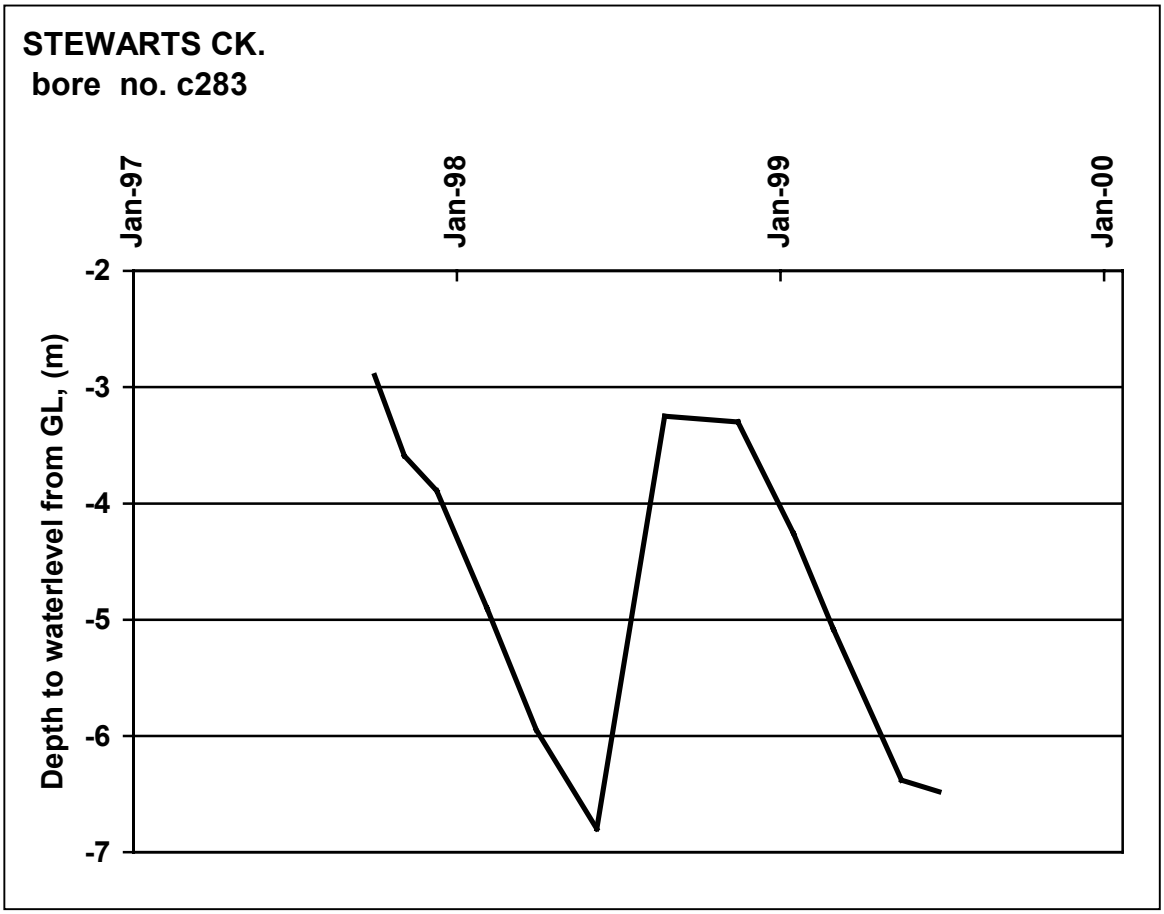
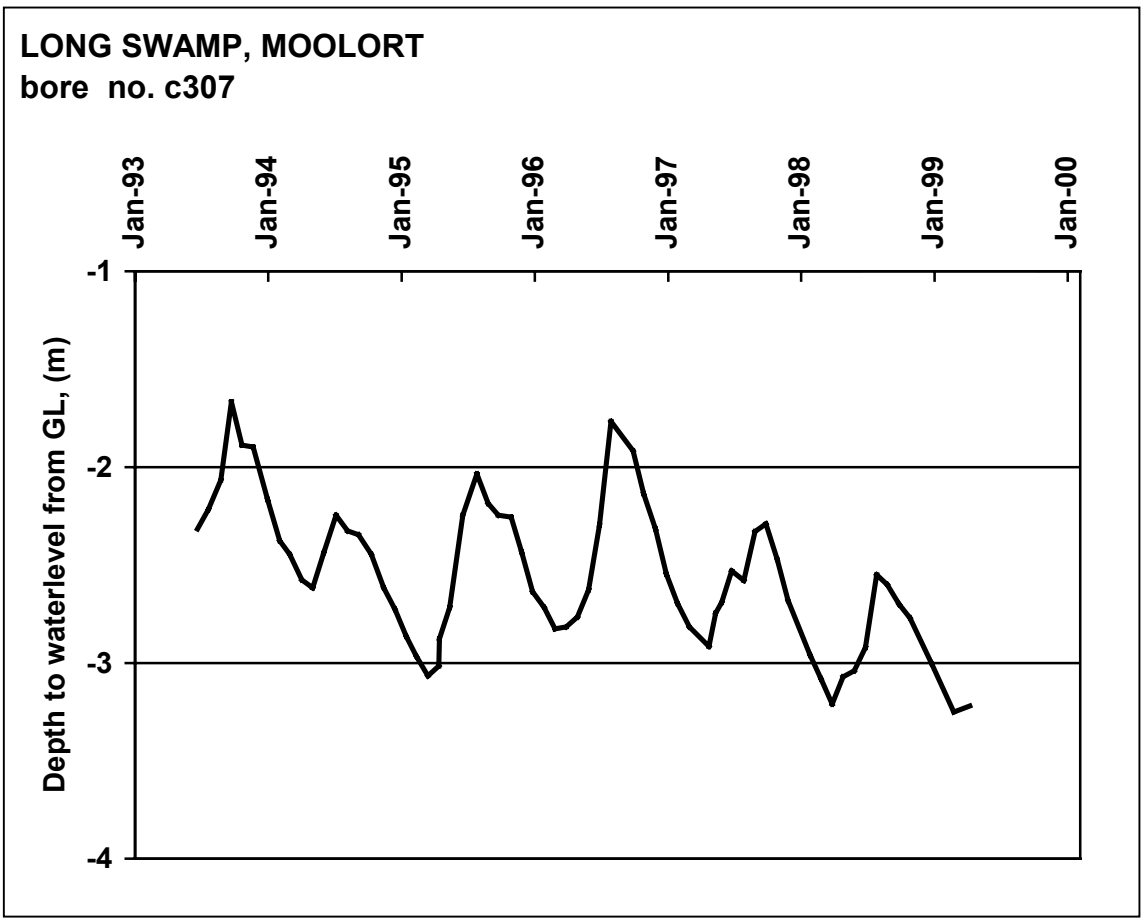
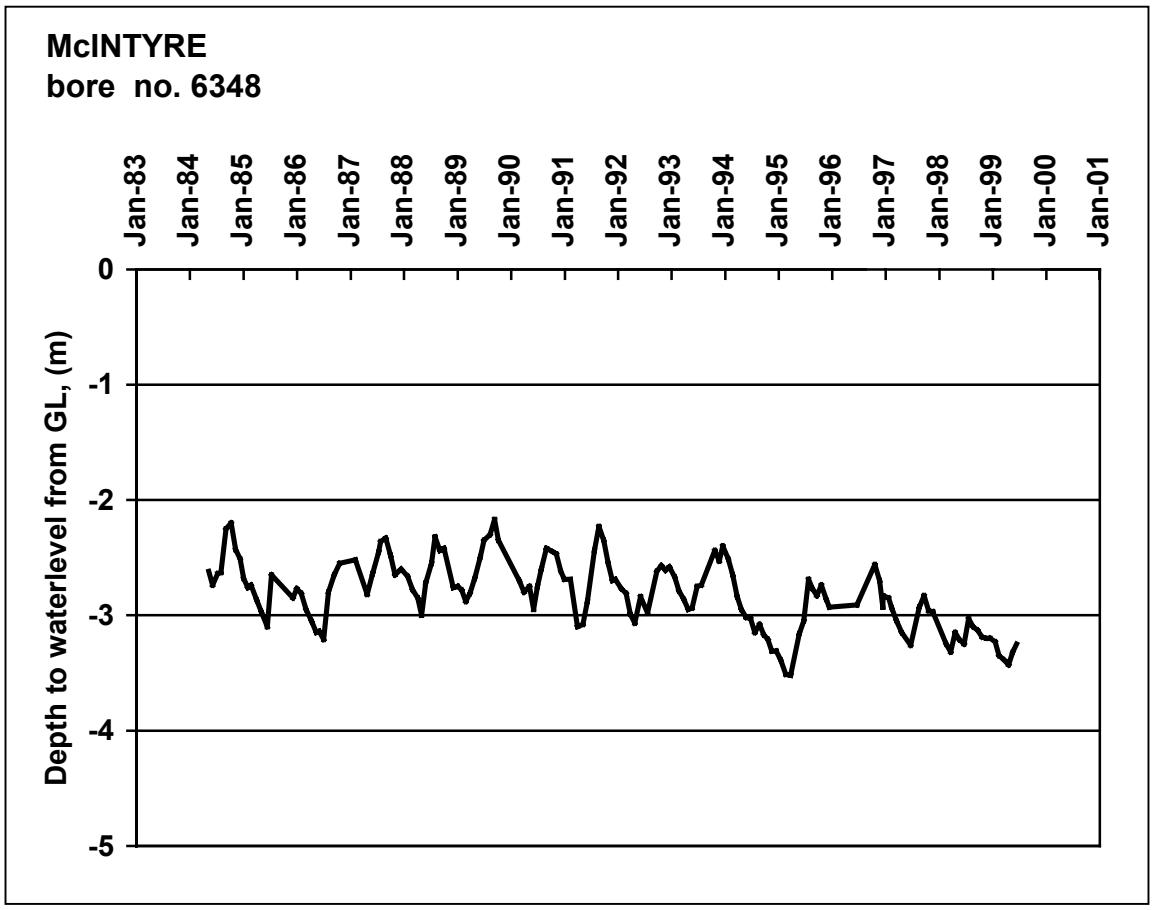
APPENDIX 2 HYDROGRAPHS OF KEY BORES FOR THE LODDON UPLANDS SALINITY REGION



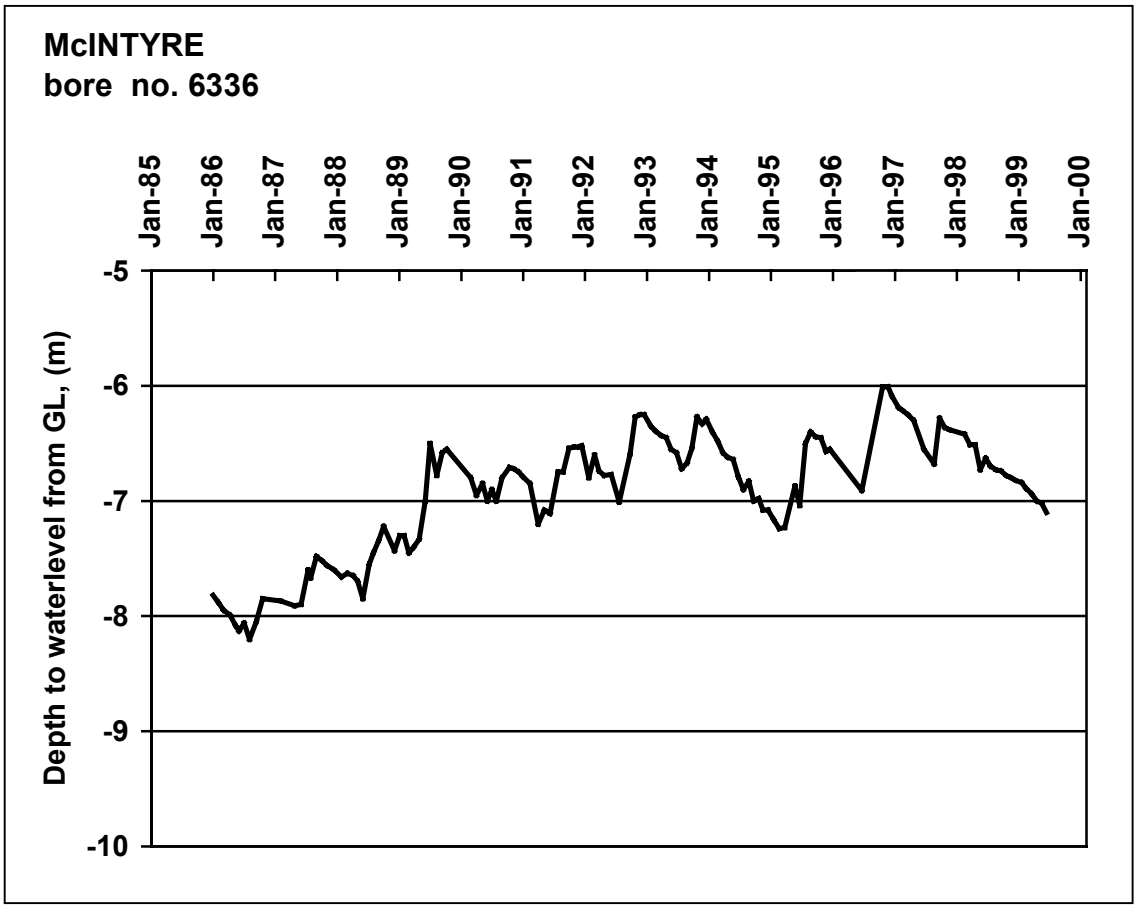
CLPR No:	283sc	Monitor	CLPR
Locality Description:	Stewarts Creek Forest bore.		
LMU:	Volcanic Rises/ Sedimentary	Landscape Position:	Mid-slope
Geological Description:	Shallow uniform & gradational soils overly stoney rises & scarps/hard fractured sandstone, mudstone and shale		
Land Cover:	Pasture, sheep grazing, some cropping on rock free rises		
Bore Depth:	-27 m	Rainfall Zone:	800 mm/yr
Av. Water Depth 1997-98:	-6.5 m	Salinity (EC):	N/a
Groundwater Trend:	Hydrograph fluctuations appear to be controlled by annual rainfall variation.		



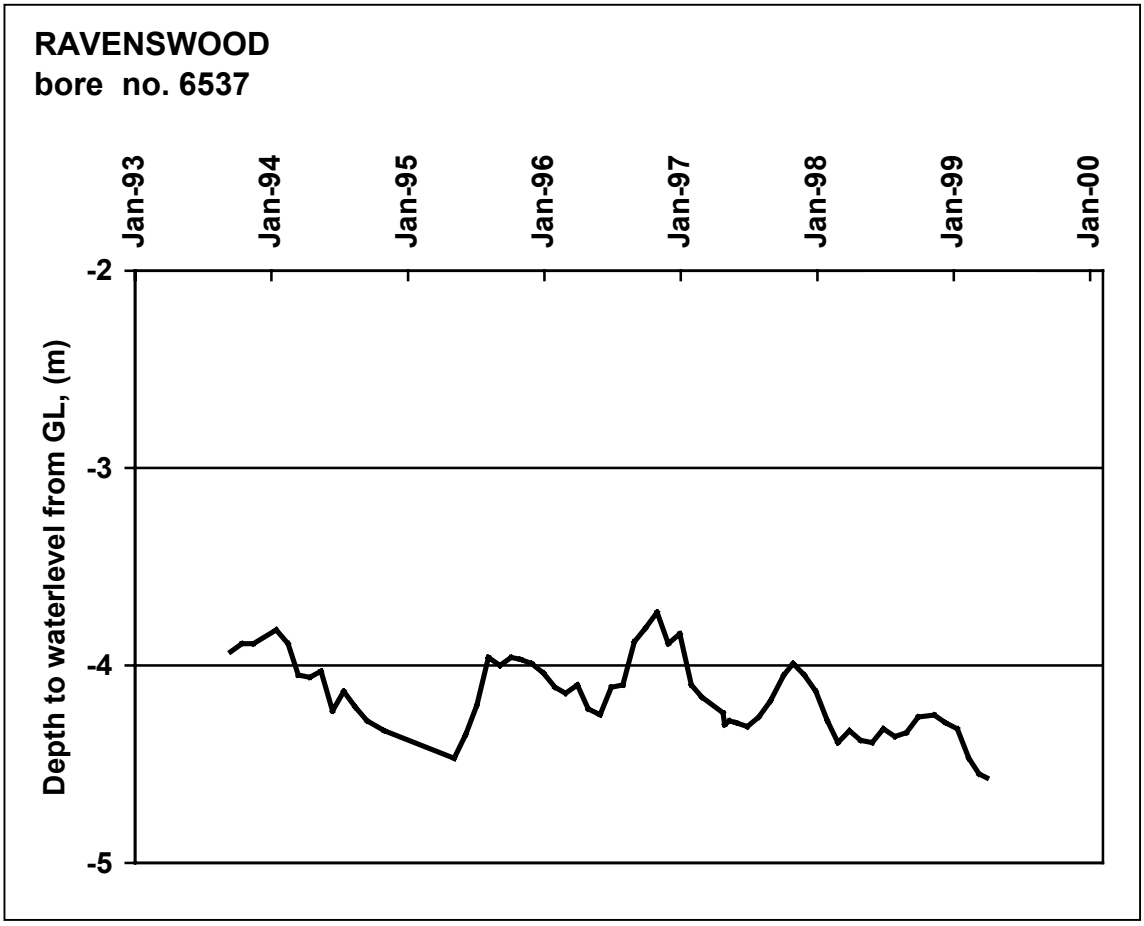
CLPR No:	C307	Monitor	Sally Bryant
Locality Description:	Long Swamp (south of Pyrenees Hwy, Moolort area)		
LMU:	Volcanic Plains	Landscape Position:	Lower slope
Geological Description:	(Newer Volcanics) Weathered layer overlying hard, fractured basalt		
Land Cover:	Annual pasture		
Bore Depth:	-24 m	Rainfall Zone:	500-600 mm/yr
Av. Water Depth 1997-98:	-3.3 m	Salinity (EC):	5350 µS/cm
Groundwater Trend:	Moderate response to annual rainfall. 1994 drought has obvious affect, but not overwhelming. Recovers well. Appears to be slight fall in water level (averaging 14 cm/yr), since 1996, most likely due to rainfall variaiton.		



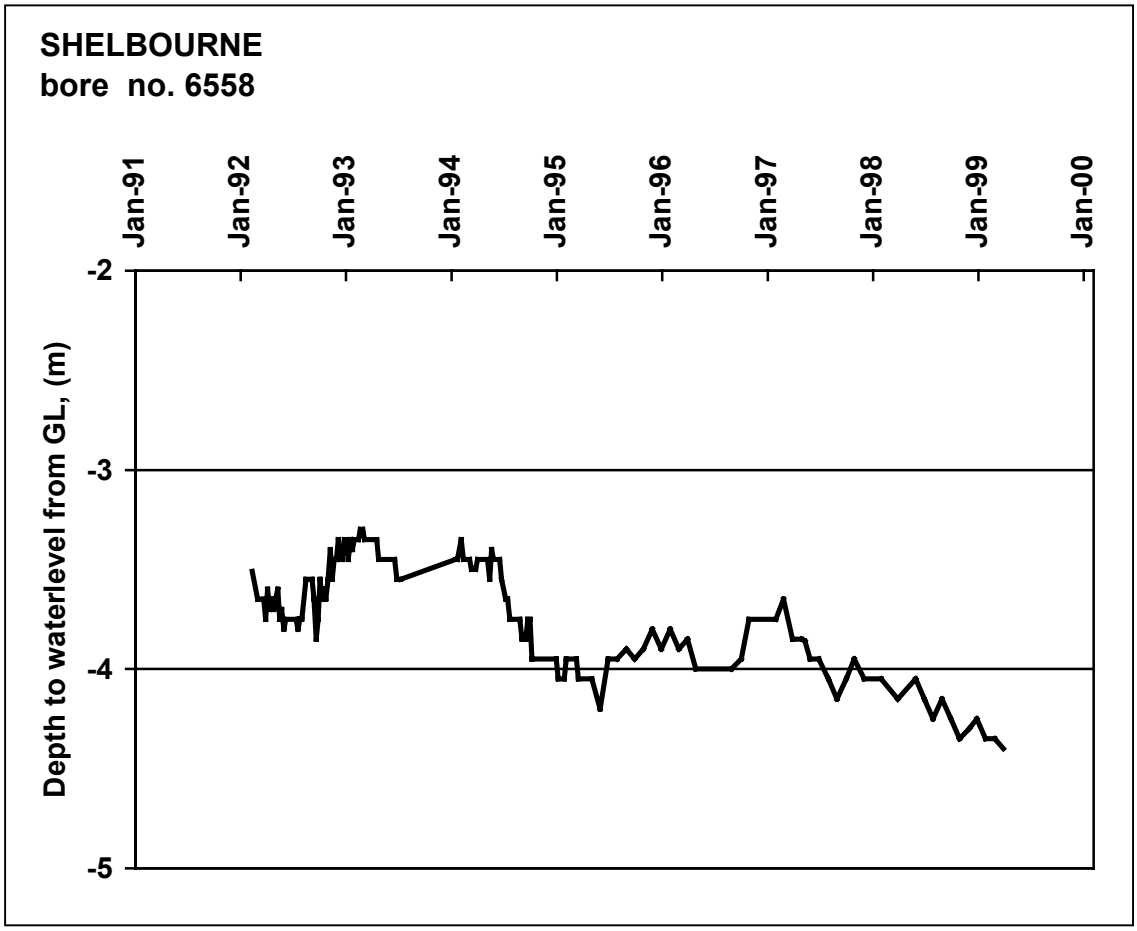
CLPR No:	6348s	Monitor:	Geoff Winsall
Locality Description:	McIntyre area. (lower northern slopes of Mt. Moliagul)		
LMU:	Sedimentary Rises/ Metamorphic Ridges	Landscape Position:	Lower slope
Geological Description:	(Ordovician sedimentary/metamorphic rock) Weathered clay and rock overlying hard, fractured rock		
Land cover:	Annual pasture		
Bore Depth:	-8.1 m	Rainfall Zone:	400-500 mm/yr
Av. Water Depth 1997-98:	-3.2 m	Salinity (EC):	18 000 µS/cm
Groundwater Trend:	Overall steady. Moderate response to annual rainfall. Stronger trough punctuated by 1994 drought. Drop in waterlevel in the late 1990s.		



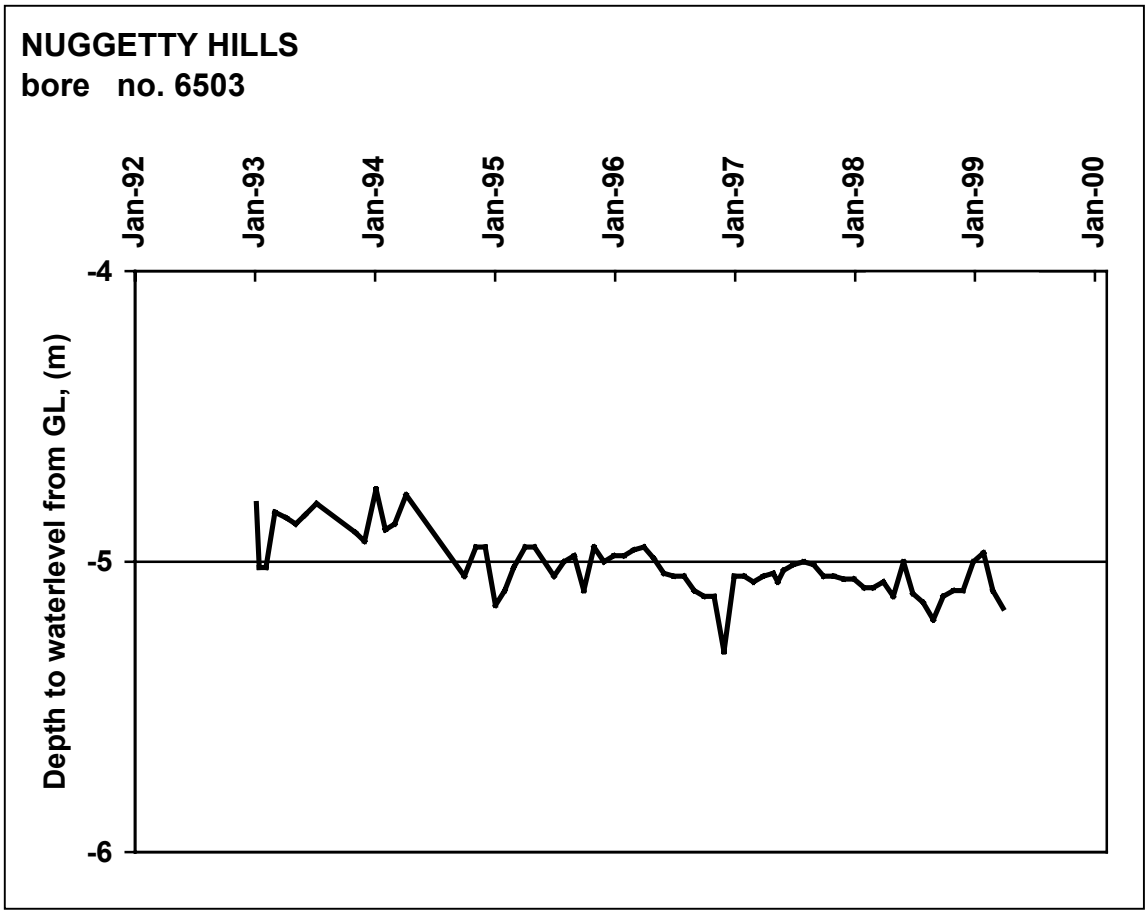
CLPR No:	6336s	Monitor:	Geoff Winsall
Locality Description:	McIntyre area. (off Rheola-Llanelly Rd)		
LMU:	Northern Granites	Landscape Position:	Midu slope
Geological Description:	(Devonian granite and Tertiary gravels) Partly cemented gravels overlying weathered granite		
Land Cover:	Annual pasture		
Bore Depth:	-11 m	Rainfall Zone:	400-500 mm/yr
Av. Water Depth 1997-98:	-7 m	Salinity (EC):	400 µS/cm
Groundwater Trend:	Moderate response to annual rainfall variation. Long term groundwater rise indicated over 10 year period indicating an underlying rising trend (averaging 19 cm/yr).		



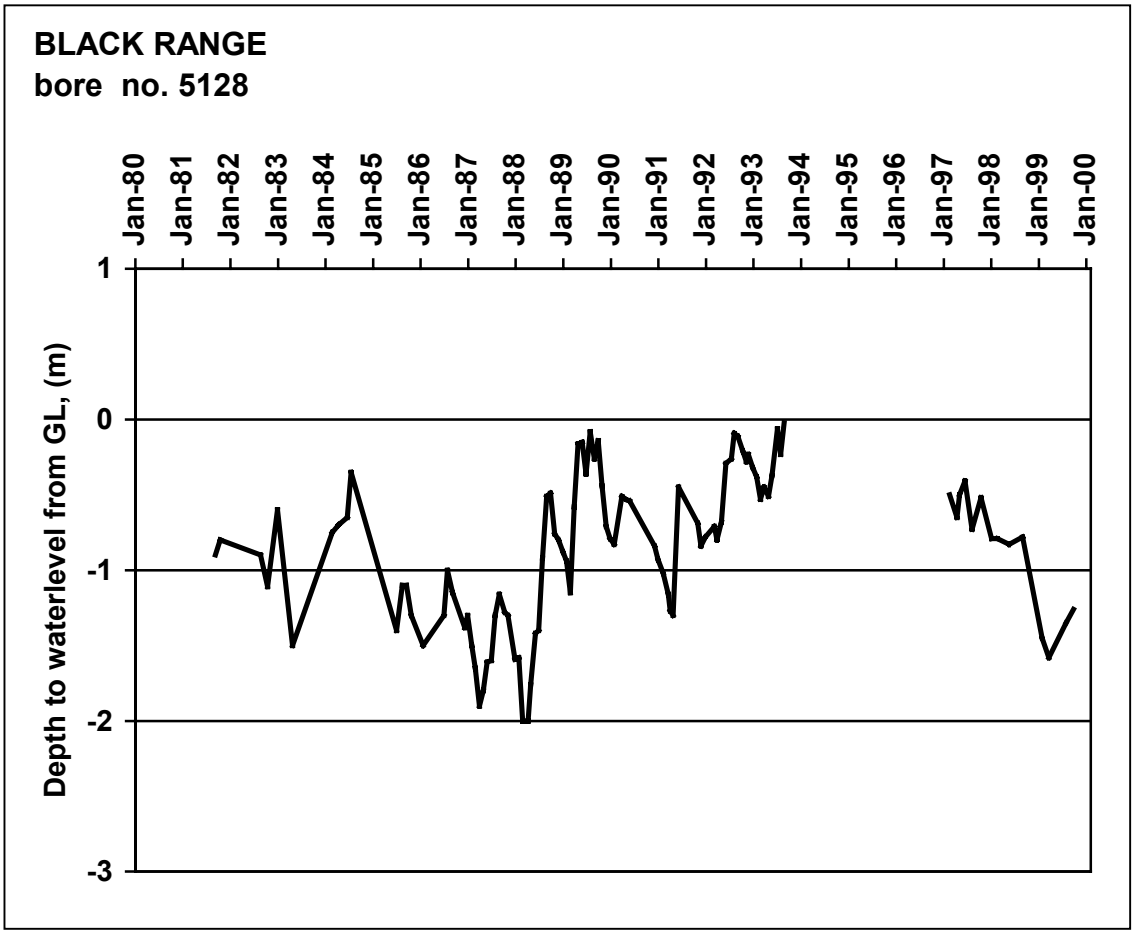
CLPR No:	6537	Monitor:	Don Bickford
Locality Description:	West of the Calder Highway (Ravenswood)		
LMU:	Southern Granites	Landscape Position:	Mid-lower slope
Geological Description:	(Devonian granite) Clay and sand overlying hard, fresh granite		
Land Cover:	Pasture		
Bore Depth:	-15 m	Rainfall Zone:	500-600 mm/yr
Av. Water Depth 1997-98:	-4.5 m	Salinity (EC):	300 µS/cm
Groundwater Trend:	Hydrograph fluctuations appear to occur in response to annual rainfall variation. (Minor response to annual rainfall variation.)		



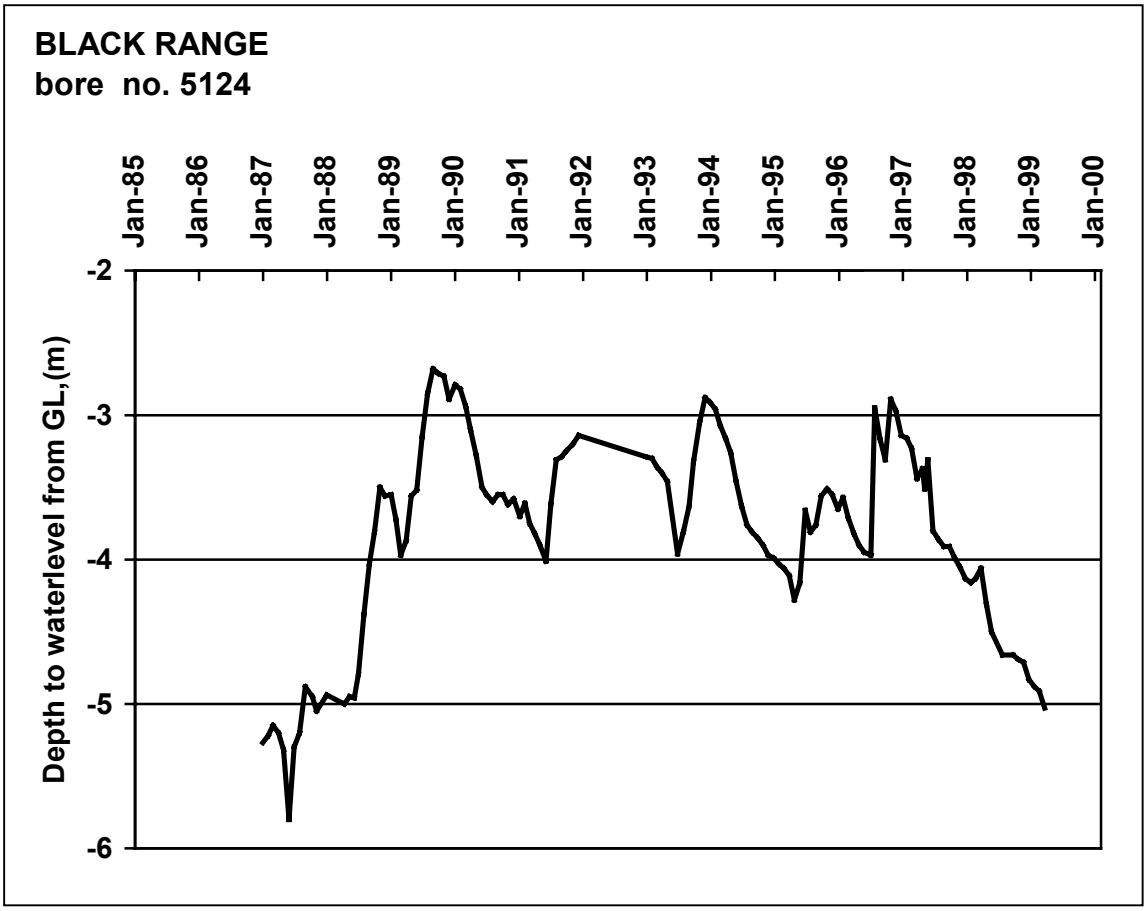
CLPR No:	6558	Monitor:	Peter Lakey
Locality Description:	Marong area (west of Shelbourne)		
LMU:	Southern Granites	Landscape Position:	N/A
Geological Description:	(Devonian granite) Clay and sand overlying hard, fresh granite		
Land cover:	Annual pasture		
Bore Depth:	-21 m	Rainfall Zone:	500-600 mm/yr
Av. Water Depth 1997-98:	-4.5 m	Salinity (EC):	10 940 µS/cm
Groundwater Trend:	Moderate response to annual rainfall. Trend falling since 1994. Does not appear to be recovering to previous groundwater level before 1994.		



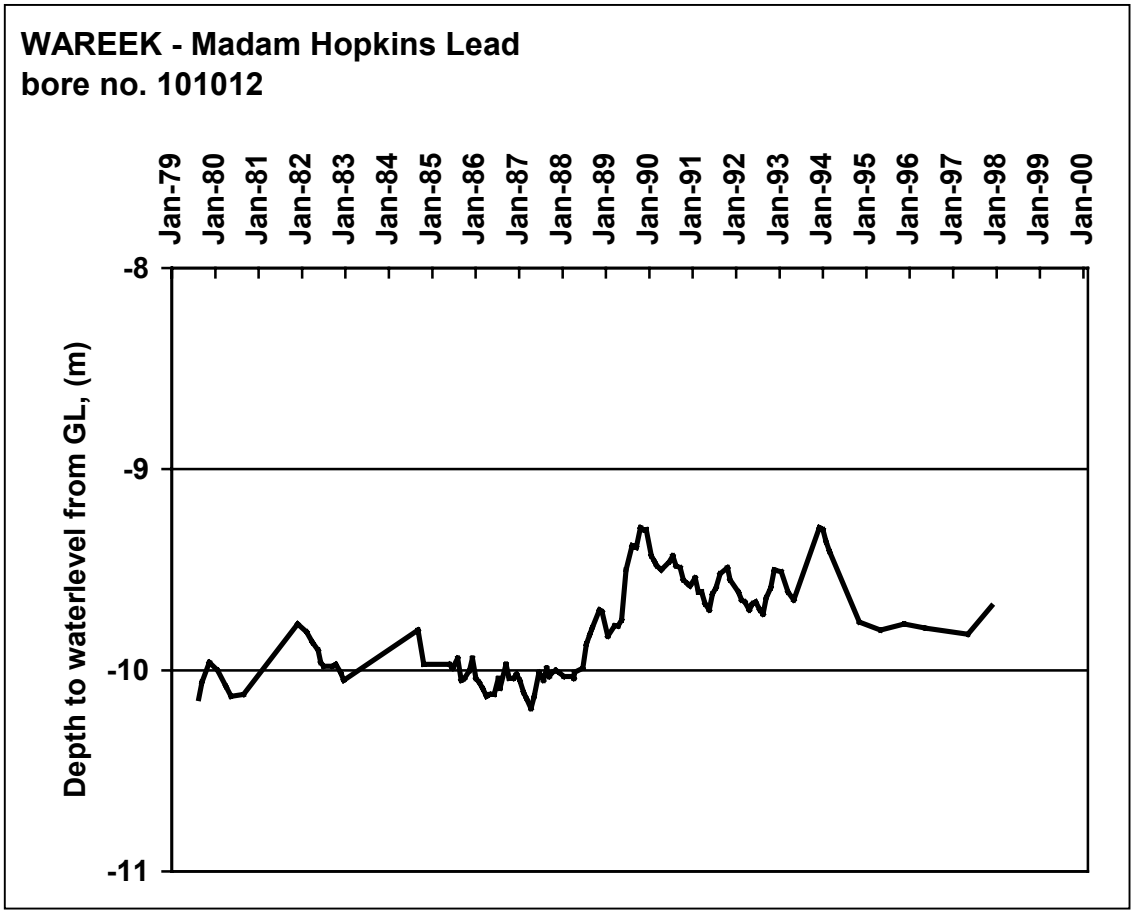
CLPR No:	6503	Monitor:	Bill McKnight
Locality Description:	Nuggetty Hills area (north-west of Maldon)		
LMU:	Southern Granites	Landscape Position:	Mid slope
Geological Description:	(Devonian granite) Clay and sand overlying hard, fresh granite		
Land Cover:	Annual pasture		
Bore Depth:	-21 m	Rainfall Zone:	500-600 mm/yr
Av. Water Depth 1997-98:	-5.1 m	Salinity (EC):	21 700 µs/cm
Groundwater Trend:	Minor response to seasonal and annual rainfall with a slight fall since 1994. Overall fall in waterlevel since 1994, possibly in result of low rainfall in late 1990s.		



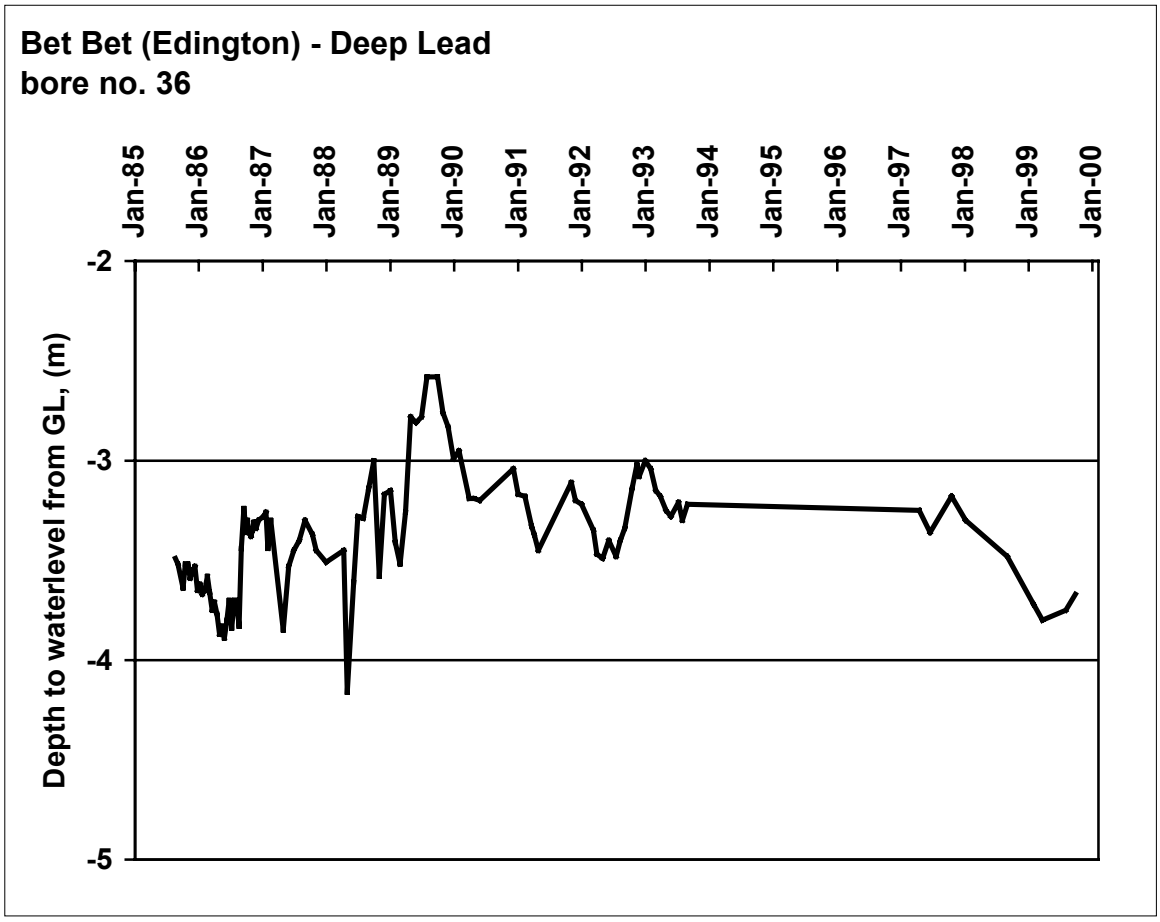
CLPR No:	5128	Monitor:	CLPR
Locality Description:	Black Range area (east side of range)		
LMU:	Northern Granite/ Metamorphic Ridges	Landscape Position:	N/A
Geological Description:	(Devonian granite and associated metamorphic ridges) Clay/sand overlying hard, fresh granite/metamorphic rock		
Land Cover:	Annual pasture		
Bore Depth:	-2.3 m	Rainfall Zone:	400-500 mm/yr
Av. Water Depth 1997-98:	-1.1 m	Salinity (EC):	N/A
Groundwater Trend:	Peaks and troughs correlate with annual rainfall. Step rise since 1990 and levelled out, good example of metamorphic ridge. Fall in hydrograph since 1997.		



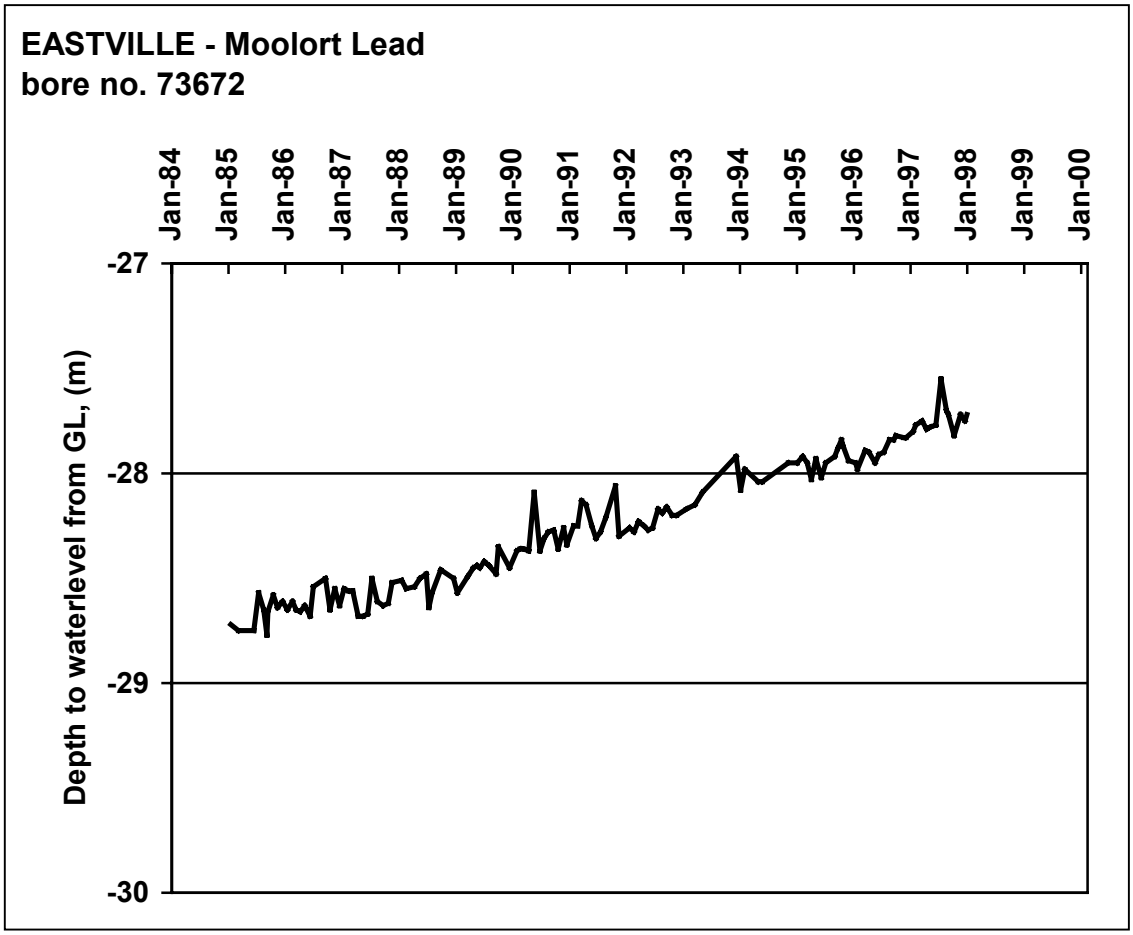
CLPR No:	5124s	Monitor:	Alex Wiseman
Locality Description:	Black Range area (east side of range)		
LMU:	Northern Granite/ Metamorphic Ridges	Landscape Position:	N/A
Geological Description:	(Devonian granite and associated metamorphic ridges) Clay/sand overlying hard, fresh granite/metamorphic rock		
Land Cover:	Annual pasture		
Bore Depth:	-6 m	Rainfall Zone:	400-500 mm/yr
Av. Water Depth 1997-98:	-5 m	Salinity (EC):	N/A
Groundwater Trend:	Moderate response to annual rainfall. Step rise since 1986-1990. Good eg, of metamorphic ridge. Strong falling trend since late 1996, possibly due to low rainfall experienced since then.		



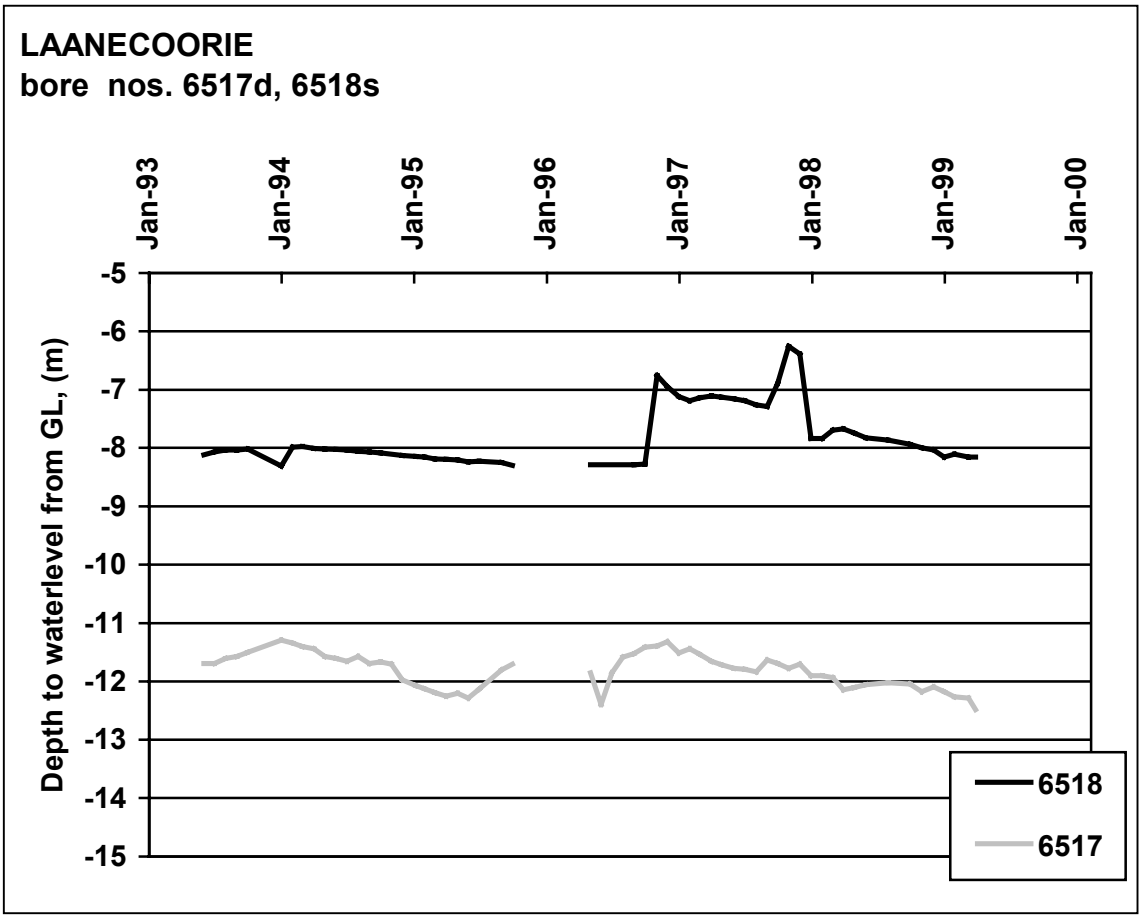
SKM No:	101012	Monitor:	Sinclair Knight Merz
Locality Description:	At Wareek (Parish of Wareek) Madam Hopkins Lead		
LMU:	Alluvial & Riverine Plains/ Sedimentary Rises	Landscape Position:	N/A
Geological Description:	Shepparton Formation, Tertiary Deep Leads, Ordovician slates and sandstones.		
Land Cover:	Annaul pasture		
Bore Depth:	-4.3 m	Rainfall Zone:	600 mm/yr
Av. Water Depth 1997-98:	-9.8 m	Salinity (EC):	2800 µS/cm
Groundwater Trend:	Minor response to annual rainfall. Step rise since late 1980s. (Averaging 2 cm/yr)		



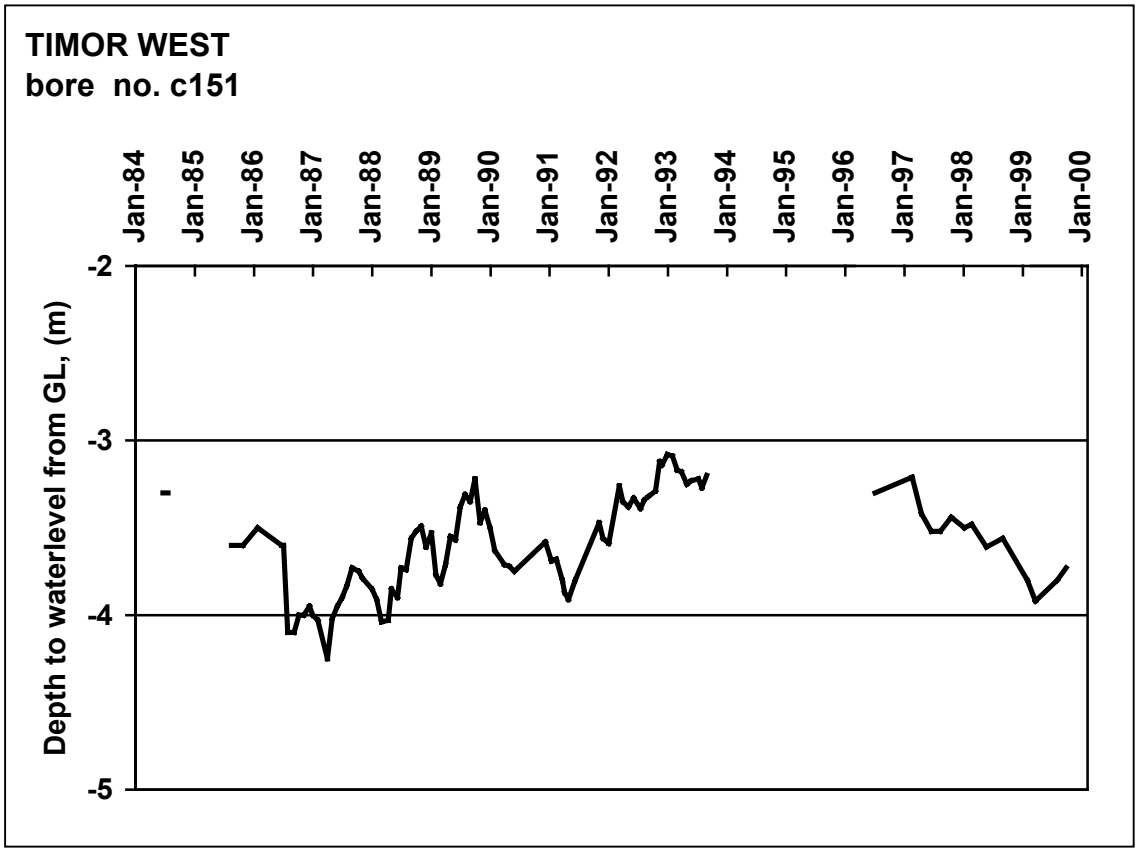
CLPR No:	36	Monitor:	CLPR
Locality Description:	Betley (Parish of Eddington) Bet Bet Deep Lead		
LMU:	Alluvial & Riverine Plains/ Sedimentary Rises	Landscape Position:	Plain Roadside
Geological Description:	Shepparton Formation, Tertiary Deep Leads, Ordovician slates and sandstones.		
Land Cover:	Annual pasture		
Bore Depth:	-90 m	Rainfall Zone:	600 mm/yr
Av. Water Depth 1997-98:	-3.8 m	Salinity (EC):	N/A
Groundwater Trend:	Moderate response to annual rainfall. Step rise since 1990, then evens out (due to lack of data). Falling trend since 1998.		



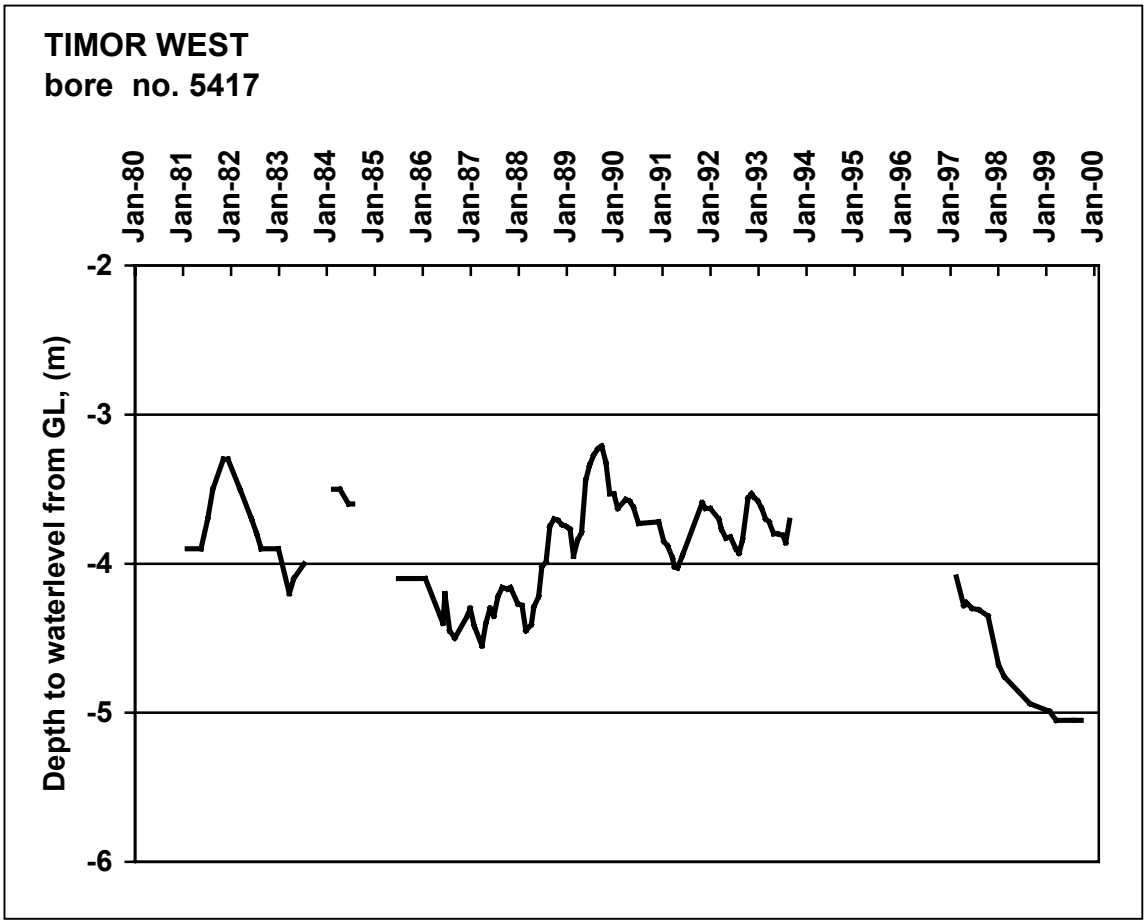
SKM No:	73672	Monitor:	Sinclair Knight Merz
Locality Description:	At Eastville (Parish of Neereman) Moolort Lead		
LMU:	Alluvial & Riverine Plains/ Sedimentary Rises	Landscape Position:	Plain
Geological Description:	Shepparton Formation, Tertiary Deep Leads, Ordovician slates and sandstones.		
Land Cover:	Annual pasture/crops		
Bore Depth:	-94 m	Rainfall Zone:	600 mm/yr
Av. Water Depth 1997-98:	-27.8 m	Salinity (EC):	1300 µS/cm
Groundwater Trend:	Steady increase in groundwater level over the past 13 years. Largely unaffected by seasonal variation possibly recharged by regional aquifer system.		



SKM No:	6517d/6518s	Monitor:	Geoff Curnow
Locality Description:	Laanecoorie		
LMU:	Riverine Alluvium (high level)	Landscape Position:	Plain (alluvial)
Geological Description:	(Shepparton Formation and Tertiary Deep Lead) Stream laid silts, sands and gravels		
Land Cover:	Lucerne based pasture		
Bore Depth:	20 m/6 m	Rainfall Zone:	400-500 mm/yr
Av. Water Depth 1997-98:	-11.6 m/-6.9 m	Salinity (EC):	Deep Bore: 58 500 µS/cm
Groundwater Trend:	Minor to no response to annual rainfall variation. Strong underlying trend. Potential groundwater recharge conditions indicated here		

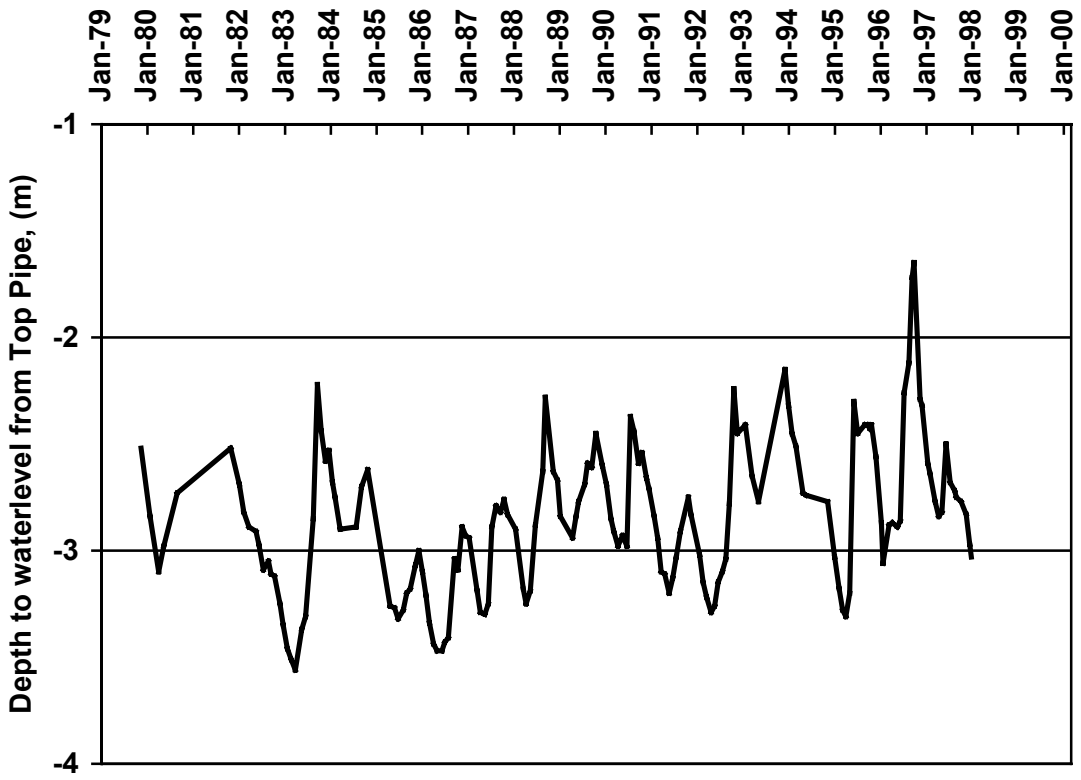


CLPR No:	c151	Monitor:	CLPR
Locality Description:	Timor West area (Bet Bet Ck. valley)		
LMU:	Riverine Alluvium (high level)	Landscape Position:	Plain (alluvial)
Geological Description:	(Shepparton Formation and Tertiary Deep Lead) Stream laid silts, sands and gravels		
Land Cover:	Pasture		
Bore Depth:	-72 m	Rainfall Zone:	400-500 mm/yr
Av. Water Depth 1997-98:	-3.9 m	Salinity (EC):	N/A
Groundwater Trend:	Moderate response to rainfall. Step rise since 1987-90 and 1991-93. Missing data between 1994 – 1996. Falling groundwater trend since 1997.		

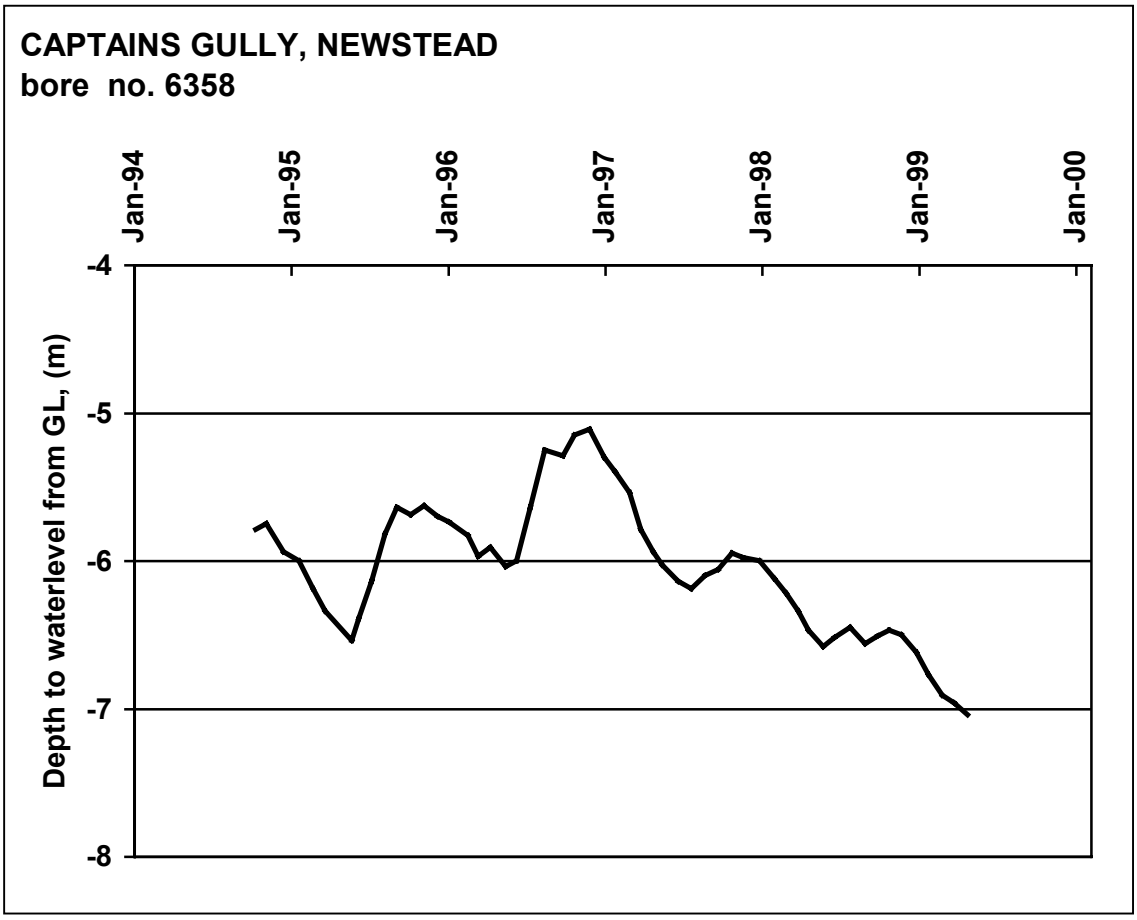


CLPR No:	5417tw	Monitor:	CLPR
Locality Description:	Timor West		
LMU:	Sedimentary Hills	Landscape Position:	Plain
Geological Description:	(Ordovician Sedimentary Rock) Hard, fractured sandstone, mudstone and shale		
Land Cover:	Pasture		
Bore Depth:	-4.9 m	Rainfall Zone:	449 mm/yr
Av. Water Depth 1997-98:	-4.3 m	Salinity (EC):	N/A
Groundwater Trend:	Hydrograph reflects annual rainfall, but breaks in graph due to missing/insufficient data		

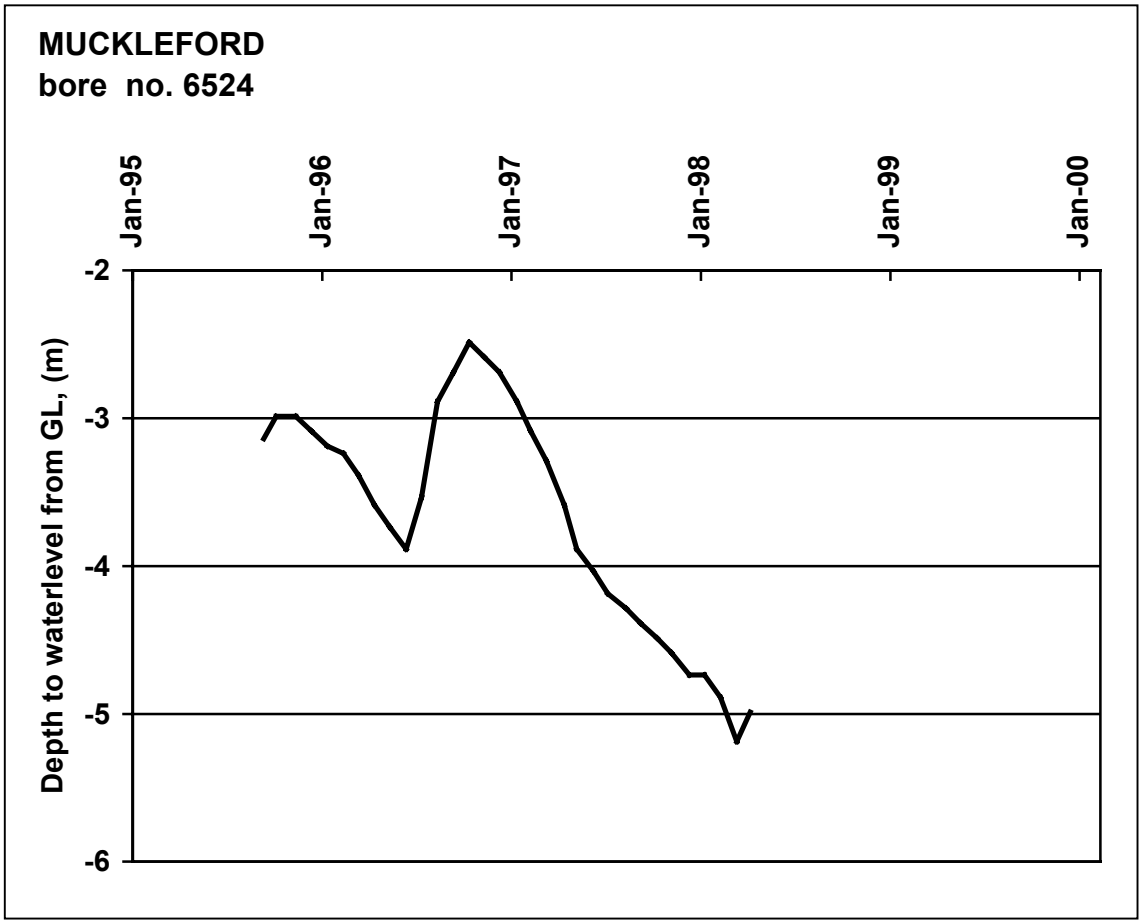
NEWSTEAD - Guildford Lead
bore no 92124



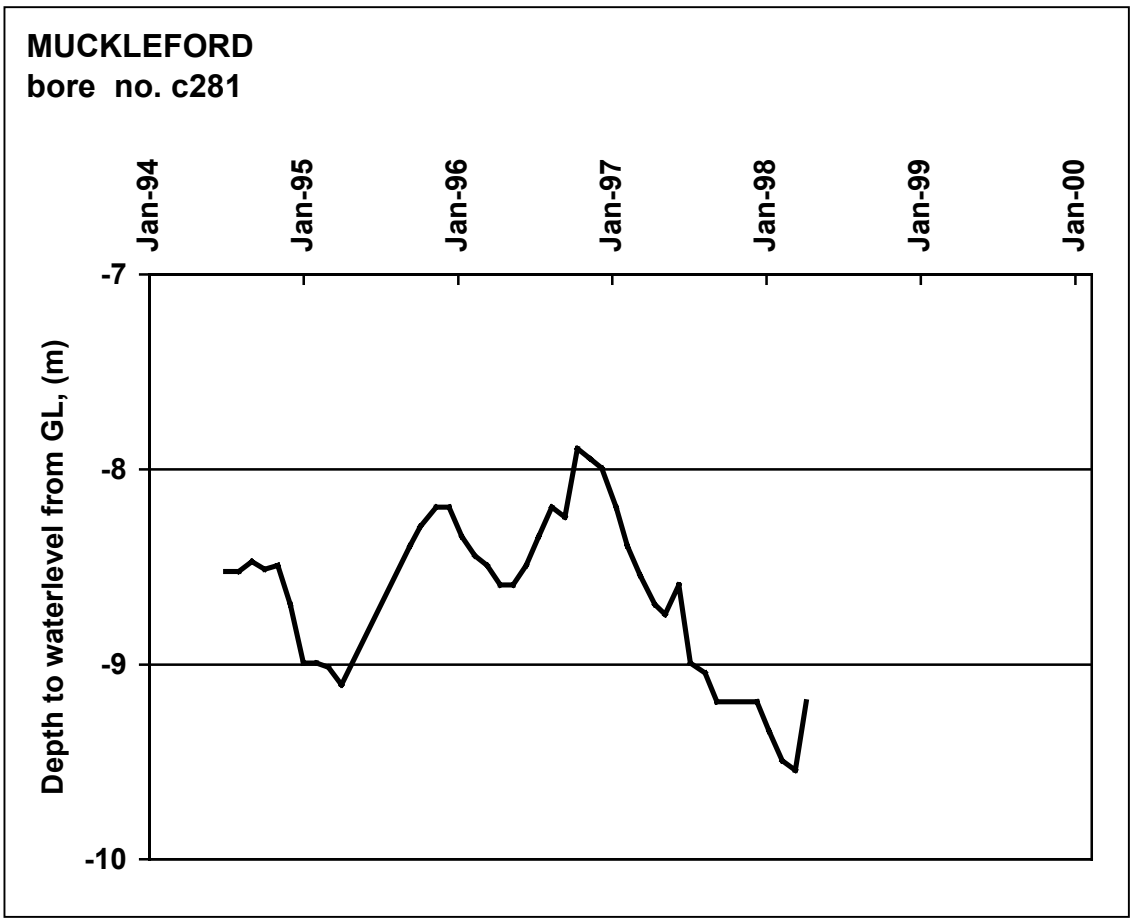
SKM No:	92124	Monitor:	Sinclair Knight Merz
Locality Description:	At Newstead (Parish of Strangways) Guildford lead		
LMU:	Sedimentary Hills	Landscape Position:	N/A
Geological Description:	Ordovician slates and siltstones		
Land Cover:	Annual pasture		
Bore Depth:	-57 m	Rainfall Zone:	600 mm/yr
Av. Water Depth 1997-98:	-2.4 m	Salinity (EC):	1145 µS/cm
Groundwater Trend:	Rising trend since the mid 1980s. Moderate response to annual rainfall variation.		



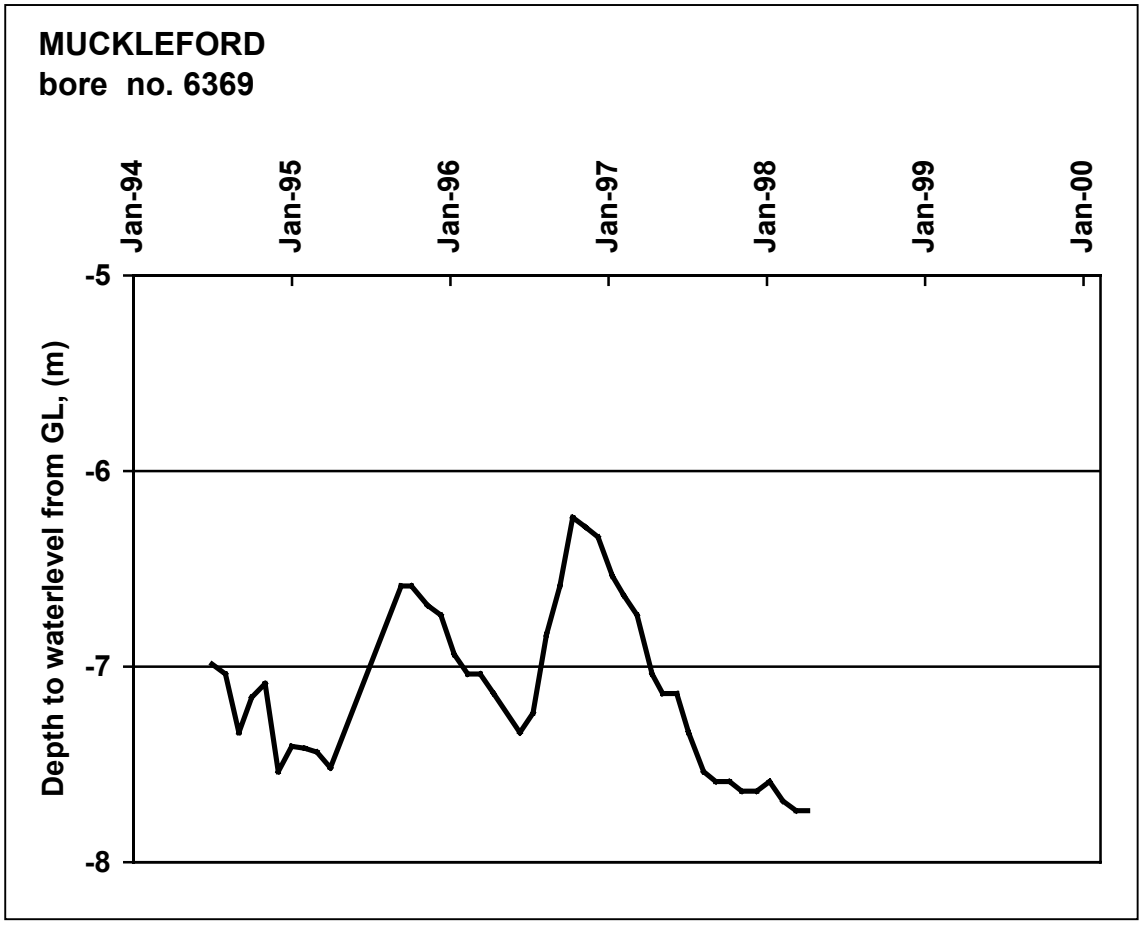
CLPR No:	6358cg	Monitor:	Ian McClay
Locality Description:	Captains Gully, Newstead		
LMU:	Sedimentary Hills	Landscape Position:	Mid-slope
Geological Description:	(Ordovician sedimentary rock) Hard, fractured sandstone, mudstone and shale		
Land Cover:	Annual pasture		
Bore Depth:	-23 m	Rainfall Zone:	600 mm/yr
Av. Water Depth 1997-98:	-7m	Salinity (EC):	N/A
Groundwater Trend:	Overall steady. Hydrograph reflects annual rainfall variation. No underlying trend since 1996, possibly in response to low rainfall in the late 1990s.		



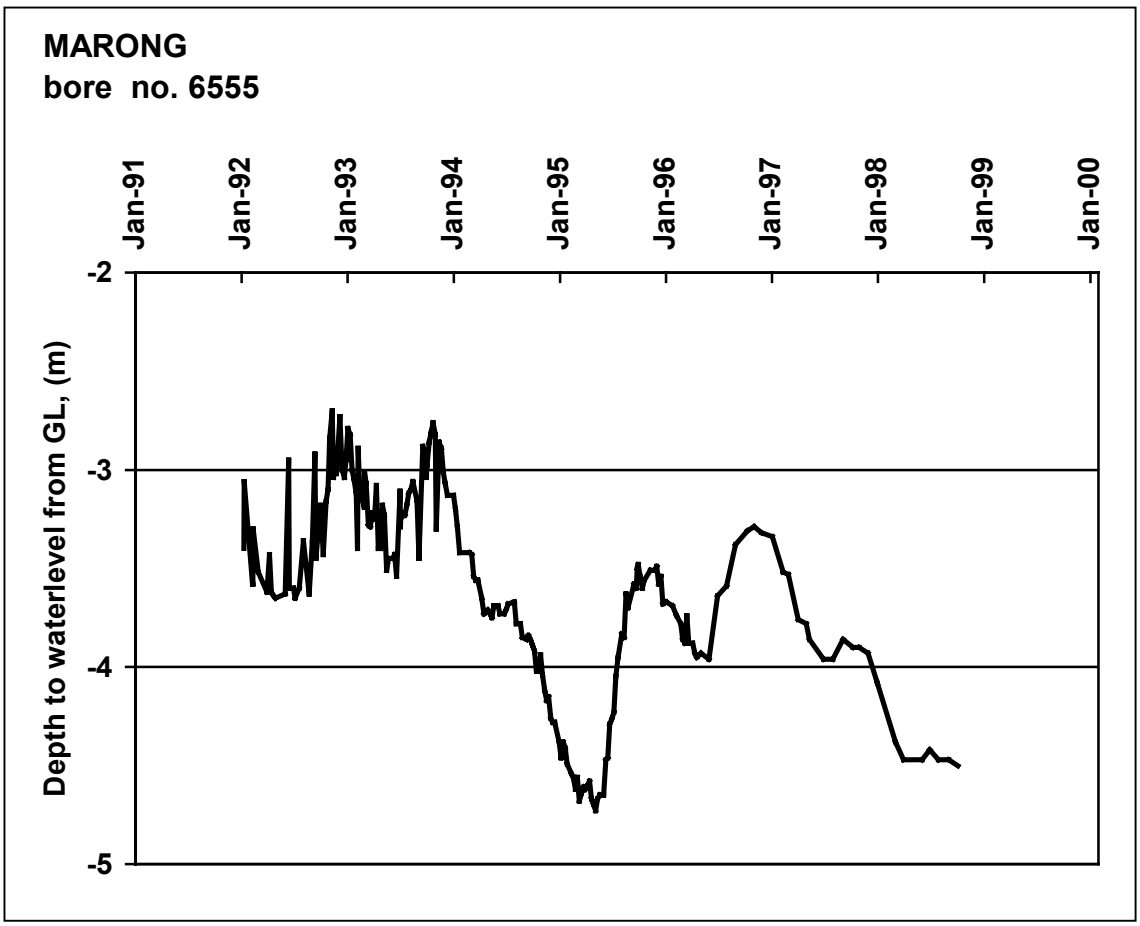
CLPR No:	6524mu	Monitor:	David Griffith
Locality Description:	Muckleford Cnr Muckleford School Rd & Butchers Rd.		
LMU:	Sedimentary Hills	Landscape Position:	Roadside
Geological Description:	(Ordovician sedimentary rock) Hard, fractured sandstone, mudstone and shale		
Land Cover:	Annaul pasture		
Bore Depth:	-8.5 m	Rainfall Zone:	616 mm/yr
Av. Water Depth 1997-98:	-5 m	Salinity (EC):	N/A
Groundwater Trend:	Insufficient data to be conclusive but does appear to reflect annual rainfall. Strong drop since 1997 obvious.		



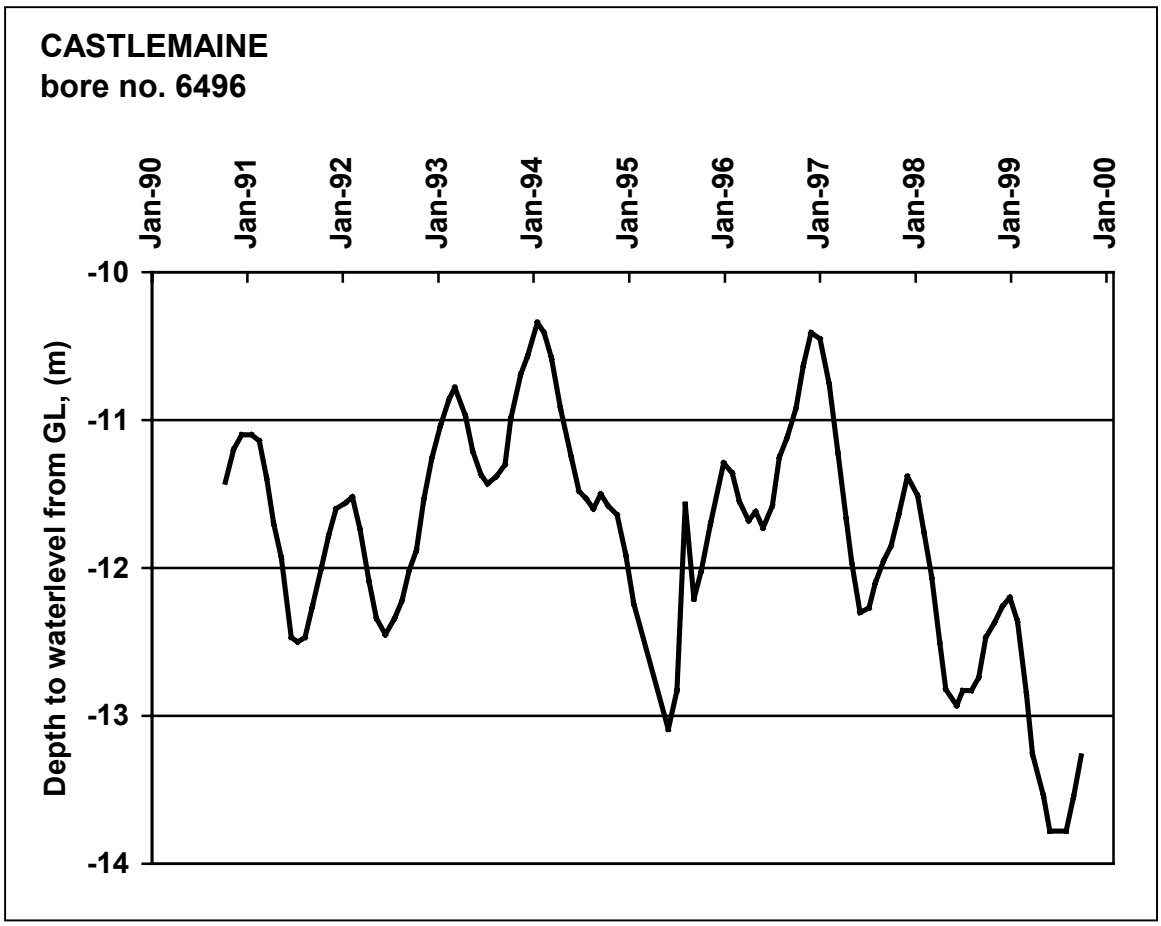
CLPR No:	281mu	Monitor:	David Griffith
Locality Description:	Muckleford		
LMU:	Sedimentary hills	Landscape Position:	Mid-slope
Geological Description:	(Ordovician sedimentary rock) Hard, fractured sandstone, mudstone and shale		
Land Cover:	Annual pasture		
Bore Depth:		Rainfall Zone:	600 mm/yr
Av. Water Depth 1997-98:	-8.2 m	Salinity (EC):	N/A
Groundwater Trend:	Fluctuations appear to correlate with annual rainfall. Falling groundwater trend since late 1996.		



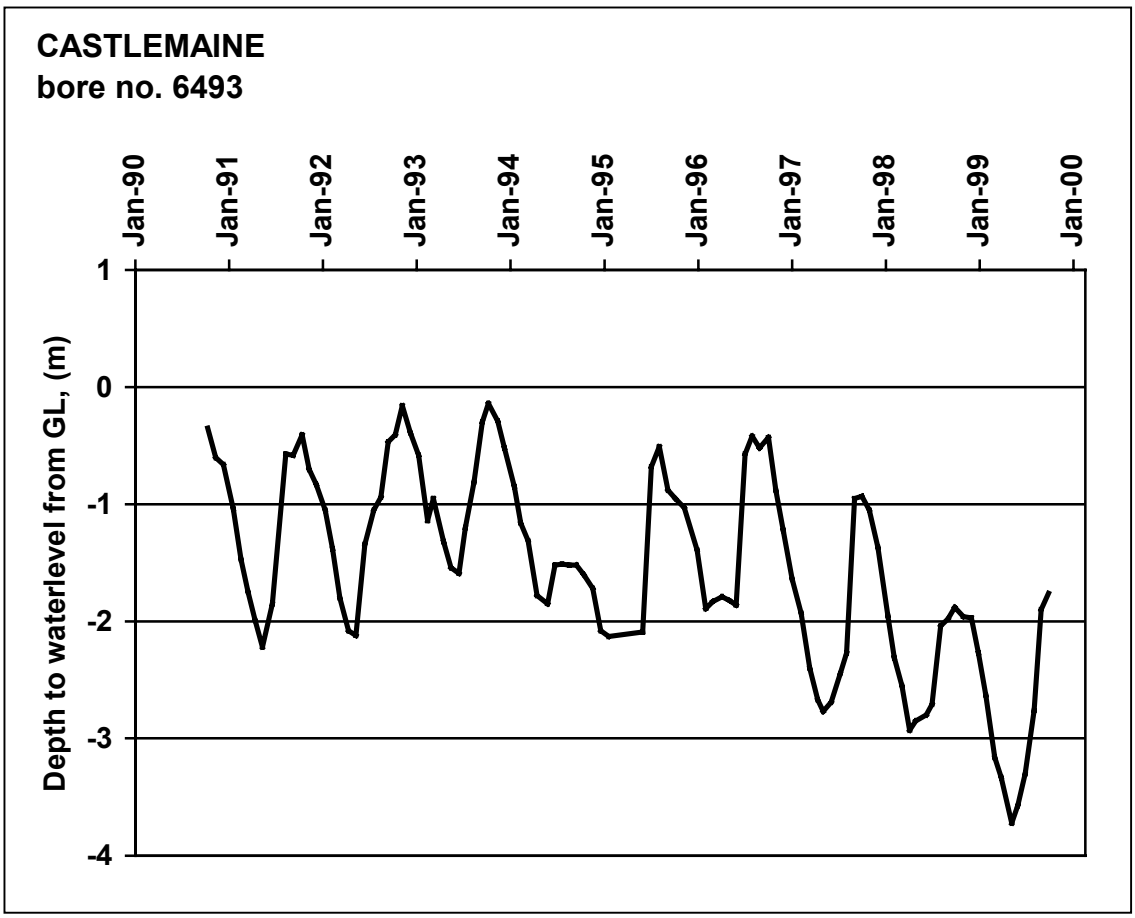
CLPR No:	6369mu	Monitor:	David Griffith
Locality Description:	Muckleford		
LMU:	Sedimentary hills	Landscape Position:	Mid-slope
Geological Description:	(Ordovician sedimentary rock) Hard, fractured sandstone, mudstone and shale		
Land Cover:	Annual pasture		
Bore Depth:	-19 m	Rainfall Zone:	600 mm/yr
Av. Water Depth 1997-98:	-7.8 m	Salinity (EC):	N/A
Groundwater Trend:	Moderate response to annual rainfall. No obvious underlying trend, does however appear to be dropping since 1997.		



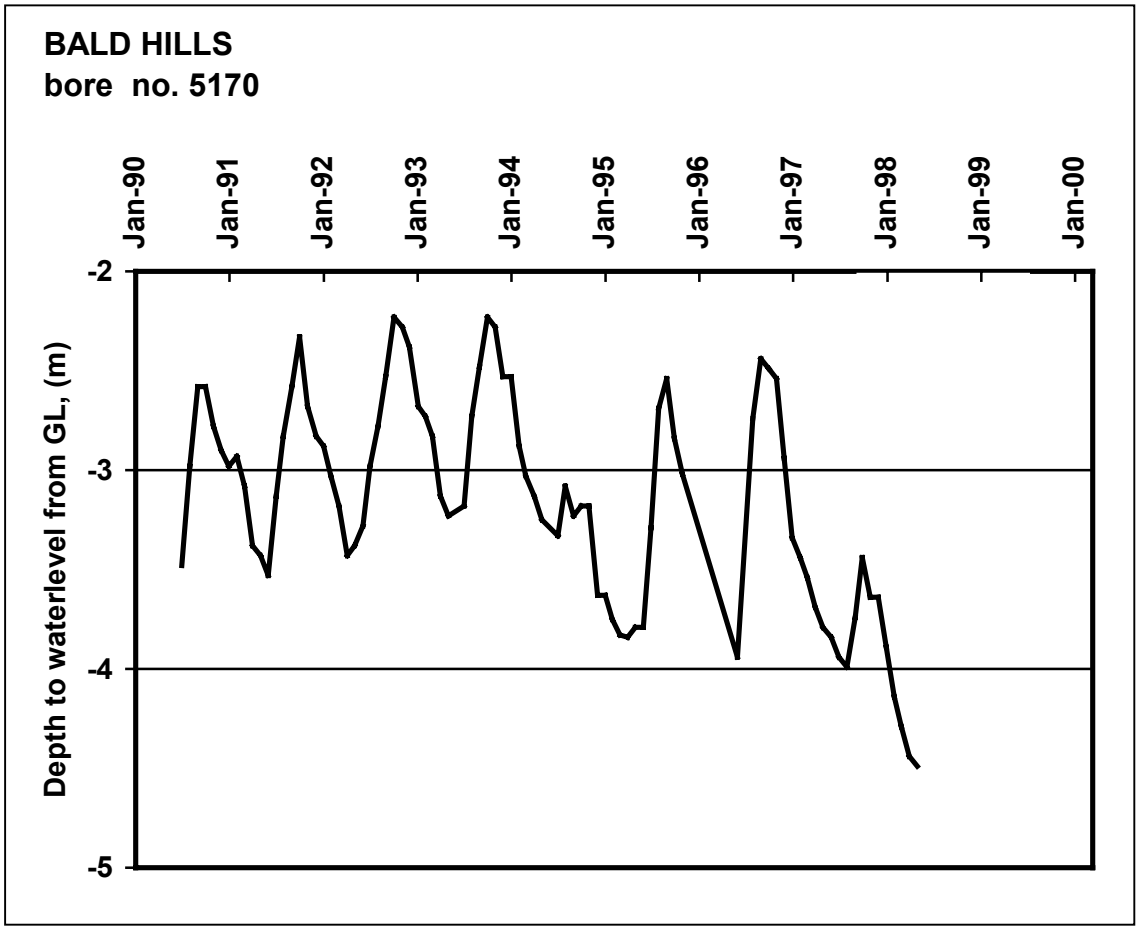
CNR No:	6555	Local No:	Peter Stone
Locality Description:	Marong area. (east of Newbridge)		
LMU:	Cropped Sedimentary Rises	Landscape Position:	Mid-lower slope
Geological Description:	(Ordovician sedimentary rock/metamorphic rock) Weathered clay and rock overlying hard, fractured rock		
Land Cover:	Lucerne pasture		
Bore Depth:	-21.5 m	Rainfall Zone:	400-500 mm/yr
Av. Water Depth 1997-98:	-4.5 m	Salinity (EC):	21 900 µS/cm
Groundwater Trend:	Groundwater levels overall correlates with annual rainfall. Fall in groundwater level is punctuated by the 1994 drought and only slowly recovering.		



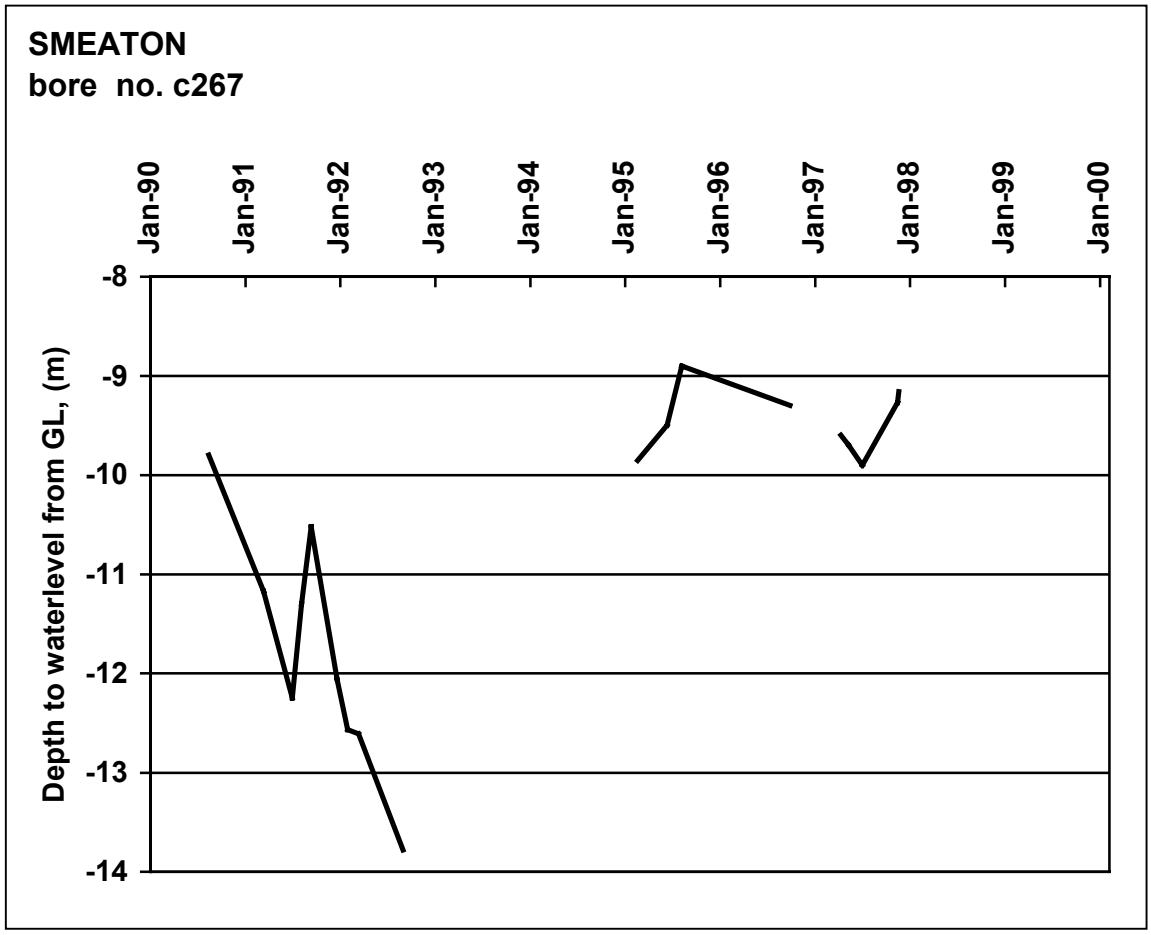
CLPR No:	6496	Monitor:	Les Vearing
Locality Description:	Castlemaine area (east of golf course)		
LMU:	Sedimentary Hills	Landscape Position:	Mid slope
Geological Description:	(Ordovician sedimentary rock) Hard, fractured sandstone, mudstone and shale		
Land Cover:	Pasture		
Bore Depth:	-20 m	Rainfall Zone:	500-600 mm/yr
Av. Water Depth 1997-98:	-13.8 m	Salinity (EC):	1300 µS/cm
Groundwater Trend:	Hydrograph pattern appears to reflect variation in annual rainfall. Strongly affected by 1994 drought. Local system strongly reliant on annual rainfall for recharge.		



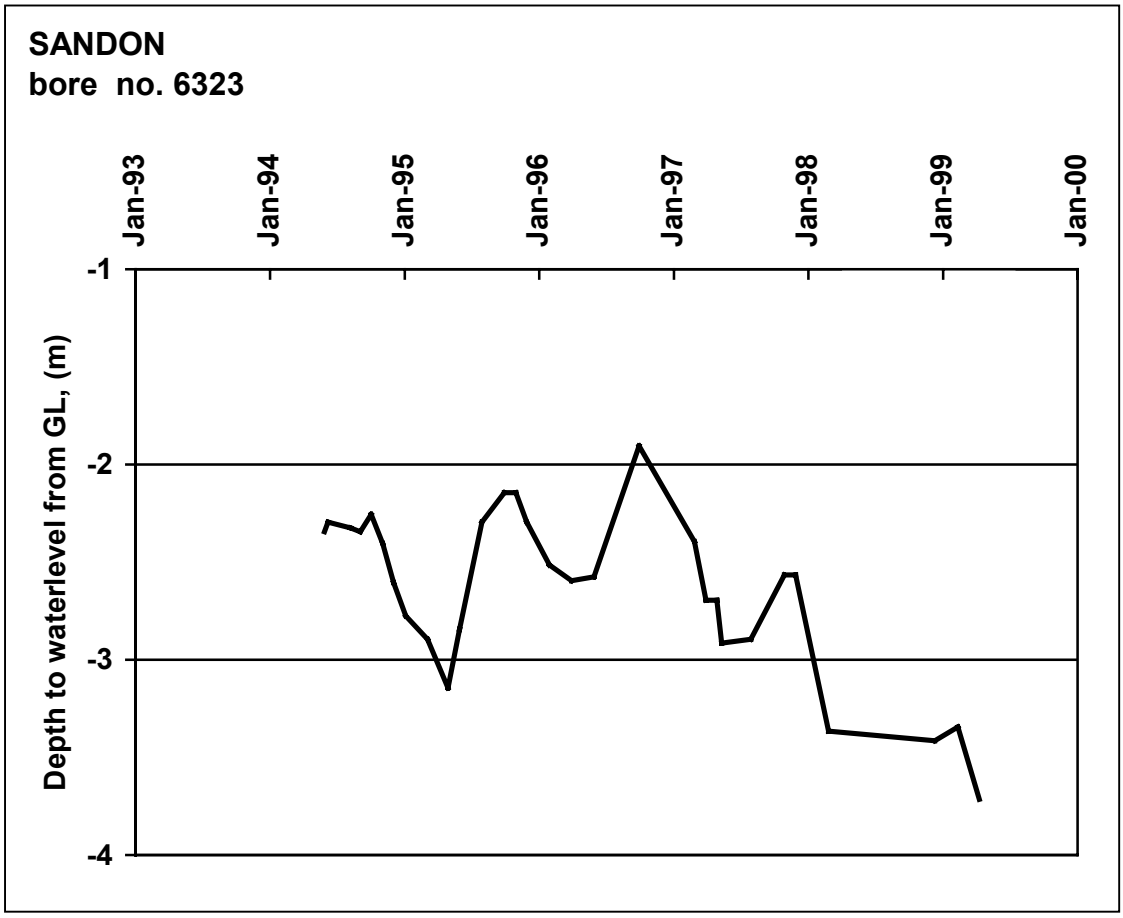
CLPR No:	6493s	Monitor:	Les Vearing
Locality Description:	Castlemaine area (at golf course)		
LMU:	Sedimentary Hills	Landscape Position:	Flats
Geological Description:	(Ordovician sedimentary rock) Hard, fractured sandstone, mudstone and shale		
Land Cover:	Native trees; grass fairways; dam to the north-west		
Bore Depth:	-6 m	Rainfall Zone:	500-600 mm/yr
Av. Water Depth 1997-98:	-2.1 m	Salinity (EC):	900 µS/cm
Groundwater Trend:	Strong response to annual rainfall. Falling trend is more obvious since 1997 (averaging 9 cm/yr).		



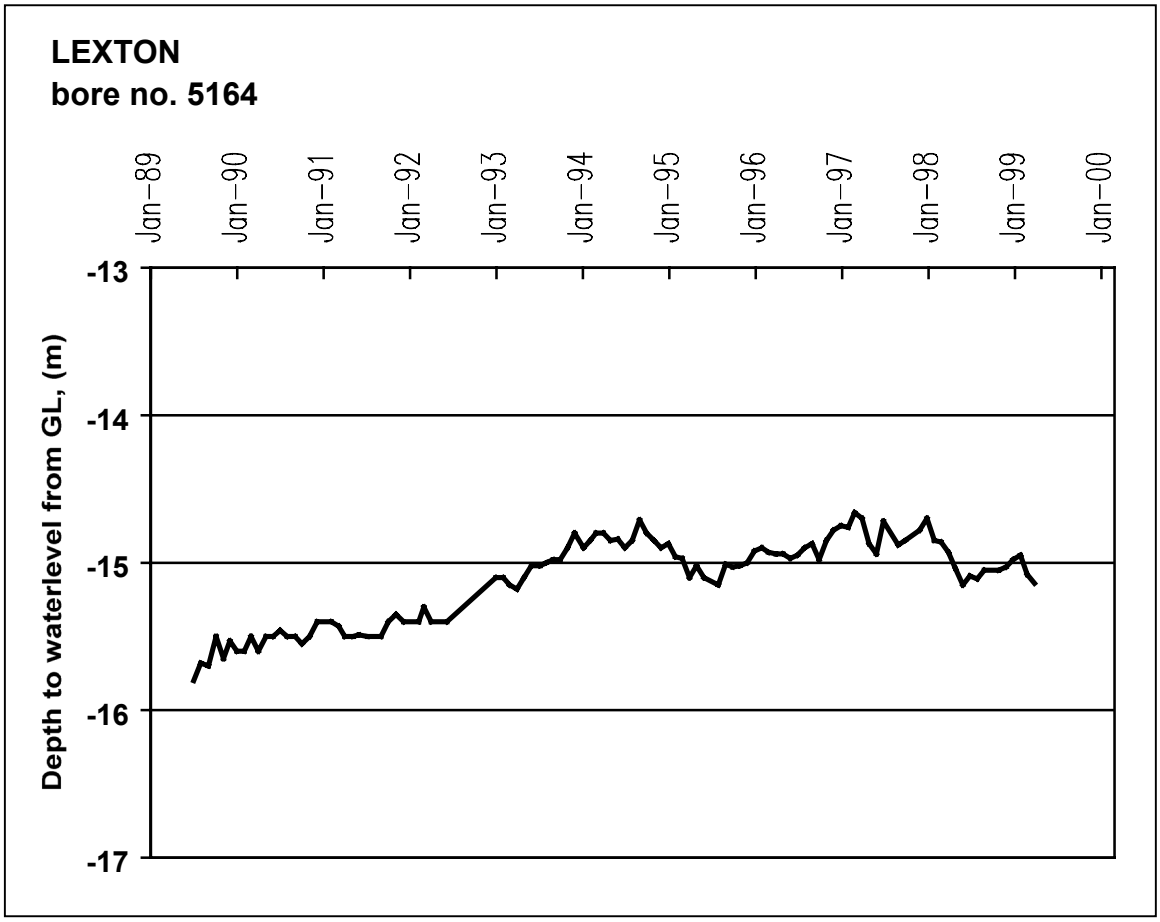
CLPR No:	5170	Monitor:	Community Monitor
Locality Description:	Bald Hills area. Slopes of Mt. Hollowback.		
LMU:	Volcanic rises	Landscape Position:	Lower slope
Geological Description:	(Newer Volcanics) Weathered layer overlying hard, fractured basalt.		
Land Cover:	Annual pasture		
Bore Depth:	-10.7 m	Rainfall Zone:	700-1000 mm/yr
Av. Water Depth 1997-98:	-4.5 m	Salinity (EC):	N/A
Groundwater Trend:	Strong response to annual rainfall variation. The effect of the 1994 drought is shown as a trough in the graph (punctuated by the 1994 drought) (Averaging 2cm/yr). Underlying falling groundwater trend.		



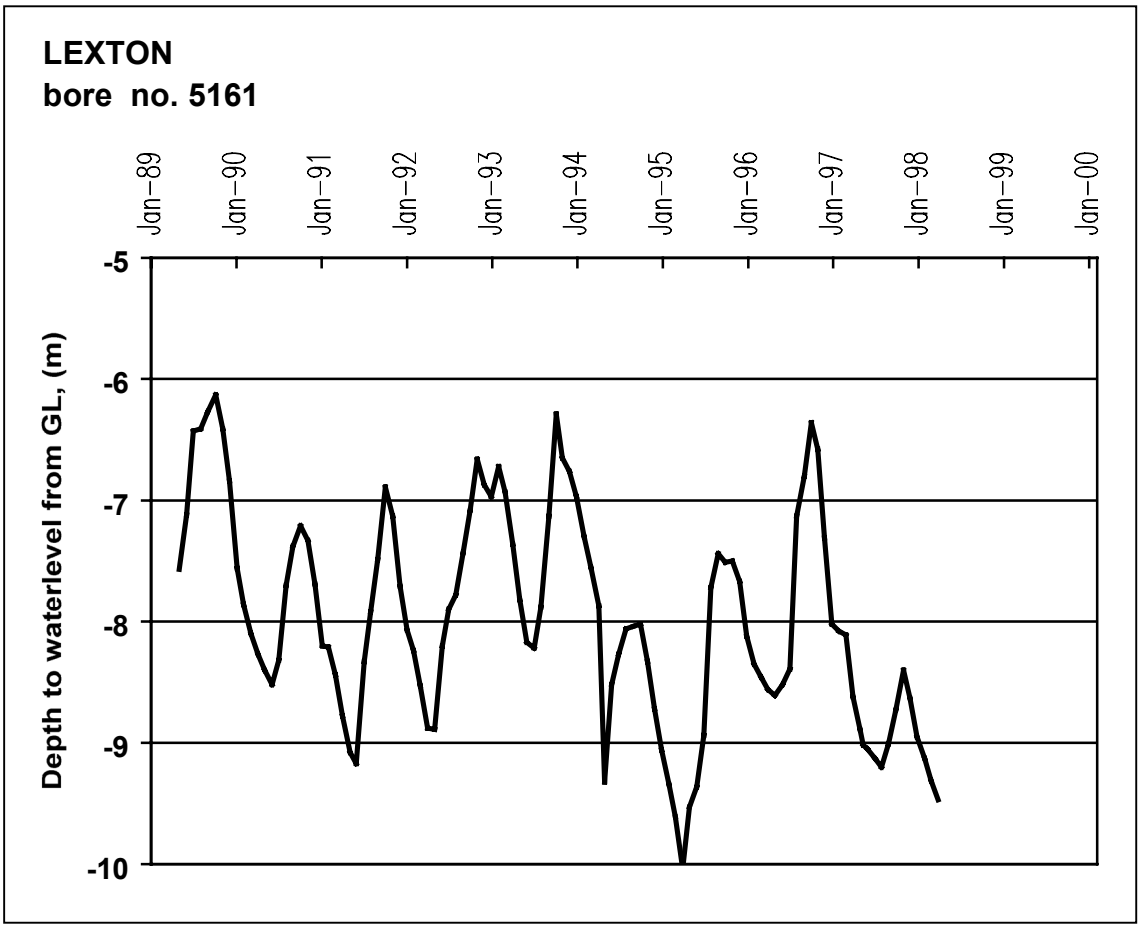
CLPR No:	267sm	Monitor:	Geoff Park
Locality Description:	Smeaton		
LMU:	Volcanic Rises / Sedimentary hills	Landscape Position:	Roadside
Geological Description:	Shallow uniform & gradational soils overly stony rises & scarps / Hard Fractured sandstone, mudstone and shale.		
Land Cover:	Pasture sheep grazing, potato cropping, and some wheat cropping on rock free rises.		
Bore Depth:	-56 m	Rainfall Zone:	747 mm/yr
Av. Water Depth 1997-98:	-9.5 m	Salinity (EC):	N/A
Groundwater Trend:	Insufficient data to conclude.		



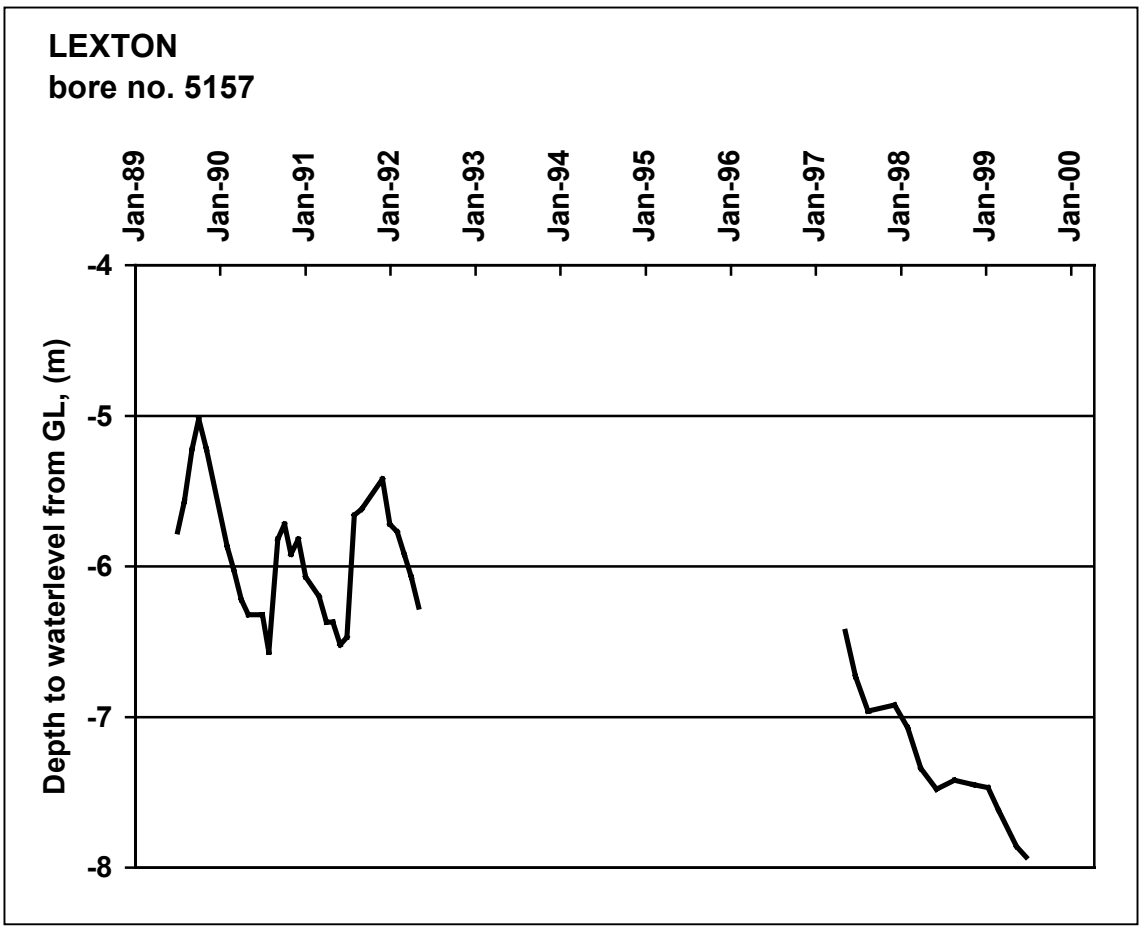
CLPR No:	6323	Monitor:	Jim Ebery
Locality Description:	Sandon		
LMU:	Northern Sedimentary Rises	Landscape Position:	Sloping hills
Geological Description:	(Ordovician sedimentary rock) Hard, fractured sandstone, mudstone and shale		
Land Cover:	Annual pasture		
Bore Depth:	-15 m	Rainfall Zone:	600 mm/yr
Av. Water Depth 1997-98:	-3.8 m	Salinity (EC):	N/A
Groundwater Trend:	Strong falling trend since late 1996. Hydrograph reflects annual rainfall.		



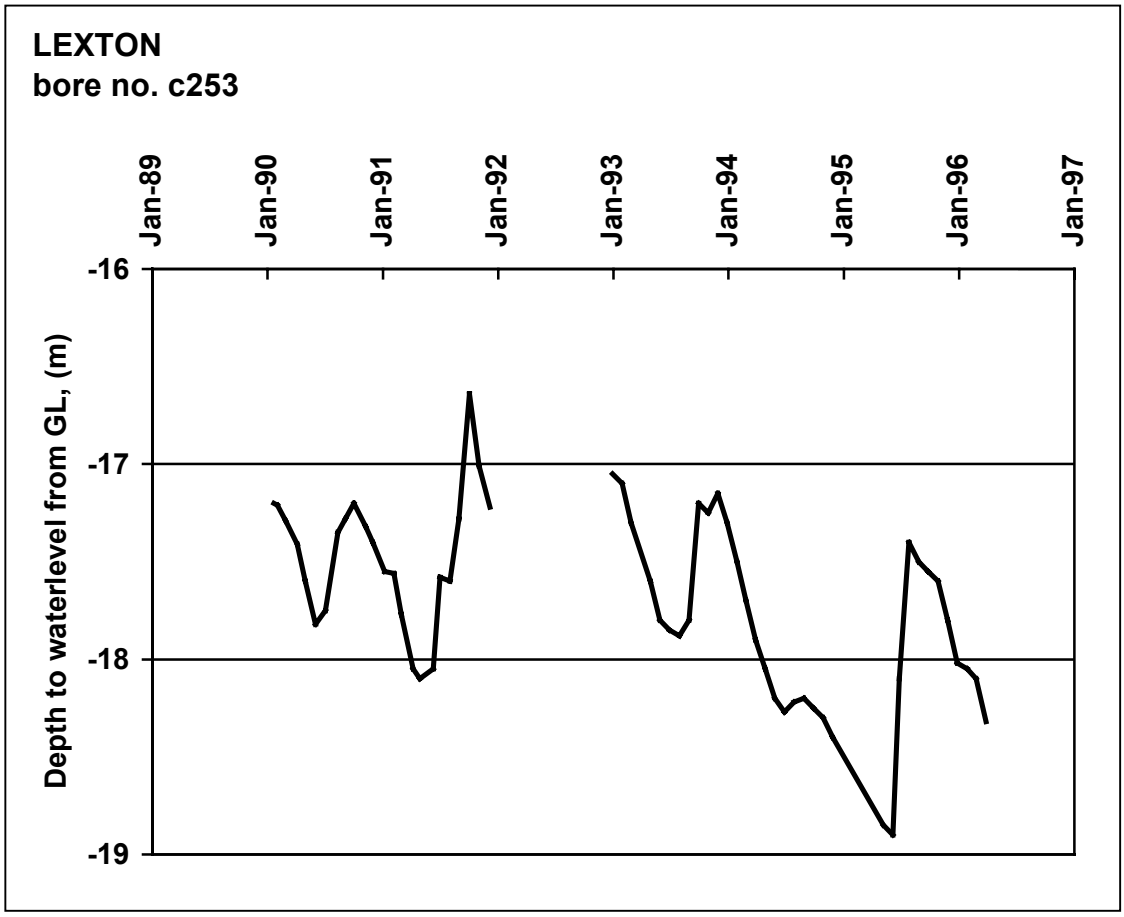
CLPR No:	5164	Monitor:	Dal McErvale
Locality Description:	Lexton area – State forest (south-west)		
LMU:	Sedimentary Hills	Landscape Position:	N/A
Geological Description:	(Ordovician sedimentary rock) Hard, fractured sandstone, mudstone and shale		
Land Cover:	Forest cover		
Bore Depth:	-20 m	Rainfall Zone:	700-1000 mm/yr
Av. Water Depth 1997-98:	-15.2 m	Salinity (EC):	N/A
Groundwater Trend:	Minor response to seasonal and annual rainfall variation. Gradual underlying long term rise in groundwater levels, (Averaging 16 cm/yr)		



CLPR No:	5161	Monitor:	David Jolly
Locality Description:	Lexton area (north)		
LMU:	Sedimentary Hills	Landscape Position:	Mid slope
Geological Description:	(Ordovician sedimentary rock) Hard, fractured sandstone, mudstone and shale		
Land Cover	Annual Pasture		
Bore Depth:	-19.2 m	Rainfall Zone:	700-1000 mm/yr
Av. Water Depth 1997-98:	-9.5 m	Salinity (EC):	N/A
Groundwater Trend:	Strong response to seasonal and annual variation in rainfall. Underling fall in groundwater level punctuated by the effect of the 1994 drought (averaging 30 cm/yr).		

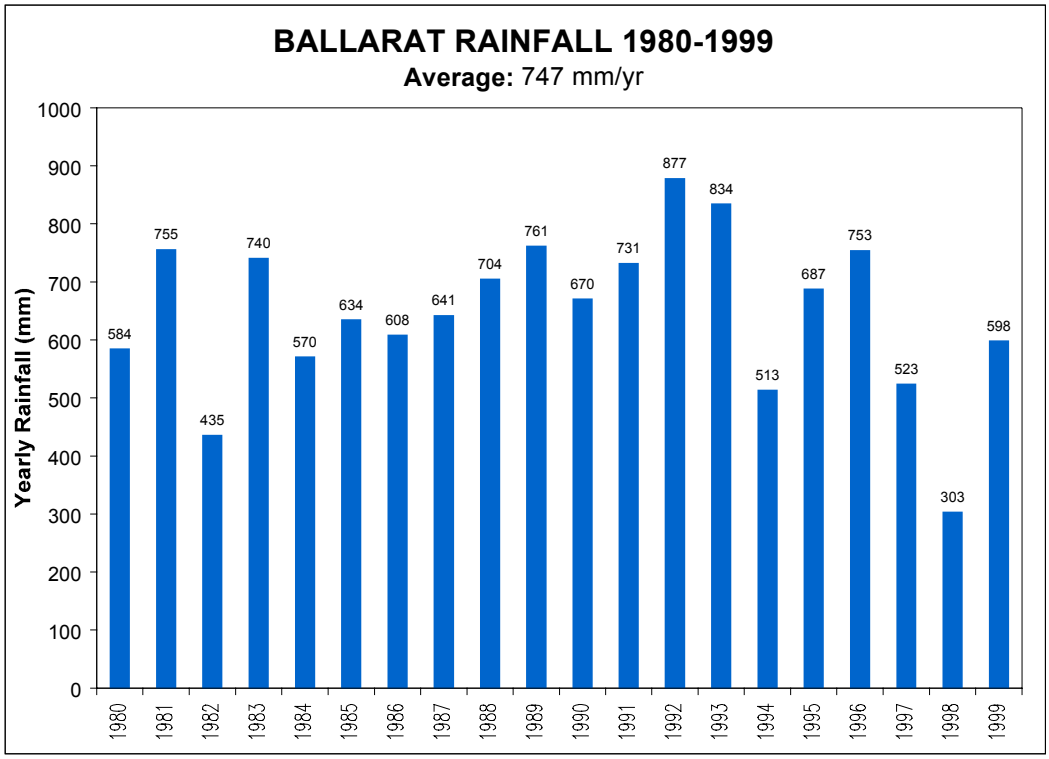


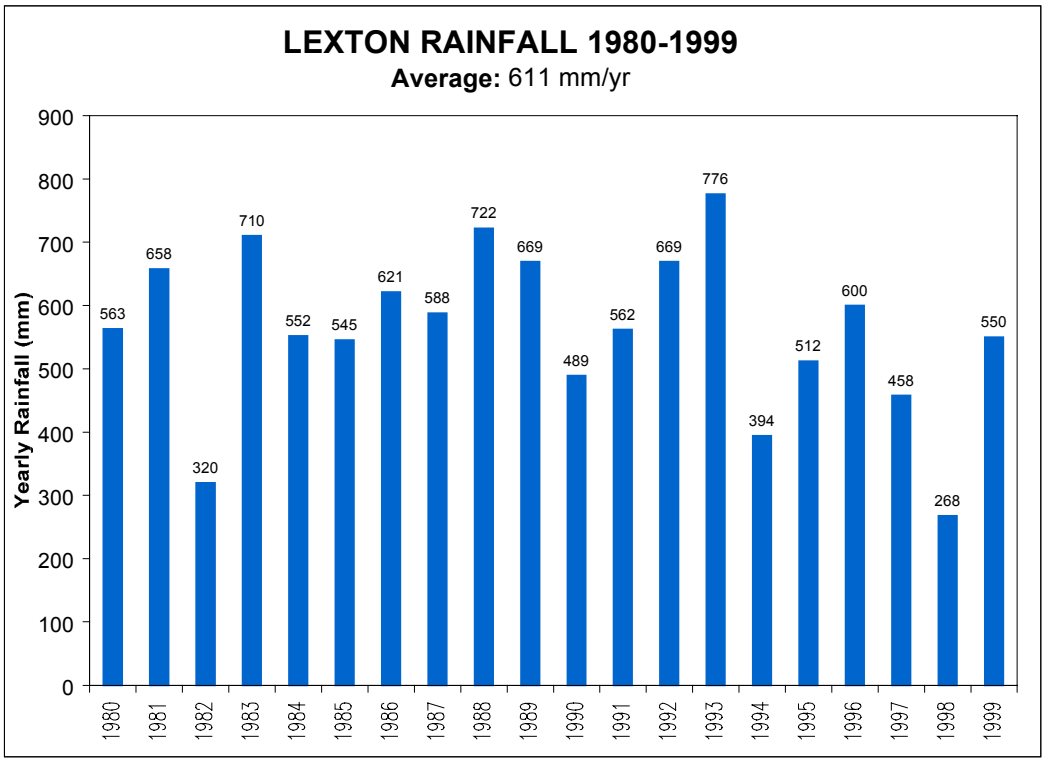
CLPR No:	5157	Monitor:	CLPR
Locality Description:	Lexton area (south-west)		
LMU:	Sedimentary Hills	Landscape Position:	N/A
Geological Description:	(Ordovician sedimentary rock) Hard, fractured sandstone, mudstone and shale		
Land Cover:	Annual pasture		
Bore Depth:	17.3 m	Rainfall Zone:	700-1000 mm/yr
Av. Water Depth 1997-98:	-7.9 m	Salinity (EC):	N/A
Groundwater Trend:	Insufficient data to conclude, appears to be a falling trend since January 1997.		

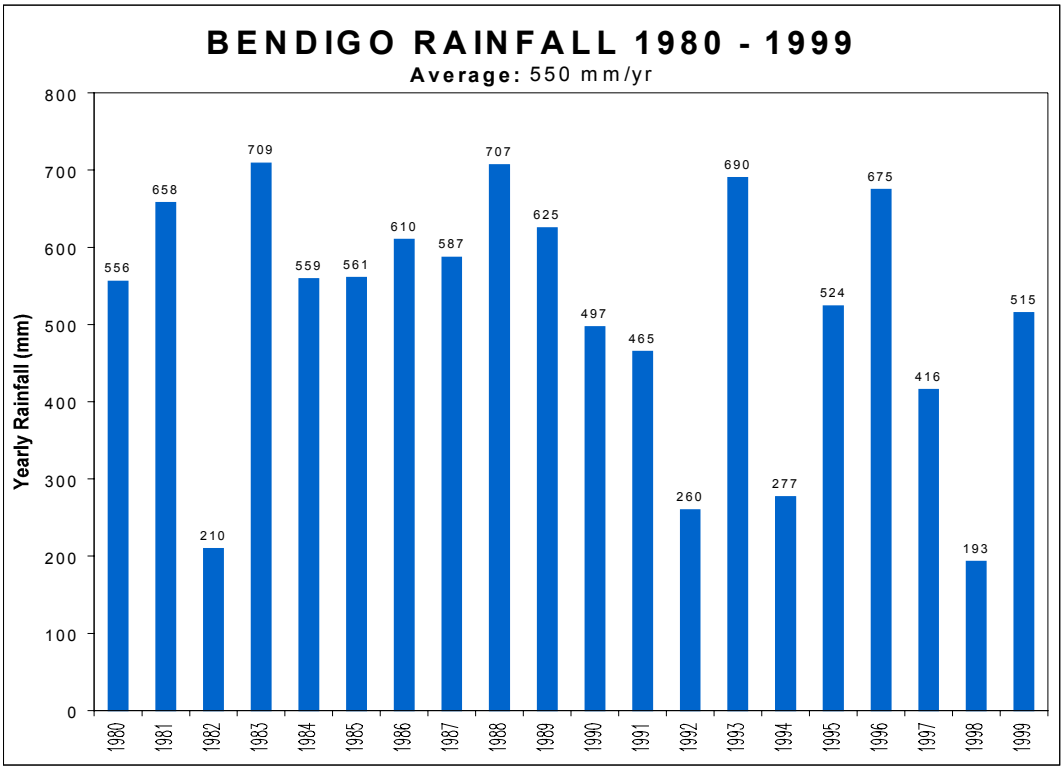


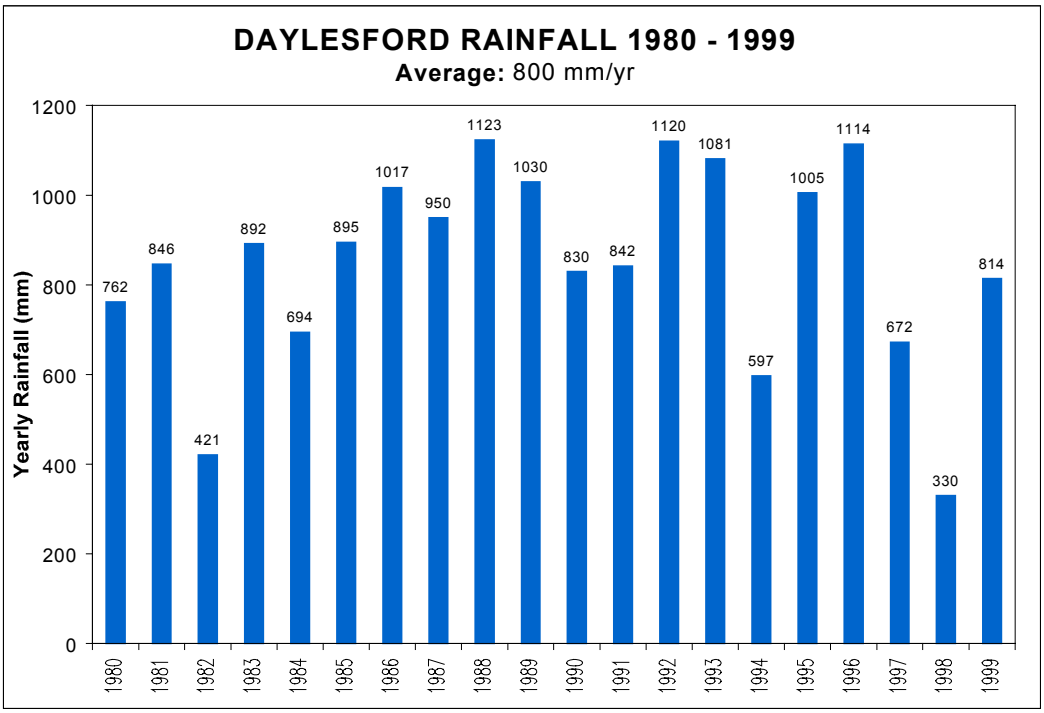
CLPR No:	c253	Monitor:	CLPR
Locality Description:	Lexton area (west)		
LMU:	Sedimentary Hills	Landscape Position:	Upper slope on a steep hill
Geological Description:	(Ordovician sedimentary rock) Hard, fractured sandstone, mudstone and shale		
Land Cover:	Annual pasture		
Bore Depth:	-53 m	Rainfall Zone:	700-1000 mm/yr
Av. Water Depth 1997-98:	-18.2 m	Salinity (EC):	N/A
Groundwater Trend:	Overall steady. Seasonal and annual rainfall patterns depicted. The trough in the graph correlates with the 1994 drought thus is affected by rainfall variation.		

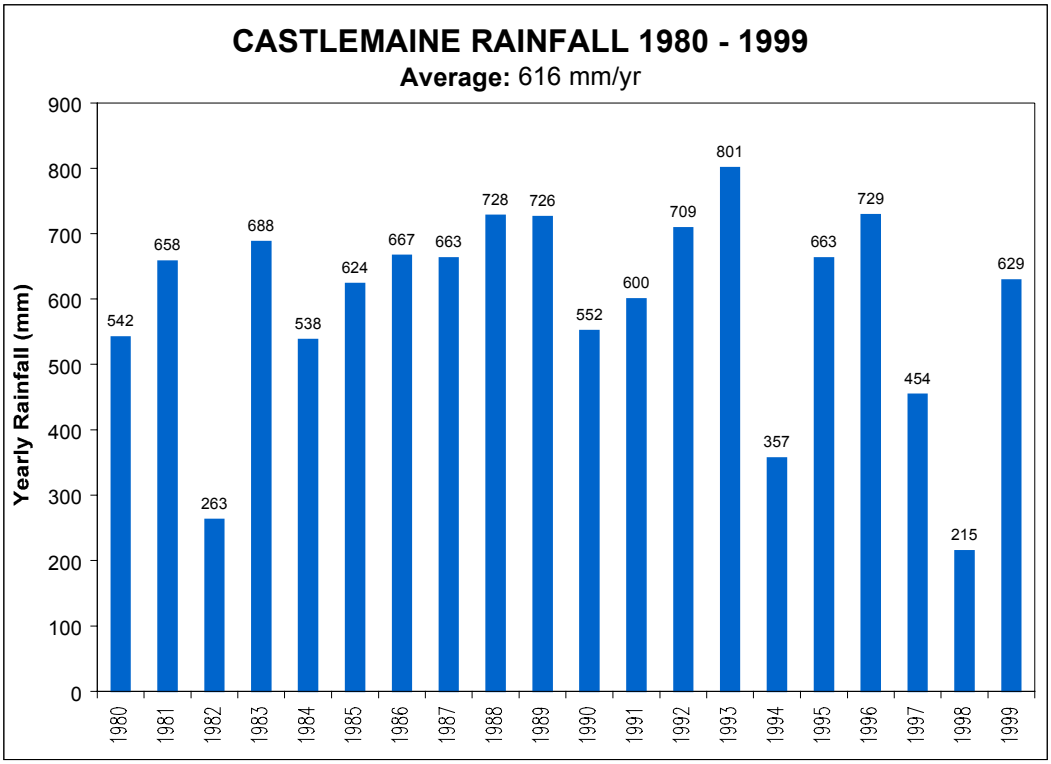
APPENDIX 3 KEY RAINFALL STATIONS FOR THE LODDON UPLANDS SALINITY REGION

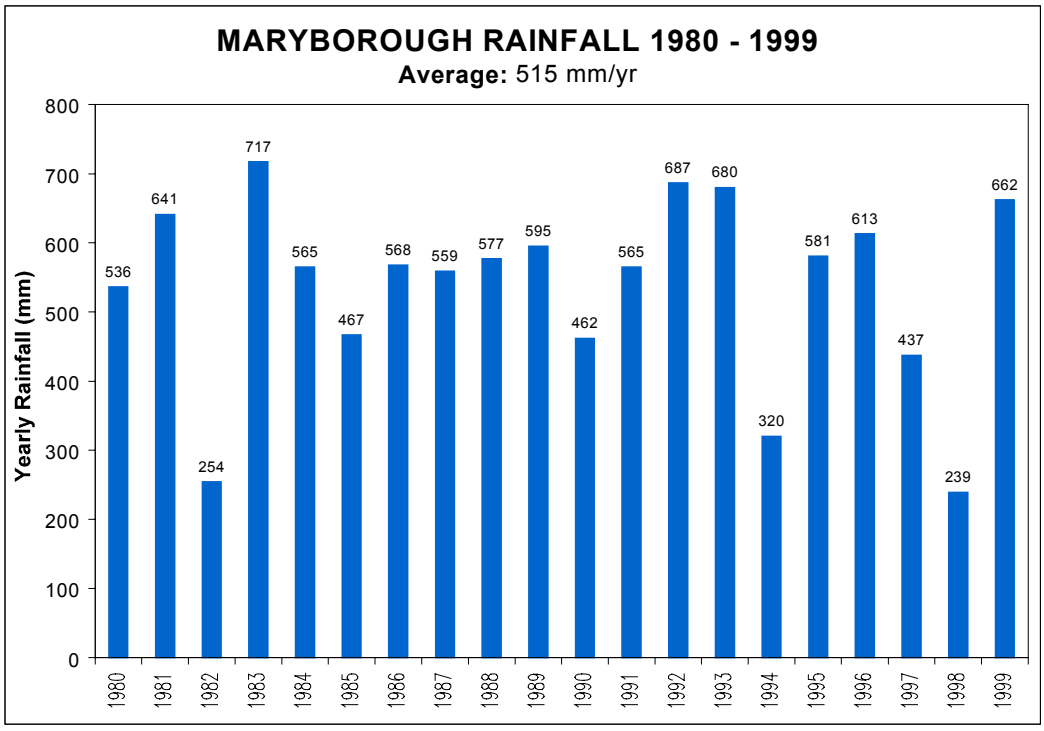


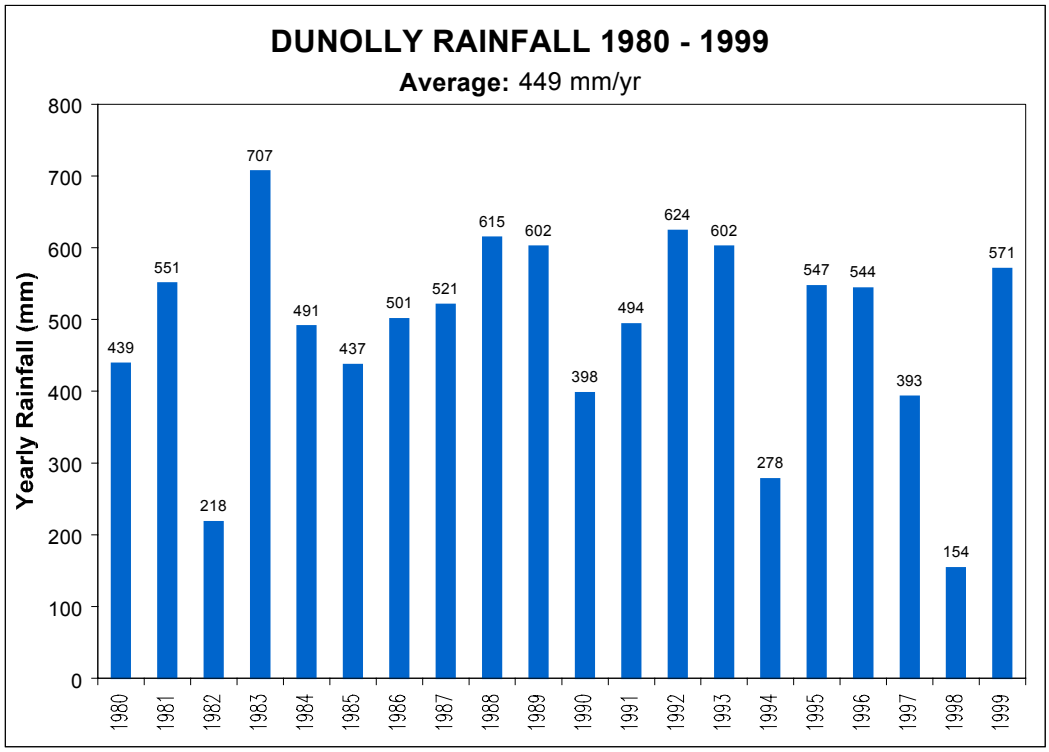


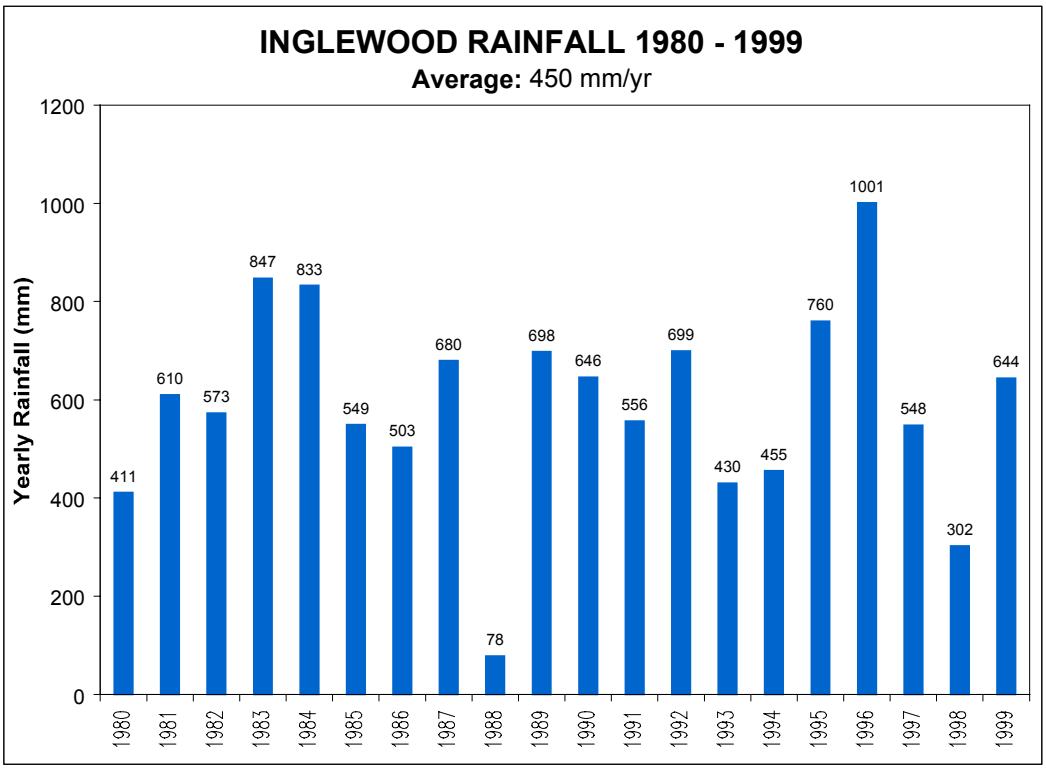

BENDIGO RAINFALL 1980 - 1999
Average: 550 mm/yr
Yearly Rainfall (mm)
0
100
200
300
400
500
600
700
800
556
658
210
709
559
561
610
587
707
625
497
465
260
690
277
524
675
416
193
515
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999


DAYLESFORD RAINFALL 1980 - 1999
Average: 800 mm/yr
Yearly Rainfall (mm)
0
200
400
600
800
1000
1200
762
846
421
892
694
895
1017
950
1123
1030
830
842
1120
1081
597
1005
1114
672
330
814
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999


CASTLEMAINE RAINFALL 1980 - 1999
Average: 616 mm/yr
Yearly Rainfall (mm)
900
800
700
600
500
400
300
200
100
0
542
658
263
688
538
624
667
663
728
726
552
600
709
801
357
663
729
454
215
629
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999


MARYBOROUGH RAINFALL 1980 - 1999
Average: 515 mm/yr
Yearly Rainfall (mm)
800
700
600
500
400
300
200
100
0
536
641
254
717
565
467
568
559
577
595
462
565
687
680
320
581
613
437
239
662
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999


DUNOLLY RAINFALL 1980 - 1999
Average: 449 mm/yr
Yearly Rainfall (mm)
0
100
200
300
400
500
600
700
800
439
551
218
707
491
437
501
521
615
602
398
494
624
602
278
547
544
393
154
571
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999


INGLEWOOD RAINFALL 1980 - 1999
Average: 450 mm/yr
Yearly Rainfall (mm)
0
200
400
600
800
1000
1200
411
610
573
847
833
549
503
680
78
698
646
556
699
430
455
760
1001
548
302
644
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999