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PRELIMINARY ASSESSMENT OF THE MURRAY-CHESLATTA SYSTEM

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Prepared for:

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- balancing river flows to: restore fish habitat in the river while minimizing the increased flushing rate of the lakes

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EXECUTIVE SUMMARY

The NEEF Management Committee has identified that their first priority should be further examination of a water release facility at Kenney Dam, reducing discharges through the Skins Lake Spillway and allowing rehabilitation of the Murray-Cheslatta system. The objective of our report was to provide clear rehabilitation objectives, identifying the flows required to support rehabilitation, reviewing options for raising minimum lake levels, and assessing the implications of flood flow releases from Skins Lake on rehabilitation.

Based on discussions with stakeholders, we recommend that fishery rehabilitation be the main objective. Secondary objectives would be tourism and recreation, where they are consistent with fishery rehabilitation.

The consensus is that flow releases from Skins Lake Spillway are required to rehabilitate fish habitat in the Cheslatta River. We recommend the minimum release practical in Cheslatta River as this is consistent with minimum flushing of Murray and Cheslatta Lakes and restoring their productivity. Flow releases from the Skins Lake Spillway would need to be combined with other activities to ensure rehabilitation.

The optimal annual release or seasonal pattern of flows from Skins Lake to supplement natural flows has not yet been determined. We recommend an adaptive approach where the releases mimic a natural hydrograph, starting with small annual releases, perhaps of 5 m^3/s. As required to rehabilitate habitat, the annual release could be gradually increased to about 15 m^3/s.

One issue that is not addressed by the natural hydrograph is "flushing flows" to maintain substrate and channel morphology. The best alternative is to divert part of the flood releases through the Skins Lake Spillway during May to supplement the natural hydrograph as required, based on observations of the stream.

It is our view, and that of some stakeholders, that infrequent flood releases from the Skins Lake Spillway are not incompatible with rehabilitation of the Cheslatta River. First, they would be extremely rare. Second, by maintaining channel dimensions, particularly the existing broad floodplain, it may be practical to pass the flood flows with minimal damage.

Finally, the Cheslatta Carrier Nation has proposed a low weir at the outlet of Murray Lake to raise minimum lake levels. The disadvantages of raised levels are that wave erosion of the shoreline would be expected to continue, the lower reaches of tributaries would remain flooded, preventing their rehabilitation, and extreme water levels would occur during infrequent flood releases through the Skins Lake Spillway, to a higher elevation that experienced under the cooling or pre-spill releases. We see few advantages to raising minimum lake levels and numerous disadvantages and consequently do not support such an approach.

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IMPORTANT

The present study has been conducted on the basis of available information, previous reports, and field inspections limited by the available time and budget. Numerical estimates provided herein represent attempts to satisfy the requirements of the study on the basis of available information and professional judgement, but in many cases they are subject to uncertainty.

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1. INTRODUCTION

1.1 OVERVIEW AND OBJECTIVES

The 1997 Settlement Agreement between the Province of British Columbia and the Aluminum Company of Canada (Alcan) created the Nechako Environmental Enhancement Fund (NEEF). The fund is managed by a three-person committee whose mandate is to identify opportunities for downstream enhancement in the Nechako Watershed, carefully considering the views of aboriginal communities, interest groups and the public.

Through public consultation the NEEF Management Committee has identified that their first priority should be further examination of a water release facility at Kenney Dam. Construction of such a facility would reduce discharges through the Skins Lake Spillway and allow rehabilitation of the Murray-Cheslatta system.

The overall purpose of this study is to provide the Management Committee with clear rehabilitation objectives for the Murray-Cheslatta system and document the options available to meet these objectives. The rehabilitation plan is to address the following issues:

- Identify the flow required to support rehabilitation of the Murray-Cheslatta system.
- Identify options for raising and stabilizing water levels in the Murray-Cheslatta Lake system.
- Assess the implications for rehabilitation of a 1 in 200 year flow release from Skins Lake Spillway, assuming that rehabilitation structures are constructed.

1.2 SCOPE

The Nechako and Murray-Cheslatta Watersheds are well-studied and most of the information required for the assessment was obtained from existing reports. The scope also included detailed discussions with stakeholders, particularly the South Side Economic Development Association (Appendix A) and the Cheslatta Carrier Nation (Appendix B). The Murray-Cheslatta system was inspected from the air on September 6, 2000, by helicopter.

2. THE MURRAY-CHESLATTA WATERSHED

In considering rehabilitation objectives, it is convenient to divide the Murray-Cheslatta System into the following components (Figure 1):

- Cheslatta River
- Cheslatta and Murray Lakes
- The tributaries to Cheslatta and Murray Lakes
- Murray River, between Cheslatta and Murray Lake
- Lower Cheslatta River, downstream of Murray Lake

2.1 PHYSIOGRAPHY

Murray and Cheslatta Lakes lie north of the Nechako Reservoir and south of Francois Lake on the Nechako Plateau (Holland 1976; Figure 1). The two lakes lie in a broad east-west trending valley at elevations of about 750 m. The height of land along the edge of their watershed reaches about 1,300 m. Cheslatta is the larger of the two lakes; it is about 50 km long and 1 km wide. Lyons and Larkin (1952) provide further details on their limnology.

The Murray-Cheslatta watershed has six main tributaries –Cheslatta River and Ootsanee, Sather, Knapp, Bird and Holy Cross Creeks – as well as a number of smaller tributaries. The total area of its watershed is about 1,300 km^2. The lower Cheslatta River drains Cheslatta and Murray Lakes and joins the Nechako River about 10 km downstream of Kenney Dam.

2.2 RELEASES FROM THE NECHAKO RESERVOIR

During construction of the Kenney Dam and filling of the Nechako Reservoir a low dam was built at the outlet of Murray Lake to store water for release to the Nechako River. After the Nechako Reservoir filled in 1956, flows were discharged to the Nechako River via the Skins Lake Spillway. Flows from the spillway travel down the upper Cheslatta River, through Cheslatta and Murray Lakes, through the lower Cheslatta River and over the Cheslatta Falls to the Nechako River. Effectively, the Murray-Cheslatta system has been part of the spillway of the Nechako Reservoir since 1956.

From 1956 to 1979, releases from the Nechako Reservoir through the Skins Lake Spillway were primarily managed for power generation at Kemano. In 1980, an injunction was granted to the Department of Fisheries and Oceans for minimum discharges into the upper Nechako River and cooling flow releases during the sockeye migration. The Nechako Fisheries Conservation Program now manages releases into the Nechako River but it maintains about the same regime as was established in 1980, originally called the "short-term flow regime". An alternative regime called the "long-term flow regime", proposed as part of the Kemano Completion Project, was never implemented.

2.3 OVERVIEW OF DAMAGE TO THE MURRAY-CHESLATTA SYSTEM

Prior to the releases from the Skins Lake Spillway, the Cheslatta River was a narrow stream that meandered along its floodplain to Cheslatta Lake and may have been about 5 to 10 m wide (Kellerhals, Church and Davies 1979; Lyons and Larkin 1952). As a result of the much larger flows that have entered from the spillway, the stream greatly enlarged and downcut (incised) up to 10 to 20 m to bedrock. Small tributaries to the main river have also downcut through their fans to join the main river. The coarse sediment eroded from the Cheslatta River and its tributaries has been deposited as an extensive delta at the head of Cheslatta Lake. Fine sediments have been carried into Murray and Cheslatta Lakes, increasing turbidity and depositing along shorelines and on the lake bottom. The finest sediments have been carried through the lakes and into the Nechako River (Federenko 1987; RCPL 1987).

The greatly increased flows from the spillway have raised water levels on Murray and Cheslatta Lakes, caused more frequent flushing due to the greater volume of water passing through the lakes, caused shoreline erosion from wave action at higher elevations, flooded the lower reaches of tributaries, and changed the annual pattern of lake levels. Due to releases of cooling flows under the current management regime for the Nechako River maximum lake levels now often occur in August and September. Reduced productivity as a result of much more frequent flushing has reduced the lakes from mesotrophic to oligotrophic status.

The increased flows through the Murray River have apparently resulted in a deep scour hole between Cheslatta and Murray Lakes. Sediment eroded from the streambed is deposited as a delta at the head of Murray Lake. It is also possible that some fine sediment eroded from the Cheslatta River has been deposited through part of this reach.

The greatly increased flows also resulted in an avulsion along the lower Cheslatta River between Murray Lake and the Cheslatta Falls. Overtopping of the right stream bank on several occasions resulted in diversion of flows into a gully and erosion of glacial deposits (RCPL 1987). Stream banks were raised and a saddle dam constructed to prevent future diversions. Lyons and Larkin (1952) note that the Cheslatta River contained excellent spawning gravel during their inspections. The gravel has now been entirely eroded and the channel is steep with bedrock banks and bed.

2.4 PREVIOUS REHABILITATION RECOMMENDATIONS

Three documents were reviewed that address fish habitat or channel rehabilitation. In a study conducted for the Ministry of Environment, Lands and Parks (MELP), Harder (1986) investigated Bird, Holy Cross, Knapp, and Ootsanee Creeks. He surveyed these creeks and commented on their fisheries capabilities and enhancement opportunities.

Ableson and Slaney (1990) of the Ministry of Environment, Lands and Parks described a number of rehabilitation strategies that could be implemented after flows from the Skins Lake spillway are reduced. Earlier, in 1985, Ableson of the Ministry of Environment in Prince George had prepared a six-year rehabilitation plan for the Murray-Cheslatta system. He recommended that the Cheslatta River channel be left for three to five years after flows from the Skins Lake spillway are reduced before stabilization and enhancement activities proceed.

In the reports by Abelson (1985) and Abelson and Slaney (1990), flow releases from the Skins Lake Spillway were recommended as part of rehabilitation. The earlier report recommended a minimum flow regime that varied throughout the year and averaged about 9 m^3/s. The later report was less specific about the required flows, suggesting 3 to 6 m^3/s to augment low flows, with the required volumes dependent on surveys after the natural flow regime is re-established. More recently, Bouillon and Pisio (2000) have examined potential hydrographs for releases from the Skins Lake Spillway, for annual releases that range from 5 to 20 m^3/s, based on observed hydrographs at nearby Water Survey of Canada stream gauges.

A brief summary of the proposed rehabilitation strategies follows:

- gravel placements between Murray and Cheslatta Lakes;
- stabilization of eroding banks along the Cheslatta River;
- gravel placements in selected sections of the Cheslatta River;
- rearing habitat improvements including habitat complexing (boulder clusters and debris structures), and planting of stream side vegetation;
- potential improvements to allow migration past the existing Cheslatta Falls, which is a barrier to fish passage;
- re-vegetation of the shoreline of Murray and Cheslatta Lakes; and
- rehabilitation of fish habitat in the lower reaches of Bird, Holy Cross, Knapp, Ootsanee Creeks and an unnamed tributary (Sather Creek) west of Ootsanee Creeks.

In addition to the above rehabilitation strategies, Ableson and Slaney (1990) recommended an intensive five-year lake-stocking program for priority sport fish species. The authors also pointed out that although enhancement opportunities are lacking in the small tributary streams to Murray and Cheslatta Lakes, six barren lakes have been stocked with rainbow trout. The option of beaver control in the lower reaches of Bird and Knapp Creeks was discussed but was considered to be impractical due to lack of good access.

Ableson and Slaney (1990) recommended that lake shoreline assessments be conducted to identify opportunities for improving shoreline-spawning habitat for lake char and lake whitefish. Such assessments would be worthwhile, but they do not appear to have been completed.

Ableson and Slaney (1990) and Ableson (1985), suggested that partially submerged wood debris be removed from the lake (see photo 6). Ableson and Slaney (1990) felt that the removal of this wood debris would enhance recreational opportunities in the lakes, but they recognized that it would not result in greater fish production. Ableson (1985) states that the Cheslatta Carrier Nation began a shoreline cleanup program in 1993.

3. HYDROLOGY

As discussed earlier, flows have been released to the Nechako Reservoir through the Murray-Cheslatta system under at least two different management scenarios. The following discussion focuses on the releases that have occurred since 1981, under the short-term flow regime.

3.1 OPERATION OF THE NECHAKO RESERVOIR SINCE 1981

The estimated average annual inflow to the Nechako Reservoir is 195 m^3/s (1930 to 1998) although inflows have been below average over the past twenty years (Triton 1999). A part of this inflow is diverted to Kemano for power generation. Alcan's water licence is for 170 m^3/s; however their maximum tunnel capacity is about 140 m^3/s and they have diverted an average of 115 m^3/s over the period from 1981 to 1998 (Rescan 2000).

Under the 1987 Settlement Agreement, Alcan is required to release a base flow of 36.8 m^3/s for fisheries protection and conservation as well as sufficient cooling water releases during the sockeye migration in July and August through the Skins Lake Spillway. When expressed on an annual basis, the cooling flow releases have averaged 16.1 m^3/s since 1981 (Rescan 2000).

The total annual demand on the reservoir, based on the average releases for Kemano, base flows and cooling flows, has then averaged around 168 m^3/s. As the demand is less than inflows, water must be spilled on occasion. Flood releases primarily occur prior to the freshet and are scheduled in consultation with the Nechako Fisheries Conservation Program and the Comptroller of Water Rights (Rescan 2000). Based on an average release from the Skins Lake Spillway of 63.7 m^3/s and subtracting the above releases for fisheries protection and conservation, the spill has been equivalent to another 10.8 m^3/s of annual release. Obviously, the required spill could be greater during wet periods when larger reservoir inflows occur.

Part of the flood releases or spills could also be dedicated to base flow releases to supplement those required under the 1987 Settlement Agreement although there is no requirement for Alcan to do so. Note that if Alcan operated their diversion tunnel at capacity, the total draft on the reservoir would be just about the long-term inflow, leaving no water available to supplement the base flow releases.

3.2 FLOWS IN THE MURRAY-CHESLATTA SYSTEM

The flows in the Murray-Cheslatta system result from natural contributions from its watershed plus releases from the Skins Lake Spillway. Average annual inflows from the Murray-Cheslatta watershed are thought to be about 5 m^3/s; Skins Lake Spillway contributes another 63.7 m^3/s, or about 93% of the total flow through the system (Bergman 1984; Triton 1999; Bouillon and Pisio 2000).

The Cheslatta River has a watershed area of about 190 km^2 and a natural average flow of about 0.6 m^3/s based on prorating the total inflow from the Murray-Cheslatta watershed on subwatershed area (Figure 1). Skins Lake Spillway contributes another 63.7 m^3/s, or about 99% of the total flow through this river (Figure 2).

The natural flow regime in the upper Cheslatta River and the other large tributaries to Murray and Cheslatta Lakes is thought to be similar to that recorded in Van Tine Creek (WSC Gauge 08JA014) (Bouillon and Pisio 2000). Natural peak flows typically occur in May; following the snowmelt freshet flows decline, reaching a minimum in March just prior to the start of the next melt season. In some years, fall rains produce a second small peak. Figures 3 shows the estimated natural hydrograph of the Cheslatta River, based on Van Tine Creek.

As a result of the spillway releases, the Cheslatta River often now has two peaks; one in April and May corresponding to pre-spill of flood releases and one in August during releases of cooling water (Figure 2). Maximum releases have typically occurred in August and have been as much as 500 m^3/s (Figure 2).

3.3 MURRAY AND CHESLATTA LAKES

Based on an estimated elevation-discharge curve for the Cheslatta-Murray Lakes (Envirocon 1984), the lake levels that occurred under natural inflows and with operation of the Skins Lake Spillway were roughly estimated from the outflows from Murray Lake under natural conditions and with the Skins Lake Spillway operating from 1981 to 1998 (Appendix D).

Table 1: Murray and Cheslatta Lake Levels

Time of Year	*Cheslatta and Murray Lake Levels (Geodetic) 1*	
	Natural Inflows	*1981 to 1998 Releases*
April and May (pre-spill releases)	765.5 m	765.5 to 768 m
August (cooling flow releases)	<765 m	767 to 769 m
Winter (November to March)	764.5 m	765.0 m

1. Assumes maximum flows of 50 m^3/s from the watershed under natural conditions. Flows from 1981 to 1998 are based on discharges measured at the Nechako River below Cheslatta Falls gauge (08JA017).

The above table suggests that maximum water levels have been raised by up to 3.5 m under the short-term flow regime. The maximum range of lake levels under the short-term flow regime is about 3.5 m; with only natural inflows it was about 1 m.

The total volume of Murray and Cheslatta Lakes is estimated to be 990,000 dam^3 (Lyons and Larkin 1952). Based on the average annual inflow since 1981 with the Skins Lake spillway operating, the lake volume is turned over or flushed about every 5.5 months. For the natural inflow of 5 m^3/s the lake volume was turned over or flushed about every 6 years.

4. THE KENNEY DAM RELEASE FACILITY

4.1 POTENTIAL OPERATION OF THE FACILITY

A coldwater release facility was originally proposed at the Kenney Dam as part of the Kemano Completion Project. The Province of BC rejected this project, but the NEEF Management Committee is now reviewing options for a similar facility with the objectives of reducing the operation of the Skins Lake Spillway and improving temperature and dissolved gas management in the Nechako River.

Rescan Environmental Services Ltd (2000) describe seven viable alternatives for the Kenney Dam Release Facility (KDRF) that provide varying degrees of control over Skins Lake spillway operation, temperatures and dissolved gases. All alternatives include a low level outlet. Some alternatives release surface water for cooling; others control temperatures by selective withdrawal. All viable alternatives either reduce operation of the Skins Lake spillway to no more than once in two hundred years or eliminate the need for its operation.

With the KDRF, cooling releases (either surface or selective) and flood releases (pre-spill) would no longer pass through the Murray-Cheslatta system. With selective withdrawal, some of the reduced volume required for cooling could be re-distributed throughout the year as base flow. The total available for re-distribution will depend on the alternative chosen and further temperature modelling along the Nechako River.

A concern for rehabilitation planning is the potential for release of infrequent, large discharges through the Skins Lake Spillway for those alternatives whose spillway capacity is 450 m^3/s, or about the anticipated release during the 200-year inflow to the Nechako Reservoir. Any flows in excess of this capacity, up to the probable maximum flood (PMF) would be released through Skins Lake. Consequently, during the 200-year inflow only a small discharge would need to be spilled through Skins Lake. It would require a very rare inflow event (perhaps of three or four hundred year return period) to result in a significant release from the spillway and a flood through the Murray-Cheslatta watershed of the magnitude that has been previously released under the cooling flow or pre-spill release patterns.

4.2 ANNUAL AND SEASONAL RELEASES TO THE MURRAY-CHESLATTA SYSTEM

Based on our discussions and report reviews, there is unanimous consensus that the flows in the Cheslatta River must be supplemented with releases from the Skins Lake Spillway and a more natural hydrograph established prior to the commencement of any significant rehabilitation works in the Murray-Cheslatta system. Based on our inspection of the upper Cheslatta River, it is apparent that fish habitat would not be rehabilitated without releases from the Skins Lake Spillway. The natural river flows (Figure 2) would barely wet the existing broad channel with its coarse bed material. It is expected that flows would be sub-surface through part of the channel during the late summer, fall and winter.

Releases for rehabilitation in the Murray-Cheslatta system from the Skins Lake Spillway would be from base flows, potentially supplemented by inflows that otherwise would be spilled. Base flow releases average 36.8 m^3/s annually under the Settlement Agreement and they could be released through the KDRF or through the Skins Lake spillway, entering the Nechako River at Cheslatta Falls.

It is likely that only a portion of the total base flow can be released through Skins Lake. Some flow would be required to maintain habitat in the Nechako Canyon and across the Cheslatta Fan. Also, releases of warm surface water through the Murray-Cheslatta system may affect temperature control in the Nechako River. Further analysis would be required to accurately determine how large a portion of the base flow releases could pass through the Murray-Cheslatta watershed without affecting either habitat in the canyon or temperature control downstream.

We estimate that up to one-third to one-half of the base flows could be available for release through the Skins Lake Spillway or about 10 to 15 m^3/s, which is reasonably consistent with the recommendations in Abelson (1985) and Abelson and Slaney (1990). As is discussed later, releases for rehabilitating habitat in the Cheslatta River affect turnover and flushing of Murray and Cheslatta Lakes. Greater flows in the river may provide better instream habitat but they may reduce lake productivity.

No in-depth study of instream flow requirements in the Cheslatta River has been completed and it is not clear what minimum annual or seasonal discharges are required to rehabilitate fish habitat. Procedures based on providing percentages of the natural hydrograph (such as the Tennant method) are not applicable to adding rehabilitation flows to such a severely eroded and enlarged channel. Detailed habitat simulation would be required to predict flow requirements for fish. Alternatively, a hydrograph could be adopted and then adjusted based on habitat observations over a period of years.

It is generally thought that the seasonal flow pattern should be as close to natural as possible since a natural flow regime is an important ecosystem component for fish and wildlife. One option to seasonally distribute the releases from the Skins Lake Spillway would be to mimic a natural hydrograph. As discussed earlier, Van Tine Creek is thought to be similar to the natural regime of the large tributaries to the Murray-Cheslatta System (Bouillon and Pisio 2000). Alternatively, the Stellako River (WSC Gauge 08JB002) provides a regime that peaks later in the year and remains higher through the late summer months. Figures 4 and 5 show potential flow regimes in the Cheslatta River, assuming releases follow the pattern of Van Tine Creek or Stellako River and the total annual release is either 10 or 15 m^3/s.

It is expected that the adopted hydrograph will require adjustment. Low flows should be of sufficient volume to maintain a continuous surface flow in a channel that is comparable to the width of the natural channel (about 10 to 15 m). Peak flows should be high enough to result in some re-working of the channel substrate. This will help to maintain clean spawning gravel as well as high biodiversity. It has been well documented that flood flows that result in erosion and deposition of channel material help to maintain a diverse community structure of animals as well as plants, both in the channel and the riparian areas.

Neither of the hydrographs in Figures 4 or 5 provide a sufficiently large flow for flushing or to maintain channel morphology (see Reiser et al 1985). Such as flow might be provided, as required based on habitat observations, by diverting a portion of the pre-spill through the Skins Lake Spillway to coincide with the natural peak in April and May.

5. FIELD INSPECTION

5.1 CHESLATTA RIVER

We inspected the Cheslatta River on September 6, 2000. On this date the releases from the Skins Lake Spillway were about the typical maximum releases that might be expected with the Kenney Dam Release Facility in place (see previous Chapter; Figures 4 and 5).

One key observation was that the channel bed, consisting of coarse cobbles and boulders with occasional bedrock exposures, is immobile at the observed flows. Minor movement of gravel along bars in the multiple channel sections of the upper Cheslatta River may occur. However, few changes are expected to occur in the channel under the potential flow regimes discussed in the previous section. Flushing flow releases would be required to mobilize bed material.

Equally, the channel banks were mostly stable with coarse lag material deposited at the observed water level. Again, there is a potential for continued erosion where flows directly impinge on the stream banks; also failure of steep slopes may also result from slumping following freeze-thaw cycles. However, only minor erosion is anticipated under the potential flow regimes discussed in the previous section.

The multiple channel sections where the flow splits across large bars had adequate flow during the site inspection, but sub-surface flow and stranding may occur during lower flows in late summer, fall and winter. The formation of anchor ice in these shallow areas in winter may affect habitat.

Concern about fish access into tributaries flowing into the Cheslatta River, particularly Home Creek, has been expressed. Access may be difficult because incision of the Cheslatta River has resulted in several meters of downcutting in the tributary channels. As a result, the lower sections of the tributaries have become much steeper and may have become a barrier to the upstream movement of fish, particularly during low flows. We did not see an example of an inaccessible tributary during the September 6th overflight. Fish-bearing tributaries that flow into the Cheslatta mainstem would require field surveys to determine their accessibility to fish.

The small tributaries to the upper Cheslatta River may further downcut in response to the lowered water levels if the KDRF is constructed. This may further impede fish access, cause deposition of some coarse sediment along the upper Cheslatta River and increase turbidity for a few years.

Ableson and Slaney (1990) state that the upper Cheslatta falls (photo 9) are a barrier to upstream fish migration and recommend that the falls be "improved" to allow fish passage. We are not aware of a feasibility study and this option may be worth pursuing if providing fish passage over the falls will improve fish productivity of the Murray-Cheslatta system. The falls should be inspected during those times of the year when upstream fish migration occurs to determine the feasibility of providing fish access past them.

The site inspection indicated a lack of spawning gravel in the stream. Most gravel is stored on bar tops and edges above the maximum water elevations that might result with the KDRF operating. The gravel could be placed in the stream channel, assuming that hydraulic analysis indicates that it would remain there.

Other issues include a lack of instream cover and a lack of riparian vegetation. Stream bank erosion has removed mature vegetation from the top of the banks though some vegetation has re-established on bar tops (Photo 11). Based on field observations it would take many years to re-establish adequate riparian vegetation to provide temperature control and LWD for instream cover.

5.2 MURRAY AND CHESLATTA LAKES

On September 6, 2000, the water levels in Murray and Cheslatta Lakes were typically part way up a beach of gravel and cobbles. The entire lake shoreline of Murray and Cheslatta Lakes consists of a foreshore that is devoid of trees. Trees likely covered this foreshore area prior to operation of the Skins Lake Spillway since the occasional standing snag is still present. In some areas, such as where the Cheslatta River flows into Cheslatta Lake (Photo 5), this foreshore area is more extensive.

The observed water level would roughly represent the maximum that would occur under the KDRF with releases from the Skins Lake Spillway of about 30 to 50 m^3/s (Figure 4) and another 20 to 30 m^3/s from the remainder of the watershed. Maximum water levels would typically be about 766 m; minimum water levels in winter would be about 764.5 m. The typical annual range in water levels would be about 1.5 m. As noted in an earlier section, maximum water levels would be about 2.5 to 3 m lower than those that have occurred during cooling flow releases.

An eroded scarp was often visible at the back of the beach near the high water mark, well above the water level observed on September 6, 2000. However, it generally appears that the much lower water levels with the KDRF would reduce much of the erosion. The eroded scarp at the back of the beach is not vegetated and it would be exposed during the lower lake levels. Along some sections of the lake, particularly on fans or exposed points, erosion may continue.

Flushing rates of Murray and Cheslatta Lakes would depend on the inflows from the Skins Lake Spillway and the inflows from the remaining watershed. As noted earlier, flushing rates under the natural inflows were about 6 years. With a release of 10 m^3/s from Skins Lake Spillway, this would be reduced to 2 years; with a release of 15 m^3/s, this would be reduced to 1.5 years. It is not clear if these releases would permit re-establishment of the trophic status that occurred under the natural inflows. Experimentation or adaptive management is thought to be required as part of balancing rehabilitation of the upper Cheslatta River and Murray and Cheslatta Lakes.

5.3 BIRD, KNAPP AND OOTSANEE CREEKS

Bird, Knapp, Sather and Ootsanee Creeks are tributaries to Murray and Cheslatta Lakes, are lake-headed, and tend to flow all year-round. Harder (1986) found that these streams supported populations of resident trout. As stated by previous authors, the lower reaches of Bird, Knapp, and Ootsanee Creeks have been subject to annual flooding during large water releases from the Skins Lake spillway. Consequently, the habitat in the lower portions of these tributaries has been significantly impacted.

Photos 1, 2, 3, and 4 show the lower reach of Bird, Knapp, Ootsanee, and Sather Creeks respectively. In all three tributaries, the riparian vegetation is almost non-existent for some distance upstream of the lake, representing the area flooded at high lake levels. Although we did not inspect these streams on the ground, we suspect that the substrate in these channel sections may have a higher percentage of fines as a result of the elevated lake levels. These fines, however, should be quickly flushed down into the lake once the reduced flow pattern is established.

Based on the September 6th survey, it appears that fish can access all four streams from Murray or Cheslatta Lake.

6. REHABILITATION OBJECTIVES AND ISSUES

As described earlier, the NEEF Management Committee defines rehabilitation as "improving the physical and environmental conditions of the Murray-Cheslatta system such that a healthy, more natural ecosystem results." The objectives would focus on five components of the system, as follows:

- Cheslatta River
- Cheslatta and Murray Lake
- The lower reaches of tributaries to Cheslatta and Murray Lakes
- Murray River, between Cheslatta and Murray Lake
- Lower Cheslatta River, downstream of Murray Lake

Rehabilitation is expected to be associated with reduced releases from the Skins Lake Spillway resulting from the Kenney Dam Release Facility. However, some rehabilitation may be possible and practical under the existing release regime or a modified regime that does not include a Kenney Dam Release Facility.

6.1 INFORMATION SOURCES

Issues and objectives are based on discussions with representatives of the South Side Economic Development Association, the Cheslatta Carrier Nation, the Ministry of Environment, Lands and Parks, Department of Fisheries and Oceans and Triton Environmental Consultants Ltd. Key reports that provide further details include Abelson (1985), Abelson and Slaney (1990), Cheslatta Carrier Nation (1992; 1994; also Appendix B), and South Side Economic Development Association (SEDA 2000; see Appendix A).

6.2 CHESLATTA RIVER

OBJECTIVES

- Release "healing flows" from the Skins Lake Spillway as part of rehabilitating fish habitat (Cheslatta Carrier Nation; Abelson and Slaney 1990).
- Restore a sport fishery. As above.
- Reduce erosion along the Cheslatta River and turbidity in the river and in Murray and Cheslatta Lakes.
- Provide recreational opportunities for canoeing, rafting or kayaking. SEDA (2000) identifies that a discharge greater than 15 m^3/s is required for adequate canoeing with the present river channel.
- Maintain viewing and picnicking at Cheslatta Falls. SEDA (2000) estimates that a discharge greater than 30 m^3/s is required for enough flow to pass over the left, steep side of the falls for viewing opportunities.
- Maintain domestic water supply. Some residents obtain their drinking water from the upper Cheslatta River. Maintaining access to the river rather than providing a particular discharge is key to meeting this objective.

- Prevent cattle access across the river. SEDA (2000) notes that a flow greater than 30 m^3/s is required to prevent cattle crossing the upper river.
- Maintain winter viewing of white swans at Skins Lake. The presence of the swans is thought to result from the open water on Skins Lake that results from discharges from the Skins Lake Spillway.

Issues

- Restoring fish habitat is expected to require natural flows plus releases from Skins Lake Spillway combined with instream works to address specific issues. As noted earlier, under the expected flow regime of the KDRF the upper Cheslatta River would be very stable. It may be necessary to narrow the channel through some reaches and to create a channel through the delta that would be exposed as a result of lower lake levels.
- As discussed earlier, adopting a natural hydrograph for releases from the Skins Lake Spillway provides the highest flows in May or June and lower flows later in the summer. For an annual release of 10 m^3/s from the spillway, discharges would be too low in August and September for canoeing (Figures 4 and 5). Some adjustments to the hydrograph may be practical to raise flows later in the summer but we feel that restoring fish habitat should be treated as a higher priority.
- Further study is required to select the annual release from Skins Lake Spillway. Typically, we recommend the minimum release practical to rehabilitate habitat which is consistent with reduced flushing of Murray and Cheslatta Lakes and restoring their productivity.
- Further analysis is recommended to determine the best distribution of the annual release throughout the year. While adopting a natural hydrograph seems to be a suitable initial approach; various approaches to assessing instream flow needs can be adopted. It may be advisable to reserve sufficient water to occasionally release flushing flows.
- Erosion along the upper Cheslatta River would be nearly eliminated, based on the proposed release patterns under the KDRF discussed previously. However, erosion may still occur in the tributaries to the upper Cheslatta River as they adjust to its lower water levels. Erosion may also occur during infrequent flood flow releases and during flushing flow releases if they are adopted.
- Infrequent flood releases from the Skins Lake spillway may not be incompatible with rehabilitating the upper Cheslatta River. By maintaining channel dimensions, particularly the existing broad floodplain, it may be practical to pass the flood flows with minimal damage. Some of the riparian trees that have established on bar surfaces would be lost as would spawning gravels placed instream.
- Under the potential flow regimes under KDRF water is anticipated to pass over the left side of the Cheslatta Falls only during May and June, reducing viewing potential for tourism. We recommend altering the distribution of flows at the head of the falls, perhaps in conjunction with fish passage structures, rather than increasing flows.
- Access is the key issue for domestic water supply rather than discharge, which would be more than adequate for supply. We recommend providing access at a suitable site.
- We do not recommend releasing flows so that the upper Cheslatta River acts as a barrier to cattle movement. These releases would be incompatible with fisheries restoration in the upper Cheslatta River and Murray and Cheslatta Lakes.

- It is not clear if the winter releases from Skins Lake Spillway would be adequate to maintain Skins Lake ice-free. Experimentation would likely be required to determine the minimum discharges that are adequate to maintain the lake for swans.

6.3 MURRAY AND CHESLATTA LAKES

OBJECTIVES

- Restore the lakes for both sport fishing and an aboriginal food fishery (Cheslatta Carrier Nation 1992; 1994). As discussed in Abelson and Slaney (1990) this may also require stocking of suitable species.
- Reduce erosion along the shoreline, particular at graveyards and at sites previously used as villages.
- Reduce the fluctuation of lake levels throughout the year.
- Reduce input of sediment and its deposition along littoral areas (Abelson and Slaney 1990).
- Remove large woody debris along the shoreline of Murray and Cheslatta Lakes.
- Treat the eroded scarp at the rear of the shoreline of the two lakes. Options include revegetation and flooding shoreline by raising lake levels with a weir.

ISSUES

- The primary approach to rehabilitating the fishery in Murray and Cheslatta Lakes would be to reduce the combined natural inflows and those from Skins Lake Spillway to a minimum that is consistent with rehabilitating habitat in the upper Cheslatta River.
- Reducing inflows will reduce maximum lake levels by about 2.5 m and reduce the annual range of lake level fluctuation to about 1.5 m. This thought to be only slightly greater than the range that occurred with only natural inflows.
- The reduced maximum lake levels are expected to nearly eliminate shoreline erosion from waves. However, erosion may still occur during infrequent flood flow releases or during flushing flow releases, should they be adopted. Treatment (bioengineering, riprap) of particularly valued sites is recommended, where required.
- Sediment delivery to the lakes would be reduced by reducing erosion along the upper Cheslatta River by moving cooling flow and pre-spill flood releases to the Kenney Dam and by reducing shoreline erosion along the lake through lowered lake levels.
- Removing LWD along the shoreline is thought to provide little rehabilitation benefit. The woody debris is mostly well above the high water elevations expected with KDRF operating. Removal is recommended at access points and to improve lake recreation.
- Revegetation of the eroding scarp at the rear of the beach is expected to occur naturally. Aerial seeding, combined with planting and bioengineering, could increase the rate of recovery.
- One option that has been proposed is to construct a low weir at the outlet of Murray Lake to raise minimum lake levels. Depending on its design, the weir may also slightly reduce the annual range of lake levels. The higher lake levels would have the advantages of partially flooding the eroded scarp at the back of the beaches along the lakes and flooding the upper Cheslatta River delta. Its disadvantages are that wave erosion of the shoreline would be expected to continue, the lower reaches of tributaries would remain flooded, preventing rehabilitation, and extreme water levels would occur during infrequent flood releases through

the Skins Lake Spillway, to a higher elevation that experienced under the cooling or pre-spill releases. The considerable cost and maintenance and inspection obligations of the structure make it unappealing.

6.4 TRIBUTARIES TO MURRAY AND CHESLATTA LAKES

OBJECTIVES

- Restore fish habitat and riparian vegetation in the lower reaches of Ootsanee, Bird, Knapp and Holy Cross Creeks (Harder and Associates 1986). These reaches have been affected by backflooding from Murray and Cheslatta Lakes.

ISSUES

- We recommend that riparian areas of the lower reach of these creeks be re-vegetated with appropriate shrubs and trees. Instream rehabilitation could also be implemented, consisting of construction of small logjams or undercut banks, in conjunction with the riparian rehabilitation.

6.5 MURRAY RIVER (BETWEEN CHESLATTA AND MURRAY LAKES)

OBJECTIVES

- Add spawning gravels to the Murray River. Siltation is thought to have damaged previous habitat (Abelson 1985; Abelson and Slaney 1990).

ISSUES

- The deep scour hole, very low velocities under the KDRF releases and fine substrate may reduce the value of adding gravel to this site.

6.6 LOWER CHESLATTA RIVER (DOWNSTREAM OF MURRAY LAKE)

OBJECTIVES

- None expressed.

ISSUES

- Releases from the Skins Lake Spillway resulted in overtopping of the right bank, diversion into a gully, and erosion of sediments in the Nechako River, and loss of spawning gravels from this river.

7. RECOMMENDATIONS

7.1 OBJECTIVES

We recommend that fishery rehabilitation be the main objective addressed by releases from Skins Lake Spillway and by other rehabilitation activities. Secondary objectives would be tourism and recreation, where they are consistent with fishery rehabilitation.

7.2 FLOW RELEASES FROM SKINS LAKE SPILLWAY

The consensus is that flow releases from Skins Lake Spillway are required to rehabilitate fish habitat in the Cheslatta River. However, it is not known what annual release or seasonal pattern of flows is required and many common techniques for setting instream flow needs are not applicable because of the severe alteration of the Cheslatta River by past releases from the Skins Lake Spillway. Typically, we recommend the minimum release practical to rehabilitate habitat as this is consistent with reduced flushing of Murray and Cheslatta Lakes and restoring their productivity.

The base flow releases to the Nechako River are the main source of flow that could be diverted to the Murray-Cheslatta system. As discussed, only a portion of this flow is available and the upper limit of annual flows for the Murray-Cheslatta system may be less than 15 m^3/s. This maximum is greater than that recommended in Abelson (1984) or Abelson and Slaney (1990).

There are two approaches that might be adopted for developing an adequate flow regime. First, minimum discharges for various life stages and species could be established by habitat simulation based on stream surveys and measurements of depths and velocities (i.e. IFIM and PHABSIM). Alternatively, a provisional hydrograph could be adopted and then annual and seasonal flows adjusted based on observations of habitat and fish utilization over a period of years. Some adjustments might also be considered to maximize recreation and tourism potential along the Cheslatta River.

We would recommend mimicking a natural hydrograph and starting with small annual releases, perhaps of 5 m^3/s. Based on observation of the stream and its habitat, the annual release could be gradually increased, if required, to about 15 m^3/s. Alternatively, flow could be moved from one part of the year to another to better supplement natural flows and rehabilitate habitat.

As discussed, Van Tine Creek is thought to be similar to the natural flow regime in the Cheslatta River and provides a typical analogue for the releases from the spillway. A hydrograph based on a release of 10 m^3/s is shown on Figure 4; Bouillon and Pisio (2000) provide examples for other annual releases.

One issue that is not addressed by the natural hydrograph is "flushing flows" to maintain substrate quality and channel morphology. One alternative is to divert part of the flood releases through the Skins Lake Spillway during May to supplement the natural hydrograph, flush the streambed and provide some erosion of the banks. Observation would be required to determine the magnitude of the required flushing flow and the frequency of the release.

7.3 Extreme Releases from the Skins Lake Spillway

Under some KDRF alternatives, releases from the Nechako Reservoir in excess of 450 m^3/s, or about the release expected during the 200-year inflow, would be diverted through the Skins Lake Spillway. As discussed, only minor flows would be released during the 200-year inflow; a very rare event would be needed for a substantial discharge through the Murray-Cheslatta system, such as was released under the cooling flow regime.

It is our view that infrequent flood releases from the Skins Lake Spillway are not incompatible with rehabilitation of the Cheslatta River. First, they would be extremely rare. By maintaining channel dimensions, particularly the existing broad floodplain, it may be practical to pass the flood flows with minimal damage. Some of the riparian trees that have established on bar surfaces would be lost, as would any spawning gravels placed instream. Damage might also be expected to instream cover placed in stream or to narrowed stream channel sections. Designing instream structures for occasional large releases could minimize costs for repair.

7.4 Options for Raising Murray and Cheslatta Lake Levels

The Cheslatta Carrier Nation has proposed a low weir at the outlet of Murray Lake to raise minimum lake levels. Depending on its design, the weir may also slightly reduce the annual range of lake levels. The higher lake levels would have the advantages of flooding beaches, although they would not cover the eroded scarp at the back of the beaches, and flooding part of the upper Cheslatta River delta. Its disadvantages are that wave erosion of the shoreline would be expected to continue, the lower reaches of tributaries would remain flooded, preventing their rehabilitation, and extreme water levels would occur during infrequent flood releases through the Skins Lake Spillway, to a higher elevation that experienced under the cooling or pre-spill releases. The considerable cost and maintenance and inspection obligations of the structure also make it unappealing.

We see few advantages to constructing a weir and numerous disadvantages and consequently do not support such an approach. We also do not support raising minimum water levels.

7.5 Rehabilitation Strategies

It is our view that flow releases from the Skins Lake Spillway should be combined with other activities to ensure rehabilitation. Appendix C discusses potential strategies in more detail.

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Figures

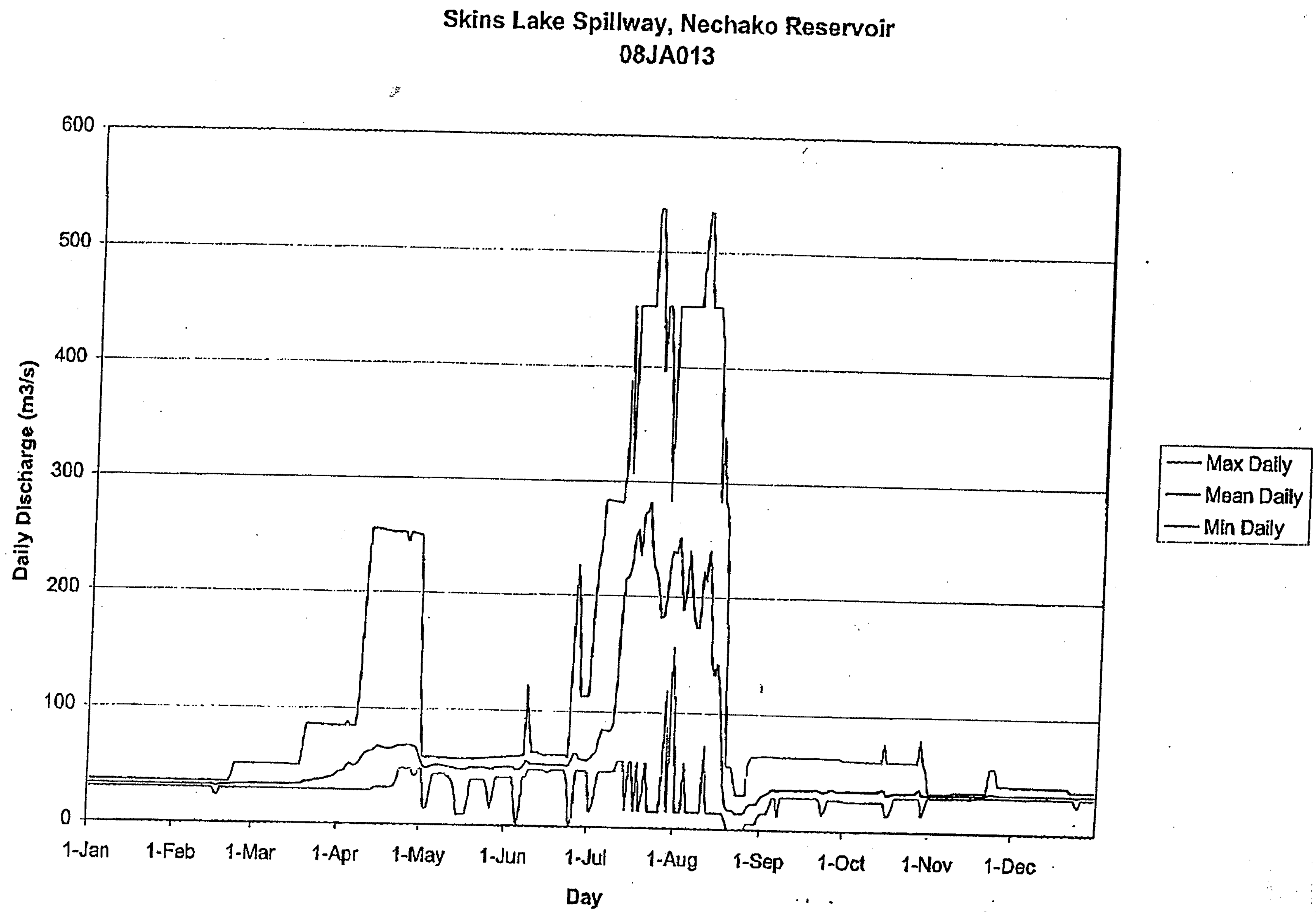
Skins Lake Spillway, Nechako Reservoir
08JA013
Daily Discharge (m3/s)
600
500
400
300
200
100
0
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
Day
Max Daily
Mean Daily
Min Daily

FIGURE 2

Upper Cheslatta River Natural Flows
(based on Van Tine Creek Near the Mouth 08JA014)

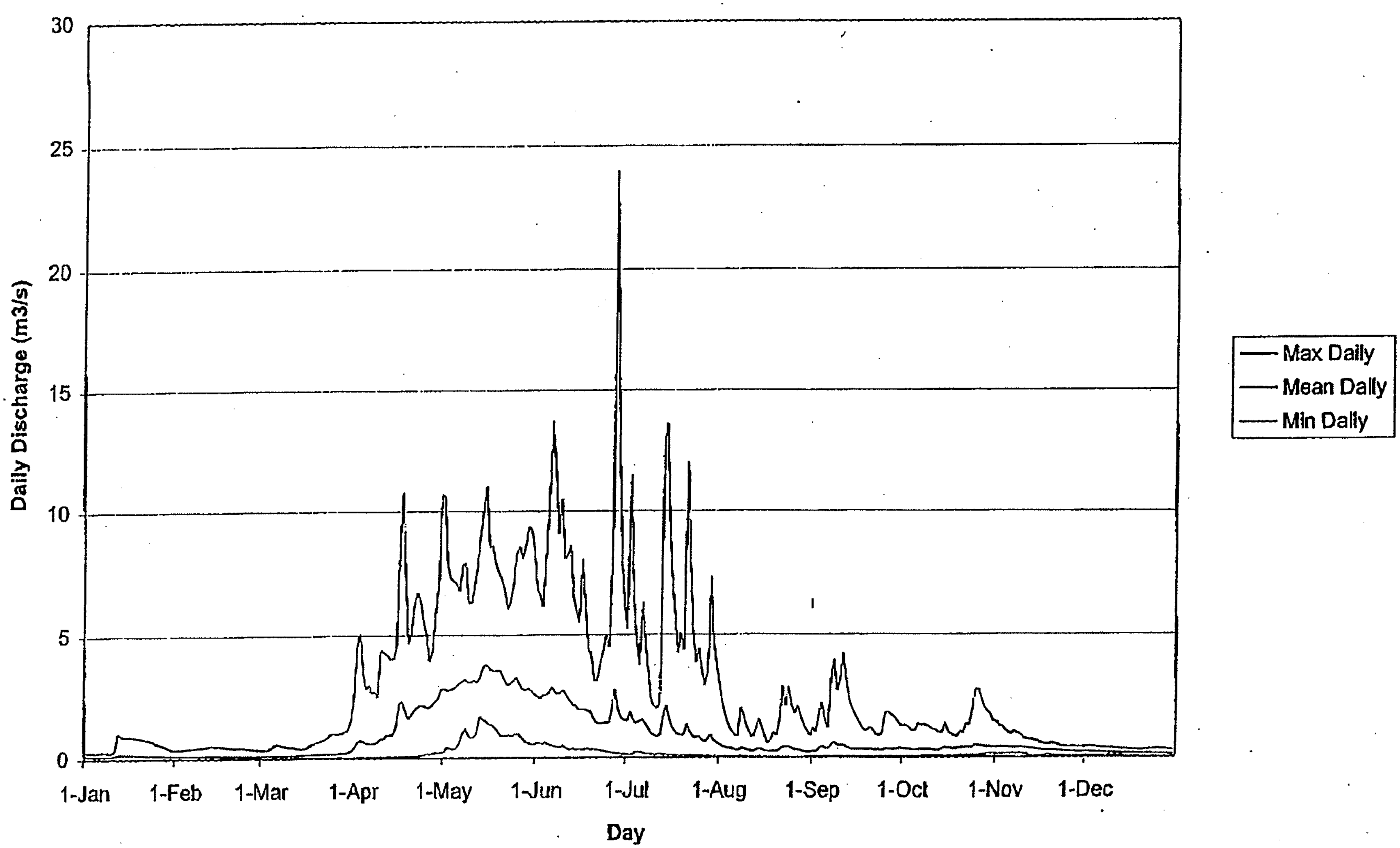

FIGURE 3

Upper Cheslatta River Hydrograph for a Release of $10 m^3/s$

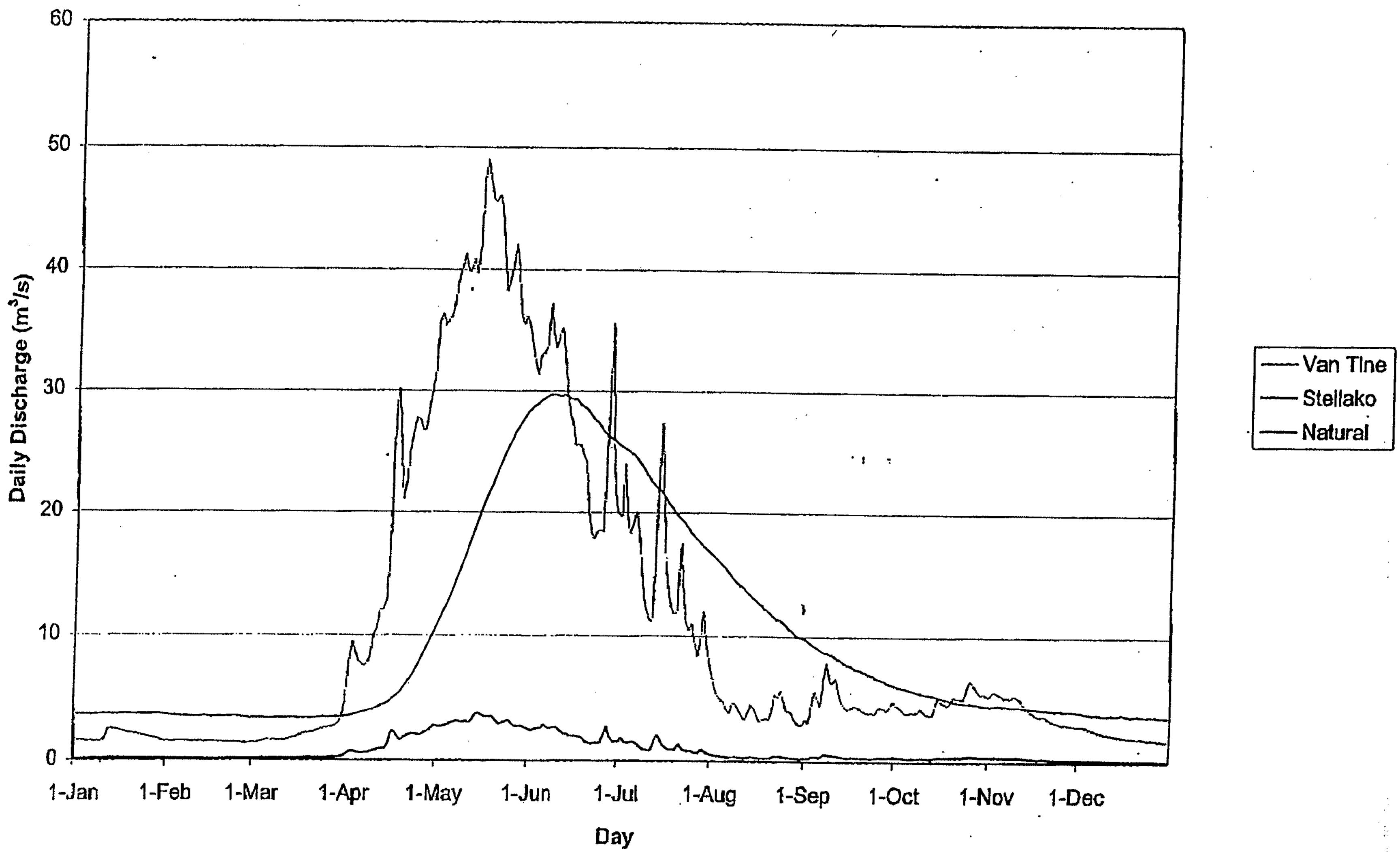

FIGURE 4

Upper Cheslatta River Hydrograph for a Release of 15m³/s

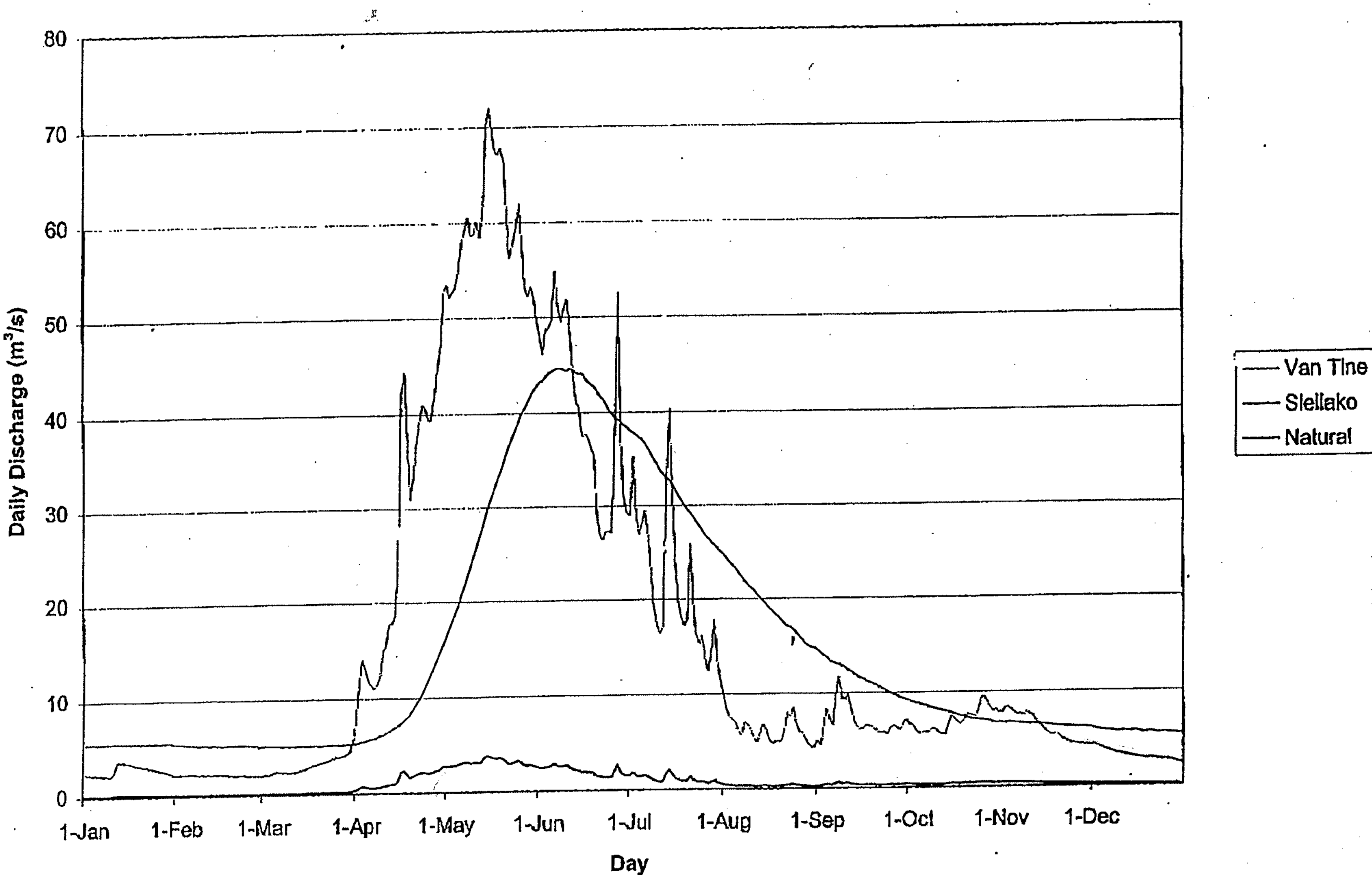

FIGURE 5

Photographs

Photographs

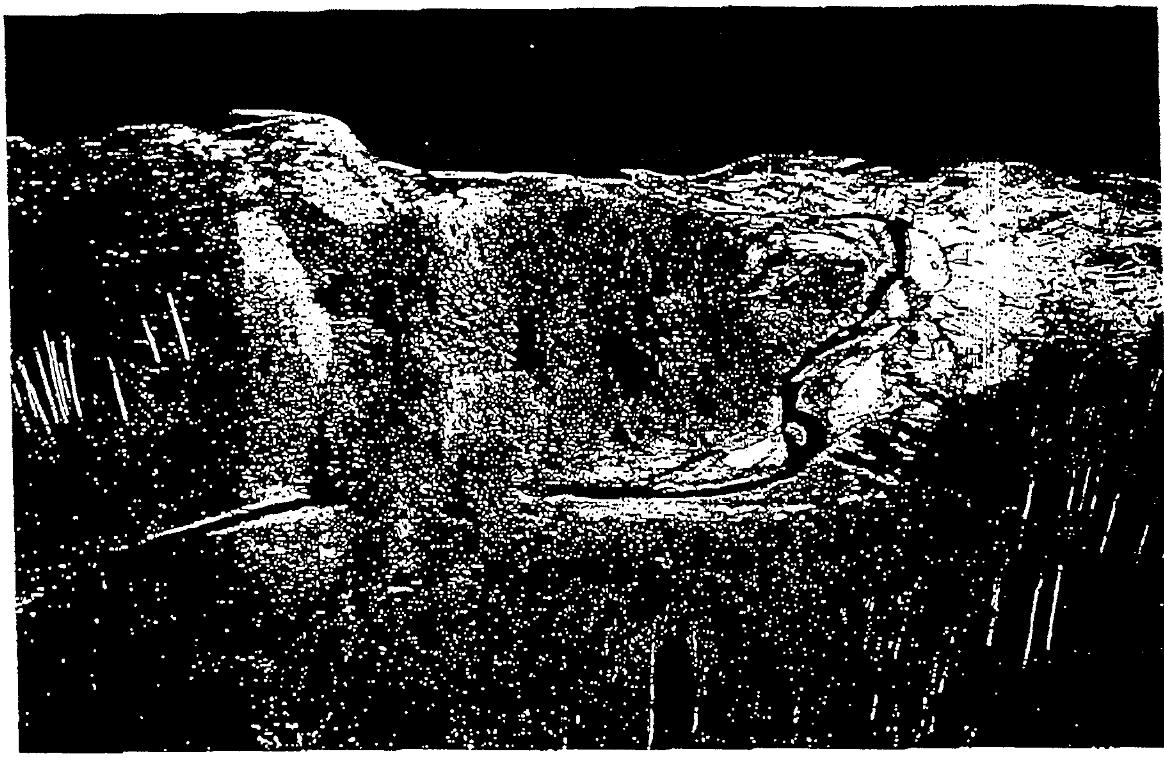

Photo 1. Lower reach of Bird Creek showing lack of riparian vegetation.

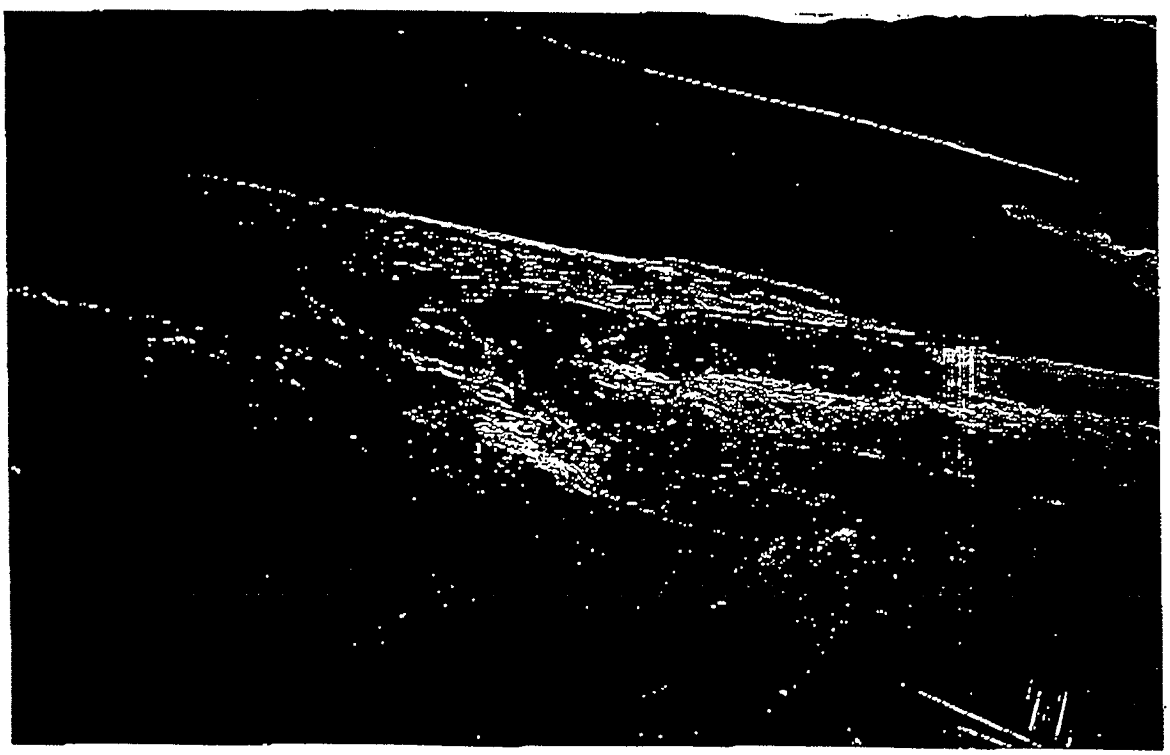

Photo 2. Lower reach of Knapp Creek showing lack of riparian vegetation.

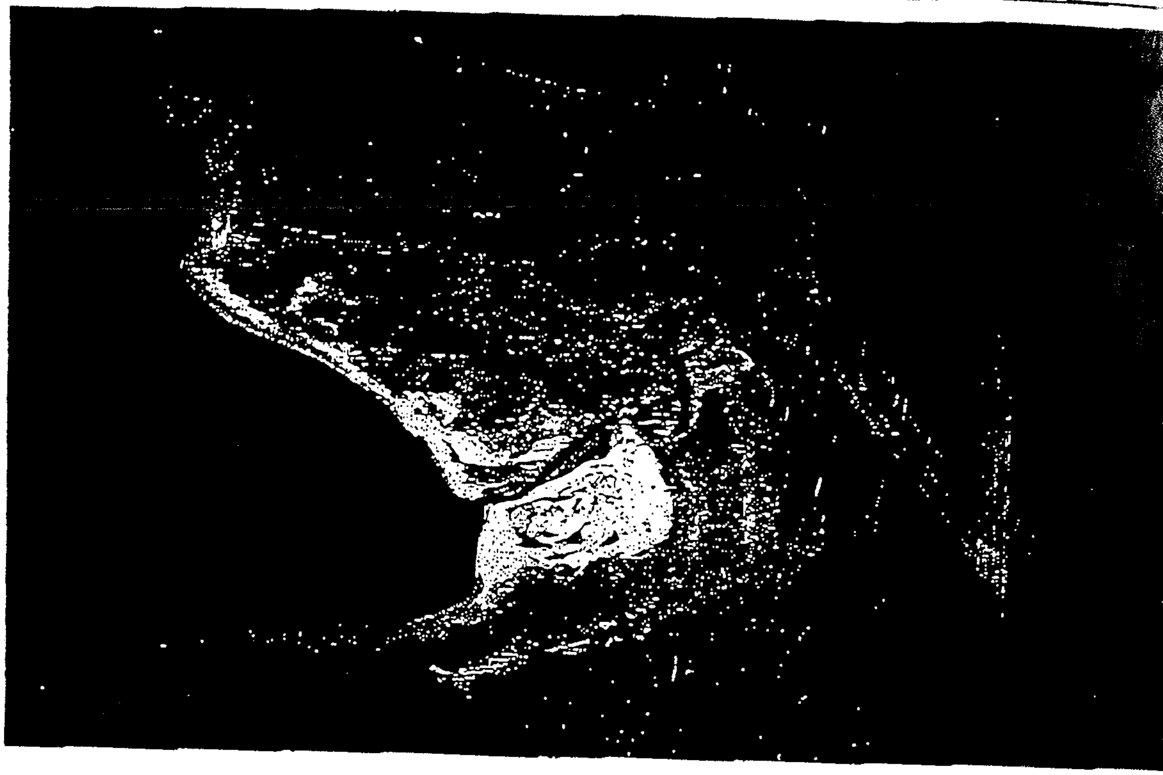

Photo 3. Lower reach of Ootsanee Creek showing lack of riparian vegetation.

Photo 4. Lower reach of Sather Creek showing lack of riparian vegetation.

Photo 5. Cheslatta River at Cheslatta Lake inlet.

Photo 6. Wood debris in Murray Lake.

Photo 7. Typical reach of Cheslatta River.

Photo 8. Cheslatta River just upstream of Lake showing channel widening.

Photo 9. Upper Cheslatta falls.

Photo 10. Cheslatta/Murray Lake foreshore at connection between the two lakes. Note the standing snags.

Photo 11. Gravel bar on Cheslatta River showing some natural re-colonization of shrubs and trees

Appä

MEETING BETWEEN NECHAKO ENVIRONMENTAL ENHANCEMENT FUND (NEEF) REPRESENTATIVE AND SOUTHSIDE ECONOMIC DEVELOPMENT ASSOCIATION (SEDA) REPRESENTATIVE, SEPTEMBER 05, 2000

THE "SOUTHSIDE" AND ITS CHARACTERISTICS

The "Southside" is an area surrounded by three large waterbodies that isolate the area from larger centers. Francois Lake forms the north boundary, the Nechako River the east boundary, the Nechako Reservoir forms the south boundary and an imaginary north -south line between the west end of Francois Lake and the Nechako Reservoir forms the relatively undefined west boundary. The area, - seemingly remote today - has been an early 20th century settlement, located on an immigration and supply route from Bella Coola and Hazelton. Settlements around Ootsa Lake are significantly older than the town of Burns Lake. The pioneers in this area built homes and cultivated the land around Ootsa Lake. Four communities were living well from guiding, trapping, hunting, farming and logging around Ootsa Lake, when the decision to flood the area was made in 1951. The residents, that had developed this area over generations, were forced to leave, the communities were scattered. The descendants of a minimum of 28 of the early families are still living in this area.

SEDA AND ITS GENERAL OBJECTIVES:

SEDA was formed by southside residents and small business owners of the Southside in 1999 to enhance private and small business opportunities south of Francois Lake. Over many years most families on the southside typically generated their income through traditional family businesses or small businesses, like farming, trapping, guiding, hunting, logging and lodging. In spite of the variety of jobs or profession everybody had, most families have to make a living on seasonal work and are unemployed more than three month a year.

At present mountain pine beetle and spruce bark beetle infestations in the Lakes and Morice Forest District as well as low wood prices decrease income opportunities in the logging branch. Alternatives and enhancement of other business opportunities are needed to keep the community viable. With the following projects SEDA tries to support efforts into this direction:

- ***Community Directory:***
  SEDA has created a community directory for small businesses, accommodations, tourist attractions and activities, events, available services, produce and craft producers for the Southside. The directory is renewed annually and is available at the Tourism Information Centre in Burns Lake and at stores and restaurants on the north and southside of Francois Lake. The listings are sorted by categories and their location is marked on a map.

- ***Saturday Southside Farmers Market adjacent to the Ferry Landing during Spring and Summer month:***
  Local farmers and gardeners and home run craft businesses have an opportunity to sell their organic produce, baking goods, and crafts to tourists and local residents.

- **Trail inventory and maintenance:**
  A trail working group of the Association collects information about historic and recent trails, creates maps for tourists and local residents with locations of the trail systems and works out maintenance and restoration schedules for these trails.

- **"The Heart of the Lakes District Tours Package" Research and Implementation Project:**
  SEDA has received a $91 900 grant (by the Ministry of Development, Cooperation and Development) for a study on ecotourism potential in the Lakes District. A goal of this study is to work out and implement a tourist package that will take visitors from Southbank into the rural communities and backcountry on the Southside (see Appendix I). This package is proposed to educate and involve people in the history, management, protection and use of this area. Different levels of luxury and comfort are planned to be offered. The package will include a large variety of outdoor activities including canoe trips, kayaking, river rafting, camping, hiking and riding tours. One of the main focuses of this development is the tourism development along existing and historic trails. The historic Cheslatta Trail is one of them, which is currently being restored by the Cheslatta Band and the SEDA. Spectacular camping and picnicking areas with views on scenic waterfalls and rapids are used frequently by tourists and local residents already today. A number of tourism businesses has taken the opportunities that are there and are using the Cheslatta River (see Appendix II). Annual community canoe or inner tube rafting events had been organized for many years. These events have a strong potential to be developed as tourist attractions. The European market is one of the main targets for this project, since strong contacts by Southsiders to European travel agencies in a number of countries exist. The large portion of European immigrants living on the Southside can assist in overcoming possible language problems. A first survey round of tourism businesses and potential tourism businesses on the Southside has been conducted.

- **Southside Residence Survey on the use of the Cheslatta River System and future visions:**
  During the summer of 1999 142 (40%) of approximately 360 households on the Southside have been interviewed by SEDA about their use of the Cheslatta – Murray – System and about their preference of what they would like to see in the future of this system. Results and details see Appendix II). The SEDA representative at the Nechako Watershed Council (NWC) gave a presentation on first and updated results of this survey at the NWC Meeting in April 1999 in Burns Lake and at the NWC meeting in July 1999 in Vanderhoof respectively.

- **Study on economic potential of ecotourism around the Cheslatta River System (at 20 cubic metre per second and higher) for Southside residents, the Cheslatta Carrier Nation and the Nechako Valley, funded by the Nechako-Kitimat Development Fund:**
  An independent consultant is collecting existing data and local information to calculate the economic potential (as revenues) of ecotourism around the Cheslatta River System (with a flow of 20 cubic metres per second or higher) for the Cheslatta Carrier Nation, the Southside residents and the Nechako Valley (see Appendix III). Joan Chess of the Fraser Basin Council acts as a project coordinator. The results of this study shall assist SEDA, the Cheslatta Carrier Nation and the Tweedsmuir Recreation Commission in discussions in the controversy between proposals to build a power generating facility at Kenney Dam and plans to develop ecotourism in and around the Cheslatta River.

SEDA's interests in the Cheslatta River System:

Tourism:

With "The Heart of the Lakes District Tours Package" SEDA offers income opportunities for a large number of community members, including First Nations and women, who have very limited work options on the Southside, so far. Tour packages can easily be extended into adjacent areas in the east and west. Round tours from Burns Lake via the Southside to the rural areas south of Fraser Lake, Fort Fraser or Vanderhoof are scenic and can offer a variety of activities and accommodations. The Southside offers a number of recreational opportunities in a very scenic setting at the gate to the North Tweedsmuir (wilderness) Park.

Approximately 2000 miles of backcountry roads and an extensive net of partly historic trails provide access into large forested areas with high wildlife values or to hidden lakes that offer excellent fishing opportunities. In an effort to attract European clients guest ranches, bed and breakfasts and resorts offer more and more adventure activities. The Cheslatta – being frequently used by community members and for community events (e.g. annual canoe races and rafting events) or by visitors from adjacent areas for many years – has been integrated into tourism activities in recent years with great success. Canoeing, guided trail rides, fly fishing for white fish and picnicking at the scenic upper falls are the most frequent commercially organized activities so far. SEDA sees a much larger potential in the use of this river when cooling flows and fluctuation in the Cheslatta River are reduced to a more natural pattern and when tourism packages are implemented.

SEDA sees potential for:

- More guided canoe trips on the Cheslatta River System from Skins Lake even into the Nechako River.
- Guided river-rafting tours over rapids and small upper falls.
- Guided kayaking tours through rapids and small upper falls.
- Camping and picnicking at the scenic Upper Cheslatta Falls.
- More guided fly fishing tours.
- Better fishing opportunities for trout fishing.
- Guided trail rides and hikes on the historic Cheslatta trail.
- Guided bird watching tours.
- Guided winter bird watching for blue listed trumpeter swans on Skins Lake.

Since SEDA has become a member of the Nechako Watershed Council it has made efforts to determine how much water is needed to realize the potentials for tourism in the Cheslatta River.

The following trials and observations have been made so far:

1. ***Viewing of the Cheslatta River and the Cheslatta Lake from a helicopter @ a release of 14.2 cubic metres per second at the Skins Lake Spillway (SLS):***
   → The river still appeared as a river. At the usually spectacular and often visited "Upper Cheslatta Falls" no significant waterflow could be observed over the rocks. The well liked picnic, camping and fishing site appeared unattractive.

2. ***Test Canoe Tour on the Cheslatta River @ a release of 14.2 cubic metres per second from SLS:***
Hans Tschanz (the owner of a local guest ranch), who canoes the Cheslatta River several times a year and Markus Laub canoed from Skins Lake to about 200 metre above the Upper Cheslatta Falls with a short 15 footer hot plastic canoe. They stated that most areas could be canoed, but they often set on ground and/or had to push the canoe with the paddles. They also stated a fiber glass canoe would not have survived the tour.

3. **Test Canoe Tour on the Cheslatte River @ a release of 20 cubic metres per second from SLS:**
Three community members (Vera Tschanz, Jessy Eicher, and one friend) canoed the Cheslatta River from Skins Lake Spillway to Wall Road in a short 15 footer hot plastic canoe. They stated that they set on ground several times. They expressed, that the water level was a little too low for canoe tour.

4. **Observation by a community member visiting the Upper Cheslatta Falls:**
A community member visiting the Upper Cheslatta Falls observed no flowing water on the falls themselves. He noted that the usually liked picnick area had no attraction anymore. (The Upper Cheslatta Falls are a very frequently visited tourist attraction.)

The following table lists tourism activities in the Cheslatta River and approximate water flow requirements needed to achieve these activities:

Tourism Activities:	Waterflow requiremens:
Guided canoe trips	20 cubic metres per second is marginal and too low.
Guided river rafting	Impossible at 20 cubic metres per second, not enough water on rapids and falls.
Kayaking tours	Unknown.
Camping and picnicking at the scenic Upper Cheslatta Falls	20 cubic metres is too low to maintain scenic falls.
Guided fly fishing tours	Unknown.
Better opportunities for trout fishing	Less fluctuation.
Guided trail rides and hikes along the Cheslatta River	At 20 cubic metres per second, camping sites at falls appear unattractive.
Guided bird watching tours	Unknown
Winter bird watching for Trompeter Swans at Skins Lake	Only possible if winter flows are large enough to keep portions of the lake open.

Cattle containment:

Range tenures along the Cheslatta system have problems to contain cattle with the current situation because wing fences fall dry or are washed out. If the water release at SLS falls to or below 30 cubic metres per second cattle cross the river into the neighbour range. If fences would be buit along the river to contain the cattle, they would have to be many kilometres long through very rough terrain. Wildlife would be kept away from the waterway and the potential for wildlife injury is high.

Drinking water:

Wells in the Cheslatta watershed have undrinkable water. Many residents along the river take their drinking water supply from the river.

App. "B"

MEETING BETWEEN NECHAKO ENVIRONMENTAL ENHANCEMENT FUND (NEEF) REPRESENTATIVE AND CHESLATTA CARRIER NATION

BACKGROUND

Chief Marvin Charlie described the features of the Murray Cheslatta and Nechako Watersheds prior to the construction of the Kenney Dam and the initial impoundment of the Nechako Reservoir. He emphasized the changes in wildlife migration (Moose and Cariboo), fisheries, the Cheslatta River, and living conditions that have followed from the Development. Chief Marvin Charlie noted drainage of small lakes along the floodplain of the Cheslatta River following downcutting and erosion of the Cheslatta River and loss of juvenile fish during spillway closure and ramping down. Clearcut harvesting in the watershed is also a concern.

The Cheslatta Carrier pointed out that a dam was constructed at the outlet of Murray Lake in 1952 and Murray and Cheslatta Lakes were operated as a reservoir for five years, storing and releasing water to the Nechako River, during the construction of Kenney Dam and filling of the Nechako Reservoir.

ISSUES

The main issues presented during the meeting are summarized as follows:

- Certainty – In order for the Cheslatta Carrier Nation to proceed with their development plans there is a need for certainty regarding flows in the Cheslatta River and Murray and Cheslatta Lakes.
- Healing Flows – The Cheslatta Carrier Nation believe that flow releases from Skins Lake Spillway into the Cheslatta River are needed to rehabilitate the watershed. Occasional flood spills were thought to be compatible with rehabilitation.
- Perpetuity – The general opinion was that flow releases from the Skins Lake Spillway were required in perpetuity as it would be difficult to restore the stream channel and the groundwater aquifers to the their previous condition. The Cheslatta Carrier Nation thought that a water license would be required to ensure that the releases are committed and continued.
- Required Volumes – Alcan had presented a series of surrogate hydrographs that might be appropriate for releases from the Skins Lake Spillway. The hydrographs provided a spring freshet and annual releases ranging up to 20 m^3/s. The Cheslatta Carrier Nation was considering the information that had been provided.
- An important long-term goal is to restore a sport and food fishery on Murray and Cheslatta Lakes and their tributaries.
- The Cheslatta Carrier Nation favoured a weir at the mouth of Murray Lake (1 to 2 m high) to raise minimum water levels, cover the eroded shoreline and the delta at the head of Cheslatta Lake.

App "C"

APPENDIX C: REHABILITATION STRATEGIES

It is our view that flow releases from the Skins Lake Spillway should be combined with other activities to ensure that rehabilitation of fish habitat is achieved. We recommend the following actions to the parties eventually responsible for rehabilitation.

Tributaries to Murray and Cheslatta Lakes

Rehabilitation of Bird, Knapp, and Ootsanee Creeks, as well as an unnamed tributary (Sather Creek) to the west of Ootsanee Creek could be initiated immediately after a reduced flow regime is implemented. We recommend that the riparian area of the lower section of these Creeks be re-vegetated with the appropriate shrubs and trees. Although we believe that riparian re-vegetation should be a priority, some instream rehabilitation could also be implemented. Opportunities for instream rehabilitation structures could be determined on a site-specific basis and may include the construction of small logjams and undercut banks.

Beavers can be problematic, especially in re-vegetated riparian areas and beaver activity should be monitored. If site inspections reveal that beaver dams are blocking the upstream movement of spawning adults, it may be possible to initiate an incentive program to encourage licensed trappers to trap the beavers and breakup the dams. Such a program would be especially helpful for the first few years as trout populations recover.

Tributaries to Cheslatta River

Concern about fish access into tributaries flowing into the Cheslatta River, particularly Home Creek, has been expressed. Incision of the Cheslatta mainstem has resulting in downcutting of the tributaries, potentially creating a barrier to fish migration. As discussed, some further adjustment of the tributaries may occur after the KDRF is constructed.

Options for providing fish access should be determined on a site-specific basis, after final tributary adjustments are completed. Options could include constructing a fishway or a new channel that is not as steep.

Upper Cheslatta Falls

Ableson and Slaney (1990) state that the upper Cheslatta falls (photo 9) are a barrier to upstream fish migration and recommend that the falls be "improved" to allow fish passage. The falls could also be altered to provide better viewing and tourism opportunities at the lower flows.

We are not aware of a feasibility study and this option may be worth pursuing if providing fish passage over the falls will improve fish productivity of the Murray-Cheslatta system. The falls should be inspected during those times of the year when upstream fish migration occurs to determine the feasibility of providing fish access past the falls.

The Cheslatta River

As discussed, spillway releases have resulted in a much larger mainstem channel that is both wider and deeper than the natural channel (photo 7). In some sections of the mainstem, the channel is considerably wider and is braided with significant volumes of gravel on bartops (Photo 8). One option may be to place this gravel within the wetted channel for spawning.

During late summer, fall and winter, surface flows in these wider sections of the mainstem may become sub-surface, particularly during the low flow periods of winter and summer. One area of particular concern is the delta at the head of Cheslatta Lake where it may be necessary to construct a new channel to maintain access in the fall.

We recommend that the Cheslatta mainstem be surveyed, once a reduced flow regime has been established, to identify any areas where a majority, or all of, the stream flow is sub-surface. Once these areas have been identified, we recommend that a single, or possibly double, channel be constructed to concentrate flows. The new channel could be designed to provide a narrower channel cross section with pools and riffles, as well as meander bends, as appropriate. In addition, habitat in the form of logjams and undercut banks could be constructed.

Riparian Areas

Rehabilitation of riparian areas should be a key component of any plan to rehabilitate the Murray-Cheslatta system. Although trees and shrubs will naturally re-colonize riparian areas once the Skins Lake flows are reduced, this process can be accelerated with the implementation of a re-vegetation program which may provide the most cost effective approach to rehabilitation of the Murray-Cheslatta system over the long-term. Since there is a large area that could benefit from planting, a re-vegetation program would likely take several years to complete.

Re-vegetation of riparian areas has been identified as a priority by previous authors (Ableson and Slaney, 1990) and should be implemented in stable areas, such as the lake shorelines, immediately after flows are reduced.

Murray, Cheslatta and Skins Lakes

The natural shoreline of Murray, Cheslatta, and Skins Lakes supported a community of trees and shrubs. In many areas along the lake shorelines remnants of these trees can be seen in the form of standing snags (photo 10). We recommend that an inventory of the lake shorelines be conducted to prioritize which areas should be planted first. Planting could include the broadcast spreading of seeds as well as planting of shrub cuttings and tree seedlings. The plant species should be determined in consultation with the Ministry of Forests and the Regional Wildlife Biologist from MoELP.

In addition to the lake shorelines, the lower reaches of the tributaries to the three lakes should be re-vegetated as described previously.

Cheslatta Mainstem

Re-vegetation of the mainstem Cheslatta River will improve stream temperatures as well as provide a future source of large woody debris (LWD) to the channel. Photo 11 shows a gravel bar on which vegetation has started to take hold. This process could be greatly accelerated with the planting of appropriate plant species.

App "D"

TABLE 2.4.1
Cheslatta/Murray Lake
Elevation - Discharge Relationship

Elevation (m)	Discharge (m^3/s)
764.1	0
764.5	6
765.0	25
765.5	50
766.0	86
766.5	125
767.0	163
768.0	245
769.0	345
770.0	465
771.0	600