

Fieldnotes



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

www.dmp.wa.gov.au/GSWA

STATE GOVERNMENT EXPLORATION INCENTIVE SCHEME Ten years on

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EXPLORATION
INCENTIVE
SCHEME



Australian Government
Geoscience Australia

Geological Survey of
Western Australia



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Fieldnotes

Fieldnotes is a free digital-only quarterly newsletter published by the Geological Survey of Western Australia (GSWA). The newsletter provides regular updates to the State's exploration industry and other geoscientists about GSWA's latest work, programs, products and services.

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GSWA publishes a vast amount of pre-competitive geoscience information on the State, contributing to billions of dollars' worth of resources for exploration and development. To find more information about publications and maps we publish, go to our [website](#).



Cover image: State gravity map, which was completed with airborne data acquisition, funded through the EIS. (See article on page 3)



State Government Exploration Incentive Scheme

Ten years on



The Western Australian Government's Exploration Incentive Scheme (EIS) was launched in April 2009, and is managed by the Geological Survey of Western Australia (GSWA). Funding of \$80 million (Fig. 1) was provided from the Royalties for Regions (RfR) program for a more than four-year initiative that ran until end of June 2013 (Phase 1). An additional \$20.5 million was allocated from RfR for 2013–14 (Phase 1A). Funding for EIS (Phase 2) was extended for three years until the end of 2016–17 with \$30 million from the Consolidated Revenue Fund (CRF). In May 2016, the scheme was extended further with an allocation of RfR funding totalling \$20 million over the two years to end of June 2019.

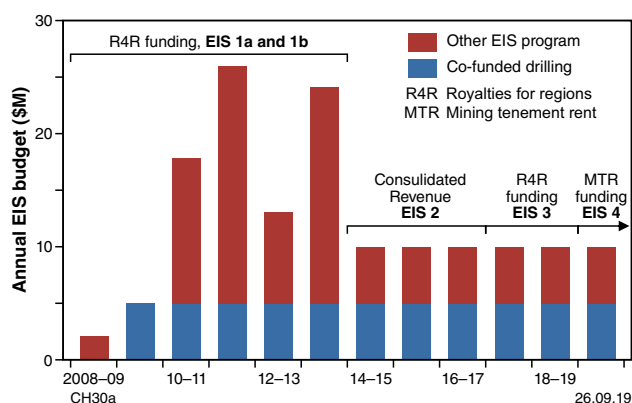


Figure 1. EIS 4 (2019 financial year onwards) – mining tenement rents

The objective of EIS is to promote exploration in Western Australia with a particular emphasis on greenfields areas that are underexplored for mineral deposits and on frontier petroleum basins, with the aim to maintain investment and exploration activity at levels required for the long-term sustainability of the State's resources sector. This requires an increase in the discovery rate of economic deposits, particularly for gold and base metals (copper, lead, zinc), and steel-industry and specialty metals (including nickel, vanadium, lithium, rare earth elements), and onshore petroleum.

An economic impact assessment (ACIL Allen Consulting, 2015) found that from every \$1 million invested in EIS there was a net benefit to the State of \$23.7 million (Fig. 2).

EIS programs

The flagship EIS program is the Co-funded Government–Industry Exploration Drilling program, which is designed to stimulate geoscience exploration of underexplored regions in Western Australia and contribute to their economic development. The program funds high-quality, technically and economically sound projects that promote new exploration concepts and new exploration technologies.

The Co-funded Drilling program only funds drilling designed to discover new minerals, or new petroleum or geothermal reservoirs, or for research purposes. Drilling to enlarge an existing mineral or petroleum resource, including for proving the economic viability of a resource, is excluded from the program.

In ten years EIS has had 19 co-funded drilling rounds, with 1455 applications and 903 grants offered, 809 to explorers and 94 to prospectors. At the end of Round 17, 806 701 m had been drilled.

The EIS also funds the acquisition of pre-competitive geology, geophysics, and geochemical and isotopic data. The geophysics acquisition program, in partnership with Geoscience Australia, completed coverage of the State by airborne magnetic and radiometrics surveys at a line-spacing of 400 m or less in 2012 (Fig. 3), and has now completed the coverage by gravity surveys with stations, or flight lines spaced at 2.5 km (cover image). A program of airborne electromagnetic surveys (AEM) is now underway in conjunction with Geoscience Australia's Exploring for the Future program in northern Australia. Availability of medium-spaced, good-quality geophysical data greatly reduces risk and aids exploration targeting in underexplored areas of the State.

GSWA developed a partnership with the Centre for Exploration Targeting (CET), a joint venture between The University of Western Australia (UWA) and Curtin University, and a world leader in mineral systems studies, to undertake innovative prospectivity studies, which are available as a series of GSWA Reports on the west Arunta, west Musgrave, Gascoyne, and east and west Kimberley.

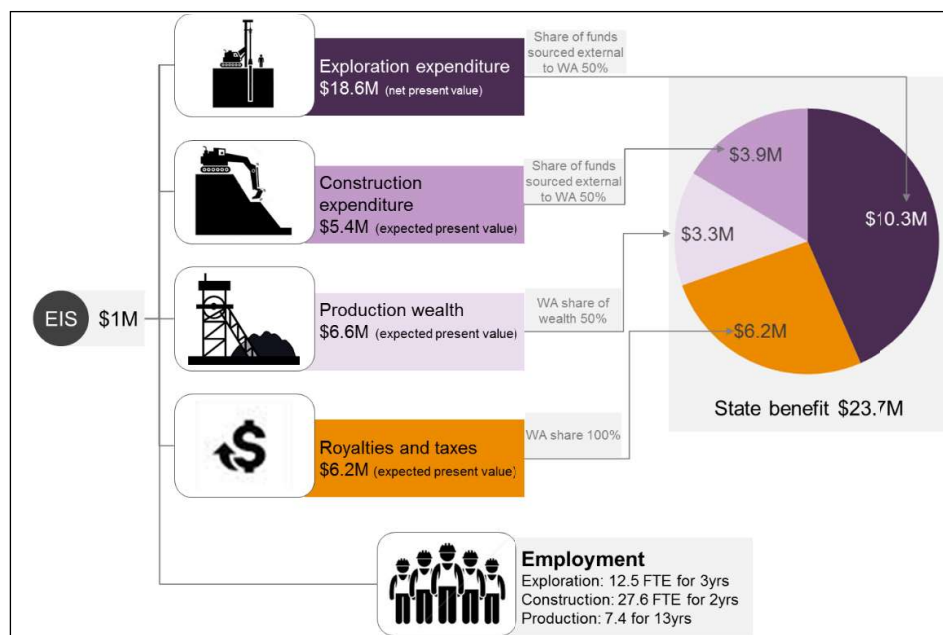


Figure 2. Summary of impacts of the EIS on WA Gross State Product and employment (from ACIL Allen Consulting, 2015)

State Government Exploration Incentive Scheme

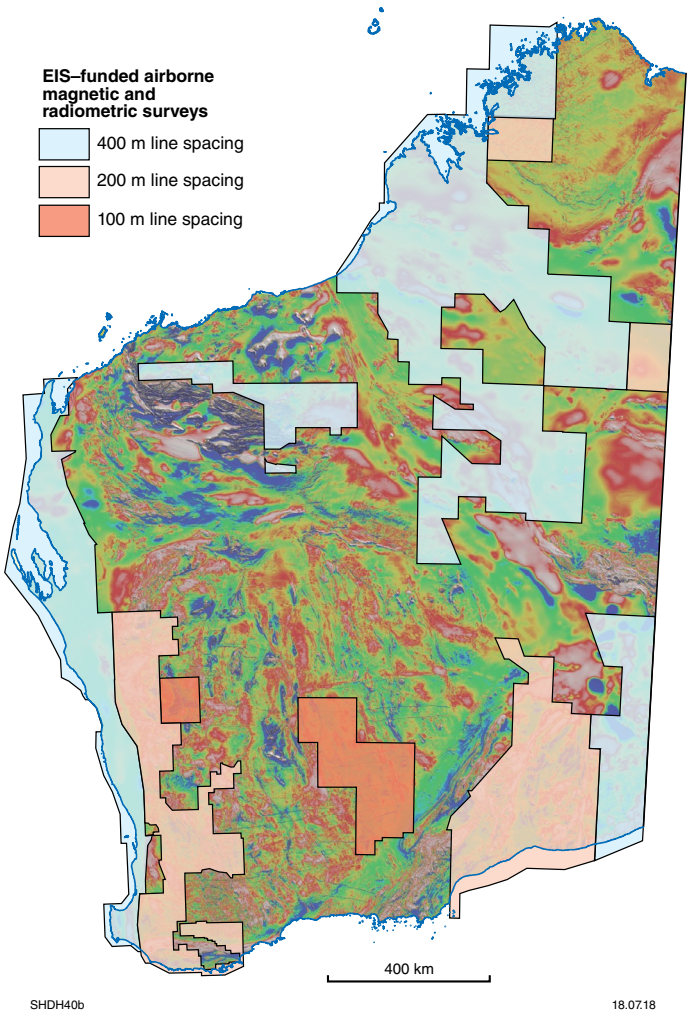


Figure 3. EIS-funded airborne magnetic and radiometric surveys at 400 m line spacing (blue), 200 m line spacing (light orange) and 100 m line spacing (dark orange)

The Capricorn Orogen Distal Footprints of Giant Ore Systems project was an example of the ‘Team WA’ approach to collaborative geoscience research in Western Australia, involving GSWA, CSIRO, Curtin University and UWA. This project has attracted \$16 million of funding from industry, the Science and Industry Endowment Fund (SIEF), the Minerals Research Institute of Western Australia (MRIWA), EIS and the universities, and involved developing innovative exploration targeting techniques.

Discovery success

The first new discovery attributable to the EIS was the Nova nickel deposit. GSWA geochemistry and EIS-funded geophysics was used to target an EIS-supported drilling program in 2011, with follow-up drilling discovering significant nickel and copper mineralization in 2012. The first concentrate was shipped from the Nova-Bollinger mine in late 2016 with the first export shipment in June 2017 and full production in mid-2017. Other successful exploration projects that have benefited from EIS funds include Gold Road Resources Gruyere gold, Rox Resources Mount Fisher East nickel, Sheffield Resources/Centrex potash, Alloy Resources/Doray gold, Encounter Resources Millennium zinc and Panoramic Resources Savannah North nickel-copper-cobalt.

The future for EIS

The future of the EIS was secured when the State Government announced in the May 2018 State budget that the EIS would continue at \$10 million per year, with ongoing funding raised from an increase in the Mining Tenement Rent (MTR). This new funding mechanism, which started in full from July 2019, represents the fourth phase of the scheme and is designated EIS 4 (Fig. 1).

Although the EIS has successfully delivered new geoscience data, and stimulated greenfields exploration over its first ten years, there is a continuing need to maintain Western Australia’s ranking among the top five of the most attractive minerals investment destination (Fig. 4). The continuation of EIS funding will allow GSWA to implement programs that will deliver integrated pre-competitive geoscience data through:

- innovative drilling promotion
- encouraging exploration through cover
- geophysical surveys
- 3D prospectivity mapping
- encouraging strategic research with industry.

EIS 4 will also implement a National Drilling Initiative (NDI) in Western Australia as part of the Mineral Exploration Cooperative Research Centre (MinEx CRC).

For more information, contact **Charlotte Hall**.

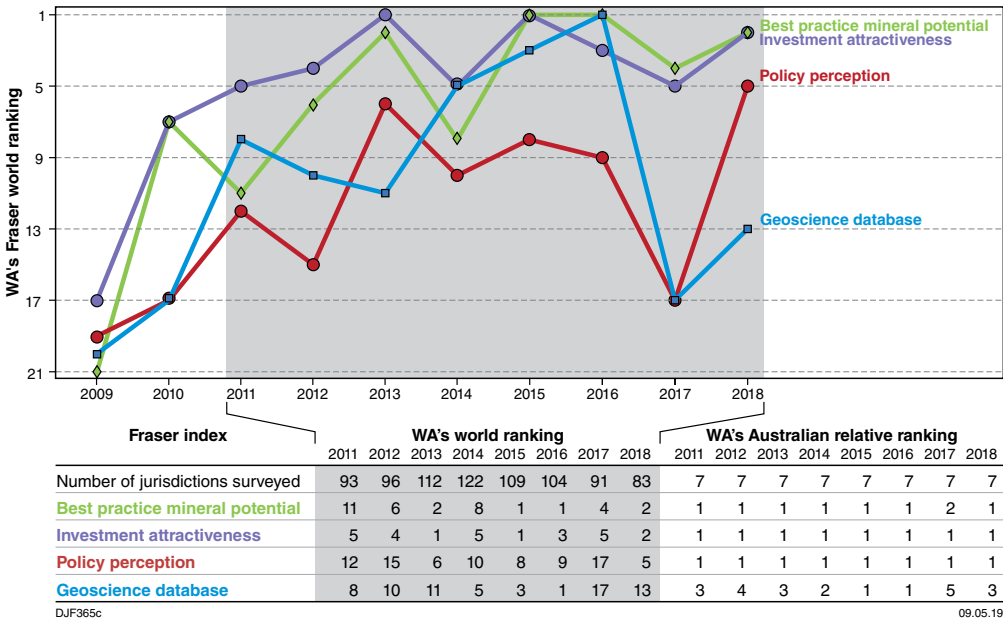


Figure 4. EIS impact – Fraser Institute 2018 Survey results

A tribute to Margaret Jadwiga Ellis

Margaret Ellis passed away on 12 July 2019 following a short illness brought on by complications from her treatment for pancreatic cancer. She had retired from the Department of Mines, Industry Regulation and Safety (DMIRS) in December 2017 after a distinguished, 21-year career with the Geological Survey of Western Australia (GSWA). She was Process Leader managing exploration information for 12 years, and then the first coordinator for the Exploration Incentive Scheme (EIS) when it commenced in 2009. She was 68.

Margaret was born and brought up in Tasmania, and it was to Hobart that she had returned to live in her retirement. She was the daughter of Polish refugees who came to Tasmania after the Second World War, where her father, an electrical engineer, worked for the Hydro-Electric Commission or 'The Hydro'. Her Polish heritage was celebrated in her traditional Christmas Eve dinners enjoyed with family and friends.

She had gained her Bachelor of Arts degree from the University of Tasmania in 1975, completing the final two units at the University of Wollongong. She subsequently qualified as a librarian which, with the geology and geography units in her degree, made her well suited to the emerging field of Information Management, particularly for exploration reporting. She was the Librarian in Charge at the Tasmanian Department of Mines (1980–94), and was involved in setting up their Tasxplor and Petxplor databases for the management of exploration data. She then moved to New South Wales to become the Chief Librarian for Western Mining Corporation, and then Principal with Minform Services.

She joined GSWA in February 1997 as the Process Leader for the Exploration and Information Management and Support Section that managed the WAPEX (now WAPIMS) and WAMEX databases. The experience she brought to Western Australia made her well placed to oversee the redevelopment of WAMEX, including the transition from holding WAMEX reports as hard copy on microfiche for viewing onsite in the library at Mineral House, to scanning reports digitally as PDFs for users to view online. During her time as Process Leader, her leadership skills led to greater ease for searching and accessing this information providing valuable material for new ground acquisition and targeting. She was closely involved in the establishment of guidelines for the online lodgement of mineral exploration reports by exploration companies, greatly streamlining the process.

In 2009, she became the Coordinator of the EIS, which began in April of that year under Rick Rogerson's leadership in GSWA. The EIS, a State government initiative at the 2008 Western Australian election, was funded from Royalties for Regions and initially provided \$80 million over four years. The EIS is now entrenched in GSWA's budget, and the undoubted success of the scheme is in no small part due to Margaret's innovative and insightful management of the \$5 million Co-funded Exploration Drilling component. She oversaw 15 rounds of Co-funded Drilling, which led to a number of discoveries, most notably the Nova-Bollinger nickel-copper mine. She had extensive knowledge and understanding of the exploration industry, and always knew the diplomatic answer to every question.

Margaret became an integral part of GSWA's Executive Team, acting as Executive Director on occasion, the first woman to



do so. She became a source of reliable advice to the DMIRS Corporate Executive, recognized by Director Generals Richard Sellers and Tim Griffin, and by Mines and Petroleum Ministers Norman Moore and Bill Marmion. That she thoroughly enjoyed what we all saw as a stressful and exhilarating journey, was expressed in her retirement letter to Rick Rogerson: 'Well, it's been a blast. The best fun I've had in a lifetime of working, but all things must come to an end and it is time for someone else to enjoy the crazy insanity which is the life of the Coordinator of the EIS'.

Margaret was a practical, innovative and independent person, arriving in Perth ahead of her husband with her two children, to set up home and take up a challenging management position. She had many friends both at GSWA and DMIRS, and in the wider exploration community. As EIS Coordinator, she was a presence at industry events in Western Australia, including RIU and AMEC conferences, and was a regular at Diggers and Dealers. She was also a fixture at GSWA's Friday night 'Wombat' and at many Social Club events.

Margaret was widowed in 2008, and she is survived by her mother, brothers and sisters, her two daughters, and by her grandson. She will be missed.

Coal in the Eucla, Canning and northern Perth Basins

The Geological Survey of Western Australia (GSWA) is in the process of releasing several Records covering the available data on the coal geology, exploration and evaluation history in the Eucla, Canning and Mesozoic coal in the northern Perth Basins. Drillhole locations and summary geological data are included as GIS files along with references to the original data sources. These products were funded through the State Government Exploration Incentive Scheme (EIS). The products will allow future explorers to access historical coal exploration and evaluation information from a single source.

Eucla Basin

Lignite was first discovered in 1848 in the Fitzgerald River area but there was no large-scale exploration until 1980 when CRA Exploration, Western Collieries and BHP delineated several prospects of varying sizes throughout the Eucla Basin. Due to low economic interest, only four tenement areas were maintained by mid-1985. Targeted exploration recommenced in the late 2000s and three deposits – Scaddan, Salmon Gums and Zanthus – have resource estimates reported according to the Joint Ore Reserves Committee (JORC) 2004 code.

Cenozoic lignite occurs as part of a sequence of marine to non-marine Eocene sedimentary paleochannel infill of the onshore western Eucla Basin. Paleochannels are widely distributed around the basin margins and have varying lengths from tens of metres to more than 30 km and depths up to 100 m.

Canning Basin

Coal seams were discovered in the Canning Basin in 1909 and were noted in petroleum wells from the mid-1950s onwards. There was considerable exploration for coal in the Fitzroy Trough from 1965 through to the early 1980s due to increase in demand for thermal coal but only a few small low-rank coal deposits were delineated. Since the early 2000s, there has been an upsurge in activity with extensive drilling campaigns in the Fitzroy Trough.

The most widespread coal seams occur in fluviodeltaic facies of the Upper Permian Lightjack Formation, the basal unit of the Liveringa Group, which has been the primary focus of exploration.



Figure 1. Location of the drillholes targeting coal in the Canning Basin

Mesozoic coals of the northern Perth Basin

Mesozoic coal was first intersected by West Australian Petroleum Pty Ltd (WAPET) in petroleum exploration wells Eneabba 1 (drilled in 1961) and Bookara 3 (drilled in 1967). Ongoing exploration since then has delineated the deposits (from north to south) of Bookara, Eneabba, Gairdner Range – Cowla Peak and Wongonderrah.

Coals in the Cattamarra Coal Measures, the principal coal-bearing unit within the Mesozoic of the northern Perth Basin, are interpreted as having been deposited in a telmatic wet forest swamp with minor marine influence.



Figure 2. Coal from Duchess-Paradise area (WAMEX report A68983, Rio Tinto, 2004)

Exploration and evaluation of coal resources

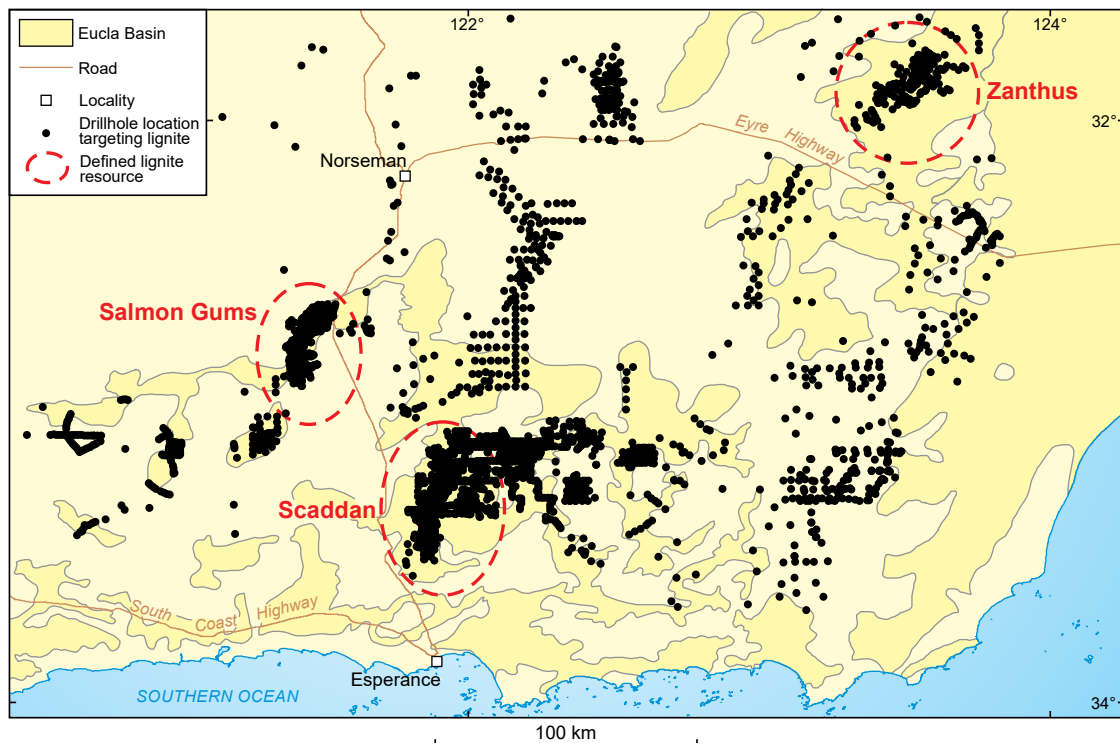


Figure 3. Location of the drillholes targeting lignite in the Eucla Basin

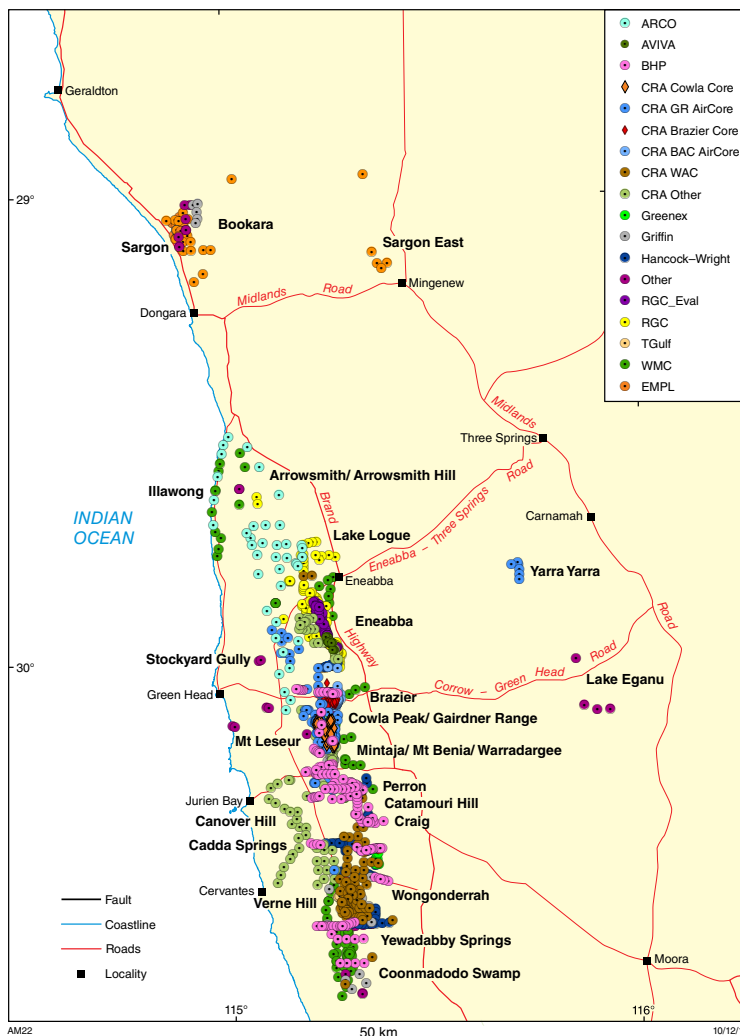


Figure 4. Location of drillholes that intersected Mesozoic coal in the northern Perth Basin

Download a free PDF of the following products from the DMIRS eBookshop:

GSWA Record 2019/5 Mesozoic coal resources of the northern Perth Basin: exploration and evaluation history by AS Millar

GSWA Record 2019/6 Cenozoic coal resources of southern Western Australia: exploration and evaluation history by SL Simons

GSWA Record 2019/10 Coal resources of the Canning Basin, Western Australia: exploration and evaluation history by SL Simons.



Locating mineralized porphyry systems in Archean rocks

In Phanerozoic porphyry Cu±Mo±Au systems, mineralized magmatic rocks have distinctive whole-rock and zircon geochemical signatures that can be attributed to high magmatic water and sulfur contents and high oxidation states, and can be used as ore fertility indicators.

Are these indicators applicable to Archean granites? The Geological Survey of Western Australia (GSWA) is addressing this question by studying the zircon trace element compositions of both barren and fertile Archean granitic rocks in the Yilgarn Craton of Western Australia (Fig. 1).

Fertile granitic rocks from the Calingiri Cu–Mo and Boddington Au–Cu–Mo deposits in the Yilgarn Craton show distinctly high zircon Eu anomaly values ($\text{Eu}/\text{Eu}^* > 0.4$), which are mainly due to amphibole-dominated fractionation in hydrous melts, similar to fertile granitic rocks of Phanerozoic age (Fig. 2). In contrast, infertile granitic rocks from across the Yilgarn Craton display lower zircon Eu/Eu^* values ($\text{Eu}/\text{Eu}^* < 0.4$), reflecting plagioclase-dominated fractionation (Fig. 2). These results suggest that zircon Eu anomalies and trace element ratios can be used to distinguish fertile from infertile granitic rocks in both Archean and Phanerozoic terranes, providing an effective geochemical exploration tool to assess the metallogenic fertility of granitic rocks over geological time.

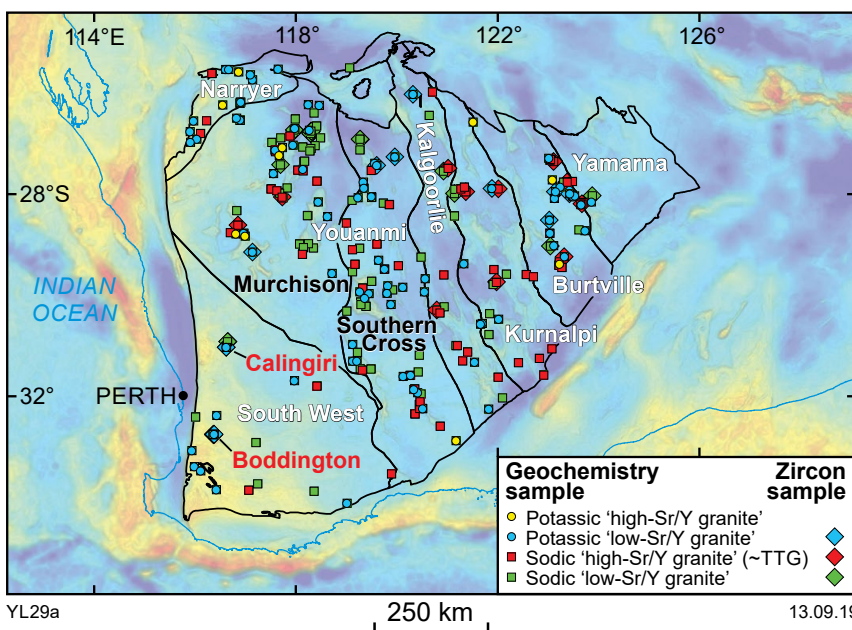


Figure 1. Whole-rock and zircon sample locations for granitic rocks, superimposed on a gravity image of the Yilgarn Craton, labelled by terrane

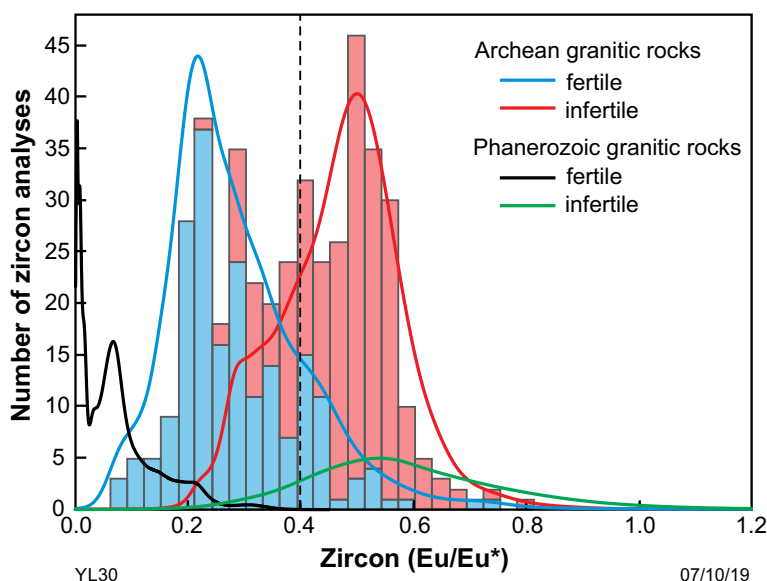


Figure 2. Probability density diagram of zircon Eu/Eu^* ratios for fertile and infertile Archean granitic rocks in the Yilgarn Craton compared with fertile and infertile granitic rocks of Phanerozoic age. The vertical dashed line ($\text{Eu}/\text{Eu}^* = 0.4$) is the fertility threshold

For use in exploration, at least 50 zircons per sample should be analysed. After filtering results that indicate contaminated and altered grains, if more than 10 out of 20 analyses indicate zircon $\text{Eu}/\text{Eu}^* > 0.4$, the sampled rock may be classified as a fertile granite.

GSWA Report 197 Zircon fingerprinting of magmatic hydrothermal systems in the Archean Yilgarn Craton by Y Lu, RH Smithies, MTD Wingate, NJ Evans, TC McCuaig, DC Champion and MD Outhwaite is now available as a free download from the DMIRS eBookshop.

For more information, contact [Yongjun Lu](#).

New data package illustrates complexity of the region

The Musgrave Province, in the heart of Proterozoic Australia, straddles the borders between Western Australia, South Australia and the Northern Territory. The western part of the province has been the focus of a GSWA regional mapping program since 2004. A new digital package for the west Musgrave Province is now available. The 2019 GIS release marks the final data release from the project work.

The GIS package includes several new detailed cross-sections illustrating the complexity of the fold and thrust system that developed during the largely amagmatic Petermann Orogeny. The updated 1:100 000, 1:250 000 and 1:500 000-scale digital interpreted bedrock geology layers are supported by over 400 reports on the lithostratigraphic units, tectonic units and events of the west Musgrave region from the GSWA Explanatory

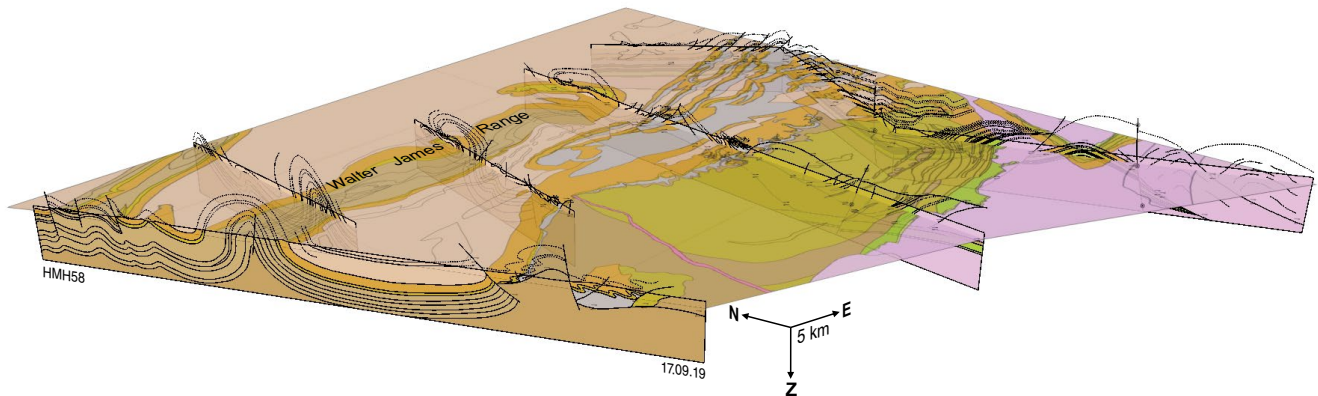


Figure 1. Cross-sections through the Petermann fold and thrust belt

The rocks of the west Musgrave region have a long and complex geological history. They were formed and deformed during several major events, including the 1345–1293 Ma Mount West Orogeny, 1220–1150 Ma Musgrave Orogeny and the 1085–1030 Ma Giles Event. The province was subjected to subsequent, widespread deformation during the 630–520 Ma Petermann Orogeny. This deformation is most intensive on the northern margin of the west Musgrave province and the southern Amadeus Basin near the Rawlinson Ranges.

Notes System (ENS) database. The thousands of field observations and photos from the WAROX database, and up-to-date imagery available provide the data behind the map layers. All GSWA publications for the region, including over 170 U–Pb geochronology reports that were produced as part of this study, are on this final west Musgrave GIS release.

For more information, please contact [Heather Howard](#).

Figure 2. Overturned Dean Quartzite in the Walter James Range



Mines and mineral deposits database gets an upgrade

The Department of Mines, Industry Regulation and Safety's (DMIRS) mines and mineral deposits database, MINEDEX, is a free spatial and textual database tracking over 5000 mining and exploration projects in Western Australia. MINEDEX unique site and project codes are also used to reference communication between industry and DMIRS.

A new MINEDEX user interface will be released in November 2019, offering a modernized user experience, comprehensive searching and improved compatibility with tablet and mobile devices. The new MINEDEX is the first DMIRS web application to conform to the digital service standards provided by the Office of Digital Government, designed to deliver a consistent 'one-government' user experience across Western Australian government websites, and to comply with accessibility and inclusivity standards.

MINEDEX provides data on:

- location, development status and geology of mineralized sites

- project structure, commodities, ownership and related tenements
- environmental registrations
- mineral resource estimates
- mineral production data
- mine operators
- Inventory of Abandoned Mine Sites (more than 192 500 sites).

Custom reports and bulk downloads of MINEDEX data are available. Spatial data from MINEDEX can also be downloaded from our [Data and Software Centre](#) in ESRI, Mapinfo, KMZ and CSV formats.

For more information, visit the [MINEDEX website](#) or contact mindex@dmirs.wa.gov.au.

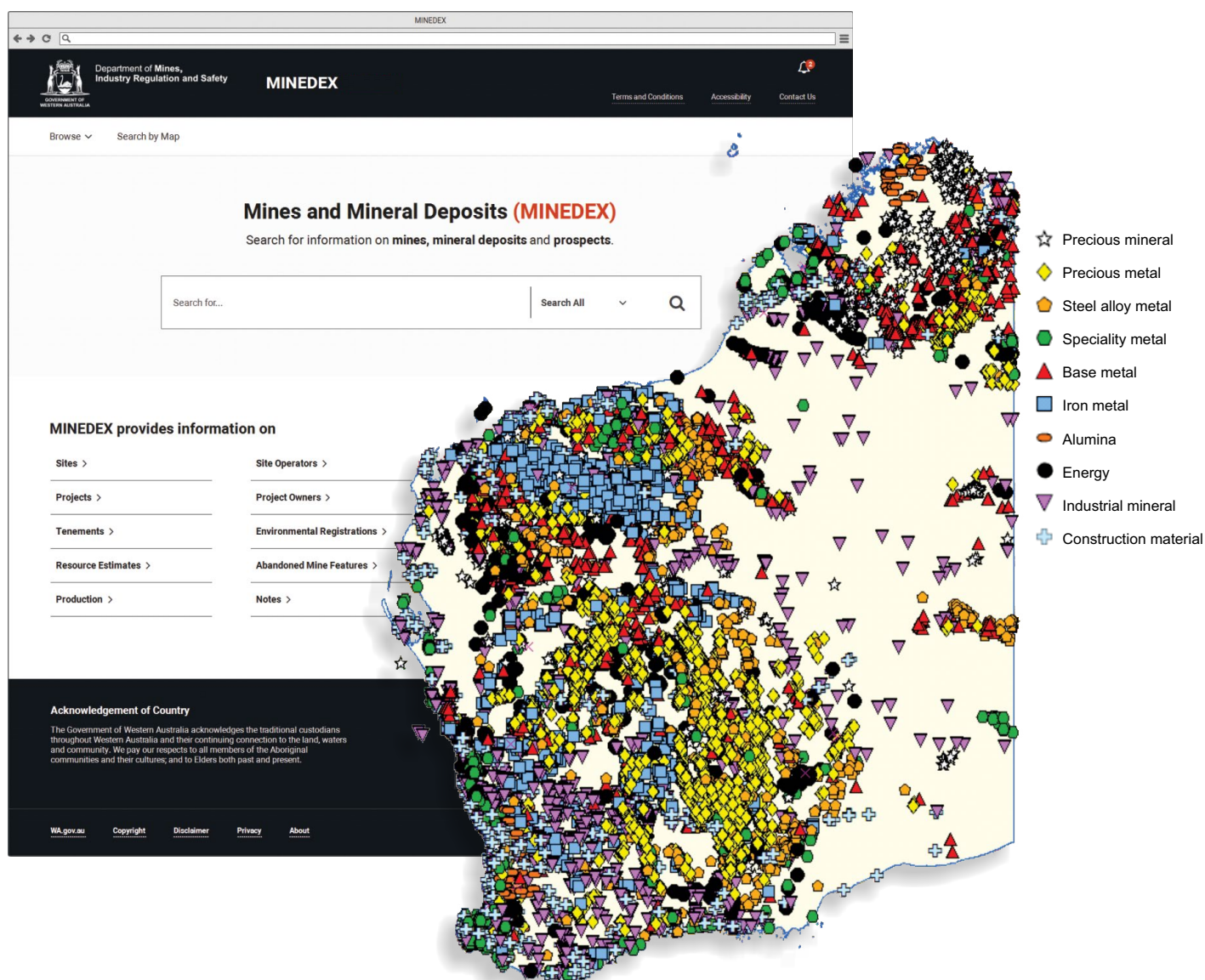
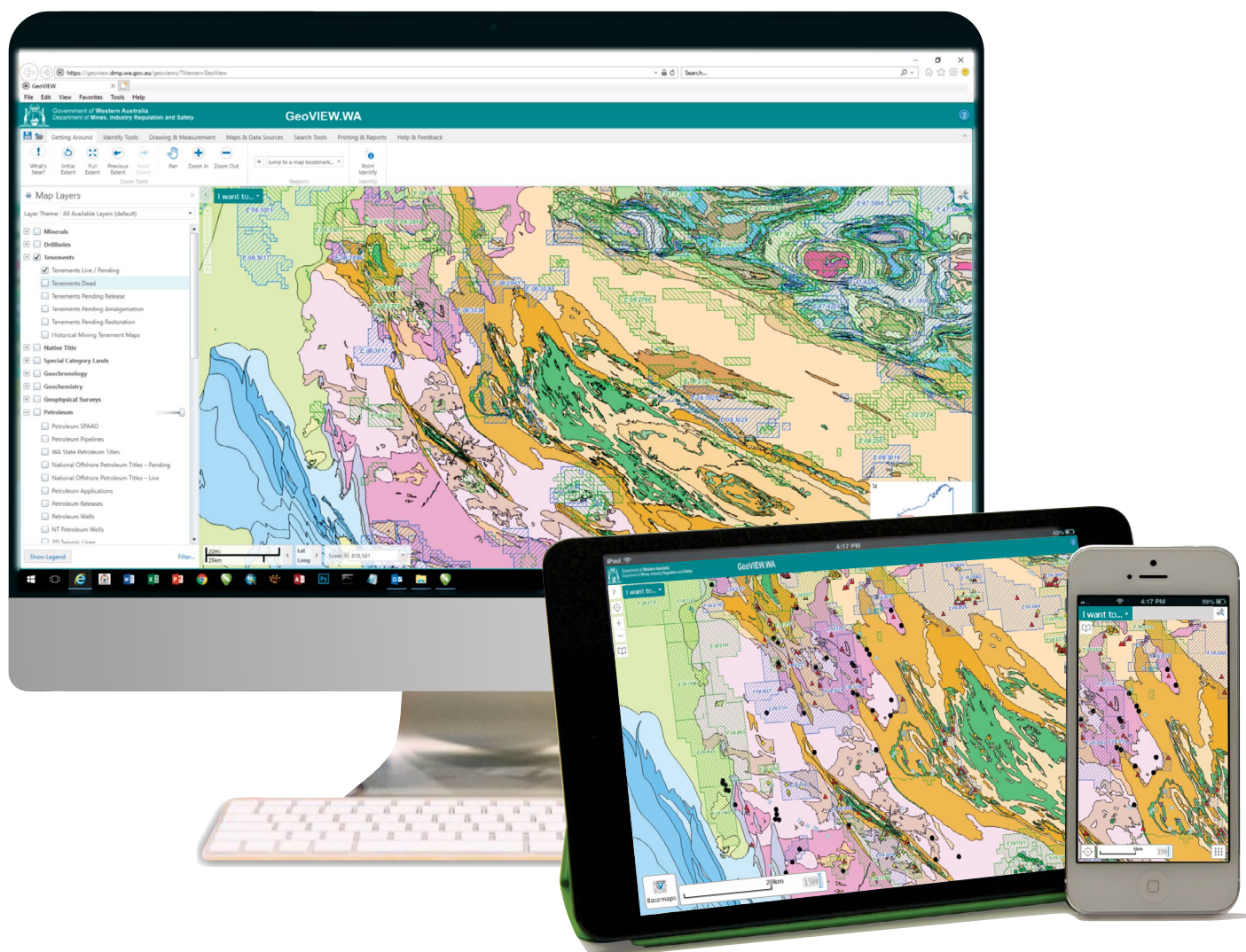


Figure 1. The new MINEDEX user interface and map of MINEDEX sites across Western Australia

GeoVIEW.WA gets a makeover



New version of GeoVIEW.WA released

GeoVIEW.WA is an online GIS-based mapping tool that allows users to view, query, and map various geology, resources and related datasets.

A new version of GeoVIEW.WA was released on 5 September 2019. The biggest improvement in this release is that access to GeoVIEW.WA is no longer dependent on the Microsoft Silverlight browser plugin.

GeoVIEW.WA will now run in all web browsers and on tablet and smart phone devices.

The new release has involved reworking the customized search tools for WAMEX, Drillholes and Geochemistry searches. The search tools provide spatial and text searching, and links allow users to view or download the data or reports.

New printing options have been added allowing the user more map customization features.

Access GeoVIEW.WA at <www.dmp.wa.gov.au/geoview>.

For more information, contact **Stephen Bandy**.

Harvey 1 Digital Core Atlas

GSWA Harvey 1 is a stratigraphic well drilled in early 2012 in the southern Perth Basin, located on a structural feature known as Harvey Ridge (Fig. 1). The well was completed as part of the South West Hub Carbon Capture and Storage (CCS) Project, a project jointly funded by the Australian Commonwealth Government CCS Flagship Program through the Department of Industry, Innovation and Science.

A coring program recovered six 100 mm (4") diameter cores over four intervals for a total of 217 m of recovered core (Fig. 2). The lithology of the core intervals was logged in detail and 90 horizontal and vertical plugs were obtained for various analyses.

A core atlas has been compiled to provide a detailed view and location of the results of the analyses on the core. This core atlas is presented in an electronic flipbook design with interactive links to provide the viewer with the ability to view the results of multiple datasets in one convenient and user-friendly location. Each tray of core was photographed by the HyLogger. The core images (as shown by the examples below) are accompanied by links to the various analyses that were conducted on each core tray.

GSWA Harvey 1 digital core atlas is available to download from [WAPIMS](#).

For more information, contact [Deidre Brooks](#).

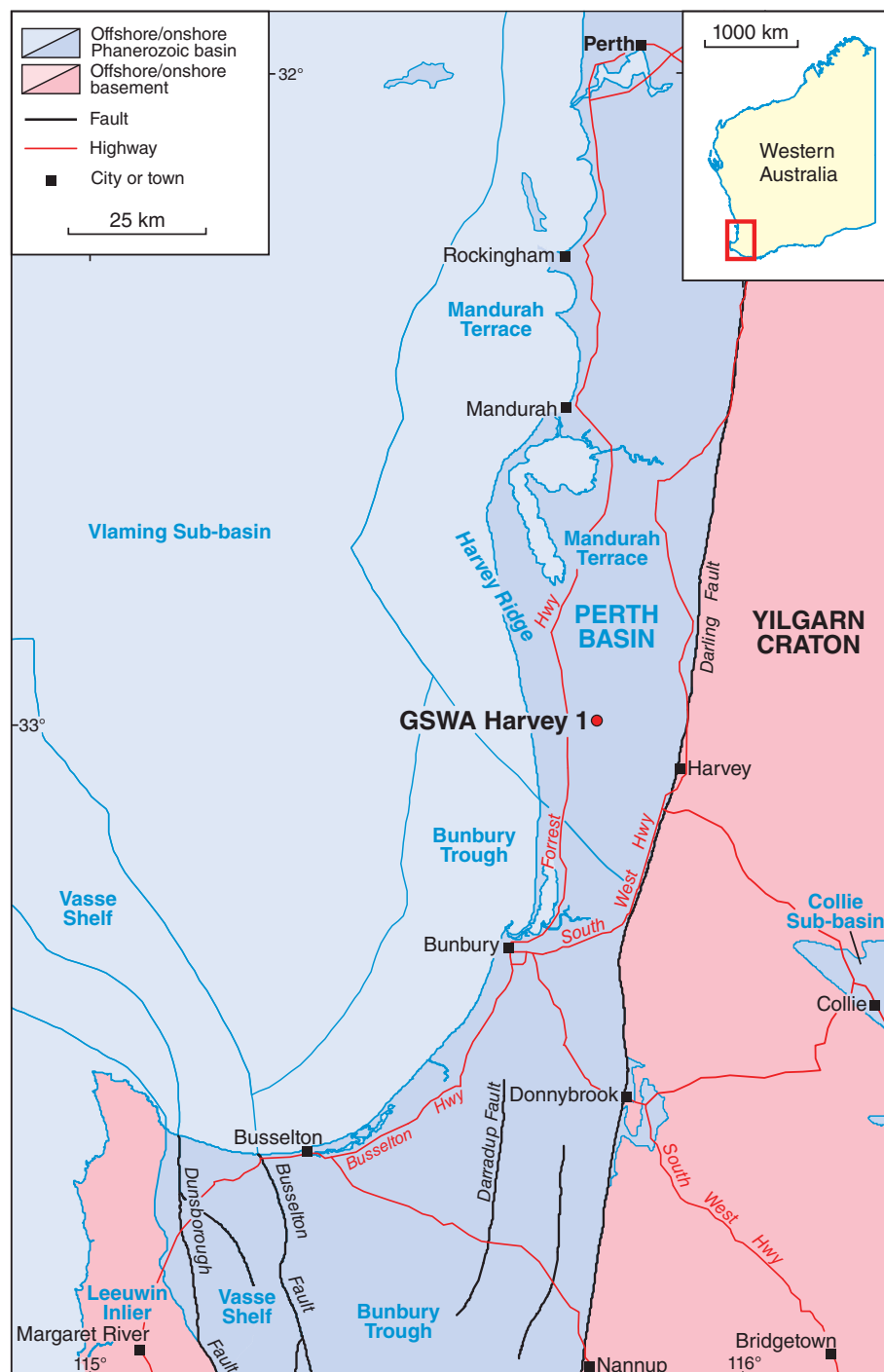
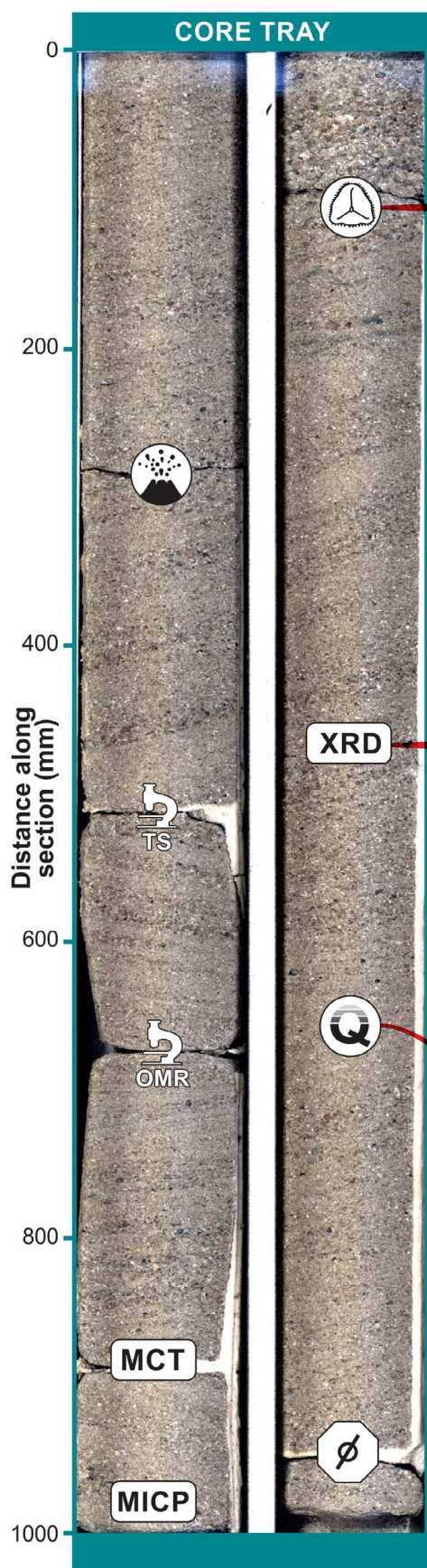


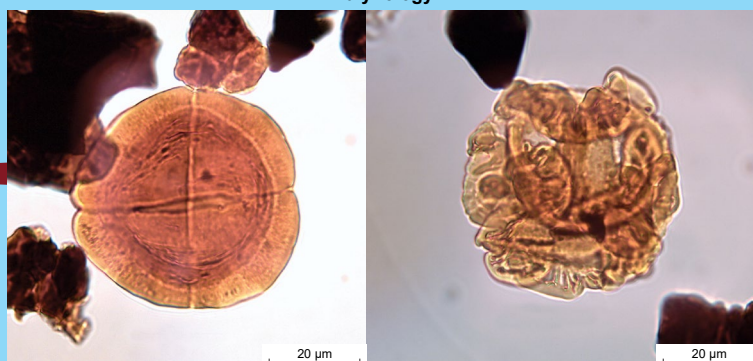
Figure 1. Location of GSWA Harvey 1

Digital core atlas project



BIOSTRATIGRAPHY

Palynology



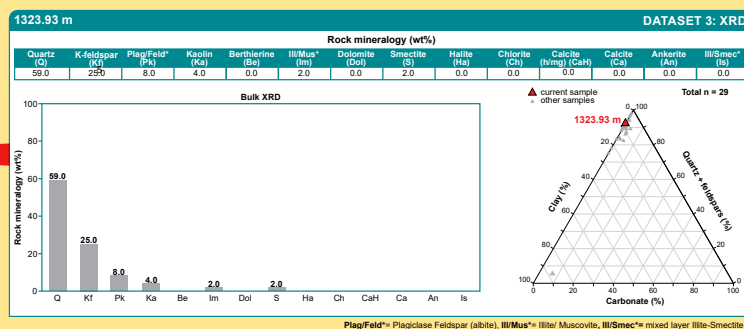
Staurosaccites quadrididus

Camerosporites cf. C. pseudoverrucatus

Palynology analyses determined age and environmental deposition. The general age of the sample's core section is Middle to Late Triassic and the environment of deposition is non-marine to nearshore marine.

INORGANIC GEOCHEMISTRY

X-ray diffraction (XRD)



A total of 58 samples was analysed. The above chart shows the rock mineralogy and a ternary diagram following the Folk (1974) classification of siliciclastic lithologies.

Quantitative evaluation of mineral abundance by scanning electron microscope (QEMSCAN)

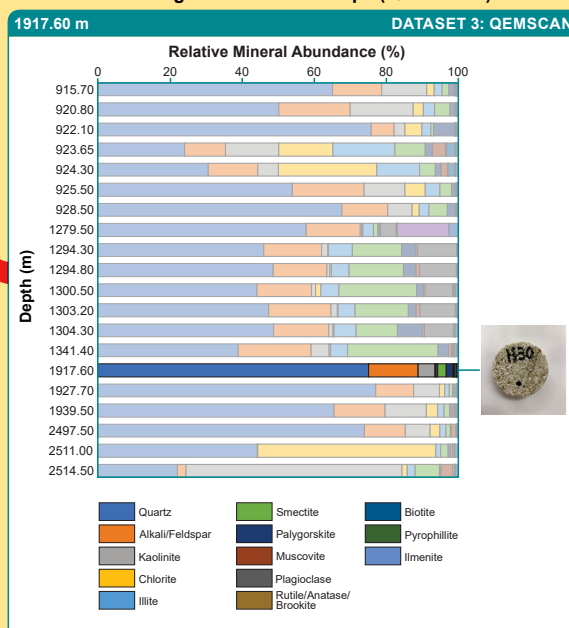


Figure 2. Scanned core image and linked analysis results in GSWA Harvey 1 Digital Core Atlas

Southwest Hub data release

Carbon capture and storage is a critical technology to deliver step change reduction of carbon dioxide for industrial economies that are implementing climate change mitigation objectives.

The South West Hub Project led by the Department of Mines, Industry Regulation and Safety (DMIRS) in Western Australia has been investigating and characterizing the Lesueur sandstone as a potential target injection and storage formation since 2007. The project has judiciously acquired data on a stage-gated decision basis. Starting with a 2D seismic over 110 line-km in 2011 and a deep well in 2012 before undertaking a complex 3D seismic over 115 km² in 2014, and then drilling three wells in 2015 that gave good areal coverage, significant core and logging data.

The South West Hub is unique as it relies on proving primary containment through 'Migration Assisted Trapping' in the Wonerup Member of the Lesueur Formation, a 1500 m-thick relatively homogenous sandstone.

The data, information and modelling produced as part of the South West Hub Project is publicly available through the **WAPIMS system**.

Some raw data, such as the seismic survey and 3D modelling, is too large to download and is therefore not available through the normal WAPIMS system. However, this material can be requested through the link on the appropriate tab.

DMIRS expresses its thanks and appreciation to the Commonwealth Department of Industry, Innovation and Science for the funding of the South West Hub Project through the CCS Flagships Program.

For more information, contact **Deidre Brooks**.

Welcome to WAPIMS

Petroleum & Geothermal Information Management System

Search the Petroleum Exploration Database

WELLS	SURVEYS	TITLES	FIELDS	CORE LIBRARY	FACILITIES	GIS MAP
<div><div><div>Well name <input type="text"/></div><div>Title <input type="text"/></div><div>Report Types <div>Select...</div></div></div><div><div>Well operator <input type="text"/></div><div>Is offshore? <div></div></div></div><div><div>Field <input type="text"/></div><div>Spud date from <input type="text"/></div></div><div><div>Basin <input type="text"/></div><div>Spud date to <input type="text"/></div></div></div> <div><div>SEARCH</div><div>CLEAR ALL</div></div>						

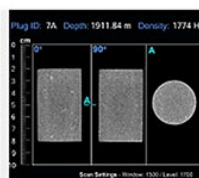
About WAPIMS

Western Australian Petroleum and Geothermal Information Management System (WAPIMS) is a petroleum exploration database containing data on titles, wells, geophysical surveys and other related exploration and production data. The system also contains the Core Library (Perth and Kalgoorlie) database.



Released Documents

Documents released on WAPIMS, searchable by date



Core Analysis

Open file well sample analysis data extracted from reports submitted to DMIRS under Petroleum Acts.



Digital Core Atlas

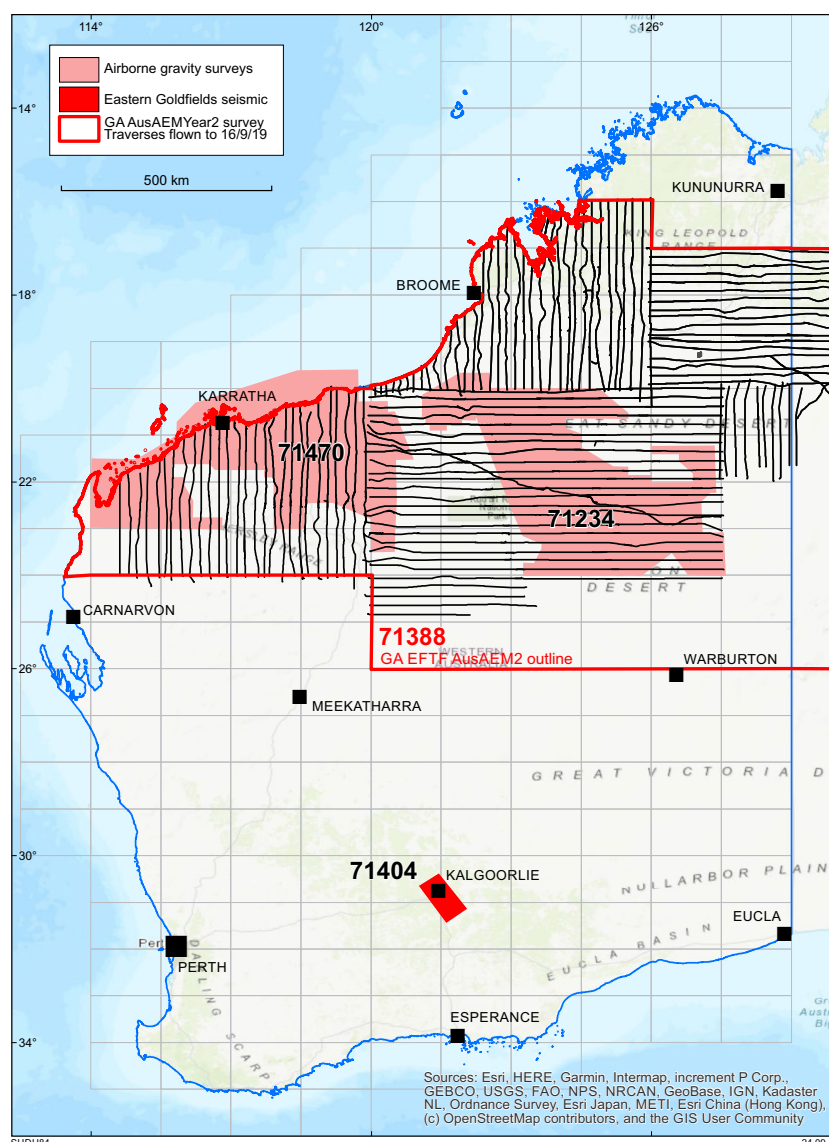
An interactive display of multiple-datasets overlaid and linked to images of individual core trays



SW Hub Carbon Storage

Data, information and modelling produced as part of the SW Hub Project

GSWA 2019–20 geophysics program update – 16 September 2019



Survey outline shapefiles available [online](#).

MAGIX Regn. No.	Survey name	Description and status
71234	Kidson 2017 Airborne Gravity	Airborne gravity data derived from Falcon gradiometer survey. Line spacing 2.5 km. Data pending final release, estimated in late 2019. Preliminary Bouguer anomaly grid and image available in GeoVIEW.WA.
71470	Pilbara 2019 Airborne Gravity	Airborne gravity survey with AIRGrav system. Line spacing 2.5 km. Acquisition complete; data processing in progress. Estimated final release by December 2019. Preliminary Bouguer anomaly grid and image from field data available in GeoVIEW.WA.
71404	Eastern Goldfields 2019 seismic traverses	305 km of Vibroseis reflection seismic along seven traverses within area shown. Vibration points 20 m; receiver interval 10 m; 5 s listen time. Data release on 26 September 2019.
71388	GA AusAEM2 2019 survey	Geoscience Australia 20 km line spacing AEM survey Year 2 in NT and WA. TEMPEST AEM system acquisition in progress; estimated completion in November 2019. See https://www.ga.gov.au/eftf/minerals/nawa/ausaem .

Data downloads from [GeoVIEW.WA](#) – search by registration number in relevant airborne and ground surveys layers in 'Geophysical Surveys' collection.

[Subscribe to the GSWA eNewsletter](#) for data release alerts.

HyLogging workshop for geologists



Thursday 28 November 2019
9 am to 4 pm



Presenters: Ian Lau (CSIRO), Lena Hancock (GSWA), Michael Wawryk (GSWA).

Requirements: Bring your own laptop for hands-on case studies using The Spectral Geologist (TSG) software package. Link for installation of TSG8 Viewer will be sent prior the workshop.

Registration is free, but places are limited to 10. Reservation is therefore essential to secure your place, but please book only if you are sure that you will attend. Free parking is available.

Contact: Lena Hancock (08) 9470 0307 <lena.hancock@dmirs.wa.gov.au>

Program

9:00 – 10:30 Introduction to the NVCL, HyLogger and data access.
Basic mineral spectroscopy theory.

10:30 – 10:45 Morning tea (provided)

10:45 – 12:30 HyLogger data interpretation using TSG8 software.
Hands-on case study data: **Golden Mile Stratigraphic drillhole SE18.**

12:30 – 13:00 Lunch (provided)

13:00 – 14:30 HyLogger data interpretation using TSG8 software.
Hands-on case study data: **Greenbushes Li pegmatite drillhole C3DD024.**

14:30 – 14:45 Afternoon tea (provided)

14:45 – 16:00 HyLogger data interpretation using TSG8 software.
Hands-on case study data: **Kambalda Ni Discovery drillhole KD1.**



Product releases

• REPORTS •

Report 192 Mafic–ultramafic intrusions of the Youanmi Terrane, Yilgarn Craton

by Ivanic, TJ

Report 193 A seismic interpretation of the Broome Platform, Willara Sub-basin and Munro Arch of the Canning Basin, Western Australia

With appendices in an accompanying zip file

by Zhan, Y

Report 197 Zircon fingerprinting of magmatic–hydrothermal systems in the Archean Yilgarn Craton

With supplementary tables in an accompanying zip file

by Lu, Y, Smithies, RH, Wingate, MTD, Evans, NJ and McCuaig, TC

• RECORDS •

Record 2019/1 Geological Survey work program 2019–20 and beyond

• DATA PACKAGES •

Compilation of geochronology information, 2019

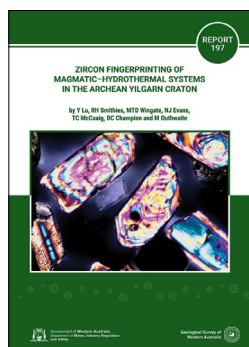
Murchison, 2019

West Musgrave, 2019

• WEBSITE •

Mineral Systems Atlas

by Sidy Morin-Ka



• OTHER PUBLICATIONS •

GSWA Calendar 2020



FREE database training – last sessions for 2019

Learn how to access geoscience data online and understand the department's systems at these FREE training sessions.

Topics include:

- navigating the department's website
- searching for geoscience publications using the eBookshop
- finding digital datasets using the Data and Software Centre
- searching for open-file mineral exploration reports using WAMEX
- searching the mineral drillholes and geochemistry databases
- using the interactive map viewers, GeoVIEW.WA and TENGGRAPH Web

- GeoMap.WA, a standalone GIS viewer for Windows

A desktop computer will be available for each participant.

PERTH

The Perth training has been divided into separate sessions: one for **advanced** (morning), and one for **beginners** (afternoon).

- **Thursday 21 November**

KALGOORLIE

The Kalgoorlie training is open to **anyone** (full day).

- **Thursday 28 November (on the same day as GSWA Kalgoorlie Open Day)**

Register

When you **register** online, include your details (name, company name, telephone number), with the name, location and date of the training you wish to attend. For the Perth sessions, please indicate whether you wish to attend the advanced (morning) or beginners (afternoon) training. See the training page on our website.

GSWA in the Goldfields

Joe Lord Core Library, Cnr Broadwood & Hunter St, West Kalgoorlie

Thursday 28 November 2019

PRESENTATION

2.00 – 4.00 pm

- **Welcome and introduction to GSWA in the Goldfields 2019**
Ian Tyler
Director Geoscience, GSWA
- **Core viewing**

The following core will be on display:

- Intersections relevant to the interpretation of the recently acquired Eastern Goldfields High Resolution Seismic Survey, which complements the evening talk by Ivan Zibra

To register for this FREE event, go to eventbrite.com.au/e/73229047051



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

Geological Survey of
Western Australia

www.dmirs.wa.gov.au