Water Quality Objective Monitoring, White River Basin, 2010

Hydrologic and Geomorphic Characteristics of the White River Drainage Basin

The White River, with a drainage area of about 50,504 square kilometres, adds vast amounts of silt and sediment from glacier and mountain runoff to Yukon River. Many large tributary rivers and streams flow into the catchment area of the White River basin. The confluence of the White River with the Yukon River creates the point that delineates the Yukon River North from the Yukon River South.

In 2010, water samples were collected at 11 sites in the White River basin. Sampling commenced on June 2nd, 2010 and a total of 117 samples were collected up until the end of the season on September 16th, 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 below all mining on Burwash Creek and the other below all mining on Gladstone Creek.

Blitz sampling events took place in the basin on June 2nd, June 30th, July 9th, July 21st, July 23rd, August 18th and September 1st 2010. Samples were taken at 11 WQO sites along the main stem of the White River as well as at the mouth of its major tributaries.

Basin total flow data was provided by the Water Survey of Canada station that is monitoring flow in the White River watershed, located just below the glacier field on the White River, at Kilometre 1881.6, of the Alaska Highway. Flow data for the individual tributaries to the White River was collected at the time of sampling using the methodology outlined in the Yukon Placer Secretariats, Water Quality Monitoring Protocol.

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

Site Code	Alias	Location	Latitude	Longitude
WH01	W 01	White River mouth	63.188920	-139.588850
WH04	W 04	White River at the Alaska Highway	61.988010	-140.555980
WH__DO_AR01	W ARC 01	Arch Creek near mouth	61.494120	-139.718550
WH__DO_KL_BU01	W BUR 01	Burwash Creek below all mining	61.442650	-139.215480
WH_DO_NI_NA_DI01	W DISC 01	Discovery Creek mouth	62.073840	-137.228520
WH_DO_NI_NA_DI02	W DISC 03	Discovery Creek above all mining	62.079540	-137.189320
WH_DO_NI_NA_DO01	W DOLL 02	Dolly Creek below all mining	62.062330	-137.221210
WH_DO_NI_NA_DO02	W DOLL 03	Dolly Creek above all mining	62.064990	-137.213200
WH_DO01	W DON 01	Donjek River at Alaska Highway	61.678940	-139.757110
WH_DO_KL_DU01	W DUK 01	Duke River at Alaskas Highway	61.377770	-139.147370
WH_DO_KL_GL01	W GLAD 01	Gladstone Creek mouth	61.318970	-138.655670
WH_DO_KL_GL02	W GLAD 02	Gladstone Lake - Gladstone Creek background	61.323900	-138.173150
WH_DO_NI_NA01	W NAN 01	Nansen Creek mouth	61.980490	-137.199040
WH_DO_NI_NA02	W NAN 02	Nansen Creek below all mining	61.980520	-137.199630
WH_DO_NI_NA03	W NAN 03	Nansen Creek upstream of Discovery Creek	62.073840	-137.228520
WH_DO_NI_NA04	W NAN 04	Nansen Creek East fork above all mining	62.095980	-137.190000
WH_DO_NI02	W NISL 02	Nisling River downstream of Klaza River	62.096410	-138.492360
WH_DO_NI03	W NISL 03	Nisling River downstream of Nansen Creek at class change	61.846160	-137.479520
WH_DO_NI04	W NISL 04	Nisling River upstream of Nansen Creek	61.980490	-137.199040
WH_DO_KL_QU01	W QUIL 01	Quill Creek at Alaska Highway	61.517150	-139.330950
WH_SA01	W SAN 01	Sanpete Creek upstream of Alaska Highway	62.091030	-140.667070
WH_DO_KL_GL_SW01	W SWA 01	Swanson Creek mouth	61.315920	-138.309820
WH_DO_KL_SW01	W SWJ 01	Swede Johnson Creek at Alaska Highway	61.592310	-139.428540
WH_DO_NI_VI02	W VIC 02	Victoria Creek left fork below all mining	62.026190	-137.056300
WH_DO_NI_VI03	W VIC 03	Victoria Creek left fork above all mining	62.097590	-137.146790

Water Quality Objective monitoring, White River Watershed – Summary

There are two major sub-drainages that make up the White River watershed, the Kluane River drainage and the Nisling River drainage. Both the Kluane River and the Nisling River flow into the Donjek River which in turn flows into the White. As placer mining takes place in both sub-drainages, site specific monitoring and inspection is necessary. The analysis of water and effluent samples collected during these routine inspections were well within the water quality objectives and sediment discharge standards set for the area.

Up until 2009, there has been insufficient data (both in quality and quantity) available in order to draw any conclusions regarding the overall water quality in the White River watershed. There was also a lack of basin specific atmospheric monitoring data available for ether drainage as there is no operating fixed position weather monitoring stations in or around the White River Watershed. The closest operating station is at Carmacks YT. The only Water Survey of Canada station that is monitoring flow in the White River watershed is located just below the glacier field on the White, at Kilometre 1881.6, of the Alaska Highway.

In order to provide additional water quality and atmospheric monitoring data than in the past, employees of the Department of Energy, Mines and Resources Client Services and Inspections Branch (CS&I) deployed automatic sampling equipment and portable weather monitoring stations in the Kluane River drainage in 2010. In 2011 the intent is to conduct a similar monitoring program to the Kluane study in the Nisling River drainage.

From the data obtained by these instruments and through on-site visits and sampling conducted by CS&I staff, the following observations regarding the water quality in the basin can be made:

On average the water quality in the basin is very low. From water samples collected at the water quality monitoring sites on the White River, the Total Suspended Solids concentrations, on average was greater than 1500 mg/L during the monitoring season. Similarly water samples collected at the mouth of most of the Whites major tributaries were also very high in TSS concentrations. Throughout the season, surface water runoff from melting snow and rainfall increase the amount of sediment entering the basin. As the air and ground warm up additional water and sediment are released into the system from glacial and ground frost melt. Flows begin to increase resulting in heavy bank and stream bed erosion which also adds additional sediment into the water. The constant impute of large amounts of glacial till into the system along with the constant fluctuations in water levels and flows which scour, deposit and then re-suspend material, all lead to the degradation of the water quality in the White River basin.

The Fish Habitat Management System - White River Watershed (Category B)
Sample Results that Exceed Water Quality Objectives for 2010

Sampling Station	WH01	WH_DO_KL_SW01	WH_DO_KL_QU01	WH_DO_KL_BU01	WH_DO_KL_DU01	WH_DO_KL_GL01	WH_DO01	WH_DO_AR01	WH_SA01	WH04
Location Description	Mouth	Mouth	Mouth	Mouth	at hwy	Mouth	Mouth	Mouth	Mouth	at hwy
Sample Type	Grab	Grab	Grab	Auto/Grab			Grab	Grab	Grab	Grab
Lat Y	63.19370	61.59196	61.50624	61.44270	61.37777	61.31897	61.67894	61.49412	62.09103	61.98801
Long X	-139.59580	-139.42787	-139.33156	-139.21507	-139.14737	-138.65567	-139.75711	-139.71855	-140.66707	-140.55598
Habitat Classification	High	Moderate-H	Moderate-H	Moderate-M	Moderate-M	Lake Rule	Moderate-L	Low	Low	Water Quality
Water Quality Objective (mg/L)	<25	<25	<25	<100	<100	<25	<200	<300	<300	n/a
Date of Sampling										
2-Jun-10		1.5		8.2	65.8	7	1817	5.6	3.8	1964.3
23-Jun-10	1683.0									
30-Jun-10		5.0					5047		5.6	3475
1-Jul-10				7443.3	34356.7					
2-Jul-10				776.0						
3-Jul-10				157.3						
21-Jul-10		12.7					2276		0.8	1980
22-Jul-10						38.7				
23-Jul-10				8.3	397.0	10.0				
18-Aug-10		40.3	132.7	1180.0	536.7		3636.7		1.1	5585
19-Aug-10				1196.0						
20-Aug-10				436.8						
21-Aug-10				298.0						
22-Aug-10				168.3						
23-Aug-10				197.3						
24-Aug-10				637.0						
25-Aug-10	726.5			389.7						
26-Aug-10				102.0						
Total Seasonal Average TSS (mg/L) by site	1204.8	12.1	66.9	388.1	7077.7	4.2	2573.9	8.3	2.6	2629.3
Number of days sampled	2	5	2	35	5	48	5	2	5	5

Legend: Not continuously monitored

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