

# Fieldnotes



Department of  
Industry and Resources

Geological Survey of  
Western Australia



Visit our Home Page at [www.doir.wa.gov.au/GSWA](http://www.doir.wa.gov.au/GSWA)

ISSN 1325 9377 ISSN 1 74168 099 9 (print)  
ISSN 1834 2272 ISSN 1 74168 098 0 (PDF)

## The Burtville Terrane: the Far East of the Yilgarn Craton

The past 25 years have seen a wealth of new data generated in the east Yilgarn. This is a result of regional 1:100 000-scale mapping programs by the Geological Survey of Western Australia (GSWA) and Geoscience Australia, the acquisition of regional-scale geophysical data, particularly aeromagnetic and gravity data and numerous academic studies of mineral deposits. Research programs carried out under the auspices of AMIRA International Limited, the Minerals and Energy Research Institute of Western Australia (MERIWA), and the Predictive Mineral Discovery Cooperative Research Centre (pmd\*CRIC) have also contributed.

One outcome of all of this new work has been the subdivision of the Yilgarn Craton into six terranes (Fig. 1; Cassidy et al., 2006). The distribution of these terranes is based on rock associations, geological structures mapped in the field and identified in seismic profiles, geochemistry, geochronology, and Sm–Nd isotope data.

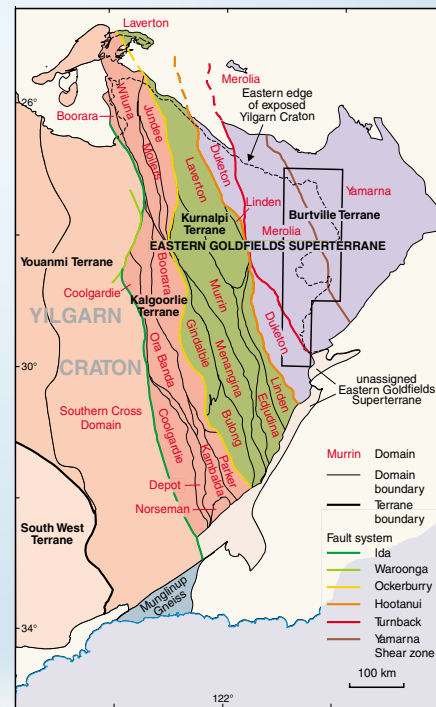


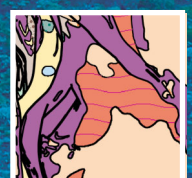
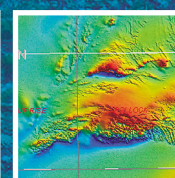
Figure 1. Tectonic division of the Yilgarn Craton, showing the subdivision into superterrane, terranes, and domains. The box in the Burtville Terrane shows the area of the current mapping program, and the dashed line shows the edge of the exposed Yilgarn Craton. Figure modified from Cassidy et al. (2006) (Note: Narryer Terrane not shown.)

continued on page 3



## What's inside?

THE BURTVILLE TERRANE.....	1,3
TIPS AND NEWS.....	2
UNDERSTANDING WA's GEOLOGY.....	4,5
GEOVIEW.WA.....	6
NATIONAL VIRTUAL CORE LIBRARY.....	6
GRAVITY SURVEY.....	7
RECENT PUBLICATIONS.....	8







## DigitalPaper™ user tip #7

### Easier searching

In our June 2006, Number 39 edition of *Fieldnotes*, we included DigitalPaper User Tip #4. That tip described how to search our *Geoscience Products* cabinet. Recently, we made some changes to how searches are performed for this cabinet.

- Previously, the *Geoscience Products* search page assumed you wanted to perform an exact match for the search criteria. For example, putting *gold* in the Title field returned only documents with that exact title. To get all documents with the word *gold* somewhere in the title, you had to enclose your search string with asterisk characters (i.e. *\*gold\**). This type of asterisk-enclosed search is called a *wildcard search*.
- Now, for most free-text-entry fields on the *Geoscience Products* search page, we've made wildcard searching the default behaviour. So, to get all documents with the word *gold* somewhere in the title, you simply enter *gold* into the Title field. No more manually inserting asterisk characters.
- Sometimes, however, you might want to perform a narrower wildcard search. For example, you might know that the document you're looking for has a title that starts with the word *geochronology*. To narrow the search in this manner, put *geochronology\** into the Title field. Instead of getting all documents with *geochronology* somewhere in the title, you'll only get matches where *geochronology* is the first word in the title.
- Similarly, where you know the last word (or words) in a Search field, you can narrow the wildcard search by adding an asterisk character to the beginning of the string. For example, searching on a title of *\*Western Australia* restricts the results to those documents where the title ends with those words.
- Should you have any difficulties using our DigitalPaper document server, please contact our Online Services Officer on (08) 9222 3629.

## New field guide for Perth



GSWA's field guide *Geology and landforms of the Perth Region* has just been released. This popular geology guidebook covers some of the classic geological localities near Perth. For instance, Cape Peron has been researched since the 1950s when Dr Rhodes Fairbridge first observed evidence of sea-level changes there. Some

of the other localities in the guidebook are: Boya quarries, Walyunga National Park, Cardup Group sedimentary rocks at Armadale quarry, and the Tamala Limestone at Cottesloe and Mosman Park.

The guide describes the landscape and rocks, and gives explanations on how they formed. Close-up photos annotated to show the various changes in lithology and structure help the reader to decipher the rocks. Diagrams, sketch maps, and panorama photos of the landscape help make this an entertaining and informative read.

\$22 incl. GST — You can purchase from the Information Centre or via ebookshop at [www.doir.wa.gov.au/ebookshop](http://www.doir.wa.gov.au/ebookshop).

## New geoscience portal!

**The Chief Government Geologists Committee announces a new look geoscience portal, [www.geoscience.gov.au](http://www.geoscience.gov.au).**

The portal gives individuals and companies interested in exploring for minerals in Australia a single point of access to geological and geophysical data. It also provides information about legal requirements for exploration in all Australian jurisdictions.

It provides:

- links to all Commonwealth, State and Territory geological surveys
- a download facility for Australia's geological maps at 1:250 000 scale
- airborne geophysical data and digital elevation data downloads from State and Territory Geological Surveys and Geoscience Australia
- all mining legislation and reporting guidelines
- the Australian mines atlas
- current minerals tenements.

The new portal is a valuable resource to promote the exploration and discovery of minerals in Australia.



# The Burtville Terrane

continued from page 1

The three easternmost terranes form the Eastern Goldfields Superterrane, with the Burtville Terrane in the far east, the Kurnalpi Terrane in the centre, and Kalgoorlie Terrane in the west. The three terranes of the Eastern Goldfields Superterrane have been interpreted as a series of continental margin fragments that were amalgamated and then accreted onto the protocratonic nucleus of the Yilgarn Craton (i.e. the Youanmi Terrane; Barley et al., 2003; Cassidy et al., 2006). Lithostratigraphic packages within terranes have been assigned to a series of domains, but relationships between different domains and even some of the bounding structures between the various domains and terranes remain under review.

## The northeast Yilgarn Craton project

GSWA's northeast Yilgarn Craton mapping project, covering the granites and greenstones of the northeasternmost part of the Yilgarn Craton, commenced in 2005. Fieldwork is largely complete in the Mount Venn, Mount Sefton, and Ulrich Range greenstone belts, with the Yamarna – Mount Gill, Dorothy Hills, Mount Hickox, and Irwin Hills greenstone belts to be mapped in 2007 (Fig. 2).

The Mount Venn greenstone belt is an upright, north-northwesterly trending syncline. The greenstones have a parallel sheared contact with the granitic gneisses to the east, and several late granites cut the belt. The lowermost greenstones are schistose mafic-ultramafic volcanic rocks, with minor interbedded banded iron-formation and quartzite units preserved on the western limb. On the eastern limb the package is intruded by parallel thin pyroxenite, leucogabbro, and dolerite sheets.

These intrusive rocks thicken significantly to the north, forming the thick composite gabbroic complex at the northern end. The mafic-ultramafic package is overlain by interbedded sandstone and siltstones, which are in turn overlain by well-bedded felsic tuffs and volcanoclastic rocks that have a sensitive high-resolution ion microprobe (SHRIMP) U-Pb zircon age of  $2769 \pm 2$  Ma. These grade up into volcanoclastic rocks interbedded with andesitic flows, which are then overlain by a series of interfingering, wedge-shaped rhyolitic and dacitic bodies. The felsic rocks preserve a transition from distal to proximal facies. The uppermost part of the succession is intruded by layered gabbros of the Mount Venn complex.

The change in composition from mafic-ultramafic to felsic volcanism is also observed in the Duketon greenstone belt (e.g. Barley et al., 2003), suggesting that there may be a consistent stratigraphy across the terrane. The age of c. 2770 Ma from the middle of the described section is younger than the sequence in the Duketon greenstone belt (i.e. 2805 Ma), but does support the hypothesis that

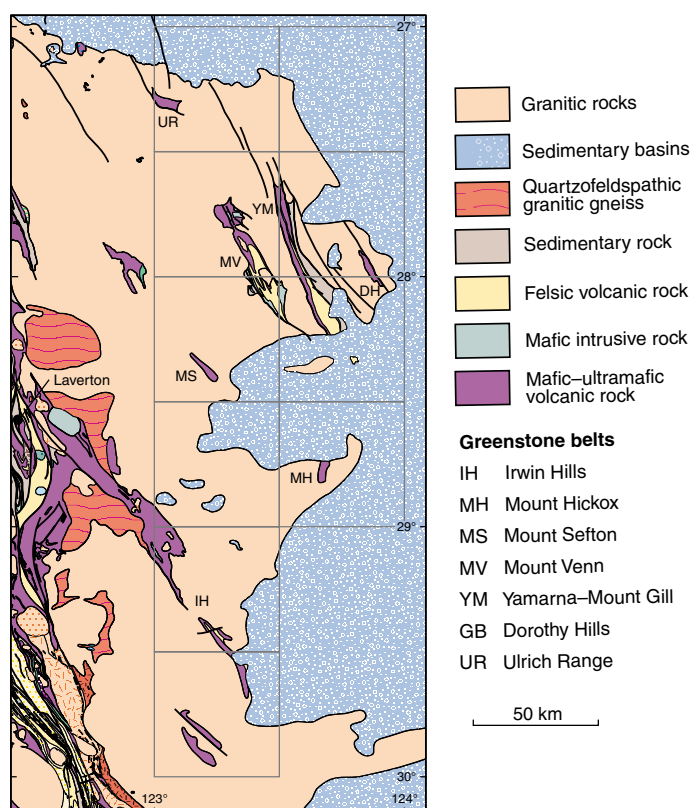


Figure 2. Geological map of the northeast Yilgarn showing the area of current mapping (from the State 1:500 000 geology map). The greenstone belts referred to in the text have been labelled

the Burtville Terrane comprises older rocks than the neighbouring terranes. It is possible that the older (>2.8 Ga) northeastern part of the Kurnalpi Terrane (i.e. the Laverton Domain) would be more appropriately assigned to the Burtville Terrane, suggesting that major movement on the Hootanui Fault post-dated the dominant period of terrane assembly.

The Geological Survey of Western Australia would like to acknowledge the cooperation and support of the Ngaanyatjarra Council.

This is an extract from an abstract by Mark Pawley in GSWA Record 2007/2 (GSWA 2007 extended abstracts).

For more information, contact Mark Pawley (mark.pawley@doir.wa.gov.au).



**G**SWA's ongoing mapping programs continue to provide insights into the geological evolution of Western Australia. An outcrop observation, a previously unseen field relationship, a set of new geochemical analyses or a new geochronology date will lead to sometimes unexpected changes in our understanding of the geology of an area and, as a consequence, of its mineral prospectivity. Field excursions to the Pilbara and the northwestern Capricorn Orogen during the 2006 field season, and presentations and posters at the recent GSWA 2007 Seminar and poster display, have provided opportunities for GSWA geologists to present and discuss new developments and ideas.

## Pilbara Craton

The Pilbara Craton project is nearing completion and a robust understanding has emerged of the changing tectonic styles that have built the craton over 700 million years of early Earth history. An early period characterized by vertical tectonics driven by mantle plumes (3.53–3.24 Ma) in the east Pilbara was followed by the onset of horizontal tectonics. Evidence for the oldest known subduction zone has been found in the Whundo Group of the Sholl Terrane at 3.12 Ga. Subduction led to accretion of the West Pilbara Superterrane and to collision with the East Pilbara Terrane at 3.07 Ga. Following collision, the De Grey Superbasin developed as a system of intracontinental sag basins. Final cratonization was marked by west-to-east prograding granitic plutonism, compressional deformation, and the intrusion of post-tectonic granites (3.00–2.83 Ga). Changing mineral systems accompany the changes in tectonic style, with the development of significant volcanic-hosted massive sulfide (VHMS) deposits, hydrothermal sedimentary replacement deposits, granite- and porphyry-related base metal, copper-molybdenum and tin-tantalum deposits, orogenic lode-gold deposits, and deposits associated with layered mafic-ultramafic intrusions.

## Yilgarn Craton

### Murchison Domain and Burtville Terrane

The tectonic framework of the Yilgarn Craton has also undergone revision recently with the publication of GSWA Record 2006/18 that involved authors from GSWA, Geoscience Australia (GA), and the University of Western Australia. The Record made use of the wealth of data, generated in the past 25 years from the east Yilgarn. A fundamental geological difference is recognized across the Mount Ida Fault between the older (3.7–2.6 Ga) western part of the Yilgarn Craton and the younger eastern part (2.9–2.6 Ga).

To the west, in the Youanmi Terrane, greenstones in the Southern Cross Domain form an older c. 3.0 Ga succession overlain by a younger c. 2.73 to 2.72 Ga package. In the Murchison Domain there are older c. 3.0 Ga greenstones at Golden Grove and in the Weld Range, but a c. 2.8 Ga succession is also recognized at Golden Grove, as well as in the Mount Magnet area, near Windimurra, and in the Pollele Syncline near Meekatharra. Younger felsic volcanic rocks range in age from 2.76 to 2.69 Ga. In the Eastern Goldfields Superterrane GSWA's focus has moved from the better known Kalgoorlie and Kurnalpi Terranes to the less well understood Burtville Terrane. Here a new age of c. 2770 Ma from the Mount Venn greenstone belt suggests that greenstones are older than those in most of the Kalgoorlie and Kurnalpi Terranes. It is possible that the older (>2.8 Ma) Laverton Domain of the Kurnalpi Terrane could be reassigned to the Burtville Terrane, suggesting that the major movement on the Hootanui Fault post-dated terrane accretion.

### Yilgarn Craton meets the Albany–Fraser Orogen

The recently discovered Tropicana gold deposit has sparked interest in new greenfields exploration along the southern and eastern margins of the Yilgarn Craton where it is reworked within the Northern Foreland of the Albany–Fraser Orogen. The reworked parts of the craton can be identified using new mapping and aeromagnetic data combined with geochronology. The Munglinup Gneiss contains remnant greenstones, and new dating of granitic gneisses has yielded c. 2660 Ma protolith ages consistent with the age of widespread granite intrusion across the Yilgarn Craton. In contrast, the Dalyup Gneiss in the Birinup Complex has granite protolith ages of c. 1680 Ma and may have developed as a terrane exotic to the Yilgarn Craton accreted during Stage I of the Albany–Fraser Orogeny. Metamorphic ages between c. 1210 and 1140 Ma represent reworking of both the Munglinup Gneiss and the Dalyup Gneiss during Stage II of the Albany–Fraser Orogeny.

### Musgrave Complex

Albany–Fraser Orogeny ages are present in the western Musgrave Complex, where the Mann Fault represents a major tectonic boundary. To the south of the fault, granulite-facies supracrustal rocks are intruded by 1330 to 1290 Ma granites and contain 1800 to 1370 Ma detrital zircon cores overgrown by 1220 to 1200 Ma rims. To the north, supracrustal rocks are intruded by 1210 to 1175 Ma granites and contain 1650 to 1290 Ma detrital zircon cores overgrown by 1180 to 1170 Ma rims. Granites intruded at c. 1150 Ma are only present south of the



This geological map of Western Australia illustrates the distribution of major basins and cratons. The map is color-coded to distinguish different geological provinces: the Pilbara Craton is shown in purple, the Yilgarn Craton in pink, and various basins in shades of brown, yellow, and blue. Key features include the Pilbara Craton in the northwest, the Yilgarn Craton in the south-central region, and the Kimberley and Speewah Basins in the far north. Other labeled basins include the Northern Carnarvon, Hamersley, Ashburton, Edmund, Collier, Officer, Earaheedy, Yerrida, Bryah and Padbury, Southern Carnarvon, Perth, Leeuwin, Bremer, Albany, Fraser, Birnie and Nornalup, Canning, Rudall, Amadeus, Musgrave, Gunbarrel, and Eucla Basins. The map also shows the King Leopold Orogen, the Halls Creek Orogen, the Ord Basin, and the Centralian Superbasin. A scale bar indicates 200 km.

# Capricorn Orogen

In the Gascoyne Complex of the Capricorn Orogen, collaborative work with the University of Western Australia has provided robust ages for medium-grade regional metamorphism between the Ti Tree Syncline and the Chalba Shear Zone. In situ monazite and xenotime ores indicate that metamorphism occurred between 1030 and 990 Ma. Ar–Ar dating of a sample from the Chalba Shear Zone containing abundant dextral strike-slip shear indicators gave evidence for muscovite growth at  $570 \pm 10$  Ma. Important tectonic activity at this time is recorded in central Australia during the Petermann Orogeny and in the Kimberley region during the King Leopold Orogeny.

Recent SHRIMP U–Pb geochronology in collaboration with Geoscience Australia has revealed the provenance history of detrital zircons from the Bangemall Supergroup. Two discrete stages reflect changes in paleogeography between the Edmund and Collier Groups. The Edmund Group records erosion of the Gascoyne Complex and progressive unroofing of early to late Paleoproterozoic supracrustal rocks on the southern margin of the Pilbara Craton. During this time the paleogeography of the Edmund Basin evolved from a horst-and-graben terrain with significant detrital contribution from localized sources, to an extensive east–westerly trending intracratonic basin with the Pilbara Craton to the north providing the main source of detritus. The Collier Group records unroofing and reworking of successively lower levels of the underlying Edmund Group, with a possible additional contribution from the Paterson Orogen.

For more information,  
contact Ian Tyler ([ian.tyler@doir.wa.gov.au](mailto:ian.tyler@doir.wa.gov.au)).

## Granites–Tanami Orogen

In the Granites–Tanami Orogen in WA the Stubbins Formation is a newly defined succession of turbiditic and pelagic sedimentary rocks interbedded with mafic volcanic rocks and abundant dolerite sills. Preliminary ages provided by Geoscience Australia gives the age of the formation as c. 1864 Ma, which is about 30 million years older than that interpreted for successions included in the Tanami Group. The geochemistry of basalt and dolerite indicates that these rocks may have been deposited in a continental back-arc basin between the Halls Creek and Arunta



# GeoVIEW.WA and core library

## GeoVIEW.WA upgrade

**Same bonnet, but new turbo engine with performance extras in a discrete offroad-ready body**

Have another look under the hood of GeoVIEW.WA next time you visit the DoIR website. There's a whole new engine with lots of added extras now online, with the integration into GeoVIEW.WA of a heavily revised and extended 1:500 000 geological dataset.

The dataset works over the pre-existing 2001 geological map data, with greater spatial accuracy, improved geological interpretations, and more detail added in several regions. For example, the Phanerozoic map units have been subdivided to give greater meaning and precision both spatially and in time. Other areas where the geology has been extensively revised since 2001 are the western Pilbara Craton, Gascoyne Complex, and Edmund and Collier Basins.

Most importantly, a lot of data has been added behind the scenes in the form of attribute tables giving detailed, consistent information about map units. These cover lithology, lithostratigraphy, relationships, age, tectonic unit, and deformation, and can be accessed by clicking the unit, as before.

For example, tectonic units within the Precambrian can be derived by rolling up the geology (using the appropriate data attribute).

The 1:500 000 dataset will become the foundation for most other GSWA products. It will not be a static product — the map and the data layers behind it will be refined incrementally as new mapping and information are added and new interpretations are made. At present, subdivisions of Phanerozoic basins both onshore and offshore are being re-assessed, and some changes will be incorporated shortly. A separate attributed layer for tectonic subdivisions within Precambrian units is also near completion. The 1:500 000 dataset is effectively the next edition of the State Geological Map in electronic form, with more precision on the surface underlain by a lot more internal grunt to suit the discriminating, power-hungry geological explorer.

For more information,  
contact Ian Tyler ([ian.tyler@doir.wa.gov.au](mailto:ian.tyler@doir.wa.gov.au))  
or Roger Hocking ([roger.hocking@doir.wa.gov.au](mailto:roger.hocking@doir.wa.gov.au)).

## National Virtual Core Library

The Federal Government is supporting the development of the National Virtual Core Library over the next four years as part of the National Collaborative Research Infrastructure Scheme (NCRIS).

The National Virtual Core Library is a proposed web-based system that will bring together the approximately 6.8 million metres of core that is currently held in State and Territory core libraries in Australia. The vision of the National Virtual Core Library is to value add and increase public access to these libraries by extracting new mineralogical information about the composition of the Australian continent. This is now possible by the new spectroscopic technology recently developed by CSIRO — the Hylogger — that can rapidly and nondestructively determine the dominant mineralogy of drilled materials in their original core trays.

The recently completed MERIWA Project M373 **Development and Implementation of Advanced Automated Core Logging Technology**, of which

GSWA was a sponsor, has demonstrated the value of this new technology to the Western Australian exploration industry. From the project has come new understanding about spatial variations in rock composition and alteration mineralogy not previously seen from gold deposits in the Eastern Goldfields, and this has provided new insights into fluid-rock interactions, and information for ore systems and mineral processing. The project also demonstrated the Hylogger's application to the petroleum industry.

The technology of the Hylogger system is still in its developmental stage and construction of the seven instruments needed for the National Virtual Core Library has commenced. It is expected that the Western Australian node will be operational in late 2008 or 2009.

The instrument will also be available to industry, greatly improving the objectivity of core logging as well as providing assistance for the discovery of mineral and petroleum resources.

For more information,  
contact Ivor Roberts, ([ivor.roberts@doir.wa.gov.au](mailto:ivor.roberts@doir.wa.gov.au)).



# Gravity survey

## Webb 2006 regional gravity survey

On 21 December 2006, GSWA and Geoscience Australia released final data from the Webb 2006 regional gravity survey. The Webb survey is the second regional gravity survey of this nature conducted as part of the Western Australian Government's funding program to increase the coverage of pre-competitive regional geoscience information over the State.

The Paterson 2005 gravity survey — data released on 6 December 2005 — was the first; a third is presently being carried out in the Murchison region.

A total of 4092 stations at a nominal spacing of  $2.5 \times 2.5$  km were collected in the Webb survey in a helicopter-assisted ground survey program carried out by Daishsat Geodetic Surveyors between August and September 2006.

Images made from the dataset are shown in Figures 1a, b and c. The outline of the gravity survey over an image of the regional (400-m line-spacing) aeromagnetic (TMI) data is shown in Figure 1d.

The vector (point-located) data are in the Australian National Gravity Database; both vector and gridded data can be obtained free-

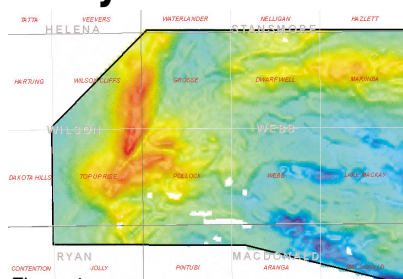


Figure 1a. Bouguer gravity anomalies ( $\rho = 2.67 \text{ tm}^{-3}$ )

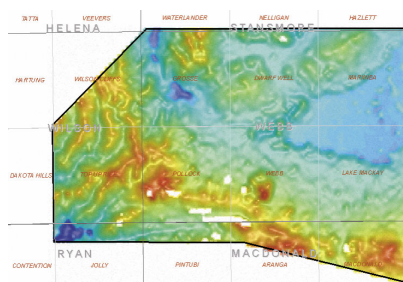


Figure 1c. Station elevations (AHD)

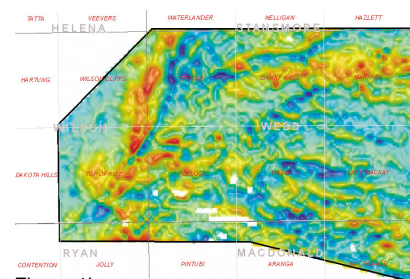


Figure 1b. First vertical derivative of Bouguer gravity

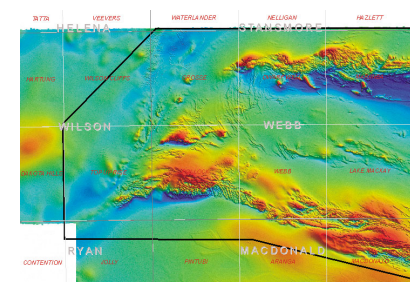


Figure 1d. Gravity survey outline over TMI image

of-charge using the GADDS download facility on the GA website at [www.ga.gov.au/gadds](http://www.ga.gov.au/gadds).

Vector, grids and ECW images with the Daishsat operations report (all on CD) may be ordered from the Information Centre at the Department of Industry and Resources in Perth. A fee of \$99 (including GST) applies. Selected ECW images can be downloaded from the GSWA website.

## GSWA regional geophysics survey program

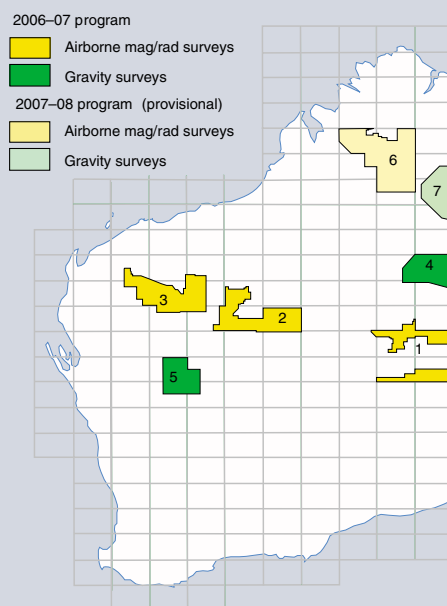
Dates shown are for release of final data; dates in parentheses are provisional.

Final data releases are available by download from the Geoscience Australia Data Delivery System at [www.ga.gov.au/gadds](http://www.ga.gov.au/gadds). Releases of preliminary data, generally at about 50% and 100% of the data acquisition stage, are made on the GSWA website [www.doir.wa.gov.au/GSWA](http://www.doir.wa.gov.au/GSWA) 'Maps and Images' page.

Subscribe to the **GSWA newsletter** (subscription link located on the News and Events page of the GSWA website) to keep informed of preliminary and final data release dates.

ID	Name	Specifications	Status	Start	End	Release
<b>Airborne Mag/Rad Surveys</b>						
1	Musgrave 2006	400 m x 60 m; E/W; N/S	Complete	Jun-06	Oct-06	13 Feb-07
2	Officer (Trainor) 2006	400 m x 60 m; N/S	Processing	Aug-06	Jan-07	(Apr-07)
3	Ashburton 2006	400 m x 60 m; N/S	Processing	Aug-06	Jan-07	(Apr-07)
6	South Kimberley 2007	400 m x 60 m; N/S	Planning	(Jul-07)	(Dec-07)	(Apr-08)
<b>Gravity Surveys</b>						
4	Webb 2006	2.5 km regular	Complete	Aug-06	Sep-06	21 Dec-06
5	Murchison 2007	2.5 km regular	Acquisition	Feb-07	(Mar-07)	(May-07)
7	West Tanami 2007	2.5 km regular	Planning	Dependent on Land Access		

Information current at: 1 March 2007



For more information,  
contact David Howard ([david.howard@doir.wa.gov.au](mailto:david.howard@doir.wa.gov.au)).





# Recent publications

All prices include 10% GST

ISSN 1325 9377 ISBN 1 74168 099 9 (print)  
ISSN 1834 2272 ISBN 1 74168 098 0 (PDF)

## RELEASED

### ■ GEOLOGICAL INFORMATION PACKAGES

East Yilgarn, 2006 update

1:100 000 Geological Information Series

Digital dataset on DVD .....\$55.00

### ■ MISCELLANEOUS

WA atlas of mineral deposits and petroleum fields 2007

by R. W. Cooper, P. B. Abeyasinghe and D. J. Flint

Available online and in hard copy ..... free of charge

GSWA Annual Review 2005–06

Available online and in hard copy ..... free of charge

Overview of mineral exploration in Western Australia for 2005–06

by D. J. Flint and P. B. Abeyasinghe

Available online and in hard copy ..... free of charge

Atlas of 1:250 000 geological series map images, Western Australia (April 2007 update)

DVD ..... \$22.00

Summary of petroleum prospectivity,

Western Australia 2007:

Bonaparte, Bight, Canning, Officer, Perth,

Northern Carnarvon, and Southern Carnarvon Basins

Available online and in hard copy..... free of charge

### ■ GEOLOGICAL AND GEOPHYSICAL MAPS

Major resource projects, Western Australia — 2007

Non-series map 1:3 000 000

by R. W. Cooper and D. J. Flint ..... \$11.00

MONTAGU 1:100 000 geological map (SG 50-16, 2843) ..... \$11.00

### ■ RECORDS

Geology of the Kalbarri area — a field guide

Record 2006/19

by R. M. Hocking and A. J. Mory

PDF available on website ..... free of charge

GSWA 2007 extended abstracts: promoting the

prospectivity of Western Australia

Record 2007/2

Book ..... \$22.00

PDF available on website ..... free of charge

## COMING SOON

### ■ MAPS

EUDAMULLAH 1:100 000 geological map (SG 50-2, 2049)

by S. Sheppard

BELL ROCK 1:100 000 geological map (SG 52-10, 4645)

Western Australia mineral deposits and petroleum fields 2007

Non-series map by R. W. Cooper

### ■ 1:100 000 GEOLOGICAL INFORMATION SERIES

WEST MUSGRAVE (BELL ROCK) update

### ■ MISCELLANEOUS

Geology and landforms of the Perth Region

(book 126 pages)

by J. R. Gozzard ..... \$22.00

Inventory of abandoned minesites: progress 1999–2006

by W. Ormsby

Digital product (DVD) ..... \$55.00

### ■ RECORDS

Structural and lithological evolution of the Jack Hills greenstone belt, Narryer Terrane, Yilgarn Craton

by C. Spaggiari

Copper, lead, and zinc in WA: commodity review for 2005–06

by P. B. Abeyasinghe and D. J. Flint

Nickel and cobalt in Western Australia: commodity review for 2005

by R. W. Cooper

TerraneChron™ analysis of zircons from Western Australian samples

2007/4 by W. L. Griffin, E. A. Belousova and S. Y. O'Reilly

Neoproterozoic reworking in the Paleoproterozoic Capricorn Orogen

by S.A. Occhipinti

Southern Yilgarn geological exploration package

### ■ REPORT

Geochemistry of volcanic rocks of the northern Pilbara Craton

by R. H. Smithies, D. C. Champion, M. J. Van Kranendonk and A. H. Hickman

All publications published as PDF files can also be ordered from the Information Centre as laser-printed copies at the cost of printing and binding. Our printed publications are now also available free as PDF files on our website at [www.doir.wa.gov.au/GSWA/publications](http://www.doir.wa.gov.au/GSWA/publications). Further details of geological publications and maps produced by the Geological Survey of Western Australia can be obtained at [www.doir.wa.gov.au/GSWA](http://www.doir.wa.gov.au/GSWA).

Hard copy publications including CDs and DVDs are available from the Information Centre, First Floor, Mineral House, 100 Plain St, East Perth, WA 6004, AUSTRALIA Phone: +61 8 9222 3459; Fax: +61 8 9222 3444 or can be purchased online from the bookshop at [www.doir.wa.gov.au](http://www.doir.wa.gov.au).