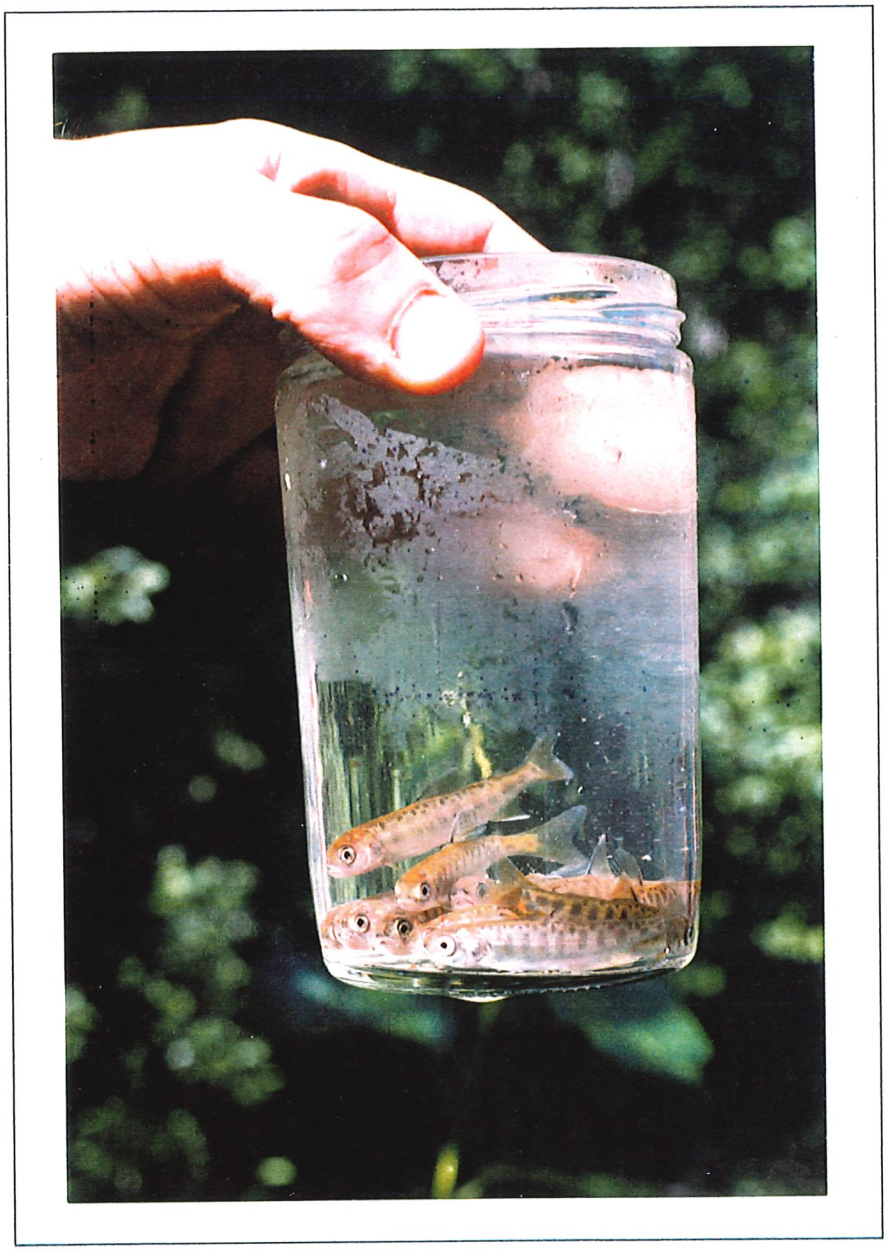
The Suskwa Watershed Restoration Program

Assessment and Prescriptions, Surveys and Design, and Works



prepared by M. Jacobs
for
The Suskwa Restoration Society
March 1998

Suskwa Watershed Restoration Program 1997
Assessments and Prescriptions,
Surveys and Design, and Works

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2.0 Executive Summary

Due to the extent of prescriptions and a limited budget a list of priorities was developed from the Suskwa WRP 1996/97 Fiscal Report for 1997/98 fiscal work. These priorities focused on the removal of barriers impeding fish access to viable habitat, the reinstatement of diverted stream channels, the completion of riparian prescriptions, pool-riffle development and ongoing assessments of impacted stream reaches and sites that required supporting data to justify treatment objectives (i.e. surveys and designs for instream work).

Work sites have been referenced to Ministry of Forests block opening numbers and hierarchical watershed codes developed during 1995 overview assessments (Suskwa WRP 1995/96 Fiscal Report). Reference to distances, in kilometers along access roads, have also been noted where applicable (i.e. road crossings).

A total 14 fords were excavated at road crossings that impeded fish access within the Blunt Creek and Harold Price (H.P.) Creek sub-basins. Seven of these sites were old corduroy crossings. The others involved metal pipe culverts that were perched or improperly installed, resulting in the diversions of the original stream channel.

All of these crossings were modified using a Hitachi 200 hoe with the exception of one site that required removal with hand tools in order to limit site disturbance as the access road had been planted within the cutblock. All crossings were grass-seeded after modification.

A total of 14 riparian sites were assessed using Riparian Management Prescription forms developed by the Ministry of Environment, Lands and Parks and the Bulkley and Kispiox Districts Ministry of Forests. High priority areas were identified for planting throughout the watershed and focused on stemming erosion and streamside planting within Riparian Reserve Zones (RRZ) as defined within the Forest Practices Code of B.C. Riparian Management Area Guidebook. Planting of these sites will require deviation from existing stocking standards given the alternate objectives for riparian restoration.

The majority of the prescriptions involve the planting of hardwoods (primarily salix sp.) for erosion control and streamside shading along watercourses and some-what smaller proportions of conifers and cottonwoods to maintain long-term stability, large woody debris (LWD) input and biodiversity. A variety of bioengineering techniques will be prescribed, subject to funding, on a trial basis for 1998.

Stream complexing was initiated at reach 1 of Skilokis Creek and at a groundwater channel along reach 1 of Natlan Creek. Both sites were modified to increase available pool habitat using boulder and LWD placement respectively. Monitoring of these sites in 1998 will determine their structural integrity after spring run-off and their effectiveness in providing added pool habitat for fish at these sites.

It can be expected that high priority sites within the watershed, that were deferred due to budget constraints in 1996 and 1997, will need to be addressed in the following years. These sites include perched culverts, disturbed riparian areas, ongoing channel avulsions within cutblocks and missing assessments of fish-bearing tributaries impacted by logging (i.e. Torkelson Lake drainages). Monitoring of remedial activities to date will assist in determining the most effective means of restoring the aquatic resources of the Suskwa watershed.

2.1 Introduction

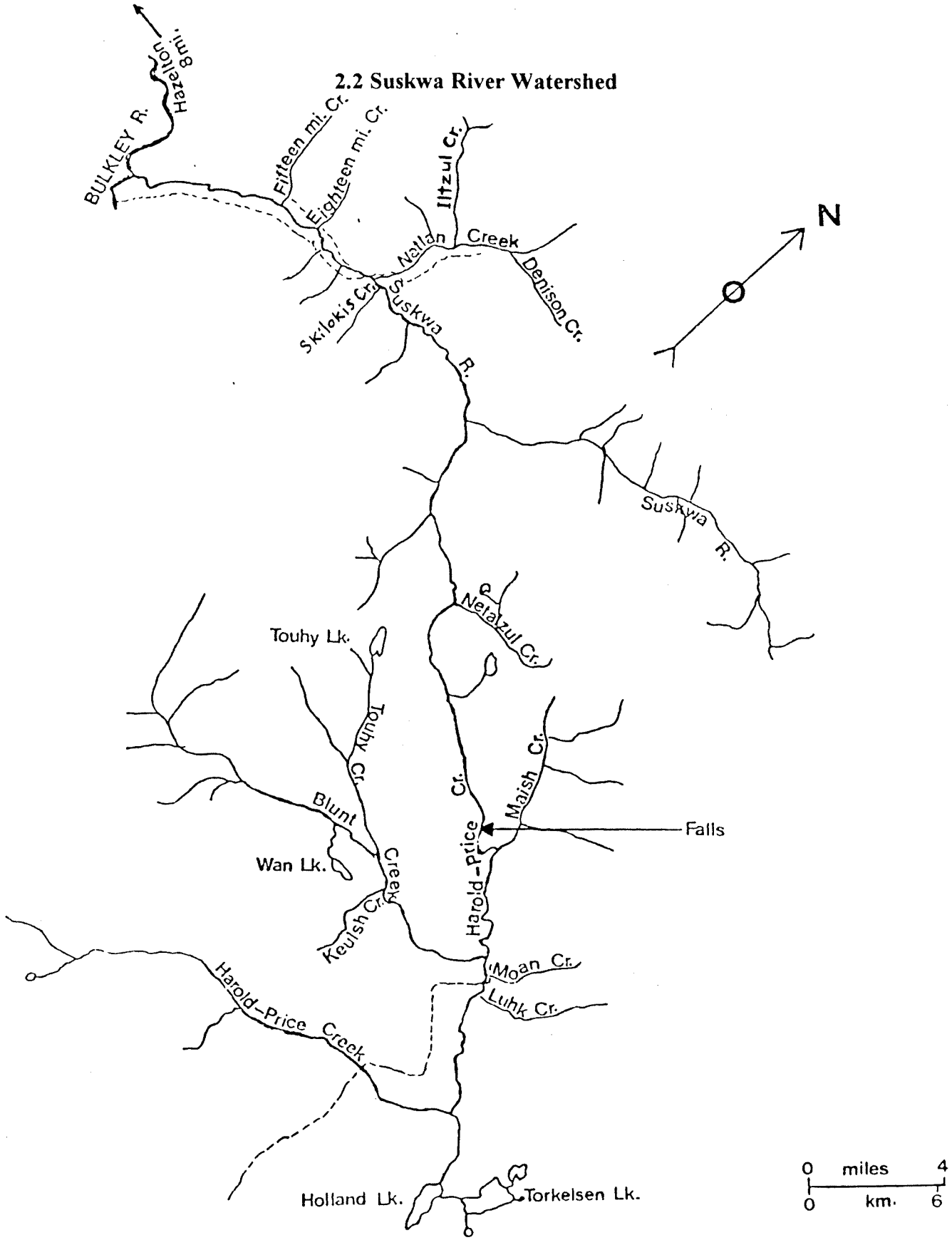
The Suskwa River watershed encompasses an area of approximately 130, 000 hectares east of Hazelton B.C. and is a major tributary to the Bulkley River. In 1995 work was initiated assessing forest harvesting related impacts to fish and fish habitat as part of the Watershed Restoration Program (WRP) under Forest Renewal B.C.

The work completed during the 1997/98 fiscal year resulted from priorities that were established, as assessments and prescriptions, in the Suskwa WRP 1996/97 Fiscal Report. The lead proponent for the project was the Suskwa Restoration Society and the contract and technical guidance was delivered via the Ministry of Environment, Lands and Parks (MOELP). Input regarding prescriptions and works was also provided by forest licencees, the Ministry of Forests (MOF) and the Department of Fisheries and Oceans (DFO).

I would like to take this opportunity to acknowledge the many dedicated people who committed themselves to the completion of watershed restoration projects within the Suskwa River drainage over the past three years. After years of developing proposals, negotiating and administrating contracts, gathering data, meeting regulatory approvals, and consulting with various user groups it gave me great pleasure to finally sit beside a flowing trout stream that had been previously dry for 5 years since it was diverted during forest harvesting in 1992. Thanks to all who made this a reality.

Mike Jacobs, December 31,1997
President - Suskwa Restoration Society

2.2 Suskwa River Watershed



3.0 Suskwa WRP 1997
Assessments and Prescriptions

3.1 Jumbo Creek (W.C. 46-700-48) Lower Suskwa sub-basin

Assessment: The headwaters of this small stream were assessed to determine the extent of forest harvesting on the upper drainage and impacts to discharge and water quality with regards to domestic water supply and fish habitat downstream. Jumbo Creek supports an abundant population of rearing trout, char and salmon within its lower reaches, however, no fish were found upstream of the Thoen Main forest road during this headwater assessment. This is likely attributed to gradients in excess of 20% downstream of this point.

This upper portion of the drainage has had more than 3 square kilometers of forest harvested between MOF openings 93M035 -001, -004, -008, -009,-010, and -018.The mainstem of this headwater section extends through blocks -009, -004, and -001 to the base of Thoen Mountain and though all six cutblocks were visited during 1997, the assessments concentrated on impacts to the mainstem found in blocks -001 and -004.

Impacts: The stream exhibits multiple channel diversions and obstructions, as a result of landing waste and residue, through blocks 93M035-001 and -004 up to the base of Thoen Mountain. At this point sub-surface flows exit an escaped burn, which extends to treeline, on the northern boundary of block -001. The existing stream channels appear to have stabilized since they were logged over in 1986 and 1987, however, two outstanding problems may effect water quality and discharge.

A channel diversion exists at the first landing along spur B of branch 6-16 in block -001(Figure 1). Flows are presently directed west at this landing down the spur B ditchline (Photo. 1). Another site located 600 meters into block -004 along branch 8-9 retains a significant amount of ponding water as a result of side-cast materials that presently act as a berm on the south side of this access road (Figure 2). The southern aspect of these blocks may also contribute to excellerated spring runoff and lower summer flows as a result of harvesting.

Prescription : The cross-ditching of the landing along spur B of branch 6-16 in block 93M035-001 is required to return flows to their original channel (figure 1). This may accomplished with a mid-sized excavator within one hour. The berm retaining water within block 93M035-004 should also be breeched to dissipate the large pond which presently exists (figure 2). This aswell may be accomplished with a mid-sized excavator within one hour. The berm will have to be approached from below the road grade as the stream channel, at the eastern end of this pond, has flooded the access road. Considerations should be made, if these works proceed, to include deactivations of these two blocks, as prescribed within the level 2 upslope report of 1996 for the Ministry of Forests, within the Roads, Hillslope and Gully portion of the Suskwa WRP. Riparian assessments of these channels is also recommended for 1998.

Photo. 1 This headwater section of Jumbo Creek, within block 93M 035-01, originally flowed to the left of the technician in this photo. The channel is presently diverted down the ditch-line (at right). No fish were found on this upland bench however this diversion may seasonally effect water supply, water quality and fish habitat downstream.

Figure 1. Block 93M 035-001 and Jumbo Creek

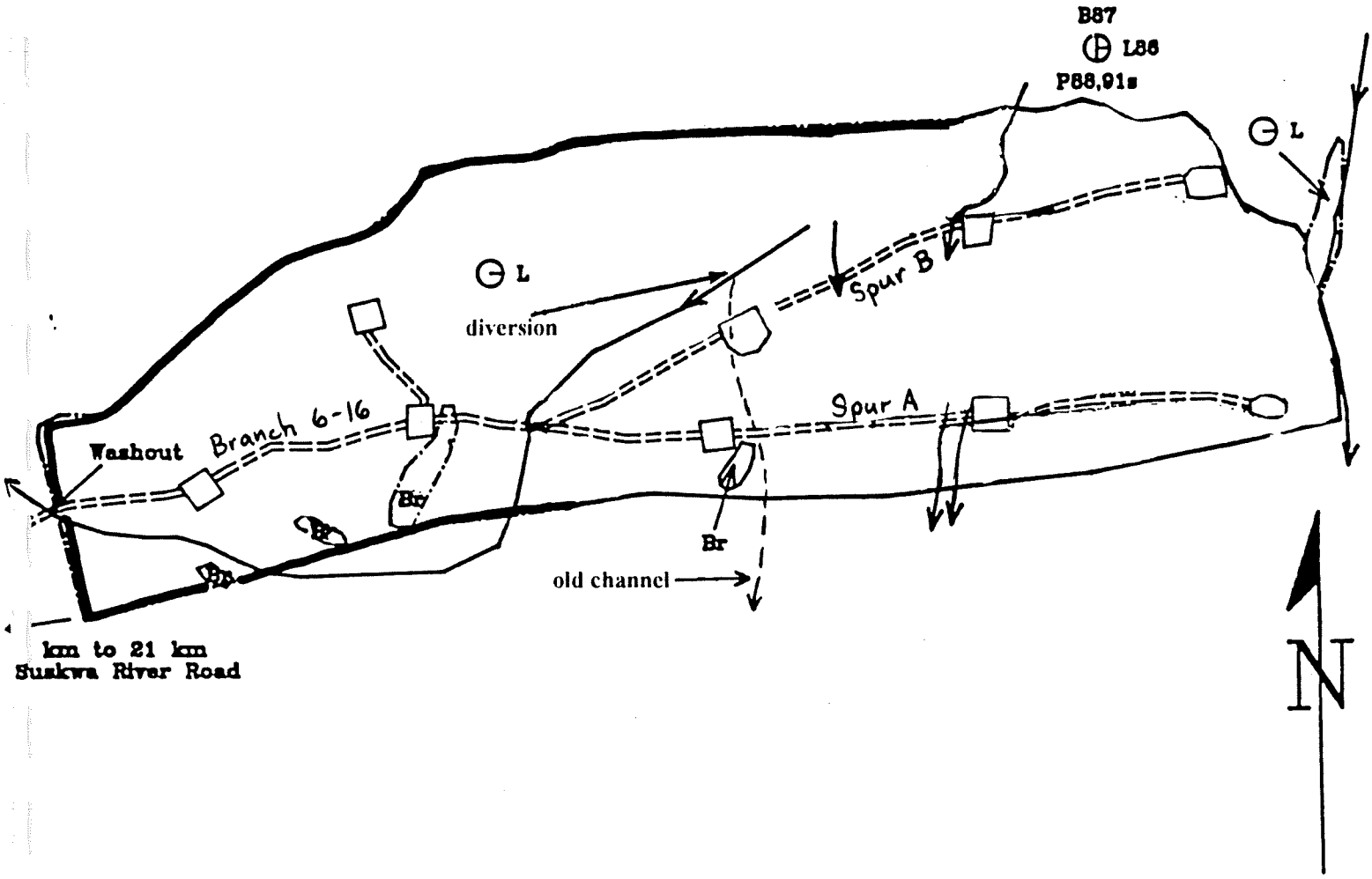


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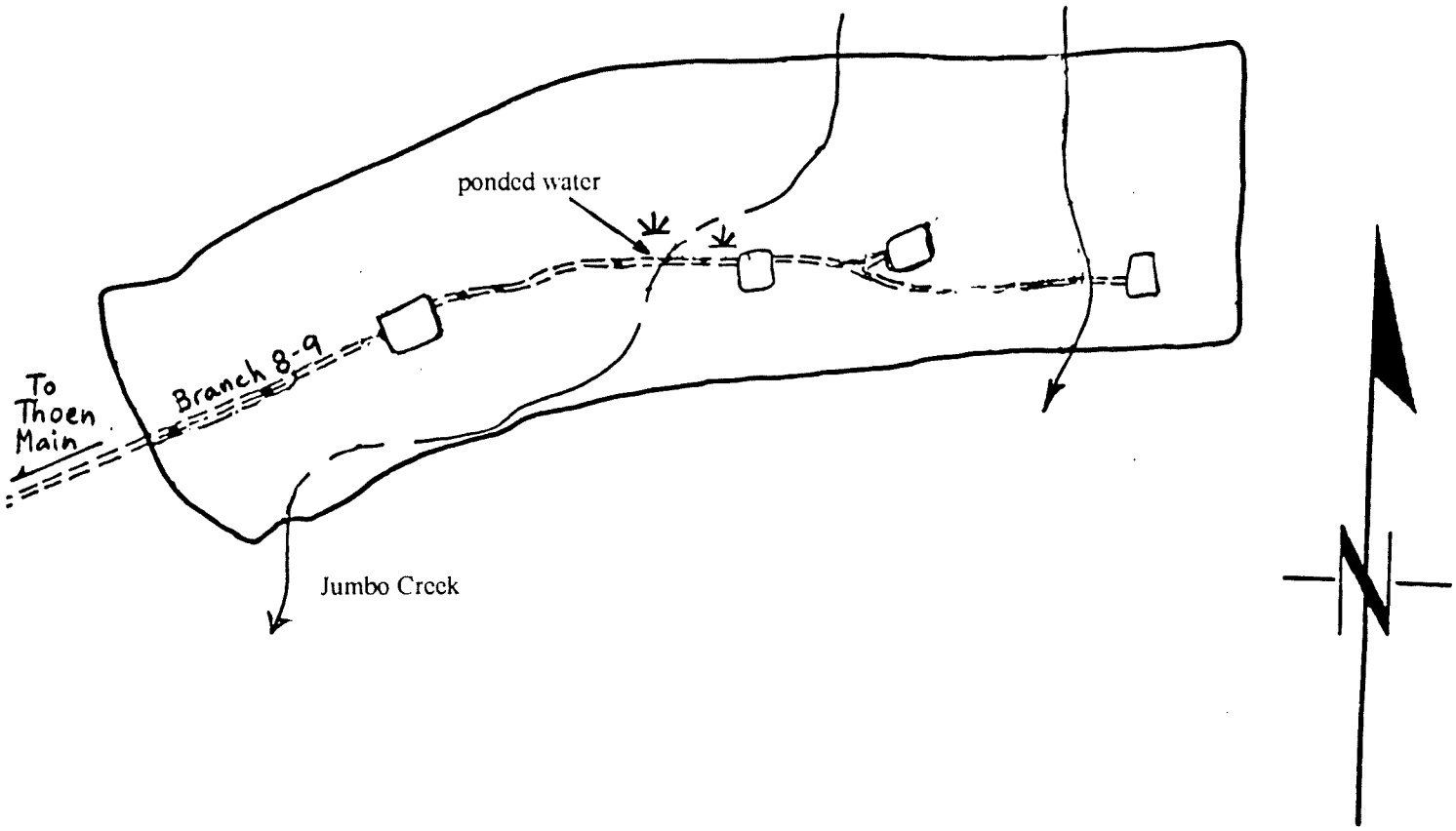
Figure 2. 93M 035-004 and Jumbo Creek



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3.2 Netalzul Mountain tribs. (blocks 93M035-006 to 93M035-016) Upper Suskwa sub-basin

Assessment : No fish were found to exist within tributaries along the Netalzul forest road through gee-trapping of road crossings in 1996 and 1997. A gradient break downstream of these crossings exceeds 20% slope and presumably limits fish distribution to this upland bench. During the 1997 field season an assessment of the Netalzul road was made from the road crossing at trib.46-700-137 to the end of block 93M035-016 to determine the extent of infilled cross-ditches that were noticed during site visits in 1996. The assessment was focused on site specific impacts to water quality along this forest road.

Impacts : A total of 38 cross ditches along the Netalzul forest road have been infilled with debris for vehicle access. The infilling of these drainage structures has led to the erosion of the existing road prism (Photo. 2)and unnecessary sediment transport to the upper Suskwa River. The extent of erosion varies from site to site and efforts should be made to limit further degradation of these structures. Despite being deactivated several metal pipe culverts remain installed along this road and should also be pulled during clean-up if possible.

Prescription : The cleaning of 38 cross-ditches along the Netalzul road is recommended to ensure proper drainage of this area and limit sediment deposition downstream. This should be dealt with in the R,H&G portion of the Suskwa WRP. An effort should be made during clean-up to provide adequate fords for vehicle access, silviculture and recreation. Clean-up of these structures may be accomplished with a mid-sized hoe in one day and considerations should be made to remove remaining culverts at that time. A list of obstructed cross-ditches and remaining culvert locations was noted as part of the 1997 assessment. The following sites were chained from a point of commencement located at the pulled bridge site at trib.46-700-137 on the Netalzul road proceeding east-southeast.

obstructed cross-ditch @ 196m
obstructed cross-ditch @ 379m
obstructed cross-ditch @ 564m
obstructed cross-ditch @ 653m
obstructed cross-ditch @ 808m
obstructed cross-ditch @ 860m
obstructed cross-ditch @ 924m
trib.46-700-134 and culvert @1045m
obstructed cross-ditch @ 1111m
small unnamed trib. and culvert @ 1177m
obstructed cross-ditch @ 1228m
obstructed cross-ditch @ 1242m
obstructed cross-ditch @ 1286m
obstructed cross-ditch @ 1354m
obstructed cross-ditch @ 1409m
obstructed cross-ditch @ 1472m
obstructed cross-ditch and unnamed creek @ 1570m
obstructed cross-ditch @ 1799m
obstructed cross-ditch @ 1915m
obstructed cross-ditch @ 2055m
obstructed cross-ditch @ 2106m
obstructed cross-ditch @ 2188m
trib. 46-700-120 and culvert @ 2229m
obstructed cross-ditch @ 2267m
obstructed cross-ditch @ 2388m
obstructed cross-ditch @ 2490m
obstructed cross-ditch and unnamed creek @ 2612m
obstructed cross-ditch @ 2669m
obstructed cross-ditch @ 2773m
obstructed cross-ditch @ 2886m
obstructed cross-ditch @ 2987m
obstructed cross-ditch @ 3044m
obstructed cross-ditch @ 3158m
obstructed cross-ditch @ 3296m
obstructed cross-ditch @ 3413m
obstructed cross-ditch @ 3505m
obstructed cross-ditch @ 3587m
obstructed cross-ditch @ 3609m
obstructed cross-ditch @ 3649m
End of Netazul Main and block 93M035-16 @ 3689m

Photo. 2 This infilled road crossing is typical of 36 fords located, along the Netalzul forest road, between the pulled bridge site at trib. 46-700-137 and the western boundary of block 93M 035 -016. These obstructed fords contribute fine sediment to the above mentioned stream and the Suskwa River through the erosion of the road prism. These crossings should be cleared and properly forded to ensure silvicultural and recreational access.

3.3 W.C. 46-700-140 (block 93M035-015) Upper Suskwa sub-basin

Assessment : During the summer of 1996 a detailed fish habitat assessment was made of this tributary bordering block 93M035-015 (Suskwa WRP 1996/97 Fiscal Report). The resulting prescriptions involved the placement of log deflectors and the selective removal of debris at a potential channel diversion located 423m upstream of the Thoen Main forest road crossing.

Prior to instream work, completed in 1997, a field visit to the prescribed site was made with a geomorphologist to determine possible impacts to the stream channel as a result of the prescription. This was conducted as a survey and design of the proposed work site and subsequent instream activities resulted from this planning process (Section 4.2.2).

It was determined that one large balsam log could be removed from the stream channel to reduce erosion of the eastern streambank bordering block 93M035-015. A site along this bank was also chosen to accommodate log deflectors to maintain bank stability until riparian vegetation is re-established (see site "B"/photo. 5 of section 4.0). A series of 35mm aerial photograghs was taken prior to 1997 work to assist in the survey and design of instream works and provide a referance for future monitoring (Photo. 3). A detailed description of instream activities is included in the "works" section of this report (Section 6.1.4).

Photo. 3 Tributary W.C. 46-700-140 and Block 93M 035-15.
Photo scale 1:3254

3.4 Harold Price Creek reach 1 tributaries (Harold Price Creek sub-basin)

Assessment : An extensive network of side-channels was assessed adjacent to reach 1 of Harold Price (H.P.) Creek between tributaries W.C. 46-700-50-01 and 46-700-50-2.4. Assessment focused on impacts to this high-value rearing area from current road development along the Hamblin FSR. The Hamblin road presently extends to tributary W.C. 46-700-50-2.4 with some clearing past this point for future development.The extent of available fish habitat within these low gradient side-channels is limited to the floodplain along the southwest side of H.P. creek, downstream of current road development. All of these channels are dependant upon numerous small feeder streams that drain the northeast face of Blunt Mountain.

An abundant population of rearing (0+and 1+) coho salmon, Dolly Varden, and rainbow trout were observed and dip-netted during 1997 assessments. Rearing (1+) chinook salmon were also gee-trapped at these side-channels during 1996 asseessments. The substrate of these side-channels was comprised of 75% fine sediment, 20% small gravels and 5% cobbles. The extent of side-channels upstream of W.C.46-700-50-2.4 along the H.P. floodplain remains unassessed, however aerial photos taken during 1996 appear to exhibit similar off-channel fish habitat that should be considered during road construction.

Impacts : The lower gradient sections of these small tributaries adjoining the H.P. creek are prone to fine sediment accumulation from disturbances upstream. This is evidently the case with these sites. Although it can be expected that some sedimentation is unavoidable during road development, a number of unnecessary road problems continue to degrade the existing road prism and fish habitat downstream.

A total of 19 metal pipe culverts, two of which are damaged and 17 of which have harvested "right of way" wood stacked on top of their outlets (Photo 4), were eroding the road prism, impeding drainage and delivering fine sediment to the lower fish-bearing sections of these tributaries at the time of assessment. A significant amount of ponding water was also observed on the roads surface, downcutting of sidecast material was apparent as this water drained. One side-channel exhibited an apparent reduction in discharge with upper portions void of water. The lower section sustains rearing rainbow trout and coho salmom from a sub-surface water supply. Although this may be attributed to ephemeral conditions with low flows at the time of assessment, unnecessary structures impeding discharge to this high-value rearing area should be addressed along this recently developed section of road and may be possible through MOF compliance and enforcement activities as per Forest Practices Code (FPC) of B.C. guidelines.

Presciption : Most of the outstanding road related problems above these side-channels can be remedied, if not yet addressed, by the collection of the "right of way" wood stacked at culvert outlets. Two other culverts may need replacement. At the time of assessment, inspections by the Ministry of Forests of the Hamblin road work was incomplete and it was suggested (Garry Wallace of M.O.F. pers. comm.) that existing road problems would be the legal responsability of the current forest licensee developing this site and therefore funding for remedial work should not be required through the Watershed Restoration Program(see following page for list of culverts and locations).

3.4 Harold Price Creek tributaries (reach 1)

The following is a list of problem culverts and their locations, in kilometers, along the Hamblin Main forest road.

damaged culvert @ 9.35 km (block 93M035-017)
damaged culvert @ 9.4 km (block 93M025-017)
culvert outlet obstructed @ 9.99 km
culvert outlet obstructed @ 10.03 km
culvert outlet obstructed @ 10.14 km
culvert outlet obstructed @ 10.25 km
culvert outlet obstructed @ 10.3 km
culvert outlet obstructed @ 10.49 km
culvert outlet obstructed @ 10.51 km
culvert outlet obstructed @ 10.65 km
culvert outlet obstructed @ 10.72 km
culvert outlet obstructed @ 10.79 km
culvert outlet obstructed @ 10.81 km
culvert outlet obstructed @ 10.85 km
culvert outlet obstructed @ 10.9 km
culvert outlet obstructed @ 11.0 km
culvert outlet obstructed @ 11.09 km
culvert outlet obstructed @ 11.34 km
culvert outlet obstructed @ 11.95 km
W.C. 46-700-50-2.4 @ 12.04 km (end)

Photo. 4 The "right of way" wood stacked at the outlet of this culvert is typical of 17 culverts between 9.35 km and 12.04 km along the Hamblin forest road. These blockages exacerbate sediment loading and effect discharge to high-value salmonid rearing areas located within side-channels adjacent to Harold Price Creek (reach 1). This has also contributed to degradation of the road prism at some sites.

3.5 Unnamed tributary to Camp Lake (Harold Price Creek sub-basin)

Fish / Habitat Assessment: This small tributary to Camp Lake (discharge 0.022 cubic meters/ sec.) was assessed from the creeks mouth at Camp Lake upstream for 332 meters adjacent to block 93M025-X2 and another section was walked for 249 meters along block 93M026-3. This low gradient stream (average gradient 1%) meanders through forested wetlands below Netalzul Mountain and is the primary water source for Camp Lake.

As noted within the 1996 assessment and presciptions report, this stream supports rearing juvenile and adult spawning cutthroat trout. Rearing juvenile cutthroat were gee-trapped and dip-netted during 1996 and 1997 assessments respectively. The stream consists of extensive glides and shallow pools with occassional riffles. Ample large woody debris (30 pieces tallied over 95 meters) and dense overhanging vegetation, primarily alder, provide the bulk of cover throughout the portions sampled (appendix 9.1).

The streams substrate is comprised primarily of fine organic sediment with small sections of cobble and fewer sections of cleaned gravels suitable for spawning. All substrates exhibit a darkened appearance typical of an organically nutrient rich water supply. A network of beaver ponds begins along the northwestern boundry of block 93M026-3. An overstorey of mature white spruce, lodgepole pine and balsam fir dominates the surrounding forest. Camp Lake is presently the base camp for a local guide-outfitter and a known fishing destination for Smithers residents.

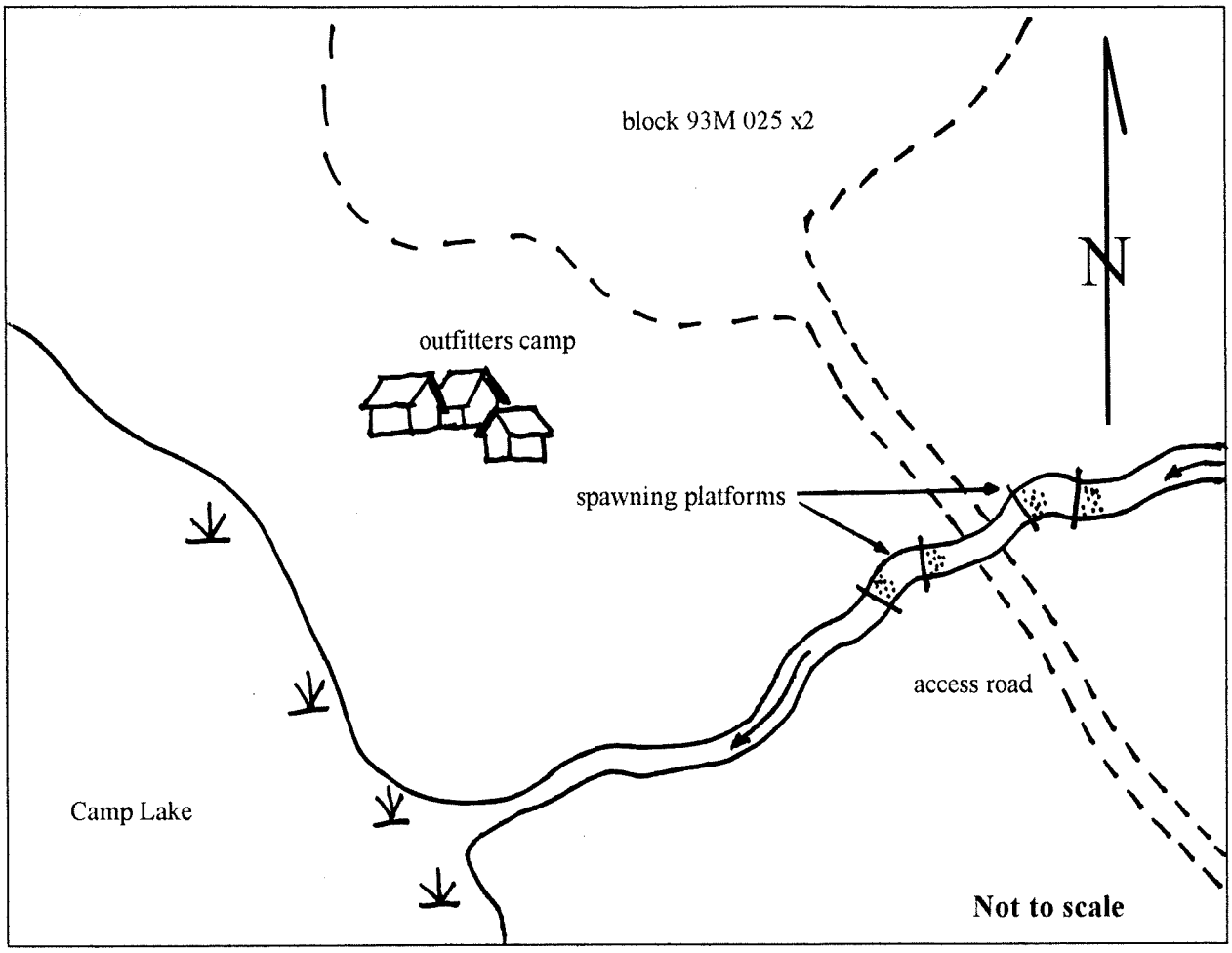
Impacts: During 1996 assessments it was noted that vehicles accessing block 93M025x2 were contributing fine sediment to this stream and lake as a result of a recently installed ford (Suskwa WRP 1996/97 Fiscal Report). This ford replaced a footbridge that previously was used for access and introduced vehicle traffic to the stream channel and a known spawning site for cutthroat trout. Riparian disturbance is limited to 249 meters of streambank along the northwestern corner of block 93M026-3. This section of stream is comprised of a series of beaver ponds and no site erosion was observed along block 3. Most of the original forest canopy was harvested along this section of stream. However, a well developed pine plantation and a seral shrub component has re-established.

Prescription: As prescribed within the 1996 assessment and prescriptions report, vehicle access to block 93M026x2 has been restricted to exclude vehicles from the stream channel. This was done by establishing a berm at the eastern side of the road crossing, creating an ATV-accessible footbridge to Camp Lake (Photo. 5) and posting a Ministry of Environment notice of restricted access (Section 6.3.1). This was done after consultation with DFO, MOF, MOELP, the forest licensee and the local guide-outfitter.

An opportunity exists, at this site, to improve spawning habitat for the resident cutthroat trout of Camp Lake and mitigate the harvesting related impacts to this species throughout this sub-basin. Spawning platforms, installed upstream and/ or downstream of the aforementioned road crossing, would provide a relatively low-cost benefit to fish habitat within this drainage and in this low energy stream. A series of small stepped platforms containing pea-gravels (5-10mm in diameter) would be an interesting pilot project for this sub-basin. Numerous other small tributaries within the Harold Price Creek drainage have been degraded to the detriment of this species. A suggested layout has been included for possible development (Figure 3).

Photo. 5 This road crossing, of the main tributary to Camp Lake, has been modified to eliminate vehicle traffic from the stream channel. A footbridge has replaced the previous ford at this known spawning site of cutthroat trout. This bridge will accomodate ATV's and pedestrian traffic to block 93M 025x2 and an outfitters camp (background). A berm has also been constructed to limit larger vehicle access and a notice posted to indicate the importance of this fish bearing stream.

Figure 3 Camp Lake tributary proposed spawning platforms



3.6 Luhk Creek W.C. 46-700-50-50 (Harold Price Creek sub-basin)

As part of a survey and design for proposed remedial work that was prescribed after 1996 detailed fish habitat assessments, a visit to block 93M 016-10 with a geomorphologist was conducted in Sept. '97 to determine potential impacts to the stream channel as a result of the prescription (section 4.0).

The 1996 prescription entailed the installment of log deflectors to help prevent channel diversions into block 93M 016-10 at one site located near the blocks north eastern boundary (photo. 15, Section 4.0) During 1996 assessments it was apparent that sediment depostion, possibly from sources within block 93M 016-10 were attributing to the infilling of the existing channel and seasonal flows were being directed into the cutblock. At that time, the main channel bank height was 0.5 meters at the proposed work site.

Upon visiting this site in Sept.1997 it became obvious that a channel diversion had occurred into block 93M 016-10 (see photo. 6) probably during spring runoff. Channel substrate was now flush with the stream bank at the proposed worksite, and a new channel extends from that point through the entire length of block 93M 016-10 to the southwestern block boundary. The new channel runs parallel to the mainstream of Luhk Creek and was discharging 0.01 cubic meters of water per second when visited (geomorphic description - Section 4.2.5).

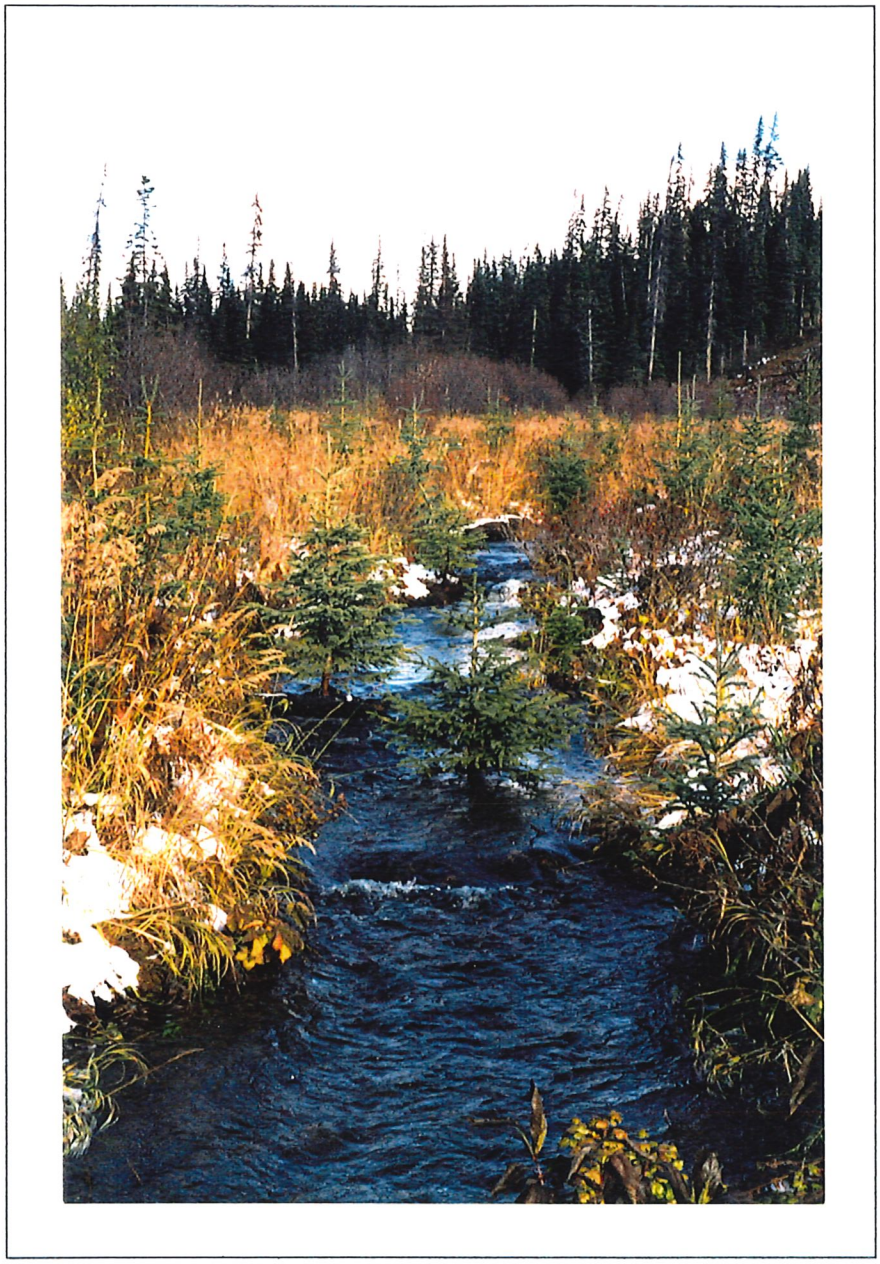


Photo. 6 This side-channel into block 93M016-010 (note crop trees midstream) originates from a channel diversion of Luhk Creek near the northeastern block boundary. Riparian vegetation (primarily hardwoods) will be required to help maintain channel stability and cover for roughly 2 kilometers of streambank.

3.7 Wan lake tributaries (T1, T2 and T4) Blunt Creek sub-basin

Assessment : Detailed fish habitat assessments were conducted at all three tributaries to Wan Lake during the 1996 field season (Suskwa WRP 1996/97 Fiscal Report). Further assessment using 35mm wide-angle photograghy was recommended for 1997 in order to help develop management decisionswith regards to a channel diversion at T1. This diversion resulted from excess water being delivered tothe Kuelsh road ditchline as a result of a natural diversion of trib. 46-700-50-30-35 on Goat Mountain.

Aerial photograghs were taken of the entire impacted area below the Goat Mountain diversion including tributary 2 (T2) and new tributaries through block 93M016-028 (Photos 7 through 10). Tributary 4 (T4) is presently undergoing investigations involving possible Forest Practices Code violations and assessment of impacts to that stream channel, as a result of harvesting during 1996, have been deferred pending an agency decision.

A detailed description of 1997 remedial activities to these stream channels, as a result of these assessments, is included within the "works" section of this report.

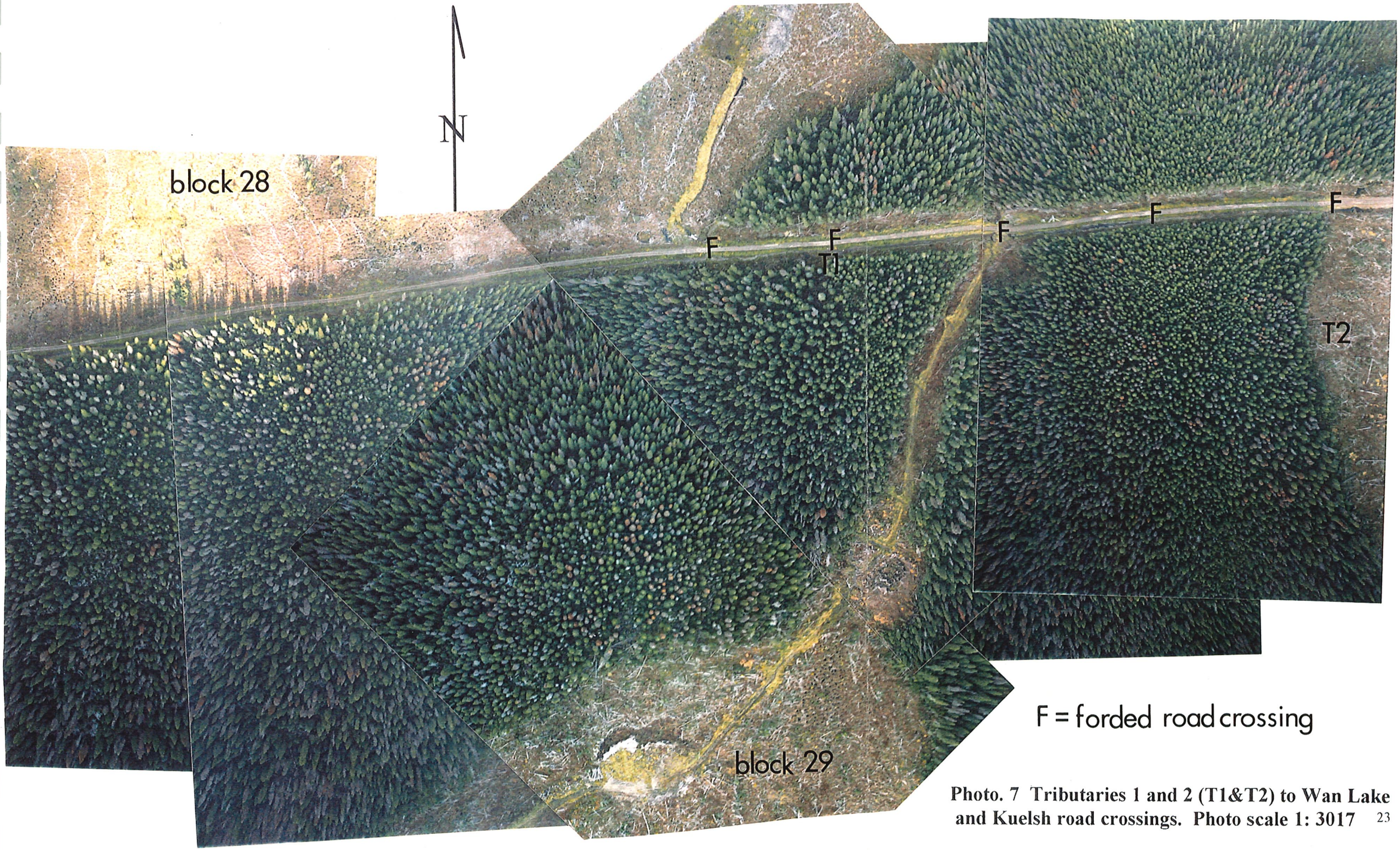


Photo. 7 Tributaries 1 and 2 (T1&T2) to Wan Lake and Kuelsh road crossings. Photo scale 1: 3017

3.8 W.C. 46-700-50-30-35 (block 93M016-028) Blunt Creek sub-basin

Assessment: This stream was diverted into block 93M016-029 as a result of a natural debris torrent off of Goat Mountain (see 1996 assessment and prescriptions report). At the northwestern corner of block 29 the stream braids into multiple channels that extend through a forested section to the Kuelsh forest road and block 93M016-028. During 1996 assessments 0+ cutthroat fry were dip-netted in ditchlines and along skid-roads within block 28. As was noted within the 1996 prescription further assessment was required within block 28 prior to remedial action to determine appropriate drainage for these new stream channels.

During 1997 assessments 35mm wide-angle aerial photograghs were taken of block 28 and drainages leading to Wan Lake (see air photos 8, 9 and 10). Field visits were then conducted to establish a working idea of block layout with respect to natural drainages. This block retains a significant amount of ponding water as a result of a process referred to as "mounding" done to prepare wet sites for silviculture. The aerial photograghs exhibited apparent channels within block 28 that could be used to drain excess water from the Kuelsh rd. ditchlines. One such channel was modified to accommodate drainage during 1997 channel reinstatements at tributaries 1 and 2 to Wan Lake (Section 6.4.3).

Impacts: As a result of the natural diversion of tributary 46-700-50-30-35 to this area and excessive seasonal drainage from Goat Mountain, the ditchblocks along the Kuelsh road are prone to failure. This has resulted in the dewatering of watercourses downstream of the road. This was the case at tributaries 1 and 2 to Wan Lake (Suskwa WRP 1996/97 Fiscal Report) and the channel at the entrance to block 28.. Due to the presence of cutthroat trout within block 28 it is crucial that drainage patterns be established and maintained. These drainages presently lack adequate stream cover and are laiden with fine sediment and course organic debris. Four primary stream channels have been established within block 28.

Prescription: The southern ditchline along the Kuelsh forest road, within block 93M016-028, will require assessment in 1998 after spring runoff to determine the effectiveness of 1997 modifications to the lower portion of the ditchline (Section 6.4.3). It can be expected that at least two other culverts will require modification 298m and 409m into block 28. This will most likely involve the fording of these crossings using a mid-sized excavator. Ongoing monitoring of remedial work done in 1997 will take place along this road after spring runoff in 1998 and any upgrades to existing work should be coordinated with this prescription.

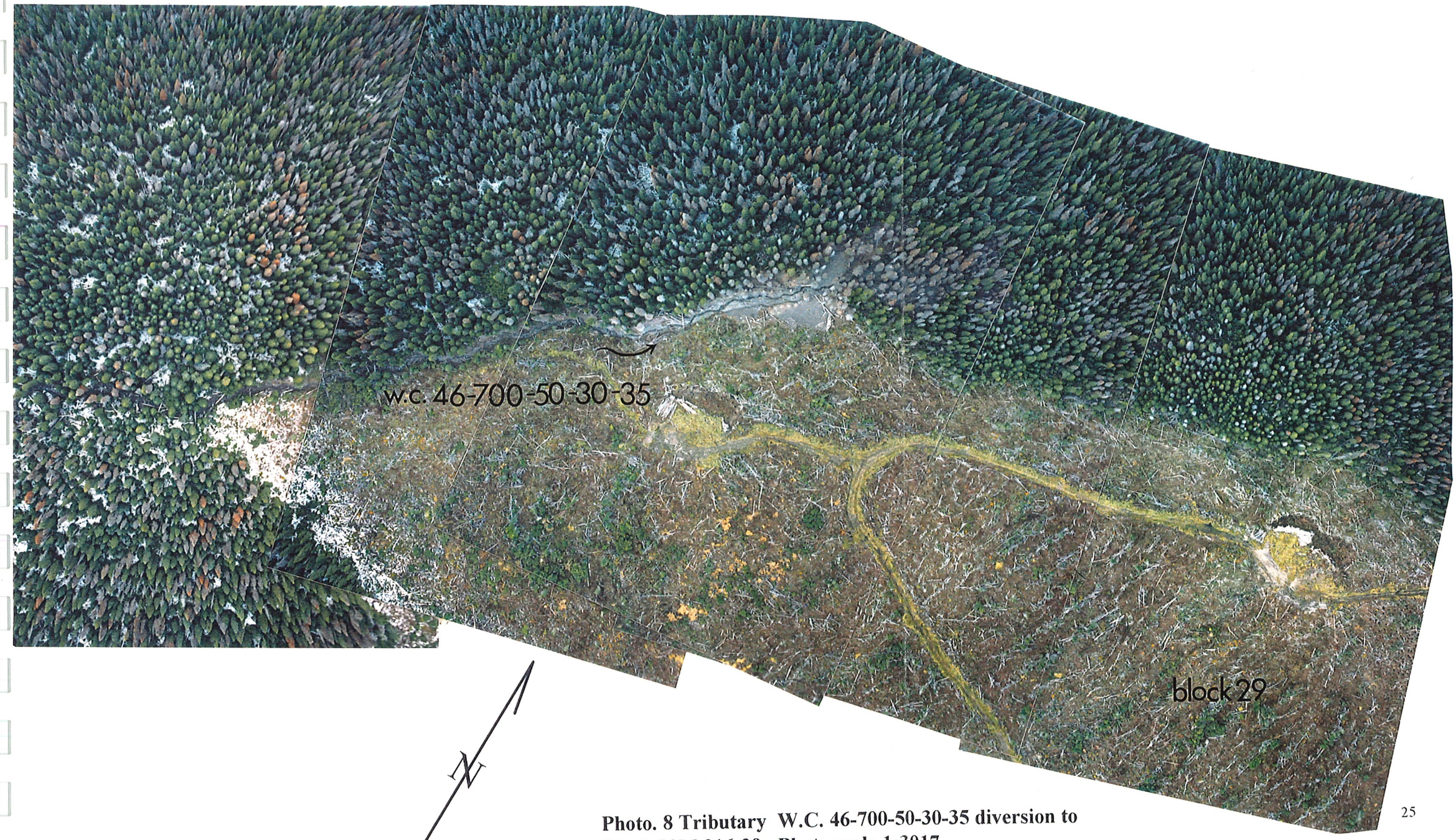


Photo. 8 Tributary W.C. 46-700-50-30-35 diversion to Block 93M 016-29. Photo scale 1:3017

Photo. 9 Braided tributaries of W.C. 46-700-50-30-35 diversion to Kuelsh road ditchline and Block 93M 016-28. Photo scale 1: 3017

Photo. 10 W.C. 46-700-50-30-35 (lower Block 93M 016-28) to Wan Lake outlet. Photo scale 1: 3017

3.9 W.C. 46-700-50-30-110 (24.4 km Blunt 2000 Rd.) Blunt Creek sub-basin

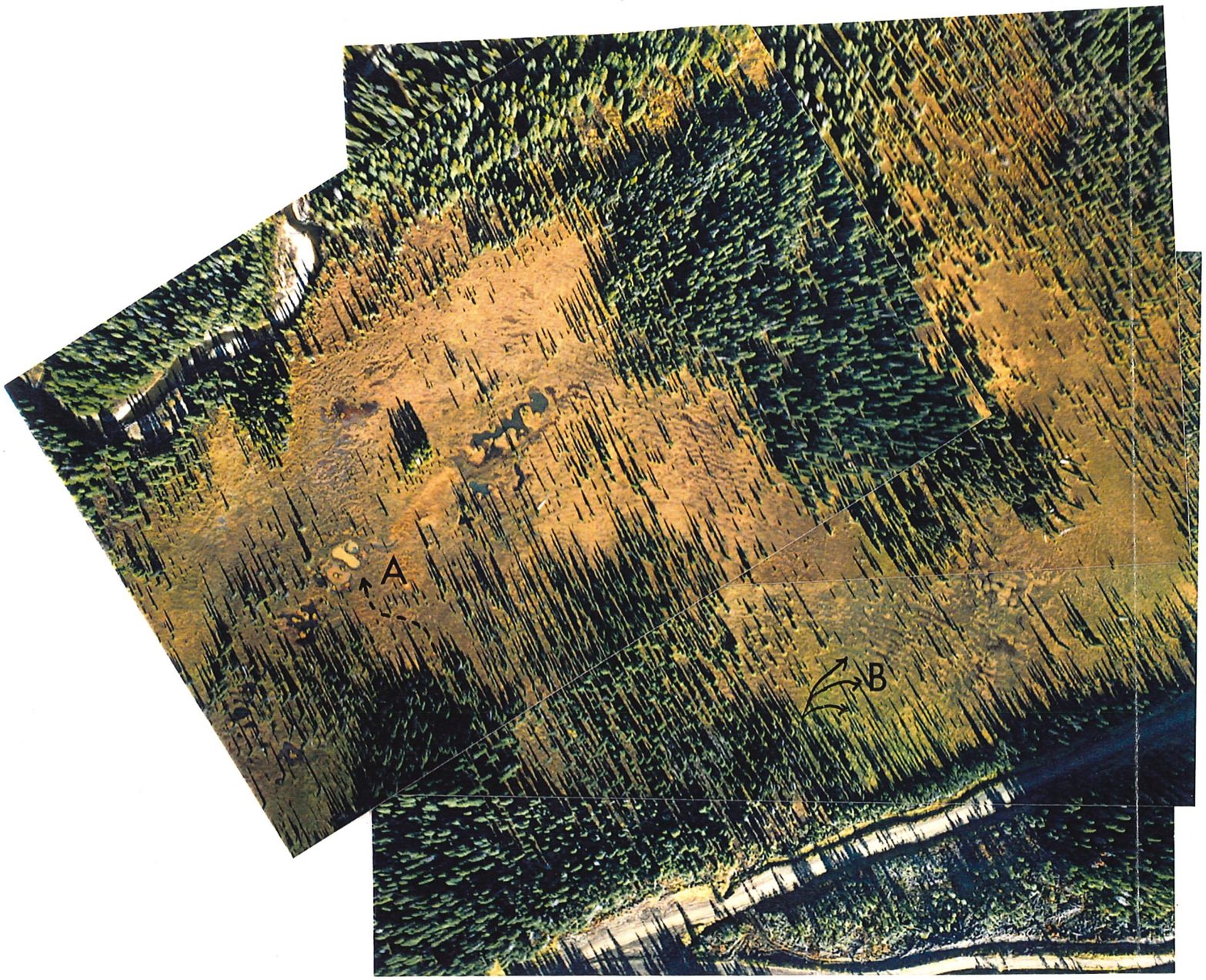
Assessment: During 1996 an assessment of this road crossing revealed a channel diversion immediatly below block 93M005-004 as a result of an improperly installed metal pipe culvert (Suskwa WRP 1996/97 Fiscal Report). The diverted flows were directed into an subalpine meadow east of the streams original channel. Prescriptions developed after 1996 field visits required that further assessments be made to determine the extent of existing fish habitat prior to the possible reinstatement of this stream to its original channel.

During 1997 an assessment of the flooded area, east of the original channel, was done using wide-angle 35mm aerial photographs of the area below block 4 (Photo. 11). This area was walked and gee-trapped to determine possible fish presence and distribution.

The stream channel is difficult to discern downstream of the road crossing at 24.4 km Blunt 2000 rd. and splays out over aggraded road materials into this fen area that comprises several hectares of flooded rushes and bog willow. Aside from a short 20 meter section of gravels immediatly below the road crossing the entire flooded area has a substrate of fine organic sediment with no distinct channel and flows go sub-surface 514 meters below the road crossing. Three sets of gee-traps were placed in the upper, middle and lower sections of the flooded area. Juvenile and adult cutthroat trout and Dolly Varden were found at all three sites.

Impacts: The flooded area below the channel diversion supports a widely distributed population of trout and char. It remains unknown as to what extent this area was populated prior to the channel diversion or how extensively the old channel was utilized prior to dewatering. A series of ponds below the old drainage no longer receives fresh water as a result of this diversion (photo. 11) however, reinstatement of the original channel is inadvisable due to the extent to which fish inhabit this flooded area. A skid road located at the entance to block 93M005-004 continues to impede fish access to habitat upstream of the road crossing.

Prescription: Due to the extent of fish distribution within the flooded area below this diverted stream and the improbability of salvaging all fry from this diversion prior to reinstatement it is recommended that no remedial work be done to rectify this diversion. The access road into block 93M005-004 should be modified to provide fish access upstream of this point. This may be accomplished within a half hour using a mid-sized hoe. This modification may be best coordinated in conjuction with other maintenance work via the forest licensee as part of the Roads, Hillslope and Gullies portion of the Suskwa WRP.



A = old channel B = diverted drainage

Photo. 11 W.C. 46-700-50-30-110 diversion from Block 93M 005-4 (24.4 km Blunt 2000 road) to reach 7 of Blunt Creek.

Photo scale 1: 3378

4.0 Suskwa WRP 1997
Geomorphic Assessment
Survey and Design

4.0 Geomorphic Stream Assessment, WRP - Suskwa River Watershed - Selected Sites

Skilokis Creek,
W.C. 46-700-140 (Grizzly Main FSR),
Natlan Creek (Reach 3)
Denison Creek (Reach 1)
Luhk Creek

Prepared for: Suskwa Restoration Society, Box 447 New Hazelton, B.C. V0J 2J0

Prepared by: Irene Weiland, P.Geo Box 4222 Smithers, B.C. V0J 2N0

Date: September, October 1997; March 1998

4.1 INTRODUCTION

In September and October 1997, five selected stream sites were visited in the Suskwa Watershed as part of the Watershed Restoration Program (WRP) Level 3 stream assessment. The objective of the field visits was to assess the geomorphic aspect and possible downstream effects of fish habitat restoration and habitat enhancement proposed by the level 2 WRP assessment (SRS, 1996).

Mike Jacobs, Suskwa Restoration Society and Irene Weiland P.Geo, I. Weiland Consulting visited the sites at Skilokis Creek and the Grizzly Main FSR on September 17, 1997, Natlan Creek (Reach 3) and Denison Creek (Reach 1) on October 7, and Luhk Creek (Harold Price sub-basin) on October 16, 1997.

Weather conditions prior to September 17 and October 7 had been relatively dry and stream flows were at a typical late summer / early autumn low stage. Snow fell and began melting prior to October 16 and stream flow was moderately high during the visit at Luhk Creek.

4.2 OBSERVATIONS AND RECOMMENDATIONS

4.2.1 Skilokis Creek (W.C. 46-700-031)

The general location of Skilokis Creek, a tributary to the Suskwa River, is described in the 1996 Assessment and Prescription Report (WRP level 2 report). The visited section of the creek (reach 1) extends 200 m on either side of the Hamblin Main FSR bridge: below the bridge to the Suskwa River confluence and above the bridge to a 3 m high waterfall.

During past clearcut logging, all mature vegetation was removed from the stream banks 100 m below and 200 m upstream of the bridge. Juvenile conifers, mostly pine, now grow along the stream banks above the bridge and deciduous vegetation, mostly alder is established along the 100 m section below the bridge. Large woody debris (LWD) is rare along the reach.

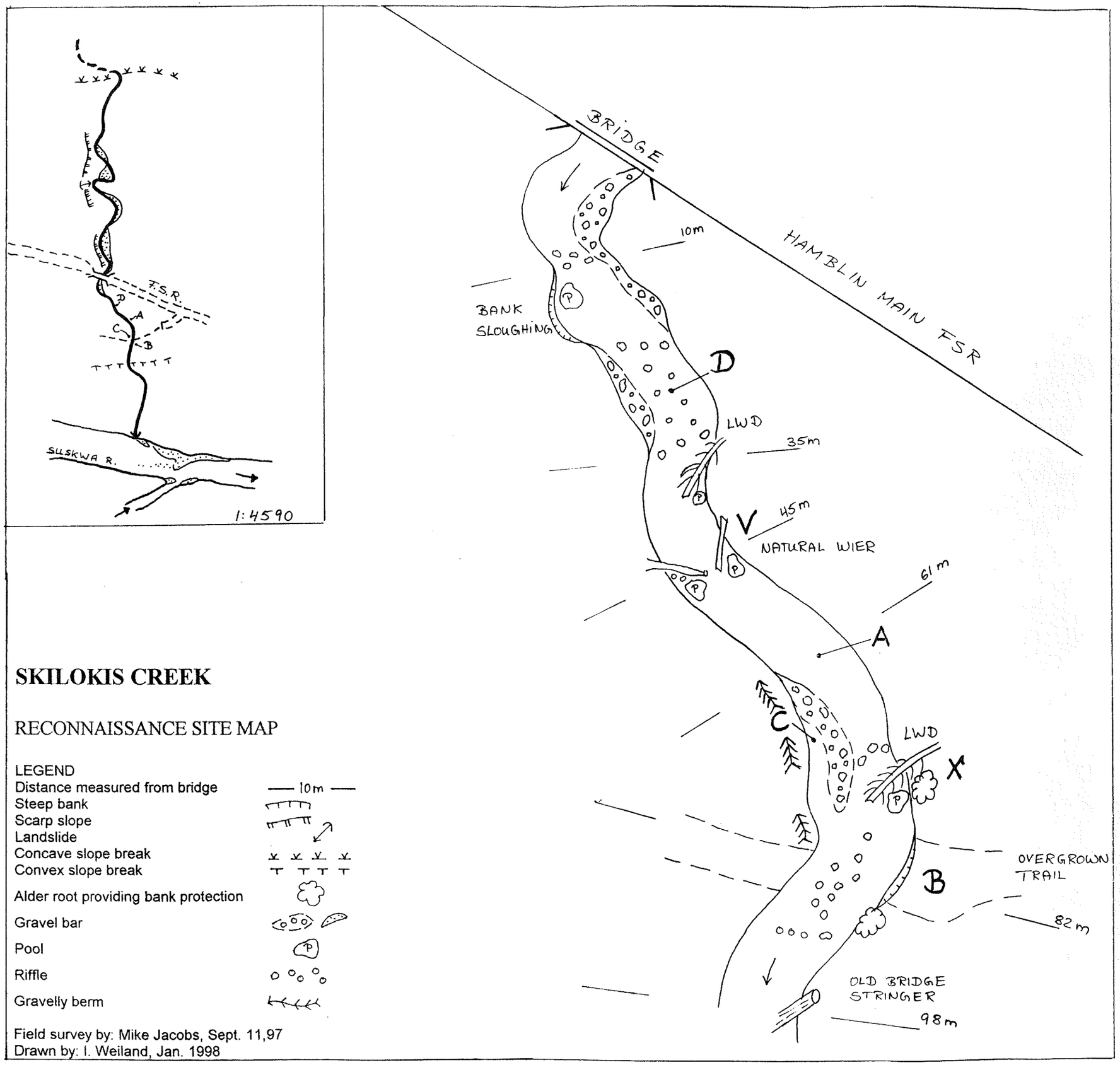
Above the bridge, the creek is confined along the eastern stream bank by a 3 to 5 meter high scarp slope consisting of morainal till and some glacio-fluvial gravel. The unconfined stream bank borders a gravelly, mostly inactive fan deposit. Below the bridge, the creek has a 5 to 7 m wide, discontinuous gravelly floodplain which is 0.5 to 1 m incised into the gravelly, abandoned fluvial fan deposit. Along the last 100 m above the mouth of Skilokis Creek, the stream is incised 1 to 2 m deep into the Suskwa River scarp slope.

In reach 1, the stream width varies between 3 to 8 m wide (W_b) with a gradient of 4 to 8 %. The gentler section below the bridge has a 4% gradient and is 6-7 m wide. Above the bridge, the gradient is steeper (6-7 %) and bankfull width varies from 4 to 12 m due to several lateral gravel bars. Bed material size is gravel and cobbles with a maximum diameter (D_{90}) of 35 to 70 cm below the bridge and > 70 cm above the bridge.

Logging impacts to the stream are manifested in particular 100 m above and below the bridge. Above the bridge, the logged scarp slope bordering Skilokis Creek has failed with a landslide entering the creek along the sharp meander bend (Figure 1). There is a severe lack of LWD in this section of the creek. Logs spanning the width of the creek were absent, leaving the stream with a very low bedload storage capacity. Due to the absence of LWD embedded in the stream bed, the stream gradient was uniform instead of stepped. Bedload transport capability is greater along a uniform gradient than along a stepped gradient. During the field trip, a large amount of bedload was in short term, temporary storage in point and lateral bars. I anticipate that, during a 1:20 year (or larger) run-off event, part of the gravel will be transported to the section below the bridge, where it will cause aggradation and channel widening.

No stabilization or restoration measures are suggested for the section above the bridge. The steep gradient (>5%), the size of the bed material and the bankfull width are not suitable for successful stabilization with small scale measures such as log placement.

Downstream of the bridge, logging impacts to the stream were less severe. The following summarizes the field observations: LWD, particularly mature conifer logs, was rare. The existing pieces were alder, 10 to 15 cm in diameter, which span 1/4 to 1/3 of the stream.



SKILOKIS CREEK

RECONNAISSANCE SITE MAP

LEGEND

Distance measured from bridge	— 10m —
Steep bank	
Scarp slope	
Landslide	
Concave slope break	
Convex slope break	
Alder root providing bank protection	
Gravel bar	
Pool	P
Riffle	
Gravelly berm	

Field survey by: Mike Jacobs, Sept. 11,97
Drawn by: I. Weiland, Jan. 1998

Figure 1: Reconnaissance site map, Skilokis Creek, Reach 1

Existing pools were small and shallow (< 0.5 m deep). Stream side vegetation consisting of immature alder, cottonwood and birch, providing shade. The level 2 WRP assessment identifies this section for its potential for stream complexing and fish habitat enhancement by increasing pool area. The following prescriptions refer to the sites A to D, V, X shown on the reconnaissance site map (figure 1) and on photos 1 - 4.

Site A: The 35 m long stream section between the natural V-weir (V) and the LWD (X) consists of a continuous, shallow riffle. Bed material (D_{90}) is 35 cm and smaller. Gradient is 4%, flow is 0.6 m3/s.

Using a small backhoe, a cascade-pool complex could be created by placing small boulders across the stream to form a stone line. Recommended material are blocks 60 cm and smaller. The blocks (angular, competent material) should be placed forming a slight V both in cross section and in plan form to centre the flow in the middle of the stream (see Watershed Restoration Technical Circular No. 9 (Draft), 1996, for specifications on boulder weirs and built riffles). Stream banks on both sides of the cascade should be lined with blocks to prevent bank erosion. Access to site A exists along the old trail (site B).

Site B: The stream bank is a slightly undercut, 70 cm high, old road fill located at a meander bend apex. Placement of a log sub-parallel to the stream bank was discussed in the field. The idea was not adopted because of concerns that this may cause scour behind the log and increase bank erosion at the site.

Site C: Groundwater surfaces and forms a slow flow between the gravel bar and the vegetated bank. Temperature of the trickle was 6° C compared to 8° C in the main creek. With slightly higher flow, the groundwater fed trickle would provide good overwintering habitat. The groundwater seems to accumulate in a shallow ditch on the floodplain draining towards the creek, but is blocked by a 1.5 m high, machine piled old gravel berm. It is recommended to breach the berm using a small backhoe. Access exists along the overgrown trail at site B.

Site D: The site presently is a 15 m long, shallow riffle with pebbles, cobbles and boulders up to 70 cm diameter. There are no pools in this section, and the pools above and below the site are shallow and small. It is recommended to break up the riffle and to create a cascade - pool complex. Recommended cascade material are sub-angular blocks 100 to 90 cm diameter with smaller blocks placed on the downstream face of the constructed cascade. The blocks should be placed with a small backhoe, replacing cobbles along one of the existing, but poorly defined stone lines on the shallow riffle. Stream banks on both sides of the cascade must be armoured with blocks to prevent bank erosion. The site should be monitored after each spring run-off to assess the effectiveness of the boulder placement.

It is recognized that the channel instability upstream of the bridge has the potential to destroy the enhancement of fish habitat at sites A and D below the bridge. It appears that the channel section above the bridge will be stable under flow conditions less severe than a 1:15 year flood. The longevity of the recommended habitat improvement depends on the occurrence of the next 1: 10 or 1:15 year flood.

4.2.2 W.C. 46-700-140 (0 km Grizzly Main FSR)

This stream drains from the south side of the Thoen Mountain Range into the Suskwa River. It crosses the Grizzly Main FSR at km 0. For 600 to 700 m above this crossing, the stream flows on a mostly inactive fluvial fan with a general slope of 10 - 15 %. Short sections of overgrown channel bed found in a 30 m wide zone along the east side of the stream are evidence that the stream channel has shifted across its fan in the geologically recent past (200 to 500 years).

The stream has a step - pool morphology with a estimated stream width of 4 to 5 m and a maximum bed material size of 40 to 50 cm. Average stream gradient is 9 %.

The eastern stream bank has been clearcut logged (block 93M.035-015), but mature conifers grow along the western stream bank. LWD is frequent in the stream. LWD pieces generally span the width of the stream and play an important role trapping sediment and are essential components of the stream profile steps.

The visited site is located 423 m upstream of the bridge crossing. A log spanning the width of the creek has blocked the entrance to the previous main channel, which has subsequently filled with gravel. At the time of the field trip, this channel was de-watered. The flow is re-routed along a newly scoured and widened channel which has eroded a meander bend into the clearcut. This channel diversion was just starting to develop during the 1996 assessment (1996 Assessment and Prescription Report), with a potential for a larger and longer diversion into block -015. The present diversion meets the old channel 5 to 10 m below the diversion point (point A on Photo 5). In the fall of 1997, the potential for a complete spill of the stream into block -015 seemed less imminent than in 1996. However, bank erosion is still active at the apex of the newly scoured meander bend (site B on Photo 6). During a large spring run-off event, the stream may overtop the bank and establish a new channel across the block.

Re-routing of this stream across the clearcut section of the fluvial fan is undesirable for several reasons: (1) it would leave the present channel which provides good bull trout habitat (Mike Jacobs, pers. comm.) de-watered, (2) with the lack of LWD and no replenishment of LWD in the clearcut, a re-routed channel would be laterally and vertically unstable, with a higher volume of bedload moving through it. (3) the site would be lost for reforestation.

In order to further reduce the potential for a stream diversion into the clearcut, the following measures are recommended:
(1) Remove the log that traps the sediment at the entrance to the old channel (marked with red X on Photo 5). This increases the chance that the old channel will be re-used during high flows. The work would be done manually using chain saws.
(2) Place logs along the eroding apex of the meander bend (point B on Photo 6). Logs should not be taken from the stream, but from the clearcut. The length of the log pieces will be limited by what can be transported and placed manually. The placed logs should be cabled together. There is little structure along the eastern stream bank to which the armour logs could be secured. An attempt could be made to secure the bank protection with metal rods that are driven vertically into the stream bed and bank.

(3) Inspect the site one year after the log removal and the placement of bank armour. Assess effectiveness of the measures and determine if further action is necessary.

4.2.3 Natlan Creek (Reach 3)

Reach 3 of Natlan Creek is a mostly confined stream, either by steep scarp slopes consisting of locally unstable morainal till with a thin cover of glaciofluvial gravel, or by bedrock walls. Short and narrow, discontinuous floodplain sections exist between the confining valley walls. At the visited site, Natlan Creek flows in a 2 metre wide, 30 m long bedrock canyon (Photo 7). A logjam is firmly wedged at the upper end of the bedrock canyon (Photo 8). A dense web of small woody debris is lodged in the jam and impedes fish and sediment passage. Access to the site was from 24.5 km on the Suskwa FSR and via block 93M.034-005.

During the 1996 assessment (1996 Assessment and Prescription Report), the logjam was found to completely block fish and sediment passage. A gravel wedge had built up against the upstream side of the jam and the pool and riffles below the jam were degraded to a cobble and bedrock substrate. (M. Jacobs, pers. comm.) By the fall of 1997, a small passage had formed underneath the logjam on the east side (true left) of the channel. Most of the gravel wedge above the jam had been transported into the pool area below the jam. A small part of the wedge was still obvious on the western stream bank where pebbles (D = 5-20 cm) are piled up 0.7 m above the relatively low fall flow level.

It appears that blockage of Natlan Creek is a recurring, natural event. Once the logjam is established, additional woody debris will get caught and temporarily, the jam is tight enough to completely block fish passage. Partial removal of the debris jam with hand tools will improve fish passage, and may accelerate the natural break down of the log jam. It is recommended to monitor sediment transport and fish passage at the site annually.

4.2.4 Denison Creek W.C. 46-700-30-20 (Reach 1)

Along reach 1, Denison Creek is partially confined between 20 to 30 m high, unstable scarp slopes of morainal till and, rarely, bedrock. Discontinuous floodplain sections with riparian vegetation exist between meander bends. The multi-thread channel pattern with avulsions is a result of a high sediment load from upstream reaches (predominantly pebbles and cobbles, some sand) and sediment and LWD input from failing scarp slopes. Average gradient is 3.5%, stream width varies from 5 to over 10 m. LWD is abundant. The Suskwa FSR traverses the upper third of the occasionally failing southern scarp slope above Denison Creek. Some scarp slope failures are associated with road fill instability, others start below the road fill due to the failure-prone clay-rich texture of the glacial till.

During the field visit, we walked the entire length of Reach 1. In particular, a site 840 m below the Denison Creek bridge was inspected. A scarp slope failure starting approximately 5 m below the FSR had deposited LWD and sediment in the creek (Photo 9). During the 1996 field assessment, the slide debris blocked the stream, creating two 1 m high steps with sediment accumulating upstream of the jam (1996 Assessment and Prescription Report). In October 1997, this barrier had been breached naturally, and gravel from the wedge above the failure had been transported and deposited in a growing point bar below the failure. No remedial action is recommended at the stream site.

The head wall of the scarp slope failure (earth flow) is formed by recurring retrogressive failure, which may eventually damage the road prism. The failure head wall is oversteepened and wet due to seepage. Road fill material is overloading the slope above the head scar. The instability associated with this failure starts above the FSR where the cut slope is slowly creeping, with some sloughing sections (Photo 10). This site should be investigated as part of the Upslope and Road Assessment of WRP. Possible remedial action may include pulling back side-cast and some road fill material (requires narrowing the road) from the head wall, installing a french drain along the road ditch and bio-engineering to stabilize and re-establish root strength on the cut slope.

4.2.5 Luhk Creek (W.C. 46-700-50-50); Harold Price Subbasin

Luhk Creek, a tributary to Harold Price Creek (reach 7), drains the south west part of the Netalzul Range. The visited section of the creek is the lower reach which flows through the clearcut block 93M.016-019. The stream is unconfined in a 10 m wide active floodplain which is embedded in a 50 to 100 m wide, 1m elevated inactive floodplain with a gradient of 2 to 3 %. A secondary, 1 to 2 m wide, previously inactive channel is embedded in the elevated floodplain and runs sub-parallel to the main channel at a distance of 10 to 50 m. The floodplain complex transects a series of steep, gravelly kame ridges.

Luhk Creek has a riffle pool morphology with an average gradient of 2%, and a pebble - cobble channel bed. Main channel stream side vegetation is dominated by alder, but is sparse towards the upstream part of the cutblock. 240 m downstream of the north east block boundary, just downstream of a 6 m long section of recently eroded stream bank(Site A, Photo 11; Photo 12), the main channel bed is filled in with small gravel (Site B, Photo11). The stream bed is aggraded to the level of the elevated floodplain. The flow is diverted into the secondary channel (Site D, Photo11) and into the plantation on the elevated floodplain. Small gravel has been spilled along the new water course for approximately 100 m. No scour or downcutting had occurred at the time of the field visit. It is assumed that the diversion occurred over the past two or three spring run-off events. Over time, the secondary channel may become more established carrying higher flows which may lead to downcutting and bed erosion. Approximately one third of the volume of the diverted flow joins the main channel after 50 and 150 metres with a 1 m and 0.7m high drop over the main channel stream bank (Photo 13). Undercutting associated with the plunge pool at the drops has caused some bank erosion. During the moderately high

flow conditions following the early snowfall and melt in October 1997, the entire length of the secondary channel carried water (Photo 14). The lower part of the secondary channel most likely falls dry during low water levels in late summer. Spruce seedlings which had been planted during reforestation of the block several years earlier, were still alive.

Based on the wide angle aerial photography taken in October 1997 (Photo 15) and field evidence, it appears that channel change and temporary re-activation of the secondary channel has occurred repeatedly in the past. However, since the clearcut logging of block -019, replenishment of LWD is interrupted. With the lack of LWD the bedload storage capacity of Luhk Creek is starting to decrease. Progressive downstream movement of sediment wedges, a possible snow-ball effect of natural, small bank erosion - gravel deposition events, will cause more extensive channel destabilization.

At the present time, no remedial action is recommended to intervene in the natural process of channel diversion. The diversion site should be monitored annually to determine if the diversion leads to dewatering of long sections of the main channel. If so, excavating one of the converging branches of the secondary channel may allow the re-routing of the flow back to the main channel.

Establishing a conifer component in the stream side vegetation must be made a priority.

4.3 REFERENCE

Ministry of Forests. 1996. Channel assessment procedure field guide book. B.C. Ministry of Forests, Victoria, B.C.

Suskwa Restoration Society. 1996. Assessment and prescription report. Prepared for Watershed Restoration Program, Smithers, B.C., Hazelton, B.C.

Watershed Restoration Program. 1996. Fish Habitat Rehabilitation Procedures. Watershed Restoration Technical Circular No. 9. Draft. B.C. Ministry of Environment, Lands, and Parks and B.C. Ministry of Forests, Victoria, B.C.

Photo 1: Skilokis Creek, Reach 1; looking upstream towards the sloughing bank above site D. Red line marks site suitable for creating stone line.

Photo 2: Skilokis Creek, Reach 1; looking upstream from site A to the natural V-weir.
Red line marks site suitable for building a stone line to create a cascade-pool complex.

Photo 3: Skilokis Creek, Reach 1; looking upstream from site X to site A and site C where the small flow of surfaced groundwater enters the channel.

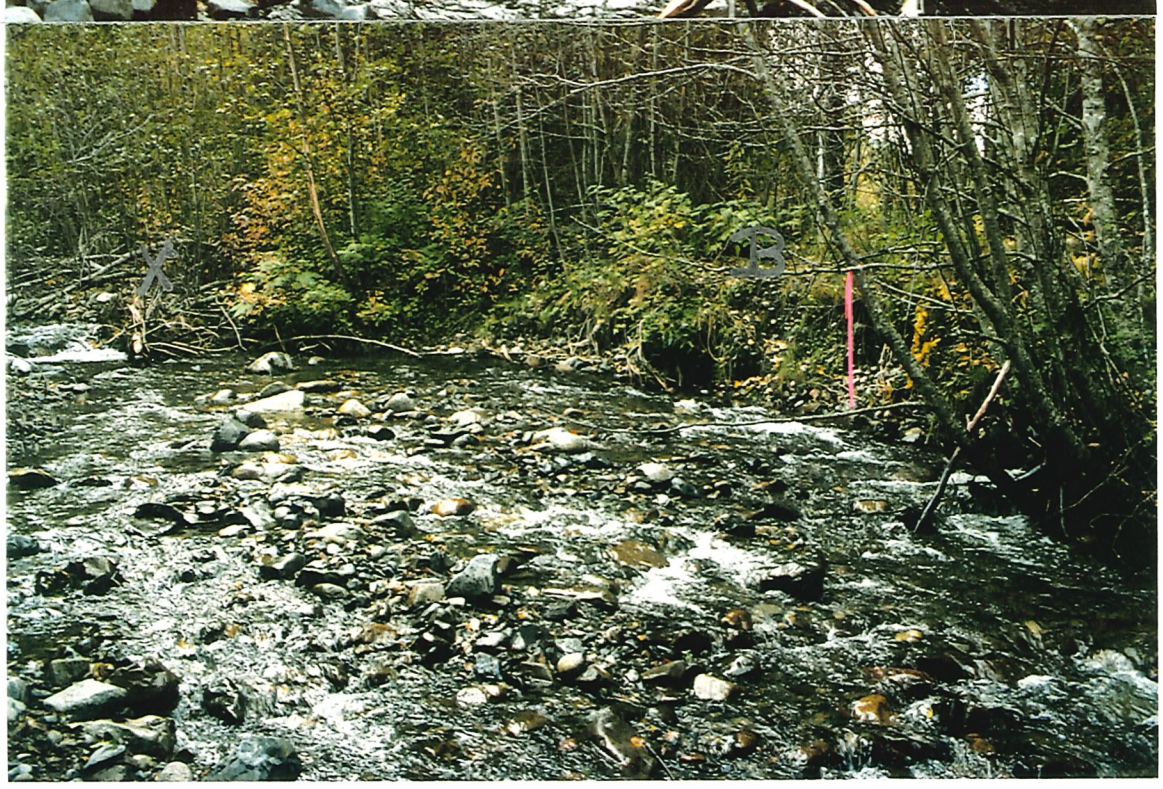


Photo 4: Skilokis Creek, Reach 1; minor bank erosion at site B, the crossing of the overgrown road.

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Photo 5: W.C. 46-700-140 (0 km Grizzly Main FSR). Looking downstream along the new channel and along the log to be removed (red Xs). The old channel, now filled with gravel, turns right at point A.

Photo 6: W.C. 46-700-140 (0 km Grizzly Main FSR). Looking downstream from point X towards the eroding meander bend apex left of point B (behind cottonwood log). 15 % sloping fluvial fan on block 93M.035-15 in the middle-ground.

Photo 7: Natlan Creek (Reach 3); narrow bedrock canyon, partially blocked by logjam. (looking upstream)

Photo 8: Natlan Creek (Reach 3); looking downstream into the narrow bedrock canyon. Flow and sediment passes under the logjam along the left stream bank.

Photo 9: Denison Creek, Reach 1; looking upstream at logjam at toe of scarp slope failure (entered from the right of photo mosaic).

Photo 10: Creeping and sloughing cut slope along Suskwa FSR near km 21. Failure below the road runs to Denison Creek.

Photo 11: Luhk Creek (flow from R to L); looking at the diversion site. A: Bank erosion, 5 m long, 2 m bank retreat. B: Gravel deposition in original main channel. C: New main channel being established. D: Overflow inot secondary channel.

Photo 12: Luhk Creek (flow from R to L); bank erosion 5 x 2 x 1 m just upstream of aggradation and diversion.

Photo 13: Luhk Creek.; .7 m drop a branch of secondary channel into main channel.

Photo 14: Luhk Creek, secondary channel, near downstream part of block 93M.016-019

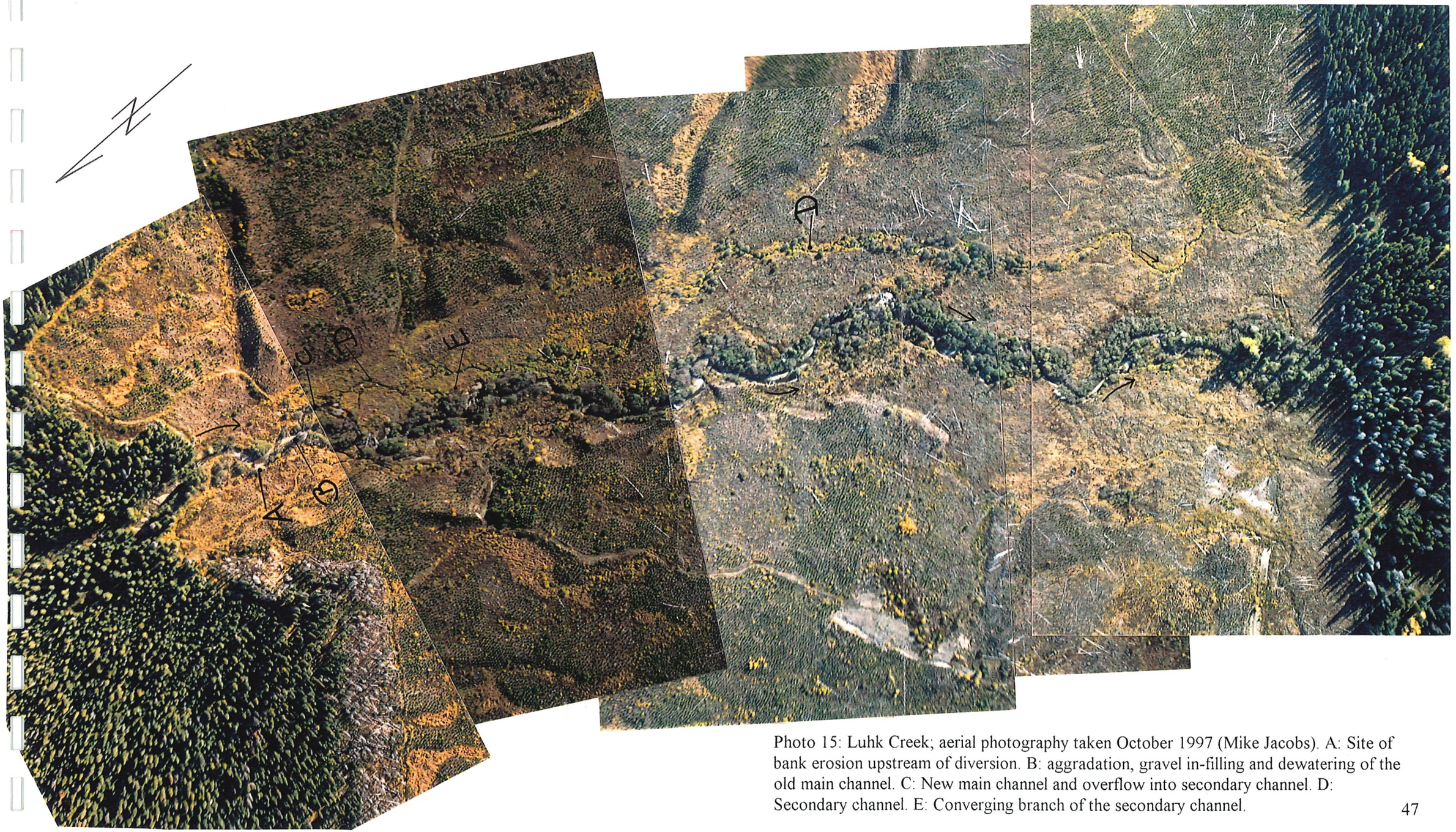


Photo 15: Luhk Creek; aerial photography taken October 1997 (Mike Jacobs). A: Site of bank erosion upstream of diversion. B: aggradation, gravel in-filling and dewatering of the old main channel. C: New main channel and overflow into secondary channel. D: Secondary channel. E: Converging branch of the secondary channel.

5.0 Suskwa WRP 1997
Riparian Prescriptions

5.1 Riparian Prescriptions Summary

During the fall of 1997 fourteen high priority riparian areas were assessed, throughout the Suskwa watershed , using riparian prescription forms that were developed by the Ministry of Environment, Lands and Parks and the Bulkley and Kispiox districts Ministry of Forests.

These 14 sites were selected from approximately 90 kilometers of logged streambank that were identified, during detailed fish habitat assessments, within the Suskwa WRP 1996/97 fiscal report. All sites selected support resident and /or anadromous salmonids.

Initial prescriptions considered entire riparian management areas (RMA's), as defined within the Forest Practices Code of B.C. Riparian Management Area Guidebook, to attain riparian functions that include biodiversity and wildlife corridors. However, due to a limited amount of projected funding for 1998, revisions were made to address sites with specific erosion problems and planting within the riparian reserve zones (RMZ's). Prescribed sites have been identified using Ministry of Forests block opening numbers and hierarchical watershed coding developed during overview assessments in 1995. Stream classes (S1 to S5) were also identified at each site according to Forest Practices Code (FPC) of B.C., depending on the streams wetted width, in order to determine the respective RRZ as defined within the FPC Riparian Management Area Guidebook.

Areas of highest priority within the Bulkley district were noted to be Blunt Creek (reach 1) and Harold Price Creek (reaches 9,10 and 11). Within the Kispiox district Skilokis Creek (reach 1), Denison Creek (reach 3) and tributary W.C. 46-700-140 (reach 2) to the upper Suskwa River were selected for riparian restoration.

Depending on funding and available stock, prescibed sites will most likely be developed over several years and planting will focus on high priority areas in attempts to reduce erosion and stabilize stream channels within logged floodplains. The prescriptions predominantly call for large amounts of willow (salix sp.) to accommodate channel stabilization. Cottonwood is also prescribed for its quick growing characteristics and as an interim supplier of large woody debris while adjacent conifer stands develop.

The prescriptions vary in species and stems per hectare depending on existing vegetation conditions that are unique to each site. As riparian restoration is a relatively new concept in the Bulkley and Kispiox districts it is advised that close monitoring of planting and survivals be done by persons or parties familiar with the objectives for riparian restoration and the Suskwa watersheds aquatic resources.

The following sites have been summarized from the detailed riparian prescriptions located within appendix 9.2.

5.2.0 *Harold Price Creek Sub-basin*

5.2.1 Harold Price Creek (reach 6) *moderate to high priority*

This treatment area is comprised of 9.57 hectares within the 50 meter RRZ through blocks 93M016-14, 15, 16, 17 and 20. The prescriptions have been separated into reaches 6(a) and 6(b) and prescription objectives focus on slope stabilization along this " S1" stream (Photo. 1 and Appendix 9.2).

5.2.2 Harold Price Creek (reach 9) *high priority*

This reach of Harold Price Creek exhibits extensive erosion along block 93M007-101. The proposed treatment area is comprised of 3.21 hectares adjacent to this "S2" stream. The primary objective for this site is to stabilize the mainstem channel that has been diverted into this cutblock. It can be expected that portions of this treatment area will be lost to erosion subsequent to planting (Photo. 2 and Appendix 9.2)

5.2.3 Harold Price Creek (reach 10) *high priority*

This reach of Harold Price Creek is by far the most dramatic expanse of erosion observed within the Suskwa watershed. Ongoing erosion throughout reach 10 for 4 kilometers has resulted in bedload deposition and channel instability that commonly exhibits wetted widths of 6 meters and bankfull widths in excess of 100 meters. Aggradation and debris jams downstream have resulted in channel avulsions through to reach 9. The prescriptions focus on an initial 2.88 hectares aimed at slowing erosion at outside meanders through blocks 93M006-4, 6, 7, 10 and 12 (Photo. 3 and Appendix 9.2).

It will be important to monitor treatment sites to determine survivals and the amount of planted area lost to erosion. It can be anticipated that erosion along this "S3" stream will continue until riparian vegetation is established.

5.2.4 Harold Price Creek (reach 11) *high priority*

This "S3" section of Harold Price Creek exhibits similar erosion problems to that reach 10 but to a lesser extent. This 1.97 hectare treatment unit focuses on stemming erosion at outside meanders through block 93M006-4. The RRZ for this site is 20 meters and it can be expected that some of the plantable area will continue to erode until streamside vegetation is reestablished. Most sites within this treatment unit will not require conifer stocking (Photo. 4 and Appendix 9.2).

5.2.5 Luhk Creek (reach 2) *moderate to high priority*

This tributary to Harold Price Creek has an established alder component throughout its length within block 93M016-10 and 19. However, sections of streambank suffer from erosion and are lacking in conifer stock. This prescription focuses on revegetating erosion sites with hardwoods and fill-planting conifers within the 20 meter RRZ of this "S3" stream. Further riparian assessment of a channel diversion near the northeast block boundary is recommended for 1998 (section 3.6).

5.2.6 Tributary W.C. 46-700-50-40 (road crossing) *low priority*

This small 0.1 hectare site is to be planted with willow to stabilize a steeply excavated ford (modified fall 1997). This road crossing is located 0.9 km along the Harold Price east main southeast of the 37.5 km branch of the Upper Fulton FSR (Appendix 9.2).

Photo. 1 Harold Price Creek (reach 6) along block 93M 016-16. Riparian planting is recommended for 9.57 hectares within the 50 meter RRZ over 4 kilometers, primarily at locations prone to erosion.

Photo. 2 Harold Price Creek (reach 9) exhibits extensive erosion through block 93M 007-101.

Photo.3 Harold Price (H.P) Creek (reach 10) along block 93M 006-6. A total treatment area of 2.88 hectares is prescribed at outside meanders throughout this eroded reach to help maintain bank stability.

Photo.4 H.P. Creek (reach 11) along block 93M006-4. Vegetation is needed to help retain streambanks.

5.3.0 *Blunt Creek Sub-basin*

5.3.1 Blunt Creek (reach 1) *high priority*

This "S2" section of Blunt Creek and its floodplain, through block 93M016-32, is presently being destabilized by erosion as a result of several channel avulsions into the cutblock. Gee-trapping at this site in 1995 and 1996 produced 3 different year-classes of rearing coho salmon in off-channel areas presently being eroded. The objective of this prescription is to stabilize existing stream channels in block 29 by planting hardwoods within the logged floodplain. A well established conifer plantation already exists at this site (Photo. 5 and Appendix 9.2).

5.3.2 Wan Lake tributary 1 (T1) *high priority*

This small 0.81 hectare treatment unit is located at the entrance to block 93M016-29 and requires channel stabilzation and stream shading through this disrupted section of stream. This "S4" stream presently flows through a landing and a mix of hardwoods and conifers is prescibed for planting along this fish-bearing tributary to Wan Lake within block 29 (Photo. 6 and Appendix 9.2)

5.3.3 Wan Lake tributaries 2 and 4 *low priority*

These 2 small tributaries to Wan Lake border the east and west sides of block 93M016-27. No RRZ presently exists along these "S4" streams and riparian planting is recommended primarily for trib.4. At the time of assessment, forest harvesting over trib.4 was incomplete and the prescription focuses on restoring the site after skidding operations have ceased . Tributary 2 has been forded at the Kuelsh road crossing and some hardwood planting may help stabilize this modification (Appendix 9.2).

5.3.4 Tributary W.C. 46-700-50-30-110 *low priority*

This small tributary to Blunt Creek has been diverted at the 24.4 km road crossing of the Blunt 2000 rd. Distribution of resident char and trout was found to be extensive throughout the newly flooded area downstream of the diversion and reinstatement of the stream channel is not an option. However, riparian vegetation is recommended at the entrance to block 93M005-004 to help maintain the stability of this diverted and eroding channel immediatly upstream of the road crossing (Appendix 9.2).

5.3.5 Tributary W.C. 46-700-50-30-115-10 *high priority*

This small "S3" stream to Blunt Creek exhibits extensive erosion along block 93M015-002 especially downstream of the bridge crossing at 21.3 km along the Blunt 2500 rd. Bedload deposition has resulted in the infilling of pools and channel avulsions into the cutblock. The treatment area prescibed is 1.64 hectares along the 20 meter RRZ and focuses on trying to stabilize the stream channel and the mixed planting of the fireguard that borders the creek downstream of the road crossing (Photo. 7 and Appendix 9.2).

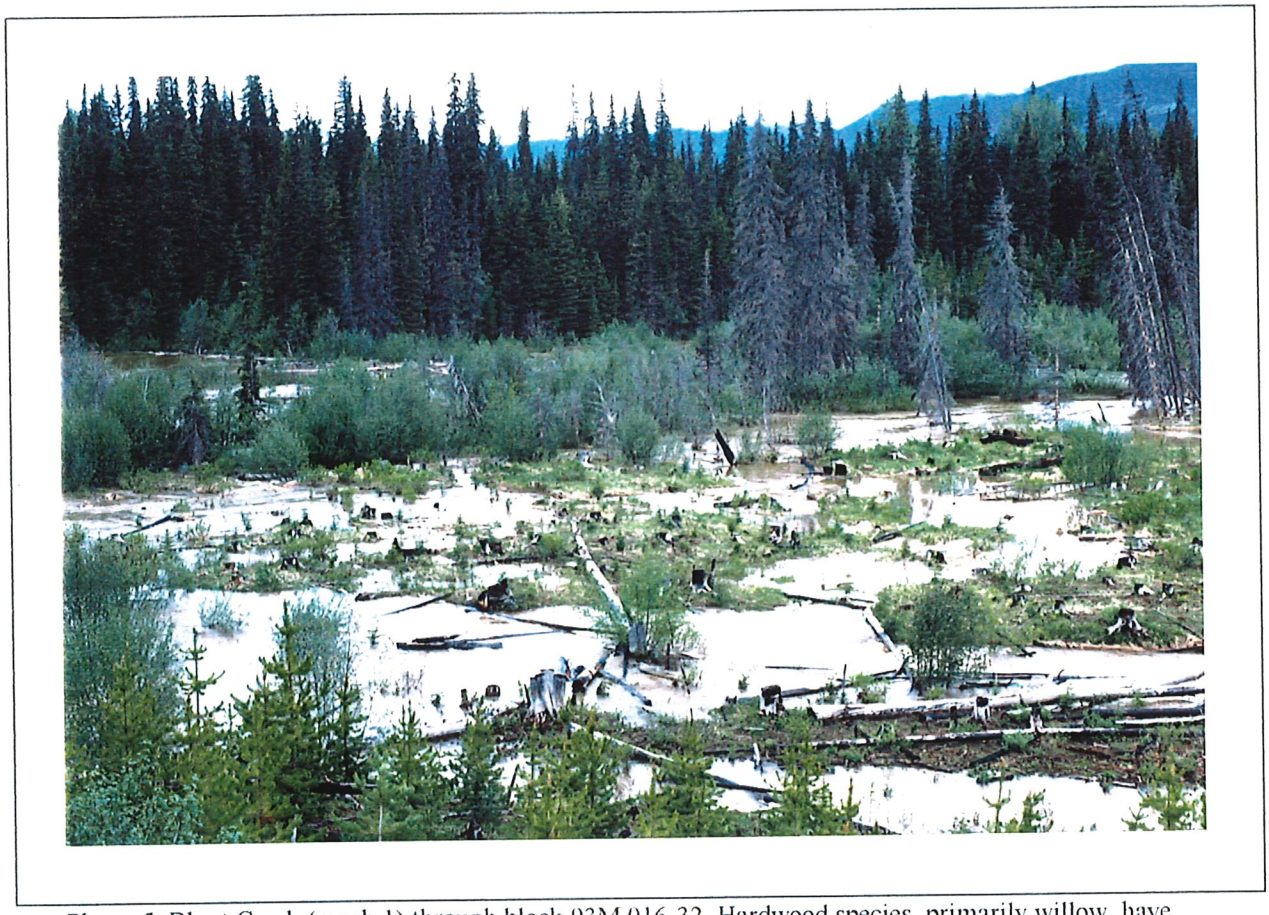


Photo. 5 Blunt Creek (reach 1) through block 93M 016-32. Hardwood species, primarily willow, have been prescribed at this site to help stabilize this eroding floodplain. The channel avulsion into this cutblock continues to degrade off-channel fish habitat that was being utilized by rearing coho salmon during 1995 and 1996 WRP assessments.

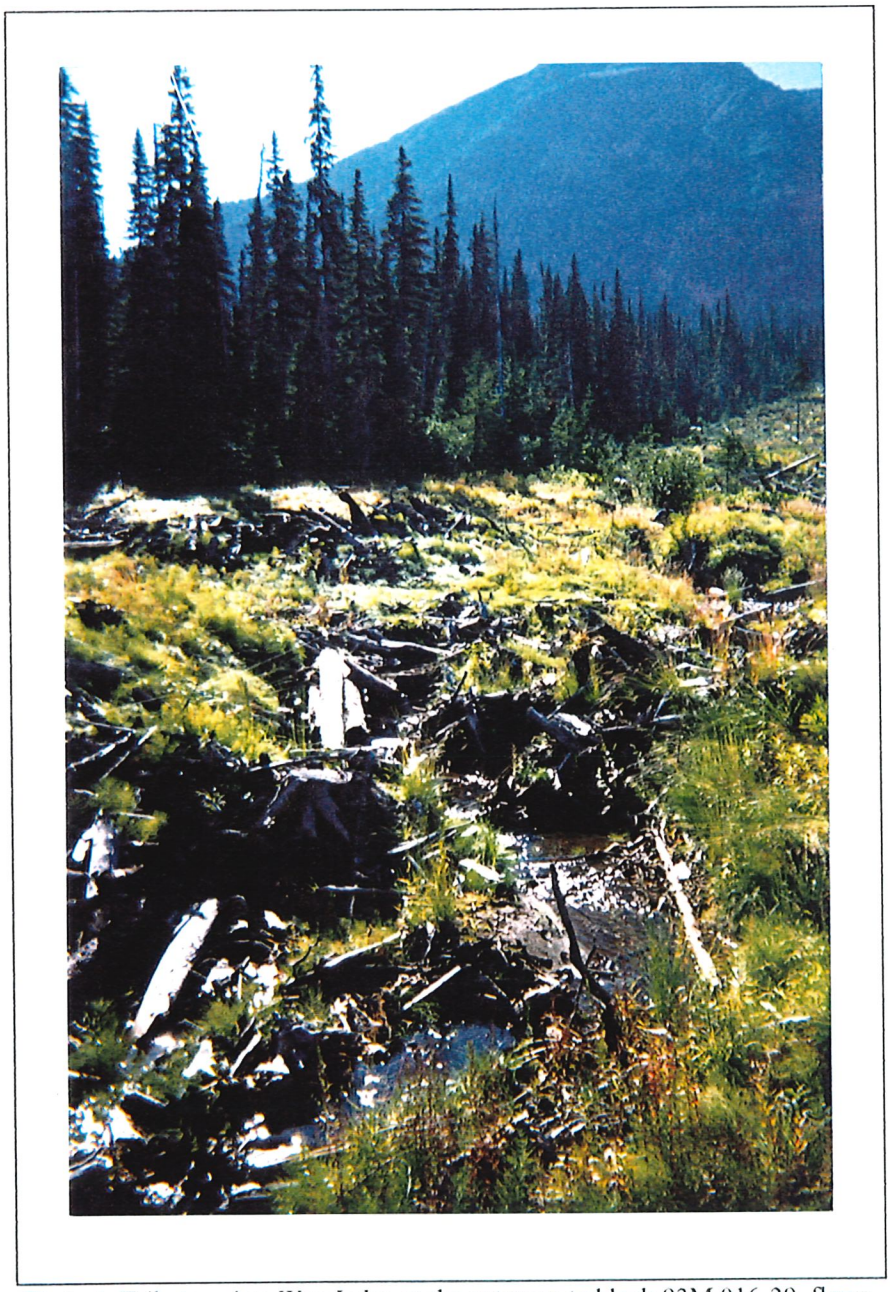


Photo.6 Tributary 1 to Wan Lake, at the entrance to block 93M 016-29, flows through a landing and logging waste that requires riparian vegetation to help maintain the stream channel and provide cover for this fish -bearing creek.

Photo.7 Tributary W.C. 46-700-50-30-115-10 to Blunt Creek along block 93M 015-002. This small stream exhibits extensive erosion, especially downstream of the road crossing at 21.3 km along the Blunt 2500 Rd. The riparian prescription focuses on stabilizing streambank along this tributary.

5.4.0 *Suskwa River Sub-basin*

5.4.1 Skilokis Creek (reach 1) *high priority*

This 1.46 hectare treatment area encompasses reach 1 of Skilokis Creek through block 93M024-18. Erosion, especially upstream of the road crossing at 0.28 km along the Hamblin rd.(see section 4.0). continues to impact fish habitat within reach 1 and this prescription will attempt to provide future channel stability along this"S3" stream. Crop trees are presently being lost to the widening stream channel (Photo. 8) and hardwoods, formerly brushed from this block, should be replaced to hinder erosion at this site.

Downstream of the road crossing a well established alder canopy is interspersed with black cottonwood, western red cedar, western hemlock, white birch and white spruce. The selective release of individual plants within the understorey and a small amount of fill-planting will speed the recovery of this riparian area (Appendix 9.2).

5.4.2 Tributary W.C. 46-700-140 (reach 2) *high priority*

This "S3" stream to the upper Suskwa River exhibited the highest amount of rearing bulltrout per gee-trap during the 1996 trapping program (Suskwa WRP 1996 Fiscal Report). Concerns of a potential channel diversion (Section 4.0)into block 93M035-15 have resulted in riparian prescriptions aimed at addressing channel instability especially 423 meters upstream of the road crossing. Some natural regeneration is established within the RRZ. Mixed planting of hardwoods and conifers over 2.04 hectares is recommended for 1998 (Appendix 9.2).

5.5.0 *Natlan Creek Sub-basin*

5.5.1 Denison Creek (reach 3) *moderate to high priority*

This "S2" stream through block 93M035-11 exhibits erosion problems associated with the former logging of its floodplain. The planting presciptions focus on maintaining channel stability and reestablishing a riparian corridor along this unstable reach of Denison Creek. Two avalanche chutes from Thoen Mountain presently extend to Denison Creek as a result of the harvesting of block 11 (Photo. 9 and Appendix 9.2).

Photo.8 Skilokis Creek (reach 1) within block 93M 024-18. Erosion, especially upstream of the 0.28 km bridge crossing along the Hamblin Rd, continues to deliver bedload and crop trees to the stream channel. Riparian planting of this reach and some selective release of the understorey, downstream of the road crossing, has been prescibed to speed recovery of this harvested reach.

Photo.9 Denison Creek, reach 3; (looking upslope from the stream channel) through block 93M 035-11, exhibits erosion problems associated with the former logging of the streams edge. Mixed planting of areas prone to erosion has been prescribed for 1998.

6.0 Suskwa WRP 1997
Works

6.1.0 *Suskwa Sub-basin*

6.1.1 Skilokis Creek (reach 1)

Skilokis Creek is a small tributary to the lower Suskwa River with a discharge of 0.56 cubic meters per second. It enters the Suskwa R.within reach 5 opposite the Natlan Creek / Suskwa River confluence.

Detailed fish habitat assessments made in 1996 noted a limited amount of large woody debris (LWD) and a lack of pool presence through block 93M024-18 as a result of the complete removal of riparian vegetation during harvesting and subsequent infilling of pools with bedload via bank erosion (Suskwa WRP 1996 Fiscal Report). Fish access is limited to 448 meters of stream within block 18 (reach 1) downstream of a 3 meter waterfall located at the cutblocks southern boundary. This section is utilized by rearing bulltrout (Photo. 1), Dolly Varden and rainbow/steelhead trout, however, the latter species was not found during pre-work sampling in 1997.

Three prospective fish habitat restoration sites were initially chosen downstream of the bridge crossing located at 0.28 km along the Hamblin main road. Due to the instability of the stream channel and gradients (ranging from 4 to 6%) at the upward end of rehabilitation criteria, as outlined within Watershed Restoration Technical Circular No. 9, the initial prescription for LWD placement was revised with the assistance of a geomorphologist to create pool habitat using boulders at two locations (sites A and D) within reach 1 (Section 4.2.1, Figure 1).

The two sites chosen are located 23 meters and 61 meters downstream of the Hamblin rd. bridge site. Forty boulders, ranging in size from 0.5 to 1.75 of a meter in diameter, were initially collected using a small John Deere front end loader /backhoe in 7.5 hours and were divided between the two work sites.

A trench, approximately 0.5m wide and 0.5m below the existing substrate, was then excavated perpendicular to the existing stream channel at each of two sites using a EX 200 Hitachi hoe. The excavated trenches were filled with six of the largest stones that were placed on end at each site and backfilled with the next largest stones. Riffle templates from the Oulette River restoration project (WRP Technical Circular No. 9) were used as examples during construction due to similarities in gradient and stream channel.

The existing habitat prior to modification (primarily riffles) was sampled using an electroshocker and a 2-pass system. Two 20 meter sections of stream were sampled at proposed habitat improvement sites. A fry density of 0.34 fish (char) per cubic meter was noted over the combined 40 meters.

The two rock lines at sites "A" (Photos 2 and 3) and "D" (Photos 4 and 5) were installed within 4 hours. A total of 9.5 cubic meters of pool habitat was created between the two chosen sites. These sites should be sampled for post-treatment fry densities and monitored for structural integrity in 1998.

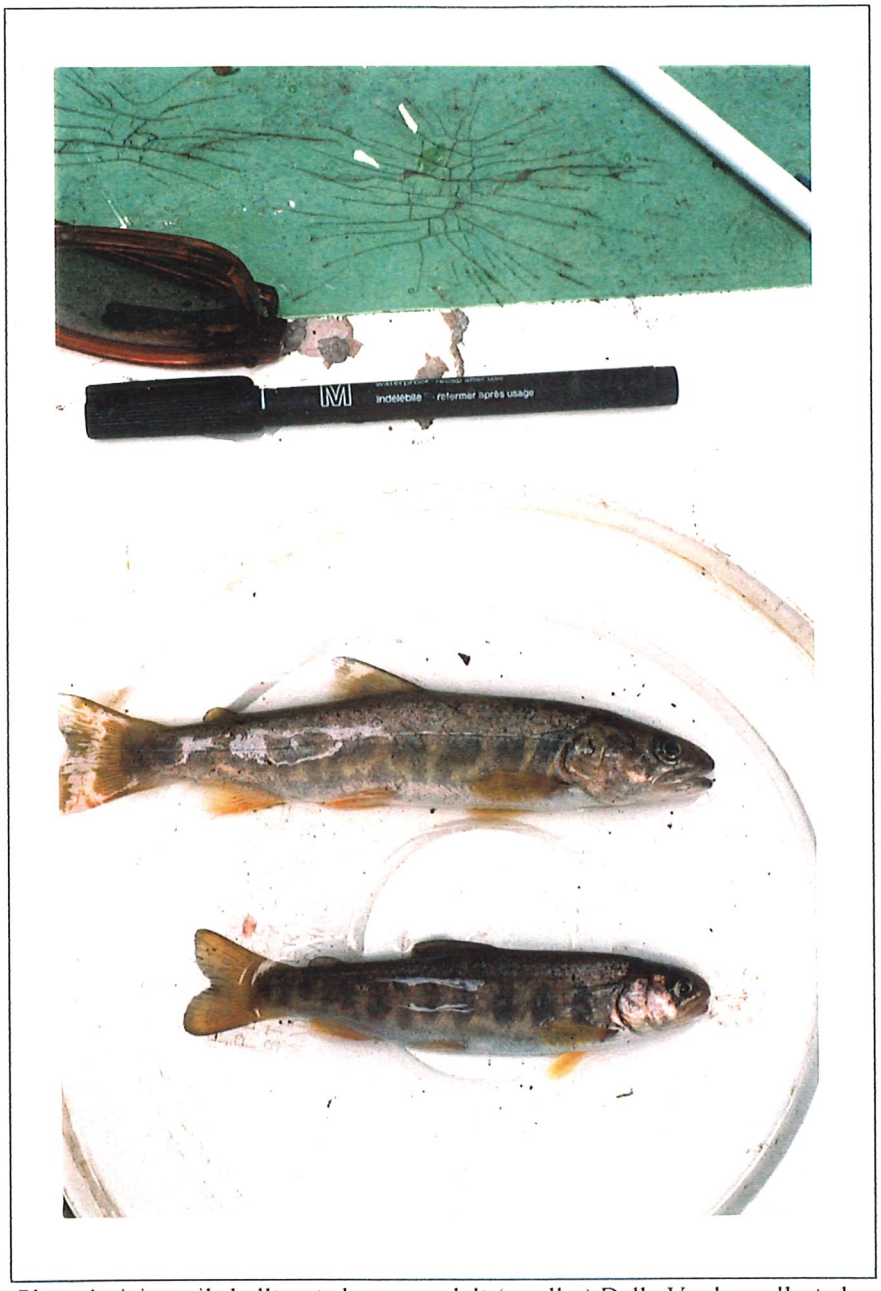
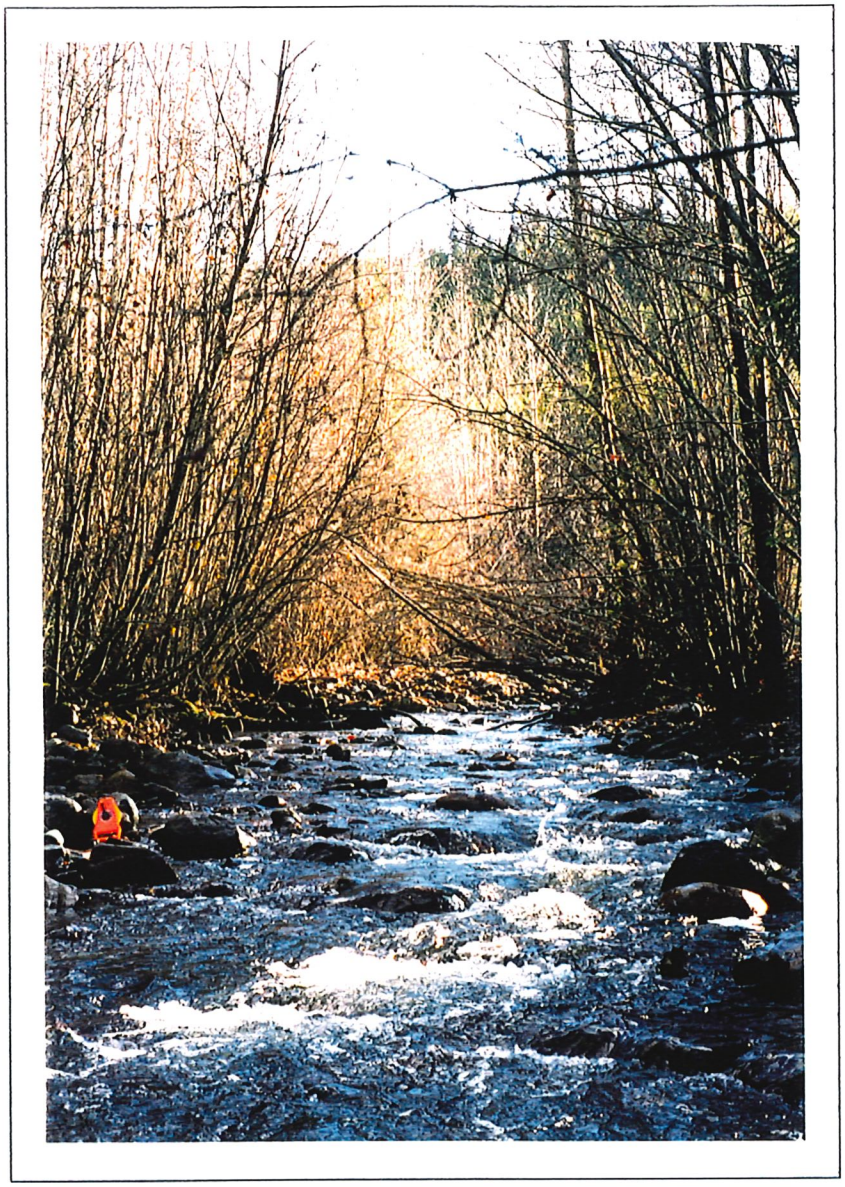


Photo.1 A juvenile bulltrout above an adult (smaller) Dolly Varden collected, during pre-treatment sampling of site "A", within reach 1 of Skilokis Creek.



Photos 2 and 3. Skilokis Creek fish habitat rehabilitation site "A" before treatment (top) and after treatment (bottom). The two pools created on either side of this rock line (lower photo) increased pool habitat, at this site, by 5.2 cubic meters. Post-treatment fry densities and habitat measurements should be monitored in 1998 after spring runoff.

Photos 4 and 5. Skilokis Creek fish habitat rehabilitation site "D" before treatment (top) and after treatment (bottom). The two pools created on either side of this rock line (lower photo) increased pool habitat, at this site, by 4.3 cubic meters. Post-treatment fry densities and habitat measurements should be monitored in 1998 after spring runoff.

6.1.2 Natlan "A" Road Crossings (W.C. 46-700-44, 45 and 48) *deferred*

The Natlan "A" road is a non-haul road that was developed in the 1970's and 80's for mining exploration and to access timber along the north side of the Suskwa River near the Harold Price Creek confluence. This road is presently used by residents of the Suskwa Valley and road work, prescribed within the Suskwa WRP 1996 Fiscal Report, has been deferred pending road liability issues. It is expected that these three road crossings will be addressed within the 1998 field season. All of these sites have long-term water quality concerns for salmonid rearing areas downstream of this road. Fish distrbution upstream of the Natlan "A" road is limited to W.C 46-700-48 (Jumbo Creek).

6.1.3 Tributary W.C. 46-700-137 (road crossing) *deferred*

This small tributary to the Upper Suskwa River received a detailed fish habitat assessment in 1996 (Suskwa WRP 1996 Fiscal Report). Despite fish access being limited to the lower reaches adjacent the Suskwa River a prescription was developed to remove bridge stringers and pullback abutment material from the stream channel at this poorly deactivated stream crossing 0.05 km along the Netalzul FSR.

Further assessment of the Netalzul road was conducted 1in 1997 and a subsquent prescription was developed to address infilled cross-ditches throughout the length of this road (Section 3.2). It is hoped that the Roads, Hillslope and Gullies component of the Suskwa WRP may address both these prescriptions together in 1998.

6.1.4 Tributary W.C. 46-700-140 (reach 2)

This site, located 423 meters upstream of the bridge crossing at 0 km along the Grizzly FSR, was modified to in the hopes of preventing a channel diversion into block 93M035-15 (see Survey and Design Section 4.0). The survey and design of this site was accomplished with the help of a geomorphologist and revisions to the initial prescription (Suskwa WRP 1996 Fiscal Report) resulted from these visits.

Two log deflectors were installed at an outside meander adjacent block 15 and secured with rebar (Photo 5 Section 4.0). A large log, channeling water toward the cutblock was also removed from the stream channel in the hopes of returning flows to an older (dry) channel along this streams western bank (Photo. 6 Section 4.0). Riparian restoration of this site is scheduled for spring /summer 1998 and will help maintain channel stability once developed at this harvested location. This stream exhibited the highest amount of bulltrout per gee-trap of all sites sampled in 1996 (Suskwa WRP 1996/97 Fiscal Report).

6.2.0 *Natlan Creek Sub-basin*

6.2.1 Natlan Creek (reach 1)

This groundwater channel extends for 200 meters parallel to the Suskwa FSR within lot 555A and enters Natlan Creek (reach 1) immediatly upstream of the FSR bridge at 15.1 km. A lack of pool habitat and large woody debris (LWD) was noted during 1996 field assessments aswell as an impassable structure (89m upstream of the channel outlet) installed in 1990 as part of a Salmonid Enhancement Programs (SEP) attempt to rear hatchery produced coho at this site (Photo. 6). Low oxygen levels and funding cuts led to SEP abandoning this project.

Prior to treatment a single pass was made with an electroshocker to determine fry densities before instream work. High turbidity after the initial pass prevented a second shocking. Two steelhead /rainbow trout fry were sampled in the lower section of the groundwater channel and two adult Dolly Varden were shocked immediatly below the impasssable SEP structure. The lower sectioned-off area exhibited a fry density of 0.34 fish (Rb trout) per cubic meter.

As prescribed within the Suskwa WRP 1996 Fiscal Report the SEP structure was removed, adding 112 meters of available rearing habitat to the existing channel, and 20 pieces of LWD were distributed over the intial 89 meters of channel for cover. No attempt was made to secure these pieces as discharge within the groundwater channel is nominal, does not fluctuate or provide scouring opportunities and is not threatened by highwater events.

In addition to these modifications three pools were excavated using a 590 John Deere hoe. These sites were created 40m, 46m and 68 meters upstream of the groundwater outlet to Natlan Creek (Photos 7 and 8). These three excavations increased pool habitat by 15.1 cubic meters. Post treatment monitoring, to determine the extent of utilization by salmonids, is recommended for 1998.

6.2.2 Natlan Creek (reach 3)

This bedrock constriction and debris jam (Photos 9 and 10) appeared to be the limiting factor for distribution of anadromous and resident fish to upper reaches within Natlan Creek during 1996 detailed fish habitat assessments (Suskwa WRP 1996 Fiscal Report). Historical fish data (SISS 1991)and trapping information obtained during 1995/ 96 found this site to be the upstream limit of distribution for bulltrout, rainbow trout /steelhead and mountain whitefish.

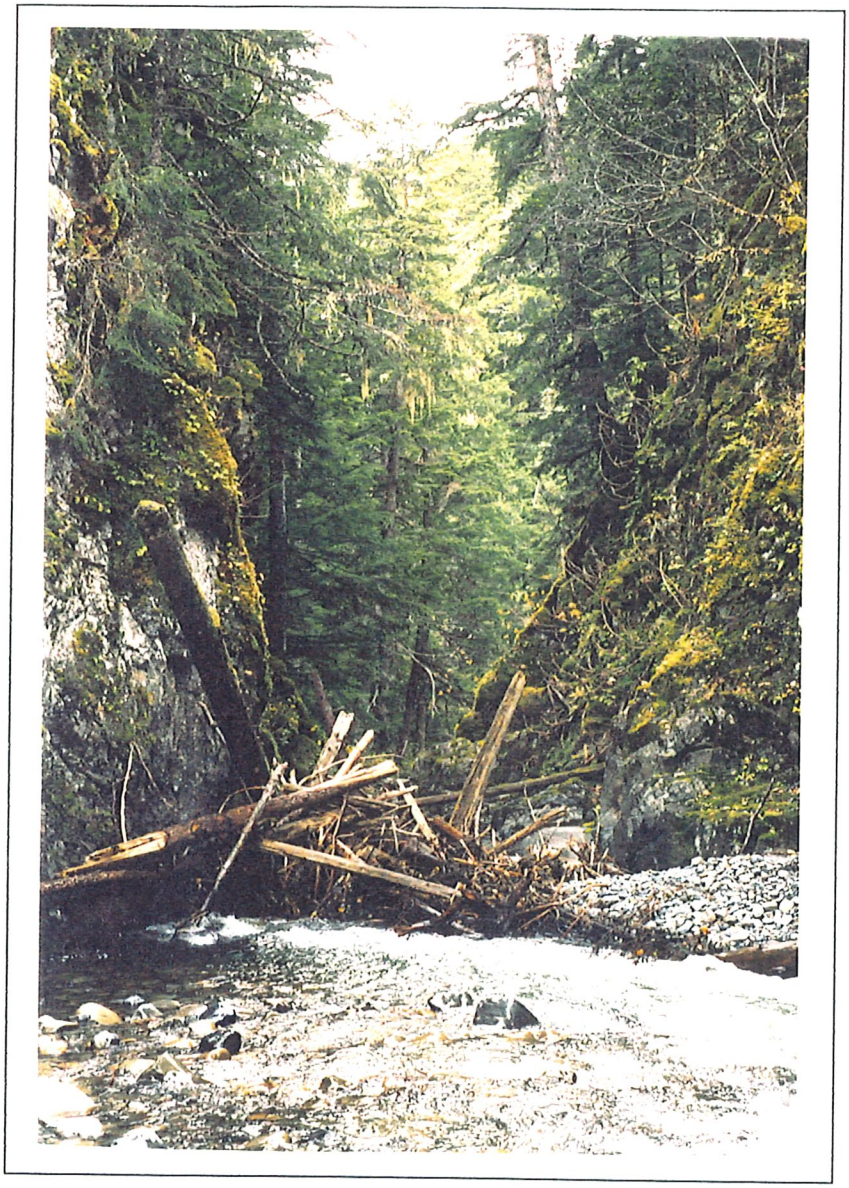
No coho salmon have been found anywhere within the Natlan Creek drainages during the last three years of gee-trapping and electroshocking despite fisheries data (SISS 1991) indicating their historical presence. Fish distribution upstream of this barrier was limited to resident Dolly Varden (SWRP 1996 Fiscal Report).

Prior to treatment in 1997 this site was visited with a geomorphologist to determine potential impacts to the stream channel as a result of the prescribed removal of this obstruction (Section 4.2.3). Concern regarding the release of a sediment wedge immediatly upstream of the logjam, noted during the 1996 field season, was dispelled after this visit as this sediment wedge had been flushed through the logjam since the 1996 assessment. It was therefore agreed that partial removal of this logjam be attempted to facilitate fish access upstream and the remaining debris be left for dispersal via highwater events.

Photo 6. This structure was installed in 1990, within this groundwater channel, as part of the Salmonid Enhancement Programs (SEP) attempt to rear coho at this site. This project was subsequently abandoned and this structure was removed as part of 1997 WRP works. As a result, an additional 112 meters of fish habitat was made available within this groundwater site.

Photos 7 and 8. This groundwater channel enters Natlan Creek, in reach 1, immediatly upstream of the Natlan Cr. bridge at 15.1 km along the Suskwa FSR.

This site was enhanced by adding LWD (at left, background) and then excavating pools (below, foreground) within the initial 90 meters of the channel. Monitoring of post-treatment fry densities is recommended for 1998.



Photos 9 and 10. This bedrock constiction and logjam appeared to be the limiting factor for fish (Rb, Bt and Mw) distribution to the upper reaches of Natlan Creek after assessments in 1995/96 (at left). This obstruction was partially removed (lower photo) to accomodate fish passage upstream. Monitoring of this site and fish distributution upstream, after trout fry have emerged, is recommended for 1998.

The partial removal of this logjam was accomplished over two days with a 2-man crew using chainsaws, a pry-bar and "come-alongs" (Photo. 10, previous page). It is estimated that more than 20 kilometers of viable fish habitat has been made accessible to anadromous and resident species as a result of the breeching of this obstruction.

This site was viewed as a mitigative measure allowing access to viable fish habitat by fish species impacted by forest harvesting and road development elsewhere in the watershed. This site should be monitored for debris accumulation after spring highwater and fish distribution upstream, preferably in late summer, after trout fry have emerged in 1998.

6.2.3 Tributary W.C. 46-700-30-130 (road crossing) *deferred*

This road crossing, located at 34 km along the Suskwa FSR (Photo. 11), was assessed in 1996 and noted to be a hindrance to fish migration. A jump pool was subsequently prescribed for development in 1997 (Suskwa WRP 1996 Fiscal Report). After further assessment of the pipe arch culvert and eroding sidecast material in 1997 it was determined that a jump pool may exacerbate erosion of the road prism and would not ensure fish passage.

This culvert has therefore been prescribed to be reinstalled within the 1998 Suskwa WRP budget. An allotment of $20,000 has been budgeted for 1998 work. This should be more than enough to complete the work providing that this multi-plate pipe arch culvert is not damaged during excavation and/or requires replacement.

6.2.4 Denison Creek (reach 1) *revised*

During 1996 detailed fish habitat assessments a slope failure below the Suskwa FSR into Denison Creek and subsequent debris jam was noted as an impediment to fish passage. A prescription was developed to selectively remove a portion of this obstruction (Suskwa WRP 1996/97 Fiscal Report).

Prior to instream work a survey and design was conducted with the assistance of a geomorphologist (Section 4.2.4). This site, when visited in 1997, was clear of slope material and no longer presented a problem to fish passage and hence did not require instream work.

During the 1997 visit two (0+) rainbow trout /steelhead fry were dip-netted at this site. Prior to this visit only Dolly Varden and bulltrout were noted to be present after two years of gee-trapping in this area.

Photo 11. This road crossing, located at 34 km along the Suskwa FSR, was noted as an obstruction to fish passage during 1996 assessments. The initial prescription to establish a jump pool here was revised due to the threat of exacerbating erosion and unassured passage. This site has been budgeted for replacement within 1998 fiscal works.

6.3.0 *Harold Price Creek Sub-basin*

6.3.1 Camp Lake Tributary (road crossing)

The road crossing (53.6 km Upper Fulton FSR) through this small tributary to Camp Lake was noted, during 1996, as contributing fine sediment to Camp Lake and disturbing a known spawning site for cutthroat trout. A prescription was developed at that time to eliminate vehicle traffic from the stream channel accessing block 93M025x2 (Suskwa WRP 1996 Fiscal Report).

During 1997 a detailed fish habitat assessment was made of this tributary (Section 3.5) and negotiations between the Ministry of Forests, the forest licensee and the guide-outfitter at Camp Lake were made to fulfill prescription objectives at the road crossing.

This road crossing has been made impassable to large vehicle traffic by the creation of a berm constructed on the south side of the stream channel. A footbridge large enough to accommodate all terrain vehicles (ATV's) was installed to allow access to Camp Lake, block 93M025x2 and the guide-outfitters camp. A notice has also been posted to identify the fisheries values present at this site. This area was grass-seeded after work was completed (Photo. 5 Section 3.5).

6.3.2 Tributary W.C. 46-700-50-14-15 (road crossing)

These two road crossings located within block openings 93M026-005 and-006, at 55.5 km (branch 53.1) Upper Fulton FSR were forded to ensure fish access past the original perched and damaged culverts (Photos. 12). These sites were excavated within one day using a Hitachi 200 mid-sized hoe and grass-seeded after excavation. These crossings should be monitored for slope stability during the 1998 field season.

6.3.3 Tributary W.C. 46-700-50-27 (road crossing) *deferred*

It was noted, during 1996 detailed fish habitat assessments, that the wooden box culvert at this road crossing (39.6 km Upper Fulton FSR) was collapsing, however, gee-trapping of this site in 1996 and 1997 failed to detect any fish. A series of (1 to 2 meter) beaver dams downstream of the road crossing appear to be the limiting factor for fish distribution. This site should be noted for future replacement due to a potential washout situation but was deferred as a lower fisheries priority during 1997 instream works.

6.3.4 Tributary W.C. 46-700-50-40 (road crossing)

This small tributary to Harold Price Creek was obstructed by a collapsed corduroy road crossing at 0.9 km along the Harold Price (H.P.) East Main Rd. (from 37.5 km branch of Upper Fulton FSR) at block opening 93M016-12. This crossing was forded using a mid-sized Hitachi 200 hoe in one hour (Photo. 13). The site was then grass-seeded. Numerous (0+ and 1+) cutthroat trout fry were noted within this stream during 1996 detailed fish habitat assessments (Suskwa WRP 1996 Fiscal Report).

6.3.5 Tributary W.C. 46-700-50-45 (road crossing)

This small tributary through block opening 93M016-10 was modified at two sites using a Hitachi 200 mid-sized hoe and hand tools. The first site ,a damaged metal culvert, located 1.8 km along the H.P. East Main Rd. from the 37.5 km branch of the Upper Fulton FSR was forded using heavy equipment. The second site was a collapsed corduroy crossing located within block 10 and was opened for fish access using hand tools so as to limit site disturbance within the planted cutblock (Photo. 14).

Photo 12. This first of two road crossings was excavated along trib.W.C. 46-700-50-14-15 to ensure resident fish passage through blocks 93M 005 and 006. This crossing was grass-seeded after modification.

Photo 13. This ford has replaced a decomposed corduroy crossing previously obstructing this fish-bearing tributary (W.C. 46-700-50-40) to Harold Price Creek. This site was grass-seeded after excavation.

Photo 14. W.C.46-700-50-45.This ford has replaced a damaged culvert for fish access in block 93M16-10.

6.3.6 Luhk Creek (reach 2) *revised*

During 1996 detailed fish habitat assessments a potential channel diversion was observed at the upper northeast boundary of block opening 93M016-19. It was prescribed that log deflectors be installed to retain flows within their original channel (Suskwa WRP 1996 Fiscal Report), however, during a survey and design prior to commencing instream work in 1997 it was discovered that the diversion had already occured (Section 4.2.5).

The new channel extends throughout the entire length of the forest opening parallel to Luhk Creek and hence instream work was unnecessary. A riparian prescription assessment is recommended for this newly flooded area (Photo.6 Section 3.6). Stream discharge through this new channel at the time of assessment was 0.1 cubic meters per second.

6.3.7 Tributary W.C. 46-700-50-85 (road crossing)

This road crossing (located 3.2 km along the H.P. East Main Rd. from the Torkelson Rd. branch) has been forded to ensure resident fish passage upstream of a previously collapsed wooden box culvert noted during 1996 assessments (Suskwa WRP1996 Fiscal Report). Excavation was completed in two hours using a Hitachi 200 mid-sized hoe and the site was grass-seeded after modification (Photo. 15).

6.3.8 Tributary W.C. 46-700-50 -115-10 (road crossings)

These 2 decomposed corduroy road crossings were excavated and forded to ensure access to resident cutthroat trout upstream of these sites within forest openings 93M017-16 and 24. These sites are located on branches A and D within these respective blocks. Excavation required a total of four hours with a Hitachi 200 mid-size hoe. Both crossings were grass-seeded after excavation and should be visited in 1998 to monitor slope stability and structural integrity (

Photo 15. W.C. 46-700-50-85. The collapsed wooden box culvert at this road crossing was removed to ensure resident fish access upstream along block 93M 017-31. This site was grass-seeded after excavation.

Photo 16. W.C.46-700-50-115-10. One of 2 sites forded to ensure fish access in blk. 93M17-16 & 24.

6.4.0 *Blunt Creek Sub-basin*

6.4.1 Wan Lake Tributary 1 (road crossing)

This road crossing, located 43.1 km along the Kuelsh Rd., was forded (Photo. 17) to restore fish access from Wan Lake and ditchblocks were reinstated to ensure discharge to respective channels. Excessive water draining to this ditchline, as a result of a natural diversion of tributary W.C. 46-700-50-30-35 on Goat Mountain, had resulted in the failure of ditchblocks and subsequent dewatering of of this creek downstream of the Kuelsh Rd. crossing (Suskwa WRP 1996 Fiscal Report).

Prior to the fording of this road crossing and the reinstatement of ditchblocks a fry salvage was conducted of adjacent drainages using an electroshocker. This site was grass-seeded after treatment and should be monitored in 1998 for structural integrity especially after spring runoff (Photo. 7 Section 3.7).

6.4.2 Wan Lake Tributary 2 (road crossing)

This small tributary and road crossing at 42.6 km along the Kuelsh Rd. was diverted during forest harvesting and road development in 1992. Reinstatement of the original channel was achieved by installing a ford at this crossing (Photo 18).

A fry salvage of the diverted channel, using an electroshocker, was made prior to reinstatement. No fish were found probably due to the fact that flows go sub-surface prior to reaching Wan Lake. Monitoring of this site is recommended for 1998. This site was grass-seeded after excavation. Remedial work at tributary 4 to Wan Lake was deferred pending Forest Practices Code decisions.

6.4.3 Tributary W.C. 46-700-50-30-35 (road crossing)

This streams channel changed as a result of a natural diversion on Goat Mountain. Presently discharge from this stream enters the southern Kuelsh Rd. ditchline within block 93M016-28 (Photo 9 Section 3.8).

One failed road crossing at the entrance to the cutblock was forded during 1997 works. It can be expected that at least one more ford will be required to ensure water supply to fish-bearing channels within block 28. Heavy snowfall at the time of assessment made fish management decisions difficult to determine in 1997.

Monitoring of this active ditchline and further assessment is recommended prior to road work in 1998. This site was grass-seeded after excavation and the metal culvert was crushed and buried.

6.4.4 Tributary W.C. 46-700-50-30-85 *deferred*

This small tributary bordering block 93M015-12 at 28 km along the Blunt 2700 Rd. was deferred due to timing constraints and its lower priority compared to other 1997 works.

6.4.5 Tributary W.C. 46-700-50-30-110 (road crossing) *revised*

The 1996 prescription for this tributaries reinstatement has been revised due to the extent of fish distribution downstream of the channel diversion at 24.4 km Blunt 2000 Rd. crossing (Section 3.9).

Photos 17 and 18. Tributaries 1 (at left) and 2 (lower photo) to Wan Lake. These stream channels were both dry, prior to treatment, downstream of the Kuelsh Rd. as a result of channel diversions at the road crossings (43.1 km and 42.6 km respectively). Both crossings were forded and ditchblocks were reinforced after a fry salvage of adjacent drainages. These channel reinstatements should be monitored in 1998 to assess the effects of spring runoff to Kuelsh Rd. ditchlines from the natural diversion of trib. W.C. 46-700-50-30-35 on Goat Mountain. Both road crossings were grass-seeded after excavation.

6.4.6 Tributary W.C. 46-700-50-30-115-10

During 1996 assessments two debris jams were noted 259m and 357m downstream of the road crossing at 21.3 km Blunt 2500 Rd. in block 93M015-002. Both appeared to be diverting seasonal flows into the cutblock (Suskwa WRP 1996 Fiscal Report).

The lower accumulation had been dipersed by the time instream works began in Sept. 1997, however, the upper debris jam (at 259m) remained intact. As prescibed within the 1996 report this logjam was selectively modified to discourage channel avulsion (Photos. 19 and 20). Erosion of the streambank adjacent block 2 , especially downstream of the road crossing, can be expected to continue until riparian vegetation has been reestablished (Section 5.0).

Photo 19. Tributary W.C. 46-700-50-30-115-10 (pre-treatment). This debris jam, 259 meters downstream of the bridge site at 21.3 km Blunt 2500 Rd., appeared to be diverting seasonal flows to block 93M 015-002 and was selectively removed with chainsaw and hand tools (lower photo).

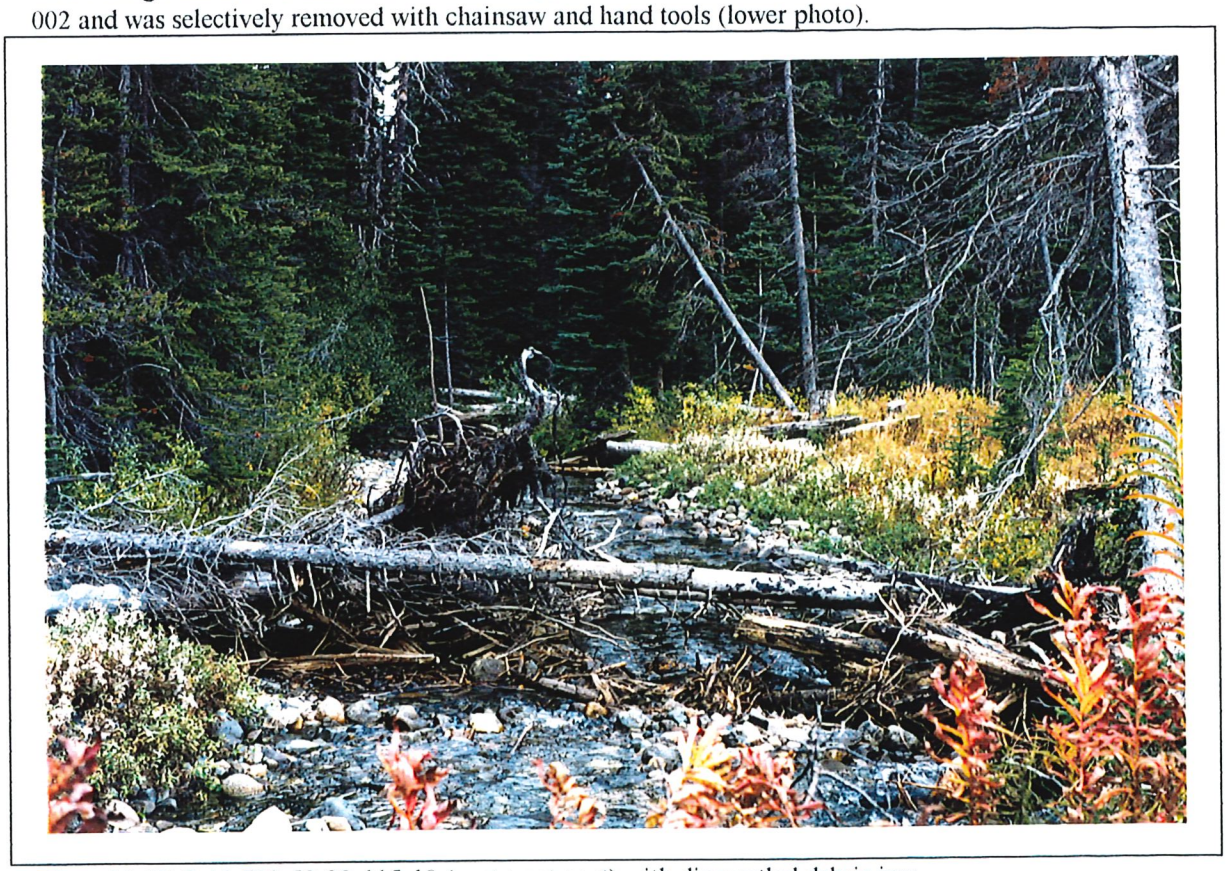


Photo 20. W.C.46-700-50-30-115-10 (post-treatment) with dismantled debris jam.

7.0 Suskwa WRP 1997 Recommendations

7.0 Recommendations

The Suskwa Restoration Society is presently the lead proponent for the Suskwa Watershed Restoration Program (WRP). We are a non-profit society interested in the stewardship of aquatic and terrestrial resources within our watershed. However, without a forest licensee as proponent for our WRP, it is currently difficult to secure funding for long- term (i.e. 5 year) goals. Annual proposals must be submitted and approved prior to development and administration comprises a large proportion of restoration activities.

Due to the extent of impacts and subsequent prescriptions that have evolved within the Suskwa WRP to date, it is essential that priorities be established to address imminent concerns and monitor completed work within the constraints of annual budgets and limited field seasons. These priorities are sometimes subject to change as environmental situations arise (i.e. landslides). However, an objective approach with long-term goals in mind is by far the best course for reclamation of aquatic values impacted by forest harvesting.

Future restoration work within the Suskwa Watershed should focus on restoring and maintaining fish-access at problem road crossings, reestablishing riparian corridors along harvested stream channels, reducing erosion and sedimentation where possible, monitoring accomplished works, assessing outstanding unaddressed drainages (i.e. Torkelson Lake tributaries) and providing mitigative and /or rehabilitative opportunities for fish habitat.

The following tables list priority projects for 1998 along with site locations and approximate costs.

7.1 Table 1 Kispiox District Priority Recommendations for the Suskwa WRP 1998

Stream (watershed code)	Road Access	Map / Block Numbers	Work Description	Projected Costs *
W.C.46-700-30-130 (Natlan sub-basin)	34 km Suskwa FSR	93M 044-001	Impassable pipe arch culvert on Suskwa mainline requires modification to ensure fish-access to 3+ km of viable habitat.	$20,000
Skilokis Creek, Natlan Creek and trib. 46-700-140	0.28 km Hamblin Rd., Suskwa FSR, and 0 km Grizzly Main	93M 024 and 034	Post- treatment assessments for structural integrity and fish distribution at Skilokis and Natlan Creek.	$ 6,000
Iltzul creek, Denison Creek and Natlan Creek	West Iltzul, Parker Main and Suskwa FSR respectively	93M 034	Geomorphic assessment of 16 failures during spring runoff (as prescribed within Level 1 and Level 2 reports)	$ 6,500
Skilokis Creek, Denison Creek and trib.46-700-140	0.28 km Hamblin Rd., 6 km Parker Main and 0 km Grizzly Rd respectively	93M 034	Riparian planting as prescribed within (section 5.0) of the 1997 report	$ 5,000
Jumbo Creek (W.C. 46-700-48)	Via Thoen Main	93M 35-001 and -004	Reinstatement of stream channels and deactivations within blocks 1&4 (see section 3.0). Riparian assessment.	$ 10,000
Netalzul Mountain tributaries	entire Netalzul forest road	93M 035	Semi-permanent deactivation for 38 infilled cross-ditches to block 93M 035-16 (see section 3.0)	$ 4,500
W.C.46-700-30-144	Branch A @ 35km Suskwa FSR	93M 044	Deactivation of collapsed bridge (see 1996 Level 2 report)	$ 4,000
Jumbo Creek and trib. W.C. 46-700-44	8.4 km and 6.4 km Natlan A road respectively	93M 025	Bridge repacement at 2 crossings pending liability issues.	$ 29,000
Total				**$ 85,000**

* These figures do not include overhead and administration costs

7.2 Table 2 Bulkley District Priority Recommendations for the Suskwa WRP 1998

Stream (watershed code)	Road Access	Map /Block Numbers	Work Description	Projected Costs *
Blunt Creek (reach 1)	36 km Upper Fulton FSR	93M 016-32	Channel stabilization and stream complexing within the logged floodplain of block 93M016-32	$ 9,000
Torkelson Lake tributaries	Nilkitkwa FSR	93M 007 and 017	Level 1 assessments at 12 sites within cutblocks and at road crossings.	$ 5,750
Blunt Creek and Harold Price Creek sub-basins	Upper Fulton FSR	93M 005, 006, 015, 016, 025	Monitoring of 1997 works for structural integrity (see section 6.0 of this report)	$ 5,600
W.C. 46-700-50-30-35 to Wan Lake	44 km Kuelsh road	93M 016-28	Assessment, fry salvage, channel reinstatement and deactivation (see section 3.0 of this report)	$ 6,950
Harold Price Creek reaches 9 and 10 and Blunt trib. W.C. 46-700-50-30-115-10	Upper Fulton FSR and Blunt 2500 road respectively	93M006 and 93M 015-2 respectively	Riparian pilot project (see section 5.0 of this report)	$ 5,000
W.C. 46-700-50-30-110 to Blunt Creek	24.4 km Blunt 2000 road	93M 005-4	Fording of spur road at entrance to block 4 to ensure fish passage (see 1996 report)	$ 1,200
Maish Creek trib. W.C. 46-700-50-20-60	49.3 km Upper Fulton FSR	93M 026	Impassable "perched" culvert replacement	$12,000
Total				**$ 45,500**

* These figures do not include overhead and administration costs

8.0 References

8.0 References

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9.0 Suskwa WRP 1997
Appendices

Appendix 9.1
Data Table (Form 4)

Level 1 field assessment - habitat survey data form

Forest District: Lillooet

NTS map sheet: (1:20,000) 93M026

Survey Date: 26 / 09 / 97 (d / m / y)

Watershed: Sustut WC 46-700-50

Weather: high overcast, drizzle

Survey Crew: MJ

Sub-Basin: Harold Price Creek

Discharge ($m^3 \cdot s^{-1}$): 0.022 m^3/s

Subsampling Fractions: 1in3 / 1in3 / 1in3 / N/A / N/A (R / P / G / C / O)

	Reach Number	Distance (m)	Habitat Unit Type	Habitat Unit Cat	Length (m)	Gradient (%)	Mean Depth (m)	Mean Width Bankfull (m)	Mean Width Wetted (m)	Pools Only Max. Depth (m)	Pools Only Crest (m)	Pools Only Residual (m)	Pools Only Pool Type	Bed Material Type Dom.	Bed Material Type Sub-Dom.	Bed Material Type Spawning Gravel?
1	1	0-45	1	G	45	1	.75	10	5					S	C	N
2	1	45-47	1	R	2	1	.13	8	2					S	C	N
3	1	47-50	1	P	3	1	.40	2.2	2	.45	.20	.25	D	S	C	N
4	1	50-64	1	G	14	1	.35	2.6	2.5					S	C	N
5	1	64-65	1	P	1	1	.3	2.2	2	.4	.17	.23	D	S	C	N
6	1	65-75	1	G	10	1	.17	2.2	2					S	C	N
7	1	75-77	1	P	2	1	.28	2.2	2	.35	.11	.24	D	S	C	N
8	1	77-89	1	R	13	1	.11	2.4	2					G	C	R L
9	1	89-94	1	G	5	1	.1	2.2	1.75					S	C/B	R L
10	1	94-94.5	1	P	.5	1	.14	2.2	2	.3	.1	.2	D	S	C/B	N

xing 7

	Total LWD Tally	Functional LWD Tally 10 - 20 cm	Functional LWD Tally 20 - 50 cm	Functional LWD Tally > 50 cm	Cover Cover Type	Cover %	Cover Cover Type	Cover %	Offchannel Habitat Type	Offchannel Habitat Access	Offchannel Habitat Length (m)	Disturbance Indicators	Riparian Vegetation Type	Riparian Vegetation Structure	Riparian Vegetation Canopy Closure	Barriers	Comments
1	25	19	2	4	OV, LWD	40			N/A				C	MF	3	N	
2	17	10	3	4	OV, SWD	40							C	MF	3	N	
3	8	0	5	3	OV, DP	40							C	MF	3	N	
4	9	2	5	2	OV, B	40						JM	C	MF	4	N	2x4's
5	11	6	1	4	OV, DP	40							C	MF	4	N	
6	10	7	0	3	IV, SWD	40							C	MF	4	N	
7	16	10	1	5	OV, LWD	25							C	MF	4	N	
8	6	3	1	2	OV, IV	20							C	MF	3	N	
9	4	2	6	1	OV, SWD	25							C	MF	4	N	
10	7	5	0	2	OV, SWD	25						EB	C	MF	3	N	FSR access

Appendix 9.2
Riparian Prescription Forms

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL ( ) AMENDMENT	DATE Y / M / D 98/03/16

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Lower Harold Price Sub-basin	

OPENING NO.	LOCATION	
93M016-16	H.P reach 6a (SW bank)	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Bulkley	mosaic # 12 and 13 WRP 1995/96	N 6117550, E 634930

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y / M / D
	7.42 ha	Geoff Watling, Dave Silver	97/10/20

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

IMPACT DESCRIPTION

Harvesting has removed most of the riparian cover along 5300 m of the Harold Price creek on this block (93M-16-16) leaving large stretches open to the erosional impact of the creek. The creek banks are tumbling into the Harold Price at numerous spots along these stretches.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

(LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit:

Main management objectives include the stabilization of the streambanks where harvesting has occured right to the edge of the creek banks. These banks are being eroded into the Harold Price Creek. Shade and SOD are expected from the Salix and Alnus and Act, with the Act giving an early LOD component. These species are also invaluable to bank stabilization. The conifer compnent, Sx and Bl will provide future LOD, SOD and shading.

INSTREAM / INCHANNEL WORKS

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

Introduction of riparian vegetation species will, with time develop a complex of vegetation stretches that will perform nicely as a wildlife corridor along this stretch of the Harold Price creek system. Introducing Bl as a conifor in the low lying areas should be a step in replacing the Sx as a silvicultural component in the area, as Sx doesn't seem to be doing too well in this unit

ECOLOGY

AREA DESCRIPTION

STREAM UNIT	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE	MOISTURE / NUTRIENT GRID
reach 6a	SBS mc 2 01,05.06	4C(D)

ELEVATION	ASPECT	SLOPE DATA OR STREAM DATA	SLOPE OR STREAM POSITION	LENGTH	UNIFORMITY
Avg.: 800m	flat	Min. 0 Max. 0 Avg. 0	G		

HUMUS FORM	ROOTING	SOIL DEPTH TO	SOIL TEXTURE	SOIL COARSE FRAGMENT	STREAM WIDTH
Mor	DEPTH 30+	RESTRICTING LAYER (cm) 30+	Si/Sil		25m

WATER COURSES	HEAVY EQUIPMENT	STREAM CLASS	RIPARIAN RESEVE ZONE	RIPARIAN MGMT AREA
Water Gullies small drainages	TO BE USED ON-SITE? ( ) Yes (X) No	S2	YES (x) NO () WIDTH: 30m	YES (x) NO () WIDTH: 50m

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT (cm)	VIGOR
Sx	81	5	1200	320	Sx damaged (frost or pest)	164	poor
Pli	19	1	280	140	fill-plant material 5-10 yrs	204	fair-good
Epan		18				90	good
Alnus		5			RVC= SHRh Sx (Pli)	300	good
Salix		4				170	good
grasses		25				120	good
Loin		10				100	good
Rosa		8				35	good
Spirea		5				40	good
Rubus		6				60	good
Vied		3				70	good
Act		2				500+	good

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

This side of the Harold Price reach 6a & b is broken up into units A - G on the map. As the site units are very similar in eco-characteristics they will be discussed as one treatment unit. Act, Salix, and Alnus will be planted for their quick growth attributes, with the Act for short term LOD and shading and the Alnus for nitrogen fixing and shading. Bl and Pli will be planted to compliment the existing conifers and to replicate conifer structures in groupings in the RRZ, for future shade and LOD, all species will be planted in groupings as well as on a grid basis.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Units A - G			total 7.42 ha		
Bl	9	PSB 415 2+0		2226	$3562
Pli	6	PSB 415 2+0		1484	$2374
Act	14	whips		3710	$5565
Salix	57	whips		14840	$22 260
Alnus	14	plugs		3710	$5936

TREATMENT TIMEFRAMES

Planting should be undertaken as soon as the snow leaves the area in 1998. Planting should be finished in the shortest possible time, preferably one month after start up.

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

Site should be monitored 1, 2, and 3 years after planting to assess the need for any fill planting, brushing, spacing, etc. Surveys should be carried out after leaf-out to ensure positive species identification.

POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

ADDITIONAL COMMENTS

Portions of units K, H, I, and J, will take any overflow Salix that may occur in the area.

PRESCRIPTION APPROVAL

PREPARATION		PRESCRIPTION APPROVAL	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/10/20	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL ( ) AMENDMENT	DATE Y / M / D 97/09/17

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
	Lower Harold Price sub-basin (reach 6A & B)	

OPENING NO.	LOCATION	
93M 016- 14, 15, 17 & 20	Toughy rd. @ 40 km	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Bulkley	mosaics # 12,13 &14 (1995 WRP)	N 6117550, E634930

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y / M / D
	2.15 ha	Geoff Watling, Dave Silver	97/10/20

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

IMPACT DESCRIPTION

This unit consists of the northeast bank of the Harold Price reach 6a, and has portions of blocks 93m-016, 14, 15, 17, 20. Alot of this section is composed of creek banks, some of which need treatment for slumping and some of which need little to no treatment. There are also some areas where harvesting has occured up to the creekbank, these areas need riparian vegetation added to insure bank stability etc.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

(LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit:

The main objectives are stabilization of any slopes that seem in danger of slumping, specifically portions of block 20 that border on creek #46-700-050-022 and Harold Price confluence. Also ll08m upstream (still in l6-20) there is another slump that needs Salix, then again downstream from Tsouts creek 250m. Blk l6-l4 in reach 6b Harold Price also needs stabilization of slope above the creek. The rest of the treatment unit is mainly in need of re-vegetating the RRZ - there are some areas where only Bl is needed to be put in the more open areas amongst the Alnus, insuring future LOD. Salix, Act Alnus and Bl, Pl, with some Sx will be put in those areas in need of complete revegetation.

INSTREAM / INCHANNEL WORKS

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

An introduction of riparian vegetation species will, with time develop a complex of vegetation structures that will perform nicely as a wildlife corridor along this stretch of the Harold Price Creek system. Introducing Bl as a conifer in the low lying areas should be a step in replacing the Sx as a silvicultural component in the area, as Sx doesn't seem to be doing to well in this unit.

ECOLOGY						
AREA DESCRIPTION						
STREAM UNIT	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE			MOISTURE / NUTRIENT GRID		
reach 6 A&B	SBS mc2 01,06			4C (D)		
ELEVATION	ASPECT	SLOPE DATA OR STREAM DATA		SLOPE OR STREAM		
				POSITION	LENGTH	UNIFORMITY
Avg.: 850 m	flat (some SW)	Min. 0	Max. 50 Avg. 4	G		
HUMUS FORM	ROOTING	SOIL DEPTH TO	SOIL TEXTURE	SOIL COARSE	STREAM WIDTH	
Mor	DEPTH 30+	RESTRICTING LAYER (cm) 30+	Sil	FRAGMENT med	25 m	
WATER COURSES	HEAVY EQUIPMENT		STREAM CLASS	RIPARIAN RESEVE ZONE	RIPARIAN MGMT AREA	
Water Gullies	TO BE USED ON-SITE? ( ) Yes (X) No		S1	YES (x) NO ()	YES (x) NO ()	
several small tribs. to H.P. Creek				WIDTH: 50 m	WIDTH: 70 m	

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT (cm)	VIGOR
Sx	97	1	1200	400	7+ yrs, some NSR voids	130	fair
Pli	1	<1			very sparse Pli	100	good
Bl	1	<1			very sparse Bl -varied ages	100	fair
Act	<1	<1					
Epan		10			RVC = SHRh Sx(Pli,Bl)	100	good
Spirea		30				80	good
grasses		27				100	good
Loin		7				110	good
Vetch		5				100	good
Rosa		3				80	good
Salix		3				180	good
Horsetail		5				40	good
Alnus		5				200+	good

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

This side of the Harold Price 6a & b is broken up into units H, I, J and K on the map. Unit H is a slump bank into which Act, Alnus, and Salix will be introduced to aid existing Pli, Act in stabilizing the slope and intercept subsurface waterflow.
Unit I outside cutbank high erosion activity. Plant Salix and Act for fast growth and root penetration. Alnus for growth and shade, Pl and Bl for future LOD and to add a more reliable element to the conifer component.
Unit J consists of a slump bank into the Harold Price. Act and Salix will be introduces in an attempt to aid existing vegetation to stabilize this slope. (Act, Alnus, Sx, Bl).
Unit K A slump bank into the Harold Price is treed, but with open soil sections. The addition of Act, Salix and Alnus will assist existing vegetation in slope stabilization. Planting will be done in groupings of species as well as in a grid pattern.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Unit H			Total H= 0.1 ha		
Act	17	whips		50	$75
Salix	66	whips		200	$300
Alnus	17	plugs		50	$80
Unit I			Total I= 1.75ha		
Bl	9	2+0 415 PSB		525	$840
Pli	6	2+0 415 PSB		350	$560
Act	14	whips		875	$1313
Salix	57	whips		3500	$5250
Alnus	14	plugs		875	$1400
Unit K			Total K= 0.3 ha		
Act	20	whips		150	$225
Salix	80	whips		600	$900

TREATMENT TIMEFRAMES

Planting should be undertaken in the spring 1998 as soon as the snow leaves and conditions allow for access to the sites. Planting should be finished within one month of startup.

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

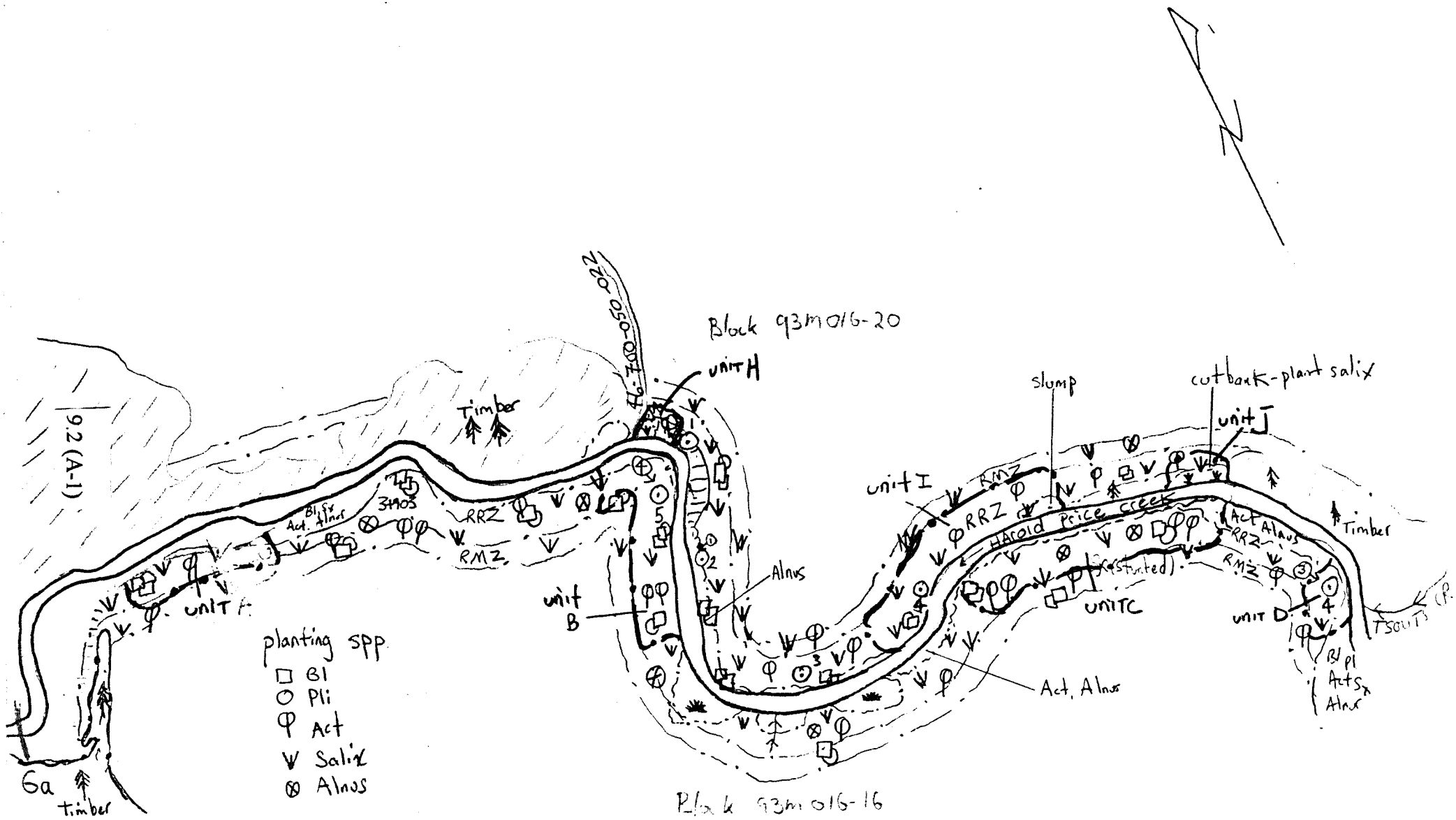
(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)
Sites should be monitored for 1, 2 and 3 years after planting to assess success rates and prescribe any necessary treatments. (i.e. fill planting, spacing, brushing, etc). Surveys should be done after leaf-out to assure positive species identification

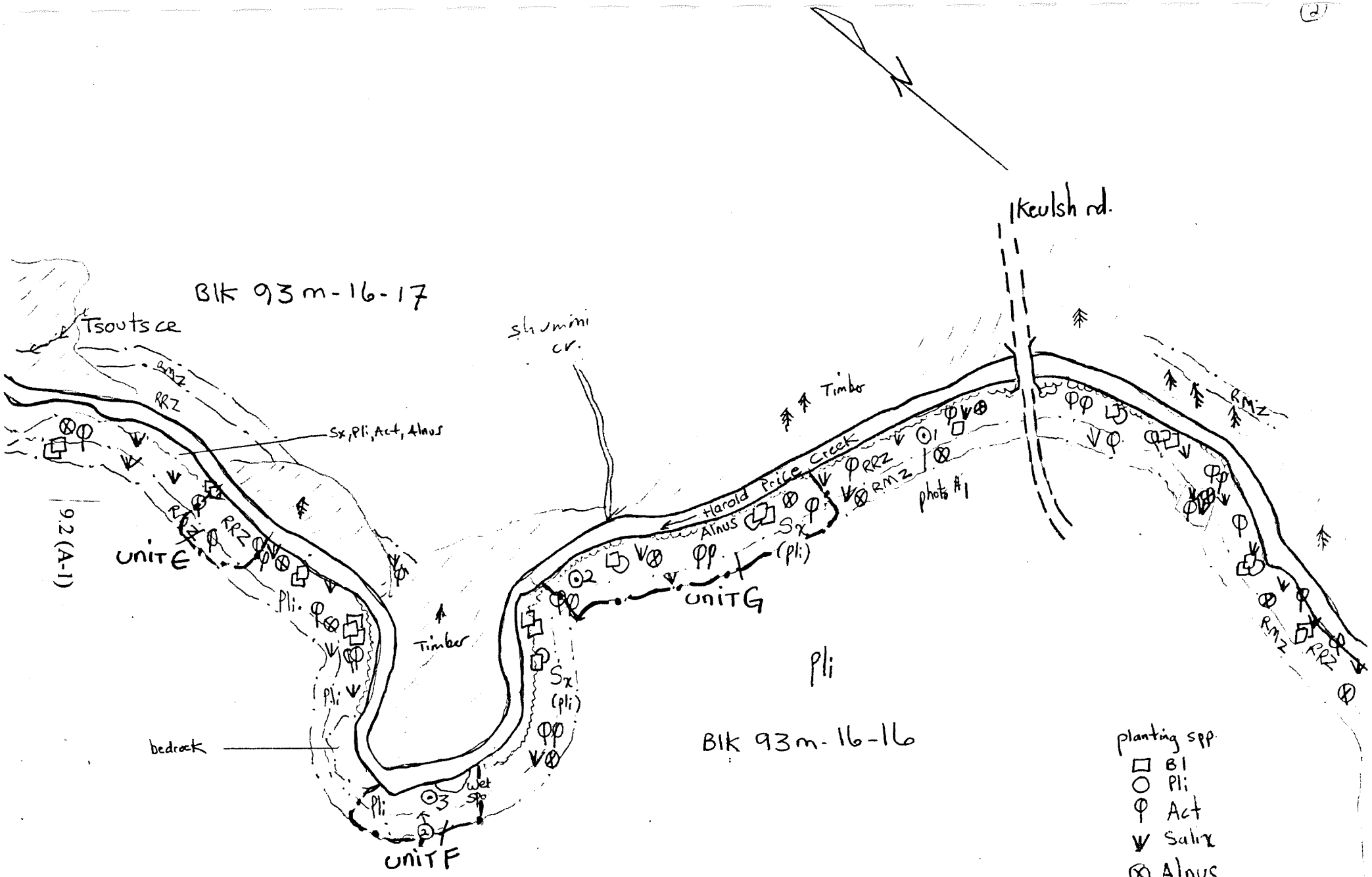
POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

RRZ should be exempt from harvesting in the future. Silvicultural treatments that are undertaken should be from a riparian biodiversity oriented viewpoint.

ADDITIONAL COMMENTS

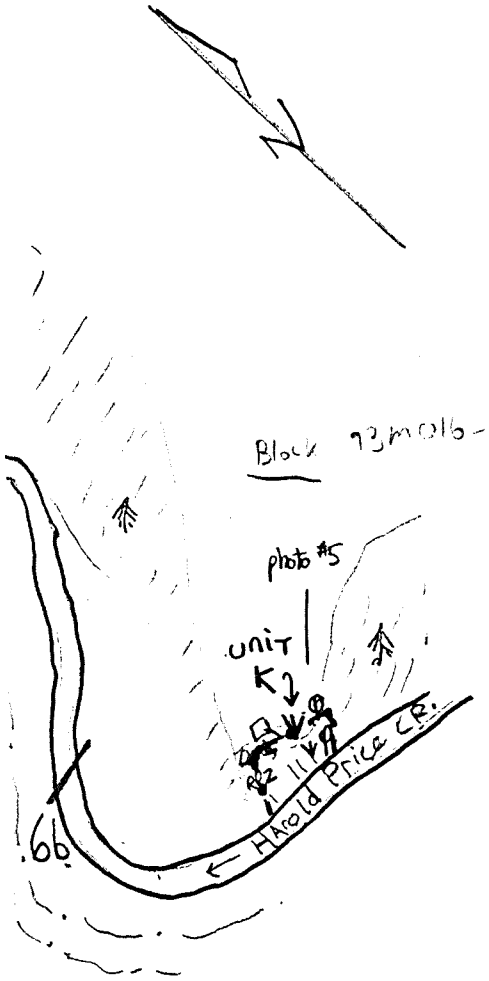
PRESCRIPTION APPROVAL			
PREPARATION		**PRESCRIPTION APPROVAL**	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/10/20	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D


Block 93M016-20
UNIT H
slump
cutbank-plant salix
unit J
unit I
RMZ
RRZ
Harold Price Creek
Timber
Act Alnus
(stunted)
UNIT C
UNIT D
UNIT A
UNIT B
Alnus
Act. Alnus
Timber
9.2 (A-1)
6a
Timber
planting spp
Bl
Pli
Act
Salix
Alnus
Block 93M016-16
1:6000


Keulsh rd.
BLK 93m-16-17
Tsoutsce
Shumini cr.
RMZ
RRZ
Sx, Pli, Act, Alnus
Timber
Harold Price Creek
Alnus
Sx
(Pli)
RRZ
RMZ
photo #1
9.2 (A-1)
UNIT E
Pli
Timber
UNIT G
Pli
Sx
(Pli)
bedrock
Wet
Pli
UNIT F
BLK 93m-16-16
planting spp
Bl
Pli
Act
Salix
Alnus

1:6000

(3)



planting spp.
- □ Bl
- ○ Pl
- ♀ At
- ⩛ Salix
- ⊗ Alnus

1:6000

9.2 (A-1)

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL () AMENDMENT	DATE Y / M / D 98/03/15

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Upper Harold Price Creek Sub-basin	

OPENING NO.	LOCATION	
93M007-101	Harold Price Creek (reach 9)	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Bulkley	mosaics # 19 to 20 1995 report	N 6106600, E640770

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y / M / D
	3.21 ha	Geoff Watling, Dave Silver	97/10/15

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

IMPACT DESCRIPTION

Most of reach 9 consits of a newly cut (since harvesting) channel, that has erosion problems on several outside curve sections. Portions of stream bank, stumps and debris are migrating into and down the Harold Price creek depositing sediment into salmonid habitat downstream. The removal of potential shading and LWD from stream banks also has a detrimental effect on the quality of wildlife habitat along reach 9.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

(LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit: The objectives are to stabilize banks at identified sites to try to aid in the prevention of erosion and sediment buildup in the HP. To add short term LWD and establish some shade structures that will develop in the near future, that will also act as wildlife habitat corridors, and to add long term LWD, SOD, bank stability and stream shading with the conifer component of the prescription.

INSTREAM / INCHANNEL WORKS : N/A

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

Bl will be introduced into the stand as a managed (planted) species. Since Sx has a history in the H.P., of cold susceptibly, and a history elsewhere as a pest targeted species. (IWS) BL will also add to the diversity of the area, as there is an abundance of Pli and Sx accross the landscape.

ECOLOGY

AREA DESCRIPTION

STREAM UNIT	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE	MOISTURE / NUTRIENT GRID
H.P reach 9	SBS Mc 2 01(05,06)	4D (5D,E)

ELEVATION	ASPECT	SLOPE DATA OR STREAM DATA	SLOPE OR STREAM POSITION	LENGTH	UNIFORMITY
Avg.: 850 m	flat	Min. Max. Avg.	G		

HUMUS FORM	ROOTING DEPTH	SOIL DEPTH TO RESTRICTING LAYER (cm)	SOIL TEXTURE	SOIL COARSE FRAGMENT	STREAM WIDTH
mor	50= cm	50=	Sil	m	25m

WATER COURSES	HEAVY EQUIPMENT	STREAM CLASS	RIPARIAN RESEVE ZONE	RIPARIAN MGMT AREA
Water Gullies side-channels	TO BE USED ON-SITE? ( ) Yes (X) No	S2	YES (x) NO () WIDTH: 30	YES (x) NO () WIDTH: 50

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT (cm)	VIGOR
Sx	93	1.5	1200	600	NSR voids , some clump tops, 10+ yr stand	120	fair to good
Pli	7	0.5	80	80	sparse naturals 6+ yrs	100	fair to good
grasses		72			all herbacious - good	120	good
Epan		12				130	good
Loin		4				100	good
Vied		4				70	good
Cow P.		3				150	good
Vetch		3				120	good

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

Although there are 6 units on this reach (areas of concern) overall they will undergo the same treatment, so we will discuss them as one treatment unit. Act Salix and Alnus will be planted for short term growth, Sx and Bl for long term climax conditions. Planting will be done to try and mimic natural riparian vegetation by the grouping of planted vegetation rather than just using current grid patterns.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Sx	15	2+0 415 PSB	total 3.21 ha	1926	$3082
Bl	8	2+0 415 PSB		963	$1540
Act	13	whips		1605	$2408
Salix	51	whips		6420	$9630
Alnus	13	plugs		1605	$2568

TREATMENT TIMEFRAMES

Planting should be done in the spring as soon as the snow goes, 1998 planting should be completed 6 weeks after operations begin.

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

Planting should be monitored at one, two and three year intervals to assess the need for any follow up activities (i.e. fill -planting, brushing, spacing, etc.) Surveys should be conducted after leaf-out for positive species identification.

POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

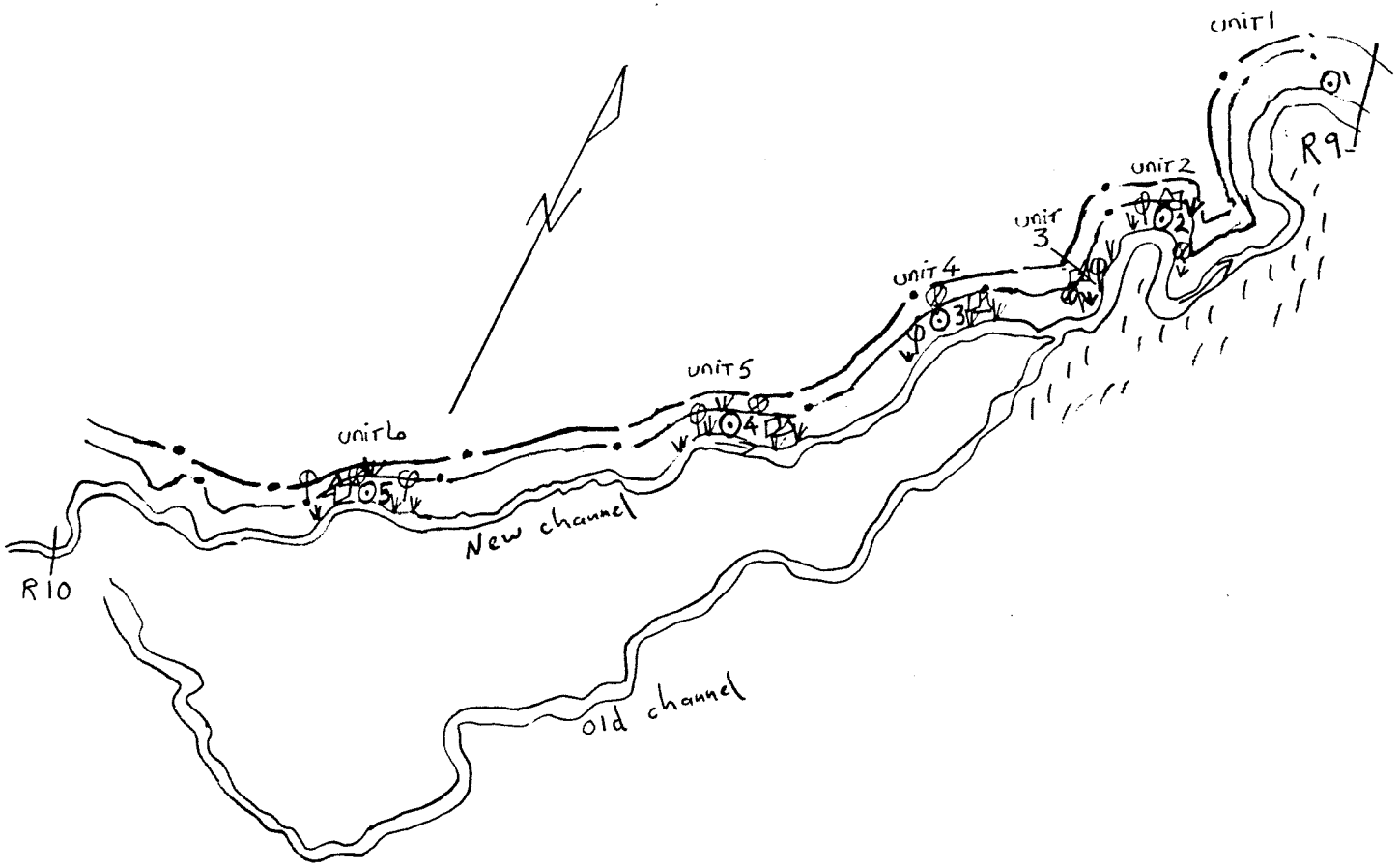
Fill-planting .

ADDITIONAL COMMENTS

Although large sections of the RMA, and even RRZ were not adequately re-vegetated up to Bio-diversity and riparian standards, funding at this time prompts us to address the most important erosion prone sections of riparian zone on this reach.

PRESCRIPTION APPROVAL			
PREPARATION		**PRESCRIPTION APPROVAL**	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/10/15	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D

HP. Reach 9 1:8037



RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL () AMENDMENT	DATE Y / M / D 97/10/8

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Harold Price Creek (reach 10)	
OPENING NO.	LOCATION	
93M006-04, 06, 07, 10 & 12	Upper Fulton FSR (27.5 km)	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Bulkley	Photos # 20, 21 & 22 of Suskwa WRP 1995/96 Fiscal Report	N 6106140, E 638000

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y / M / D
	2.88 ha	Geoff Watling and Dave Silver	97/10/14

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

IMPACT DESCRIPTION

The main impacts to this reach are erosion activities at outside curves which threaten to remove substantial portions of streambank. The removal of potential shading and LWD from streambanks also has a detrimental effect on fish habitat and water quality.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit: Objectives within reach 10 are to stablilze banks at designated sites to help reduce erosion and sediment input , to add short and long-term LWD and to reestablish streamside vegetation for fish and wildlife habitat.

INSTREAM / INCHANNEL WORKS

No

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

During planting Bl will be introduced into the stand as a managed species as the Sx in this area has a history of cold susceptibility and elsewhere as a pest targetted species (IWS). Bl will also add to the diversity of the area, as there is an abundance of Pl and Sx across the landscape.

ECOLOGY

AREA DESCRIPTION

STREAM UNIT	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE	MOISTURE / NUTRIENT GRID
H.P. reach 10	SBS Mc 2 01 (05,06)	4D

ELEVATION	ASPECT	SLOPE DATA OR STREAM DATA	SLOPE OR STREAM		
			POSITION	LENGTH	UNIFORMITY
Avg.: 890 m	flat	Min. Max. 5% Avg. 0	G		

HUMUS FORM	ROOTING	SOIL DEPTH TO	SOIL TEXTURE	SOIL COARSE	STREAM WIDTH
Mor	DEPTH 30+	RESTRICTING LAYER (cm) 30+	SL	FRAGMENT M	5m

WATER COURSES	HEAVY EQUIPMENT	STREAM CLASS	RIPARIAN RESEVE ZONE	RIPARIAN MGMT AREA
Water Gullies side-channels, trib, -50-135	TO BE USED ON-SITE? ( ) Yes (X) No	S2	YES (x) NO () WIDTH:20	YES (x) NO () WIDTH:40

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT in (cm)	VIGOR
Sx	94	2	867	632	NSR voids (>1ha) 10+ yrs	170	fair
Bl	3	1	34	34	scattered naturals (13+ yrs)	150	fair
At	1	0.5	300	-	sparse naturals	162	fair
Act	2	0.5	100	-	sparse naturals	100	fair
grasses		68			dominant		
Loin		8					
Epan		8					
Vied		2			RVC= SHRh Sx (Bl,At,Act)		
Rubus		3					
Salix		3					
Alnus		2					
Cowp		2					

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

Although there are 6 units on this reach they will all have the same treatment applied. Therefore they will henceforth be referred to as one treatment unit. Act, Salix and Alnus will be planted for short-term growth and Sx and Bl for long-term climax type structures. Planting will attempt to mimic natural riparian vegetation by planting in groups rather than grid patterns.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Sx	15 (600)	2+0 PSB 415	see attached pg.	1728	$2765
Bl	8 (300)	2+0 PSB 415		864	$1382
Act	13 (500)	whips		1440	$2160
Salix	51 (2000)	whips		5760	$8640
Alnus	13 (500)	plugs		1440	$2304
				Total	$17,251

TREATMENT TIMEFRAMES

Planting should be done in the spring as soon as the snow leaves (1998). Planting should be completed 6 weeks after operations begin.

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

Planting should be monitored at one, two and three year intervals to assess the need for possible folllow-up treatment (i.e. fill-planting, spacing, etc.) Surveys should be conducted after leaf-out for positive species identification.

POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

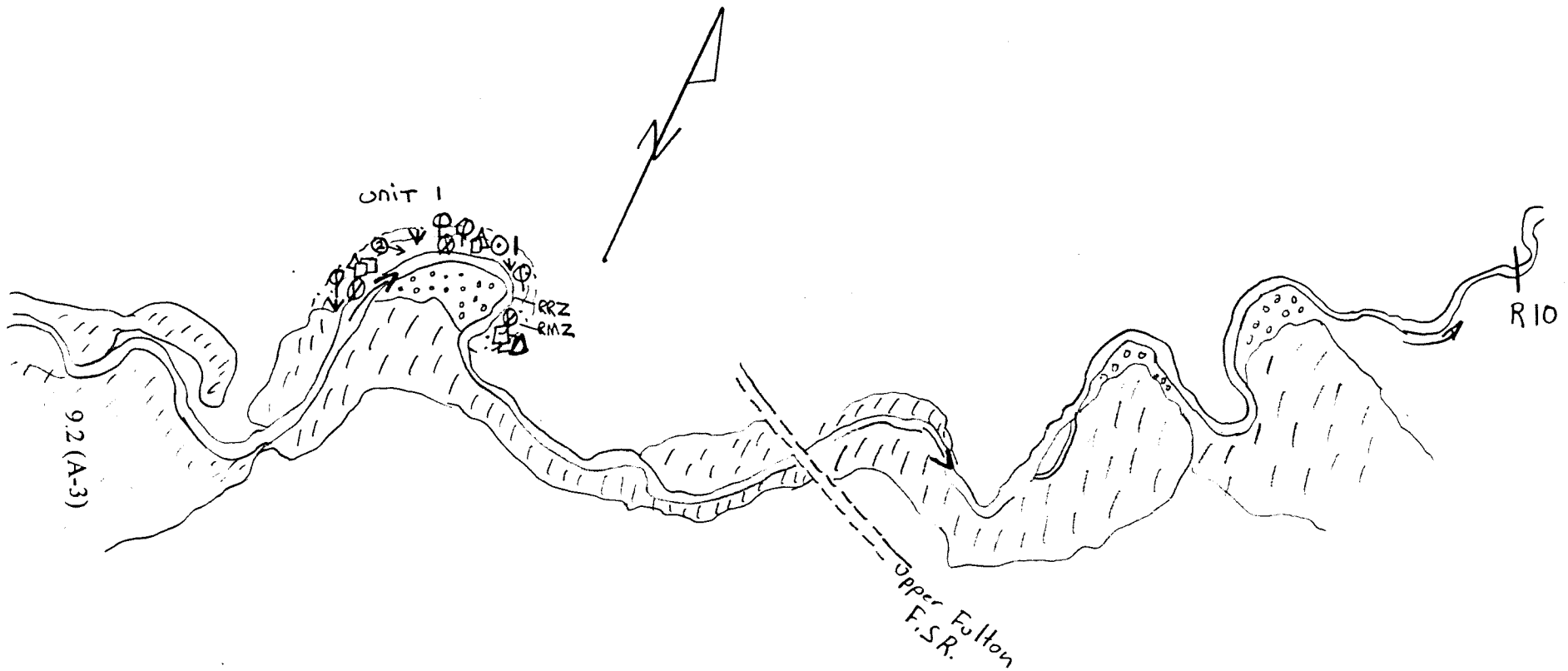
N/A

ADDITIONAL COMMENTS

Although large sections of the RMA and even the RRZ were not adequately vegetated, up to bio-diversity and riparian standards, funding at this time prompts us to address the most important and erosion prone sections of this reach.

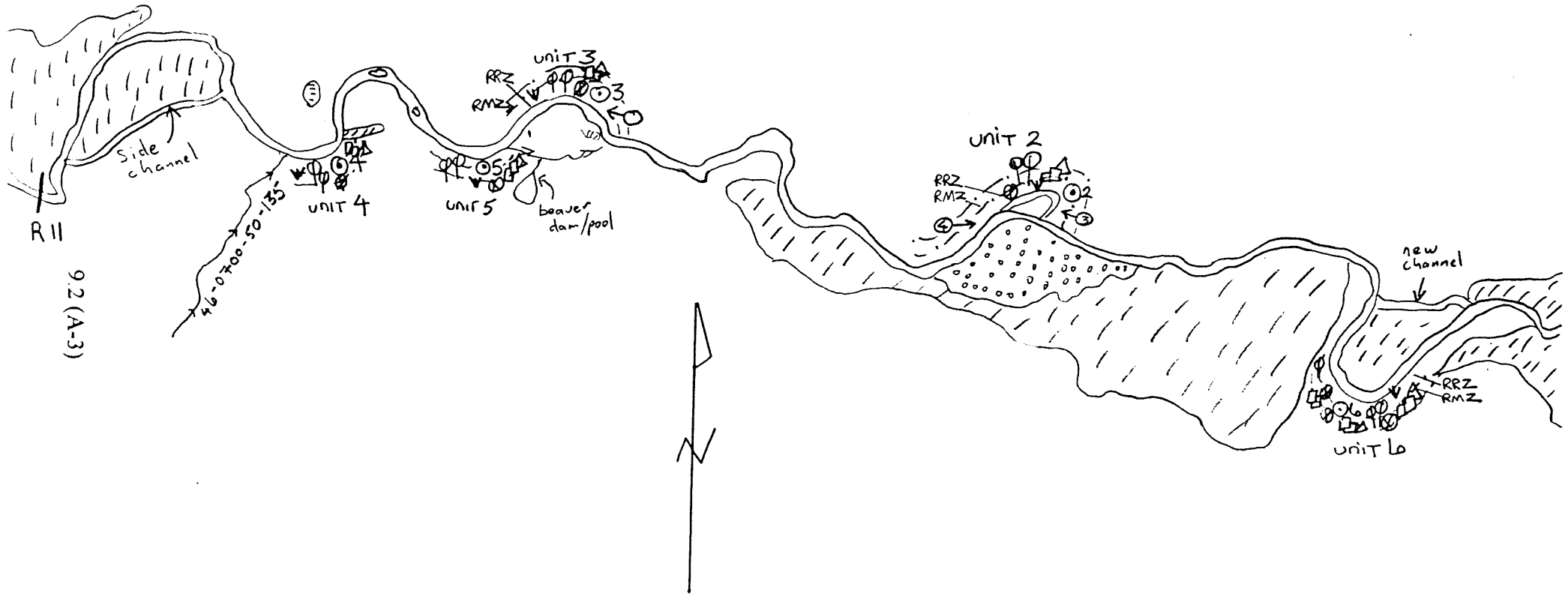
PRESCRIPTION APPROVAL			
PREPARATION		**PRESCRIPTION APPROVAL**	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/10/14	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D

HP Reach 10 1:8037



HP Reach 10

1: 8037



9.2 (A-3)

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL () AMENDMENT	DATE Y / M / D 98/03/16

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Upper Harold Price Creek Sub-basin	

OPENING NO.	LOCATION	
93M 006-4	Harold Price Creek (reach 11)	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Bulkley	mosaic # 22 Suskwa WRP 1995/96	N 6106150, E 637100

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y / M / D
	1.97 ha	Geoff Watling, Dave Silver	97/10/24

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

MPACT DESCRIPTION

The main impact on reach 11 is erosion occuring on 2 outside curves of the creek, which are lacking in riparian egetation. These banks have only Sx and grasses as main vegetative components.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit:

Objectives here focus on stabilizing outside meanders by planting Salix, Alnus and Act. Bl and Sx will be planted for ong-term climax structures.

NSTREAM / INCHANNEL WORKS

ADDITIONAL MANAGEMENT OBJECTIVES

Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

hickly vegetating these sites will add wildlife habitat to this reach.

ECOLOGY

AREA DESCRIPTION

STREAM UNIT	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE	MOISTURE / NUTRIENT GRID
reach 11	SBS mc2 01,(05,06)	4 D (E)

ELEVATION	ASPECT	SLOPE DATA OR STREAM DATA	SLOPE OR STREAM		
			POSITION	LENGTH	UNIFORMITY
Avg.: 890m	flat	Min. Max. 5 Avg. 0	G		

HUMUS FORM	ROOTING	SOIL DEPTH TO	SOIL TEXTURE	SOIL COARSE	STREAM WIDTH
Mor	DEPTH 30+ cm	RESTRICTING LAYER (cm) 30+	Sil	FRAGMENT M	5m

WATER COURSES	HEAVY EQUIPMENT	STREAM CLASS	RIPARIAN RESEVE ZONE	RIPARIAN MGMT AREA
Water Gullies	TO BE USED ON-SITE? ( ) Yes (X) No	S3	YES (x) NO () WIDTH: 20	YES (x) NO () WIDTH: 40

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT	VIGOR
Sx	91	2	800+		Planted Sx -some voids 9yrs		f- good
Bl	6	<0.5			scattered naturals -low stock		f- good
At	1	< 0.5			naturals		fair
Act	2	< 0.5			naturals		fair
grasses		15					good
Epan		52			RVC= SHRh Sx (Bl,At,Act)		good
Loin		7					good
Salix		3					good
Alnus		5					good
Cow P.		2					good
Vied		5					good
Rubus		5					good

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

Units 1 and 2 will be planted to the same species and stocking levels so will be discussed as one unit. Target stand conditions include a thick layer of Salix throughout the RMA interspersed with Alnus and Act. This will act as a overstorey layer with the Sx and Bl emerging later as climax species. Planting will be done to mimc natural clumping aswell as in grid patterns.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Unit 1					
Sx		PSB 615 or 415 2+0		262	$419
Bl		PSB 615 or 415 2+0		786	$1258
Act		whips		655	$983
Salix		whips		2620	$3930
Alnus		plugs		655	$1048
			total (U1) 1.31h		total $7637
Unit 2					
Sx		PSB 615 or 415 2+0		132	$211
Bl				396	$634
Act				330	$495
Salix				1320	$1980
Alnus				330	$528
			total (U2) 0.66		total $3848

TREATMENT TIMEFRAMES

Planting should be done as soon as the snow leaves in the spring of 1998 and should be completed 1 month after start-up.

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

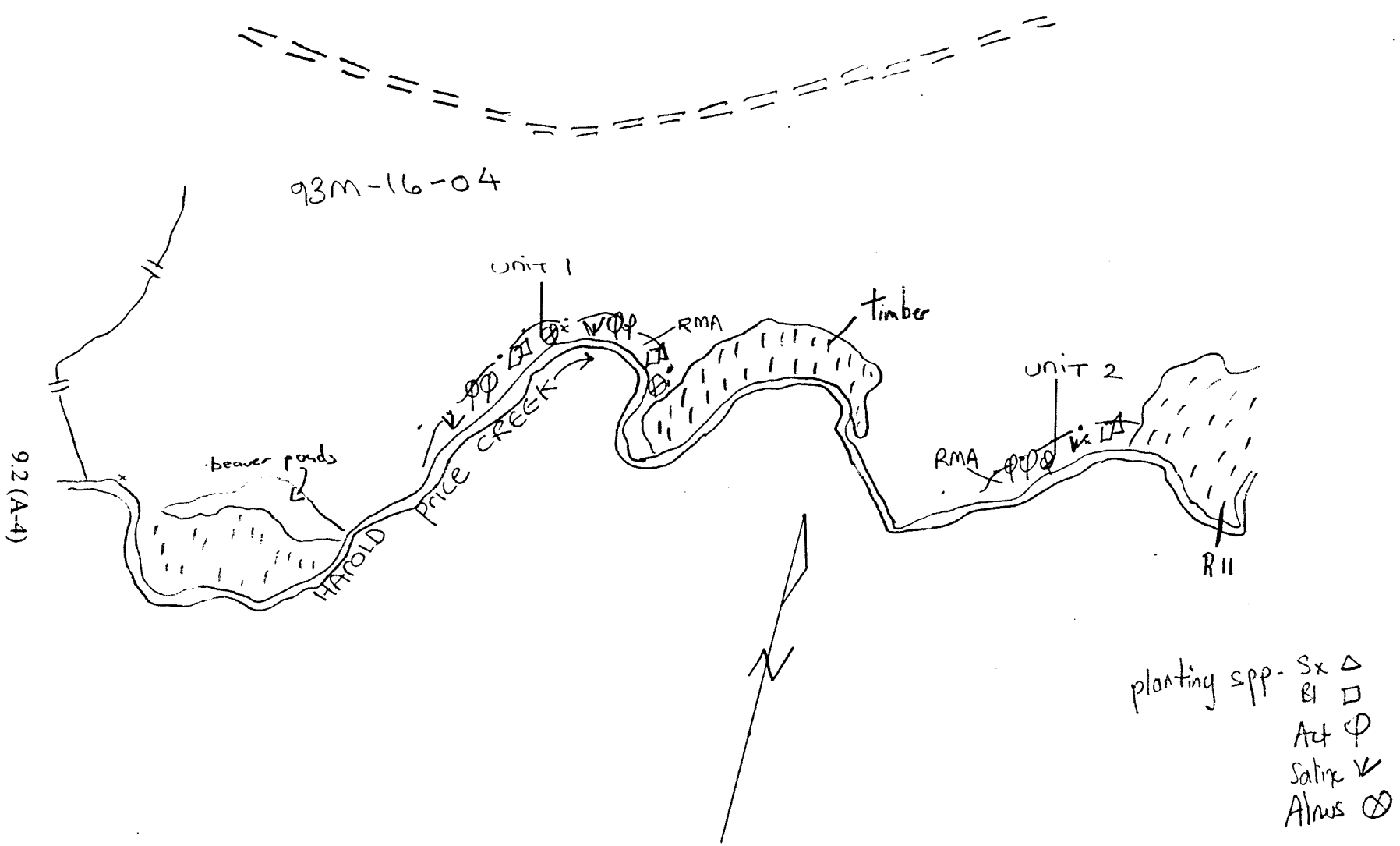
The site should be monitored 1, 2 and 3 years after planting to assess survivals and possible subsequent treatments. Surveys should be conducted after leaf-out for positive species identification.

POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

ADDITIONAL COMMENTS

PRESCRIPTION APPROVAL			
PREPARATION		**PRESCRIPTION APPROVAL**	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/10/24	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D

H.P. Reach 11 1:8037



9.2 (A-4)

H.P. (Reach 11) 1:8037

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL () AMENDMENT	DATE Y / M / D 97/09/19

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Upper Harold Price Creek Sub-basin	

OPENING NO.	LOCATION	
93M016-10 and 19	Luhk Creek (reach 2)	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Bulkley	Photo #15 Section 4.0 WRP 1997/98	N611220, E639750

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y / M / D
	3.38 ha	Geoff Watling, Dave Silver	97/09/22

FISH HABITAT ASSESSMENT

See Suskwa WRP 1997/98 Fiscal Report

IMPACT DESCRIPTION

Although an Alnus cover exists over much of the RRZ, there are several outside curve sections that are in danger of eroding. There is also no short-term LOD available within the Alnus. The special area is a slump to Luhk Creek.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

(LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit:

Unit 1: Plant Bl and Sx amongst Alnus for future LOD and shading.

Unit 2: Treatment is broken down into 5 sections that require Salix, Alnus and Act for short-term shading, LOD, etc. while Bl will be planted for long-term LOD and climax vegetation stuctures.

INSTREAM / INCHANNEL WORKS

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

Objectives are to improve fish habitat, stream channel stabilization, water quality, temperature regulation and wildlife cover.

ECOLOGY					
AREA DESCRIPTION					
STREAM UNIT reach 2	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE SBS mc2 01			MOISTURE / NUTRIENT GRID 4C	
ELEVATION Avg.:	ASPECT S	SLOPE DATA OR STREAM DATA Min. Max. Avg.		SLOPE OR STREAM POSITION: G LENGTH UNIFORMITY	
HUMUS FORM Mor	ROOTING DEPTH 40cm+	SOIL DEPTH TO RESTRICTING LAYER (cm) 40cm	SOIL TEXTURE Sil	SOIL COARSE FRAGMENT < 35%	STREAM WIDTH
WATER COURSES Water Gullies	HEAVY EQUIPMENT TO BE USED ON-SITE? ( ) Yes (X) No		STREAM CLASS S3	RIPARIAN RESEVE ZONE YES (x) NO () WIDTH: 20	RIPARIAN MGMT AREA YES (x) NO () WIDTH: 40

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT (cm)	VIGOR
Sx			1080	520	Sx- planted 1990 -good coverage	130	good
Pli			520	320	Pli - 4 yrs old	100	good
					RVC= SHRh Sx,Pli (act)		
Epan		25				130	good
grasses		35				120	good
Loin		10				140	good
alder		15				450	good
Rubus		6				60	good
Salix		4				140	good
Act		1				400	good
Sx		2				130	good
Pli		2				100	good

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

This reach consists of 2 treatment units.

Unit 1: (Alder overstorey) This unit has a good start on establishing adequate riparian structure that extends from the streambank inland (on average 10-15m). Planting of Bl and Sx for long-term attributes are recommended within alnus.

Unit 2: (Sx and Pli) This unit is a basic plantation complex consisting of Sx, Pli, Epan, grasses and some shrub species. Though these extend to the streambank this does not protect this channel from erosional activities. This requires planting of Act, Salix and Alnus to stabilize the banks and provide some short-term LWD. Bl should be planted for long-term LWD. This unit is primarily located inland from the Alnus unit, however does extend to the stream channel at some points.

Planting will be done at both sites mimicing natural structures. Seedlings will be placed in groups as well as in grids to replicate clumping of species similar to natural settings.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Unit 2			total (2) 0.54 ha		
Bl	21	2+0 415 PSB		432	$691
Act	13	whips		270	$405
Salix	53	whips		1080	$1620
Alnus	13	plugs		270	$432
Special area			total 0.2 ha		
Salix	80	whips		650	$975
Bl	20	plugs 415 2+0		100	$160
Unit 1			total (1) 2.64 ha		
Bl	80	2+0 PSB 415		1584	$2534
Sx	20	2+0 PSB 415		396	$633

TREATMENT TIMEFRAMES

This area should be planted to Bl, Act, Salix and Alnus as soon as snow leaves in 1998. This is likely to be mid-May and no later than the end of June. Planting should be completed 2 weeks after start-up.

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)
Monitor 1, 2 and 3 years after planting to determine subsquent treatments, if any. Surveys should be done after leaf-out for positive species identification.

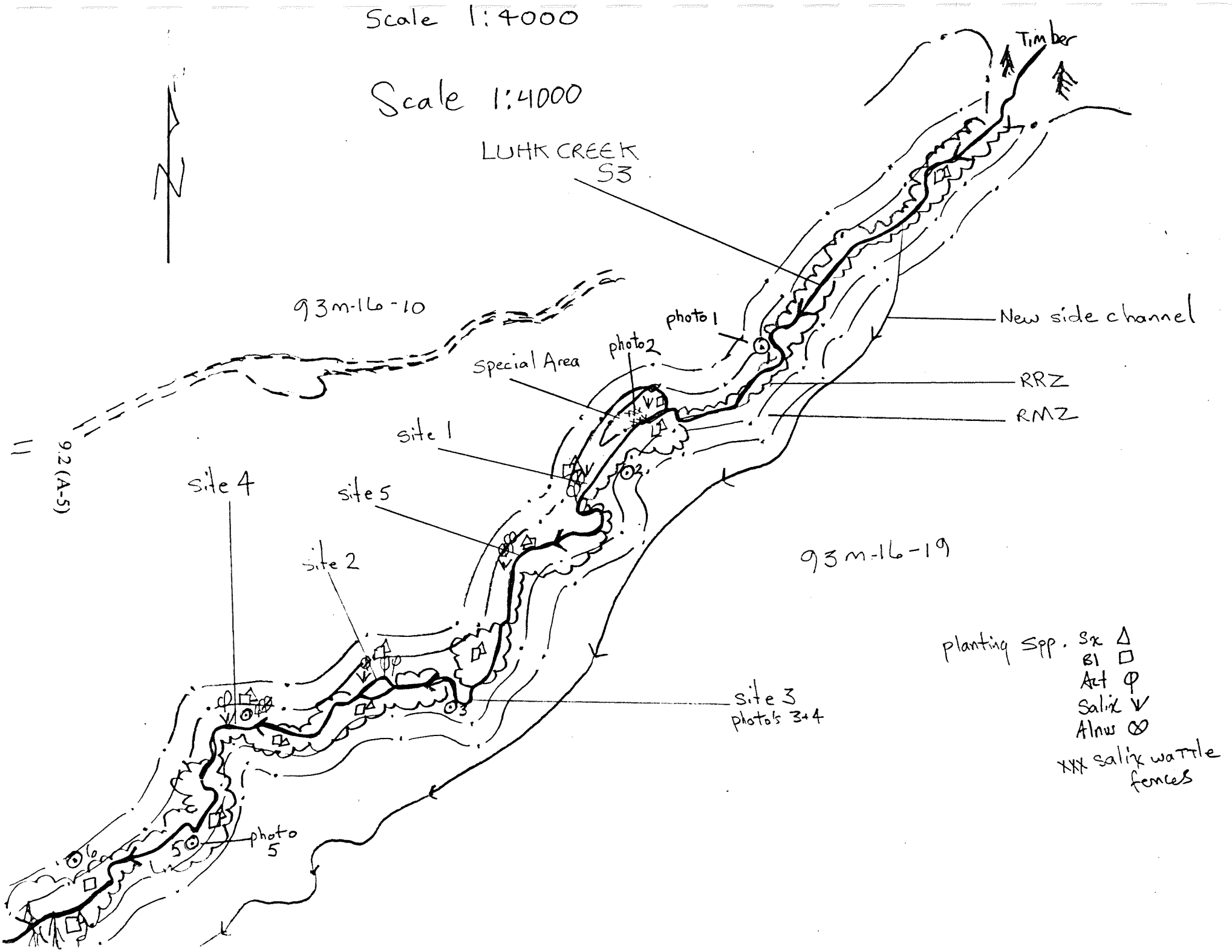
POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

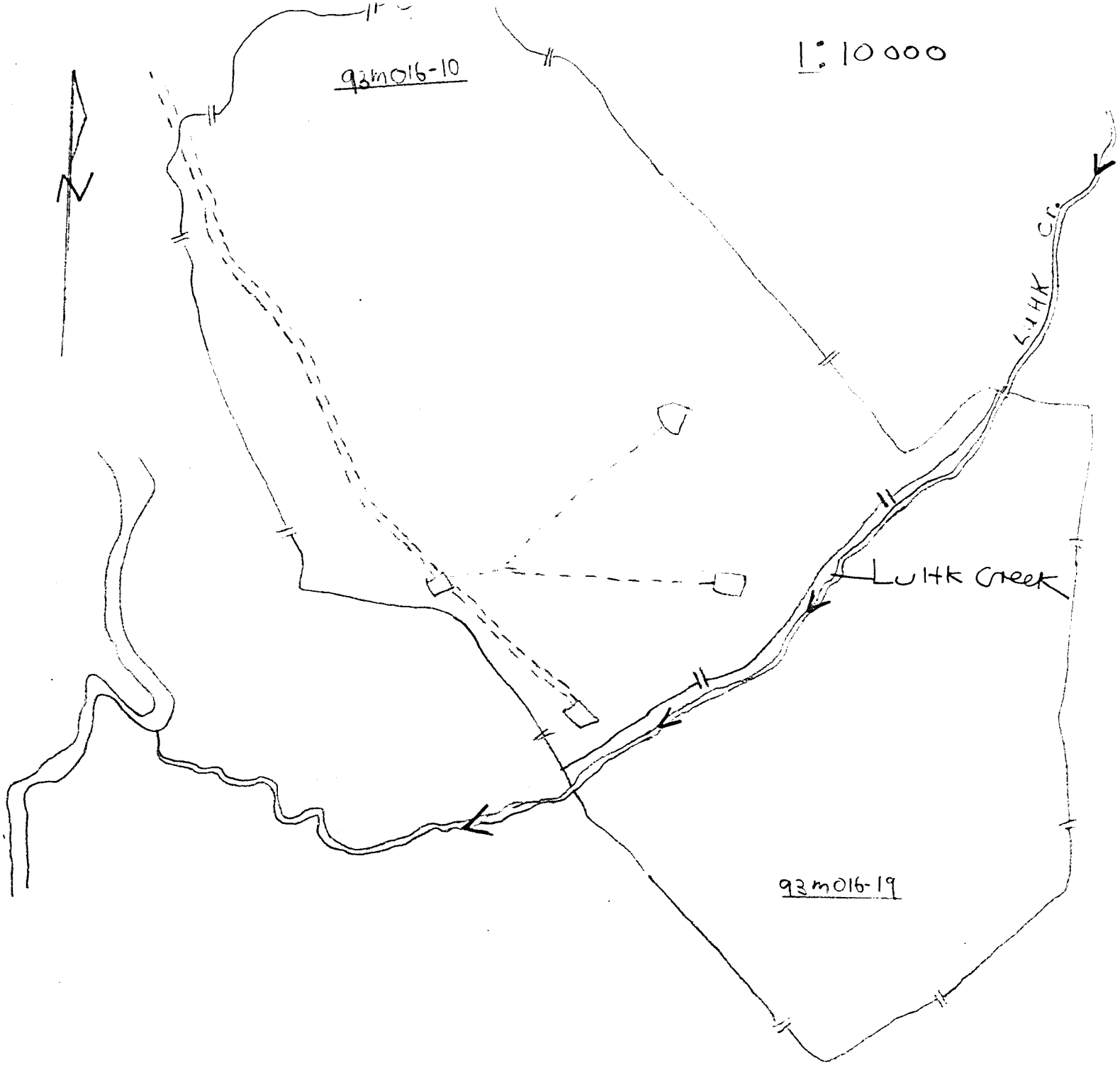
Activities within the RRZ should be kept to a minimum until riparian structures are established. Possible future work includes thinning and conifer release.

ADDITIONAL COMMENTS

Units 1 and 2 are straight forward prescriptions except that conifers will be planted under Alnus in unit 1. Salix will be applied to a slump along reach 2. New side-channels ,as a result of channel diversions to block 10, should be assessed in 1998.

PRESCRIPTION APPROVAL			
PREPARATION		**PRESCRIPTION APPROVAL**	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/09/22	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D


Scale 1:4000
Scale 1:4000
LUHR CREEK
S3
Timber
93m-16-10
photo 1
New side channel
photo 2
Special Area
RRZ
RMZ
site 1
9.2 (A-5)
site 4
site 5
site 2
93m-16-19
site 3
photo's 3+4
photo 5
planting spp. Sx
Bl
Act
Salix
Alnus
XXX salix wattle fences



9.2 (A-5)

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL ( ) AMENDMENT	DATE Y / M / D 97/10/8

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Upper Harold Price Creek Sub-basin 46-700-50-40	
OPENING NO. 93M 016-12	LOCATION Harold Price East Main	
REGION Prince Rupert	DISTRICT Bulkley / AIR PHOTO NO. N/A	LONGITUDE / LATITUDE / UTM GRID N6113295, E638485
TOTAL AREA / NET AREA TO BE TREATED 0.1 ha	FIELD WORK DONE BY Geoff Watling, Dave Silver	DATE COMPLETED Y / M / D 97/10/24

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

MPACT DESCRIPTION

Culvert is to be pulled. Impacts expected to be minimal. Some possible sedimentation to stream.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

(LWD/SOD, Stream shading, Surface sediments, Degradation)

)etailed Description per Unit:

Low priority; grass-seed exposed soils after excavation.

NSTREAM / INCHANNEL WORKS

)eactivation.

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

ECOLOGY						
AREA DESCRIPTION						
STREAM UNIT reach 2	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE SBS mc2 01, (05,06)			MOISTURE / NUTRIENT GRID 4C (D-E)		
ELEVATION Avg.:	ASPECT even	SLOPE DATA OR STREAM DATA Min. Max. Avg.		SLOPE OR STREAM POSITION	LENGTH	UNIFORMITY
HUMUS FORM Mor (moder)	ROOTING DEPTH 30+ cm	SOIL DEPTH TO RESTRICTING LAYER (cm) 30+	SOIL TEXTURE Sil	SOIL COARSE FRAGMENT (%)	STREAM WIDTH 1m	
WATER COURSES Water Gullies	HEAVY EQUIPMENT TO BE USED ON-SITE? ( ) Yes (X) No		STREAM CLASS S4	RIPARIAN RESEVE ZONE YES (x) NO () WIDTH:	RIPARIAN MGMT AREA YES (x) NO () WIDTH: 30m	

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT	VIGOR
Salix		5			road crossing		good
grasses		60					good
Epan		20					good
Alnus		5					good

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

The culvert is to be pulled; seed exposed soils to grass and legumes.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
grass	50		0.1 ha		
legume	50				

TREATMENT TIMEFRAMES

Seed immediatly after excavation or early spring 1998.

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

ADDITIONAL COMMENTS

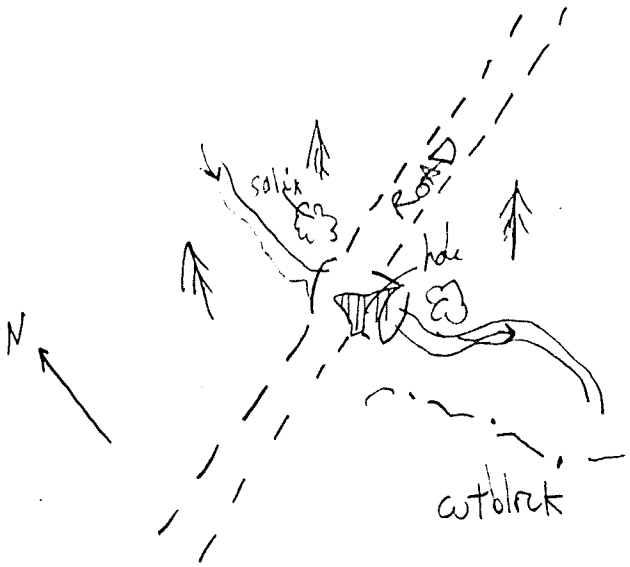
Very low priority - no treatment.

PRESCRIPTION APPROVAL

PREPARATION		PRESCRIPTION APPROVAL	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/10/24	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D

LUHK RD Culvert
46-700-50-40

MAP NOT to scale



RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL () AMENDMENT	DATE Y / M / D 97/9/11

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Blunt Creek Sub-basin	

OPENING NO.	LOCATION	
93M016-32	Blunt Creek (reach1)	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Bulkley	Blunt Creek # 1 (1995 WRP fiscal report)	E636540, N6112700

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y / M / D
	4.6 ha	Geoff Watling, David Silver	97/9/22

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

IMPACT DESCRIPTION

Active floodplain is visibly eroding side-channels, off-channel fish habitat, and planted Sx on site. Subsequent sediment to Blunt Creek.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

(LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit: Riparian Management area is an active floodplain. The main goal of the prescription is to stabilize the networks of channels that are eroding across this floodplain. Utilize Salix and Act. as faster growing plants for bank stabilization, future LWD, SOD, shading and habitat. Planting ,slower growing, Alnus will add nitrogen to system for the Sx and Bl which will become future LWD, SOD and shading. Planned stand structures will replicate riparian vegetation structures already existing in this area and should evolve, over time, to climax conditions. At special areas Salix/wattles will be used to maintain bank integrity.

INSTREAM / INCHANNEL WORKS

Recommended within Suskwa WRP 1997/98 Fiscal Report (Section 7.2)

ADDITIONAL MANAGEMENT OBJECTIVES

Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

Fish habitat, streambank stability, stream temperature regulation,water quality and wildlife corridors.

ECOLOGY

AREA DESCRIPTION

STREAM UNIT	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE	MOISTURE / NUTRIENT GRID
Reach 1	SBS Mc2 -010 (09)	6 C/D

ELEVATION		ASPECT	SLOPE DATA OR STREAM DATA	SLOPE OR STREAM		
				POSITION	LENGTH	UNIFORMITY
Avg.: 850m	flat floodplain	F (NE)	Min. 0 Max. 4% Avg. 0	F		

HUMUS FORM	ROOTING DEPTH	SOIL DEPTH TO	SOIL TEXTURE	SOIL COARSE	STREAM WIDTH
		RESTRICTING LAYER (cm)		FRAGMENT	
moder	50 cm+	30 (some old gravel bars)	Sil	L	5.5m

WATER COURSES	HEAVY EQUIPMENT	STREAM CLASS	RIPARIAN RESEVE ZONE	RIPARIAN MGMT AREA
Water Gullies side-channels	TO BE USED ON-SITE? ( ) Yes (X) No	S2	YES (X) NO ( ) WIDTH:	YES (X) NO ( ) WIDTH:

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT in (cm)	VIGOR
Sx	99		2700	1000	conifer component		
Bl	1		n/a	n/a	conifer component		
Alnus		2				100	
Epan		14			RVC= SHRh/Sx (Bl)	130	
grasses		30				110	
Salix		2				160	
Sx		1		2266	7 yr old imm. ~ 1000 st/ha (Sx)	168	
Bl		1		200	naturals	150	
horsetail		15				40	
ribes		5				50	
vetch		15				40	
Act		<1				200	
rubus		5				90	
loin		5				80	
vied		4				80	

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

The stand we are trying to establish will be one that incororates riparian type species and that mimics riparian stand structures. Since the area in question is an active floodplain, the whole floodplain will be treated as riparian area (RMA). Target stand conditions include the introduction of Act, Salix, and Alnus as integral parts of the system and acceptance of the stand as a permanent riparian structure. Species to be planted on site include Bl, Act, Salix, and Alnus. Sx is already present on site. The desired stand composition will consist of a combination of conifers (Sx and Bl) for long-term LWD and stream shading.. Act will be planted for quicker LWD and channel stabilization. Salix and Alnus will be utilized for their channel stabilizing qualities on the many side-channels of the floodplain. These plantings will be designed to mimic natural riparian structures in that the species will be planted in small groupings as well as on a grid basis for a more natural distribution of species. Act and Salix should be planted thickly to ensure survivals as beaver activity is heavy in this area.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Bl	14	2+0 PSB 615(415)	4.6	2000	$3200
Sx	4	2+0 PSB 615(415)	4.6	500	$800
Act	29	2m whips	4.6	4000	$6000
Salix	special area	2m whips	250 m of pounded Salix stakes	250	$150
Salix	39	2m whips	4.6	5500	$8250
Alnus	14		4.6	2000	$3200
					Total $21,600

TREATMENT TIMEFRAMES

Due to the nature of the floodplain, planting will have to be done later in the year than is usual. A field trip (June 4,1997) to this site revealed excessive flooding of this area as a result of late spring run-off. Depending on snowmelt this site could be planted in late June 1998 to August at the very latest.

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

This area should surveyed one, two and three years after planting to assess growth and survival of planted species and prescibe any subsequent work needed at this site (i.e. fill-planting, spacing, etc.). Surveys should be conducted after leaf-out to assure positive plant species identification.

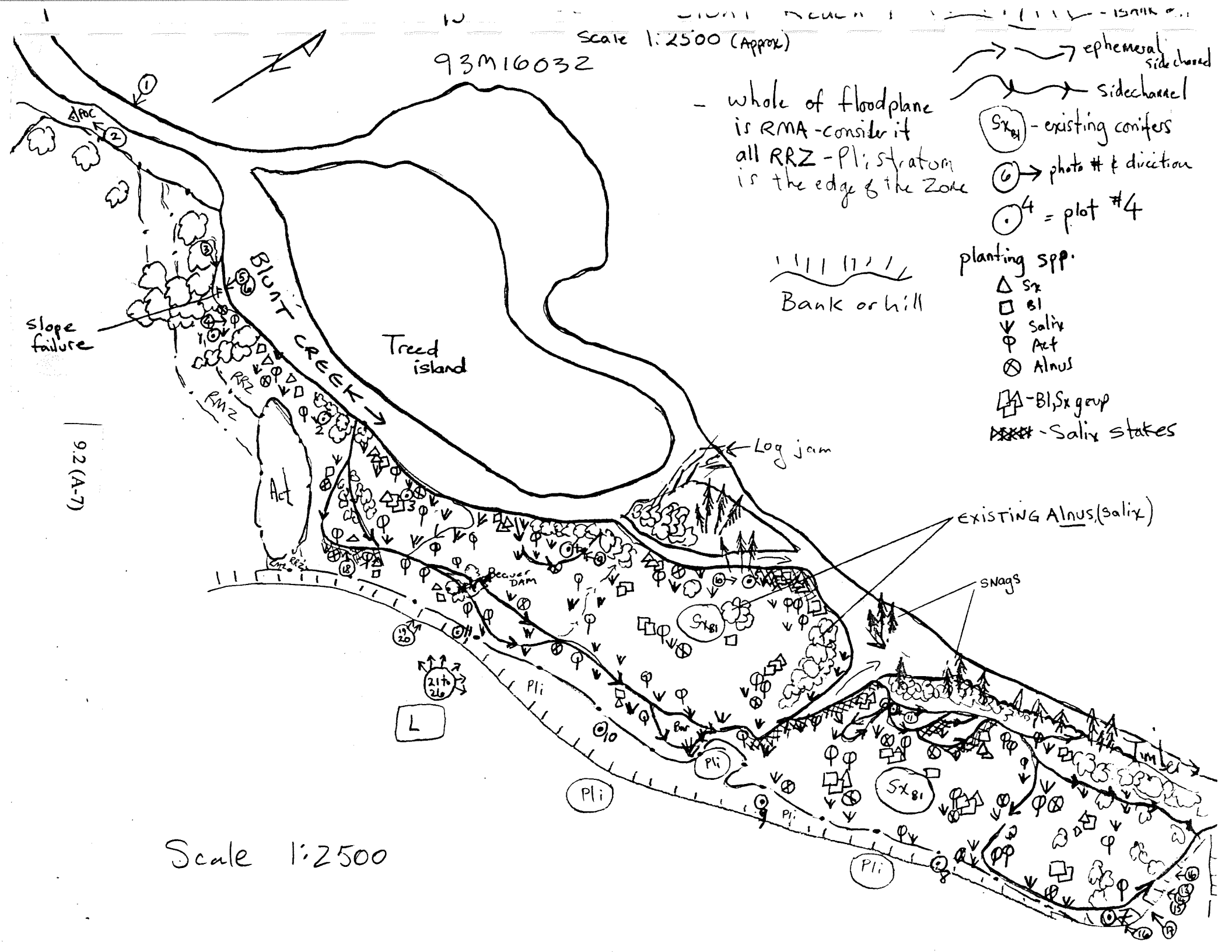
POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

This area should be managed as permanent riparian reserve zone due to the alluvial nature of the site and the sensitivity of coho salmon stocks utilizing this specific site and Blunt Creek.

ADDITIONAL COMMENTS

Due to the critical nature of this site, as threatened coho off-channel habitat, it should be given high priority for restoration as vegetation for the most part is absent throughout the logged floodplain. At the time of assessment grasses dominated most of this area and were not providing channel stability within the cutblock. Cottonwood, willow and alder are necessary to quickly provide stability, shade and sediment filtering properties needed to fulfill riparian objectives. This will also provide cover for animal species noted on the floodplain (black bear, grizzly, moose, deer and wolf).

PRESCRIPTION APPROVAL					
PREPARATION			**PRESCRIPTION APPROVAL**		
PREPARED BY			MINISTRY OFFICIAL (MOE) *(SIGNATURE)*		
PRINTED NAME - Geoff Watling	DATE PREPARED	Y / M / D 97/9/22	PRINTED NAME	DATE APPROVED	Y / M / D
MINISTRY OFFICIAL (MOF)			**FINAL APPROVAL**		
SIGNATURE			DISTRICT MANAGER *(SIGNATURE)*		
PRINTED NAME	DATE SIGNED	Y / M / D	PRINTED NAME	DATE APPROVED	Y / M / D


Scale 1:2500 (Approx)
93M16032
- whole of floodplane is RMA - consider it all RRZ - Pli stratum is the edge of the Zone
ephemeral
sidechannel
Sx81 - existing conifers
photo # & direction
plot #4
planting spp.
Sx
Bl
Salix
Act
Alnus
Bl,Sx group
Salix stakes
Bank or hill
slope failure
Treed island
BLUNT CREEK
Log jam
EXISTING Alnus (salix)
SNAGS
Act
RRZ
RMZ
Beaver DAM
Pli
L
9.2 (A-7)
Scale 1:2500

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL () AMENDMENT	DATE Y / M / D 97/09/24

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Blunt Creek Sub-basin	
OPENING NO.	LOCATION	
93M016-29	Kuelsh rd. @ entrance to 93M 016-29	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Bulkley	Photo # 7 Section 3.7 WRP 1997/98	N6110000, E629200

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y / M / D
	0.81 ha	Geoff Watling, Dave Silver	97/10/2

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

MPACT DESCRIPTION

Trib. 1a has breached its banks and cut a new course through a landing and a portion of the block. This stream flows directly to Wan Lake and requires sediment sources to be minimized.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit:

Trib. 1a is basically a landing with a new creek channel running through it which requires stabilization and vegetation in general. Salix and Alnus should be planted for quick shading, SOD and channel stability. Sx and Bl needed for future WD, SOD and to replicate climax stand conditions.

Trib. 1b area is moderate to low priority . Requires Salix to buffer against windthrow. Conifer level and structures are dequate in this unit.

INSTREAM / INCHANNEL WORKS

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

ECOLOGY

AREA DESCRIPTION

STREAM UNIT	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE	MOISTURE / NUTRIENT GRID
reach 2	ESSF mc 01,07,06	5D

ELEVATION	ASPECT	SLOPE DATA OR STREAM DATA	SLOPE OR STREAM		
			POSITION	LENGTH	UNIFORMITY
Avg.: 1050	N (NE)	Min. 3 Max. 8 Avg. 5	D/E		

HUMUS FORM	ROOTING	SOIL DEPTH TO	SOIL TEXTURE	SOIL COARSE	STREAM WIDTH
				FRAGMENT	
Mor	DEPTH 30+ cm	RESTRICTING LAYER (cm) 30+	Sil	M	1.5m

WATER COURSES	HEAVY EQUIPMENT	STREAM CLASS	RIPARIAN RESEVE ZONE	RIPARIAN MGMT AREA
Water Gullies	TO BE USED ON-SITE? ( ) Yes (X) No		YES (x) NO () WIDTH:	YES (x) NO () WIDTH: 30

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT (cm)	VIGOR
Sx	34	3	1800	400	Planted 5yr olds, nats. 10+yr	88	poor
Bl	66	7	3500	100		100	poor
Horsetail		30				30	
Mefe		22				110	
Ribes		7				60	
grasses		18				110	
Epan		2				50	
Salix		2				40	
					RVC= SHRh Bl, Sx		

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

Main area of treatment is the stretch of creek that traverses the block and crosses the edge of a landing. Riparian vegetation structures are virtually non-existant. Desired stand composition would include Act, Salix and Alnus for quick growth, shade and cover. Bl and Sx will be planted tofulfill climax species target. Planting of species will be done in clumps and on grid pattern.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Landing					
Sx	13	2+0 PSB 415		100	$160
Bl	31	2+0 PSB 415		250	$450
Salix	28	whips		225	$338
Alnus	28	plugs		225	$360
			total 0.25 ha		
Block					
Salix	100			1350	$2025
			total 0.56 ha		

TREATMENT TIMEFRAMES

Planting should be done as soon as snow melts in spring 1998 as this is a high elevation site. Planting should coincide with activities on Blunt Creek (reach 1).

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

Monitor site 1, 2 and 3 years after planting to assess survivals and possible foolow-up treatments. Surveys should be done after leaf-out to assure positive species identification.

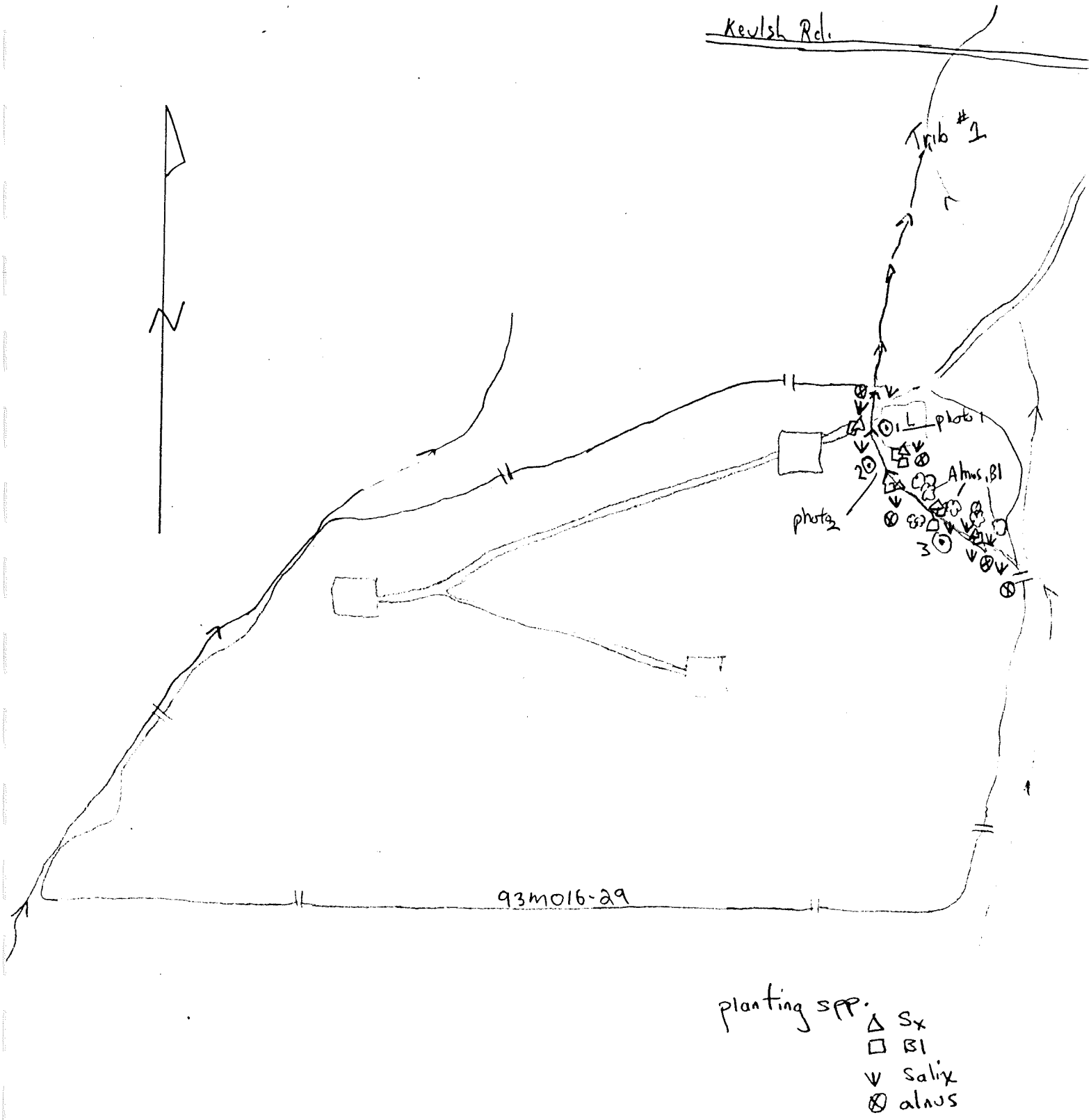
POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

ADDITIONAL COMMENTS

Trib 1a is a high priority site.

PRESCRIPTION APPROVAL			
PREPARATION		**PRESCRIPTION APPROVAL**	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/10/2	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D

WAN Tribs. 1



scale 1:5000

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL ( ) AMENDMENT	DATE Y / M / D 97/09/24

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Blunt Creek Sub-basin	

OPENING NO.	LOCATION	
93M016-27	Tribs. 2 &4 Kuelsh Rd. (41.9 and 42.6 km)	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Bulkley	T2- Photo # 7 Section 3.7 WRP 1997/98 Fiscal Report	N6110265, E629658

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y / M / D
	0.74 ha	Geoff Watling, Dave Silver	97/09/24

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

IMPACT DESCRIPTION

Tris. 2 and 4 require basic riparian structures to ensure water quality to Wan Lake

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

(LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit:

Trib. 2 : Unit has a strip < 2m of mature timber remaining along it. Remaining RMA needs Salix and Alnus for diversity, habitat and wind firmness. Some Bl needed at voids.

Trib.4 : This trib. is expected to undergo removal of timber (cut fall 1997) from its stream channel. We foresee that this will disrupt existing stocking. The prescription entails planting spring 1998 with Salix, Alnus, Sx and Bl to replace stocks damaged via skidding.

INSTREAM / INCHANNEL WORKS

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

ECOLOGY						
AREA DESCRIPTION						
STREAM UNIT 2nd reaches	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE ESSF mc 01,07,06				MOISTURE / NUTRIENT GRID 5D	
ELEVATION Avg.: 1050m	ASPECT N(NE)	SLOPE DATA OR STREAM DATA Min. 3 Max. 8 Avg. 5		SLOPE OR STREAM POSITION D/E	LENGTH	UNIFORMITY
HUMUS FORM Mor (moder)	ROOTING DEPTH 30+cm	SOIL DEPTH TO RESTRICTING LAYER (cm) 30+	SOIL TEXTURE Sil	SOIL COARSE M FRAGMENT (%) 20-35	STREAM WIDTH 1.5m	
WATER COURSES Water Gullies side channels	HEAVY EQUIPMENT TO BE USED ON-SITE? ( ) Yes (X) No		STREAM CLASS S4	RIPARIAN RESEVE ZONE YES (x) NO () WIDTH:	RIPARIAN MGMT AREA YES (x) NO () WIDTH : 30	

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT (cm)	VIGOR
Trib. 2							
Sx	69		2000	1000	planted and naturals <8 yrs	61	mod.
Bl	31		900	100	naturals <15 yrs	32	poor
					RVC= SHRh Sx,Bl		
Sx		3					
Bl		3					
Epan		15				100	
Ribes		15				50	
Horsetail		15				35	
Rubus		5				80	
Loin		5				90	
Vacc		15				60	
Trib. 4					RVC= SHRh ,Bl,Sx		
Sx	22	2	1100	200	planted & naturals to 7yrs	74	poor
Bl	78	5	4000	400	naturals & residuals to 10yrs	63	poor
Mefe		20				70	
Horsetail		10				4	
Loin		5				85	
Vacc		5				5	
Ribes		5				45	
Epan		5				130	
grasses		10				110	

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

Trib.2 : This tributary has mature timber (Bl,Sx) on a <2m ribbon along its edge. This site is a lower priority. Desired stand structure will incorporate Salix as abuffer against windthrow and provide immediate shading.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Trib. 2			total 0.63 ha		
Salix	48	whips		750	$1200
Alnus	36	plugs		600	$960
Bl	16	2+0 415 PSB		250	$400
Trib.4			total (4) 0.74ha		
Sx	14	2+0 PSB 415		300	$480
Bl	21	2+0 PSB 415		450	$720
Salix	36	whips		750	$1125
Alnus	29	15 cm plugs		600	$960

TREATMENT TIMEFRAMES

Planting should be done as soon as snow leaves in the spring 1998. As this is a high elevation site, planting will likely coincide with activities along Blunt Creek (reach 1).

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

Sites should be monitored 1, 2 and 3 years after planting to assess possible follow-up treatment. Surveys should be conducted after leaf-out for positive species identification.

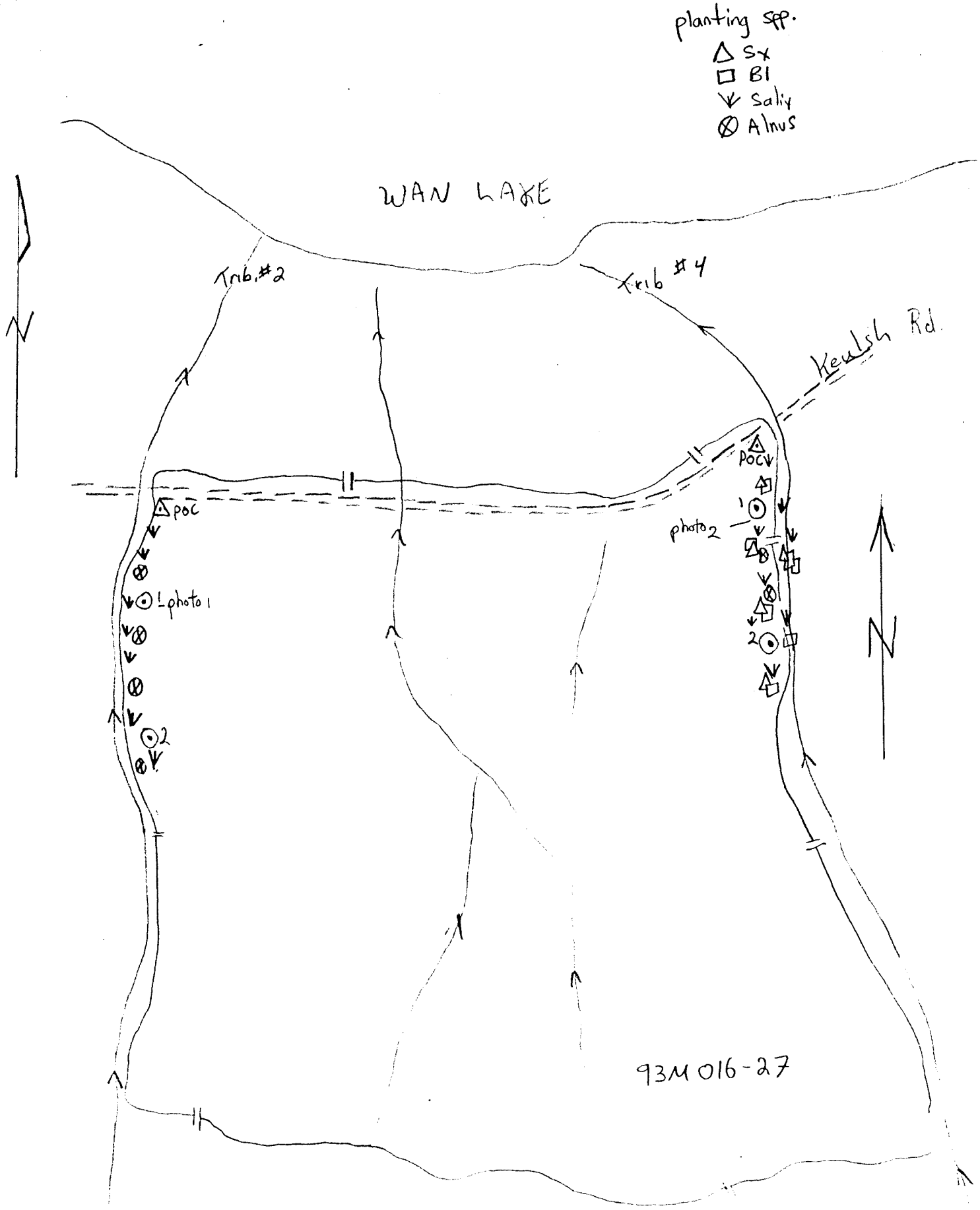
POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

ADDITIONAL COMMENTS

Tribs. 2 and 4 are of moderate urgency and should be prioitized according to available funding.

PRESCRIPTION APPROVAL			
PREPARATION		**PRESCRIPTION APPROVAL**	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/09/24	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D

WAN TRIBS 2 and 4



9.2 (A-9)

scale 1:5000

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1:20,000	(X) ORIGINAL () AMENDMENT	DATE Y/M/D 97/10/01

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Blunt Creek Sub-basin 700-50-30-110	

OPENING NO.	LOCATION	
93M005-004	Blunt 2000 rd. 24.4 km	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Bulkley	photo # 11 Section 3.9 WRP 1997/98 Fiscal Report	N6107050, E620760

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y/M/D
	0.4 ha	Geoff Watling, Dave Silver	97/10/17

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

IMPACT DESCRIPTION

This small creek has jumped its channel and now flows under the Blunt 2000 rd. through a metal culvert into a forested area. Fish have been found within this new channel. Stream channel lacks stability and shading.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

(LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit:

This site requires bank stabilizing and shading structures in the short term. Salix and Alnus can be used to accomplish this, Sx and Bl can be added wherever conifer content is lacking for long term structural integrity.

INSTREAM / INCHANNEL WORKS

See Section 3.9 Suskwa WRP 1997/98 Fiscal Report.

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

ECOLOGY

AREA DESCRIPTION

STREAM UNIT	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE	MOISTURE / NUTRIENT GRID
	ESSF mc 05,07,10	5,6,7E

ELEVATION	ASPECT	SLOPE DATA OR STREAM DATA	SLOPE OR STREAM POSITION	SLOPE OR STREAM LENGTH	SLOPE OR STREAM UNIFORMITY
Avg.: 1100m	N	Min. 3 Max. 13 Avg. 7			

HUMUS FORM	ROOTING	SOIL DEPTH TO	SOIL TEXTURE	SOIL COARSE FRAGMENT (%)	STREAM WIDTH
Mormoder	DEPTH 30+ cm	RESTRICTING LAYER (cm) 30+	Sil	20-40	1m

WATER COURSES	HEAVY EQUIPMENT	STREAM CLASS	RIPARIAN RESEVE ZONE	RIPARIAN MGMT AREA
Water Gullies	TO BE USED ON-SITE? (x) Yes ( ) No	S4	YES (x) NO () WIDTH:	YES (x) NO () WIDTH: 30

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT (cm)	VIGOR
Sx		5			planted 4+yrs, some voids	44	good
Bl		5			naturals <5 yrs	44	fair
grasses		20				110	good
Epan		7				100	good
Ribes		10				40	good
Vied		2				45	good
Loin		5				65	good
Salix		2				65	good

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

Due to the small size of this unit a blanket treatment is prescribed with species being planted where appropriate. Salix will be planted mainly around the road crossing. The access rd. within 93M005-004 should also be planted. Fill-plantig of conifers is recommended at the crossing. Salix will be especially helpful in stabilizing the west bank on the southeast of the creek. Plant in groups aswell as in a grid pattern.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Bl		2+0 PSB 415	total 0.4 ha	120	$192
Sx		2+0 PSB 415		120	$192
Salix		whips		800	$1200
Alnus		plug		400	$600

TREATMENT TIMEFRAMES

Planting should be done in the late spring as soon as snows melt (1998).

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

Monitor 1, 2 and 3 years after planting to assess survivals and possible fill-planting. Assess after leaf-out to assure positive species identification.

POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

ADDITIONAL COMMENTS

This prescription is written with the presumption that the channel will not be reinstated to its former channel due to fish distribution below the road crossing.

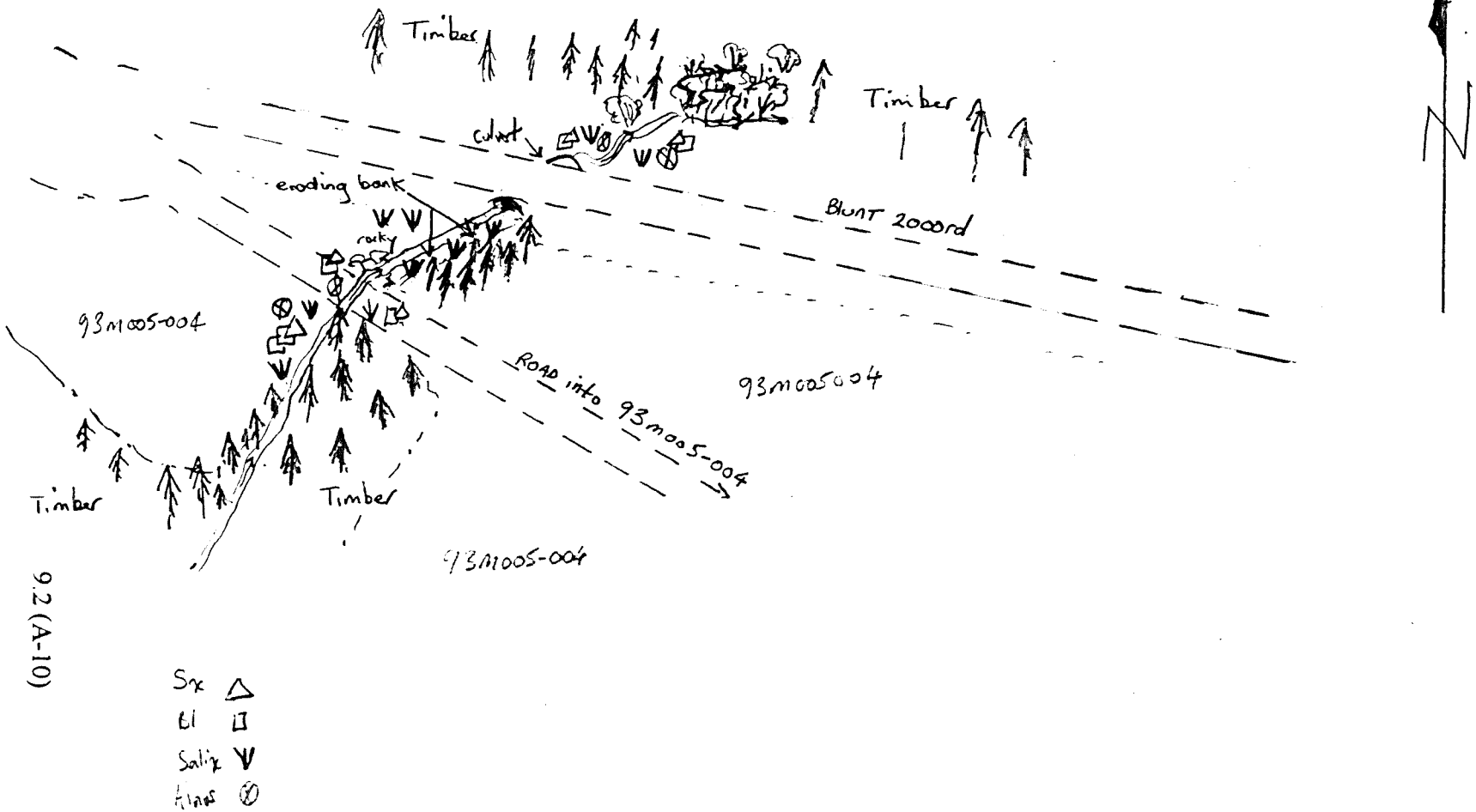
PRESCRIPTION APPROVAL			
PREPARATION		**PRESCRIPTION APPROVAL**	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/10/17	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D

Scale 1:1000

Blk 93m005-004
Creek 050-030-110

Scale 1:1000

Blk 93m005-004
/W.C. 46-700-50-30-110



9.2 (A-10)

93M 005 - 4

(W.C. 46-700-50-30-110)

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL ( ) AMENDMENT	DATE Y / M / D 97/09/04

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	W.C. 46-700-50-30-115-10 to Blunt Creek	
OPENING NO. 93M015 -02	LOCATION 21.3 km Blunt 2500 rd.	
REGION Prince Rupert	DISTRICT Bulkley	AIR PHOTO NO. mosaic enclosed
LONGITUDE / LATITUDE / UTM GRID N6108650, E617300		

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y / M / D
	1.64 ha	Geoff Watling, Dave Silver	97/10/22

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report.

IMPACT DESCRIPTION

Streamside vegetation has been removed from one bank of the creek for 400m dowstream of the bridge site. The stream has jumped its banks at several points within this section at debris jams. The outside curves of the creek show signs of instability and seasonal channel avulsions appear to follow the fireguard which runs parallel to the stream.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

(LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit: Riparian management objectives predominantly concern the shading and stabilization of this tributaries channel along block 93M015-2. Streamside habitat and riparian corridors for wildlife are also a primary concern. Act, Salix and Alnus will be added for short-term riparian qualities with Sx and Bl added to the existing conifers for long-term LOD, shading and climax structure.

INSTREAM / INCHANNEL WORKS

See Section 6.4.6 Suskwa WRP 1997/98 Fiscal Report

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

Revegetation of this riparian area will benefit large mammals as this corridor exhibits signs of use by grizzly, moose and wolf. Bl will be introduced to diversify the existing stand of Sx and Pl. This range area also shows signs of bank disturbance by livestock (cattle).

ECOLOGY						
AREA DESCRIPTION						
STREAM UNIT reach 2	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE ESSF mc 01 (06)			MOISTURE / NUTRIENT GRID 4-5/C		
ELEVATION Avg.: 1072 m	ASPECT SE	SLOPE DATA OR STREAM DATA Min. 2 Max. 5 Avg. 2		SLOPE OR STREAM POSITION E/F	LENGTH	UNIFORMITY
HUMUS FORM Mor	ROOTING DEPTH 30+cm	SOIL DEPTH TO RESTRICTING LAYER (cm) 30	SOIL TEXTURE SL	SOIL COARSE FRAGMENT (%) < 35%		STREAM WIDTH 3.5 m
WATER COURSES Water Gullies	HEAVY EQUIPMENT TO BE USED ON-SITE? ( ) Yes (X) No		STREAM CLASS S3	RIPARIAN RESEVE ZONE YES (x) NO () WIDTH: 20		RIPARIAN MGMT AREA YES (x) NO () WIDTH: 40

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT (cm)	VIGOR
Pli					planted 3 yr olds	105	good
Sx	90	6			natural varied < 3 yr old	20	good
Bl	5	2			natural varied <3 yr old	20	good
Hw	5	2			natural varied < 3yr old	15	good
Alnus		not in plots					good
fireweed		50				100	good
twinberry		5			RVC=SHRh Pli(Sx,Bl)	90	good
ribes		5				50	good
cow parsnip		2				120	good
elder-berry		2				130	good
bunch-berry		5				5	good
coltsfoot		5				15	good
horsetail		5				25	good
grasses		5				100	good
willow		2				90	good
alder		4				200	good

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

Stand conditions should mimic riparian vegetation complexes that occur in similar areas adjacent the harvested section within the EFFS mc. A mixture of Balsam and Spruce would be the desired conifer component with a small amount of cottonwood to utlize its quick growing characteristics for short-term LOD. The shrub component should consist of a Salix dominated layers immediatly adjacent the stream with interspersed alder. Planting of all species should attempt to mimic natural populations of these plants by placing them in groups and clumps rather than a typical grid pattern.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Sx	8	PSB 415 4+0	total 1.27 ha	254	$406
Bl	12	PSB 415		381	$610
Act	20	whips		635	$953
Salix	40	whips		1276	$1914
Alnus	20	plugs		635	$1016
Special areas					
Sx	6	PSB 415 2+0	total 0.37 ha	74	$118
Bl	10	PSB 415 2+0		111	$178
Act	17	whips		185	$276
Salix	67	whips		740	$1110

TREATMENT TIMEFRAMES

Planting should be done as soon as the snow leaves in 1998 and should be finished in the shortest possible time (approx. 2 weeks).

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

Monitoring of this site should be done with a revised silvicultural survey that recognizes modifications to the stocking standards necessary to acommodate riparian restorative objectives. Surveys should be conducted one, two and three years after planting to assess the vegetation structures and their adaptation to these sites. Surveys should be done after leaf-out for positive species identification.

POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

Posssible fill-planting.

ADDITIONAL COMMENTS

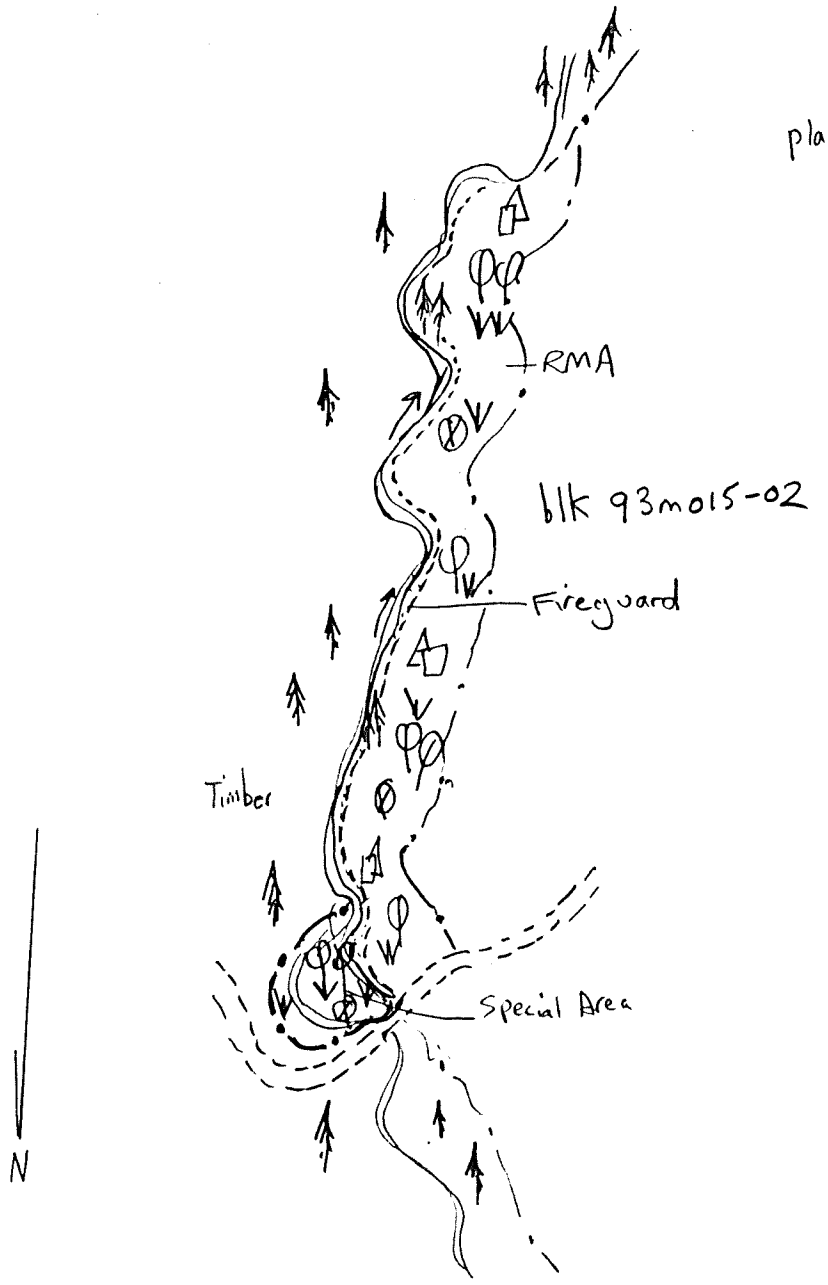
A special area exists downstream of the road crossing and will be planted to the species mix as the rest of the RMA , however Salix will be planted to 2000 stems per hectare in the hopes of helping to stabilize this stream channel.

PRESCRIPTION APPROVAL			
PREPARATION		**PRESCRIPTION APPROVAL**	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/10/22	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D

93m015-02

Creek WC 46-0700-50-30-115-10

scale 1:3333 (approx)



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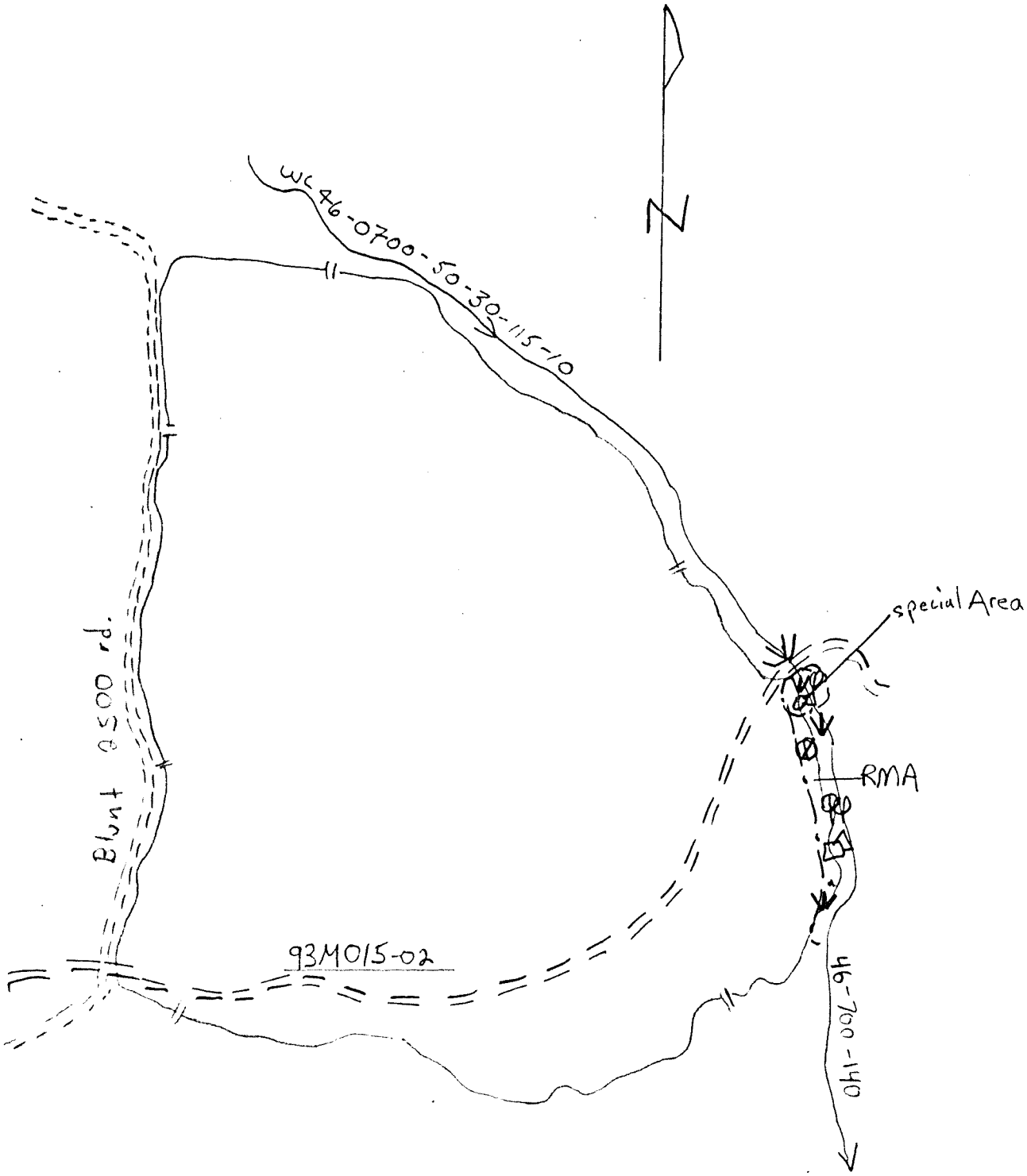


W.C 46-700-50-30-115-10 to Blunt Cr. through block 93M 35-15. **Photo Scale 1:3597**

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL ( ) AMENDMENT	DATE Y / M / D 98/03/16

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Lower Suskwa River Sub-basin	

OPENING NO.	LOCATION	
93M024-18	Skilokis Creek reach 1	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Kispiox	Skilokis mosaic # 1 WRP 1995/96	N6126890, E609960

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y / M / D
	1.46 ha	Geoff Watling, Dave Silver	97/9/23

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

IMPACT DESCRIPTION

Outside curves on Skilokis Creek, upstream of the Hamblin rd. bridge, are being eroded during highwater to reach 1 and the Suskwa River.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

(LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit:

Unit 1: Plant conifers under Alnus canopy for long-term LOD, shading and climax riparian vegetation structures.

Unit 2: No treatment. Let deciduous component continue.

Unit 3: No treatment. Let conifers develop naturally and self-space.

Special area: Salix and Act for streambank stabilization , LOD and shading.

INSTREAM / INCHANNEL WORKS

See Suskwa WRP 1997/98 Fiscal Report Section 6.1.

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

ECOLOGY						
AREA DESCRIPTION						
STREAM UNIT reach 1	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE ICH mc2 01(07)			MOISTURE / NUTRIENT GRID 5B (6C pockets)		
ELEVATION Avg.: 457m	ASPECT N	SLOPE DATA OR STREAM DATA Min. Max. Avg.		SLOPE OR STREAM POSITION E	LENGTH	UNIFORMITY
HUMUS FORM Mor	ROOTING DEPTH 30 cm	SOIL DEPTH TO RESTRICTING LAYER (cm) 30 cm	SOIL TEXTURE Sil	SOIL COARSE FRAGMENT M 35-70	STREAM WIDTH 4m	
WATER COURSES Water Gullies	HEAVY EQUIPMENT TO BE USED ON-SITE? ( ) Yes (X) No		STREAM CLASS S3	RIPARIAN RESEVE ZONE YES (x) NO () WIDTH:	RIPARIAN MGMT AREA YES (x) NO () WIDTH:	

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT (cm)	VIGOR
Sx	45	5	1800	400	natural seed-in varied age	320	
Cw	43	4	1700	600	natural seed-in varied age	380	
Hw	5	<1	400		naturals < 2yrs uniform	150	
Bl	2	<1	200		naturals avg. <6yrs	550	
Act	5	5	400	200	15 cm dbh/26 yrs uniform	950	
Alnus		25				900	
Cose		5					
Opho		5					
Special area							
Salix	65	8			germinants <2yrs old	<10	
Act	35	3			germinants <2yrs old	<10	

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

Unit 1: Alnus overstorey with conifer understorey is target. Area is evolving nicely towards the target. Planting Bl and Cw (and minor Sx component) in small groupings will complete the groundwork necessary for building adequate riparian structures. This structure will consist of a Alnus, Act overstorey that will give way in time to Sx, Hw and Cw climax species.

Unit 2: This is a Pli dominated stand with Hw, Cw and Sx understorey. Desired conditions would include leaving understorey to develop and allowing At and Ep to freely develop and retain shrub layers.

Unit 3: A thick Sx unit that is low-priority. Sx starting to self-thin themselves with large diameter trees evolving from the stand. This stand should develop along desired lines with a minimum of activity.

Special area: This consists of streambanks and a couple of small gravel bars within the bankfull width. This unit will be an experiment in streambank stabilization utilizing Act, Salix and minor amounts of Alnus, Sx and Bl.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Unit 1			total 1.48 ha		
Bl	50	2+0 415 PSB		600	$960
Cw	25	2+0 415 PSB		300	$480
Sx	12.5	2+0 415 PSB		150	$240
Hw	12.5	2+0 415 PSB		150	$240
Unit 2		no treatment			
Unit 3		no treatment			
Special area					
Salix		whips	total 0.2 ha	400	$650
Act		whips		100	$150
Alnus		15 cm plugs		100	$160
Sx		PSB 415 2+0		100	$160

TREATMENT TIMEFRAMES

Planting should be done after highwater in early-mid summer. Planting should be completed as soon as possible and should take no more than 2 weeks.

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

Site should be monitored 1, 2 and 3 years after planting to assess possible subsequent treatments. Surveys should be conducted after leaf-out to assure positive species identification.

POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

Surveys

ADDITIONAL COMMENTS

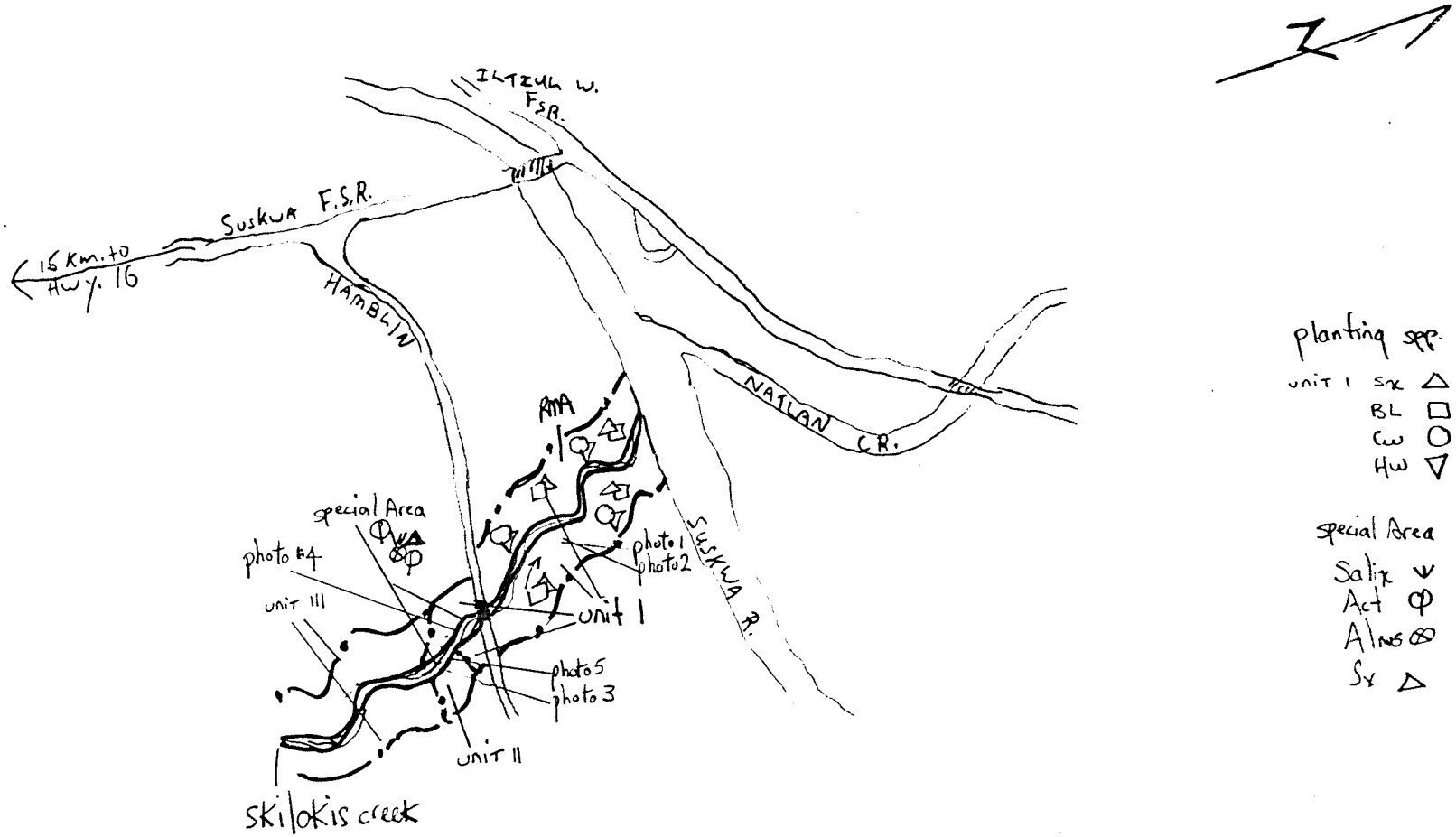
PRESCRIPTION APPROVAL			
PREPARATION		**PRESCRIPTION APPROVAL**	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/09/23	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D

93m-024-018

1:5000

93M024-18

1:5000



9.2 (A-12)

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1:20,000	(X) ORIGINAL () AMENDMENT	DATE Y/M/D 97/09/05

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Upper Suskwa sub-basin (W.C. 46-700-140)	

OPENING NO.	LOCATION	
93M035-15	0 km Grizzly Main FSR	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Kispiox	Photo # 3 (Section 3.3)	N6134185, E624900

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y/M/D
	2.04 ha	Geoff Watling, Dave Silver	97/10/17

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

IMPACT DESCRIPTION

Most of RMA is in good shape with the growth of Alnus alongside the creek and Sx and vegetation inland (RM Z). The RM Z could use thickening with Salix, Alnus and Act. The outside curve special area is erosion prone by the creek, and it also needs short term vegetation for shading LWD purposes.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

(LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit:

The objectives are to thicken vegetation structures in the RMA with the addition of Salix and Alnus, with Act also added for short term LOD, shading etc. Extra Salix will be planted in the special area in the hopes that the added root penetration will stabilize the streambanks.

INSTREAM / INCHANNEL WORKS

See Section 6.1.4 (Suskwa WRP 1997/98 Fiscal Report)

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

Increasing vegetation in the RMA will expand wildlife cover attributes to meet bio-diversity and riparian standards.

ECOLOGY						
AREA DESCRIPTION						
STREAM UNIT reach 2	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE ICHG mc 1 03,04 (01)			MOISTURE / NUTRIENT GRID 5C/D (E)		
ELEVATION Avg.: 900 m	ASPECT S(SE)	SLOPE DATA OR STREAM DATA Min. 5 Max. 10 Avg.7		SLOPE OR STREAM POSITION	LENGTH	UNIFORMITY
HUMUS FORM Mor	ROOTING DEPTH 30 cm	SOIL DEPTH TO RESTRICTING LAYER (cm) 30	SOIL TEXTURE Sil	SOIL COARSE FRAGMENT mod	STREAM WIDTH 5 m	
WATER COURSES Water Gullies	HEAVY EQUIPMENT TO BE USED ON-SITE? ( ) Yes (X) No		STREAM CLASS S3	RIPARIAN RESEVE ZONE YES (x) NO () WIDTH: 20	RIPARIAN MGMT AREA YES (x) NO () WIDTH: 40	

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT (cm)	VIGOR
Sx	40	4	1960	500	4 yr old - planted	45	good
Bl	50	5	2450	500	naturals and residuals	<150	good
Hw	10	3	490		naturals and some residuals	<100	good
Epan		30			RVC= SHRh Bl,Sx (Hw)		
Vied		15					
Rupa		10					
Loin		5					
Ribes		5					
Vacc		5					
Rubus		5					
Horsetail		5					
Oak fern		10					

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

Substatial portions of the RRZ are Alnus covered and require no treatment. Some of the RMA and all of the RRZ will be planted to Salix, Alnus and Act for quick shade and LOD structures. There seems to be enough conifer present with 4900 stems / ha and 1000 well spaced stems/ha, no conifer content will be added to this stand.

The deciduous component will generally thicken up the riparian structures and provide wildlife cover in the future. Assuming Alnus takes up one half of the RRZ the RMA will be 1.8 ha. The plantings will be done in groupings to emulate natural riparian vegetation structures. Conifers should be staked to avoid snow and vegetation press.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Act	25	whips	total 1.8 ha	900	$1440
Salix	50	whips		1800	$2880
Alnus	25	plugs		900	$1440
special area					
Act	2	whips		120	$192
Salix	8	whips		480	$768
					$6720

TREATMENT TIMEFRAMES

Planting should be done first thing in the spring, as soon as the snow leaves. Planting should be done in the shortest possible time, preferably within one month after start-up.

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

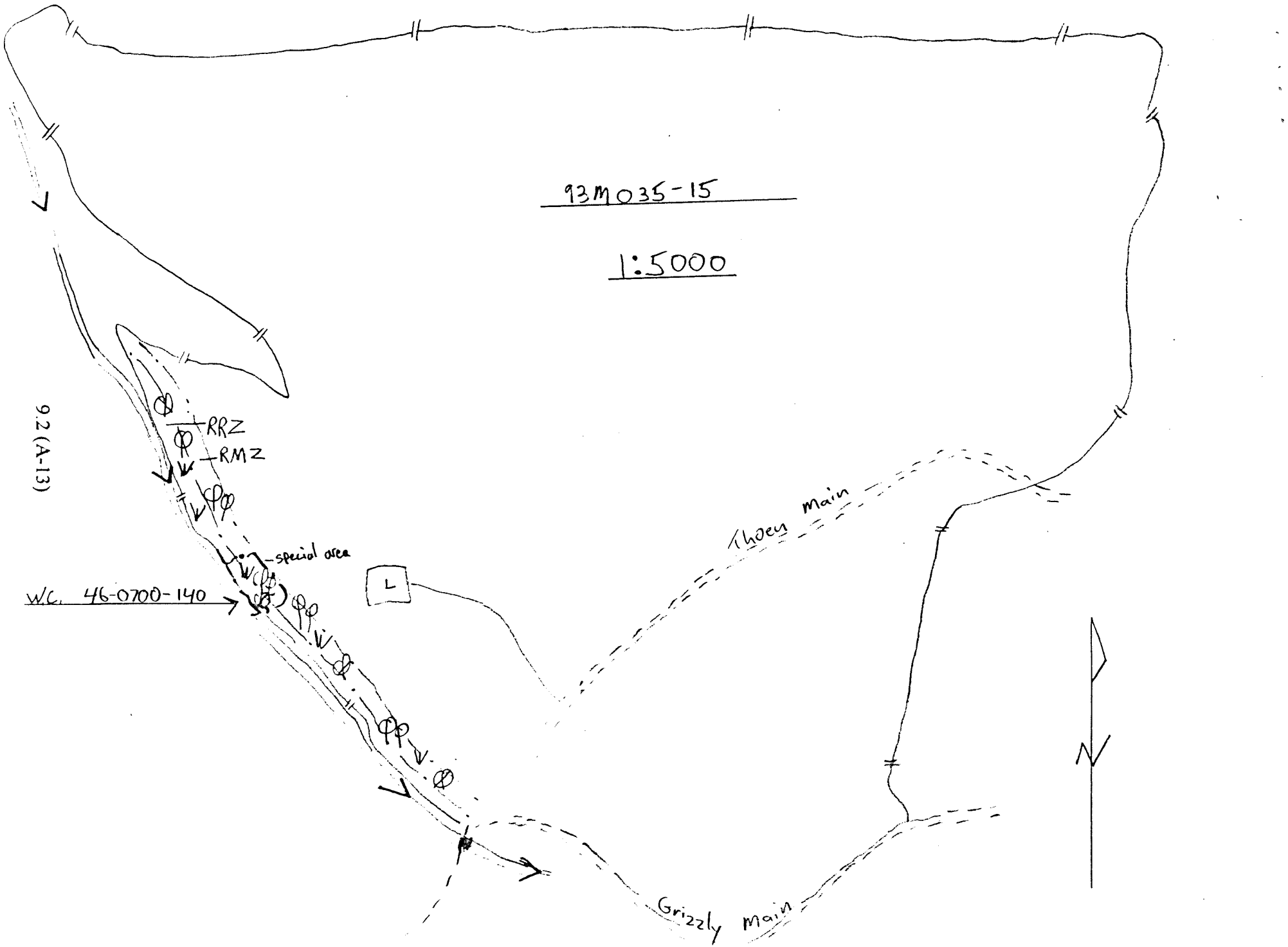
(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

Site should be monitored one, two and three years after planting to assess the need for any fill planting, spacing or brushing. Surveys should be conducted after leaf out to assure positive species identification.

ADDITIONAL COMMENTS

PRESCRIPTION APPROVAL			
PREPARATION		**PRESCRIPTION APPROVAL**	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/10/17	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D


93M035-15
1:5000
9.2 (A-13)
RRZ
RMZ
special area
W.C. 46-0700-140
L
Thoen main
Grizzly main

RIPARIAN MANAGEMENT PRESCRIPTION

ATTACH MAP AT FOLLOWING SCALE: (x) 1:5,000 ( ) 1:10,000 (x) 1: 20,000	(X) ORIGINAL ( ) AMENDMENT	DATE Y / M / D 97/10/02

LOCATION

WATERSHED RESTORATION PROJECT	WATERSHED DRAINAGE / SUB-UNIT	
Suskwa	Natlan Creek Sub-basin	

OPENING NO.	LOCATION	
93M035-11	Denison Creek (reach 3)	

REGION	DISTRICT	AIR PHOTO NO.	LONGITUDE / LATITUDE / UTM GRID
Prince Rupert	Kispiox	Denison mosaic # 4&5 WRP 1995	N6134135, E617300

TOTAL AREA	NET AREA TO BE TREATED	FIELD WORK DONE BY	DATE COMPLETED Y / M / D
	2.375 ha	Geoff Watling, Dave Silver	97/10/15

FISH HABITAT ASSESSMENT

See Suskwa WRP 1996/97 Fiscal Report

IMPACT DESCRIPTION

Unit 1: Some slumping on downstream portion of unit. Good RRZ structures to 15m. Lots of conifers. Requires only Act, Salix and Alnus in RMA and a small portion in the RRZ.

Unit 2: The RMA lacks riparian vegetation structures. Some erosional activity at streambanks with loss of shade/cover LWD input and SOD.

RIPARIAN PRESCRIPTION MANAGEMENT OBJECTIVES

(LWD/SOD, Stream shading, Surface sediments, Degradation)

Detailed Description per Unit:

Unit 1: The main objectives are to increase shade and cover to the RMA as soon as possible using deciduous species.

Unit 2: The objectives at this site are to stabilize streambanks and to provide long-term LWD, shade and cover using quick growing hardwoods, for initial input, and conifers for long-term riparian structures.

INSTREAM / INCHANNEL WORKS

ADDITIONAL MANAGEMENT OBJECTIVES

(Wildlife, Forest Health, Silviculture) (Consider Adjacent Stand)

Cover added by plantings will complete the wildlife corridor along Denison Creek. Bear scat (possibly grizzly) was noted during field visits. Salix will assist in stabilizing a washout in the western end of block 93M035-11.

ECOLOGY

AREA DESCRIPTION

STREAM UNIT	ZONE, SUBZONE, VARIANT, SITE SERIES, PHASE, TYPE	MOISTURE / NUTRIENT GRID
reach 3	ICH mc2 03,04	5 D/E

ELEVATION	ASPECT	SLOPE DATA OR STREAM DATA	SLOPE OR STREAM POSITION	LENGTH	UNIFORMITY
Avg.: 870m	WSW	Min. 5 Max. 75 Avg. 50	G		

HUMUS FORM	ROOTING	SOIL DEPTH TO	SOIL TEXTURE	SOIL COARSE	STREAM WIDTH
Mor	DEPTH 30+ cm	RESTRICTING LAYER (cm) 30	SiCL	FRAGMENT (%)	>5m

WATER COURSES	HEAVY EQUIPMENT	STREAM CLASS	RIPARIAN RESEVE ZONE	RIPARIAN MGMT AREA
Water Gullies 3 streams enter Denison	TO BE USED ON-SITE? ( ) Yes (X) No	S2	YES (x) NO () WIDTH: 30	YES (x) NO () WIDTH: 50

CURRENT STAND COMPOSITION

SPECIES	% STAND COMP.	% AREA COVERAGE	TOTAL SPH	WELL SPACED SPH	DESCRIPTION: (STOCKING, UNIFORMITY, AGE CLASS)	HEIGHT (cm)	VIGOR
Unit 1							
Sx	46	15	2600	900	6 yrs- some small voids	100	good
Bl	44	15	2500	300	abundant naturals <10yrs	80	good
Hw	10	10	600	100	naturals residuals <15 yrs	<200	good
Epan		20					
Ribes		5					
Horsetail		0.5					
Mefe		5					
Vacc		10					
Alnus		5					

TARGET CONDITIONS AND STRATEGY

TREATMENT REGIME (Describe target stand condition, Desired species, Stocking %, Density, Etc.) (Reference to Large Scale Project Map, outlining Treatment Units requiring different species or levels of stocking)

Unit 1: Requires Act, Salix and Alnus with extra Salix at special area # 1. Wattling on slumping hillside.

Unit 2: Plant Sx and Bl for climax structures and Act,Salix and Alnus for short-term stand stability, shading and LOD.

SEEDLING REQUIREMENT INFORMATION

SPECIES	PERCENT STAND COMP.	STOCK TYPE	TREATMENT AREA (UNIT & HA)	QUANTITY	COST (APPROX.)
Unit 1					
Act	33.3	whips	0.875 ha	438	$657
Salix	33.3	whips		438	$657
Alnus	33.3	15 cm plugs		438	$701
Unit 2					
Sx	8	PSB 415 2+0	total 1.5 ha	450	$720
Bl	8	PSB 415 2+0		450	$720
Act	14	whips		750	$1125
Salix	56	whips		3000	$4500
Alnus	14	plugs		750	$1200
Wattling:					
Salix	100	stakes	<0.1 total	250	$375

TREATMENT TIMEFRAMES

Planting should be done as soon as snow melts in late spring 1998 and should be completed 4 weeks after commencement.

POST-TREATMENT OR FOLLOW-UP ACTIVITIES

(Recommended post-treatment activities: Fill-planting, spacing, brushing, survival surveys)

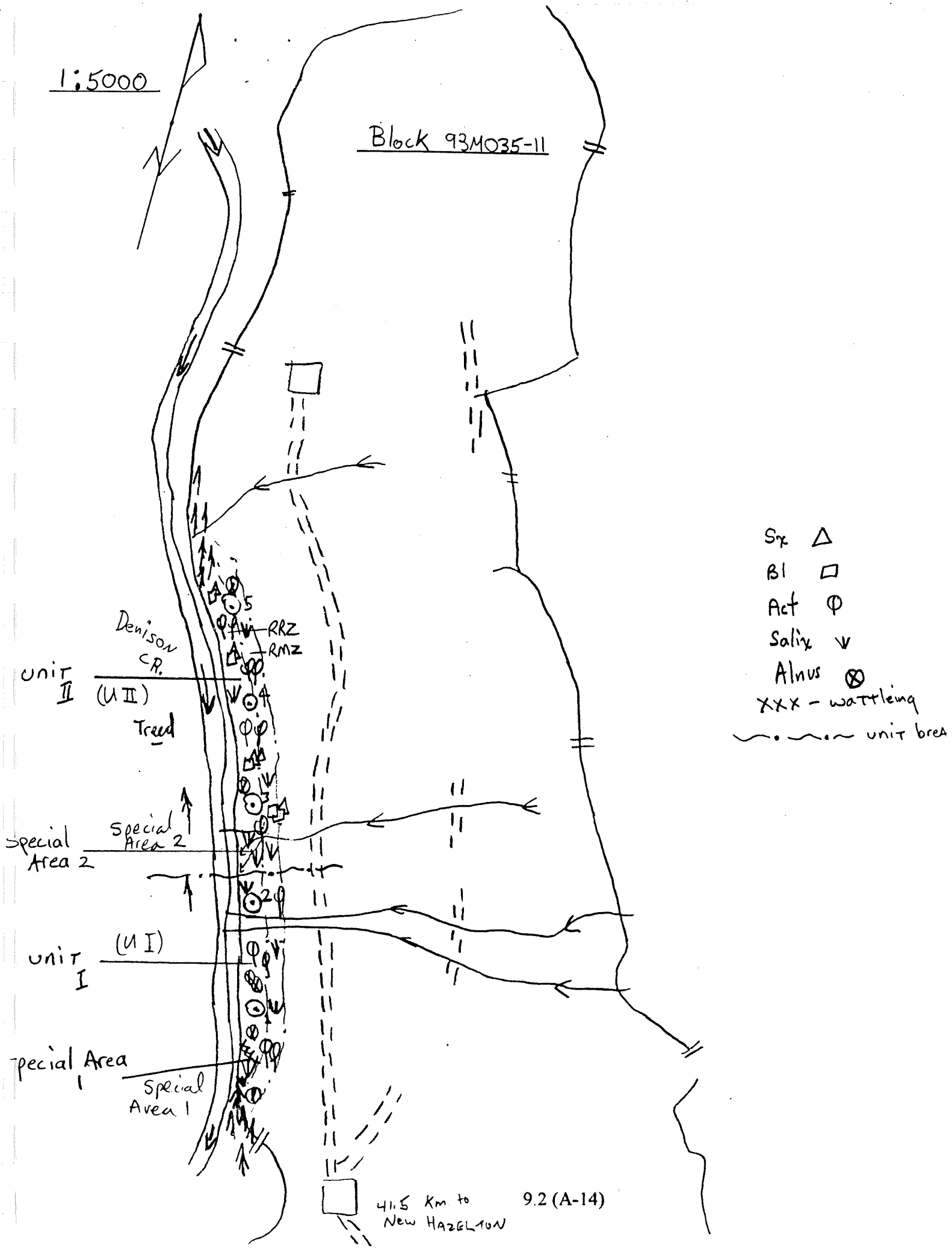
Monitor 1, 2 and 3 years after planting to assess any treatments necessary (i.e. spacing, brushing). Surveys should be done after leaf-out for positive species identification.

POTENTIAL FUTURE MANAGEMENT ACTIVITIES PLANNED

Fill-planting of slope failure and exposed soils with Salix.

ADDITIONAL COMMENTS

PRESCRIPTION APPROVAL			
PREPARATION		**PRESCRIPTION APPROVAL**	
PREPARED BY		MINISTRY OFFICIAL (MOE) *(SIGNATURE)*	
PRINTED NAME Geoff Watling	DATE PREPARED Y / M / D 97/10/15	PRINTED NAME	DATE APPROVED Y / M / D
MINISTRY OFFICIAL (MOF)		**FINAL APPROVAL**	
SIGNATURE		DISTRICT MANAGER *(SIGNATURE)*	
PRINTED NAME	DATE SIGNED Y / M / D	PRINTED NAME	DATE APPROVED Y / M / D


1:5000
Block 93M035-11
Denison C.R.
RRZ
RMZ
unit II (UII)
Treed
Special Area 2
Special Area 2
unit I (UI)
Special Area 1
Special Area
41.5 Km to New HAZELTON
9.2 (A-14)
Sx
Bl
Act
Salix
Alnus
XXX - wattleing
unit brea