

Guichon Creek Irrigation Ditch Decommissioning Project

**Project Implementation and Management
By
DFO, Restoration, Kamloops**



**Project Funding Provided
By**

The Pacific Salmon Commission

May 31, 2006

Introduction

For many years irrigation ditches were used as the primary means of transporting water to hay fields in the Interior of BC. These ditches would divert water from streams for the summer season and would then be shut down in the fall season; unfortunately thousands of juvenile salmonids (mainly coho salmon and steelhead trout) would utilize these areas as rearing habitats throughout the summer months and subsequently be stranded during the fall season when the irrigation ditches were shut down.

Fourteen such ditches have been constructed with points of diversion off of Guichon Creek (tributary to the Nicola River) near Merritt, B.C. in the early part of the century to deliver water to numerous ranches and the Lower Nicola Indian Band. Of these fourteen ditches, two divert water to three ranch's in the area (Kuiper, Grant and Moyer Ranches) and are still in use today. Proper management and maintenance of intake screens on all of the ditches including these two has not taken place over the years and as a result literally thousands of juvenile and adult salmon and steelhead were being stranded and perishing in the ditches when they were shut down during the fall at the end of the irrigation season (see photo on cover page).

The issue of water conservation within the Lower Nicola Area is not a new issue and in fact has been an ongoing concern for numerous government agencies, local First Nations and private citizens since the early 1980's. For example as a result of a lack of water within Guichon Creek in 1982, Rob Bell Irving (then of DFO) wrote to John O'Rierdan (then of the Ministry of Environment, Kamloops) requesting that minimum flows in Guichon Creek be maintained at 0.2 m³/s (7 cfs) in order to properly maintain fish production. In 1986 an investigation by R.J. Petrie (then of the Water Management Branch, Kamloops) into the problems associated with the numerous diversion structures in the Guichon Creek watershed highlighted the need to better understand the current diversions and problems associated with water use in the Guichon Creek drainage. Mr. Petrie's initial investigation led to a more detailed published report in 1991 by Dobson Engineering. This report titled "Guichon Creek – Recommendations Regarding Enhancement of Flows for Fish" highlighted the ongoing problems associated with numerous irrigation ditches that were originally built to divert water from Guichon Creek to Stumbles Creek and other areas within the Lower Nicola Area for the purposes of irrigating agricultural lands (I have included a copy of this report for your review). The report identified two primary problems associated with the 14 irrigation ditch diversion sites along Guichon Creek 1) a lack of proper fish screens at any of the 14 diversion structures was resulting in significant fish kills

within the ditches after the irrigation season and 2) inefficient water delivery systems (ditch losses of 80% were common) resulting in ditch losses of $0.21\text{m}^3/\text{s}$ or 750% of the licensed quantity on a daily basis was taking place (Dobson Eng, 1991).

The impact of these 14 diversions to Guichon Creek resulted in an inefficient use of water that should have been available for many other environmental and anthropogenic uses within the Guichon Creek system. Significant losses of juvenile salmon and trout within the ditch systems was also taking place on a yearly basis causing concern and alarm within the Kamloops DFO office. In 1998 a DFO investigation into a massive fish kill within numerous irrigation ditches diverting water from Guichon Creek led to a renewed joint effort by all parties involved including DFO to try once and again to solve the historical problems associated with the diversion structures. This renewed effort was also a means of avoiding prosecution by DFO under the Federal Fisheries Act for the fish kills that had taken place within the ditches.

Fortunately, the Dobson Engineering report also included recommendations to solve the water diversion problems that were occurring within the Guichon Creek drainage. These recommendations were:

- 1) Improve upstream storage
- 2) Relocate the diversion structures to the Nicola River or lower down along Guichon Creek
- 3) Improve the intakes and delivery systems of the current diversion structures including drilling wells to access groundwater sources

An overall management plan was discussed at length with all the parties involved and a plan was developed that included installing a three fish friendly intake screens (Finnegan Screens) at the point of diversions on the Lower Nicola Indian Band's upper and lower ditches. This was completed in 1999 (we are also currently working with the Band to upgrade their irrigation ditch with a pipe delivery system). Relocation of the Kuiper Ranch diversion ditch to the Nicola River, this was completed in 2005. Drill two wells to provide groundwater to the Grant (now Sam, Wright, Galbraith) and Moyer (now Smoluk) Ranches. The first well was drilled in 2000 to a depth of 280 feet and resulted in an artesian style well that provided approximately 400 gpm of water. The last phase of this overall project was to complete the drilling of the second well enabling the decommissioning of the remaining two irrigation ditches to conserve significant water savings. Currently, the volume of water in Guichon Creek above the uppermost irrigation ditch diversion is approximately 40 cfs or $1.13\text{ m}^3/\text{s}$. The old Grant/Kuiper and Moyer irrigation ditches each divert approximately 9.9 cfs or $0.28\text{ m}^3/\text{s}$ of water for a total of approximately 19.8 cfs or $0.56\text{ m}^3/\text{s}$ from Guichon Creek. As well, leakage within the ditches accounts for approximately 7.4 cfs or $0.21\text{ m}^3/\text{s}$ (up to 80%) of water loss from the original allocation of diverted water. The decommissioning of these two ditches through alternative water delivery systems will increase by almost 50% the amount of water available within the mainstem of Guichon Creek and the Nicola River below the ditch intakes.

Other options were considered such as: replacing the earthen ditches with a pipe system on the Kuiper/ Grant and Moyer ditches, this option was deemed to not be economically feasible as the cost was approximated at \$500,000.00. As well the point of diversion location for both these ditches along Guichon Creek is located on reserve land and in a difficult location to work with in terms of the physical attributes of the river channel. Increasing storage at Mamit Lake was also not pursued for financial reasons, as the dam itself needs substantial repairs due to age and a lack of a permanent fish way was not included in the original construction.

Project Details

The bidding process to drill the artesian style well commenced in August 2005, DFO issued a RFP for the drilling and engineering portion of the work. Columbia Water Wells was the only company to bid on the work with a bid price of \$55K. Due to the low level of interest from drilling companies we decided to re-issue the RFP with an increased timeline to complete the work. Two bids were received at this point, 1) Columbia Water Wells again at \$55k and 2) Drill-well Enterprises with a bid of \$80k.

The price received from both companies was higher than expected due to steel prices rising dramatically throughout the past year as a result of development in China. We also received feedback from within the drilling industry that most of the drilling companies that could handle this type of well were very busy in the oil and gas areas of BC and Alberta at the time.

Columbia Water Well was awarded the contract for a \$55k for the drilling portion of the work and AMEC engineering services was awarded a contract for \$20k for engineering services to assist with soil analysis and well screen size selection and general well management.

The project total for both contracts was \$75k as we had been awarded \$55k from the PSC we needed to raise additional funds for the actual drilling portion of the proposal and the final decommissioning of the two ditches (approximately \$15k) to complete the project. The decision was made to go ahead with the actual drilling phase including the engineering services and look for additional funds as the project proceeded and in March 2006 drilling commenced at the site. Drilling was extremely difficult with the drill rig encountering several large very hard rocks that had to be blasted within the well casing right from the beginning down to about 170 feet. Substrate from this point on was much easier to work with and drilling proceeded fairly smoothly. At 230 feet significant water was encountered, a weak artesian style well (small amounts of water was flowing in an upward direction, although any flow is a good sign) was estimated to be producing approximately 200 gpm of water from a pump type situation.

A group decision was made between AMEC/DFO and Columbia Water Wells to develop the well at 230 feet, the well screens were ordered by AMEC based on drill soil samples. The screens included a 10 foot section of 10 slot pipe (1/10,000 of an inch slots) and a 30 foot section of 30 slot 1/30,000 of an inch). They were installed and the well was developed at a depth of 230 feet. Unfortunately the screens silted in due to an unexpected high level of fine silts in the area of the water and essentially the screens clogged with debris within a week of installation, upward flow of water was reduced to a minimum flow, pump volume was estimated to have decreased to below 100 gpm. This was an unexpected setback as AMEC had been hired to provide the project with advice regarding proper screen sizes based on soil analysis from the well site. A meeting between AMEC and DFO revealed that AMEC made the right decision on the well screen sizes based on the soil sample analysis but due to the type of drilling rig being used to drill the well, the soil samples collected may not have reflected their actual physical makeup and subsequently the screens plugged.

A pump test has been performed on the well by Columbia Water Wells to determine the exact volume of water the well is capable of producing. The pump test concluded that currently the well is capable of producing approximately 33 gpm. In order for the ditches to be decommissioned a minimum well pump volume of 200 gpm needed to be met.

Columbia Water Well's has provided an estimated cost of \$40k to pull the existing screens, re-develop the well at 230 feet install new larger sized screens and continue to drill to 280 feet. To

off-set these additional costs plus address the ditch decommissioning costs, DFO has allocated an additional \$20k and we were successful with an application to the National Water Expansion program for an additional \$25k from Ag Canada. Based on the costs of the previous work the additional \$45k should cover the added costs incurred during the project.



Second Well Site (PSC Project) – Current depth 230 feet, weak artesian well, well capacity between 100-200 gpm.

Concluding Remarks

Future work at this site will commence later in the year (depending on Columbia's schedule), the preferred option from our viewpoint will be to re-develop the well with new larger screens at 230 feet and continue to drill another 50 feet to the expected second aquifer at 280 feet. Once the well has been re-developed and is producing 200 gpm the irrigation ditches will be permanently decommissioned.

PSC will of course be included in all aspects of the final portion of this project. A revised final report will be sent to the PSC upon completion of the project.