



A 2011 Overview of An

Report Caveat

The Tsilhqot'in have met the test for aboriginal title in the lands described in Tsilhqot'in Nation v. British Columbia, 2007 BCSC 1700 ("Tsilhqot'in Nation"). These lands are within the Tsilhqot'in traditional territory and the Xeni Gwet'in First Nation's caretaking area. Nothing said in our meetings or documents shall abrogate or derogate from any aboriginal title or aboriginal rights of the Tsilhqot'in, the Xeni Gwet'in First Nation or any Tsilhqot'in or Xeni Gwet'in members. The Xeni Gwet'in First Nation is one of six Tsilhqot'in communities which include: Yunesit'in, Tl'etinqox, Tsi Del Del, ?Esdilagh, and Tl'esqox.

Acknowledgements

Cariboo Envirotech Ltd. would like to thank the Chief and Council of the Xeni Gwet'in First Nation Government for their support and guidance during this project. Their connectivity to the land base of the Xeni Gwet'in Caretaker Area has been invaluable in establishing the first applications of a structured Ecosystem Based Management Plan to this geographical area; a land management plan that they have eternally applied in their traditional way.

We would also like to extend our thanks to the Fraser Salmon and Watershed Program jointly managed by the Fraser Basin Council and the Pacific Salmon Foundation. Their financial support for this project and projects undertaken in previous years has provided the Chilko River Watershed Roundtable with a representative voice echoing the concerns of many who value Pacific salmon and the quality aquatic habitat they require for existence.

As always we are indebted to our field crew of Rocky Quilt, Norman William and Trevor Quilt. Their knowledge of the Xeni Gwet'in Caretaker Area and their community proves invaluable each and every occasion we have had the pleasure of working with these fine Tsilhqot'in people.

We would like to thank project coordinator and Quality Waters Program Manager Nancy Oppermann and Xeni Gwet'in's Wilderness Tourism Coordinator Pam Quilt for all their efforts on this project and for the Chilko River Watershed Roundtable. This project would not have happened without their support.

We would also like to thank Herb Hammond and Silva Ecosystem Consultants for their guidance and provision of information on ecosystem based management planning for the Xeni Gwet'in Caretaker Area.

We are always grateful for the opportunity to work with the Xeni Gwet'in First Nation and thank them for allowing us to share their undying spirit of independence and their close relationship to their Xeni Gwet'in Caretaker Area. We feel privileged to be a part of their cultural desire to live in harmony with the land.

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1.0 Introduction

This project has been funded by the Fraser Salmon and Watershed Program. Its aim is to build on the achievements and guidance of the Chilko River Watershed Roundtable through their meetings held over the last four years. The function of the Roundtable hosted by the Xeni Gwet'in First Nation Government is to provide an inclusive discussion forum for parties interested in the sustainable management of watersheds and the potential impact development may have on the Pacific salmon that reside in the Chilko and Taseko River drainages.

It has long been the desire of the Roundtable to develop a watershed plan that protects monitors and enhances Pacific salmon while addressing community goals and objectives. This watershed plan should be compatible with the Xeni Gwet'in's Ecosystem Based Management planning approach as outlined by Hammond (2010) and by Holmes (2011), and should have high regard to the hydro-riparian planning considerations as detailed in the Great Bear Rainforest's Hydro-riparian Planning Guide (Coast Information Team 2004).

It is recognized that salmon in the Xeni Gwet'in Caretaker Area are considered a keystone species and their sustainability is a key consideration for the health of many species and indeed the health and well-being of the Xeni Gwet'in community. With this thought in mind a key component of the watershed management plan has to be local input from the Roundtable members (Holmes 2011). Additionally, input is valued from individuals within the Xeni Gwet'in community, whose vast fund of historic and local knowledge is vital in the formulation and implementation of the Plan as it develops.

Historic information was available for consideration in the Plan via interviews conducted in 2006 by Silva Ecosystem Consultants who collected and collated cultural and economic information in the watershed. More recently community members were continually interviewed during this field assessment during the data collection phase of the report and feedback will be incorporated when the ideas developed are presented to the community.

It is expected that all agencies and consultants involved in resource management within the Caretaker Area will contribute their research knowledge, data, expertise and experiences from other areas freely and willingly to the Xeni Gwet'in community. It is hoped they will achieve this through community presentations and workshops, and by involving community members wherever possible through employment opportunities.

The goal of the salmon and watershed planning process will be the integration of the related Nemiah Creek field assessment results and informed community planning that complements and fits into the Ecosystem Based Management Planning developed by the Xeni Gwet'in with Herb Hammond of Silva Ecosystem Consultants.

2.0 Location

The Xeni Gwet'in traditional use area as defined in the Supreme Court of British Columbia (Tsilhqot'in Nation v. The Province of British Columbia 2007) is roughly located south of Highway 20 between Lee's Corner and Tatla Lake in the Chilcotin Region of British Columbia. This extensive area encompasses the Chilko and Taseko River watersheds including a myriad of tributaries and lakes.

For the most part the landscape is untouched wilderness and as such has been very actively defended by the Tsilhqot'in people of Xeni Gwet'in. There is however continuous pressure on this area, particularly from mining and on occasion from forestry interests to enter the territory and operate under outside management. Improved road access has also led to many non-residents visiting the Xeni Gwet'in Caretaker Area and while this is encouraged under the terms of the Nemiah Declaration (Xeni Gwet'in 1989), it has also been abused. Examples include over hunting and numerous new unauthorized quad trails have been developed by visitors either hunting, picking mushrooms, or recreating.

The Chilko and Taseko River watersheds provide habitat for four species of migratory Pacific salmon. Chinook and sockeye can be found in reasonably high escapement numbers, however coho and pink salmon are recorded yet their populations and distribution are poorly defined. The Chilko River is recognized as one of the most healthy and consistent runs of sockeye salmon in the entire Fraser River drainage. This run has enormous economic value to the commercial and sports fisheries downstream on the Chilko River in both the ocean and estuary. Additionally, it is of extreme importance as a food, social and cultural fishery to the Tsilhqot'in people and to numerous First Nation communities downstream in the Fraser River. In 2010 and 2011 this sockeye run was developed in collaboration with Fisheries and Oceans Canada's (DFO) Pacific Integrated Commercial Fishery Initiative (PICFI) as an embryo commercial fishery by the Xeni Gwet'in First Nation Government (Photo 1).



Photo 1: Xeni Gwet'in's Rocky Quilt dip-netting as part of the PICFI fishery in 2010.

For these reasons the Tsilhqot'in people of Xeni Gwet'in have chosen to manage their traditional areas responsibly and sustainably under a system of ecosystem based management (EBM) as outlined in Hammond (2010). The brief four day field assessment of the Nemiah Valley undertaken in early October of 2011 and summarized in this report was designed to contribute to this existing plan.

In developing this 2011 project it was evident that the funding available would limit the size of the watershed where assessment was possible. Geography and access were other prime considerations. Initially it was thought to assess a salmon bearing watershed within the Taseko/Elkin Creek drainage where extensive ecological based management planning had previously occurred in the Taseko-Elkin Ecosystem Based Plan (2002) with the view to developing a sustainable forest enterprise. However fisheries based data is limited in this watershed with as late as 2010, new populations of sockeye and kokanee being recorded (Holmes 2010). The threat from mining in this watershed is extreme with a second Canadian Environmental Assessment office review of the Prosperity Mine Project being recently announced and much more field assessment work is required than could be undertaken in this survey.

For this reason the watershed chosen for planning development was that of Nemiah Creek. This was attractive for many reasons. Firstly as pointed out in Hammond (2010) "eco" (Greek) means home, "ecosystem" means "home" system. The Nemiah Creek watershed is now home for a large part of the Xeni Gwet'in community, particularly in the winter months. It is in this watershed that most of the permanent dwellings of the people exist, including the school, the

health care centre, the commercial enterprise and the Nation's office. The valley is where the majority of the horses and cattle are over-wintered and the source of the hay to carry them through the winter. The valley is also serviced by the only major road into the territory running from Lee's Corner, crossing the Taseko River at the Davidson Bridge and ending in the valley near the outlet of Nemiah Creek where it enters Chilko Lake. The watershed data base benefits from a Fish and Fish Habitat study conducted by Cariboo Envirotech Ltd. (2006) and since then the Xeni Gwet'in fisheries crew has conducted sporadic management as budgets permitted.

As the home of the people this watershed is recognized as part of the fabric of the community's attachment to the land. This allows for interest and opinion, traditional knowledge and history from all members of the community to flow into the development of a land management plan.

3.0 The Nemiah Creek Watershed

Nemiah Creek is approximately 19 kilometres long, with the watershed rising to the east of Konni Lake (see Appendix map) where its height of land is shared by the Elkin Creek/Taseko River drainage to the east. There is little for water volume in Nemiah Creek until below Konni Lake which is a large (565 hectares) deep (30 metres) and long (5 kilometres) lake. While it receives little water contribution from input streams it has a very substantial spring water feed. This is evidenced by a lake spawning population of kokanee and indeed historically, community elders describe a sockeye population on occasion that accessed habitat this far up the drainage.

From Konni Lake the creek flows west to Chilko Lake passing through Nemiah Lake. This lake is extremely shallow, for the most part less than 2 metres in depth with water in summer being considerably warm. However this system does benefit from having two major cold water tributaries contribute to the flow. Klokon Creek from the north and Tatlow Creek from the south. Both of these creeks have glacial origins. Klokon sourcing from a small glacier sheltered to the north of the Nemiah Range and Tatlow flowing from a more substantial glacier lying to the north of Tsylos Mountain.

On its route to Chilko Lake, Nemiah Creek is only joined by one additional substantial tributary, Robertson Creek, again sourcing from the south and the Tsylos range. This tributary joins at a point approximately half way between Nemiah Lake and Chilko Lake.

While the tributaries of Nemiah Creek offer some fast flowing steep sections, the main stem is characterized by slower moving water with gradients from the headwaters to Chilko Lake averaging 2% but never exceeding 4%. Both Klokon Creek and Tatlow Creek have fish bearing lakes high up in their watersheds. The total extent of the drainage can be viewed on the attached project map located in Appendix 1.

3.1 The Economics of Nemiah Creek

*“Eco” from the Greek meaning **home**, “nomics” from the Greek meaning **management**; economics meaning **home management**.*

While there has always been settlement within the Nemiah Valley prior to the smallpox outbreaks of the 1860s, the settlements of the Xeni Gwet'in communities were both more extensive and more dispersed throughout their traditional area. The current aggregation of Xeni people into this valley is the recognition of its ability to sustain the people and supply most of their traditional needs.

Prior to the construction of the new road west from Lee's Corner in the early 1970s the valley was virtually self-sustaining with access with the outside world via wagon trails to the north and east and trails to the south.

The valley provided an adequate supply of grazing and overwintering for cattle and horses and year round fishing and hunting opportunities. The landscape was an extensive source of plants for food and traditional medicines from the glacial slopes of Tsylos Mountain to the rich valley bottom wetlands. There is an adequate supply of timber, pine, fir, willow and poplar to service all traditional requirements for construction and fuel. Seasonal sorties out of the valley allowed for an enhanced lifestyle with large hunting, trapping, food gathering and fishing territories being developed and maintained. Social gatherings and trading connections were extensive with both adjacent Tsilhqot'in communities as well as Shuswap, Lillooet, carrier and Bella Cooola neighbors.

The arrival of Europeans onto the Chilcotin Plateau in the 1800s represented an enormous change in the economy of the area. There were and still are threats to traditional first nation use areas. Disease, particularly smallpox ravaged communities, families and cultures. New opportunities in a more extensive trading network arrived. Of special significance in this regard to the people of the Nemiah Valley was the trade in fur that developed. This allowed pelts to be exchanged at various trading posts, particularly Lee's Corner for the basics and staples of European life.

While the people of Nemiah appreciated some of the new found resources, they never abandoned their traditional economy and territories realizing that in self-sufficiency lay the key to maintaining an independence that would serve them well in dealing with the rapidly changing and unsustainable culture that would surround them. The improvement of the access road to Williams Lake through Lee's Corner has rapidly expanded the interface between the Xeni culture of self-sufficiency and connectivity with the land and the prevailing western culture and economics which can be best described as the “science of devaluing the future”.

While the culture of the Xeni Gwet'in people is not isolationist by nature, discussion with a majority of community members reveals their pervading view that it is pertinent to maintain the

degree of independence that a level of self-sufficiency and sustainable management of their territories provides. It is with this high regard to Xeni Gwet'in tradition that management of the Nemiah Creek watershed must be considered.

It will therefore be necessary to recognize, maintain and enhance the importance of the Nemiah Creek drainage in providing the following essential resources to the people of the valley in perpetuity and manage them accordingly.

Water from the drainage currently extracted from Klokon Creek is the source of drinking water for much of the community and nothing can be allowed to damage or diminish this supply. The water delivery benefits from a gravity fed system, and while not yet serving all properties in the valley it is extensive and offers local extraction points for community members not connected. Other properties where water is produced from wells in the valley require that at all times their groundwater sources are protected from pollution.

Hydro-electric power in the valley is currently the subject of much discussion. The current system of diesel generated power (70 kw) in the locality of the community's administration office is insufficient, has limited distribution and is adverse to an ecosystem based management plan. The diesel system is supplemented throughout the valley by individual properties having either a small gas generator or combined solar with propane powered backup systems. Current discussion hinges on the virtues of adopting a more extensive grid system, possibly developed by BC Hydro with a diesel backup, but with the primary power generation coming from a hydro-electric system based at Klokon Creek. The potential power generation capacity of such a development is rated at 400 kw and is full sufficient to power the entire community including the heating of water.

Such a system is obviously compatible with the degree of independence and self-sufficiency close to the heart of Xeni Gwet'in culture given the potential for future successful negotiation of BC Hydro's involvement. Initial surveys of the project offer little or no deleterious impacts on other values in the watershed. The possible site is located high in the watershed above any migrating salmonids and resident rainbow trout have access to all required habitats both upstream and downstream of this location.

This project again emphasizes the potential importance of the Nemiah Creek watershed in providing for the requirements of the Xeni Gwet'in people.

Fuel and energy provision in the watershed is also complemented by firewood production. The advent of the mountain pine beetle has both increased supply and availability of this valuable resource and most community members do not have to leave the watershed to obtain their supply. With the beetle kill currently stalled it seems likely the watershed can continue to supply adequate wood for small scale construction, traditional fencing requirements and fuel. Silva Ecosystem Consultants (2006) have additionally identified some small scale areas in the

Robertson and Tatlow Creek drainages that are capable of supporting a modest and sustainable forest enterprise.

As already noted cattle and horses have become an essential part of Xeni Gwet'in culture, both for the use of residents and also as a source of income from outside markets. One of the key ingredients to the successful economy of livestock rearing in the watershed is the provision of winter feed. It is here that the Nemiah drainage has been able to support this enterprise. Fall hay harvest has become a part of the Xeni Gwet'in culture. The hay harvested is entirely comprised of the traditional "swamp" hay variety cut from natural meadows along the sides of Nemiah Creek. The hay is a mixture of many species predominantly grasses and sedges cut in late summer after the livestock have been out on the wild range inside and outside of the watershed since spring. While the nutritional level of the hay cut is not equal to that of re-seeded pasture hay it has two enormous benefits to the valley economy. Firstly, the energy cost of locally produced hay is low and secondly, it is organic in nature potentially providing added value to any stock taken to market.

Production of local hay seems to have been reduced in recent years. Discussions with community members identified substantial areas that were previously worked as hay meadows (see Map Appendix 1) that have reverted to willow swamp (Photos 2 and 3).



Photo 2: Hay fields being reclaimed by willow swamps on fringes.



Photo 3: Swamp infringing on adjacent hay meadows.

One of the main factors in these changes was identified as increased beaver activity. Indeed, discussions with locals involved in valley hay production referred to difficulties from beaver flooding the meadows and hindering or preventing harvest of hay crops.

These difficulties relating to hay production also melded with difficulties identified by the Xeni Gwet'in fisheries crew who had been working in the Nemiah Creek watershed since 2006. The importance of food fish production to the community from this drainage was identified in their original study (Holmes 2006). A survey of residents noted that on average fish was eaten by households on two days per week. Very little of this fish was purchased as only 13% of respondents listed store purchases as part of their consumption while 97% of the respondents ate fish from the Nemiah Creek system. The fish and fish habitat survey (Holmes 2006) detailed the presence of spawning populations of bull trout, rainbow trout, sockeye salmon, kokanee, whitefish and suckers all established within the Nemiah Creek watershed. All these species contribute to the traditional fishery within the valley which focuses on a net and ice fishery on Konni lake but also has a substantial stream fishery component.

Three issues of concern regarding the sustainability of this Nemiah Creek food fishery were identified. All of these issues entailed either access to or the quality of spawning areas within the watershed. Firstly a section of creek was identified where livestock impacts within the riparian area were excessive (see Project Map-Appendix 1). Sedimentation was impacting a prime

spawning area for Konni Lake rainbow trout. Secondly, two culverts on the main Nemiah Valley road were identified as impacting the spawning runs of fish out of Konni Lake. These culverts are either full or partial barriers to seasonal fish migration and as such were reported to the BC Ministry of Transport in 2007 (Photos 4 and 5).



Photo 4: Drop culvert preventing upstream migration during low flows.



Photo 5: Culvert possibly preventing upstream migration during peak flows.

It was noted that during the field assessment of this project, the culvert replacement was finally in progress on this main Nemiah Road. Discussions with Michael Lares, Xeni Gwet'in Enterprise manager who is overseeing this project confirmed that the contractor is aware of the fisheries significance of these two aforementioned culverts. They will be replaced under the supervision of Triton Environmental ensuring compliancy with fish passage requirements.

Thirdly, major problems with upstream fish access from Chilko Lake into the upper reaches of Nemiah creek were identified. Runs of bull trout, rainbow trout and sockeye salmon seasonally leave the lake to utilize the spawning gravels available in the Nemiah watershed. Of particular interest was the 2006 sockeye salmon escapement of 450 fish, only reaching as far upstream as the Nemiah Rodeo Grounds. However, discussions with elders revealed this run was historically larger and more extensive within the watershed. Indeed, as late as the 1970s sockeye salmon were on occasion caught in nets in Konni Lake at the head of the drainage. Sockeye salmon were also known to enter both Tatlow and Robertson Creeks. This 2006 escapement of sockeye was reported to DFO who were unaware sockeye utilize Nemiah Creek.

In 2006 the run of bull trout was noted as occurring almost simultaneously with the sockeye escapement (early September) but the focus of these fish was identified as the spawning gravels served by the cold waters of Robertson Creek.

The 2006 report identified beaver damming the creek to be seriously impacting access to spawning for all species of fish in Nemiah Creek and indeed the dams were contributing considerably to degrading the habitat quality through sedimentation of that identified spawning gravel.

4.0 Field Assessment 2011

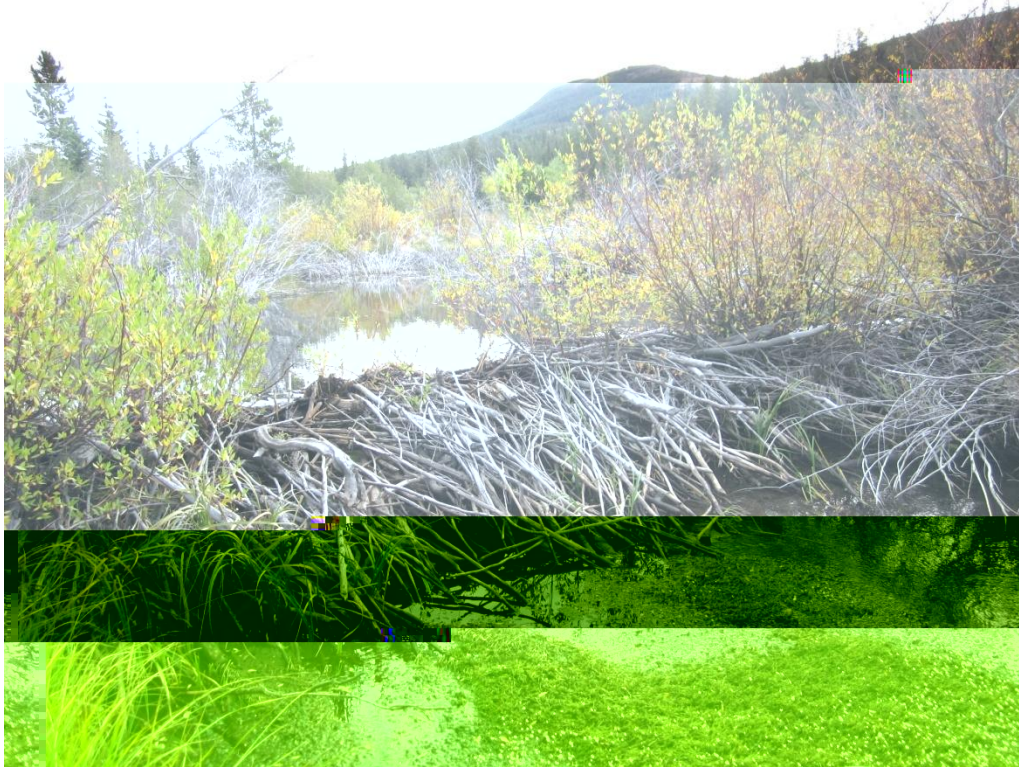
It was felt that sufficient previous research, anecdotal evidence and local knowledge were all pointing to a substantial change occurring in the biology of the Nemiah Creek watershed over the last 30 years. This change seemed to focus on an increase in beaver populations in the valley. The result of this population increase was having a profound effect on the economy of the valley and its sustainability. The beaver dams were fundamentally changing the nature of the hydro-riparian zones along Nemiah Creek. Hay meadows were no longer drying out sufficiently in summer to allow harvesting of substantial areas (Photos 6 and 7). Barriers and creek diversions were becoming so substantial that spawning runs of fish essential to the traditional food fishery



Photo 6: Wet meadows preventing hay harvest.



Photo 7: Beaver activity resulted in wet meadows that remained un-harvested.



Photos 8: Beaver dam showing de-watered streambed downstream.



Photo 9: New stream channel caused by beaver dam upstream.



Photo 10: Leaning spruce trees destined to fall into Nemiah Creek.



Photo 11: Dead and dying spruce trees in the riparian zone of Nemiah Creek.

In recognition of these issues the fisheries crew in Nemiah have whenever time or funding has allowed, undertaken stream clearance work and the opening of larger dams. This was initiated immediately prior to the arrival of the fall runs of sockeye and bull trout migrating upstream from Chilko Lake. To this end in 2010 the crew was rewarded with a count of >2000 sockeye spawners in Nemiah Creek (Holmes 2010). The sockeye were not recorded upstream of Nemaia Lake however and still not approaching their historical known distribution.

The reasons for the increased beaver presence and its consequences for the residents of the Nemiah Creek watershed have been much discussed. Two factors seem to have been of prime importance.

In traditional Xenigwet'in culture, beaver was a much valued animal. It was an excellent source of food. Its meat was sought after, often smoked for winter storage and having a very high fat content (particularly the tail) was an essential aid to winter survival. The animal does not hibernate and therefore there was also some winter availability at known locations where collected food sticks of willow and poplar are stored adjacent to lodges. Furs were of obvious utility traditionally, and with the arrival of Europeans on the Chilcotin Plateau became a very important trade item, being either bartered for groceries or sold. These two requirements kept a continuous pressure on beaver populations in Nemiah Creek which was the closest supply to home for most Xenigwet'in residents.

In the late 1970s the fur trade in beaver pelts collapsed with pressure from European environmental groups and the decline has continued until present. A pelt worth \$50 at auction in the early 1970s is now worth approximately \$20. This combined with inflated costs and the risks associated with winter trapping on flowing water have led to a total collapse of the beaver pelt enterprise in the Nemiah Valley. Additionally the construction of the road connection to Highway 20 in the 1970s to Williams Lake has allowed for substantial changes in people's diets and made factory produced meats and oils available at affordable prices. The result has been a virtual total removal of beaver meat from the Xenigwet'in diet.

The primary predator on the beaver population was undoubtedly human. Wolves, coyotes and grizzly bear are all known to take beaver of various ages but they are also less likely found near human settlement. The result of the removal of predator control species has been an explosion in the beaver population of the Nemiah Creek watershed. Consequently the fisheries value of Nemiah creek and its associated tributaries has declined, impacted by barrier construction and sedimentation. The beaver's hydro-riparian engineering talents and requirements for farmed willow areas is also severely impacting the creek-side annual hay harvest traditional to Nemiah culture.

While these two aspects of beaver biology have a negative impact on the current economy of the Nemiah Creek watershed, it is only fair to note some of the positive impacts that beaver may also bring to a watershed. From a fisheries perspective, generally the presence of beaver can provide some genuine benefit to an aquatic environment. Their dam systems can offer much improvement to rearing and over-wintering habitats for salmonids. They can provide warmer and calmer water conditions and integrate both large and small woody debris into the system enhancing both habitat and nutrition.

However in the case of Nemiah Creek, rearing habitat and warmer water (courtesy of Nemaia Lake) is not in short supply. The majority of the creek is already slow flowing and long weedy sections have no shortage of primary production. The habitat in short supply in the drainage is well oxygenated spawning habitat with clean gravel if Nemiah Creek is to produce its full complement of young salmonids to the more extensive Chilko River watershed. The beaver are severely impacting the quality of and access to this habitat.

Again, with the hay meadows, beaver presence has some utility, as spring flooding provides both water and nutrients to these sites. However it is arguable that sufficient irrigation is effected by the natural cycle without the continuous maintenance of a high water table from beaver damming.

Armed with these considerations it was deemed important to gain some actual population numbers and distribution details of the beaver in the Nemiah Creek watershed if management of their population was to be considered. To this end a survey of beaver presence on the main stem of Nemiah Creek, Roberson Creek and Klokon Creek was undertaken in the fall of 2011.

4.1 Overview of Field Assessments

During the first week of October 2011 a survey was planned of the beaver dams and lodges present in the Nemiah Creek watershed. In 2011 funding was unavailable for opening of beaver dams to assist salmonid passage so it was felt that a good view of the current situation could be achieved. Three Nemiah community members Rocky Quilt, Trevor Quilt, and Norman William were employed but with limited time and funding available, it was realized that not every stream in the watershed could be assessed in the four days allocated for field work.

However, from previous assessments since 2006 in the Xenigwet'in Caretaker Area and the Nemiah Valley it was known where the highest impacted areas were likely to be. Effort was concentrated on the main stem of Nemiah Creek and the lower sections of Robertson, Tatlow and Klokon Creek and its main tributaries. The slower reaches of all these streams offer ideal beaver habitat. Beaver are known to inhabit other local areas but lodge and dam building is sporadic and

over-wintering on stream reaches with increased flows is unlikely. Beaver are also known to inhabit Konni Lake and Augers lake year round but neither of these were surveyed as their impact on riparian zones and fish passage in these locations is not significant.

Reach 1 of Nemiah Creek was also excluded. This stream reach had been canoed by the fisheries crew in 2006, 2007, 2008 and 2010 (Holmes 2006-2010) and in none of these years were beaver dams encountered. Beaver do inhabit this area in numbers and streamside lodges exist. However there is insufficient woody material available close to the streamside to allow dam construction, the riparian zones primarily consisting of sedge and small willow. Without damming, the beaver population has not substantially affected water levels and sediment deposition in the streamside meadows, and there are no obstacles to fish passage.

4.2 Methodology

All the creek sections outlined in Section 4.1 were either walked or canoed during the field assessment. This involved penetrating some very dense willow thickets, and in the case of canoeing, undertaking numerous portages. All dams that crossed the main stem of the survey creeks were recorded and GPS coordinates were taken, however numerous other side channels, diverted channels and smaller dams exist (Photo 12).



Photo 12: Beaver dam found on a small side channel of Nemiah Creek.

Additionally, all “substantial” beaver lodges were recorded and GPS locations were also taken. “Substantial” beaver lodges were lodges where it was considered over-wintering was probable. The defining feature used to determine whether over-wintering would occur was the accumulation of winter feed sticks at the lodge entrance.

Two types of lodges exist, the classic and more obvious “haystack” types of lodge and the less obstructive streamside bank lodges where the beaver have usually utilized an existing feature be it a downed tree stump or an under-cut bank (Photos 13 and 14). Many smaller lodges were observed particularly of the streamside variety where beaver obviously seek sanctuary on occasion while travelling their territory but these had no food stores and were not considered residences.

While surveying the extent of the watershed main stems the opportunity was also taken to reassess other economic and riparian impacts that were occurring such as culvert problems or grazing impacts.

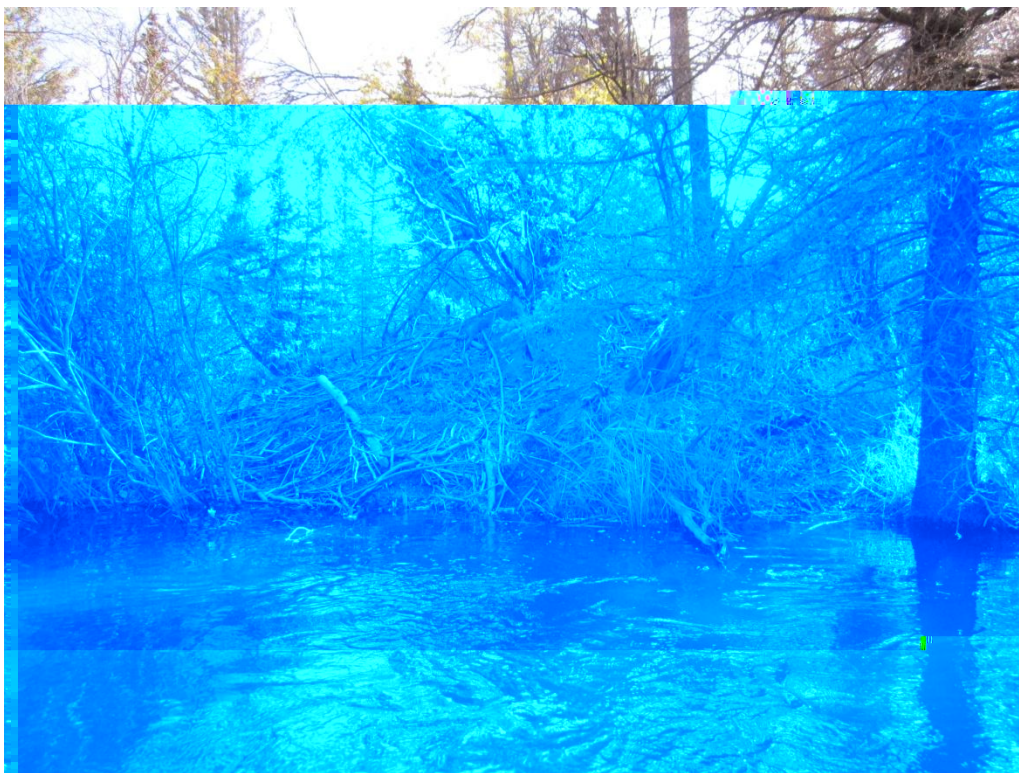


Photo 13: Haystack style beaver lodge located on Nemiah Creek.



Photo 14: Streamside bank beaver lodge located on Nemiah Creek.

4.3 Results

The results of the beaver lodge and dam survey were best presented in map form and this can be found in Appendix 1. The legend to the side of the map provides the exact GPS locations of all the features noted. In all 32 active lodges and 50 Nemiah Creek main stem dams were observed and recorded. Two areas where hay meadows were known to exist into the 1970s which have now reverted to willow thicket and provide excellent moose winter habitat are also identified on the map. The main area of hay meadow under threat from current beaver activity is also identified.

Streamside impacts from cattle and horse grazing in the riparian zones are not extensive. This is attributable to the low numbers of livestock kept by the Nemiah Community. The one section of impacted habitat first recorded in Holmes (2006) still exists and is not improved (Photo 15). Due to the critical location for rainbow trout spawning this neglected issue needs to be addressed. This section is also marked on the map.



Photo 15: Riparian zone and stream bed gravel of Nemiah Creek impacted by cattle.

Interestingly, during the survey some sections of extremely “muddy” water were observed. This was initially thought to have been as a result of cattle and horses in the stream. However, further investigation revealed the source to be newly constructed beaver dams (Photo 16). Having crossed the stream with woody material the beavers were solidifying their efforts by building up layers of mud on the ace of the dam. Water passing through and over the dam was picking up a heavy load of this fine mud with resultant sedimentation of the downstream area.

Both culverts C1 and C2 (Photos 4 and 5) identified on the map remain at best seasonally passable to salmonids but as mentioned in Section 3.1 it is hoped that this is being resolved. No other or new culvert problems were observed.



Photo 16: Muddy water created by beaver dam building activity.

4.4 Discussion

The suspected high population of beaver in the Nemiah Creek watershed and their impacts on riparian zones, fish passage and hay meadows was confirmed. With 32 substantial lodges recorded and using the generally utilized formula that a lodge population consists of adults, kits and one year olds of between 5 to 7 individuals, we can estimate the population to be approximately 200 beaver. However, to this estimate it is necessary to include the populations that inhabit Konni Lake, Augers Lake, and reach 1 of Nemiah Creek (not surveyed). This likely puts the population closer to 300, or approximately twice the number of people living in the Nemiah Valley. Given the described, obvious and economic impacts, due consideration needs to be given by the Chief and Council through resident consultation balancing community interests, to a program of beaver control.

Utilizing details provided in Furbearer Management Guidelines (Hatler and Beal 2003), recommendations for trap line management suggest that a harvest of approximately 30% of beaver in a given area is sustainable. With the current numbers present this would indicate a harvest of 80 beaver per annum would probably not reduce the population. This seems a large number of individuals to remove from the system and such a management approach needs to be both considered and monitored if it is to be included in an ecosystem based management plan for the watershed.

Firstly, with the decline in beaver trapping and fur prices has gone a decline in skills and interest in the community and this needs to be addressed with training of a new generation of trappers. Additionally, the potential production of 80 pelts and carcasses per annum would require adequate research into usage of these materials. Raw sales of pelts into the fur trade is unlikely in the present market to yield enough to even cover costs. It is therefore necessary to address the idea of a value added enterprise that can process and use the fur for a craft product line produced within the Valley. Again there may be a need for craft skills training by elders for a new generation to benefit from such an enterprise.

Thought needs to be given to using the meat from the resulting carcasses, with again elders possible taking a lead in re-introducing beaver into the Xeni Gwet'in diet, and any surplus may be utilized as pet food. The Internet provides a vast range of recipes for cooking beaver meat, for example in the Complete Fish and Game Cookbook (Livingston 1996). While there is not always praise for the fatty nature of the meat, it seems to be the basis of many hearty and spicy stews and particularly good when smoked.

It is suggested that if a trapping program is undertaken in the Nemiah Valley watershed, this should begin in a modest way. This would benefit from developing appropriate skills and processing. Ideally initial trapping should be focused on the lower two reaches of Robertson Creek. This area has serious impacts both to the hay harvest at Chilkonni Ranch and bull trout spawning habitat and access to it. The fall migration of bull trout is also a regularly harvested source of food fish at many locations on the creek. Of almost equal priority would be to trap the sections of river between the Baptiste bridge upstream to the Rodeo Grounds. The excessive damming (10 major dams and 17 active lodges) here is severely impacting movement of sockeye and rainbow trout to their traditional spawning areas which extend from the Rodeo Grounds upstream to Nemaia Lake.

No doubt trapping of these areas will encourage immigration of juveniles from other areas but it is suggested that a plan could start by removing 50 beavers from these key areas initially, then perhaps building up to 80 per annum with a constant monitoring of results to see how improvements progress.

Monitoring should include annual assessments of the various benefits it is hoped to achieve by reducing beaver populations. An annual count of lodges and dams in the sections recorded in 2011 would be important. Additionally, records of bales of hay taken off the Chilkonni Meadows should be kept to ensure benefits are being achieved there.

Enumeration should be undertaken annually of spawning sockeye and rainbow trout from the Rodeo Grounds upstream to Nemaia lake and of bull trout from the mouth of Robertson Creek to

the Valley road crossing. Such counts should be conducted within the same week each year with consistent enumeration standards.

If the initial culls appear to be producing worthwhile results it could be recommended to extend the trapping with a view to extending sockeye spawning opportunities in Nemaia Creek to more of their known historical range where fish travelled as far upstream as Konni Lake and the lower reaches of Tatlow Creek.

4.5 Conclusions

The Nemiah Creek watershed is a bountiful home for the Tsilhqot'in people of Xeni Gwet'in. It presently provides many benefits to the community. Excellent drinking water, grazing and winter feed for stock are major inputs to the valley economy. The watershed provides food particularly fish, hunting opportunities, medicinal plants, and berries and these important sites have been recorded and mapped (Silva Ecosystem Consultants 2006). Presently with the planning of a 400 kw hydro-electric turbine for Klokton Creek the drainage offers an independent answer to most of the power and energy requirements fundamental to modern living. Additionally there is opportunity for small scale sustainable forestry production and the potential has been assessed through the Xeni Gwet'in Ecosystem Based Management Plan (Hammond 2006).

For the most part however the watershed can be considered pristine (unusual in British Columbia today) and has to date been managed by the community in a sustainable manner. This management has resulted in a growing wilderness tourism industry with great potential to contribute to the wealth of community members.

This brief overview report has highlighted some changes in the economy of the watershed that have developed over the last 30 years. These are largely as a result of cultural changes that have occurred with increased access to urban centres. This has led to a changing involvement and trade with neighboring societies.

Beaver populations previously trapped, and a mainstay of the traditional economy, for both food and fur, have been shown to have expanded in numbers and as such are clearly impacting other values. It will be necessary to control these populations if hay production and fisheries quality values close to the heart of the Xeni Gwet'in culture are to be maintained.

It is expected that under the ecosystem based management planning favored by the Xeni Gwet'in that such culling will be undertaken in a controlled and sustainable manner using precautionary principles as outlined in Hammond (2006). It will be necessary to adopt a monitoring system to record accruing benefits and to guide progress to a goal of improved hay production and a

sustainable food fishery. It will also be necessary to develop skills that utilize to the maximum beaver removed from the Nemiah Creek watershed. The development of such a plan requires the input and consideration of the entire community and will need to be fully discussed at meetings of Chief and Council and at community meetings.

It is however a matter of some urgency that spawning populations of sockeye, bull trout, and rainbow trout from Chilko Lake be at least maintained and preferably returned to their historic extent in the Nemiah Creek watershed. Of particular interest is to know whether the sockeye present represent a unique genetic strain to Nemiah, and if so, what is their genetic relationship to the Konni Lake kokanee that are an important part of the Xeni Gwet'in diet? How much genetic insurance and interchange exists between these two populations and how interdependent are they? There is opportunity in this small drainage to study this relationship and to this end genetic samples of Nemiah sockeye were taken in 2010 for comparison with Chilko sockeye. Results of this sampling have not been received from DFO at this time.

In conclusion, the situation of the expanding beaver population resulting in a heavily impacted watershed with substantial changes to hydro riparian zones is certainly not unique to Nemiah Creek. In the Xeni Gwet'in Caretaker Area similar situations were noted on Yohetta Creek (Holmes 2010) and Lastman Creek (Holmes 2008) where dams are denying access to excellent salmonid spawning areas. In the larger picture of British Columbia there is no doubt that a combination of expanding beaver populations and improperly placed culverts as evidenced in the Nemiah Valley are severely limiting salmonid spawning on some of the Province's smaller and extremely valuable streams. These issues require the constant attention of fisheries management staff.

It is hoped that the Xeni Gwet'in community can yet again take a lead and set an example on how to manage a wilderness economy in a sustainable manner.

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