

EASTERN GOLDFIELDS GEOCHEMICAL BARCODING

EASTERN GOLDFIELDS GREENSTONES

Eastern Goldfields greenstones are composed of greenschist to amphibolite facies ultramafic, mafic and felsic volcanic rocks, with less common siliciclastic and chemically precipitated sedimentary rocks. Largely as a result of the Geological Survey of Western Australia's (GSWA's) regional 1:100 000 scale mapping, a broadly similar stratigraphy has long been inferred for several greenstone belts of the Eastern Goldfields Superterrane, but this has never been rigorously tested. Elsewhere, the lithology, stratigraphy and age of other greenstone belts (e.g. those of the Kurnalpi and Gindalbie terrains) indicate gross regional stratigraphic variations. Compiling a local or regional greenstone stratigraphy is hampered by a lack of exposure and diagnostic marker horizons, poor geochronological control on mafic and ultramafic rocks, and structural reorganization.

Geochemistry offers a means for stratigraphic correlation, and diamond drillcore provides some compensation for poor surface exposure. The analysis of drillcore samples is the basis of GSWA's Eastern Goldfields greenstone geochemical barcoding project.

Features of this program include:

- Analysis of 67 analytes, including 12 as oxides, and 55 as trace elements by combined XRF and LA-ICP-MS (laser ablation inductively coupled plasma mass spectrometry; fire assay and ICP for Au, Pd, Pt)
- Monitoring of data quality by analysis of sample duplicates, reference materials, and blanks
- As of January 2019, 3080 samples from ~150 drillholes (Fig. 1) have been added to a database comprising >5570 high-quality (e.g. modern ICP-MS data quoting full trace element and locational data etc.) analyses of regional greenstones and published sources
- All GSWA data are made available for download from www.dmp.wa.gov.au/geochem and will also be included in all releases of East Yilgarn Geological Information Series from 2019.

The project has several long-term aims

- Establish a geochemical 'barcode' of the stratigraphy (including local variations) for regions such as Kalgoorlie, Kambalda, Menzies and Norseman, which are relatively well known, better documented, and rich in diamond-drilled data
- Compare the geochemical stratigraphy of less well-known greenstone belts with reference geochemical stratigraphies
- Establish how easily geochemical data from diamond drillholes can be related to that of surface samples

Ultimate outcomes

- To establish whether local and/or regional greenstone stratigraphies are valid, and the geological reasons for local and regional stratigraphic variations
- To provide a means for companies to better establish where a particular lithology or lithological association fits in a local or regional stratigraphy
- Provide a modern, high quality, geochemical dataset that will better constrain future models on Archean granite-greenstone evolution and associated mineral systems

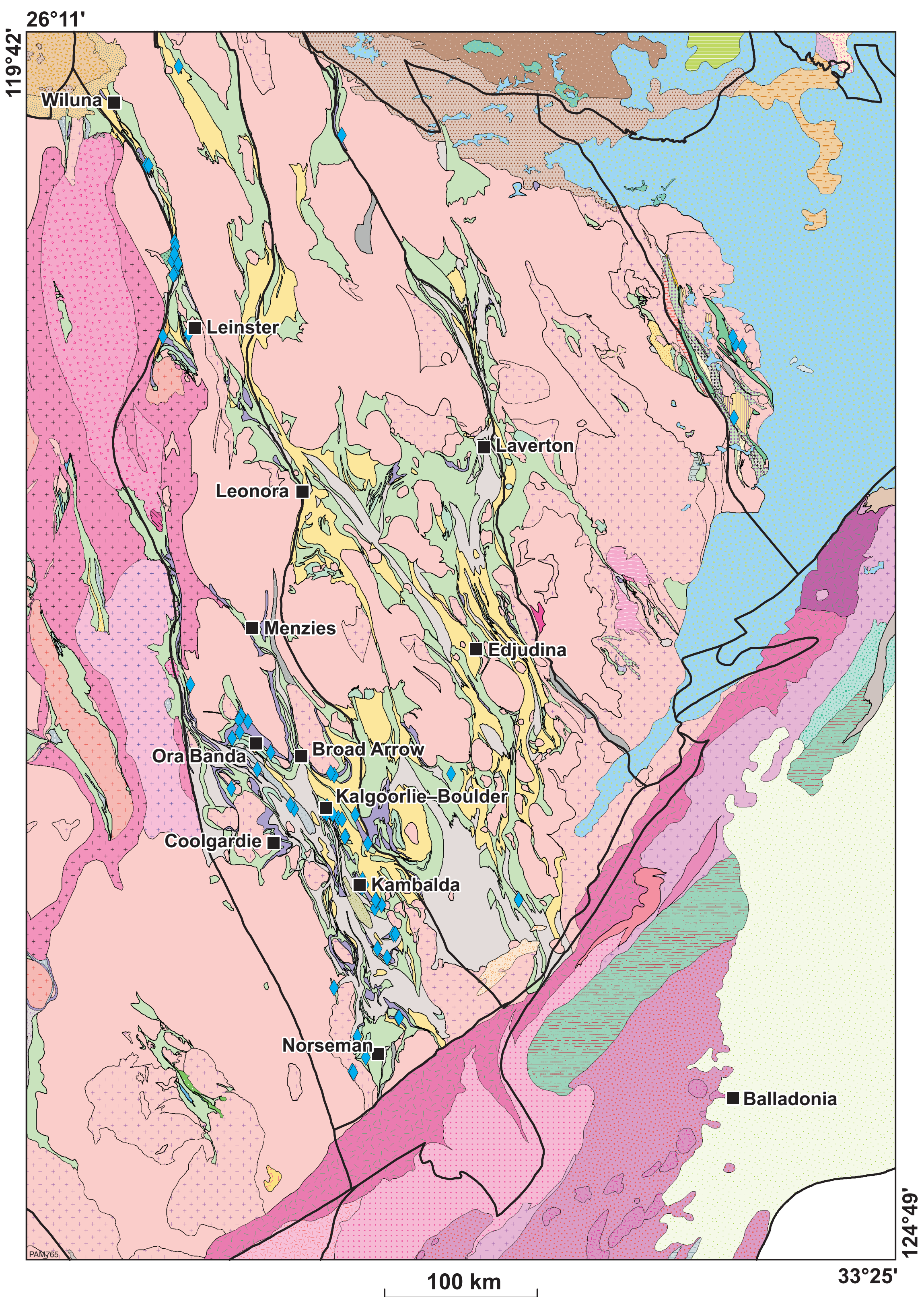


Figure 1. Interpreted GSWA 1:500 000 scale bedrock geology of the Eastern Goldfields Superterrane showing the location of cores that have so far been sampled in the course of this project

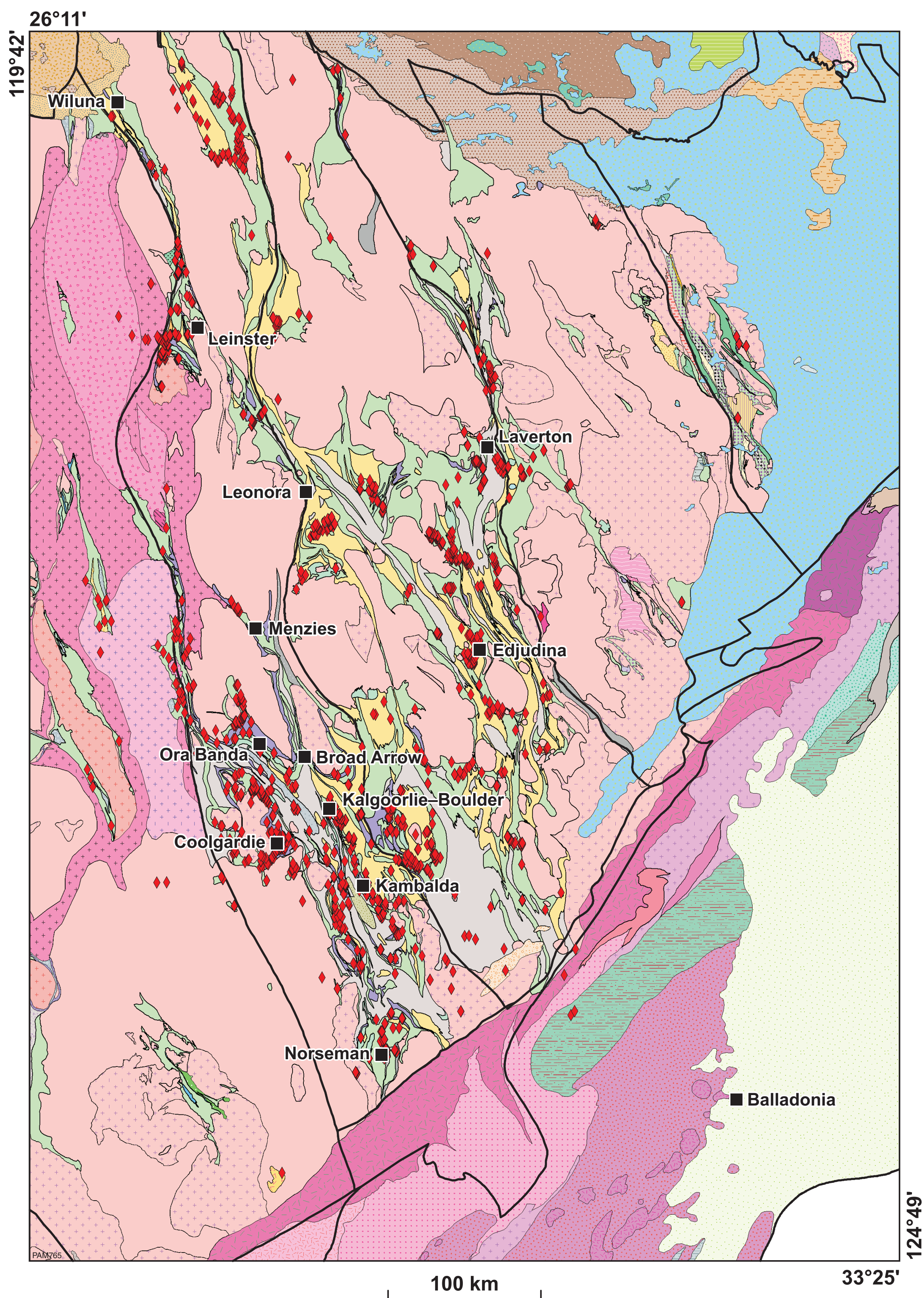
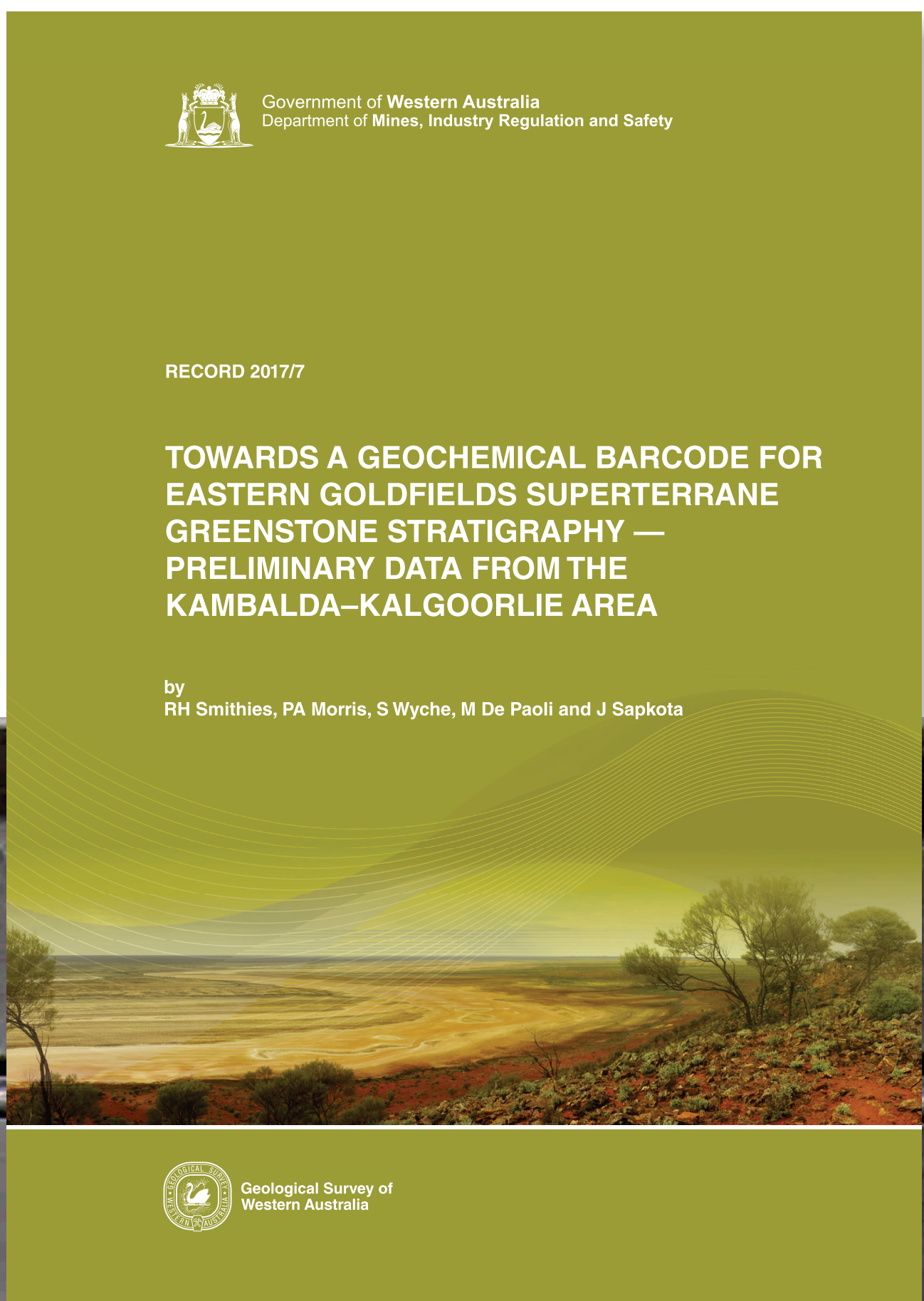


Figure 2. Interpreted GSWA 1:500 000 bedrock geology of the Eastern Goldfields Superterrane showing the distribution of sites from which we have obtained high-quality whole-rock geochemical analyses from both GSWA and non-GSWA published sources

Figure 2 shows that some greenstone belts are either poorly sampled or not sampled at all

Related GSWA Products



DMIRS encourages exploration companies who are willing to make available drillcore for sampling and geochemical analysis to contact Hugh Smithies (hugh.smithies@dmirs.wa.gov.au)

EXPLORATION
INCENTIVE
SCHEME



Government of Western Australia
Department of Mines, Industry Regulation and Safety

www.dmir.wa.gov.au

Geological Survey of
Western Australia



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