

Geological mapping in the eastern Capricorn Orogen: implications for mineral exploration

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A new initiative was begun in 1994 to map the geology of the eastern Capricorn Orogen. This region includes the Palaeoproterozoic Bryah–Padbury Basins, Yerrida Basin, and Earraheedy Basin, formerly known collectively as the Nabberu Province. Fieldwork in these tectonic units is now completed and Geological Survey of Western Australia (GSWA) products published to date arising from this new mapping initiative are shown in Figure 1. The results of this mapping, together with new geochronological, geochemical, geophysical, and petrographic data, have led to the recognition of the above-mentioned tectonic units, which span a period of almost 400 m.y. (Yerrida Basin, 2.17–1.84 Ga; Bryah–Padbury Basins, 2.0–1.9 Ga; Earraheedy Basin, c. 1.8 Ga). The term Nabberu Province is now obsolete.

These newly recognized tectonic units and the style of their contained mineral deposits have led to a holistic

model of geodynamic evolution within the framework of the Capricorn Orogen. This, in turn, provided useful insights into the exploration potential of the region.

Known metallic mineralization in the Bryah and Padbury Basins includes volcanogenic massive sulfides, manganese, and iron oxides, and orogenic lode-gold deposits. The latter is a distinctive class of gold deposits, associated in space and time with collisional and accretionary tectonics. The Bryah Group contains mafic and ultramafic rocks of oceanic plateau affinity that were accreted onto the northwest margin of the Yilgarn Craton. Apart from orogenic gold lodes, these rocks may also host sulfide deposits generated through venting of hydrothermal fluids on the sea floor.

The Yerrida Basin is less well-endowed with known mineralization, but its geodynamic history and tectonic

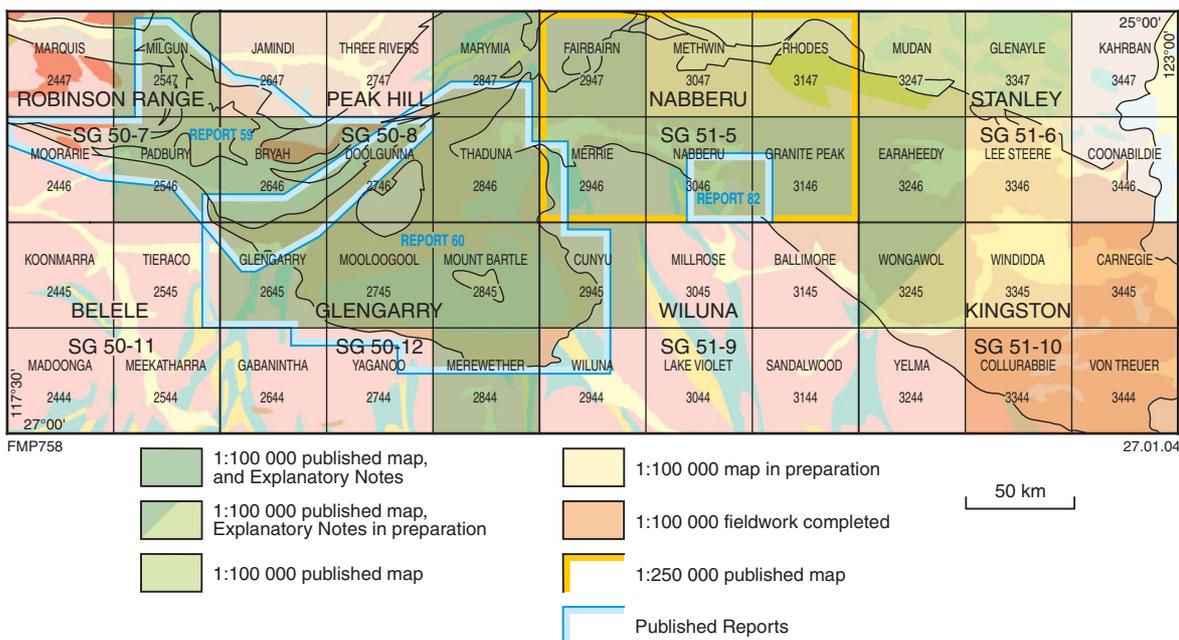


Figure 1. Completed and in progress series map sheets, Explanatory Notes, and Reports published 1995–2003 by the Glengarry and Earraheedy project teams

setting suggest potential for precious metals in hot-spring chemical precipitates and in black shale. In addition, intraplate intrusive and extrusive mafic rocks (Killara Formation) may host Noril'sk style nickel–copper–platinum group element (PGE) deposits.

The Earraheedy Group contains hydrothermal ore deposits that include Mississippi valley-type zinc–lead in carbonate units of the basal Yelma Formation and non-sulfide lead (oxides only), also in the Yelma Formation or at the unconformity with the underlying youngest unit of the Yerrida Basin (Mooloogool Group). The Superior-type granular iron-formation beds of the Frere Formation extend along strike for a total of approximately 500 km, constituting a significant iron resource. The Stanley Fold Belt, on the northern margin of the Earraheedy Basin, is the result of transpressive tectonics and may host orogenic type gold. Although not part of the Capricorn Orogen, strictly speaking, the Glenayle sill complex is in fault contact with the northern margin of the Earraheedy Basin, and is part of a recently discovered 1070 Ma large igneous province, which includes the Giles intrusions of the Musgrave Complex. The Glenayle sill complex is prospective for nickel–copper–PGE.