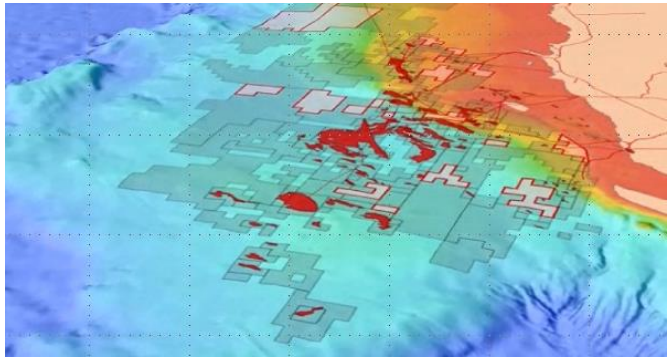
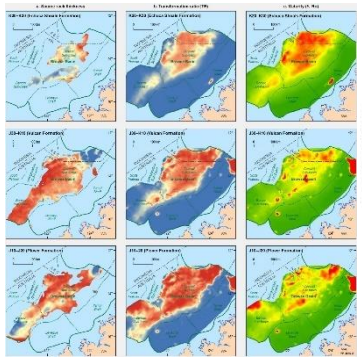
Australian Government
Geoscience Australia

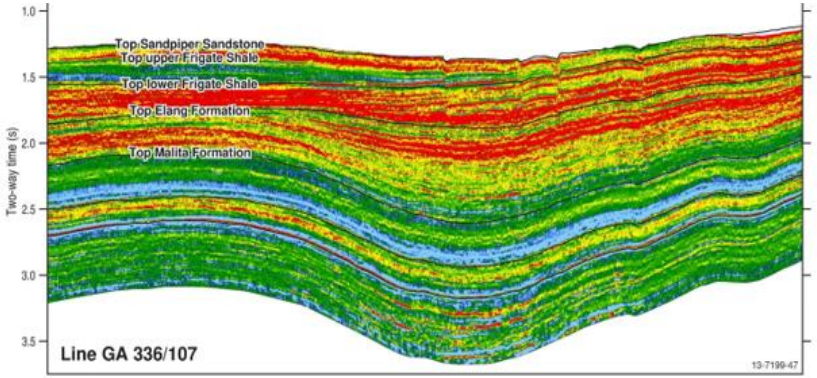
The 2020 Offshore Acreage Release

Petroleum Geological Summaries and Data Access

Tom Bernecker
Director, Energy Resources Advice and Promotion
Minerals, Energy and Groundwater Division

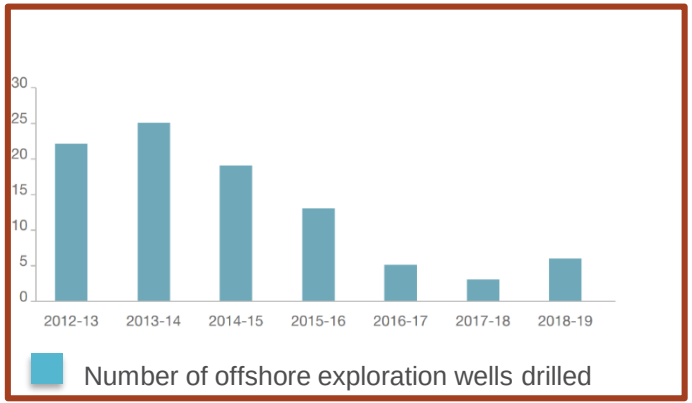


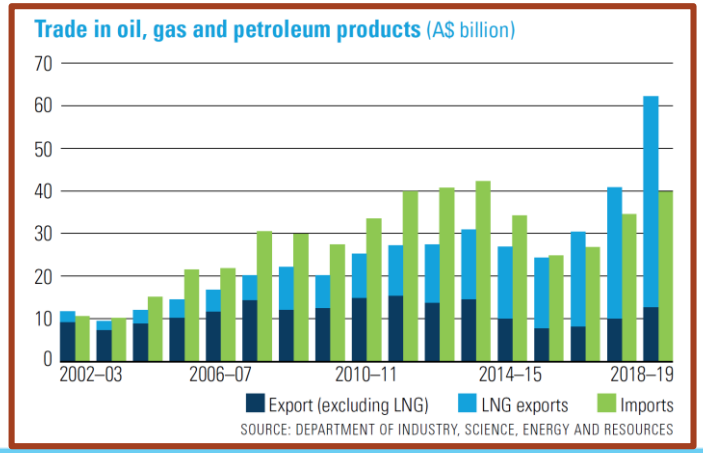


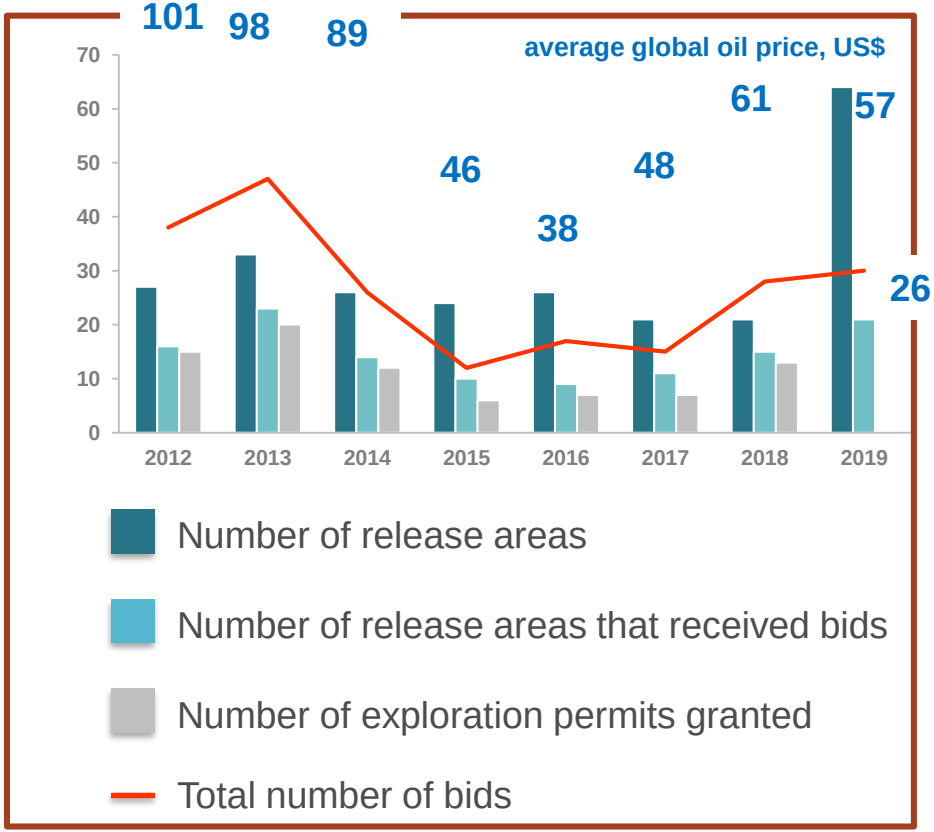


Review - 2012 -2019 offshore exploration activity, oil and gas trade :

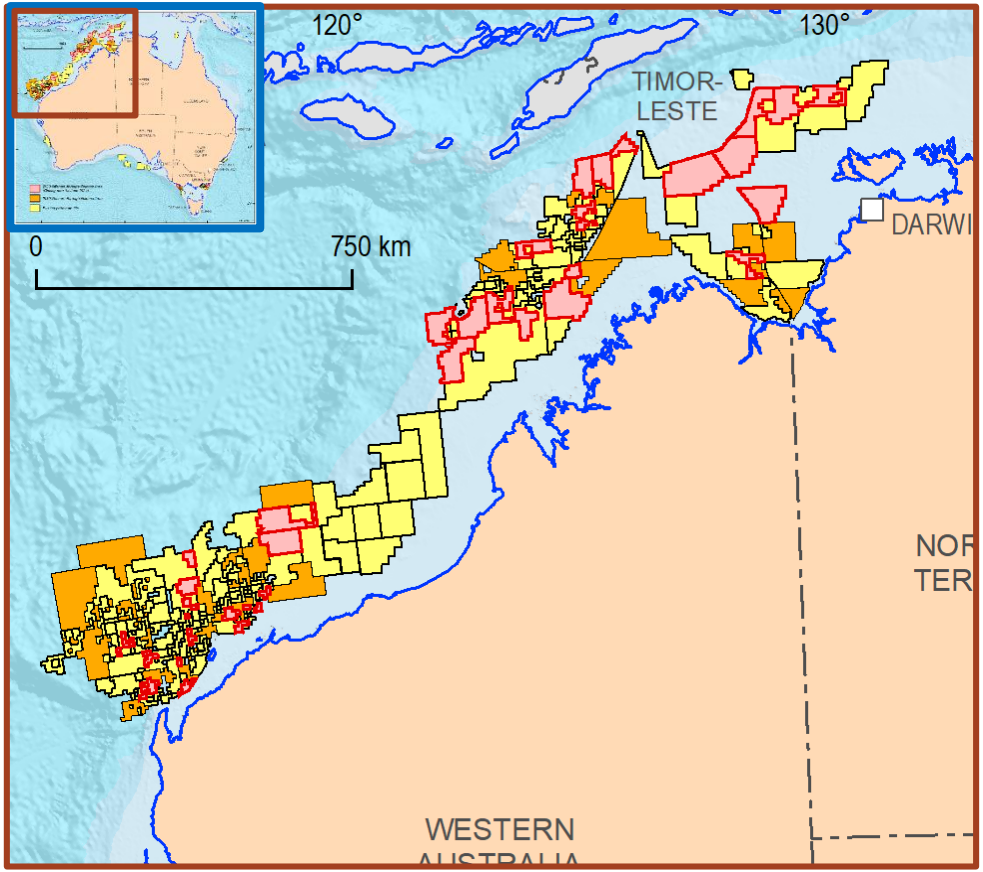
(was it) a positive outlook?





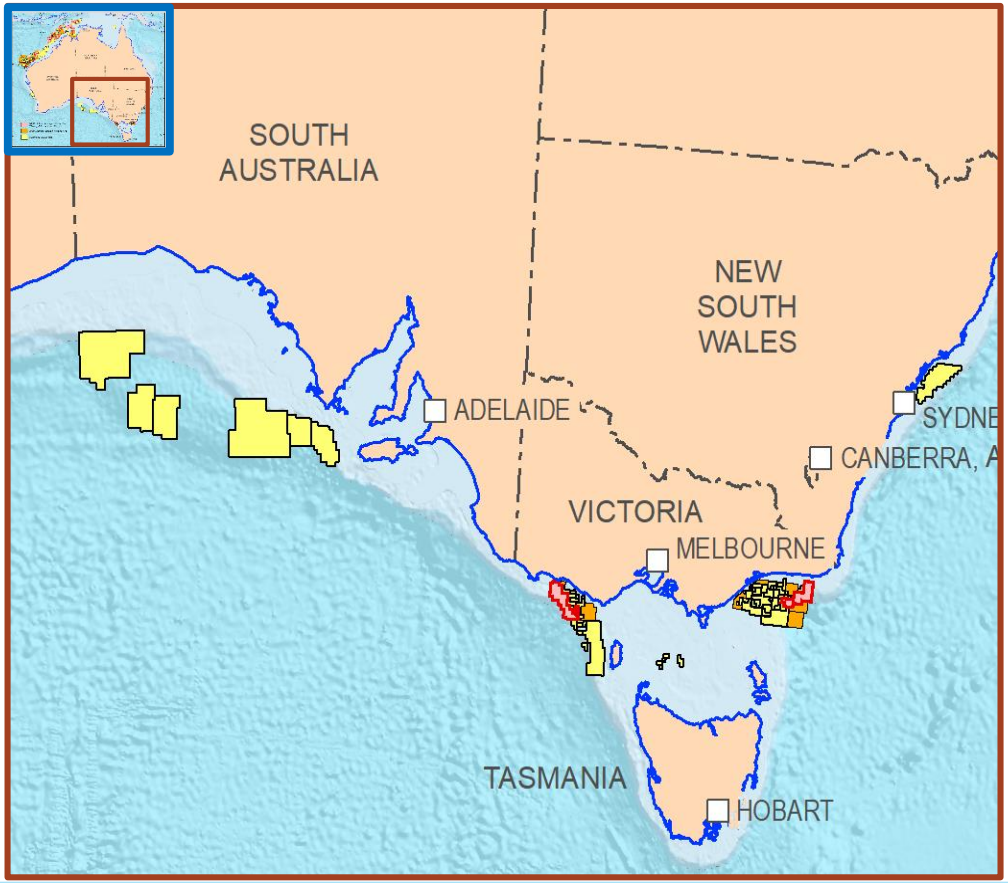


Current offshore permits, 2019 and 2020 release areas



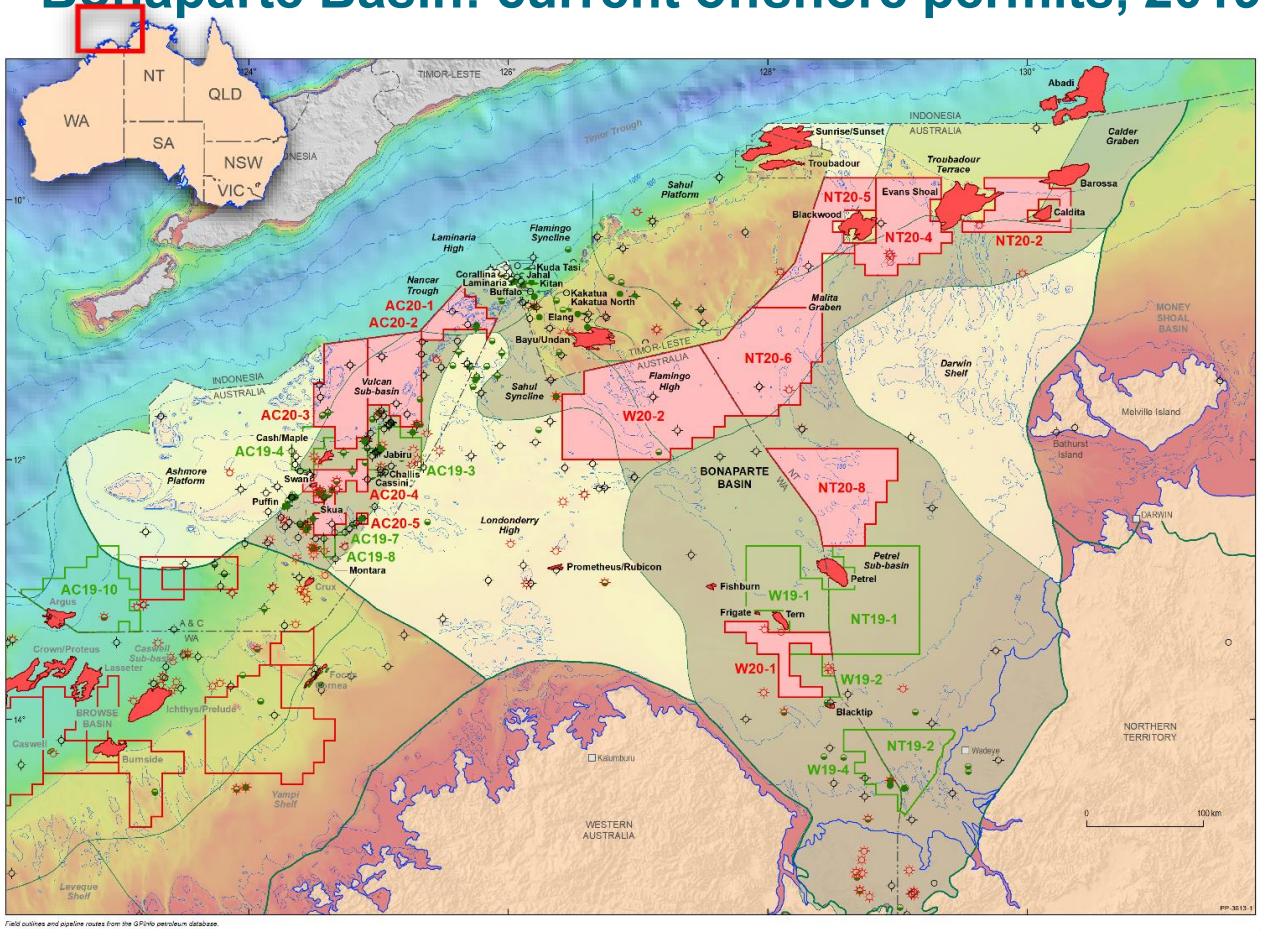
- 90 nominations received, 49 areas submitted for public consultation, 42 areas released
- NW Shelf continues to attract the vast majority of industry nominations
- Bonaparte Basin new focus of interest
- Southern margin remains underexplored
- Otway and Gippsland basins important for adding gas volumes to SE-Australia

Current offshore permits, 2019 and 2020 release areas



- 90 nominations received, 49 areas submitted for public consultation, 42 areas released
- NW Shelf continues to attract the vast majority of industry nominations
- Bonaparte Basin new focus of interest
- Southern margin remains underexplored
- Otway and Gippsland basins important for adding gas volumes to SE-Australia

Bonaparte Basin: current offshore permits, 2019 and 2020 release areas



Field outlines and pipeline routes from the GPinfo petroleum database.

New areas cover 3 established hydrocarbon provinces:

- Petrel Sub-basin
- Troubadour Terrace
- Vulcan Sub-basin

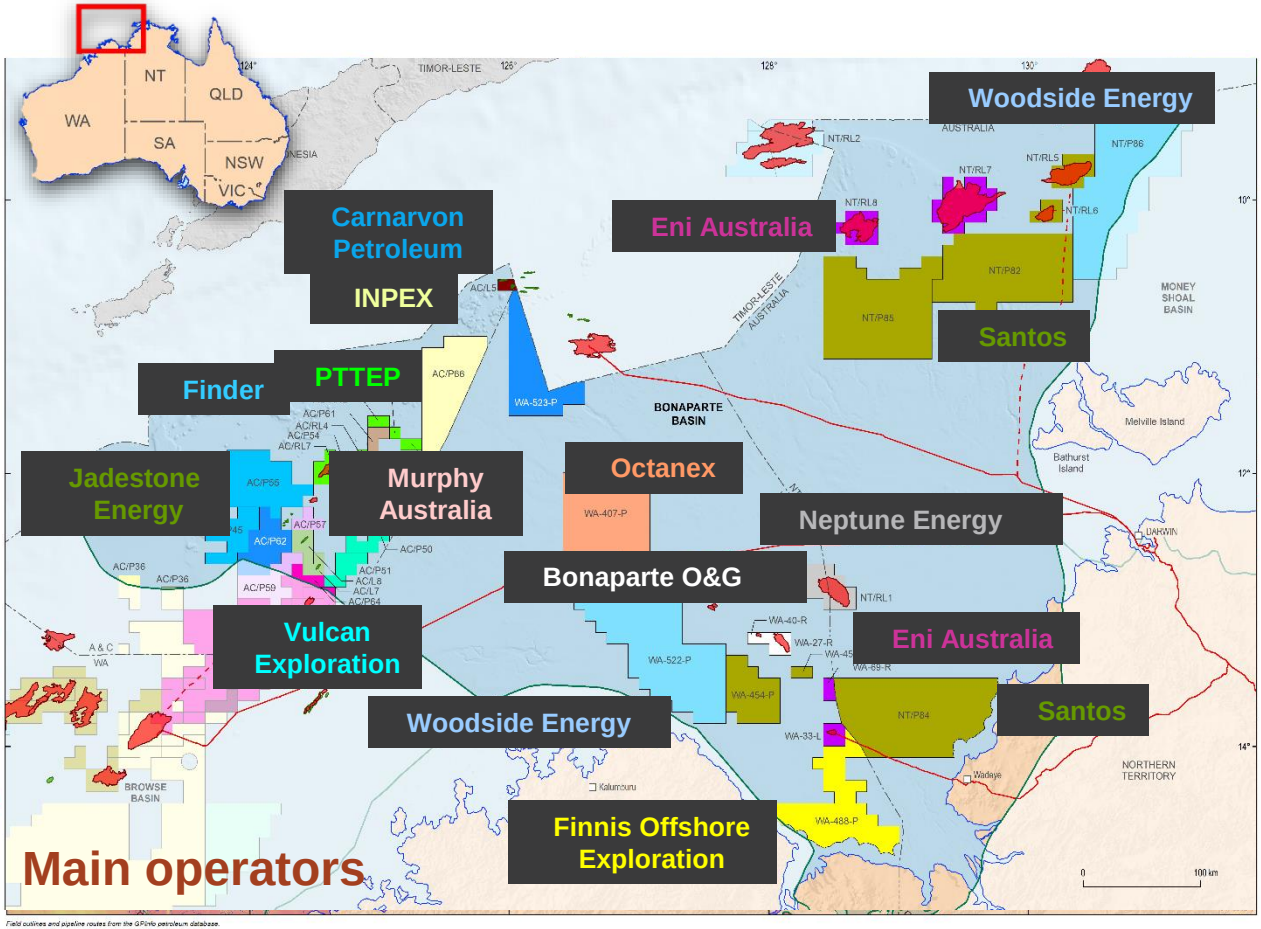
In addition, Malita Graben areas offer untapped potential

Gas produced: 0.35 Tcf
Gas remaining: 27.96 Tcf (2P + 2C)

Oil produced: 449 MMbbl
Oil remaining: 90 MMbbl (2P + 2C)
Condensate remaining: 437 MMbbl

(Geoscience Australia)

Bonaparte Basin: current offshore permits, 2019 and 2020 release areas



New areas cover 3 established hydrocarbon provinces:

- Petrel Sub-basin
- Troubadour Terrace
- Vulcan Sub-basin

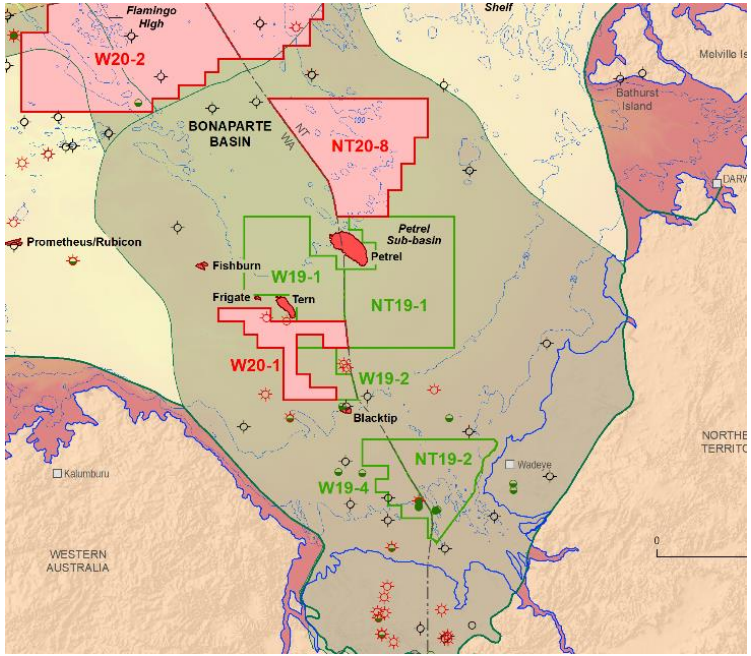
In addition, Malita Graben areas offer untapped potential

Gas produced: 0.35 Tcf
Gas remaining: 27.96 Tcf (2P + 2C)

Oil produced: 449 MMbbl
Oil remaining: 90 MMbbl (2P + 2C)
Condensate remaining: 437 MMbbl

(Geoscience Australia)

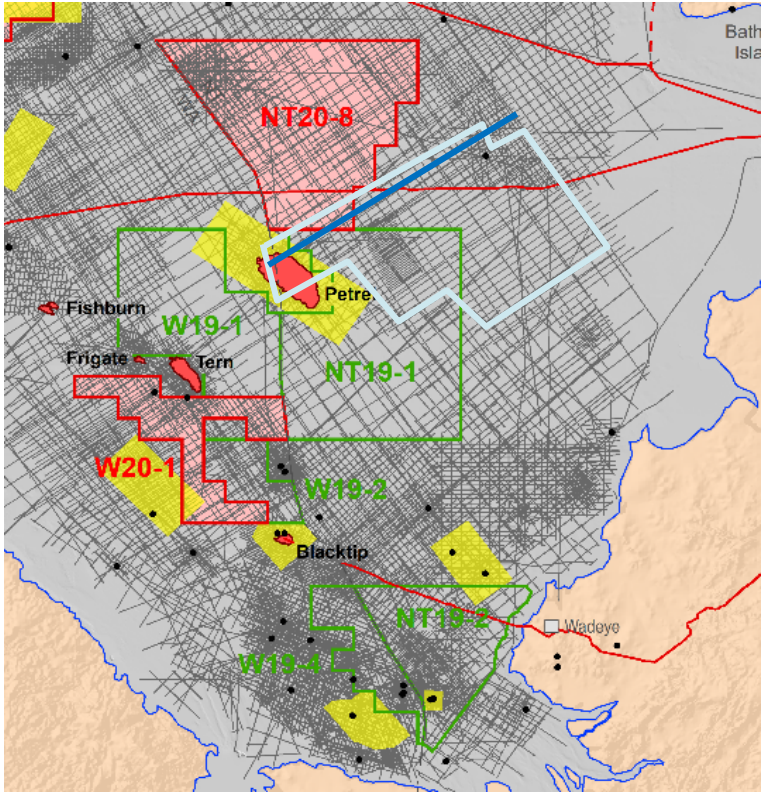
Petrel Sub-basin



- Shallow water exploration and development (< 100 metres)
- Existing gas production (Blacktip), further development planned (Petrel, Tern)
- Salt-tectonism
- Limited 3D seismic coverage
- Strong industry interest in recent years

- **Area NT20-8**
- Underexplored part of sub-basin
- Upper Paleozoic- lower Mesozoic targets
- GA's seismic survey provides insights into upper Mesozoic section (carbon storage study)

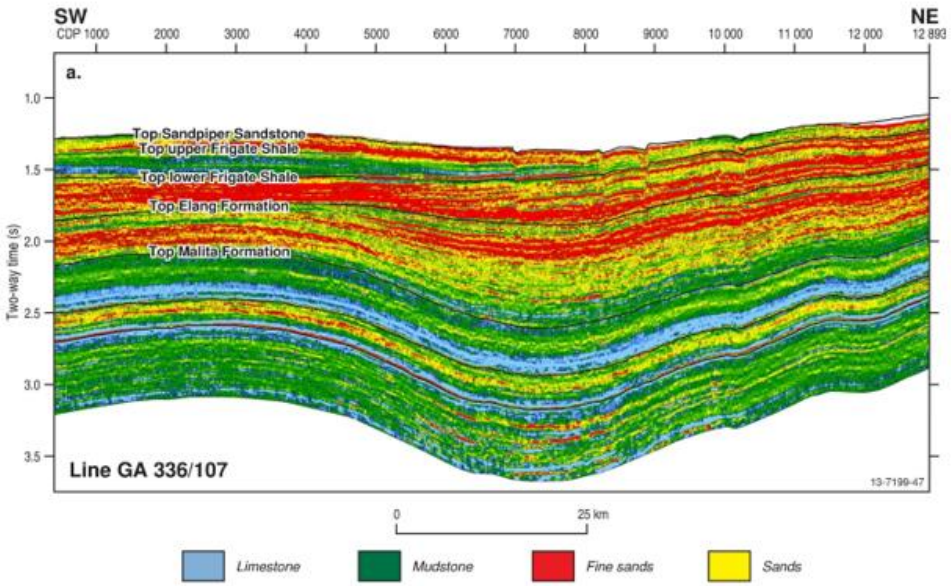
Petrel Sub-basin



- Shallow water exploration and development (< 100 metres)
- Existing gas production (Blacktip), further development planned (Petrel, Tern)
- Salt-tectonism
- Limited 3D seismic coverage
- Strong industry interest in recent years

- **Area NT20-8**
- Underexplored part of sub-basin
- Upper Paleozoic- lower Mesozoic targets
- GA's seismic survey provides insights into upper Mesozoic section (carbon storage study)

Petrel Sub-basin



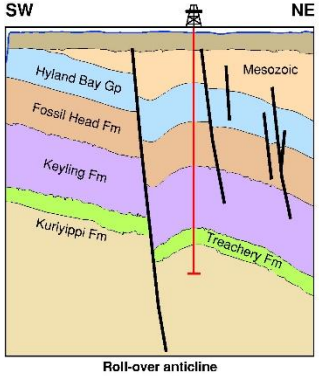
- Shallow water exploration and development (< 100 metres)
- Existing gas production (Blacktip), further development planned (Petrel, Tern)
- Salt-tectonism
- Limited 3D seismic coverage
- Strong industry interest in recent years

- **Area NT20-8**
- Underexplored part of sub-basin
- Upper Paleozoic- lower Mesozoic targets
- GA's seismic survey provides insights into upper Mesozoic section (carbon storage study)

https://ecat.ga.gov.au/geonetwork/srv/eng/catalog.search#/metadata/76510

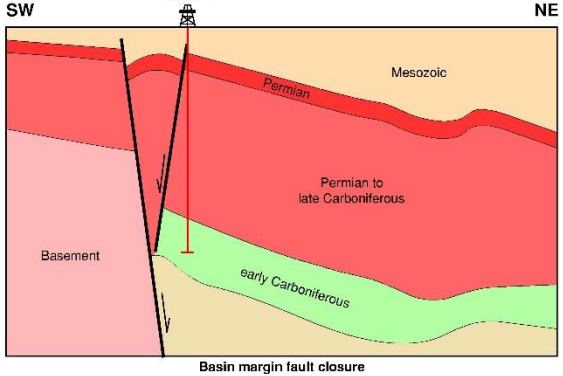
Petrel Sub-basin

Weasel-1



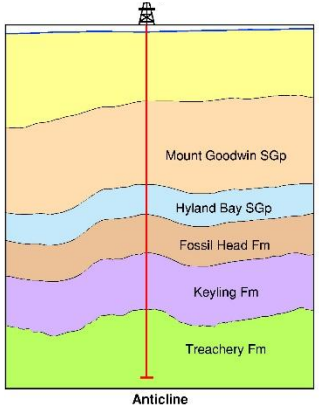
Roll-over anticline

Lesueur-1



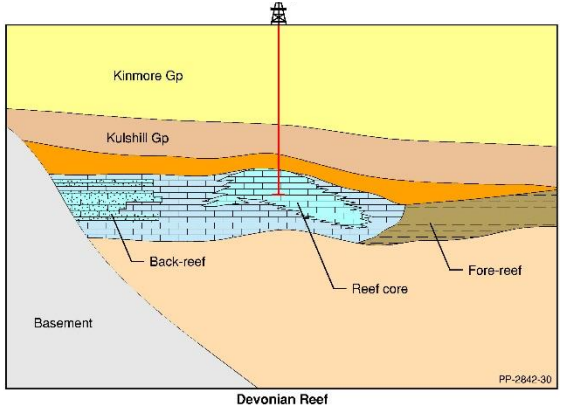
Basin margin fault closure

Blacktip-1

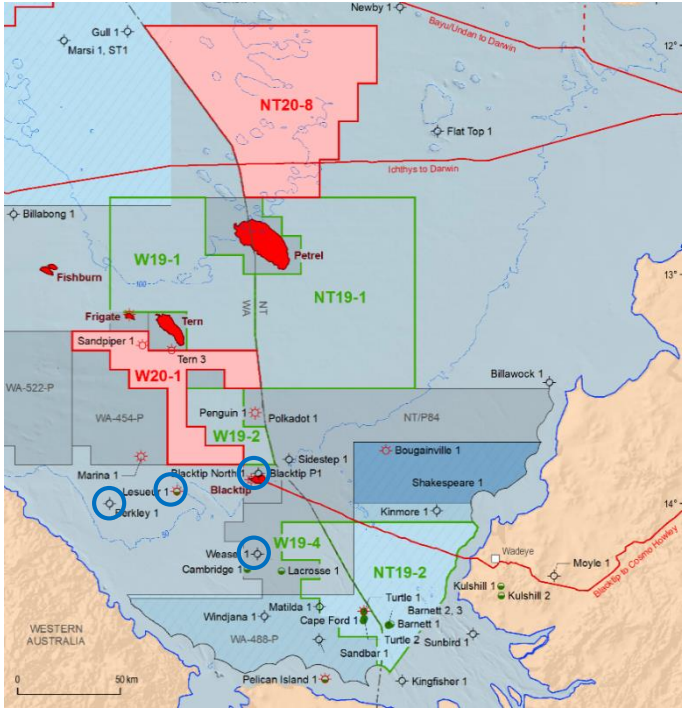


Anticline

Berkley-1

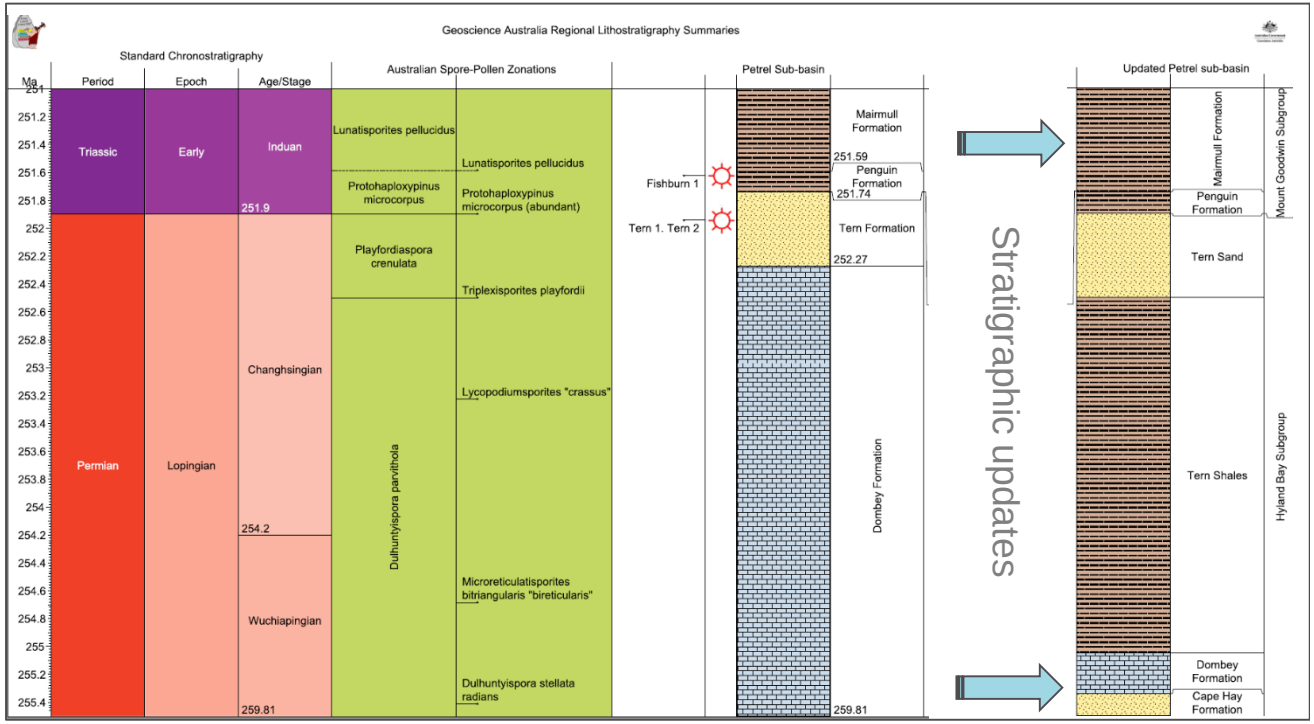


Devonian Reef



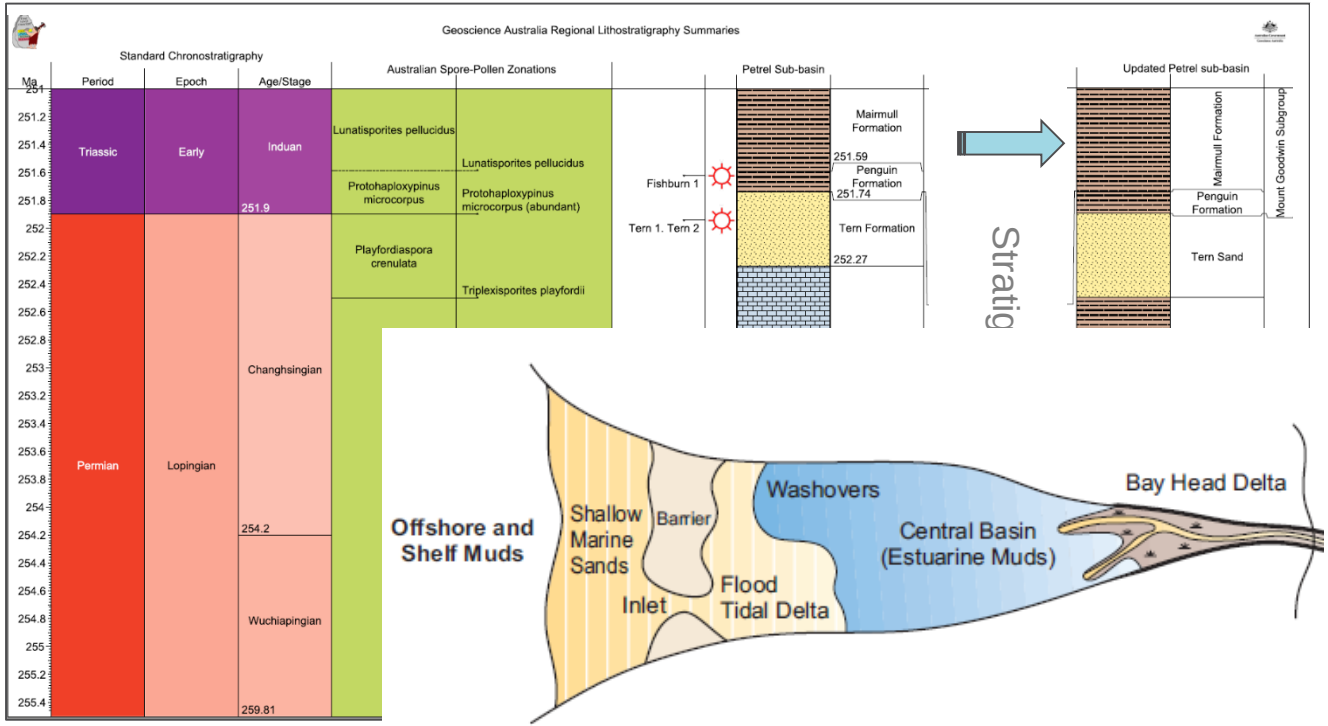
- **Area WA20-1**
- Located in main part of Petrel Sub-basin exploration activity
- Variety of play types

Geoscience Australia's stratigraphic studies: Permo-Triassic boundary in the Bonaparte Basin



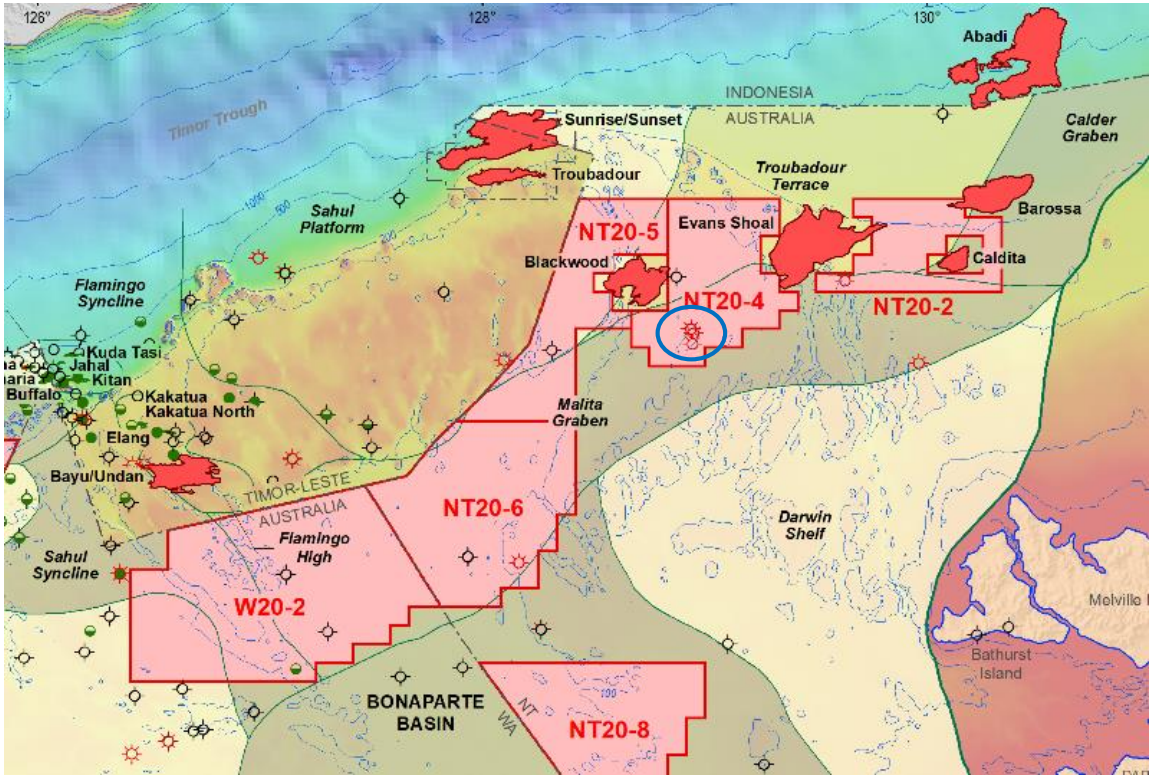
- Major geological changes impacted on basin evolution
- Petrel-Sub-basin dominated by low energy depositional environments
- Understanding the change from carbonate to siliciclastic sedimentation
- Palaeogeography to reveal exploration play fairways
- Delineation of sedimentary facies associations provide insights into presence/absence of reservoir sandstones

Geoscience Australia's stratigraphic studies: Permo-Triassic boundary in the Bonaparte Basin



- Major geological changes impacted on basin evolution
- Petrel-Sub-basin dominated by low energy depositional environments
- Understanding the change from carbonate to siliciclastic sedimentation
- Palaeogeography to reveal exploration play fairways
- Delineation of sedimentary facies associations provide insights into presence/absence of reservoir sandstones

Troubadour Terrace and Malita Graben



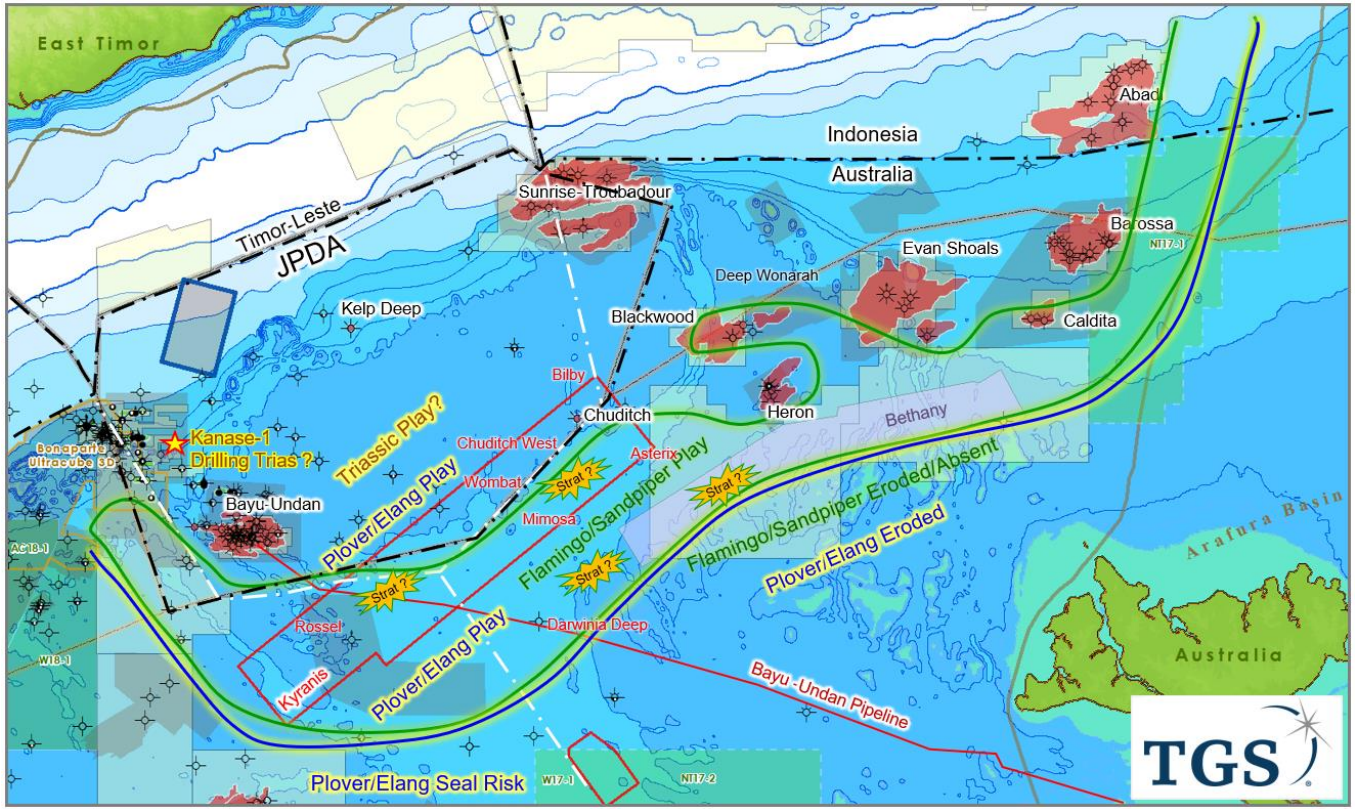
Areas NT20-2, NT20-4 and NT20-5

- Multi-Tcf gas accumulations with, some significant Helium content
- First gas discovered by Heron-1 in 1971
- Source/Reservoir intervals are part of regional Jurassic deltaic system (Plover Formation), and shallow marine regressive sandstones (Elang Formation)
- Proposed pipeline to feed gas into Darwin processing facility

Areas NT20-6 and W20-2

- Underexplored part of northern Bonaparte Basin
- Petroleum systems elements similar to those further north
- Contribution from older (Upper Paleozoic) source rocks possible
- Presence of stratigraphic plays along margin of Petrel Sub-basin?

Malita Graben



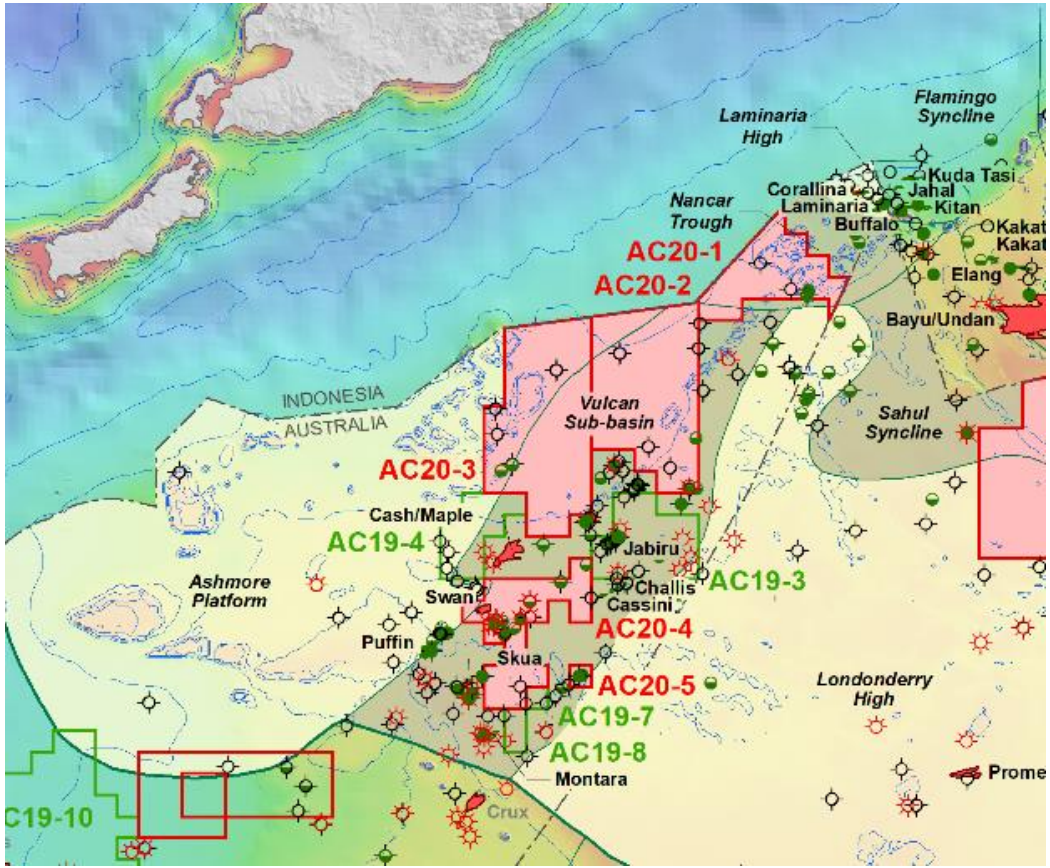
- Well control indicates thick section of Upper Cretaceous Bathurst Group accumulated in rapidly subsiding depocentre
- Marine source rocks may have liquid/wet gas potential (early mature)

Uncertainties:

- Distribution of sandbodies in fine-grained dominated sedimentary system
- Controls of porosity preservation at depth
- Migration pathways

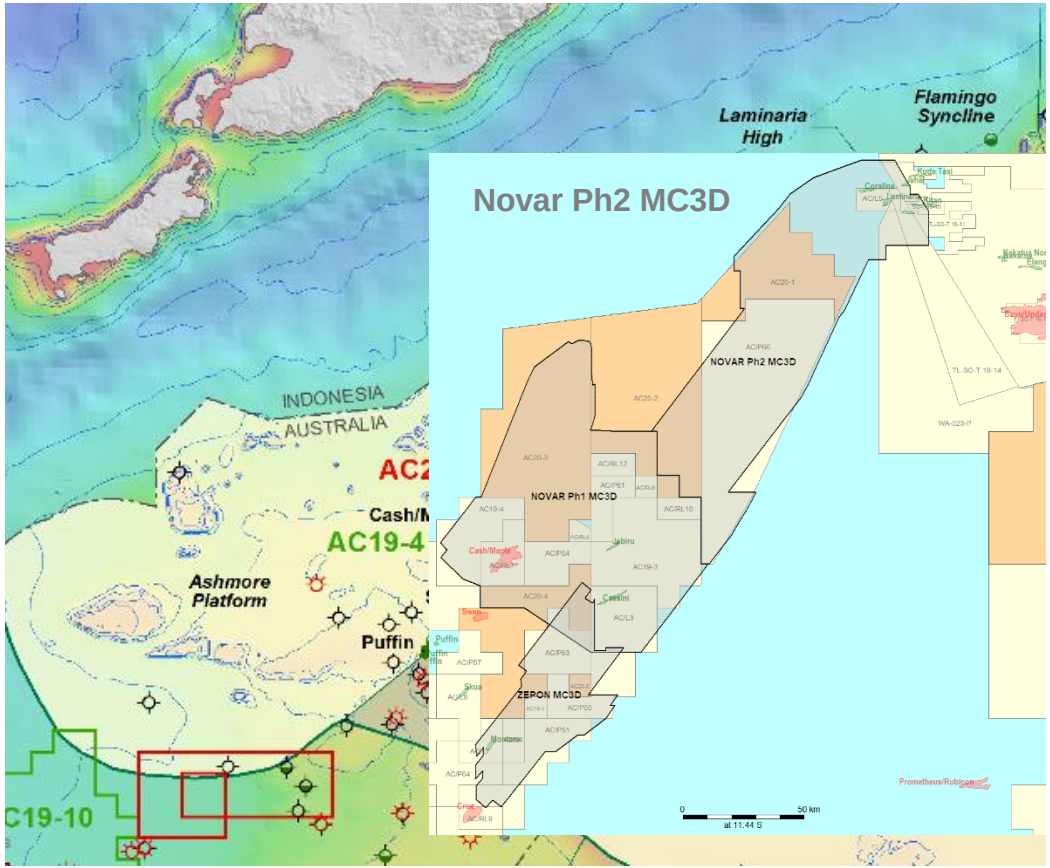
https://www.seapex.org/wp-content/uploads/Abstract/4_4%20Spectrum%20-%20West%20Malita%20Graben.pdf **(2019)**

Vulcan Sub-basin



- Proven hydrocarbon province with oil production
- Regular uptake of new exploration permits
- Jurassic depocentre with oil and gas-prone source rocks
- Structural plays in Triassic-Jurassic
- Stratigraphic plays (Upper Cretaceous and younger)
- Untapped deeper (older) Triassic rift sequences
- New multi-client seismic data commercially available

Vulcan Sub-basin



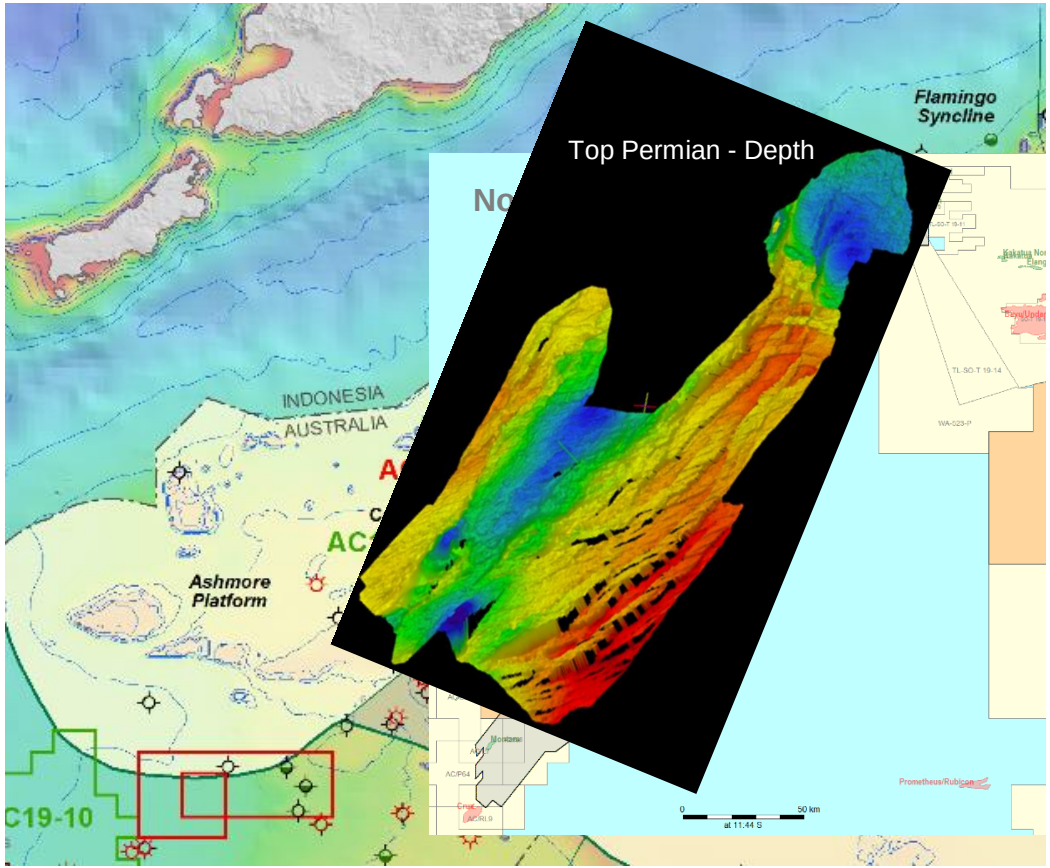
- Sub-basin initiated during Triassic as part of the NW Shelf rift system
- Structural architecture dominated by NNE-trending lineaments
- Troughs and grabens able to accommodate thick sedimentary sequences
- Northernmost part (Nancar Trough) controlled by WNW-trending lineaments and represents a different oil-prone hydrocarbon province

Seismic images provided by

www.mcresources.com.au

MCR Multi-Client Resources

Vulcan Sub-basin



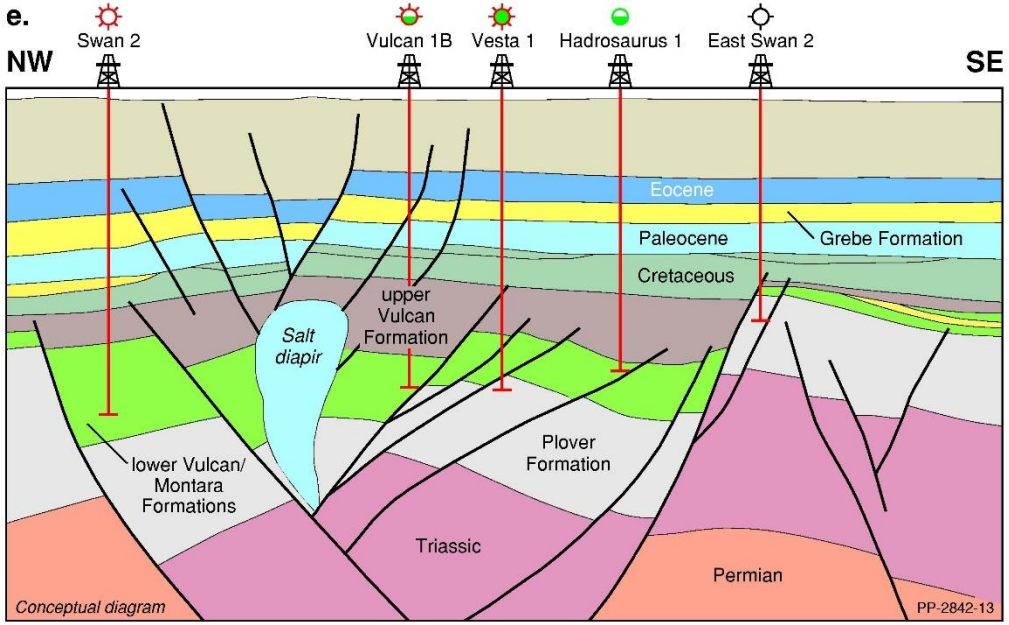
- Sub-basin initiated during Triassic as part of the NW Shelf rift system
- Structural architecture dominated by NNE-trending lineaments
- Troughs and grabens able to accommodate thick sedimentary sequences
- Northernmost part (Nancar Trough) controlled by WNW-trending lineaments and represents a different oil-prone hydrocarbon province

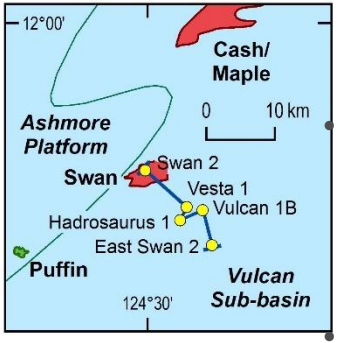
Seismic images provided by

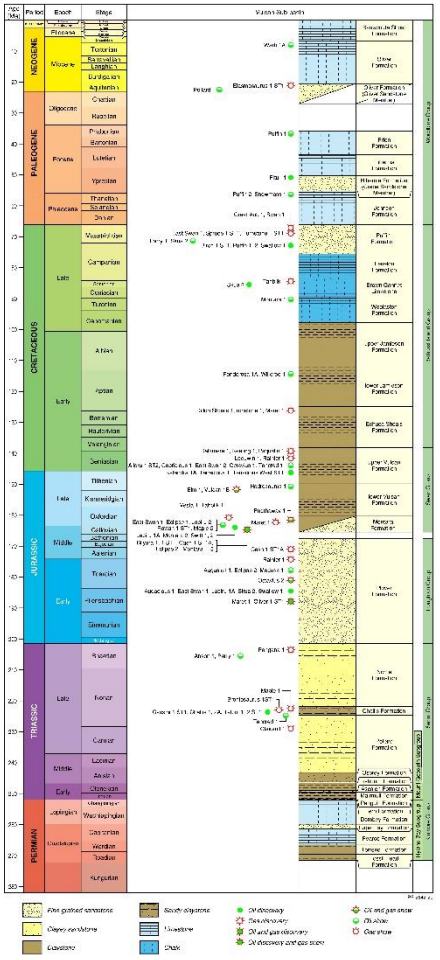
www.mcresources.com.au

MCR Multi-Client Resources

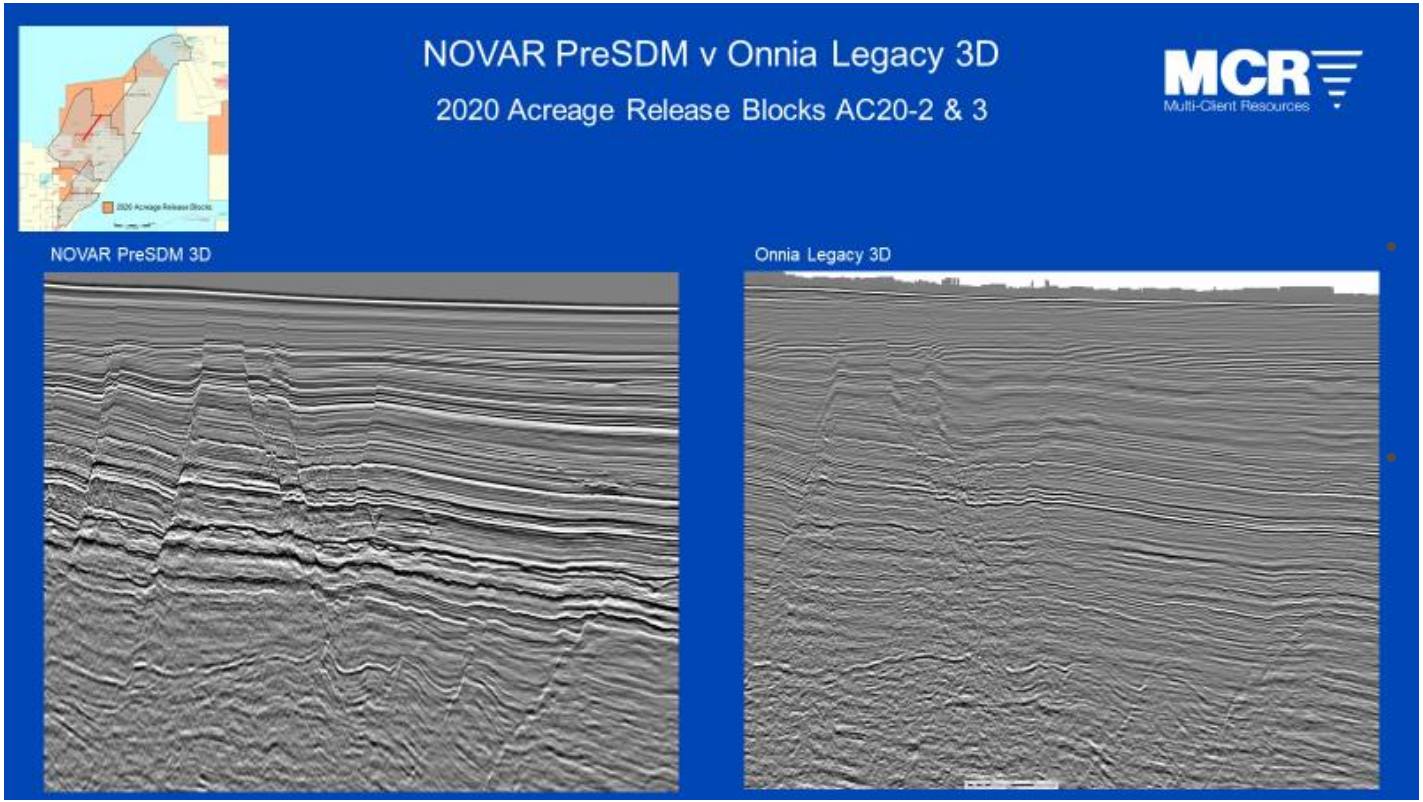
Vulcan Sub-basin

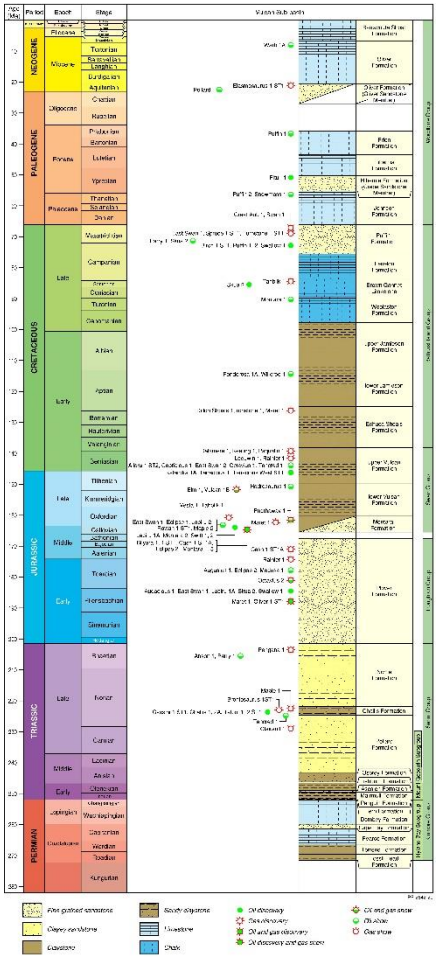




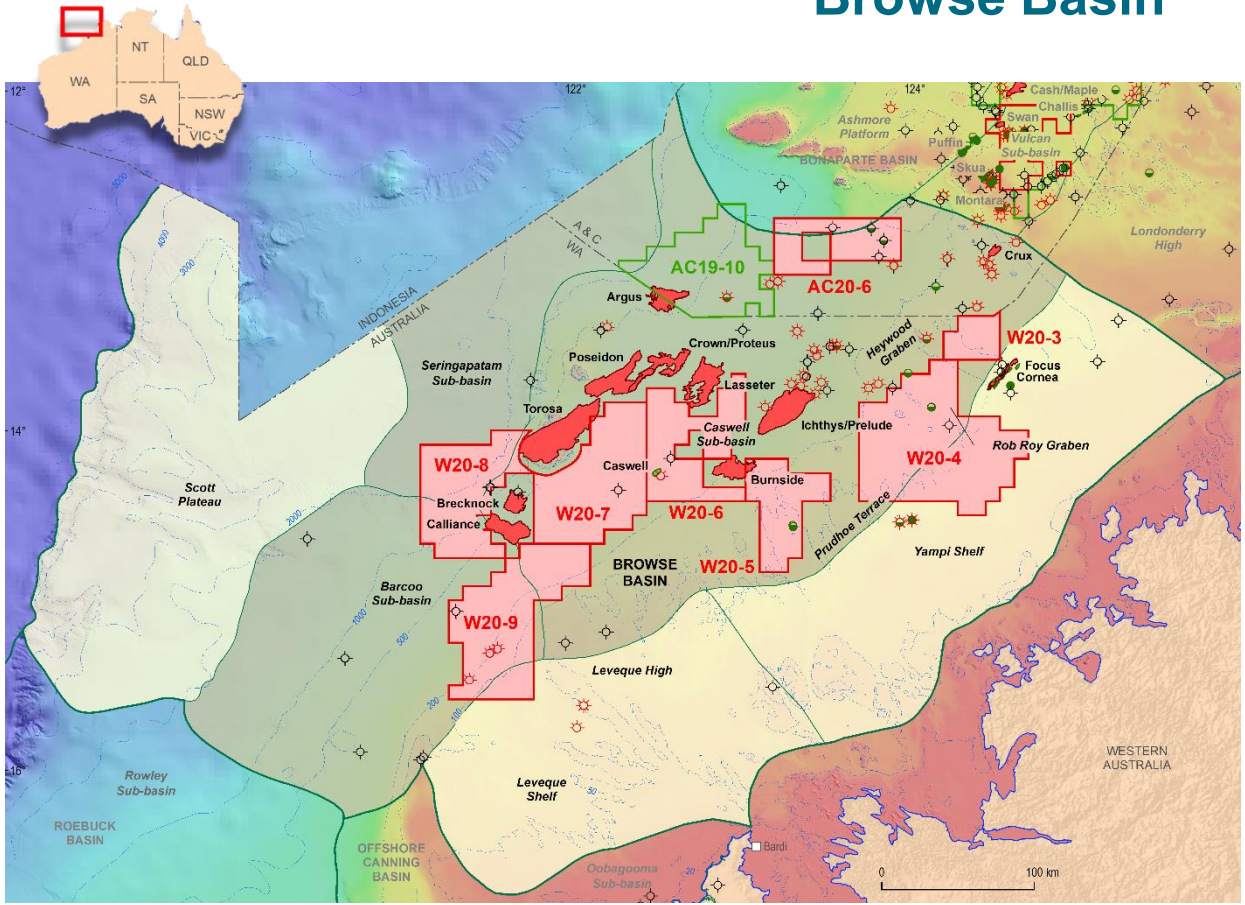


Vulcan Sub-basin





Browse Basin



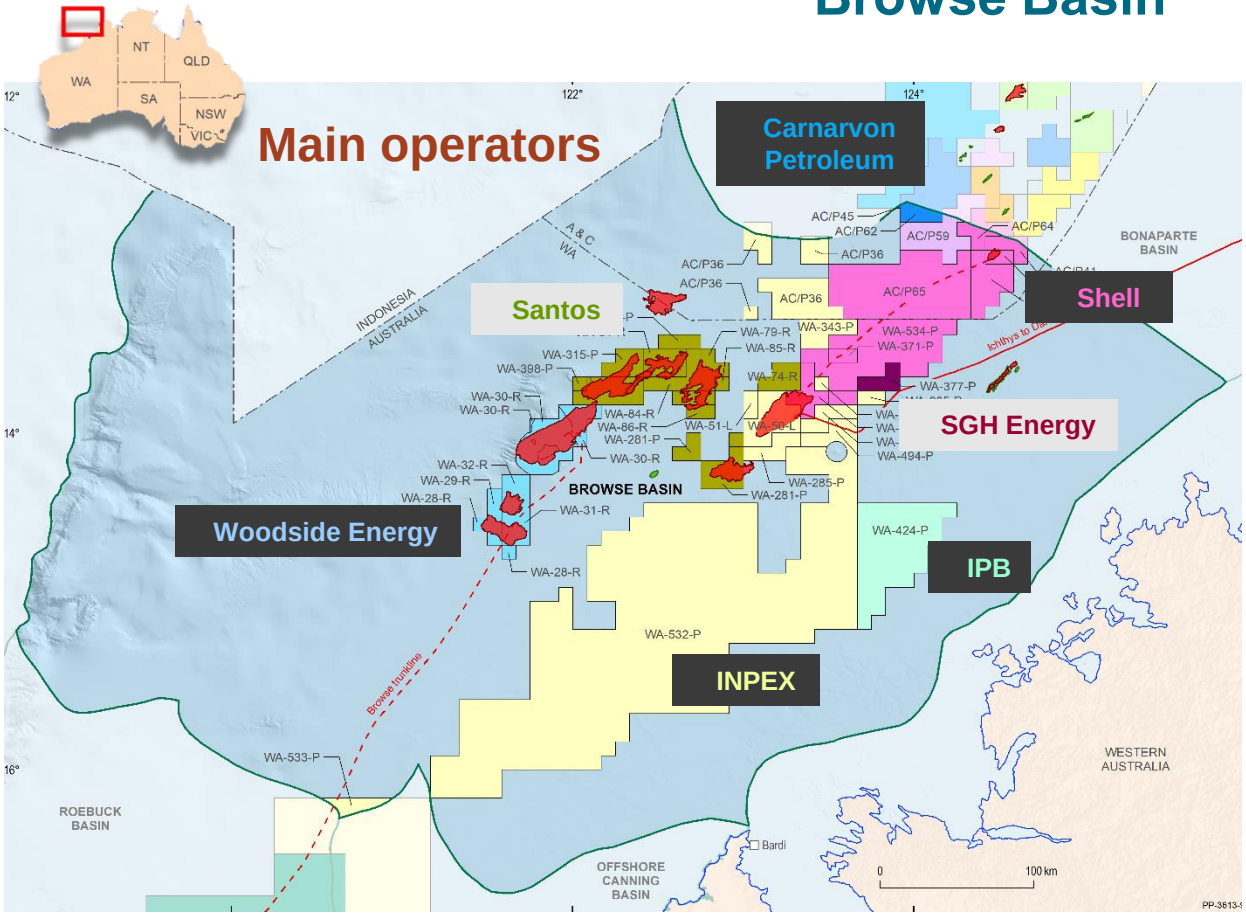
- Gas and condensate production commenced in 2018 (Inpex operated Ichthys field), followed by Shell-operated Prelude FLNG in 2019
- Discussions regarding the development of additional resources continue.
- Eight areas on offer in 2020
  - *Caswell Sub-basin*
  - *Yampi Shelf*
  - *Barcoo Sub-basin*

Gas produced: 0.07 Tcf
Gas remaining: 39.75 Tcf (2P + 2C)

Oil produced: 3 MMbbl
Oil remaining: 37 MMbbl (2P + 2C)
Condensate remaining: 1173 MMbbl
LPG remaining: 60 MMbbl

(Geoscience Australia)

Browse Basin



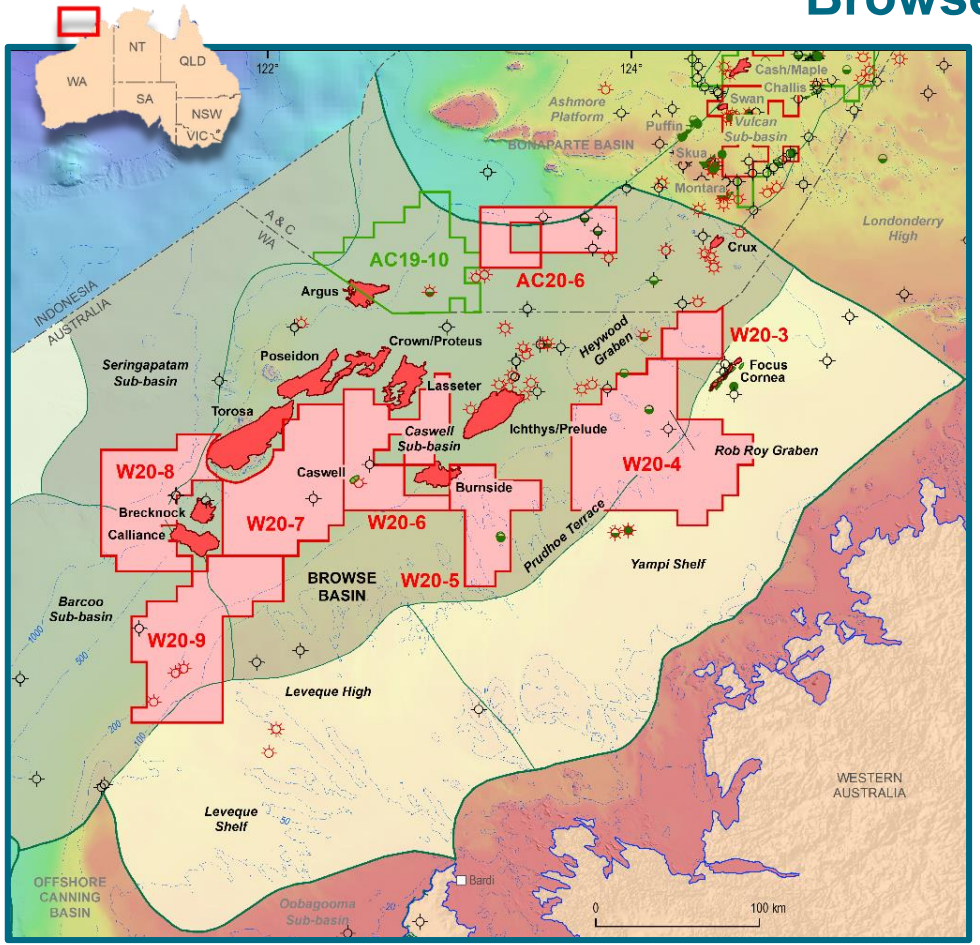
- Gas and condensate production commenced in 2018 (Inpex operated Ichthys field), followed by Shell-operated Prelude FLNG in 2019
- Discussions regarding the development of additional resources continue.
- Eight areas on offer in 2020
  - *Caswell Sub-basin*
  - *Yampi Shelf*
  - *Barcoo Sub-basin*

Gas produced: 0.07 Tcf
Gas remaining: 39.75 Tcf (2P + 2C)

Oil produced: 3 MMbbl
Oil remaining: 37 MMbbl (2P + 2C)
Condensate remaining: 1173 MMbbl
LPG remaining: 60 MMbbl

(Geoscience Australia)

Browse Basin



Area AC20-6 (Water depths 200 - 500 m)

- Transition to Vulcan-Sub-basin, flank of Heywood Graben
- Multiple Jurassic and Cretaceous plays, including Echuca Shoals oil-play

Areas W20-3 and W20-4 (Water depths 100 – 200 m)

- Transition to Yampi Shelf
- Pinch-out of Cretaceous sediments over shallow basement
- Demonstrated oil occurrence (Cornea, Braveheart, Buccaneer)

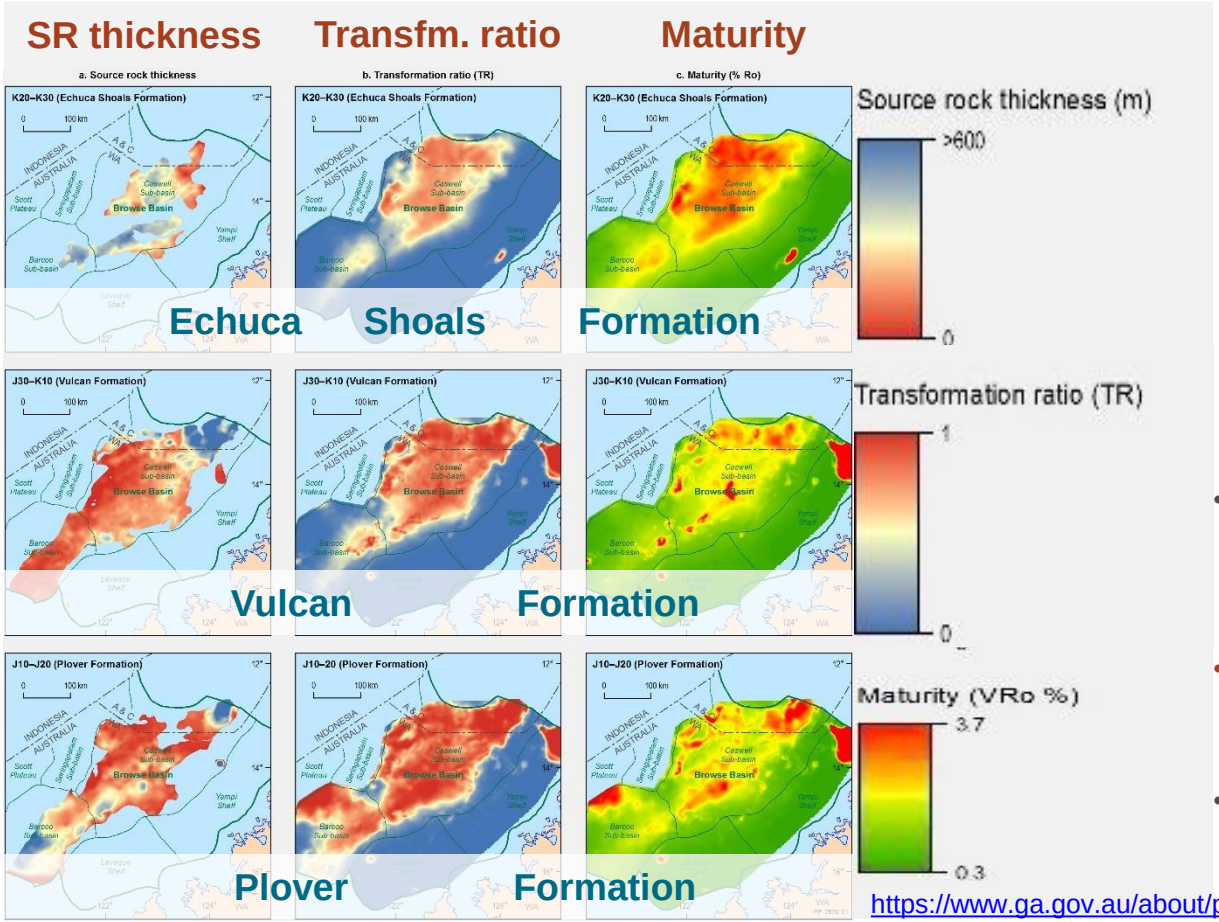
Areas W20-5, 6, 7, & 8 (Water depths 100 – 1000 m)

- Located within main gas producing part of basin
- Multiple plays dominated by Plover (Lower-mid Jurassic) and Vulcan (Upper Jurassic to Lower Cretaceous) sequences

Area W20-9 (Water depths 100 - 500 m)

- Transition to underexplored Barcoo-Sub-basin
- Limited well control indicates presence of gas-prone petroleum system in Jurassic section (“Plover”)
- Access to hydrocarbon migration is main uncertainty

Browse Basin: source rock characteristics

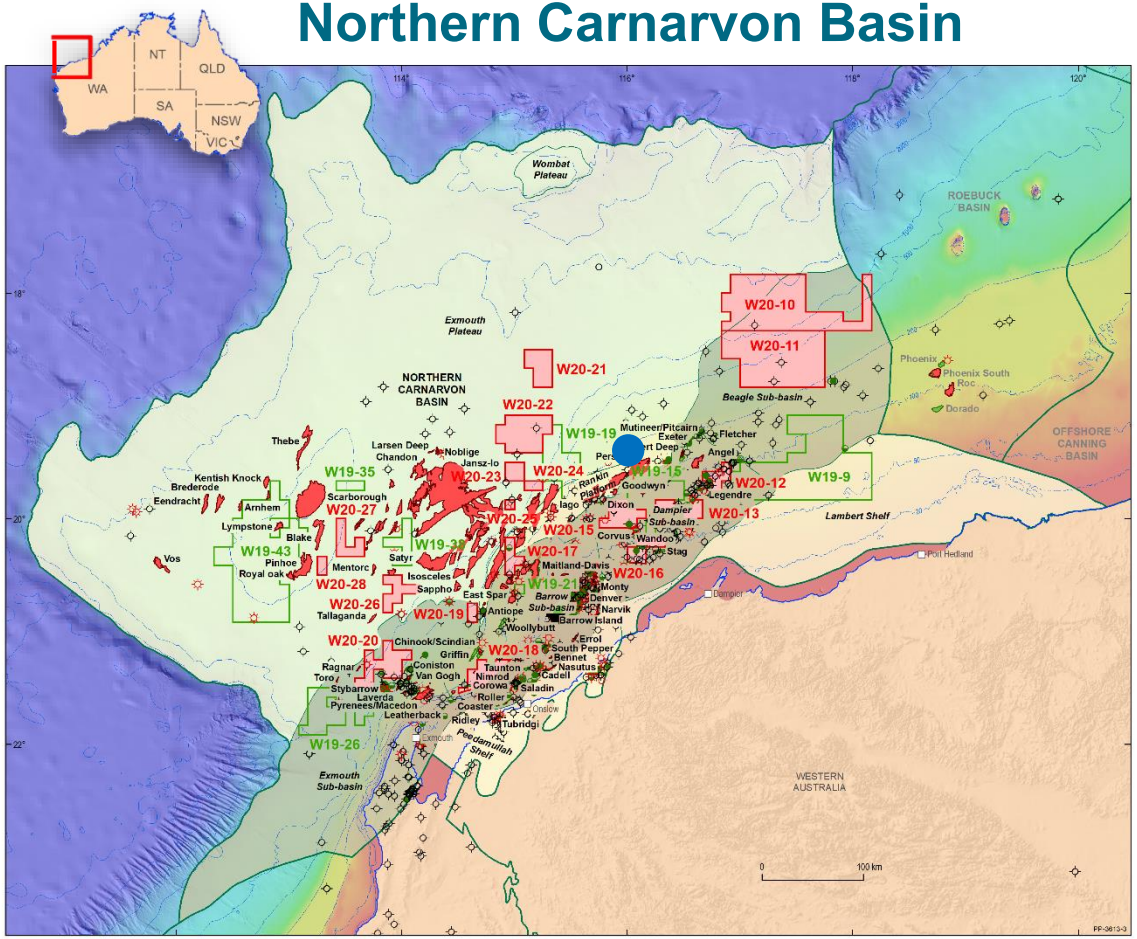


- Plover Formation (fluvial-deltaic, Lower-mid Jurassic) contains thickest source rock intervals in Barcoo SB and Heywood Graben
- Vulcan Formation source rocks (Upper Jurassic, marine) thickest in Heywood Graben
- Echuca Shoals source rocks (Lower Cretaceous, marine) not as widely distributed

- Plover and Vulcan formations have largest hydrocarbon generation potential, but source rock maturity is variable across basin
- Echuca Shoals source rocks are highly mature in central and northern part of basin.
- Indication of increased heat flow during Early Cretaceous

https://www.ga.gov.au/about/projects/resources/browse-basin-petroleum-systems-study

Northern Carnarvon Basin



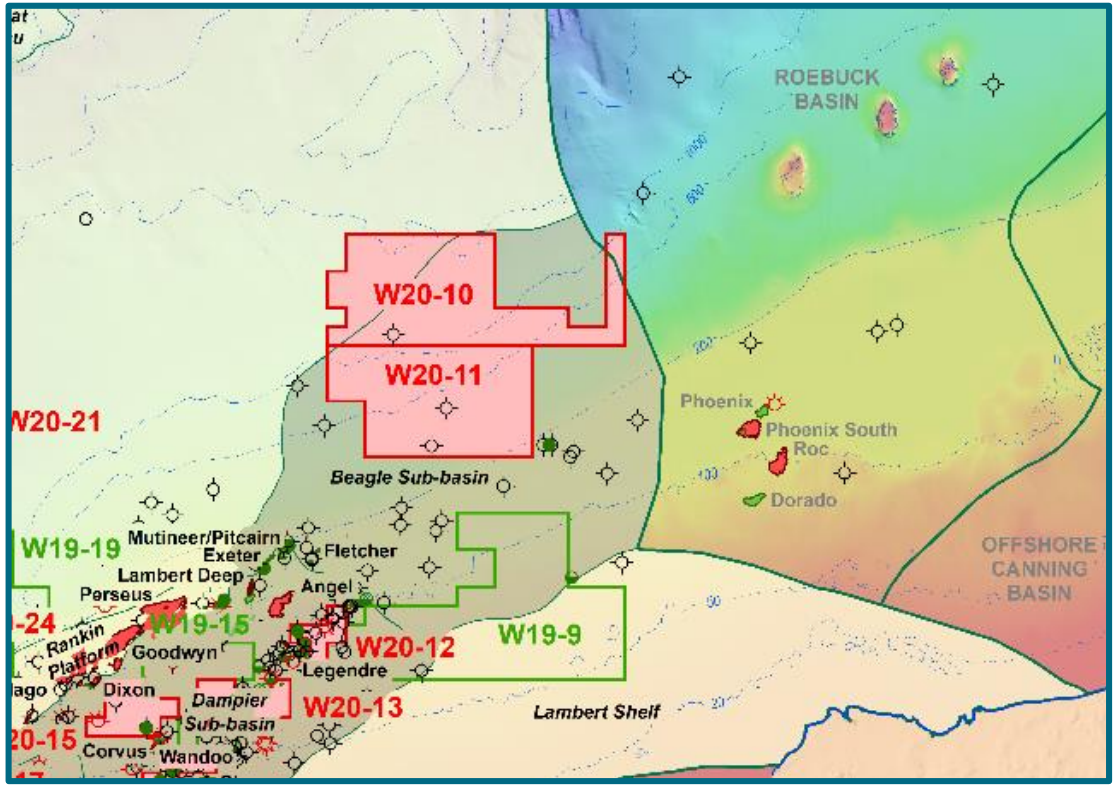
- Australia's premier hydrocarbon province since the mid-1990s, attractive to companies of all sizes
- LNG export hub, expanding infrastructure
- Inboard areas offer access to multiple gas and oil-prone petroleum systems
- Outboard areas offer access to world class gas play (Upper Triassic Mungaroo deltaic system)
- Untapped Lower-mid Triassic targets, including "deep Mungaroo" (BP's proposed Ironbark-1 in WA-359-P)

Gas produced: 30.64 Tcf
Gas remaining: 94.89 Tcf (2P + 2C)

Oil produced: 3207 MMbbl
Oil remaining: 1039 MMbbl (2P + 2C)
Condensate remaining: 950 MMbbl
LPG remaining: 1 MMbbl

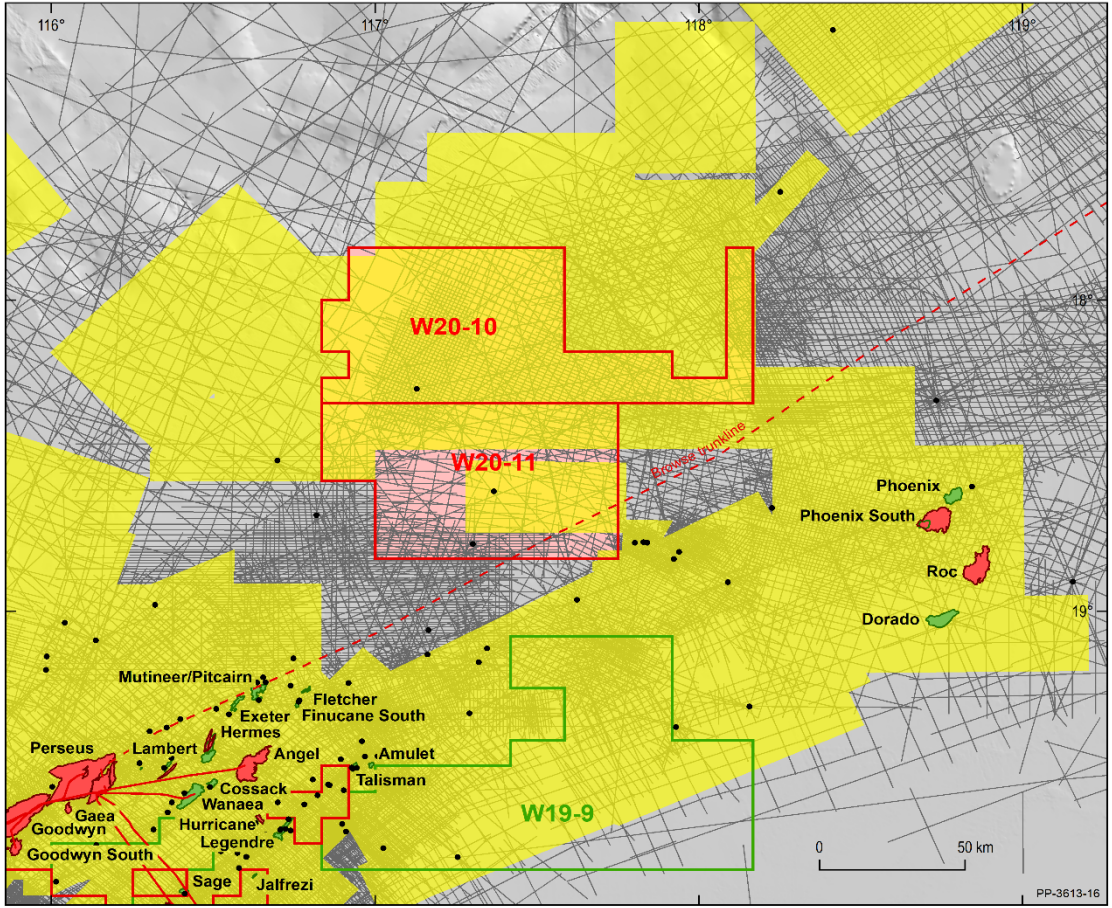
(Geoscience Australia)

Beagle Sub-basin



- Northern part of Area W20-10 considered deep-water frontier
- Nebo-1 indicates presence of liquid petroleum system
- Success in Bedout Sub-basin has triggered strong interest in surrounding region
- Triassic is untapped target in Beagle Sub-basin
- Understanding of Late Permian – Early Triassic basin evolution may hold key to success
- Extensive 3D seismic coverage, including parts of TGS's regional Capreolus survey

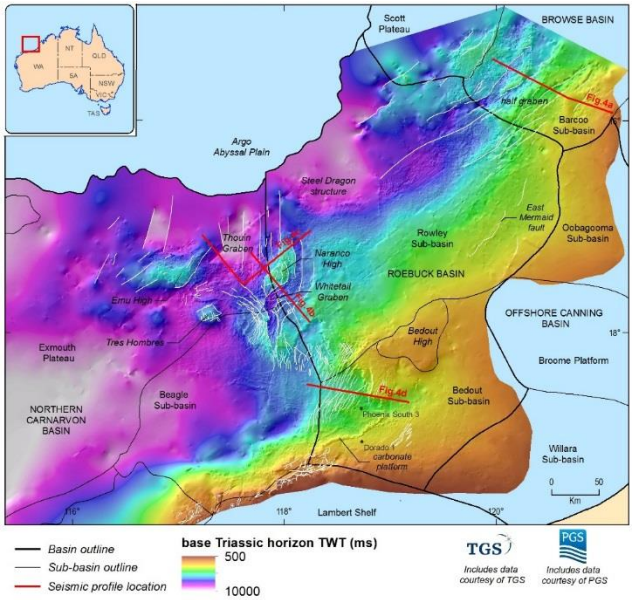
Beagle Sub-basin



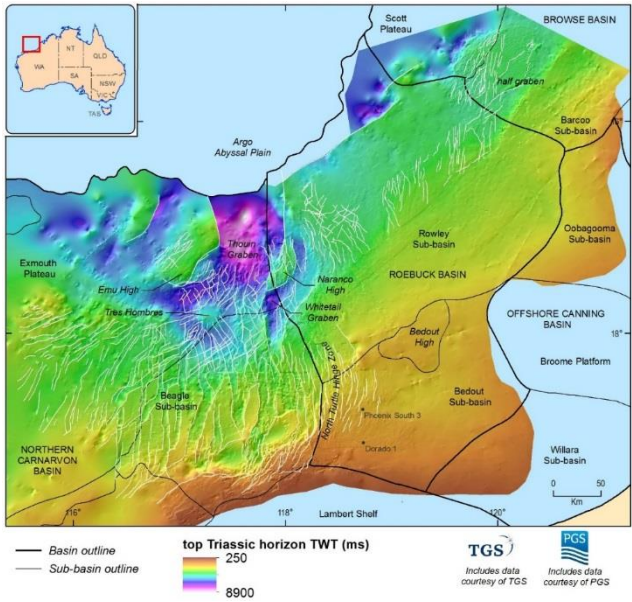
- Northern part of Area W20-10 considered deep-water frontier
- Nebo-1 indicates presence of liquid petroleum system
- Success in Bedout Sub-basin has triggered strong interest in surrounding region
- Triassic is untapped target in Beagle Sub-basin
- Understanding of Late Permian – Early Triassic basin evolution may hold key to success
- Extensive 3D seismic coverage, including parts of TGS's regional Capreolus survey

Central North West Shelf: *Regional Geological Study by Geoscience Australia*

Example: Integration of 2D and 3D seismic data sets



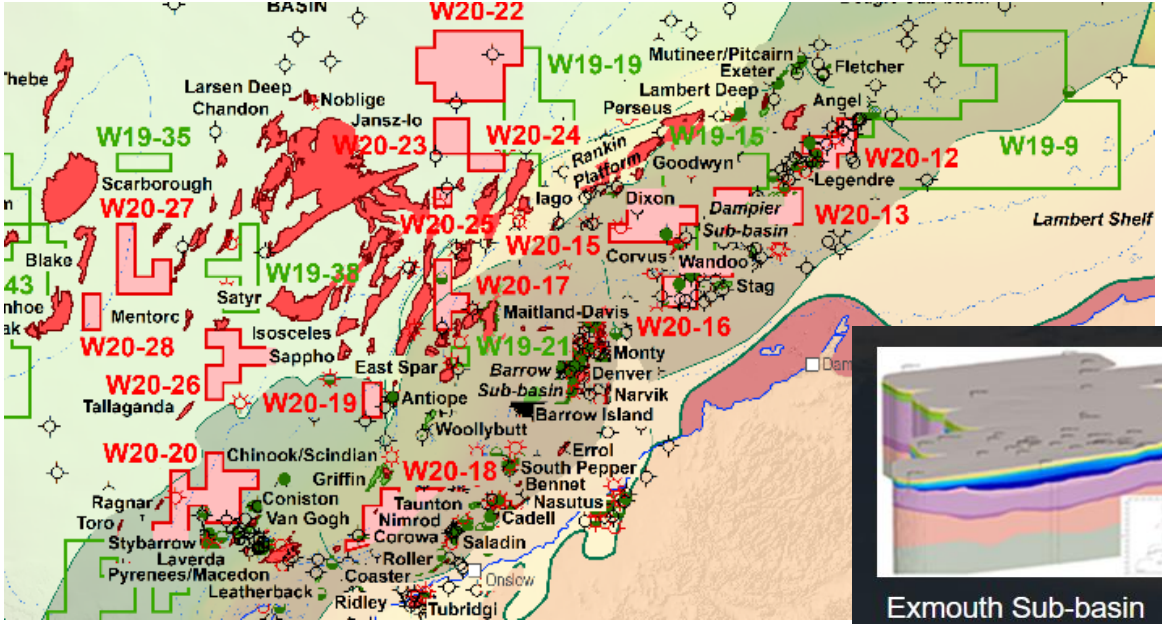
www.ga.gov.au/nopims

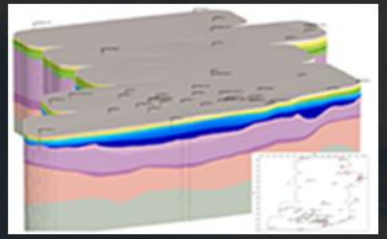


Results include:

- Improved understanding of basin development, recognition of shifting depocentres
- Interpretation of depositional facies associations and changes through the Triassic period
- Reassessment of basin boundaries

Dampier, Barrow, Exmouth Sub-basins





Exmouth Sub-basin Regional Study

20/11/2019

New 3D Petroleum System Model for the Exmouth Sub-Basin.

Areas W20-12 to W20-20

- Continued exploration success
- Triassic, Jurassic and Cretaceous proven petroleum systems
- Fully covered by modern 3D seismic
- Results from petroleum systems study on Exmouth Sub-basin available on NOPIMS

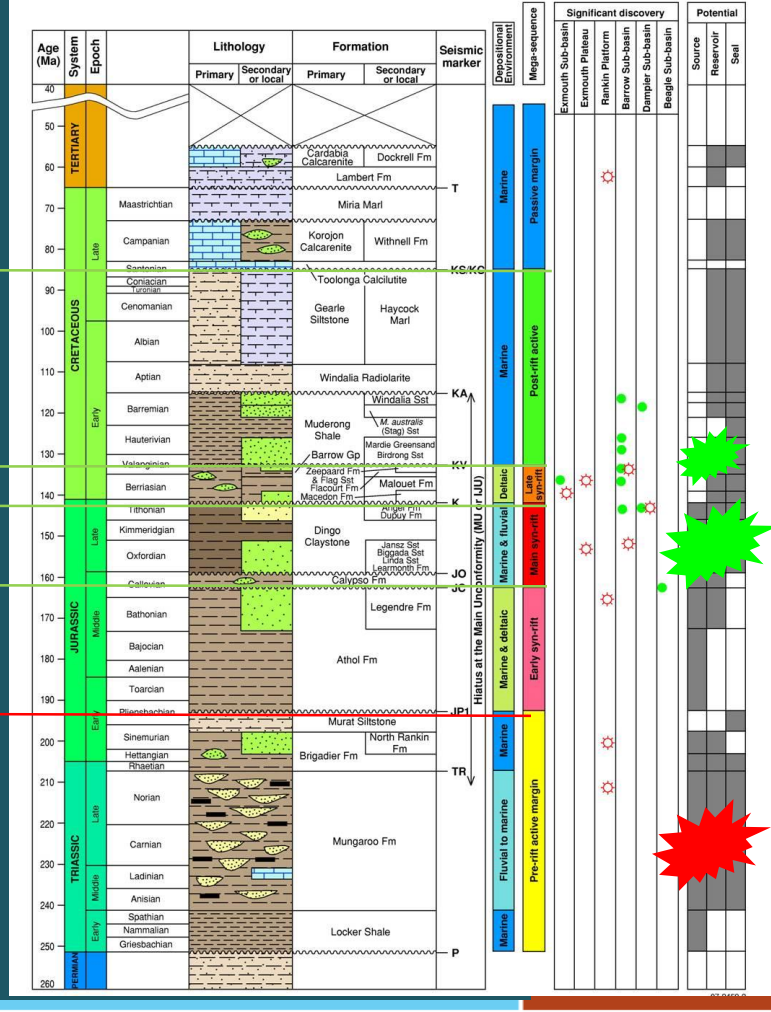
Upper Cretaceous - Paleogene
Passive Margin loading of basins by prograding carbonate wedge
Miocene collision

Cretaceous Major Transgression
Open marine, Regional Seal – Muderong

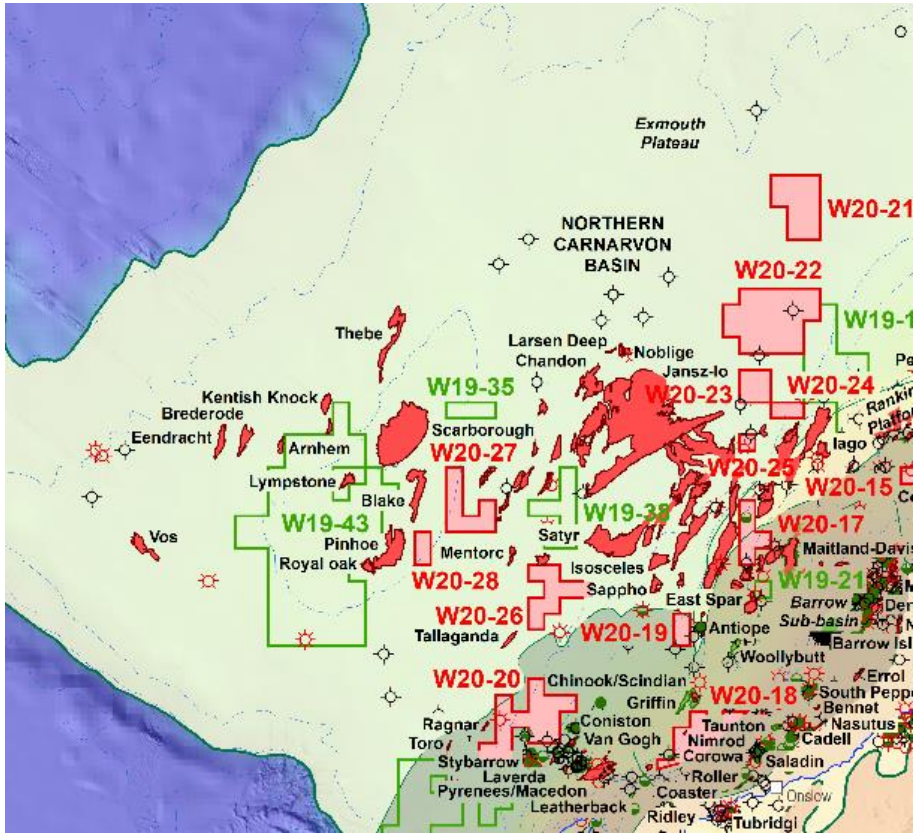
Cretaceous deltas – Barrow Group
Jurassic Restricted marine – Dingo Claystone Oil Source

Jurassic Prodelta and Delta – Athol & Legendre Fms

Triassic deltas – Mungaroo
Coal & Shale Source – Gas
Fluvial Reservoirs -Tilt Blocks



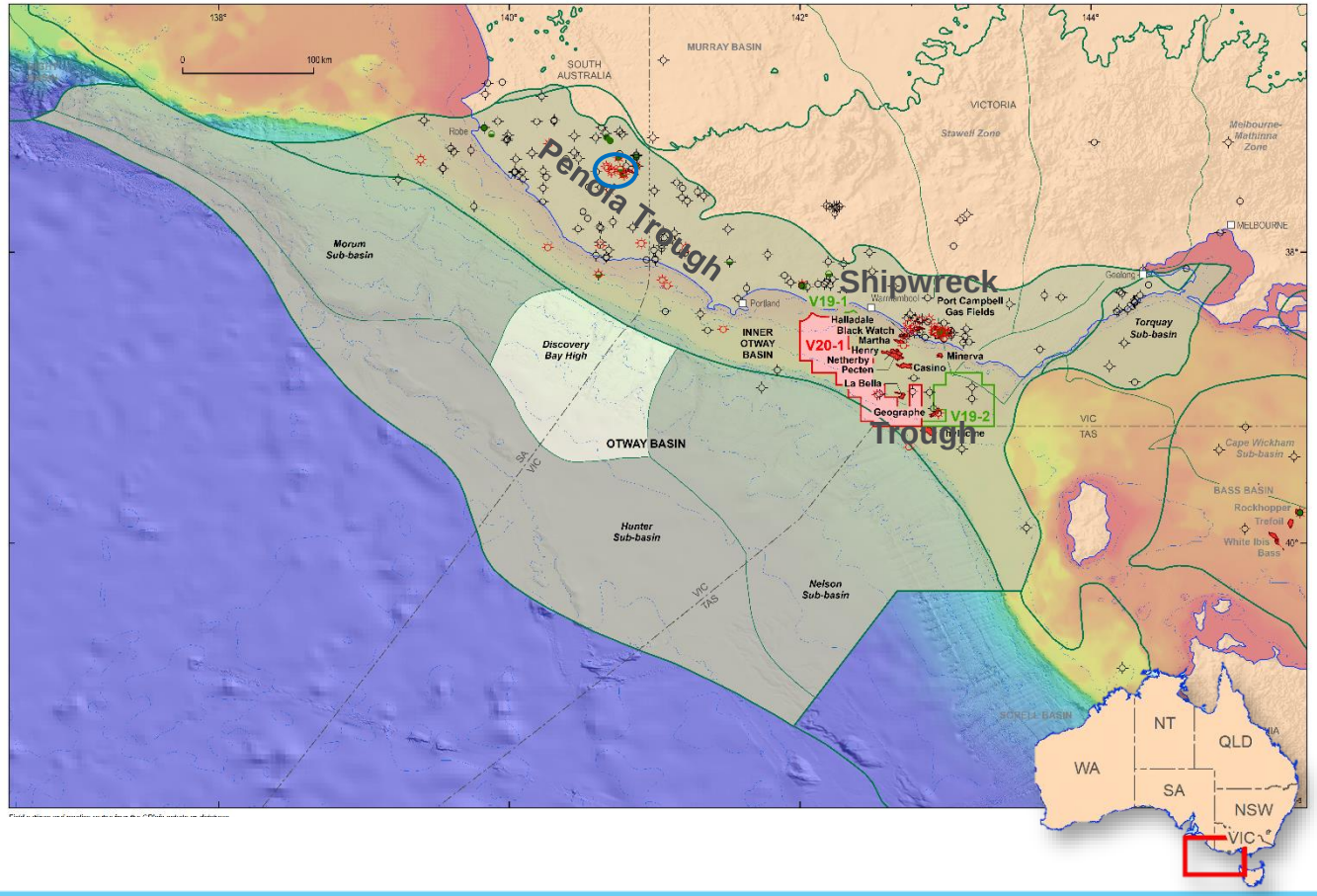
Exmouth Plateau



Areas W20-21 to W20-28

- Cretaceous play
- Western region of “traditional” Mungaroo play
- Testing the extent of Mungaroo gas play
- Distribution of Triassic carbonates?
- Southern area may have access to Lower Triassic targets
- Limited well control in the northern part
- Block sizes and outlines result of mandated relinquishments

Otway Basin



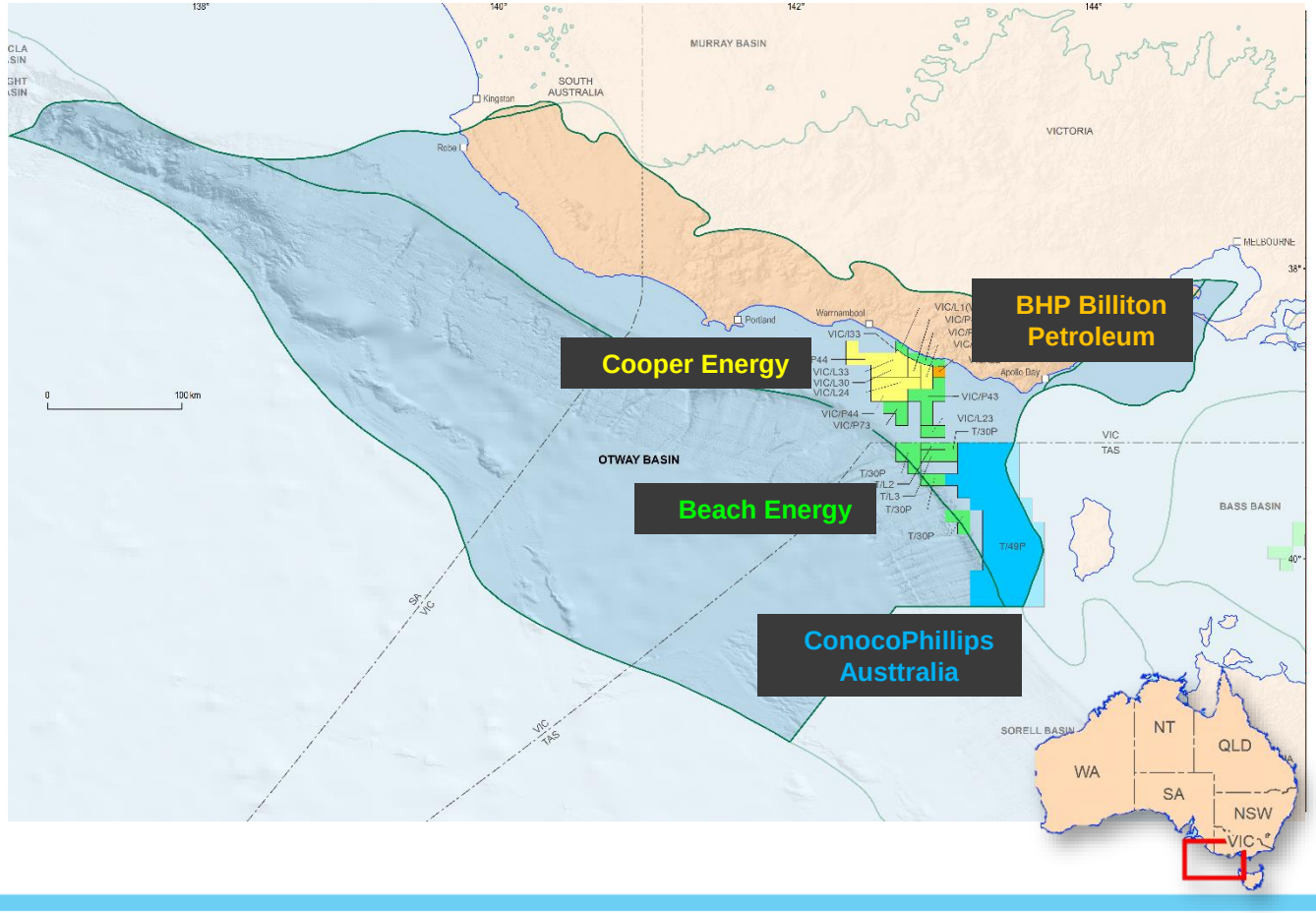
- Gas producing province since late 1990s
- Rapid suite of new discoveries since Geographe/Thylacine in 2001
- Waarre Fm (Late Cretaceous, Turonian) in Shipwreck Trough is main play
- Additional discoveries (onshore) are related to Early Cretaceous “Pretty Hill Formation”, eg. Hazelgrove in Penola Trough, South Australia
- Currently four main operators holding offshore permits

Gas produced: 1.53 Tcf
Gas remaining: 1.52 Tcf (2P + 2C)

Oil produced: 28 MMbbl
Oil remaining: 7 MMbbl (2P + 2C)
Condensate remaining: 22 MMbbl
LPG remaining: 25 MMbbl

(Geoscience Australia)

Otway Basin: Main Operators



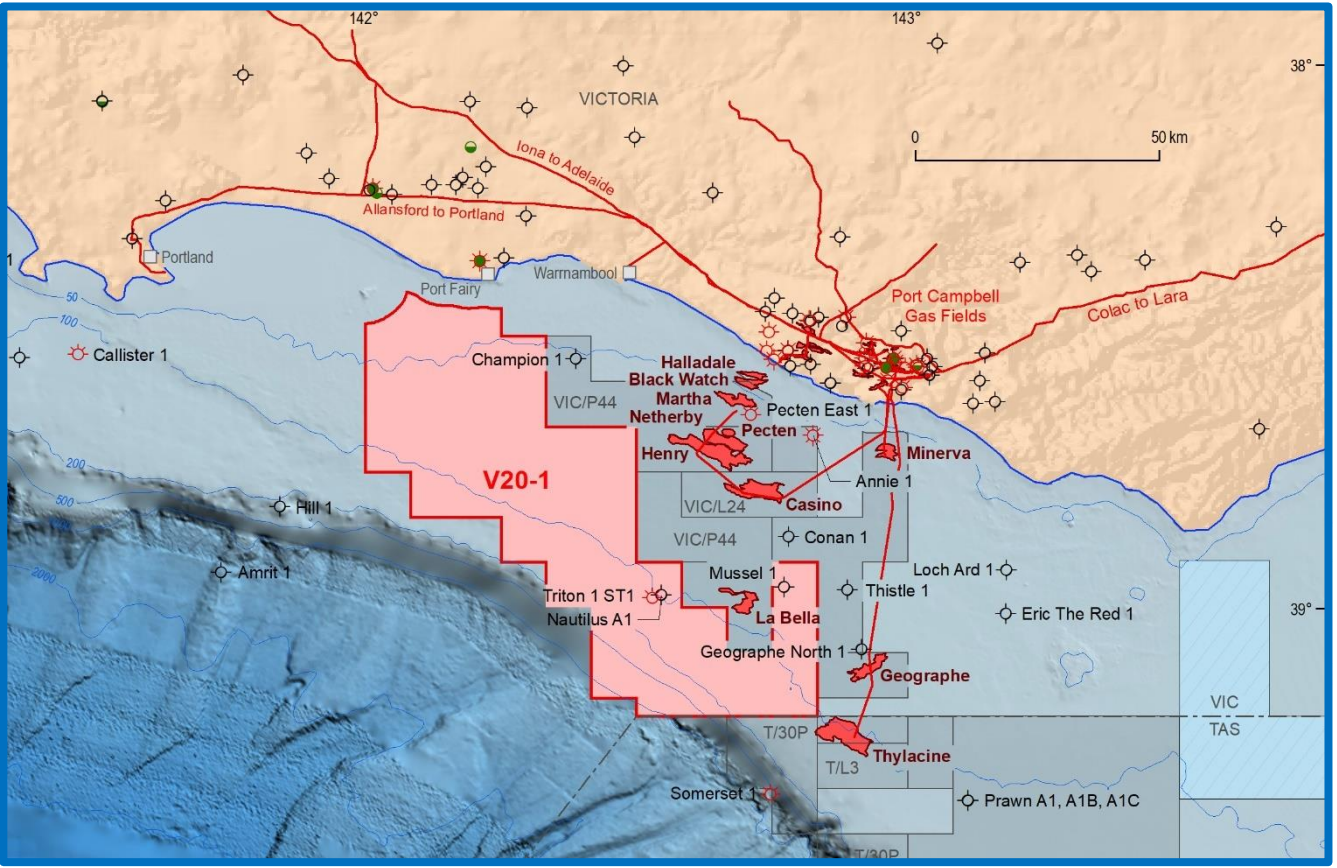
- Gas producing province since late 1990s
- Rapid suite of new discoveries since Geographe/Thylacine in 2001
- Waarre Fm (Late Cretaceous, Turonian) in Shipwreck Trough is main play
- Additional discoveries (onshore) are related to Early Cretaceous “Pretty Hill Formation”, eg. Hazelgrove in Penola Trough, South Australia
- Currently four main operators holding offshore permits

Gas produced: 1.53 Tcf
Gas remaining: 1.52 Tcf (2P + 2C)

Oil produced: 28 MMbbl
Oil remaining: 7 MMbbl (2P + 2C)
Condensate remaining: 22 MMbbl
LPG remaining: 25 MMbbl

(Geoscience Australia)

Otway Basin



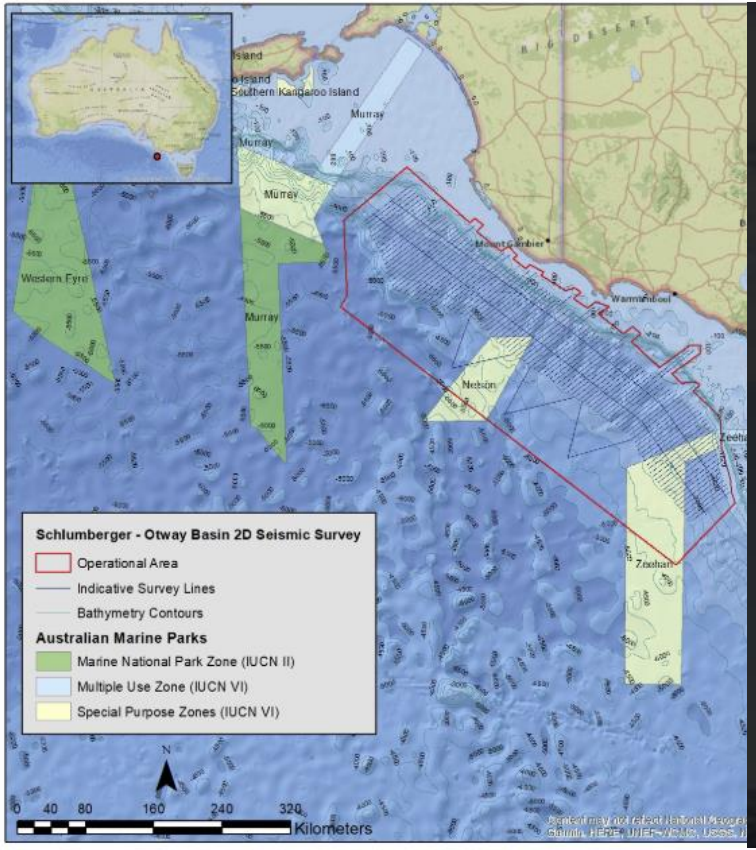
Area V20-1

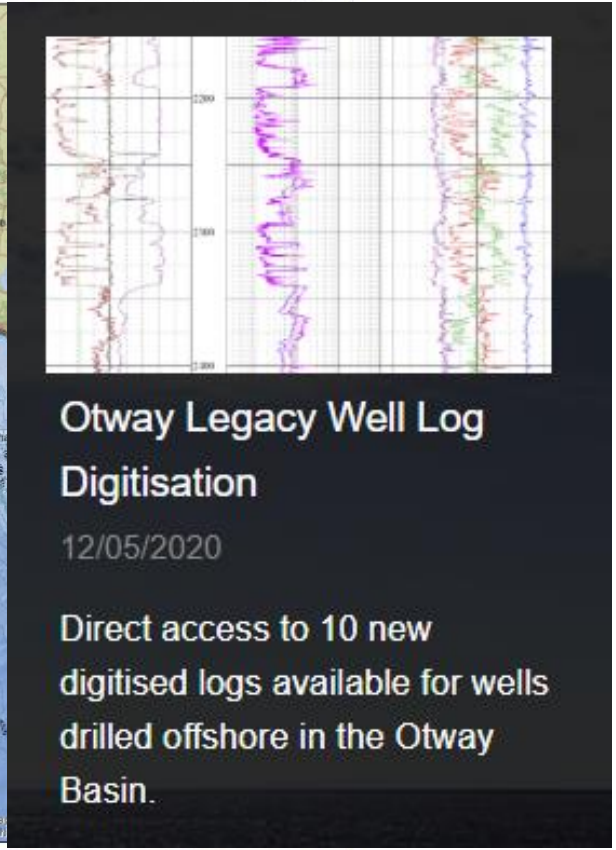
- Continental shelf of basin underexplored
- Waarre play confirmed in La Bella, including presence of wet gas
- Deeper Cretaceous plays have remained untested

New data

- Regional seismic survey acquired across deep water area
- GA commenced integrated regional study of basin
- Review of petroleum systems
- New digitised well-logs available on NOPIMS

Otway Basin





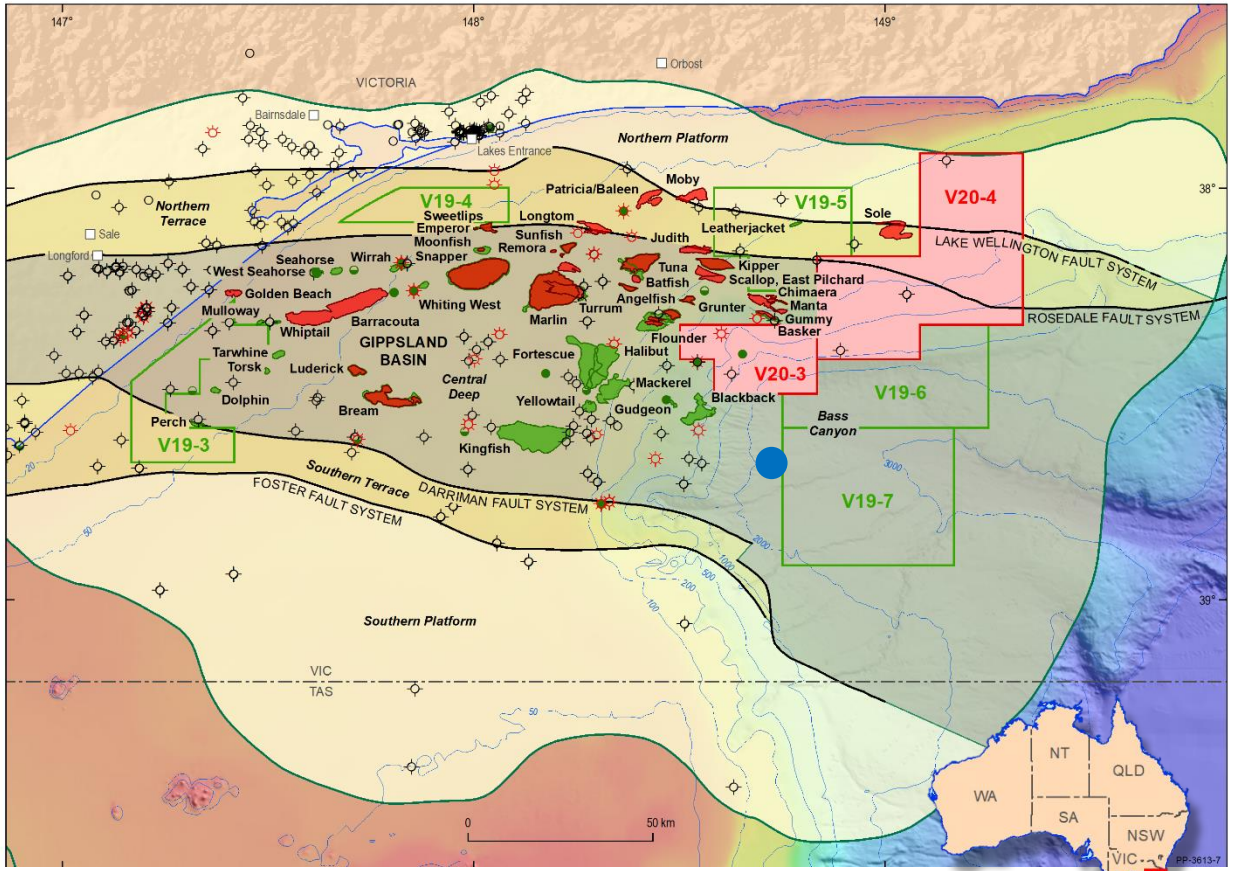
Area V20-1

- Continental shelf of basin underexplored
- Waarre play confirmed in La Bella, including presence of wet gas
- Deeper Cretaceous plays have remained untested

New data

- Regional seismic survey acquired across deep water area
- GA commenced integrated regional study of basin
- Review of petroleum systems
- New digitised well-logs available on NOPIMS

Gippsland Basin



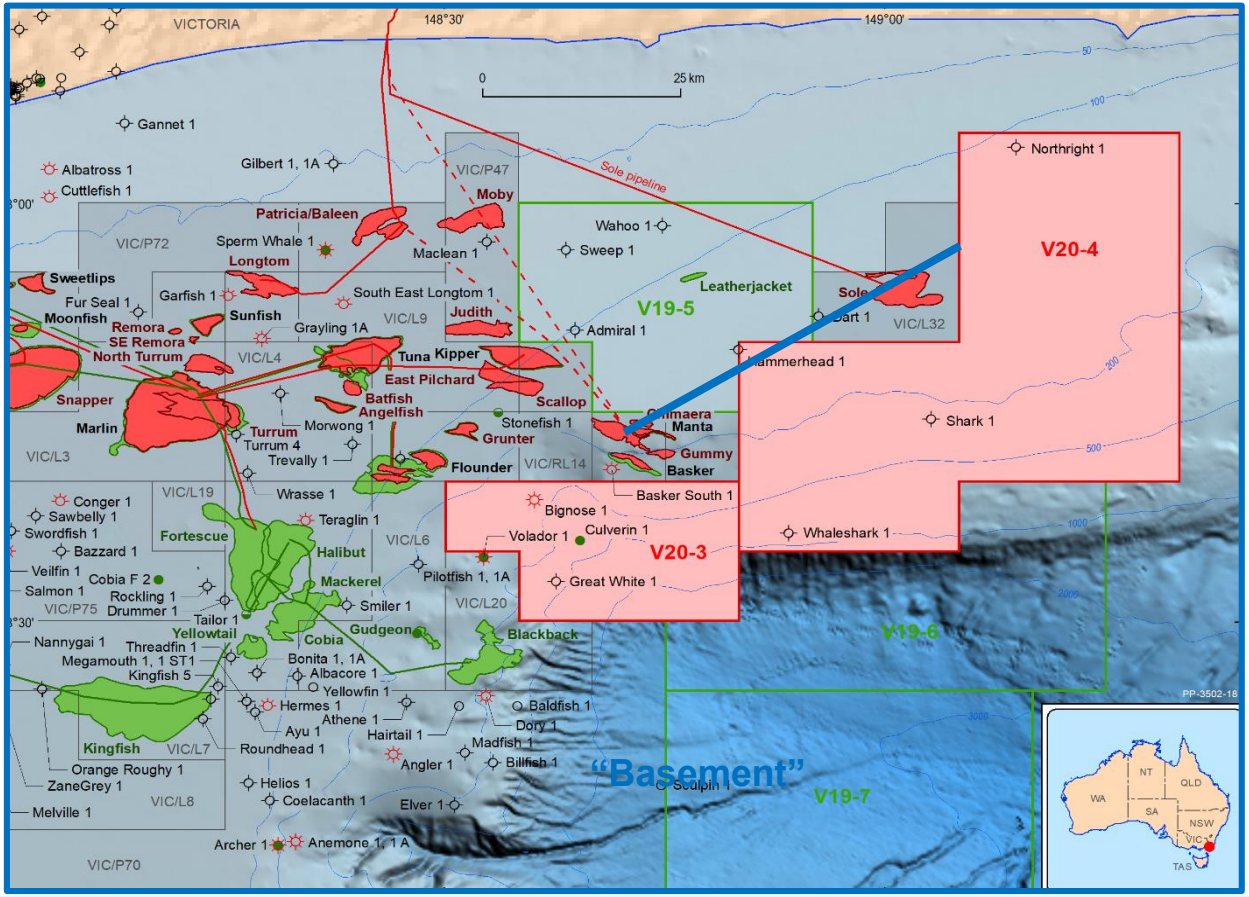
- World class oil gas province with continued oil and gas production since 1970
- Wide-ranging untested exploration targets, especially in the east and along the basin flanks
- New permit awards in recent years indicate that the basin has maintained its attractiveness
- Sculpin-1 (ExxonMobil) newest exploration well, drilled in Nov/Dec2019 (2,300 m water depth)

Gas produced: 10.13 Tcf
Gas remaining: 5.06 Tcf (2P + 2C)

Oil produced: 4940 MMbbl
Oil remaining: 171 MMbbl (2P + 2C)
Condensate remaining: 130 MMbbl
LPG remaining: 210 MMbbl

(Geoscience Australia)

Gippsland Basin



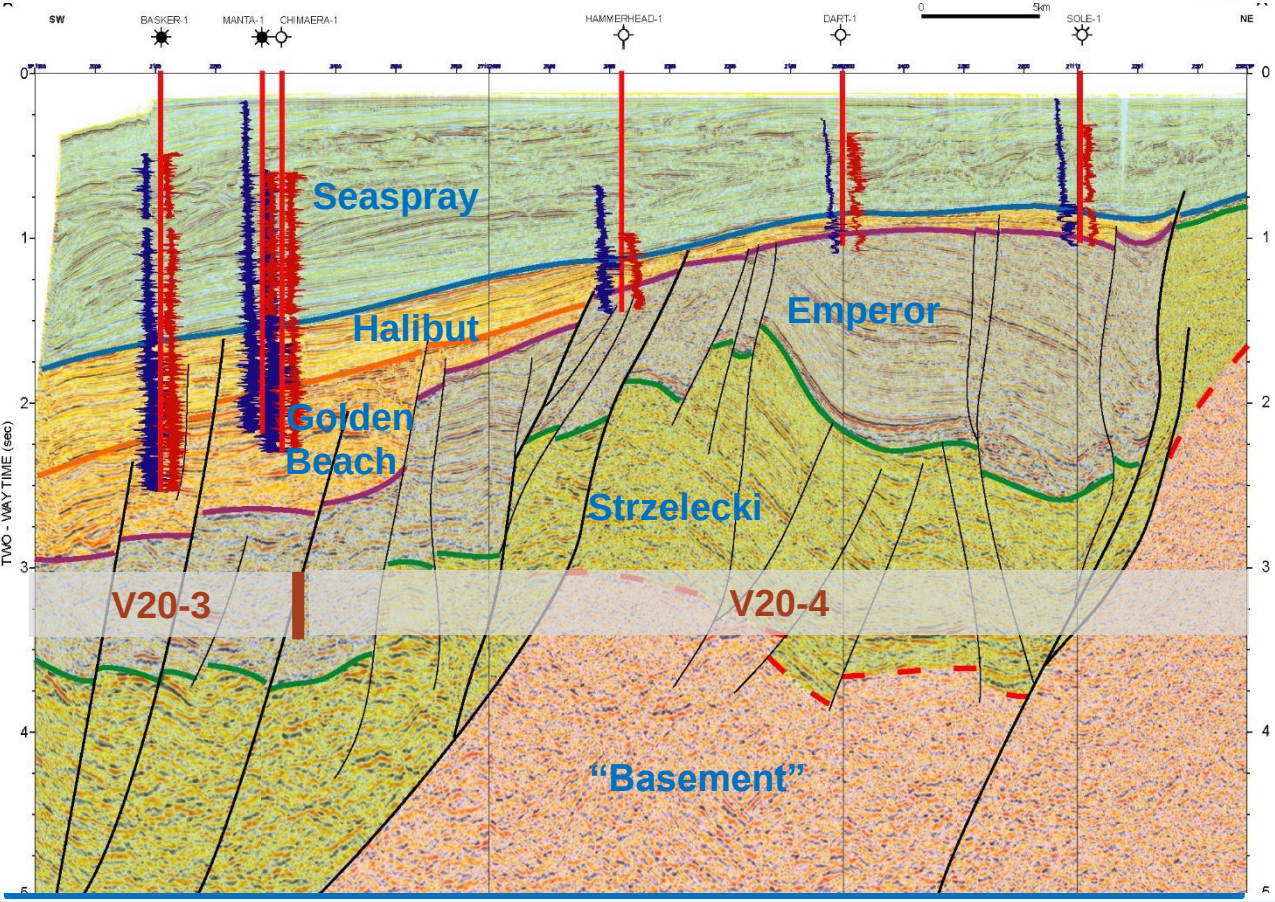
Areas V20-3 and V20-4

- Covering the entire sedimentary section
- Access to proven plays in deeper (older) Latrobe Group sediments, including Kipper and Basker/Manta analogues
- Pinch-out plays along Northern Terrace/Northern Platform
- Open questions about true thickness of stratigraphic groups

New data

- Ongoing review of biostratigraphy by Geoscience Australia
- CGG's new reprocessed 3D seismic

Gippsland Basin



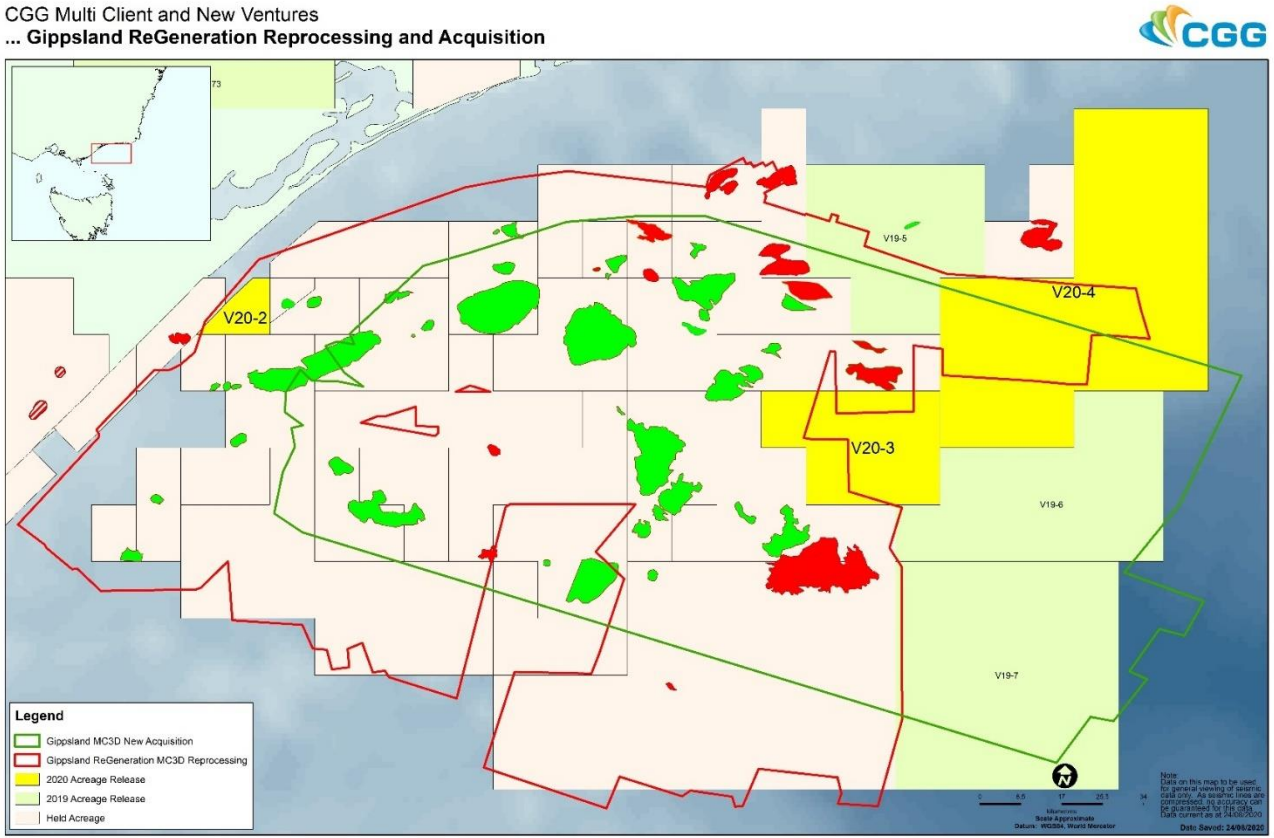
Areas V20-3 and V20-4

- Covering the entire sedimentary section
- Access to proven plays in deeper (older) Latrobe Group sediments, including Kipper and Basker/Manta analogues
- Pinch-out plays along Northern Terrace/Northern Platform
- Open questions about true thickness of stratigraphic groups

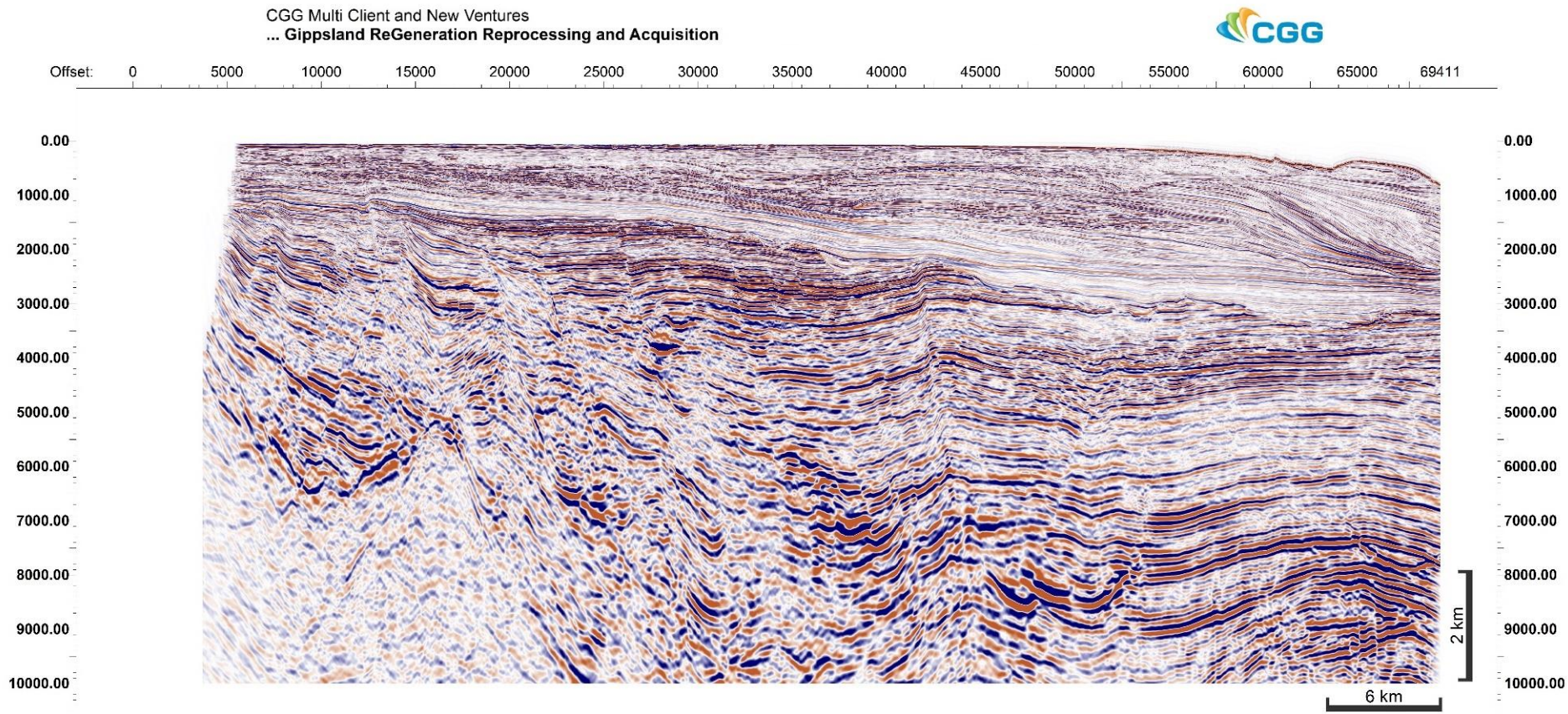
New data

- Ongoing review of biostratigraphy by Geoscience Australia
- CGG's new reprocessed 3D seismic

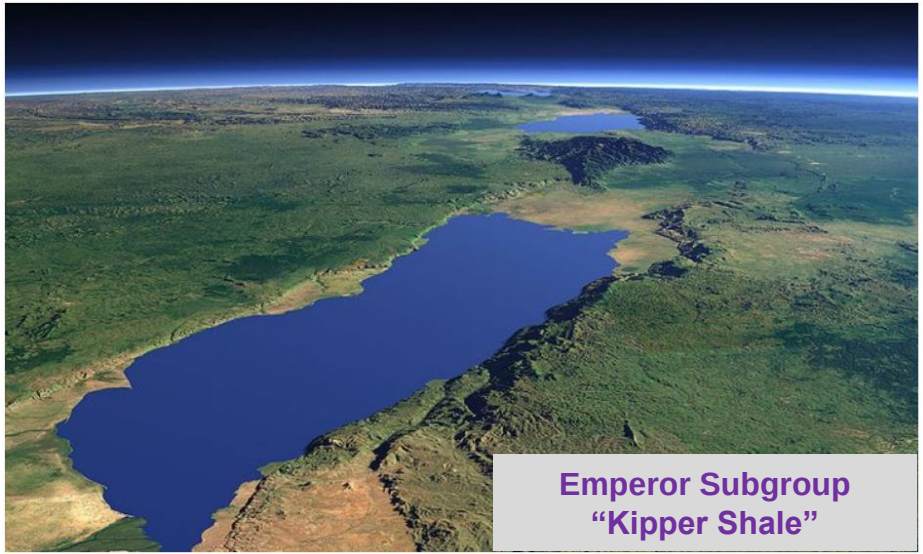
Gippsland Basin: new regional data



Gippsland Basin: new regional data



Gippsland Basin: palaeodepositional environments



https://www.ugandabudgetsafaris.com/blog/rift-valley-lakes-in-uganda/

https://coastalgadnr.org/Wetlands

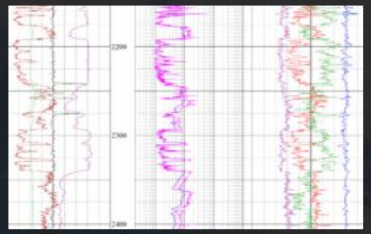
Australian Government
Geoscience Australia
National Offshore Petroleum Titles Administrator

National Offshore Petroleum Information Management System (NOPIMS)

Welcome to NOPIMS

Geoscience Australia has developed the National Offshore Petroleum Information Management System (NOPIMS) as an online data discovery and delivery system for all Australian offshore petroleum wells and survey information.

Data Access



Otway Legacy Well Log Digitisation

12/05/2020

Direct access to 10 new digitised logs available for wells drilled offshore in the Otway Basin.

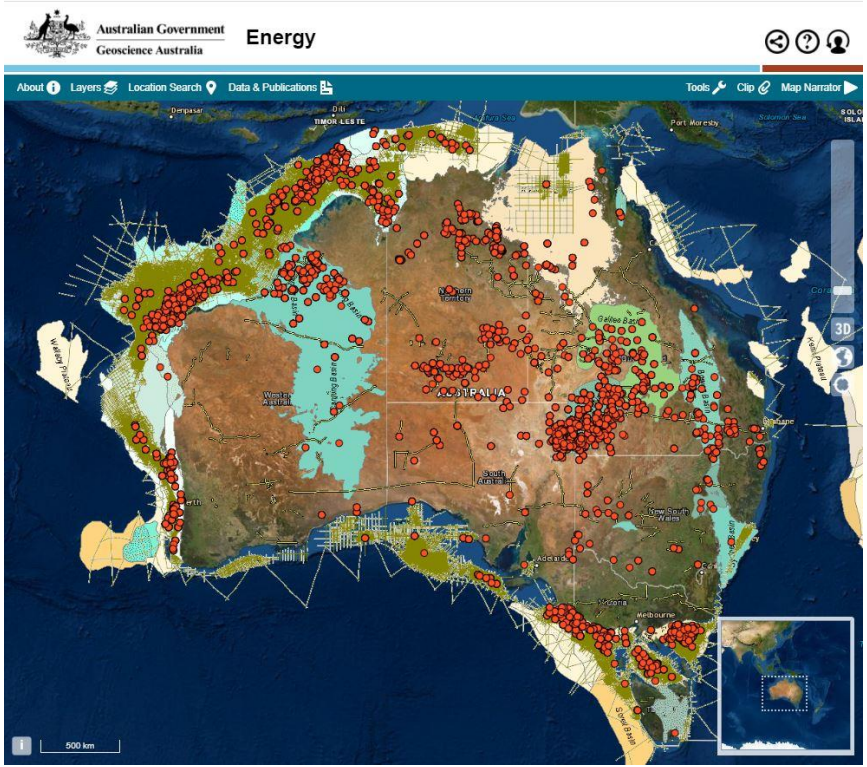
2020 Acreage Release consultation

04/05/2020

Consultation on potential areas for the 2020 Offshore Petroleum Acreage Release is now open.

https://www.ga.gov.au/nopims

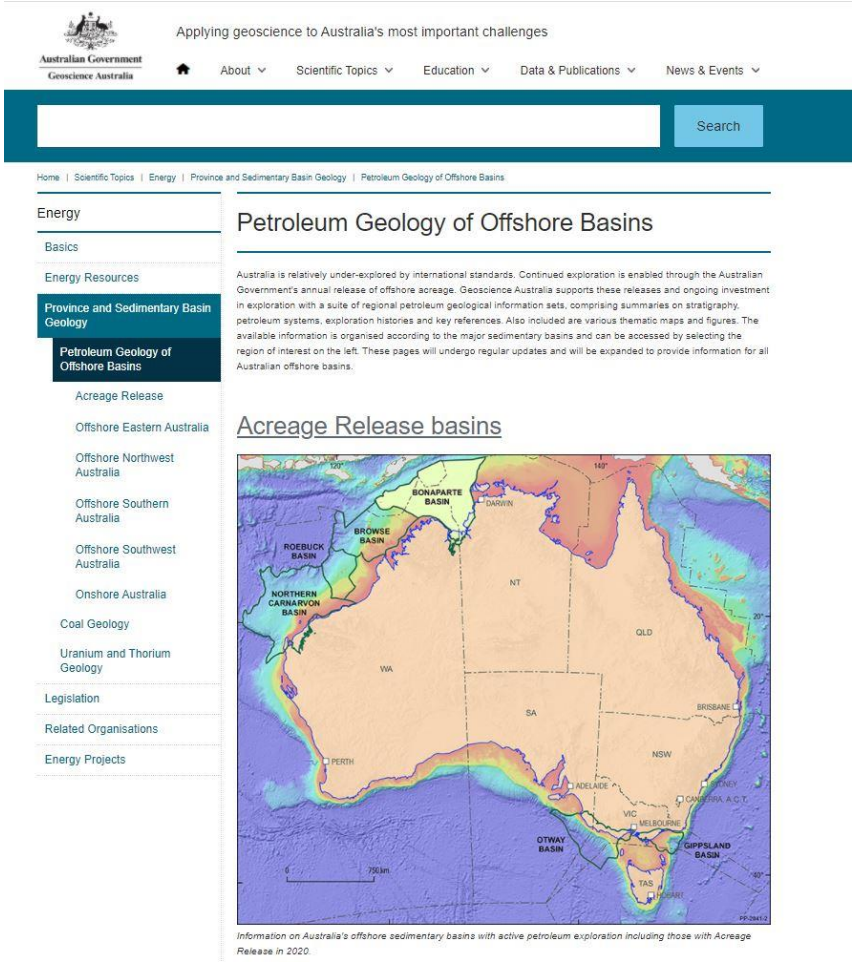
Geoscience Australia's Data Discovery Portal



https://portal.ga.gov.au/persona/energy

Geoscience Australia's newly developed data discovery portal allows access to a wide range of geological and geospatial data, including:

- petroleum wells
- source rock geochemistry
- stratigraphic information
- province and basin geology
- geophysical data coverage
- a range of geospatial and administrative datasets

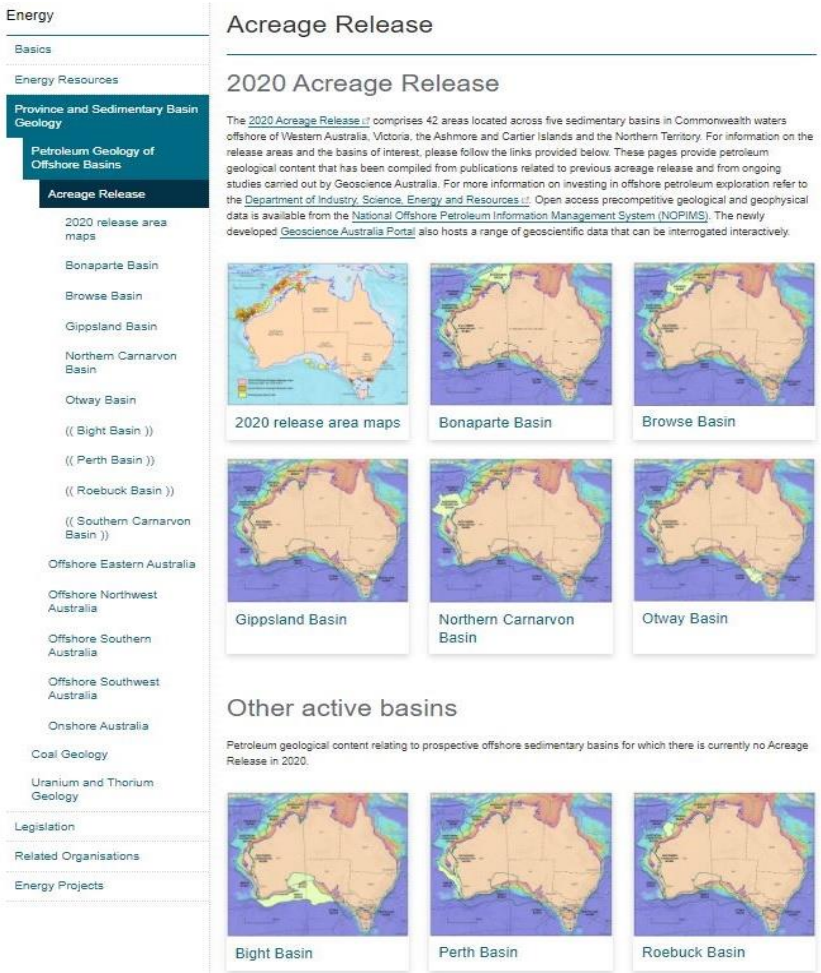


Information on Australia's offshore sedimentary basins with active petroleum exploration including those with Acreage Release in 2020.

Geoscience Australia supports the annual acreage release with a suite of regional petroleum geological information including:

- basin evolution
- stratigraphy
- petroleum systems
- exploration histories
- key references
- a variety of thematic maps and figures

www.ga.gov.au/petroleum



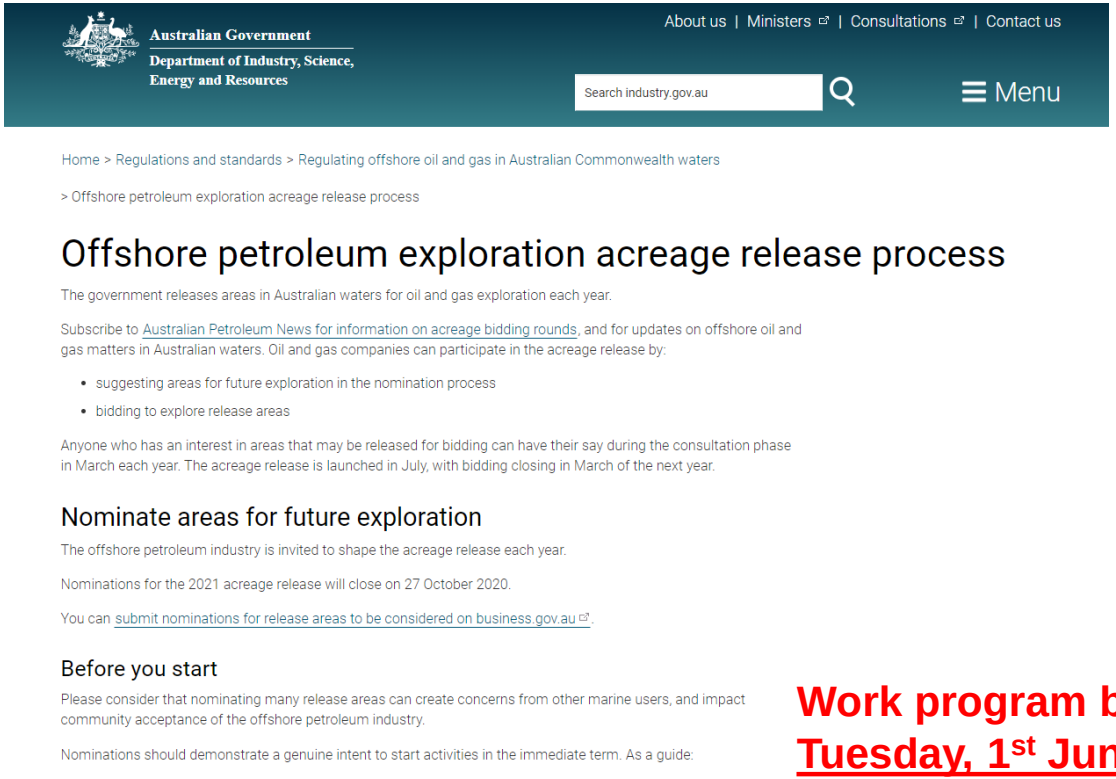
Geoscience Australia supports the annual acreage release with a suite of regional petroleum geological information including:

- basin evolution
- stratigraphy
- petroleum systems
- exploration histories
- key references
- a variety of thematic maps and figures

www.ga.gov.au/petroleum

Further Information

industry.gov.au/2020-acreage-release



Australian Government
Department of Industry, Science, Energy and Resources

About us | Ministers | Consultations | Contact us

Search industry.gov.au

Menu

Home > Regulations and standards > Regulating offshore oil and gas in Australian Commonwealth waters

> Offshore petroleum exploration acreage release process

Offshore petroleum exploration acreage release process

The government releases areas in Australian waters for oil and gas exploration each year.

Subscribe to Australian Petroleum News for information on acreage bidding rounds, and for updates on offshore oil and gas matters in Australian waters. Oil and gas companies can participate in the acreage release by:

- suggesting areas for future exploration in the nomination process
- bidding to explore release areas

Anyone who has an interest in areas that may be released for bidding can have their say during the consultation phase in March each year. The acreage release is launched in July, with bidding closing in March of the next year.

Nominate areas for future exploration

The offshore petroleum industry is invited to shape the acreage release each year.

Nominations for the 2021 acreage release will close on 27 October 2020.

You can submit nominations for release areas to be considered on business.gov.au.

Before you start

Please consider that nominating many release areas can create concerns from other marine users, and impact community acceptance of the offshore petroleum industry.

Nominations should demonstrate a genuine intent to start activities in the immediate term. As a guide:

- Acreage Release process
- How to obtain acreage, bidding process
- Release area maps (“QuickLooks”)
- Block listings and diagrams
- How to nominate areas for future release

Work program bidding for 2020 release areas closes Tuesday, 1st June, 2021