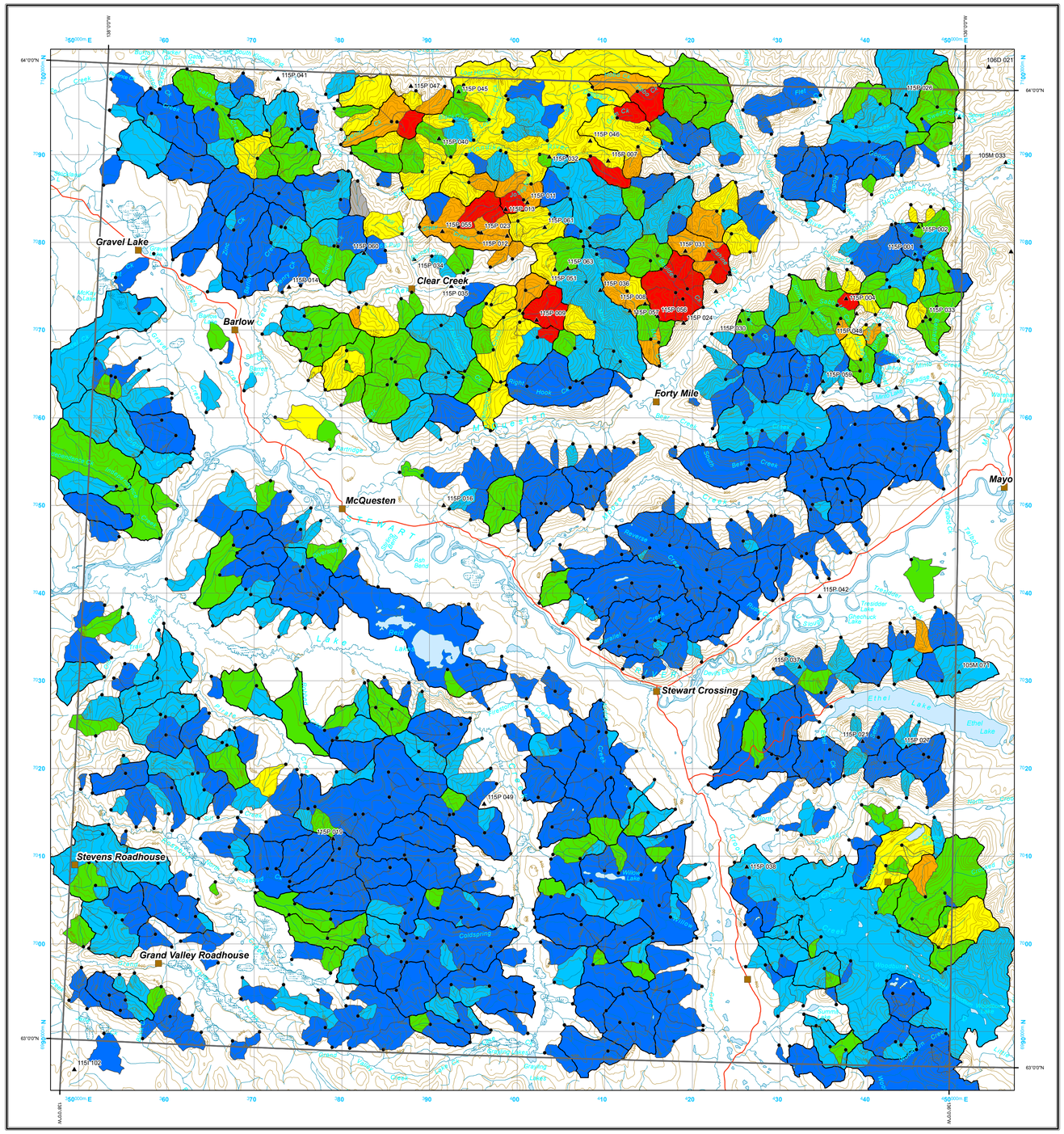


INTRODUCTION

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

Stream sediment and water samples from the McQueston area (NTS 115P) were collected at a reconnaissance scale in 1987 as part of the Canada – Yukon Mineral Development Agreement (Hornbrook & Friske, 1988). Field descriptions and initial geochemical data for 841 sites were originally released in Geological Survey of Canada (GSC) Open File 1650. New geochemical data from the re-analysis of archive sample material were released in Yukon Geological Survey (YGS) Open File 2012-9 (Jackaman, 2012). The reader is referred to these reports for detailed descriptions of sampling techniques, analytical procedures and quality control measures.

MINERAL OCCURRENCES

Various types of base and precious-metal mineralization have been identified in the McQueston area as listed in Table 1 (Yukon MINFILE, 2015). The most significant deposits are classed as intrusion-related Au (Hobo, Pukelman and Highet prospects), polymetallic Ag-Pb-Zn vein (Quest, East Ridge, May Creek and Hawthorne prospects prospects), W skarn/porphyry (Rhosgobel and Scheelite Dome prospects) and Sn-Ag vein/greisen (Zeta deposit and Jabberwock prospect). The Nucleus-Revenue Cu-Mo porphyry and Minto Cu deposits occur in the adjacent NTS map area to the south supporting the prospectivity of the region for these types of deposits.

WEIGHTED SUMS MODELING

As described in the methodology report (Mackie *et al.*, 2015), two approaches have been used to subdue the influence of background lithological variation and effects of secondary absorption. One uses data levelled by the dominant geology mapped within each catchment, while the other uses residuals calculated from regression against selected principal components. Weighted sums models (WSM) have been generated using the processed data. The importance rankings used in WSMs are summarized in Table 2. Each model is optimized for a target deposit type however other deposit types may be represented in a given model due to similarities in elemental abundances and associations. The model for Porphyry Cu-Mo deposits could not be validated as no occurrences of this deposit type exists in the map area.

Exploratory data analysis using both raw element data and principal components indicate that lithological variation exhibits a significant control on the distribution of many commodity and pathfinder elements. Importantly, for this map area, much of the variability is linked to mineralization. The first component (PC1) accounts for ~25% of the total geochemical variation and has high positive loadings in Na, Ti, Sc, V, Nb and Ca; and high negative loadings in Pb, Bi, Li, Zn, La and As. Positive PC1 generally corresponds to felsic intrusive rocks of the Sulphur Creek Suite that dominate the southern part of the map area. Negative responses of PC1 are relatable to polymetallic Ag-Pb-Zn occurrences in the northern part of the map area and therefore is interpreted to represent a mineralization signal. The second component, with high loadings of Cd, Se, loss-on-ignition, Ca, Sr, Cu and Sb, corresponds to areas of carbonate bedrock and low-lying topography. The third component with high loadings in Ni, Fe, Mg, Co, Cu and Cr shows elevated responses associated with ultramafic intrusions and, sporadically, within areas mapped as Hyland group sedimentary rocks.

Regression analysis of selected metals against the relevant principal component(s) effectively filters the interpreted lithological control and consequently enhances responses related to known mineral occurrences. Levelling by mapped geology is less effective at filtering the lithological control for certain elements however given the strength of the mineralization signal the models generated using the two approaches are quite similar.

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 (14 km^2). 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 in large catchments may also be of interest.

Table 1: List of Mineral Occurrences for NTS map sheet 115P (Yukon MINFILE, 2015)

Number	Name	Type	Status	Commodities
115P 001	JAYBEE	Vein Polymetallic Ag-Pb-Zn±Au	Anomaly	Lead, Silver
115P 002	SEATTLE	Vein Polymetallic Ag-Pb-Zn±Au	Showing	Lead, Silver
115P 003	HAWTHORNE	Vein Polymetallic Ag-Pb-Zn±Au	Drilled Prospect	Antimony, Arsenic, Silver, Lead, Gold, Bismuth
115P 004	SCHEELITE DOME	Porphyry W	Drilled Prospect	Arsenic, Tungsten, Copper, Gold, Tin, Molybdenum, Bismuth
115P 007	MAHTIN	Skarn Au	Drilled Prospect	Antimony, Tin, Bismuth, Copper, Silver, Gold, Arsenic
115P 008	EAST RIDGE	Vein Polymetallic Ag-Pb-Zn±Au	Prospect	Copper, Zinc, Lead, Silver, Tungsten, Tin, Gold
115P 009	LUGDUSH	Skarn W	Prospect	Lead, Tungsten, Silver
115P 010	RIDGE	Vein Polymetallic Ag-Pb-Zn±Au	Showing	Lead, Silver, Zinc, Tin
115P 011	JOSEPHINE	Plutonic Related Au	Showing	Gold, Tungsten
115P 012	RHOSGOBEL	Skarn W	Drilled Prospect	Arsenic, Gold, Tungsten, Silver, Bismuth
115P 013	PUKELMAN	Plutonic Related Au	Drilled Prospect	Gold
115P 014	RUSS	Porphyry-related Au	Showing	Thorium, Uranium
115P 016	MOOSE RIDGE	Vein Polymetallic Ag-Pb-Zn±Au	Showing	Silver
115P 019	ROSEBUD	Ultramafic-hosted asbestos	Showing	Asbestos
115P 021	SETHER	Unknown	Anomaly	Gold
115P 023	CLEAR CREEK PROJECT	Plutonic Related Au	Drilled Prospect	Gold
115P 024	BOULDER	Vein Polymetallic Ag-Pb-Zn±Au	Showing	Copper
115P 027	ETHEL	Sediment hosted Mississippi Valley-Type Pb-Zn (MVT)	Showing	Lead
115P 028	SECRET	Plutonic Related Au	Anomaly	Gold, Tungsten, Silver, Tin
115P 030	OLIVER	Skarn Sn	Drilled Prospect	Copper, Zinc, Tin, Silver, Gold
115P 031	BIX	Plutonic Related Au	Prospect	Tin
115P 033	HIGHET	Plutonic Related Au	Drilled Prospect	Antimony, Arsenic, Bismuth, Copper, Gold, Silver, Tungsten
115P 034	BARNEY	Plutonic Related Au	Showing	Tin, Tungsten
115P 036	BANDER	Vein and Greisens Sn	Showing	Lead
115P 044	SAVY	Plutonic Related Au	Unknown	Arsenic, Gold
115P 045	OMEGA	Sediment hosted Stratiform Barite	Deposit	Barite, Zinc, Silver
115P 047	ZETA	Vein and Greisens Sn	Deposit	Barite, Zinc, Tin, Copper, Silver
115P 048	POTHER	Skarn Sn	Prospect	Gold, Lead, Silver, Tin, Zinc
115P 049	PIRATE	Vein Au-Quartz	Anomaly	Gold
115P 051	JABBERWOCK	Vein and Greisens Sn	Prospect	Copper, Silver, Tin
115P 055	LEFT	Plutonic Related Au	Anomaly	Antimony, Arsenic, Gold
115P 056	MAY CREEK	Vein Polymetallic Ag-Pb-Zn±Au	Prospect	Copper, Silver, Zinc, Lead
115P 057	QUEST	Vein Polymetallic Ag-Pb-Zn±Au	Prospect	Gold, Silver, Lead
115P 061	BIG	Plutonic Related Au	Showing	Arsenic, Gold, Manganese, Tungsten, Silver, Lead, Bismuth
115P 063	VAN	Unknown	Showing	Arsenic, Silver, Zinc, Tungsten, Lead, Bismuth, Copper, Gold
115P 040	FIONA	Unknown	Unknown	
115P 042	MCGUINTY	Unknown	Anomaly	
115P 006	HOBO	Plutonic Related Au	Deposit	Gold, Copper, Silver, Molybdenum, Lead
115P 041	SYENITE	Unknown	Unknown	
115P 046	WEIZ	Unknown	Unknown	
115P 032	MOZI	Porphyry Cu-Mo-Au	Anomaly	
115P 025	TOTH	Unknown	Unknown	
115P 054	PENTICTON	Unknown	Unknown	
115P 062	COBBLE	Porphyry Alkalic Cu-Au	Showing	
115P 037	TWENTYSIX	Unknown	Unknown	
115P 035	CLEMENT	Vein Polymetallic Ag-Pb-Zn±Au	Unknown	
115P 059	TURNIP	Unknown	Unknown	
115P 060	LOST HORSES	Unknown	Anomaly	
115P 038	FREBIRD	Unknown	Unknown	
115P 058	PAW	Unknown	Unknown	
115P 026	ORTELL	Unknown	Unknown	

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

Target Deposit Type[a]	Other Deposit Types[a]	Mn	Fe	Co	Ni	Cu	Mo	Zn	Pb	Ag	Au[1]	As[2]	Ba	Cd	Sn[1]	Sb	Te	Hg	Tl	Bi	W[1]
Polymetallic Ag-Pb-Zn	SEDEX; VMS; Pb-Zn skarn							2	4	2		1	-2	1		1					
SEDEX Pb-Zn	Polymetallic Ag-Pb-Zn; VMS; Pb-Zn skarn							3	3	1			1	1					1		-2
Intrusion-related Au	Epithermal Au-Ag; Polymetallic Ag-Pb-Zn								-2	1	4	3			1					2	
Porphyry Cu-Mo	Intrusion-related Au; Cu skarn; Porphyry Mo				-2	4	3	-1	-1	1		2									1
W skarn	Porphyry W; Sn skarn/greisen; Porphyry Mo						1					1			2					2	4

[a]Polymetallic Ag-Pb-Zn type includes vein and manto styles; SEDEX = sedimentary exhalative; VMS = volcanic-hosted/associated massive sulphide
[1]For heavily censored elements and those not strongly controled by geology, raw data are used following a $\log_{10}$ transformation.
[2]Calculated residual from regression against Fe and Mn.

LEGEND

- Town
- Mineral Occurrence
- Road
- Contour
- River
- NTS map sheet
- Water Body
- Wetland
- Sample Location
- Catchment >14 km²

Weighted sums model (Geology Levelled)
W skarn deposits

- incomplete element suite
- 0-50th percentile
- 50-75th percentile
- 75-90th percentile
- 90-95th percentile
- 95-98th percentile
- 98-100th percentile

RECOMMENDED CITATION

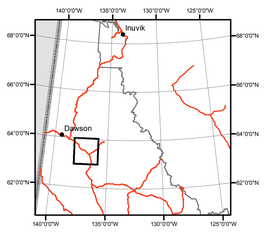
MACKIE, R., ARNE, D. AND PENNIMPEDE, C., 2016. Weighted sums model for W skarn deposits levelled by geology. In: Enhanced interpretation of stream sediment geochemical data for NTS map sheet 115P. Yukon Geological Survey, Open File 2016-31, scale 1:250 000, sheet 5 of 11

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 obtained 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.

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



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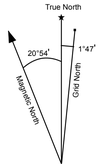
ONE THOUSAND METRE GRID
Universal Transverse Mercator Projection
North American Datum 1983
Zone 8

CONTOUR INTERVAL 100 FEET
Elevations in metres above Mean Sea Level

W skarn
Weighted sums model
(Geology Levelled)
Sheet 5 of 11

SCALE 1:250 000

0 1 2 3 4 5
kilometres



Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION 2015
FOR CENTRE OF MAP

116B DAWSON	116A LARSEN CREEK	106D NASH CREEK
115O STEWART RIVER	115P **THIS MAP**	105M MAYO
115J STEVENSON RIDGE	115I CARMACKS	105L GLENYON

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Yukon Geological Survey
Energy, Mines and Resources
Government of Yukon

Open File 2016-31

Weighted sums model for W skarn deposits levelled by mapped geology (NTS 115P) Sheet 5 of 11

by

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