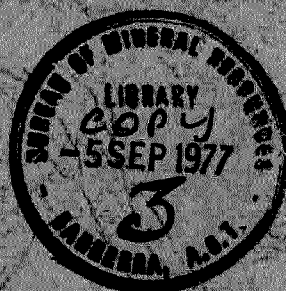


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BULLETIN 183



Australian Platform-Cover Correlation Charts — Adelaidean to Recent

S. J. MAYNE

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DEPARTMENT OF NATIONAL RESOURCES
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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S. J. MAYNE



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Australian Platform-Cover Correlation Charts – Adelaidean to Recent

S. J. Mayne

The pocket in this Bulletin contains five Australia-wide correlation charts and location maps in microform (together with microform of the Bulletin text)*. The charts summarize the stratigraphy of the major Australian basins that belong to two categories in the Tectonic Map Map of Australia and New Guinea (1971)—‘Trans-Australian Platform Cover’ and ‘Central Australian Platform Cover’. Several basins belonging to ‘Transitional Domains’ have also been included because one of them (Adavale Basin) contains hydrocarbons.

The platform cover in Australia that is Adelaidean to Recent in age can be studied in five major time-rock groupings, each of which forms the basis of one of the charts. These groupings are clearly similar to the ‘mega-sequences’ described by J. W. Porter and R. G. McCrossan for the Phanerozoic of Canada and which appear to have worldwide significance

and seem to conform to major events preceding and following the breakup of Pangaea’ (‘Basin consanguinity in petroleum resource estimation’. In Haun, J. D. (Ed.), *Studies in Geology* No. 1—Methods of estimating the volume of undiscovered oil and gas resources. Amer. Ass. petrol. Geol., Tulsa, 1975).

An attempt has been made to show the lithology, maximum thickness and environment of deposition of the various beds listed. Estimates of hydrocarbon reserves are as quoted in BMR Petroleum Newsletter No. 62 (1975). A wide range of published stratigraphic correlations and interpretations has been used in the compilation. No rigid interpretation of age or equivalence of strata should necessarily be presumed by the layout of the data in the charts.

Brief notes on the major time-rock groupings follow, together with selected bibliographies.

ADELAIDEAN-ORDOVICIAN BASINS

Most of the basins in this chart are composite, in that each contains several sedimentary sequences that are separated from each other by pronounced unconformities. However, the basins form a distinct group which is characterized by mainly Adelaidean basal sediments resting with angular unconformity on Archaean or Proterozoic rocks, and by termination of the sedimentary cycle during the Ordovician. The Delamerian Orogeny and the Rodingan Movement may be correlated with the Benambran Orogeny of the Lachlan Fold Belt.

Except for the Ngalia and Amadeus Basins and the Adelaide Geosyncline, there has been little diastrophism or metamorphism.

Ordovician sandstones in the Amadeus Basin contain the following reserves of hydrocarbons: crude oil, $11.92 \times 10^6 \text{m}^3$; gas, $41.94 \times 10^6 \text{m}^3$; LPG, $9.52 \times 10^6 \text{m}^3$.

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* Paper prints of the full-size charts and location maps may be purchased from the Bureau of Mineral Resources (attention: Publication Sales), P.O. Box 378, Canberra City, A.C.T. 2601.

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DEVONIAN-CARBONIFEROUS BASINS

The Devonian-Carboniferous basins are characterized by initial thick accumulations of largely terrestrial, poorly fossiliferous clastics which were probably a direct consequence of the upheavals of the Ordovician. No Silurian beds are unequivocally present. The Pertnjara Movement, which can be recognized in all of the basins, has been correlated with the Tabberabberan Orogeny of the Lachlan Fold Belt; the Alice Springs Orogeny, which was intense in central Australia, correlates with the Kanimblan Orogeny—indeed, sedimentation in the Drummond Basin was terminated by the Kanimblan Orogeny. Sedimentation seems to have ceased everywhere by Upper Carboniferous times.

The Adavale and Drummond Basins are distinct in that they contain considerable thicknesses of volcanics and volcanogenic sediments. The Adavale and Warburton Basins are wholly concealed by younger basins.

The Adavale Basin has reserves of about $0.58 \times 10^9 \text{ m}^3$ of gas in the Etonvale Formation.

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PERMO-TRIASSIC BASINS

The Sydney, Bowen, Galilee, Cooper, Pedirka, Arckaringa, and Tasmania Basins are virtually restricted to the Permian and Triassic; the other successions summarized in this chart are parts of composite basins.

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following the tectonic disturbances of the Middle Palaeozoic. There is an almost universal unconformity below the basinal sequences, which commonly begin late in the Carboniferous, although in parts of the Sydney and Bowen Basins there is no clear break between the accepted basin sequences and the underlying rocks. Orogenic phenomena in eastern Australia were manifested in both the Permian and Triassic and are thought to have terminated sedimentation in the mid-Triassic (although see 'Mesozoic Basins' chart).

There are thick and very widespread Permian coal deposits in several basins, and economically important accumulations of oil and gas in both Permian and Triassic reservoirs. Estimates of initial hydrocarbon reserves for the Cooper Basin are as follows: crude oil, $14.16 \times 10^6 \text{ m}^3$; gas, $99.78 \times 10^9 \text{ m}^3$; LPG, $37.07 \times 10^6 \text{ m}^3$.

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MESOZOIC BASINS

The most widespread sequences in this chart—most of the Surat, Eromanga, and Carpentaria Basins, which together cover much of the eastern half of the continent—are Lower Jurassic to Lower Cretaceous in age. In New South Wales the area in which beds of this age occur is known as the Great Australian Basin. These basins, together with the Laura Basin, owe their origin to intracratonic downwarping.

The Clarence-Moreton and Maryborough Basins are transitional, and may be genetically related to the development of the New Zealand geosyncline (the term 'Ipswich Basin' is sometimes used for the pre-Bundamba sediments here included in the Clarence-Moreton Basin).

The Western Australian sequences accumulated on the Atlantic-margin-type edge of the Australian section of fragmented Gondwanaland.

Reservoirs of this age on the Northwest Shelf, and in the Surat Basin, are estimated to contain the following initial reserves of hydrocarbons:

	Crude Oil (10 ⁶ m ³)	LPG (10 ⁶ m ³)	Gas (10 ⁹ m ³)
Bowen-Surat Basins			
(producing)	3.44	—	3.69
(non-producing)	0.19	—	2.92
Perth Basin			
(producing)	0.35	—	16.11
Carnarvon Basin			
(producing)	40.50	0.25	8.17
(non-producing)	59.19	53.83	433.17

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CRETACEOUS-CAINOZOIC BASINS

Most of the basins in this chart are of Atlantic-margin type, and belong to two phases of the break-up of Gondwanaland. The basins fronting the Southern Ocean and the Tasman Sea originated in the Lower Cretaceous and are related to the separation of Australia from Antarctica and New Zealand. The composite basins fronting the Indian Ocean belong to the older Indo-Australian fragmentation period, and originated in the Palaeozoic. The Karumba Basin is the Cainozoic heir of the Carpentaria Basin.

Hydrocarbon accumulations are important in Tertiary rocks of the Gippsland Basin; initial reserves have been estimated as follows:

	Crude Oil (10 ⁶ m ³)	LPG (10 ⁶ m ³)	Gas (10 ⁹ m ³)
Producing fields	323.88	60.98	191.03
Non-producing fields	27.45	12.14	46.5

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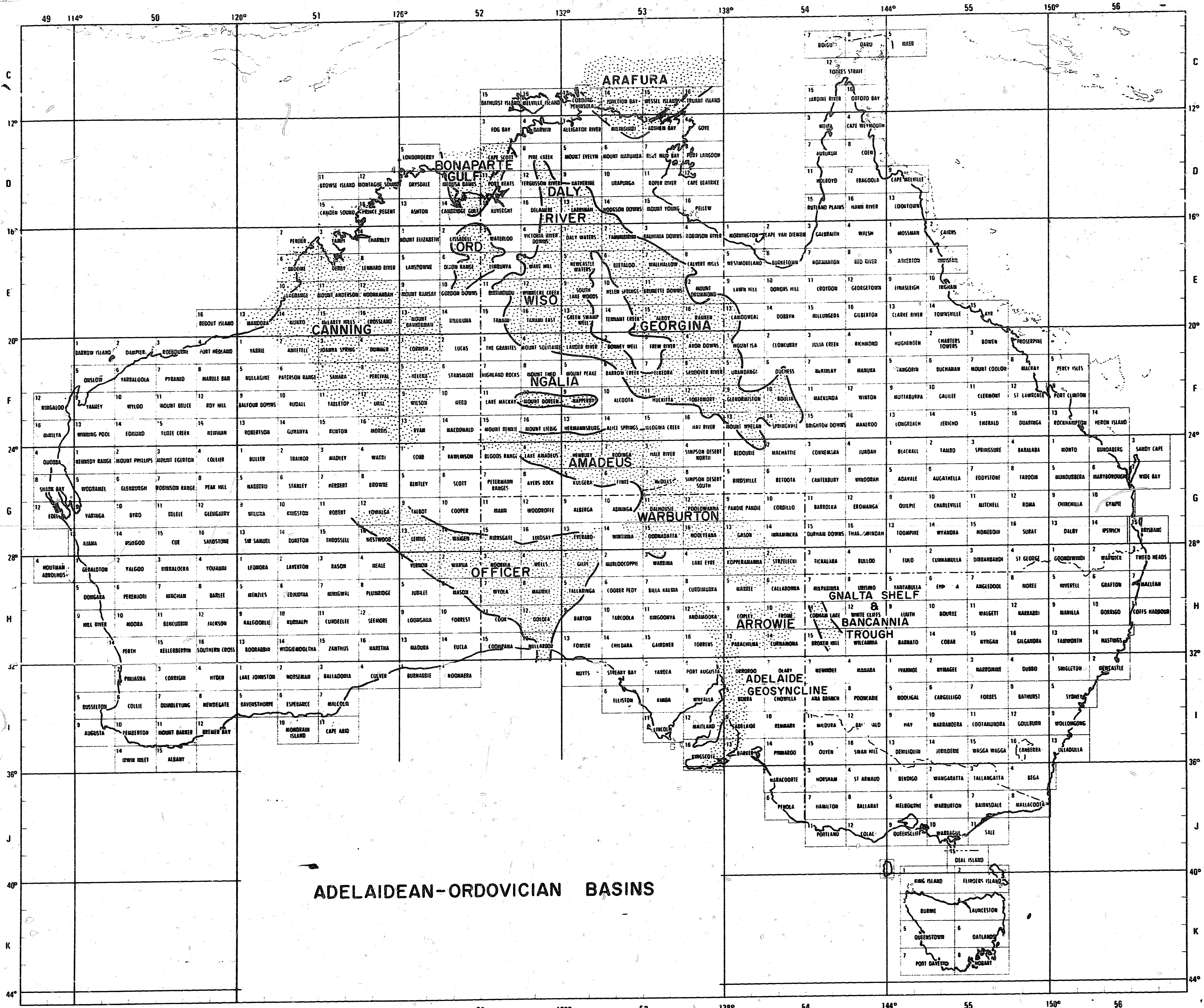
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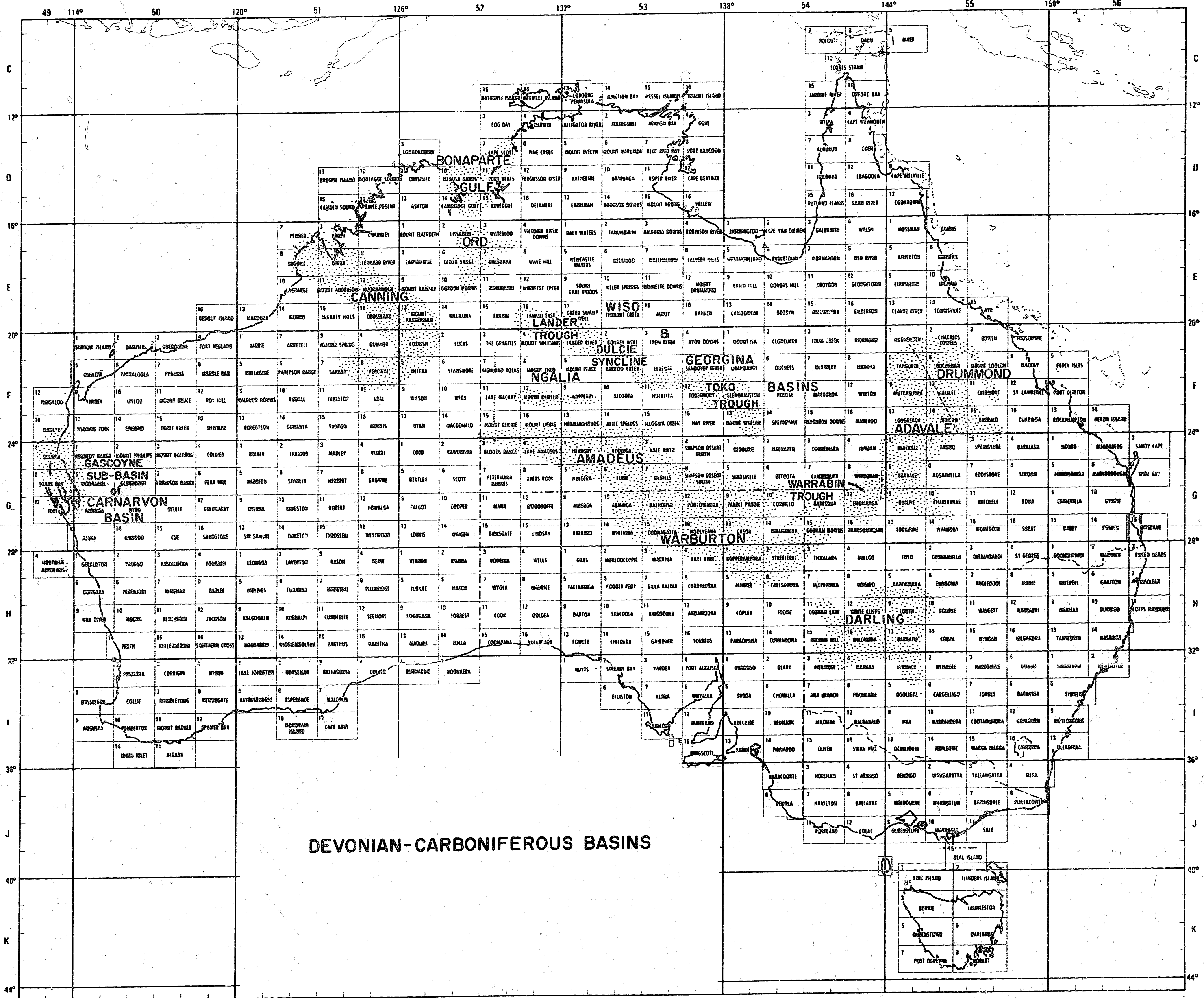
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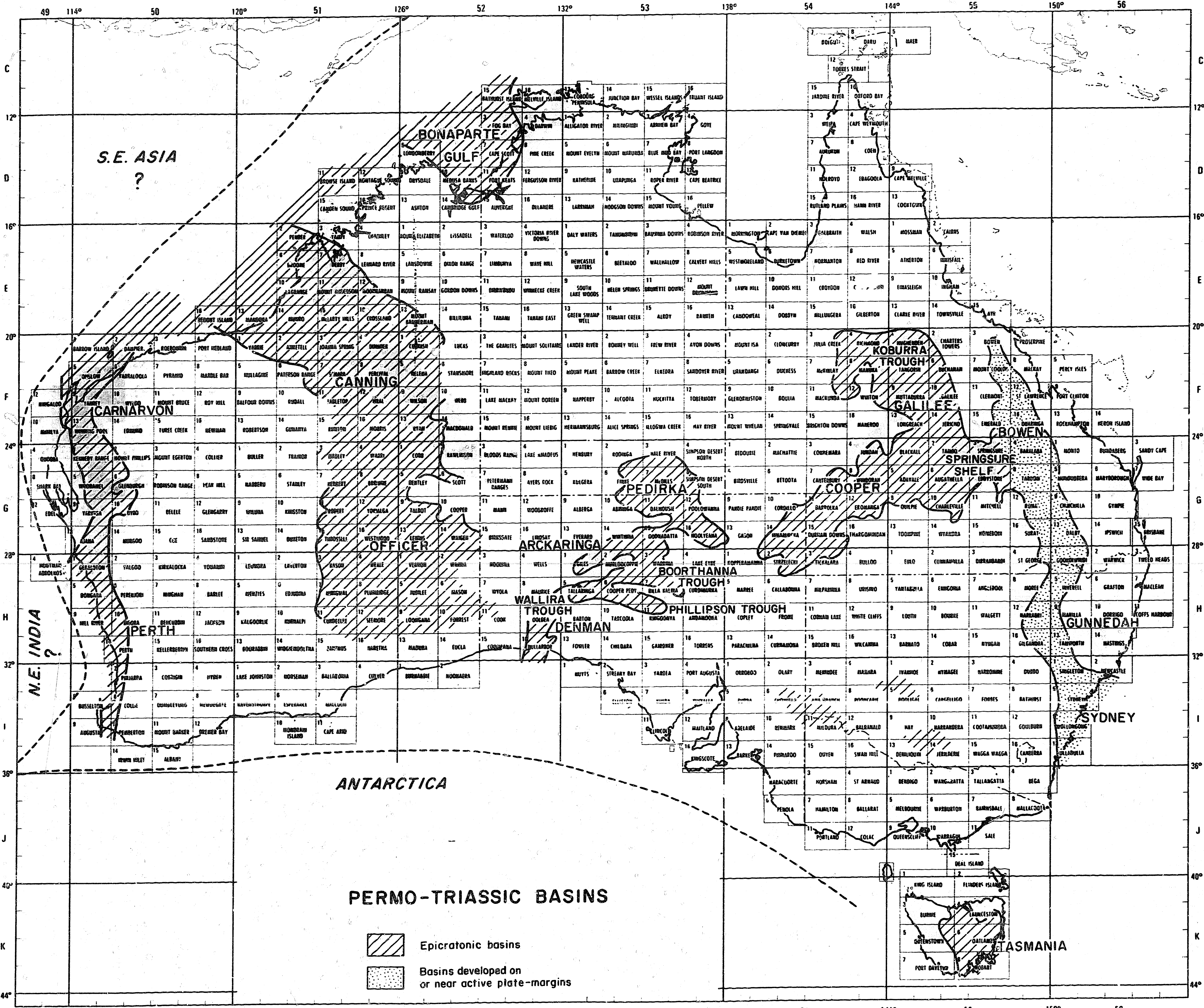
6.9.

Age Group	Percentage of correct responses
10	60
15	65
20	70
25	75
30	80
35	85
40	90
45	92
50	94
55	96
60	97
65	98
70	99
75	100
80	100
85	100
90	100
95	100
100	100



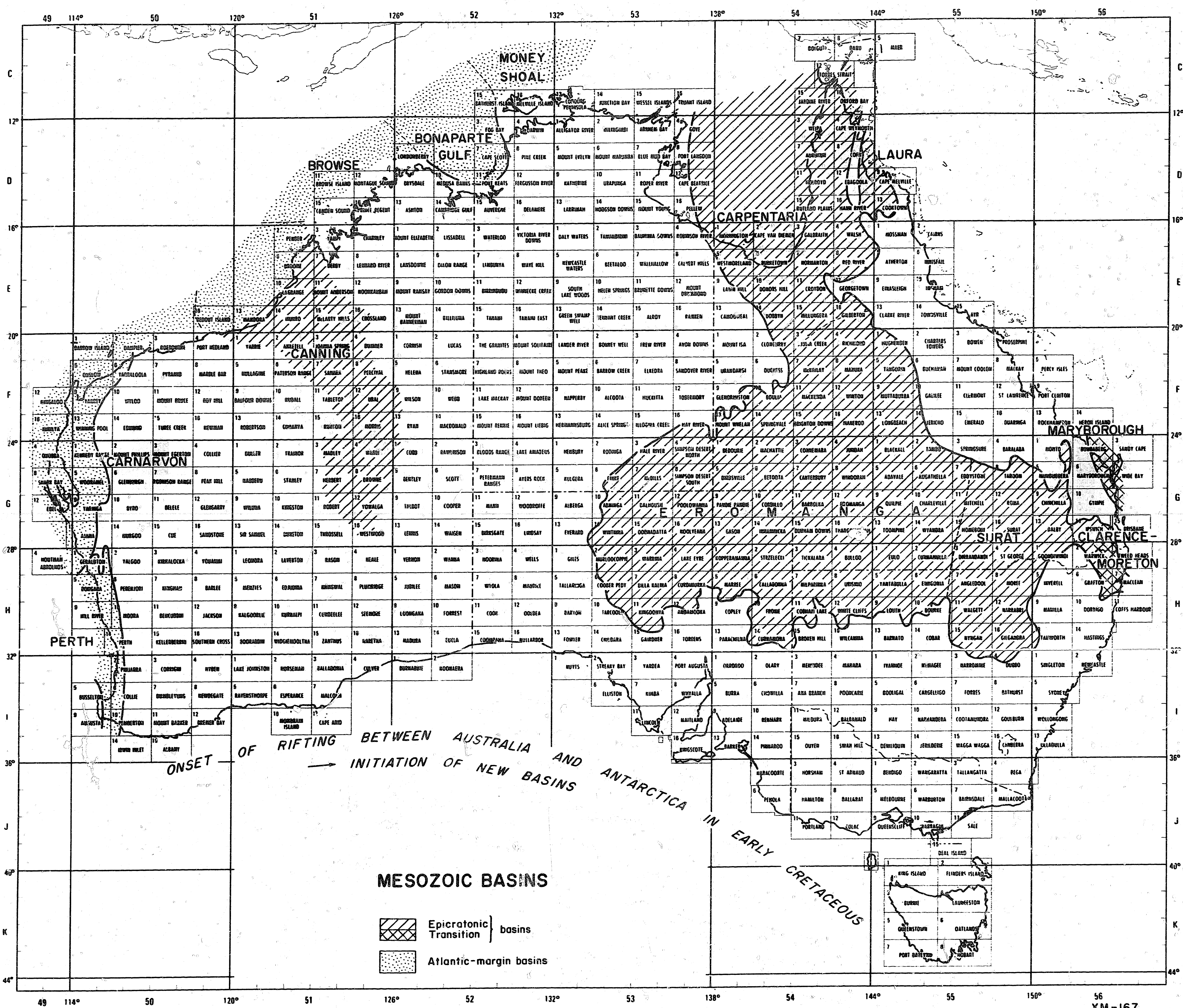
DEVONIAN-CARBONIFEROUS BASINS

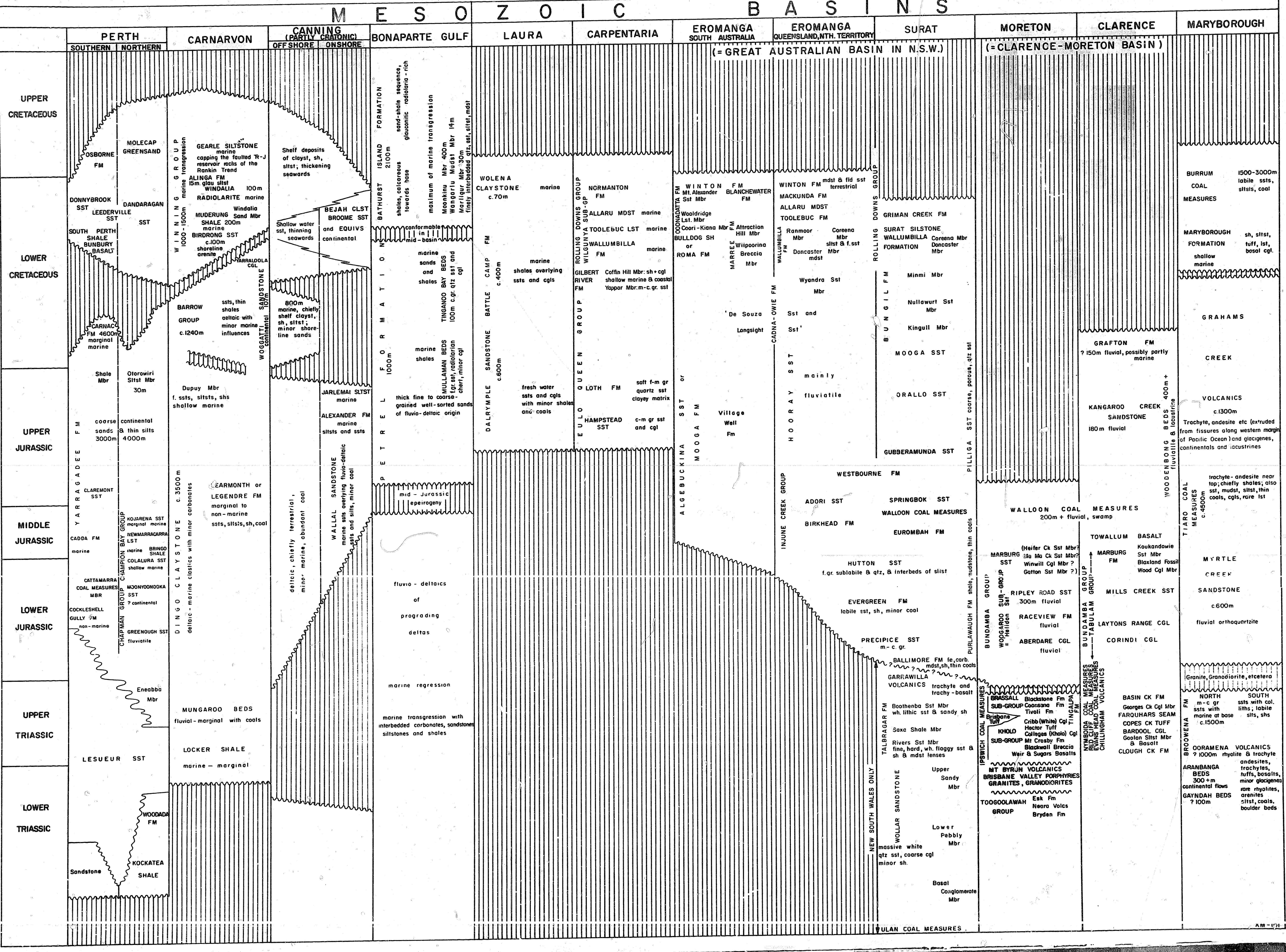
DEVONIAN — CARBONIFEROUS BASINS												
	CARNARVON	BONAPARTE GULF	CANNING	AMADEUS	NGALIA	GEORGINA DULCIE SYNCLINE	TOKO SYNCLINE	WARBURTON	ADAVALE	DRUMMOND	BANCANNIA TROUGH	DARLING BASIN
	Basal Lyons Group	Basal Kulshill Fm	Basal Grant Fm	?				Pedirka Basin Sediments	Galilee Basin Sediments			
UPPER CARBONIFEROUS	HARRIS SST c.85m clean quartz sst, continental	BORDER CREEK FM quartz, cgl, sltst, fluvial		A L I C E O R O G E N Y								
LOWER CARBONIFEROUS	YINDAGINDY FM. c.70m interbedded lsts & ssts, very shallow marine WILLIAMSBURY FM 200m + m-c gr. feldspathic sst MOOGAREE LST	POINT SPRING SST TANMURRA FM & MEDUSA BEDS WAGGON BURVILL MILLIGANS CREEK BEDS ZIMMERMAN SST SEPTIMUS LST ENGA SST BURT RANGE FM UTTING CALC & NINING LST BUTTONS BEDS Jeremiah Mbr Cecil Sst Mbr Hargreaves Mbr Kunnamurra Mbr Kellys Knob Mbr	ANDERSON FM interbedded ssts, sltsts, shs and carbonates c.1600m LAUREL May River FM Mbr YELLOWDRUM SST GUM HOLE FM LULWIGUI FM 825m interbedded sltst, lst, sh CLANMEYER SLTST c.1000m PIKER HILLS FM BIRDEYE LST PIKE COMPLEX BUGLE-GAP LST VIRGIN HILLS FM NAPIER FM GOGO FM SADLER FM PILLARA FM WINDJANA LST VAN EMERICK BEAN BOBS BORE STONY CR CGLS	SANTO SST qtz, kaolin cgl fluvial - piedmont BURACOWRA SST kaolinitic, qtz c.280m, fluvial Horseshoe Bend Sh c.300m red- green sh, playa lakes LANGRA FM sst, minor cgl, sltsts fluvial c.230m POLLY CGL semi-arid fluvial c.390m								
UPPER DEVONIAN	WILLARADDIE FM poorly sorted sands, slts, cgl MUNABIA SST GNEUDNA FM biostromal lsts, ssts, sltsts NANNYARRA GREYWACKE	COCKATOO FORMATION along the eastern margin are thick ssts, cgl and local detrital beds. Jeremiah Mbr Cecil Sst Mbr Hargreaves Mbr Kunnamurra Mbr Kellys Knob Mbr	CLANMEYER SLTST c.1000m PIKE COMPLEX BUGLE-GAP LST VIRGIN HILLS FM NAPIER FM GOGO FM SADLER FM PILLARA FM WINDJANA LST VAN EMERICK BEAN BOBS BORE STONY CR CGLS	FINKE GROUP SANTO SST qtz, kaolin cgl fluvial - piedmont BURACOWRA SST kaolinitic, qtz c.280m, fluvial Horseshoe Bend Sh c.300m red- green sh, playa lakes LANGRA FM sst, minor cgl, sltsts fluvial c.230m POLLY CGL semi-arid fluvial c.390m	MOUNT ECLIPSE SANDSTONE	UPPER DULCIE SAND-	UPPER CRAVENS CREEK BEDS continental	HORSESHOE BEND SHALE 90m terrestrial LANGRA SST 560m terrestrial POLLY CGL 400m with evaporites terrestrial	BUCKABIE FM reddish f gr sst and sltst, sh c.2000m shallow marine and terrestrial - last stages of filling of the basin ETONVALE FM. Shale - Silstone mbr, 140m } marine Sandstone mbr, 165m } Cooladdi Dolomite Mbr Boree Salt Mbr 80m marine evaporitic 600m	Telemon FM 2100m sltst, lst sst, cgl Scarwater 2100m cgl, slt, cgl slt, sltst Mt Hall FM 3000m ssts, cgl Mt Rankin FM 660m ssts, chert, cgl terrestrial	NUNDOOKA SST and RAVENDALE FM 1500m qtz, sst	MULGA DOWNS GROUP cgl, sst, sltst, sh, fluvatile
MIDDLE DEVONIAN		PETREL GRABEN FAULTING salt	FITZROY GRABEN FAULTING	PERTNJARA	MOVEMENT							
LOWER DEVONIAN	Non - deposition in the early Devonian	EROSION IN ONSHORE AREAS EVAPORITIC SEQUENCES IN OFFSHORE AREAS	TANDALGOO RED BEDS c.700 + m	MEREENIE SST 1000 + m orthoquartzite complex desert environment	EROSION SINCE UPPER ORDOVICIAN	LOWER DULCIE SST oscillating marine / non - marine	LOWER CRAVENS CREEK BEDS	MEREENIE SST 360m terrestrial + ? shallow marine sandstones		LOG CREEK FM Sandstone mbr, 160m shallow marine Shale mbr, 160m Barry Lst Mbr marine 300m marine GUMBARDO FM c 800m acid volcanics & volcanogenic marine sediments	Ukalunda Beds Theresa Cr Volcs marine Dunstable Volcs	AMPHITHEATRE BEDS — ? — ? — MALLEE TANK BEDS and SLIME BEDS — ? — ? — COBAR GROUP and CARGELLIGO FM MT HOPE VOLCANICS
UPPER SILURIAN	An evaporitic sequence of carbonates and halides - the DIRK HARTOG FORMATION 740m Activity along the Darling Fault during the Silurian resulted in sands from the Pre-Cambrian hinterland being deposited in the Carnarvon Basin as the TUMBLAGOODA SST 1830m (also in the Perth Basin)		(overlying Silurian ? CARRIBUDDY FM)									

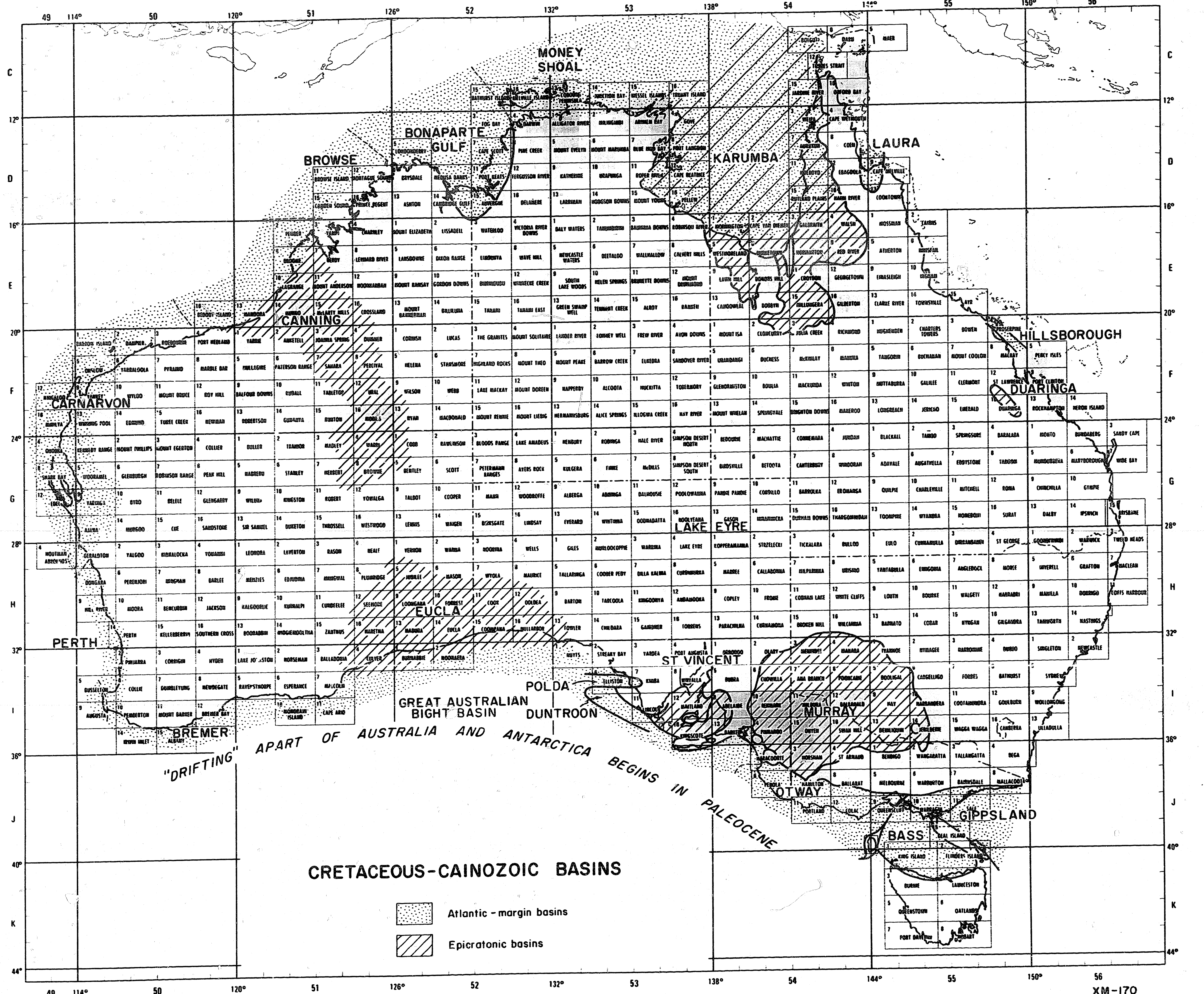


P E R M O - T R I A S S I C B A S I N S

		PERMO-TRIASSIC BASINS										PERTH		TASMANIA	
		SYDNEY	BOWEN	GALILEE	COOPER	PEDIRKA	ARCKARINGA	CANNING	BONAPARTE GULF	CARNARVON	SOUTHERN	NORTHERN			
PERMIAN	TRIASSIC	UPPER							non-marine "Red-Beds" of multi-coloured shales with interbedded sandstones maximum regression massive sands, fluvial (thickest known Triassic section is 1950m in Sahul Shoals I)	MUNGAROO BEDS 1200m interbedded ssts, shales, siltst, some coal deltaic, paludal		COCKLESHELL GULLY FM Cottamorra C.M. Mbr 512m Enedaba C1st Mbr 675m LESUEUR SST 1200m c. gr. conglomeratic feldspathic ssts, minor siltst, sh continental (piedmont)	a. BRADY FM and COAL MEASURES 165m		
		MIDDLE							marine regression; prograding deltas, fluvial deposition				TIERIS FM 85m alternating shales & carbonaceous sst		
TRIASSIC	TRIASSIC	LOWER										WOODADA FM 275m f. gr. thinly bedded sst; lesser siltst fluvio-deltaic	CLUAN FM 140m quartzose sst, sh, siltst		
		TATARIAN												KNOCKLOFTY FM c.80m sandstones & shales	
TRIASSIC	TRIASSIC	LOWER											ROSS SST 200m quartzose cliff-forming		
		TATARIAN												SFRINGS SST c.90m	
TRIASSIC	TRIASSIC	LOWER											local unconformity		
		TATARIAN												CYGNET COAL MEASURES JACKIE FM 43m sst + sh; plants	
TRIASSIC	TRIASSIC	LOWER											EDEN MDST 9m BLACKWOOD CGL 15m DRYIS MDST 100m, massive, quartzose, with siltst and sst PALMER SST 4m med. to cgl, qtz to labile SPRINGMOUNT MDST shallow marine-coastal c.65m		
		TATARIAN												RISDON SST GARCIA SST f. gr. to cgl 13m marine WESTON MDST 9m marine DAROOL SST 12m marine MEANDER MDST 62m siltst, sst; marine	
TRIASSIC	TRIASSIC	LOWER											CASCADES GROUP GRANGE MDST 50m BERRIEDALE NASSAU SLTST 30m		
		TATARIAN												MERSEY COAL MEAS. c.40m LIFFEY SST + minor carb sh 35m fresh-water PREOIFENNA COAL MEASURES c.40m MACRAE MDST c.100m, and DARLINGTON LST GOLDEN VALLEY OP marine 85m GLENCOE FM	
TRIASSIC	TRIASSIC	LOWER											WOODY ISLAND SST and INGLIS SST c.200m QUAMBY MDST 100m oil sh coastal		
		TATARIAN												WYNWARD TILLITE 500m STOCKERS TILLITE 100m WOODBRIDGE TILLITE 250m	







[illegible]