Lower Coquitlam River Fish Habitat Assessment (Level 1) - 2014

Coquitlam & Port Coquitlam, BC

Prepared for:
City of Coquitlam, Coquitlam River Watershed Roundtable, Pacific Salmon Foundation, Metro Vancouver and British Columbia Institute of Technology

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Executive Summary

Level 1 Fish Habitat Assessment Procedure (FHAP) evaluations were conducted on the mainstem of the lower Coquitlam River, from the Coquitlam Dam to tidewaters, in Coquitlam and Port Coquitlam, BC, during the late summer of 2014. Off-channel habitat was not generally included in this assessment. This assessment was undertaken to establish baseline data of the habitat quantity and quality as it pertains to salmonid production as well as provide a training exercise in L1FHAP for second-year technical students in the Fish, Wildlife and Recreation program at British Columbia Institute of Technology. The preliminary evaluation of habitat conditions showed that for this stream, while much of the habitat is of high quality, there are some deficiencies and areas of concern. While the upper reaches studied contained high quality boulder and riffle habitats, the lower reaches contained more spawning gravel. There were limited amounts of large woody debris habitats throughout the Coquitlam River which probably reflects the historic logging, damming and diking in the area. This report summarizes the data collected and will serve as a reference resource for future evaluations of how to best optimize fish production in the Coquitlam River.

A training program was developed for the Fish Wildlife and Recreation Program (FWR) at the British Columbia Institute of Technology (BCIT). A classroom presentation was conducted with an associated one-day field instruction on campus. The students then conducted a supervised 2-day L1FHAP of a reach in the Coquitlam River.

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GLOSSARY

bankfull channel width - the horizontal distance perpendicular to the channel axis between the tops of the stream banks on opposite sides of the stream

disturbance indicators - indicators of recent channel disturbances that may lower salmonid habitat values which include changes to bed characteristics, channel patterns, banks and large woody debris

habitat unit - The level 1 fish habitat assessment divides each stream reach into strata consisting of distinct, naturally-occurring habitat units. Habitat units were classified as pools, riffles, glides or cascades based on differences in water velocity, morphology, local topography and substrate size.

large woody debris (LWD) - a piece of dead wood within the bankfull channel width which exceed 2 m in length and 10 cm in diameter. Functional LWD (within the wetted width) is defined as that which influences channel geomorphology.

pool frequency - pool frequency or mean pool spacing per bankfull width was calculated by dividing total reach length by the number of pools within a reach multiplied by mean bankfull width

potential barriers - partial or complete blockages to movement by juvenile or adult salmonids such as culverts and disused bridges, landslides or bank sloughing, log jams, falls, cascades or chutes, and gradient barriers

spawning habitat - areas where water depths are greater than 15 cm and water velocities between 0.3 and 1.0 m/s during the spawning season. For anadamous salmon, gravel patches should be 1-2 m^2 in area with particle size between 10-150 mm. For resident trout and char, spawning gravel patches should be greater than 0.1 m^2 in areas with particle size between 10-75 mm.

stream reach - a homogeneous section of stream channel, characterized by uniform discharge, gradient, channel morphology, channel confinement, and streambed and bank material

wetted width - the horizontal distance perpendicular to the channel axis from water's edge on one side to water's edge on the opposite side

Source: Johnston and Slaney 1996

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Ladell, J., N. Mackinnon, D.J.F. McCubbing and C. Fell. 2015. Lower Coquitlam River Fish Habitat Assessment (Level 1), 2014. Report prepared for City of Coquitlam, Coquitlam River Watershed Roundtable, Pacific Salmon Foundation, British Columbia Institute of Technology, and Metro Vancouver. 156 p.

1.0 Introduction

The Coquitlam River watershed is a 17 km-long, partially-urbanized watershed that drains 261 km^2 of the North Shore mountains in the lower mainland, British Columbia (Figure 1). A dam on the Coquitlam River, constructed in 1914 and currently operated by BC Hydro, is located approximately 18 km upstream from its confluence with the Fraser River. The dam separates the watershed into the upper and lower Coquitlam River drainages. The lower Coquitlam River drainage is 79 km^2 in area and includes over 30 tributaries. The largest tributary, Or Creek, drains 22 km^2 of the eastern slope of the watershed. Downstream of the dam, the mainstem of the Coquitlam River has had the majority of its drainage patterns altered by logging and, more recently, development. A reasonably-intact riparian linear corridor exists along much of the Coquitlam River although this corridor becomes less intact as the river nears the central business district of Port Coquitlam.

In spite of the extensive impacts of urbanization on the river, the Coquitlam River supports 24 species of fish. There have, historically, been strong populations of Pacific salmon, trout, and char but these largely collapsed during the years of gravel mining from the river c.a. 1950's-1960's. A number of initiatives have been undertaken over the last 30 years to restore these stocks. These initiatives include both off-channel habitat construction and improved flow regimes from the Coquitlam Reservoir and dam. As part of BC Hydro's Coquitlam-Buntzen Water Use Plan (WUP) fish flows through the dam have been increased to facilitate fish production. Flows are regulated to balance trade-offs between power generation, drinking water, and fisheries values. As part of the WUP, fish production and fish habitat metrics have been monitored extensively by BC Hydro (McNair 2012; Schick et al. 2014).

Currently there are measurable abundances of coho salmon (*Oncorhynchus kisutch*), pink salmon (*O. gorbuscha*), chum salmon (*O. keta*), and steelhead trout (*O. mykiss*). Chinook salmon (*O. tshawytscha*) occur in low abundances but appear to be increasing (Schick et al. 2013). In addition to natural production of salmonids in the watershed, there are a number of fish hatcheries (Coquitlam River Hatchery, River Springs Hatchery, Hoy Creek Optimist Hatchery) that produce salmon and trout. Various off-channel habitat projects (Grant's Tomb, Swoboda Channel, Grist Channel, Pitt River Rd. Compensation Ponds, etc.) also increase production in the lower watershed.

Other species of fish inhabiting Coquitlam River, downstream of the dam include longnose dace (*Rhinichthys cataractae*), prickly sculpin (*Cottus asper*), redside shiner (*Richardsonius balteatus*), Pacific lamprey (*Entosphenus tridentatus*), and three-spine stickleback (*Gasterosteous aculeatus*).

There have been numerous fish and fish habitat studies carried out by a variety of agencies (BC Ministry of Environment, Fisheries and Oceans Canada, BC Hydro, Metro Vancouver) on the lower Coquitlam River since the late 1970s. Most recently, assessments carried out through the WUP process have been the most comprehensive to date.

Because of the anthropogenic changes to the main channel and riparian areas of the mainstem Coquitlam River, a quantification of the habitat capacity is needed to undertake prescriptions to further restore the degraded aspects of this stream. One such model that inventories the habitat quality of streams is the Level 1 Fish Habitat Assessment Procedure. In 2014 the city of Coquitlam determine that such an assessment would be appropriate in order to maintain and enhance the viability of the community. Through the City of Coquitlam, and on behalf of a collaborative organization, the Coquitlam River Watershed Roundtable, the Pacific Salmon Foundation and Metro Vancouver provided grant funding to initiate a Level 1 Habitat Assessment for the lower Coquitlam River.

The project facilitator, InStream Fisheries Research Inc., was asked to:

- Provide a field-based Level 1 Fish Habitat Assessment Procedure (FHAP) survey on the Coquitlam River below the dam.

- Develop and conduct a Level 1 Fish Habitat Assessment classroom and field-training course for BCIT Fish, Wildlife and Recreation Program students and City of Coquitlam employees.

2.0 Methods

2.1 Level 1 FHAP

The habitat assessment was prepared in accordance with guidelines developed in the Fish Habitat Assessment Procedures Manual (FHAP), Watershed Restoration Technical Circular 8 (Johnston and Slaney 1996). FHAP is a multi-stepped approach and the fish habitat assessment procedure evaluates and quantitatively assesses forested, salmonid bearing streams. The procedure also identifies fish species at risk, generates a quantitative description of fish habitat conditions, evaluates fish habitat conditions, and identifies opportunities for effective fish habitat rehabilitation within a watershed (Johnston and Slaney 1996).

The first step in the FHAP is to generate an overview summary of the existing fish-species information in the watershed of interest. BC Hydro has been carrying out adult and juvenile salmonid surveys in the lower Coquitlam River since 2000 (Schick et al. 2013) and this provided a baseline information set for this project. These studies have shown that coho, chum and pink salmon, and steelhead trout, escapements to the Coquitlam River have all been increasing to levels above that necessary to seed the available habitat. Chinook salmon escapements, while low, have been increasing since 2007.

Level 1 FHAP field survey was carried out in the late summer of 2013 on the Coquitlam River from its confluence with the Fraser River to the fish fence near Grant's Tomb. This work took place over a total distance of 20.4 km of river. In order to stratify the sampling, the 20.4 km was divided into 5 reaches that largely reflect the rivers variations in channel morphology.

Reach-0, the most downstream reach, is located south of Pitt River Road and is highly influenced by tidal waters from the Fraser River. It is the lowest gradient of all of the study reaches and, unlike the other reaches has a stream-bed composition that is dominated by sand and silt. In contrast, Reach-4 is located near Coquitlam Dam and is the upper most reach comprising a high-gradient, coarse-sediment stream channel. Reach-2 was also divided into two sub-reaches in order to take into account to the respective-differing surrounding land uses. In short, Reach-2b is located alongside gravel mining operations while 2a is located within a more residential area. The five reaches vary in length, from the smallest at 1908 m to the largest at 4131 m. Although the Coquitlam River is highly constrained either naturally or due to development and diking, its riparian areas consist of a fairly vegetated riparian corridor. The river does pass under multiple road and pedestrian bridges but has avoided being culverted unlike many of its smaller tributaries. There are also numerous artificially constructed side channels and spawning channels along the river, especially upstream near the dam.

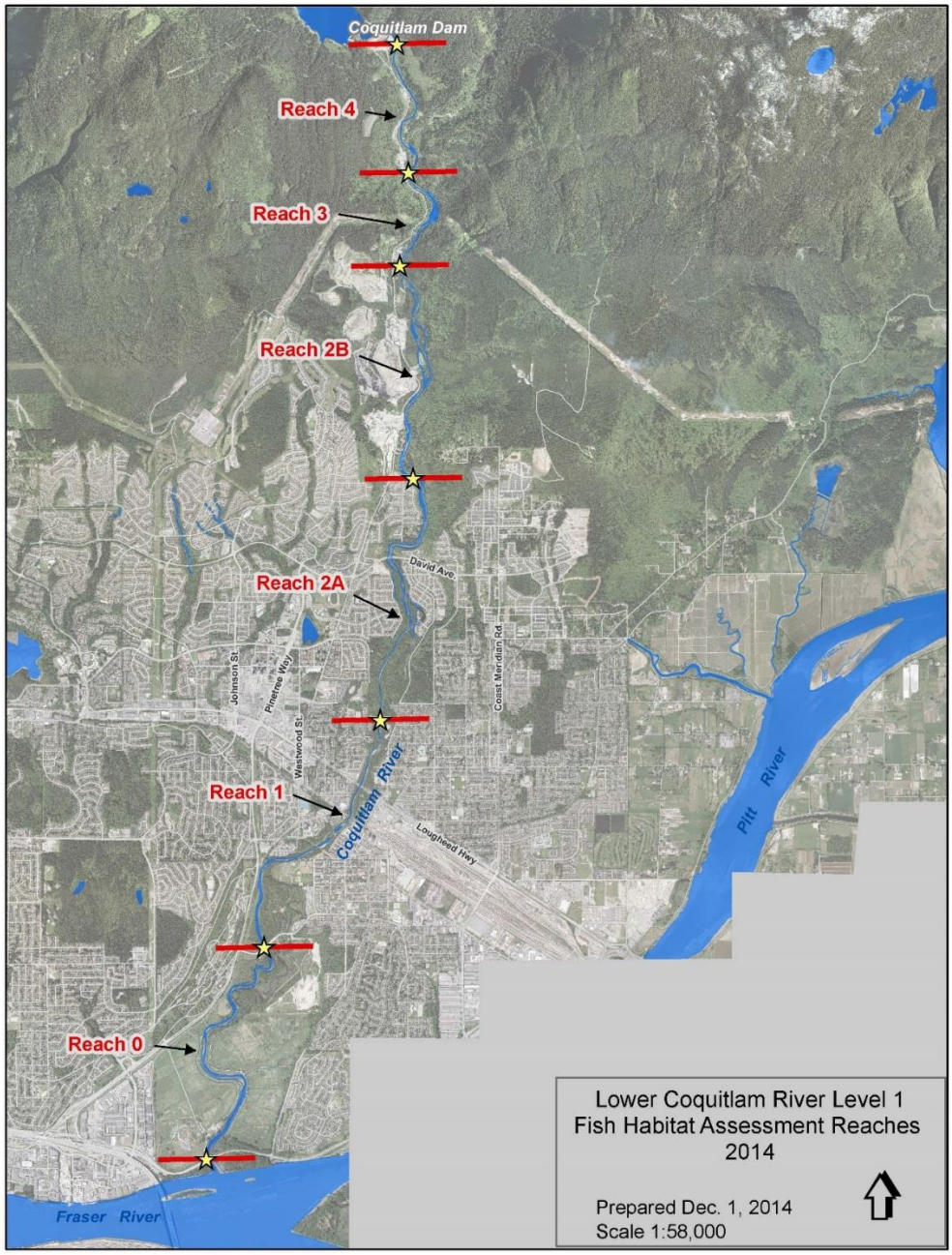


Figure 1. Map of the lower Coquitlam River study area and its defined study reaches.

The FHAP was undertaken as follows. Each reach was divided into hydraulic units that were categorized and separated into riffles, pools, cascades and glides. Physical measurements of bankfull width, wetted width, bankfull depth, mean wetted depth, maximum pool depth and residual pool depth where made with meter sticks, while gradient and unit length were made using multi-purpose rangefinder (accurate to 0.1 m).

The total amount of large woody debris (LWD) was counted within the bankfull width. To be counted, a piece of wood needs to exceed 2 m in length and 10 cm in diameter. Functional wood (within the wetted width), defined as that which influences channel geomorphology, was also counted. The functional LWD was further categorized into size classes of 10-20 cm diameter, 20-50 cm diameter, and >50 cm diameter. Within-reach large-wood numbers were then compared to diagnostics table values (Table 5, Johnston and Slaney 1996) and rated accordingly. In order for the reach to gain a rating of “good” salmonid habitat, a threshold of two pieces of LWD per bankfull width must be available. This threshold has been found to be accurate in streams where bankfull widths do not exceed 15 m. In smaller streams (<15 m bankfull) LWD on banks will influence channel hydraulics. However, in larger streams/rivers where bankfull widths are greater than 15 m, the LWD sitting high on the banks may have limited influence on channel hydraulics. Slaney and Andusak (2003) suggest that in larger streams/rivers functional LWD-per-bankfull width should be used as primary diagnostic for LWD. These criteria were used to evaluate LWD within the lower Coquitlam watershed.

Another diagnostic metric, calculated for each reach, was pool frequency or mean pool spacing per bankfull width. This was calculated by dividing total reach length by the number of pools within a reach multiplied by mean bankfull width. In the diagnostics table found in Johnston and Slaney (1996), a value of less than “2” is considered to be good salmonid habitat, but similar to LWD, this value is expected for streams of bankfull widths less than 15 m. In larger streams/rivers a value between 5-7 bankfull widths-between-pools was seen as close to the natural state of salmonid habitat (Montgomery et al. 1995; Myers and Swanson 1997). Diagnostics values for pool spacing were calculated based on the bankfull width of the stream in question.

Other parameters measured in the assessment included available cover, off-channel habitat, disturbance indicators, riparian vegetation, and substrate type and size. Off-channel habitat is important as it may serve as refuge or rearing areas for fish during times of high flows (Johnston and Slaney 1996) or overwintering habitat. It is important to note the accessibility of these channels to fish as isolated channels could be reconnected as a restoration project. However, for this study, we only assessed off-channel habitat located less than 5m from the mainstem perimeter.

GPS points were recorded at each end of the reaches. Upstream and downstream digital photographs were also taken of each unit as a record of location and a visual aid.

3.0 Results

The Coquitlam River was divided into reaches based on a previous BC Hydro Instream Flow Needs (IFN) investigations (BC Hydro 2003). Beginning at the Fraser River (Reach-0), reaches were numbered in ascending order upstream to the fish fence by Grant's Tomb (Reach-4). The reaches sampled ranged in length from 1908 m (Reach-3) to 4131 m (Reach-1). By using average stream-widths and unit lengths to calculate wetted area, the total wetted area sampled was 486,570 m^2, with Reach-4 being the smallest at 32,450 m^2 and Reach-0 the largest at 150,423 m^2.

These habitat assessments were carried out from July 21st to August 29th, 2014.

3.1 Reach-0

Reach-0, the most downstream reach, extends upstream from the Fraser River to the uppermost extent of the tidally-influenced zone. It extended 4015 m upstream, ending just above the Hoy Creek confluence (Figure 1). Reach-0 had an average gradient of 0% and a mean bankfull width and wetted width of 34.4 m and 29.1 m, respectively (Table 1). The total wetted area was 150,423 m^2. Reach-0 was composed of 2% (143 m) riffle, 13% (880 m) pool, and 85% (2993 m) glide (Table 2).

Pool frequency was low at 11.7 average-channel-widths between pools. Total LWD was the highest of all the reaches at 3.0 pieces per channel width, with functional LWD at 2.7 pieces per channel width (Table 1).

Fine substrates dominated the stream bottom in this reach (91%), with small gravel being the subdominant substrate (3% small gravel, 6% large gravel). Cover within the reach was provided primarily by overhanging vegetation (61%), and deep pools (24%).

Spawning habitat was found in 13% of the habitat units. Isolated spawning pockets were found in 3% of the units, while high quality spawning habitat was found for anadromous/resident species in 9% of the units. Disturbances were found in 38% of the units with eroded banks and pilings being most dominant.

3.2 Reach-1

The longest unit, Reach-1, extends 4,130 m upstream from the uppermost extent of the tidally-influenced zone. Reach-1 was composed of 54% glide (2,242 m), 35% riffle (1458 m), and 10% pool (430 m) (Table 2). Mean bankfull width was 8.6 m and mean wetted width was 7.5 m. Total wetted area was 8,2607 m². There was a mean bankfull depth of 0.83 m and a mean gradient of 0.2% (Table 1).

Of the habitat units consisting of pools, Reach-1 had the overall best rating among all reaches when it came to mean pool spacing per channel width with a 15.2. This reach also possessed the most pieces of LWD, as well as pieces of functional LWD per channel width at 2.2 and 2.0 (Table 1).

In the units where cover was observed, overhanging vegetation was dominant (71%). The rest of the units were dominated by boulders (21%), deep-pools (5%), instream vegetation (1%), and cut-banks (1%). Where overhanging vegetation was dominant, it provided a mean percent cover of 4.6% (Figure 3).

The main substrates were cobbles at 48% (39% small cobble, 9% large cobble) with gravels at 33% (all large gravel), boulders at 13%, and sands, silts, clays or fine organic materials at 6% (Figure 5).

Spawning habitat was found in 44% of the units. Isolated spawning pockets for anadromous salmon was most common being found in 20% of the units. Isolated pockets were also found for resident species (2%) and anadromous/resident species (8%). Ten percent of sites with spawning habitat were considered to be of high quality for anadromous species (4%) and anadromous/resident species (6%) (Figure 7). Disturbances were found in 20% of the units with not one disturbance indicator being dominant (Table 3).

3.3 Reach-2a

Reach-2 was divided into two sub-reaches in order to take into account the surrounding land uses, with Reach-2a being located within a more urbanized area downstream of the gravel mining area located on the western side of the river valley. This reach extends 3,915 m upstream from Reach-1 having a gradient of 0.8%. Mean bankfull width and wetted width were 24.4 m and 21.6 m, respectively (Table 1). The total wetted area was 82,153 m^2, which was composed of 70% (2,630 m) riffle and 30% (1,284 m) glide (Table 2).

No pool habitat was identified within in this reach. A total of 1.0 pieces of LWD per channel width was observed, while 0.6 pieces were functional LWD. The dominant substrates here were cobbles and boulders (2% small cobble, 53% large cobble, 43% boulders), and a small amount of large gravel was also present (2%).

Cover within the reach was provided mainly by overhanging vegetation (50%) and boulders (49%). Suitable spawning habitat was found in 39% of the 29 total habitat units.

Isolated spawning pockets were found for resident species (2%), anadromous species (20%), and both anadromous and resident species (8%). High quality spawning habitat was found for anadromous species (4%), and for both anadromous and resident species (6%). Few disturbances were found in this reach (8%), with no particular disturbance found to be dominant.

3.4 Reach-2b

Reach-2b is located parallel to extensive gravel mining operations along the west side of the valley. Approximately half way up the reach, Pritchett Creek drains into the river off of the eastern slope. In total, the reach was 4,055 m in length and had a gradient of 0.8% (Table 1). Mean bankfull width and wetted width were 26.9 m and 24.8 m, respectively. The total wetted area was 81,640 m^2, and it was composed of 76% (3,045 m) riffle, 0.14% (11 m) pool, 0.73% (26 m) cascade, and 23% (974 m) glide.

Pool frequency was very low (poor rating) (Table 4), at 151 channel widths between pools. Total LWD was at 2.1 pieces per channel width, with functional LWD at 1.3 pieces per channel width.

Large cobble and boulders dominated the substrate within the reach (54% and 40%), with small cobble and large gravel being the subdominant substrate types (5% and 2%).

Fish cover within the reach was comprised primarily of overhanging vegetation (55%) and boulders (45%). Spawning habitat was found in 59% of the reach. Also, 2% were isolated spawning pockets, suitable for anadromous species, 2% were isolated spawning pockets suitable for resident species, and 49% were isolated spawning pockets suitable for both anadromous and resident species. A total of 6% was high quality spawning habitat for both anadromous and resident species.

Disturbances were noted in 29% of the habitat units with elevated mid-channel bars being the most dominant.

3.5 Reach-3

Reach-3 extends from the upstream limit of the gravel mining area, a total of 1,908 m, to the Or Creek confluence, making it the shortest reach sampled in the river. Mean gradient for the reach was assessed at 1.3%.

Average bankfull width and wetted widths were 19.3 m and 18.6 m, respectively (Table 1). The total wetted area was 33,365 m^2, with 62% (3,045 m) consisting of riffle, 3% (45.6 m) of pool, 13% (176 m) of cascade, and 23% (460 m) of glide (Table 2).

Pool frequency had a low (poor rating) (Table 4) at 49 average channel widths between pools. A total of 1.2 pieces of LWD was present per channel width, 1.0 pieces were functional LWD (Table 1). Boulders and large cobbles were the dominant substrate, at 46% and 43%, respectively. Small cobble was the subdominant substrate at 11%. The majority of the cover was composed of overhanging vegetation (46%) and boulders (46%) with the rest of the coverage provided by deep pools (4%) and large woody debris (4%).

Salmonid habitat suitable for spawning was found in 69% of the habitat units. Isolated spawning pockets suitable for resident species were in 20% of the units. Suitable substrate and flow for anadromous species were in 3% of the habitat units and spawning pockets suitable for both resident and anadromous species were in 46% of the habitat units. Disturbances were mainly comprised of elevated mid channel bars and un-vegetated bars; they accounted for 11% of the habitat units.

3.6 Reach-4

Reach-4 is located directly upstream from Reach-3, beginning at the confluence of Or Creek. It extends upstream for 2378 m towards the Coquitlam Dam at a gradient of 1% (Table 1).

The mean bankfull width and wetted width were 16.3 m and 15.2 m, respectively, with a total wetted area of 32,450 m^2 (Table 1). This reach was composed of 62% (1,397 m) riffles, and 38% (977 m) glides.

No pool habitats were observed in this reach. Very little LWD was observed per channel width (0.9 total pieces, Table 1) with about 71% of the wood being functional LWD. The substrate morphology of Reach-4 is dominated by large boulders (55%) and large cobbles (33%). The rest of the substrates were small cobbles (8%) and sand/silt material (4%) distributed in low bars and planar bed sections (low bed load movement).

Cover within the reach was provided by boulders (56%) and overhanging vegetation (32%), the rest as large woody debris (12%).

Suitable spawning habitat was found in 49% of the units, where 8% were isolated pockets suitable for resident species, 6% were isolated pockets suitable for anadromous species, and 27% were isolated pockets suitable for both anadromous and resident species. A total of 8% were high-quality spawning habitat suitable for anadromous and resident species. Disturbances were found in 12% of the units, where elevated mid channel bars were the dominant disturbance.

4.0 Discussion

The intention of this study was to assess the basic fish habitat availability in the mainstem of the Coquitlam River between the dam at Coquitlam Reservoir and the Fraser River. The lower Coquitlam River is a highly urbanized watershed with a legacy of anthropogenic impacts. Logging of the riparian areas preceded the land development. In recent years there has been a recognition that past practices have degraded fish habitat and fish production. The legacies of river impoundment, development and other industrial activities have created a flow-regulated river with degraded habitat. Recent enhancement initiatives have served to reverse some of these declines and fish populations, in particular salmonids, are gradually rebounding.

In order to restore streams degraded by human activities, we need to, first, understand the habitat capacity. The Level 1 FHAP survey "provides a standard framework for identifying the needs and opportunities for fish habitat restoration through systematic resource assessments, and for prescribing and implementing effective activities to improve fishery and aquatic resources." (Johnson and Slaney 1996). The fish habitat assessment conducted in 2014 identified, in general, that the fish habitat condition in the surveyed reaches is poor (Table 4). Of particular concern is the lack of pools which are important holding areas for upstream migrating adult salmonids and important rearing areas for juveniles. Pool habitat can also provide cover. There is a limited amount of spawning gravel, especially in the lower reaches, and much of the suitable gravel has a high level of embeddedness.

Our survey found that there was a lack of cover available to fish from large instream woody debris throughout most of the river. LWD is almost always associated with complex fish habitat and refuge areas. The reduction in of flushing flows due to the dam and mature riparian forest suggests that LWD accumulations are unlikely to occur naturally. Most of the historical surveys have identified the reduced value of fish habitat (especially in the downstream reaches) resulting from a lack of LWD (Douglas 2007)

The primary aim of the baseline habitat survey is to identify habitat conditions in the surveyed reaches that may limit salmonid fish production (Johnson and Slaney 1996). This habitat assessment has identified some degraded habitat variables. Fish habitat could be improved through the implementation of reach specific restoration opportunities.

Broadly, the lower Coquitlam River is dominated by a riffle-glide channel type across all reaches excepting Reach-0 which is tidally influenced. In the upper reaches (primarily downstream of Or Creek) the channel is aggrading somewhat from tributary sediment inputs. Further downstream, however, the channel is stable or even degrading as is typical of dam headed rivers that have few natural upstream sediment inputs. These channel types can have moderate salmonid habitat value as compared to unimpacted systems.

Our assessment showed that there are few or temporary barriers to adult salmonid migration. There are some log jam barriers found in Reach-4 that may act as barriers to migration at low flows but these are likely temporary log jams that are subject to movement during fall/winter storm events. Reach-3 has extensive man-made rock weirs in various locations that may also serve to impede fish migration at low flows.

A deficiency of high quality pool habitat was identified as a cause for concern in the habitat assessment. Pool habitat provides rearing and holding habitat for all life stages of salmonids. Only 3 out of the 6 reaches surveyed had measurable pool habitat and the largest areas occurred in Reach-0. This tidally influenced lower reach undoubtedly provides excellent holding and rearing habitat for salmonids in the Coquitlam. Generalized diagnostics of salmonid habitat suggest that greater than 30% pool area within a given reach is good condition (Johnson and Slaney 1996). No reaches in our survey exceeded 13% pool habitat by area.

Typically, coincident with pool habitat is large woody debris which often acts functionally to create the scour necessary to create a pool. LWD can serve as cover from predation for salmonids and reaches lacking in LWD subsequently have reduced habitat value. Most reaches do not lack in total amounts of LWD and are rated either good or fair. However, in order for LWD to be functional it must provide scour for the formation of a pool. The assessed ratings for functional LWD were low for all reaches excepting Reach-0.

The recruitment of wood into streams is a function of the characteristics of the riparian area. The overwhelming majority of riparian-stand structure was young forest across all the reaches of the Coquitlam River. This is not conducive to the development of good woody-debris structure in streams. This type of riparian vegetation is often associated with elevated stream temperatures, reduced bank stability and reduced LWD inputs to the river. These are all elements that can serve to diminish salmonid habitat quality. Somewhat balancing this off, the abundance of light input from diminished riparian cover can increase leaf litter, algal production, and ultimately food sources for fish.

Off-channel habitats provide important overwintering sites and refuge areas during high flow events. In the lower Coquitlam River historical industrial practices, channelization and urbanization have virtually eliminated off-channel areas. Natural off-channel habitat was limited in all reaches apart from Reach-4. There have been recent attempts over the last 25 years to increase salmonid habitat quality by opening up old side-streams or constructing artificial off-channel habitat in the lower river. Stream restoration and enhancement sites such as the Or Creek channels and ponds or the Grist Channel were attempts to increase salmonid habitat values by increasing off-channel habitat.

These habitat surveys identified that in the reaches upstream of the Pitt River Bridge (Reaches 1-4) there were measurable suitable spawning gravel for anadromous and resident salmonids. It was apparent that most of the suitable areas of gravel were isolated but well distributed through the river. The accumulation of fines substrate materials (sand) downstream of Reach-4 may be contributing to the degradation of high quality salmonid habitat.

There have been a number of Coquitlam River fish habitat assessments conducted over the past 30 years. They have typically found similar results to those provided in this report. Previous studies have found that there was little cover available to fish in the mainstem of the river (De Leeuw 1982; Dewell et al. 1987; Riley et al. 1998).

The measurements of habitat condition show that important parameters related to salmonid habitat (LWD, pool habitat and off-channel habitat) are limited across most reaches and likely limit natural fish production. Yet fish surveys for some species show that the Coquitlam River carrying capacity is being exceeded in most cases relative to streams of comparable nutrient richness (Schick et al. 2013). It is important to recognize, however, that supplementation of natural production from hatcheries will mask the habitat limitations placed upon this river.

Recommendations:

This report identifies that there are some extensive areas of the lower Coquitlam River with habitat impairment. The deficiencies identified in this report were arrived at by comparing current channel conditions with average habitat conditions for a watershed in an undisturbed area. The Coquitlam River has a legacy of habitat pressures that are unlikely to be reversed *en masse*. Nevertheless, a number of measures can be taken to assist in the recovery of this river. These include:

- Identify specific sites for Level 2 field assessments to provide the detailed information needed to develop appropriate habitat restoration plans.
- Work with ongoing juvenile salmonid monitoring via the Coquitlam River Monitoring Program (BC Hydro) help identify critical habitats that are of particular importance to target species.
- Exploring the potential for educational opportunities related to salmonid colonization in an urban environment. i.e. through BCIT, Streamkeepers groups, public involvement.

5.0 Fish Wildlife and Recreation Program Training

An important component of the 2014 Coquitlam River fish habitat assessment was a collaborative training project between the Fish Wildlife and Recreation Program at the British Columbia Institute of Technology, the City of Coquitlam and Instream Fisheries Research Inc. The purpose of the program was to develop a classroom and field based training module for BCIT students and other interested parties.

Instream Fisheries Research developed a classroom presentation (Appendix D) that was delivered at BCIT on September 8, 2015. The overall purpose of the presentation was to give an introductory overview of the survey methodology outlined in WRP Technical Circular #8 Fish Habitat Assessment Procedure. Although not specific to the Coquitlam River, the training provided gave a good fundamental background for fish habitat surveys undertaken in British Columbia.

The second component of the BCIT training program was a field presentation carried out on a portion of Guichon Creek which runs through the BCIT campus. The qualified instructor from IFR showed students the basic concepts associated with collecting the various fish habitat parameters, gave an overview of proper data collection and field techniques.

On September 15th and 17th Instream Fisheries led a Coquitlam River training exercise for the habitat assessment students. The survey area was centered at the Reach 2A/2B break located at Galette Park (Figure 1). The students were split into two groups, one of which worked in a downstream direction into Reach 2A and the other moved upstream into Reach 2B. Students were split into small groups (3-4 persons) and each group would assess a discrete habitat unit, record their data and then move forward to the next available unsurveyed habitat unit. This “leapfrogging” technique allowed each group to encounter a variety of different habitat units over the two days of training. Several training staff moved among the survey groups to provide direction and answer questions when asked.

Over the two day period the students surveyed approximately 3.8 km of mainstem (primary) habitat in the Coquitlam River. This training program served to give the students a combination of classroom and real-world experience to serve as a baseline introduction to the process of salmonid habitat evaluation.

6.0 References

De Leeuw, A.D. 1982. Enhancement possibilities for some anadromous salmonids in the Coquitlam River. Unpublished report. Fish and Wildlife Branch, BC. Ministry of Environment, Victoria, BC.

Dewell, D., B. Saboe, D. Misky, and A. Arcand. 1987. A biophysical inventory of salmonid juveniles in the Coquitlam River and its tributaries. Unpublished report.

Douglas, T. 2007. Lower Coquitlam River fish habitat and flooding assessment. Report prepared for Watershed Watch Salmon Society and Kwikwetlem First Nation. 88 p.

Bisson, P. A., K. Sullivan, and J. L. Nielsen. 1998. Channel hydraulics, habitat use, and body form of juvenile coho salmon. Steelhead, and Cutthroat Trout in streams. Transactions of the American Fisheries Society 117:3, 262-273.

BC Hydro. 2003. Lower Coquitlam River 2003 instream flow needs assessment: interim report on transect data collection. Prepared for the BC Hydro Coquitlam Dam Water Use Plan project, Burnaby, BC.

Johnston, N.T., and P.A. Slaney 1996. Fish habitat assessment procedures. Province of BC Watershed Restoration Technical Circular No. 8: 97 p.

McNair, J. 2012. Lower Coquitlam River Fish Habitat Requirements Study. COQMON-3. 2008 – 2011. Report prepared for B.C. Hydro Power Facilities, Burnaby, BC. January 2012. 13 p.

Myers, T., and S. Swanson 1997. Variability of pool characteristics with pool type and formative feature on small Great Basin rangeland streams. Journal of Hydrology 201:62-81.

Montgomery, D.R., J.M. Buffington, R.D. Smith, K.M. Schmidt, and G. Pess 1995. Pool spacing in forest channels. Water Resources Research 31:1097-1105.

Schick, J., J. Macnair, and G. Lewis. 2013. Coquitlam River Fish Monitoring Program: 2000-2013 Results. Report prepared for B.C. Hydro Power Facilities, Burnaby, BC. July 2014. 144 p.

Schick, J., S. Decker, J. Macnair, and G. Lewis. 2013. Coquitlam River fish monitoring program: 2000-2011 results. Report prepared for B.C. Hydro Power Facilities, Burnaby, BC. April 2013. 148 p.

Slaney, P.A., and H. Andusak 2003. Fish habitat assessment of the Lardeau River (2002) integrated with habitat assessments of the Duncan River. Contract report for the Ministry of Water, Land and Air Protection. 37 p.

TABLES

Table 1. Parameter statistics, by reach, for the Coquitlam River collected during summer 2014.

	Reach					
	0	1	2A	2B	3	4
Reach length (m)	4,015.7	4,130.7	3,914.5	4,055.1	1,908.1	2,377.9
Total wetted area (m^2)	150,422.9	106,539.5	82,152.5	81,640.1	33,364.5	32,450.4
Average gradient (%)	0.0	0.2	0.8	0.8	1.3	1.0
Average mainstem gradient (%)	0.0	0.2	0.7	0.7	1.1	0.8
Mean bankfull width (m)	34.4	27.2	24.2	26.9	19.3	16.3
Mean wetted width (m)	29.1	21.1	21.6	24.8	18.6	15.2
Mean water depth (m)	0.80	0.45	0.45	0.44	0.46	0.55
Mean bankfull depth (m)	1.79	0.83	0.70	0.64	0.65	0.72
Mean pool spacing per channel width	11.7	15.2	0.0	150.7	49.4	0.0
Total number of LWD pieces per channel width	3.0	2.2	1.0	2.1	1.2	0.9
Number of functional LWD pieces per channel width	2.7	2.0	0.6	1.3	1.0	0.6
Dominant substrate	F	SC/LG	LC/B	LC/B	B/LC	B/LC
Dominant cover	0	OV	OV/B	OV/B	B/OV	B

Table 2. Statistics for the various habitat types, by reach, for the Coquitlam River collected during summer 2014.

		Reach					
		0	1	2A	2B	3	4
Riffle	Length in reach(m)	143.1	1,458.4	2,630.1	3,044.5	1,226.5	1,397.3
↓	Total Wetted Area (m^2)	2,980.3	39,685.8	57,350.2	61,858.3	20,574.0	19,960.2
↓	Reach amount (%) of total area	2	37	70	76	62	62
Pool	Length in reach (m)	879.7	429.9	-	10.8	45.6	-
↓	Total Wetted Area (m^2)	19,319.5	10,551.2	-	114.5	889.2	-
↓	Reach amount (%) of total area	13	10	-	0	3	-
Cascade	Length in reach(m)		-	-	26.3	175.9	-
↓	Total Wetted Area (m^2)		-	-	599.6	4,218.9	-
↓	Reach amount (%) of total area		-	-	1	13	-
Glide	Length in reach (m)	2,992.9	2,242.4	1,284.4	973.5	460.1	976.6
↓	Total Wetted Area (m^2)	128,123.2	56,302.5	24,802.3	19,067.7	7,682.4	12,478.7
↓	Reach amount (%) of total area	85	53	30	23	23	38

Table 3. Disturbance indicators by reach for the lower Coquitlam River collected during November 2013. (EB=eroding banks, PD=most LWD parallel to banks, MC=multiple channels (braiding), MB=elevated mid-channel bars, DW=extensive areas of (unvegetated) bar, WG=large, extensive sediment wedges, and LJ/JM=recently formed log jams).

Reach	# of units with disturbances	% of units	Type
0	12	38%	PILINGS,EB,DW
1	13	20%	DW,EB,JM,MB,MC,BC
2A	4	8%	BC,MB,MC,JM
2B	18	29%	MB,BC,MC,DW,EB,JM
3	4	11%	MB,DW
4	6	12%	MB,BC

Table 4. Coquitlam River diagnostics of salmonid habitat at the reach level, 2014. Note that off-channel habitat, located greater than 5 m from the main-stem perimeter, was not assessed.

Reach	Boulder Cover	Pool Frequency	Functional LWD per bankfull channel width	Off Channel Habitat	Spawning Gravel availability
0	Poor	Poor	Good	Absent	Poor
1	Fair	Poor	Fair	Fair	Good
2A	Good	Absent	Poor	Poor	Good
2B	Good	Absent	Fair	Poor	Good
3	Good	Poor	Poor	Absent	Good
4	Good	Absent	Poor	Poor	Good

FIGURES

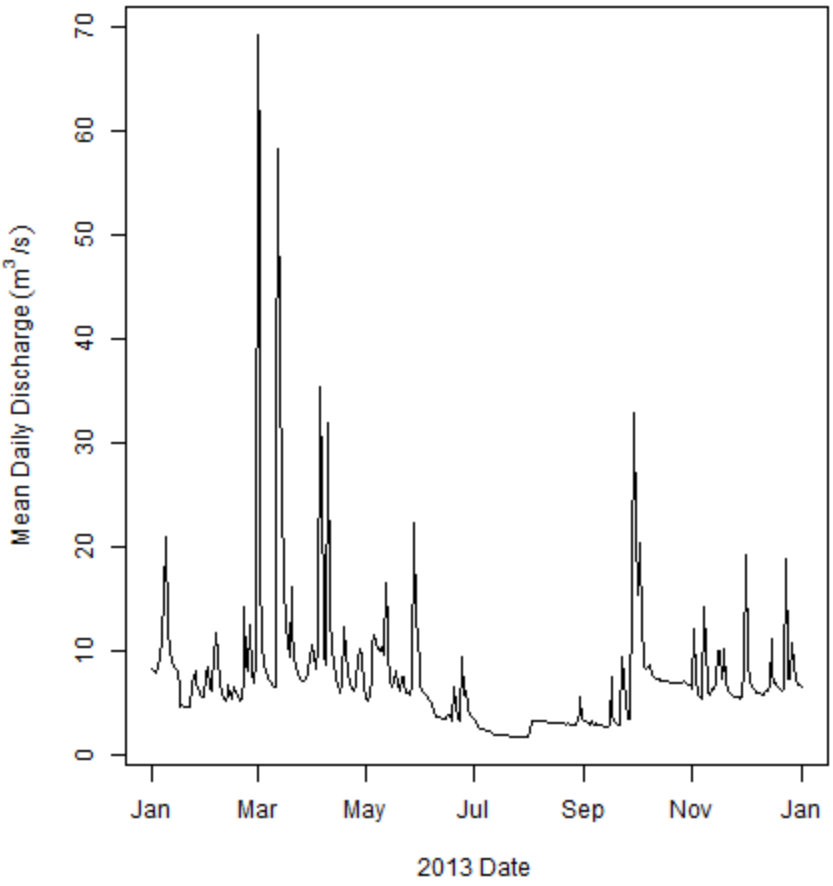


Figure 2. 2013 Mean daily discharge (m^3/s) measured at Water Survey of Canada hydrometric station, 08MH002 Coquitlam River, at Port Coquitlam.

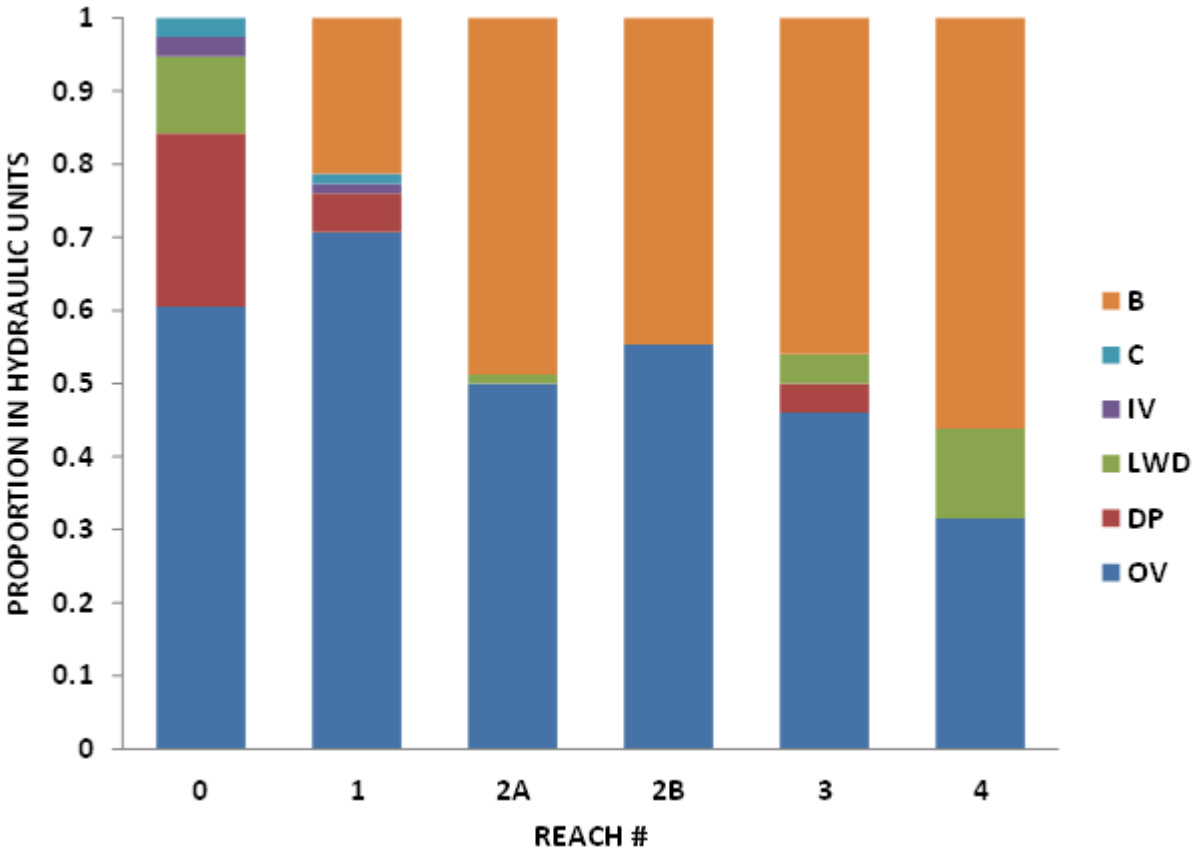


Figure 3. Proportion of dominant cover types by reach in the Coquitlam River. (OV=overhanging vegetation, DP=deep pool, LWD=large woody debris, IV=instream vegetation, C=undercut banks, B=boulders

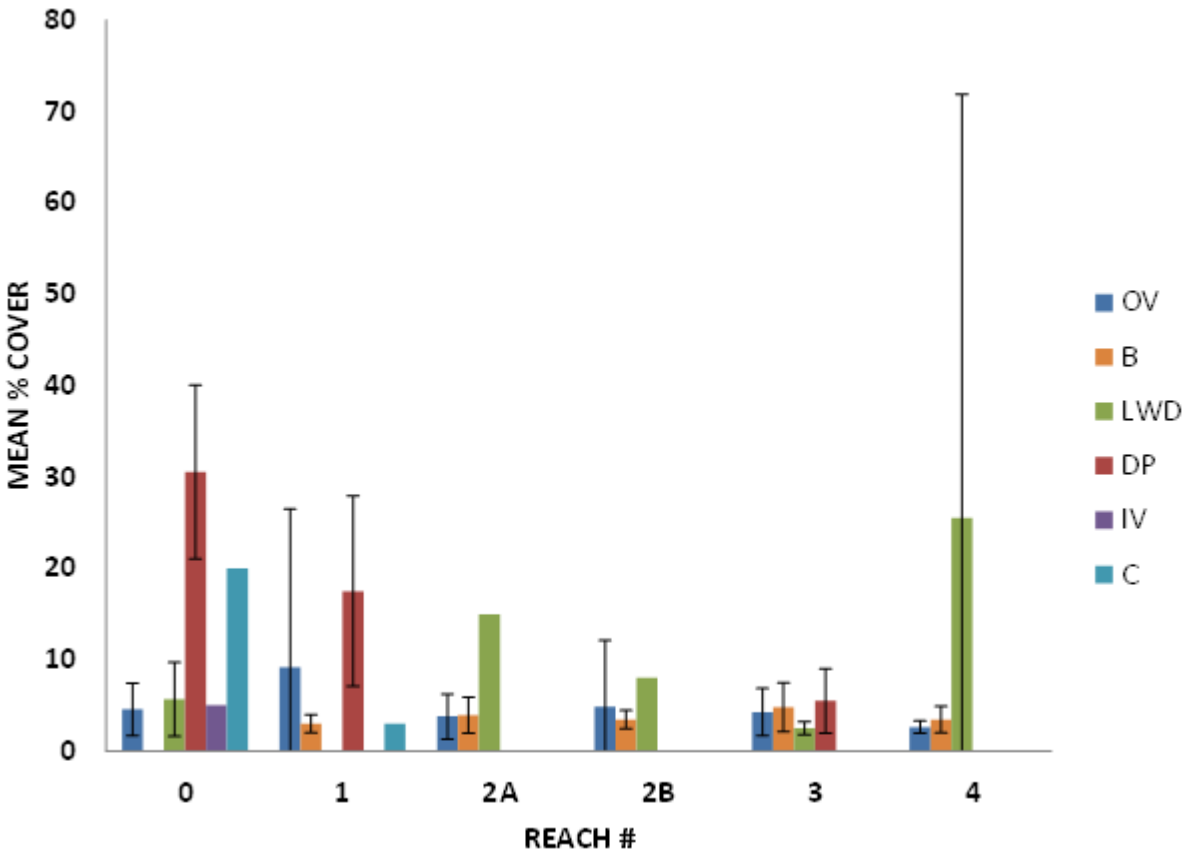


Figure 4. Mean percentage of cover type (± SD) by reach in the Coquitlam River. (C=undercut banks, IV=instream vegetation, DP=deep pool, LWD=large woody debris, B=boulders, OV=overhanging vegetation

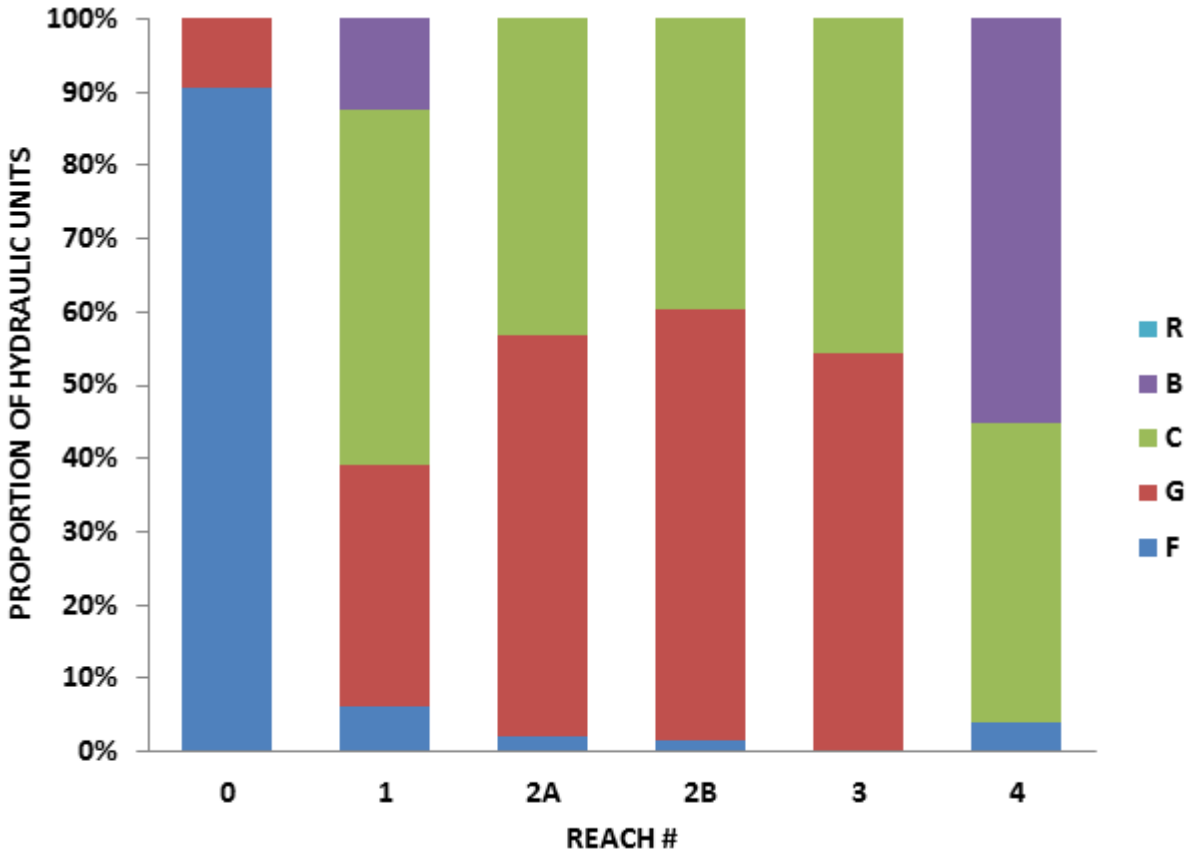


Figure 5. Proportion of dominant bed material types by reach in the Coquitlam River. (R=bedrock, B=boulders, C=cobbles, G=gravels, F=fines

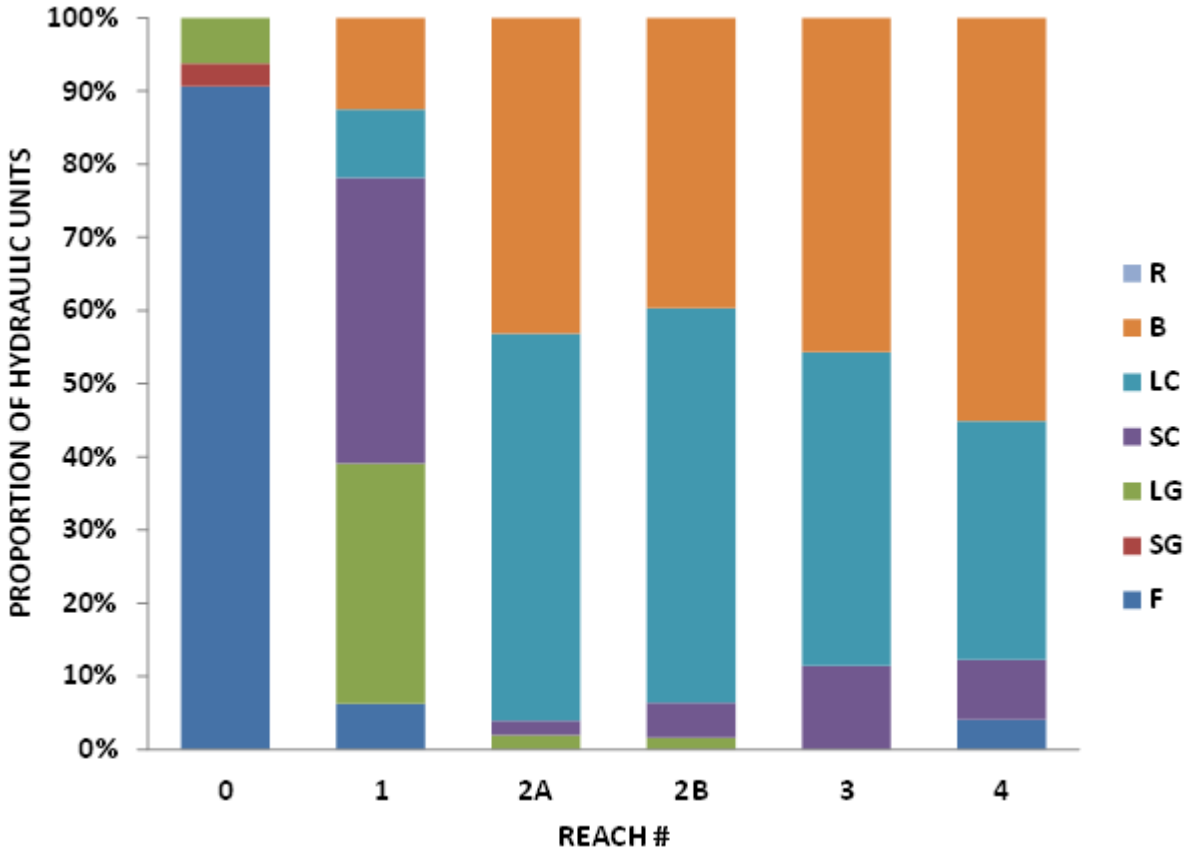


Figure 6. Detailed proportion of dominant bed material types by reach in the Coquitlam River. (R=bedrock, B=boulders, LC=large cobbles, SC=small cobbles, LG=large gravels, SG=small gravels, S=sands

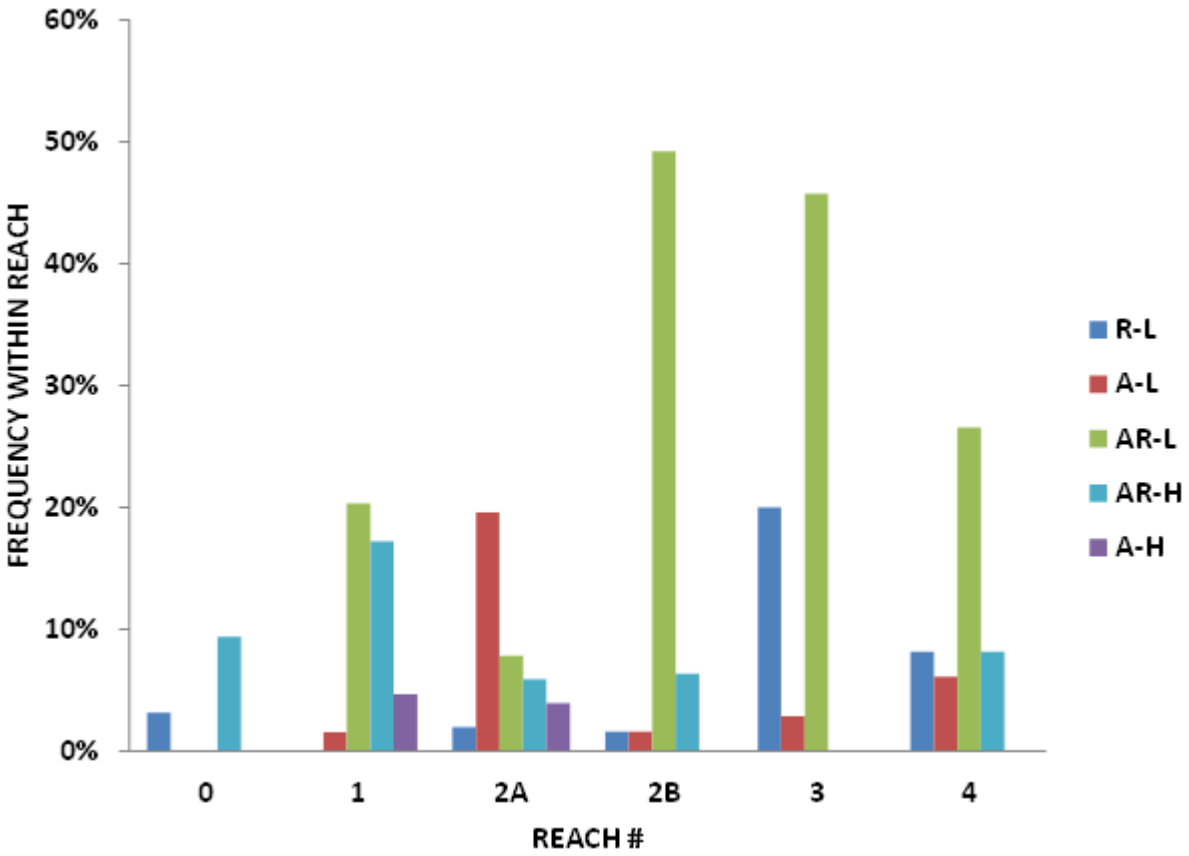


Figure 7. Percent frequency of spawning gravels, by reach, in the Coquitlam River, summer 2014. (L=little suitable spawning gravels, H=extensive areas of spawning gravels; R=suitable for resident trout and char, A=suitable for anadromous salmon, AR=suitable for both resident trout and anadromous salmon

PHOTOGRAPHS

Photo A. Reach-0 pool habitat at UTM 10U 0514485 5454871 (looking downstream), July 21, 2014

Photo B. Reach-1 riffle habitat UTM 10U 0515401 516227 (looking downstream), July 30, 2014.

Photo C. Reach-1 glide habitat UTM 10U 0515401 5457821 (looking downstream), July 30, 2014.

Photo D. Reach-2a glide habitat UTM 10U 0516582 5459578 (looking downstream??), July 31, 2014. Note artificial LWD structures on left side of river

Photo E. Reach-2a glide habitat UTM 10U 0516519 5461510 (looking upstream), August 5, 2014. Note woody debris jam.

Photo F. Reach-2a riffle habitat UTM 10U 0516900 5462550 (looking downstream), August 7, 2014.

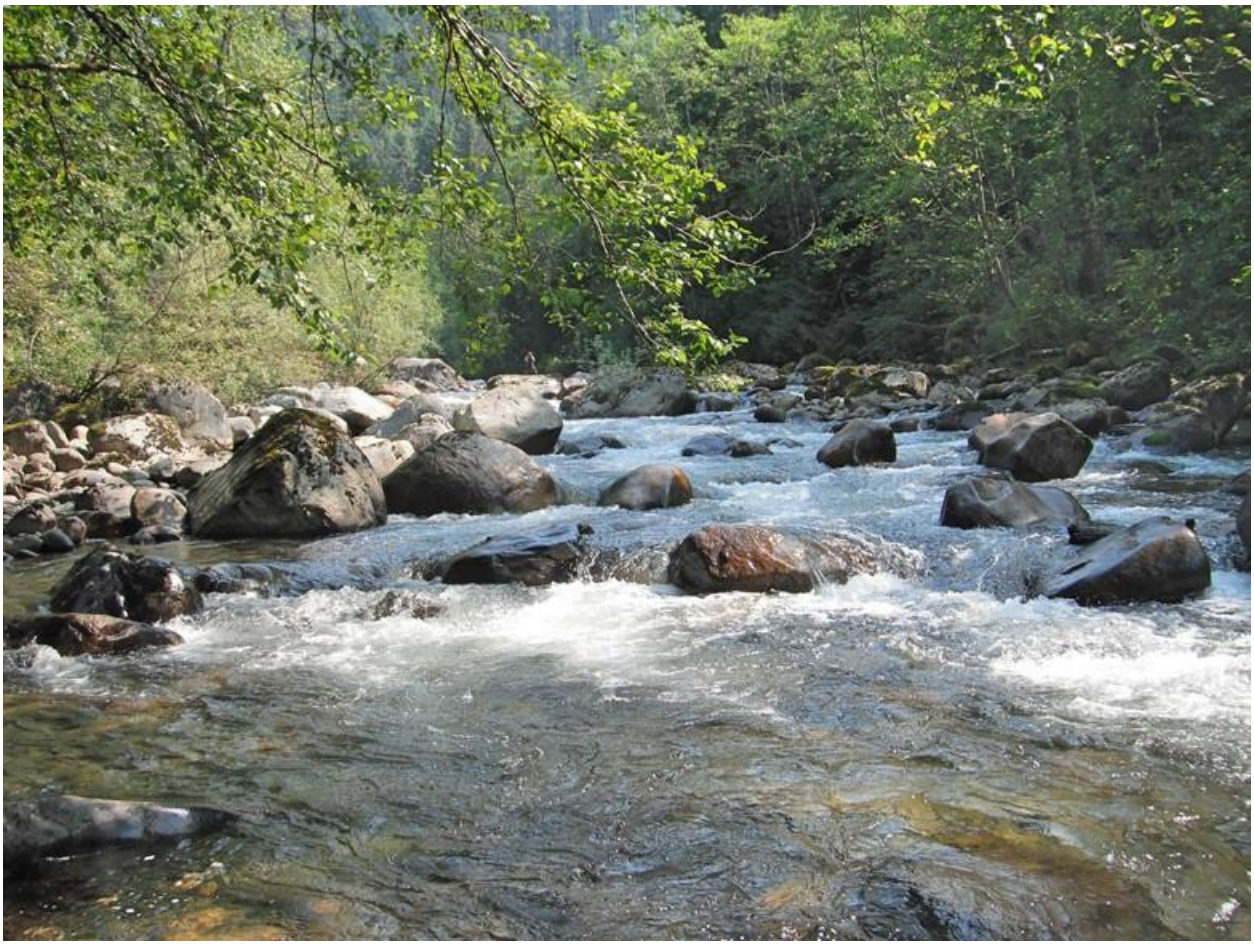


Photo G. Reach-3 cascade habitat UTM 10U 0516584 5463782 (looking upstream), August 11, 2014.

Photo H. Reach-3 pool habitat UTM 10U 0516930 5464728 (looking upstream), August 11, 2014.

Photo I. Reach-4 glide habitat UTM 10U 0516571 5466190 (looking upstream), August 28, 2014.

Photo J. Reach-4 riffle habitat UTM 10U 0516473 5466738 (looking upstream) August 29, 2014.

Photo K. Student training in Reach-2A. September 17, 2014

APPENDIX A - Raw Data Collected by InStream Fisheries Research Inc.

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
21-Jul-14	0	1	R	1	7.9	0.1	1.03	0.80	0.23	26.1	22.3				
21-Jul-14	0	2	G	1	117.1	0.0	1.14	0.80	0.34	23.4	21.1				
21-Jul-14	0	3	R	1	84.1	0.1	1.22	0.85	0.37	23.3	15.8				
21-Jul-14	0	4	P	1	71.6	0.0	2.02	1.05	0.97	19.8	19.7	3.00	1.05	1.95	SC
21-Jul-14	0	5	G	1	60.5	0.0	1.66	1.00	0.66	23.8	19.4				
21-Jul-14	0	6	P	1	30.1	0.0	2.01	1.00	1.01	26.7	21.7	1.85	0.70	1.15	SC
21-Jul-14	0	7	G	1	16.9	0.0	1.60	1.00	0.60	24.0	20.5				
21-Jul-14	0	8	P	1	131.6	0.0	2.44	1.30	1.14	21.8	19.8	2.30	1.03	1.27	SC
21-Jul-14	0	9	G	1	46	0.0	1.46	0.80	0.66	23.8	22.6				
21-Jul-14	0	10	P	1	121.1	0.0	1.92	0.90	1.02	27.6	22.2	2.65	0.78	1.67	SC
21-Jul-14	0	11	G	1	51.6	0.0	1.30	0.70	0.60	25.9	22.9				
21-Jul-14	0	12	P	1	112.6	0.0	2.13	0.80	1.33	28.0	25.3	1.65	0.90	0.75	SC
21-Jul-14	0	13	G	1	146.5	0.0	1.93	0.73	1.21	27.6	25.1				
21-Jul-14	0	14	P	1	77.8	0.0	2.37	0.62	1.75	24.5	23.3	2.60	1.30	1.30	SC
22-Jul-14	0	15	G	1	63.6	0.0	1.51	1.20	0.31	30.5	27.4				
22-Jul-14	0	16	R	1	27.5	0.1	1.43	1.20	0.23	36.1	29.0				
22-Jul-14	0	17	P	1	117.4	0.0	2.46	1.38	1.09	27.9	19.9	2.00	0.93	1.07	SC
22-Jul-14	0	18	G	1	159.4	0.0	1.70	1.20	0.50	33.6	26.0				
22-Jul-14	0	19	R	1	23.6	0.2	2.15	1.30	0.85	36.3	28.9				
22-Jul-14	0	20	G	1	104.6	0.0	1.76	1.25	0.51	32.2	26.7				
22-Jul-14	0	21	P	3	(18)						10.0	1.65	0.50	1.15	SC
22-Jul-14	0	22	P	1	124.7	0.0	2.35	1.35	1.00	32.4	19.2	2.20	1.23	0.97	SC
22-Jul-14	0	23	G	1	124.3	0.0	1.85	1.20	0.65	33.6	30.2				
22-Jul-14	0	24	G	1	230	0.0	1.81	1.25	0.56	45.6	21.0				
22-Jul-14	0	25	G	1	172.3	0.0	2.15	1.25	0.90	35.2	25.2				
22-Jul-14	0	26	G	1	183.2	0.0	1.88	1.20	0.68	43.6	39.7				
22-Jul-14	0	27	G	1	157.6	0.0	1.70	1.20	0.50	45.5	43.2				
22-Jul-14	0	28	G	1	129.3	0.0	1.82	1.20	0.62	47.1	35.2				
22-Jul-14	0	29	P	1	92.8	0.0	2.73	1.20	1.53	34.9	27.8	2.10	1.00	1.10	SC

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
22-Jul-14	0	30	G	1	228.9	0.0	1.73	1.05	0.68	50.7	47.9				
22-Jul-14	0	31	G	1	183.5	0.0	1.75	0.80	0.95	45.8	44.0				
22-Jul-14	0	32	G	1	300	0.0	0.65	0.55	1.13	58.8	57.1				
22-Jul-14	0	33	G	1	517.6	0.0	1.60	0.45	1.15	83.4	80.9				
29-Jul-14	1	1	G	1	171.4	0.0	1.57	0.90	0.67	22.7	20.6				
29-Jul-14	1	2	R	1	49.9	0.5	1.12	0.65	0.47	33.4	21.6				
29-Jul-14	1	3	G	1	114.3	0.0	0.95	0.60	0.35	30.9	25.8				
29-Jul-14	1	4	P	1	102.9	0.0	1.56	0.60	0.96	33.3	31.3	1.60	0.70	0.90	SC
29-Jul-14	1	5	G	1	53	0.0	1.32	0.60	0.72	24.4	23.4				
29-Jul-14	1	6	P	1	50	0.0	1.73	0.60	1.13	22.5	20.0	1.50	80.00	0.70	SC
29-Jul-14	1	7	G	1	79.6	0.0	0.88	0.55	0.33	26.7	24.8				
29-Jul-14	1	8	P	1	70.6	0.0	1.42	0.60	0.82	22.5	20.6	1.80	0.62	1.18	SC
29-Jul-14	1	9	R	1	48.8	0.1	1.12	0.60	0.52	30.9	17.8				
29-Jul-14	1	10	G	1	76.1	0.0	1.08	0.55	0.53	25.0	21.8				
29-Jul-14	1	11	P	3	34					8.0		1.40	0.60	0.80	SC
29-Jul-14	1	12	R	1	49.3	0.3	0.93	0.60	0.33	19.7	18.4				
29-Jul-14	1	13	G	1	76.7	0.0	0.93	0.55	0.38	25.0	22.8				
29-Jul-14	1	14	P	1	104.5	0.0	1.77	0.45	1.32	19.0	18.4	2.00	0.55	1.45	SC
29-Jul-14	1	15	G	1	38.5	0.0	0.68	0.45	0.23	26.5	24.5				
29-Jul-14	1	16	R	1	49.4	0.4	0.84	0.50	0.34	26.0	18.4				
29-Jul-14	1	17	P	3	18.6					7.0		1.15	0.30	0.85	SC
29-Jul-14	1	18	P	1	63.3	0.0	1.27	0.45	0.82	27.0	19.6	1.4	0.31	1.09	SC
29-Jul-14	1	19	R	1	19.4	0.3	0.66	0.45	0.21	26.8	22.8				
29-Jul-14	1	20	G	1	50	0.0	0.89	0.50	0.39	21.5	21.5				
29-Jul-14	1	21	R	1	46.3	0.1	0.64	0.40	0.24	24.4	24.4				
29-Jul-14	1	22	G	1	23.7	0.0	0.84	0.45	0.39	22.7	21.7				
29-Jul-14	1	23	P	1	29.1	0.0	1.42	0.45	0.97	22.7	21.7	2.00	0.55	1.45	SC
29-Jul-14	1	24	R	1	94.6	0.1	0.75	0.40	0.35	32.8	17.2				
29-Jul-14	1	25	G	1	163.2	0.0	0.83	0.35	0.48	41.4	23.1				
29-Jul-14	1	26	R	1	115.1	0.1	0.65	0.30	0.35	24.7	14.8				
30-Jul-14	1	1	G	1	60.9	0.0	0.70	0.35	0.35	29.9	26.2				

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
30-Jul-14	1	2	G	1	87.3	0.0	1.01	0.40	0.61	21.2	16.5				
30-Jul-14	1	3	R	1	89.9	0.3	0.68	0.35	0.33	21.8	19.8				
30-Jul-14	1	4	P	3	18.6						6.0	1.25	0.35	0.90	SC
30-Jul-14	1	5	R	2	33.2	0.2	0.71	0.40	0.31	7.6	7.1				
30-Jul-14	1	6	P	2	9.5	0.0	1.18	0.40	0.78	6.8	6.2	1.15	0.23	0.92	SC
30-Jul-14	1	7	R	2	44.4	0.4	0.67	0.40	0.27	6.4	5.9				
30-Jul-14	1	8	G	2	29	0.1	0.77	0.35	0.42	7.0	6.0				
30-Jul-14	1	9	R	2	24.1	0.7	0.49	0.30	0.19	12.1	9.8				
30-Jul-14	1	10	G	2	15.3	0.0	0.58	0.30	0.28	15.6	14.4				
30-Jul-14	1	11	G	1	100.4	0.0	0.81	0.25	0.56	24.0	17.0				
30-Jul-14	1	12	R	1	24.2	0.1	0.57	0.25	0.32	19.6	15.8				
30-Jul-14	1	13	G	1	26.1	0.1	0.60	0.25	0.35	64.4	11.3				
30-Jul-14	1	14	R	1	30	0.9	0.80	0.30	0.50	21.6	10.3				
30-Jul-14	1	15	G	1	52.3	0.0	0.75	0.25	0.50	15.5	12.7				
30-Jul-14	1	16	R	1	71.2	0.4	0.58	0.30	0.28	14.8	13.6				
30-Jul-14	1	17	G	1	108	0.0	0.73	0.30	0.43	31.6	12.6				
30-Jul-14	1	18	G	2	131.6	0.0	0.49	0.25	0.24	13.4	11.4				
30-Jul-14	1	19	R	1	70	0.5	0.46	0.20	0.26	37.0	29.2				
30-Jul-14	1	20	G	1	56.9	0.1	0.52	0.20	0.32	30.2	25.6				
30-Jul-14	1	21	R	1	19.2	0.2	0.48	0.25	0.23	23.8	22.7				
30-Jul-14	1	22	G	1	92.8	0.0	0.63	0.25	0.38	22.6	15.7				
30-Jul-14	1	23	R	1	40.7	0.4	0.72	0.25	0.47	24.5	11.7				
30-Jul-14	1	24	G	1	39.3	0.2	0.51	0.20	0.31	29.0	18.5				
30-Jul-14	1	25	R	1	37.6	0.2	0.52	0.25	0.27	30.3	30.1				
30-Jul-14	1	26	G	1	59.5	0.0	0.65	0.25	0.40	21.0	20.8				
30-Jul-14	1	27	R	1	50.6	0.3	0.48	0.20	0.28	43.4	19.4				
30-Jul-14	1	28	G	1	128.7	0.0	0.53	0.25	0.28	27.3	24.0				
30-Jul-14	1	29	R	1	47	0.6	0.43	0.20	0.23	28.5	27.0				
30-Jul-14	1	30	G	1	108.3	0.0	0.60	0.30	0.30	27.8	27.3				
30-Jul-14	1	31	R	1	188	0.5	0.64	0.28	0.36	34.7	21.1				
30-Jul-14	1	32	G	2	67.5	0.0	0.41	0.25	0.16	6.0	5.0				

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
30-Jul-14	1	33	R	2	20.6	1.7	0.34	0.20	0.14	7.3	5.6				
30-Jul-14	1	34	G	2	24.1	0.0	0.53	0.20	0.33	9.2	6.6				
31-Jul-14	1	1	G	1	98.6	0.1	0.65	0.20	0.45	25.0	22.3				
31-Jul-14	1	2	R	1	42.4	0.6	0.54	0.25	0.29	28.0	26.6				
31-Jul-14	1	3	G	1	54.1	0.0	0.76	0.25	0.51	21.8	18.1				
31-Jul-14	1	4	R	1	33.8	0.5	0.63	0.30	0.33	24.8	20.3				
31-Jul-14	1	5	G	1	55.2	0.0	0.83	0.25	0.58	19.9	15.7				
31-Jul-14	1	6	R	1	31.5	2.1	0.48	0.20	0.28	33.1	32.5				
31-Jul-14	1	7	R	1	87.2	1.0	0.47	0.20	0.27	37.1	36.5				
31-Jul-14	2A	8	G	1	68.8	0.0	0.56	0.20	0.36	31.3	29.8				
31-Jul-14	2A	9	R	1	144.6	0.8	0.53	0.25	0.28	31.9	30.9				
31-Jul-14	2A	10	G	1	44.2	0.1	0.74	0.30	0.44	21.0	19.4				
31-Jul-14	2A	11	R	1	237.8	0.9	0.59	0.23	0.36	20.8	19.9				
31-Jul-14	2A	12	G	1	40.6	0.0	0.84	0.30	0.54	20.5	14.3				
31-Jul-14	2A	13	R	1	105.3	1.0	0.50	0.25	0.25	28.1	27.5				
31-Jul-14	2A	14	G	1	110.3	0.0	0.81	0.30	0.51	22.6	21.7				
31-Jul-14	2A	15	R	1	41.6	1.0	0.60	0.25	0.35	24.6	22.2				
31-Jul-14	2A	16	G	1	142.7	0.0	0.80	0.33	0.48	16.6	15.6				
31-Jul-14	2A	17	R	1	124.9	0.9	0.63	0.30	0.33	23.6	22.4				
31-Jul-14	2A	18	G	1	38	0.0	0.67	0.25	0.42	17.3	17.0				
31-Jul-14	2A	19	R	1	174.8	1.4	0.61	0.25	0.36	25.4	24.3				
31-Jul-14	2A	20	G	1	79	0.0	0.95	0.25	0.70	22.3	20.9				
31-Jul-14	2A	21	R	1	90.5	1.8	0.51	0.20	0.31	30.5	27.8				
01-Aug-14	2A	1	G	1	91.3	0.0	0.78	0.25	0.53	20.1	19.6				
01-Aug-14	2A	2	R	1	78.2	2.0	0.71	0.30	0.41	17.9	14.7				
01-Aug-14	2A	3	R	1	135.2	1.2	0.53	0.25	0.28	34.3	32.0				
01-Aug-14	2A	4	G	1	33.6	0.0	0.84	0.25	0.59	24.7	22.7				
01-Aug-14	2A	5	R	1	95.5	0.7	0.74	0.30	0.44	21.4	20.7				
01-Aug-14	2A	6	G	1	75	0.0	0.63	0.30	0.33	18.6	17.2				
01-Aug-14	2A	7	R	1	99.8	1.8	0.74	0.30	0.44	34.7	27.5				
01-Aug-14	2A	8	G	1	42.6	0.1	0.79	0.30	0.49	22.2	21.0				

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
01-Aug-14	2A	9	R	1	109.2	1.6	0.72	0.28	0.45	26.3	22.4				
01-Aug-14	2A	10	G	1	25.3	0.0	0.85	0.30	0.55	23.2	19.6				
01-Aug-14	2A	11	R	1	333.1	1.2	0.68	0.25	0.43	23.6	20.0				
01-Aug-14	2A	12	G	1	28.4	0.1	0.86	0.25	0.61	18.7	16.3				
01-Aug-14	2A	13	R	1	93.5	0.6	0.75	0.30	0.45	18.8	13.0				
05-Aug-14	2A	1	G	2	12.6	0.0	0.56	0.25	0.31	11.4	9.3				
05-Aug-14	2A	2	R	2	15.5	1.8	0.40	0.20	0.20	10.8	10.1				
05-Aug-14	2A	3	G	2	9.4	0.0	0.49	0.25	0.24	12.2	11.7				
05-Aug-14	2A	4	R	2	14.3	0.8	0.37	0.20	0.17	14.2	14.1				
05-Aug-14	2A	5	G	2	22.4	0.0	0.64	0.20	0.44	9.3	8.0				
05-Aug-14	2A	6	R	2	8	3.7	0.53	0.20	0.33	9.6	7.2				
05-Aug-14	2A	7	G	2	13.5	0.0	0.53	0.20	0.33	12.8	11.6				
05-Aug-14	2A	8	R	2	15.4	2.3	0.42	0.20	0.22	9.3	7.3				
05-Aug-14	2A	9	G	2	10.1	0.0	0.68	0.25	0.43	8.4	5.8				
05-Aug-14	2A	10	R	2	30.3	2.8	0.41	0.15	0.26	10.2	8.7				
05-Aug-14	2A	11	G	2	22.2	0.1	0.58	0.25	0.33	13.6	13.6				
05-Aug-14	2A	12	R	2	37	0.8	0.53	0.20	0.33	13.9	12.7				
05-Aug-14	2A	13	G	1	51.1	0.0	1.10	0.18	0.92	13.1	12.3				
05-Aug-14	2A	14	R	1	177.6	1.1	0.52	0.20	0.32	26.2	19.3				
05-Aug-14	2A	15	G	1	134.3	0.0	0.87	0.25	0.62	23.9	22.7				
05-Aug-14	2A	16	R	1	161.8	1.4	0.63	0.25	0.38	25.3	23.4				
05-Aug-14	2A	17	G	1	56.3	0.0	0.82	0.25	0.57	23.8	22.8				
05-Aug-14	2A	18	R	1	173.7	2.0	0.64	0.23	0.42	18.8	16.2				
05-Aug-14	2A	19	R	1	29.4	1.9	0.50	0.20	0.30	38.1	34.7				
05-Aug-14	2A	20	R	2	70.6	2.1	0.44	0.20	0.24	22.8	22.0				
05-Aug-14	2A	21	G	2	12.5	0.0	0.70	0.20	0.50	12.0	12.0				
05-Aug-14	2A	22	R	2	32.5	1.4	0.46	0.20	0.26	12.7	12.3				
05-Aug-14	2A	23	G	2	24	0.0	0.84	0.20	0.64	12.0	11.3				
05-Aug-14	2A	24	G	1	96.2	0.0	0.67	0.23	0.44	25.4	25.1				
05-Aug-14	2B	25	R	1	131.4	1.6	0.63	0.25	0.38	14.3	13.5				
05-Aug-14	2B	26	G	1	24.4	0.2	0.85	0.20	0.65	20.9	17.3				

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
05-Aug-14	2B	27	R	1	65.5	1.9	0.50	0.20	0.30	33.9	33.3				
05-Aug-14	2B	28	G	1	33.4	0.0	0.68	0.20	0.48	23.9	21.3				
05-Aug-14	2B	29	R	1	82.1	0.9	0.52	0.25	0.27	22.9	20.0				
05-Aug-14	2B	30	R	2	168.3	2.1	0.43	0.15	0.28	14.6	14.0				
05-Aug-14	2B	31	G	2	30.1	0.0	0.45	0.15	0.30	12.1	11.6				
05-Aug-14	2B	32	R	2	85.7	2.5	0.46	0.15	0.31	15.0	15.0				
05-Aug-14	2B	33	G	2	14.3	0.0	0.66	0.20	0.46	16.7	13.4				
05-Aug-14	2B	34	R	2	22.3	1.4	0.47	0.15	0.32	13.9	13.6				
05-Aug-14	2B	35	R	2	42.7	2.3	0.45	0.15	0.30	3.8	3.6				
07-Aug-14	2B	1	G	1	135.3	0.0	0.54	0.20	0.34	33.1	26.1				
07-Aug-14	2B	2	R	1	89.3	0.8	0.56	0.20	0.36	31.1	29.9				
07-Aug-14	2B	3	R	1	156.4	0.9	0.50	0.20	0.30	35.8	35.3				
07-Aug-14	2B	4	R	1	118.7	0.9	0.72	0.20	0.52	17.3	16.4				
07-Aug-14	2B	5	R	2	52.2	1.4	0.29	0.15	0.14	12.3	8.6				
07-Aug-14	2B	6	G	2	38.7	0.1	0.29	0.15	0.14	12.4	11.2				
07-Aug-14	2B	7	P	2	10.8	0.0	0.92	0.25	0.67	10.6	10.6	121	25	94	SC
07-Aug-14	2B	8	R	2	29	0.8	0.36	0.25	0.11	10.2	6.0				
07-Aug-14	2B	9	G	2	41.4	0.0	0.54	0.25	0.29	10.4	6.4				
07-Aug-14	2B	10	R	2	29.9	1.4	0.70	0.35	0.35	4.0	3.2				
07-Aug-14	2B	11	G	1	68.7	0.0	0.83	0.25	0.58	24.9	24.7				
07-Aug-14	2B	12	R	1	89.5	1.2	0.84	0.25	0.59	18.2	16.1				
07-Aug-14	2B	13	G	1	29.2	0.1	0.66	0.20	0.46	23.4	22.2				
07-Aug-14	2B	14	R	1	125.9	1.0	0.50	0.20	0.30	32.6	29.0				
07-Aug-14	2B	15	G	1	99.9	0.0	0.59	0.20	0.39	25.0	24.2				
07-Aug-14	2B	16	G	2	29	0.0	0.40	0.20	0.20	4.0	4.0				
07-Aug-14	2B	17	R	2	53.7	0.5	0.39	0.20	0.19	9.8	9.8				
07-Aug-14	2B	18	R	1	88.5	1.1	0.55	0.20	0.35	36.3	33.7				
07-Aug-14	2B	19	R	1	18.6	1.1	0.51	0.20	0.31	38.0	37.2				
07-Aug-14	2B	20	G	1	39.8	0.1	0.60	0.20	0.40	38.4	36.3				
07-Aug-14	2B	21	R	1	47.7	1.9	0.59	0.20	0.39	40.0	39.7				
07-Aug-14	2B	22	R	1	85.8	0.6	0.45		0.45	36.0	35.4				

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
08-Aug-14	2B	1	G	1	24	0.0	0.67	0.20	0.47	25.8	24.5				
08-Aug-14	2B	2	R	1	57.7	0.6	0.61	0.20	0.41	26.2	24.7				
08-Aug-14	2B	3	G	1	45	0.1	0.72	0.20	0.52	21.8	19.1				
08-Aug-14	2B	4	R	1	268	0.9	0.58	0.20	0.38	21.3	20.6				
08-Aug-14	2B	5	G	1	22.7	0.1	0.59	0.20	0.39	25.5	24.8				
08-Aug-14	2B	6	R	1	110.6	1.0	0.49	0.20	0.29	27.8	25.6				
08-Aug-14	2B	7	G	1	18	0.0	0.69	0.20	0.49	36.4	35.5				
08-Aug-14	2B	8	R	1	98.3	1.1	0.50	0.20	0.30	26.8	23.8				
08-Aug-14	2B	9	R	1	35	0.2	0.49	0.15	0.34	25.6	25.2				
08-Aug-14	2B	10	G	1	62.9	0.1	0.72	0.20	0.52	26.6	18.5				
08-Aug-14	2B	11	R	2	109.4	1.2	0.05	0.00	0.05	3.5	1.8				
08-Aug-14	2B	12	R	1	124.2	0.9	0.81	0.25	0.56	17.8	16.5				
08-Aug-14	2B	13	C	1	26.3	4.7	0.54	0.25	0.29	25.8	22.8				
08-Aug-14	2B	14	R	1	212.3	0.7	0.56	0.15	0.41	26.2	20.9				
08-Aug-14	2B	15	R	2	61.6	1.0	8.50	0.20	8.30	6.0	4.5				
08-Aug-14	2B	16	G	1	44.8	0.0	0.63	0.15	0.48	23.7	20.9				
08-Aug-14	2B	17	R	1	145	1.1	1.24	0.25	0.99	14.1	13.4				
08-Aug-14	2B	18	G	1	41.8	0.0	0.97	0.25	0.72	21.8	19.9				
08-Aug-14	2B	19	R	2	14	2.8	0.40	0.25	0.15	16.2	10.0				
08-Aug-14	2B	20	G	2	28.4	0.2	0.66	0.20	0.46	9.0	7.4				
08-Aug-14	2B	21	R	2	12.6	2.7	0.37	0.20	0.17	8.4	6.4				
08-Aug-14	2B	22	G	2	13.5	0.1	0.48	0.20	0.28	8.4	6.4				
08-Aug-14	2B	23	R	2	18.9	1.9	0.29	0.15	0.14	8.4	7.3				
08-Aug-14	2B	24	G	2	16	0.0	0.54	0.20	0.34	7.7	7.2				
08-Aug-14	2B	25	R	2	24.9	1.9	0.37	0.20	0.17	9.0	6.0				
08-Aug-14	2B	26	G	2	44.7	0.0	0.80	0.20	0.60	8.0	7.2				
11-Aug-14	2B	1	R	1	47.7	0.3	0.54	0.20	0.34	34.7	32.7				
11-Aug-14	2B	2	G	1	8.7	0.0	0.75	0.20	0.55	27.0	23.0				
11-Aug-14	2B	3	R	1	121.1	1.3	0.57	0.20	0.37	29.0	26.0				
11-Aug-14	2B	4	G	1	18.8	0.0	0.78	0.20	0.58	19.9	17.3				
11-Aug-14	3	5	G	1	42.9	0.0	0.61	0.20	0.41	20.0	20.0				

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
11-Aug-14	3	6	R	1	113.5	1.2	0.50	0.20	0.30	21.1	19.5				
11-Aug-14	3	7	G	1	34.6	0.0	0.67	0.20	0.47	22.0	21.8				
11-Aug-14	3	8	R	1	125.2	1.6	0.64	0.15	0.49	24.0	23.8				
11-Aug-14	3	9	G	1	49.7	0.0	0.62	0.20	0.42	21.5	21.3				
11-Aug-14	3	10	R	1	98.7	0.8	0.60	0.20	0.40	22.8	18.6				
11-Aug-14	3	11	P	1	45.6	0.0	1.31	0.25	1.06	20.2	19.5				
11-Aug-14	3	12	C	1	25.9	3.7	0.79	0.20	0.59	22.5	19.0	>1.70	0.35	>1.35	SC
11-Aug-14	3	13	R	1	30.6	0.6	0.66	0.20	0.46	15.6	14.7				
11-Aug-14	3	14	C	1	69.1	3.8	0.57	0.20	0.37	22.5	32.5				
11-Aug-14	3	15	G	1	34.7	0.0	0.61	0.20	0.41	22.5	21.4				
11-Aug-14	3	16	R	1	52.5	2.5	0.58	0.20	0.38	23.3	19.6				
11-Aug-14	3	17	C	1	68	4.4	0.74	0.20	0.54	22.7	20.3				
11-Aug-14	3	18	R	1	50.3	0.9	0.65	0.20	0.45	22.7	22.6				
11-Aug-14	3	19	G	1	39.1	0.0	0.67	0.20	0.47	20.0	18.9				
11-Aug-14	3	20	R	1	63.8	3.3	0.53	0.15	0.38	27.2	25.8				
11-Aug-14	3	21	P	3	7.6						5.5	1.21	0.35	0.86	SC
11-Aug-14	3	22	G	2	19.1	0.0	0.41	0.20	0.21	9.8	7.7				
11-Aug-14	3	23	R	2	43.1	1.9	0.38	0.20	0.18	9.4	7.3				
11-Aug-14	3	24	G	2	24.5	0.1	0.43	0.20	0.23	7.0	6.0				
11-Aug-14	3	25	R	2	40.3	2.5	0.64	0.15	0.49	11.2	8.8				
11-Aug-14	3	26	C	2	12.9	9.3	0.59	0.20	0.39	8.2	7.8				
11-Aug-14	3	27	G	2	17.4	0.1	0.87	0.25	0.62	11.2	9.2	103	53	0.5	SC
11-Aug-14	3	28	R	2	122.2	1.3	0.45	0.20	0.25	8.7	8.1				
11-Aug-14	3	29	G	1	27.2	0.0	0.68	0.20	0.48	30.6	25.7				
12-Aug-14	3	1	R	1	61.9	1.2	0.45	0.15	0.30	30.0	25.9				
12-Aug-14	3	2	G	1	29.5	0.2	0.71	0.20	0.51	18.1	17.0				
12-Aug-14	3	3	R	1	92.9	1.2	0.58	0.20	0.38	21.0	19.5				
12-Aug-14	3	4	G	1	50.7	0.1	0.65	0.20	0.45	18.6	16.9				
12-Aug-14	3	5	R	1	63.2	1.2	0.84	0.20	0.64	13.2	11.9				
12-Aug-14	3	6	R	1	106.5	0.9	0.56	0.20	0.36	23.8	23.1				
12-Aug-14	3	7	G	1	70.7	0.0	1.03	0.20	0.83	12.1	12.0				

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
12-Aug-14	3	8	R	1	44.4	0.3	0.87	0.25	0.62	9.4	8.2				
12-Aug-14	3	9	R	1	44.5	1.9	0.29	0.10	0.19	7.9	7.1				
12-Aug-14	3	10	G	1	20	0.0	0.40	0.15	0.25	9.0	8.5				
12-Aug-14	3	11	R	1	72.9	0.9	0.41	0.15	0.26	5.5	4.5				
28-Aug-14	4	1	R	1	26.2	3.5	0.58	0.20	0.38	26.1	24.6				
28-Aug-14	4	2	G	1	54.6	0.3	0.72	0.20	0.52	23.3	16.2				
28-Aug-14	4	3	R	1	36.1	1.9	0.55	0.20	0.35	19.3	16.8				
28-Aug-14	4	4	G	2	7.7	2.6	0.35	0.25	0.10	3.7	2.4				
28-Aug-14	4	5	R	2	8.7	0.0	0.39	0.20	0.19	3.7	2.9				
28-Aug-14	4	6	O	2	4	7.0				3.7	2.9				
28-Aug-14	4	7	G	2	4.9	0.3	0.41	0.20	0.21	3.7	3.3				
28-Aug-14	4	8	R	2	17.7	0.4	0.36	0.20	0.16	5.4	4.8				
28-Aug-14	4	9	G	2	16.2	0.0	0.26	0.15	0.11	7.5	4.4				
28-Aug-14	4	10	R	2	20.2	0.7	0.25	0.15	0.10	9.2	8.2				
28-Aug-14	4	11	G	1	18.4	0.3	0.92	0.20	0.72	11.5	10.3				
28-Aug-14	4	12	R	1	170.6	0.9	0.64	0.20	0.44	18.2	14.7				
28-Aug-14	4	13	R	2	22.3	2.3	0.48	0.20	0.28	4.5	3.6				
28-Aug-14	4	14	G	2	11.2	0.1	0.44	0.15	0.29	5.7	4.9				
28-Aug-14	4	15	R	2	12.8	1.0	0.42	0.15	0.27	7.6	6.3				
28-Aug-14	4	16	G	2	17.5	0.0	0.44	0.15	0.29	8.8	8.6				
28-Aug-14	4	17	G	1	29.2	0.3	0.89	0.20	0.69	12.5	12.0				
28-Aug-14	4	18	R	1	77.9	1.6	0.77	0.20	0.57	17.8	16.6				
28-Aug-14	4	19	G	1	42	0.0	0.95	0.20	0.75	9.1	8.6				
28-Aug-14	4	20	R	1	18.4	0.9	0.64	0.20	0.44	10.1	10.1				
28-Aug-14	4	21	G	1	83.5	0.0	0.82	0.20	0.62	16.8	16.8				
28-Aug-14	4	22	R	1	95.7	2.3	0.83	0.20	0.63	15.8	15.3				
28-Aug-14	4	23	G	1	61.6	0.4	0.84	0.20	0.64	21.6	20.5				
28-Aug-14	4	24	R	1	142.2	1.3	0.82	0.20	0.62	15.7	15.5				
28-Aug-14	4	25	G	1	58.2	0.4	0.62	0.15	0.47	16.3	16.1				
28-Aug-14	4	26	R	1	49.7	1.0	0.77	0.15	0.62	15.3	14.2				
28-Aug-14	4	27	R	2	41.3	1.4	0.45	0.20	0.25	5.5	5.3				

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
28-Aug-14	4	28	G	2	56.6	0.1	0.59	0.15	0.44	5.6	4.9				
28-Aug-14	4	29	R	1	54.7	0.9	0.63	0.15	0.48	27.8	23.8				
28-Aug-14	4	30	G	1	66	0.4	0.75	0.15	0.60	21.0	20.2				
28-Aug-14	4	31	R	1	90.5	0.9	0.76	0.20	0.56	23.1	24.6				
28-Aug-14	4	32	G	1	59.5	0.3	0.80	0.20	0.60	16.4	15.3				
29-Aug-14	4	1	R	1	93.4	0.6	0.53	0.15	0.38	16.6	15.6				
29-Aug-14	4	2	G	1	23.1	0.4	0.57	0.15	0.42	20.8	20.3				
29-Aug-14	4	3	R	1	67.2	0.7	0.68	0.15	0.53	11.0	10.7				
29-Aug-14	4	4	G	1	115.7	0.1	1.11	0.15	0.96	16.2	13.9				
29-Aug-14	4	5	R	1	68.5	1.7	0.64	0.15	0.49	8.3	8.1				
29-Aug-14	4	6	G	1	35.9	0.3	0.76	0.15	0.61	8.1	7.9				
29-Aug-14	4	7	R	2	22.2	2.9	0.32	0.15	0.17	7.1	6.1				
29-Aug-14	4	8	G	2	23.4	0.1	0.47	0.15	0.32	7.3	7.1				
29-Aug-14	4	9	R	2	10.5	2.8	0.32	0.15	0.17	7.4	7.0				
29-Aug-14	4	10	R	1	54.4	1.4	0.50	0.15	0.35	11.8	11.2				
29-Aug-14	4	11	G	1	48.4	0.1	0.67	0.15	0.52	13.8	13.6				
29-Aug-14	4	12	R	1	109.9	0.6	0.44	0.10	0.34	12.8	12.8				
29-Aug-14	4	13	G	2	24.3	0.0	0.71	0.20	0.51	6.7	6.0				
29-Aug-14	4	14	R	2	9.5	0.9	0.73	0.20	0.53	4.8	4.6				
29-Aug-14	4	15	G	2	67.5	0.1	0.53	0.15	0.38	7.2	7.1				
29-Aug-14	4	16	G	2	51.2	0.0	0.61	0.10	0.51	9.1	8.8				
29-Aug-14	4	17	R	2	76.7	1.0	0.27	0.10	0.17	15.6	15.3				

Date	Reach	Unit #	Bed Material			D-90			Total LWD	Functional LWD			Cover					
			Dom	Sub	Spawn					10-20cm	20-50cm	>50cm	Type	%	Type	%		
21-Jul-14	0	1	LG	SG	AR-H				1		1		OV	4				
21-Jul-14	0	2	F	LG					9				OV	15	LWD	TR		
21-Jul-14	0	3	LG	SG	AR-H				27	21	6		OV	TR	LWD	2		
21-Jul-14	0	4	F	SG	R-L				14	1	7	4	DP	40	LWD	5	UC	20
21-Jul-14	0	5	F	SG					4	2			OV	TR				
21-Jul-14	0	6	F	SG					3		1	2	OV	3	LWD	10	DP	40
21-Jul-14	0	7	F	SG					3		1	2	OV	5				
21-Jul-14	0	8	F	SG					19	9	4		OV	3	DP	40		
21-Jul-14	0	9	F	SG					3	1		1	OV	5				
21-Jul-14	0	10	F						16	3	4	8	OV	3	DP	40		
21-Jul-14	0	11	F	SG					14	2	12		OV	4				
21-Jul-14	0	12	F	SG					10	6	3	1	OV	6	DP	20		
21-Jul-14	0	13	F	LG					10	3	6	1	OV	3				
21-Jul-14	0	14	F						2	2			OV	3	DP	25		
22-Jul-14	0	15	F	SG					4	3	1		OV	4				
22-Jul-14	0	16	SG	F	AR-H				7	3	4		OV	TR				
22-Jul-14	0	17	F						11	8	1	2	OV	5	DP	20		
22-Jul-14	0	18	F	SG					4	2	2		OV	5				
22-Jul-14	0	19	F	SG					6		5	1	OV	4				
22-Jul-14	0	20	F	SG					20	13	4	3	OV	2				
22-Jul-14	0	21																
22-Jul-14	0	22	F						22	10	10	2	DP	30				
22-Jul-14	0	23	F						6	4	1	1	OV	TR				
22-Jul-14	0	24	F	SG					36	10	13	5	IV	5	OV	TR		
22-Jul-14	0	25	F						14	7	1	5	OV	4				
22-Jul-14	0	26	F						27	10	9	7	OV	TR				
22-Jul-14	0	27	F						14	8	5	1						
22-Jul-14	0	28	F						2	1	1							
22-Jul-14	0	29	F										DP	20				
22-Jul-14	0	30	F						4	1	3							
22-Jul-14	0	31	F						15	3	7	5						
22-Jul-14	0	32	F						15	5	8	2						
22-Jul-14	0	33	F						5	2	1	1						

Date	Reach	Unit #	Bed Material			D-90			Total LWD	Functional LWD			Cover					
			Dom	Sub	Spawn					10-20cm	20-50cm	>50cm	Type	%	Type	%		
29-Jul-14	1	1	LG	F					9	5	4		OV	4				
29-Jul-14	1	2	LG	SG	AR-L				9	8	1		OV	5	C	TR	IV	TR
29-Jul-14	1	3	LG	F					11	7	2	2	OV	4				
29-Jul-14	1	4	F	LG					38	12	11	5	OV	5	DP	30		
29-Jul-14	1	5	LG	F					7	2	4	1	OV	TR				
29-Jul-14	1	6	F						5	3		2	OV	3	DP	15		
29-Jul-14	1	7	LG	F	AR-H				16	10	5	1	OV	3				
29-Jul-14	1	8	F						11	7	1		OV	2	DP	20		
29-Jul-14	1	9	LG	SC	A-H				8	5	3	1	OV	2				
29-Jul-14	1	10	LG	SC					10	6	3	1	OV	2				
29-Jul-14	1	11	(F)	SC									(DP)					
29-Jul-14	1	12	SC	LG	A-H				3	3			OV	3				
29-Jul-14	1	13	LG						6	3	1	2	OV	3				
29-Jul-14	1	14	F	LG					3	2	1		OV	3				
29-Jul-14	1	15	SC	LG	A-L				8	6	2		OV	4				
29-Jul-14	1	16	SC	LG	AR-H				5	2	2	1	OV	3				
29-Jul-14	1	17	(F)	LG									(DP)	10				
29-Jul-14	1	18	LG	F					9	5	1	1	OV	3				
29-Jul-14	1	19	SC	LG	AR-H				4	2	1	1	OV	5				
29-Jul-14	1	20	LG	SG					5	3	2		C	3				
29-Jul-14	1	21	LG	SC	A-H				8	6	2		OV	4				
29-Jul-14	1	22	LG	SC					4	2	1	1	OV	5				
29-Jul-14	1	23	LG	SC					3	2	1		OV	3				
29-Jul-14	1	24	LG	SC	AR-H				15	5	8	1	OV	5				
29-Jul-14	1	25	SC	LG	AR-H				14	8	5	1	OV	TR				
29-Jul-14	1	26	SC	LG	AR-H				17	7	7		OV	2				
30-Jul-14	1	1	SC	LG	A-L				4		4		OV	3				
30-Jul-14	1	2	SC	LG					10	6	2	2	OV	TR	B	TR		
30-Jul-14	1	3	SC	LG	AR-H				18	9	8	1	OV	3				
30-Jul-14	1	4	(F)	LG									(LWD)	5	(DP)	30		
30-Jul-14	1	5	SC	LG					6	2	3		OV	70				
30-Jul-14	1	6	SC	LG					10	5	5		OV	70	DP	5		
30-Jul-14	1	7	SC	LG	AR-H				6	2	1		OV	70				

Date	Reach	Unit #	Bed Material			D-90			Total LWD	Functional LWD			Cover					
			Dom	Sub	Spawn					10-20cm	20-50cm	>50cm	Type	%	Type	%		
30-Jul-14	1	8	SC	LG	AR-H				7	3	2		OV	50				
30-Jul-14	1	9	SC	LG	AR-H				2		1		OV	10				
30-Jul-14	1	10	SC	LG	A-L				3	2	1		OV	TR				
30-Jul-14	1	11	SC	LG	A-L				15	6	5	3	OV	3				
30-Jul-14	1	12	SC	LG	A-L				5	2	2	1						
30-Jul-14	1	13	SC	LC					2			1						
30-Jul-14	1	14	LG	SC	A-L				5	1	4							
30-Jul-14	1	15	SC	LG					3	3			B	TR	OV	5		
30-Jul-14	1	16	SC	LG					6	1	2	3	OV	8	B	TR		
30-Jul-14	1	17	LG	SC														
30-Jul-14	1	18	LG	SC					12	9	3		B	TR	OV	10		
30-Jul-14	1	19	LG	SC	A-L				9	5	4		OV	5				
30-Jul-14	1	20	SC	LG					4	3		1	OV	4				
30-Jul-14	1	21	SC	LG	A-L				1	1			OV	3				
30-Jul-14	1	22	LG	LC	A-L								OV	3				
30-Jul-14	1	23	LC	SC	A-L				3	2	1		OV	5				
30-Jul-14	1	24	SC	LC	A-L				3	2	1							
30-Jul-14	1	25	LG	SC	AR-H				2	1	1		OV	4				
30-Jul-14	1	26	SC	LC					4	3								
30-Jul-14	1	27	SC	LC	A-L				2	2			B	TR	OV	5		
30-Jul-14	1	28	LG	SC					5	2	2	1	OV	8	B	TR	C	TR
30-Jul-14	1	29	LC	SC	A-L				5	2	2		B	TR	OV	5		
30-Jul-14	1	30	LC	SC					3	2	1		OV	5	B	TR		
30-Jul-14	1	31	LC	B					10	5	4		OV	3	B	TR		
30-Jul-14	1	32	B						20	10 + L J			OV	TR				
30-Jul-14	1	33	B	LC					4	3								
30-Jul-14	1	34	B	LC					3	1	1		B	TR				
31-Jul-14	1	1	LC	B					1	1			B	2				
31-Jul-14	1	2	B	LC									B	3				
31-Jul-14	1	3	LC	B					1				OV	3				
31-Jul-14	1	4	B	LC					1	1			B	4	OV	3		
31-Jul-14	1	5	B	LC					2	1	2		OV	2	B	TR		
31-Jul-14	1	6	B	LC					3				OV	6	B	4		

Date	Reach	Unit #	Bed Material			D-90			Total LWD	Functional LWD			Cover					
			Dom	Sub	Spawn					10-20cm	20-50cm	>50cm	Type	%	Type	%		
31-Jul-14	1	7	B	LC					6	3	1		OV	2	B	2		
31-Jul-14	2A	8	LC	LG					2	2			OV	4	B	TR		
31-Jul-14	2A	9	LC	B					6	3	2		B	3	OV	2		
31-Jul-14	2A	10	B	LG					1				B	2	OV	5		
31-Jul-14	2A	11	B	LC					2	2			B	5	OV	2		
31-Jul-14	2A	12	LC	LG					2	1			OV	2	B	TR		
31-Jul-14	2A	13	LC	B	A-L				7	5	2		OV	2	B	3		
31-Jul-14	2A	14	LC	SC	A-L				3	2	1		OV	TR	B	TR		
31-Jul-14	2A	15	LC	B	A-L				5			1	OV	5	B	2		
31-Jul-14	2A	16	LC	B	A-L				23	2		14	B	3	OV	TR		
31-Jul-14	2A	17	LC	B	A-L				2	2			OV	2	B	2		
31-Jul-14	2A	18	B	LC									OV	TR	B	3		
31-Jul-14	2A	19	B	LC					2	1		1	OV	3	B	2		
31-Jul-14	2A	20	SC	LG	AR-L				1				OV	2	B	TR		
31-Jul-14	2A	21	B	LC					6	1					B	3		
01-Aug-14	2A	1	LC	SC									OV	4	B	TR		
01-Aug-14	2A	2	B	LC					1				OV	3	B	3		
01-Aug-14	2A	3	B	LC	A-L				5	2	1		OV	TR	B	3		
01-Aug-14	2A	4	B	LC									OV	TR	B	2		
01-Aug-14	2A	5	B	LC	A-L				3	1			OV	TR	B	4		
01-Aug-14	2A	6	LC	SC	A-H								OV	3	B	TR		
01-Aug-14	2A	7	B	LC					7		2	2	B	5				
01-Aug-14	2A	8	B	LC									OV	TR	B	TR		
01-Aug-14	2A	9	B	LC	A-L				2	1			OV	3	B	5		
01-Aug-14	2A	10	B										OV	2	B	TR		
01-Aug-14	2A	11	B		A-L				10	3	1	1	B	7	OV	2		
01-Aug-14	2A	12	LC	B		32	37	40	1				OV	TR				
01-Aug-14	2A	13	B	LC		35	30	35	2				OV	3				
05-Aug-14	2A	1	LC	F														
05-Aug-14	2A	2	LG	SC	A-H	31	30	24					B	TR				
05-Aug-14	2A	3	LC	SC														
05-Aug-14	2A	4	LC	SC		21	24	22	1				OV	10				
05-Aug-14	2A	5	LC	SC		26	27	27					OV	TR				

Date	Reach	Unit #	Bed Material			D-90			Total LWD	Functional LWD			Cover					
			Dom	Sub	Spawn					10-20cm	20-50cm	>50cm	Type	%	Type	%		
05-Aug-14	2A	6	LC	B		26	31	31					OV	5	B	3		
05-Aug-14	2A	7	LC	LG	AR-L	36	31	29	4	4			B	TR				
05-Aug-14	2A	8	LC	SC		28	30	36	1	1			OV	TR	B	TR		
05-Aug-14	2A	9	LC	B		34	30	29	1		1		OV	10	B	TR		
05-Aug-14	2A	10	B	LC		30	31	30	15		2	JL	LWD	15				
05-Aug-14	2A	11	LC	SC		26	34	32	1	1			OV	3				
05-Aug-14	2A	12	B	LC					4	1	1		B	4	OV	TR		
05-Aug-14	2A	13	LC	B									OV	TR				
05-Aug-14	2A	14	LC	B					11	2	4		OV	10	B	4		
05-Aug-14	2A	15	LC	LG	AR-H				2	2			OV	TR	B	3		
05-Aug-14	2A	16	LC	B	A-L				4	2			OV	2				
05-Aug-14	2A	17	LC	LG	AR-L				2	1	1		B	TR	OV	TR		
05-Aug-14	2A	18	B	LC					1				B	8				
05-Aug-14	2A	19	LC	SC	AR-H				1		1		OV	3	B	TR		
05-Aug-14	2A	20	B	LC	AR-L				15	4	1	2	B	5	OV	5		
05-Aug-14	2A	21	B										OV	2	B	10		
05-Aug-14	2A	22	B		R-L				14	2	1	1	B	4	OV	3		
05-Aug-14	2A	23	B	F					14	1	L J		B	TR				
05-Aug-14	2A	24	LC	SC	AR-H				2	2			OV	4	B	TR		
05-Aug-14	2B	25	B	LC					12	L J, 1	1		OV	TR	B	5		
05-Aug-14	2B	26	LC	B	AR-L				1			1	OV	TR	B	TR		
05-Aug-14	2B	27	B	LC	AR-L				5	4			B	5	OV	TR		
05-Aug-14	2B	28	LC	B					2		2		OV	TR				
05-Aug-14	2B	29	B	LC					5	2	2	1	B	2	OV	2		
05-Aug-14	2B	30	LC	B	AR-L				10	5	1	1	B	5	OV	4		
05-Aug-14	2B	31	SC	LC					2	2								
05-Aug-14	2B	32	B						5	3	1							
05-Aug-14	2B	33	LC	B														
05-Aug-14	2B	34	B	LC									B	3				
05-Aug-14	2B	35	B	LC					2		1	1	OV	8	B	TR		
07-Aug-14	2B	1	LC	SC	AR-L				1	1			OV	2				
07-Aug-14	2B	2	LC	B	AR-L													
07-Aug-14	2B	3	B	LC	AR-L				1	1			OV	TR				

Date	Reach	Unit #	Bed Material			D-90			Total LWD	Functional LWD			Cover					
			Dom	Sub	Spawn					10-20cm	20-50cm	>50cm	Type	%	Type	%		
07-Aug-14	2B	4	B	LC									B	3	OV	TR		
07-Aug-14	2B	5	B	LC					5	2	3							
07-Aug-14	2B	6	B	LC					1	1								
07-Aug-14	2B	7	B	LC					12	JL	1	1	OV	3	LWD	8		
07-Aug-14	2B	8	B	LC									OV	10	B	3		
07-Aug-14	2B	9	LC	SC					4	2	2		OV	5	B	4		
07-Aug-14	2B	10	B	LC					1	1								
07-Aug-14	2B	11	LC	B	A-L								B	TR				
07-Aug-14	2B	12	B	LC					5	3			B	3	OV	TR		
07-Aug-14	2B	13	LC	B	AR-L				3									
07-Aug-14	2B	14	LC	B					2		1		OV	3				
07-Aug-14	2B	15	LC	SC	AR-L								OV	2				
07-Aug-14	2B	16	LC	SC	AR-L				1	1			OV	40				
07-Aug-14	2B	17	LC	SC	AR-L				21	5	5		OV	3				
07-Aug-14	2B	18	B	LC					1				B	5	OV	TR		
07-Aug-14	2B	19	LC	B					3	1	1		OV	2	B	2		
07-Aug-14	2B	20	LC	SC	AR-L				7	4	1		OV	TR				
07-Aug-14	2B	21	B	LC	AR-L				37	12	12	3	B	5	OV	3		
07-Aug-14	2B	22	B	LC	AR-L				19	3	11	2	B	3	OV	TR		
08-Aug-14	2B	1	B	LC	AR-L								B	3				
08-Aug-14	2B	2	B	LC					2	1		1	B	4				
08-Aug-14	2B	3	LC	B					2				B	3	OV	TR		
08-Aug-14	2B	4	B	LC	AR-L				17	8	2		OV	2	B	5		
08-Aug-14	2B	5	LG	SC	AR-H													
08-Aug-14	2B	6	LC	B	AR-L				14	6	2		OV	TR	B	2		
08-Aug-14	2B	7	B	LC	AR-L				7	2		2	B	3	OV	TR		
08-Aug-14	2B	8	LC	B	AR-L				21	3		1	OV	2	B	3		
08-Aug-14	2B	9	LC	SC	AR-H				3	1			OV	2				
08-Aug-14	2B	10	LC	SC	AR-H				3	2			OV	TR				
08-Aug-14	2B	11	SC	LG					2				OV	2				
08-Aug-14	2B	12	LC	B					5	2			B	3				
08-Aug-14	2B	13	B		R-L				3	2			B	3				
08-Aug-14	2B	14	LC	B	AR-H				11	5	1		B	4	OV	3		

Date	Reach	Unit #	Bed Material			D-90			Total LWD	Functional LWD			Cover					
			Dom	Sub	Spawn					10-20cm	20-50cm	>50cm	Type	%	Type	%		
08-Aug-14	2B	15	LC	B					18	5		1	OV	5	B	3	LWD	TR
08-Aug-14	2B	16	LC	SC	AR-L								OV	TR				
08-Aug-14	2B	17	LC	SC	AR-L				23	2	3	2	OV	5	B	3		
08-Aug-14	2B	18	LC		AR-L								OV	2				
08-Aug-14	2B	19	SC	LC	AR-L				3	1	2		OV	4				
08-Aug-14	2B	20	LC	B	AR-L				4	1	1	2	B	TR	OV	5		
08-Aug-14	2B	21	LC	B	AR-L				5	2			OV	4	B	3		
08-Aug-14	2B	22	LC	SC	AR-L				3	1	2							
08-Aug-14	2B	23	LC	B					3	2	1							
08-Aug-14	2B	24	LC	SC	AR-L				1			1						
08-Aug-14	2B	25	LC	B	AR-L				2	1								
08-Aug-14	2B	26	LC	SC	AR-L				4		1	2	OV	3				
11-Aug-14	2B	1	B	LC	AR-L				1	1			B	TR	OV	2		
11-Aug-14	2B	2	B	LC					3	2	1		B	TR				
11-Aug-14	2B	3	B	LC	AR-L				6	3		1	OV	3	B	TR		
11-Aug-14	2B	4	LC	B	AR-L				2	2			B	TR				
11-Aug-14	3	5	LC	B	AR-L				2	1			OV	4				
11-Aug-14	3	6	B	LC	AR-L				3	3			OV	4	B	TR		
11-Aug-14	3	7	LC	B	AR-L								B	TR				
11-Aug-14	3	8	B	LC	AR-L				1				OV	3	B	5		
11-Aug-14	3	9	LC	SC	AR-L								OV	3	B	TR		
11-Aug-14	3	10	B	LC	AR-L				4	3	1		OV	TR	B	TR		
11-Aug-14	3	11	SC	LG	AR-L								OV	TR	DP	8	B	TR
11-Aug-14	3	12	B	LC									B	5	OV	3		
11-Aug-14	3	13	B	LC														
11-Aug-14	3	14	B	LC	AR-L				1				B	5				
11-Aug-14	3	15	B	LC	AR-L				3	2		1	OV	TR	B	2		
11-Aug-14	3	16	B	LC	R-L				7	2	1	2	OV	5	B	3		
11-Aug-14	3	17	B						7	2	2	1	B	5				
11-Aug-14	3	18	LC	B	R-L				1				B	3	OV	3		
11-Aug-14	3	19	LC	B	AR-L								B	3	OV	TR		
11-Aug-14	3	20	B						1				OV	TR	B	2	DP	3
11-Aug-14	3	21	(B)	(LC)									(DP)	30	(B)	3		

Date	Reach	Unit #	Bed Material			D-90			Total LWD	Functional LWD			Cover					
			Dom	Sub	Spawn					10-20cm	20-50cm	>50cm	Type	%	Type	%		
11-Aug-14	3	22	LC	SC	AR-L				2	1		1						
11-Aug-14	3	23	SC	LC	AR-L				1	1								
11-Aug-14	3	24	B	LC					12	L J		1						
11-Aug-14	3	25	B	LC									B	10	OV	5		
11-Aug-14	3	26	B						5	2			B	12				
11-Aug-14	3	27	B	SC	R-L				1			1	B	5				
11-Aug-14	3	28	LC	SC					19	12	2	2	B	5	OV	3		
11-Aug-14	3	29	LC	B									B	TR	OV	TR		
12-Aug-14	3	1	LC	B	R-L				4	3	1		B	4	OV	2		
12-Aug-14	3	2	LC	SC	R-L				4				OV	2				
12-Aug-14	3	3	B	LC	R-L								OV	3	B	3		
12-Aug-14	3	4	LC	SC	AR-L				1		1							
12-Aug-14	3	5	LC	B					10		8	2	OV	TR	LWD	3		
12-Aug-14	3	6	LC	B	AR-L				10		4	6	OV	TR	LWD	2		
12-Aug-14	3	7	LC	B	AR-L				10	7	3							
12-Aug-14	3	8	B	LC					3	2			B	TR	OV	TR		
12-Aug-14	3	9	SC	LC	R-H				5	2	2	1	OV	10				
12-Aug-14	3	10	SC	LC	R-L													
12-Aug-14	3	11	LC	B	AR-L				7	2			OV	10	B	5		
28-Aug-14	4	1	B	LC					2	1			B	5				
28-Aug-14	4	2	B	LC									OV	2				
28-Aug-14	4	3	B	LC					3	2			OV	2	B	TR		
28-Aug-14	4	4	LC	SC									OV	TR				
28-Aug-14	4	5	F	B														
28-Aug-14	4	6	F						10		L J		LWD	95				
28-Aug-14	4	7	B	F														
28-Aug-14	4	8	B	LC					1	1			B	3				
28-Aug-14	4	9	LC	B														
28-Aug-14	4	10	B	LC					3	2	1		B	TR				
28-Aug-14	4	11	B	LC					1									
28-Aug-14	4	12	B	LC	AR-L				7	2	1	1	OV	3	B	TR		
28-Aug-14	4	13	LC	B									B	4	OV	3		
28-Aug-14	4	14	B	LC									B	3				

Date	Reach	Unit #	Bed Material			D-90			Total LWD	Functional LWD			Cover					
			Dom	Sub	Spawn					10-20cm	20-50cm	>50cm	Type	%	Type	%		
28-Aug-14	4	15	B	LC									B	2				
28-Aug-14	4	16	LC	B	R-L								B	2				
28-Aug-14	4	17	LC	B	R-L								OV	TR	B	2		
28-Aug-14	4	18	B	LC					3	1	1		B	3	OV	TR		
28-Aug-14	4	19	B	LC					1									
28-Aug-14	4	20	LC	B	A-L				1	1			B	TR	OV	3		
28-Aug-14	4	21	LC	SC	AR-L				5			1	OV	TR	B	TR		
28-Aug-14	4	22	B	LC					1				B	4				
28-Aug-14	4	23	B	LC	AR-L				3	3			B	3				
28-Aug-14	4	24	B						1				B	4				
28-Aug-14	4	25	LC	B	AR-L				17	5	L J	1	LWD	3				
28-Aug-14	4	26	B	LC	AR-L				3		2		B	2				
28-Aug-14	4	27	B	LC	R-L				2	1	1		B	4				
28-Aug-14	4	28	LC	B	R-L				1	1			B	TR				
28-Aug-14	4	29	B	LC	AR-L				20	5, L J	2		LWD	TR				
28-Aug-14	4	30	LC	SC	AR-L				14	5	2	2	B	TR				
28-Aug-14	4	31	B	LC	AR-L				3				B	3				
28-Aug-14	4	32	B	LC	AR-L								OV	3	B	3		
29-Aug-14	4	1	B	LC	AR-L				1				OV	3	B	4		
29-Aug-14	4	2	LC	B	AR-L				4	3			LWD	2	B	2		
29-Aug-14	4	3	LC	B	AR-L								OV	2				
29-Aug-14	4	4	LC	B	AR-L				2		2		OV	4				
29-Aug-14	4	5	B	LC					2				B	5				
29-Aug-14	4	6	LC	B									B	TR				
29-Aug-14	4	7	B	LC									B	8	OV	2		
29-Aug-14	4	8	LC	B	A-L													
29-Aug-14	4	9	B	LC									B	5				
29-Aug-14	4	10	B	LC									B	2				
29-Aug-14	4	11	LC	B									OV	2				
29-Aug-14	4	12	B	LC	A-L				4	3			OV	TR	B	3		
29-Aug-14	4	13	SC	LG	AR-H				5			1	LWD	TR				
29-Aug-14	4	14	B	LC									B	TR				
29-Aug-14	4	15	SC	LG	AR-H				2	1		1	LWD	TR				

Date	Reach	Unit #	Bed Material			D-90			Total LWD	Functional LWD			Cover					
			Dom	Sub	Spawn					10-20cm	20-50cm	>50cm	Type	%	Type	%		
29-Aug-14	4	16	SC	LG	AR-H				4	2		2	OV	TR	LWD	2		
29-Aug-14	4	17	SC	LG	AR-H				8	5			B	TR	OV	TR		

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators					Riparian Vegetation			Photo #		Camera
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Area (m^2)	Type	Type	Structure	Closure	U/S	D/S	
21-Jul-14	0	1	SC	GOOD	16.2	2	EB	18.9				D	YF	1	2241	2240	FUJI
21-Jul-14	0	2					EB	100				D	YF	2	2243	2242	FUJI
21-Jul-14	0	3					EB	70				D	YF	1	2245	2244	FUJI
21-Jul-14	0	4					EB	71.6				D	YF	1	2247	2246	FUJI
21-Jul-14	0	5										D	YF	1	2249	2248	FUJI
21-Jul-14	0	6					PILINGS	15				D	YF	1	2251	2250	FUJI
21-Jul-14	0	7					PILINGS	1				D	YF	1	2252	2251	FUJI
21-Jul-14	0	8					PILINGS	120				D	YF	1	2254/55	2253	FUJI
21-Jul-14	0	9										D	YF	1	2258	2257	FUJI
21-Jul-14	0	10										D	YF	1	2260	2259	FUJI
21-Jul-14	0	11					EB	50				D	YF	1	2262	2261	FUJI
21-Jul-14	0	12	SC	POOR	<20							D	YF	2	2265	2263	FUJI
21-Jul-14	0	13					PILINGS	60				D	YF	1	2267	2266	FUJI
21-Jul-14	0	14					PILINGS	10				D	YF	1	2269	2268	FUJI
22-Jul-14	0	15										D	YF	1	2271	2270	FUJI
22-Jul-14	0	16										D	YF	1	2273	2272	FUJI
22-Jul-14	0	17										D	YF	1	2275	2274	FUJI
22-Jul-14	0	18										D	YF	1	2277	2276	FUJI
22-Jul-14	0	19										D	YF	1	2279	2278	FUJI
22-Jul-14	0	20										D	YF	1	2281	2280	FUJI
22-Jul-14	0	21															FUJI
22-Jul-14	0	22										D	YF	1	2283	2282	FUJI
22-Jul-14	0	23	SC	GOOD	23	5						D	YF	1	2285	2284	FUJI
22-Jul-14	0	24					DW	227				S	SHR	1	2287	2286	FUJI
22-Jul-14	0	25										S	SHR	1	2289	2288	FUJI
22-Jul-14	0	26										S	SHR	1	2291	2290	FUJI

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators					Riparian Vegetation			Photo #		Camera
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Area (m²)	Type	Type	Structure	Closure	U/S	D/S	
22-Jul-14	0	27										S	SHR	1	2293	2292	FUJI
22-Jul-14	0	28	SC	GOOD	32.7	8						S	SHR	1		2294	FUJI
22-Jul-14	0	29										S	SHR	1	2296		FUJI
22-Jul-14	0	30										S	SHR	1	2298	2297	FUJI
22-Jul-14	0	31										S	SHR	1	2300	2299	FUJI
22-Jul-14	0	32	SC	GOOD	<50	2						S	SHR	1	2302	2301	FUJI
22-Jul-14	0	33					PILINGS	10				D	YF	1		2303	FUJI
29-Jul-14	1	1					EB	80				D	YF	1		2306	FUJI
29-Jul-14	1	2					EB	40	DW	50		D	YF	1	2307	2309	FUJI
29-Jul-14	1	3										D	YF	1	2308	2310	FUJI
29-Jul-14	1	4										D	YF	1	2311	2312	FUJI
29-Jul-14	1	5										D	YF	1	2313	2314	FUJI
29-Jul-14	1	6					JM	32				D	YF	1	2315	2317	FUJI
29-Jul-14	1	7										D	YF	1	2318	2319	FUJI
29-Jul-14	1	8										D	YF	1	2320	2321/22	FUJI
29-Jul-14	1	9					DW	15				D	YF	1	2323	2324	FUJI
29-Jul-14	1	10										D	YF	1	2325	2326	FUJI
29-Jul-14	1	11										(D)	(YF)	(1)			FUJI
29-Jul-14	1	12	SC	GOOD	38.4	3						D	YF	1	2327	2329	FUJI
29-Jul-14	1	13										D	YF	1	2330	2331	FUJI
29-Jul-14	1	14										D	YF	1	2332	2333	FUJI
29-Jul-14	1	15										D	YF	1	2334	2335	FUJI
29-Jul-14	1	16					DW	25				D	YF	1	2336	2338	FUJI
29-Jul-14	1	17										(D)	(YF)	(1)	2337		FUJI
29-Jul-14	1	18	SC	GOOD	27							D	YF	1	2339	2341	FUJI
29-Jul-14	1	19										D	YF	1	2342	2343	FUJI
29-Jul-14	1	20										D	YF	1	2344	2345	FUJI
29-Jul-14	1	21										D	YF	1	2346	2347	FUJI
29-Jul-14	1	22										D	YF	1	2348	2349	FUJI
29-Jul-14	1	23										D	YF	1	2350	2351	FUJI
29-Jul-14	1	24	SC	GOOD	23	3	DW	90				D	YF	1	2352	2353	FUJI
29-Jul-14	1	25										D	YF	1	2354	2355	FUJI

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators					Riparian Vegetation			Photo #		Camera
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Area (m²)	Type	Type	Structure	Closure	U/S	D/S	
29-Jul-14	1	26					MB	100				D	YF	1	2356	2357	FUJI
30-Jul-14	1	1										D	YF	1	2358	2359	FUJI
30-Jul-14	1	2										D	YF	1	2360	2361	FUJI
30-Jul-14	1	3					MC		BC	28.2	JM	D	YF	1	2362	2364	FUJI
30-Jul-14	1	4										(D)	(YF)	(1)	2363		FUJI
30-Jul-14	1	5										D	YF	4	2365	2366	FUJI
30-Jul-14	1	6										D	YF	4	2367	2368	FUJI
30-Jul-14	1	7										D	YF	4	2369	2370	FUJI
30-Jul-14	1	8					JM					D	YF	3	2371	2372	FUJI
30-Jul-14	1	9										D	YF	1	2373	2374	FUJI
30-Jul-14	1	10	SC	GOOD	12	2						D	YF	1	2375	2376	FUJI
30-Jul-14	1	11	SC	GOOD	17.2	2.5						D	YF	1	2377	2378	FUJI
30-Jul-14	1	12										D	YF	1	2379	2380	FUJI
30-Jul-14	1	13										D	YF	1	2381	2382	FUJI
30-Jul-14	1	14					MC		MB	40		D	YF	1	2383	2384	FUJI
30-Jul-14	1	15					JM					D	YF	1	2385	2386	FUJI
30-Jul-14	1	16										D	YF	1	2387	2388	FUJI
30-Jul-14	1	17										D	YF	1	2389	2392	FUJI
30-Jul-14	1	18										D	YF	1	2390	2391	FUJI
30-Jul-14	1	19					MB					D	YF	1	2393	2394	FUJI
30-Jul-14	1	20										D	YF	1	2395	2396	FUJI
30-Jul-14	1	21										D	YF	1	2397	2398	FUJI
30-Jul-14	1	22										D	YF	1	2399	2400	FUJI
30-Jul-14	1	23										D	YF	1	2401	2402	FUJI
30-Jul-14	1	24										D	YF	1	2403	2404	FUJI
30-Jul-14	1	25										D	YF	2	2405	2406	FUJI
30-Jul-14	1	26										D	YF	2	2407	2408	FUJI
30-Jul-14	1	27										D	YF	1	2409	2410	FUJI
30-Jul-14	1	28										D	YF	1	2411	2413	FUJI
30-Jul-14	1	29										D	YF	1	2414	2415	FUJI
30-Jul-14	1	30										D	YF	1	2416	2417	FUJI
30-Jul-14	1	31										D	YF	1	2418 & 20	2419 & 21	FUJI

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators					Riparian Vegetation			Photo #		Camera
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Area (m²)	Type	Type	Structure	Closure	U/S	D/S	
30-Jul-14	1	32										D	YF	4	2422	2423	FUJI
30-Jul-14	1	33										D	YF	4	2424	2425	FUJI
30-Jul-14	1	34										D	YF	3	2426	2427	FUJI
31-Jul-14	1	1										D	YF	1	2429	2430	FUJI
31-Jul-14	1	2										D	YF	1	2431	2432	FUJI
31-Jul-14	1	3					EB	15				D	YF	1	2433	2434	FUJI
31-Jul-14	1	4										D	YF	1	2435	2436	FUJI
31-Jul-14	1	5										D	YF	1	2437	2438	FUJI
31-Jul-14	1	6										D	YF	1	2439	2440	FUJI
31-Jul-14	1	7										D	YF	1	2441	2442	FUJI
31-Jul-14	2A	8	TRIB			1.50						D	YF	1	2443	2444	FUJI
31-Jul-14	2A	9										D	YF	1	2445	2446	FUJI
31-Jul-14	2A	10										D	YF	2	2447	2448	FUJI
31-Jul-14	2A	11										D	YF	2	2449 & 51	2450 & 52	FUJI
31-Jul-14	2A	12	TRIB			1.00						D	YF	2	2453	2454	FUJI
31-Jul-14	2A	13										D	YF	1	2455	2456	FUJI
31-Jul-14	2A	14										D	YF	1	2457	2458	FUJI
31-Jul-14	2A	15										D	YF	2	2459	2460	FUJI
31-Jul-14	2A	16										D	YF	2	2461	2462	FUJI
31-Jul-14	2A	17	TRIB			0.75						D	YF	2	2463	2464	FUJI
31-Jul-14	2A	18										D	YF	4	2465	2466	FUJI
31-Jul-14	2A	19										D	YF	1	2467	2468	FUJI
31-Jul-14	2A	20										D	YF	1	2469 & 71	2470 & 72	FUJI
31-Jul-14	2A	21										D	YF	1	2473		FUJI
01-Aug-14	2A	1	TRIB			2						D	YF	1	2480	2481	FUJI
01-Aug-14	2A	2										D	YF	1	2482	2483	FUJI
01-Aug-14	2A	3					MB	50	MC	135		D	YF	1	2484 & 85	2486	FUJI
01-Aug-14	2A	4										D	YF	1	2487	2488	FUJI
01-Aug-14	2A	5	TRIB	GOOD		TRICKLE						D	YF	1	2489	2490	FUJI
01-Aug-14	2A	6										D	YF	2	2491	2492	FUJI
01-Aug-14	2A	7	TRIB	GOOD		2						D	YF	1	2493	2494	FUJI
01-Aug-14	2A	8										D	YF	1	2495	2496	FUJI

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators					Riparian Vegetation			Photo #		Camera
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Area (m²)	Type	Type	Structure	Closure	U/S	D/S	
01-Aug-14	2A	9										D	YF	1	2497	2498	FUJI
01-Aug-14	2A	10										D	YF	1	2499	2500	FUJI
01-Aug-14	2A	11					BC	100	IV	30		D	YF	1	2501	2502	FUJI
01-Aug-14	2A	12										D	YF	1	2503	2504	FUJI
01-Aug-14	2A	13										D	YF	1	2505	2506	FUJI
05-Aug-14	2A	1										D	YF	4	2507	2508	FUJI
05-Aug-14	2A	2										D	YF	4	2509	2510	FUJI
05-Aug-14	2A	3										D	YF	4	2511	2514	FUJI
05-Aug-14	2A	4										D	YF	4	2515	2512	FUJI
05-Aug-14	2A	5										D	YF	2	2513	2516	FUJI
05-Aug-14	2A	6										D	YF	4	2517	2518	FUJI
05-Aug-14	2A	7										D	YF	1	2519	2520	FUJI
05-Aug-14	2A	8										D	YF	1	2521	2522	FUJI
05-Aug-14	2A	9										D	YF	4	2523	2524	FUJI
05-Aug-14	2A	10	SC	GOOD	>70	2						D	YF	3	2525	2526	FUJI
05-Aug-14	2A	11										D	YF	2	2527	2528	FUJI
05-Aug-14	2A	12										D	YF	1	2529	2530	FUJI
05-Aug-14	2A	13										D	YF	2	2531	2532	FUJI
05-Aug-14	2A	14										D	YF	2		2533	FUJI
05-Aug-14	2A	15										D	YF	1	2534	2535	FUJI
05-Aug-14	2A	16										D	YF	1	2536	2537	FUJI
05-Aug-14	2A	17										D	YF	1	2538	2539	FUJI
05-Aug-14	2A	18					BC					D	YF	2	2540	2542	FUJI
05-Aug-14	2A	19										D	YF	1	2543	2544	FUJI
05-Aug-14	2A	20										D	YF	2	2546	2545	FUJI
05-Aug-14	2A	21										D	YF	2	2548	2547	FUJI
05-Aug-14	2A	22										D	YF	2	2550	2549	FUJI
05-Aug-14	2A	23					JM					D	YF	4	2552	2551	FUJI
05-Aug-14	2A	24										D	YF	1	2553	2554	FUJI
05-Aug-14	2B	25										D	YF	1	2555	2556	FUJI
05-Aug-14	2B	26										D	YF	1	2557	2558	FUJI
05-Aug-14	2B	27										D	YF	1	2559	2560	FUJI

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators					Riparian Vegetation			Photo #		Camera
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Area (m²)	Type	Type	Structure	Closure	U/S	D/S	
05-Aug-14	2B	28					MB					D	YF	1	2561	2562	FUJI
05-Aug-14	2B	29					MB	29				D	YF	1	2563	2564	FUJI
05-Aug-14	2B	30										D	YF	4	2565	2566	FUJI
05-Aug-14	2B	31										D	YF	4	2567	2568	FUJI
05-Aug-14	2B	32	SC	GOOD		1.2	MC					D	YF	2	2569	2570	FUJI
05-Aug-14	2B	33										D	YF	2	2571	2572	FUJI
05-Aug-14	2B	34										D	YF	4	2573	2574	FUJI
05-Aug-14	2B	35										D	YF	5	2575	2576 & 77	FUJI
07-Aug-14	2B	1					MC	35.5				M	YF	1	2578	2579	FUJI
07-Aug-14	2B	2										M	YF	1	2580	2581	FUJI
07-Aug-14	2B	3					MB	149.4				D	YF	2	2582	2583	FUJI
07-Aug-14	2B	4										M	YF	1	2584	2597	FUJI
07-Aug-14	2B	5										M	YF	3	2585	2586	FUJI
07-Aug-14	2B	6										M	YF	1	2587	2588	FUJI
07-Aug-14	2B	7										M	YF	1	2589	2590	FUJI
07-Aug-14	2B	8										M	YF	3	2591	2592	FUJI
07-Aug-14	2B	9										M	YF	2	2593	2594	FUJI
07-Aug-14	2B	10					EB	29.9				M	YF	2	2595	2596	FUJI
07-Aug-14	2B	11										M	YF	1	2598	2599	FUJI
07-Aug-14	2B	12	TRIB	POOR	25	0.7						M	YF	1	2600	2601	FUJI
07-Aug-14	2B	13										M	YF	1	2602	2603	FUJI
07-Aug-14	2B	14					MB	70				M	YF	1	2604	2605	FUJI
07-Aug-14	2B	15										D	YF	1	2606	2608	FUJI
07-Aug-14	2B	16										D	YF	4		2607	FUJI
07-Aug-14	2B	17	TRIB	POOR		1						D	YF	3	2609	2610	FUJI
07-Aug-14	2B	18										D	YF	1	2611	2612	FUJI
07-Aug-14	2B	19					MB					D	YF	1	2613	2614	FUJI
07-Aug-14	2B	20					MB					D	YF	1	2615	2616	FUJI
07-Aug-14	2B	21	TRIB	POOR		1	MB					D	YF	1	2617	2618	FUJI
07-Aug-14	2B	22					MC					M	YF	1	2619	2620	FUJI
08-Aug-14	2B	1										M	YF	1	2621	2622	FUJI
08-Aug-14	2B	2										M	YF	1	2623	2624	FUJI

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators					Riparian Vegetation			Photo #		Camera
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Area (m²)	Type	Type	Structure	Closure	U/S	D/S	
08-Aug-14	2B	3										M	YF	1	2625	2626	FUJI
08-Aug-14	2B	4	TRIB	GOOD		6						M	YF	2	2627	2628	FUJI
08-Aug-14	2B	5										M	YF	2	2629	2630	FUJI
08-Aug-14	2B	6					MB	30				M	YF	2	2631	2632 & 34	FUJI
08-Aug-14	2B	7					JM		MB	18		M	YF	2	2633 & 35	2636 & 37	FUJI
08-Aug-14	2B	8					MC		MB	22		M	YF	1	2638	2640	FUJI
08-Aug-14	2B	9										M	YF	1	2641	2642	FUJI
08-Aug-14	2B	10										M	YF	1	2643	2645	FUJI
08-Aug-14	2B	11										M	YF	3	2644		FUJI
08-Aug-14	2B	12	TRIB	GOOD		4.5						M	YF	1	2646	2647	FUJI
08-Aug-14	2B	13										M	YF	1	2648		FUJI
08-Aug-14	2B	14					MB	41				M	YF	1	2648	2650/51	FUJI
08-Aug-14	2B	15	SC	GOOD								D	YF	3		2649	FUJI
08-Aug-14	2B	16										D	YF	2	2652	2653	FUJI
08-Aug-14	2B	17										M	YF	3	2654	2655	FUJI
08-Aug-14	2B	18										M	YF	1	2673	2672	FUJI
08-Aug-14	2B	19										M	YF	1	2657	2656	FUJI
08-Aug-14	2B	20										M	YF	1	2659	2658	FUJI
08-Aug-14	2B	21										D	YF	2	2661	2660	FUJI
08-Aug-14	2B	22										M	YF	2	2663	2662	FUJI
08-Aug-14	2B	23										D	YF	2	2665	2664	FUJI
08-Aug-14	2B	24										D	YF	2	2667	2666	FUJI
08-Aug-14	2B	25										D	YF	1	2669	2668	FUJI
08-Aug-14	2B	26										M	YF	2	2671	2670	FUJI
11-Aug-14	2B	1					MB	45				M	YF	2	2674	2675	FUJI
11-Aug-14	2B	2					MB	5				M	YF	2	2676	2677	FUJI
11-Aug-14	2B	3					DW	25	MB	50	MC	M	YF	2	2678	2679	FUJI
11-Aug-14	2B	4										M	YF	1	2680	2681	FUJI
11-Aug-14	3	5	TRIB	GOOD		2.5						M	YF	2	2682	2683	FUJI
11-Aug-14	3	6					MB					M	YF	2	2684	2685	FUJI
11-Aug-14	3	7										M	YF	1	2686	2687	FUJI
11-Aug-14	3	8										M	YF	1	2688	2689	FUJI

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators					Riparian Vegetation			Photo #		Camera
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Area (m²)	Type	Type	Structure	Closure	U/S	D/S	
11-Aug-14	3	9										M	YF	1	2690	2691	FUJI
11-Aug-14	3	10					DW	35				M	YF	1	2692	2693	FUJI
11-Aug-14	3	11										M	YF	1	2694	2695	FUJI
11-Aug-14	3	12										M	YF	1	2696	2697	FUJI
11-Aug-14	3	13										M	YF	1	2698	2699	FUJI
11-Aug-14	3	14										M	YF	1	2700	2701	FUJI
11-Aug-14	3	15										M	YF	1	2702	2703	FUJI
11-Aug-14	3	16	TRIB	GOOD		6	MB	26				M	YF	1	2704	2705	FUJI
11-Aug-14	3	17										M	YF	1	2706	2707	FUJI
11-Aug-14	3	18										M	YF	1	2708	2709	FUJI
11-Aug-14	3	19										M	YF	2	2710	2711	FUJI
11-Aug-14	3	20										M	YF	1	2712	2714	FUJI
11-Aug-14	3	21										M	YF	2	2713		FUJI
11-Aug-14	3	22										M	YF	3	2716	2715	FUJI
11-Aug-14	3	23										M	YF	3	2718 & 19	2717	FUJI
11-Aug-14	3	24										M	YF	3	2721	2720	FUJI
11-Aug-14	3	25										M	YF	3	2723	2722	FUJI
11-Aug-14	3	26										M	YF	3	2725	2724	FUJI
11-Aug-14	3	27										D	YF	2	2727	2726	FUJI
11-Aug-14	3	28										M	YF	2	2729 & 30	2728	FUJI
11-Aug-14	3	29										D	YF	1	2731	2732	FUJI
12-Aug-14	3	1					MB	60				M	YF	1	2733	2734	FUJI
12-Aug-14	3	2										M	YF	1	2735	2736	FUJI
12-Aug-14	3	3	TRIB	GOOD		0.75						D	YF	1	2737	2738	FUJI
12-Aug-14	3	4										M	YF	1	2739	2741 & 40	FUJI
12-Aug-14	3	5										M	YF	1	2742	2743	FUJI
12-Aug-14	3	6										M	YF	1	2744	2745	FUJI
12-Aug-14	3	7										D	YF	1	2746	2747	FUJI
12-Aug-14	3	8										M	YF	2	2748	2755	FUJI
12-Aug-14	3	9										D	YF	2	2749	2750	FUJI
12-Aug-14	3	10										D	YF	1	2751	2752	FUJI
12-Aug-14	3	11										D	YF	4	2753	2754	FUJI

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators					Riparian Vegetation			Photo #		Camera
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Area (m²)	Type	Type	Structure	Closure	U/S	D/S	
28-Aug-14	4	1										M	YF	1	2756	2757	FUJI
28-Aug-14	4	2										M	YF	1	2758	2759	FUJI
28-Aug-14	4	3										M	YF	1	2760	2774	FUJI
28-Aug-14	4	4										D	YF	3	2762	2761	FUJI
28-Aug-14	4	5	TRIB	GOOD		0.25						D	YF	2	2764	2763	FUJI
28-Aug-14	4	6										D	YF	3	2767	2765	FUJI
28-Aug-14	4	7										D	YF	3	2767	2766	FUJI
28-Aug-14	4	8										D	YF	3	2769	2768	FUJI
28-Aug-14	4	9										M	YF	3	2771	2770	FUJI
28-Aug-14	4	10										M	YF	2	2773	2772	FUJI
28-Aug-14	4	11										M	YF	1	2775	2776	FUJI
28-Aug-14	4	12										M	YF	1	2777	2785	FUJI
28-Aug-14	4	13										M	YF	2		2778	FUJI
28-Aug-14	4	14										M	YF	2	2780	2779	FUJI
28-Aug-14	4	15										M	YF	2	2782	2781	FUJI
28-Aug-14	4	16										M	YF	2	2784	2783	FUJI
28-Aug-14	4	17										M	YF	1	2786	2787	FUJI
28-Aug-14	4	18										M	YF	2	2788	2789	FUJI
28-Aug-14	4	19										D	YF	1	2790	2791	FUJI
28-Aug-14	4	20					MB	2				D	YF	1	2792	2793	FUJI
28-Aug-14	4	21					MB	12				D	YF	2	2794	2795	FUJI
28-Aug-14	4	22										M	YF	2	2796	2797	FUJI
28-Aug-14	4	23					MB	38				D	YF	2	2798	2799	FUJI
28-Aug-14	4	24										D	YF	2	2800	2801	FUJI
28-Aug-14	4	25										D	YF	2	2802	2803	FUJI
28-Aug-14	4	26										D	YF	2	2804	2805	FUJI
28-Aug-14	4	27										D	YF	2	2807	2806	FUJI
28-Aug-14	4	28										D	YF	2	2809	2808	FUJI
28-Aug-14	4	29					MB					D	YF	1	2811	2810	FUJI
28-Aug-14	4	30										D	YF	1	2813	2812	FUJI
28-Aug-14	4	31										M	YF	1	2814	2815	FUJI
28-Aug-14	4	32										M	YF	1	2816	2817	FUJI

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators					Riparian Vegetation			Photo #		Camera
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Area (m²)	Type	Type	Structure	Closure	U/S	D/S	
29-Aug-14	4	1										M	YF	2	2818	2819	FUJI
29-Aug-14	4	2	TRIB	GOOD	200+	4	MB	7				M	YF	2	2820	2821	FUJI
29-Aug-14	4	3										M	YF	2	2822	2823	FUJI
29-Aug-14	4	4	TRIB	GOOD	200+	4						M	YF	2	2824	2885	FUJI
29-Aug-14	4	5										M	YF	3	2826	2833	FUJI
29-Aug-14	4	6										M	YF	2	2834	2835	FUJI
29-Aug-14	4	7										M	YF	3	2828	2827	FUJI
29-Aug-14	4	8										M	YF	3	2830	2829	FUJI
29-Aug-14	4	9										M	YF	3	2832	2831	FUJI
29-Aug-14	4	10										D	YF	2	2836	2837	FUJI
29-Aug-14	4	11	TRIB	GOOD	200+	4.6						D	YF	2	2838	2839	FUJI
29-Aug-14	4	12										D	YF	2	2840	2841	FUJI
29-Aug-14	4	13										M	YF	2	2843	2842	FUJI
29-Aug-14	4	14										M	YF	2	2845	2844	FUJI
29-Aug-14	4	15										M	YF	2	2847	2846	FUJI
29-Aug-14	4	16	SL	GOOD	20	10						D	YF	1	2849	2848	FUJI
29-Aug-14	4	17	SL	GOOD	20	4.3	BC	20				D	YF	1	2851 & 53	2850 % 52	FUJI

Date	Watershed	Stream	Start UTM	End UTM	Survey Direction	Discharge (m^3/s)	Weather	Crew	Reach	Unit #s Surveyed
21-Jul-14	Coquitlam	Coquitlam River	10U 0514808 5455361	10U 0514378 5454644	D	1.621	Sunny/0%CC	NM, DR, ML	0	1-14
22-Jul-14	Coquitlam	Coquitlam River	10U 0514378 5454644	10U 0514070 5452707	D	1.594	Sunny/20%CC	NM, DR, ML	0	15-33
29-Jul-14	Coquitlam	Coquitlam River	10U 0514808 5455361	10U 0515401 5456579	U	1.823	Sunny/0%CC	NM,ML	1	1-26
30-Jul-14	Coquitlam	Coquitlam River	10U 0515401 5456579	10U 0516227 5457821	U	1.749	Sunny/0%CC	NM,ML	1	1-34
31-Jul-14	Coquitlam	Coquitlam River	10U 0516227 5457821	10U 0516582 5459578	U	1.710	Sunny/0%CC	NM,ML	1	1-7
31-Jul-14	Coquitlam	Coquitlam River	10U 0516227 5457821	10U 0516582 5459578	U	1.71	Sunny/0%CC	NM,ML	2A	8-21
01-Aug-14	Coquitlam	Coquitlam River	10U 0516582 5459578	10U 0516766 5460502	U	2.143	Sunny/0%CC	NM,ML	2A	1-13
05-Aug-14	Coquitlam	Coquitlam River	10U 0516766 5460502	10U 0516519 5461510	U	2.861	Sunny/0%CC	NM,ML	2A	1-35
07-Aug-14	Coquitlam	Coquitlam River	10U 0516519 5461510	10U 0516900 5462550	U	2.847	Sunny/0%CC	NM,ML	2B	1-26
11-Aug-14	Coquitlam	Coquitlam River	10U 0516584 5463782	10U 0516930 5464728	U	2.749	Sunny/0%CC	NM,ML	2B	1-4
11-Aug-14	Coquitlam	Coquitlam River	10U 0516584 5463782	10U 0516930 5464728	U	2.749	Sunny/0%CC	NM,ML	3	5-29
12-Aug-14	Coquitlam	Coquitlam River	10U 0516930 5464728	10U 0516615 5465113	U	2.806	Light Rain/100% CC	NM,ML	3	1-11
28-Aug-14	Coquitlam	Coquitlam River	10U 0516616 5465122	10U 0516571 5466190	U	2.598	Dry/95%CC	NM,ML	4	1-32
29-Aug-14	Coquitlam	Coquitlam River	10U 0516571 5466190	10U 0516473 5466738	U	2.566	Dry/100%CC	NM,ML	4	1-17

APPENDIX B - Raw Data Collected by BCIT Students

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
15-Sep-14	2B	1	P	1	18		0.97	0.25	0.72	20.2	17.2	2	0.4	1.6	S
15-Sep-14	2B	2	G	1	72.8		0.65	0.15	0.50	26.8	24.2				
15-Sep-14	2B	3	R	1	21.8	3	0.76	0.45	0.31	33.7	24.5				
15-Sep-14	2B	4	G	1	10.7	1.8	0.73	0.33	0.40	35.5					
15-Sep-14	2B	5	R	1	75	2	0.85	0.30	0.55	32	23.5				
15-Sep-14	2B	6A	C	1	25.8		0.82	0.30	0.52	22.2	20.1				
15-Sep-14	2B	6B	R	2	18.5		0.52	0.19	0.33	19	19				
15-Sep-14	2B	7	R	2	33		0.49	0.16	0.33	18.5					
15-Sep-14	2B	8	G	2	29		0.77	0.45	0.32	11.3					
15-Sep-14	2B	9	R	2	27.7		0.46	0.14	0.32	12.9					
15-Sep-14	2B	10	P	2	22.5		0.78	0.10	0.68	9.1	9.1	1	0.2	0.75	DP
15-Sep-14	2B	7A	R	1	16.2		0.75	0.28	0.47	15.9	14.4				
15-Sep-14	2B	8	R	1	46	2	0.88	0.35	0.53	16	13.5				
15-Sep-14	2B	9A	G	1	59.2		0.82	0.36	0.46	21.2	21.3				
15-Sep-14	2B	10A	R	1	36	3	0.42	0.20	0.22	36	36				
15-Sep-14	2B	11	R	1	69.1		0.80	0.37	0.43	21.2	17.9				
15-Sep-14	2B	12	G	1	143	0	1.08	0.31	0.77	17	21.5				
15-Sep-14	2B	13	R	1	34.1	3	0.41	0.16	0.25	39	39				
15-Sep-14	2B	14	C	1	14	2	0.77	0.30	0.47	14	10				
17-Sep-14	2B	1	G	1	18.3		0.77	0.40	0.37	30	23				
17-Sep-14	2B	2	R	1	29.2	1	0.67	0.35	0.32	24	19				
17-Sep-14	2B	3	G	1	12.6		0.72	0.10	0.62	27	12				
17-Sep-14	2B	4A1	G	2	13.4		0.45	0.15	0.30	16.4	16.4				
17-Sep-14	2B	4A2	R	2	33		0.57	0.22	0.35	12.9	10.3				
17-Sep-14	2B	4A3	G	2	18.8		0.51	0.18	0.33	6.1	6.1				
17-Sep-14	2B	4A4	R	2	35.4		0.54	0.23	0.31	6.9	6.8				

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
17-Sep-14	2B	4A5	P	2	9.1		0.95	0.28	0.67		5.8	105	20	85	S
17-Sep-14	2B	4A6	R	2	37.5		0.58	0.32	0.26	7.1	7.1				
17-Sep-14	2B	4B	R	1	83	1	0.68	0.35	0.33	59.9	15.3				
17-Sep-14	2B	5B	G	1	77	0	0.71	0.25	0.46	16.2	18.8	130	50	80	S
17-Sep-14	2B	6	G	1	60.6		0.67	0.15	0.52	25.5	22.4				
17-Sep-14	2B	7	R	1	108		0.72	0.35	0.37	37.2	21.3				
17-Sep-14	2B	8	G	1	65		0.75	0.45	0.30	17.4	17.4				
17-Sep-14	2B	9	R	1	44		0.57	0.30	0.27	27	23				
17-Sep-14	2B	10	G	1	60.6	0	0.70	0.25	0.45	25.4	22				
17-Sep-14	2B	11A	R	2	108		0.68	0.20	0.48	15.6	7				
17-Sep-14	2B	11B	G	1	110	1	0.40	0.20	0.20	13	11				
17-Sep-14	2B	12	P	1	43.5		0.75	0.20	0.55	20	18	175	40	135	S
17-Sep-14	2B	13	R	1	64	2	0.55	0.35	0.20	23	23				
17-Sep-14	2B	14	G	1	36		0.73	0.40	0.33	20	20				
17-Sep-14	2B	15	R	1	32.3	1	0.59	0.23	0.36	25.5	25.5				
17-Sep-14	2B	16	P	1	66.8		1.57	0.70	0.87	20.4	16.8				
17-Sep-14	2A	12	R	1	96	1.1	0.59	0.37	0.22	26.2	24.9				
17-Sep-14	2A	11	G	1	122	0.1	0.68	0.35	0.33	26.6	26.4				
17-Sep-14	2A	10	R	1	51	0.2	0.67	0.33	0.34	24	18				
17-Sep-14	2A	9	R	1	62	0.5	0.68	0.25	0.43	21.1	20.2				
17-Sep-14	2A	8	R	1	31	0.1	0.54	0.30	0.24	30	26.4				
17-Sep-14	2A	7	G	1	34	0.2	0.43	0.09	0.34	23.2	20.2				
17-Sep-14	2A	6	R	1	41	2	0.45		0.45	23.9	11.4				
17-Sep-14	2A	5	G	1	98	0.1	0.71	0.23	0.48	21	17				
17-Sep-14	2A	4	G	1	154	0.3	0.41	0.20	0.21	26.2	20.5				
17-Sep-14	2A	3	G	1	76		0.74	0.20	0.54	22	21				
17-Sep-14	2A	2	G	1	160	0.8	0.83	0.40	0.43	17	17				

Date	Reach	Unit #	Type	Cat.	Length (m)	Gradient (%)	Bank Depth (m)	Mean Bank Depth (m)	Mean Water Depth (m)	Mean Bank Width (m)	Mean Wetted Width (m)	Pool Depths (m)			Pool Type
												Max	Crest	Residual	
17-Sep-14	2A	1	R	1	36	0.3	0.83	0.30	0.53	18.5	9				
17-Sep-14	2A	4B	R	2	37.3	2	0.37	0.20	0.17	11.9	7.5				
17-Sep-14	2A	3B	G	2	21	2	0.48	0.20	0.28	8.7	7				
17-Sep-14	2A	2B	P	2	12.8	0.4	1.00	0.20	0.80	11.5	10.4	115	30	85	S
17-Sep-14	2A	1B	G	2	126.2	0.4	0.33	0.20	0.13	14.7	12.3				
15-Sep-14	2A	16A	R	2	83.5	0.5	0.58	0.25	0.33	11.3	9.7				
15-Sep-14	2A	16	G	1	109	0.3	0.68	0.30	0.38	24.5	24				
15-Sep-14	2A	16	R	1	122.3	1.2	0.55	0.20	0.35	15.9	13.9				
15-Sep-14	2A	14	G	1	83	0.6	0.71	0.35	0.36	26.6	22				
15-Sep-14	2A	14	R	1	69	2	0.88	0.30	0.58	16.2	14.3				
15-Sep-14	2A	13	G	1	75	0.5	0.85	0.25	0.60	23.2	20				
15-Sep-14	2A	12	R	1	63.2	1.1	0.73	0.23	0.50	16.2	15				
15-Sep-14	2A	11	G	1	52.1	0.2	0.73	0.30	0.43	22.1	19				
15-Sep-14	2A	10B	R	2	36.8	0.6	0.32	0.07	0.25	10.2	10				
15-Sep-14	2A	9B	G	2	20.8	0.2	0.58	0.18	0.40	10.7	10				
15-Sep-14	2A	8B	R	2	107.5	1.8	0.41	0.15	0.26	13.5	13				
15-Sep-14	2A	8	R	1	194.6	0.5	0.75	0.30	0.45	19.6	18.6				
15-Sep-14	2A	7	G	1	83.5	0.2	0.77	0.30	0.47	30	19.9				
15-Sep-14	2A	6	G	1	90.1	0.2	0.45	0.15	0.30	35.7	25				
15-Sep-14	2A	5	R	1	73	3	0.65	0.30	0.35	26.6	25.1				
15-Sep-14	2A	4	G	1	33.3	2	0.62	0.17	0.45	23	20.8				
15-Sep-14	2A	3	R	1	88.2	2	0.59	0.25	0.34	29.5	28				
15-Sep-14	2A	2	G	1	31	0.3	0.95	0.30	0.65	22.8	17				
15-Sep-14	2A	1	R	1	110.1	0.7	0.61	0.25	0.36	16	15.5				

Date	Reach	Unit #	Bed Material				Total LWD	Functional LWD			Cover			
			Dom	Sub	Spawn			10-20cm	20-50cm	>50cm	Type	%	Type	%
15-Sep-14	2B	1	C	B	R	L					B	1	DP	3
15-Sep-14	2B	2	SC	LC	AR	L	1	1			B	1		
15-Sep-14	2B	3	SC	SG	A	L	2		2		B	1	OV	1
15-Sep-14	2B	4	G	C	AR	H					B	1	OV	1
15-Sep-14	2B	5	B	LG	A	L	1				B	20	OV	1
15-Sep-14	2B	6A	B	LC							B	7		
15-Sep-14	2B	6B	B	C	R	L					B	3	OV	1
15-Sep-14	2B	7	B	G	R	L					B	5	OV	1
15-Sep-14	2B	8	B	C							B	3	OV	1
15-Sep-14	2B	9	B	C	R	L					B	3	OV	3
15-Sep-14	2B	10	B				5	3	2		B	1	DP	1
15-Sep-14	2B	7A	B	LC							B	1		
15-Sep-14	2B	8	C	B	A	L					B	10		
15-Sep-14	2B	9A	SC	LC	A	L					B	2		
15-Sep-14	2B	10A	B	LC			1				B	10	OV	1
15-Sep-14	2B	11	B	LC			3	2	1		B	1		
15-Sep-14	2B	12	C	LG							B	1	OV	1
15-Sep-14	2B	13	SC	LC	A	L					B	1	OV	1
15-Sep-14	2B	14	B	C							B	3		
17-Sep-14	2B	1	LC	SC	R	L	5	2	2	1				
17-Sep-14	2B	2	SC	LG	A	H	9	4	5		B	1	LWD	1
17-Sep-14	2B	3	C	G	A	H	21	12	6	3	LWD	1	C	1
17-Sep-14	2B	4A1	SC	G							C	1	OV	1
17-Sep-14	2B	4A2	SC	G	AR	H	12	10	2		LWD	1		
17-Sep-14	2B	4A3	SC	G	AR	H	1	1			OV	10		
17-Sep-14	2B	4A4	SC	G	A	L	3	2	1					
17-Sep-14	2B	4A5	SC	G			5	3	2		DP	1		
17-Sep-14	2B	4A6	LG	SC							OV	5		
17-Sep-14	2B	4B	LG	SG	A	H	11	5	5		B	1	LWD	1
17-Sep-14	2B	5B	F	LG			5		2		B	1	C	1
17-Sep-14	2B	6	G	C	AR	H	5	5						
17-Sep-14	2B	7	G	C	AR	H	25	10	13	2	LWD	1	OV	4

Date	Reach	Unit #	Bed Material				Total LWD	Functional LWD			Cover			
			Dom	Sub	Spawn			10-20cm	20-50cm	>50cm	Type	%	Type	%
17-Sep-14	2B	8	G	C	AR	H	16	15	1		LWD	1	OV	1
17-Sep-14	2B	9	G	C	AR	H	3		3		DP	1		
17-Sep-14	2B	10	SG	LG			8	4	2	1	C	1	OV	1
17-Sep-14	2B	11A	G	C	AR	H	6	4	1	1	C	1		
17-Sep-14	2B	11B	SG	LG			18	9	6		B	1	OV	3
17-Sep-14	2B	12	G	S	AR	H					C	1	DP	6
17-Sep-14	2B	13	LG	SG			9	6			C	3	OV	2
17-Sep-14	2B	14	C	G	AR	H	4	3		1	C	1		
17-Sep-14	2B	15	LG	SG			1		1		B	1	OV	1
17-Sep-14	2B	16	G	S			1			1	DP	15	OV	1
17-Sep-14	2A	12	SC	LG			7	3	4		OV	1		
17-Sep-14	2A	11	LC	SC							OV	1		
17-Sep-14	2A	10	LC	LG	A	L								
17-Sep-14	2A	9	LC	SC			6	2	4		LWD	1	OV	1
17-Sep-14	2A	8	SC	LG	R	L	6	3	1		OV	1		
17-Sep-14	2A	7	SC	LG	AR	H	2	1			OV	1		
17-Sep-14	2A	6	LC	SC			3	3						
17-Sep-14	2A	5	LC	SC	A	H					OV	1	C	1
17-Sep-14	2A	4	SC	LG	AR	H	2		2		OV	1		
17-Sep-14	2A	3	SC	LG	AR	H					OV	1	C	1
17-Sep-14	2A	2	SC	LG			6	3	3		OV	3		
17-Sep-14	2A	1	SC	LG	A	L	6	5	1		LWD	1	C	1
17-Sep-14	2A	4B	SC	LG	A	H	1	1			OV	1		
17-Sep-14	2A	3B	LG	F							OV	1		
17-Sep-14	2A	2B	F	LG							B	4		
17-Sep-14	2A	1B	SC	LG			1	1			LWD	1	OV	5
15-Sep-14	2A	16A	LC	SC			2	1	1		B	1	OV	1
15-Sep-14	2A	16	SC	LC							B	1	OV	1
15-Sep-14	2A	16	B	SC	R	L	12	10	2		B	1		
15-Sep-14	2A	14	SC	LG			2		2					
15-Sep-14	2A	14	B	LC			1				B	1	DP	1
15-Sep-14	2A	13	LC	SC	A	L					B	1	OV	1

Date	Reach	Unit #	Bed Material				Total LWD	Functional LWD			Cover			
			Dom	Sub	Spawn			10-20cm	20-50cm	>50cm	Type	%	Type	%
15-Sep-14	2A	12	LC	B							B	1	OV	1
15-Sep-14	2A	11	SC	B			2	1	1		B	1	OV	1
15-Sep-14	2A	10B	LC	B	AR	L	3	2			B	1	OV	1
15-Sep-14	2A	9B	LC	B							B	1	OV	4
15-Sep-14	2A	8B	B	SC	AR	L	4	3			B	1	OV	3
15-Sep-14	2A	8	B	LC			2	1	1		B	2		
15-Sep-14	2A	7	LC	SC			2	1	1				OV	1
15-Sep-14	2A	6	SC	LC	A	L							OV	1
15-Sep-14	2A	5	LC	SC			5	1	1		B	1	OV	1
15-Sep-14	2A	4	SC	LC	AR	L	2		2					
15-Sep-14	2A	3	SC	B			2		1		B	1	OV	1
15-Sep-14	2A	2	SC	B			1			1	B	1	DP	5
15-Sep-14	2A	1	LC	B			2	1			B	1		

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators				Riparian Vegetation			Velocity	Photo #	
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Length (m)	Type	Structure	Closure		U/S	D/S
15-Sep-14	2B	1									M	YF	1	0.18	937	936
15-Sep-14	2B	2									M	YF	1			
15-Sep-14	2B	3					MB	5.5	PD		D	YF	1	1	5485 & 5486	5490 & 5491
15-Sep-14	2B	4									M	YF	1	0.63	946	945
15-Sep-14	2B	5					SC				M	YF	1	1.2	5492	5495
15-Sep-14	2B	6A					MB	21.1			M	YF	1			
15-Sep-14	2B	6B									M	YF	2	0.41	947	948
15-Sep-14	2B	7									M	YF	2	0.3	949	950
15-Sep-14	2B	8									M	YF	2	0.5	953	951
15-Sep-14	2B	9									M	YF	2	0.39	957	954
15-Sep-14	2B	10					JW	9.1			M	YF	3	0.97	959	958
15-Sep-14	2B	7A					MB	16.2			M	YF	1			
15-Sep-14	2B	8									M	YF	1	0.47	5499	5496
15-Sep-14	2B	9A									M	YF	1			
15-Sep-14	2B	10A									M	YF	1	0.94	5509	5503
15-Sep-14	2B	11									M	YF	1			
15-Sep-14	2B	12					MB	1			M	YF	1	3	5511	5510
15-Sep-14	2B	13									M	YF	1	1.5	5515	5513
15-Sep-14	2B	14									M	YF	1	1.71	969	966
17-Sep-14	2B	1									D	YF	1			
17-Sep-14	2B	2	SC	G	14.3	3.5	PD	29.2			D	YF	1		407	406
17-Sep-14	2B	3					EB				D	YF	1	0.14		
17-Sep-14	2B	4A1	SC	good	27.4	2.05					D	YF	1			
17-Sep-14	2B	4A2					JM	3			D	YF	1			
17-Sep-14	2B	4A3									D	YF	3			
17-Sep-14	2B	4A4									D	YF	4			
17-Sep-14	2B	4A5					LJ	2			D	PS	2			
17-Sep-14	2B	4A6									S	SHR	1			
17-Sep-14	2B	4B	SC	P	29.8	5	DW	83	EB		D	YF	1		409	408
17-Sep-14	2B	5B					MB	30			S	SHR	1		410	411
17-Sep-14	2B	6					EB				D	YF	1	0.5		

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators				Riparian Vegetation			Velocity	Photo #	
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Length (m)	Type	Structure	Closure		U/S	D/S
17-Sep-14	2B	7					EB		MB		D	YF	1	0.59		
17-Sep-14	2B	8									D	YF	1	0.54		
17-Sep-14	2B	9					EB				D	YF	1	0.67		
17-Sep-14	2B	10					MB	10			D	YF	1		412	413
17-Sep-14	2B	11A					EB				D	YF	2	0.83		
17-Sep-14	2B	11B					MB				D	YF	1		415	414
17-Sep-14	2B	12					EB				D	YF	1	0.33		
17-Sep-14	2B	13					EB	64			D	YF	1		417	416
17-Sep-14	2B	14					EB				D	YF	1	0.45		
17-Sep-14	2B	15					EB	32.3			D	YF	1		420	421
17-Sep-14	2B	16	SC	good	20	8	EB	66.8			D	YF	1			
17-Sep-14	2A	12					EB	15			M	YF	1			
17-Sep-14	2A	11									D	YF	1		42	43
17-Sep-14	2A	10									D	YF	1			
17-Sep-14	2A	9									D	YF	1		40	41
17-Sep-14	2A	8									M	YF	1			
17-Sep-14	2A	7									D	YF	1			
17-Sep-14	2A	6									D	YF	1		38	39
17-Sep-14	2A	5									D	YF	1			
17-Sep-14	2A	4	SC	P	69	4					D	YF	1			
17-Sep-14	2A	3									D	YF	1			
17-Sep-14	2A	2					LR	20			D	YF	1			
17-Sep-14	2A	1					PD				D	YF	1			
17-Sep-14	2A	4B									D	YF	2		36	37
17-Sep-14	2A	3B									D	YF	1		34	35
17-Sep-14	2A	2B									D	YF	1		31	
17-Sep-14	2A	1B					MC	25.4	MB		D	YF	1		30	32
15-Sep-14	2A	16A									M	YF	1		24	25
15-Sep-14	2A	16									M	YF	1			
15-Sep-14	2A	16									M	YF	1			
15-Sep-14	2A	14					EB	10	LR	10	M	YF	1			

Date	Reach	Unit #	Off-channel Habitat				Disturbance Indicators				Riparian Vegetation			Velocity	Photo #	
			Type	Access	Length (m)	Width (m)	Type	Length (m)	Type	Length (m)	Type	Structure	Closure		U/S	D/S
15-Sep-14	2A	14									M	YF	1		22	23
15-Sep-14	2A	13									M	YF	1		19	20
15-Sep-14	2A	12									M	YF	1			
15-Sep-14	2A	11					EB	4			M	YF	1			
15-Sep-14	2A	10B									M	YF	1			
15-Sep-14	2A	9B									M	YF	2		1010	1011
15-Sep-14	2A	8B									M	YF	1		1006	1009
15-Sep-14	2A	8									M	YF	1			
15-Sep-14	2A	7					EB		MB	49.4	M	YF	1			
15-Sep-14	2A	6									M	YF	2		1002	1005
15-Sep-14	2A	5					DW	7.3			M	YF	1		12	11
15-Sep-14	2A	4					MB		MC	9.4	M	YF	1			
15-Sep-14	2A	3									M	YF	1		994	1001
15-Sep-14	2A	2					DW	35.7			M	YF	1		9	10
15-Sep-14	2A	1									M	YF	1			

APPENDIX C - Level 1 - Habitat Survey Data Form

Page_____of_____ **LEVEL 1 – HABITAT SURVEY DATA FORM** **INSTREAM FISHERIES RESEARCH**

Date:	Crew:	Daily Discharge (WSC):
Watershed	Start NTU:	
Stream/Sub-basin:	End NTU:	Weather:
Reach:	Survey Direction (U/D):	Camera Used:

Unit#	Hab. Unit		Length	Grad	Mean Depth (cm)		Mean Width (m)		Pool Depths (cm)			
	Type	Cat	(m)	%	Bank	Wet	Bank	Wet	Max.	Crest	Res.	Type

Unit#	Bed Material					Total	Functional LWD			Cover				Off-channel Hab.			
	Dom	Sub	Spawn		D-90	LWD	10-20	20-30	>30	Type	%	Type	%	Type	Access	Length	Width

*F < 2mm, SG 2-16mm, LG 16-64mm, SC 64-128mm, LC 128-256mm, B 256-4000mm, Bedrock < 4000mm

Unit#	Disturbance Indicators			Riparian Vegetation			Useable Area		Velocity	Photo#		Comments (use back if need)
	Type & Length			Type	Structure	Closure				U/S	D/S	

APPENDIX D - Level 1 – Coquitlam River FHAP Training Presentation

Level 1 Fisheries Habitat Assessment

Don McCubbing
Jason Ladell

- InStream Fisheries Research Inc.

2014

Level 1 Fisheries Habitat Assessment

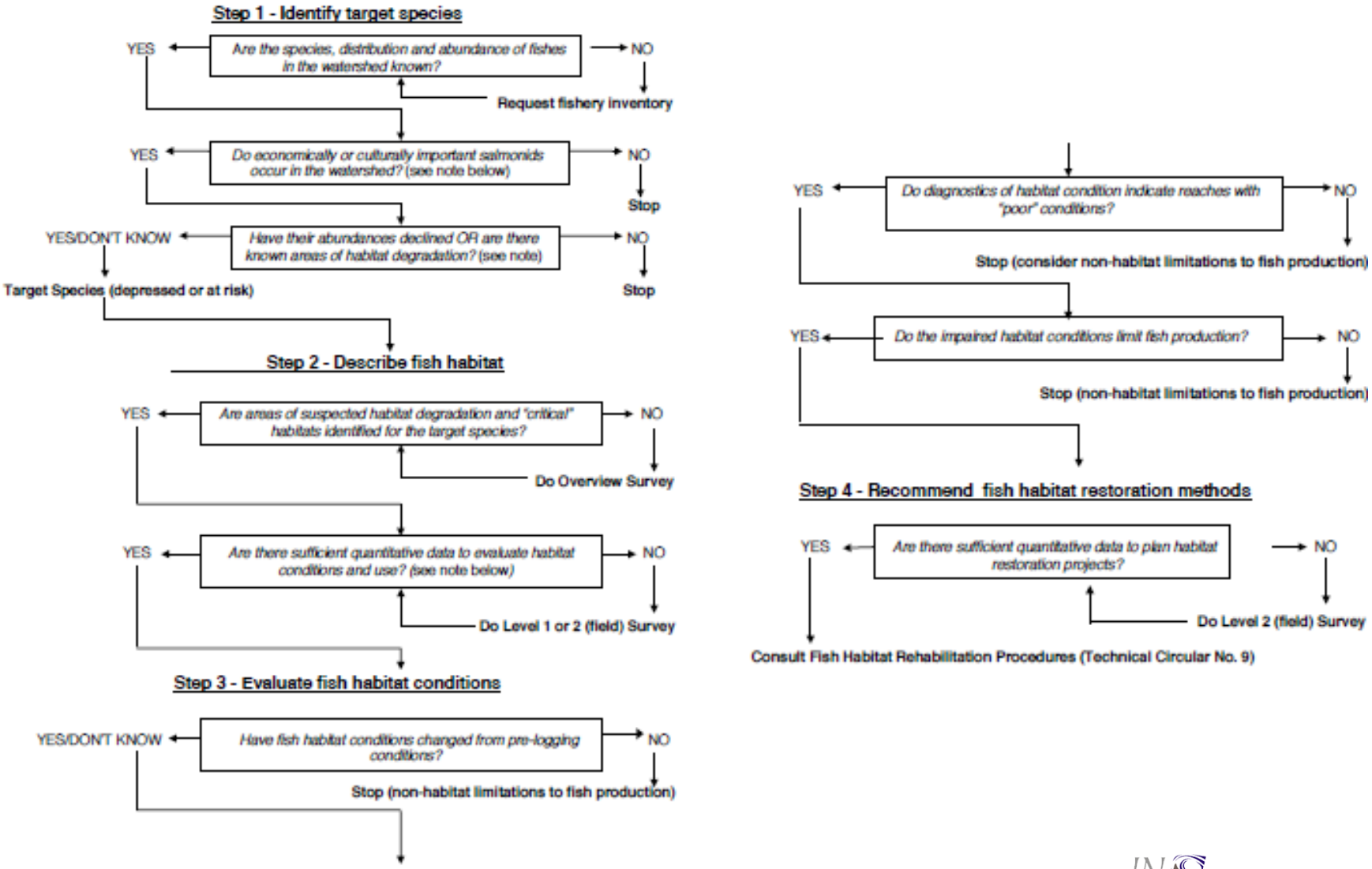
- The Watershed Restoration Program (WRP) was a provincial initiative undertaken for the restoration of lands impacted by past forest practices.
- A series of technical circulars were produced to assist in planning watershed restoration projects
- Johnson, N.T. and P.A. Slaney. 1996. Fish Habitat Assessment Procedures. Watershed Restoration Technical Circular No. 8.

Baseline Assessment Procedure

- Allows identification of opportunities to increase depressed stocks of salmonids in streams

1. Overview summary: existing information from maps, reports, databases, etc.
2. Reconnaissance Level 1 1Survey
3. Detailed site-specific Level 2 survey

Figure 1 - Flowchart of the fish habitat assessment process (see notes below).



Level 1 Fisheries Habitat Assessment

- Background Information:

Identify the watershed

Watershed code

Topographic maps

The Fisheries Information Summary System (FISS) provides spatially represented summary level fish and fish habitat data for waterbodies throughout British Columbia and the Yukon

EcoCat provides access to digital reports and publications, and their associated files such as maps, datasets, and published inventory information.

INSTREAM

Level 1 Fisheries Habitat Assessment

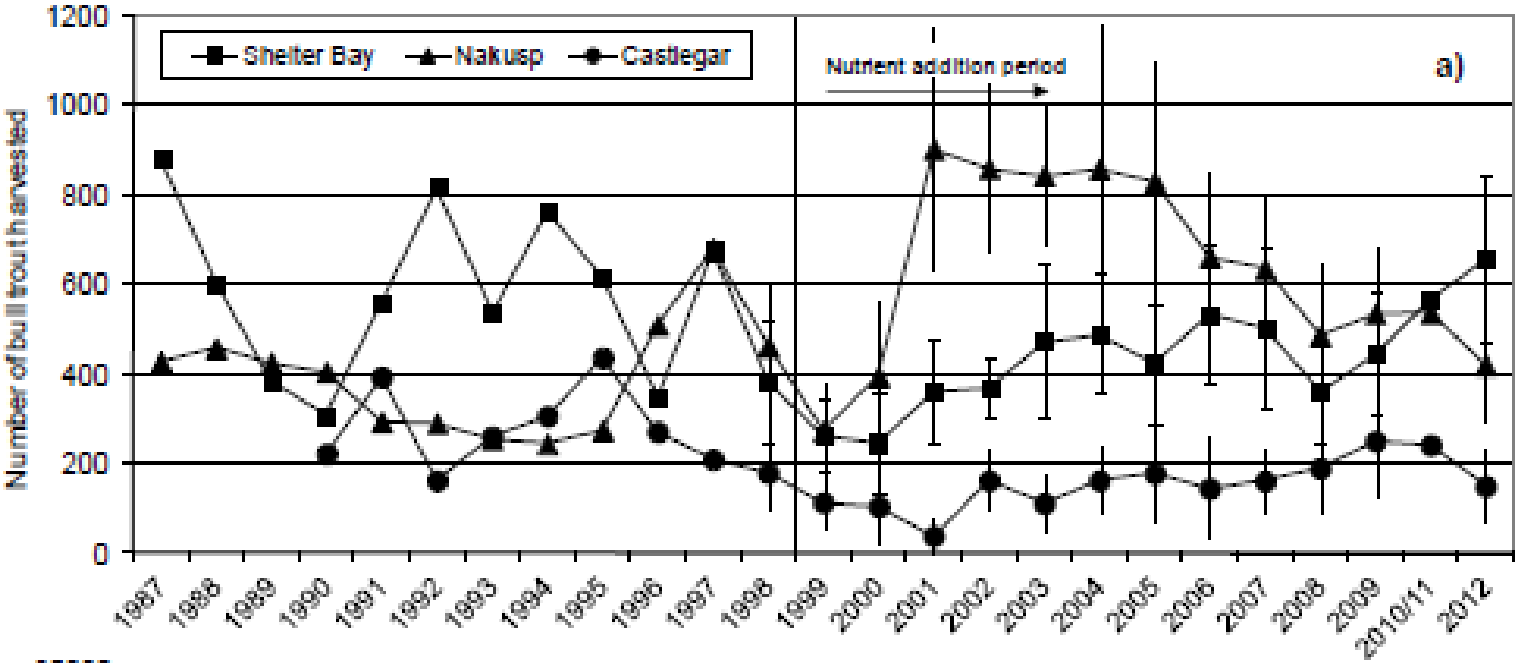
- Background Information:

- Identify the target species: Pacific salmon, kokanee, resident or anadromous trout and/or char

Level 1 Fisheries Habitat Assessment

- Background Information:

- Summarize trends in abundance from existing information



Level 1 Fisheries Habitat Assessment

- Background Information:

- Establish stream reaches: homogeneous section of stream characterized by uniform discharge, gradient, channel morphology, channel confinement, and streambed and bank materials

INSTREAM

Level 1 Fisheries Habitat Assessment

- Background Information:

- Identify critical or heavily-used reaches
- Identify areas of special concern (e.g potential barriers)

Level 1 Fisheries Habitat Assessment

- Background Information:

- Identify the target species: Pacific salmon, kokanee, resident or anadromous trout and/or char
- Summarize trends in abundance from existing information
- Establish stream reaches: homogeneous section of stream characterized by uniform discharge, gradient, channel morphology, channel confinement, and streambed and bank materials
- Identify critical or heavily-used reaches
- Identify areas of special concern (e.g potential barriers)

Level 1 Field Assessment

Provides the quantitative information needed initially to define and plan restoration projects

By using existing and overview information, you can usually restrict the level 1 field survey to a relatively small portion of the watershed where habitat information will be useful in defining opportunities for effective restoration projects

Level 1 Field Assessment

Provides the quantitative information needed initially to define and plan restoration projects

The habitat features of particular importance are:

1. **adult holding pools**
2. spawning gravel quantity and quality
3. (rearing) pool area and frequency
4. cover in pools and riffles
5. LWD frequency and distribution
6. substrate characteristics of the stream bed
7. off-channel habitat
8. nutrient concentrations during the summer growing season

Level 1 Field Assessment

Provides the quantitative information needed initially to define and plan restoration projects

The habitat features of particular importance are:

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Level 1 Field Assessment

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The habitat features of particular importance are:

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4. cover in pools and riffles
5. LWD frequency and distribution
6. substrate characteristics of the stream bed
7. off-channel habitat
8. nutrient concentrations during the summer growing season

Level 1 Field Assessment

Provides the quantitative information needed initially to define and plan restoration projects

The habitat features of particular importance are:

1. adult holding pools
2. spawning gravel quantity and quality
3. (rearing) pool area and frequency
4. **cover in pools and riffles**
5. LWD frequency and distribution
6. substrate characteristics of the stream bed
7. off-channel habitat
8. nutrient concentrations during the summer growing season

Level 1 Field Assessment

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16
11
8
5.6
4
2.8
2
22.6
32
45
64
90
128
250

Level 1 Field Assessment

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Level 1 Field Assessment

Provides the quantitative information needed initially to define and plan restoration projects

To evaluate habitat conditions, the level 1 assessment compares the values of the above habitat features within the reach to expected values. If watershed or regional criteria for habitat conditions do not exist, then use the diagnostic criteria of TABLE 5 to evaluate conditions in the reach

Table 5. Diagnostics of salmonid habitat condition at the reach level (from Anonymous 1993); see notes below.

Habitat Parameter	Gradient or W_b Class	Use	Quality		
			Poor	Fair	Good
Percent pool (by area)	<2 %, < 15 m wide	Summer/winter rearing habitat	< 40 %	40 - 55%	> 55 %
Percent pool (by area)	2-5 % , < 15 m wide	Summer/winter rearing habitat	< 30 %	30 - 40 %	> 40 %
Percent pool (by area)	>5 % , < 15 m wide	Summer/winter rearing habitat	< 20 %	20 - 30 %	> 30 %
Pool frequency (mean pool spacing)	<2 %, < 15 m wide	Summer/winter rearing habitat	> 4 channel widths per pool	2 - 4 channel widths per pool	< 2 channel widths per pool
Pool frequency (mean pool spacing)	2-5 % , < 15 m wide	Summer/winter rearing habitat	> 4 channel widths per pool	2 - 4 channel widths per pool	< 2 channel widths per pool
Pool frequency (mean pool spacing)	>5 % , < 15 m wide	Summer/winter rearing habitat	> 4 channel widths per pool	2 - 4 channel widths per pool	< 2 channel widths per pool
LWD pieces per bankfull channel width	all	Summer/winter rearing habitat	< 1	1 - 2	> 2
% wood cover in pools	< 5 %, < 15 m wide	Summer/winter rearing habitat	most pools in low category 0 - 5 %	most pools in moderate category 6 - 20 %	most pools in high category > 20 %
Boulder cover in gravel-cobble riffles	all	Summer/winter rearing habitat	< 10 %	10 - 30 %	> 30 %
Overhead cover	all	Summer/winter rearing habitat	< 10 %	10 - 20 %	> 20 %
Substrate	all	Winter rearing habitat	interstices filled: sand or small gravel subdominant in cobble or boulder dominant	interstices reduced: sand subdominant in some units with cobble or boulder dominant	interstices clear: sand or small gravel rarely subdominant in any habitat unit

Level 1 Field Assessment

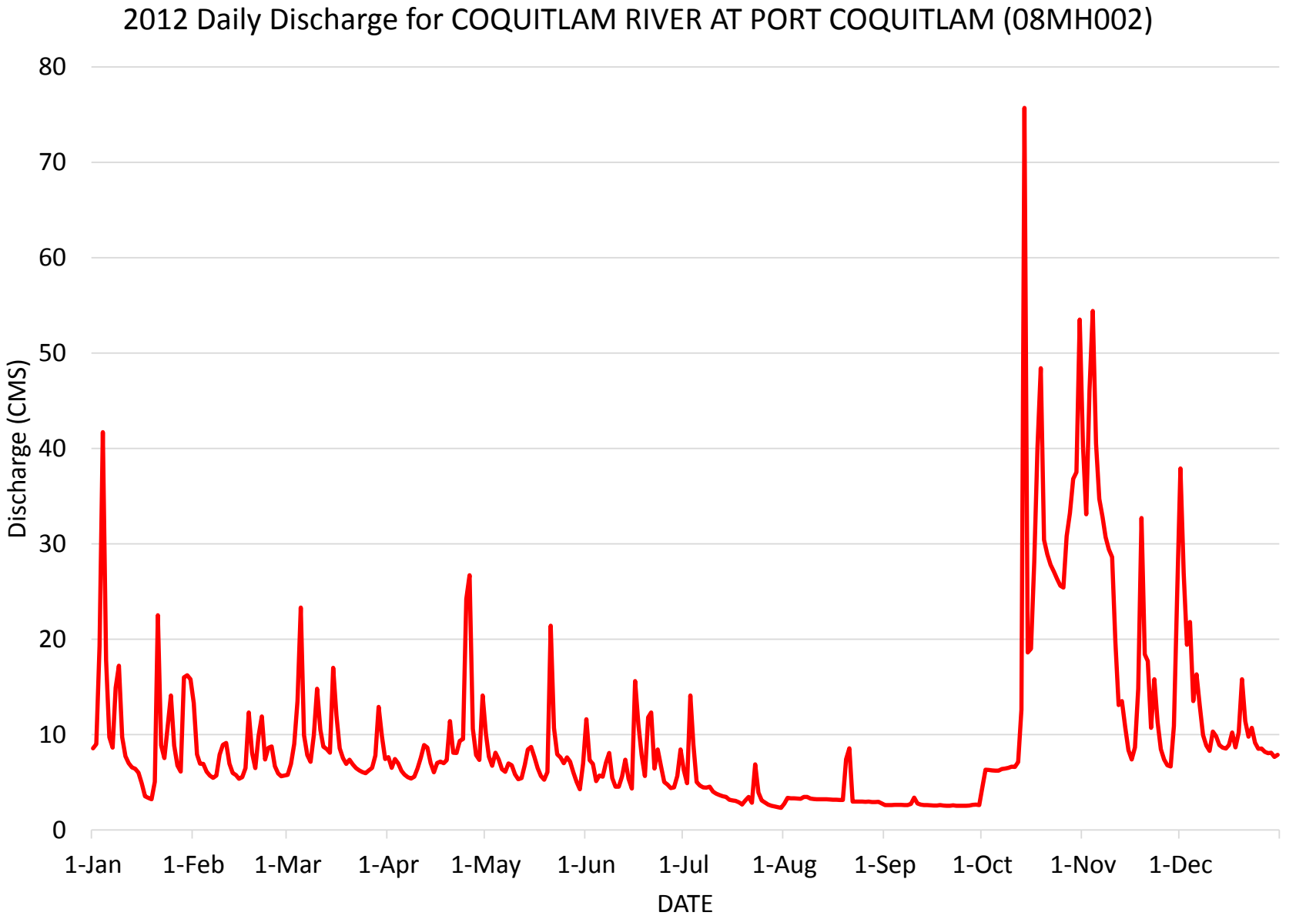
Pre-Survey Planning:

- survey locations and scope
- the survey design
- survey methods
- access and transportation constraints
- required permits and operational regulations
- training and safety issues
- the roles and responsibilities of the field crew

Level 1 Field Assessment

Pre-Survey Planning:

Because habitat characteristics may vary with discharge, do the survey under summer base flow conditions. Examine seasonal discharge patterns for the stream or for nearby streams from Water Survey of Canada discharge records to identify likely base flow conditions. Avoid doing surveys during changes in flow conditions (e.g., after a rainstorm or during snowmelt). Be aware of regional timing windows for instream fisheries work that might affect your survey


2012 Daily Discharge for COQUITLAM RIVER AT PORT COQUITLAM (08MH002)
80
70
60
50
40
30
20
10
0
Discharge (CMS)
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
DATE

Level 1 Field Assessment

Habitat Unit Type:

The level 1 fish habitat assessment divides each stream reach into strata consisting of distinct, naturally-occurring habitat units

The habitat units distinguished in a level 1 assessment are:

- **pools (both scour pools and dammed pools)**
- non-turbulent fast-flowing water (glides, broadly defined),
- turbulent fast-flowing water (riffles, broadly defined),
- cascades (higher-gradient "riffles"), and
- other (wetland complexes that lack an identifiable primary channel, sloughs, lakes, areas of sub-surface flow, or areas where the channel cannot be observed (e.g., under large log jams)

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Level 1 Field Assessment

Habitat Unit Type: POOLS

Pools are areas of (relatively) slower, deeper water with a concave bottom profile, finer sediments, and a water surface gradient near 0%

The residual depth is the difference between the maximum pool depth and the depth at the pool outlet, and approximates the pool depth at zero flow

Maximum depth in m (± 0.05 m) at the deepest point

Riffle crest depth in m is the water depth measured at the riffle crest (i.e., at the pool overflow or pool control element) of the pool.

Pool-like habitat units must have both the following minimum dimensions

Bankfull Channel Width (m)	Minimum Area (m^2)	Minimum Residual Depth (m)
0 - 2.5	1.0	0.20
2.5 - 5	2.0	0.40
5 - 10	4.0	0.50
10 - 15	6.0	0.60
15 - 20	8.0	0.70
> 20	10.0	0.80

Level 1 Field Assessment

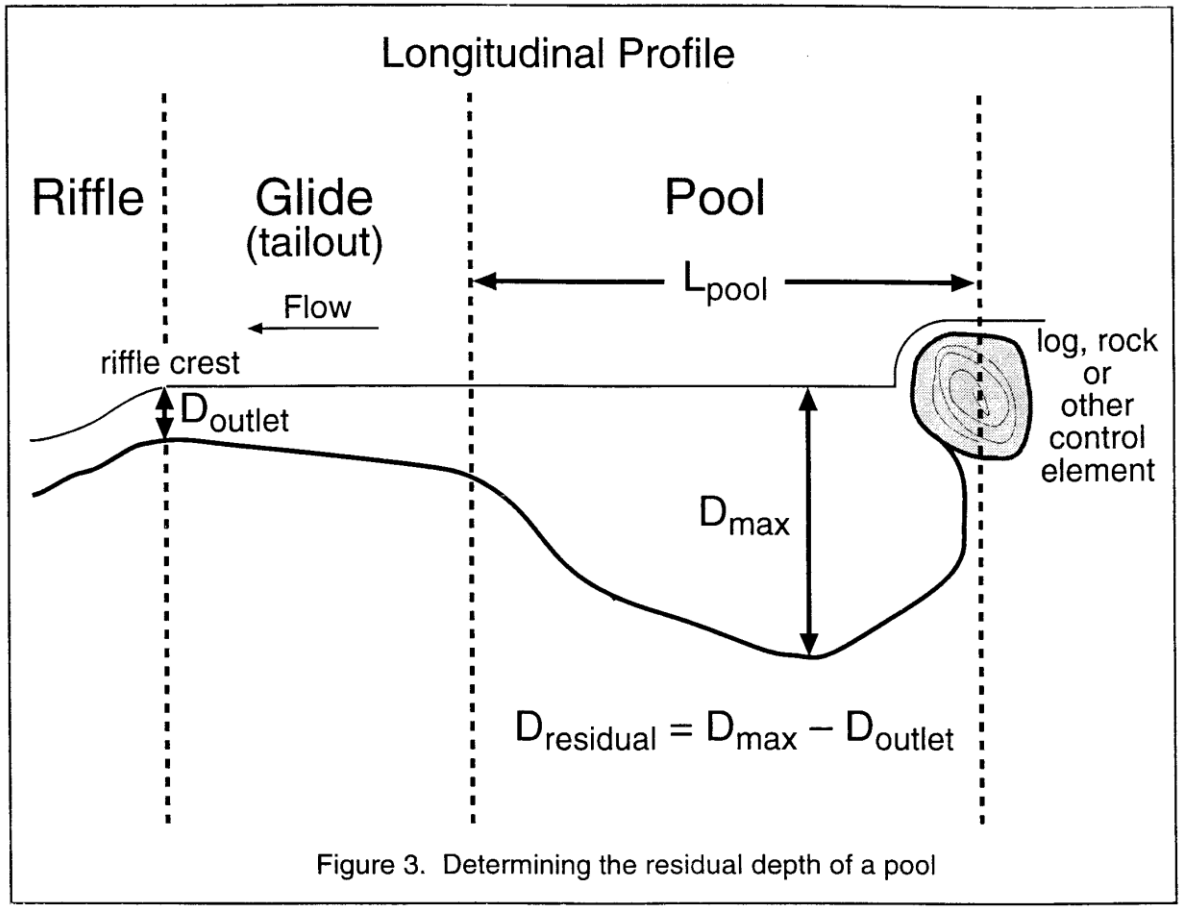


Figure 3. Determining the residual depth of a pool

INSTREAM

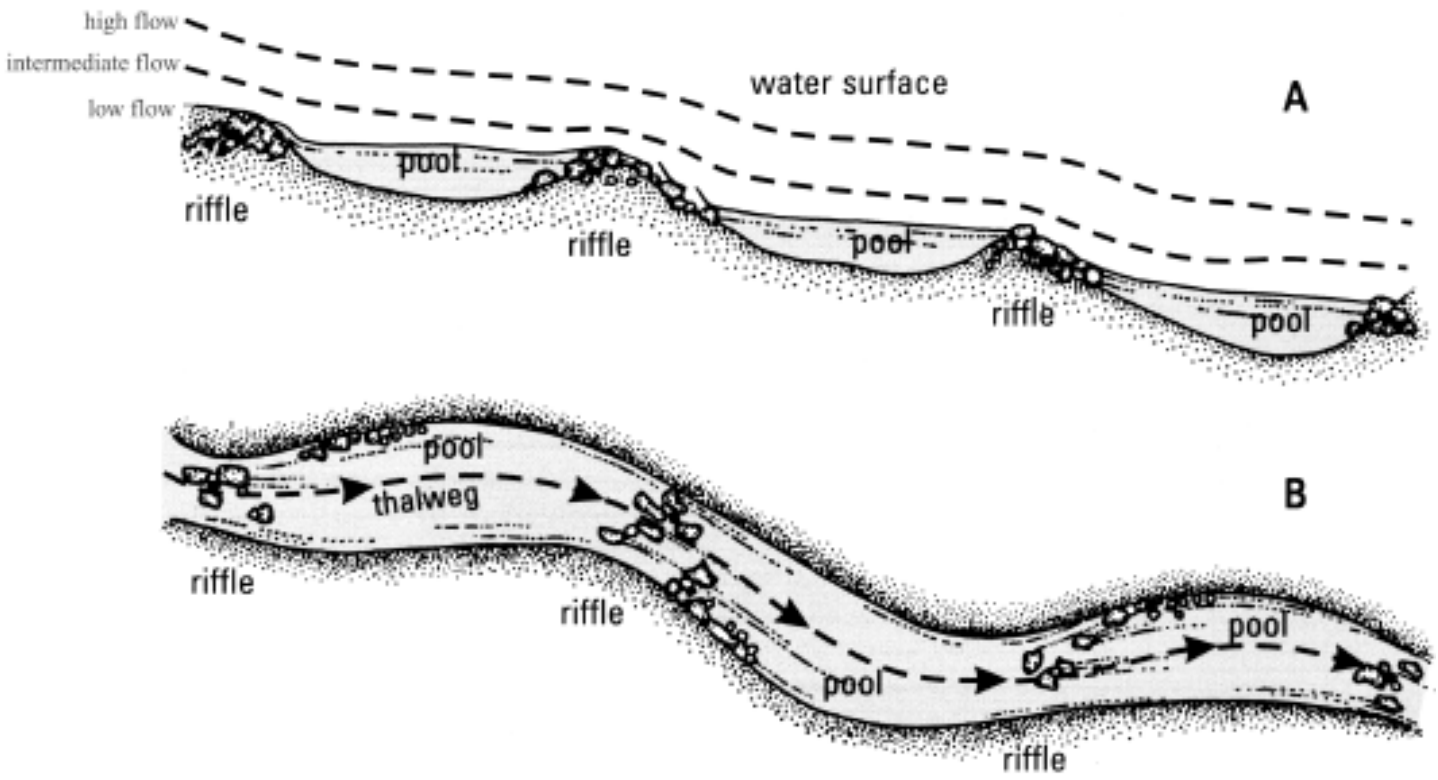
Level 1 Field Assessment

Habitat Unit Types:

RIFFLES are areas of turbulent, fast-flowing water. In alluvial reaches, they are commonly shallow, moderate-gradient areas with gravel or cobble substrates, bed material projecting above the water surface, and with obvious surface turbulence.

GLIDES include all areas of fast-flowing, non-turbulent water. Glides (and riffles) have relatively flat bottoms in cross-section. Pool tailouts, the elongated transitional zone of moderately-shallow, flat-bottomed water with smooth, laminar flow that occur between pools and riffles in low-gradient channels, are a common form of glide.

CASCADES are steep, stepped “riffles” of bedrock or emergent cobble or boulders in channels with gradients greater than about 4%


high flow
intermediate flow
low flow
water surface
A
pool
riffle
riffle
pool
riffle
pool
pool
thalweg
B
riffle
riffle
pool
pool
riffle

Level 1 Field Assessment

Survey Methods:

Level 1 fish habitat surveys require the following equipment:

1. fibreglass surveyor's tape (50 m length)
2. surveyor's rod or metre stick (0.01m divisions)
3. clinometer or Abney level
4. hip chain (metre divisions)
5. 1:20,000 (or larger) map
6. handheld Geographic Positioning System (GPS) unit
7. thermometer (or recording thermograph)
8. clip board
9. level 1 habitat survey forms
10. waterproof field note book
11. pencils
12. camera and film
13. first aid equipment
14. optical or electronic rangefinder (optional)
15. flow meter (optional).

Page_____of_____ **LEVEL 1 – HABITAT SURVEY DATA FORM** **INSTREAM FISHERIES RESEARCH**

Date:	Crew:	Daily Discharge (WSC):
Watershed	Start NTU:	
Stream/Sub-basin:	End NTU:	Weather:
Reach:	Survey Direction (U/D):	Camera Used:

Unit#	Hab. Unit		Length	Grad	Mean Depth (cm)		Mean Width (m)		Pool Depths (cm)			
	Type	Cat	(m)	%	Bank	Wet	Bank	Wet	Max.	Crest	Res.	Type

Unit#	Bed Material					Total LWD	Functional LWD			Cover				Off-channel Hab.			
	Dom	Sub	Spawn		D-90		10-20	20-50	>50	Type	%	Type	%	Type	Access	Length	Width

*F < 2mm, SG 2-16mm, LG 16-64mm, SC 64-128mm, LC 128-256mm, B 256-4000mm, Bedrock < 4000mm

Unit#	Disturbance Indicators Type & Length			Riparian Vegetation			Useable Area		Velocity	Photo#		Comments (use back if need)
				Type	Structure	Closure				U/S	D/S	

INSTREAM

Level 1 Field Assessment

General Information:

You will have the gazetteered name and watershed code from your Overview Assessment. Note weather conditions and other factors that might affect the survey

Record the habitat unit type for sampled units as:

- P = pool
- G = glide
- R = riffle
- C = cascade, or
- O = other. Record the nature of the “other” habitat unit in the comment field.

Level 1 Field Assessment

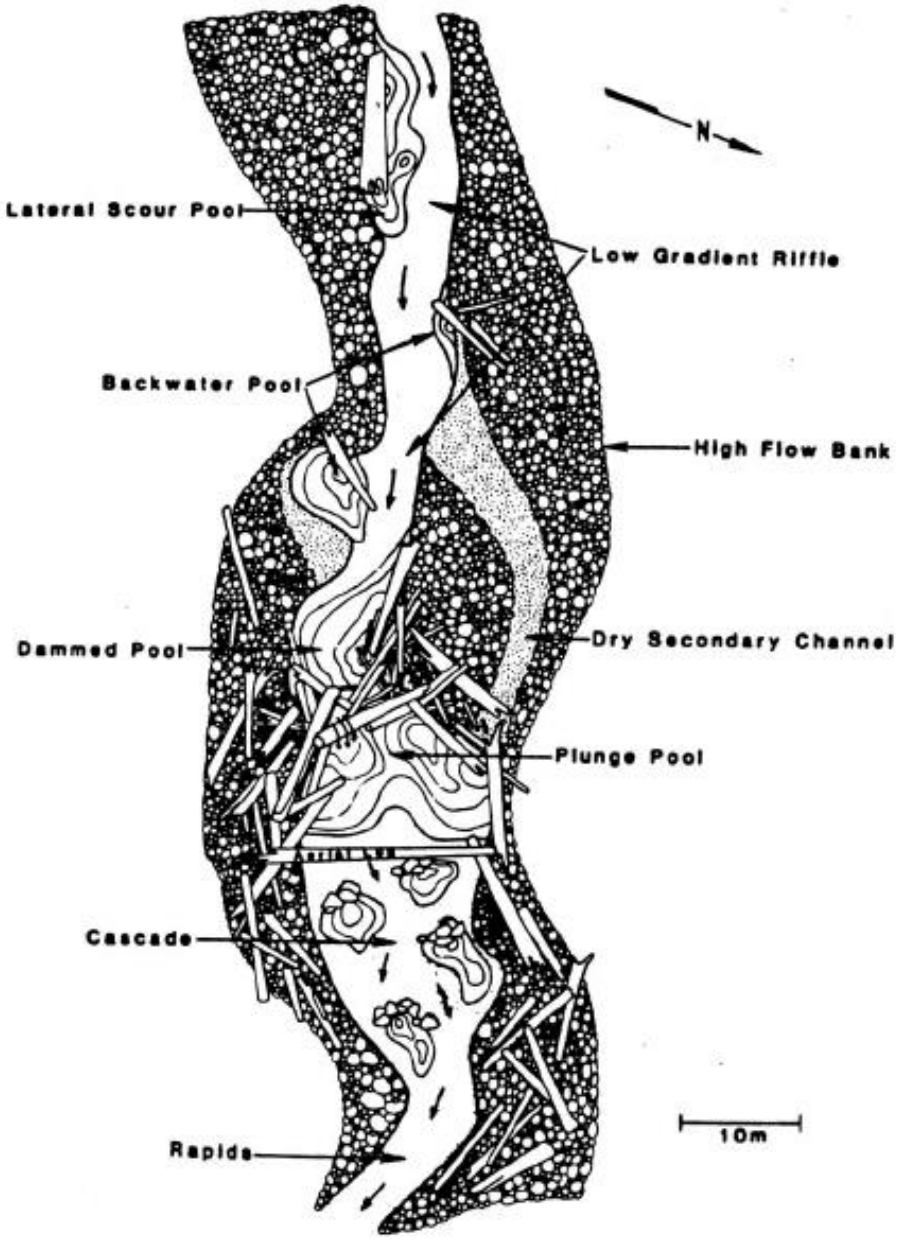
Habitat Survey Data Form:

Habitat Unit Category

You should distinguish habitat units in secondary channels or small habitat units that do not span the main channel from major habitat units in the main channel. Do not neglect secondary channels; they are often important habitats for juvenile fish. Categorize habitat units as:

1 = primary habitat units. Primary units are habitat units in the main stream channel which occupy more than 50% of the wetted width.

2 = secondary habitat units. Secondary units occur in minor channels that are isolated from the main channel by a vegetated island with perennial plants greater than 1 metre in height. In braided reaches, where many secondary channels occur, record only the habitat units in the dominant channels and note that the channel is braided.


N
Lateral Scour Pool
Low Gradient Riffle
Backwater Pool
High Flow Bank
Dammed Pool
Dry Secondary Channel
Plunge Pool
Cascade
Rapids
10m

Level 1 Field Assessment

Habitat Survey Data Form:

Habitat Unit Category

You should distinguish habitat units in secondary channels or small habitat units that do not span the main channel from major habitat units in the main channel. Do not neglect secondary channels; they are often important habitats for juvenile fish. Categorize habitat units as:

3 = tertiary habitat units. Tertiary units are significant, identifiable habitat units within the main stream channel that meet the minimum size criteria but which occupy less than 50% of the wetted width (e.g., they are embedded within a larger habitat unit, or are separated from the primary unit by an obstruction or a gravel bar that lacks perennial vegetation). In a level 1 survey you would normally distinguish only those tertiary units that are significant as fish habitat (e.g., deep lateral scour pools); otherwise combine them with the larger adjacent unit that meets the minimum size criterion.

Level 1 Field Assessment

Habitat Survey Data Form:

Length (m)

Measure the length along the thalweg of the habitat unit in metres, using a calibrated surveyor's tape (or laser). If the thalweg is not accessible (e.g., because of water depth), take the length measurement at mid-point on the unit's boundary. For sinuous units, take the length as the sum of straight-line lengths along the thalweg

Gradient (%)

Use a clinometer or Abney level to measure the gradient (± 0.5%) of the water surface over the habitat unit. Mark the surveyor's rod at the eye level of the measurer. The rod man holds the surveyor's rod vertical at the far boundary of the habitat unit while the measurer sights the clinometer on this mark to make the gradient measurement

Level 1 Field Assessment

Habitat Survey Data Form:

Mean Water Depth (m)

Determine the mean depth (± 0.05 m) of the habitat unit by averaging 3 depths taken ¼, ½, and ¾ of the distance across a transect perpendicular to the flow at a "representative" site within the habitat unit

Survey multiple sites if the water depth is highly varied in a unit

Bankfull Water Depth (m)

Measure the vertical distance (± 0.05 m) from a horizontal line at the height of the bankfull width to the water surface at the "representative" site at which you measured the bankfull width

The presence of rooted vegetation often indicates the extent of bankfull width

Level 1 Field Assessment

Habitat Survey Data Form:

Mean Wetted Width, Ww (m)

Measure the wetted width (± 0.1 m) of the habitat unit as the horizontal distance perpendicular to the channel axis from water's edge on one side to water's edge on the opposite side at the "representative" site used above to determine mean depth

Mean Bankfull Channel Width, Wb (m)

Measure the bankfull channel width (± 0.1 m) at a "representative" site as the horizontal distance perpendicular to the channel axis between the tops of the streambanks on opposite sides of the stream

- do not include vegetated islands (i.e., islands with perennial terrestial vegetation more than 1 metre in height). If multiple channels are separated by vegetated islands, sum the separate bankfull channel width measurements

Level 1 Field Assessment

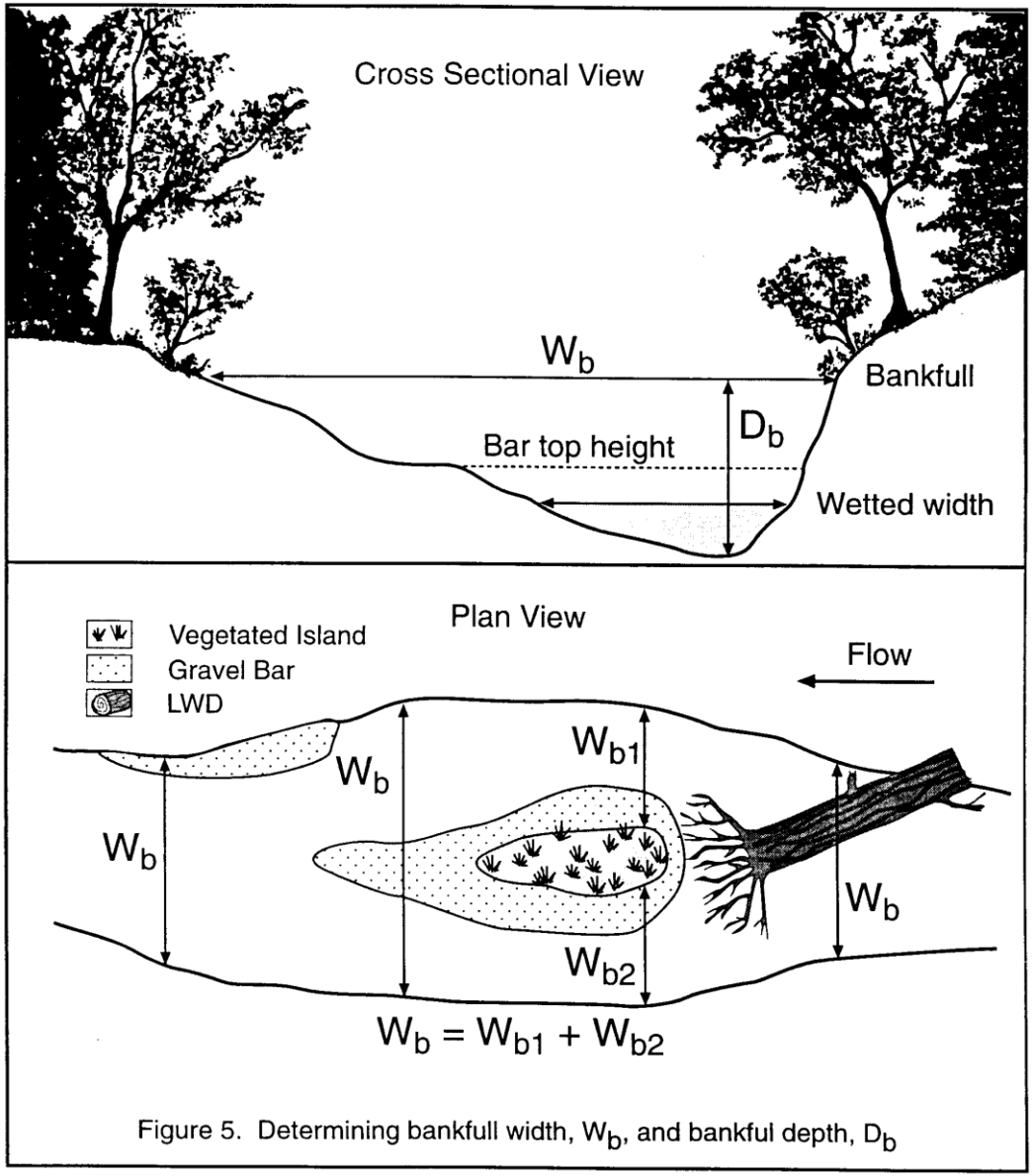


Figure 5. Determining bankfull width, W_b, and bankful depth, D_b

INSTREAM

Level 1 Field Assessment

Habitat Survey Data Form:

Maximum Pool Depth (m)

For pools, measure (or estimate, if necessary) the maximum water depth (± 0.05 m).

Riffle Crest (Pool Outlet) Depth (m)

For pools, measure the water depth (± 0.05 m) at the pool outlet

Residual Depth (m)

Calculate the residual depth (± 0.05 m) of the pool as the difference between the maximum pool depth and the riffle crest depth (or pool outlet depth). Note that pools must meet both minimum surface area and minimum residual depth criteria to be counted.

Level 1 Field Assessment

Habitat Survey Data Form:

Pool Type

Record the pool type as:

S = scour pool, formed by scouring around or adjacent to an obstruction such as a log, boulder, or root wad or by flow convergence where two channels join

D = dammed pool, formed by impoundment behind a channel spanning obstruction such as a beaver dam, log, or log jam

U = unknown (unable to classify)

Level 1 Field Assessment

Habitat Survey Data Form:

<u>Dominant and Sub-Dominant Bed Materials</u>

Estimate and record the size-class of the substrate material that covers the largest proportion (dominant) and the second-largest proportion (subdominant) of the habitat unit. Categorize substrates as:

- F = sands, silts, clays or fine organic material (< 2 mm diameter)
- SG =small gravels (2 - 16 mm)
- LG =large gravels (16 - 64 mm)
- SC = small cobble (64 - 128 mm)
- LC = large cobbles (128 - 256 mm)
- B = boulders (256 - 4000 mm)
- R = bedrock (> 4000 mm)

Level 1 Field Assessment

Habitat Survey Data Form:

<u>Spawning Gravel Amount and Type</u>

Spawning gravels are gravels that are located in areas where water depths greater than 15 cm and water velocities between about 0.3 and 1.0 $m \cdot s^{-1}$ are expected during the spawning season. For anadromous salmon, spawning gravel patches should be 1-2 m^2 in area with a particle size between about 10-150 mm. For (small) resident trout and char, spawning gravel patches should be greater than 0.1 m2 in area with a particle size between 10-75 mm. Pay particular attention to pool tailouts and riffle crests as potential spawning sites.

Record the presence of suitable spawning gravels for the target fish species as:

- N = no suitable gravel patches in the habitat unit
- L = little suitable spawning gravels (e.g., isolated pockets)
- H = extensive areas of spawning gravels

Record the type of spawning gravel as:

- R = suitable for resident trout and char
- A = suitable for anadromous salmon
- AR = suitable for both resident trout and anadromous salmon

Level 1 Field Assessment

Habitat Survey Data Form:

Large Woody Debris Tally

Large woody debris (LWD) is a piece of dead wood, having a diameter 10 cm or larger over a minimum 2 m length, that intrudes into the bankfull channel

Functional LWD

Influence channel geomorphology by causing scour or impoundment. Count as functional LWD only those LWD pieces that are the primary cause of the formation or geometry of a pool.

Tally functional LWD by three size classes (10-20 cm diameter, 20-50 cm diameter and > 50 cm diameter)

Level 1 Field Assessment

Habitat Survey Data Form:

Cover (% by type)

Cover is a structural element in the wetted channel or within 1 metre of the water surface that serves to visually isolate fish and/or to provide suitable microhabitats where fish can hide, rest or feed

Estimate the percentage of the total surface area of the habitat unit that is covered by the following cover types:

- SWD = small woody debris (i.e., smaller than the criteria given previously)
- LWD = large woody debris, as defined above
- B = boulders
- C = undercut banks
- DP = deep pool (i.e., the portion of a pool with a depth > 1 m)
- OV = overhanging vegetation within 1 metre of the water surface
- IV = instream vegetation
- O = other (i.e. rip-rap)

Level 1 Field Assessment

Habitat Survey Data Form:

Cover (% by type)

Record the percentage of the total surface area of the habitat unit for (up to) the three dominant cover types. Record the amount of cover as:

- N = no cover in the habitat unit,
- TR = cover element is present but likely comprises less than 2% of the habitat unit area, or
- Numeric value = the estimated percentage of the total area by cover type.

Level 1 Field Assessment

Habitat Survey Data Form:

<u>Off-channel Habitat</u>

Record the presence of off-channel habitat that may be used by fish as refuges or rearing areas at high flows. Pay particular attention to relict channels in the adjacent floodplain which have been isolated by lateral movement of the stream and which could be re-connected to the stream as a restoration project.

Note any ground water flows within isolated sidechannels.

Level 1 Field Assessment

Habitat Survey Data Form:

Off-channel Habitat

Categorize off-channel habitat as:

- SC = sidechannels
- SL = sloughs (blind-ended channels)
- PD = off-channel ponds
- WL = seasonally-flooded wetlands

Measure or estimate the length and area of the off-channel habitat unit, and note fish access to the off-channel area as:

- N = no access to fish
- P = accessible only at high flows
- G = accessible at most flows

Level 1 Field Assessment

Habitat Survey Data Form:

Disturbance Indicators: Record type and length

Table 2. Indicators of recent channel disturbance

	Indicator Feature	Code
Bed Characteristics	1. Extensive areas of scour	
	2. Extensive areas of (unvegetated) bar	DW
	3. Large, extensive sediment wedges	WG
	4. Elevated mid-channel bars	MB
	5. Extensive riffle zones	LR
	6. Limited pool frequency and extent	FP
Channel pattern	1. Multiple channels (braiding)	MC
Banks	1. Eroding banks	EB
	2. Isolated sidechannels or backchannels	BC
LWD	1. Most LWD parallel to banks	PD
	2. Recently formed LWD jams	JM

Level 1 Field Assessment

Habitat Survey Data Form:

Riparian Vegetation Type

Record the dominant vegetation type in the riparian area within 20 m of the stream channel as:

- N = largely unvegetated, with much bare mineral soil visible
- G = grasslands or bog
- SH = shrub/herb, dominated by herbaceous or shrubby vegetation
- D = deciduous forest
- C = coniferous forest
- M = mixed deciduous-coniferous forest

Level 1 Field Assessment

Habitat Survey Data Form:

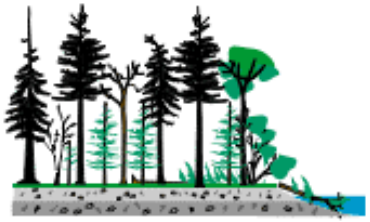
Riparian Structural Stage

Record the structural stage of the dominant vegetation in the adjacent riparian area as:

- INIT = the non-vegetated or initial colonization stage following disturbance, with less than 5% cover
- SHR = shrub/herb stage with less than 10% tree cover
- PS = pole-sapling stage, with trees overtopping the shrub layer, usually less than 15-20 years old
- YF = young forest. Self-thinning is evident and the forest canopy is differentiating into distinct layers. Stand age is typically 30-80 years
- MF = mature forest with well-developed understory

Year 300
Old forest

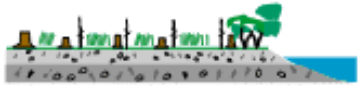
Proper functioning condition



Stands in proper functioning condition maintain all of the required riparian attributes necessary for sustained management of riparian ecosystems including: components of wildlife and fisheries habitat, channel stability, water quality and floodplain development.

Year 6
Shrub herb

Past harvesting in riparian areas commonly removed all conifer and deciduous overstorey. These sites were often extensively disturbed by falling and yarding, road construction and burning. Rich, moist riparian sites are often invaded by rapidly growing shrubs and deciduous trees species that can lead to impaired riparian function.

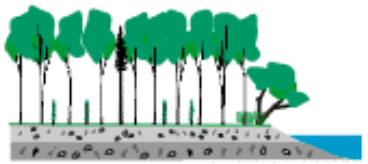


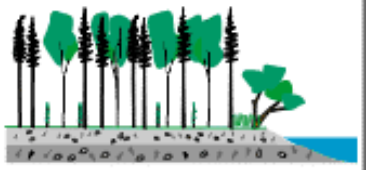
Deciduous dominated

Mixed conifer/deciduous

Year 25
Pole sapling

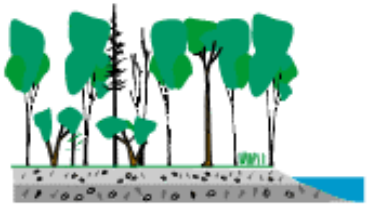
Re-establishing riparian function begins early. Sites dominant to deciduous crowd out conifers, resulting in low conifer stocking densities that can persist through subsequent stages of forest development.

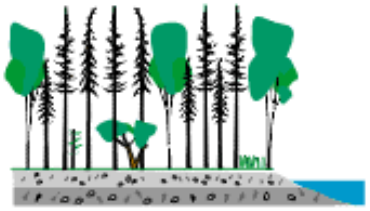




Year 70
Young forest

Mixed conifer/deciduous sites retain a greater ability to re-establish those complex stand characteristics that provide for all riparian functions. Deciduous sites can achieve some, but not all of the desired characteristics.

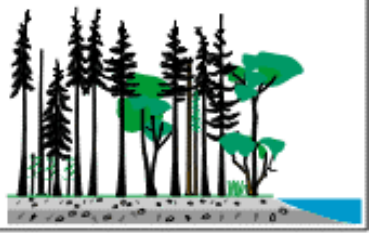




Year 150
Mature forest

Dysfunctional stands can persist for many years, depending on site characteristics. Restoration can speed the recovery of these sites by rectifying unfavorable species mixes and growth conditions.

Desired future condition



Year of structural stage varies with species of trees and between regions.

Level 1 Field Assessment

Habitat Survey Data Form:

Overstream Canopy Closure

Categorize the extent of canopy closure over the stream (i.e., the proportion of the surface area of the stream that is covered by the projecting riparian canopy) as:

0 = none

1 = 1-20% covered

2 = 21-40% covered

3 = 41-70% covered

4 = 71-90% covered

5 = > 90% covered

Level 1 Field Assessment

Habitat Survey Data Form:

Fish Useable Habitat Area

Useable steelhead fry and parr habitat was is visually estimated within each habitat unit.

Briefly, within a given habitat unit usable wetted area for steelhead trout was determined as a percentage of total wetted area by visual methods. Usable fry habitat was evaluated as being less than 20 cm in depth and with a velocity greater than 0.1 ms^{-1} but not exceeding 0.5 ms^{-1}. Usable trout parr habitat was evaluated as having a depth range of 20-50 cm and a velocity of 0.2 to 0.6 ms^{-1}

Date: 5 Aug 2024	Crew: NM	Daily Discharge (WSC): ~2.861
Watershed: COQUITLAM	Start NTU: 104 0516766 5460502	
Stream/Sub-basin: 4	End NTU: 104 0516519 5461510	Weather: 0% CC Sunny
Reach: 2A	Survey Direction (U/D): U	Camera Used: Fuji

Unit#	Hab. Unit Type	Hab. Unit Cat	Length (m)	Grad %	Mean Depth (cm) Bank	Mean Depth (cm) Wet	Mean Width (m) Bank	Mean Width (m) Wet	Pool Depths (cm) Max.	Pool Depths (cm) Crest	Pool Depths (cm) Res.	Pool Depths (cm) Type
67	G	2	13.5	0	20	29, 35, 33	12.8	11.6				
8	R	2	15.4	2.3	20	15, 18, 30, 5	9.3	7.3				
9	G	2	10.1	0	25	19, 70, 41	8.4	5.8				
10	R	2	30.3	2.8	15	24, 26, 27	10.2	8.7				
11	G	2	22.2	0.1	25	40, 25, 33, 35	13.6	13.6				
12	R	2	37.0	0.8	20	30, 38, 38, 25	13.9	12.7				

Unit#	Bed Material Dom	Bed Material Sub	Spawn		Bed Material D-90	Total LWD	Functional LWD 10-20	Functional LWD 20-50	Functional LWD >50	Cover Type	Cover %	Cover Type	Cover %	Off-channel Hab. Type	Off-channel Hab. Access	Off-channel Hab. Length	Off-channel Hab. Width
7	LC	LG	AR	L	36, 31, 29		VII			B	TR						
8	LC	SC	AR	L	28, 30, 36		I			OV	TR	B	TR				
9	LC	B			34, 30, 29			I		OV	10	B	TR				
10	B	LC			30, 31, 30	III		II	LJ	LWD	15			SC	Good	>70	2
11	LC	SC			26, 34, 32		I			OV	3						
12	B	LC				II	I			B	4	OV	TR				

*F < 2mm, SG 2-16mm, LG 16-64mm, SC 64-128mm, LC 128-256mm, B 256-4000mm, Bedrock < 4000mm

Unit#	Disturbance Indicators Type & Length			Riparian Vegetation Type	Riparian Vegetation Structure	Riparian Vegetation Closure	Useable Area		Velocity	Photo# U/S	Photo# D/S	Comments (use back if need)
67	MC~15	MB~15		D	YF	1				2519	2520	Braiding
78				D	YF	1				2521	2522	
89				D	YF	4				2523	2524	
9 10				B	YF	3				2525	2526	
10 11				D	YF	2				2527	2528	
11 12				D	YF	1				2529	2530	