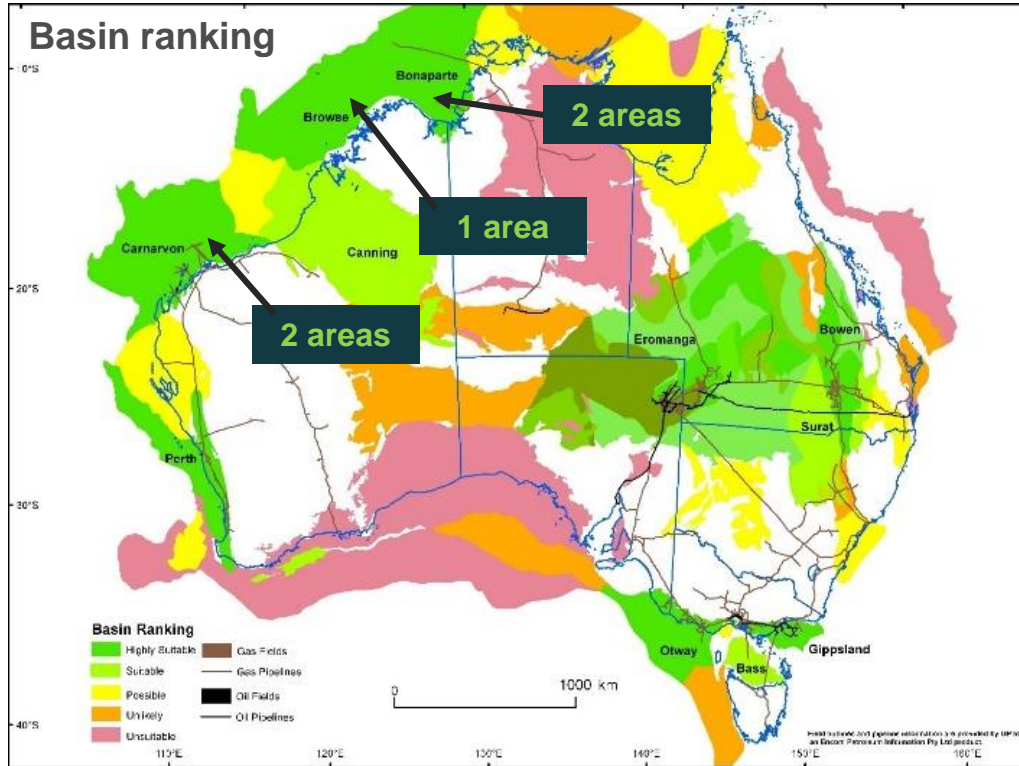


National CCS-studies

National carbon mapping and infrastructure plan (2009)

National CO₂ infrastructure plan (2012–2016)



- Investigation of geological characteristics and other factors to determine the potential, capacity and ranking of sedimentary basins for CO₂ storage
- Accelerate identification and development of CO₂ storage sites close to major emission sources

highly suitable

suitable

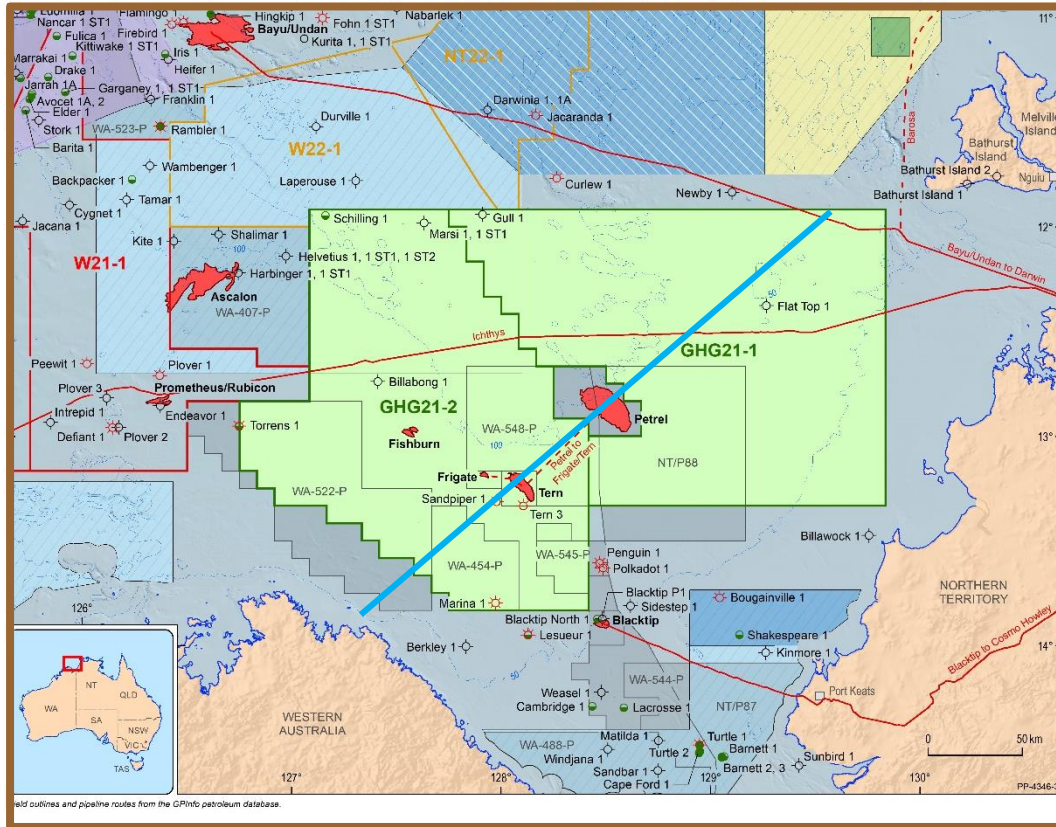
possible

unlikely

unsuitable

- Several offshore provinces deemed highly suitable
- Largest potential in sedimentary sequences of Jurassic and younger ages

Areas GHG21-1 and GHG21-2: Petrel Sub-basin



GHG21-1

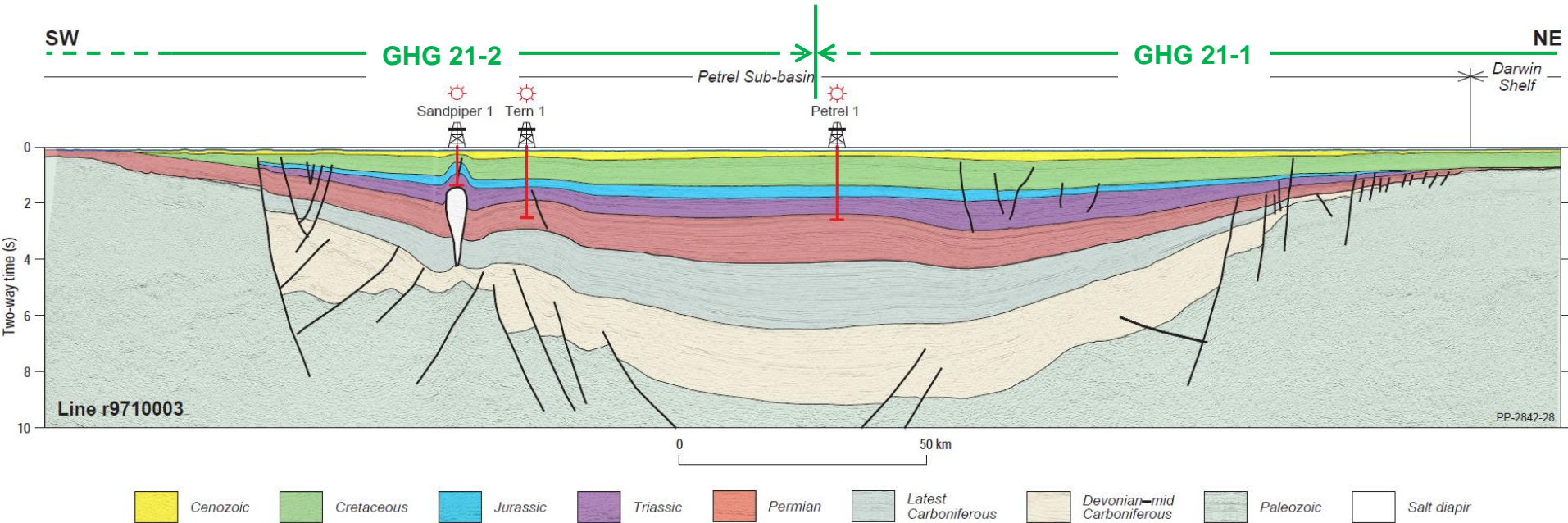
- 330 graticular blocks, water depths 30-75 m
- Limited well control

GHG21-2

- 304 graticular blocks, water depths 30-75 m
- Several gas discovery wells
- Storage in saline aquifers (Jurassic-Lower Cretaceous)
- Potential CO₂ sources: Darwin processing facilities; Bonaparte field developments
- CO₂ storage potential assessed by 2014 GA-study

Petrel Sub-basin

- Shallow water exploration and development (< 100 metres)
- Existing gas production (Blacktip), further development planned (Petrel, Tern)
- Salt-tectonism
- Over 10,000m of sedimentary section, thick Paleozoic sequences
- Jurassic-Cretaceous section main target for CO₂ storage

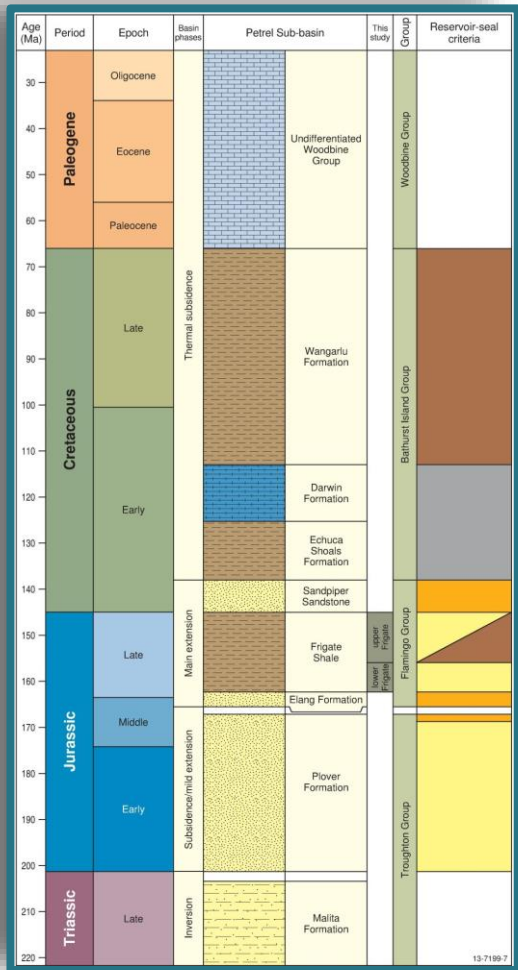
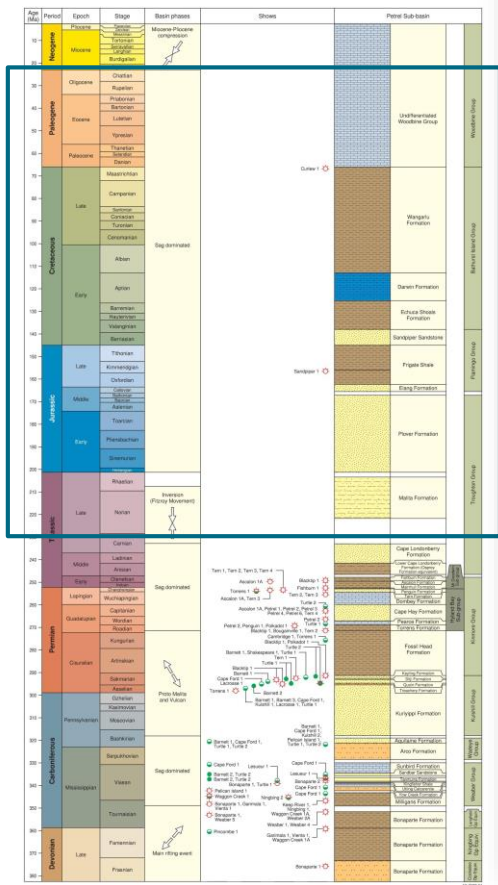


Stratigraphy of the Petrel Sub-basin

Minor gas shows in Mesozoic section

Commercial gas accumulations in Permian section

Oil and gas accumulations in southern Petrel SB, including onshore



Highly effective seal

Effective seal

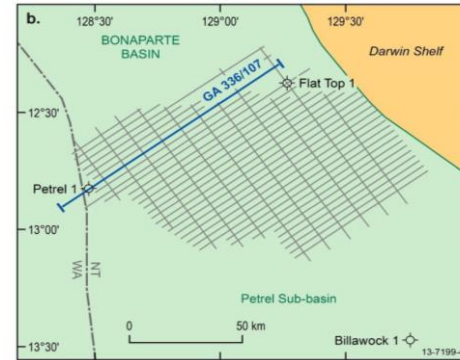
Highly suitable reservoir

Suitable reservoir / Highly effective seal

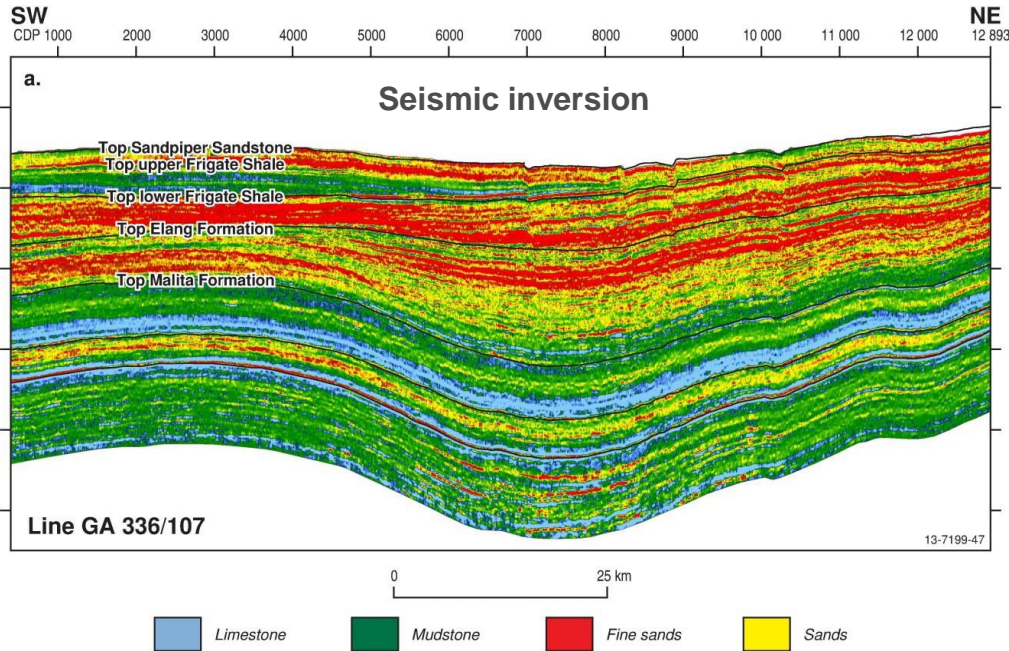
Highly suitable reservoir

Suitable reservoir

Geoscience Australia's Petrel Sub-basin CO₂ Storage Assessment

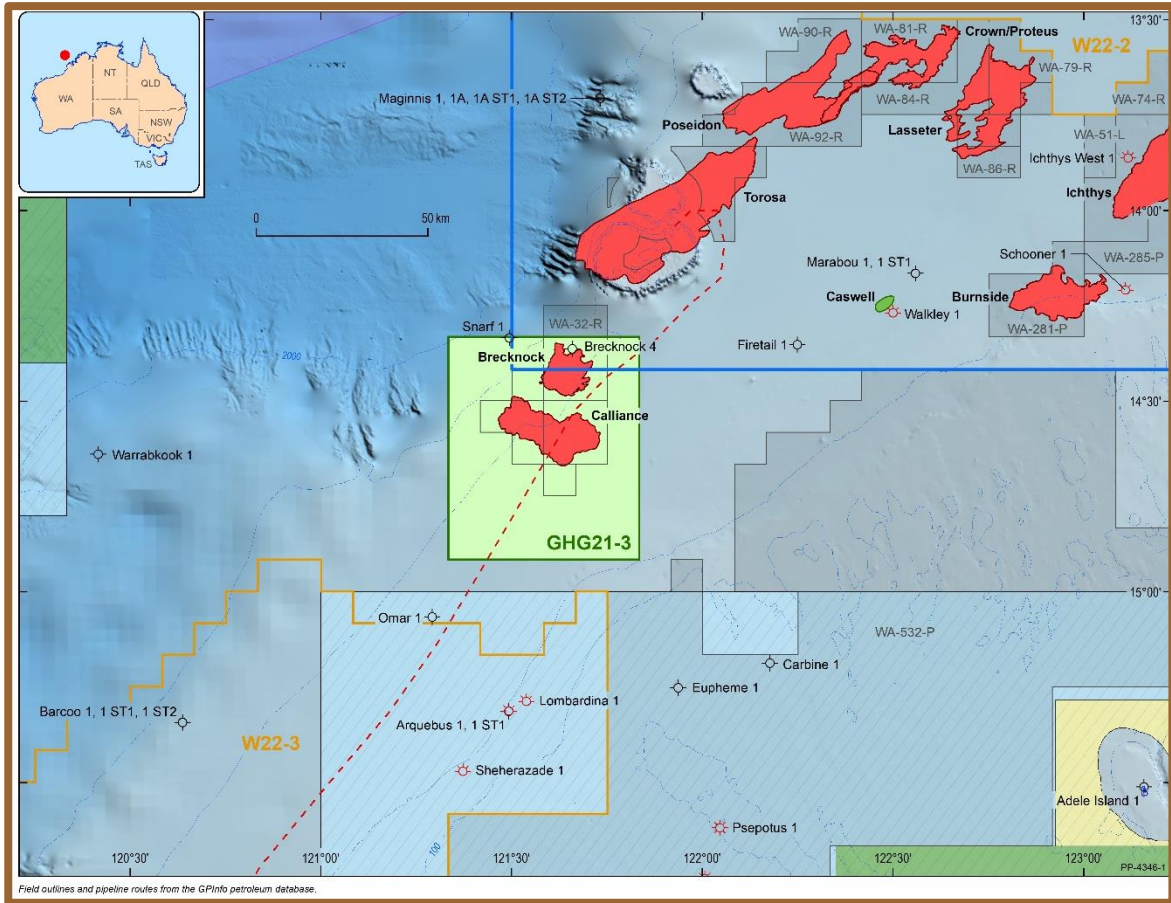


- 2014 assessment and data acquisition program in Petrel Sub-basin
- 4,091 km new 2D seismic refraction and sub-bottom profiler data
- Plover Fm (Jurassic) reservoir facies is main objective
- Geomechanical analysis indicates low risk of fault reactivation over target areas.
- Modelling revealed slow migration of CO₂ plume



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

Area GHG21-3: Browse Basin (Caswell Sub-basin)

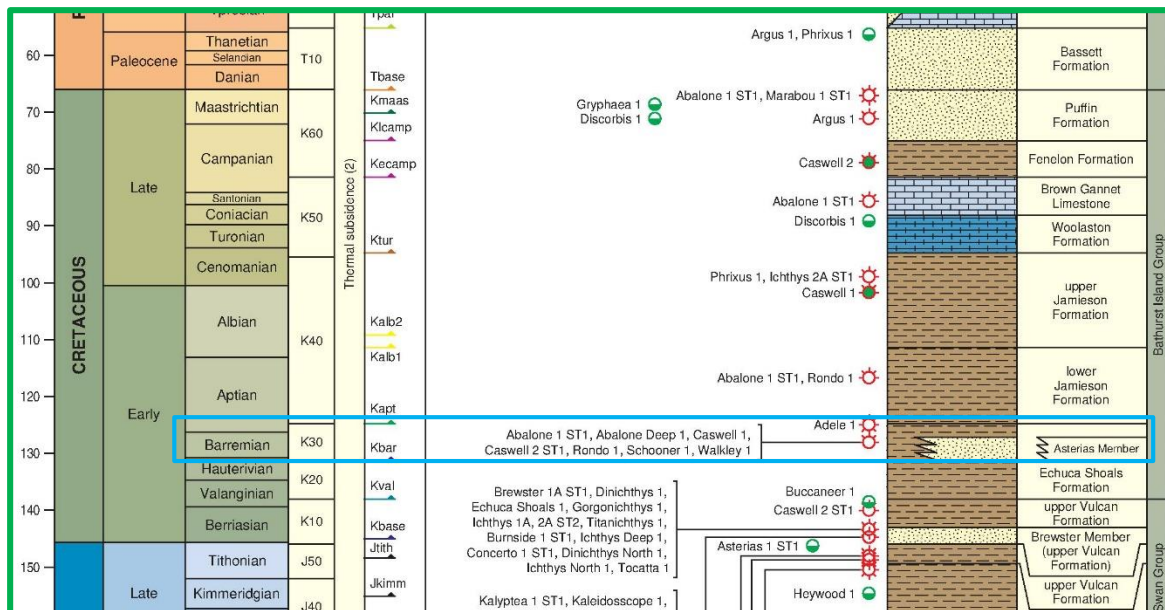
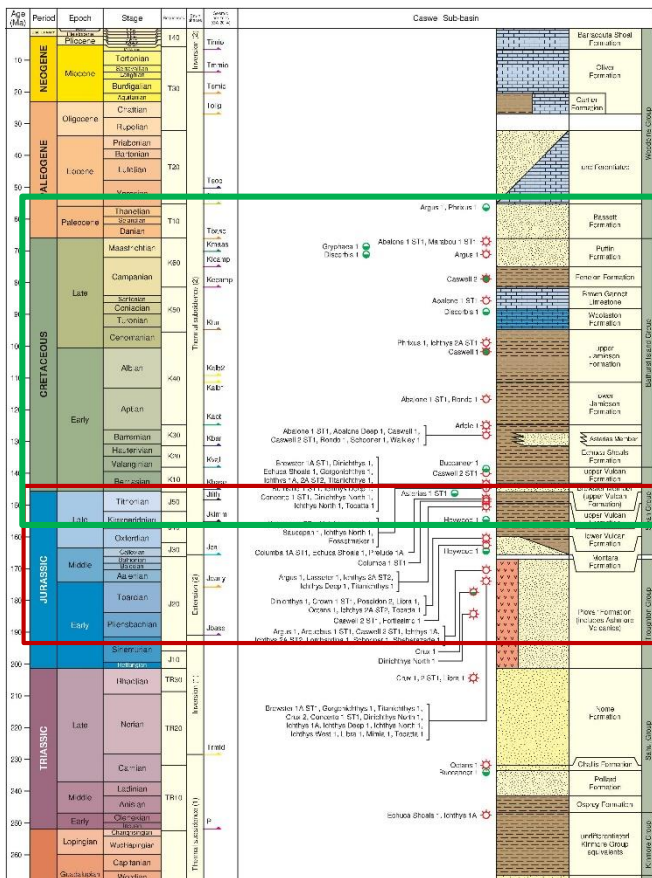


- Producing basin since 2018 (Ichthys, Prelude)
- Discussions regarding the development of additional resources continue
- Outboard gas fields (Torosa, Brecknock, Calliance) have high CO₂ content

GHG21-3

- 42 graticular blocks, water depths 200-2000 m
- Storage in saline aquifers (mainly Lower Cretaceous)
- Potential CO₂ sources: gas from future field developments
- **CO₂ storage potential in Caswell Sub-basin assessed by 2016 GA study**

Stratigraphy of the Caswell Sub-basin

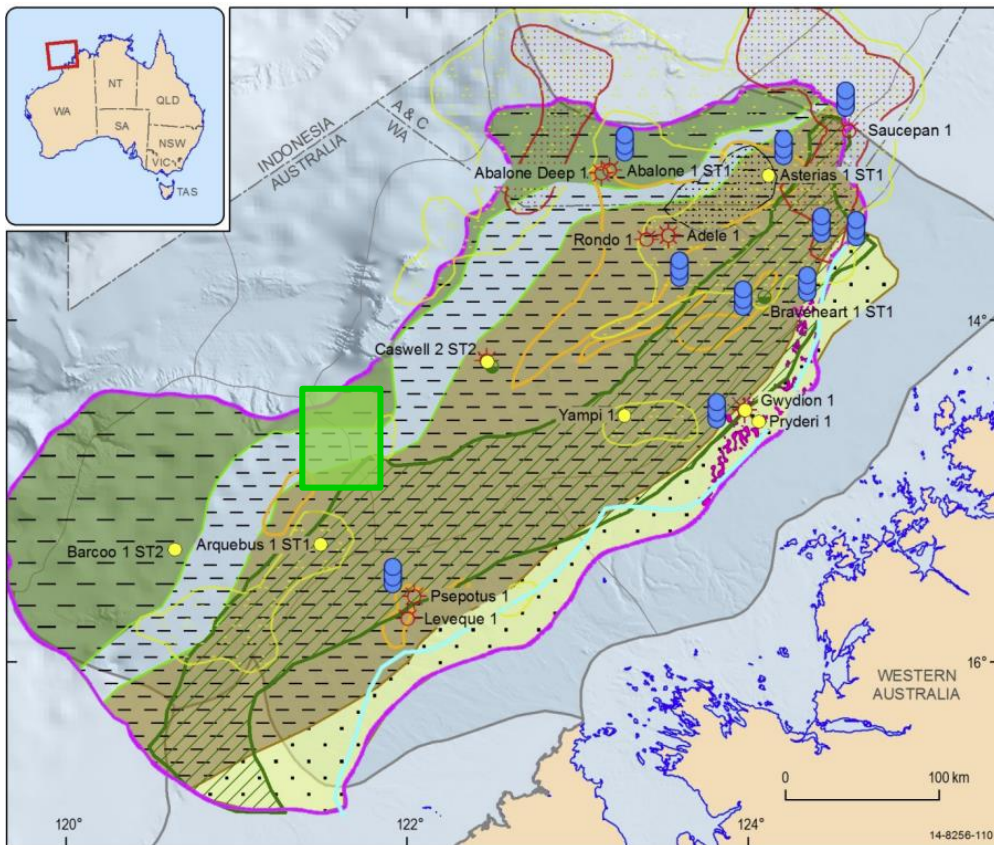


Lower Cretaceous main target for CO₂ storage

Jurassic hosts the majority of gas accumulations

- GA-study evaluated each mappable seismic supersequence (K10 to T30)
- Focus on eastern part of sub-basin where known fluid migration pathways can be assessed

GA Browse Basin CO₂ study



Scope:

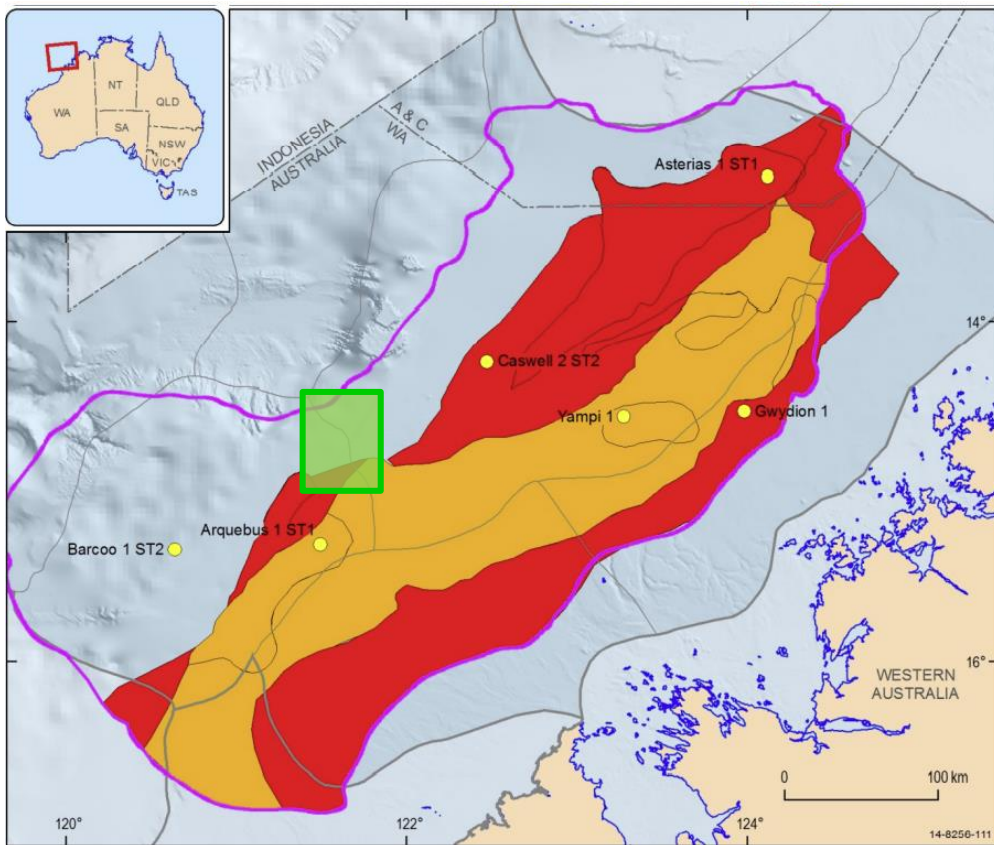
- Focussed on Cretaceous succession recognising reduced risk of overlap between hydrocarbon exploration and CO₂ storage
- Identification of regional-scale constraints for CO₂ containment (depth of storage limits, fault density, seal presence, resource overlap)
- Regional-scale assessment of CO₂ storage potential, supported by palaeogeographic maps and play fairway maps

Main results:

- Suitable reservoir facies related to submarine fans and basin-wide clinoform topsets.
- Suitable supersequences are
 - K10, K20, K30, lower K40 and K60 clinoform topsets
 - K10-K40 stacked basin margin plays
 - K30, K50 and K60 submarine fan plays
- Seals are best developed in the Lower Cretaceous succession

https://d28rz98at9flks.cloudfront.net/89867/Rec2016_017.pdf

Example: K30 supersequence



Scope:

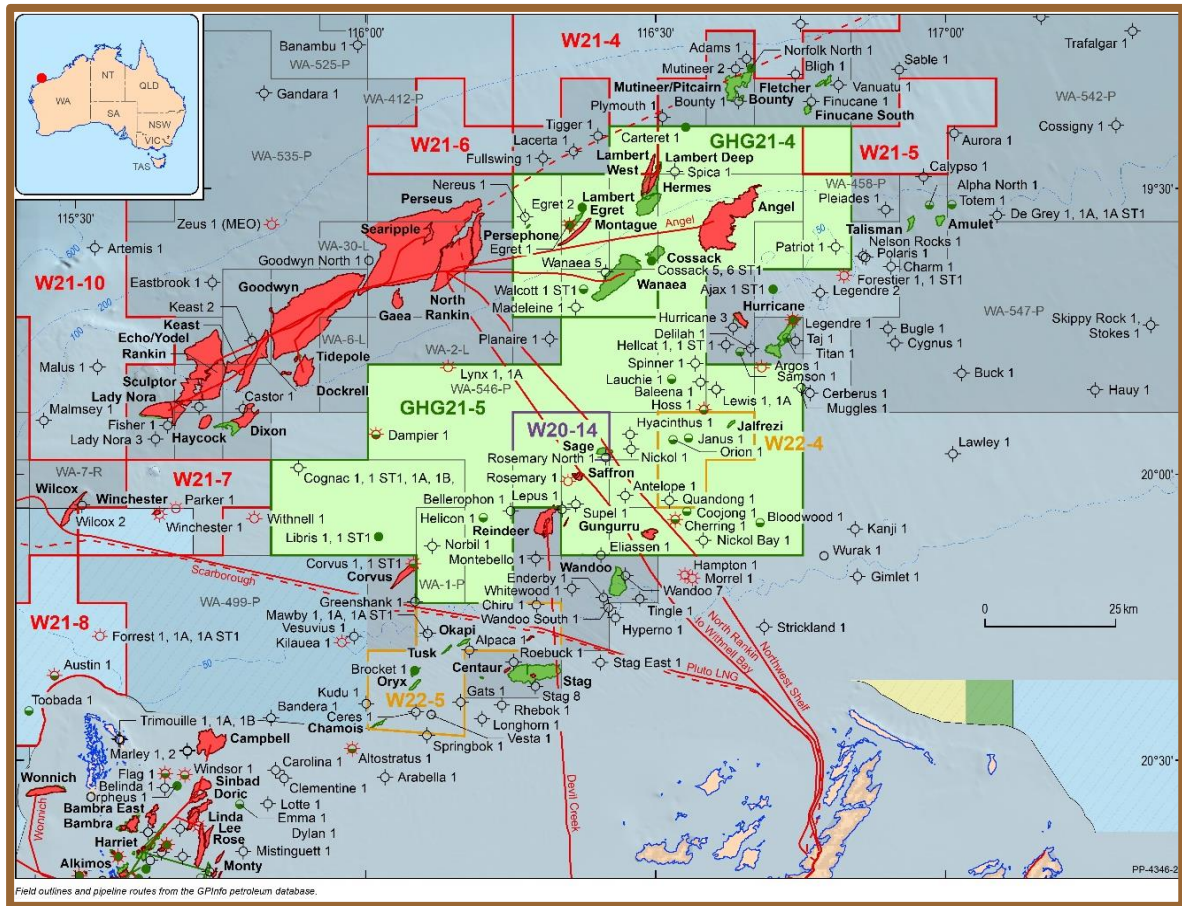
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Areas GHG21-4 and GHG21-5: Northern Carnarvon Basin



Field outlines and pipeline routes from the GPlinto petroleum database.

- Gas producing province since 1999, oil since 1964
- Complete 3D seismic coverage
- Extensive well control

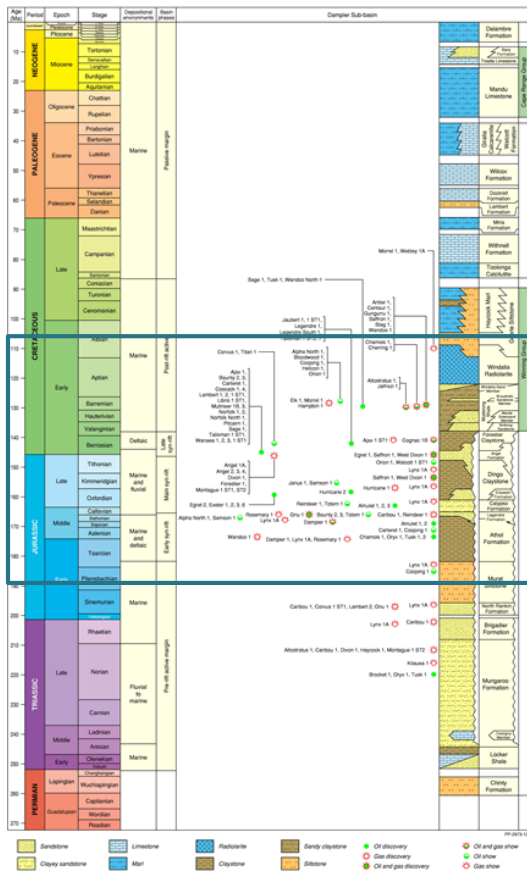
GHG21-4

- 22 graticular blocks, water depths 50-100 m

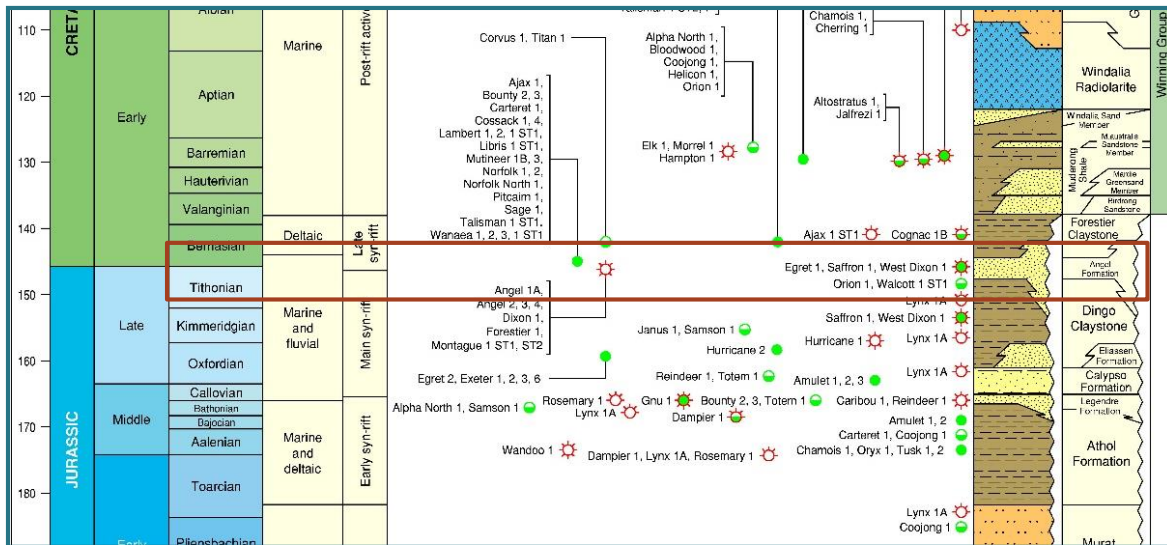
GHG21-5

- 45 graticular blocks, water depths 100-150 m
- Storage in depleted gas fields
- Potential CO₂ sources: industrial emissions from greater Dampier region

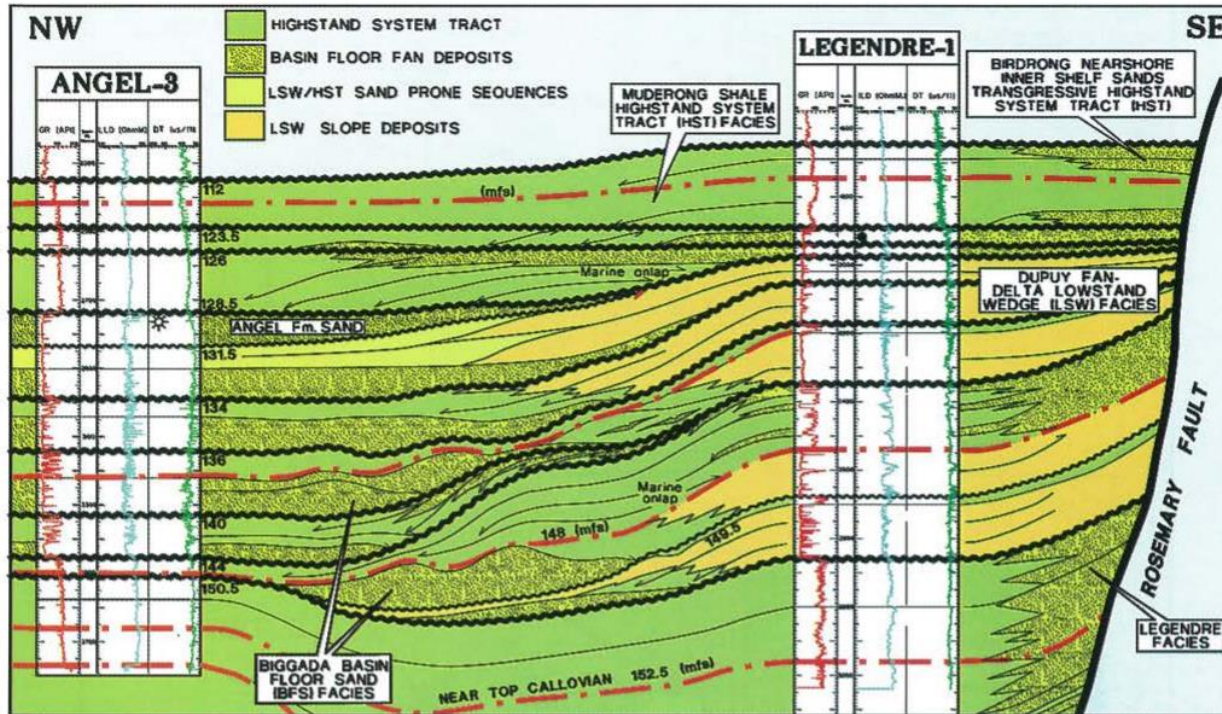
Stratigraphy of the Dampier Sub-basin



- Majority of oil and gas accumulations hosted by Middle-Upper Jurassic and Lower Cretaceous sandstone reservoirs
- Target for CO₂ storage uppermost Jurassic (Tithonian) deep water fans



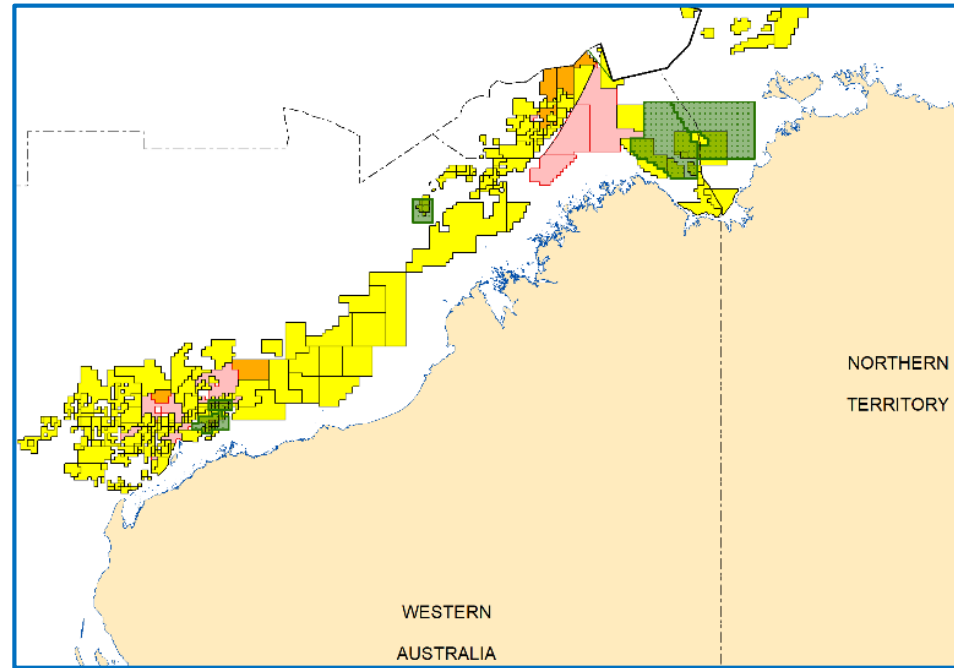
Well correlation Angel-3 to Legendre-1



- Transition from deltaic/inner shelf to slope and basin floor depositional environment
- Uppermost Jurassic (Tithonian) sandstones (“Angel Formation”) include reservoir facies
- Basin floor sandstones overlain and surrounded by fine-grained deep water mudstones (effective seals)
- Regional seal provided by Lower Cretaceous Muderong Shale

Summary

- Five offshore areas available for assessment of greenhouse gas storage potential
- Work program bids will be accepted between **4 -10 March 2022**
- Release areas are supported by a wealth of geological data
- From a geological perspective, successful storage requires a good understanding of:
 - **Injectivity** (extent of favorable reservoir conditions)
 - **Capacity** (long term storage potential)
 - **Containment** (seal integrity, fault behavior)
 - **Monitorability** (plume behavior over time)



Further information



- GHG Acreage Release information:
www.industry.gov.au/2021-ghg-acreage-release
- CCS projects, publications, data: www.ga.gov.au/ccs
- GA's interactive data discovery tool: <https://portal.ga.gov.au/>
- Australia's Energy Commodity Resources:
www.ga.gov.au/digital-publication/aecr2021
- Open file offshore petroleum data: www.ga.gov.au/nopims
- Hydrogen: www.ga.gov.au/hydrogen
- Hydrogen Economic Fairway Tool:
www.portal.ga.gov.au/persona/hydrogen
- Exploring for the Future: www.ga.gov.au/efft

