Placer Potential Map

Dawson Land Use Plan

By

Jeffrey Bond

Yukon Geological Survey

Dawson Land Use Plan – Placer Potential Map

1.0 Introduction

Placer mining has been an important economic driver within the Dawson land use planning area since the late 1800's. The key components for making this area so rich in placer gold include: the region's favourable bedrock geology for gold mineralization, the highly dissected mountainous terrain (deep valleys) and the lack of glaciation. Equally important to the geological components are the existing placer mining heritage and culture that is embedded in the area. Placer mining requires a unique combination of skill sets that are found in few places on the planet, yet exist in relative abundance in this area thanks to over 100 years of cumulative mining knowledge.

Placer minerals are not the only valuable commodity in the region. The area is home to a range of ecosystems that reflect the terrain diversity, its unglaciated heritage and the fluvial landscape. In addition, both eco-tourism and historical-tourism have played an important economic role. Land use planning is necessary in order to recognize the region's economic and biological attributes, how they relate and how best to enable them to co-exist.

This document outlines the methodology used to develop a placer potential map for the planning area. Like any mineral potential map, placer potential is based on the current state of knowledge that exists at the time of the plan. As exploration progresses new discoveries are made and new mineral potential attributes are realized for the region. A mineral potential map will never be perfect but is necessary to help guide land use planning at this time.

2.0 Placer potential classification system

The placer potential mapping process consisted of applying a classification rating of 1 (lowest) to 5 (highest) for all the streams within the planning area (Table 1). Factors affecting a stream's potential included development history and hard rock mineral potential (gold deposit potential). These are described in the following sections. Terrain attributes such as potential overburden thickness, water flow or local topography were not factored into the rating due to the lack of knowledge for most un-mined drainages.

Table 1: Placer Potential Mapping - Classification System

Value	Colour	Name	Comments
1	blue	Low probability	0-20th percentile tract potential
2	green	Low-moderate probability	20-40th percentile tract potential
3	orange	Moderate probability	40-80th percentile tract potential
4	red	High probability	80-100th percentile tract potential or proximal to production
5	purple	Confirmed probability	Previous production or exploration supporting a placer deposit

2.1 Development history

The development history of a stream was determined by referencing two digital sources of data: 1) the Placer Development Status, which identifies current development, extensive development and historical development (Placer Stream Classification Model, 50K, Yukon Placer Watershed Atlas); and 2) Dawson Area Placer Activity Map (Lipovsky et al, 2001). From the first data source, if a stream was classified as having current, extensive or historical development then it was given a "Confirmed" probability or a value of 5. From the second data set, or placer activity map, streams were classified into two categories, major gold-bearing streams with significant mechanized placer mining operations and secondly, proven or potential gold-bearing streams with some prospecting or exploration history, but no significant mechanized placer mining operations. The major gold-bearing streams were given a "Confirmed" probability or a value of 5, whereas the streams with proven or potential placer gold deposits were given a "High" probability or a value of 4. A stream's classification was also increased to a value of 4 if a certain reach of that stream was classified as a value of 5, regardless of how the un-mined portion of that stream would have been rated according to the overall mineral potential tract value. This value-by-association assumption recognizes the fact that known existing placers are the best indicator for additional placers within a watershed.

2.2 Mineral potential tracts

The placer potential map utilized the mineral potential assessment to classify streams that have had no previous known placer development or exploration history. Mineral potential assessments utilize a variety of data such as bedrock geology, stream sediment geochemistry and mineral occurrences to rank land tracts that have common geology. Refer to Kilby (2012) for detailed information on the mineral potential assessment process for the Dawson land use plan. The three mineral (gold) deposit models used to classify streams within the tracts included: gold in quartz veins, plutonic-related gold and the White gold deposit type. A probability value for each gold deposit type was assigned to each tract through the mineral potential mapping process. These values were converted to percentiles in the placer potential mapping in order to group tracts with low (0-20th), low-moderate (20th-40th), moderate (40th-80th) and high (80th-100th) gold deposit potential. Within each tract the percentile ranking for each of the three gold deposit types was compared and the highest ranking was used to classify the water courses. No benefit was gained if multiple gold deposit types were valued high within a tract; only the highest percentile ranking was considered for the classification. The classification process also recognized that placer gold can be transported downstream across tract boundaries within a watershed. Therefore, classification values extend downstream even if the stream crosses a tract with a lower probability for having gold mineralization (Fig. 1).

2.3 Classification system

Once the placer potential value was determined a colour code was applied to the stream segments within the 1:50,000-scale national topographic database watercourse layer in ArcGIS. The classification value assigned to a particular stream reach applies to all fluvial deposits within that section of the valley.

This includes all bench (elevated paleo-placers) deposits that lie adjacent to the floodplain regardless of distance from the floodplain. Surficial geology maps can be referenced for the location of the more obvious bench landforms. The Yukon Geological Survey digital surficial geology data is available at: http://www.geology.gov.yk.ca/digital_surficial_data.html. The classification system and the definition of each value is outlined below in Table 1.

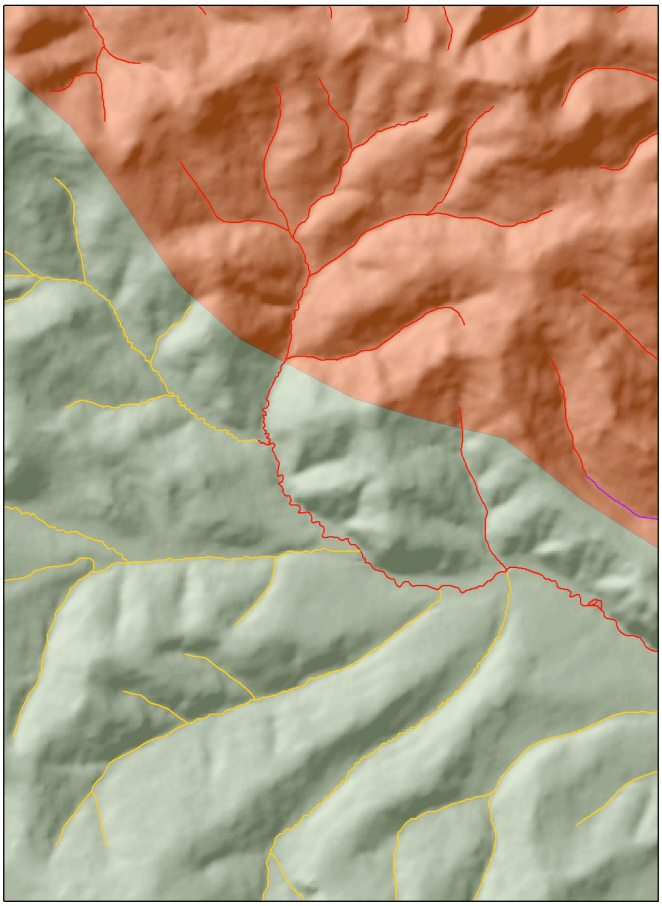

Figure 2. This map illustrates how a tract with high potential for gold mineralization can influence the placer potential classification for a drainage that extends into a lower ranking tract. The red-coloured stream originates in a tract that is ranked high (red background) for plutonic-related gold mineralization and extends into a tract that has moderate mineral potential (green background). Placer gold can be transported into the lower stream reaches thereby affecting its classification.

3.0 Limitations

Mineral assessments are based on the best geoscientific information available at the time of the study. Assessments must be revised as knowledge of the geology of an area and the types of mineral deposits that could occur within that area improves. This type of study represents a "best estimate at the time" on resources that are hidden in the ground and cannot be quantified. Conclusions derived from such a study are only as sound as the data that are available for the evaluation.

4.0 References

Kilby, W. 2012. Dawson Land Use Planning Mineral Potential Assessment. Yukon Geological Survey, Unpublished document, 137 p.

Lipovsky, P., Lowey, G. and LeBarge, W., 2001. Dawson Area Placer Activity Map (1:250 000 scale). Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, Open File 2001-36.