

Water Quality Objective Monitoring, Yukon River North, 2010

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 river's 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 m³/s. The total drainage area is 832,700 km² of which 323,800 km² 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 River's 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 2010, 149 grab samples were taken by employees of the Department of Energy, Mines and Resources Client Services and Inspections Branch at 54 different locations in the Yukon River North basin. Basin total flow data was provided 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	ALIAS	SITE_DESCRIPTION	LATITUDE_DD	LONGITUDE_DD
YN01	N/A	Yukon River downstream Cliff Creek	64.52887	-140.47661
YN_CLI01	YN CLF 01	Cliff Creek mouth	64.52947	-140.47823
YN02	08-0745	Yukon River upstream of Cliff Creek	64.52887	-140.47661
YN_SH01	YN SHL 01	Shell Creek mouth	64.49932	-140.41846
YN03	08-747	Yukon River upstream of Shell Creek	64.49828	-140.4212
YN_CO01	YN COA 01	Coal Creek mouth	64.47765	-140.42995
YN04	08-0749	Yukon River upstream of Coal Creek	64.47665	-140.43954
YN05	08-0751	Yukon River upstream of Forty Mile River	64.42408	-140.52603
YN_CA01	YN CAS 01	Cassiar Creek mouth	64.32935	-140.16624
YN06	08-0754	Yukon River upstream of Cassiar Creek	64.32884	-140.16194
YN_WO01	YN WOD 01	Wood Chopper Creek mouth	64.31986	-140.00548
YN07	08-0756	Yukon River upstream of Wood Chopper Creek	64.3217	-140.00537
YN_FI01	YN FIF 01	Fifteen Mile River mouth	64.28246	-139.81498
YN08	08-0758	Yukon River upstream of Fifteen Mile River	64.28041	-139.81335
YN_FRE01	YN FRE 01	Fresno Creek mouth	64.27278	-139.80246
YN09	08-760	Yukon River upstream of Fresno Creek	64.2725	-139.7993
YN_CHA_BA01	YN BAL 01	Ballarat Creek North mouth	64.28518	-139.64308
YN_CHA01	YN CHA 01	Chandindu River mouth	64.25319	-139.71492
YN10	N/A	Yukon River upstream of the Chandidu River	64.2497	-139.71177
YN_QU01	YN QUE 01	Quebec Creek mouth	64.17254	-139.54402
YN11	08-0762	Yukon River upstream of Quebec Creek	64.17162	-139.54102
YN_CLE01	YN CLR 01	Clear Creek mouth	64.11076	-139.45007
YN12	08-0766	Yukon River upstream of Clear Creek	64.10801	-139.45413
YN_DE01	YN DEA 01	Deadwood Creek mouth	64.10506	-139.46524
YN13	08-0765	Yukon River upstream of Deadwood Creek	64.10433	-139.4632
YN_MO01	YN MOS 01	Moosehide Creek mouth	64.09401	-139.43771
YN14	08-0768	Yukon River upstream of Moosehide Creek	64.09351	-139.43628
YN15	YN DAWSON	Yukon River at Dawson City ferry landing	64.0740166	-139.4251333
YN16	YN 02	Yukon River upstream of Klondike River	64.04423	139.45139
YN_OK01	YN OK 01	OK Creek mouth	64.0276	-139.52306
YN17	08-0742	Yukon River upstream of OK Creek	64.02329	-139.52451
YN_SW01	YN SWE 01	Swede Creek mouth	64.0251	-139.57346
YN18	08-0741	Yukon River upstream of Swede Creek	64.02007	-139.57184
YN_BE01	YN BEL 01	Bell Creek mouth	63.9597	-139.74794
YN19	YN 03	Yukon River upstream of Bell Creek	63.9262	-139.70016
YN_EN01	YN ENS 01	Ensley Creek mouth	63.89738	-139.71614
YN20	YN 04	Yukon River upstream of Ensley Creek	63.89657	-139.71706
YN_GA01	YN GAL 01	Galena Creek mouth	63.79417	-139.77724
YN21	N/A	Yukon River upstream of the Indian River and Galena Creek	63.77602	139.76076
YN_RE01	YN REN 01	Reindeer Creek mouth	63.7136	-139.68056
YN22	YN 05	Yukon River upstream of Reindeer Creek	63.69801	-139.73257
YN_LU01	YN JOE 01	Lucky Joe Creek mouth	63.57226	-139.72383
YN23	YN 06	Yukon River upstream Lucky Joe Creek	63.57132	-139.74707
YN24	YN 08	Yukon River upstream of Sixtymile River	63.555	-139.75714
YN_RO01	YN ROS 01	Rosebute Creek mouth	63.50432	-139.69641
YN25	YN 10	Yukon River upstream of Rosebute Creek	63.50501	-139.69879
YN_SE01	YN SES 01	Sestak Creek mouth	63.4812	-139.73581
YN26	YN 12	Yukon River upstream of Sestak Creek	63.47845	-139.73273
YN_EX01	YN EXC 01	Excelsior Creek mouth	63.43735	-139.70348
YN27	N/A	Yukon River upstream of Excelsior Creek	63.43816	-139.67314
YN_CHR01	YN CHR 01	Chris Creek mouth	63.37242	-139.57265
YN28	N/A	Yukon River upstream Chris Creek	63.35849	-139.52873
YN_HE01	YN HEN 01	Henderson Creek below all mining	63.35162	-139.41206
YN29	YN 13	Yukon River upstream Henderson Creek	63.34033	-139.49336
YN30	YN 14	Yukon River upstream of Stewart River	63.27946	-139.41748
YN_FRI01	YN FRS 01	Frisco Creek mouth	63.21962	-139.54034
YN31	YN 15	Yukon River upstream of Frisco Creek	63.2198	-139.54309
YN32	YN 16	Yukon River upstream of the White River	63.17187	-139.56998

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 2010**

Sampling Station	YN15	YN18	YN24	YN_SE01	YN26	YN_HE01	YN30	
Location Description	at Dawson ferry landing	u/s of KL01	u/s Sixty Mile R	Mouth	u/s YN_SE01	Mouth	u/s of Stewart R	
Sample Type	Grab	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	
Input								
Direction of Flow								
Date of Sampling								
17-Jun-10		85.3	86.8					
22-Jun-10			335.0	25.4	197.3		29.0	
23-Jun-10	161.5	195.4	18.6					
11-Aug-10							113.3	
12-Aug-10			723.0	2.3	860.0			
25-Aug-10			543.0	2.3	589.0		388.0	
26-Aug-10	265.7	339.0						
31-Aug-10			319.0	3.7	264.7		251.3	
1-Sep-10		186.3						
Total Seasonal Average TSS (mg/L) by site	213.6	201.5	337.6	8.4	477.8		195.4	
Number of days sampled	2	4	6	4	4	0	4	
Legend	Not continuously monitored							
	Water Samples that are: Above / Below the Water Quality Objective							