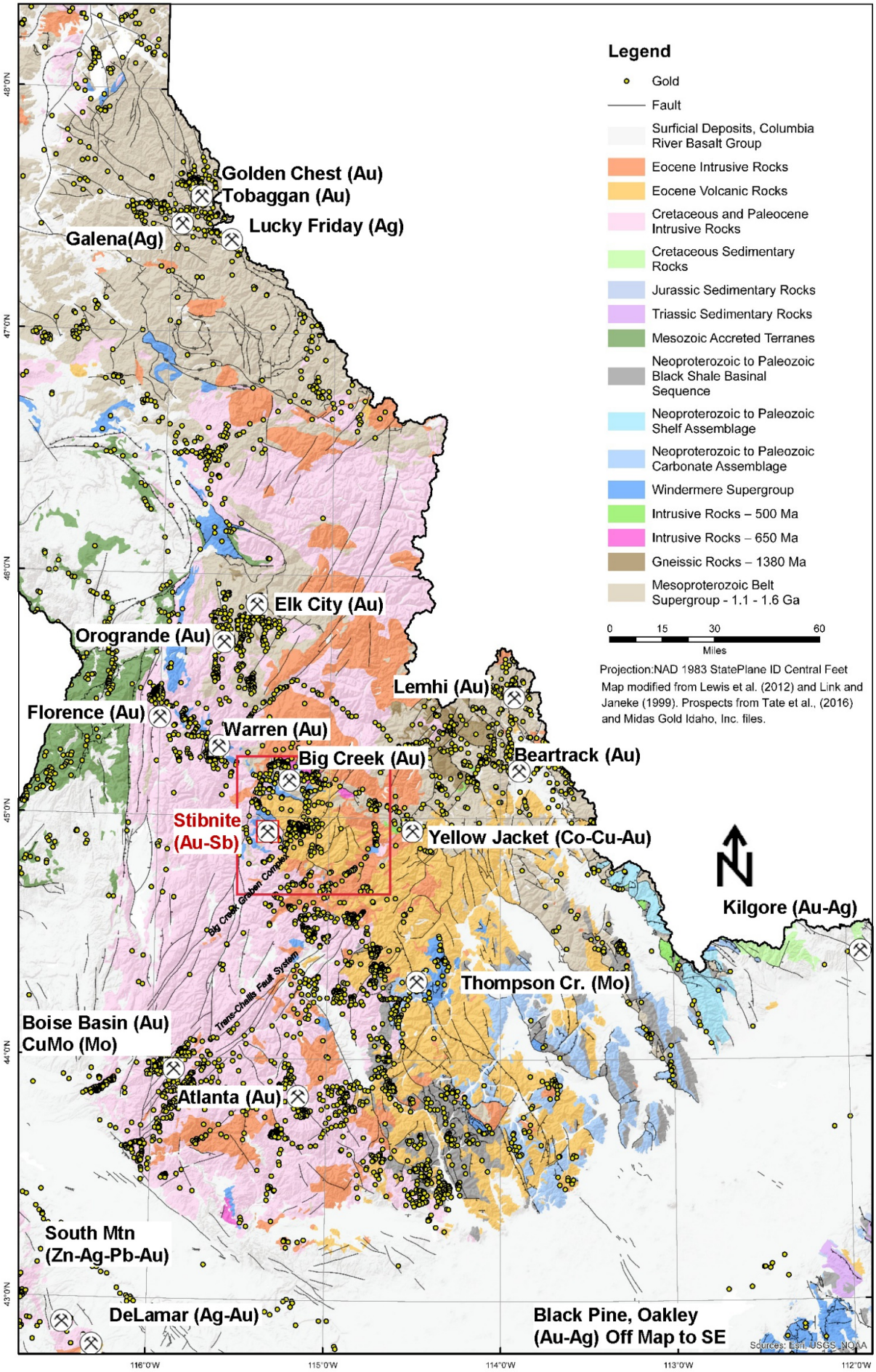
SEG 100 Conference: Celebrating a Century of Discovery

ST.006
The Central Idaho Mineral Belt- A Big Basin, Basin Busting Batholith, Broken Basement, Bustling Brines, and Ore Deposit Brewing

Christopher Dail, Austin Zinsser
Perpetua Resources Idaho, Inc., Boise, ID, USA

The 90+-year-old Stibnite-Yellow Pine Mining District is located in central Idaho, U.S.A., and is a major past producer of Au, Ag, W, Sb, and Hg. Recent development has led to a rebirth of the District with a proposal to develop a mineral reserve of 4.8 Moz Au and significant antimony in three open pits and via reprocessing of former sulfide tailings from the 1930s-50s operations. Project development is currently at the permitting stage. The District lies at the intersection of a series of large basement terrain boundaries, regional faults, and regional-scale stratigraphic breaks and along the eastern margin of the Cretaceous-age Idaho Batholith and the western margin of the Eocene Tertiary-age Thunder Mountain Caldera Complex. It lies within a discrete northwest-trending alignment of ore deposits of variable ages known locally as the Central Idaho Mineral Belt (CIMB). This belt of epigenetic gold and base metal deposits is roughly 100 km long and 10-20 km wide and follows the trace of the ancestral shelf-to-basin transition of “Windermere” rift to drift facies of Neoproterozoic to Paleozoic age. The CIMB crosscuts surficial rock units of various ages and indicates some underlying control on metal deposit formation unrelated to surficial exposures. A hypothesis is presented that the CIMB alignment is related to the assimilation of Neoproterozoic to Paleozoic metal-rich basinal rocks into ascending Cretaceous age reduced intrusives of the Idaho Batholith which were later uplifted, extended, and then subjected to Tertiary heat flow associated with Paleogene through Eocene magmatism along the former shelf-to-basin transition margin. The Cretaceous intrusives show evidence for increased crustal contamination over time and space with a transition from early metaluminous to younger, more peraluminous compositions. The Idaho Black Shale Belt is well exposed in south-central Idaho and farther south into Nevada, and similar sequences are exposed in the northern Idaho Panhandle and in eastern Washington, indicating likely regional continuity of the reduced facies sequences across the state of Idaho and along the CIMB. This model requires that the Idaho Black Shale Basin sequence be present at depth instead of having been eroded, as has been proposed for previous models for the stratigraphic and tectonic successions in the region. Regional geophysical data, isotopic signatures, detrital zircon data, and other lines of evidence suggest there is the possibility of additional deposits such as those at Stibnite-Yellow Pine along the CIMB, and potentially into B.C. as well, that resulted from similar basement controls for ascending magmas, stratigraphic sources for metals, and structural plumbing systems for hydrothermal systems of variable age.


Legend
Gold
Fault
Surficial Deposits, Columbia River Basalt Group
Eocene Intrusive Rocks
Eocene Volcanic Rocks
Cretaceous and Paleocene Intrusive Rocks
Cretaceous Sedimentary Rocks
Jurassic Sedimentary Rocks
Triassic Sedimentary Rocks
Mesozoic Accreted Terranes
Neoproterozoic to Paleozoic Black Shale Basinal Sequence
Neoproterozoic to Paleozoic Shelf Assemblage
Neoproterozoic to Paleozoic Carbonate Assemblage
Windermere Supergroup
Intrusive Rocks – 500 Ma
Intrusive Rocks – 650 Ma
Gneissic Rocks – 1380 Ma
Mesoproterozoic Belt Supergroup - 1.1 - 1.6 Ga
0 15 30 60
Miles
Projection:NAD 1983 StatePlane ID Central Feet
Map modified from Lewis et al. (2012) and Link and Janeke (1999). Prospects from Tate et al., (2016) and Midas Gold Idaho, Inc. files.
Golden Chest (Au)
Tobaggan (Au)
Lucky Friday (Ag)
Galena(Ag)
Elk City (Au)
Orogrande (Au)
Florence (Au)
Lemhi (Au)
Warren (Au)
Big Creek (Au)
Beartrack (Au)
Stibnite (Au-Sb)
Yellow Jacket (Co-Cu-Au)
Big Creek Graben Complex
Trans-Challis Fault System
Kilgore (Au-Ag)
Thompson Cr. (Mo)
Boise Basin (Au)
CuMo (Mo)
Atlanta (Au)
South Mtn (Zn-Ag-Pb-Au)
DeLamar (Ag-Au)
Black Pine, Oakley (Au-Ag) Off Map to SE
Sources: Esri, USGS, NOAA
48°0'N
47°0'N
46°0'N
45°0'N
44°0'N
43°0'N
116°0'W
115°0'W
114°0'W
113°0'W
112°0'W