Water Quality Objective Monitoring, Yukon River North , 2009

Hydrologic and Geomorphic Characteristics of the Yukon River North Watershed

The Yukon River is a major watercourse of north western North America. Over half of the river lies in the U.S. state of Alaska, with most of the other portion lying in and giving its name to Canada's Yukon Territory, and a small part of the river starts near the rivers source in British Columbia. The river is 3,700 km long and empties into the Bering Sea at the Yukon-Kuskokwim Delta. The average flow is 6,430 m^3/s. The total drainage area is 832,700 km^2 of which 323,800 km^2 is in Canada. By comparison, the total area is more than 25% larger than the province of Alberta.

The Yukon River is divided into two sections, the North Yukon section, downstream from the Yukon Rivers confluence with the White River and the South Yukon, the section of the Yukon River upstream from its confluence with the White River. The average water quality of the North Yukon River is much more turbid and higher in suspended solids concentrations than that of the South Yukon due to the huge contribution of sediment and glacial material entering the Yukon River from the White River drainage. Total suspended solids concentrations in the North Yukon can be 10-25 times higher than those found in the South Yukon. Many large tributary rivers and streams flow into the catchment area of the Yukon River basin.

In 2009, 18 grab samples were taken by inspection staff on behalf of the Water Quality Team at 19 different locations in the Yukon River North basin. Basin total flow data was provided to us by the Water Survey of Canada station located on the Yukon River above the White River.

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

SITE CODE	LOCATION	LAT_Y	LONG_X
08-0702	unknown tributary to the Yukon River	63.26939	-139.47041
08-0737	Yukon River u/s Stewart River	63.27946	-139.41748
08-0741	Yukon River u/s Swede Creek	64.02007	-139.57184
08-0742	Yukon River u/s OK Creek	64.02329	-139.52451
08-0745	Yukon River u/s Cliff Creek	64.52887	-140.47661
08-0747	Yukon River u/s Shell Creek	64.49828	-140.42120
08-0749	Yukon River u/s Coal Creek	64.47665	-140.43954
08-0751	Yukon River u/s Forty Mile River	64.42408	-140.52603
08-0754	Yukon River u/s Cassiar	64.32884	-140.16194
08-0756	Yukon River u/s Wood Chopper Creek	64.32170	-140.00537
08-0758	Yukon River u/s Fifteen Mile River	64.28041	-139.81335
08-0760	Yukon River u/s Fresno Creek	64.27250	-139.79930
08-0762	Yukon River u/s Quebec Creek	64.17162	-139.54102
08-0765	Yukon River u/s Deadwood Creek	64.10433	-139.46320

08-0766	Yukon River u/s Clear Creek	64.10801	-139.45413
08-0768	Yukon River u/s Moosehide	64.09351	-139.43628
YN 01	Yukon River d/s of Cassiar Creek	64.33194	-140.21059
YN 02	Yukon River u/s of Klondike River	64.02574	-139.46721
YN 03	Yukon River d/s Ensley Creek	63.92620	-139.70016
YN 04	Yukon River u/s Ensley Creek	63.73400	-139.68927
YN 05	Yukon River u/s Reindeer Creek	63.69801	-139.73257
YN 06	Yukon River d/s Sixtymile River left Bank	63.57132	-139.74707
YN 07	Yukon River d/s of Sixtymile right limit	63.57077	-139.74094
YN 08	Yukon River u/s of Sixtymile River	63.55500	-139.75714
YN 09	Yukon River d/s Rosebute Creek	63.51890	-139.70337
YN 10	Yukon River u/s of Rosebute Creek	63.50501	-139.69879
YN 11	Yukon River d/s Sestak Creek	63.49162	-139.72768
YN 12	Yukon River u/s Sestak Creek	63.47845	-139.73273
YN 13	Yukon River d/s of Stewart River	63.34033	-139.49336
YN 14	Yukon River d/s Frisco, u/s Stewart River	63.24504	-139.49696
YN 15	Yukon River d/s of White River, u/s Frisco Creek	63.21980	-139.54309
YN 16	Yukon River u/s of the White River	63.17187	-139.56998
YN BAL 01	Ballarat Creek North mouth	64.28518	-139.64308
YN BEL 01	Bell Creek mouth	63.95970	-139.74794
YN CAS 01	Cassiar Creek mouth	64.32935	-140.16624
YN CHA 01	Chandindu River mouth	64.25319	-139.71492
YN CHR 01	Chris Creek mouth	63.34833	-139.62254
YN CLF 01	Cliff Creek mouth	64.52947	-140.47823
YN CLR 01	Clear Creek mouth	64.11076	-139.45007
YN COA 01	Coal Creek mouth	64.47765	-140.42995
YN DAWSON	Yukon River at Dawson City ferry landing	64.07402	-139.42513
YN DEA 01	Deadwood Creek mouth	64.10506	-139.46524
YN ENS 01	Ensley Creek mouth	63.89738	-139.71614
YN ENS 02	Ensley Creek u/s mouth	63.89693	-139.71489
YN EXC 01	Excelsior Creek mouth	63.37097	-139.79335
YN FIF 01	Fifteen Mile River mouth	64.79417	-139.81349
YN FOR 01	Forty Mile River mouth	64.42268	-140.56477
YN FRE 01	Fresno Creek mouth	64.27278	-139.80246
YN FRS 01	Frisco Creek mouth	63.21962	-139.54034
YN GAL 01	Galena Creek mouth	63.79417	-139.77724
YN HEN 01	Henderson Creek Below All Mining (BAM)	63.35162	-139.41206
YN JOE 01	Lucky Joe Creek mouth	63.57226	-139.72383
YN MOS 01	Moosehide Creek mouth	64.09401	-139.43771
YN OK 01	OK Creek mouth	64.02760	-139.52306
YN QUE 01	Quebec Creek mouth	64.17254	-139.54402
YN REN 01	Reindeer Creek mouth	63.71360	-139.68056
YN ROS 01	Rosebute Creek Below All Mining (BAM)	63.50066	-139.68410

YN SES 01	Sestak Creek mouth	63.48120	-139.73581
YN SHL 01	Shell Creek mouth	64.49932	-140.41846
YN SWE 01	Swede Creek mouth	64.02510	-139.57346
YN WOD 01	Wood Chopper Creek mouth	64.31986	-140.00548

Water Quality Objective monitoring, Yukon River North Watershed – Summary

On those occasions when the WQO were not met and the Total Suspended Solids levels were greater than the objectives, there is a direct correlation to environmental conditions influencing the amount of solids concentrations in the water.

As noted above, the Yukon River is divided into the North and South Yukon River at its confluence with the White River. The water quality of the North Yukon River is heavily influenced by the sediment rich meltwater that enters the Yukon River from the discharge of the White River. The huge amount of glacial sediment that enters the Yukon River from the White degrades the water quality of the Yukon beyond the river's ability to dilute the sediment load to a level of compliance. The Yukon River North remains heavily turbid all the way until its confluence with the Arctic Ocean.

Beginning in mid May, and peaking in mid June, the seasonal 'spring' freshet increases the flow of the Yukon River and helps to dilute the flow from the White River. By the beginning of August, the flow of the Yukon River is usually at its lowest level while the White River continues to input a continuously even flow of sediment into the receiving waters of the Yukon, all the way until the end of August. The water quality of the Yukon River is generally at its lowest during this August period until the flow of the White River begins to subside, and clean water inputs to the Yukon River increase.

Throughout the season, rain fall, either as localised events or basin wide occurrences, increase the amount of surface water run off and the volume of stream flows in the basin. Increases in sediment laden ground and surface water entering the system can add to the amount of sediment in the water. The ability of the receiving water to dilute these contributions of sediment is negated by the re-suspension of stream bed 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.

All of these factors; vast amounts of meltwater entering the system, precipitation leading to increased sediment input and increased flows re-suspending settled material and further eroding stream and river banks, lead to an increase in suspended solids concentrations and a decrease in water quality.

The Fish Habitat Management System - Yukon River North Watershed (Category B)
Sample Results that Exceed Water Quality Objectives for 2009

Sampling Station	Confluence with Forty Mile River Watershed	YN DAWSON	Confluence with Klondike	YN 02	Confluence with Indian River Watershed	Confluene with Sixty Mile	YN 08	YN SES 01	YN 12	YN HEN 01	Confluence with Stewart River Watershed	YN 14	Confluence with White River Watershed	Confluence with Yukon River South Watershed
Location Description		at ferry landing		u/s K 01			u/s 60M 01	Mouth	u/s YN SES 01	Mouth		u/s ST 01		
Sample Type				Grab			Grab	Grab	Grab	Grab		Grab		
Lat Y		64.07402		64.02574			63.55500	63.48120	63.47845	63.35162		63.24504		
Long X		-139.42513		-139.46721			-139.75714	-139.73581	-139.73273	-139.41206		-139.49696		
Habitat Classification		Area of special consideration		Area of special consideration			High	Moderate-M	High	Moderate-L		High		
Water Quality Objective (mg/L)		25		25			25	100	25	200		25		
Date of Sampling														
08/06/09				**554.0**			**914.0**	**5.7**	**1461.4**	**109.5**		**56.4**		
Total Seasonal Average TSS (mg/L)by site				**554.0**			**914.0**	**5.7**	**1461.4**	**109.5**		**56.4**		
Number of days sampled				**1**			**1**	**1**	**1**	**1**		**1**		

Legend **Not continuously monitored**

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