YUKON PLACER SECRETARIAT

Water Quality Monitoring Annual Report 2016

White River Watershed

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Water Quality Objective Monitoring, White River Basin, 2016

Hydrologic and Geomorphic Characteristics of the White River Drainage Basin

The White River, with a drainage area of about 50,504 square kilometers, 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 2016, water samples were collected at 4 sites in the White River basin. Sampling commenced on June 1st, 2016 and 323 samples were collected up until the end of the season on September 29th, 2016. A combination of composite sampling technics, utilizing three automated stations, and grab sampling methods were used in the basin.

In addition to the automated sampling equipment, newly acquired level monitoring instrumentation was installed at three sites, on Nansen Creek below all mining, and upstream of Discovery Creek confluence, and on Victoria Creek, left fork below all mining. This new monitoring equipment has provided us with additional data that correlates with the precipitation data collected via our portable weather stations and has allowed us to derive changes in stream flow and water velocity at these sites.

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

Atmospheric data was collected using two portable weather stations; one located on Victoria Creek and the other on Nansen Creek.

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

Two major sub-drainages 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 (in both 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 Kilometer 1881.6, of the Alaska Highway.

In order to provide additional water quality and atmospheric monitoring data than in the past, EMR CMI staff deployed automatic sampling equipment and portable weather monitoring stations in the Nisling River drainage in 2016. 323 samples were collected at four different sites between June 1stth, 2016 and Septmeber 29th, 2016.

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

Insufficient data was obtained throughout the season to draw any conclusions that would be representative to the general state of the water quality in the entire White River basin. However, on average, at the three sites located on Nansen Creek, using the data obtained through automatic equipment and grab sampling, the water quality of the creek meet the minimum objectives set under the Fish Habitat Management System.

On those occasions when the WQO were not met and the Total Suspended Solids levels were greater than the objectives, a direct correlation between environmental conditions and the volume of solids in the water was observed.

In most cases, rainfall, as either localised events or basin wide occurrences, increased the amount of surface run off and subsequent soil erosion from the land, increasing the input of sediment into the receiving waters. These increases occurred simultaneously at the time of the rain event or immediately in a period of one or two days after the rain event, as surface water continued draining from the land and ground water infiltrated the watercourse.

Increases in sediment-laden ground and surface water entering the system add to the amount of sediment in the water. The ability of the receiving water to dilute these inputs of sediment is negated by the re-suspension of streambed material and by the further erosion of the streams banks that occurs along with the increased flows that are generated by the aftermath of these rain events.

The Fish Habitat Management System - White River Watershed (Category B)
Sample Results that Exceed Water Quality Objectives for 2013

Sampling Station	**WH_DO_NI_VI02**	**WH_DO_NI_NA02**	**WH_DO_NI_NA03**
Location Description	Left fork below all mining	Below all mining	u/s of WH_DO_NI_NA_DI01
Sample Type	Auto/Grab	Auto/Grab	Auto/Grab
Lat Y	62.02619	62.05599	62.07384
Long X	-137.05630	-137.22148	-137.22852
Habitat Classification	Low	Low	Low
Water Quality Objective (mg/L)	**<300**	**<300**	**<300**
Date of Sampling			
2-Jun-16	**2.4**	**922.4**	**60.8**
8-Aug-16	**2.8**	**694.0**	**181.2**
16-Aug-16	**10.4**	**272.0**	**318.0**
27-Aug-16	**78.0**	**217.6**	**368.0**
15-Sep-16	**9.6**	**4382.0**	**68.4**
29-Sep-16			**831.2**
Total Seasonal Average TSS (mg/L) by site	**27.9**	**152.4**	**80.6**
Number of days sampled	**110**	**90**	**110**

Legend

Not continuously monitored

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