Water Quality Objective Monitoring, Sixty Mile River Basin, 2010

Sixty Mile River Watershed

This basin has been extensively monitored for the past 7 years providing us with a vast amount of information regarding the state of the water quality in a historically mined watershed. The Sixty Mile River basin is a heavily diverse watershed, with vast areas of active mining as well as inactive, reclaimed and partially reclaimed, sections. Placer gold was discovered in the Sixty Mile River area in 1892 by C. Miller. The principal creeks mined were Miller, Glacier, Big Gold, Little Gold and Bedrock creeks. In 1915 and 1916, the North American Trading and Transportation Co. dredged near the mouth of Miller Creek.

The dredge was refurbished by the Holbrook Dredging Co., which mined in the Sixty Mile Valley below Miller Creek between 1929 and 1941. A new dredge was constructed by Yukon Exploration sand Yukon Placer Mining Co., which mined the lower reaches of Glacier and Big Gold Creeks and part of the Sixty Mile River from 1947 to 1959. Mining in the basin still continues to date and has been very active over the last decade.

In 2010, water samples were collected at 17 different sites in the Sixty Mile River basin. Sampling commenced on June 17th, 2010 and a total of 191 samples were collected up until the end of the season on September 28th 2010. A combination of automatic composite sampling and grab sampling methods were used in the basin.

Atmospheric data was collected using two portable weather stations, one located near the mouth of the Sixty Mile River, the other at an Upper Sixty Mile River background site.

Blitz sampling events took place in the Sixty Mile River Watershed on June 23rd and September 1st, 2010. Samples were taken every five kilometres along the main stem of the Sixty Mile River and at the mouth of the major tributaries.

Basin total flow data was provided to us by the Water Survey of Canada station located near the mouth of the Sixty Mile River. Flow data for the individual tributaries to the Sixty Mile River was collected at the time of sampling using the methodology outlined in the Yukon Placer Secretariat's Water Quality Monitoring Protocol.

Site Codes and Global Position of Water Quality Sampling Locations in the Sixty Mile River Watershed

Site Code	Alias	Location	Latitude	Longitude
SI01	60M 01	Sixty Mile River mouth	63.559290	-139.765780
SI02	60M 01A	Sixty Mile River upstream Ten Mile Creek	63.546760	-139.929380
SI03	60M 01B	Sixty Mile River downstream Twenty Mile Creek	63.689450	-140.159810
SI04	60M 02	Sixty Mile River upstream of Water Survey of Canada Site	63.692860	-140.169480
SI05	60M 02A	Sixty Mile River upstream of confluence with Matson Creek	63.718800	-140.190467
SI06	60M 03	Sixty Mile River upstream of Fifty Mile Creek	63.793140	-140.197310
SI07	60M 04	Sixty Mile River downstream of California Creek	64.022190	-140.342030
SI08	60M 05	Sixty Mile River downstream of Five Mile Creek	64.039035	-140.617535
SI09	60M 06	Sixty Mile River downstream of Big Gold Creek	64.015900	-140.694380
SI10	60M 07	Sixty Mile River upstream of Big Gold Creek	64.015910	-140.696720
SI11	60M 08	Sixty Mile River downstream of Miller Creek	63.987120	-140.789410
SI12	60M 09	Sixty Mile River upstream of Miller Creek	63.987320	-140.792360
SI13	60M 10	Sixty Mile River downstream of Bedrock Creek	63.964419	-140.857844
SI14	60M 11	Sixty Mile River above all mining	63.955050	-140.869280
SI_BE01	60M BED 01	Bedrock Creek mouth	63.963710	-140.861110
SI_BI01	60M BIG 01	Big Gold Creek mouth	64.015900	-140.720460
SI_BI02	60M BIG 02	Big Gold Creek upstream of confluence with Glacier Creek	64.027080	-140.749850
SI_CA01	60M CAL 01	California Creek mouth	64.020170	-140.351500
SI_FI01	60M FIF 01	Fifty Mile Creek mouth	63.793490	-140.202740
SI_GL01	60M GLA 01	Glacier Creek mouth	64.014180	-140.720460
SI_GL02	60M GLA 02	Glacier Creek at road crossing	64.022930	-140.749940
SI_MA01	60M MAT 01	Matson Creek mouth	63.718620	-140.198240
SI_MA02	60M MAT 02	Upper Matson Creek	63.705067	-140.292183
SI_MI01	60M MIL 01	Miller Creek mouth	63.987320	-140.792360
SI_TE01	60M TEN 01	Ten Mile Creek mouth	63.547990	-139.913350
SI_TWEL01	60M TWEL 01	Twelve Mile Creek mouth	63.216670	-139.850000
SI_TWEN01	60M TWEN 01	Twenty Mile Creek mouth	63.609090	-140.038150

Water Quality Objective monitoring, Sixty Mile River Watershed – Summary

Due to the great interest in the area, and recent changes in mining locations and levels of activity, the Sixty Mile River Watershed was once again designated an important watershed for monitoring in 2010. This meant that a major proportion of the monitoring effort was spent in the basin, and that the monitoring schedule included many repeat visits throughout the season. Two automatic water sampling station and two weather stations were set up and maintained from June 17th until shutdown on September 28th 2010.

From the data obtained by these instruments and through on site visits and sampling conducted by employees of the Department of Energy, Mines and Resource's Client Services and Inspections Branch, the following observations regarding the water quality in the basin can be made:

> The overall water quality in the basin, met the minimum objectives set under the *Fish Habitat Management System* throughout the monitoring season with one possible exception, at the WQO site located near the mouth of the Sixty Mile, immediately up stream of the Water Survey of Canada flow monitoring site. During the time period when extremely high concentrations of solids in samples collected by the automated sampling equipment were found (July 31st to August 4th), the intake head of the equipment may have been resting on the stream bed. This would allow the equipment to suck up settled material into the sampler, heavily influencing the results. It is also conceivable that changes in flow patterns, stream bed movement and the sudden change in solids concentration in the water led to burying of the suction head and failure of the equipment. The results of solids concentrations in the samples collected between July 31st and August 4th should likely be dismissed.

Results from the analysis of the water quality at the final discharge of the Sixty Mile River into the receiving waters of the Yukon River, site SI01, might corroborate the decision to retain or dismiss the solids concentrations recorded at site SI04 between July 31st and August 4th, but unfortunately this information is not available. The SI01 site is only accessible by boat or by air and the width of the river channel at the mouth makes it very difficult to monitor with automated sampling equipment.

The Fish Habitat Management System - Sixty Mile River Watershed (Category B)

Sample Results that Exceed Water Quality Objectives for 2010

Sampling Station	SI01	SI04	SI_MA01	SI_FI01	SI06	SI08	SI10	SI_BI01	SI_MI01	SI14
Location Description	Mouth	lower 60M u/s WSC station	Matson Ck Mouth	Fifty Mile Ck mouth	u/s Fifty Mile Creek	d/s Eldorado Placers	u/s SI_BI01	Big Gold Ck mouth	Miller Ck mouth	AAM
Sample Type	Auto/Grab	Auto/Grab	Auto/Grab	Grab	Auto/Grab	Grab	Grab		Grab	Auto/Grab
Lat Y	63.54735	63.69286	63.71928	63.79349	63.79314	64.03903	64.01576	64.02708	63.98746	63.96247
Long X	-139.79333	-140.16948	-140.19861	-140.20274	-140.19731	-140.61754	-140.69718	-140.74985	-140.79268	-140.86173
Habitat Classification	Area of special consideration	Moderate-L	Area of special consideration	Moderate-L	Moderate-L	Low	Low	Low	Low	Low
Water Quality Objective (mg/L)	100	200	200	200	200	300	300	300	300	300
Date of Sampling										
23-Jun-10	103.3	44.9	80.5	18.6		43.6	46.0	103.0	69.9	23.6
23-Jul-10		945.3								555.0
24-Jul-10		663.0								907.7
25-Jul-10		57.6								9738.0
27-Jul-10		241.5								24.3
30-Jul-10		171.5								568.5
31-Jul-10		8083.2								206
1-Aug-10		15670.0								
2-Aug-10		12668.0								
3-Aug-10		1670.7								
4-Aug-10		1506.0								
19-Aug-10		732.7								322.3
20-Aug-10		375.3								79
1-Sep-10	13.9	27.7	15.6	340.2	24.2	32	36.8	3.7	3	27.5
3-Sep-10		255.8								54.5
Total Seasonal Average TSS (mg/L) by site	32.0	709.8	48.1	179.4	31.1	37.8	41.4	53.3	36.4	192.5
Number of days sampled	5	62	2	2	2	2	2	2	2	72

Legend: Not continuously monitored

Water Samples that are: Above / Below the Water Quality Objective