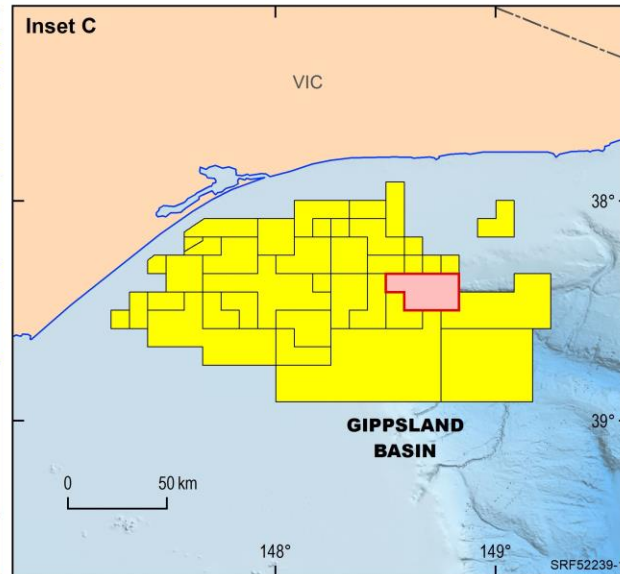
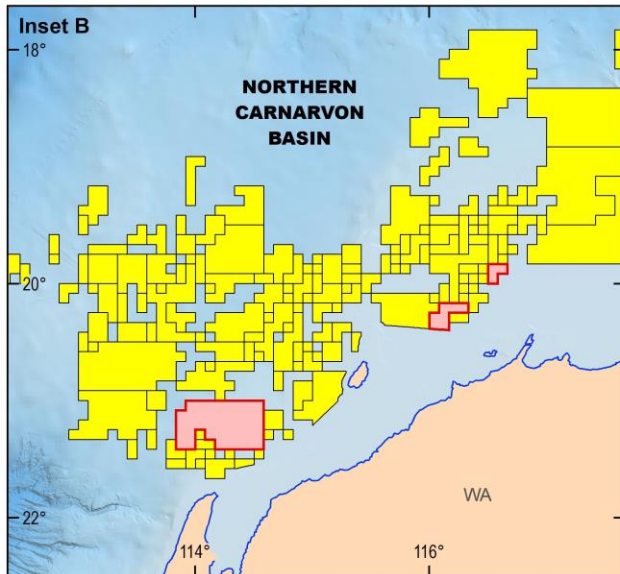
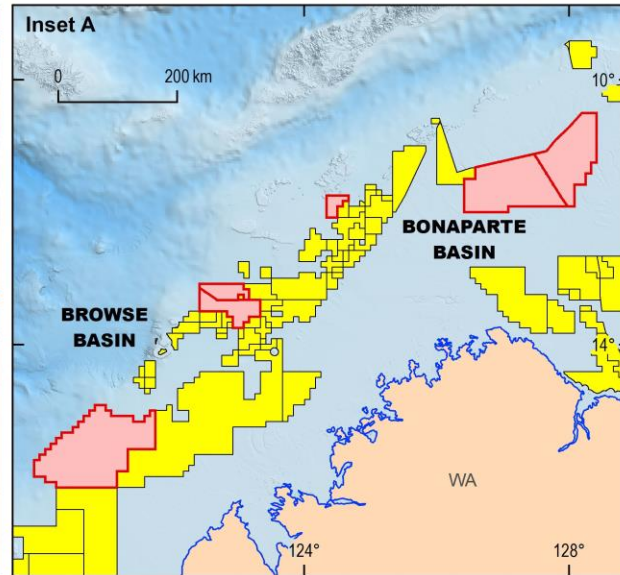
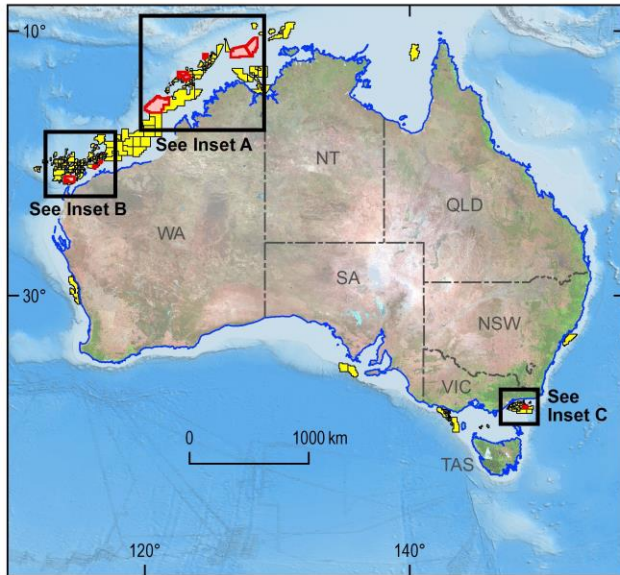


# Geological Context of the 2022 Offshore Acreage Release Areas

Tom Bernecker, Ryan Owens, Andrew Kelman & Kamal Khider  
*Energy Resources Advice & Promotion;  
Minerals, Energy & Groundwater Division*

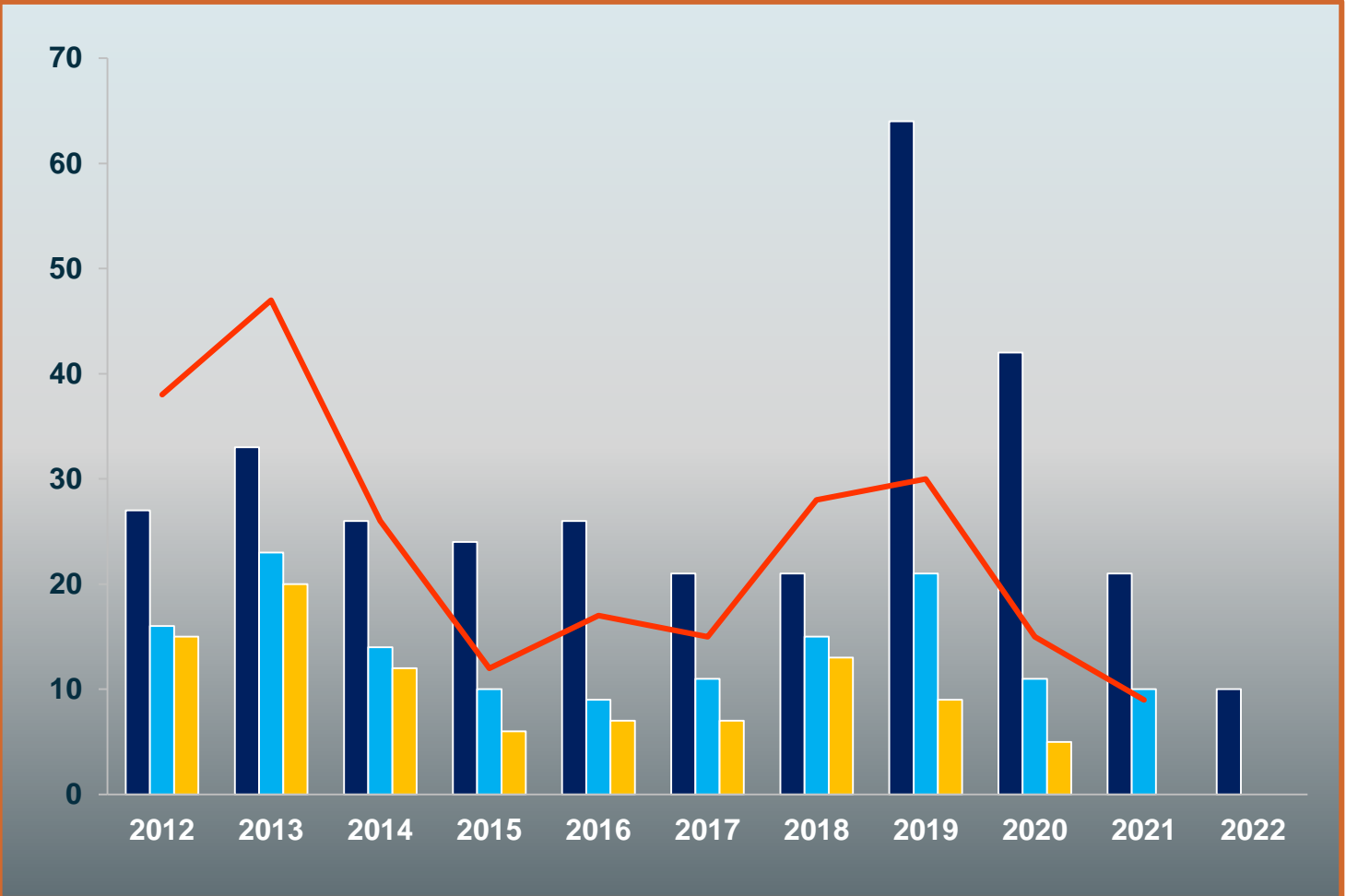
# Current offshore permits and 2022 release areas



- **31 nominations received, 10 areas submitted for public consultation, 10 areas released**
- **In 2022, majority of areas located in the Bonaparte and Browse basins**
- **Underexplored areas in Bonaparte Basin (Malita Graben ) and Browse Basin (Barcoo Sub-basin )**
- **Only one area released outside NW Shelf: eastern Gippsland Basin**

**Closing date for bid submission:  
Thursday, 2 March 2023**

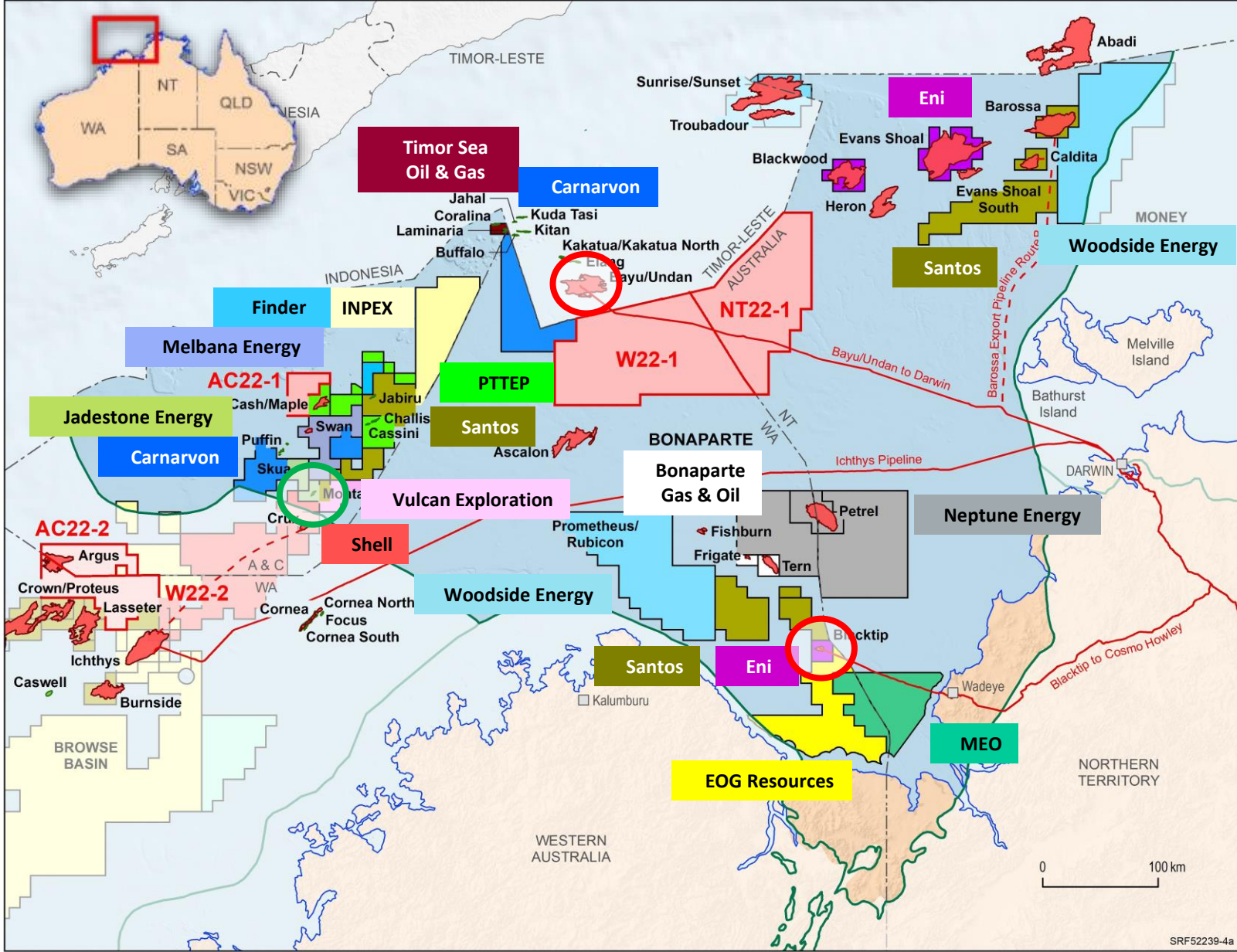
# Offshore acreage release statistics: 2012 - 2022



- Bid-round participation improved after 2014/15 global downturn
- Implementation of new acreage release process in 2019 resulted in large number of nominations and large number of bid submissions
- From 2020 onwards, noticeable decline in nominations received and areas released
- In 2022, lowest number of release areas



# Bonaparte Basin: main operators and infrastructure



Established oil and gas province with production from

- **Blacktip** (Petrel Sub-basin, pipeline)
- **Montara** (Vulcan Sub-basin, FPSO)
- **Bayu-Undan** (Flamingo High, pipeline)

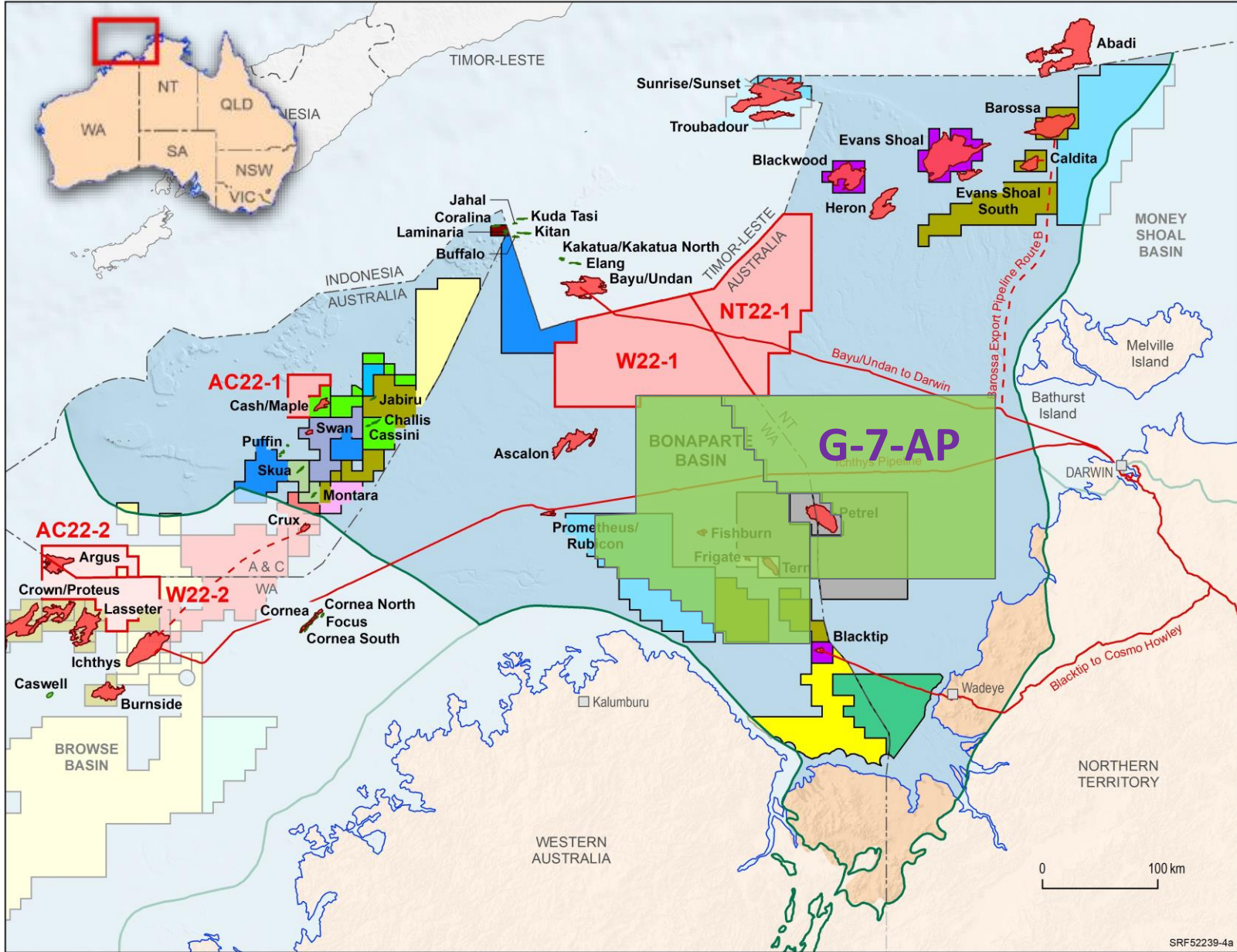
Current activities and future developments include:

- Strong focus on gas exploration/development
- Resurgence of exploration activity in Timor-Leste part of basin
- Extension of Bayu-Undan gas resource with CCS and feedstock for Darwin LNG
- Development of Barossa-Caldita gas field
- Development of Petrel-Tern gas field

**Bids received for greenhouse gas storage areas in Petrel Sub-basin**

**INPEX awarded western area (\$ 159 million guaranteed work program)**

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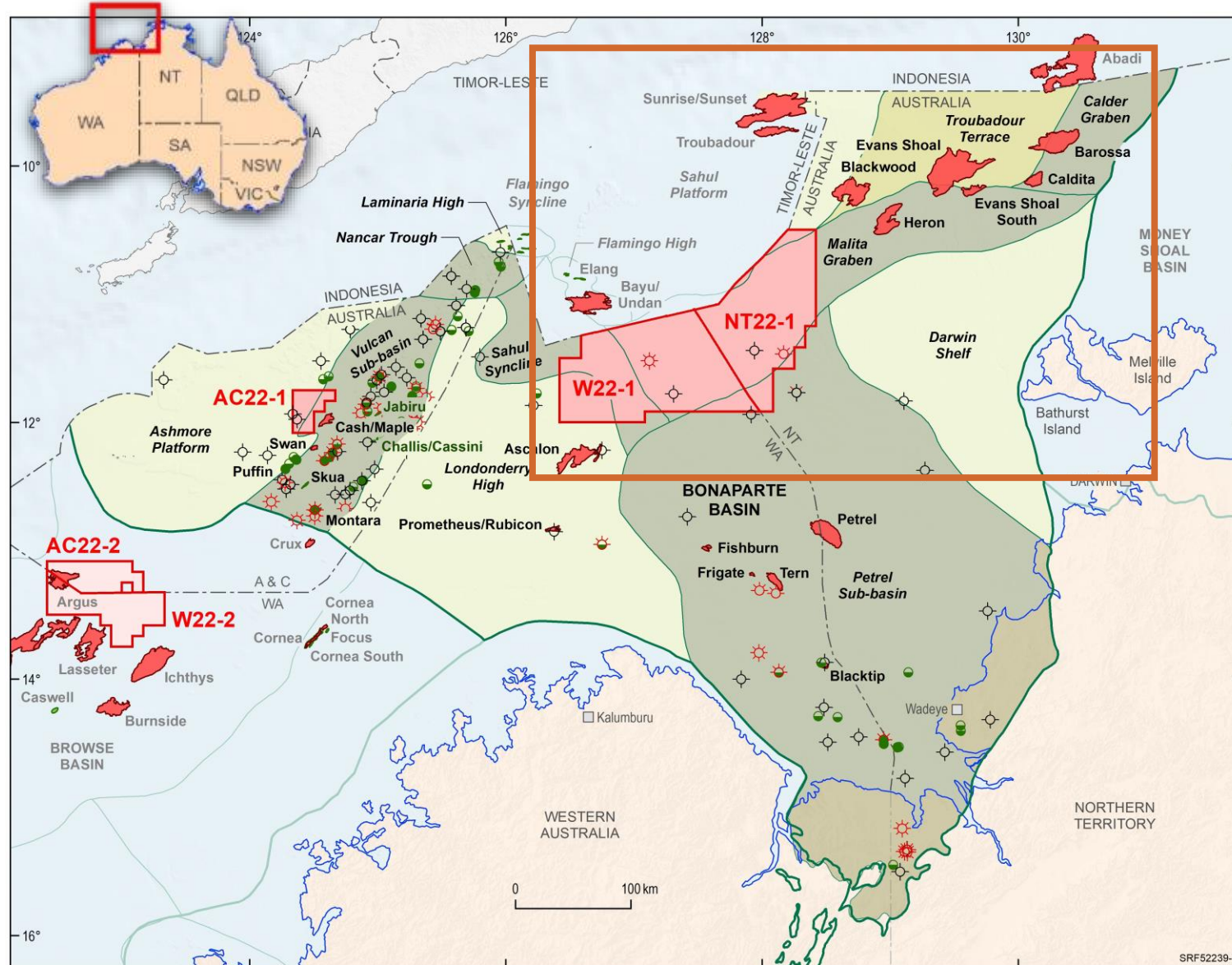
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# Release areas NT22-1 and W22-1: Malita Graben



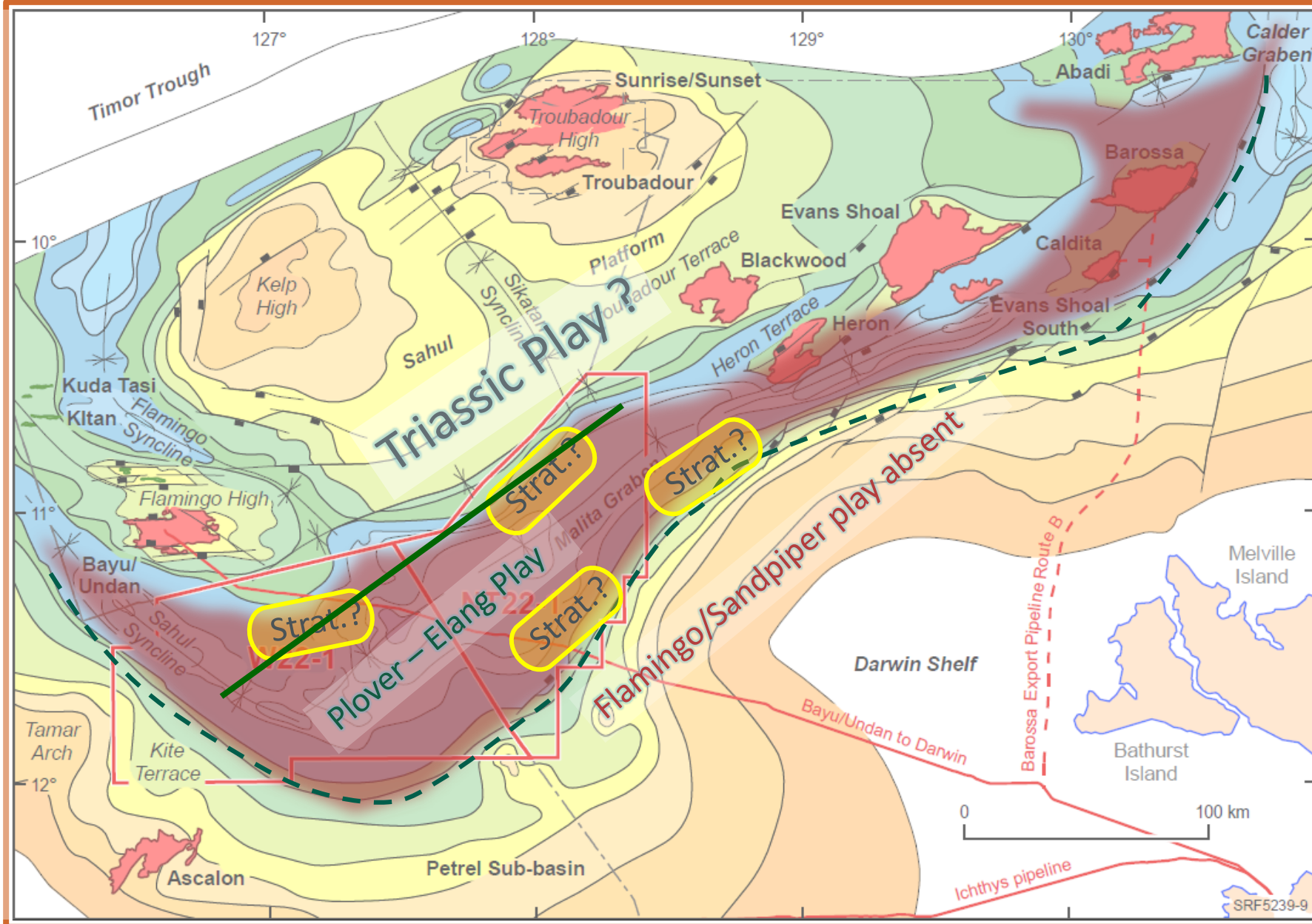
## NT22-1 and W22-1:

- Separated by scheduled area boundary
- Combined 270 graticular blocks (120; 150)
- Shallow water (50 – 100 m)

## Malita Graben:

- Mesozoic to Cenozoic depocentre
- First well drilled in 1972 (Heron-1); gas shows in Late Jurassic to Cretaceous sediments
- Gas discovery at Durville-1 (2011); 39 m gas column in lower Sandpiper Fm (Berriasian to Tithonian)
- Remains largely underexplored
- Main petroleum system related to Jurassic Plover Formation

# Malita Graben – play fairway map



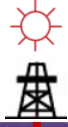
Interpreted extent of Flamingo/Sandpiper play (Jurassic-Cretaceous)

Plover/Elang play: (Jurassic)

Demarcation between seal presence and seal risk

Structural contour map after Shell, 2000; play fairways after Mather, J. & Hand, N, 2019

Durville-1  
(projected)



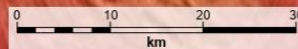
# Malita Graben

TGS Kyranis reprocessed seismic

Durville-1

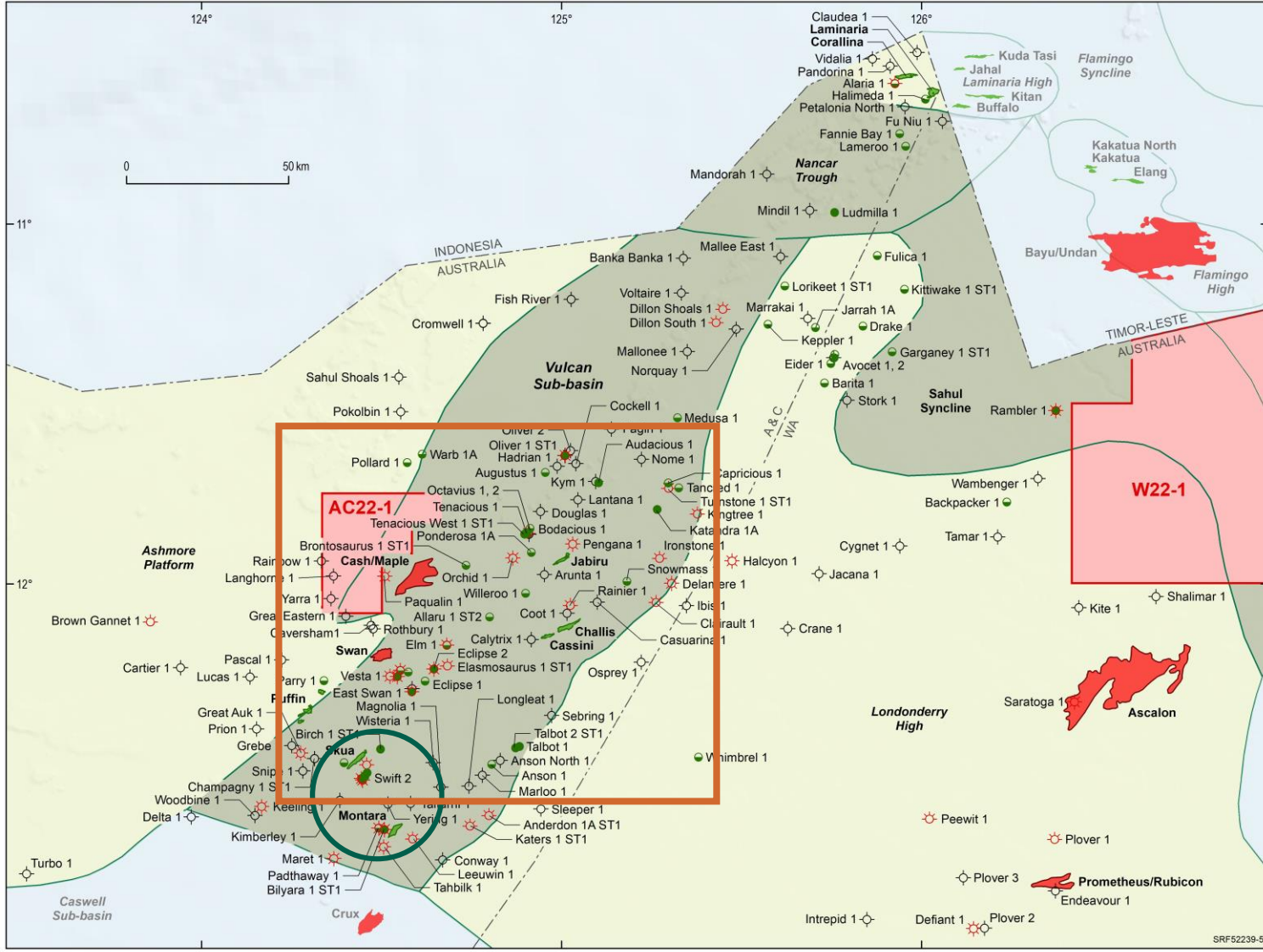
TD:4,136 mKB

- Target: Middle Jurassic sandstones (Plover-Elang play)
- Secondary objective: U. Jurassic and L. Cretaceous
- 39 m dry gas column in Tithonian - Berriasian Lower Sandpiper Fm.
- Plover-Elang objective not reached
- Opportunity to further target Middle Jurassic and Lower Cretaceous section
- Main uncertainty related to reservoir quality within Plover Formation, dependant on depth of burial





# Vulcan Sub-basin



- Late Jurassic extensional depocenter filled with Permian to Holocene sediments
- Proven hydrocarbon province with oil production from Montara (incl Skua, Swift, Swallow)
- Mature exploration province offering additional prospects and play concepts
- Extensive coverage with modern 2D and 3D seismic surveys

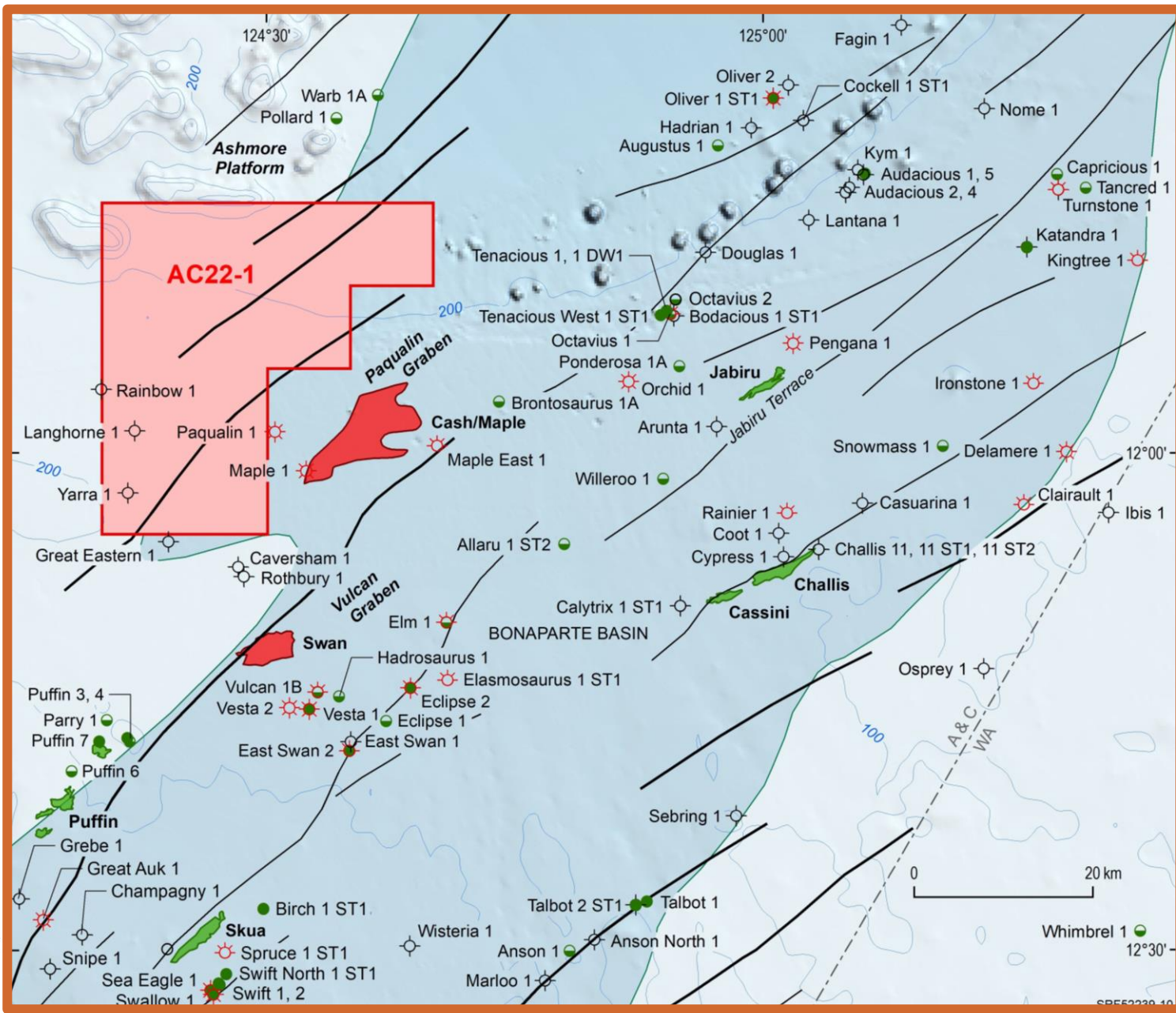
## Release area AC22-1:

- 11 graticular blocks, 200 m water depth
- Straddling the boundary between Vulcan Sub-basin and Ashmore Platform
- Access to important source kitchen represented by Paqualin Graben
- Paqualin-1 (gas discovery) provides well control

Field outlines from the GPluto petroleum database.

SRF52239-5

# Vulcan Sub-basin



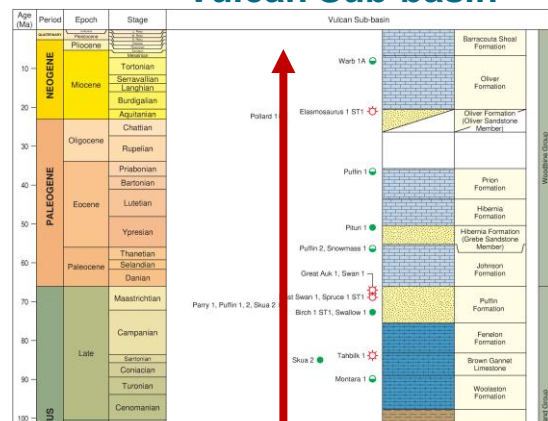
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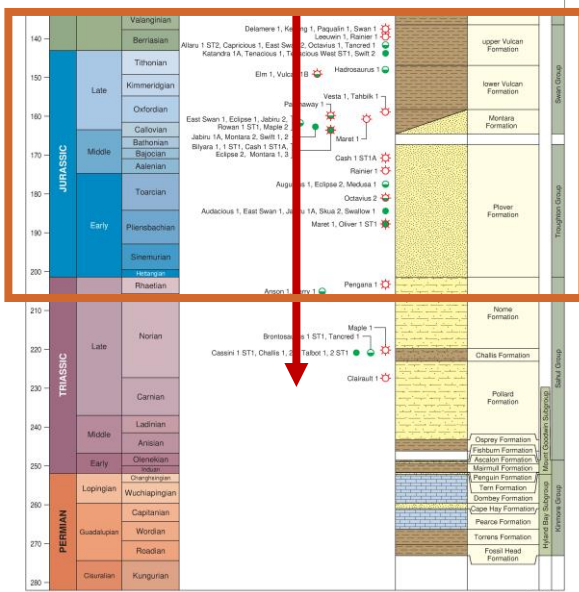
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# Release Area AC22-1: stratigraphic framework, hydrocarbon occurrences

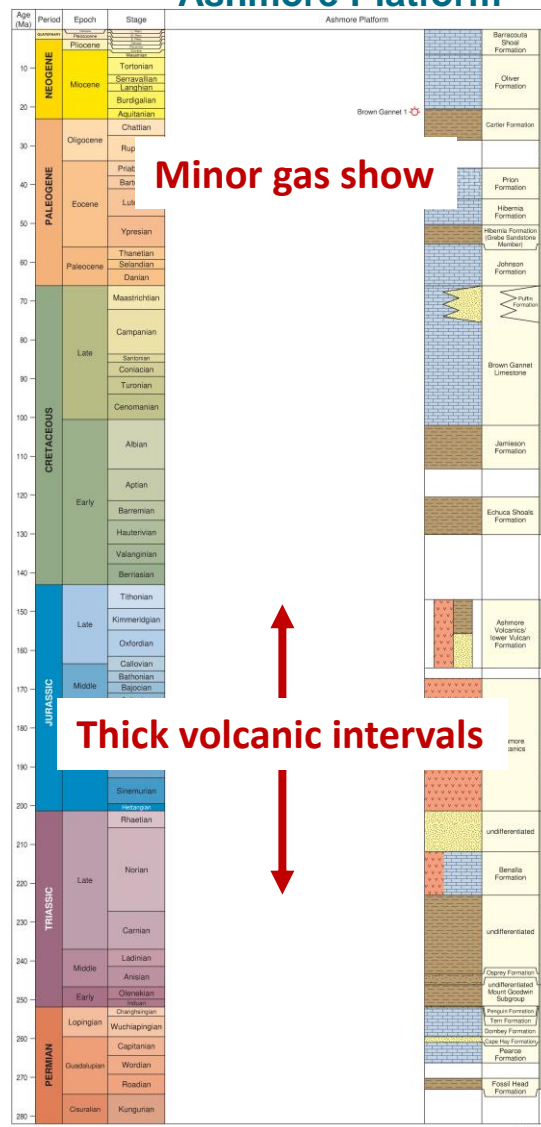
## Vulcan Sub-basin



Multiple petroleum systems and plays

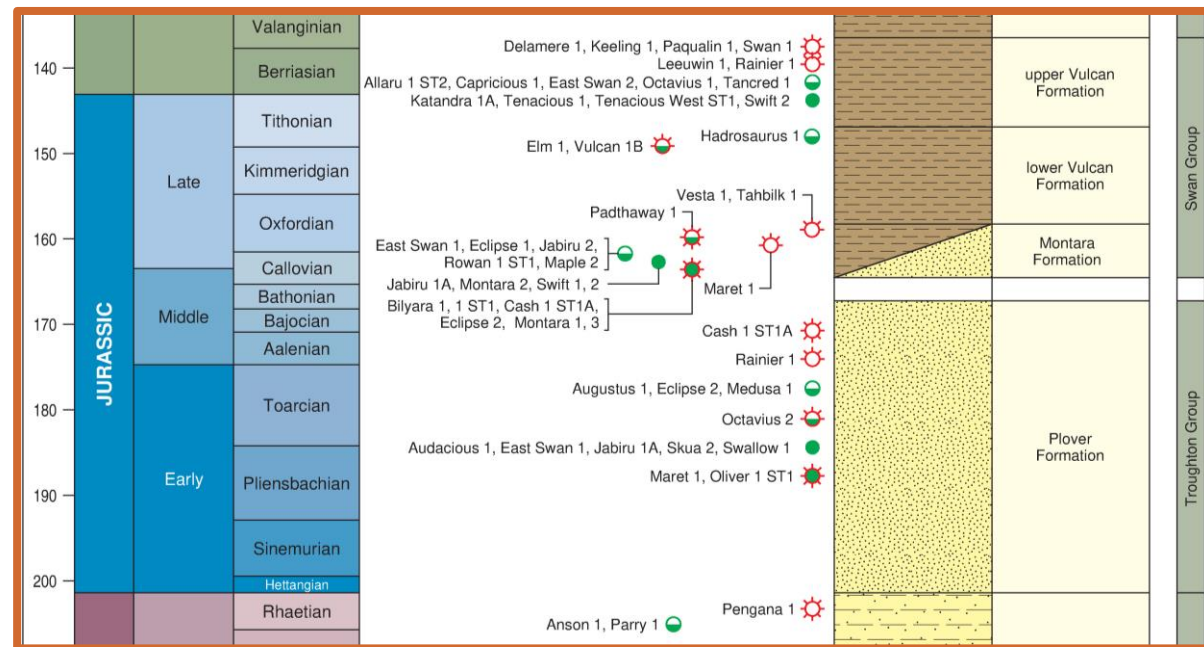


## Ashmore Platform



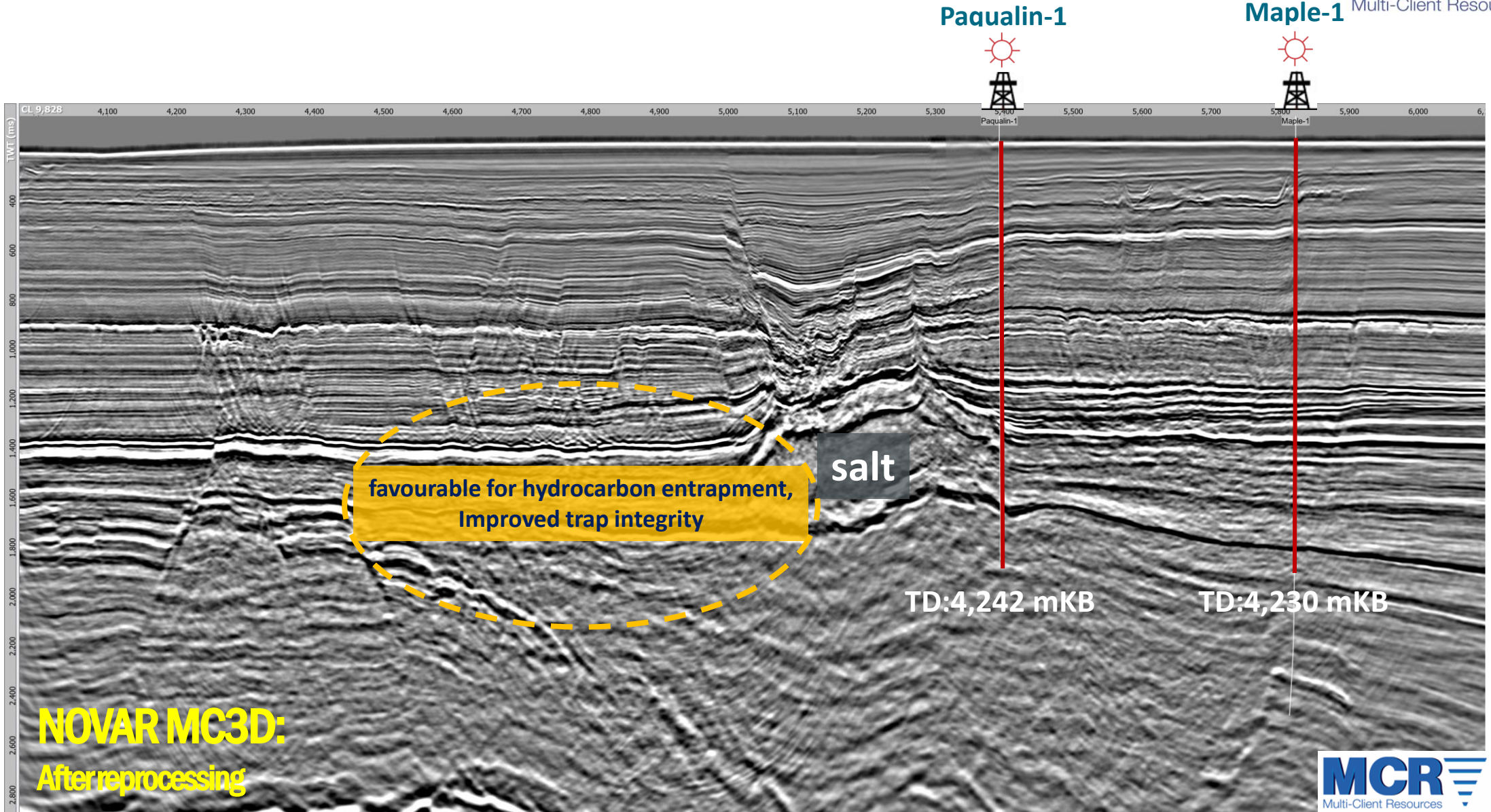
Minor gas show

Thick volcanic intervals

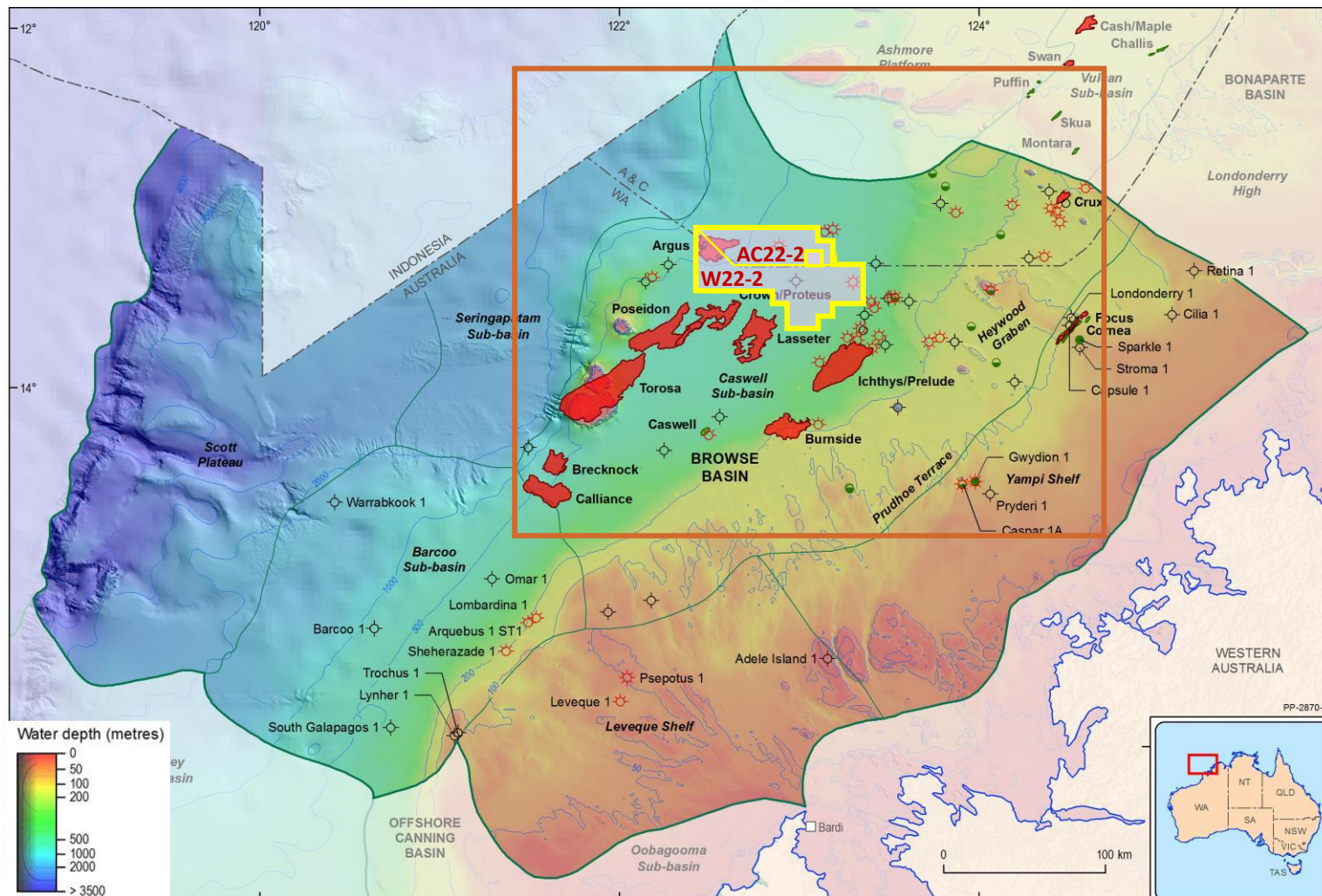


- Montara and lower Vulcan Formation main source rocks in the Paqualin Graben
- Paqualin-1, (western flank of graben) targeted Plover Formation and recorded 2m gas column in upper Vulcan Formation
- Hydrocarbon migration from depocenter toward sub-basin confirmed

# Release Area AC22-1: seismic section



# Browse Basin



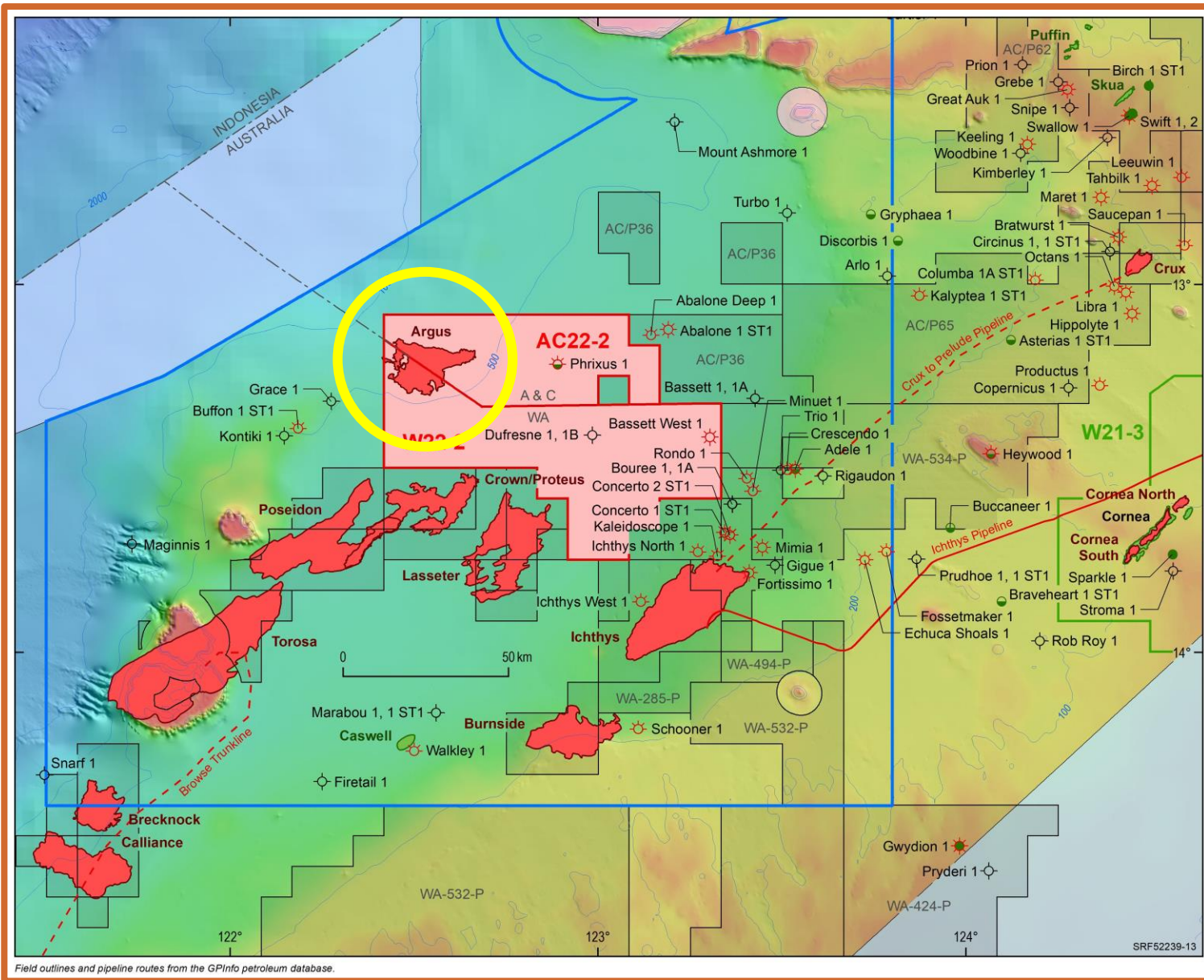
Field outlines and pipeline routes from the GPlinfo petroleum database.

- **Paleozoic to Cenozoic rift-basin**
- **Four hydrocarbon families/petroleum systems identified** (Geoscience Australia, 2017)
- **Gas/condensate production commenced in 2018**
- **Discussions regarding the development of additional resources continue**

## Release areas AC22-2 & W22-2:

- **Located in Caswell Sub-basin**
- **Combined 72 graticular blocks (25; 47)**
- **Water depth 200-500m**
- **Extensive data coverage; includes Argus gas field**

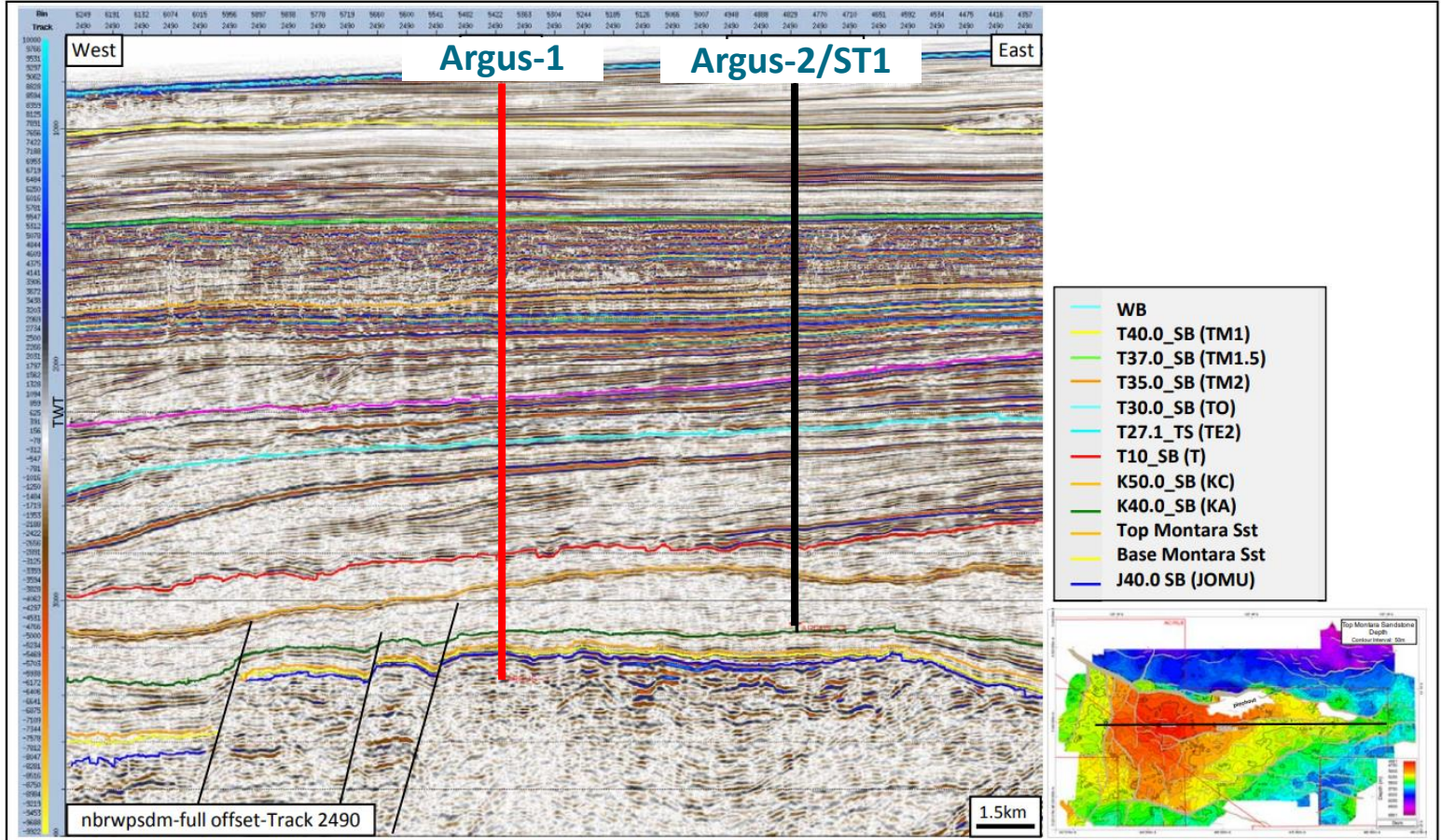
# Browse Basin: release areas AC22-2 & W22-2



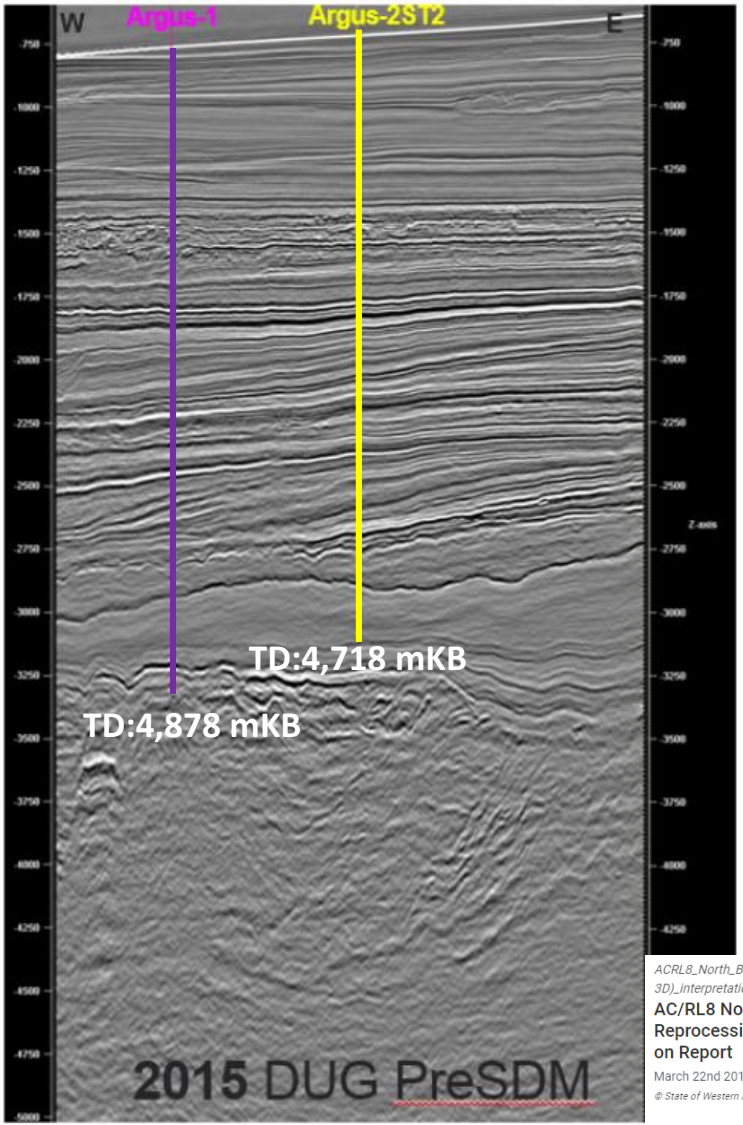
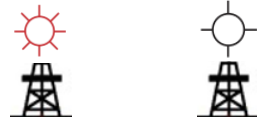
## Argus-1

- **Target: Middle to Upper Jurassic Plover Formation**
- **240m gas column in Oxfordian sandstones**
- **Oil traces in Paleocene carbonates**
- **Deeply buried Jurassic and Triassic sediments interpreted as source rock intervals**
- **Argus-2, targeting Upper Jurassic Montara Fm unsuccessful**

# Caswell Sub-basin: seismic across Argus gas discovery

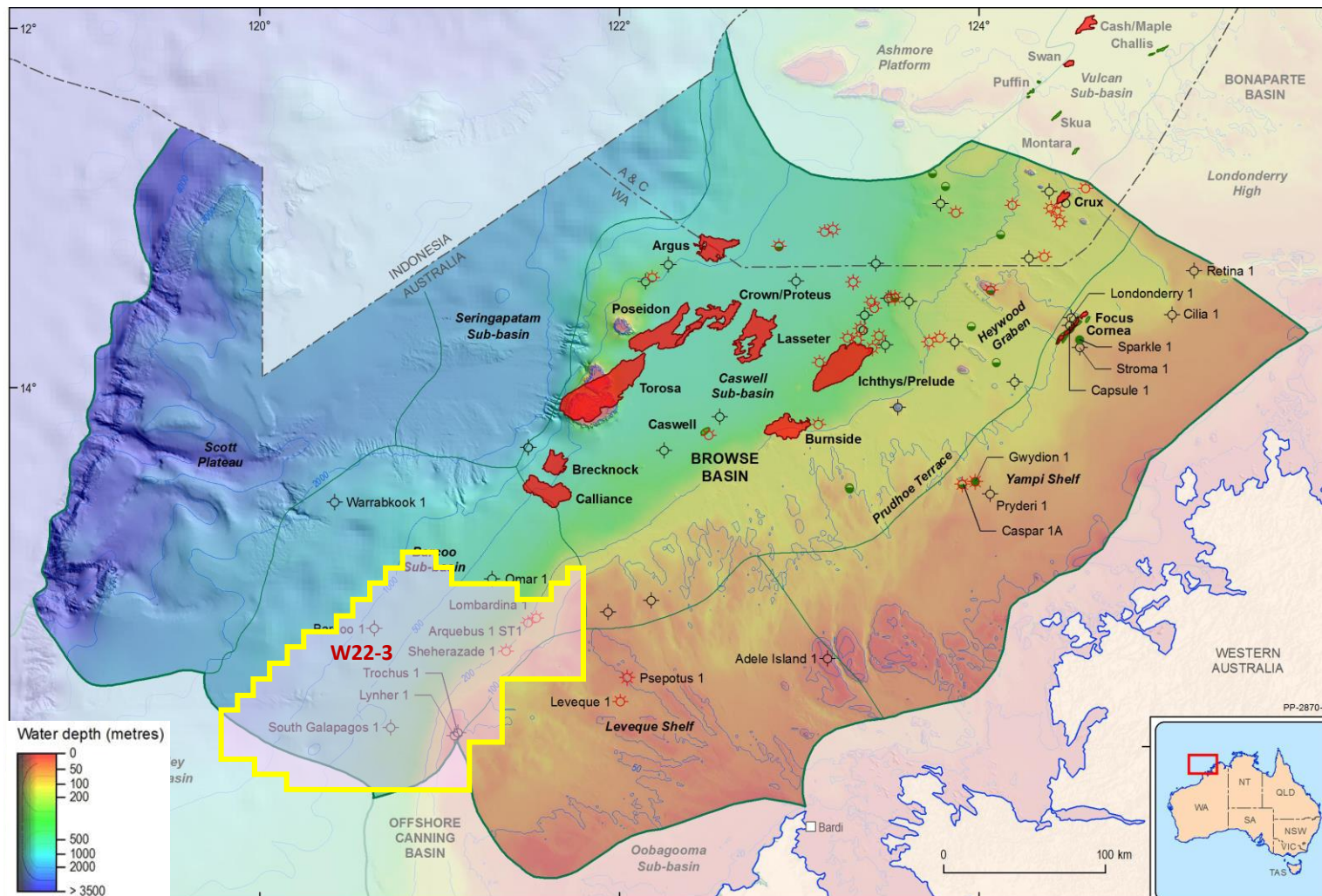


Argus-1    Argus-2/ST1



ACRL8\_North\_Browse\_TQ3D\_2015\_Repro\_(Argus\_3D)\_interpretation\_report - P8  
 AC/RL8 North Browse TQ3D 2015 Reprocessing Seismic Interpretation Report  
 March 22nd 2017  
 © State of Western Australia (DMIRS) 2022

# Browse Basin

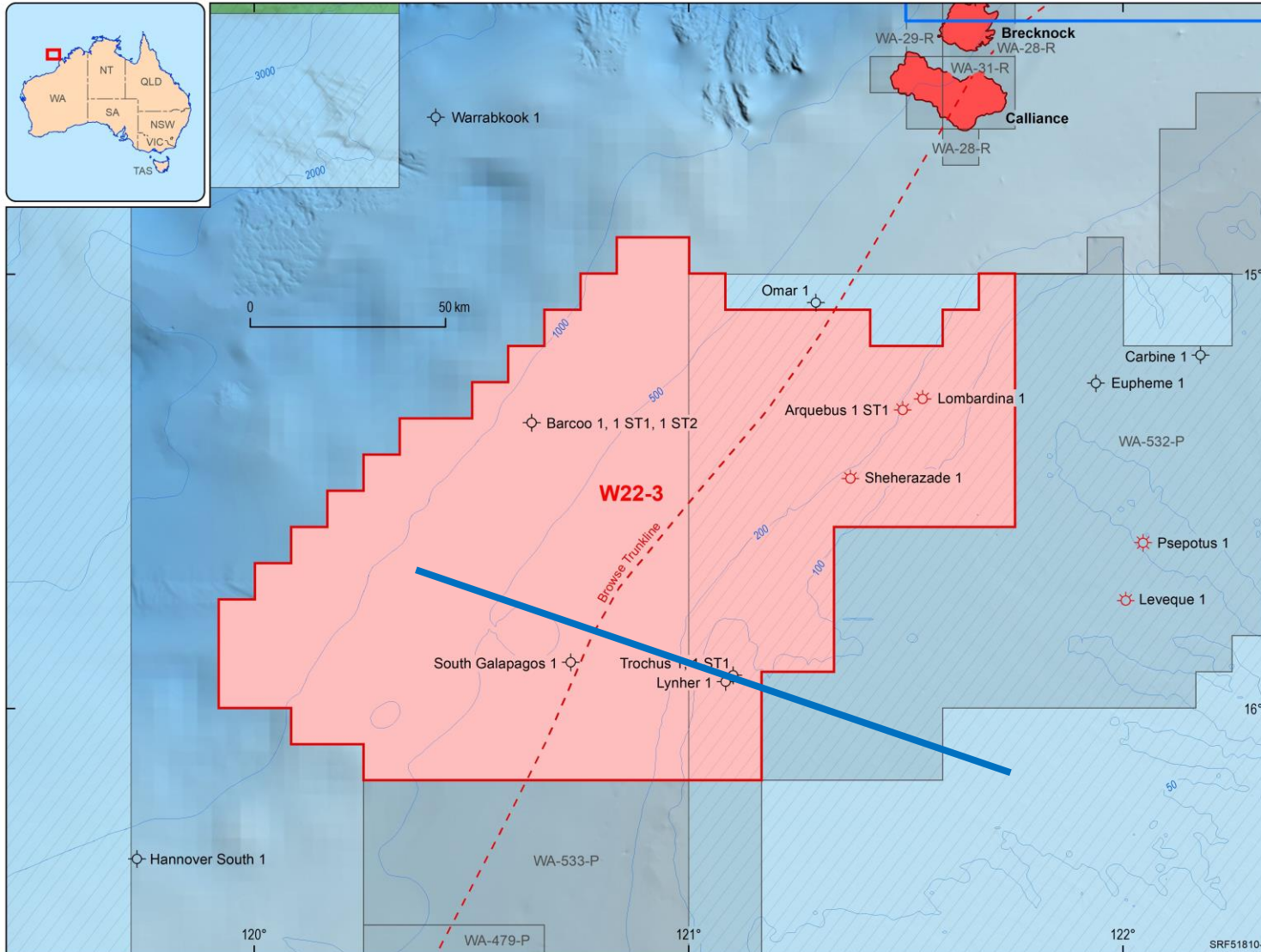


## Release Area W22-3:

- Located in Barcoo Sub-basin
- 250 graticular blocks, 100-1,000m water depth
- Thin Triassic and Jurassic section
- Largely underexplored



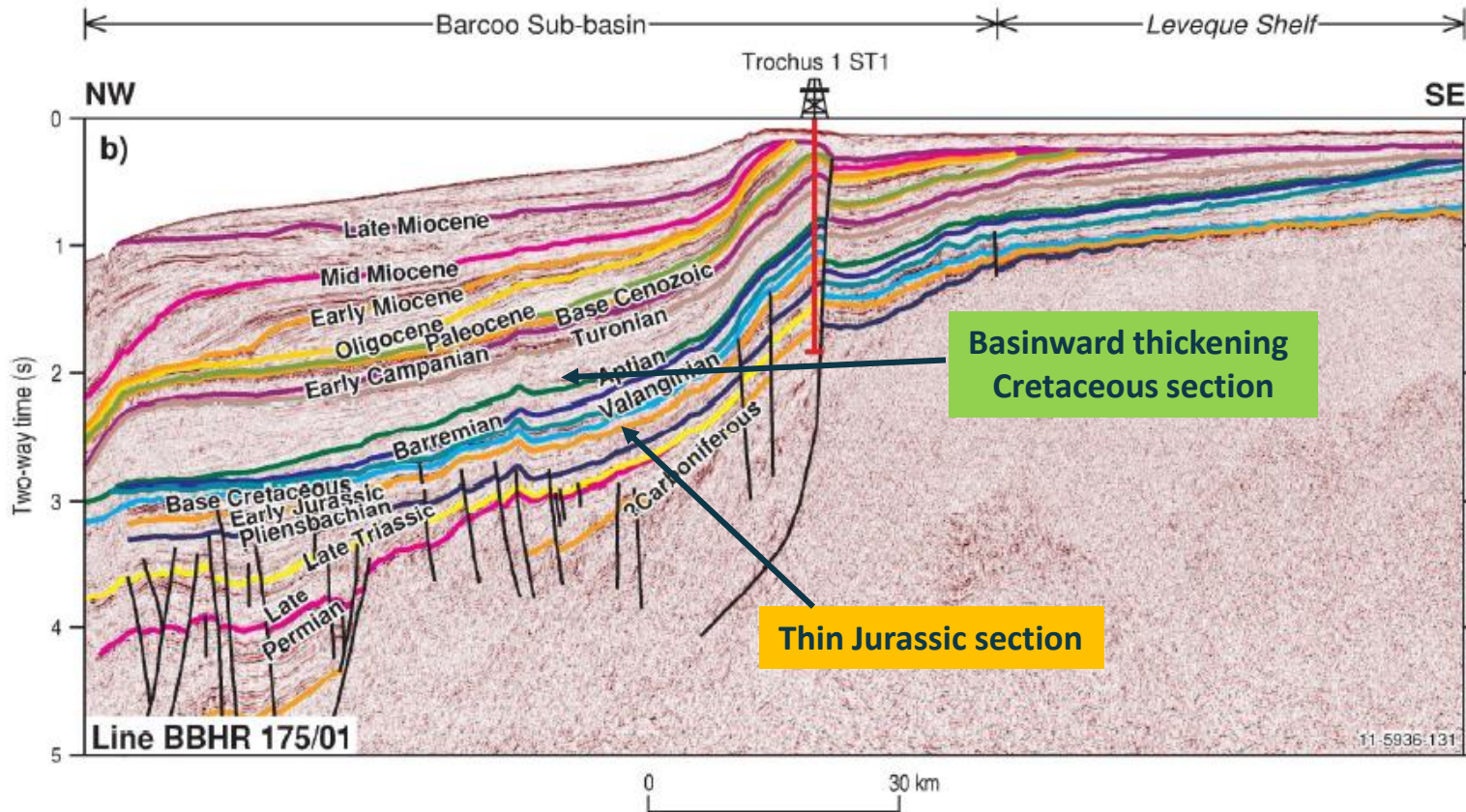
# Barcoo Sub-basin: Release area W22-3



Field outlines and pipeline routes from the GPlinfo petroleum database.

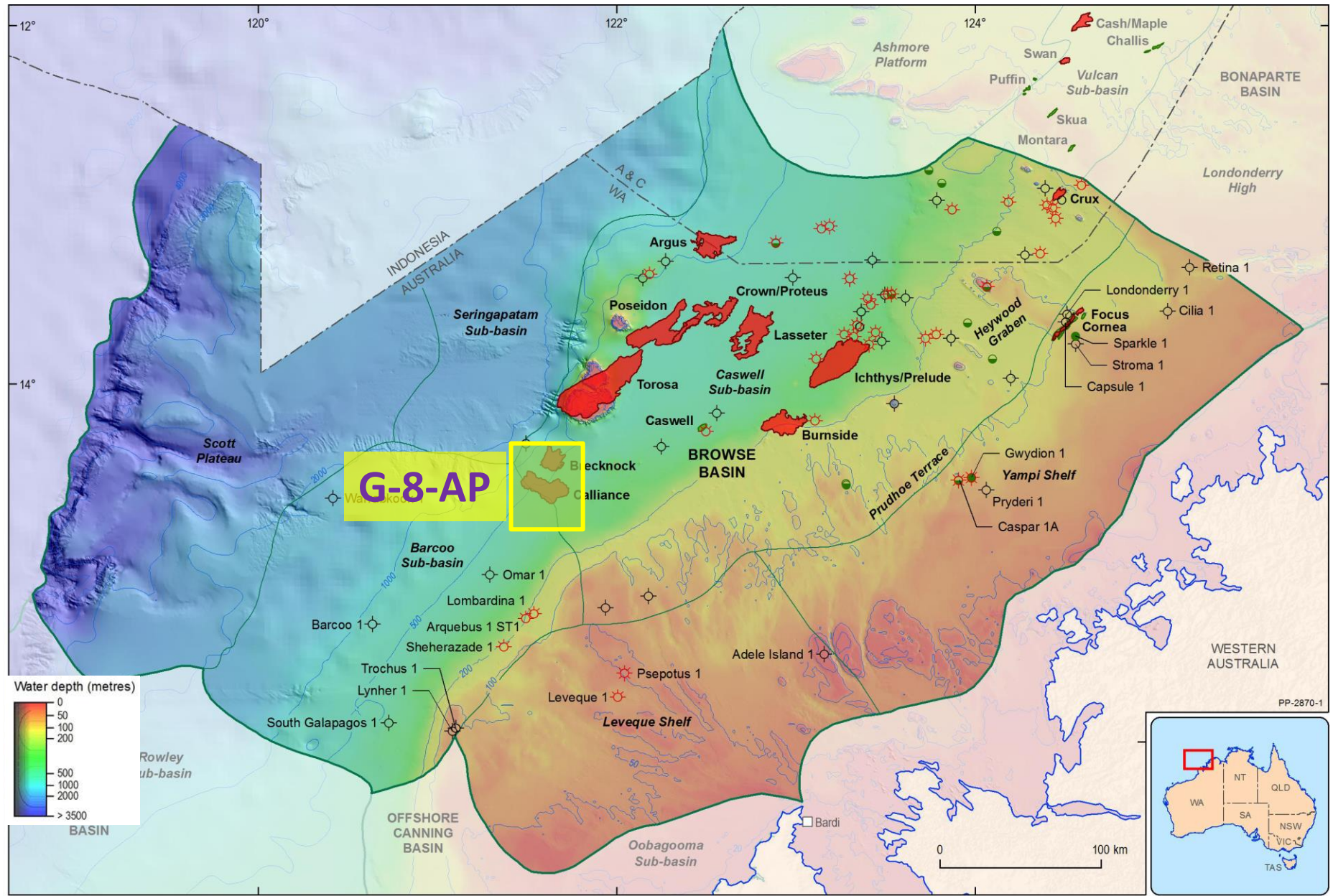
- **First well, Lynher-1, drilled in 1970, encountered good quality reservoirs (porosity 19-23%) in Jurassic sediments**
- **Subsequent drilling between 1980 to 1993 confirmed presence of gas-prone petroleum system, but no commercial success**
- **Main target, Plover Fm, only present in thin Jurassic interval, thick Cretaceous remains largely untested**

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# Browse Basin

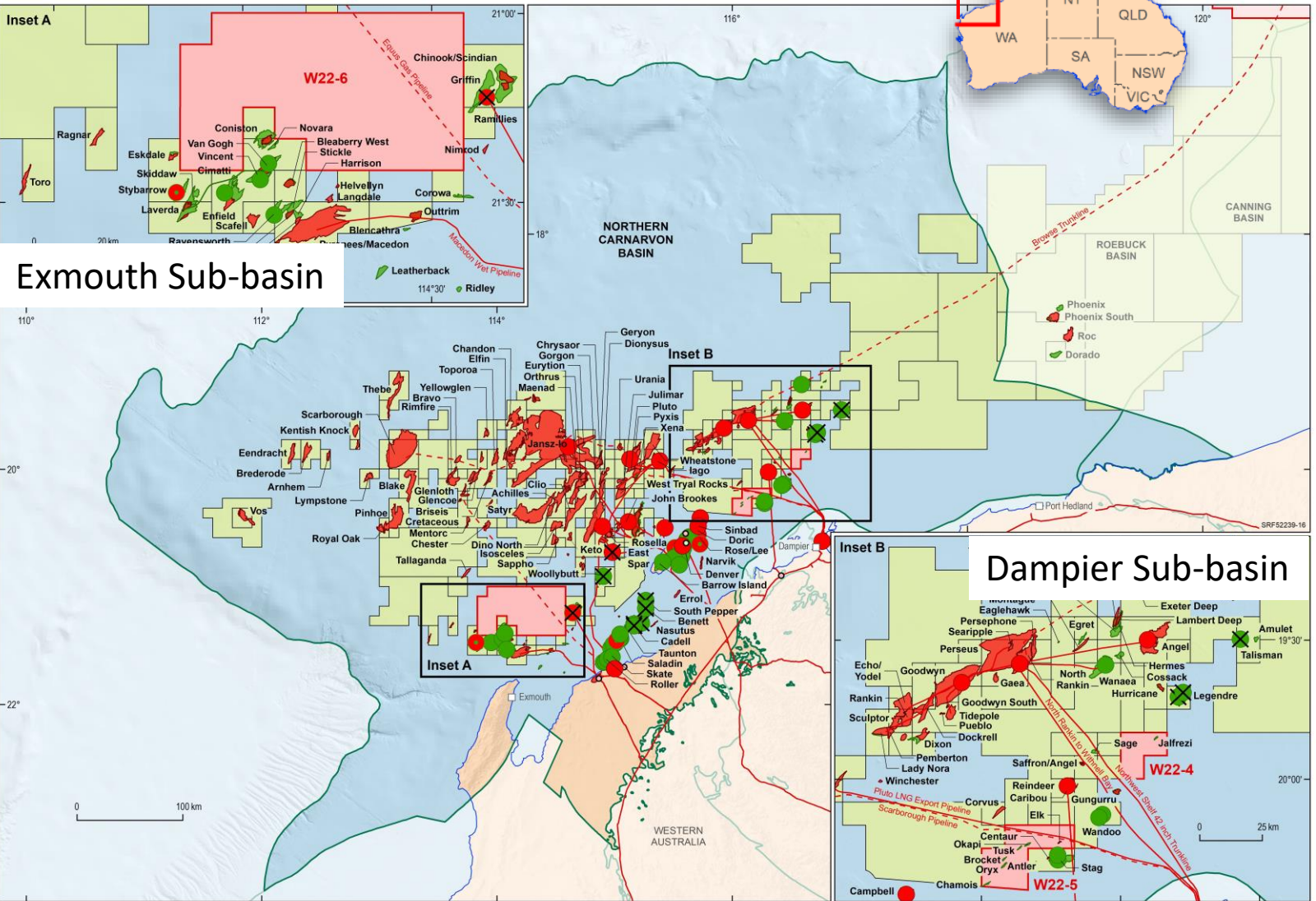


Bids received for greenhouse gas storage areas in Caswell Sub-basin

Woodside Energy awarded G-8-AP (\$ 4.5 million guaranteed work program)

Field outlines and pipeline routes from the GPlInfo petroleum database.

# Northern Carnarvon Basin



- Up to 15km thick succession of Paleozoic, Mesozoic and Cenozoic sediments
- Dominated by deltaic to marginal marine siliciclastics and shelfal carbonates
- In 2022, only three areas released in two inboard mature sub-basins
- Access to both oil and gas-prone petroleum systems

**Gas produced: 36.63 Tcf**  
**Gas remaining: 94.72 Tcf (2P + 2C)**

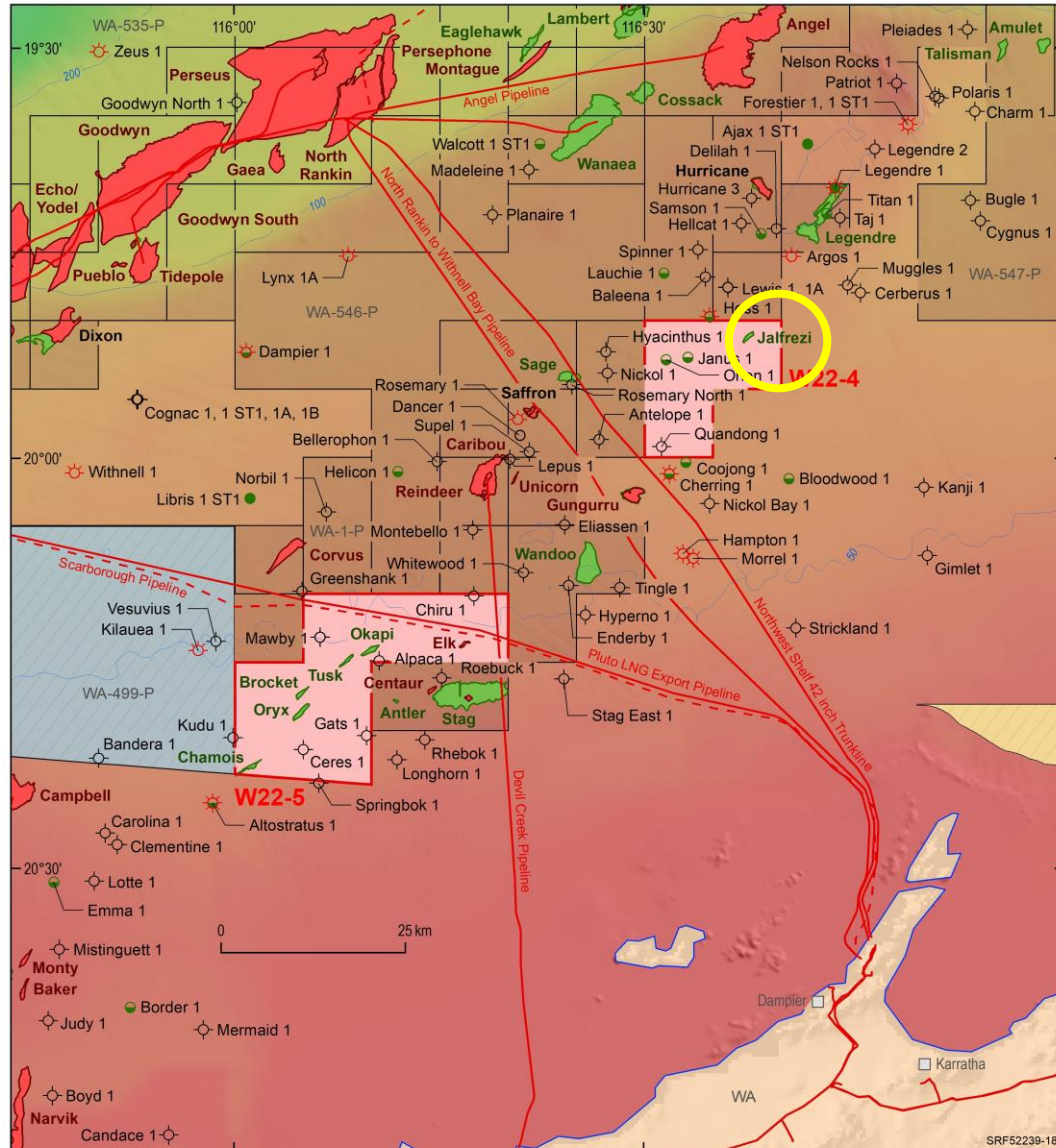
**Oil produced: 2,021 MMbbl**  
**Oil remaining: 512.2 MMbbl (2P + 2C)**

**Condensate produced: 1,116 MMbbl**  
**Condensate remaining: 902.5 MMbbl**

*(Geoscience Australia, 2022)*

**X Field decommissioning commenced**

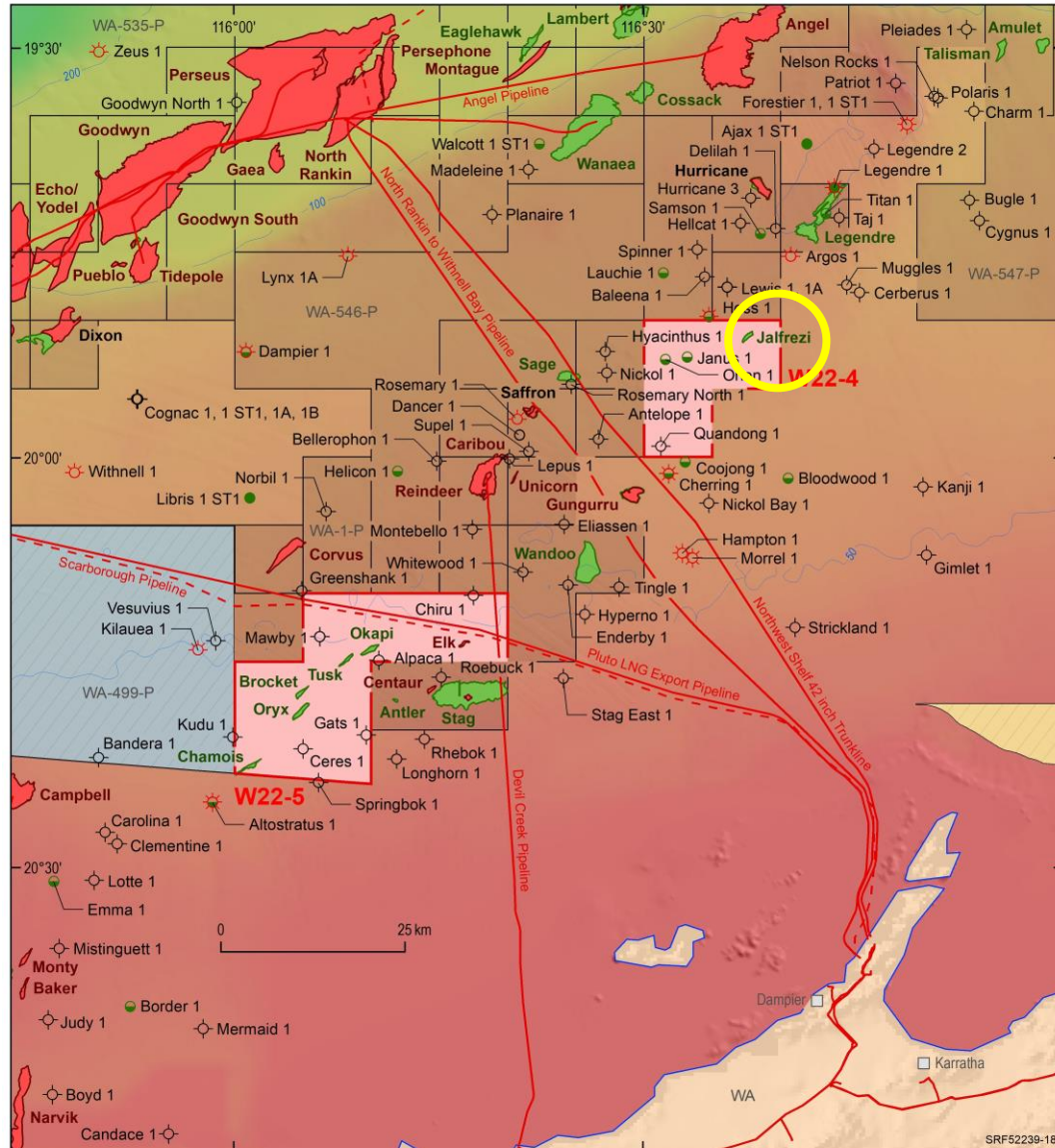
# Dampier Sub-basin: release areas W22-4 and W22-5



Field outlines and pipeline routes from the GPInfo petroleum database.

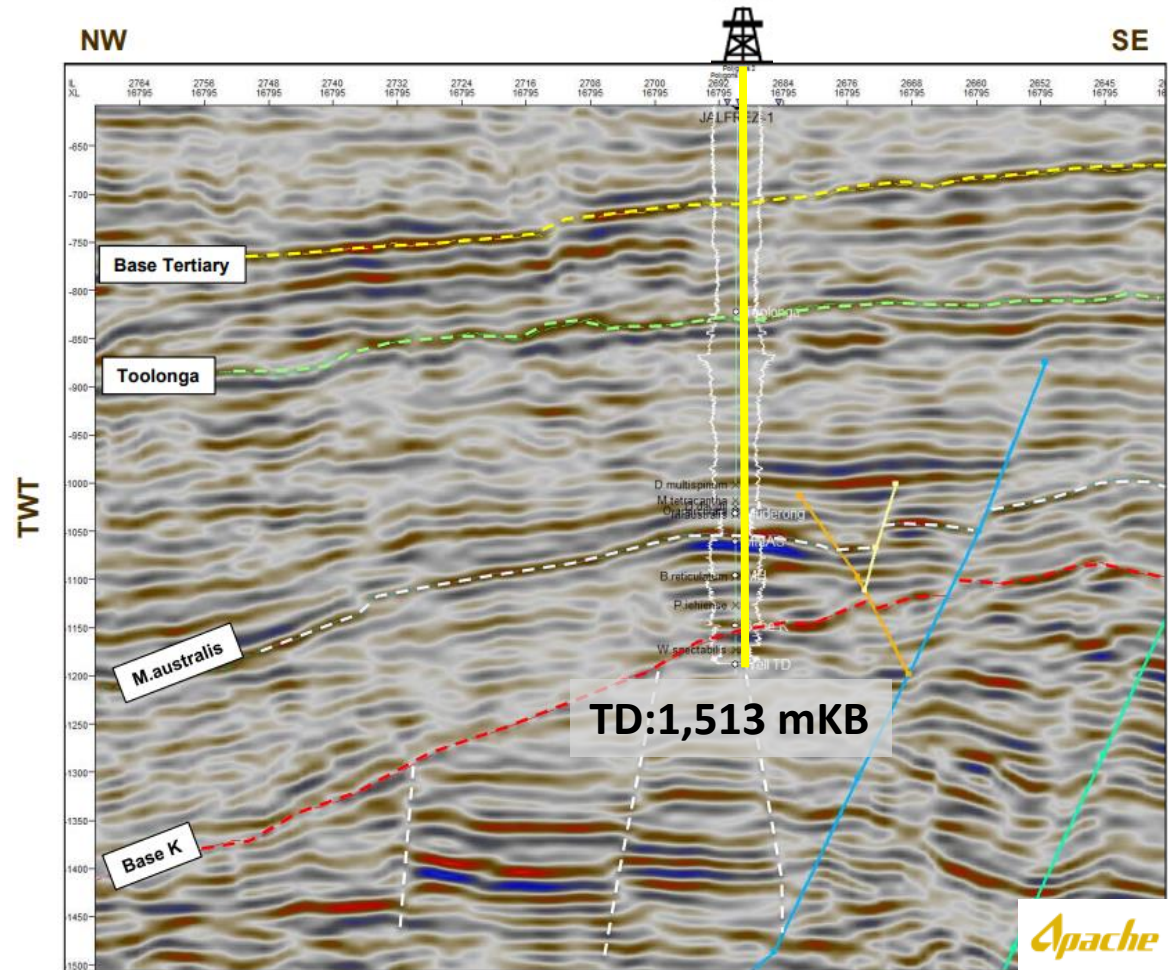
- Triassic, Jurassic and Lower Cretaceous sedimentary sequences
- Shift from Triassic lower coastal plain environments to marginal marine during Jurassic
- Access to both oil and gas-prone petroleum systems
- Multiple plays successfully tested:
  - Upper Triassic (Mungaroo delta system)
  - Mid-U. Jurassic (Athol Formation, deep marine fan system)
  - Cretaceous (*M. australis* sandstone), shallow marine sandstones

# Dampier Sub-basin: release areas W22-4 and W22-5



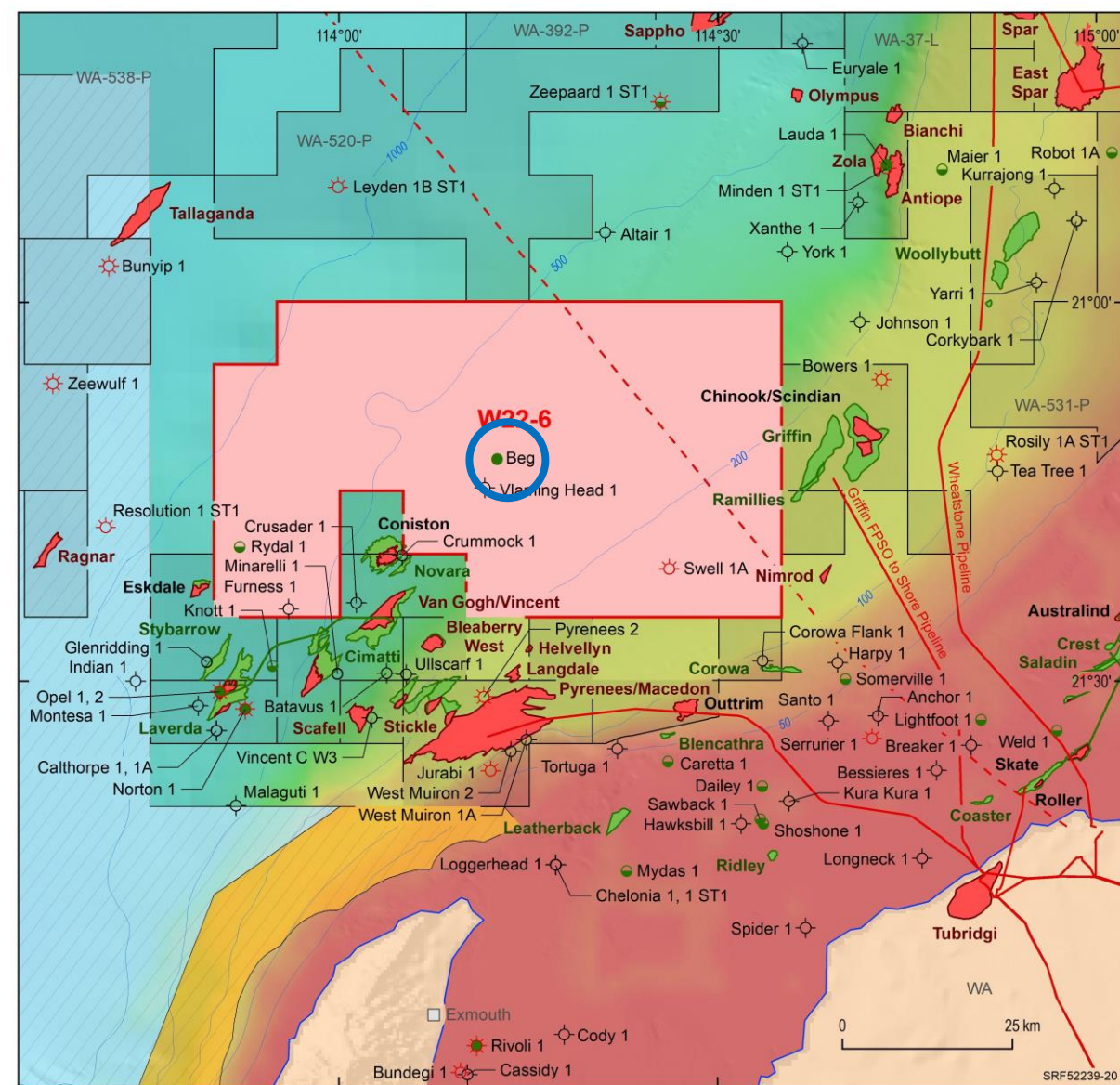
Field outlines and pipeline routes from the GPInfo petroleum database.

## Jalfrezi-1



- *M. australis* objective
- Net gas pay of 12.7 m directly overlying 2.9m net oil pay
- Excellent reservoir facies (up to 28% porosity and permeabilities between 5.7 and 3,270mD)

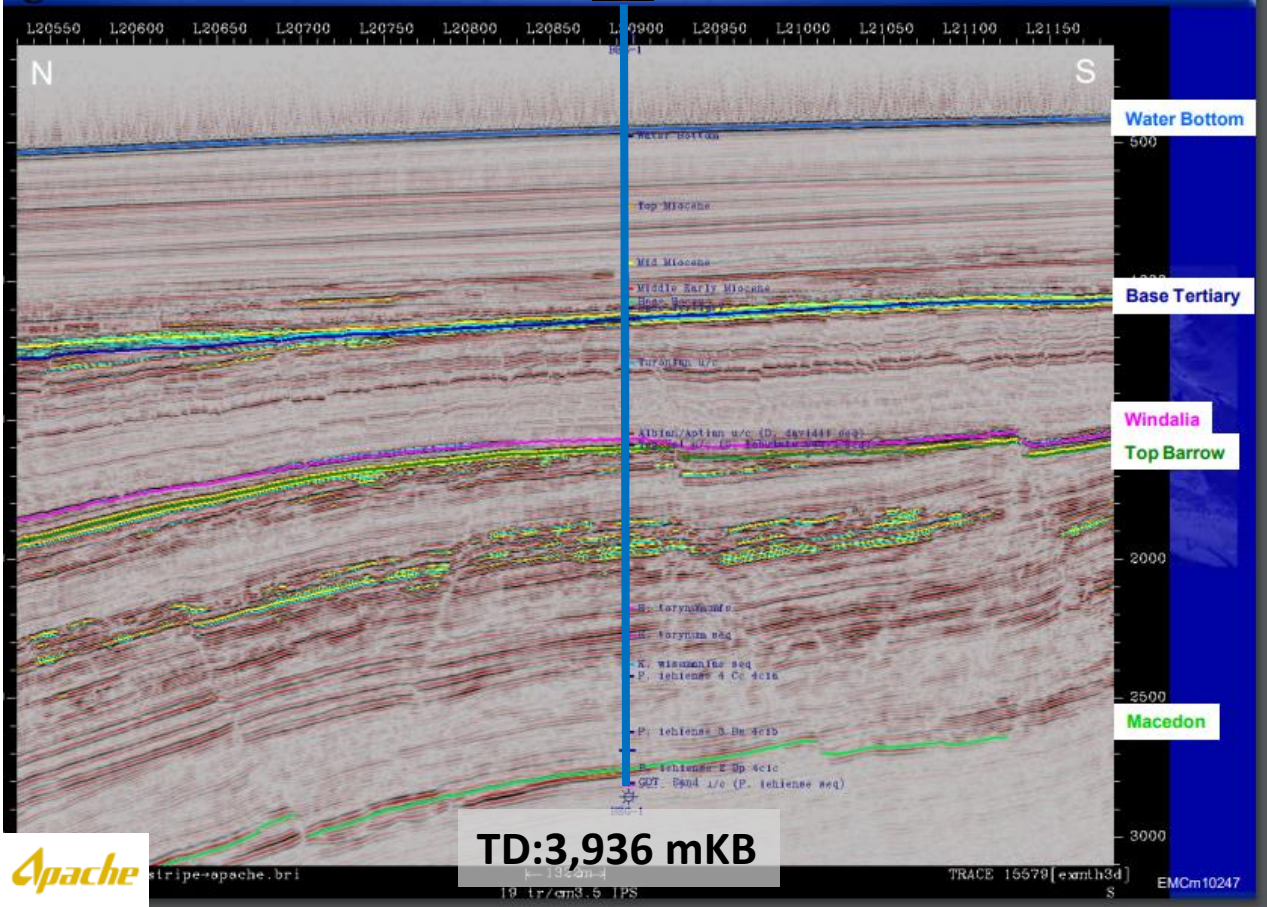
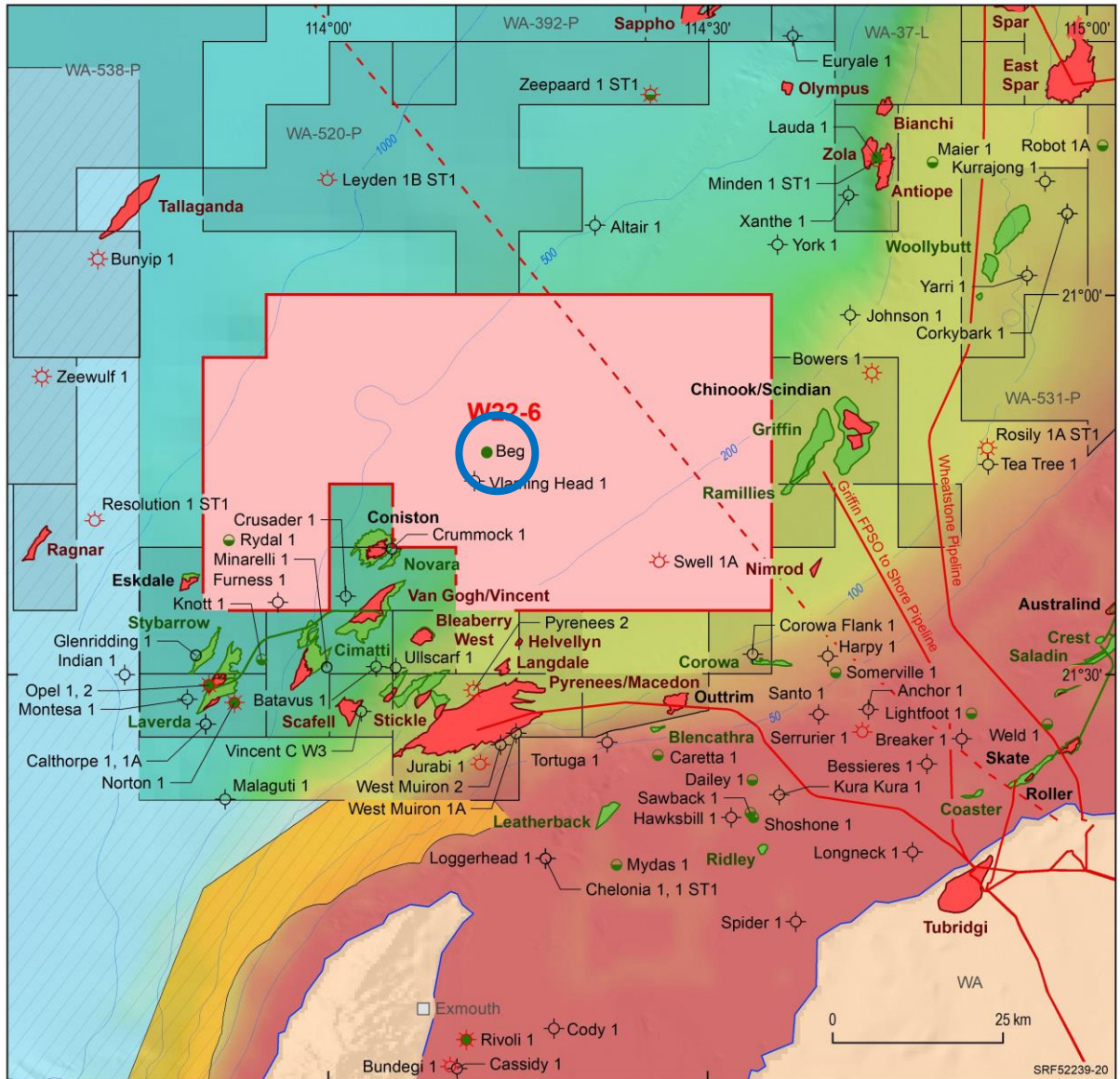
# Exmouth Sub-basin: Release Area W22-6



- Pre-rift deposition represented by Permian to Lower Triassic sediments
- Main oil-prone source rock is Dingo Claystone (Upper Jurassic)
- Reservoirs in Barrow Group and Dupuy Sandstone (uppermost Jurassic)
- Muderong Shale (Lower Cretaceous) is regional seal
- Release Area located to the north of producing region and is largely underexplored with only five wells providing geological control
- Oil discovery at Beg-1

# Exmouth Sub-basin: Release Area W22-6

Beg-1

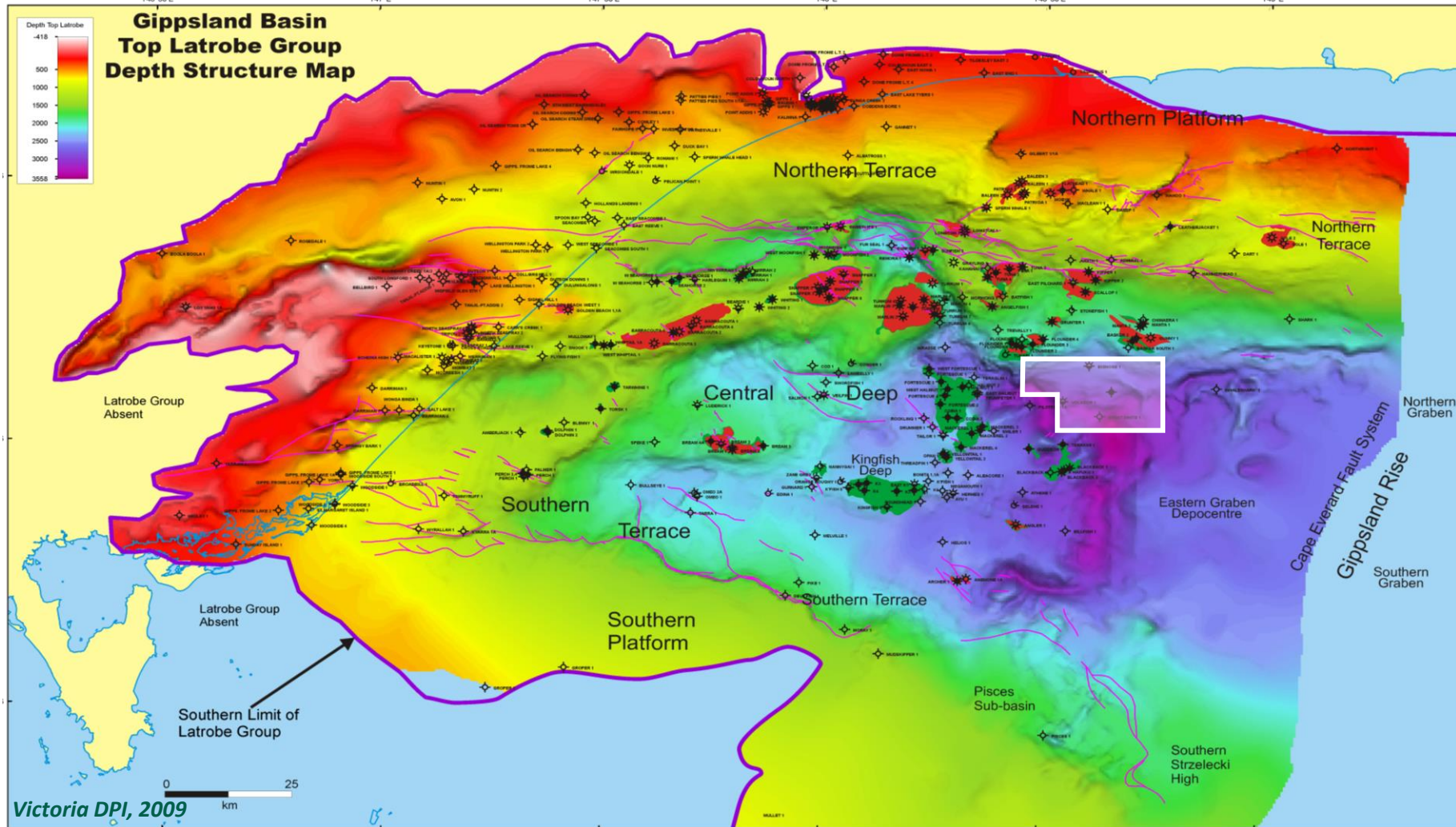


- Tested stratigraphic trap in L. Cretaceous (“Macedon Fm”)
- Small oil column of 1.9m (12.3 % porosity; 58% water saturation)
- Confirming northward extent of oil-play

Field outlines and pipeline routes from the GPlInfo petroleum database.



# 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
- Opportunity to add extra gas volumes to SE-Australia market

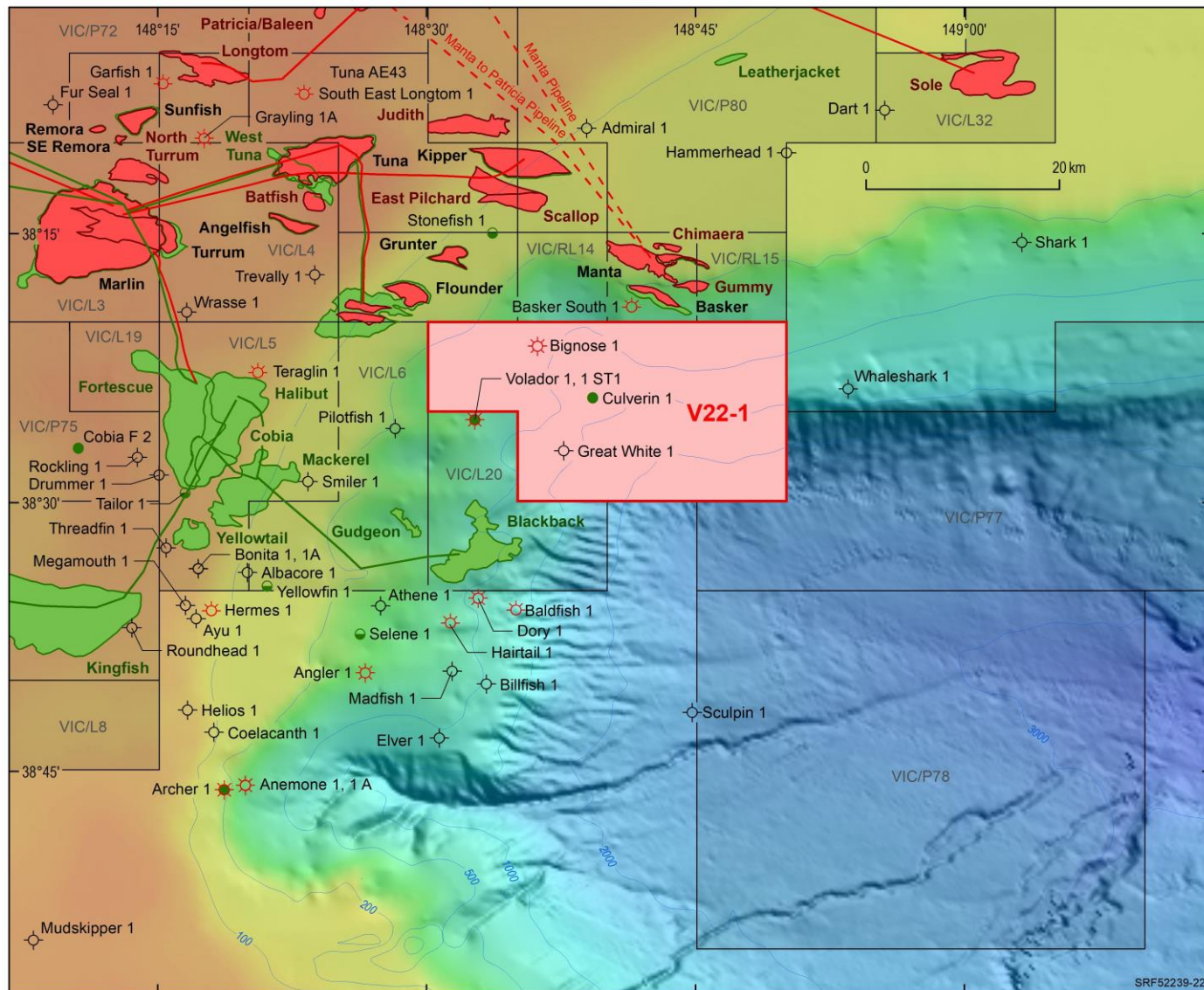
**Gas produced: 10.73 Tcf**  
**Gas remaining: 4.76 Tcf (2P + 2C)**

**Crude oil produced: 3,850 MMbbl**  
**Crude oil remaining: 96.2 MMbbl (2P + 2C)**

**Condensate produced: 280.1 MMbbl**  
**Condensate remaining: 90.0 MMbbl**

*(Geoscience Australia, 2022)*

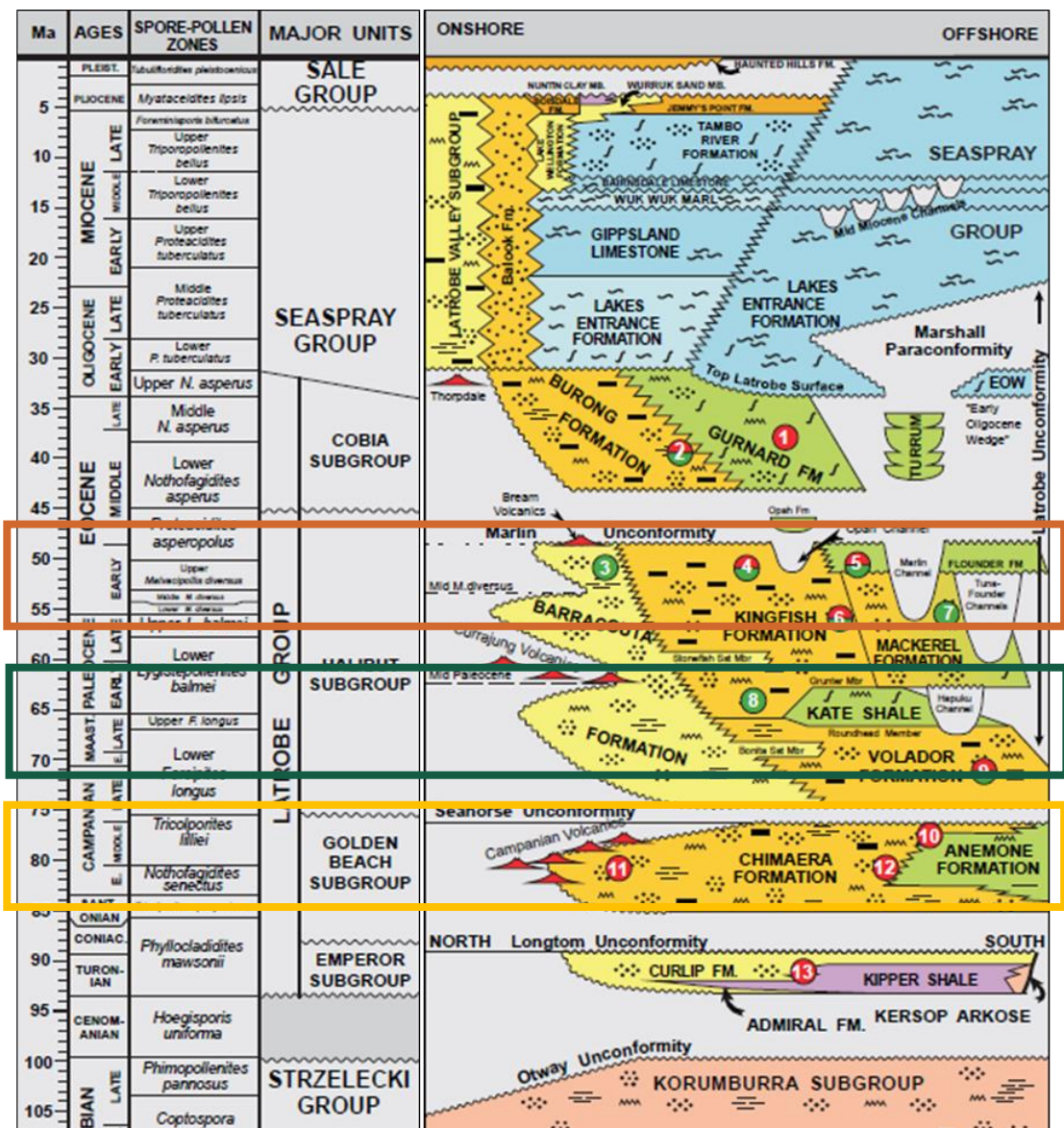
# Gippsland Basin: Release Area V22-1



- 7 graticular blocks in the eastern Central Deep, straddling the western flank of the Bass Canyon (200 – 2,000 m water depth)
- Adjacent to previously producing Basker/Manta oil and gas field
- Release area offers access to three main petroleum systems:
  - Top-Latrobe/Eocene (Blackback equivalent, oil)
  - Intra-Latrobe/Maastrichtian/Paleocene (Culverin, oil; Volador, oil and gas)
  - Golden Beach/Campanian (Basker/Manta; gas and oil)

Field outlines and pipeline routes from the GPlnfo petroleum database.

# Gippsland Basin: Release Area V22-1



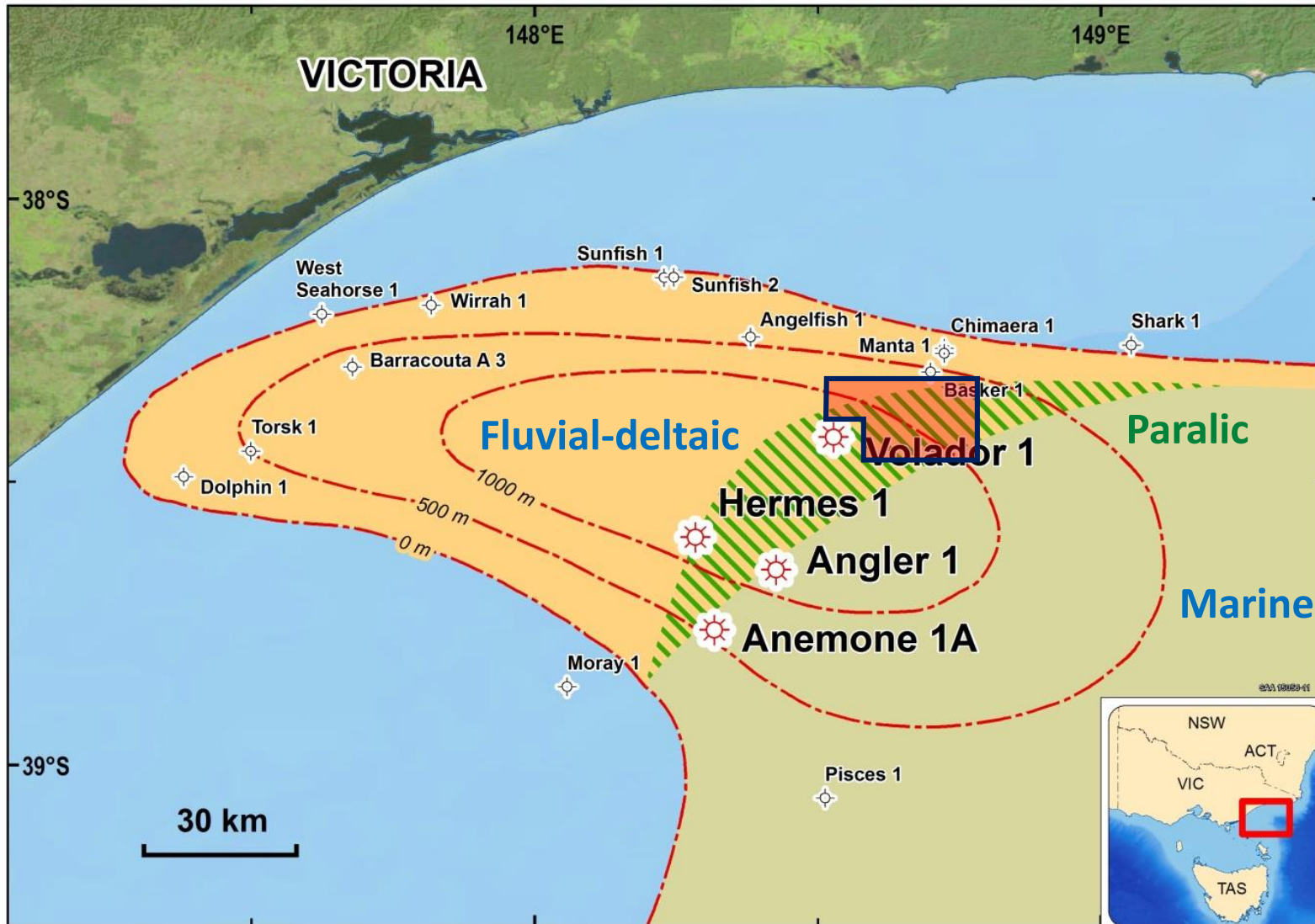
Bernecker & Partridge, 2001

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# Gippsland Basin:

## Late Campanian Palaeogeography Golden Beach Subgroup (*T. lilliei*)



Bernecker & Partridge, 2001

- Golden Beach Subgroup deposited during Campanian, following opening of Tasman Sea (approx. 90 mio years ago)
- Well control limited to flanks of Central Deep
- First marine incursion recorded by Angler and Anemone
- Release Area located within paralic transition zone between fluvial-deltaic (coastal plain) and shallow marine environments
- Indication of marine source rocks presence in the east
- Uncertainty regarding source rock contribution from deeper (older) lacustrine facies (“Kipper Shale”)

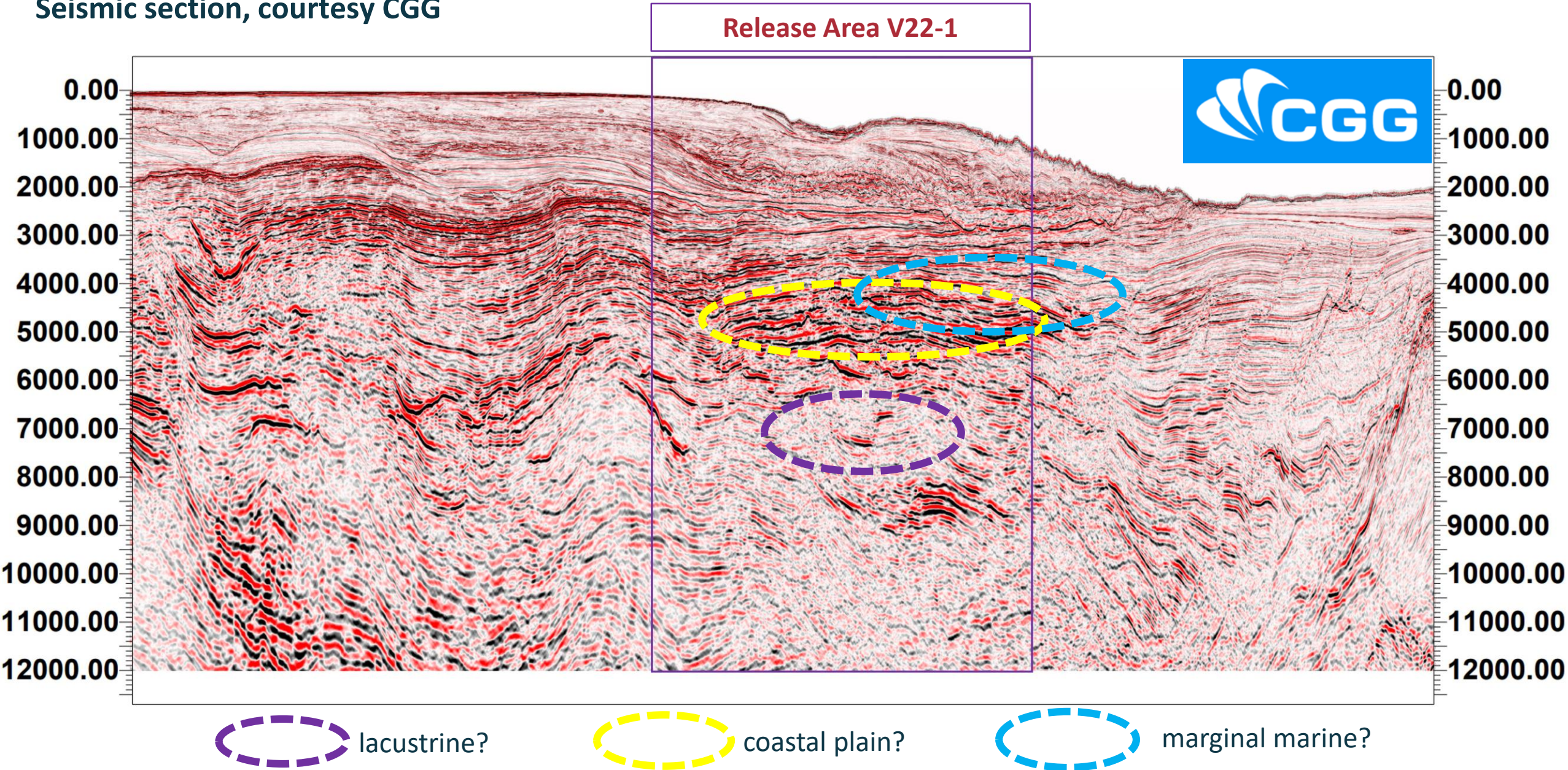
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# Gippsland Basin: Seismic section, courtesy CGG



# Summary

- **The 2022 offshore acreage release offers 10 new areas for oil & gas exploration**
- **The release areas include a large gas field (Argus, Caswell Sub-basin) and several small oil accumulations in the Dampier Sub-basin**
- **Release areas in the Malita Graben and Barcoo-Sub-basin are underexplored**
- **Release Area in the Gippsland Basin offers untested targets in deeper section (Golden Beach Sub-group)**

**Closing date for bid submission:  
Thursday, 2 March 2023**

# Data access and further information



**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](#)

**Offshore Petroleum Exploration Acreage Release Webinar - Registration**  
05/08/2022

Registration to attend the 2022 Offshore Petroleum Exploration Acreage Release webinar is now open. The event will start on Wednesday 24

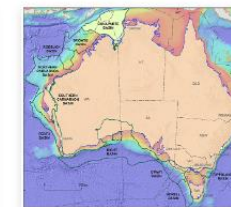
**Gravity and magnetic enhancement grids and images for the Otway Basin**  
05/08/2022

Over 8,200 line kilometres of gravity and magnetic data enhanced to produce 1000 m grid cell size.

[www.ga.gov.au/nopims](http://www.ga.gov.au/nopims)



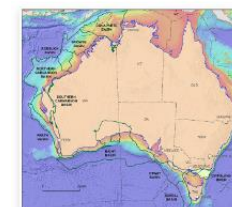
2021 release area maps



Bonaparte Basin



Browse Basin



Gippsland Basin



Northern Carnarvon Basin



Otway Basin

[www.ga.gov.au/petroleum](http://www.ga.gov.au/petroleum)