



## INTRODUCTION

New geochemical data from re-analysis of archived stream sediment samples have been assessed using weighted sums modeling and catchment basin analysis, as described in the methodology report that accompanies this map (Mackie et al., 2015). Both commodity and pathfinder element abundances are evaluated to highlight areas that show geochemical responses consistent with a variety of base- and precious-metal mineral deposit types. The results of modeling, completed using two approaches, are presented as a series of catchment maps and associated data files. This release is part of a regional assessment of stream sediment geochemistry that covers a large part of Yukon.

## SAMPLING AND ANALYSIS PROGRAMS

Regional stream sediment and water samples from the Finlayson Lake map area (105G) were collected at a reconnaissance scale in 1987 as part of the National Geochemical Reconnaissance program. Field data for 914 sites and initial geochemical data were released in Geological Survey of Canada ("GSC") Open File 1648 (Friske and Hornbrook, 1988). In 2008, new geochemical data (ICP-MS) was released in GSC Open File 5696 (Friske et al., 2008a) and Yukon Geological Survey ("YGS") Open File 2008-3 (Friske et al., 2008b). The reader is referred to these open files for details regarding sampling techniques, analytical procedures and quality control and assurance. While the database contains information for 914 sample sites, only 871 have been included in this assessment as catchment basins (provided by the YGS) were only generated for those samples that could be reasonably assigned to a specific stream polyline. This unusually high proportion of 'omitted' sample sites is due to the difficulty of defining drainage basins in regions of subdued topography. Levelling by dominant mapped lithology has a more subtle effect on filtering these interpreted lithological control for certain elements (e.g., Ag, Cd, Sb, Hg, Ba and Mo). In order to reduce this impact in the WSM these elements were given low importance rankings (or were omitted) for certain deposit types. Additionally, strong responses for Zn, Pb and Ag related to VMS and polymetallic Ag-Pb-Zn vein mineralization prevented using these elements as pathfinders for other deposit types. Negative rankings were assigned to certain variables to help differentiate deposit types with similar metal associations. For example, negative rankings for Pb and Zn are used in the WSM for Epithermal Au-Ag in order to reduce the contribution of Ag related to VMS mineralization.

The effectiveness of historical sampling coverage has been assessed empirically using graphs of WSMs plotted against catchment surface area to determine the ideal maximum catchment size (10 km<sup>2</sup>). Catchments that cover larger areas (shown on the map with bold outlines) are interpreted to have been under-sampled and thus require further sampling to properly evaluate the area for geochemical anomalism. Given the likelihood that a mineralization 'signal' would be progressively diluted with increasing catchment size, marginally high WSM scores for samples in large catchments are also of interest.

## MINERAL OCCURRENCES

A variety of types of base and precious-metal mineralization have been documented in the map sheet as summarized in Table 1 (Yukon MINFILE, 2015). Several volcanogenic massive sulphide deposits have been discovered and encompass the Finlayson Lake VMS district. Various sub-classes or types have been documented including: volcanic-sediment hosted Wolverine-Lynx ('Fetish' Occurrence), Kuroko-type Kudz Ze Kayah ('Tag' Occurrence) and GP4F deposits, Beschi-type Fyra Lake deposit and Cyprus-type Ice deposits. Other notable occurrences in the region include the Tintina (105G), Groundhog, Ketzakey and Stumpy (105F) polymetallic Ag-Pb-Zn deposits (105G), Ketsa River Au deposit (105F), Anvil district Pb-Zn-Ag SEDEX (105K) and Grew Creek epithermal Au-Ag deposits (105K).

The weighted sums model (WSM) is a geostatistical technique that uses a weighted average of geochemical data from various sample sites to predict values for unsampled areas. It takes into account the spatial distribution of data points and the presence of different geological units. The WSM score for each catchment is calculated based on the weighted average of the WSM scores for all sample sites within that catchment. The catchment polygons are color-coded according to their WSM scores, with higher scores represented by green and yellow colors and lower scores by blue colors. The map also shows contour lines, rivers, roads, and sample locations marked with triangles. Numerous sample sites are labeled with codes such as 105G 001 through 105G 340. A legend on the right explains symbols for towns, mineral occurrences, roads, contours, rivers, and sample locations. A scale bar shows distances up to 5 kilometers.

## WEIGHTED SUMS MODELING

As described in the report accompanying this map (Mackie et al., 2015), two approaches have been used to subdue the influence of background lithological variation and secondary absorption on the composition of stream sediments. One uses data levelled by the dominant geology mapped within

Table 2: Importance rankings for weighted sums models using data levelled by dominant mapped geology.

Target Deposit Type*	Other Deposit Types*	Mn	Fe	Co	Ni	Cu	Mo	Zn	Pb	Ag	Au <sup>†</sup>	As	Ba	Cd	Sn	Sb	Te	Hg	Tl	Bi	W
Polymetallic Ag-Pb-Zn	SEDEX (high Ag); VMS							2	4	1	2										
VMS (Zn-rich)	SEDEX (low Ag); Pb-Zn; skarn						2	4	3	1		2									
VMS (Cu-rich)						2	4	-2	-1	-1											
Intrusion-related Au	Epithermal Au-Ag							-1	-1	4	1			2							
Epithermal Au-Ag	High and low sulphidation							-1	-1	3	4			1	2						
Porphyry Cu-Mo	Cu-Au porphyry; Cu-skarn						4	2	-1	-1	3	1									
W Skarn	W skarn and vein											1							2	3	
Hydromorphic Anomaly												4									

\*Polymetallic Ag-Pb-Zn type includes vein and manto styles; SEDEX = sedimentary exhalative; VMS = volcanic-hosted/associated massive sulphide deposits

<sup>†</sup>Au data are not levelled by dominant geology, instead log<sub>10</sub> transformed raw data are used.

## LEGEND

Town	■
Mineral Occurrence	▲
Road	—
Contour	—
River	—
NTS Map Sheet	□
Water Body	—
Welland	—
Sample Location	●
Catchment	○
Catchment > 10 km <sup>2</sup>	○

## REFERENCES

- Friske, P.W. and Hornbrook, E.H., 1988. National Geochemical Reconnaissance Stream Sediment and Water Geochemical Data, South-Central Yukon (NTS 105G). Geological Survey of Canada, Open File 1648.  
 Friske, P.W.B., Hornbrook, E.H.W., McCurdy, M.W., Day, S.J.A. and McNeill, R.J., 2008a. Regional stream sediment and water geochemical data, Finlayson Lake area, southeastern Yukon (NTS 105G). Geological Survey of Canada, Open File 5696.  
 Friske, P.W.B., McCurdy, M.W., Day, S.J.A. and McNeill, R.J., 2008b. Regional stream sediment and water geochemical data, Finlayson Lake area, southeastern Yukon Territory (NTS 105G). Yukon Geological Survey, Open File 2008-3.

Mackie, R., Arne, D. and Brown, O., 2015. Enhanced interpretation of regional stream sediment (RGS) geochemical data from Yukon: catchment basin analysis and weighted sums modeling. Yukon Geological Survey, Open File 2015-10.

Yukon MINFILE, 2015. Yukon MINFILE – A database of mineral occurrences. Yukon Geological Survey, [www.data.geology.gov.yk.ca](http://www.data.geology.gov.yk.ca), accessed May 2015.

## RECOMMENDED CITATION

MACKIE, R., ARNE, D. AND PENNIMPEDE, C., 2015. Weighted sums model for W Skarn deposits levelled by geology. In: Enhanced interpretation of stream sediment geochemical data for NTS 105G. Yukon Geological Survey, Open File 2015-26, scale 1:250 000, sheet 8 of 17.

Catchment basin polygons generated by the Yukon Geological Survey (J.O. Bruce).

Any revisions or additional geological information known to the user would be welcomed by the Yukon Geological Survey.

Paper copies of this map and the accompanying report may be purchased from the Yukon Geological Survey, Energy, Mines and Resources, Government of Yukon, Room 102-300 Main St., Whitehorse, Yukon, Y1A 2B5. Ph. 867-667-3201, Email: [geology@gov.yk.ca](mailto:geology@gov.yk.ca).

A digital PDF (Portable Document Format) file of this map may be downloaded free of charge from the Yukon Geological Survey website: <http://www.geology.gov.yk.ca>.

Table 1: List of Mineral Occurrences for NTS map sheet 105G (Yukon MINFILE, 2015)

Number	Name	Type	Status	Commodities
105G-001	BLONDIN	Vein Polymetallic Ag-Pb-ZnAu	Prospect	Copper, Zinc, Lead, Gold, Silver
105G-003	BERRYBERRY	Vein Polymetallic Ag-Pb-ZnAu	Drilled Prospected	Copper, Silver, Zinc, Tungsten, Gold, Lead
105G-005	SLAMAN	Vein Polymetallic Ag-Pb-ZnAu	Showing	Copper, Zinc
105G-006	TINTINA	Sediment hosted Mississippi Valley-Type Pb-Zn (MVT)	Deposit	Bismuth, Gold, Silver, Zinc, Lead, Cadmium, Copper
105G-007	PLUMA	Sediment hosted Mississippi Valley-Type Pb-Zn (MVT)	Showing	Lead, Silver, Zinc
105G-008	WHITEHORN	Skarn Pb-Zn	Unknown	Copper, Lead, Zinc, Copper, Barite, Gold
105G-009	WHITEHORN	Vein Polymetallic Ag-Pb-ZnAu	Showing	Copper, Zinc
105G-010	HILLER	Vein Polymetallic Ag-Pb-ZnAu	Showing	Copper
105G-011	AXIA	Vein Polymetallic Ag-Pb-ZnAu	Unknown	Copper
105G-012	HORN	Skarn Pb-Zn	Unknown	Copper, Barite, Copper, Silver
105G-014	WILDER	Unknown	Unknown	Anomaly
105G-015	NAN	Volcanogenic Massive Sulphide (VMS) Beschi Cu-Zn	Prospect	Arsenic, Silver, Zinc, Lead, Asbestos, Gold, Barite
105G-016	EL	Volcanogenic Massive Sulphide (VMS) Kuroko Cu-Pb-Zn	Showing	Arsenic, Silver, Zinc, Lead, Asbestos, Gold, Barite
105G-017	PIRO	Vein Polymetallic Ag-Pb-ZnAu	Unknown	Copper
105G-018	PIERCE	Vein Polymetallic Ag-Pb-ZnAu	Unknown	Skarn Cu
105G-019	BOOTS	Skarn Pb-Zn	Unknown	Copper, Zinc, Barite, Zinc, Tungsten
105G-020	PIERCE	Unknown	Unknown	Anomaly
105G-021	ZIELINSKI	Vein Polymetallic Ag-Pb-ZnAu	Showing	Arsenic, Beryllium, Fluorite, Lead, Zinc, Silver, Copper
105G-022	UNKNOWN	Unknown	Unknown	Copper, Zinc
105G-023	UNKNOWN	Unknown	Unknown	Copper, Zinc
105G-024	GOD	Unknown	Unknown	Anomaly
105G-025	CHISHOLM	Skarn Pb-Zn	Unknown	Copper, Zinc, Gold, Zinc, Lead, Copper
105G-026	RIVERA	Volcanogenic Massive Sulphide (VMS) Beschi Cu-Zn	Drilled Prospected	Copper, Zinc
105G-027	GP4F	Manto Polymetallic Ag-Pb-Zn	Prospect	Copper, Gold, Zinc, Lead, Copper
105G-028	GP4F	Manto Polymetallic Ag-Pb-Zn	Prospect	Copper, Gold, Zinc, Lead, Copper
105G-029	GEE	Vein Polymetallic Ag-Pb-ZnAu	Showing	Copper, Zinc, Gold, Zinc
105G-030	PIRO	Vein Quartz	Unknown	Copper, Silver, Gold, Uranium, Zinc
105G-031	ROB	Vein Polymetallic Ag-Pb-ZnAu	Drilled Prospected	Copper, Lead, Zinc, Silver
105G-032	TAK	Unknown	Unknown	Anomaly
105G-033	FYRE	Volcanogenic Massive Sulphide (VMS) Beschi Cu-Zn	Deposit	Cobalt, Copper, Zinc, Silver, Gold
105G-034	TOP	Vein Polymetallic Ag-Pb-ZnAu	Showing	Cobalt, Copper, Lead, Silver, Zinc, Gold
105G-035	SPUR	Skarn Pb-Zn	Unknown	Anomaly
105G-036	BLACK	Unknown	Unknown	Cobalt, Copper, Lead, Silver, Zinc, Gold, Molybdenum, Zinc
105G-037	NORTH RIVER	Skarn Cu	Unknown	Copper, Zinc, Lead, Silver
105G-038	VINCENT	Vein Polymetallic Ag-Pb-ZnAu	Showing	Copper, Zinc, Silver, Lead
105G-039	JAY	Vein Polymetallic Ag-Pb-ZnAu	Drilled Prospected	Bartonite, Zinc, Lead, Copper
105G-040	WHITEHORN	Vein Polymetallic Ag-Pb-ZnAu	Showing	Copper, Zinc, Lead, Zinc
105G-041	MCINTOSH	Skarn Pb-Zn	Unknown	Anomaly
105G-042	WHITEHORN	Volcanogenic Massive Sulphide (VMS) Kuroko Cu-Pb-Zn	Drilled Prospected	Bartonite, Zinc, Lead, Zinc, Gold
105G-043	WHITEHORN	Volcanogenic Sulphide - type not determined	Prospect	Bartonite, Zinc, Lead, Zinc, Gold
105G-044	WHITEHORN	Volcanogenic Massive Sulphide (VMS) Kuroko Cu-Pb-Zn	Drilled Prospected	Bartonite, Zinc, Lead, Zinc, Gold
105G-045	WHITEHORN	Volcanogenic Sulphide - type not determined	Prospect	Bartonite, Zinc, Lead, Zinc, Gold
105G-046	WHITEHORN	Volcanogenic Massive Sulphide (VMS) Kuroko Cu-Pb-Zn	Drilled Prospected	Bartonite, Zinc, Lead, Zinc, Gold
105G-047	WHITEHORN	Volcanogenic Sulphide - type not determined	Prospect	Bartonite, Zinc, Lead, Zinc, Gold
105G-048	WHITEHORN	Volcanogenic		