# Bonaparte Basin (WA)

**NW WESTERN AUSTRALIA, OFFSHORE**

**Reservoir:**

**Plover,** Elang formations, and Sandpiper Sandstone

**Seal:**

**Frigate Formation** and Bathurst island Group

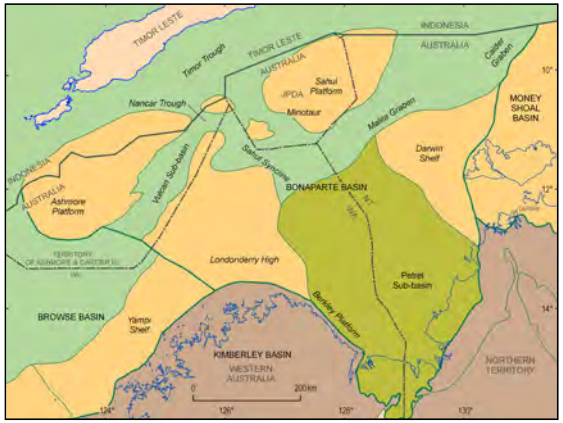
**HYDROCARBON POTENTIAL**

CATEGORY 1 and 2* (OGRA 2005)

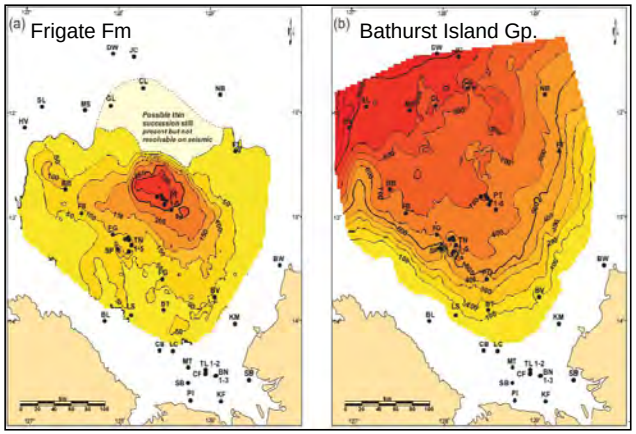
| | | |
|---|---|---|
| Crude oil | MMBL | 134.09 |
| Condensate | MMBL | 631.74 |
| LPG | MMBL | 365.72 |
| Sales gas | Tcf | 27.99 |

*data from entire basin

## STRUCTURAL ELEMENTS

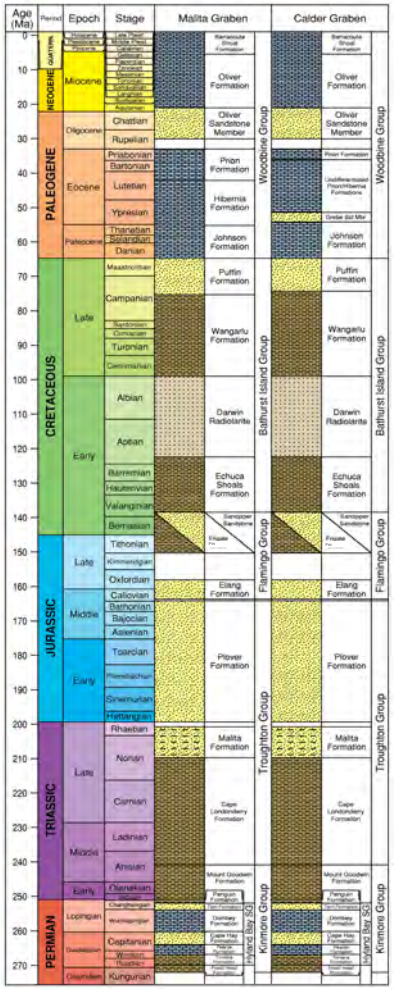



## REGIONAL SEAL AREA

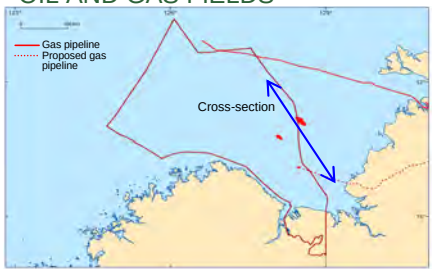



(Gibson-Poole et al., 2002)

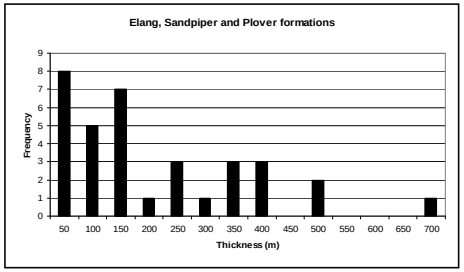
## STRATIGRAPHY




## OIL AND GAS FIELDS

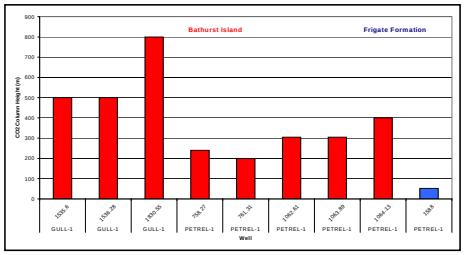



## RESERVOIR THICKNESS



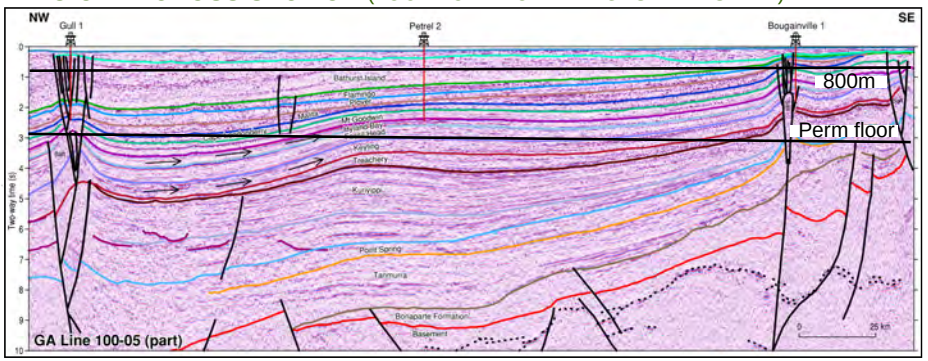

## WELLS AND SEISMIC COVERAGE

## TOP SEAL POTENTIAL

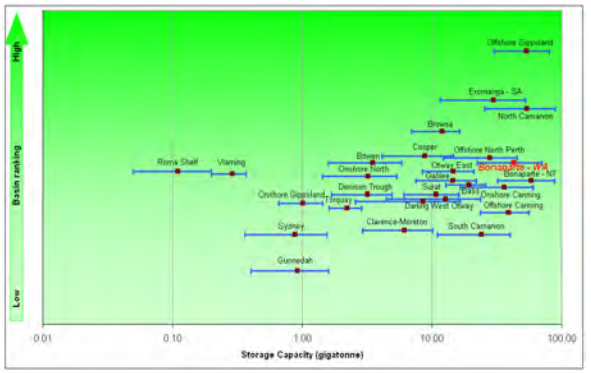



(After Gibson-Poole et al., 2002)

## REGIONAL CROSS SECTION (LOCATION IN OIL AND GAS FIELDS MAP)

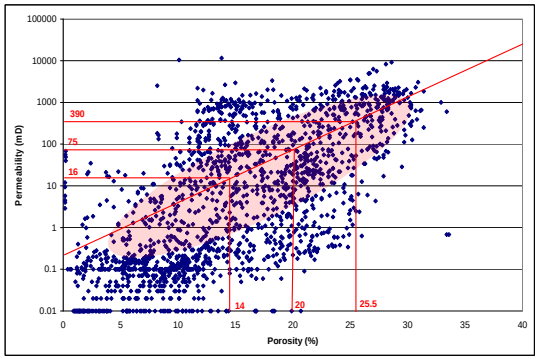



## BASIN RANKING VS. CAPACITY

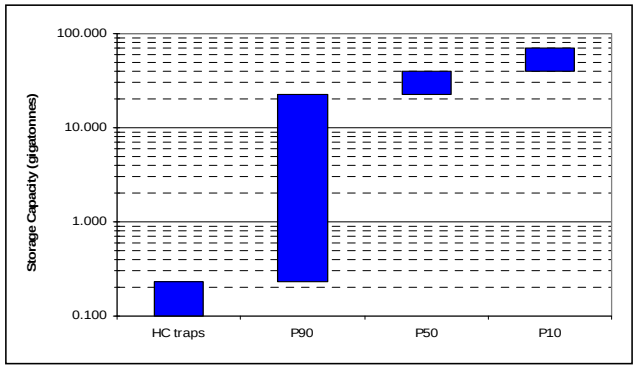


# Bonaparte Basin (WA)

## POROSITY VS. PERMEABILITY *Values from basin-wide dataset



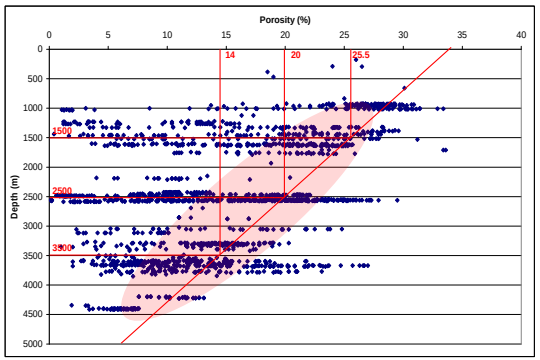

## STORAGE CAPACITY



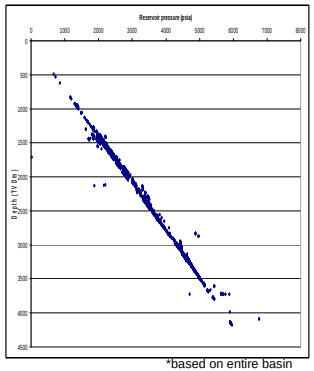

## BASIN RANKING

| Category | Description | Score | Weighting |
|---|---|---|---|
| Tectonics (Seismicity) | Low | 5 | 0.00 |
| Size | Very Large | 4 | 0.06 |
| Depth | Intermediate | 3 | 0.10 |
| Type | Non-marine and Marine | 2 | 0.04 |
| Faulting intensity | Extensive | 1 | 0.14 |
| Hydrogeology | Good | 3 | 0.04 |
| Geothermal | Moderate | 2 | 0.05 |
| Hydrocarbon potential | Large | 4 | 0.05 |
| Maturity | Developing | 3 | 0.05 |
| Coal and CBM | Deep | 3 | 0.00 |
| Reservoir | Excellent | 5 | 0.16 |
| Seal | Good | 4 | 0.18 |
| Reservoir/Seal Pairs | Good | 3 | 0.03 |
| Onshore/Offshore | Deep Offshore | 1 | 0.00 |
| Climate | Tropical | 3 | 0.00 |
| Accessibility | Difficult | 2 | 0.00 |
| Infrastructure | None | 1 | 0.00 |
| $CO_2$ sources | Few | 2 | 0.00 |
| Knowledge level | Good | 3 | 0.05 |
| Data availability | Good | 3 | 0.05 |
| **Overall Ranking** | | | **9** |

## POROSITY VS. DEPTH

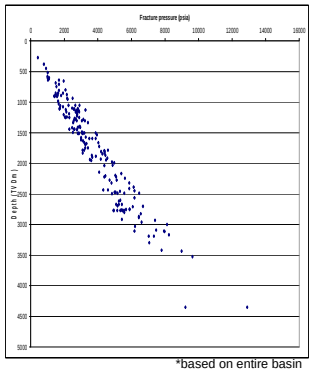



## RESERVOIR PRESSURE VS. DEPTH *CSIRO PressurePlot



*based on entire basin

## FRACTURE PRESSURE VS. DEPTH *CSIRO PressurePlot



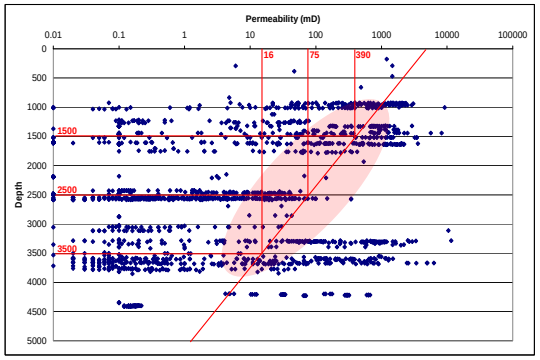
*based on entire basin

## STORAGE CAPACITY ESTIMATE

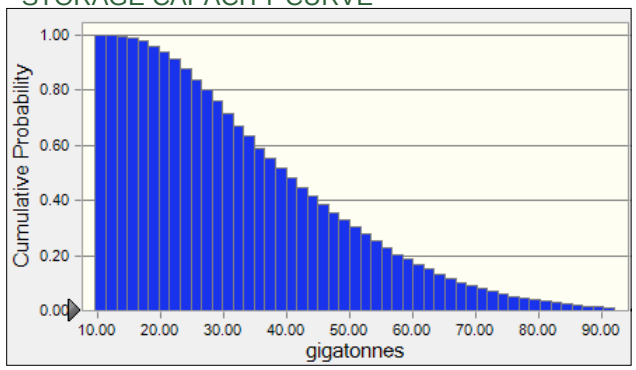
| Parameter | Unit | Score (P90) | Score (P50) | Score (P10) | Distribution |
|---|---|---|---|---|---|
| Area of storage region | $km^2$ | 30000* | 65000* | 80500 | Triangular |
| Gross thickness of saline formation | m | 50 | 100 | 300 | Triangular |
| Average porosity of saline formation over thickness interval | % | 17 | 20 | 23 | Triangular |
| Density of $CO_2$ at average reservoir conditions | tonne/$m^3$ | 0.5 | 0.6 | 0.7 | Triangular |
| E-storage efficiency factor (% of total pore volume) | % | 4 | 4 | 4 | |
| Calculated storage potential | gigatonnes | 22.4 | 39.3 | 70.6 | |

* including WA

## PERMEABILITY VS. DEPTH




## STORAGE CAPACITY CURVE




## POTENTIAL INJECTION PARAMETERS

| Parameter | Unit | Shallow | Mid-Depth | Deep |
|---|---|---|---|---|
| Depth base seal | m | 1150 | 2000 | 3200 |
| Formation thickness | m | 350 | 500 | 300 |
| Injection depth | m | 1500 | 2500 | 3500 |
| Porosity | % | 25.5 | 20 | 14 |
| Absolute permeability | mD | 390 | 75 | 16 |
| Formation pressure | psia | 2160 | 3600 | 5040 |
| Fracture pressure | psia | 3175 | 5290 | 7405 |

## DISCLAIMER

The purpose of these montages is to aid a high level evaluation of the geological storage potential of Australia's sedimentary basins for future $CO_2$ emissions. The evaluations are based on core analysis and other data derived from Geoscience Australia and other sources. However due to time constraints, it has not been possible to carry out the detailed evaluation of the data, which will be required for the next phase of analysis.

In this exercise, we sought to recognise a range of characteristics within each basin by identifying three sets of parameters at different locations and depths in the basin. The intent is to generate an indication of a range of storage capacity and potential injection rates. These capacities and rates are being used in high level reservoir modelling work to generate injection tariffs* and capacity estimates. All of this work feeds into a process that provides indicative, conceptual transport and storage tariffs for $CO_2$ emissions captured in various parts of Australia.

This 'top down', simplistic approach seeks to describe the magnitude and range of potential costs for transport and storage in Australia, at a 'conceptual' level of accuracy. Clearly, any final investment decision would call on an increased understanding and level of accuracy through the usual project development process.

* Cost per tonne of $CO_2$ avoided, calculated using the net present value of cash flows over a 25 year asset life.

## REFERENCES


Gibson-Poole, C., Lang, S., Streit, J., Kraishan, G. and Hillis, R., 2002. Assessing a basin's potential for geological sequestration of carbon dioxide: An example from the Mesozoic of the Petrel Sub-basin, NW Australia. In: Keep, M. and Moss, S.J. (eds), The Sedimentary Basins of Western Australia 3. Proceedings of the Petroleum Exploration Society of Australia Symposium 2002, Perth, 439-463.

Petroleum and Marine Division, Geoscience Australia, 2007. Oil and Gas Resources of Australia 2005. Geoscience Australia, Canberra.