REGOLITH LANDFORM MAP
WESTERN AUSTRALIA

INTRODUCTION

GSWA is currently producing a seamless State 1:500 000 regolith-landform digital layer of Western Australia, which will be available on GeoView.WA and complement the current State 1:500 000 interpreted bedrock geology layer. The compilation of the State 1:500 000 regolith-landform layer involves the combination of seamless 1:100 000 project geology layers (where available), 1:250 000 scale 1st edition surface geology, and 1:100 000 and 1:250 000 regolith layers available in GSWA database (Fig. 1). This requires the polygons to be edited (aggregation and generalization) and the regolith units to be re-coded to comply with the current system used by GSWA (GSWA, Record 2013/7). An example of the final layer product is shown in figure 6.

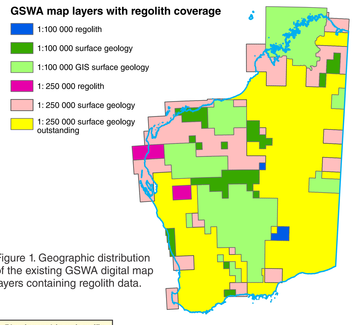


Figure 1. Geographic distribution of the existing GSWA digital map layers containing regolith data.

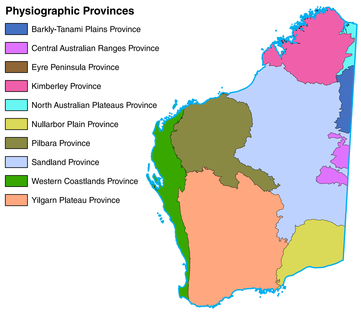


Figure 2. Geomorphological physiographic units, (Pain et al, 2011). Geomorphologic physiographic units of WA are classified into divisions, provinces and regions. The physiographic mapping units are based on landform characteristics, underlying geology, regolith and soils.

RE-CODING

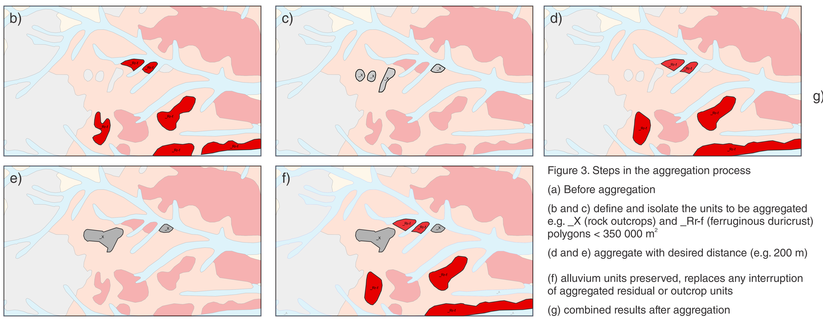
Recoding requires code translation to the current regolith classification system, as per GSWA Record 2013/7. The unit codes will be composed of a primary landform code qualifier, a compositional secondary code qualifier, and a physiographic unit suffix as exemplified in Table 1.

'Old' mapping codes	Current regolith codes *GSWA Record 2013/7*	Simplified to 1st and 2nd order qualifier	Physiographic unit suffix *(Pain et al, 2011, Fig 2)*
Ama Amphibolite	Xmm	X-m	X-m-YIPP
Czck Calcrete on cemented colluvium derived from ultramafic rock	R.ku	R_k	R_k-PIP
Czcb Colluvium; dissected gravel deposits derived from Fortescue Group	Clm	C-l	C-l-PIP

Table 1. An example of 'old' regolith codes converted to the current Regolith Record 2013/07 including the physiographic province suffix

AGGREGATION

Aggregation implies merging neighbouring polygons of the same code. It is performed in GIS environment using ET GeoWizards application. To obtain the best results with aggregation a series of parameters need to be implemented. In the case of the WA State regolith-landform layer map the parameters are listed and illustrated in Figure 3.



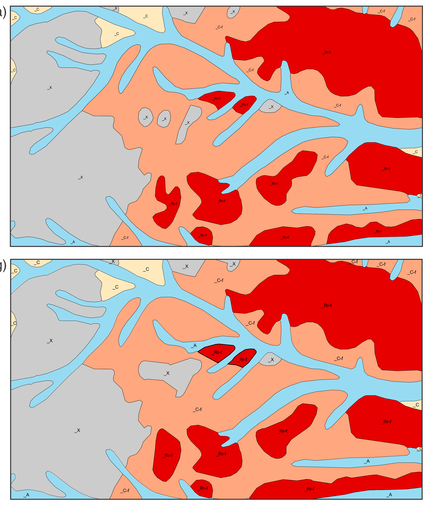


Figure 3. Steps in the aggregation process

(a) Before aggregation

(b and c) define and isolate the units to be aggregated e.g. _X (rock outcrops) and _Rr-f (ferruginous duricrust) polygons < 350 000 m^2

(d and e) aggregate with desired distance (e.g. 200 m)

(f) alluvium units preserved, replaces any interruption of aggregated residual or outcrop units

(g) combined results after aggregation

GENERALIZATION

Resolving the 'small polygons' problem.

Generalization implies editing the layers original line work and polygon geometry to be legible at 1:500 000 scale by using the Geoscaler Arc GIS tool. This process includes removing, amalgamating or redrawing polygons that fall below the minimum areas restrictions of the aimed map scale (Table 2). An example of polygons that require the generalization process for the desired map scale is illustrated in Figure 4.

Minimum areas and widths for geological features

Map scale	1:100 000	1:250 000	1:500 000
Polygons in m^2	12 000	75 000	300 000
Width polygons in m	100	250	500

Table 2. Cartographic minimum areas criteria for polygons to be legible at the given map scales.

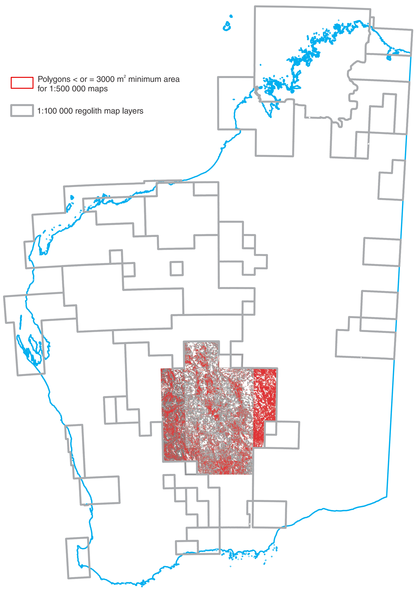
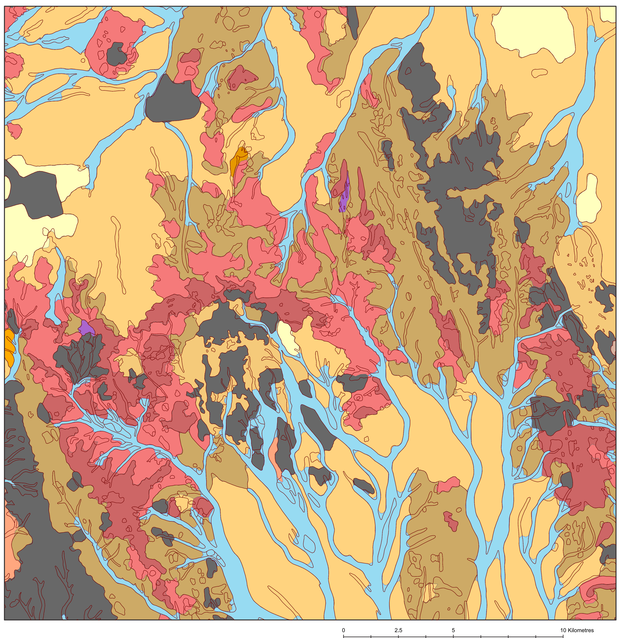


Figure 4. The distribution of polygons that are smaller than the minimum tolerable area (small polygons) in the Yilgarn and Musgraves regolith 1:250 000 map layers. Small polygons are highlighted in red.



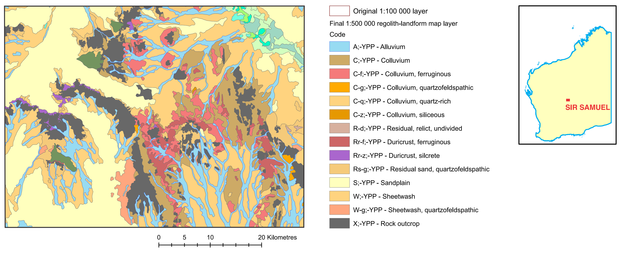


Figure 6. Map shows part of 1:500 000 regolith-landform layer of Western Australia, on Yilgarn Plateau Physiographic Province. Original map layer was downscaled from 1:100 000 to 1: 250 000 scale. The original 1:100 000 layer is shown in red contouring lines overlapping the final 1:500 000 map layer shown in colour.

GeoScaler

GeoScaler is a software that works as an ArcGIS geoprocessing tool (Fig. 5) designed for automated generalization of surficial and bedrock geology maps, in other words it can upscale or downscale the maps. It works by recalculating the geometry of the polygons and adjusting their dimensions from the original scale to the desired one. This involves four main steps: data preparation, cellular automata, post processing and raster to vector conversion.

GeoScaler was developed at LNC (Labaratorie de cartographie numerique et de photogrammetrie) of the Quebec division of the Geological Survey of Canada.

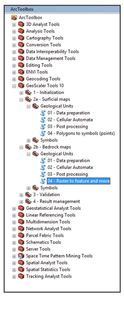


Figure 5. Geoscaler is an ArcGIS tool free to download from www.geoscan.nrcan.gc.ca

References

Geological Survey of Western Australia 2013, A revised classification system for regolith in Western Australia, and the recommended approach to regolith mapping: Geological Survey of Western Australia, Record 2013/7, 26p.

Pain C, Gregory L, Wilson P., and McKenzie N. 2011, The physiographic regions of Australia, explanatory notes: Australian Collaborative Land evaluation Program, National Committee on Soil and Terrain, 35p.

Huot-Vezina, G., Boivin, R., Smirnoff, A., and Paradis, S.J., 2012. GeoScaler: Generalization tool (with a supplementary user guide in French); Geological Survey of Canada, Open File 6231, (2nd edition).

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