



Victoria & Tasmania Section

Oil and Gas Exploration & Production in Victoria

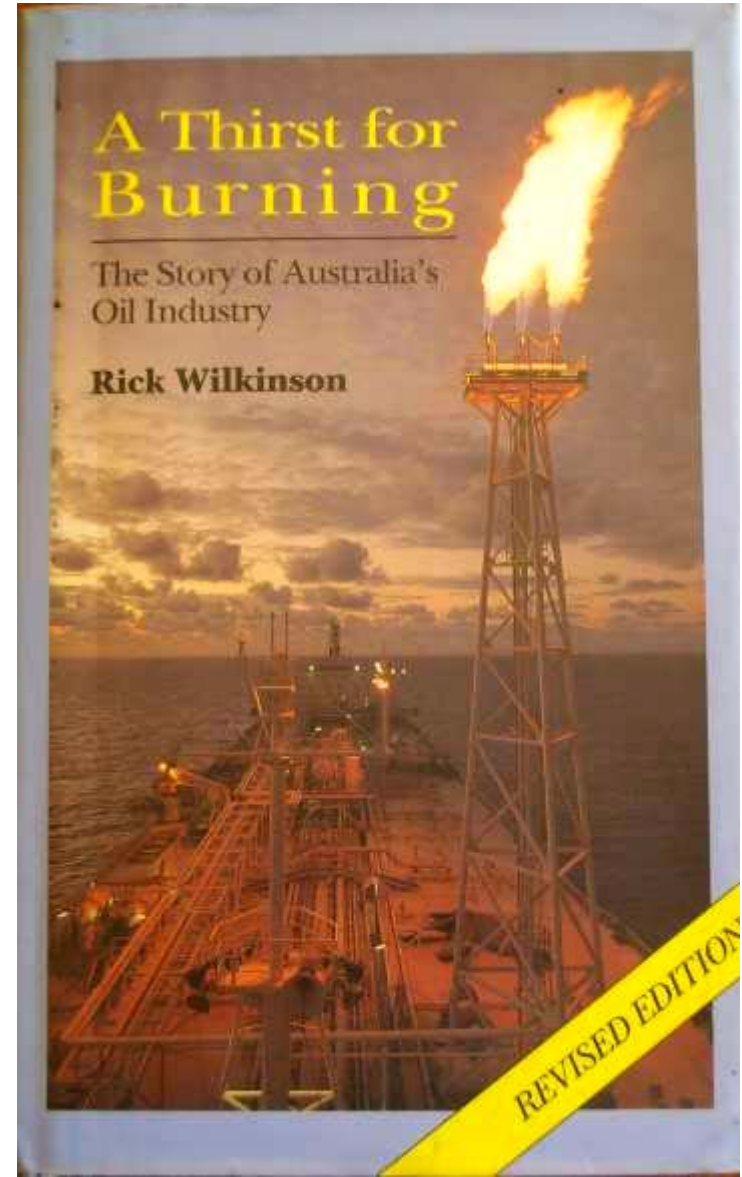
Steve Henzell

Manager of Select, WorleyParsons

- ☐ Victorian overview
- ☐ Gippsland Basin
- ☐ Offshore Gippsland Basin
- ☐ Otway Basin
- ☐ Bass Basin
- ☐ Innovation
- ☐ The Future?

Acknowledgements & Sources

- ☐ Rick Wilkinson's book "A Thirst for Burning"
- ☐ Victorian Department of Primary Industry
- ☐ Esso and BHP Billiton
- ☐ TRUenergy
- ☐ Origin
- ☐ Santos
- ☐ WorleyParsons
- ☐ Many members of the SPE

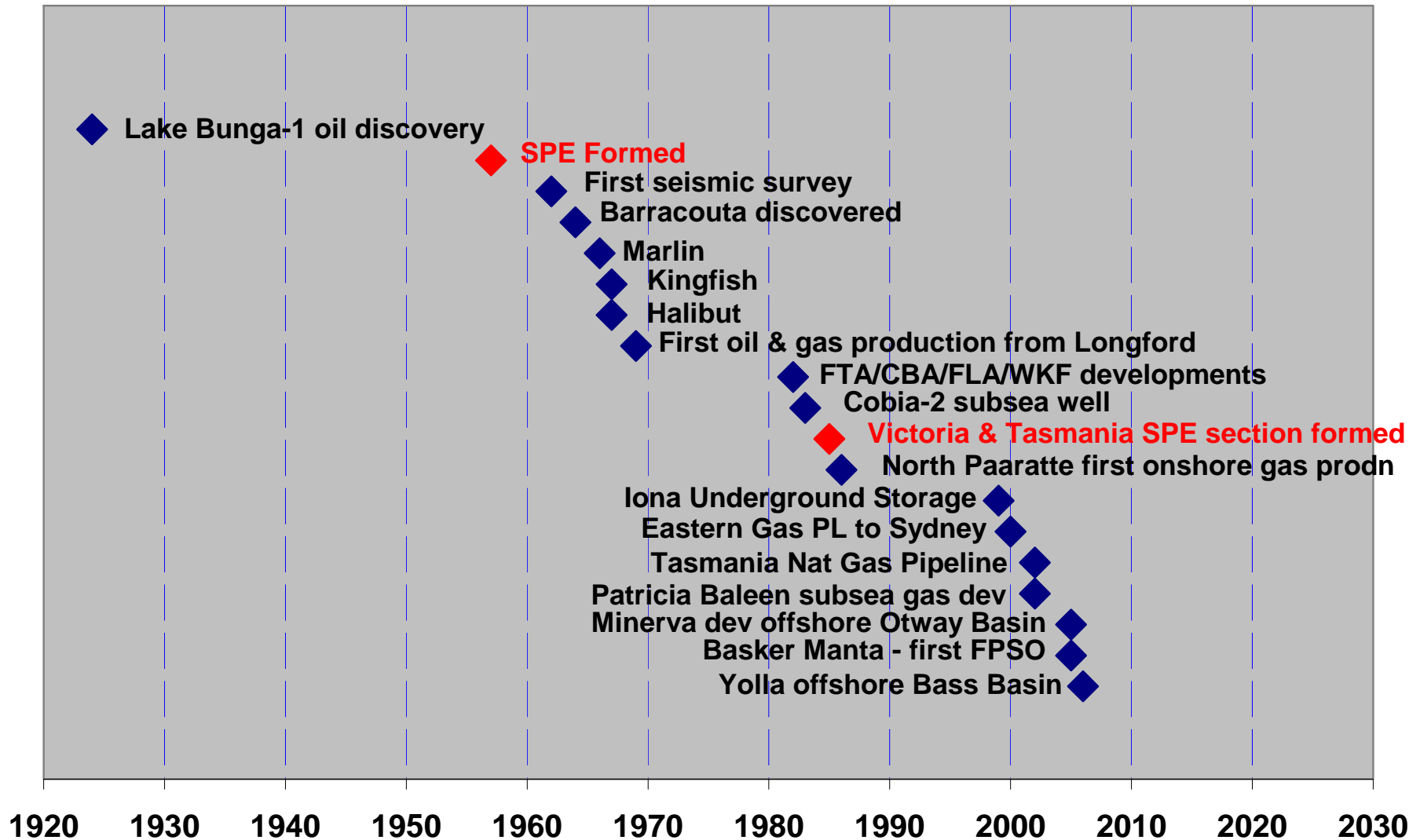




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Victoria's Oil and Gas Industry

Timeline of Oil & Gas in Victoria



Victoria's Sedimentary Basins

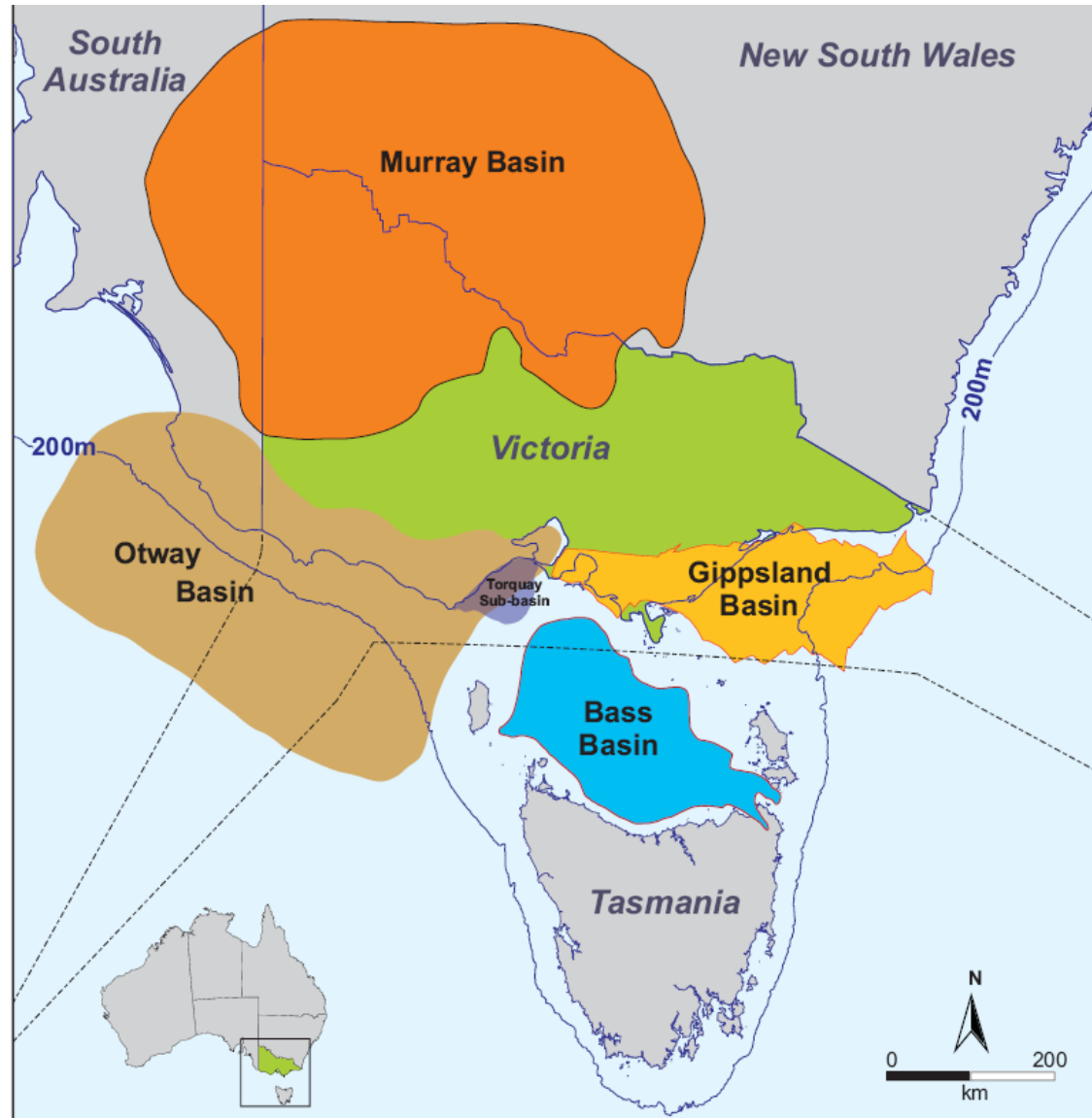
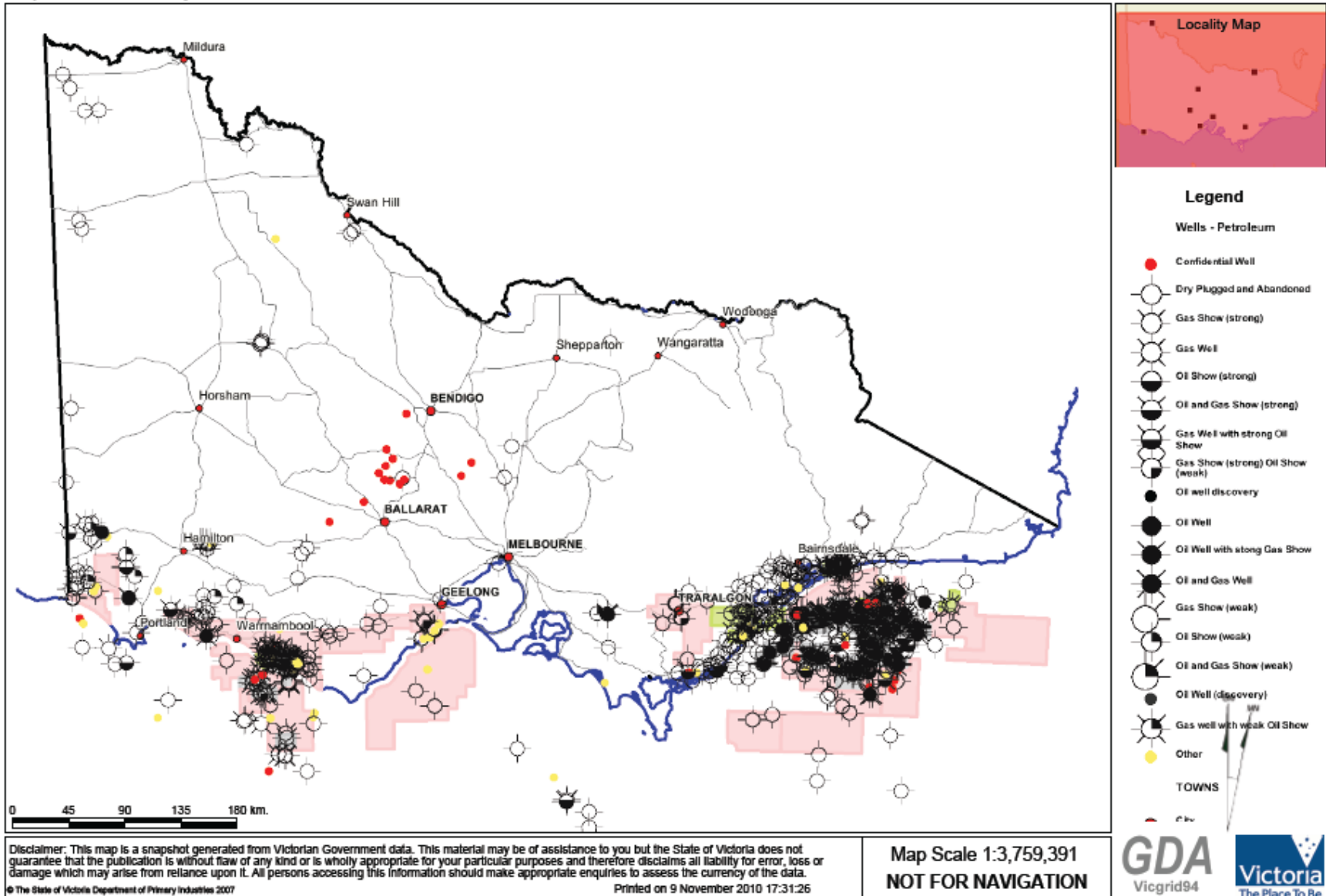


Image courtesy of
Department of
Primary Industries

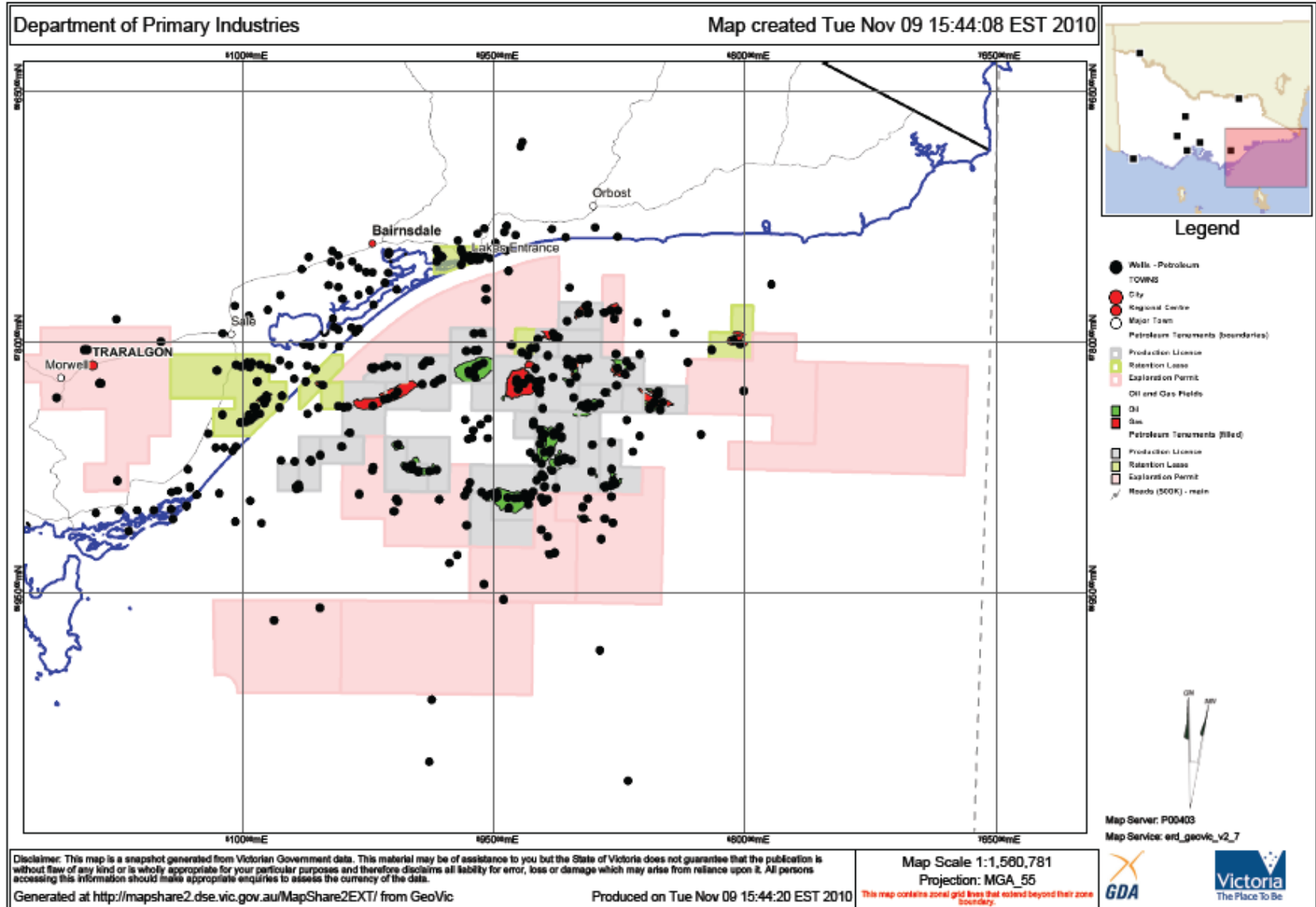
Drilling Activity Across the State



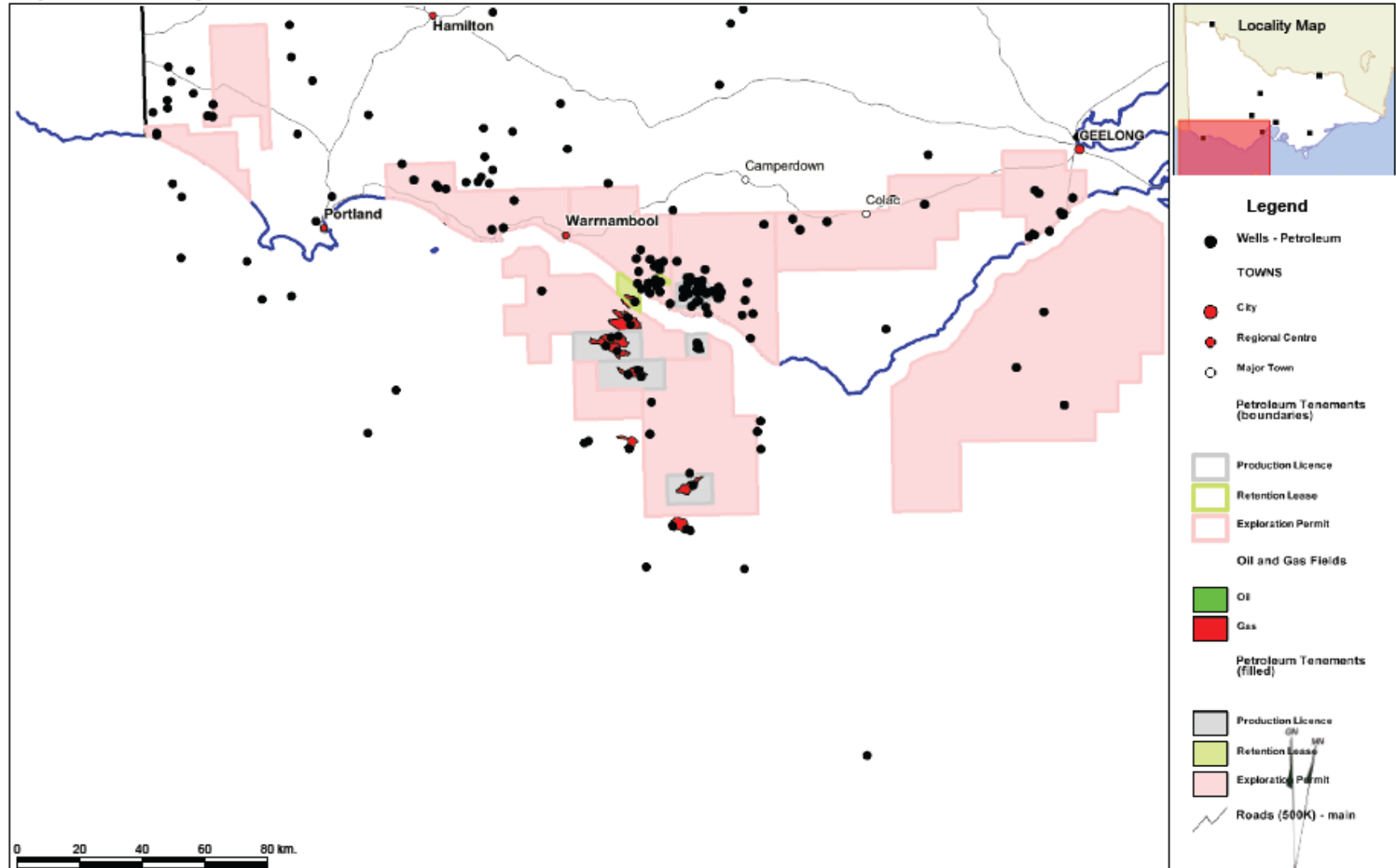


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Gippsland Basin



Otway Basin



Disclaimer: This map is a snapshot generated from Victorian Government data. This material may be of assistance to you but the State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons accessing this information should make appropriate enquiries to assess the currency of the data.

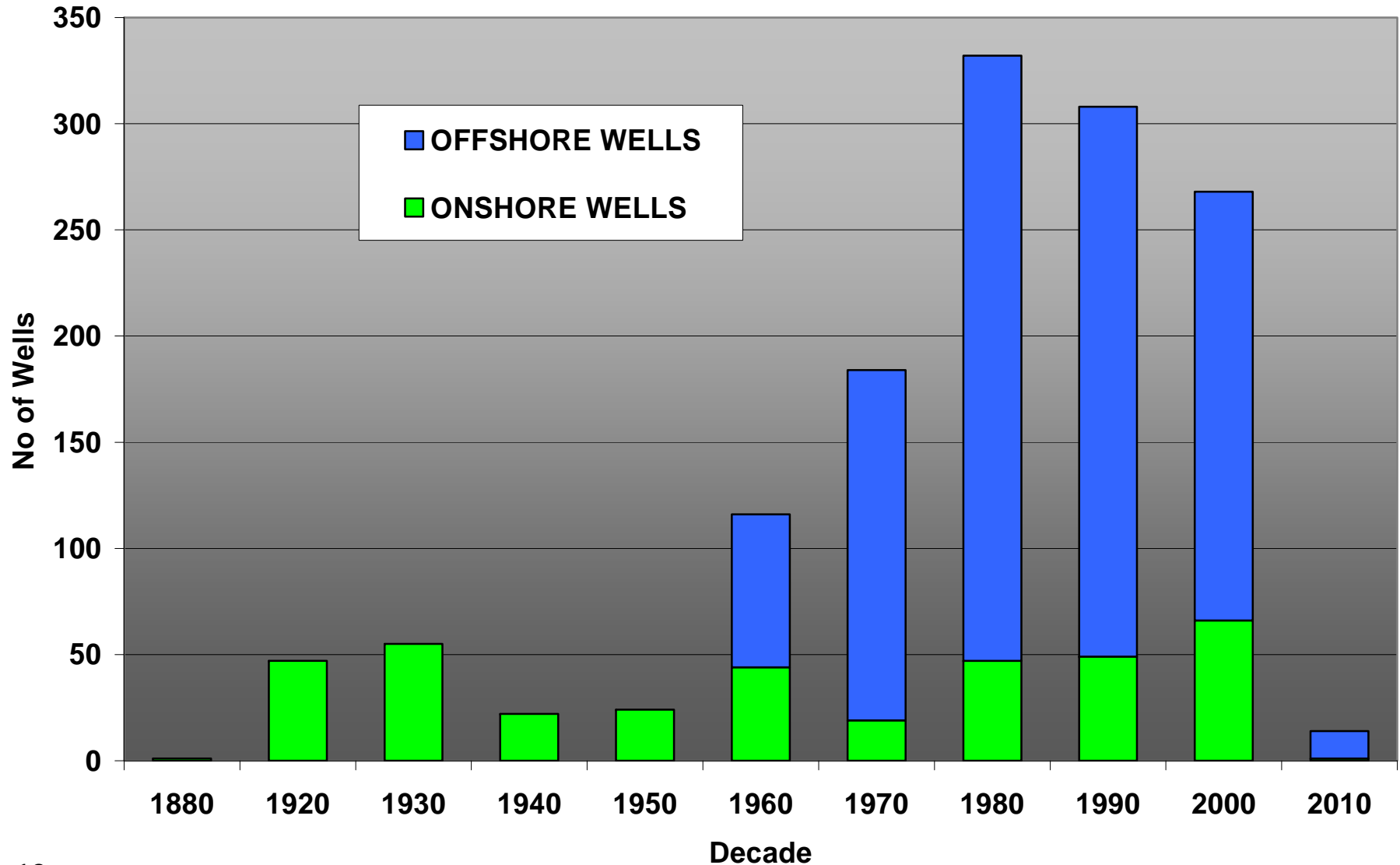
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Printed on 9 November 2010 15:45:50

Map Scale 1:1,572,864

NOT FOR NAVIGATION

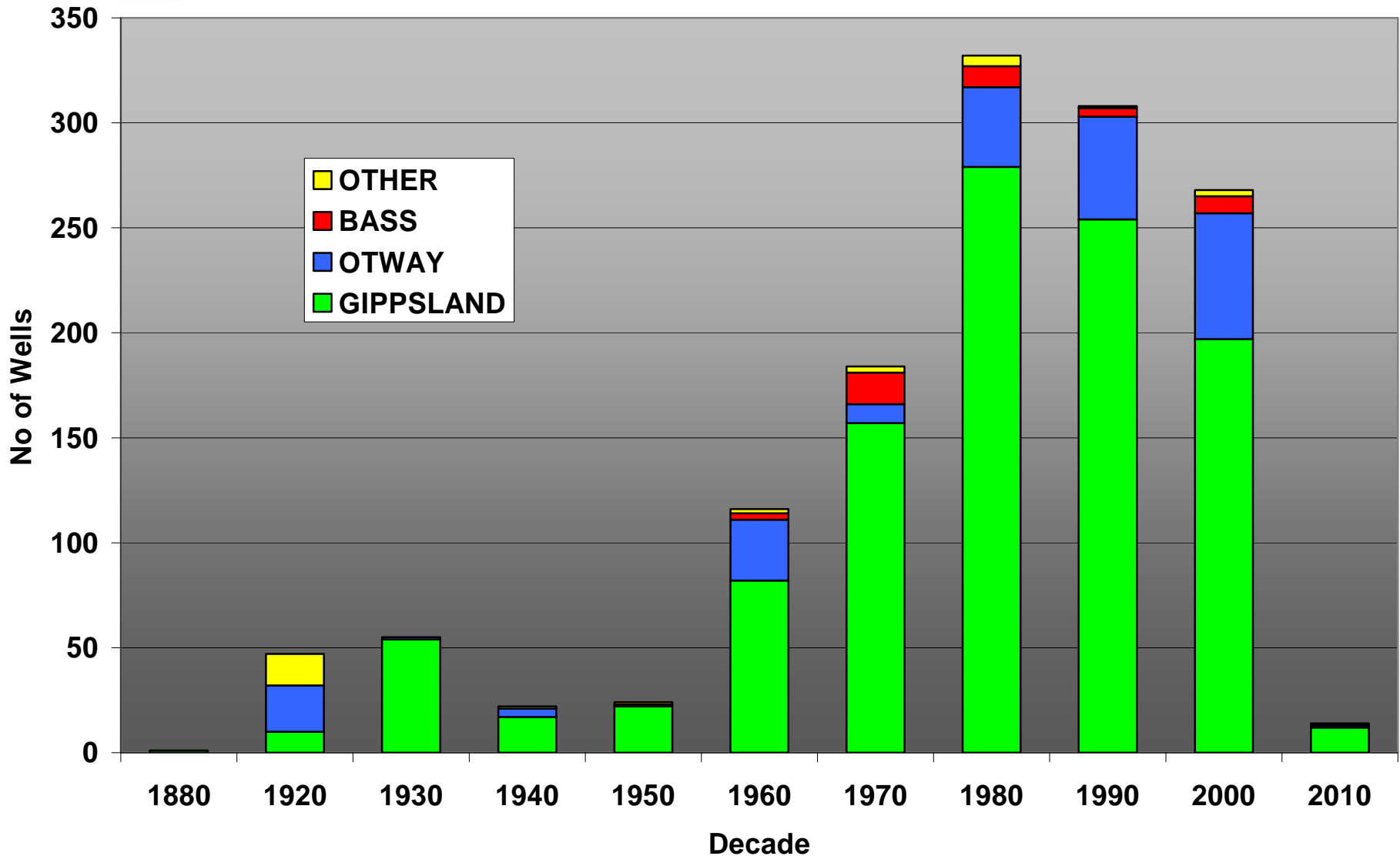
Onshore & Offshore Wells



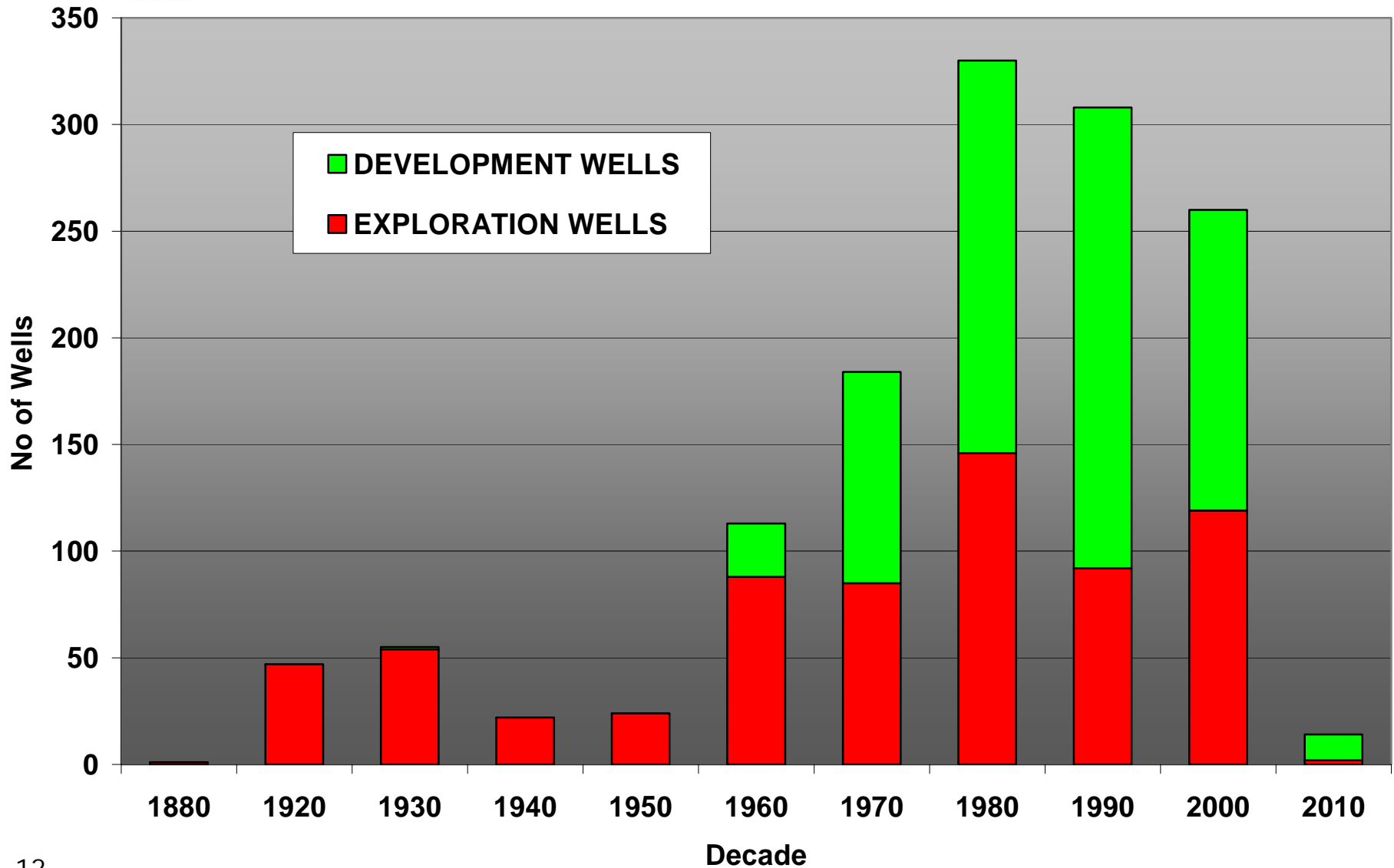


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Distribution of Wells



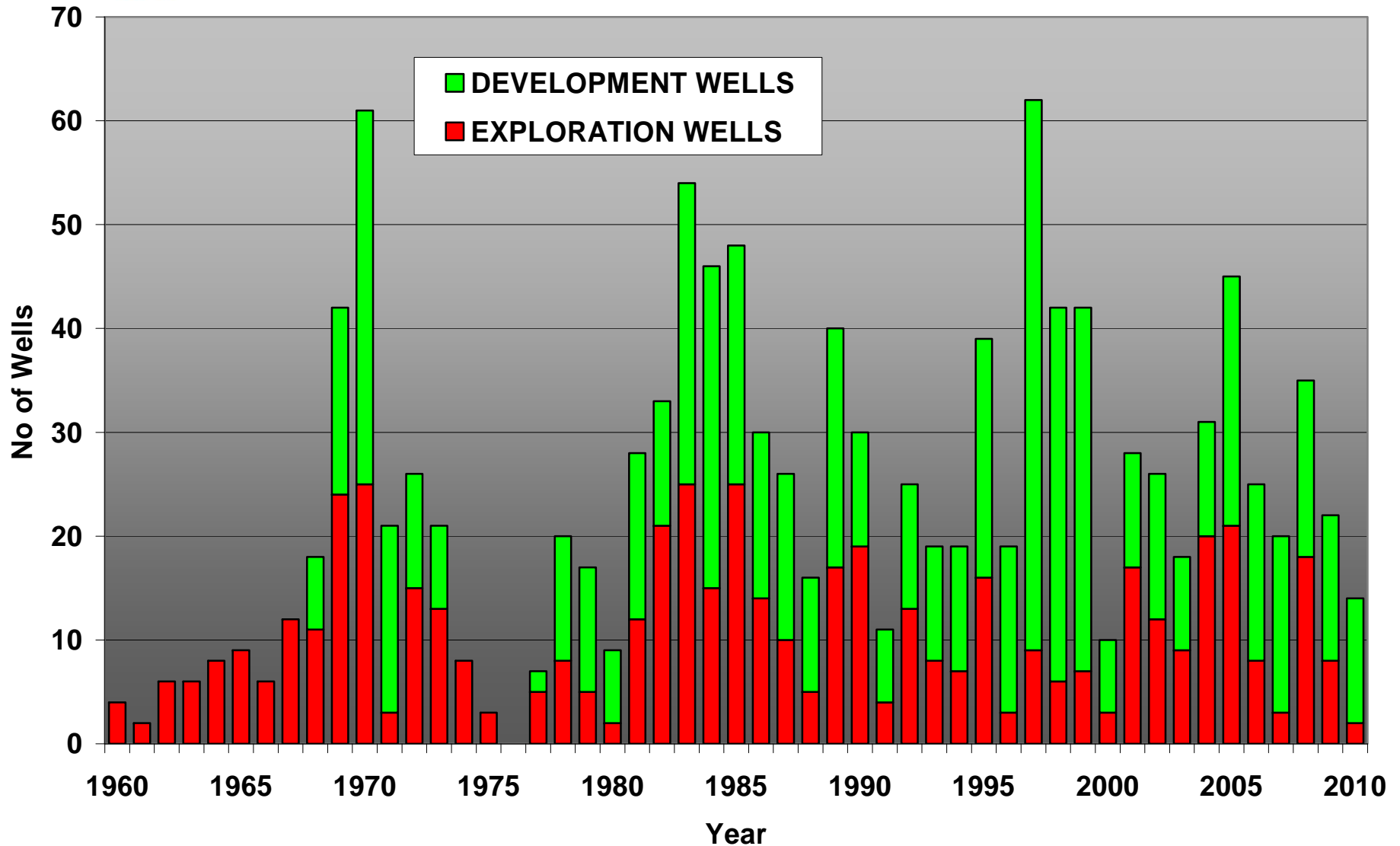
Exploration and Development





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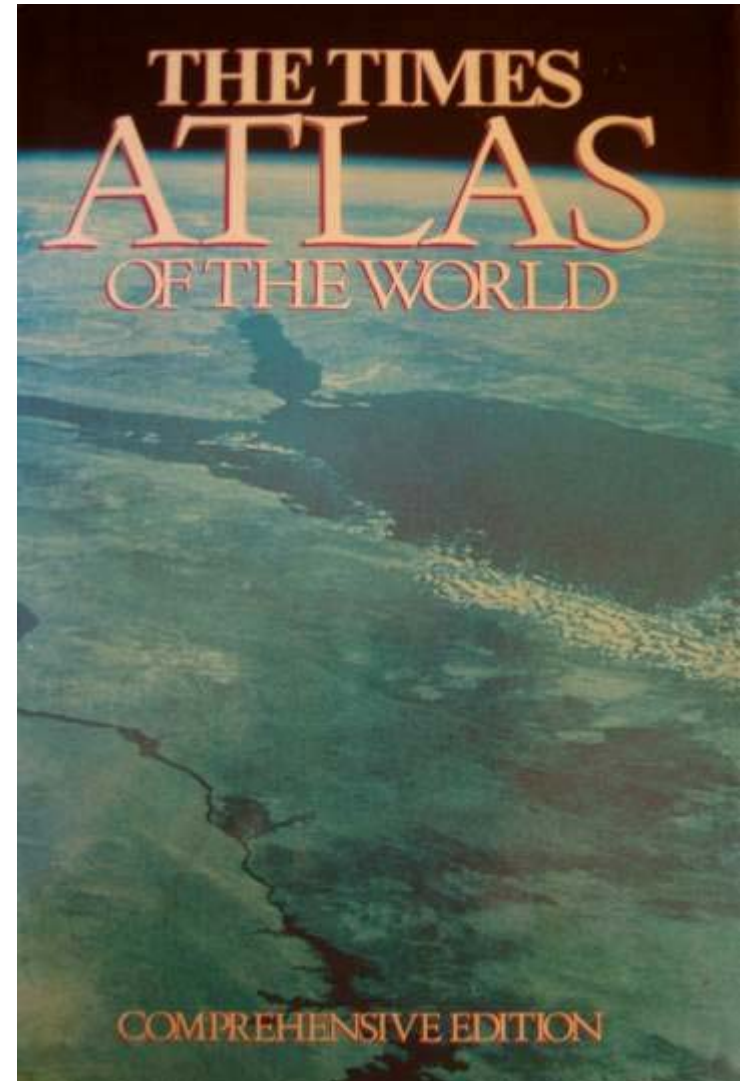
Year – by – Year



Production

Oil

- Peak production in January 1984
- 74.8 Megalitres per day on 13 January





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Gippsland Basin

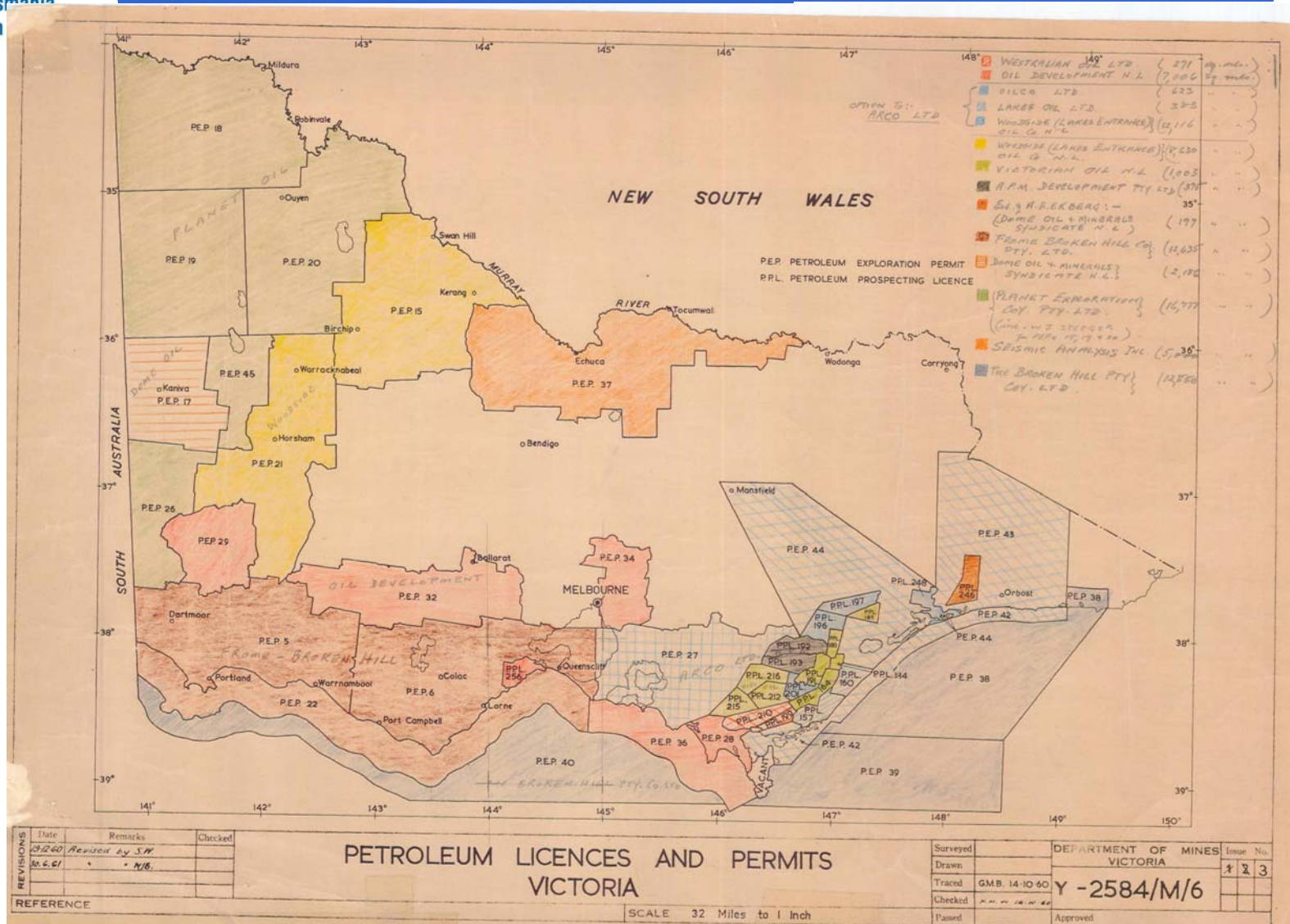
Lake Bunga-1



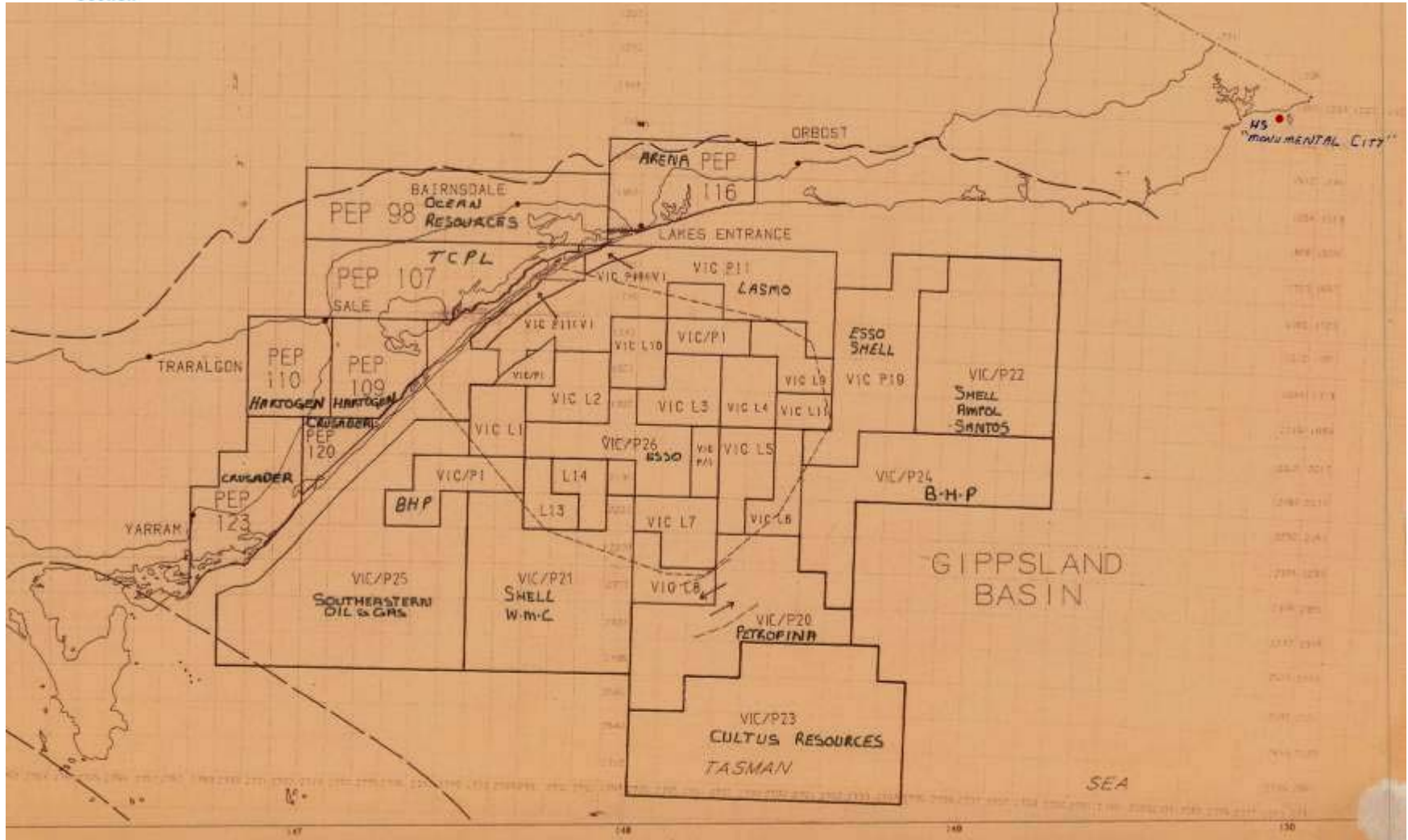
Source Lakes Oil website
<http://www.lakesoil.com.au/corporate/>

Lake Bunga Oil Development

- ❑ 13 m oil column found in a water well
- ❑ Glauconitic, partly fossiliferous conglomerates in the uppermost section of the Latrobe Group
- ❑ Discovered in 1924
- ❑ Development
 - ❑ Driven by war effort
 - ❑ Chamber at base of 3 metre diameter shaft, 400 metres deep
 - ❑ Horizontal drilling from the chamber into the seams
 - ❑ About 8000 b recovered, including 5000 b from the shaft









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Offshore Gippsland Basin

Offshore Gippsland Basin

- Frontier territory in the 1960s
 - Water depths
 - Storm magnitudes
 - Offshore technology was still novel
- Woodside had ventured only into the coastal margin

BHP's Involvement Starts

☐ Lewis Weeks

- ☐ Recently retired chief geologist of Standard Oil Co of New Jersey (Esso)
- ☐ Consultant to BHP
- ☐ Recommended the offshore Gippsland Basin
- ☐ Received a 2.5% overriding royalty

☐ BHP

- ☐ Took out permits for 163,000 sq km in Victoria, Tasmania and South Australia waters
- ☐ Hematite Exploration formed
- ☐ Aerial magnetometer survey performed to obtain a basic outline of the basins and their sediments
- ☐ 9600 km of seismic shot in both the Otway and Gippsland Basins
- ☐ BHP sought a partner – Esso selected



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Glomar III



First Exploration Wells

☐ Spud Dates

<input type="checkbox"/> Barracouta 1	27 December 1964
<input type="checkbox"/> Barracouta 2	8 June 1965
<input type="checkbox"/> Cod 1	20 September 1965
<input type="checkbox"/> Marlin 1	5 December 1965
<input type="checkbox"/> Marlin 2	30 May 1966
<input type="checkbox"/> Marlin 3	16 December 1966
<input type="checkbox"/> Kingfish 1	6 April 1967
<input type="checkbox"/> Halibut 1	20 June 1967
<input type="checkbox"/> Dolphin 1	28 September 1967
<input type="checkbox"/> Kingfish 2	28 November 1967
<input type="checkbox"/> Kingfish 3	2 February 1968



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Development Commences

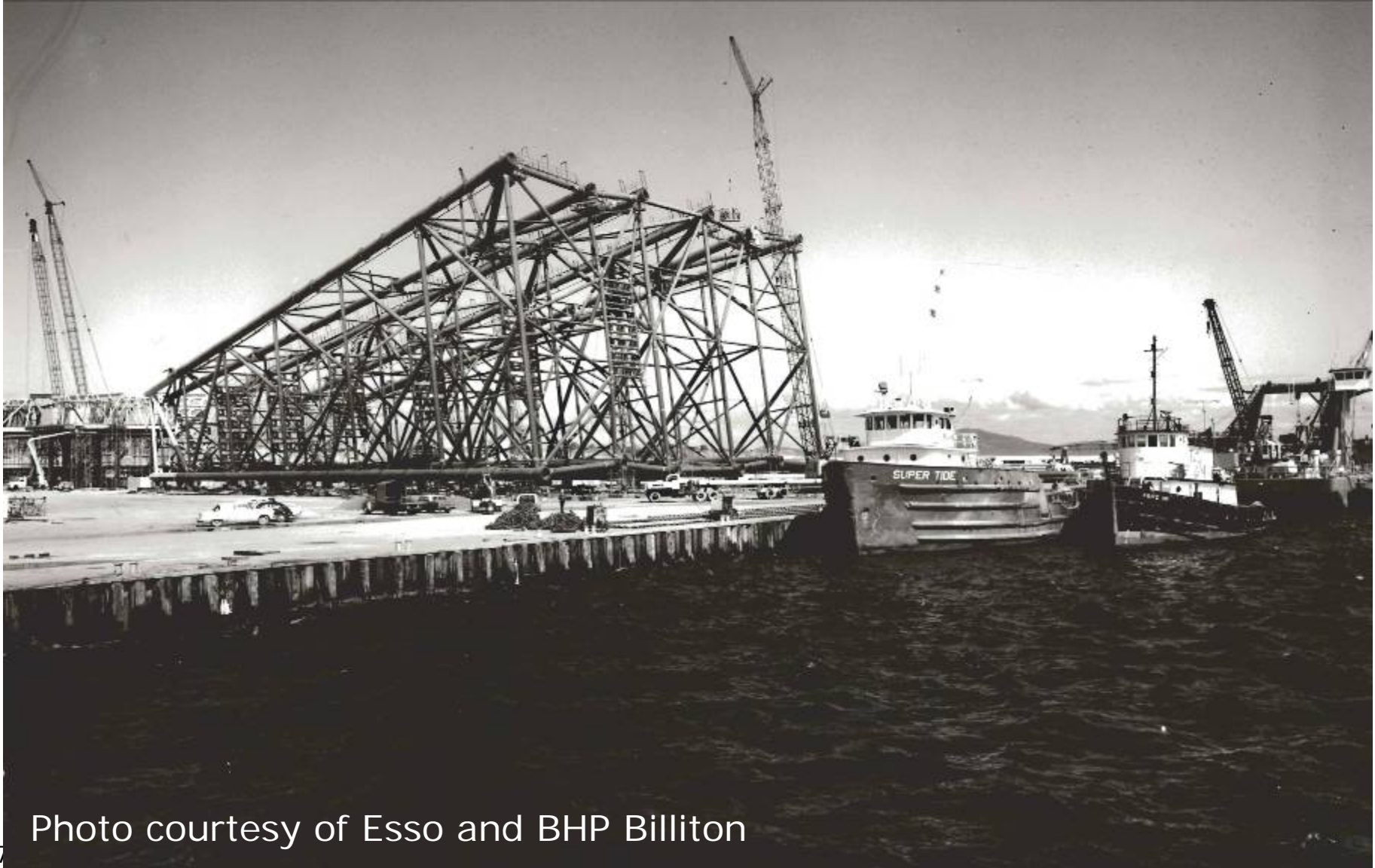


Photo courtesy of Esso and BHP Billiton

Jacket Construction at BBMT



Photo courtesy of
Esso and BHP Billiton



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Barracouta Ready for Transport



Photo courtesy of Esso and BHP Billiton



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Barracouta Jacket Tow Out



Photo courtesy of Esso and BHP Billiton

Barracouta Topsides



Photo courtesy of Esso and BHP Billiton



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DB3 Derrick Barge



Pipelaying Adjacent to Barracouta



Photo courtesy of Esso and BHP Billiton

Barracouta Today



Photo courtesy of Esso and BHP Billiton

Gas Plant 1 at Longford



Photo courtesy of Esso and BHP Billiton

Longford



Photo courtesy of Esso and BHP Billiton



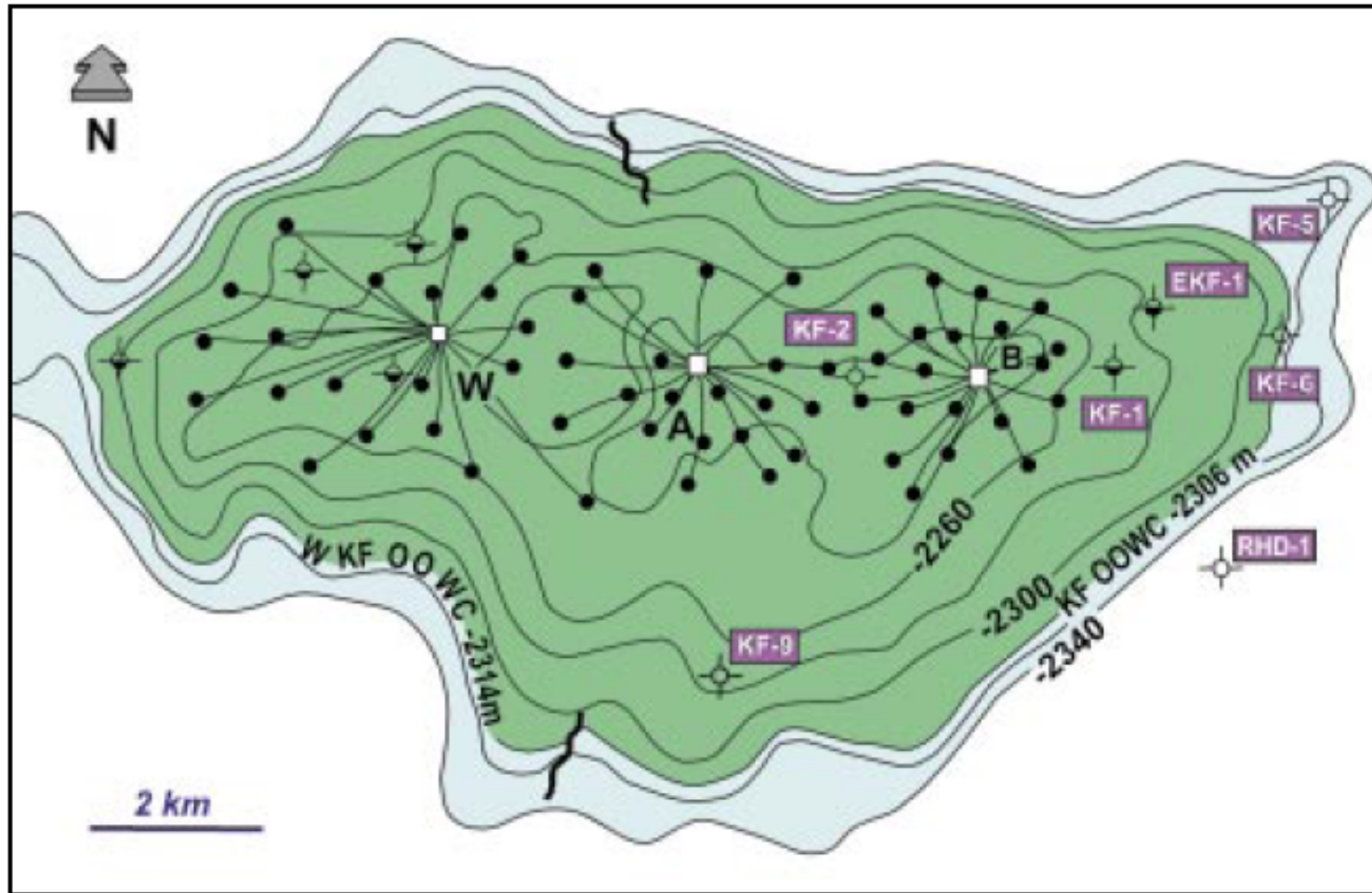
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Longford Today

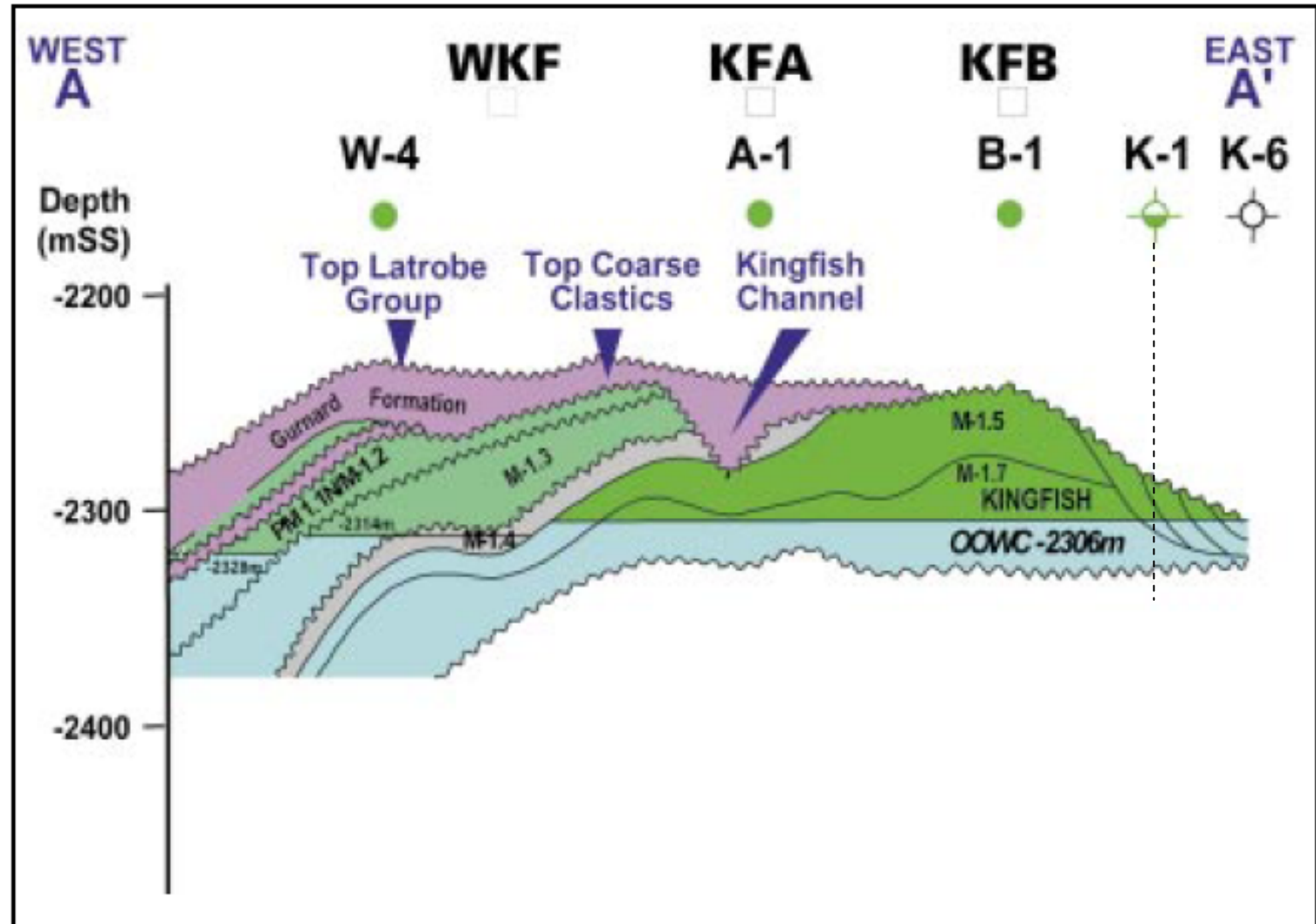


37Photo courtesy of Esso and BHP Billiton

Kingfish Field



KF-1 Almost Missed

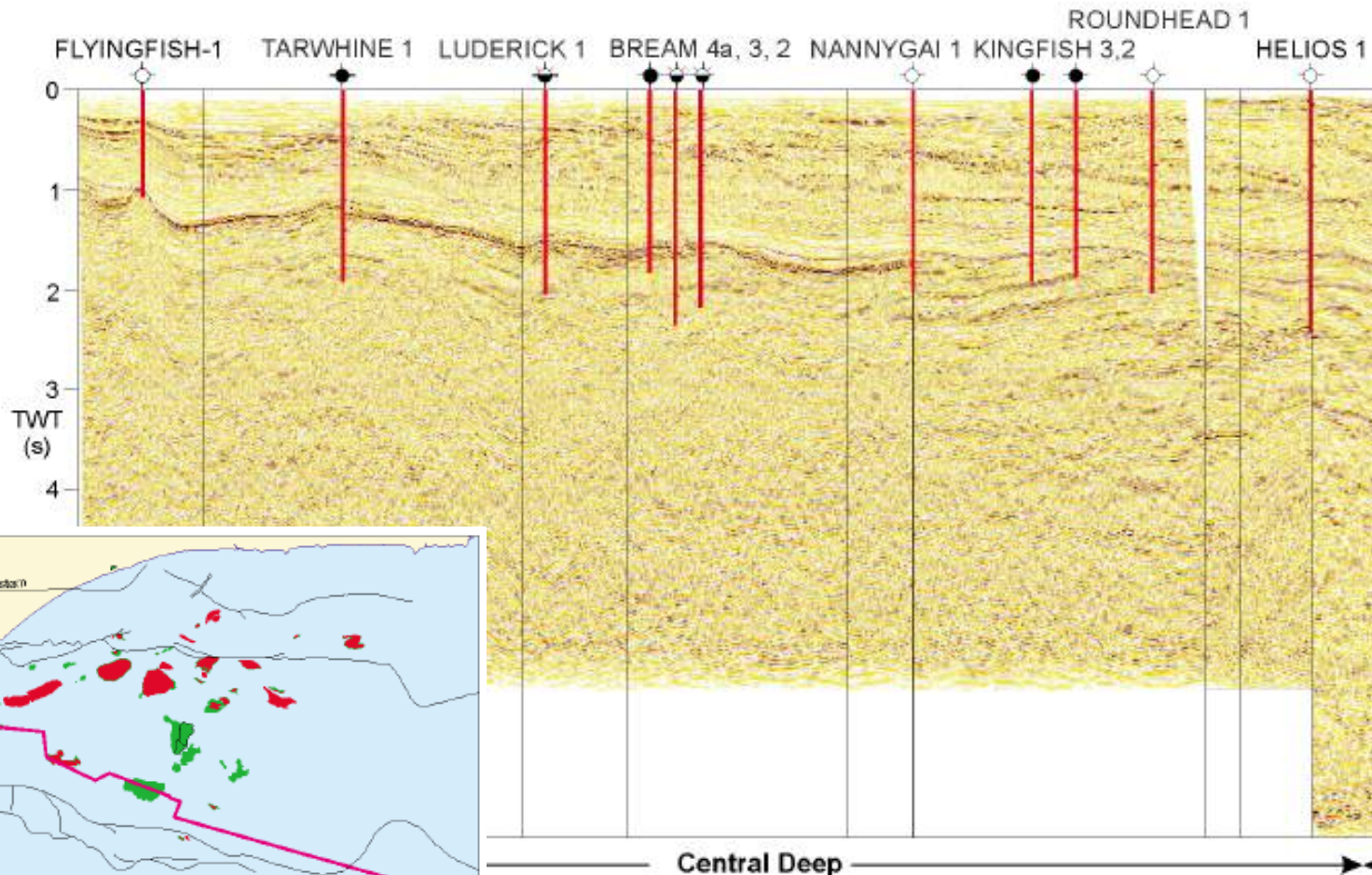




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Regional Seismic Line

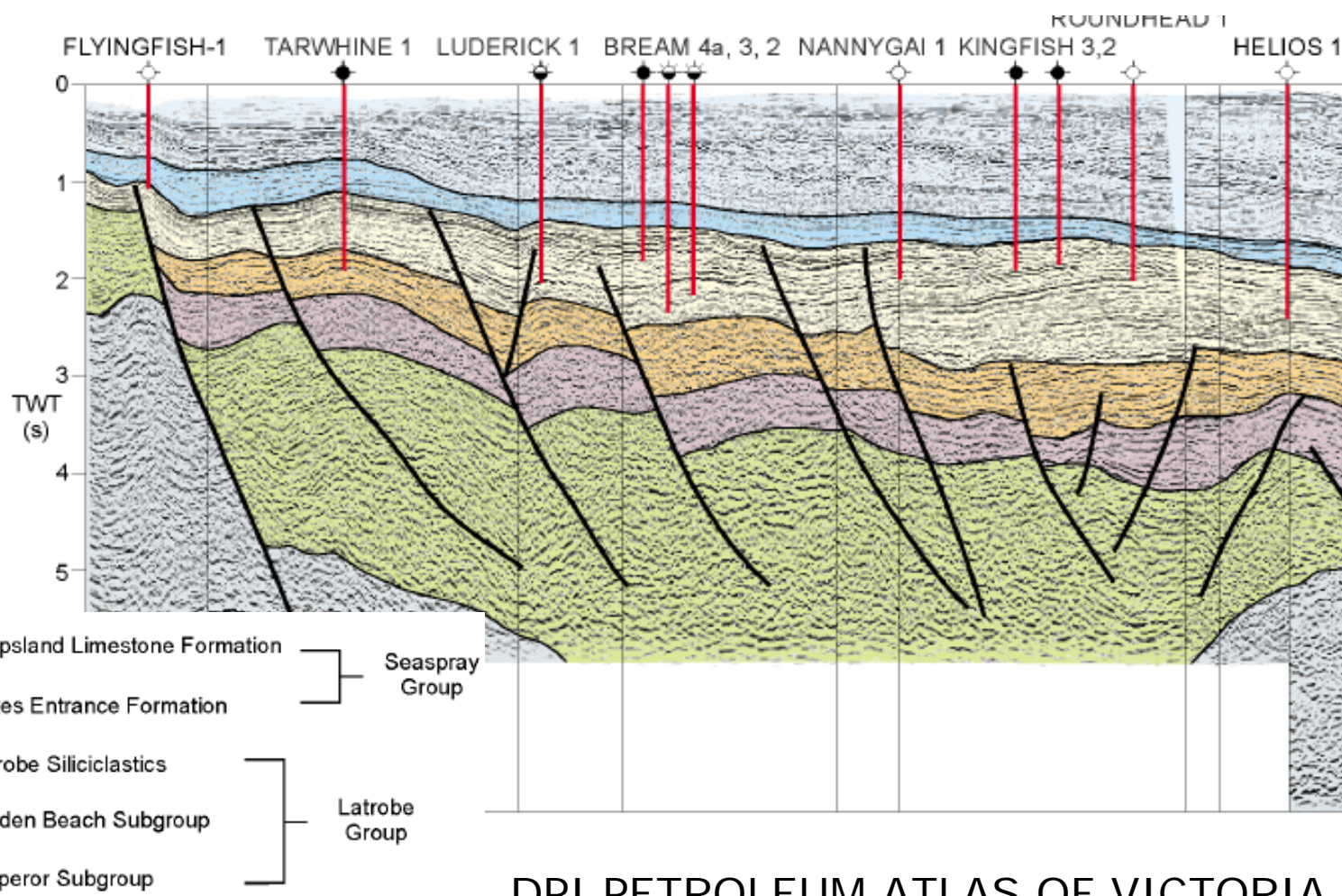
WNW



DPI PETROLEUM ATLAS OF VICTORIA



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DPI PETROLEUM ATLAS OF VICTORIA



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WKF, KFA & KFB



Photo courtesy of Esso and BHP Billiton

Top of Latrobe Reservoirs

- Text book reservoirs
 - Sweet, light crude oil
 - Multi-Darcy permeabilities
 - Very strong regional aquifer support
 - Very low residual oil saturations
 - Large, continuous sands allowing large drainage radius
- The main oil reservoirs were highly undersaturated
 - No gas to handle on the platforms
 - Pumping and metering

First Production

Barracouta	March	1969
Marlin	April	1969
Halibut	March	1970
Kingfish	January	1971
Mackerel	December	1977
Cobia (subsea) and Tuna	June	1979
Snapper	July	1981
West Kingfish	December	1982
Fortescue	May	1983
Flounder	December	1984



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Marlin



West Kingfish

Photos courtesy of Esso and BHP Billiton

First Production

Bream	May	1988
Whiting (unmanned)	November	1989
Dolphin, Perch (unmanned)	January	1990
Tarwhine (subsea)	May	1990
Seahorse (subsea)	September	1990
Bream B (unmanned)	December	1996
West Tuna	January	1997
Blackback (subsea)	June	1999



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Perch



Bream B

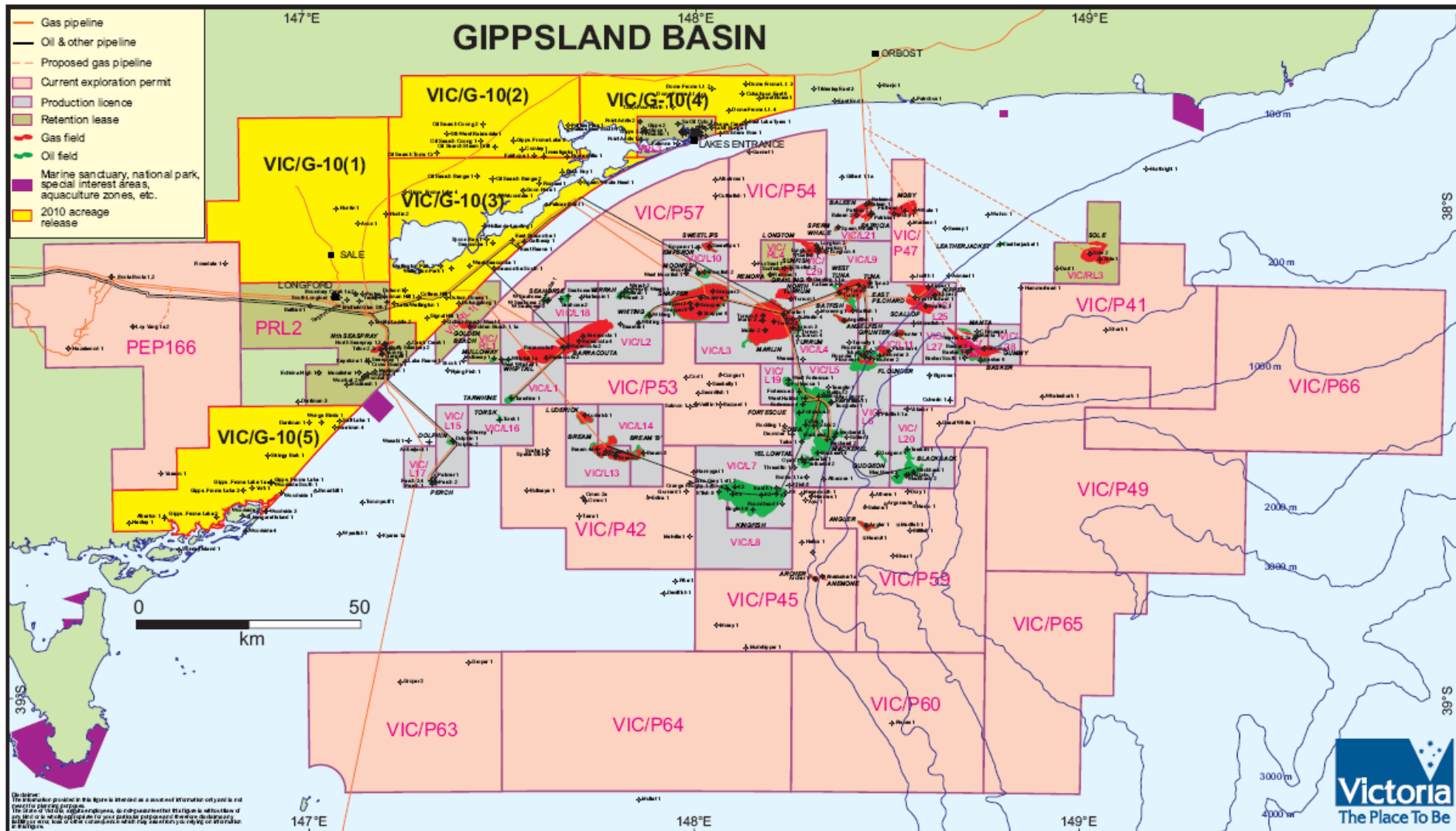


Bream A
Jacket



West
Tuna

Current Gippsland Acreage



⁴⁸ Source: DPI website

First Production

Patricia & Baleen (subsea)		2003
Basker & Manta (subsea/FPSO)	December	2006
Longtom (subsea)	October	2009

Recent Developments



Crystal Ocean
Basker



Longtom

Photo from Nexus website

Subsea control unit and Longtom-4 wellhead in place

Patricia Baleen Gas Plant



Photo courtesy of Santos



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Otway Basin

Commercial Onshore Gas

- ❑ Exploration in the Otway Basin commenced in the 1920s
- ❑ Sub-commercial discoveries in the 1950's and 1960's
- ❑ North Paaratte discovered in 1979
 - ❑ Beach Petroleum 100%
- ❑ Grumby and Wallaby Creek followed in 1981
- ❑ Iona discovered in 1988

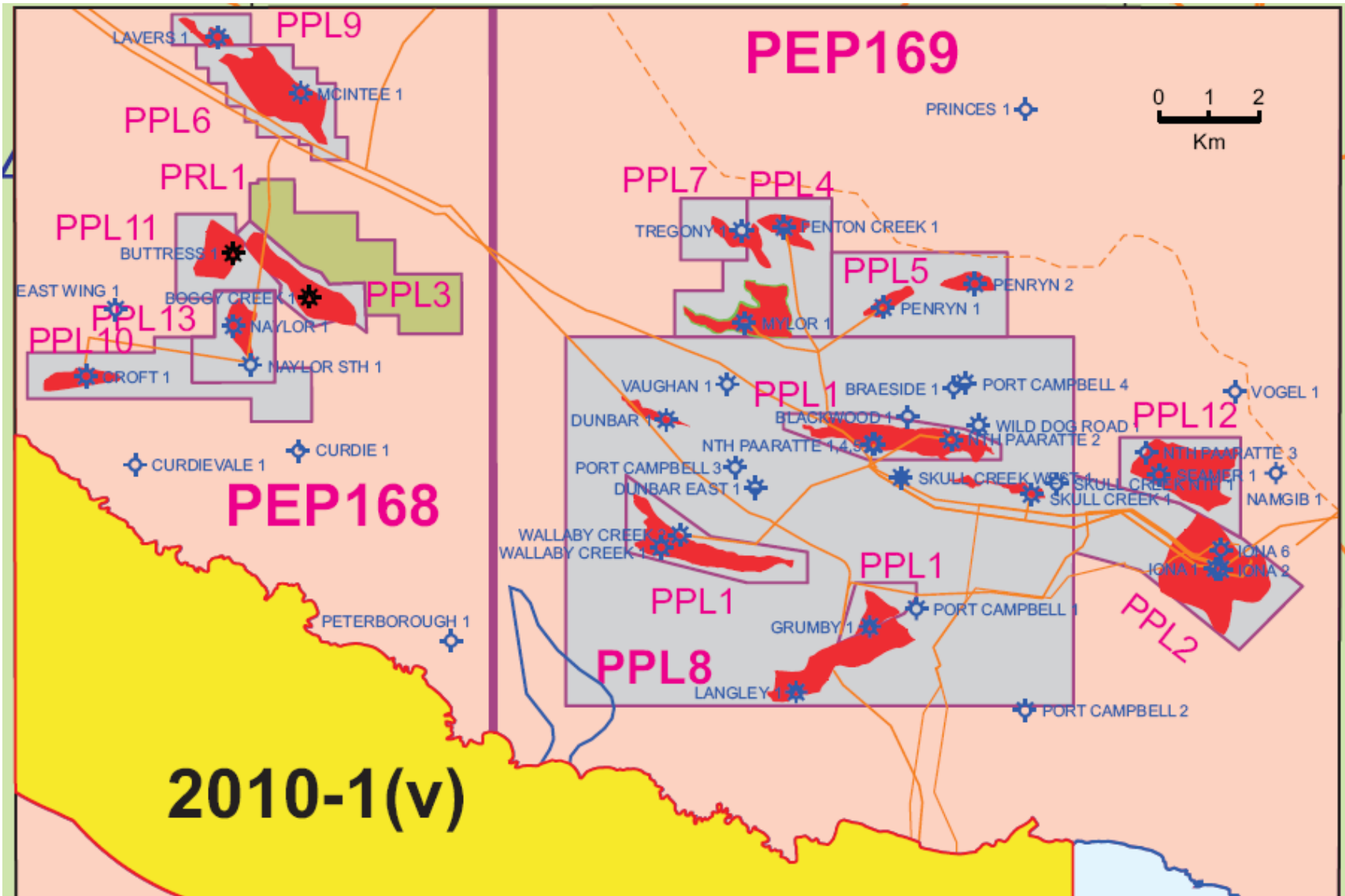
North Paaratte Gas Plant

- ☐ First onshore gas production
 - ☐ To Warrnambool by a discrete pipeline system
 - ☐ 2nd April 1986
 - ☐ 4 hours to commission
- ☐ Gas supply extended to Cobden in 1989
- ☐ Iona brought on production in 1992
 - ☐ Gas supply extended to Portland and Hamilton
- ☐ Fields acquired by Victorian government from Beach in 1998
 - ☐ Gas storage service



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Onshore Otway Production Licences



- Series of small gas discoveries by Santos in PEP 153 and PEP 154
- Connected to a gas plant at Heytesbury
 - Adjacent to North Paaratte gas plant
- Essentially fully depleted



Offshore Gas Discovered

- Minerva discovered in 1993
 - Long time to source a suitable gas market
 - Ultimately tied to the SEAgas pipeline development
 - First gas achieved in January 2005
- Geographe and Thylacine discovered in 2001
 - First gas achieved in September 2007
- Casino discovered in 2002
 - First gas achieved in March 2006
- Henry discovered in 2005
- Netherby discovered in 2008

Minerva Gas Plant



Photo courtesy of BHP Billiton

Casino, Henry, Netherby





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Port Campbell Coastline





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Subsea Developments





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Iona and Otway Gas Plants



Photo courtesy of TRUenergy



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Thylacine



Photo courtesy of Origin Energy



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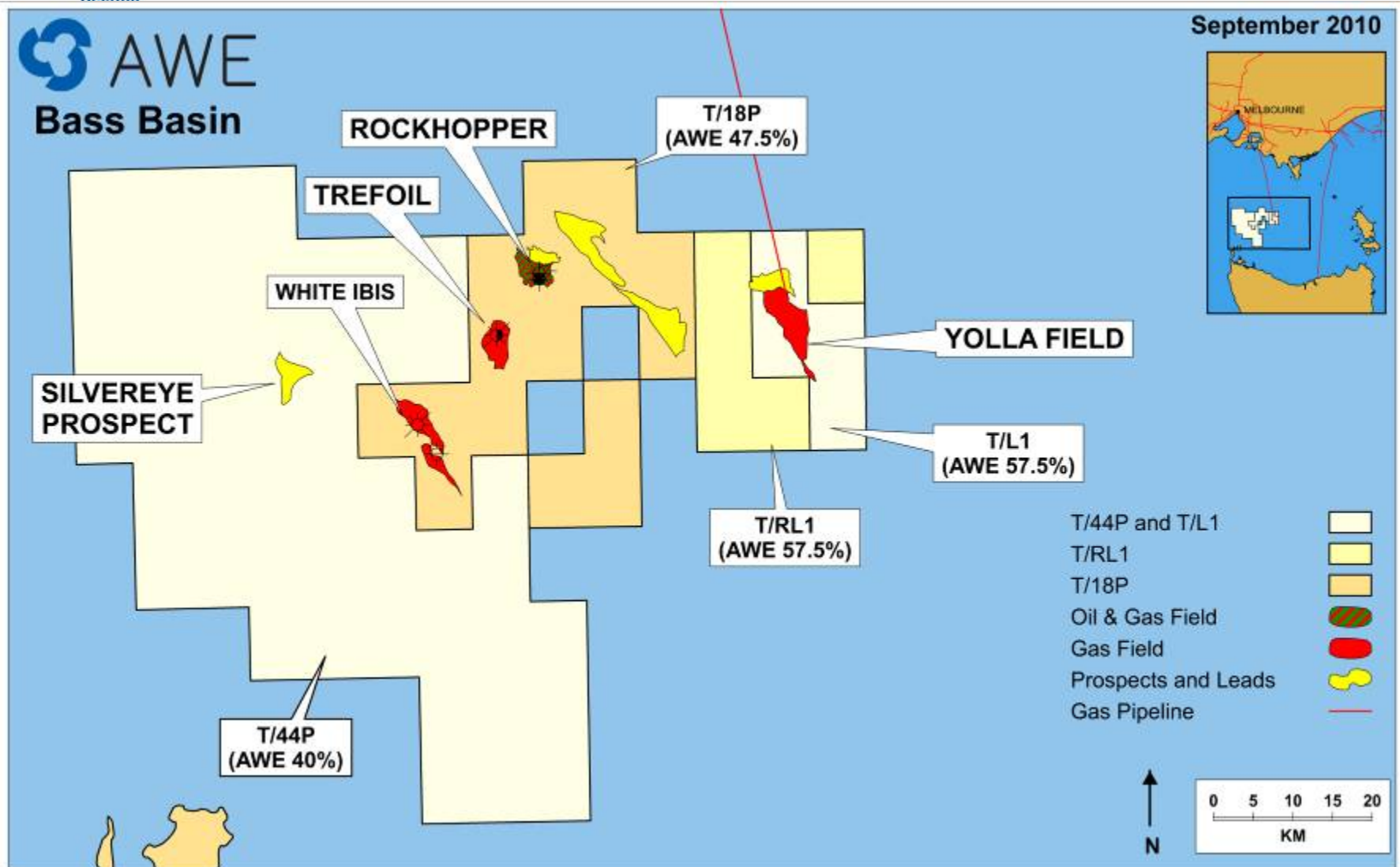
Bass Basin

- ❑ Initially explored concurrently with Gippsland and Otway basins
- ❑ No commercial discoveries until Yolla-1 was drilled in 1985 by Amoco
- ❑ Premier Oil drilled Yolla-2 in 1998
- ❑ White Ibis was drilled at the same time
- ❑ Trefoil discovered in 2004
- ❑ Origin developed Yolla as part of the BassGas development
 - ❑ Project approved in 1999
 - ❑ Commercial gas production in 2006



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Bass Basin discoveries





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Yolla Platform



Photo courtesy of Origin Energy

LangLang Gas Plant



Photo courtesy of Origin Energy



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Expanding the Gas Network

Gas Market in Victoria

- ❑ Liberation of the gas market in the 1990's was an enabler for further gas development
 - ❑ Esso and BHPB allowed to market gas directly to large customers
 - ❑ Esso and BHPB allowed to sell gas interstate
 - ❑ Gas and Fuel Corp no longer tied exclusively to Esso and BHPB
- ❑ Many of the original long term contracts had expired or were due to expire
 - ❑ Gas prices without escalation
 - ❑ Gas prices at less than 50cents/GJ

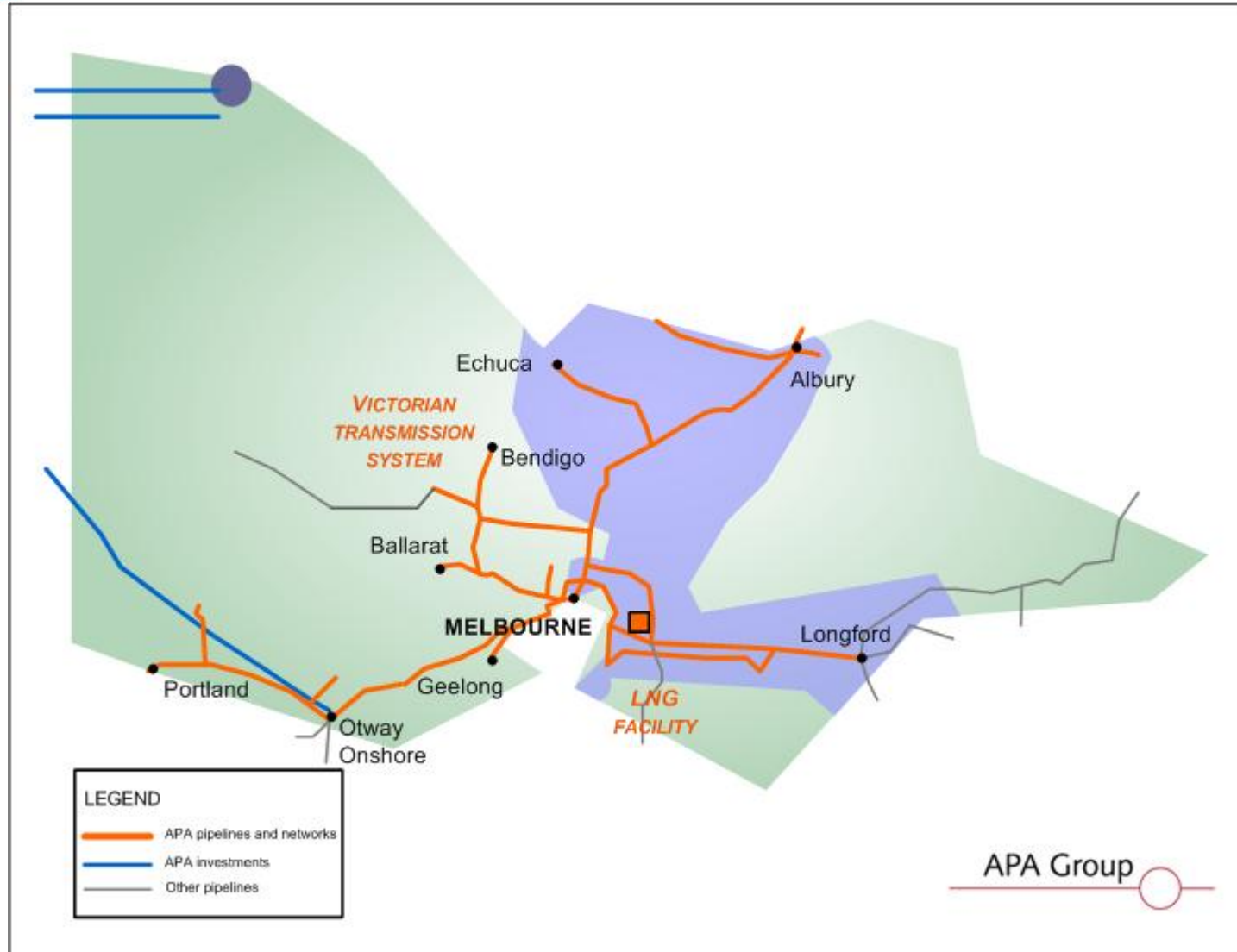
Longford Incident

- 25th September 1998
- Explosion in Gas Plant 1
- Gas supplies to Victoria interrupted
 - No gas supplies for 12 days
 - Inventory of pipelines reserved for essential services
- Accelerated alternative gas supply developments
 - Western Underground Gas Storage
 - Interconnects with NSW



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Connections to NSW





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Eastern Gas Pipeline



Longford Compressor Station



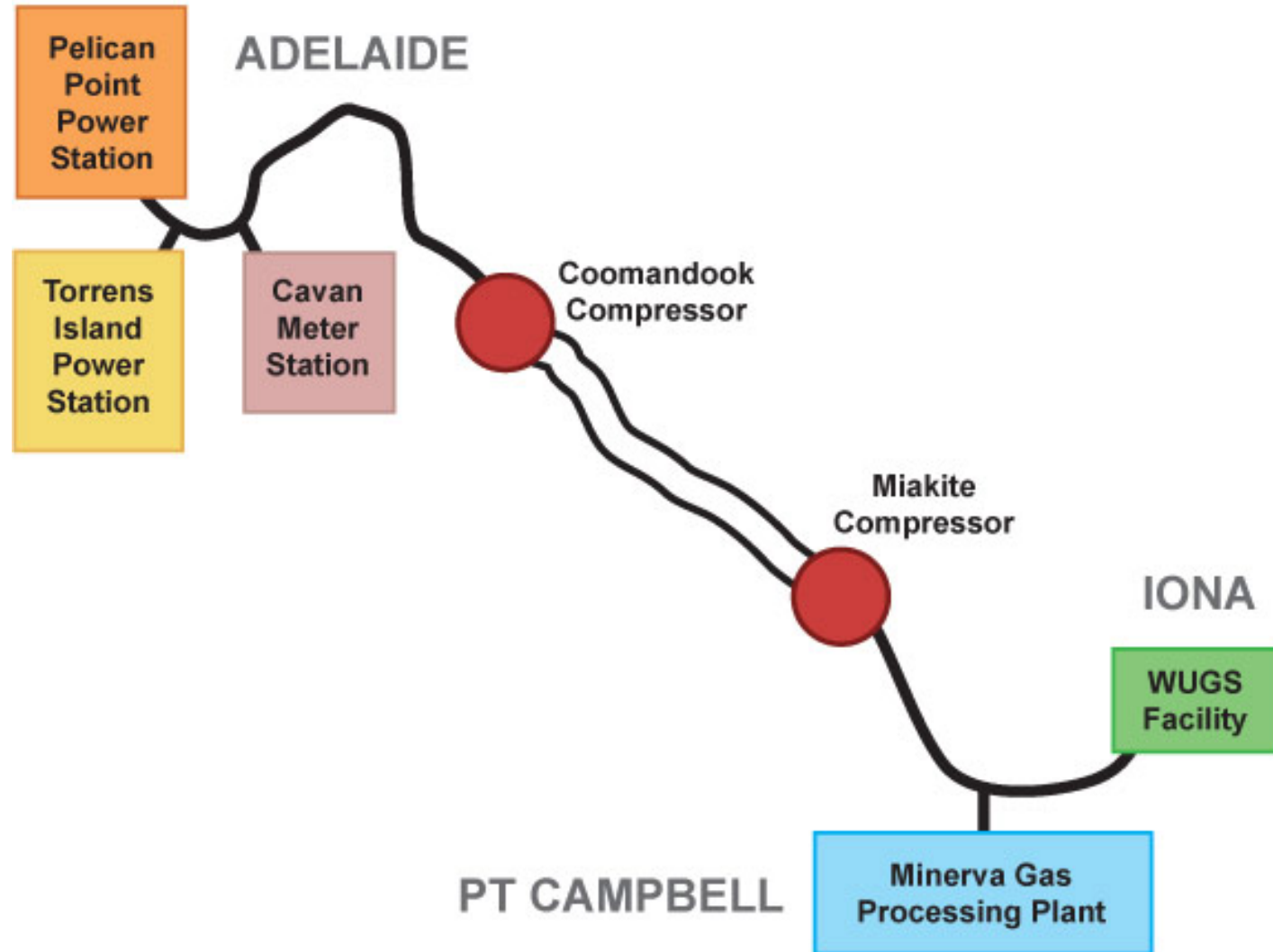
Tasmania Natural Gas Pipeline





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Connection to South Australia





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A Long History of Innovation

- First subsea completion in Australia
- Produced Cobia from 1979 to 1983
- Through flow line technology

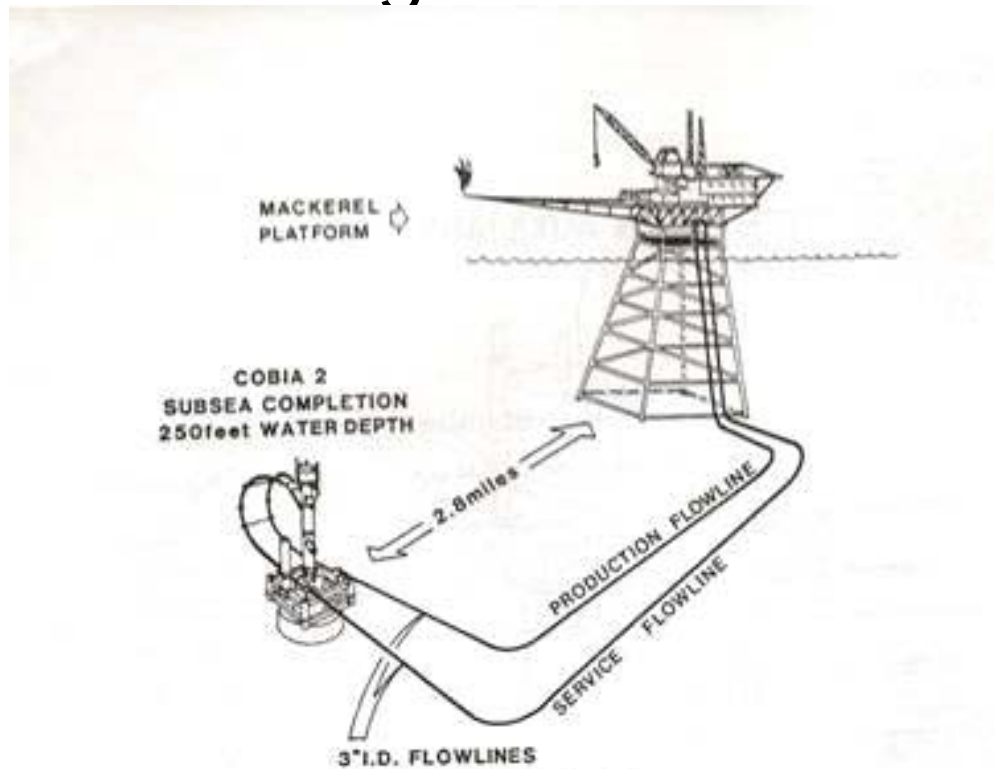


Fig. 2—Cobia-2 subsea completion.

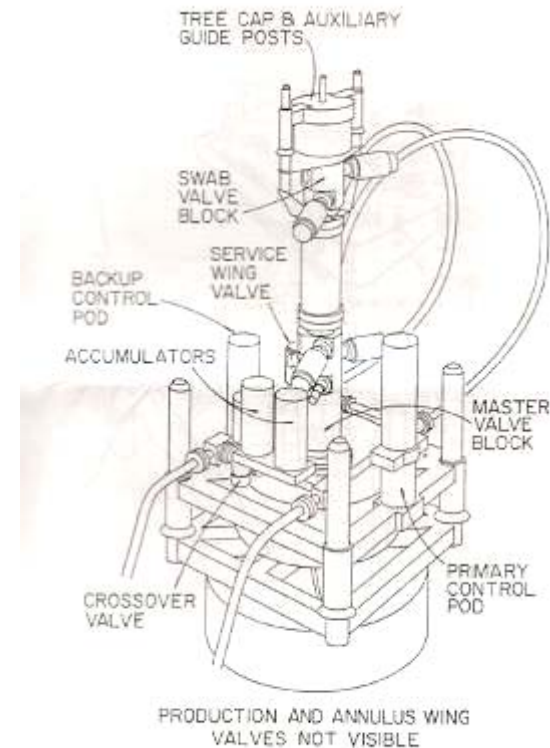


Fig. 4—Cobia-2 subsea tree.

Record Extended Reach Drilling

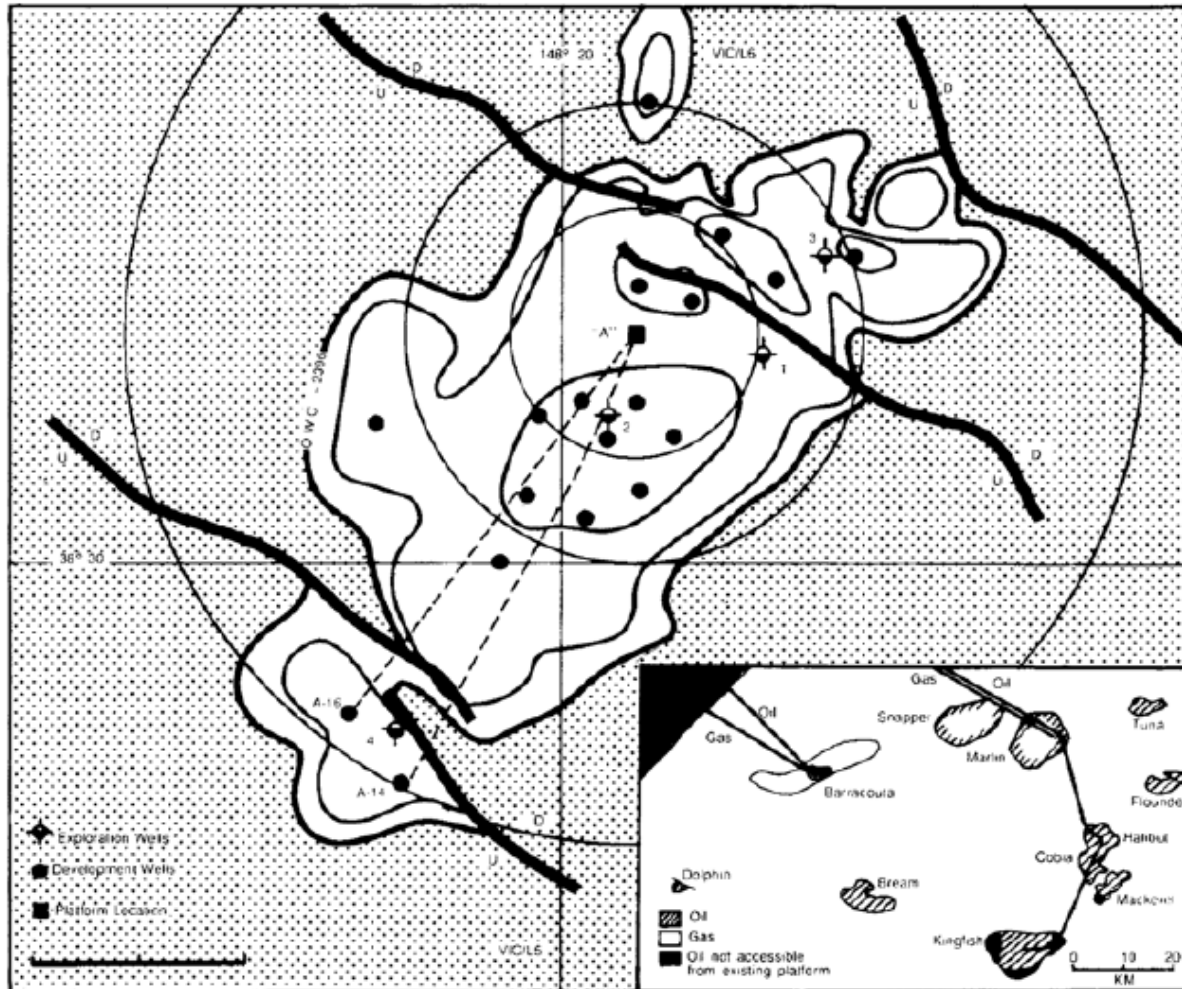
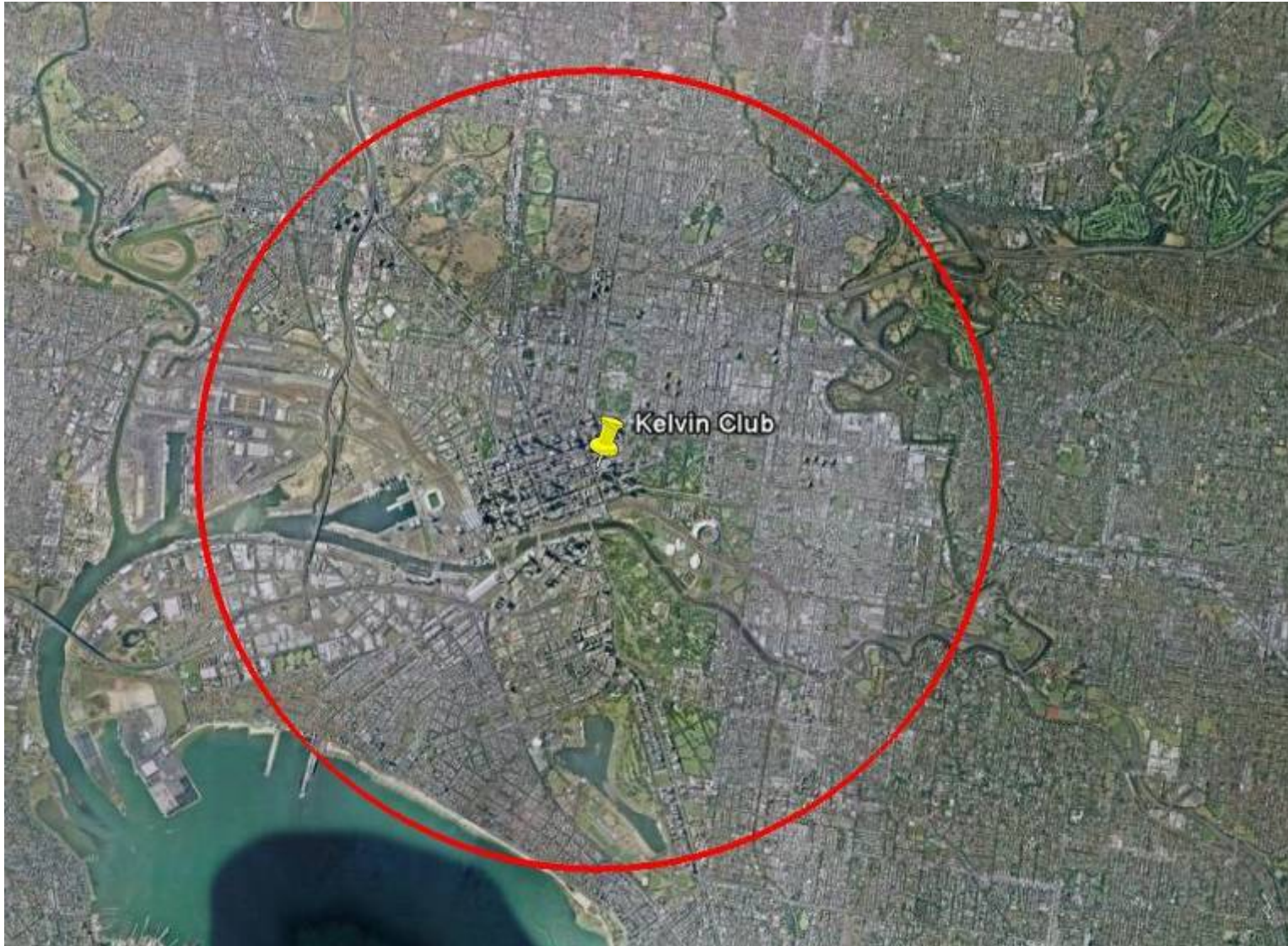


Fig. 3—Producing fields, Mackerel structure map top Latrobe.



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South Mackerel Reach



Platform Strengthening



Photo courtesy of Esso
and BHP Billiton



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Monopods





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Self Installing Platforms



Yolla platform



Jack-up Installed Platforms



Thylacine platform



Photos courtesy of Origin Energy

Thylacine Platform



Photo courtesy of Origin Energy

Subsea HIPPS



Protects low
pressure Patricia
Baleen pipeline
from high
pressure Longtom
pipeline

Other Innovations

- ☐ Use of glycol for hydrate inhibitor
- ☐ Drag reducer
- ☐ Hydrocyclones
- ☐ Pipe-in-pipe insulated flowlines
- ☐ Bottom tow pipelines
- ☐ Horizontal directionally drilled shore crossings



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Where to from here?

- ☐ Kipper
- ☐ Marlin B/Turrum
- ☐ Gas Conditioning Plant
- ☐ Tie-backs everywhere
- ☐ CO₂ capture and storage



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Thank You
