaky Bill's	S2		G	2	6	1.0	0.20	0.3	0.5	15.0	2.0	12	5	15	70		10	AR	L	3						7		7		10					10	20				
Shaky Bill's	S2		P	2	4		0.30	0.4	0.5	10.0	2.0	8	30	20	50			AR	L	2	0.4	0.2	0.2	W		7		3	4	20					20	20				
Shaky Bill's	S2	354	G	1	15		0.15	0.2	0.5	10.0	2.0	30	15	15	70			AR	L	9						1		1							0	30				
Shaky Bill's	S2	369	R	1	12	1.0	0.05	0.2	0.5	10.0	4.0	48	15	20	60	5		AR	L	15						1	1			5					5	20				EB
Shaky Bill's	S2	381	P	1	17		0.30	0.6	1.0	10.0	3.0	51	25	10	60	5		AR	L	11	0.6	0.1	0.5	W		9	6		3	5					5	5				EB

Appendix 2A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[2,5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only					Functional LWD Tally					Cover (%)					Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Shaky Bill's	S2	398	R	1	10	1.0	0.05	0.2	1.0	10.0	2.0	20	15	15	60	10		AR	L	5						0					10				10	5					EB
Shaky Bill's	S2	408	P	1	14		0.20	0.6	1.0	12.0	5.0	70	20	20	50	10		AR	L	21	0.6	0.1	0.5	W		11	2	5	4	10	10				20	5					
Shaky Bill's	S2	422	R	1	6	1.0	0.10	0.2	0.5	15.0	5.0	30	15	15	60	10		AR	L	8						0					10				10	10					EB
Shaky Bill's	S2	428	G	1	19		0.25	0.5	0.5	15.0	5.0	95	15	5	70	10		AR	L	18						8	2	3	3	10	10				20	10					
Shaky Bill's	S2	447	R	1	9	3.0	0.10	0.2	0.5	12.0	2.0	18	15	15	65	5		AR	L	5						4	1	3		5					5	10					EB
Shaky Bill's	S2	456	G	1	5		0.10	0.2	0.5	15.0	3.0	15	10	10	75	5		AR	L	4						2	1	1		5					5	70					EB
Shaky Bill's	S2	461	R	1	25	3.0	0.10	0.2	0.5	10.0	8.0	200	5	35	50	10		AR	L	90						12	5	6	1	5	10				15	5					EB
Shaky Bill's	S2	486	G	1	6		0.20	0.5	0.5	10.0	4.0	24	10	20	60	10		AR		8						0					10				10						
Shaky Bill's	S2	492	P	1	12		0.40	0.8	0.5	10.0	5.0	60	20	10	10	60		AR		7	0.8	0.3	0.5	W		19	10	3	6	10	60				70						
Shaky Bill's	S2	504	R	1	23	2.0	0.10	0.2	1.0	9.0	3.0	69	5	5	30	60		AR	L	8						0					60				60	5					
Shaky Bill's	S2	527	P	1	8		0.25	0.5	0.5	10.0	4.0	32	10	10	40	40		AR	L	6	0.5	0.2	0.4	W		3	1	1	1	5	40				45						EB
Shaky Bill's	S2	535	R	1	14	2.0	0.10	0.3	0.5	10.0	5.0	70	5	10	25	60		AR	L	11						10	5	2	3	5	60				65						EB
Shaky Bill's	S2	549	P	1	7		0.25	0.6	0.5	10.0	2.0	14	5	5	30	50	10	AR	L	2	0.6	0.2	0.5	B		0					50				50						EB
Shaky Bill's	S2	556	R	1	17	2.0	0.10	0.3	0.5	10.0	2.0	34	5	5	40	50		AR	L	4						0					50				50						EB
Shaky Bill's	S2	573	P	1	12		0.45	0.9	4.0	8.0	6.0	72	15	20	5	30	30	AR	L	15	0.9	0.2	0.8	W	Y	3		2	1	5	30				35						JM
Rousseau	R1	0	G	1	34		0.45	0.6	0.5	25.0	4.0	136	20	70	10			AR	H	98						0									0	30	WL	P	100		
Rousseau	R1	34	R	1	10	1.0	0.05	0.1	0.5	25.0	6.0	60	20	80				AR	H	48						1		1							0	10					
Rousseau	R1	44	G	1	54		0.50	0.8	0.5	25.0	3.0	162	35	60	5			AR	H	99						2		2							0	5					
Rousseau	R1	98	R	1	21	1.0	0.10	0.2	0.2	25.0	5.0	105	20	60	20			AR	H	67						3		3							0	50	SC	P	60		
Rousseau	R1	119	G	1	35		0.15	0.5	0.2	40.0	10.0	350	30	70				AR	H	245						4		3	1						0						
Rousseau	R1	154	R	1	48		0.15	0.5	0.2	60.0	4.0	192	30	70				AR	H	134						2	2								0					MB	MC
Rousseau	R1	202	G	1	43		0.35	0.6	0.2	60.0	14.0	602	30	70				AR	H	421						0									0		SC	P	10	WG	MB MC
Rousseau	R1		G	2	3		0.10	0.2	0.2	50.0	4.0	12	50	50				AR	M	6						7	3	2	2	20					20		SC	P	60		BC
Rousseau	R1	245	R	1	26	1.0	0.10	0.2	0.2	50.0	3.0	78	20	70	10			AR	H	56						8		7	1	5					5					WG	MB MC JM
Rousseau	R1		G	2	21		0.50	1.2	0.3	50.0	5.0	105	50	50				AR	M	53						1		1				5	30		35	5					MC EB
Rousseau	R1	271	P	1	57		1.40	3.0	0.5	25.0	10.0	570	95	5				AR	N	29	3.0	0.1	2.9	R	Y	2	2					5	80		85	10					EB
Rousseau	R1	328	G	1	40		0.25	0.4	0.3	30.0	10.0	400	40	60				AR	H	240						0									0		SC	G	90		WG
Rousseau	R1		P	3	15		0.35	0.5	0.3	30.0	3.0	45	95				5	AR	L	0	0.5	0.2	0.3	W		4	3	1		5			5	10	70					WG
Rousseau	R1	368	R	1	22	1.0	0.10	0.2	0.3	30.0	6.0	132	20	80				AR	H	106						2	2			5					5						WG
Rousseau	R1		P	3	7		0.45	0.8	0.3	20.0	12.0	84	30	70				AR	M	59	0.8	0.3	0.5	W		6	3	3		20					20	10					WG
Rousseau	R1	390	R	1	33	1.0	0.10	0.2	0.5	25.0	13.0	429	20	80				AR	H	343						0									0	10					
Rousseau	R1	423	P	1	33		1.00	2.2	0.2	25.0	12.0	396	70	25			5	AR	L	99	2.2	0.3	1.8	R	Y	0						30			30	40					
Rousseau	R1		P	3	4		1.00	2.0	0.2	50.0	30.0	120	100					AR	N	0	2.0	1.0	1.0	R	Y	7	2	2	3	5			5	10	20					MC MB WG
Rousseau	R1	456	R	1	32	1.0	0.20	0.4	0.2	50.0	7.0	224	15	50	35			AR	L	128						1	1								0	5	SC	G	190		
Rousseau	R1		P	3	4		0.30	0.7	0.2	30.0	2.0	8	90	10				AR	N	1	0.7	0.3	0.4	R		2	2			5					5	20					WG
Rousseau	R1	488	G	1	31		0.40	0.8	0.2	30.0	8.0	248	30	70				AR	H	174						0									0						WG
Rousseau	R1	519	P	1	10		0.80	1.1	0.2	30.0	12.0	120	20	70	10			AR	M	86	1.1	0.3	0.8	W	Y	6	2	4							0						
Rousseau	R1	529	G	1	47		0.25	0.7	0.2	30.0	6.0	282	30	50	20			AR	M	152						1	1								0	5					
Rousseau	R1	576	R	1	5	1.0	0.05	0.1	1.0	30.0	16.0	80	15	80	5			AR	H	65						0									0		SC	G	30		
Rousseau	R1	581	G	1	63		0.30	0.5	1.0	30.0	16.0	1008	40	30	30			AR	L	363						2			2						0		SC	P	25		MC
Rousseau	R1		P	3	10		0.50	0.8	1.0	30.0	10.0	100	80	20				AR	N	20	0.8	0.3	0.5	W		0									0						MC
Rousseau	R1	644	P	1	13		0.80	1.2	1.0	30.0	7.0	91	70	20	10			AR	L	20	1.2	0.5	0.7	R		0						5	10		15						MC
Rousseau	R1	657	G	1	21		0.15	0.3	2.0	25.0	7.0	147	50	20	30			AR	L	38						0									0		SC	G	30	WG	MB EB MC
Rousseau	R1	678	R	1	8	1.0	0.05	0.1	2.0	25.0	2.0	16	10	80	10			AR	H	13						0									0					WG	MB EB MC
Rousseau	R1	686	P	1	18		1.00	2.0	0.5	40.0	18.0	324	80	20				AR	N	65	2.0	0.1	1.9	W	Y	9	2	3	4	10		60			70	5				WG	MB EB MC
Rousseau	R1	704	P	1	17		0.40	0.9	0.5	40.0	5.0	85	70	25	5			AR	M	22	0.9	0.4	0.5	W		1			1						0	30				WG	MB EB MC
Rousseau	R1	721	G	1	14		0.15	0.3	1.0	45.0	4.0	56	20	80				AR	H	45						3	3								0	5				MC	WG MB
Rousseau	R1	735	P	1	16		0.80	1.5	1.0	45.0	10.0	160	20	70	10			AR	H	115	1.5	0.3	1.2	W	Y	28	10	15	3	10		30			40					MC EB	WG MB JM
Rousseau	R1	751	G	1	7		0.15	0.3	1.0	40.0	3.0	21	25	70	5			AR	H	15						1		1							0						WG
Rousseau	R1	758	R	1	10	1.0	0.05	0.1	1.0	40.0	4.0	40	20	60	20			AR	M	26						0									0						
Rousseau	R1	768	G	1	8		0.15	0.2	1.0	30.0	6.0	48	25	70			5	AR	H	34						1	1								0						
Rousseau	R1	776	P	1	15		0.80	1.3	0.5	30.0	8.0	120	25	70	5			AR	H	85	1.3	0.3	1.0	W	Y	2			2	2		20			22						WG MB
Rousseau	R1	791	G	1	44		0.60	1.1	0.2	70.0	8.0	352	80	20				AR	L	70						20		20		40					40					WG	MB JM MC EB
Rousseau	R1	835	P	1	10		7.01	1.1	0.2	70.0	10.0	100	80	20				AR	L	20	1.1	0.3	0.9	W	Y	4		2	2	5					5					WG	MB JM MC EB SC
Rousseau	R1	845	G	1	169		0.25	0.5	0.2	50.0	4.0	676	50	50				AR	L	338						16	5	6	5	5					5	5					JM MC EB
Rousseau	R1	1014	P	1	10		0.70	0.9	0.2	50.0	4.0	40	90	10				AR	L	4	0.9	0.1	0.8	W		1		1							0						

Appendix 2A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only					Functional LWD Tally				Cover (%)						Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Rousseau	R1	1024	G	1	27		0.00	0.0	0.1	50.0	0.0	0						AR	N	0						0								0						
Rousseau	R1		P	2	5		0.30	0.5	0.1	50.0	5.0	25	30	70				AR	M	18	0.5	0.0	0.5	W	Y	9	3	4	2	30					30						JM
Rousseau	R1	1051	G	1	157		0.20	0.4	0.5	30.0	11.0	900	65	30	5			AR	H	535						2			2					0						
Rousseau	R1		P	3	71		1.50	2.5	0.5	30.0	6.0	426	90	10				AR	N	43	2.5	0.4	2.1	W	Y	5		2	3	5			70		75						WG MB
Rousseau	R1	1208	R	1	7	1.0	0.05	0.1	0.2	30.0	5.0	395	20	80				AR	H	28						4		3	1	2					2						
Rousseau	R1	1215	G	1	39		0.20	0.5	0.2	30.0	13.0	507	30	70				AR	H	355						1		1						5	5						
Rousseau	R1	1254	P	1	16		0.80	1.4	0.5	30.0	8.0	128	20	80				AR	H	102	1.4	0.4	1.0	W	Y	5	2	1	2	5			30		35		SC	P	15			SC
Rousseau	R1	1270	G	1	12		0.25	0.5	0.5	30.0	8.0	96	90	10				AR	H	10						0								0	10					
Rousseau	R1	1282	P	1	38		0.80	1.6	0.5	30.0	8.0	304	50	50				AR	M	152	1.6	0.3	1.3	W	Y	18	4	11	3	20					20	10					WG
Rousseau	R1	1320	G	1	42		0.00	0.0	0.5	25.0	0.0	0	25	70	5			AR	M	0						7	6	1							0	5					
Rousseau	R1	1362	P	1	31		1.00	2.2	0.5	25.0	4.0	124	20	60	20			AR	M	79	2.2	0.0	2.2	W		6	3	3		1		5	70		76						
Rousseau	R1	1393	G	1	74		0.20	0.5	0.5	25.0	3.0	222	30	50	20			AR	M	120						10	6	4		5					5	20	SL	P	70		
Rousseau	R1	1467	R	1	36	1.0	0.05	0.1	0.2	25.0	3.0	108	15	80	5			AR	H	87						1			1						0	20					
Rousseau	R1	1503	G	1	30		0.10	0.8	0.2	25.0	4.0	120	50	40	10			AR	M	50						5	2		3						0						
Rousseau	R1	1533	R	1	6	1.0	0.05	0.1	0.2	25.0	10.0	60	10	85	5			AR	H	52						0									0						MB
Rousseau	R1	1539	G	1	8		0.10	0.2	0.2	25.0	8.0	64	20	70	10			AR	M	46						0									0		SC	G	50		MB
Rousseau	R1	1547	P	1	4		0.35	0.9	0.2	25.0	6.0	24	50	45	5			AR	L	11	0.9	0.2	0.7	W	Y	14	4	4	6	30			50		80						MB JM
Rousseau	R1	1551	G	1	109		0.25	0.5	0.5	25.0	17.0	1853	25	70	5			AR	H	1316						5	3	2							0						WG
Rousseau	R1	1660	P	1	25		0.70	1.2	2.0	25.0	16.0	400	80	10			10	AR	L	40	1.2	0.4	0.9	R		0						5	50		55						
Rousseau	R1	1685	G	1	29		0.45	0.8	0.5	25.0	4.0	116	60	35	5			AR	M	42						2			2	20					20						WG MB
Rousseau	R1	1714	R	1	11	1.0	0.05	0.1	0.5	25.0	8.0	88	10	50	40			AR	L	51						0									0						WG MB
Rousseau	R1	1725	G	1	10		0.20	0.4	0.5	25.0	10.0	100	60	30	10			AR	L	32						1		1							0						
Rousseau	R1	1735	P	1	30		0.80	1.3	0.5	25.0	10.0	300	50	40	10			AR	L	126	1.3	0.4	0.9	W	Y	4		1	3	5					5	5					MB
Rousseau	R1	1765	R	1	12	1.0	0.05	0.1	0.5	25.0	2.0	24	10	60	30			AR	M	16						0									0		SL	G	25		
Rousseau	R1	1777	P	1	25		0.80	1.6	0.5	25.0	12.0	300	80	20				AR	L	60	1.6	0.1	1.5	W	Y	36	15	15	6	40			70		110						JM
Rousseau	R1	1802	R	1	18	1.0	0.10	0.2	0.3	25.0	3.0	54	20	30	50			AR	L	22						0									0	5	WL	P	15		
Rousseau	R1	1820	G	1	11		0.20	0.4	0.3	25.0	3.0	33	20	30	50			AR	L	13						5		5		5					5	5					
Rousseau	R1	1831	R	1	11	1.0	0.07	0.1	0.5	25.0	3.0	33	10	70	20			AR	M	24						0									0						WG
Rousseau	R1	1842	G	1	23		0.35	0.8	0.5	25.0	8.0	184	10	40	50			AR	L	92						3	2	1		5					5						WG
Rousseau	R1	1865	R	1	6	1.0	0.10	0.2	0.5	25.0	2.0	12	10	60	30			AR	M	8						0									0						
Rousseau	R1	1871	P	1	21		0.60	1.0	0.5	25.0	3.0	63	25	45	10		20	AR	M	30	1.0	0.1	0.9	R		0							5		5	70					
Rousseau	R1	1892	R	1	3	8.0	0.05	0.1	4.0	15.0	11.0		10	10	80				L	9						0									0						WG
Rousseau	R1	1895	G	1	34		0.30	0.8	1.0	35.0	4.0	136	30	38	30	2		AR	H	60						4	1	3				2			2	5					WG MB EB
Rousseau	R1	1929	R	1	19	1.0	0.10	0.2	1.0	30.0	2.0		20	80					H	30						2	2								0						
Rousseau	R1	1948	G	1	35		0.25	0.7	1.0	30.0	3.0	105	15	80	5			AR	H	85						5	3	2		5					5	70					
Rousseau	R1	1983	R	1	9	1.0	0.10	0.2	1.0	15.0	1.0		15	60	20	5			L	6						1		1		5					5	20					MB EB WG
Rousseau	R1	1992	P	1	11		0.80	2.0	1.0	30.0	20.0	220	80	10	10			AR	L	26	2.0	0.2	1.8	W	Y	22	5	10	7	50			50		100		SC	N	30		WG MB JM EB
Rousseau	R1	2003	G	1	9		0.20	0.4	1.0	30.0	3.0	27	40	5	50	5		AR	L	4						1	1			5					5						WG EB
Rousseau	R1	2012	R	1	29	1.0	0.10	0.3	0.5	30.0	3.0	87	80	10	5	5			L	10						2		2		5					5						EB
Rousseau	R1	2041	P	1	16		0.80	1.5	3.0	25.0	6.0	96	85	5	5	5		AR	L	6	1.5	0.1	1.4	W	Y	0							40		40	5					EB
Rousseau	R1	2057	G	1	19		0.30	0.6	1.0	25.0	4.0	76	60	5	20	5	10	AR	L	7						0						5			5						WG EB
Rousseau	R1	2076	R	1	15	1.0	0.05	0.1	1.0	25.0	10.0	150	20	60	20			AR	M	96						2		1	1						0	5					EB
Rousseau	R1	2091	G	1	38		0.35	0.6	0.5	25.0	6.0	228	30	20	30		20	AR	L	59						12		7	5	2					2	5					
Rousseau	R1		P	2	2		0.45	1.0	1.5	20.0	4.0	8	80	20				AR	L	2	1.0	0.0	1.0	W		1			1	10			5		15	10					WG EB
Rousseau	R1	2129	R	1	12	1.0	0.10	0.2	1.5	20.0	2.0	24	20	50	30			AR	L	13						3	1	2							0	5					WG EB
Rousseau	R1	2141	G	1	11		0.30	0.6	1.0	20.0	6.0	66	20	50	30		10	AR	H	37						4	4			2					2	70					EB
Rousseau	R1	2152	P	1	18		1.00	2.0	1.0	20.0	6.0	108	65	15	15	5		AR	L	19	2.0	0.3	1.7	W		14	6	6	2	15	5	5	30		55						WG WB
Rousseau	R1	2170	R	1	50	1.0	0.20	0.3	0.5	25.0	3.0	150	20	40	40			AR	M	72						1			1	20					20	5					
Rousseau	R1	2220	P	1	20		0.60	1.1	0.5	25.0	5.0	100	30	20	50			AR	M	30	1.1	0.2	0.9	W	Y	14	5	8	1	5			5		10	5					EB
Rousseau	R1	2240	R	1	50	1.0	0.15	0.4	0.5	25.0	3.5	175	20	30	45	5		AR	L	68						6	2	4				5			5	50					WG EB
Rousseau	R1	2290	G	1	55		0.25	0.4	15.0	25.0	7.0	385	30	30	40			AR	L	146						7	4		3	2					2						
Rousseau	R1	2345	R	1	6	3.0	0.05	0.1	15.0	25.0	6.0	36	10	80	10				H	30						0									0						
Rousseau	R1	2351	P	1	28		0.45	1.2	15.0	25.0	6.0	168	50	40	10			AR	H	71	1.2	0.1	1.1	W	Y	8		3	5	5			5		10	5	SC	N	60			
Rousseau	R1	2379	R	1	13	2.0	0.15	0.2	15.0	25.0	3.0	39	20	20	30	5	25		L	10						0						5			5						
Rousseau	R1	2392	G	1	19		0.20	0.5	15.0	20.0	4.0	76	30	35	30	5		AR	L	31						3			3	2	5				7						EB

Appendix 2A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only					Functional LWD Tally				Cover (%)					Overhanging veg.	Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover		Type[10]	Access[11]	Length (m)		
Rousseau	R1	2411	R	1	4	1.0	0.05	0.1	15.0	25.0	2.0	8		10	70	20			N	2						0									0				WG EB	
Rousseau	R1	2415	P	1	23		0.70	1.5	15.0	25.0	8.0	184	20	20	15	5	40	AR	L	42	1.5	0.1	1.4	W	Y	3		1	2		20		40		60	5				
Rousseau	R1	2438	G	1	27		0.30	0.6	0.5	25.0	3.5	94.5		5	15	10	70	AR	N	8						0					10				10	5				
Rousseau	R1	2465	R	1	39		0.10	0.2	0.5	25.0	10.0	390	20	60	15	5			L	246						2	2				5				5	2				
Rousseau	R1	2504	G	1	87		0.60	0.8	3.0	25.0	6.0	522	70	10	10	10		AR	L	63						2			2						0					
Rousseau	R1	2591	R	1	108	1.0	0.15	0.3	3.0	25.0	7.0	756	20	30	40	5	5		L	287						3		3			5				5	5	SC	N	150	EB
Rousseau	R1		P	2	4		0.20	0.3	5.0	25.0	3.0	12	20	30	50			AR	L	5	0.3	0.0	0.3	W		7	2	3	2	20					20					EB
Rousseau	R1		G	2	35		0.25	0.3	2.0	20.0	6.0	210	15	15	65	5		AR	L	59						9		3	6	10	5				15	10				
Rousseau	R1	2699	P	1	25		1.20	2.0	3.0	18.0	7.0	175	20	35	30	15		AR	L	72	2.0	0.3	1.7	W	Y	25		10	15	20	15		70		105					WG JM EB
Rousseau	R1	2724	G	1	15		0.50	0.7	4.0	10.0	6.0	90	15	50	15		20	AR	H	48						0									0	60				WG JM EB
Rousseau	R1	2739	P	1	12		1.00	2.2	4.0	10.0	8.0	96	40	40	10		10		H	40	2.2	0.5	1.7	W	Y	7	2	2	3	15			70		85					WG JM EB
Rousseau	R1	2751	R	1	37	3.0	0.15	0.3	3.0	10.0	3.0	111	15	20	60	5		AR	L	36						0									0	10				
Rousseau	R1	2788	G	1	11		0.20	0.3	4.0	25.0	3.0	33	20	20	60			AR	L	11						0									0					
Rousseau	R1	2799	R	1	4	1.0	0.15	0.2	4.0	25.0	5.0	20	10	30	60			AR	L	8						1			1	5					5				WG MB JM MC EB BC
Rousseau	R1	2803	G	1	34		0.30	0.5	4.0	25.0	6.0	204	40	10	50			AR	N	41						33	15	15	3	50					50				WG MB JM MC EB BC
Rousseau	R1	2837	G	1	16		0.30	0.7	3.0	25.0	3.0	48	40	10	50			AR	N	10						6	2	3	1	10					10				EB WG
Rousseau	R1	2853	R	1	10	2.0	0.10	0.2	3.0	16.0	3.0	30	20	70	10			AR	M	22						0									0				WG	
Rousseau	R1	2863	P	1	18		1.00	1.6	10.0	17.0	10.0	180	50	50				AR	H	90	1.6	0.2	1.4	W	Y	14	4	7	3	50			50		100					
Rousseau	R1		R	2	21	2.0	0.10	0.8	10.0	25.0	1.5	31.5	60	40				AR	M	13						3		3							0				WG MB	
Rousseau	R1	2881	G	1	59		0.25	0.6	10.0	25.0	3.5	206.5	90	10				AR	N	21						0									0				WG MB	
Rousseau	R1	2940	P	1	19		0.70	1.1	4.0	25.0	5.0	95	50	30	20			AR	M	32	1.1	0.2	0.9	W		7	2	3	2	15			5		20					WG MB
Rousseau	R1	2959	R	1	15	1.0	0.10	0.2	10.0	25.0	1.5	22.5		30	60	10		AR	M	9						0									0				WG MB EB	
Rousseau	R1	2974	G	1	10		0.25	0.4	15.0	25.0	5.0	50	30	40	30			AR	M	23						2	1	1							0		SC	G	35	WG MB JM MB	
Rousseau	R1	2984	P	1	18		0.90	1.4	15.0	25.0	7.0	126	65	30	5			AR	H	39	1.4	0.4	1.0	W	Y	6		3	3	5			20		25					WG MB JM MB
Rousseau	R1	3002	G	1	22		0.45	0.8	3.0	25.0	10.0	220	70	20	10			AR	M	48						6	2	3	1	5					5				WG JM MB	
Rousseau	R1	3024	R	1	25	1.0	0.15	0.3	0.2	25.0	5.0	125	10	10	70	10		AR	N	30						0					10				10					
Rousseau	R1	3049	G	1	55		0.20	0.4	2.0	25.0	4.0	220	20	50	30			AR	H	123						2		2							0					
Rousseau	R1	3104	R	1	16	1.0	0.10	0.3	5.0	25.0	3.0	48	10	20	50	20		AR	N	14						5	1	2	2		20				20					
Rousseau	R1	3120	G	1	33		0.20	0.4	3.0	20.0	4.0	132	20	5	65	10		AR	N	24						1		1			10				10					
Rousseau	R1	3153	R	1	56	2.0	0.15	0.4	10.0	40.0	4.5	252	20	5	65	10		AR	N	45						2		1	1		10				10		SC	N	20	WG MB	
Rousseau	R1	3209	P	1	25		1.50	3.5	10.0	35.0	18.0	450	40	20	15	5	20	AR	N	104	3.5	0.3	3.2	W	Y	30	10	10	10	2	5		80		87					JM
Rousseau	R1	3234	R	1	15	3.0	0.10	0.2	10.0	25.0	1.0	15		10	60		30	AR	N	3						0									0					
Rousseau	R1	3249	G	1	17		0.30	0.5	10.0	25.0	3.0	51	10	30	60			AR	M	21						0									0				WG MB	
Rousseau	R2	0	R	1	4	2.0	0.10	0.2	10.0	25.0	1.0	4	10	40	50			AR	M	2						0									0				WG JM	
Rousseau	R2	4	P	1	29		0.80	1.3	10.0	25.0	6.0	174	40	10	50			AR	L	35	1.3	0.1	1.2	W	Y	15	7	5	3	20			20		40	5				WG JM
Rousseau	R2	33	G	1	12		0.30	0.7	10.0	25.0	5.0	60	40	30	30			AR	M	22						4		4		10					10					
Rousseau	R2	45	R	1	25	2.0	0.05	0.2	15.0	20.0	1.0	25	10	60	30			AR	M	17						0									0	10				
Rousseau	R2	70	G	1	49		0.35	0.8	15.0	25.0	8.0	392	20	20	60			AR	L	125						11	6	2	3	2					2					
Rousseau	R2	119	R	1	11	2.0	0.10	0.8	15.0	25.0	2.0	22	10	40	50			AR	M	11						1			1	5					5					
Rousseau	R2	130	G	1	23		0.30	0.8	10.0	25.0	5.0	115	80	20				AR	L	23						2		1	1						0					
Rousseau	R2	153	P	1	38		0.65	1.2	15.0	25.0	5.5	209	40	40	10	5	5	AR	H	88	1.2	0.3	0.9	R	Y	0					5		15		20					
Rousseau	R2	191	R	1	13	1.0	0.07	0.2	15.0	25.0	4.0	52		50	50			AR	M	31						1		1		10					10				WG EB	
Rousseau	R2	204	G	1	27		0.20	0.3	7.0	25.0	5.0	135	10	40	50			AR	M	68						3	1	2		2					2					
Rousseau	R2	231	P	1	12		0.80	1.2	7.0	25.0	6.0	72	60	10	30			AR	L	12	1.2	0.3	0.9	R	Y	3	1	2		5					5					
Rousseau	R2	243	G	1	28		0.20	0.7	2.0	25.0	3.0	84	10	30	60			AR	L	35						2		2							0					
Rousseau	R2	271	R	1	28	2.0	0.10	0.2	2.0	20.0	4.0	112	15	15	65	5		AR	L	31						2		2			5				5				EB	
Rousseau	R2	299	G	1	33		0.20	0.3	5.0	20.0	4.0	132	20	20	60			AR	L	42						2		2							0				EB	
Rousseau	R2	332	P	1	16		0.50	1.0	5.0	20.0	7.0	112	45	5	50			AR	N	17	1.0	0.3	0.7	R	Y	1	1								0					
Rousseau	R2		P	3	12		0.60	1.3	14.0	20.0	5.0	60	60	20	20			AR	L	14	1.3	0.3	1.0	W		2		1	1			10	20		30	10				
Rousseau	R2	348	G	1	30		0.20	0.5	14.0	20.0	4.0	120	40	20	40			AR	L	34						0									0				MB EB	
Rousseau	R2	378	P	1	17		0.60	1.3	15.0	20.0	6.0	102	70	10	20			AR	L	14	1.3	0.3	1.0	W	Y	5		2	3	5			20		25					
Rousseau	R2	395	R	1	21	2.0	0.15	0.2	15.0	20.0	3.0	63	10	10	70	10		AR	L	15						0					10				10				WG	
Rousseau	R2	416	G	1	12		0.20	0.4	15.0	15.0	3.0	36	20	20	55	5		AR	L	11						2		1	1	5	5				10					
Rousseau	R2	428	R	1	17	1.0	0.15	0.2	15.0	20.0	3.0	51	20	10	60	10		AR	L	11						0					10				10	5				
Rousseau	R2	445	P	1	34		1.00	2.0	15.0	18.0	10.0	340	20	40	20		20	AR	H	150	2.0	0.3	1.7	R	Y	1		1					40		40					

Appendix 2A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only					Total LWD tally	Functional LWD Tally			Cover (%)					Overhanging veg.	Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]		10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover		Type[10]	Access[11]	Length (m)		
Rousseau	R2	479	R	1	15	2.0	0.10	0.2	15.0	20.0	12.0	180	15	25	50	10		AR	M	63						0					10				10					
Rousseau	R2	494	P	1	24		1.00	1.6	20.0	20.0	6.0	144	50	25	25			AR	;L	43	1.6	0.2	1.4	R	Y	0							35		35					
Rousseau	R2	518	R	1	28	2.0	0.10	0.2	20.0	20.0	5.0	140	20	30	30	20		AR	L	50						2	1		1		20				20					
Rousseau	R2	546	G	1	20		0.30	0.7	20.0	18.0	7.0	140	70	20	10			AR	N	31						2	1		1						0					
Rousseau	R2	566	R	1	3	2.0	0.05	0.1	20.0	20.0	2.0	6	10	15	70	5		AR	L	2						0					5				5					
Rousseau	R2	569	P	1	20		0.80	1.2	20.0	20.0	4.0	80	60	10	20	5	5	AR		11	1.2	0.3	0.9	R	Y	0							10		10					
Rousseau	R2	589	R	1	24	3.0	0.10	0.3	20.0	20.0	4.0	96	10	30	30	30		AR		35						0									0					WG
Rousseau	R2	613	G	1	10		0.30	0.4	20.0	20.0	4.0	40	10	30	30	30		AR		14						3		1	2	2					2					WG
Rousseau	R2	623	P	1	22		0.80	1.1	20.0	20.0	4.0	88	60	10	25	5		AR		13	1.1	0.3	0.8	W	Y	5		2	3	5	5		30		40					
F Trib	F1W	0	G	1	35		0.35	0.8	1.0	10.0	8.0	280	95		5			AR	N	3						3	2	1					2	2	5				EB
F Trib	F1W	35	R	1	5	1.0	0.05	0.1	1.0	10.0	1.0	5	100					AR	N	0						0									0					
F Trib	F1W	40	G	1	29		0.35	0.6	0.5	15.0	4.0	116	90	5	5			AR	L	7						0									0					
F Trib	F1W	69	R	1	6	1.0	0.05	0.1	0.5	16.0	1.0	6	90	10				AR	L	1						0				20					20					
F Trib	F1W	75	P	1	5		0.60	1.0	2.0	25.0	23.0	138	80	15	4	1		AR	L	22	1.0	0.1	0.9	W	Y	21	10	10	1	20	1		5		26				WG	EB
F Trib	F1W	80	R	1	16	1.0	0.05	0.1	0.5	15.0	1.0	5	10	90				AR	L	5						1	1								0					
F Trib	F1W	96	G	1	18		0.30	0.7	0.5	15.0	5.0	80	80	15	5			AR	L	13						3	1	2		40					40					
F Trib	F1W	114	R	1	10	1.0	0.02	0.1	0.5	25.0	3.0	54	5	90	5			AR	H	49						0								2	2	2				
F Trib	F1W	124	G	1	11		0.40	0.6	0.2	20.0	6.0	60	70	30				AR	M	18						1	1								0	5	SC	G	20		MC
F Trib	F1W	135	P	1	31		0.40	0.8	0.2	25.0	8.0	88	85	10	5			AR	L	10	0.8	0.3	0.5	W		5	4		1	5					5	5					
F Trib	F1W	166	G	1	5		0.35	0.7	1.0	25.0	8.0	248	70	30				AR	L	74						12	5	4	3	50					50					WG MB JM
F Trib	F1W	171	P	1	60		0.50	0.8	1.0	25.0	5.0	25	80	20				AR	L	5	0.8	0.3	0.5	W		14	6	5	3	60					60					JM
F Trib	F1W	231	G	1	45		0.20	0.4	0.2	25.0	3.0	180	60	30	10			AR	L	58						110	30	60	20	60					60				SC	WG MB JM EB MC
F Trib	F1W	276	G	1	28		0.00	0.0	0.2	25.0	0.0	0	100					AR	N	0						0									0	PD	N	70		
F Trib	F1W	304	G	1	4		0.15	0.3	1.0	25.0	2.0	56	15	80	5			AR	H	45						7	4		3	5					5				WG	MB JM MC EB MC
F Trib	F1E	0	G	1	19		0.30	0.9	.5	25.0	4.0	76	40	20	40			AR	H	21						0									0					MG EB
F Trib	F1E	19	R	1	6		0.08	0.1	0.5	25.0	2.0	12	10	80	10			AR	M	10						1		1				5			5					MB EB
F Trib	F1E	25	G	1	29		0.30	0.6	1.0	25.0	2.0	58	25	70	5			AR	M	41						1			1	1					1	30				
F Trib	F1E	54	R	1	12	2.0	0.10	0.2	1.0	25.0	1.0	12	15	55	30			AR	M	7						2		2				5			5					WG MB MC EB
F Trib	F1E	66	P	1	27		0.70	1.2	1.0	25.0	8.0	216	40	40	20			AR	L	95	1.2	0.1	1.1	W	Y	15	5	5	5	15					15					JM
F Trib	F1E	93	R	1	13	3.0	0.10	0.2	1.0	25.0	5.0	65	20	60	20			AR	M	42						3	1	1	1	5					5	3				WG MB MC EB
F Trib	F1E	106	P	1	19		0.40	1.0	0.2	25.0	4.0	76		50	50			AR	L	46	1.0	0.1	0.9	W	Y	2		1	1	5			10		15		SC	G	70		MB MC EB
F Trib	F1E	125	R	1	6	1.0	0.10	0.2	0.2	25.0	5.0	30	10	80	10			AR	H	25						0									0	5				MB MC EB
F Trib	F1E	131	G	1	15		0.30	0.6	0.2	25.0	10.0	150	30	60	10			AR	H	93						2	1	1		1					1	5				MC
F Trib	F1E	146	P	1	27		0.80	1.4	0.2	25.0	7.0	189	60	40				AR	H	76	1.4	0.4	1.0	W	Y	1		1		2			10		12					MC EB
F Trib	F1E	173	G	1	21		0.35	0.6	0.5	25.0	5.0	105	25	60	10	5		AR	M	65						0					5				5					WG EB
F Trib	F1E	194	R	1	4	2.0	0.10	0.2	0.5	25.0	2.0	8	10	30	60			AR	H	3						0									0					WG EB
F Trib	F1E	198	G	1	8		0.35	0.7	0.5	25.0	3.0	24	80	10	10			AR	L	3						10		10		5					5	5				WG
F Trib	F1E	206	P	1	4		0.70	1.2	1.0	25.0	3.0	12	20	40	40			AR	L	6	1.2	0.0	1.2	W	Y	3		2	1	20			30		50	60				
F Trib	F1E	210	R	1	10	1.0	0.05	0.2	0.5	25.0	5.0	50		50	50			AR	L	30						0									0					WG
F Trib	F1E	220	G	1	36		0.30	0.8	0.5	25.0	7.0	252		50	50			AR	M	151						7	2	3	2	10		10			20	5				WG
F Trib	F1E	256	R	1	12	1.0	0.10	0.2	0.5	25.0	2.0	24		50	50			AR	M	14						0									0					WG EB
F Trib	F1E	268	P	1	7		0.40	1.0	0.5	25.0	10.0	70	70	30				AR	L	21	1.0	0.2	0.8	W	Y	25	10	10	5	50			50		100					WG EB MB JM
F Trib	F1F	0	R	1	10	1.0	0.10	0.2	0.5	25.0	2.0	20		50	50			AR	H	12						0									0					
F Trib	F1F	10	P	1	27		0.40	1.2	0.5	25.0	7.0	189	20	80				AR	H	151	1.2	0.1	1.1	W	Y	4		1	3	5			5		10					
F Trib	F1F	37	R	1	12	1.0	0.10	0.2	4.0	25.0	4.0	48	20	80				AR	H	38						2		1	1	5					5					WG
F Trib	F1F	49	G	1	16		0.25	0.5	10.0	25.0	4.0	64	30	60	10			AR	M	40						6		3	3	5					5					
F Trib	F1F	65	P	1	27		1.20	2.2	2.0	12.0	7.0	189	70	5	10	5	10	AR	L	13	2.2	0.3	1.9	R	Y	2	1	1			5		70		75					
F Trib	F1F	92	R	1	19	1.0	0.10	0.2	1.0	20.0	2.0	38		50	45	5		AR	M	22						5	2	2	1		5				5					WB EB
F Trib	F1F	111	G	1	13		0.30	0.5	1.0	25.0	3.0	39	30	50	20			AR	M	21						1			1						0					
F Trib	F1F	124	P	1	24		0.60	1.1	1.0	25.0	5.0	120	30	30	30	1	9	AR	M	43	1.1	0.3	0.8	R	Y	1		1			1		10		11					
F Trib	F1F	148	R	1	11	2.0	0.20	0.5	2.0	35.0	4.0	44	40	30	30			AR	M	16						2		2							0					
F Trib	F1F	159	G	1	18		0.40	0.6	3.0	14.0	8.0	144	40	30	28	2		AR	M	51						8	1	5	2	2	2				4					
F Trib	F1F	177	R	1	13	5.0	0.10	0.2	3.0	15.0	4.0	52	5	50	40	5		AR	M	30						4		3	1	2					2					
F Trib	F1F	190	P	1	12		0.80	1.3	1.0	25.0	10.0	120	40	25	25	5	5	AR	M	36	1.3	0.3	1.0	R	Y	11	6	3	2	10	5		20		35					JM
F Trib	F1F	202	R	1	13	1.0	0.15	0.3	1.0	20.0	2.0	26		35	60	5		AR	L	12						0					5				5					

Appendix 2A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only					Functional LWD Tally				Cover (%)					Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
F Trib	F1F	215	G	1	14		0.40	0.8	1.0	20.0	3.5	49	50	5	20	5	20	AR	N	4						2		1	1	5	5				10					
F Trib	F1F	229	P	1	11		0.50	0.9	10.0	20.0	4.0	44	20	20	35	15	10	AR	L	12	0.9	0.2	0.7	W		7		4	3	2	10				12					
F Trib	F1F	240	R	1	23	1.0	0.15	0.4	8.0	10.0	2.0	46	45	5	50			AR	N	7						0				1					1				WG
F Trib	F1F	263	P	1	25		0.70	2.0	15.0	20.0	10.0	250	70	10	10	10		AR	L	30	2.0	0.1	1.9	R	Y	2	1	1			10		50		60					
F Trib	F1F	288	P	1	18		0.35	1.0	15.0	20.0	8.0	144	70	10	10	10		AR	L	17						1			1		10				10					
F Trib	F1F	306	R	1	86	3.0	0.40	0.6	15.0	20.0	4.0	344	10	10	10	60	10	AR	N	41						0					60				60					
F Trib	F1F	392	G	1	11		0.30	0.4	25.0	12.0	4.0	44	10	30	10	40	10	AR	L	14	1.0	0.3	0.8	R	Y	0					40				40					
F Trib	F1F	403	P	1	16		0.80	0.9	25.0	12.0	4.0	64	10	10	10	60	10	AR	N	8	0.9	0.4	0.5	R	Y	0					60				60					
F Trib	F1F	419	R	1	16	2.0	0.25	0.6	25.0	10.0	3.0	48			20	30	50	AR	N	2						0					30				30					
F Trib	F1F	435	P	1	18		0.60	1.1	25.0	10.0	2.0	36		5	5	10	80	AR	N	2	1.1	0.2	0.9	R	Y	0					10		30		40					
F Trib	F1F	453	C	1	11	5.0	0.20	0.5	25.0	18.0	2.0	22					100	AR	N	0						0									0					
F Trib	F1F	464	P	1	38		0.90	1.5	25.0	15.0	8.0	304		5	5	10	80	AR	N	18	1.5	0.2	1.3	R	Y	0					10		20		30					
F Trib	F1F	502	R	1	5	3.0	0.25	0.3	25.0	12.0	1.5	7.5		5	5	5	85	AR	N	0						0					5				5					
F Trib	F1F	507	P	1	5		0.70	1.0	25.0	12.0	4.0	20		10	5	5	80	AR	N	2	1.0	0.2	0.8	R	Y	0					5		20		25					
F Trib	F1F	512	R	1	6	2.0	0.30	0.4	25.0	12.0	0.5	3					100	AR	N	0						0									0					
F Trib	F1F	518	P	1	14		1.60	2.0	25.0	13.0	3.0	42		70	20		10	AR	H	31	2.0	0.1	1.9	R	Y	0							95		95					
F Trib	F1F	532	C	1	4	5.0	0.05	0.1	25.0	15.0	3.0	12					100	AR	N	0						0									0					
F Trib	F1F	536	P	1	36		0.80	2.0	25.0	15.0	5.0	180					100	AR	N	0	2.0	0.1	1.9	R	Y			1					20		20		SC	G	20		
F Trib	F1F	572	C	1	2	5.0	0.15	0.2	25.0	17.0	2.0	4					100	AR	N	0															0					
F Trib	F1F	574	P	1	10		3.00	6.0	25.0	17.0	7.0	70					100	AR	N	0	6.0	0.1	5.9	R	Y	0							100		100					F
F Trib	F1F	584	P	1	23		4.00	12.0	30.0	25.0	25.0	575	10	80	10			AR	G	472	12.0	0.3	11.7	R	Y	3			3				95		95					F
Pachena	P2	0	G	1	74		0.80	1.2	2.0	24.0	17.0	1258	30	60	10			AR	H	780						32	10	15	7	20					20				EB PD	
Pachena	P2	74	R	1	40	1.0	0.20	0.3	2.0	25.0	4.0	160	30	70				AR	H	112						6		2	4	15					15				EB PD	
Pachena	P2	114	P	1	61		0.50	2.0	4.0	24.0	18.0	1098	20	50	20	10		AR	M	593	2.0	0.3	1.7	W	Y	7	1	5	1	1	10				11				EB	
Pachena	P2	175	G	1	69		0.60	1.0	2.0	25.0	20.0	1380	40	40	20			AR	H	607						6	1	2	3	1		1		2	1				EB	
Pachena	P2	244	R	1	29	1.0	0.25	0.3	1.0	20.0	18.0	522	30	60	10			AR	H	324						6	3	2	1	1			1	2				EB PD	
Pachena	P2	273	G	1	67		0.65	1.0	1.0	22.0	17.0	1139	20	70	10			AR	H	820						3		3		1		5		6	2			EB PD	
Pachena	P2		P	3	10		0.80	1.2	1.0	22.0	17.0	170	20	50	25	5		AR	L	94	1.2	0.7	0.6	W	Y	7	3	2	2		5	20			25				EB	
Pachena	P2	340	R	1	25	1.0	0.10	0.2	20.0	23.0	20.0	500	15	80	5			AR	H	405						2	1		1				10	10				EB PD	
Pachena	P2	365	G	1	83	1.0	0.60	0.8	1.0	22.0	20.0	1660	20	40	20	10	10	AR		730						10	3	4	3	1	10			10	21				EB PD	
Pachena	P2	448	P	1	32		1.00	1.6	2.0	20.0	10.0	320	20	20	20	20	20	AR		77	1.6	0.7	0.9	W	Y	7	2	2	3	2	20	30	10	62					EB	
Pachena	P2	480	G	1	70		0.45	0.7	2.0	18.0	12.0	840	50	20	10	10	10	AR		185						31	10	6	15	10	10		10	30				JM EB	
Pachena	P2	550	G	1	60		0.25	0.4	2.0	22.0	18.0	1080	50	20	10	10	10	AR		238						8	3	2	3	1			10	11	1			EB PD	
Pachena	P2	610	P	1	20		0.60	1.1	2.0	20.0	15.0	300	60	20	20			AR	L	72	1.1	0.5	0.6	W	Y	8		7	1	50				50				JM EB PD	
Pachena	P2	630	G	1	85		0.35	0.5	1.0	22.0	18.0	1530	40	30	30			AR	L	551						5		2	3				1	1	1			EB PD	
Pachena	P2		P	3	10		0.70	1.0	1.0	20.0	10.0	100	50	30	20			AR	L	34	1.0	0.6	0.4	W	Y	1			1	10		20		30				EB PD	
Pachena	P2	715	R	1	12		0.05	0.1	1.0	20.0	4.0	48	20	80				AR	H	38						10	6	4	3	50				53				EB JM	
Pachena	P2	727	G	1	28		0.25	0.5	2.0	22.0	20.0	560	40	40	20			AR	M	246						3	1	2		1				1	1			MB EB PD	
Pachena	P2	755	R	1	8	1.0	0.05	0.1	2.0	22.0	12.0	96	20	80				AR	H	77						1			1					0				EB PD	
Pachena	P2	763	G	1	100		0.30	0.7	2.0	22.0	20.0	2000	60	20	20			AR	L	480						6	2	3	1	1			10	11	1			EB PD MB	
Pachena	P2	863	G	1	37		0.15	0.3	1.0	22.0	7.0	259	10	10	80			AR	N	67						2		1	1	1		1		2				EB	
Pachena	P2	900	G	1	30		0.35	0.6	1.0	18.0	13.0	390	50	20	30			AR	L	101						1		1						0				EB	
Pachena	P2	930	P	1	13		0.85	1.1	1.0	20.0	15.0	195	70	15	15			AR	L	35	1.1	0.6	0.5	W	Y	3	3					10		10	1			EB	
Pachena	P2	943	G	1	30		0.20	0.3	0.5	20.0	12.0	360	80	10	10			AR	L	43						7		7					1	1	1			EB	
Pachena	P2	973	R	1	57	1.0	0.10	0.2	0.5	20.0	12.0	684	15	15	65	5		AR	L	192						0					5		2	7				EB MB	
Pachena	P2	1030	G	1	110	1.0	0.30	0.5	3.0	23.0	20.0	2200	60	20	20			AR	M	528						16	4	12		1			2	3	1			EB PD	
Pachena	P2	1140	R	1	30	2.0	0.05	0.1	1.0	20.0	10.0	300	10	80	10			AR	H	246						5	2	2	1				1	1				MB EB	
Pachena	P2	1170	G	1	70	1.0	0.45	0.8	1.0	20.0	18.0	1260	40	10	50			AR	L	252						7	2	3	2	1				1	1			JM EB	
Pachena	P2	1240	G	1	60	1.0	0.25	0.3	2.0	22.0	20.0	1200	79	10	10	1		AR	L	144						9	2	2	5	1	1			2				JM	
Pachena	P2	1300	G	1	55		0.30	0.4	1.0	20.0	10.0	550	50	20	28	1	1	AR	L	141						14	5	7	2	1	1			2				JM EB	
Pachena	P2	1355	P	1	10		0.60	1.0	1.0	20.0	10.0	100	50	50				AR	H	50	1.0	0.4	0.6	O	Y	0						5		5				EB	
Pachena	P2	1365	G	1	20		0.30	0.5	1.0	20.0	15.0	300	50	50				AR	L	150						0								0	1				
Pachena	P2	1385	P	1	46		0.70	1.3	1.0	22.0	20.0	920	60	5	35			AR	L	110	1.3	0.5	0.8	W	Y	5		3	2	1		15		16						
Pachena	P2	1431	G	1	14		0.25	0.4	1.0	20.0	16.0	224	40	10	40	10		AR	L	40						0					10			10	2				
Pachena	P2	1445	P	1	23		0.80	1.2	1.0	25.0	20.0	460	50		50			AR	L	46	1.2	0.4	0.8	W	Y	0						20		20				WG	

Appendix 2A continued.

Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)						Off-channel Habitat			Channel Disturbances[12]	Barriers[13]
													<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)		
Pachena	P2	1468	R	1	19	1.0	0.15	0.3	2.0	20.0	10.0	190	50	40	10			AR	M	80						0								0						
Pachena	P2	1487	G	1	38		0.40	0.5	2.0	25.0	22.0	836	90	5	5			AR	L	50						0								0						
Pachena	P2	1525	P	1	25		1.20	2.2	1.0	20.0	20.0	500	80	10	10			AR	L	60	2.2	0.5	1.7	W	Y	1			1			80		80		SC	N	30		EB
Pachena	P2	1550	G	1	27		0.40	0.5	1.0	20.0	17.0	459	80	10	10			AR	L	55						2		1	1				10	10	5					
Pachena	P2	1577	P	1	21		0.80	1.2	1.0	23.0	20.0	420	90	5	5			AR	L	25	1.2	0.4	0.8	W	Y	0								0	2					
Pachena	P2	1598	R	1	29	2.0	0.20	0.4	1.0	22.0	14.0	406	20	80				AR	H	325						0							10	10	2					
Pachena	P2	1627	G	1	36		0.40	0.5	1.0	23.0	15.0	540	80	20				AR	L	108						3	2		1					0						EB
Pachena	P2	1663	P	1	25		0.80	1.2	1.0	22.0	20.0	500	80	20				AR	L	100	1.2	0.4	0.8	O	Y	1	1					50		50	2					EB
Pachena	P2	1688	R	1	27	1.0	0.15	0.2	1.0	25.0	12.0	324	50	50				AR	H	162						2	1		1				10	10					MB EB
Pachena	P2	1715	G	1	10		0.25	0.4	1.0	20.0	13.0	130	60	40				AR	M	52						4	3	1						0						MB EB
Pachena	P2	1725	P	1	13		1.00	1.5	1.5	20.0	13.0	169	50	50				AR	M	85	1.5	0.3	1.2	W	Y	35	2	30	3	10		2	50	62	10					EB
Pachena	P2	1738	R	1	16	1.0	0.10	0.3	1.0	20.0	10.0	160	70	30				AR	L	48						3		2	1	1				1						WG MB
Pachena	P2	1754	P	1	33		1.00	2.0	1.0	25.0	20.0	660	50	50				AR	M	330	2.0	0.1	1.9	W	Y	9		5	4	25			50	75						JM EB
Pachena	P2	1787	G	1	87		0.30	0.5	0.5	25.0	8.0	696	70	20	10			AR	L	153						12	5	3	4	5				5						JM EB
Pachena	P2	1874	P	1	18		1.00	1.5	1.0	25.0	20.0	360	90	10				AR	L	36	1.5	0.1	1.4	W	Y	13	5	3	5				60	60	5					WG JM EB
Pachena	P2	1892	G	1	21		0.40	0.6	1.0	22.0	20.0	420	50	50				AR	H	210						1		1						0	5					
Pachena	P2	1913	P	1	8		0.80	1.2	1.0	22.0	15.0	120	70	30				AR	H	36	1.2	0.6	0.6	W	Y	6		2	4	1			20	21						
Pachena	P2	1921	R	1	2	1.0	0.20	0.4	1.0	20.0	15.0	30	20	80				AR	H	24						8	3	2	3	30				30	5					
Pachena	P2	1923	G	1	11		0.35	0.5	1.0	20.0	10.0	110	50	50				AR	H	55						0								0	5					
Pachena	P2	1934	P	1	10		0.70	1.1	1.0	20.0	14.0	140	50	50				AR	H	70	0.7	0.3	0.8	W		5		3	2	5				5	5					
Pachena	P2	1944	G	1	29		0.30	0.6	1.0	20.0	10.0	290	50	50				AR	H	145						1		1						0	30					
Pachena	P2	1973	P	1	7		0.80	1.1	1.0	20.0	10.0	70	30	40	29	1		AR	M	32	1.1	0.3	0.7	W		3		1	2	5	1	5	10	21	5					EB
Pachena	P2	1980	R	1	13	1.0	0.05	0.1	2.0	15.0	6.0	78	10	90				AR	H	70						1	1							0	1					
Pachena	P2	1993	G	1	16		0.30	0.6	2.0	20.0	7.0	112	40	50	10			AR	M	58						0								0	20					EB
Pachena	P2	2009	P	1	34		1.00	1.8	2.0	22.0	14.0	476	60	30	10			AR	L	152	1.8	0.3	1.5	W	Y	7	3	2	2	5			50	55	5					EB
Pachena	P2	2043	R	1	6		0.10	0.2	2.0	20.0	4.0	24	20	80				AR	H	19						0								0	20					
Pachena	P2	2049	P	1	37		0.80	1.2	1.5	20.0	14.0	518	90	10				AR	L	52	1.2	0.2	1.0	W	Y	2		1	1	5			20	25						EB
Pachena	P2	2086	G	1	26		0.20	0.5	2.0	16.0	14.0	364	60	40				AR	M	146						1			1					0	10					EB
Pachena	P2		P	3	10		0.70	1.1	2.0	15.0	6.0	60	70	30				AR	L	18	1.1	0.3	0.8	W	Y	2	1	1			10	50		60						EB MB
Pachena	P2	2112	R	1	20	1.0	0.20	0.5	1.0	15.0	4.0	80	50	50				AR	M	40						1		1						0						EB MB
Pachena	P2	2132	P	1	45		0.50	0.7	1.0	22.0	15.0	675	50	50				AR	M	338	0.7	0.4	0.3	W		30	10	10	10	60				60						EB JM
Pachena	P2	2177	R	1	37	1.0	0.15	0.3	1.0	20.0	6.0	222	10	80	10			AR	H	182						30	10	10	10	30				30						WG MB JM
Pachena	P2	2214	G	1	31		0.30	0.4	1.0	20.0	10.0	310	30	70				AR	H	217						30	10	10	10	50				50						MB JM
Pachena	P2	2245	R	1	24	1.0	0.20	0.4	2.0	20.0	8.0	192	30	70				AR	H	134						4			4	5				5						
Pachena	P2	2269	P	1	16		0.70	1.0	1.0	20.0	15.0	240	20	78	2			AR	H	188	1.0	0.1	0.9	W	Y	6	2	2	2	2			10	12						
Pachena	P2	2285	G	1	12		0.30	0.4	2.0	20.0	15.0	180	50	50				AR	M	90						2		1	1					0						EB
Pachena	P2	2297	P	1	15		0.75	1.1	2.0	16.0	12.0	180	90	10				AR	N	18	1.1	0.4	0.7	W		5		5		2				2						EB
Pachena	P2	2312	G	1	15		0.30	0.5	2.0	16.0	7.0	105	50	50				AR	M	53						2		2						0						EB
Pachena	P2	2327	P	1	18		0.40	1.3	3.0	25.0	15.0	270	40	60				AR	L	162	1.3	0.4	0.9	W	Y	2			2	1				1						EB
Pachena	P2	2345	R	1	39	1.0	0.20	0.3	3.0	30.0	15.0	585	40	60				AR	L	351						30	10	10	10	50				50						EB JM
Pachena	P2	2384	G	1	66		0.80	1.2	3.0	25.0	8.0	528	90	10				AR	L	53						0								0	90					EB
Pachena	P6	0	P	1	50		1.20	2.2	0.5	25.0	8.0	400	70	30				AR	L	120	2.2	0.5	1.7	W	Y	4			4				50	50						
Pachena	P6	50	G	1	20		0.50	0.8	0.5	25.0	15.0	300	80	20				AR	L	60						1			1				20	20	60					SC
Pachena	P6	70	P	1	12		0.50	0.8	0.5	25.0	10.0	120	80	20				AR	L	24	0.8	0.4	0.4	W		7		3	4	5				5	10					
Pachena	P6	82	G	1	24		0.40	0.6	0.5	25.0	70.0	1680	60	40				AR	H	672						2			2	2			2	4	25					
Pachena	P6	106	P	1	9		0.30	0.7	0.5	20.0	5.0	45	30	70				AR	M	32	0.7	0.2	0.5	W		2		1	1	2			5	7	70					
Pachena	P6	115	G	1	25		0.25	0.5	0.5	20.0	8.0	200	60	40				AR	H	80						7	2	5					15	15	70					
Pachena	P6	140	R	1	4	1.0	0.05	0.1	0.5	20.0	5.0	20	80	20				AR	L	4						2	2			60				60	5					
Pachena	P6	144	G	1	16		0.25	0.5	0.5	20.0	8.0	128	80	20				AR	L	26						4	2	2		2				2	10					MC
Pachena	P6	160	R	1	5	1.0	0.05	0.1	0.5	25.0	1.0	5	50	50				AR	L	3						0								0	2					
Pachena	P6	165	P	1	14		0.30	0.8	0.5	25.0	8.0	112	70	30				AR	L	34	0.8	0.1	0.7	W	Y	13	2	9	2	20		5		25	10					JM
Pachena	P6	179	R	1	7	1.0	0.10	0.2	0.5	25.0	1.0	7	15	80	5			AR	M	6						0							5	5					
Pachena	P6	186	G	1	28		0.45	0.6	0.5	25.0	6.0	168	50	50				AR	M	84						2	2							0	60					EB
Pachena	P6	214	R	1	4	1.0	0.00	0.0	0.5	20.0	0.0	0	40	55	5			AR	H	0						0								0	30					
Pachena	P6	218	G	1	36		0.30	0.6	0.5	20.0	5.0	180	80	20				AR	L	36						3	2	1				5		5	70	SC	G	25		MC EB

Appendix 2A continued.

													Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)							Off-channel Habitat				
Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)	Channel Disturbances[12]	Barriers[13]
Pachena	P6	254	R	1	5	1.0	0.05	0.1	0.5	20.0	2.0	10	5	90	5			AR	H	9						0									0	100					EB
Pachena	P6	259	P	1	19		1.00	1.6	2.0	20.0	8.0	152	90	10				AR	L	15	1.6	0.1	1.5	W	Y	11		4	7	30			25		55	10					JM
Pachena	P6	278	R	1	4	1.0	0.07	0.1	0.5	20.0	3.0	12	70	30				AR	L	4						1	1				10			10	80					EB
Pachena	P6	282	P	1	23		0.60	0.9	0.5	20.0	7.0	161	90	10				AR	L	16	0.9	0.1	0.8	W	Y	5	1	3	1	5					5	20	SC	G	20		MC EB
Pachena	P6	305	G	1	16		0.25	0.5	1.0	20.0	4.0	64	90	10				AR	L	6						0					2			2	10					EB
Pachena	P6	321	R	1	7	1.0	0.05	0.1	0.5	20.0	3.0	21	90	10				AR	N	2						0							30	30	60					MC EB
Pachena	P6	328	P	1	58		0.60	1.0	0.5	20.0	10.0	580	60	30	10			AR	L	186	1.0	0.1	0.9	W	Y	5	3	1	1	40			5		45	5					JM
Pachena	P6	386	G	1	10		0.35	0.6	0.5	20.0	4.0	40	50	50				AR	M	20						0									0	70					
Pachena	P6	396	R	1	8	1.0	0.10	0.2	0.5	20.0	3.0	24	40	60				AR	H	14						0									0	20					
Pachena	P6	404	P	1	11		0.30	0.9	0.5	20.0	4.0	44	80	20				AR	L	9	0.9	0.1	0.8	W		3		2	1	5					5	5					
Pachena	P6	415	R	1	8	1.0	0.05	0.1	2.0	20.0	2.0	16	30	70				AR	H	11						0									0	20					
Pachena	P6	423	G	1	17		0.30	0.6	2.0	20.0	15.0	255	30	70				AR	H	179						2	1	1					10	10	20					
Pachena	P6	440	G	1	20		0.50	0.6	2.0	30.0	7.0	140	80	20				AR	N	28						0									0	60					WG MB MC EB
Pachena	P6	460	G	1	40		0.40	0.6	2.0	30.0	4.0	160	80	20				AR	N	32						11	4	5	2	5					5	10					MB MC EB
Pachena	P6	500	G	1	29		0.25	0.5	3.0	30.0	4.0	116	70	30				AR	L	35						6	2	3	1						0	20					MC EB
Pachena	P6	529	P	1	7		0.45	0.7	2.0	30.0	4.0	28	50	50				AR	M	14	0.7	0.1	0.6	W		7	3	2	2	40					40						EB
Pachena	P6	536	G	1	12		0.00	0.0	2.0	30.0	0.5	6	50	50				AR	L	3						0									0						
Pachena	P6	548	P	1	10		0.45	0.7	2.0	30.0	4.0	40	90	10				AR	N	4	0.7	0.0	0.7	W	Y	1			1	5					5	30					
Pachena	P6	558	G	1	12		0.00	0.0	2.0	30.0	0.0	0	50	50				AR	L	0						0									0						MB MC
Pachena	P6	570	R	1	14	1.0	0.03	0.1	0.5	30.0		0	50	50				AR	L	0						6	2	3	1	20					20	60					WG EB MC
Pachena	P6	584	G	1	20		0.25	0.4	0.5	30.0		0	50	50				AR	L	0						0									0	80					WG MB MC EB
Pachena	P6	604	R	1	6	1.0	0.10	0.2	0.5	30.0		0	50	50				AR	M	0						0									0	80					MC
Pachena	P6	610	G	1	11		0.20	0.4	0.2	30.0	4.0	44	50	50				AR	L	22						2	1	1							0	50					MC
Pachena	P6	621	R	1	3	1.0	0.05	0.1	0.5	30.0	1.0	3	30	70				AR	M	2						0				10					10	50					
Pachena	P6	624	G	1	11		0.25	0.5	0.5	30.0	3.0	33	40	60				AR	M	20						0									0	30					
Pachena	P6	635	R	1	3	1.0	0.05	0.1	0.5	30.0	2.0	6	10	85	5			AR	H	5						0									0	60					
Pachena	P6	638	G	1	28		0.35	0.5	0.5	30.0	3.0	84	55	35	10			AR	L	31						3		1	2	5					5	45					MC
Pachena	P6	666	R	1	14	1.0	0.10	0.2	0.5	30.0	3.0	42	60	40				AR	L	17						14	3	1	10	40					40	20					WG MC
Pachena	P6	680	G	1	8		0.15	0.2	0.5	30.0	2.0	16	60	30	10			AR	L	5						1	1								0	30					WG MC
Pachena	P6	688	P	1	10		0.50	0.7	0.5	30.0	3.0	30	80	20				AR	L	6	0.7	0.1	0.6	W		4	4			10					10						WG MB JM MC
Pachena	P6	698	R	1	3	1.0	0.05	0.1	0.5	30.0	2.0	6	30	60	10			AR	L	4						4	4			30					30	5	SC	G	10		SC
Pachena	P6	701	G	1	25		0.35	0.7	0.5	30.0	3.0	75	45	40	10	5		AR	M	32						0									0	20					
Pachena	P6	726	G	1	34		0.15	0.3	0.5	30.0	3.0	102	50	45	3	1	1	AR	M	47						3	1	1	1		1				1	20					
Pachena	P6	760	R	1	13	1.0	0.05	0.1	0.5	30.0	3.0	39	10	90				AR	H	35						1	1					2			2	15					EB
Pachena	P6	773	G	1	13		0.15	0.2	1.0	30.0	4.0	52	10	90				AR	H	47						0							2	2	2					EB
Pachena	P6	786	R	1	15	1.0	0.10	0.2	1.0	25.0	3.0	45	10	90				AR	H	41						2	1	1		1					1	5					EB
Pachena	P6	801	P	1	12		0.35	0.7	1.0	25.0	15.0	180	70	30				AR	M	54	0.7	0.1	0.6	W		2	1	1							0		SC	G	25		WG MB MC EB
Pachena	P6	813	G	1	9		0.20	0.4	1.0	25.0	10.0	90	30	70				AR	M	63						3	2	1		5					5	5					WG MB JM MC
Pachena	P6	822	R	1	10	1.0	0.00	0.0	2.0	25.0	0.0	0	10	90				AR	H	0						0									0						MB
Pachena	P6	832	G	1	13		0.25	0.6	2.0	25.0	5.0	65	30	70				AR	H	46						3	2		1	5					5	10	SC	N	50		MB EB
Pachena	P6	845	P	1	13		0.70	1.2	2.0	25.0	5.0	65	50	50				AR	H	33	1.2	0.3	0.9	W	Y	2	2			5		10			15	15					MC
Pachena	P6	858	G	1	27		0.20	0.4	2.0	25.0	4.0	108	70	30				AR	M	32						4	2	1	1	10					10						MB MC
Pachena	P6	885	R	1	5	1.0	0.05	0.1	1.0	30.0	1.0	5	10	90				AR	H	5						0									0	10					WG
Pachena	P6	890	G	1	8		0.25	0.4	1.0	30.0	4.0	32	30	60	10			AR	H	20						2	1	1							0	2					MC EB
Pachena	P6	898	R	1	6	1.0	0.05	0.1	1.0	30.0	1.0	6	20	80				AR	H	5						2	1	1					10	10	30					
Pachena	P6	904	P	1	25		0.70	1.1	1.5	30.0	6.0	150	70	30				AR	L	45	1.1	0.5	1.1	W	Y	6	2	3	1	20		5			25	30					WG MB JM MC EB
Pachena	P6	929	R	1	16	1.0	0.05	0.1	0.2	20.0	2.0	32	50	50				AR	M	16						2	2								0	50					WG MC
Pachena	P6	945	P	1	11		0.85	1.3	0.2	20.0	5.0	55	80	20				AR	L	11	1.3	0.1	1.2	W	Y	1			1				25		25	10					
Pachena	P6	956	G	1	5		0.35	0.6	0.2	20.0	3.0	15	70	20	10			AR	L	3						1		1							0	20					EB
Pachena	P6	961	R	1	4	1.0	0.10	0.2	0.2	20.0	2.0	8	20	60	20			AR	M	5						1		1							0						
Pachena	P6	965	G	1	13		0.20	0.3	1.0	20.0	3.0	39	30	40	30			AR	M	18						3	1	2							0	5					WG MC
Pachena	P6	978	R	1	9	1.0	0.10	0.2	1.0	20.0	3.0	27	10	50	40			AR	M	16						0									0	5					
Pachena	P6	987	G	1	26		0.40	0.6	3.0	10.0	7.0	182	50	20	30			AR	L	47						0									0						
Pachena	P6	1013	R	1	4	1.0	0.05	0.1	1.0	15.0	7.0	28	20	75	5			AR	M	21						1		1							0						
Pachena	P6	1017	G	1	15		0.25	0.5	0.7	15.0	7.0	105	60	30	10			AR	M	34						1		1							0	10					EB

Appendix 2A continued.

													Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)							Off-channel Habitat				
Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[5]	<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)	Channel Disturbances[12]	Barriers[13]
Pachena	P6	1032	P	1	4		0.40	0.6	0.5	15.0	8.0	32	30	40	30			AR	M	15	0.6	0.2	0.4	W		3	1	1	1	5					5	5					EB
Pachena	P6	1036	R	1	7	1.0	0.05	0.1	0.5	15.0	2.0	14	10	40	50			AR	L	7						0									0	5					EB
Pachena	P7	0	G	1	28		0.15	0.3	0.5	8.0	2.0	56	20	80				AR	H	45						4	1	3							0	20					EB
Pachena	P7	28	R	1	7	1.0	0.02	0.0	0.5	8.0	2.0	14	5	90	5			AR	H	13						0									0	10					
Pachena	P7	35	G	1	28		0.10	0.4	1.0	8.0	2.0	56	5	90	5			AR	H	51						1	1								0	40					EB
Pachena	P7	63	P	1	15		0.60	1.2	0.5	10.0	4.0	60	70	30				AR	L	18	1.2	0.1	1.2	W	H	8	3	4	1	20			20		40	30	SC	G	20		
Pachena	P7	78	P	1	5		0.35	0.6	0.5	8.0	2.5	12.5	30	60	10			AR	H	8	0.6	0.1	0.5	W		2			2	15		5			20	60					EB
Pachena	P7	83	G	1	13		0.10	0.3	0.5	10.0	2.0	26	20	80				AR	M	21						8	3	5		10					10	30					
Pachena	P7	96	R	1	7	1.0	0.03	0.1	0.5	10.0	2.0	14	15	80	5			AR	M	11						0									0	10					EB
Pachena	P7	103	G	1	39		0.20	0.6	0.5	10.0	2.0	78	20	80				AR	H	62						11	5	4	2	5					5	15					WG MC
Pachena	P7	142	R	1	9	2.0	0.03	0.1	2.0	10.0	0.5	4.5	50	50				AR	M	2						3	3								0	5					
Pachena	P7	151	G	1	20		0.15	0.2	2.0	10.0	1.0	20	50	40	10			AR	M	8						3		1	2	2					2	20					MC
Pachena	P7		P	2	15		0.15	0.2	2.0	10.0	10.0	150	90	10				AR	L	15	0.2	0.0	0.2	O		2	2			10			10	20	5					MC
Pachena	P7	171	P	1	2		0.25	0.5	2.0	10.0	8.0	16	30	40	30			AR	M	7	0.5	0.3	0.2	W		3	1	1	1	30					30						
Pachena	P7	173	G	1	24		0.15	0.2	0.5	10.0	7.0	168	40	60				AR	M	101						2		1	1	5					5	50					WG
Pachena	P7	197	R	1	9	1.0	0.05	0.1	0.5	10.0	2.0	18	30	70				AR	H	13						0								2		20					MB MC
Pachena	P7	206	G	1	39		0.10	0.2	0.5	10.0	2.5	97.5	50	50				AR	L	49						5		3	2	1				10	11	30					MC EB
Pachena	P7	245	P	1	3		0.25	0.4	0.5	10.0	3.0	9	70	30				AR	L	3	0.4	0.2	0.3	W		2		1	1	15				10	25	90					MC
Pachena	P7	248	G	1	37		0.20	0.3	0.5	10.0	5.0	185	70	30				AR	L	56						8	3	4	1	1				5	6	60					WG MC EB
Pachena	P7	285	P	1	11		0.35	0.7	0.5	10.0	2.0	22	70	30				AR	L	7	0.7	0.0	0.7	O	Y	1		1		5		5			10						WG MC EB
Pachena	P7	296	P	1	12		0.25	0.5	0.5	10.0	4.0	48	90	10				AR	L	5	0.5	0.2	0.4	W		2	2								0	20					WG MC
Pachena	P7	308	R	1	9	1.0	0.10	0.2	0.5	10.0	2.0	18	20	80				AR	H	14						0									0	50					MC EB
Pachena	P7	317	G	1	17		0.15	0.3	0.5	15.0	3.0	51	20	60	10		10	AR	M	32						1	1					20			20	100					MC EB
Pachena	P7	334	P	1	13		0.40	0.8	0.5	15.0	2.0	26	60	30	10			AR	L	8	0.8	0.0	0.8	W	Y	0									0	90					WG MC EB
Pachena	P7	347	G	1	23		0.10	0.2	0.5	15.0	2.0	46	30	60	10			AR	M	29						3		3		5					5	70					WG MC
Pachena	P7	370	G	1	8		0.20	0.2	0.5	15.0	2.0	16	30	70				AR	M	11						0									0						WG MC EB
Pachena	P7	378	R	1	7	1.0	0.03	0.1	0.5	15.0	1.0	7	20	60	20			AR	M	4						0									0	70					
Pachena	P7	385	G	1	22		0.20	0.3	1.0	15.0	2.0	44	30	30	40			AR	M	17						7		7		3					3	10					
Pachena	P7	407	R	1	6	1.0	0.02	0.1	0.5	15.0	1.0	6	20	70	10			AR	H	4						0									0	20					EB
Pachena	P7	413	G	1	7		0.20	0.4	0.5	15.0	2.0	14	50	50				AR	L	7						0									0	50					
Pachena	P7	420	P	1	9		0.40	0.5	1.0	15.0	2.0	18	60	40				AR	M	7	0.5	0.3	0.2	W		1			1						0						EB
Pachena	P7	429	R	1	6	1.0	0.02	0.0	0.2	15.0	1.0	6	10	85	5			AR	H	5						0									0						MC EB
Pachena	P7	435	P	1	9		0.30	0.6	0.2	15.0	3.0	27	30	40	30			AR	M	12	0.6	0.1	0.5	W	Y	2	2			10		5			15	5					MC EB
Pachena	P7	444	R	1	6	1.0	0.03	0.1	0.2	15.0	3.0	18	20	60	20			AR	M	12						1		1							0	10					EB
Pachena	P7	450	G	1	9		0.10	0.2	0.5	15.0	2.0	18	20	60	20			AR	M	12						0									0	60					MC EB
Pachena	P7	459	R	1	11	2.0	0.04	0.1	0.5	15.0	1.0	11	10	60	30			AR	L	7						0									0	30					EB
Pachena	P7	470	G	1	18		0.15	0.3	0.5	15.0	3.0	54	40	40	20			AR	M	24						2	2			10					10	10					MC EB JM
Pachena	P7	488	P	1	6		0.30	0.5	0.5	15.0	3.0	18	30	60	10			AR	L	11	0.5	0.1	0.5	W	Y	3	1	1	1	5					5	50					WG MC EB
Pachena	P7	494	G	1	20		0.10	0.2	0.2	15.0	2.0	40	30	40	30			AR	L	18						0									0	40					MC EB
Pachena	P7	514	R	1	6	2.0	0.05	0.1	0.2	15.0	2.0	12	20	20	60			AR	L	4						0									0	10					EB
Pachena	P7	520	P	1	8		0.30	0.6	0.2	15.0	2.0	16	80	20				AR	L	3	0.6	0.1	0.6	W		2			2	10					10						
Pachena	P7	528	R	1	4	2.0	0.05	0.1	0.2	15.0	3.0	12		10	20	10	60	AR	N	2						0					10				10	10					EB
Pachena	P7	532	G	1	5		0.25	0.4	5.0	15.0	2.0	10	10	20	40	10	20	AR	N	3						5	3	2		5	10				15	30					JM MC PD
Pachena	P7	537	R	1	14	1.0	0.07	0.1	10.0	15.0	1.0	14	10	50	40			AR	M	8						2	2			5					5	50					JM MC PD
Pachena	P7	551	G	1	24		0.10	0.2	10.0	15.0	4.0	96	20	50	15	5	10	AR	L	51						2		1	1		5			2	7	20					EB
Pachena	P7	575	R	1	13	1.0	0.05	0.1	10.0	15.0	2.0	26	15	15	50	10	10	AR	L	7						3	1	1	1	5	10				15	15					EB
Pachena	P7	588	P	1	6		0.30	0.5	15.0	12.0	2.5	15	50	30	10		10	AR	N	5						2	1	1		1					1	5					EB
Pachena	P7	594	R	1	16	2.0	0.15	0.2	15.0	10.0	2.0	32	50		10	10	30	AR	N	1						0					10				10	5					EB
Pachena	P7	610	G	1	9		0.10	0.2	15.0	9.0	2.0	18	50		10	10	30	AR	N	0						1		1		10					10	5					
Pachena	P7	619	P	1	4		0.05	0.1	15.0	7.0	1.0	4			5	5	90	AR	N	0	0.5	0.1	0.4	W		0				5					5						
Pachena	P7	623	G	1	11		0.20	0.3	10.0	8.0	2.5	27.5	30	30	10	10	20	AR	L	9						0				10					10	5					
Pachena	P7	634	R	1	10	1.0	0.10	0.2	10.0	8.0	2.0	20	40	40	5	5	10	AR	M	8						4	3	1		2	5				7						MB JM
Pachena	P7	644	P	1	6		0.20	0.4	10.0	8.0	3.0	18	30	60	10			AR	H	11	0.4	0.1	0.3	W		4	1	2	1	40				5	45						JM
Pachena	P7	650	R	1	16	1.0	0.07	0.2	7.0	8.0	2.0	32	20	30	10	10	30	AR	L	10						1	1				10				10	10					
Pachena	P7	666	G	1	7		0.20	0.3	8.0	8.0	1.5	10.5	10	10	5	5	70	AR	N	1						2			2	1					1						

Appendix 2A continued.

														Percent Bed Material (range in mm)					Spawning Gravel			Pools Only						Functional LWD Tally				Cover (%)							Off-channel Habitat				
Sub Basin	Reach	Reach location (m)[1]	Habitat type[3]	Habitat category[4]	Habitat length (m)	Gradient (%)	Mean depth (m)	Maximum depth (m)	Bank height (m)	Bankfull width (m)	Wetted width (m)	Rearing Habitat Area (m²)[2,5]	<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock	Type[6]	Quality[7]	Amount (m²)	Maximum depth (m)	Crest depth (m)	Residual depth (m)	Control element[8]	Good holding pool?[9]	Total LWD tally	10 to 20 cm	20 to 50 cm	>50 cm	Woody debris	Boulder	Cutbank	Deep pool	Instream veg.	Total instream cover	Overhanging veg.	Type[10]	Access[11]	Length (m)	Channel Disturbances[12]	Barriers[13]
Pachena	P7	673	R	1	32	1.0	0.10	0.2	8.0	12.0	2.0	64	5	5	25	5	60	AR	N	6						3		3							0						
Pachena	P7	705	G	1	20		0.10	0.2	8.0	18.0	2.0	40	10	10	10	10	60	AR	N	5						1	1								0						EB
Pachena	P7	725	R	1	27	1.0	0.15	0.3	4.0	15.0	3.0	81	5	15	30	50		AR	N	17						1		1							0						
Pachena	P7	752	G	1	20		0.15	0.2	0.5	15.0	2.5	50	30	50	15	5		AR	H	27						0									0	5					EB
Pachena	P7	772	P	1	5		0.20	0.4	0.5	15.0	2.5	12.5	30	50	10	10		AR	H	7	0.4	0.1	0.3	W		3		1	2	30					30	5					EB
Pachena	P7	777	G	1	21		0.20	0.3	0.5	15.0	3.0	63	20	60	20			AR	M	40						12	3	4	5	30					30	60					EB
Pachena	P7	798	R	1	7	1.0	0.20	0.6	0.5	15.0	3.0	21	50	50				AR	L	11	0.6	0.1	0.6	W		3	1	2		5					5	50					
Pachena	P7	805	R	1	3	1.0	0.05	0.1	0.2	25.0	1.0	3	5	90	5			AR	H	3						0								10	10	10					
Pachena	P7	808	P	1	9		0.25	0.5	0.2	20.0	5.0	45	10	70	10	10		AR	H	32	0.5	0.1	0.4	W		2		1	1	10	10				20	70					EB
Pachena	P7	817	R	1	5	1.0	0.05	0.1	0.3	20.0	1.0	5	10	60	30			AR	L	3						1		1							0						MB MC
Pachena	P7	822	G	1	37	1.0	0.20	0.3	0.3	20.0	2.0	74	30	50	15	5		AR	M	39						4		2	2	5	5				10	70					MB MC EB PD
Pachena	P7	859	R	1	31	2.0	0.01	0.0	10.0	20.0	0.5	15.5	10	20	20	50		AR	L	4						4	1	2	1		50				50	20					MC EB
Pachena	P7	890	P	1	4		0.15	0.3	10.0	20.0	2.0	8	10	20	20	50		AR	L	2	0.3	0.1	0.2	W		2		1	1	20	50				70	5					MC EB
Pachena	P7	894	G	1	13	1.0	0.20	0.4	15.0	20.0	5.0	65	20	20	20	30	10	AR	L	16						1		1			30	5			35	10					MC EB
Pachena	P7	907	C	1	7	15.0	0.02	0.1	15.0	20.0	2.0	14					100	AR	N	0						0									0	5					
Pachena	P7	914	R	1	23	3.0	0.05	0.3	10.0	15.0	2.5	57.5					100	AR	N	0						8		3	5	10					10	60					JM
Pachena	P7	937	G	1	8		0.02	0.0	15.0	14.0	6.0	48	60	30	10			AR	N	15						30	10	10	10	70					70						JM EB
Pachena	P7	945	P	1	9		0.50	0.9	10.0	14.0	9.0	81	75	15	5	5		AR	N	13	0.9	0.0	0.9	W	Y	1			1	5	5				10	5					JM EB
Pachena	P7	954	G	1	14	1.0	0.10	0.3	10.0	15.0	4.0	56					100	AR	N	0						0									0						
Pachena	P7	968	P	1	7		0.90	1.3	15.0	14.0	8.0	56				5	5	90	AR	N	1	1.3	0.0	1.3	O	Y	1			1				80	80					F

[1] Reach location denotes the distance upstream from the lower reach break.

[3] Habitat types are: pool (P), riffle (R), glide (G), cascade (C), other (O).

[4] Habitat categories are: primary habitat type (1), side channel (2), tertiary scour pool (3).

[5] Habitat area is calculated for rearing salmonids as length multiplied by wetted width.

[6] Spawning gravel type codes are: suitable for anadromous salmon (A), suitable for resident trout and char (R), suitable for both salmon and trout (AR), not suitable (N).

[7] Spawning gravel quality codes are: low (L), moderate (M), high (H), none (N).

[8] Control element codes are: boulder (B), bedrock (R), wood (W), beaver dam (D), culvert (CV), riffle (RI), glide (G) and other (O).

[9] A pool is classified as a good adult holding pool (Y) if the product of the maximum depth times the total overhead cover is >= 30. Overhead cover is the sum of LWD, boulder, cutbank and overhanging vegetation.

[10] Off-channel habitat codes are: alcove (ALC), side channel (SC), slough (SL), pond (PD), wetland (WL), spring (SP), other (O).

[11] Off-channel access codes are: no access (N), high flow only (P), most flows (G).

[12] Disturbance indicator codes are: scour (SC), unvegetated bar (DW), sediment wedge (WG), middle-channel bars (MB), extensive riffle zone (LR), road crossing thru creek at riffle crest or pool tailout (RC), multiple channels (MC), eroding banks (EB), back-channels (BC), LWD parallel to bank (PD), LWD jams (JM), avulsion (AV), >50% silt content (E), other (O).

[13] Potential barrier codes are: none (N), log jam (X), falls > 2 m (F), culvert (CV), bridge (BR), beaver dam (BD), land slide or bank failure (LS), cascade or chute (C), other (O).

Appendix 2B. Area surveyed and percentage of each primary habitat type in the Pachena River watershed.

Reach Number	Mean Bankfull Width (m)	Surveyed Length (m)	Surveyed Area (m^2)	Percent Habitat Type			
				Pool	Riffle	Glide	Cascade
S1N	21.0	265	1350	28.8	0.0	71.2	0.0
S1S	24.6	270	1009	47.6	0.5	51.9	0.0
S2	16.3	585	2374	27.8	37.3	34.9	0.0
R1	29.1	3266	23055	28.1	20.0	52.0	0.0
R2	21.5	645	3386	40.8	22.2	37.0	0.0
F1W	20.1	308	1341	18.7	5.2	76.1	0.0
F1E	25.0	275	1429	39.4	14.1	46.5	0.0
F1F	18.1	607	3402	69.0	19.9	10.0	1.1
P2	21.1	2450	36892	24.5	12.5	63.1	0.0
P6	24.4	1043	7049	31.1	5.3	63.5	0.0
P7	13.3	975	2715	24.4	18.8	56.3	0.5

Appendix 2C. Summary of cover attributes for the Pachena River watershed.

		Percent Instream Cover Types						
Reach Number	**Habitat Unit**	**LWD / SWD**	**Boulder**	**Undercut Banks**	**Deep Pool**	**Instream Vegetation**	**Total Percent Instream Cover**	**Overhanging Vegetation**
S1N	P	2.9	0.0	0.0	0.0	0.0	2.9	22.7
S1N	R	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S1N	G	1.7	0.0	0.0	0.0	0.0	1.7	15.3
S1N	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S1N	All	2.1	0.0	0.0	0.0	0.0	2.1	17.4
S1S	P	10.6	0.0	0.0	17.5	0.0	28.1	19.5
S1S	R	0.0	0.0	0.0	0.0	0.0	0.0	80.0
S1S	G	0.0	0.0	0.0	0.0	3.3	3.3	29.8
S1S	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S1S	All	5.1	0.0	0.0	8.3	1.7	15.1	25.1
S2	P	5.0	12.8	3.0	9.8	0.0	30.6	4.6
S2	R	2.1	14.9	0.1	0.0	0.0	17.0	9.0
S2	G	2.9	2.5	0.0	0.0	0.3	5.7	15.0
S2	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S2	All	3.2	10.0	0.9	2.7	0.1	16.8	9.9
R1	P	9.8	1.4	1.0	40.7	0.1	53.0	6.8
R1	R	1.1	2.6	0.0	0.0	0.0	3.7	6.5
R1	G	3.2	0.4	0.0	0.3	0.2	4.1	3.2
R1	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
R1	All	4.6	1.1	0.3	11.6	0.1	17.7	4.8
R2	P	3.5	1.1	0.4	23.1	0.0	28.1	1.1
R2	R	0.8	8.4	0.0	0.0	0.0	9.3	0.7
R2	G	1.5	0.1	0.0	0.0	0.0	1.7	0.0
R2	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
R2	All	2.2	2.4	0.2	9.4	0.0	14.1	0.6
F1W	P	18.7	0.5	0.0	2.7	0.0	22.0	1.8
F1W	R	1.7	0.0	0.0	0.0	1.5	3.3	1.5
F1W	G	26.2	0.0	0.0	0.0	0.5	26.7	1.7
F1W	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F1W	All	23.5	0.1	0.0	0.5	0.5	24.6	1.7
F1E	P	13.7	0.0	0.0	11.6	0.0	25.3	1.3
F1E	R	1.6	0.0	0.6	0.0	0.0	2.2	1.7
F1E	G	4.3	0.8	3.8	0.0	0.0	8.9	5.8
F1E	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F1E	All	7.6	0.4	1.8	4.6	0.0	14.4	3.5
F1F	P	1.0	5.7	0.0	45.6	0.0	52.3	0.0
F1F	R	0.6	33.2	0.0	0.0	0.0	33.7	0.0
F1F	G	2.5	6.7	0.0	0.0	0.0	9.3	0.0
F1F	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F1F	All	1.0	11.2	0.0	31.5	0.0	43.7	0.0

Appendix 2C continued

		Percent Instream Cover Types						
Reach Number	**Habitat Unit**	**LWD / SWD**	**Boulder**	**Undercut Banks**	**Deep Pool**	**Instream Vegetation**	**Total Percent Instream Cover**	**Overhanging Vegetation**
P2	P	9.4	2.0	0.1	23.4	0.4	35.3	1.0
P2	R	9.4	0.7	0.0	0.0	3.1	13.3	0.3
P2	G	2.8	1.2	0.0	0.3	2.9	7.3	3.5
P2	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P2	All	5.2	1.4	0.0	5.9	2.3	14.9	2.5
P6	P	16.8	0.0	0.3	13.4	0.1	30.6	9.4
P6	R	8.3	0.0	0.5	0.0	1.9	10.8	22.2
P6	G	1.5	0.0	0.2	0.0	3.4	5.1	29.6
P6	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a
P6	All	6.6	0.0	0.3	4.2	2.3	13.3	22.9
P7	P	9.5	1.9	0.5	8.6	2.5	23.0	18.4
P7	R	1.8	3.7	0.0	0.0	0.1	5.6	18.2
P7	G	5.5	2.2	0.9	0.0	1.4	9.9	34.8
P7	C	0.0	0.0	0.0	0.0	0.0	0.0	5.0
P7	All	5.7	2.4	0.6	2.1	1.4	12.2	27.5

Appendix 2D. Summary of bed material and spawning attributes for study area reaches in the Pachena River watershed.

Reach Number	Bed Material Composition (%)					Spawning Quantity (m^2)[1]	Spawning Quality[2]
	<2 mm	2-64 mm	64-256 mm	>256 mm	Bedrock		
S1N	53.7	46.3	0.0	0.0	0.0	625	Poor
S1S	62.3	37.7	0.0	0.0	0.0	380	Poor
S2	18.6	29.9	37.7	10.3	3.5	888	Fair
R1	41.8	41.1	14.0	1.4	1.8	10125	Poor
R2	32.4	24.1	37.3	3.7	2.4	1070	Poor
F1W	73.5	22.2	4.3	0.1	0.0	309	Poor
F1E	28.4	47.7	23.5	0.4	0.0	749	Poor
F1F	23.7	31.1	13.0	11.3	20.8	1148	Fair
P2	49.1	32.7	15.4	1.7	1.2	13190	Poor
P6	61.2	35.9	2.7	0.0	0.1	2572	Poor
P7	36.0	38.2	9.7	4.4	11.7	1091	Poor

[1] Value = (%gravels (2-64 mm) + 20 % cobbles (64-256 mm))*length*wetted width (surveyed area only).

[2] Poor is fines (<2 mm) >25%, Fair if fines >15% and uncompacted, Good if fines < =15% and uncompacted.

Appendix 2E. Summary of large woody debris (LWD) attributes for study area reaches in the Pachena River watershed.

Reach Number	Habitat Unit	Surveyed Length (m)	Mean Bankfull Width (m)	Number of Functional LWD [1]				Recommended Number of LWD Pieces [2]		
				<20 cm	20-50 cm	>50 cm	Total	10m x 0.35m pieces	10m x 0.5m pieces	10m x 0.75m pieces
S1N	All	265	21.0	16	19	9	44	110	54	24
S1S	All	270	24.6	16	23	9	48	113	55	24
S2	All	585	16.3	41	65	52	158	244	119	53
R1	All	3266	29.1	171	261	146	578	1361	667	296
R2	All	645	21.5	18	31	20	69	269	132	58
F1W	All	308	20.1	64	82	31	177	128	63	28
F1E	All	275	25.0	19	37	16	72	115	56	25
F1F	All	607	18.1	11	29	22	62	253	124	55
P2	All	2450	21.1	133	211	151	495	1021	500	222
P6	All	1043	24.4	62	65	49	176	435	213	94
P7	All	975	13.3	58	81	51	190	406	199	88

[1] To be termed functional, a piece of LWD must be providing cover, a control element for a pool or modifying channel morphology.

[2] Modified from Cederholm et al. (1997) such that recommended volume of LWD per 100 m of stream is 80 m^3 for streams with less than or equal to 10 m bankfull width and 40 m^3 for streams with greater than 10 m bankfull width.

Appendix 2F. Detailed canopy and riparian stage descriptions for selected reaches in the Pachena River watershed.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Shaky Bill's	S1N	0	P	15			
Shaky Bill's	S1N	15	G	15	4	M	YF
Shaky Bill's	S1N	30	P	25	4	M	YF
Shaky Bill's	S1N	55	G	21	2	D	SH
Shaky Bill's	S1N	76	P	7	2	D	PS
Shaky Bill's	S1N	83	G	103	2	D	PS
Shaky Bill's	S1N	186	P	11	2	D	PS
Shaky Bill's	S1N	197	G	31	2	D	PS
Shaky Bill's	S1N	228	P	17	7	D	PS
Shaky Bill's	S1N	245	G	20	7	D	PS
Shaky Bill's	S1S	0	P	20	4	M	MF
Shaky Bill's	S1S	20	P	32	4	M	MF
Shaky Bill's	S1S	52	G	8	4	M	YF
Shaky Bill's	S1S	60	P	5	7	M	YF
Shaky Bill's	S1S	65	G	81	7	M	YF
Shaky Bill's	S1S	146	P	9	9	M	YF
Shaky Bill's	S1S	155	G	30	9	M	YF
Shaky Bill's	S1S	185	P	8	9	M	YF
Shaky Bill's	S1S	193	G	44	7	M	YF
Shaky Bill's	S1S	237	P	7	7	M	YF
Shaky Bill's	S1S	244	G	7	7	M	YF
Shaky Bill's	S1S	251	P	14	9	M	YF
Shaky Bill's	S1S	265	R	5	4	M	YF
Shaky Bill's	S2	0	G	12	0	D	PS
Shaky Bill's	S2	12	P	5	0	D	PS
Shaky Bill's	S2	17	G	12	0	D	PS
Shaky Bill's	S2	29	R	11	7	M	YF
Shaky Bill's	S2	40	G	20	9	M	YF
Shaky Bill's	S2	60	P	4	7	M	YF
Shaky Bill's	S2	64	R	4	4	M	YF
Shaky Bill's	S2	68	G	24	4	M	YF
Shaky Bill's	S2	92	P	12	0	M	YF
Shaky Bill's	S2	104	R	5	0	M	YF
Shaky Bill's	S2	109	P	9	2	M	YF
Shaky Bill's	S2	118	G	8	7	M	YF
Shaky Bill's	S2	126	R	7	7	M	YF
Shaky Bill's	S2	133	G	12	0	M	YF
Shaky Bill's	S2	145	R	2	2	M	YF
Shaky Bill's	S2	147	G	20	0	M	YF
Shaky Bill's	S2	167	R	3	0	M	YF
Shaky Bill's	S2	170	G	20	0	D	PS
Shaky Bill's	S2	190	P	10	0	M	YF
Shaky Bill's	S2	200	R	3	0	M	YF
Shaky Bill's	S2	203	P	21	0	M	YF

Appendix 2F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Shaky Bill's	S2	224	R	7	0	M	YF
Shaky Bill's	S2	231	G	10	2	D	PS
Shaky Bill's	S2	241	R	17	2	M	YF
Shaky Bill's	S2	258	P	18	2	M	YF
Shaky Bill's	S2	276	R	14	2	M	YF
Shaky Bill's	S2	290	G	13	2	M	YF
Shaky Bill's	S2	303	R	51	4	M	YF
Shaky Bill's	S2	0	G	6	4	M	YF
Shaky Bill's	S2	0	P	4	4	M	YF
Shaky Bill's	S2	354	G	15	4	M	YF
Shaky Bill's	S2	369	R	12	4	M	YF
Shaky Bill's	S2	381	P	17	4	M	YF
Shaky Bill's	S2	398	R	10	0	M	YF
Shaky Bill's	S2	408	P	14	2	M	YF
Shaky Bill's	S2	422	R	6	4	M	YF
Shaky Bill's	S2	428	G	19	2	M	YF
Shaky Bill's	S2	447	R	9	0	M	YF
Shaky Bill's	S2	456	G	5	0	M	YF
Shaky Bill's	S2	461	R	25	0	M	YF
Shaky Bill's	S2	486	G	6			
Shaky Bill's	S2	492	P	12			
Shaky Bill's	S2	504	R	23			
Shaky Bill's	S2	527	P	8	0	M	YF
Shaky Bill's	S2	535	R	14	0	M	YF
Shaky Bill's	S2	549	P	7	0	M	YF
Shaky Bill's	S2	556	R	17	0	M	YF
Shaky Bill's	S2	573	P	12	0	M	YF
Rousseau	R1	0	G	34	0	D	PS
Rousseau	R1	34	R	10	0	D	PS
Rousseau	R1	44	G	54	2	D	PS
Rousseau	R1	98	R	21	0	D	PS
Rousseau	R1	119	G	35	0	D	PS
Rousseau	R1	154	R	48	2	M	YF
Rousseau	R1	202	G	43	2	M	YF
Rousseau	R1	0	G	3	2	M	YF
Rousseau	R1	245	R	26	2	M	YF
Rousseau	R1	0	G	21	2	M	YF
Rousseau	R1	271	P	57	2	M	YF
Rousseau	R1	328	G	40	0	M	YF
Rousseau	R1	0	P	15	0	M	YF
Rousseau	R1	368	R	22	0	M	YF
Rousseau	R1	0	P	7	0	M	YF
Rousseau	R1	390	R	33	0	M	YF
Rousseau	R1	423	P	33	0	M	YF

Appendix 2F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Rousseau	R1	0	P	4	0	M	YF
Rousseau	R1	456	R	32	0	M	YF
Rousseau	R1	0	P	4	0	M	YF
Rousseau	R1	488	G	31	2	M	YF
Rousseau	R1	519	P	10	0	M	YF
Rousseau	R1	529	G	47	2	M	YF
Rousseau	R1	576	R	5	0	M	YF
Rousseau	R1	581	G	63	2	M	YF
Rousseau	R1	0	P	10	0	M	YF
Rousseau	R1	644	P	13	0	M	YF
Rousseau	R1	657	G	21	2	M	YF
Rousseau	R1	678	R	8	2	M	YF
Rousseau	R1	686	P	18	2	D	YF
Rousseau	R1	704	P	17	2	M	YF
Rousseau	R1	721	G	14	0	D	SH
Rousseau	R1	735	P	16	0	D	PS
Rousseau	R1	751	G	7	0	D	PS
Rousseau	R1	758	R	10	0	D	PS
Rousseau	R1	768	G	8	0	M	YF
Rousseau	R1	776	P	15	0	M	YF
Rousseau	R1	791	G	44	0	M	YF
Rousseau	R1	835	P	10	0	M	YF
Rousseau	R1	845	G	169	7	M	YF
Rousseau	R1	1014	P	10	2	D	YF
Rousseau	R1	1024	G	27	2	D	YF
Rousseau	R1	0	P	5		D	YF
Rousseau	R1	1051	G	157	2	M	YF
Rousseau	R1	0	P	71	2	M	YF
Rousseau	R1	1208	R	7	2	D	YF
Rousseau	R1	1215	G	39	2	D	YF
Rousseau	R1	1254	P	16	0	M	YF
Rousseau	R1	1270	G	12	0	M	YF
Rousseau	R1	1282	P	38	2	M	YF
Rousseau	R1	1320	G	42	0	M	YF
Rousseau	R1	1362	P	31	0	M	YF
Rousseau	R1	1393	G	74	0	M	YF
Rousseau	R1	1467	R	36	2	M	YF
Rousseau	R1	1503	G	30	0	M	YF
Rousseau	R1	1533	R	6	0	M	YF
Rousseau	R1	1539	G	8	0	M	YF
Rousseau	R1	1547	P	4	0	M	YF
Rousseau	R1	1551	G	109	2	M	YF
Rousseau	R1	1660	P	25	4	M	YF
Rousseau	R1	1685	G	29	0	M	YF
Rousseau	R1	1714	R	11	0	M	YF
Rousseau	R1	1725	G	10	0	M	YF
Rousseau	R1	1735	P	30	0	M	YF
Rousseau	R1	1765	R	12	0	M	YF

Appendix 2F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Rousseau	R1	1777	P	25	7	M	YF
Rousseau	R1	1802	R	18	2	M	YF
Rousseau	R1	1820	G	11	4	M	YF
Rousseau	R1	1831	R	11	0	M	YF
Rousseau	R1	1842	G	23	2	M	YF
Rousseau	R1	1865	R	6	0	M	YF
Rousseau	R1	1871	P	21	2	M	YF
Rousseau	R1	1892	R	3	0	M	YF
Rousseau	R1	1895	G	34	0	M	YF
Rousseau	R1	1929	R	19	0	M	YF
Rousseau	R1	1948	G	35	0	M	YF
Rousseau	R1	1983	R	9	0	M	YF
Rousseau	R1	1992	P	11	2	M	YF
Rousseau	R1	2003	G	9	7	M	YF
Rousseau	R1	2012	R	29	7	M	YF
Rousseau	R1	2041	P	16	4	M	YF
Rousseau	R1	2057	G	19	7	M	YF
Rousseau	R1	2076	R	15	0	M	YF
Rousseau	R1	2091	G	38	2	M	YF
Rousseau	R1	0	P	2	4	M	YF
Rousseau	R1	2129	R	12	4	M	YF
Rousseau	R1	2141	G	11	7	M	YF
Rousseau	R1	2152	P	18	0	M	YF
Rousseau	R1	2170	R	50	0	M	YF
Rousseau	R1	2220	P	20	0	M	YF
Rousseau	R1	2240	R	50	0	M	YF
Rousseau	R1	2290	G	55	0	M	YF
Rousseau	R1	2345	R	6	0	M	YF
Rousseau	R1	2351	P	28	0	M	YF
Rousseau	R1	2379	R	13	0	M	YF
Rousseau	R1	2392	G	19	0	M	YF
Rousseau	R1	2411	R	4	0	M	YF
Rousseau	R1	2415	P	23	0	M	YF
Rousseau	R1	2438	G	27	0	M	YF
Rousseau	R1	2465	R	39	0	M	YF
Rousseau	R1	2504	G	87	2	M	YF
Rousseau	R1	2591	R	108	0	M	YF
Rousseau	R1	0	P	4	2	M	YF
Rousseau	R1	0	G	35	2	M	YF
Rousseau	R1	2699	P	25	2	M	YF
Rousseau	R1	2724	G	15	2	M	YF
Rousseau	R1	2739	P	12	0	M	YF
Rousseau	R1	2751	R	37	0	M	YF
Rousseau	R1	2788	G	11	0	M	YF
Rousseau	R1	2799	R	4	0	M	YF
Rousseau	R1	2803	G	34	0	M	YF

Appendix 2F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Rousseau	R1	2837	G	16	0	M	YF
Rousseau	R1	2853	R	10	2	M	YF
Rousseau	R1	2863	P	18	2	M	YF
Rousseau	R1	0	R	21	0	M	YF
Rousseau	R1	2881	G	59	0	M	YF
Rousseau	R1	2940	P	19	4	M	YF
Rousseau	R1	2959	R	15	0	M	YF
Rousseau	R1	2974	G	10	0	M	YF
Rousseau	R1	2984	P	18	2	M	YF
Rousseau	R1	3002	G	22	0	M	YF
Rousseau	R1	3024	R	25	2	M	YF
Rousseau	R1	3049	G	55	2	M	YF
Rousseau	R1	3104	R	16	2	M	YF
Rousseau	R1	3120	G	33	2	M	YF
Rousseau	R1	3153	R	56	0	M	YF
Rousseau	R1	3209	P	25	0	M	YF
Rousseau	R1	3234	R	15	0	M	YF
Rousseau	R1	3249	G	17	0	M	YF
Rousseau	R2	0	R	4	2	M	YF
Rousseau	R2	4	P	29	0	M	YF
Rousseau	R2	33	G	12	0	M	YF
Rousseau	R2	45	R	25	2	M	YF
Rousseau	R2	70	G	49	2	M	YF
Rousseau	R2	119	R	11	2	M	YF
Rousseau	R2	130	G	23	2	M	YF
Rousseau	R2	153	P	38	2	M	YF
Rousseau	R2	191	R	13	2	M	YF
Rousseau	R2	204	G	27	0	M	YF
Rousseau	R2	231	P	12	0	M	YF
Rousseau	R2	243	G	28	0	M	YF
Rousseau	R2	271	R	28	2	M	YF
Rousseau	R2	299	G	33	0	M	YF
Rousseau	R2	332	P	16	0	M	YF
Rousseau	R2	0	P	12	0	M	YF
Rousseau	R2	348	G	30	0	M	YF
Rousseau	R2	378	P	17	0	M	YF
Rousseau	R2	395	R	21	0	M	YF
Rousseau	R2	416	G	12	0	M	YF
Rousseau	R2	428	R	17	0	M	YF
Rousseau	R2	445	P	34	2	M	YF
Rousseau	R2	479	R	15	0	M	YF
Rousseau	R2	494	P	24	2	M	YF
Rousseau	R2	518	R	28	2	M	YF
Rousseau	R2	546	G	20	2	M	YF

Appendix 2F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Rousseau	R2	566	R	3	2	M	YF
Rousseau	R2	569	P	20	4	M	YF
Rousseau	R2	589	R	24	4	M	YF
Rousseau	R2	613	G	10	4	M	YF
Rousseau	R2	623	P	22	4	M	YF
F Trib	F1W	0	G	35	4	M	YF
F Trib	F1W	35	R	5	4	M	YF
F Trib	F1W	40	G	29	4	M	YF
F Trib	F1W	69	R	6	4	M	YF
F Trib	F1W	75	P	5	9	M	YF
F Trib	F1W	80	R	16	4	M	YF
F Trib	F1W	96	G	18	2	M	YF
F Trib	F1W	114	R	10	4	M	YF
F Trib	F1W	124	G	11	4	M	YF
F Trib	F1W	135	P	31	4	M	YF
F Trib	F1W	166	G	5	4	M	YF
F Trib	F1W	171	P	60	4	M	YF
F Trib	F1W	231	G	45	0	M	YF
F Trib	F1W	276	G	28	0	M	YF
F Trib	F1W	304	G	4	0	M	YF
F Trib	F1E	0	G	19	7	M	YF
F Trib	F1E	19	R	6	7	M	YF
F Trib	F1E	25	G	29	0	M	YF
F Trib	F1E	54	R	12	0	M	YF
F Trib	F1E	66	P	27	0	M	YF
F Trib	F1E	93	R	13	4	M	YF
F Trib	F1E	106	P	19	0	M	YF
F Trib	F1E	125	R	6	2	M	YF
F Trib	F1E	131	G	15	2	M	YF
F Trib	F1E	146	P	27	0	M	YF
F Trib	F1E	173	G	21	0	M	YF
F Trib	F1E	194	R	4	0	M	YF
F Trib	F1E	198	G	8	0	M	YF
F Trib	F1E	206	P	4	2	M	YF
F Trib	F1E	210	R	10	4	M	YF
F Trib	F1E	220	G	36	4	M	YF
F Trib	F1E	256	R	12	2	M	YF
F Trib	F1E	268	P	7	0	M	YF
F Trib	F1F	0	R	10	0	M	YF
F Trib	F1F	10	P	27	0	M	YF
F Trib	F1F	37	R	12	2	M	YF
F Trib	F1F	49	G	16	2	M	YF
F Trib	F1F	65	P	27	0	M	YF
F Trib	F1F	92	R	19	0	M	YF

Appendix 2F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
F Trib	F1F	111	G	13	0	M	YF
F Trib	F1F	124	P	24	0	M	YF
F Trib	F1F	148	R	11	2	M	YF
F Trib	F1F	159	G	18	2	M	YF
F Trib	F1F	177	R	13	4	M	YF
F Trib	F1F	190	P	12	2	M	YF
F Trib	F1F	202	R	13	0	M	YF
F Trib	F1F	215	G	14	0	M	YF
F Trib	F1F	229	P	11	2	M	YF
F Trib	F1F	240	R	23	0	M	YF
F Trib	F1F	263	P	25	0	M	YF
F Trib	F1F	288	P	18	2	M	YF
F Trib	F1F	306	R	86	0	M	YF
F Trib	F1F	392	G	11	2	M	YF
F Trib	F1F	403	P	16	2	M	YF
F Trib	F1F	419	R	16	2	M	YF
F Trib	F1F	435	P	18	0	M	YF
F Trib	F1F	453	C	11	0	M	YF
F Trib	F1F	464	P	38	0	M	YF
F Trib	F1F	502	R	5	0	M	YF
F Trib	F1F	507	P	5	0	M	YF
F Trib	F1F	512	R	6	0	M	YF
F Trib	F1F	518	P	14	0	M	YF
F Trib	F1F	532	C	4	0	M	YF
F Trib	F1F	536	P	36	0	M	YF
F Trib	F1F	572	C	2	0	M	YF
F Trib	F1F	574	P	10	0	M	YF
F Trib	F1F	584	P	23	0	M	YF
Pachena	P2	0	G	74	0	C	MF
Pachena	P2	74	R	40	0	C	MF
Pachena	P2	114	P	61	0	C	MF
Pachena	P2	175	G	69	0	C	MF
Pachena	P2	244	R	29	0	C	MF
Pachena	P2	273	G	67	0	C	MF
Pachena	P2	0	P	10	0	C	MF
Pachena	P2	340	R	25	0	C	MF
Pachena	P2	365	G	83	0	D	SH
Pachena	P2	448	P	32	0	D	SH
Pachena	P2	480	G	70	0	D	SH
Pachena	P2	550	G	60	0	D	SH
Pachena	P2	610	P	20	0	D	SH
Pachena	P2	630	G	85	0	D	SH
Pachena	P2	0	P	10	0	D	SH
Pachena	P2	715	R	12	0	C	MF

Appendix 2F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Pachena	P2	727	G	28	0	D	SH
Pachena	P2	755	R	8	0	D	SH
Pachena	P2	763	G	100	0	D	SH
Pachena	P2	863	G	37	0	M	YF
Pachena	P2	900	G	30	0	M	YF
Pachena	P2	930	P	13	0	M	YF
Pachena	P2	943	G	30	0	M	YF
Pachena	P2	973	R	57	0	M	YF
Pachena	P2	1030	G	110	0	D	SH
Pachena	P2	1140	R	30	0	D	YF
Pachena	P2	1170	G	70	0	M	YF
Pachena	P2	1240	G	60	0	M	YF
Pachena	P2	1300	G	55	0	M	YF
Pachena	P2	1355	P	10	0	M	YF
Pachena	P2	1365	G	20	0	M	YF
Pachena	P2	1385	P	46	2	M	YF
Pachena	P2	1431	G	14	0	M	YF
Pachena	P2	1445	P	23	0	M	YF
Pachena	P2	1468	R	19	0	D	SH
Pachena	P2	1487	G	38	0	D	SH
Pachena	P2	1525	P	25	0	D	SH
Pachena	P2	1550	G	27	0	D	SH
Pachena	P2	1577	P	21			
Pachena	P2	1598	R	29			
Pachena	P2	1627	G	36	0	D	PS
Pachena	P2	1663	P	25	0	D	PS
Pachena	P2	1688	R	27	0	D	PS
Pachena	P2	1715	G	10	0	D	PS
Pachena	P2	1725	P	13	0	D	SH
Pachena	P2	1738	R	16	0	D	SH
Pachena	P2	1754	P	33	0	D	SH
Pachena	P2	1787	G	87	0	D	SH
Pachena	P2	1874	P	18	0	M	MF
Pachena	P2	1892	G	21	0	M	MF
Pachena	P2	1913	P	8	0	M	MF
Pachena	P2	1921	R	2	0	M	MF
Pachena	P2	1923	G	11	0	C	MF
Pachena	P2	1934	P	10	0	C	MF
Pachena	P2	1944	G	29	0	C	MF
Pachena	P2	1973	P	7	0	C	MF
Pachena	P2	1980	R	13	0	C	MF
Pachena	P2	1993	G	16	0	C	MF
Pachena	P2	2009	P	34	0	C	MF
Pachena	P2	2043	R	6	0	C	MF

Appendix 2F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Pachena	P2	2049	P	37	2	C	MF
Pachena	P2	2086	G	26	2	C	MF
Pachena	P2	0	P	10	7	C	MF
Pachena	P2	2112	R	20	2	C	MF
Pachena	P2	2132	P	45	0	C	MF
Pachena	P2	2177	R	37	0	C	MF
Pachena	P2	2214	G	31	0	C	MF
Pachena	P2	2245	R	24	0	C	MF
Pachena	P2	2269	P	16	4	C	MF
Pachena	P2	2285	G	12	4	C	MF
Pachena	P2	2297	P	15	7	C	MF
Pachena	P2	2312	G	15	4	C	MF
Pachena	P2	2327	P	18	0	C	YF
Pachena	P2	2345	R	39	0	C	MF
Pachena	P2	2384	G	66	7	D	SH
Pachena	P6	0	P	50	2	M	YF
Pachena	P6	50	G	20	2	M	YF
Pachena	P6	70	P	12	2	M	YF
Pachena	P6	82	G	24	2	M	YF
Pachena	P6	106	P	9	4	M	YF
Pachena	P6	115	G	25	4	M	YF
Pachena	P6	140	R	4	0	M	YF
Pachena	P6	144	G	16	0	M	YF
Pachena	P6	160	R	5	0	M	YF
Pachena	P6	165	P	14	2	C	YF
Pachena	P6	179	R	7	0	C	YF
Pachena	P6	186	G	28	0	M	YF
Pachena	P6	214	R	4	7	C	YF
Pachena	P6	218	G	36	7	C	YF
Pachena	P6	254	R	5	9	C	YF
Pachena	P6	259	P	19	7	C	YF
Pachena	P6	278	R	4	4	M	YF
Pachena	P6	282	P	23	4	M	YF
Pachena	P6	305	G	16	7	M	YF
Pachena	P6	321	R	7	4	M	YF
Pachena	P6	328	P	58	4	M	YF
Pachena	P6	386	G	10	0	M	YF
Pachena	P6	396	R	8	2	M	YF
Pachena	P6	404	P	11	4	M	YF
Pachena	P6	415	R	8	7	M	YF
Pachena	P6	423	G	17	2	M	YF
Pachena	P6	440	G	20	4	M	YF
Pachena	P6	460	G	40	4	M	YF
Pachena	P6	500	G	29	7	M	YF

Appendix 2F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Pachena	P6	529	P	7	2	M	YF
Pachena	P6	536	G	12	2	M	YF
Pachena	P6	548	P	10	2	M	YF
Pachena	P6	558	G	12	2	M	YF
Pachena	P6	570	R	14	2	M	YF
Pachena	P6	584	G	20	7	M	YF
Pachena	P6	604	R	6	4	M	YF
Pachena	P6	610	G	11	4	M	YF
Pachena	P6	621	R	3	4	M	YF
Pachena	P6	624	G	11	7	M	YF
Pachena	P6	635	R	3	7	M	YF
Pachena	P6	638	G	28	2	M	YF
Pachena	P6	666	R	14	0	M	YF
Pachena	P6	680	G	8	0	M	YF
Pachena	P6	688	P	10	0	M	YF
Pachena	P6	698	R	3	4	M	YF
Pachena	P6	701	G	25	4	M	YF
Pachena	P6	726	G	34	7	M	YF
Pachena	P6	760	R	13	9	M	YF
Pachena	P6	773	G	13	7	M	YF
Pachena	P6	786	R	15	4	M	YF
Pachena	P6	801	P	12	0	M	YF
Pachena	P6	813	G	9	0	M	YF
Pachena	P6	822	R	10	2	M	YF
Pachena	P6	832	G	13	2	M	YF
Pachena	P6	845	P	13	0	M	YF
Pachena	P6	858	G	27	0	M	YF
Pachena	P6	885	R	5	7	M	YF
Pachena	P6	890	G	8	2	M	YF
Pachena	P6	898	R	6	4	M	YF
Pachena	P6	904	P	25	0	M	YF
Pachena	P6	929	R	16	4	M	YF
Pachena	P6	945	P	11	0	M	YF
Pachena	P6	956	G	5	0	M	YF
Pachena	P6	961	R	4	0	M	YF
Pachena	P6	965	G	13	4	M	YF
Pachena	P6	978	R	9	7	M	YF
Pachena	P6	987	G	26	0	M	YF
Pachena	P6	1013	R	4	0	M	YF
Pachena	P6	1017	G	15	7	M	YF
Pachena	P6	1032	P	4	4	M	YF
Pachena	P6	1036	R	7	4	M	YF
Pachena	P7	0	G	28	9	M	YF
Pachena	P7	28	R	7	9	M	YF

Appendix 2F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Pachena	P7	35	G	28	4	M	YF
Pachena	P7	63	P	15	9	M	YF
Pachena	P7	78	P	5	7	M	YF
Pachena	P7	83	G	13	4	M	YF
Pachena	P7	96	R	7	2	M	YF
Pachena	P7	103	G	39	0	M	YF
Pachena	P7	142	R	9	0	C	YF
Pachena	P7	151	G	20	0	C	YF
Pachena	P7	0	P	15	0	C	YF
Pachena	P7	171	P	2	0	C	YF
Pachena	P7	173	G	24	0	C	YF
Pachena	P7	197	R	9	0	C	YF
Pachena	P7	206	G	39	7	C	YF
Pachena	P7	245	P	3	7	C	YF
Pachena	P7	248	G	37	7	M	YF
Pachena	P7	285	P	11	7	M	YF
Pachena	P7	296	P	12	9	M	YF
Pachena	P7	308	R	9	9	M	YF
Pachena	P7	317	G	17	9	D	SH
Pachena	P7	334	P	13	9	D	YF
Pachena	P7	347	G	23	9	M	YF
Pachena	P7	370	G	8	9	M	YF
Pachena	P7	378	R	7	9	M	YF
Pachena	P7	385	G	22	7	M	YF
Pachena	P7	407	R	6	7	M	YF
Pachena	P7	413	G	7	7	M	YF
Pachena	P7	420	P	9	4	M	YF
Pachena	P7	429	R	6	4	M	YF
Pachena	P7	435	P	9	4	M	YF
Pachena	P7	444	R	6	7	M	YF
Pachena	P7	450	G	9	9	M	YF
Pachena	P7	459	R	11	9	M	YF
Pachena	P7	470	G	18	9	M	YF
Pachena	P7	488	P	6	9	M	YF
Pachena	P7	494	G	20	7	M	YF
Pachena	P7	514	R	6	7	M	YF
Pachena	P7	520	P	8	9	M	YF
Pachena	P7	528	R	4	9	M	YF
Pachena	P7	532	G	5	9	M	YF
Pachena	P7	537	R	14	9	M	YF
Pachena	P7	551	G	24	7	M	YF
Pachena	P7	575	R	13	7	M	YF
Pachena	P7	588	P	6	9	M	YF
Pachena	P7	594	R	16	9	M	YF

Appendix 2F continued.

Sub Basin	Reach	Reach Loc.[1]	Habitat Type[2]	Habitat Length[3]	Canopy Code[4]	Riparian Type[5]	Riparian Stage[6]
Pachena	P7	610	G	9	9	M	YF
Pachena	P7	619	P	4	9	M	YF
Pachena	P7	623	G	11	9	M	YF
Pachena	P7	634	R	10	9	M	YF
Pachena	P7	644	P	6	9	M	YF
Pachena	P7	650	R	16	9	M	YF
Pachena	P7	666	G	7	9	M	YF
Pachena	P7	673	R	32	9	M	YF
Pachena	P7	705	G	20	9	M	YF
Pachena	P7	725	R	27	9	M	YF
Pachena	P7	752	G	20	9	M	YF
Pachena	P7	772	P	5	9	M	YF
Pachena	P7	777	G	21	7	M	YF
Pachena	P7	798	R	7	4	M	YF
Pachena	P7	805	R	3	2	M	YF
Pachena	P7	808	P	9	7	M	YF
Pachena	P7	817	R	5	7	M	YF
Pachena	P7	822	G	37	4	M	YF
Pachena	P7	859	R	31	7	M	YF
Pachena	P7	890	P	4	7	M	YF
Pachena	P7	894	G	13	7	M	YF
Pachena	P7	907	C	7	7	M	YF
Pachena	P7	914	R	23	4	M	YF
Pachena	P7	937	G	8	7	M	YF
Pachena	P7	945	P	9	4	M	YF
Pachena	P7	954	G	14	7	M	YF
Pachena	P7	968	P	7	7	M	YF

[1] Reach location (in meters); denotes the distance upstream from the lower reach break.

[2] Habitat types are: pool (P), riffle (R), glide (G), cascade (C) and other (O).

[3] Habitat length is the length (m) of the habitat unit being assessed.

[4] Canopy code is: 0 = 0-20%; 2 = 21-40%; 4 = 41-70%; 7 = 71-90%; 4 = 71-90%; 9 = > 90%

[5] Riparian type denotes the dominant type within 20 m of the stream: D=deciduous, C=coniferous, M=mixed, N = largely bare, S =shrub / herb and G = grasslands / bog.

[6] Riparian stage of the dominanat vegetation: IN = non vegetated, SH = shrub / herb, PS = pole sapling, YF = young forest and MF = mature forest.

Appendix 3. Diagnostic summary of salmonid habitat condition for Pachena River watershed. Analysis based on FHAP conducted by Morgan (2002).

Stream	Reach Number	% Pools[1]		Pool Frequency[2]		Holding Pools[3]		% Wood in Pools[4]		% Boulder in Riffles[5]		% Overhead Cover[6]		Gravel Quantity[7]		Gravel Quality[8]		Off-channel Habitat[9]	
		Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating	Value	Rating
Shaky Bill's	SB	14.7	Poor	8.8	Good	15.7	Good	12.7	Fair	3.1	Poor	17.9	Fair	43.9	Good	24	Fair	3	Good
Trib U	U1	61.5	Good	7.3	Good	24.6	Good	3.8	Poor	0.0	Poor	17.2	Fair	35.7	Good	57	Poor	1	Fair
Trib U	U2	36.5	Fair	6.0	Good	12.9	Good	10.0	Fair	1.3	Poor	31.9	Good	39.4	Good	2	Good	0	Poor
Trib F	I1	65.9	Good	2.8	Good	25.2	Good	14.3	Fair	0.0	Poor	20.7	Good	78.2	Good	4	Good	4	Good
Trib F	F1	70.9	Good	3.9	Good	28.3	Good	4.3	Poor	0.0	Poor	10.0	Poor	64.8	Good	9	Good	2	Good
Trib E	E1	48.0	Good	3.5	Good	24.2	Good	16.6	Fair	0.0	Poor	73.1	Good	53.5	Good	28	Poor	3	Good
Rousseau	RM	74.4	Good	9.9	Good	6.2	Good	0.6	Poor	0.1	Poor	9.9	Poor	64.1	Good	30	Poor	6	Good
Rousseau	RMC	70.1	Good	3.0	Good	18.1	Good	5.8	Fair	3.3	Poor	19.6	Fair	56.2	Good	12	Good	9	Good
Trib H	H1	44.5	Good	7.3	Good	17.1	Good	11.1	Fair	0.0	Poor	28.6	Good	38.2	Good	33	Poor	0	Poor
Pachena	P2	24.7	Poor	8.4	Good	6.7	Good	2.6	Poor	0.0	Poor	5.8	Poor	46.9	Good	15	Good	0	Poor
Pachena	P6	57.2	Good	3.4	Good	38.8	Good	10.1	Fair	0.0	Poor	39.8	Good	61.8	Good	31	Poor	6	Good
Pachena	P7	40.7	Good	5.1	Good	18.5	Good	4.2	Poor	0.3	Poor	42.4	Good	42.8	Good	26	Poor	4	Good
Trib G	G1	11.3	Poor	8.2	Good	22.9	Good	42.7	Good	4.4	Poor	45.5	Good	27.0	Good	1	Good	0	Poor

[1] Value is percent pools (%P = total pool area / total wetted area). Poor < 30%, Fair <= 40%, Good > 40% (for gradients 2-5%).

[2] Value is number of bankfull widths per pool (PF = mean bankfull width / total number of pools). Good < 10, Fair <= 15, Poor > 15.

[3] Value is the number of pools per 1000 m for which the deep pool cover > 0 and maximum depth x % total instream cover >= 30. Poor < 1, Fair <= 2, Good > 2.

[4] Value is the mean percent wood cover in pools. Poor < 6%, Fair <= 20%, Good > 20%.

[5] Value is the percent boulder cover in riffles. Poor < 10%, Fair <= 30%, Good > 30%.

[6] Value is the percent overhead cover in pools. Poor < 10%, Fair < 20%, Good > 20%.

[7] Value reflects the percentage of spawining gravel in all habitat areas of each reach. Poor < 10%, Fair <= 25%, Good >25%

[8] Value is the percent of substrate in <2 mm category (fines). Poor > 25%, Fair >15% and uncompacted, Good < =15% and uncompacted.

[9] Value is the number of off-channel habitats. Poor < 1, Fair <= 2, Good > 2.

PHOTOPLATES



Photo 1. Reach S1. Upstream end of riffle at 880 m. Looking downstream.



Photo 2. Reach S2. Glide at 235 m. Looking upstream.



Photo 3. Reach S4. Glide at 450 m at confluence with South Sarita River on left bank (right side of photo). Looking upstream.



Photo 4. Reach S4. Glide at 400 m with large cobble ("bowling alley"). Clearcut on left bank. Looking upstream.



Photo 5. Reach F13. Glide at 930 m. Looking upstream.



Photo 6. Reach F14. Riffle at 170 m. Looking upstream.



Photo 7. Reach F15. Pool at 170 m. Looking downstream.



Photo 8. Reach F16. Riffle at 528 m. Looking upstream.



Photo 9. Reach F17. Riffle at 1,058 m. Looking downstream.



Photo 10. Reach SS20. Dry glide at 750 m. Looking downstream.



Photo 11. Reach SS20. Dry glide at 415 m. Looking downstream. Former side channel which is now the mainstem of the South Sarita River.



Photo 12. Reach SS21. Bedrock pool at 800 m with Rick Nookemus. Looking upstream.



Photo 13. Reach SS27. Riffle at 366 m. Looking upstream.



Photo 14. Reach SS30. Riffle at 166 m. Looking upstream.



Photo 15. Reach SS31. Riffle at 254 m. Looking upstream.



Photo 16. Reach SC34. Riffle at 285 m. Looking upstream.



Photo 17. Reach SC35. Isolated pool at 1,060 m. Looking upstream. Only three small such pools over a distance of 350 m, where flow goes subsurface.

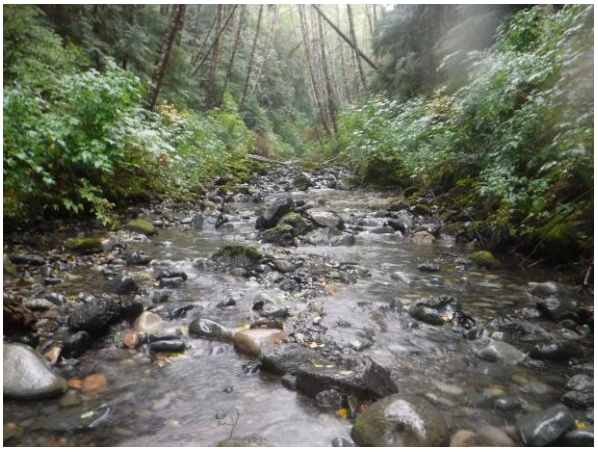


Photo 18. Reach SC36. Riffle at 276 m. Looking upstream.



Photo 19. Reach SC37. Small isolated pool at 718 m under tip of LWD structure. Looking downstream. Flow is totally subsurface for 263 m.



Photo 20. Reach H50. Riffle at 400 m. Looking upstream.

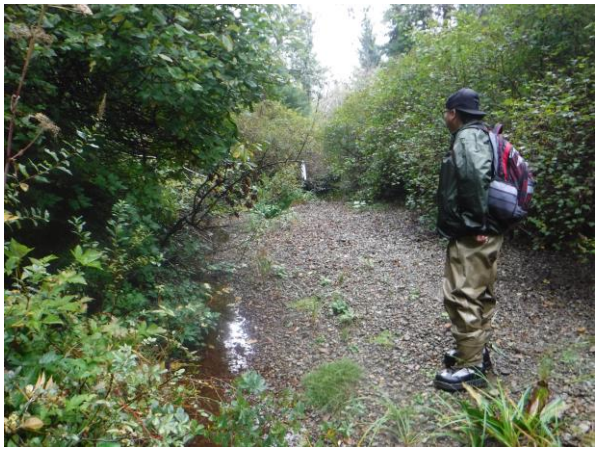


Photo 21. Reach S1N. Glide at 55 m. Looking upstream with Amber Bowes.



Photo 22. Reach S1S. Pool at 20 m. Looking downstream.



Photo 23. Reach S2. Riffle at 369 m. Looking upstream.



Photo 24. Reach R1. Riffle at 3104 m. Looking downstream.



Photo 25. Reach R2. Bedrock pool 153 m. Looking downstream.



Photo 26. Reach F1W. Cross channel log across pool at 75 m. Looking upstream.



Photo 27. Reach F1E. Pool at 66 m. Looking upstream. With Amber, Nate and Rick.



Photo 28. Reach F1F. Pool at 288 m. Looking upstream.



Photo 29. Reach P2. Suspended cross channel cedar over pool at 1,525 m. Looking upstream.



Photo 30. Confluence of Reach P5 and Reach R1. Large cedar across outflow of wetland in Reach P5. Looking at right bank.



Photo 31. Reach P6. Glide at 832 m. Looking upstream.



Photo 32. Reach P7. Glide at 752 m. Looking downstream.