Outline

- Basin Overview (John Tellers)
- Description of Plays (Jessica Pierson & Valerie Smith)
- Source Rocks and Geohistory (Julia McConnell)
- Fairway Maps and Prospects (Matt Boyce)
- Volumetric and Risk Analyses (Julia McConnell)
- Summary and Recommendations (Matt Boyce)
Tectonic Evolution of the Cooper Basin

**Triassic**
- Continued fluvial deposition dominates the environment post a Late Permian uplift.

**Permian**
- Glacial retreat causes large amounts of fluvial sediment to be deposited in the Cooper Basin.
- Peat swamps and flood plain deposits are located above the Early Permian unconformity caused by uplift.

**Carboniferous**
- Cooper basin drifts to higher latitudes (55° S to 70° S) forming Pangea.
- Deformation along the Eastern Australian Plate produces uplift and glaciation.

Alexander et al. (1998)
Formations of Interest

Merrimelia Fm:
- Starts the Cooper Basin
- Waxing and waning of glacial sediments
Formations of Interest

- Tirrawarra SS:
  - Glaciers waning
  - North flowing streams
  - Low sinuosity
  - High width depth ratio

- Merrimelia Fm:
  - Starts the Cooper Basin
  - Waxing and waning of glacial sediments

<table>
<thead>
<tr>
<th>Era</th>
<th>Interval</th>
<th>Formations</th>
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<tbody>
<tr>
<td>Triassic</td>
<td>Toolachee Fm&lt;br&gt;Roseneath Shale&lt;br&gt;Epsilon Fm&lt;br&gt;Murteree Fm</td>
<td>Patchawarra</td>
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<tr>
<td>Permian</td>
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<td>Cooper Basin</td>
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<tr>
<td>Carboniferous</td>
<td>Tirrawarra Fm</td>
<td>Merrimelia Fm</td>
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Formations of Interest

Merrimelia Fm:
- Starts the Cooper Basin
- Waxing and waning of glacial sediments

Patchawarra Fm:
- North flowing
- High sinuosity fluvial system
- Peats prevent avulsion
Formations of Interest

- Toolachee Fm: Fluvial system, High sinuosity
- Cooper Basin
  - Triassic Interval
    - Toolachee Fm
    - Roseneath Shale
    - Epsilon Fm
    - Murteree Fm
  - Patchawarra
  - Tirrawarra Fm
  - Merrimelia Fm

Toolachee Fm:
- Fluvial system
- High sinuosity
### Formations of Interest

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<td>Merrimelia Fm</td>
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**Cooper Basin**
- Triassic Interval
- Permian
- Carboniferous

**Map:***
- **Cooba-1**
- **Meranji-1**
- **Pelican-5**
Formations of Interest

- Poolowanna Fm:
  - Fluvial system
  - High sinuosity

Eromanga Basin Cretaceous
- Cadna-owie Fm
  - Murta Member
- Mooga Fm
  - Namur Member

Jurassic
- Westbourne Fm
- Hutton Fm
- Poolawanna Fm
Formations of Interest

<table>
<thead>
<tr>
<th>Eromanga Basin</th>
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<td>Cretaceous</td>
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<tr>
<td>Cadna-owie Fm</td>
<td>Murta Member</td>
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<td>Mooga Fm</td>
<td>Namur Member</td>
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<td>Westbourne Fm</td>
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<td>Jurassic</td>
<td></td>
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<td>Hutton Fm</td>
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<tr>
<td>Poolawanna Fm</td>
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</table>

Jurassic - Hutton Fm

Cretaceous - Cadna-owie Fm, Murta Member, Mooga Fm, Namur Member, Westbourne Fm

Formation labels: Pelican-5, Cooba-1, Meranji-1, Hutton Fm
Formations of Interest

Jurassic
- Hutton Fm
- Poolawanna Fm

Cretaceous
- Cadna-owie Fm
  - Murta Member
- Mooga Fm
  - Namur Member
- Westbourne Fm

Mooga Fm (Namur Mbr)
# Formations of Interest

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<thead>
<tr>
<th>Layer</th>
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<td><strong>Cretaceous</strong></td>
<td>Mooga Fm (Murta Mbr):</td>
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<td>Cadna-owie Fm</td>
<td>Murta Member</td>
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<td>Namur Member</td>
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<tr>
<td>Westbourne Fm</td>
<td></td>
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<td>Hutton Fm</td>
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<table>
<thead>
<tr>
<th><strong>Jurassic</strong></th>
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<tr>
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<td>Hutton Fm</td>
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<td>Poolawanna Fm</td>
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Formations of Interest

- **Eromanga Basin**
  - *Cretaceous*
    - Cadna-owie Fm
      - Murta Member
    - Mooga Fm
      - Namur Member
  - *Jurassic*
    - Westbourne Fm
    - Hutton Fm
    - Poolawanna Fm

- **Cadna-Owie Fm:**
  - Pelican-5
  - Cooba-1
  - Meranji-1
Cooper Basin (Toolachee Fm)
Fault Network (ant tracking algorithm)
Eromanga Basin (Poolowanna Fm)
Fault Network (ant tracking algorithm)
Description of Plays
- Principle oil reservoir of the Cooper Basin
- Deposited in a glacially influenced braided stream system
- Medium to coarse grained sandstone with an average porosity of ~10% and an average Sw of ~20%
- Sourced from the Merrimelia Fm
- Structural trap on flanks of anticlines

Bruarjökull, Iceland (http://www.hi.is/~oi)
**Patchawarra**

- Deposited in a high sinuosity fluvial system
- Multiple sand bodies
- Tight sands with an average porosity of 9%, Sw 25%
- Up to 107' of gas pay
- Most production comes from sands above VC Coal
- Sands that onlap onto flanks of the anticline are also productive

Yamal Tundra, Siberia (http://www.hi.is/~oi)
- High sinuosity fluvial system with coal-forming swamps and lacustrine depositional environments in low relief areas.
- Average porosity of 11-13%, Sw 48%
- 52’ of gas pay
- Thick channel and point-bar sandstones that overlie coal are targeted
Hutton Basin

- Non-marine low-sinuosity fluvial sandstone depositionally controlled by regional Triassic unconformity.
- Average porosity of 10-12%, Sw 68%
- Possible source rock is the Nappamerri Shale
- Usually water saturated but potential hydrocarbons in anticlinal structures

Tasman River, Tasmania
(www.outdoors.webshots.com/album/35572796/qttMdu.html)
Namur

- Massive sandstone, deposited in braided stream system
- Dominantly unconsolidated with average porosity of 21%, Sw 38%
- Shales in the Namur Mbr and overlying Murta Mbr provide good seals
- 35’ of oil pay in the Meranji well (1723 – 1733 m)
Source Rocks and Geohistory
Fairway Maps and Prospects
Two Proposed well locations near the Meranji-1
Primary targets are the Patchawarra and Namur
Secondary target is the Tirrawarra
• 8 Proposed Well Locations
• Primary Target is the Patchawarra
• Secondary Targets are the Namur and Tirrawarra
Plays 3 and 4

- 5 Proposed well locations
- Primary target is the Patchawarra
- Namur and Tirrawarra are secondary reservoirs
Index Map

Prospect Well Location

Play 5

Namur

Patchawarra

Merrimelia

Cadnaowie

Toolachee

Patchawarra

Merrimelia
Unconventional Coal Bed Methane: VC Coal

- Assumptions
  - Bituminous Coal
  - Conservative absorption estimates
  - Uniform thickness
  - Gas Content
  - Estimated Hydrocarbon Recovery
    - 151 Mcm of gas
Volumetrics and Risk Analyses
Volumetrics

Estimated OHIP Per Unit

- Namur
- Toolachee
- Patchawarra
- Tirrawarra

Play

Mm³
## Risk Elements

<table>
<thead>
<tr>
<th>PLAY</th>
<th>OGIP</th>
<th>OOIP</th>
<th>RISK ELEMENTS</th>
<th>ADJUSTED VOLUME (Mm³ and Mbbl)</th>
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<td>Mm³</td>
<td>Mbbl</td>
<td>Source</td>
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<td>5</td>
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Risk Analysis

![Bar chart showing risk analysis for different plays.](chart.png)
Summary and Recommendations
Summary

- Proven oil and gas reservoirs
- Structural and stratigraphic plays
- Low risk prospects
- High risk prospects
Recommendations

- Pursue land negotiations for wells in Play 1 and Play 2
- Wait for Plays 3, 4, and 5
- Higher resolution seismic
- Eromanga Basin
- Unconventional plays - Coalbed Methane
Questions?