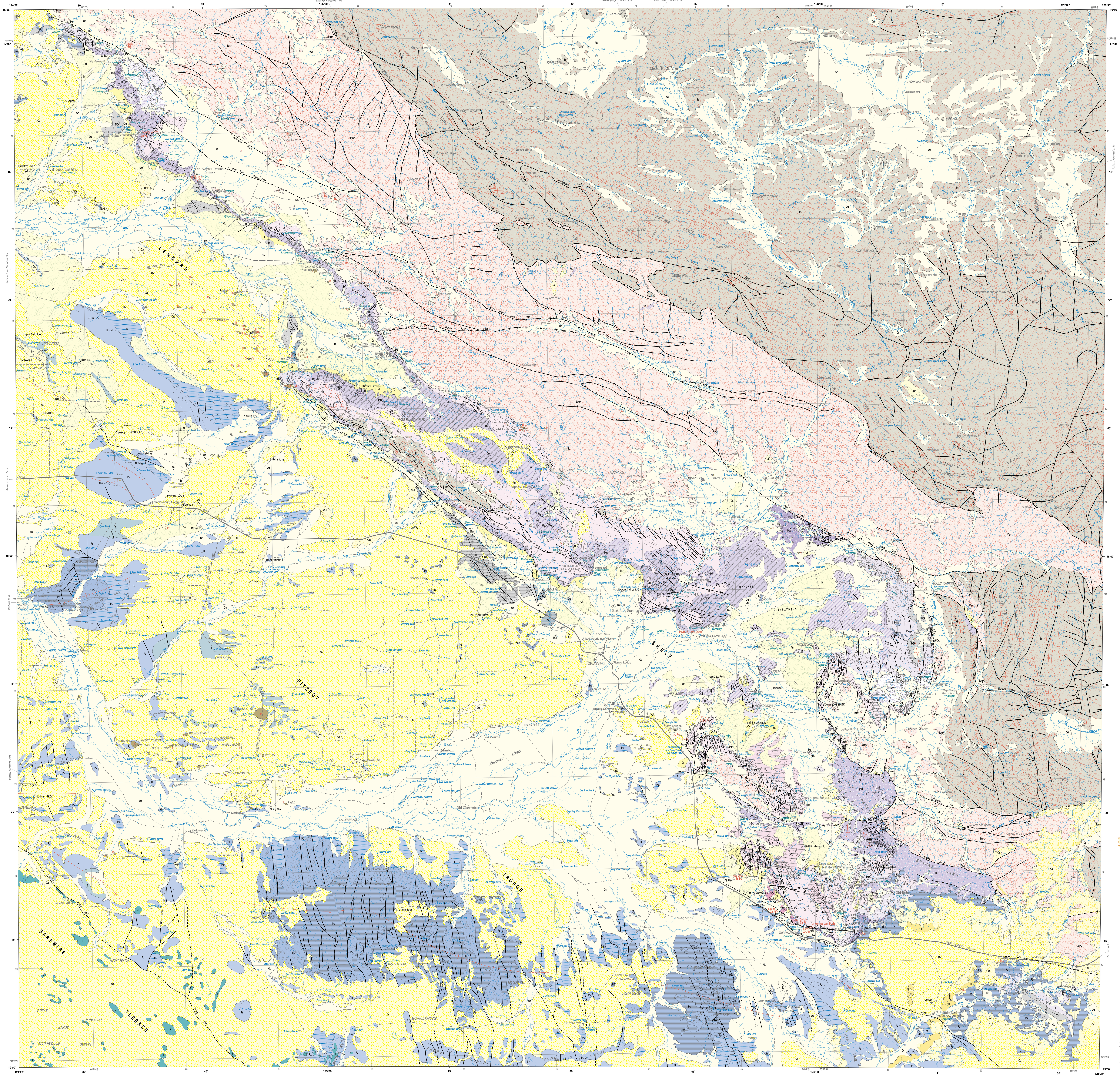


QUATERNARY (CAINOZOIC)

- Qa Alluvial deposits—reddish sand, gravel, and clay in channels and floodplains
- Qb Black-soil deposits—black clayey gilgai soil
- Qk Calcrete and tufa
- Qs Sandplain deposits—unconsolidated eolian and residual sands; minor silt and clay; includes low vegetated dunes
- Cz Alluvial and colluvial deposits
- Czd Duricrust—siliceous and ferruginous rocks

TERTIARY — MIOCENE

- Tf FITZROY VOLCANICS: lamproite diatremes and associated pyroclastic rocks; largely or entirely covered by Quaternary soils
- Tl LAWFORD FORMATION: crudely bedded lacustrine siltstone, sandstone, and chalcedonic limestone

MESOZOIC

- J (JURASSIC) Marine and continental sandstone, siltstone, and shale; undivided
- Tr (TRIASSIC) Marine shale, and marine and continental sandstone; undivided

PALAEOZOIC

PERMIAN

- PL LIVERINGA GROUP: well-bedded shallow-marine to fluvial sandstone and siltstone; ferruginous in part
- Pn NOONKANBAH FORMATION: well-bedded deltaic to shallow-marine sandstone, siltstone, and shale; minor dolomite
- Pp POOLE SANDSTONE: well-bedded fine-grained marine sandstone
- PG GRANT GROUP: crudely bedded marine sandstone and siltstone; in part glacigene

CARBONIFEROUS — TOURNAISIAN

- DCF FAIRFIELD GROUP: shale, sandstone, and fossiliferous limestone
  - CFl LAUREL FORMATION: marine limestone, shale, siltstone, and sandstone
  - DFy YELLOW DRUM SANDSTONE: fluvial to paralic sandstone and dolomite; minor shale and siltstone
  - DFg GUMHOLE FORMATION: shallow-marine limestone, siltstone, and shale; minor dolomite

DEVONIAN

Devonian reef complexes

FAMENNIAN

- Di PIKER HILLS FORMATION: *marginal-slope* and *basin facies*: yellow and grey limestone, siltstone, and sandstone; locally conglomeratic
- Du BUGLE GAP LIMESTONE: *fore-reef subfacies*: crudely bedded, pale grey limestone with some allochthonous blocks of reef limestone
- Dw WINDJANA LIMESTONE: *reef-margin subfacies*: massive, microbial reef limestone; locally dolomitized; commonly with many neptunian dykes
- Dl NULLARA LIMESTONE: *back-reef subfacies*: well-bedded fenestral, oolitic, and pelloidal limestone; locally dolomitized, sandy, and conglomeratic
  - Dls Conglomerate, sandstone, and siltstone; Red Bluffs (Larrawa) area

FRASNIAN and FAMENNIAN

- Dn NAPIER FORMATION: *marginal-slope facies*
  - Dna Famennian well-bedded to massive reefal-slope and fore-reef limestone; locally dolomitized and steeply dipping; locally microbial and sponge rich; some allochthonous blocks and debris flows; some sandstone
  - Dns Frasnian and Famennian deep-water bioherms: stromatolite and *Receptaculites*/ sponge limestone; locally dolomitized
  - Dnr Frasnian well-bedded to massive reefal-slope and fore-reef limestone; locally dolomitized and steeply dipping; locally microbial and sponge rich; some allochthonous blocks and debris flows; some sandstone and conglomerate
- Dr VIRGIN HILLS FORMATION: *marginal-slope* and *basin facies*: thin-bedded red and grey limestone, siltstone, and sandstone; some allochthonous blocks of reef limestone

GIVETIAN and FRASNIAN

- Dd SADLER LIMESTONE: *marginal-slope* and *basin facies*: grey limestone, thick- to thin-bedded; with scattered allochthonous blocks of reef limestone, some debris-flow deposits, and common silicified fossils
- Dg GOGO FORMATION: *basin facies* and lower *fore-reef subfacies*: grey, weathering yellow, siltstone, shale, and silty limestone
- Dp PILLARA LIMESTONE: *platform facies*, undivided, generally *back-reef subfacies*, rimmed by narrow *reef-margin* and *reef-flat subfacies*: white to light grey, yellow, and red, massive to medium-bedded, stromatoporoid and microbial reef limestone, locally dolomitized, with subordinate coralline limestone; locally sandy and grading to sandstone, with some conglomeratic horizons

GIVETIAN

- Da CADJEBUT FORMATION: *evaporitic facies*: siltstone, shale, sandstone, dolomite, and evaporites, leached in outcrop; coastal shoal and hypersaline lagoon deposits

Devonian conglomerates

FRASNIAN and FAMENNIAN

- Dca BARRAMUNDI CONGLOMERATE: siliciclastic conglomerate and sandstone; alluvial-cone, fan-delta, and submarine-fan deposits
- Dcv VAN EMMERICK CONGLOMERATE: siliciclastic conglomerate and sandstone; alluvial-cone, fan-delta, and submarine-fan deposits; extends into Givetian in subsurface
  - Dcvu Upper Van Emmerick Conglomerate (probably Famennian)
- Dcb BEHN CONGLOMERATE: siliciclastic conglomerate and sandstone; alluvial-cone, fan-delta, and submarine-fan deposits
- Dco BOBS BORE CONGLOMERATE: siliciclastic conglomerate and sandstone; submarine-fan deposits
- Dce ELMA CONGLOMERATE: Frasnian and Famennian siliciclastic conglomerate and sandstone; alluvial-cone and submarine-fan deposits

FRASNIAN

- Dcp SPARKE CONGLOMERATE: siliciclastic conglomerate and sandstone, with minor limestone and dolomite; alluvial-cone, fan-delta, and submarine-fan deposits
  - Dcpg Goleru Member: cyclic sequences, coarsening upwards, commonly grading from marine siltstone or sandstone at the base to subaerial boulder conglomerate at the top
- Ds BIG SPRING FORMATION: sandstone, well bedded to massive; locally calcareous, with massive siliciclastic conglomerate at the base; fan-delta and alluvial-cone deposits
- Dcs STONY CREEK CONGLOMERATE: siliciclastic conglomerate and sandstone; fan-delta and submarine-fan deposits
- Dcm MUELLER CONGLOMERATE: siliciclastic conglomerate overlying Proterozoic rocks; alluvial-cone deposits; precise age not known
- Dc Conglomerate and sandstone, unassigned

ORDOVICIAN

PRICES CREEK GROUP

- OPg GAP CREEK FORMATION: shallow-marine dolomitic sandstone and siltstone
- OPe EMANUEL FORMATION: shallow-marine siltstone, shale, and limestone, with lesser sandstone

PROTEROZOIC

- 1835–610 Ma — Ps Sedimentary rock and dolerite
- 1870–1840 Ma — Pgmv Granite, metamorphic and volcanic rocks

Symbols

Geological boundary
- exposed
- concealed, or gradational facies boundary

Fault
- observed, normal, showing dip direction
- concealed
- thrust, triangle on upthrown side
- showing relative lateral displacement

Fold, showing axial trace and direction of plunge
- anticline; exposed, concealed
- syncline; exposed, concealed
- overturned anticline
- overturned syncline

Bedding
- inclined, showing strike and dip
- horizontal
- overturned
- trend from aerial photography

- Highway with national route marker
- Formed road
- Track
- Aboriginal community — Muludja Community
- Homestead — Fossil Downs
- Aboriginal name — Wolangnguru
- Building
- Yard — Duckhole Yard
- Microwave repeater station
- National Park or Conservation Park boundary

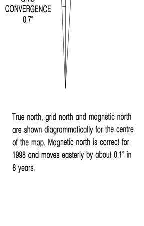
- Watercourse, with pool — Minnie Pool
- Spring — Henwood Spring
- Soak — Stumpys Soak
- Swamp — Blue Bush Swamp
- Waterhole — Junction Waterhole
- Bore — Homestead Bore
- Well — Longs Well
- Windpump
- Dam — Range Dam
- Tank — Spinifex Tank
- Abandoned — (abd)
- Position doubtful — (PD)

Petroleum exploration well
- dry, abandoned — Napier 1
- Stratigraphic well — Brooking Springs 1
- Completed as water bore — Oscar Hill 1

Petroleum production well
- oil — Blina 1
- oil, suspended or shut in — Janpam North 1
- oil, abandoned — Boronia 1
- gas, abandoned — St George Range 1

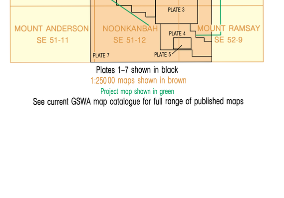
- Mine — Goongewa
- Mine, abandoned — Cadjebut
- Opencut, abandoned — Narlarla
- Prospect — Kutarta
- Quarry

Mineral occurrence
- Building stone — Bs
- Diamond — Di
- Garnet — Grt
- Lead — Pb
- Road material — Rm
- Zinc — Zn



True north, grid north and magnetic north are shown diagrammatically for the centre of the map. Magnetic north is correct for 1998 and moves easterly by about 0.1° in 8 years.

SHEET INDEX



Plates 1–7 shown in black
1:250 000 maps shown in brown
Project map shown in green
See current GSWA map catalogue for full range of published maps

DEPARTMENT OF MINERALS AND ENERGY
L. C. RANFORD, DIRECTOR GENERAL

GOVERNMENT OF WESTERN AUSTRALIA
HON. NORMAN MOORE, M.L.C.
MINISTER FOR MINES

GEOLOGICAL SURVEY OF WESTERN AUSTRALIA
DAVID BLIGHT, DIRECTOR

SCALE 1:250 000

5000 Metres 0 5 10 15 20 25 30 Kilometres

TRANSVERSE MERCATOR PROJECTION
HORIZONTAL DATUM: AUSTRALIAN GEODETIC DATUM 1984
VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
Grid lines indicate 20 000 metre interval of the Australia Map Grid Zone 51 and 52

Compiled by P. E. Playford and R. M. Hocking

Devonian geology by P. E. Playford 1962–1995, R. M. Hocking 1993–1995, E. A. Cockbain 1968–1971, A. D. George 1993–1995, N. F. Hurley 1983–1984, D. C. Lowry 1962–1963, V. A. Pedone 1985–1986, M. W. Wallace 1985–1986, and B. A. Ward 1985–1986

Phanerozoic (other than Devonian) geology derived from GSWA and BMR 1:250 000 sheets (see sheet index)

Precambrian geology modified from Griffin and Tyler, 1995, with other data derived from GSWA and BMR 1:250 000 sheets (see sheet index)

Edited by N. Tetlow and G. Loan

Cartography by S. Coldicutt and K. Greenberg

Topography from the Department of Land Administration with modifications from geological field surveys

Published by the Geological Survey of Western Australia. Copies available from the Information Centre, Department of Minerals and Energy, 100 Plain Street, East Perth, WA, 6004. Phone (08) 9222 3459, Fax (08) 9222 3444

This map is also available in digital form

Printed by the Land Information Centre, Bathurst, New South Wales

LENNARD SHELF

DEVONIAN REEF COMPLEXES OF THE CANNING BASIN

BULLETIN 145 PLATE 7

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