

Appendix B Table B-1 *Macropus* $\delta^{13}\text{C}$, $\delta^{15}\text{N}$ and $\delta^{18}\text{O}$ isotope results for bone collagen and enamel carbonate tissues..

Population location number and specimen ID	Species	Age in years	% C ₄ grass based on $\delta^{13}\text{C}$ bone collagen	Bone collagen results		Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results						
			Hattersley (1983)	$\delta^{13}\text{C}$	$\delta^{15}\text{N}$	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	
1 Arnhem Land- near Koorlthirahda Outstation, NT																
1883	<i>M. antilopinus</i>		95	100	-8.10	3.30										
2243	<i>M. antilopinus</i>		95	67	-13.70	4.32										
1676	<i>M. bernardus</i>		95	67	-13.80	4.33										
2215	<i>M. bernardus</i>		95	55	-15.40	5.07										
2242	<i>M. bernardus</i>		95	67	-13.80	4.65										
1312	<i>M. robustus</i>		95	77	-12.30	4.07										
Group mean			95	72	-12.85	4.29										
Standard deviation					2.53	0.59										
N					6	6										
2 Mathison Creek- ~87 km SW Katherine, NT																
1310	<i>M. robustus</i>		95	96	-9.70	3.51										
1311	<i>M. robustus</i>		95	99	-9.30	5.26										
Group mean			95	97	-9.50	4.38										
Standard deviation					0.28	1.23										
N					2	2										
3 Mount Garnett, QLD																
1304	<i>M. giganteus</i>	4	95	98	-9.40	3.07										
1306	<i>M. giganteus</i>	1.7	95	99	-9.20	3.56										
1303	<i>M. robustus</i>	12.5	95	89	-10.70	7.18										
1305	<i>M. robustus</i>		95	88	-10.80	4.24										
Group mean			95	93	-10.03	4.51										
Standard deviation					0.84	1.84										
N					4	4										
4 ~150 km east of Normanton, QLD																
1297	<i>M. giganteus</i>	7.3	95	47	-16.50	4.58										
1298	<i>M. giganteus</i>	4.2	95	76	-12.50	5.03										
1301	<i>M. giganteus</i>	6	95	87	-11.00	4.93										
1300	<i>M. robustus</i>	2.8	95	92	-10.20	4.34										
Group mean			95	75	-12.55	4.72										
Standard deviation					2.80	0.32										
N					4	4										
5 Cloncurry to Normanton, QLD																
1292	<i>M. robustus</i>	13	95	92	-10.20	7.04										
1293	<i>M. robustus</i>	9.0	95	86	-11.10	10.31										
1289	<i>M. rufus</i>	6.4	95	77	-12.40	7.26										
1290	<i>M. rufus</i>	14	95	73	-12.90	8.08										
Group mean			95	82	-11.65	8.17	-8.87	-8.35	-6.11	-6.17	-4.95	4.01	3.76	4.80	3.47	1.43
Standard deviation					1.23	1.49						4.01	3.76	4.80	3.47	1.43
N					4	4	1	1	1	1	1	1	1	1	1	1

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Population location number and specimen ID	Species	Age in years	% C ₂ grass Hattersley (1983)	Bone collagen results		Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results					
				δ ¹³ C	δ ¹⁵ N	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4
6 Charters Towers to Townsville, QLD															
1223	<i>M. robustus</i>	5	95	-8.50	4.91	-5.77	-5.52	-4.20	-2.10	-2.24	-2.61	-3.13	-2.15	-3.03	-2.53
1227	<i>M. sp. indet.</i>	6.5	95	-8.30	6.25										
1229	<i>M. sp. indet.</i>	6	95	-8.30	5.17										
1232	<i>M. sp. indet.</i>	1.3	95	-8.20	3.00										
Group mean			95	-8.33	4.83	-5.77	-5.52	-4.20	-2.10	-2.24	-2.61	-3.13	-2.15	-3.03	-2.53
Standard deviation				0.13	1.35										
N.				4	4	1	1	1	1	1	1	1	1	1	1
7 Townsville to Bowen, QLD															
1238	<i>M. giganteus</i>	6.5	95	-9.80	8.12										
1239	<i>M. giganteus</i>	6.5	95	-11.60	5.66										
1240	<i>M. giganteus</i>		95	-9.40	8.12										
1241	<i>M. giganteus</i>		95	-9.00	6.00										
Group mean			95	-9.95	6.98										
Standard deviation				1.15	1.33										
N.				4	4	0	0	0	0	0	0	0	0	0	0
8 Canoowear, QLD															
1276	<i>M. rufus</i>	11	95	-14.30	10.22										
1281	<i>M. rufus</i>	6.5	95	-13.40	7.74										
Group mean			95	-13.85	8.98										
Standard deviation				0.64	1.75										
N.				2	2	0	0	0	0	0	0	0	0	0	0
9 Torrens Creek (~75km to Charters Towers), QLD															
1213	<i>M. giganteus</i>	2.3	95	-9.00	6.57										
1214	<i>M. giganteus</i>	2.3	95	-9.50	5.16										
1218	<i>M. rufus</i>	7.5	95	-9.60	9.44	-6.48	-6.09	-4.60	-2.45	-1.80	-0.06	-0.62	-1.97	-1.89	-2.69
1222	<i>M. rufus</i>	4.4	95	-14.40	5.96	-8.72	-7.82	-5.53	-6.37	-7.70	-0.78	-1.05	-4.40	-2.64	-0.11
1210	<i>M. sp. indet.</i>	2.9	95	-9.50	6.36										
Group mean			95	-10.40	6.70	-7.60	-6.96	-5.06	-4.41	-4.75	-0.42	-0.84	-3.18	-2.27	-1.40
Standard deviation				2.25	1.62	1.58	1.22	0.66	2.78	4.17	0.51	0.30	1.72	0.53	1.83
N.				5	5	2	2	2	2	2	2	2	2	2	2
10 Julia Creek, QLD															
1153	<i>M. robustus</i>	6.4	95	-13.20	8.07	-10.57	-11.06	-8.46	-7.97	-7.22	1.37	1.28	1.41	1.95	1.37
1154	<i>M. robustus</i>	6.4	95	-12.70	8.56	-10.81	-9.78	-7.96	-6.39	-4.61	4.84	3.62	3.88	5.04	2.12
1159	<i>M. robustus</i>	4.4	95	-13.20	8.54										
1162	<i>M. robustus</i>	8.5	95	-14.00	9.27	-8.69	-8.80	-10.16	-6.19	-7.03	1.52	1.55	2.79	3.36	2.95
1155	<i>M. rufus</i>	2.7	95	-15.30	7.64										

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Population location number and specimen ID	Species	Age in years	% C ₄ grass based on Hattersley (1983)	Bone collagen results	Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results							
			$\delta^{13}\text{C}$ bone collagen	$\delta^{15}\text{N}$	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4		
1157	<i>M. rufus</i>	8	95	91	-10.40	10.06	-6.62	-6.46	-6.57	-4.25	-4.08	0.84	1.12	0.44	2.17	1.85
1160	<i>M. rufus</i>	3.8	95	67	-13.80	7.58	-9.17	-9.02	-8.29	-6.20	-5.74	2.14	1.89	2.13	3.13	2.07
Group mean			95	71	-13.23	8.53	-9.17	-9.02	-8.29	-6.20	-5.74	2.14	1.89	2.13	3.13	2.07
Standard deviation					1.50	0.89	1.95	1.95	1.48	1.53	1.62	1.82	1.17	1.52	1.42	0.66
N.					7	7	4	4	4	4	4	4	4	4	4	4
11 Mt Isa to Cloncurry, QLD																
1286	<i>M. robustus</i>	6	95	94	-9.90	3.04										
1287	<i>M. robustus</i>	14	95	96	-9.70	3.45										
1142	<i>M. rufus</i>	8	95	56	-15.30	6.62	-11.98	-12.44	-7.69	-7.42	-7.84	1.76	1.86	1.78	3.11	5.55
1143	<i>M. rufus</i>		95	94	-9.90	4.51	-6.37	-6.41	-4.48	-2.03	-1.95	0.91	1.53	3.02	3.05	1.98
1147	<i>M. rufus</i>	10	95	82	-11.70	8.80										
1149	<i>M. sp. indet.</i>	6	95	99	-9.20	8.64										
Group mean					-10.95	5.84	-9.17	-9.42	-6.08	-4.73	-4.89	1.33	1.70	2.40	3.08	3.77
Standard deviation					2.29	2.55	3.97	4.26	2.27	3.82	4.17	0.60	0.23	0.88	0.05	2.52
N.					6	6	2	2	2	2	2	2	2	2	2	2
12 Hengden, QLD																
1186	<i>M. giganteus</i>	4.0	95	97	-9.50	10.67	-6.35	-5.48	-4.61	-3.09	-2.63	-1.51	-1.02	-1.27	0.87	-0.04
1191	<i>M. giganteus</i>	6.3	95	99	-9.20	9.68	-5.79	-6.23	-4.07	-2.32	-1.82	1.26	1.10	1.40	2.03	1.18
1197	<i>M. giganteus</i>	4.5	95	100	-8.90	8.85										
1198	<i>M. rufus</i>	5.7	95	72	-13.00	8.88	-9.21	-7.72	-5.08	-5.73	-5.73	-2.02	-1.88	-0.66	-1.25	-1.18
1202	<i>M. rufus</i>	6.4	95	98	-9.40	6.05	-8.11	-5.97	-2.91	-2.95	-2.95	-0.45	-0.75	-0.40	-1.31	-1.31
1203	<i>M. rufus</i>	5	95	97	-9.50	6.08	-6.54	-6.47	-4.12	-2.65	-2.56	-0.82	-1.72	-1.33	-2.39	-0.98
1248	<i>M. giganteus</i>	6.4	95	70	-13.30	13.14										
1251	<i>M. giganteus</i>	6.5	95	61	-14.60	14.07										
1252	<i>M. giganteus</i>	2.4	95	61	-14.60	13.11										
1253	<i>M. giganteus</i>	3.5	95	66	-13.90	13.33										
1254	<i>M. giganteus</i>	4.5	95	64	-14.20	12.39										
1200	<i>M. robustus</i>	6.5	95	13			-11.30	-11.48	-6.82	-6.12	-7.10	-0.99	-1.52	0.13	0.55	-0.88
1257	<i>M. robustus</i>	6.6	95	59	-14.80	12.64										
1201	<i>M. rufus</i>	10.5	95	52			-5.77	-4.67			-4.35	0.76	-0.02			0.64
1249	<i>M. rufus</i>	6	95	68	-13.60	14.76										
1255	<i>M. rufus</i>	5.8	95	48	-16.40	13.58										
1258	<i>M. rufus</i>	10.6	95	55	-15.40	12.22										
1259	<i>M. rufus</i>	6.5	95	51	-16.00	11.00										
1250	<i>M. sp. indet.</i>		95	54	-15.60	13.10										
1256	<i>M. sp. indet.</i>	1.9	95	59	-14.80	13.11										
Group mean					-13.15	11.37	-7.58	-6.86	-5.55	-3.69	-3.88	-0.54	-0.63	-0.62	0.00	-0.38
Standard deviation					2.61	2.76	2.08	2.67	1.52	1.53	1.93	1.18	1.17	1.20	1.52	0.99
N.					18	18	7	5	6	6	7	7	5	6	6	7
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Population location number and specimen ID	Species	Age in years	% C ₄ grass based on δ ¹³ C bone collagen	Bone collagen results		Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results					
				δ ¹³ C	δ ¹⁵ N	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4
13 Richmond to Hugenden, QLD															
1180	<i>M. virenteus</i>	1.6	95	-11.10	9.92	-7.83	-7.82	-5.67	-3.45	-3.14	-1.47	-1.37	-1.35	-2.26	-0.35
1181	<i>M. virenteus</i>	6.8	95	-10.00	8.08										
1170	<i>M. virenteus</i>	2.3	95	-13.60	9.56										
1171	<i>M. rufus</i>	2.7	95	-11.90	9.70										
1172	<i>M. rufus</i>	5.7	95	-10.25	10.59	-6.82	-5.78	-4.37	-3.03	-3.80	-0.77	-1.03	-0.48	3.55	2.22
1184	<i>M. robustus</i>	10.5	95	-15.30	8.37	-11.30	-11.05	-10.90	-8.01	-7.37	-0.19	-0.54	0.36	0.52	1.91
Group mean			95	-12.03	9.37	-8.65	-8.22	-6.98	-4.83	-4.77	-0.81	-0.98	-0.49	0.60	1.26
Standard deviation				2.07	0.96	2.35	2.66	3.46	2.76	2.27	0.64	0.42	0.86	2.91	1.41
N.				6	6	3	3	3	3	3	3	3	3	3	3
14 Winton to Cloncurry (~260km S/E of C), QLD															
1138	<i>M. rufus</i>	5.7	95	-12.40	9.35	-8.89	-9.46	-6.77	-6.61	-6.60	7.25	6.20	6.74	5.84	3.91
1140	<i>M. robustus</i>	8	95	-15.70	7.03	-10.66	-10.37	-6.99	-5.29	-6.99	1.28	1.59	3.49	5.41	2.41
Group mean			95	-14.05	8.19	-9.77	-9.91	-6.88	-5.95	-6.80	4.26	3.89	5.11	5.63	3.16
Standard deviation				2.33	1.64	1.26	0.65	0.15	0.93	0.28	4.22	3.26	2.30	0.30	1.06
N.				2	2	2	2	2	2	2	2	2	2	2	2
15 Winton, QLD															
1134	<i>M. rufus</i>	4.4	95	-11.50	11.22										
1135	<i>M. rufus</i>	3.9	95	-13.60	7.78										
Group mean			95	-12.55	9.50										
Standard deviation				1.48	2.43										
N.				2	2	0	0	0	0	0	0	0	0	0	0
16 Aileron Sth, ~170km Nth Alice Springs, NT															
1268	<i>M. rufus</i>	3.8	95	-16.50	10.56										
1269	<i>M. robustus</i>	13	95	-11.00	6.52										
Group mean			95	-13.75	8.54										
Standard deviation				3.89	2.86										
N.				2	2	0	0	0	0	0	0	0	0	0	0
17 Longreach, QLD															
1089	<i>M. giganteus</i>	2.2	95	-8.70	7.69										
1092	<i>M. giganteus</i>	12.5	95	-8.70	9.46										
1096	<i>M. giganteus</i>	1.4	95	-10.00	9.47										
1102	<i>M. giganteus</i>	2	95	-9.70	9.53										
1108	<i>M. giganteus</i>	2	95	-9.50	9.67										
1109	<i>M. giganteus</i>	2.2	95	-10.10	9.90										
1113	<i>M. giganteus</i>	2	95	-10.40	10.91										
1114	<i>M. giganteus</i>	5.5	95	-11.00	7.25										
1116	<i>M. giganteus</i>	4.8	95	-9.50	9.31										
				-7.22	-2.68						1.45	1.96			

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Population location number and specimen ID	Species	Age in years	% C ₄ grass based on $\delta^{13}\text{C}$ bone collagen	Bone collagen results $\delta^{13}\text{C}$ $\delta^{15}\text{N}$	Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results					
			Hattersley (1983)		Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4
1118	<i>M. giganteus</i>	2.8	95	96	-9.70	7.55								
1119	<i>M. giganteus</i>	1.6	95	100	-9.00	8.88								
1120	<i>M. giganteus</i>	2.5	95	99	-9.30	8.14								
1122	<i>M. giganteus</i>	5	95	99	-9.20	9.03	-7.06	-2.04		1.89	1.97			
1123	<i>M. giganteus</i>	2.5	95	98	-9.40	7.58								
1126	<i>M. giganteus</i>	4.8	95	99	-9.30	8.07	-6.07	-2.90		1.15	1.85			
1097	<i>M. robustus</i>	13.0	95	73	-12.90	11.89	-8.30	-5.61		2.36	5.72			
1098	<i>M. robustus</i>	8.5	95	61	-14.60	10.11	-11.12	-11.06	-9.90	7.41	6.51	4.02	5.80	5.55
1099	<i>M. robustus</i>	1.9	95	61	-14.60	8.65								
1103	<i>M. robustus</i>	10.2	95	58	-15.00	10.02	-10.08	-10.66	-10.19	7.73	6.99	5.34	7.35	8.01
1105	<i>M. robustus</i>	3.5	95	97	-9.60	8.95								
1111	<i>M. robustus</i>	4.3	95	84	-11.40	7.48								
1086	<i>M. rufus</i>	0.8	95	82	-11.70	7.04								
1087	<i>M. rufus</i>	2.1	95	72	-13.10	8.46								
1094	<i>M. rufus</i>	1	95	67	-13.80	9.66								
1095	<i>M. rufus</i>	2	95	93	-10.10	8.82								
1100	<i>M. rufus</i>	3.2	95	89	-10.60	6.92								
1101	<i>M. rufus</i>	10.2	95	71	-13.20	11.53	-7.90	-5.70	-7.54	5.27	8.86	4.41	7.36	8.65
1106	<i>M. rufus</i>	2.1	95	86	-11.10	11.02								
1107	<i>M. rufus</i>	4	95	77	-12.30	10.57								
1110	<i>M. rufus</i>	2.7	95	95	-9.80	6.89								
1112	<i>M. rufus</i>	1.4	95	88	-10.80	8.37								
1115	<i>M. rufus</i>	1.1	95	92	-10.20	9.16								
1117	<i>M. rufus</i>	2.7	95	100	-9.00	12.09								
1121	<i>M. rufus</i>	1	95	94	-9.90	8.07	-6.42	-5.83	-8.12	5.31	4.45	4.06	5.90	6.37
Group mean			95	88	-10.80	9.06	-7.77	-5.83	-8.12	3.87	4.45	4.06	5.90	6.37
Standard deviation					1.83	1.42	1.81	3.46	2.50	2.59	2.89	1.19	2.02	2.47
N					34	34	9	8	4	9	8	4	4	4
18 Rockhampton to Keppoon Beach, QLD														
990	<i>M. giganteus</i>		85	99	-9.30	3.93								
991	<i>M. giganteus</i>		85	99	-9.30	3.50								
992	<i>M. giganteus</i>	5.2	85	100	-8.70	4.17	-6.07	-4.65		-3.34	-0.83			
993	<i>M. giganteus</i>	2.8	85	100	-8.80	4.10		-1.95			-2.94			
995	<i>M. giganteus</i>		85	99	-9.30	3.91								
996	<i>M. giganteus</i>		85	21	-20.20	12.85								
997	<i>M. giganteus</i>	6.3	85	100	-7.80	4.22			-3.62	-1.95	-2.08		-0.89	-0.59
998	<i>M. giganteus</i>	2.2	85	100	-7.90	4.07								-1.11
Group mean	<i>M. giganteus</i>		85	100	-10.16	5.09	-6.07	-3.30	-3.62	-1.95	-2.08	-3.34	-1.88	-0.89
Standard deviation					4.10	3.14	1.91	2	1	1	1	1	1	1
N					8	8	1	2	1	1	1	2	1	1
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Population location number and specimen ID	Species	Age in years	% C ₄ grass based on Hattersley (1983)	Bone collagen results		Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results						
				δ ¹³ C	δ ¹⁵ N	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	
19 Emerald, QLD																
999	<i>M. sp. indet.</i>	10.2	95	-9.60	8.61											
1047	<i>M. sp. indet.</i>		95	-8.40	8.33											
Group mean			95	-9.00	8.47											
Standard deviation				0.85	0.19											
N.			2	2	2	0	0	0	0	0	0	0	0	0	0	
20 Emerald to Alpha, QLD																
1051	<i>M. giganteus</i>	10.2	95	-8.60	8.03	-6.15	-6.45	-4.30	-2.80	-2.07	0.32	0.38	0.19	0.75	-0.34	
1067	<i>M. giganteus</i>	5.9	95	-8.70	5.80	-5.46	-5.58	-3.97	-2.31	-2.18	2.02	0.95	0.21	1.38	1.91	
1065	<i>M. robustus</i>	6	95	-10.40	6.26	-7.13		-5.20		-5.72	1.90		1.45		2.97	
Group mean			95.00	-9.23	6.70	-6.25	-6.02	-4.49	-2.55	0.62	1.41	0.67	0.62	1.07	1.51	
Standard deviation				1.01	1.18	0.84	0.61	0.64	0.35	2.08	0.95	0.41	0.72	0.44	1.69	
N.			3	3	3	3	2	3	2	3	3	2	3	2	3	
21 Eridunda- ~75 km Sth Alice Springs, NT																
1263	<i>M. rufus</i>	12	85	-14.00	11.89											
1264	<i>M. rufus</i>	4	85	-15.30	9.73											
1265	<i>M. rufus</i>	11.5	85	-13.70	12.14											
1266	<i>M. sp. indet.</i>	8	85	-15.20	11.86											
Group mean			85	-14.55	11.40											
Standard deviation				0.82	1.12											
N.			4	4	4	0	0	0	0	0	0	0	0	0	0	
22 Mitchell to Charleville (~60 km E of C), QLD																
945	<i>M. rufus</i>	2.7	85	-10.00	10.36											
949	<i>M. rufus</i>	2.3	85	-10.10	7.74											
Group mean			85	-10.05	9.05											
Standard deviation				0.07	1.86											
N.			2	2	2	0	0	0	0	0	0	0	0	0	0	
23 Charleville to Cunnamulla, QLD																
952	<i>M. giganteus</i>	7.3	85	-15.50	10.13											
953	<i>M. giganteus</i>	4	85	-10.26	8.66											
958	<i>M. giganteus</i>	3.7	85	-14.30	9.05											
961	<i>M. giganteus</i>	4.5	85	-11.80	10.68											
962	<i>M. giganteus</i>	3.7	85	-11.40	10.38											
951	<i>M. rufus</i>	4	85	-13.80	8.63											
959	<i>M. rufus</i>	4	85	-17.80	10.80											
960	<i>M. rufus</i>	4	85	-11.70	10.52											
Group mean			85	-13.32	9.86											
Standard deviation				2.51	0.92											
N.			8	8	8	0	0	0	0	0	0	0	0	0	0	

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Population location number and specimen ID	Species	Age in years	% C ₄ grass	Bone collagen results	Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results								
			Hattersley based on δ ¹³ C bone collagen (1983)	δ ¹³ C	δ ¹⁵ N	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4		
24 Brisbane- Redlands, QLD	<i>M. giganteus</i>	678	65	22	-20.10	4.00											
	<i>M. giganteus</i>	679	65	22	-20.00	2.77											
	<i>M. giganteus</i>	680	65	18	-20.60	3.20											
	<i>M. giganteus</i>	681	65	19	-20.40	2.75											
	Group mean		65	20	-20.28	3.18											
	Standard deviation	N.			0.28	0.58											
25 Kalgoe, SA	<i>M. rufus</i>	1262	85	43	-17.30	14.76	-10.81	-10.54	-7.71	-9.03	-9.56	4.49	4.49	5.33	5.22	7.16	
26 Cunnamulla to St. George (250km W of St. G), QLD	<i>M. robustus</i>	969	75	20	-20.30	12.72											
27 Coober Pedy (Nth), SA	<i>M. rufus</i>	1260	75	62	-14.50	11.89											
28 Tioboburra, NSW	<i>M. rufus</i>	37	7.5	59	-14.80	12.14	-8.40	-10.25	-10.96	-9.71	-7.04	7.55	5.58	6.83	9.18	8.87	
	<i>M. rufus</i>	39	2.3	85	-15.00	11.58											
	<i>M. rufus</i>	40	6.8	85	-10.70	9.46	-8.50	-7.93	-6.55	-4.36	-3.80	4.25	2.45	4.32	4.77	5.17	
	<i>M. rufus</i>	41	1	85	-14.00	10.05	-8.10	-10.55	-11.07			2.68	2.46	4.14			
	<i>M. sp. indet.</i>	36	15.8	85	-16.10	12.74	-9.81	-9.78	-8.89	-7.77	-8.71	7.52	5.99	7.62	7.94	8.72	
	<i>M. sp. indet.</i>	38	3.3	85	-16.50	11.71	-10.96	-10.16	-10.95	-10.15		7.12	6.63	6.29	7.87		
	<i>M. sp. indet.</i>	42	2.3	85	-16.40	9.48	-8.18	-7.31	-6.16	-4.59	-5.56	4.12	5.56	3.42	9.54	7.79	
	<i>M. sp. indet.</i>	43	4.5	85	-14.20	11.39	-7.56	-7.31	-6.16	-4.59	-5.56	4.12	4.75	5.97	9.54	7.79	
	Group mean				-14.71	11.07	-8.89	-9.17	-9.19	-7.32	-6.28	5.54	4.77	5.51	7.86	7.64	
	Standard deviation	N.			1.89	1.25	1.26	1.32	2.09	2.74	2.10	2.11	1.68	1.56	1.88	1.71	
29 Maree, SA	<i>M. fuliginosus</i>	30	5.8	61	-14.60	10.78	-10.00	-10.27	-9.54	-8.03	-8.07	2.55	2.41	4.57	8.02	6.55	
	<i>M. sp. indet.</i>	29	13	75	-15.40	11.08	-11.10	-11.07	-7.61	-8.04	-8.99	8.21	7.87	8.41	6.25	5.86	
	<i>M. sp. indet.</i>	31	4.5	75	-15.40	11.33	-11.20	-10.25	-9.41	-7.57		3.75	4.51	5.90	6.59		
	<i>M. sp. indet.</i>	32	2.8	75	-14.30	11.16											
	<i>M. sp. indet.</i>	33		75	-14.30	8.45											
	<i>M. sp. indet.</i>	34	2	75	-15.80	11.03	-11.35	-12.93	-9.90	-8.50	-8.71	5.56	5.91	7.83	7.28	7.69	
Group mean		8			10.64	-10.91	-11.13	-9.12	-8.04	-8.59	5.02	5.18	6.68	7.04	6.70		
Standard deviation	N.				0.65	1.09	0.62	1.26	1.02	0.38	0.47	2.46	2.30	1.77	0.78	0.92	
30 Bourke, NSW					6	6	4	4	4	4	3	4	4	4	4	3	

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Population location number and specimen ID	Species	Age in years	% C ₄ grass Hattersley based on δ ¹³ C bone collagen (1983)	Bone collagen results		Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results					
				δ ¹³ C	δ ¹⁵ N	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4
45	<i>M. sp. indet.</i>	3.9	75	39	-17.60	7.39	-15.24	-11.46	-9.93			4.29	3.10	2.85	
46	<i>M. sp. indet.</i>	2	75	51	-16.00	8.98	-11.46	-11.46	-12.21			3.64	3.07	0.86	
47	<i>M. sp. indet.</i>	4.1	75	54	-15.50	6.45									
Group mean			75.00	48	-16.37	7.61	-13.35	-11.46	-11.07			3.97	3.09	1.86	
Standard deviation					1.10	1.28	2.67	0.00	1.61			0.46	0.02	1.41	
N.					3	3	2	2	2	0	0	2	2	2	0
32	near Andamooka, SA														
1247	<i>M. rufus</i>	2	65	50	-16.10	12.21									
33	Parachilna- Flinders ranges, SA														
23	<i>M. sp. indet.</i>	16	65	11	-21.50	7.54									
24	<i>M. sp. indet.</i>	4.5	65	53	-15.70	10.03									
Group mean			65	32	-18.60	8.78									
Standard deviation					4.10	1.76									
N.					2	2	0	0	0	0	0	0	0	0	0
34	Cobar, NSW														
582	<i>M. giganteus</i>	3.7	65	31	-18.80	6.91									
583	<i>M. giganteus</i>	6.8	65	41	-17.40	7.20									
584	<i>M. giganteus</i>	8.3	65	17	-20.80	8.39									
586	<i>M. giganteus</i>	10.5	65	20	-20.50	8.07									
655	<i>M. giganteus</i>	2.3	65	12	-21.40	8.17									
588	<i>M. robustus</i>	9	65	27	-19.30	7.09	-15.03	-16.44	-12.52	-10.46	-10.90	2.08	1.18	1.99	2.17
579	<i>M. rufus</i>	10.5	65	11	-21.50	9.01									
587	<i>M. rufus</i>	2.1	65	35	-18.20	7.61									
Group mean			65	24	-19.74	7.81	-15.03	-16.44	-12.52	-10.46	-10.90	2.08	1.18	1.99	2.17
Standard deviation					1.53	0.73									
N.					8	8	1	1	1	1	1	1	1	1	1
35	Cobar to Nyngan, NSW														
593	<i>M. giganteus</i>	5.2	65	23	-19.90	7.65									
594	<i>M. giganteus</i>	4.2	65	46	-16.70	7.54									
596	<i>M. giganteus</i>	7.8	65	52	-15.80	6.94	-14.07	-13.99	-11.21	-9.36	-9.03	2.27	2.29	1.41	1.83
598	<i>M. giganteus</i>	3	65	49	-16.20	7.89									
599	<i>M. giganteus</i>	6.3	65												
600	<i>M. giganteus</i>	4.1	65	54	-15.60	7.23									
595	<i>M. robustus</i>	4.6	65	45	-16.80	6.56									
590	<i>M. rufus</i>	3.2	65	20	-20.30	8.63									
860	<i>M. rufus</i>	15	65	15	-21.00	6.94									
591	<i>M. sp. indet.</i>	5.8	65	34	-18.40	7.54	-14.98	-15.21	-12.01	-12.63	-12.63	1.45	1.07	3.18	0.79

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Population location number and specimen ID	Species	Age in years	% C ₄ grass based on Hattersley (1983)		Bone collagen results		Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results			
			$\delta^{13}\text{C}$	$\delta^{15}\text{N}$	Inciisor	Molar 1	Molar 2	Molar 3	Molar 4	Inciisor	Molar 1	Molar 2	Molar 3	Molar 4
592	<i>M. sp. indet.</i>	13	65	27	-19.30	6.29								
597	<i>M. sp. indet.</i>	1.9	65	18	-20.60	9.08								
862	<i>M. sp. indet.</i>		65	38	-17.80	6.13								
Group mean			65	35	-18	7.37	-14.52	-14.60	-11.61	-12.07	-11.35	1.86	1.68	2.30
Standard deviation					1.98	0.89	0.64	0.86	0.56	2.48	2.01	0.58	0.87	1.25
N					12	12	2	2	2	3	3	2	2	2
36	Wilcannia, NSW													
575	<i>M. robustus</i>	10.5	75	58	-15.00	10.20	-16.23	-13.04	-9.88	-9.89	-0.85	1.80	2.50	2.34
576	<i>M. robustus</i>	7.5	75	46	-16.70	9.24								
649	<i>M. robustus</i>	10.5	75	38	-17.80	12.31	-10.05	-11.05	-7.49	-9.57	5.30	4.53	5.12	6.25
568	<i>M. rufus</i>	10.5	75	42	-17.20	10.97	-11.47			-10.38	0.33			2.78
569	<i>M. rufus</i>	2.3	75	35	-18.20	10.32	-9.69	-11.70			5.10	1.51		
574	<i>M. rufus</i>	2.3	75	37	-18.00	11.48	-9.93	-9.71	-10.63		5.32	4.67	2.45	
858	<i>M. sp. indet.</i>		75	44	-17.00	11.60								
861	<i>M. sp. indet.</i>		75	37	-17.90	12.38								
Group mean			75	0	-17.23	11.06	-11.47	-10.71	-11.57	-8.69	-9.95	3.04	3.09	2.93
Standard deviation					1.04	1.09	2.75	1.41	1.29	1.69	0.41	3.04	2.24	1.43
N					8	8	5	2	3	2	3	5	2	3
37	Wilcannia to Cobar, NSW													
577	<i>M. robustus</i>	10.5	65	36	-18.10	7.39								
578	<i>M. rufus</i>	2.1	65	31	-18.80	7.81								
Group mean			65	34	-18.45	7.60								
Standard deviation					0.49	0.30								
N					2	2	0	0	0	0	0	0	0	0
38	Nyngan to Dubbo, NSW													
601	<i>M. giganteus</i>	3	65	45	-16.80	9.17								
602	<i>M. giganteus</i>	1.7	65	38	-17.80	8.99								
603	<i>M. giganteus</i>	2	65	30	-18.90	5.01								
604	<i>M. sp. indet.</i>		65	57	-15.20	4.08								
Group mean			65	42	-17.18	6.81								
Standard deviation					1.57	2.65								
N					4	4	0	0	0	0	0	0	0	0
39	Broken Hill to Wilcannia, NSW													
563	<i>M. giganteus</i>	2.8	65	71	-13.20	8.49								
564	<i>M. giganteus</i>	4	65	72	-13.10	8.58								
651	<i>M. giganteus</i>	3.2	65	44	-16.90	8.33								

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Population location number and specimen ID	Species	Age in years	% C ₄ grass based on δ ¹³ C bone collagen	Bone collagen results		Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results					
				δ ¹³ C	δ ¹⁵ N	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4
652	<i>M. giganteus</i>	2.3	65	-17.30	7.44										
562	<i>M. robustus</i>	1.9	65	-14.80	9.66										
550	<i>M. rufus</i>	2.3	65	-17.70	11.75										
561	<i>M. rufus</i>	10.5	65	-17.50	11.28	-17.00	-15.00	-12.90	-10.60	-9.80	6.25	6.32	7.87	4.69	6.28
529	<i>M. rufus</i>	1.1	55	-21.30	7.78										
Group mean			64	-16.48	9.16	-17.00	-15.00	-12.90	-10.60	-9.80	6.25	6.32	7.87	4.69	6.28
Standard deviation				2.72	1.59										
N.				8	8	1	1	1	1	1	1	1	1	1	1
40 Port Augusta, SA															
781	<i>M. fuliginosus</i>	3.7	55	-21.10	10.15										
773	<i>M. giganteus</i>	7.3	55	-20.40	9.67										
752	<i>M. robustus</i>	13.5	55	-21.10	7.97										
727	<i>M. rufus</i>		55	-21.70	9.12										
729	<i>M. rufus</i>	10.5	55	-20.30	6.75										
Group mean			55	-20.92	8.73										
Standard deviation				0.58	1.38										
N.				5	5	0	0	0	0	0	0	0	0	0	0
41 Wentworth to Broken Hill, NSW															
539	<i>M. giganteus</i>	3.7	65	-21.00	9.04										
544	<i>M. giganteus</i>	2.3	65	-22.70	6.32										
644	<i>M. robustus</i>	10.5	55	-19.50	10.52										
545	<i>M. rufus</i>	4	65	-18.90	9.87										
547	<i>M. rufus</i>	10.5	65	-20.90	11.30	-17.40	-15.71	-13.86	-11.65	-14.48	4.77	4.68	4.88	5.70	5.97
548	<i>M. rufus</i>	1.6	65	-19.10	10.52										
643	<i>M. rufus</i>	10.5	55	-20.90	10.55										
Group mean			62	-20.43	9.73	-17.40	-15.71	-13.86	-11.65	-14.48	4.77	4.68	4.88	5.70	5.97
Standard deviation				1.35	1.66										
N.				7	7	1	1	1	1	1	1	1	1	1	1
42 Burra (Redbanks), SA															
1	<i>M. fuliginosus</i>	7.5	55	-19.90	6.08										
2	<i>M. fuliginosus</i>	11.3	55	-21.10	5.44	-18.17	-17.44	-17.03	-15.38	-15.00	0.17	0.09	0.07	-1.19	0.54
3	<i>M. fuliginosus</i>	4.8	55	-21.20	5.57	-18.37	-17.53	-16.88	-14.71	-14.23	-0.61	0.35	1.51	1.41	2.15
5	<i>M. fuliginosus</i>	7.3	55	-21.40	6.97		-17.90	-16.60	-15.60	-13.60		0.73	1.70	0.14	3.59
6	<i>M. fuliginosus</i>	5.2	55	-20.80	6.65										
48	<i>M. fuliginosus</i>	10	55	-20.80	4.29	-18.20	-17.61	-14.89	-15.30	-14.78	-1.50	-0.81	0.61	0.30	4.03
50	<i>M. fuliginosus</i>	2.6	55	-21.90	4.36										

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Population location number and specimen ID	Species	Age in years	% C ₄ grass based on δ ¹³ C bone collagen		Bone collagen results		Enamel carbonate carbon isotope results					Enamel carbonate oxygen isotope results				
			Hattersley (1983)	δ ¹³ C bone collagen	δ ¹³ C	δ ¹⁵ N	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4
85	<i>M. robustus</i>		55	20	-20.50	6.61										
49	<i>M. rufus</i>	4.5	55	22	-20.00	8.61										
22	<i>M. sp. indet.</i>	14.9	55	21	-20.20	5.99										
Group mean			55	17	-20.78	6.06	-18.25	-17.62	-16.35	-15.25	-14.40	-0.65	0.09	0.97	0.17	2.58
Standard deviation					0.64	1.28	0.11	0.20	0.99	0.38	0.62	0.83	0.65	0.77	1.07	1.58
N.					10	10	3	4	4	4	4	3	4	4	4	4
43	Wentworth, NSW															
526	<i>M. giganteus</i>	5.5	55	38	-17.80	8.15										
532	<i>M. giganteus</i>	4.4	55	9	-21.90	6.88										
534	<i>M. giganteus</i>	4	55	14	-21.20	6.85										
853	<i>M. giganteus</i>		55	14	-21.20	7.53										
521	<i>M. robustus</i>	3.5	55	7	-22.10	-0.07										
855	<i>M. robustus</i>		55	20	-20.30	8.84										
522	<i>M. rufus</i>	4.4	55	15	-21.00	7.60										
525	<i>M. rufus</i>	1.9	55	22	-20.00	10.44										
527	<i>M. rufus</i>	4.4	55	9	-21.90	8.69										
528	<i>M. rufus</i>	2.3	55	52	-15.90	8.97										
530	<i>M. rufus</i>	1	55	9	-21.80	7.31										
531	<i>M. rufus</i>	5	55	15	-21.00	6.81										
535	<i>M. rufus</i>	3.8	55	12	-21.40	7.53	-18.40	-18.55	-16.18	-14.35		0.02	0.92	2.10	3.55	
856	<i>M. rufus</i>		55	16	-20.90	9.37										
857	<i>M. rufus</i>		55	9	-21.90	7.19										
Group mean			55	17	-20.69	7.47	-18.40	-18.55	-16.18	-14.35		0.02	0.92	2.10	3.55	
Standard deviation					1.71	2.34										
N.					15	15	1	1	1	1	0	1	1	1	1	0
44	Blanchetown, SA															
65	<i>M. rufus</i>		45	15	-21.00	7.63										
70	<i>M. sp. indet.</i>		45	11	-21.60	8.16										
72	<i>M. sp. indet.</i>		45	10	-21.70	6.08										
73	<i>M. sp. indet.</i>		45	11	-21.50	6.67										
4	<i>M. fuliginosus</i>	12.5	55	10	-21.70	7.01										
83	<i>M. rufus</i>	6.3	55	7	-22.10	8.48										
74	<i>M. rufus</i>	10.8	55	9	-21.90	8.19										
19	<i>M. sp. indet.</i>	11	55	13	-21.30	7.85										
20	<i>M. sp. indet.</i>	8.5	55	14	-21.20	6.96										
21	<i>M. sp. indet.</i>	16	55	9	-21.90	6.45										
Group mean			51	11	-21.59	7.35										
Standard deviation					0.34	0.82										
N.					10	10	0	0	0	0	0	0	0	0	0	0

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Population location number and specimen ID	Species	Age in years	% C ₄ grass Hattersley (1983) based on δ ¹³ C bone collagen	Bone collagen results		Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results						
				δ ¹³ C	δ ¹⁵ N	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	
45	Mildura to Renmark, SA															
839	<i>M. rufus</i>	10	55	24	-19.70	8.69	-14.63	-15.09	-13.98	-12.57	-12.06	3.60	3.53	3.57	5.42	4.96
46	Boorowa, NSW															
609	<i>M. giganteus</i>	2.3	45	5	-22.40	5.97										
613	<i>M. giganteus</i>	5	45	29	-19.00	5.63										
614	<i>M. giganteus</i>	2.7	45	16	-20.90	4.14										
615	<i>M. giganteus</i>	3.8	45	39	-17.70	5.46										
618	<i>M. giganteus</i>	10.9	35	14	-21.20	4.66										
621	<i>M. giganteus</i>	1.9	35	8	-22.00	9.00										
622	<i>M. giganteus</i>	1.6	35	29	-19.10	5.15										
625	<i>M. giganteus</i>	1.6	35	16	-20.90	3.48										
627	<i>M. giganteus</i>	2.2	35	9	-21.90	4.52										
623	<i>M. sp. indet.</i>	1.6	35	29	-19.00	4.53										
Group mean			39	19	-20.41	5.25										
Standard deviation					1.59	1.51										
N.					10	10	0	0	0	0	0	0	0	0	0	0
47	Hay, NSW															
669	<i>M. fuliginosus</i>		45	25	-19.60	8.52										
674	<i>M. fuliginosus</i>	5.2	45	20	-20.30	8.15										
788	<i>M. fuliginosus</i>	4	45	18	-20.60	8.84										
789	<i>M. fuliginosus</i>	6.3	45	29	-19.00	8.93										
790	<i>M. fuliginosus</i>	5.5	45	14	-21.20	7.89										
793	<i>M. fuliginosus</i>	4.2	45	27	-19.30	7.53										
797	<i>M. fuliginosus</i>	2.2	45	37	-18.00	8.12										
799	<i>M. fuliginosus</i>	6.8	45	27	-19.30	9.08										
673	<i>M. fuliginosus/giganteus</i>		45	47	-16.60	8.20	-16.80			-12.40	0.36					-1.70
668	<i>M. giganteus</i>	3.5	45	37	-17.90	5.74										
675	<i>M. giganteus</i>		45	23	-19.90	8.21	-17.14	-16.70	-13.38	-14.86		-1.01	0.19	1.38	-0.13	
791	<i>M. giganteus</i>	3.2	45	11	-21.60	7.67										
662	<i>M. rufus</i>	6.3	45	20	-20.50	6.51	-16.72	-18.42	-16.08	-13.30	-14.13	-0.11	-0.91	1.54	1.54	-0.07
664	<i>M. rufus</i>	3.2	45	34	-18.40	8.50	-13.60	-13.31	-14.30	-11.45		1.74	0.55	-0.66	1.44	
665	<i>M. rufus</i>	10.5	45	20	-20.50	7.52	-16.06	-15.98	-16.24	-14.34	-15.20	1.90	1.73	1.31	2.44	-1.45
798	<i>M. sp. indet.</i>	2	45	13	-21.30	7.80										
Group mean			45	25	-19.63	7.95	-16.06	-16.10	-15.00	-13.49	-13.91	0.58	0.39	0.89	1.32	-1.07
Standard deviation					1.39	0.87	1.43	2.12	1.39	1.51	1.42	1.24	1.09	1.04	1.07	0.88
N.					16	16	5	4	4	4	3	5	4	4	4	3

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Population location number and specimen ID	Species	Age in years	% C ₄ grass based on Hattersley (1983) $\delta^{13}\text{C}$ bone collagen		Bone collagen results $\delta^{13}\text{C}$ $\delta^{15}\text{N}$		Enamel carbonate carbon isotope results Incisor Molar 1 Molar 2 Molar 3 Molar 4				Enamel carbonate oxygen isotope results Incisor Molar 1 Molar 2 Molar 3 Molar 4			
48 Balranald, NSW														
758	<i>M. fuliginosus</i>	1.4	45	54	-15.50	8.51								
759	<i>M. fuliginosus</i>	4	45	17	-20.70	6.82								
760	<i>M. fuliginosus</i>	2.5	45	31	-18.80	7.71								
762	<i>M. fuliginosus</i>	7.8	45	30	-18.90	9.16								
767	<i>M. fuliginosus</i>	1.2	45	14	-21.20	8.45								
770	<i>M. fuliginosus</i>	4.8	45	14	-21.10	7.64								
755	<i>M. eiegneus</i>	2.8	45	27	-19.40	7.49								
761	<i>M. eiegneus</i>	4.2	45	24	-19.80	7.42								
768	<i>M. eiegneus</i>	2.3	45	20	-20.30	7.87								
785	<i>M. giganteus</i>	1.9	45	12	-21.40	8.56								
820	<i>M. eiegneus</i>	2	45	34	-18.40	4.34								
769	<i>M. robustus</i>	7.3	45	10	-21.70	7.15								
753	<i>M. rufus</i>	5.9	45	39	-17.60	8.27								
756	<i>M. rufus</i>	3.2	45	30	-18.90	7.44								
787	<i>M. rufus</i>	4	45	14	-21.10	8.10								
815	<i>M. rufus</i>	3.8	45	26	-19.50	7.58								
816	<i>M. rufus</i>	2.7	45	20	-20.30	8.64								
818	<i>M. rufus</i>		45	11	-21.60	6.28								
819	<i>M. rufus</i>	2.7	45	33	-18.50	8.90								
822	<i>M. rufus</i>	6.8	45	23	-19.90	7.32								
823	<i>M. rufus</i>	10.5	45	17	-20.80	9.04								
794	<i>M. sp. indet.</i>	1.5	45	18	-20.60	8.22								
821	<i>M. sp. indet.</i>	0.9	45	41	-17.40	4.66								
764	<i>M. sp. indet. Cf. robustus</i>	6.3	45	35	-18.20	7.69								
Group mean			45	25	-19.65	7.64								
Standard deviation					1.55	1.20								
N					24	24								
49 Canberra-Black Mountain, ACT														
424	<i>M. giganteus</i>		15	28	1.47	5.89								
50 Braidwood, NSW														
11	<i>M. giganteus</i>		25	35	-18.20	3.53								
12	<i>M. giganteus</i>		25	62	-14.40	2.59								
13	<i>M. giganteus</i>		25	31	-18.80	3.49								
14	<i>M. giganteus</i>		25	49	-16.30	3.47								
15	<i>M. giganteus</i>		25	32	-18.60	3.78								
53	<i>M. giganteus</i>		25	49	-16.20	1.82								
54	<i>M. giganteus</i>		25	25	-19.60	4.31								
419	<i>M. giganteus</i>		25	27	-19.40	4.55								

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Population location number and specimen ID	Species	Age in years	% C ₄ grass based on $\delta^{13}\text{C}$ bone collagen	Bone collagen results $\delta^{13}\text{C}$ $\delta^{15}\text{N}$	Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results							
			Hattersley (1983)			Inciisor	Molar 1	Molar 2	Molar 3	Molar 4	Inciisor	Molar 1	Molar 2	Molar 3	Molar 4	
Group mean			5	0	-25.00	4.35	-20.89	-20.23	-18.37	-18.09	-18.06	-2.17	-1.99	-2.01	-1.81	-2.50
Standard deviation					0.47	0.59	0.44	0.53	0.75	0.16	0.65	0.08	0.01	0.88	0.42	1.04
N:					8	8	2	2	2	2	2	2	2	2	2	2
Kangaroo Island- Peneshaw to Brown Beach, SA																
91	<i>M. fuliginosus</i>		5	1	-23.00	5.58	0	0	0	0	0	0	0	0	0	0
N:					1	1	0	0	0	0	0	0	0	0	0	0
Kangaroo Island- Vivonne Bay, SA																
164	<i>M. fuliginosus</i>		5	0	-23.10	4.16	-19.61	-19.62	-18.20	-16.89	-15.96	-2.07	-2.12	-1.78	-2.13	-0.62
N:					1	1	1	1	1	1	1	1	1	1	1	1
Kangaroo Island- Rocky River, SA																
242	<i>M. fuliginosus</i>	1.7	5	0	-25.00	5.62	-20.53					-1.35				
246	<i>M. fuliginosus</i>	1.5	5	0	-25.00	4.49										
248	<i>M. fuliginosus</i>	0.7	5	0	-25.10	5.48	-20.58					-2.39				
255	<i>M. fuliginosus</i>	1.8	5	0	-25.10	4.53										
267	<i>M. fuliginosus</i>	13.3	5	0	-25.00	4.08										
268	<i>M. fuliginosus</i>	1.8	5	0	-24.60	4.86	-21.48	-21.30	-19.97			-1.71	-1.89	-2.02		
270	<i>M. fuliginosus</i>	3.2	5	0	-24.40	4.72										
271	<i>M. fuliginosus</i>	8.9	5	0	-25.70	4.51										
272	<i>M. fuliginosus</i>	5.2	5	0	-25.70	5.08										
275	<i>M. fuliginosus</i>	1.3	5	0	-25.20	4.55	-20.95					-1.94				
276	<i>M. fuliginosus</i>	4.8	5	0	-25.60	4.73	-22.77	-21.30	-18.80	-18.80		-1.54	-0.53	-0.52	-0.84	
278	<i>M. fuliginosus</i>	0.6	5	0	-25.80	4.14						0.58	1.05	-0.30	0.03	
279	<i>M. fuliginosus</i>	4.1	5	0	-25.20	4.73	-21.44	-21.72	-18.55	-19.23		-1.39	-0.46	-0.95	-0.40	
Group mean			5	0	-25.18	4.73	-21.29	-21.44	-19.11	-19.02		-1.39	-0.46	-0.95	-0.40	
Standard deviation					0.42	0.45	0.83	0.24	0.76	0.30		1.03	1.47	0.94	0.61	
N:					13	13	6	3	3	2	0	6	3	3	2	0
Kangaroo Island- Wst. Vivonne Bay, SA																
182	<i>M. fuliginosus</i>	2.8	5	0	-24.20	3.97										
187	<i>M. fuliginosus</i>		5	0	-23.50	4.25	-20.70	-20.29	-17.67	-17.00	-16.98	-1.60	-1.31	-0.05	-0.83	-1.75
203	<i>M. fuliginosus</i>		5	0	-23.30	4.81	-20.12	-19.90	-18.30	-16.88	-16.68	-2.49	-2.55	-1.78	-1.47	-1.56
Group mean			5	0	-23.67	4.34	-20.41	-20.10	-17.98	-16.94	-16.83	-2.04	-1.93	-0.92	-1.15	-1.66
Standard deviation					0.47	0.43	0.41	0.28	0.45	0.09	0.21	0.63	0.88	1.22	0.45	0.14
N:					3	3	2	2	2	2	2	2	2	2	2	2
Kangaroo Island- Kelly Hill Caves, SA																
229	<i>M. fuliginosus</i>	2	5	0	-24.40	3.78										
230	<i>M. fuliginosus</i>	1.5	5	0	-25.00	2.15						-1.57	-1.08	-0.72	-1.44	
237	<i>M. fuliginosus</i>	3	5	0	-24.50	4.87	-21.26	-20.65	-19.30	-17.39						

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Population location number and specimen ID	Species	Age in years	% C ₄ grass Hattersley (1983)	based on δ ¹³ C bone collagen	Bone collagen results		Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results					
					δ ¹³ C	δ ¹⁵ N	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4
238	<i>M. fuliginosus</i>	1.3	5	0	-23.90	4.74	-20.20	-21.60	-21.33	-20.19	-18.18	-0.94	-2.82	-2.47	-1.77	-2.10
241	<i>M. fuliginosus</i>	2.5	5	0	-24.30	4.79	-21.60	-21.33	-20.19	-18.18		-2.82	-2.47	-1.77	-2.10	
Group mean			5	0	-24.42	4.07	-21.02	-20.99	-19.75	-17.79		-1.78	-1.78	-1.25	-1.77	
Standard deviation					0.40	1.16	0.73	0.48	0.63	0.56		0.96	0.98	0.74	0.47	
N.					5	5	3	2	2	2	0	3	2	2	2	0
Kangaroo Island- all three sites																
Group mean			5	0	-23.93	4.39	-20.93	-20.66	-18.77	-17.84	-17.15	-1.73	-1.49	-1.30	-1.38	-1.79
Standard deviation					4.61	0.91	0.78	0.73	0.85	0.85	0.97	0.83	1.09	0.85	0.73	0.93
N.					31	31	14	10	10	9	5	14	10	10	9	5
53 Mt Kosciuszko NP, NSW																
801	<i>M. giganteus</i>	8	15	1	-23.00	4.23	-21.30	-21.02	-18.88	-17.29	-17.02	-4.41	-4.22	-3.91	-3.97	-3.25
806	<i>M. fuliginosus</i>	6.8	15	0	-23.80	3.45	-21.80	-21.70	-18.70	-16.60	-18.10	-2.94	-2.88	-2.17	-1.62	-3.65
811	<i>M. giganteus</i>	1.4	15	0	-23.90	3.08	-21.00	-21.00	-18.70	-16.60	-18.10	-2.69	-2.88	-2.17	-1.62	-3.65
Group mean			15	0	-23.57	3.59	-21.37	-21.36	-18.79	-16.95	-17.56	-3.34	-3.55	-3.04	-2.79	-3.45
Standard deviation					0.49	0.59	0.40	0.48	0.13	0.49	0.76	0.93	0.95	1.23	1.67	0.28
N.					3	3	3	2	2	2	2	3	2	2	2	2
Jindabyne, NSW																
54 805	<i>M. giganteus</i>	2.6	15	18	-20.60	3.28	-21.00	-19.40	-16.90			-2.39	-1.65	-1.40		
55 Cooma to Bombala, NSW																
488	<i>M. giganteus</i>		15	7	-22.10	3.47										
490	<i>M. giganteus</i>		15	11	-21.50	5.01										
492	<i>M. giganteus</i>		15	10	-21.70	5.25										
Group mean			15	9	-21.77	4.58										
Standard deviation					0.31	0.97										
N.					3	3	0	0	0	0	0	0	0	0	0	0
56 Puckapunyal, VIC																
375	<i>M. fuliginosus/giganteus</i>		25	0	-23.70	6.31	-20.88	-20.87	-18.64			-2.55	-2.11	-1.08		
376	<i>M. fuliginosus/giganteus</i>		25	3	-22.70	6.24										
378	<i>M. fuliginosus/giganteus</i>		25	0	-23.40	5.97										
379	<i>M. fuliginosus/giganteus</i>		25	4	-22.60	4.56										
381	<i>M. fuliginosus/giganteus</i>		25	3	-22.70	4.57										
382	<i>M. fuliginosus/giganteus</i>		25	1	-23.10	5.71										
383	<i>M. fuliginosus/giganteus</i>		25	0	-24.20	6.26										
384	<i>M. fuliginosus/giganteus</i>		25	0	-23.30	5.20	-18.03	-18.55	-17.27	-13.40	-15.00	-1.09	-1.24	-1.11	-2.10	-0.21
390	<i>M. fuliginosus/giganteus</i>		25	24	-19.80	3.64	-17.11	-17.17	-16.17			-1.85	-1.91	-2.82		
391	<i>M. fuliginosus/giganteus</i>		25	24	-19.80	3.02										

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Population location number and specimen ID	Species	Age in years	% C ₄ grass based on $\delta^{13}\text{C}$ bone collagen		Bone collagen results		Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results					
			Hattersley (1983)		$\delta^{13}\text{C}$	$\delta^{15}\text{N}$	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4
57 Omeo, VIC	886	<i>M. fuliginosus/giganteus</i>	6.3	25	-23.00	5.75	-18.00	-18.06	-18.11	-16.54	-16.80	0.57	0.03	-1.95	-0.39	-0.27
	887	<i>M. fuliginosus/giganteus</i>	7.3	25	-21.60	5.38	-16.70	-16.31	-16.47	-15.17	-15.95	-0.19	-0.33	-0.43	-0.34	-0.46
	889	<i>M. fuliginosus/giganteus</i>	7.3	25	-23.60	5.10	-16.79	-20.37	-20.19	-19.21	-16.67	-1.54	-3.49	-3.77	-3.28	-1.13
	Group mean			25	-22.58	5.21	-17.92	-18.55	-17.81	-16.08	-16.10	-1.11	-1.51	-1.86	-1.53	-0.52
	Standard deviation				1.38	1.03	1.56	1.78	1.50	2.45	0.83	1.14	1.29	1.25	1.43	0.42
	N.				13	13	6	6	6	4	4	6	6	6	4	4
58 Bombala to Cann River, VIC	504	<i>M. giganteus</i>		15	-22.40	5.12	-19.09	-19.00	-16.67	-16.09		-3.10	-2.25	-1.56	-3.99	
	505	<i>M. giganteus</i>		15	-22.10	5.00										
	Group mean			15	-22.25	5.06										
	Standard deviation				0.21	0.08	1	1	1	1	0	1	1	1	1	0
	N.				2	2	1	1	1	1	1	1	1	1	1	0
	59 Grampians (Halls Gap), VIC	493	<i>M. giganteus</i>		15	-21.20	4.70	-9.86	-9.59	-9.71	-8.54		-1.40	-1.08	-2.21	-4.12
496		<i>M. giganteus</i>		15	-16.40	4.14										
497		<i>M. giganteus</i>		15	-21.30	4.54										
498		<i>M. giganteus</i>		15	-22.50	4.20	-9.86	-9.59	-9.71	-8.54		-1.40	-1.08	-2.21	-4.12	
Group mean				15	-20.35	4.40										
Standard deviation					2.70	0.27	1	1	1	1	0	1	1	1	1	0
60 Ballarat, VIC	N.				4	4	1	1	1	1	1	0	1	1	1	0
	360	<i>M. fuliginosus</i>		15	-23.50	5.44	-15.16	-16.20	-16.16	-15.44	-16.98	-0.76	-0.55	-1.54	-0.21	-1.20
	358	<i>M. fuliginosus/giganteus</i>		15	-23.70	5.88										
	356	<i>M. fuliginosus/giganteus</i>		15	-23.60	5.74										
	353	<i>M. fuliginosus</i>		15	-23.50	5.15	-21.20									
	352	<i>M. fuliginosus/giganteus</i>		15	-23.40	4.80										
	349	<i>M. fuliginosus/giganteus</i>		15	-23.30	5.63										
	357	<i>M. fuliginosus/giganteus</i>		15	-22.80	5.40										
	351	<i>M. fuliginosus/giganteus</i>		15	-22.40	4.76										
	355	<i>M. fuliginosus</i>		15	-21.40	5.09	-19.23	-17.30	-16.28	-15.69	-15.54	-1.91	-0.70	-1.30	-1.82	-2.44
	Group mean			15	-23.07	5.32	-18.53	-16.75	-16.22	-15.57	-16.26	-1.34	-0.63	-1.42	-1.02	-1.82
	Standard deviation				0.75	0.40	3.08	0.78	0.08	0.18	1.02	0.81				
N.				9	9	3	2	2	2	2	2	2	2	2	2	

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Population location number and specimen ID	Species	Age in years	% C ₄ grass Hattersley based on (1983) $\delta^{13}\text{C}$ bone collagen	Bone collagen results		Enamel carbonate carbon isotope results				Enamel carbonate oxygen isotope results					
				$\delta^{13}\text{C}$	$\delta^{15}\text{N}$	Incisor	Molar 1	Molar 2	Molar 3	Molar 4	Incisor	Molar 1	Molar 2	Molar 3	Molar 4
641	<i>M. giganteus</i>	2.5	15	-23.60	4.70	-20.78	-20.75	-19.33			-2.56	-1.13	-1.75		
642	<i>M. giganteus</i>	1.8	15	-19.10	2.33										
Group mean			15	-22.28	3.97	-20.78	-20.75	-19.33			-2.56	-1.13	-1.75		
Standard deviation				2.15	1.44										
N				4	4	1	1	1	0	0	1	1	1	0	0
61	Seymour (central), VIC														
374	<i>M. fuliginosus/giganteus</i>		25	-20.80	4.44										

Appendix B Table B-2 Statistical analysis of *Macropus* bone collagen $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values against age for the populations with five or more specimens.

Population location number	N	Bone collagen $\delta^{15}\text{N}$		Bone collagen $\delta^{13}\text{C}$	
		Pearson Correlation Coefficient	P value significance level 0.05	Pearson Correlation Coefficient	P value significance level 0.05
9	5	-0.176	0.777	0.875	0.052
10	7	0.655	0.110	0.843	0.071
11	5	0.039	0.950	-0.257	0.677
12	17	-0.133	0.611	-0.035	0.893
13	6	-0.355	0.490	-0.618	0.191
17	34	-0.320	0.065	0.389	0.023*
23	8	0.341	0.408	-0.435	0.281
28	8	-0.038	0.929	0.566	0.144
29	6	-0.676	0.141	0.451	0.370
34	8	-0.334	0.419	0.381	0.352
35	10	-0.003	0.994	-0.752	0.012*
36	6	0.597	0.211	0.099	0.852
39	8	-0.247	0.555	0.450	0.263
41	7	0.013	0.978	0.601	0.154
42	9	0.361	0.340	-0.163	0.676
43	10	0.327	0.356	-0.275	0.441
44	6	-0.093	0.860	-0.706	0.117
46	10	0.004	0.992	-0.100	0.783
47	13	-0.171	0.576	0.048	0.875
48	23	-0.208	0.342	0.288	0.183
52	27	-0.172	0.390	0.076	0.708

* Statistically significant correlations between bone collagen $\delta^{13}\text{C}$ and age were observed in populations number 17 (Longreach) and 35-(Cobar/Nyngan), however, note that correlations were opposite in sign to each other. Thus although statistically significant, they were not considered biologically meaningful for this study

Appendix B Table B-3. *Macropus* dentine collagen $\delta^{13}\text{C}$ results

Population location number	Specimen ID	Species	Dentine collagen $\delta^{13}\text{C}$ values for different tooth types				
			Incisor	Molar 1	Molar 2	Molar 3	Molar 4
42	2	<i>M. fuliginosus</i>	-20.72	-25.01*	-23.87	-21.67	-21.27
42	3	<i>M. fuliginosus</i>	-21.41	-21.5	-21.35	-20.96	-20.81
52	164	<i>M. fuliginosus</i>	-23.2	-23.1	-23	-22.55	-22.45
52	187	<i>M. fuliginosus</i>	-23.19	-23.21	-23.14	-23.13	-23.52
52	203	<i>M. fuliginosus</i>	-23.28	**	-23.16	-23.34	-23.35
52	294	<i>M. fuliginosus</i>	-24.46	-24.3	-24.5	-24.69	-24.7
52	301	<i>M. fuliginosus</i>	-24.73	-24.64	-24.3	-24.3	-24.12
39	561	<i>M. rufus</i>	-18.4	-17.72	-16.87	-15.91	-15.67
17	1098	<i>M. robustus</i>	-14.94	**	-14.91	-13.93	-14.3
9	1218	<i>M. rufus</i>	-12.75	-8.94	-8.7	-8.67	-8.5
9	1222	<i>M. rufus</i>	-14.16	-12.95	-11.03	-10.73	-10.3

*considered a possible data point outlier. ** failed sample

Appendix B Table B-4. *Macropus* dentine collagen $\delta^{15}\text{N}$ results

Population location number	Specimen ID	Species	Dentine collagen $\delta^{15}\text{N}$ values for different tooth types				
			Incisor	Molar 1	Molar 2	Molar 3	Molar 4
42	2	<i>M. fuliginosus</i>	6.1	5.8	5.7	5.3	6.4
42	3	<i>M. fuliginosus</i>	7.5	6.6	6.5	6	6.6
52	164	<i>M. fuliginosus</i>	5.8	5.1	5.1	4.7	4.6
52	187	<i>M. fuliginosus</i>	6	4.8	5.2	4.5	4.6
52	203	<i>M. fuliginosus</i>	7.2	**	5.7	5.2	4.9
52	294	<i>M. fuliginosus</i>	6	6.35	5.95	5.2	6
52	301	<i>M. fuliginosus</i>	6.1	5.3	5.9	5	4.8
39	561	<i>M. rufus</i>	12.3	12.4	11.7	11.5	12
17	1098	<i>M. robustus</i>	12.8	12.2	12.1	11.6	10.5
9	1218	<i>M. rufus</i>	10.3	10.7	10.4	10.9	10.5
9	1222	<i>M. rufus</i>	7.8	7.3	6.9	6.5	6.5

** failed sample

Appendix B Table B-5. Statistics for comparison between *Macropus* species bone collagen $\delta^{13}\text{C}$ values in population 37 Balranald/Hay, NSW

Descriptive statistics					
#37 Balranald/Hay, NSW	N	Mean	Standard deviation	Standard error of mean	
Macropus robustus	2	-19.945	2.482	1.755	
Macropus rufus	12	-19.791	1.208	0.349	
Macropus giganteus	23	-19.513	1.542	0.322	
Total	37				

One- Way ANOVA test					
Source of Variation	Degrees of Freedom	Sum of Squares	Mean of Squares	F-statistic	P significance
Between Groups	2	0.823	0.412	0.188	0.83
Residual	34	74.54	2.192		
Total	36	75.363			
Normality Test:	Passed	(P = 0.661)			
Equal Variance Test:	Passed	(P = 0.498)			
The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.830).					

Appendix B Table B-6. Statistics for comparison between *Macropus* species bone collagen $\delta^{13}\text{C}$ values in population 17 Longreach, QLD.

Descriptive statistics				
#17 Longreach, QLD	N	Mean	Standard deviation	Standard error of mean
<i>Macropus robustus</i>	15	-9.56	0.63	0.16
<i>Macropus rufus</i>	13	-11.20	1.51	0.42
<i>Macropus giganteus</i>	6	-13.02	2.15	0.88
Total	34	-10.80	1.83	0.31

One- Way ANOVA test					
Source of Variation	Degrees of Freedom	Sum of Squares	Mean of Squares	F-statistic	P significance
Between Groups	2	54.748	27.374	15.151	P<0.001
Residual	31	56.010	1.807		
Total	33	110.758			
Normality Test:	Passed	(P = 0.515)			
Equal Variance Test:	Failed	(P < 0.050)			

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001).

Due to Failed Equal Variance test the Kruskal-Wallis One Way Analysis of Variance on Ranks was applied to the $\delta^{13}\text{C}$ data

Results: H = 46.832 with 3 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P <= 0.001)

Appendix B Table B-7. Statistics for comparison between *Macropus* species bone collagen $\delta^{13}\text{C}$ values in population 12 Hughenden, QLD

Descriptive statistics					
#12 Hughenden, QLD	N	Mean	Standard deviation	Standard error of mean	
<i>Macropus robustus</i>	7	-13.346	2.922	1.104	
<i>Macropus rufus</i>	1	-14.78	0	0	
<i>Macropus giganteus</i>	8	-12.275	2.586	0.914	
Total					

One- Way ANOVA test					
Source of Variation	Degrees of Freedom	Sum of Squares	Mean of Squares	F-statistic	P significance
Between Groups	1	4.286	4.286	0.568	0.464
Residual	13	98.03	7.541		
Total	14	102.316			
Normality Test:	Passed	(P = 0.341)			
Equal Variance Test:	Passed	(P = 0.532)			

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.464).

Appendix B Table B-8. Statistics for comparison between *Macropus* species bone collagen $\delta^{15}\text{N}$ values in population 37 Balranald/Hay, NSW

Descriptive statistics				
#37 Balranald/Hay, NSW	N	Mean	Standard deviation	Standard error of mean
<i>Macropus robustus</i>	23	7.86	1.08	0.23
<i>Macropus rufus</i>	12	7.84	0.89	0.26
<i>Macropus giganteus</i>	2	7.42	0.38	0.27
Total	37			

One- Way ANOVA test					
Source of Variation	Degrees of Freedom	Sum of Squares	Mean of Squares	F-statistic	P significance
Between Groups	2	0.363	0.181	0.178	0.838
Residual	34	34.724	1.021		
Total	36	35.086			
Normality Test:	Failed	(P < 0.050)			
Equal Variance Test:	Failed	(P < 0.050)			

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.838).

Due to Failed Equal Variance test the Kruskal-Wallis One Way Analysis of Variance on Ranks was applied to the $\delta^{15}\text{N}$ data

Results: H = 1.414 with 2 degrees of freedom. (P = 0.493)

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.493).

Appendix B Table B-9. Statistics for comparison between *Macropus* species bone collagen $\delta^{15}\text{N}$ values in population 17 Longreach, QLD

Descriptive statistics					
#17 Longreach, QLD	N	Mean	Standard deviation	Standard error of mean	
<i>Macropus robustus</i>	6	15	8.829	1.062	0.274
<i>Macropus rufus</i>	13	13	9.123	1.756	0.487
<i>Macropus giganteus</i>	15	6	9.517	1.514	0.618
Total	37	-10.80			

One- Way ANOVA test					
Source of Variation	Degrees of Freedom	Sum of Squares	Mean of Squares	F-statistic	P significance
Between Groups	2	2.100	1.050	0.507	0.607
Residual	31	64.242	2.072		
Total	33	66.342			
Normality Test:	Passed	(P = 0.121)			
Equal Variance Test:	Passed	(P = 0.143)			

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.607).

Appendix B Table B-10. Statistics for comparison between *Macropus* species bone collagen $\delta^{15}\text{N}$ values in population 12 Hughenden, QLD

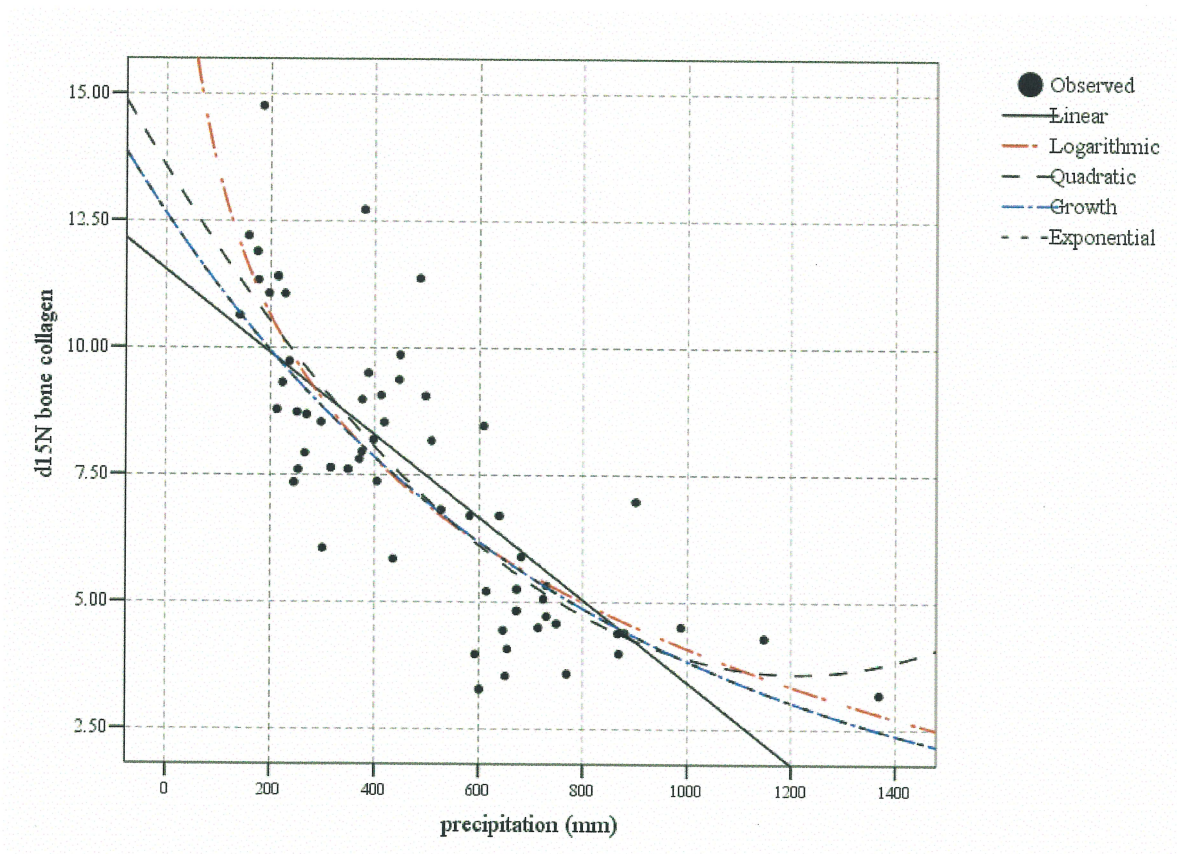
Descriptive statistics				
12 Hughenden, QLD	N	Mean	Standard deviation	Standard error of mean
<i>Macropus robustus</i>	7	10.365	3.479	1.315
<i>Macropus rufus</i>	1	12.635	0	0
<i>Macropus giganteus</i>	8	11.653	2.432	0.86
Total	16			

One- Way ANOVA test					
Source of Variation	Degrees of Freedom	Sum of Squares	Mean of Squares	F-statistic	P significance
Between Groups	1	6.195	6.195	0.706	0.416
Residual	13	114.038	8.772		
Total	14	120.233			
Normality Test:	Passed	(P = 0.439)			
Equal Variance Test:	Passed	(P = 0.145)			

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.416).

Appendix B Table B-11. Statistical results (curve fits using SPSS V12.) that attempted to quantify the relationship between *Macropus* $\delta^{15}\text{N}$ and mean annual precipitation.

SPSS™ V12. Model Summary and Parameter Estimates								
Dependent Variable: <i>Macropus</i> bone collagen $\delta^{15}\text{N}$								
The independent variable is mean annual precipitation (mm)								
Equation	Model Summary					Parameter Estimates		
	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	0.60	88.41	1	59	0.000	11.527	-0.008	
Logarithmic	0.65	110.32	1	59	0.000	32.209	-4.072	
Quadratic	0.65	55.05	2	58	0.000	13.545	-0.016	6.81E-06
Growth	0.65	107.81	1	59	0.000	2.536	-0.001	
Exponential	0.65	107.81	1	59	0.000	12.627	-0.001	

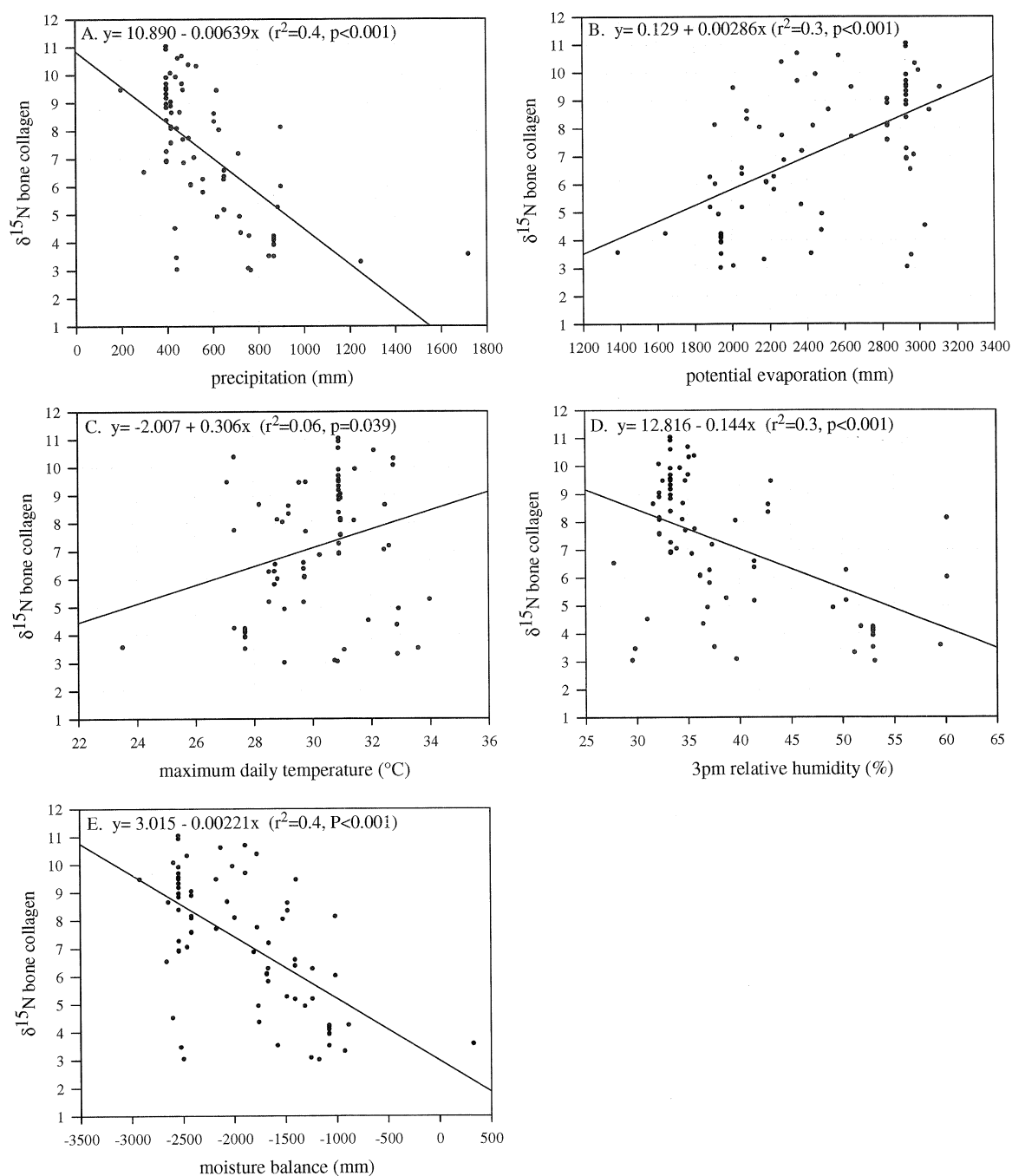
**Appendix B Figure B-1.** Plot of the relationship between *Macropus* mean population $\delta^{15}\text{N}$ (N=61) and precipitation- showing the different curves fitted using linear, logarithmic, quadratic, growth and exponential equations. The r^2 values for each curve are included in Table C-11 above.

Appendix B Table B-12. Calculated statistics for *Macropus* mean population stable isotope and climate correlations

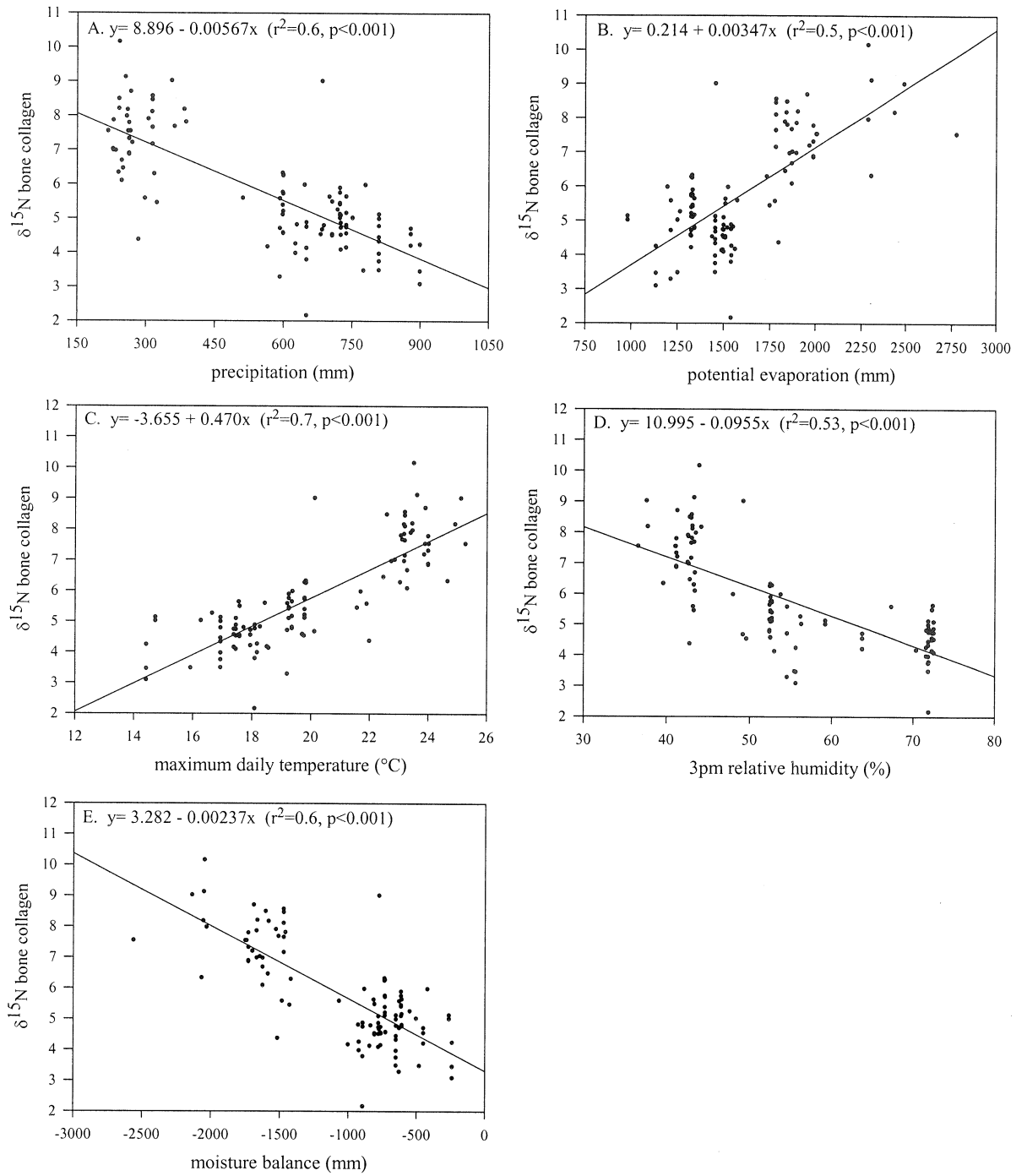
Isotope and tissue	Statistics	Climate variables				
		Precipitation	Potential evaporation	Daily max. temperature	3pm % relative humidity	Moisture balance
Bone collagen $\delta^{13}\text{C}$	Pearson's correlation coefficient	0.076	0.518	0.824	-0.446	-0.377
	P value	0.559	<0.001	<0.001	<0.001	0.003
	Number of populations	61	61	61	61	61
Incisor enamel $\delta^{13}\text{C}$	Pearson's correlation coefficient	-0.281	0.718	0.907	-0.704	-0.654
	P value	0.0875	<0.001	<0.001	<0.001	<0.001
	Number of populations	38	38	38	38	38
Bone collagen $\delta^{15}\text{N}$	Pearson's correlation coefficient	-0.778	0.773	0.446	-0.768	-0.842
	P value	<0.001	<0.001	<0.001	<0.001	<0.001
	Number of populations	61	61	61	61	61
Incisor enamel carbonate $\delta^{18}\text{O}$	Pearson's correlation coefficient	-0.853	0.820	0.597	-0.726	-0.867
	P value	<0.001	<0.001	<0.001	<0.001	<0.001
	Number of populations	38	38	38	38	38



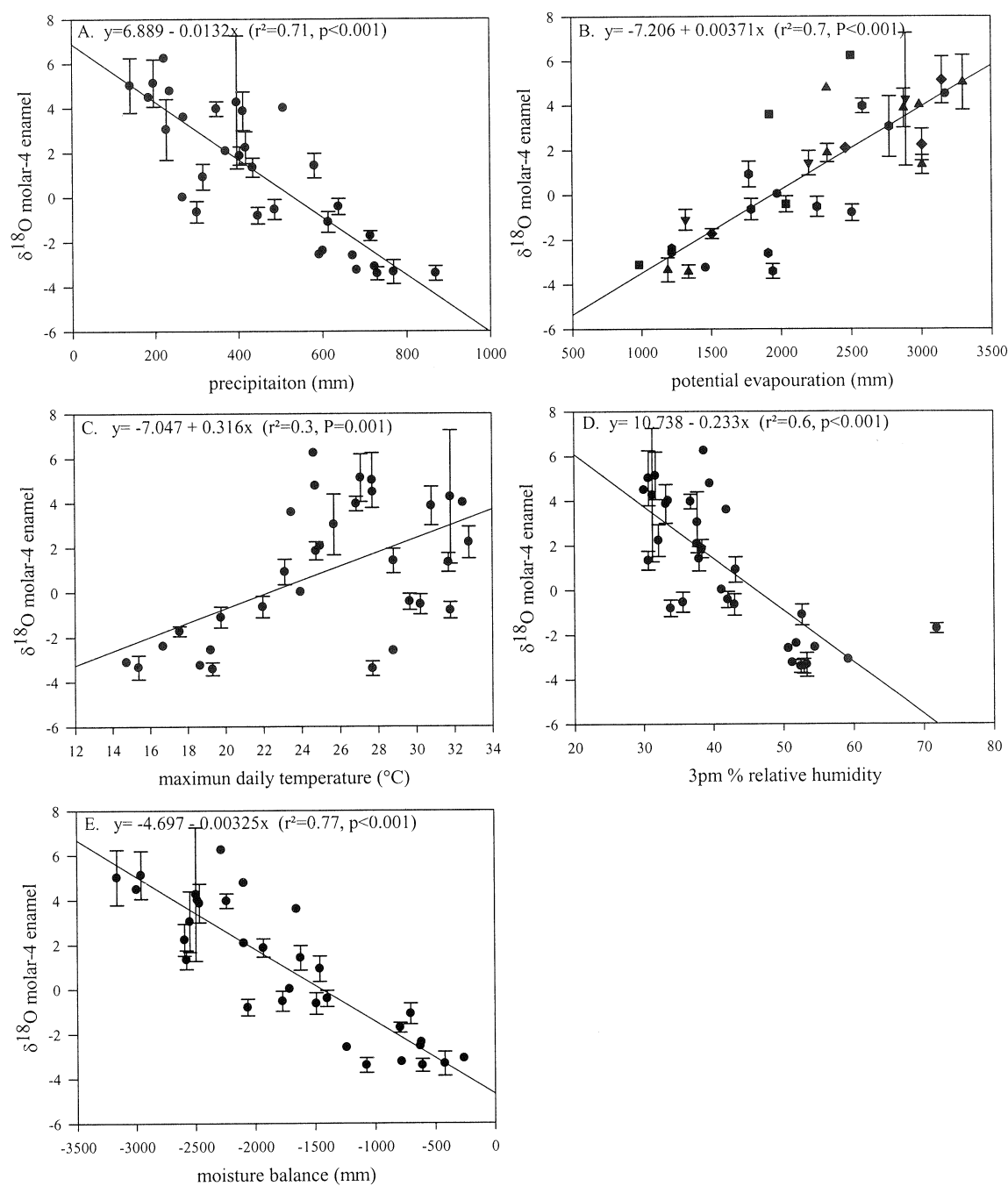
Appendix B Figure B-2. Semi-arid landscape at Burra, South Australia. Site number 42 for the *Macropus* study.



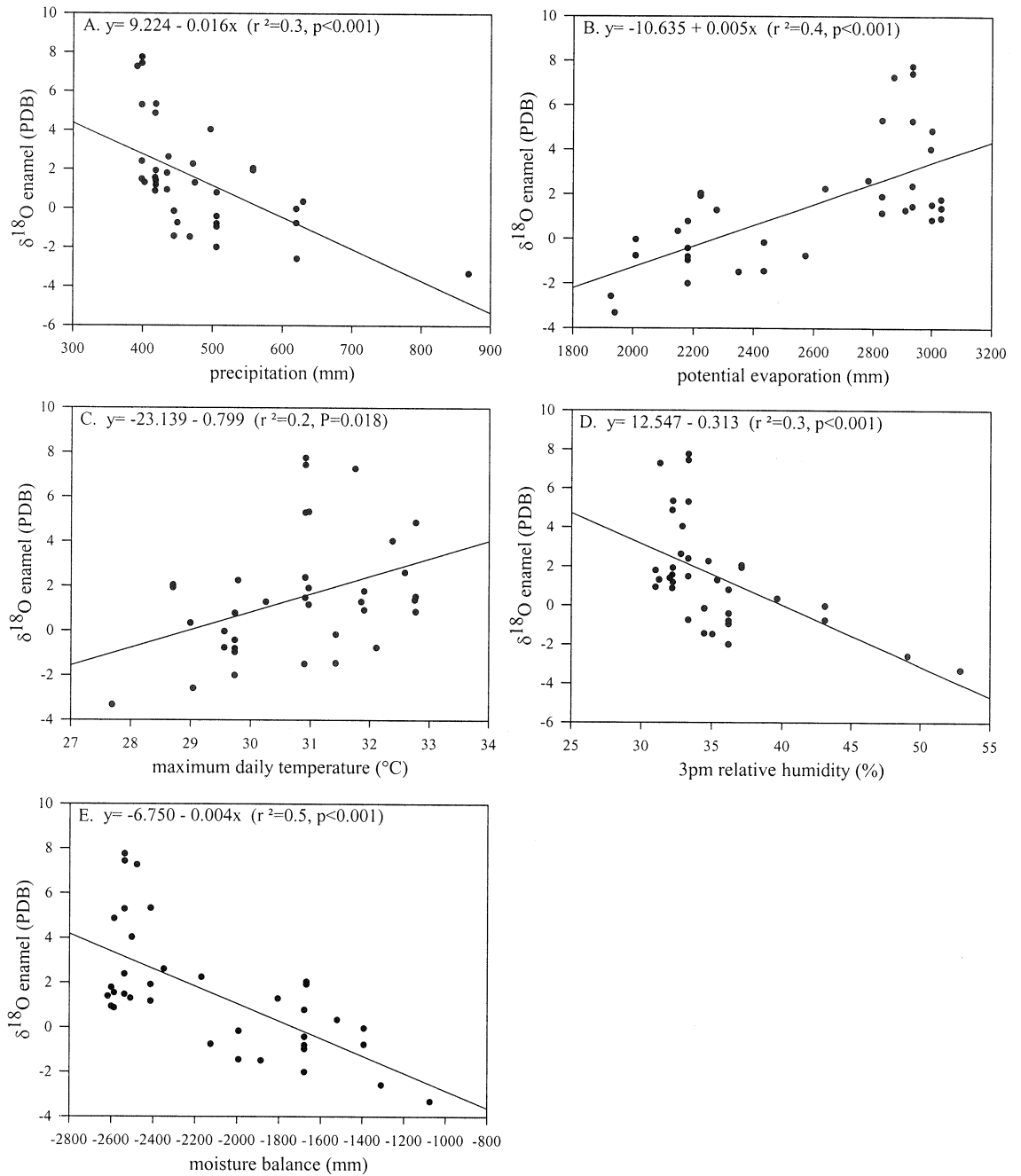
Appendix B Figure B-3. Plots *Macropus* bone collagen $\delta^{15}\text{N}$ values against mean annual climate variables. These specimens are the C_4 -grass-consuming *Macropus* from sites in northern Australia ($n=72$). Each individual's $\delta^{13}\text{C}_{\text{B-collagen}}$ value was used to determine if the diet consisted of $<85\%$ C_3 grass - a $\delta^{13}\text{C}$ value more depleted than -11‰ was the cut off.



Appendix B Figure B-4. Plots *Macropus* bone collagen $\delta^{15}\text{N}$ values against mean annual climate variables. These specimens are the C_3 -grass-consuming *Macropus* from sites in southern Australia ($n=107$). Each individual's $\delta^{13}\text{C}_{\text{B-collagen}}$ value was used to determine if the diet consisted of $>85\%$ C_3 grass- a $\delta^{13}\text{C}$ value more depleted than -21‰ was the cut off.



Appendix B Figure B-5 Plots of *Macropus* population mean enamel molar-4 $\delta^{18}\text{O}$ values against mean annual climate variables on a continental scale (N=61)



Appendix B Figure B-6. Plots of *Macropus* $\delta^{18}\text{O}$ values against mean annual climate variables from locations $<25^{\circ}\text{S}$ - the C_4 grass dominated regions in northern Australia.

Appendix B Table B-13. Results of oneway-ANOVA statistical tests comparing $\delta^{13}\text{C}$ values of different kangaroo species in all populations with more than one species

Population number	Number of <i>Macropus</i> species in the population			Sum of Squares			Degrees of freedom			Mean Square		F-statistic	Significance level (0.05, 2-tailed)
	<i>M. giganteus</i> / <i>fuliginosus</i>	<i>M. rufus</i>	<i>M. robustus</i>	Between Groups	Within Groups	Total	Between Groups	Within Groups	Total	Between Groups	Within Groups		
3*	2	0	2	1.988	0.031	2.019	1	2	3	1.988	0.015	128.993	0.008*
5	0	2	2	4.151	0.551	4.702	1	2	3	4.151	0.275	15.076	0.060
9	2	2	0	7.290	11.762	19.052	1	2	3	7.290	5.881	1.240	0.381
10	0	3	4	0.022	13.865	13.887	1	5	6	0.022	2.773	0.008	0.932
11	0	3	2	7.626	15.092	22.718	1	3	4	7.626	5.031	1.516	0.306
12	11	9	2	8.054	98.030	106.084	2	13	15	4.027	7.541	0.534	0.599
13	2	3	1	15.368	6.257	21.625	2	3	5	7.684	2.086	3.684	0.156
17	15	13	6	54.748	56.010	110.758	2	31	33	27.374	1.807	15.151	0.000
23	4	3	0	5.852	38.345	44.198	1	6	7	5.852	6.391	0.916	0.376
34	5	2	0	0.248	16.141	16.388	2	5	7	0.124	3.228	0.038	0.963
35	6	2	1	21.930	12.851	34.781	2	5	7	10.965	2.570	4.266	0.083
36	0	3	3	2.381	4.263	6.644	1	4	5	2.381	1.066	2.235	0.209
39	5	3	1	7.426	17.805	25.232	2	5	7	3.713	3.561	1.043	0.418
41	3	4	0	5.603	5.123	10.726	2	4	6	2.802	1.281	2.188	0.228
43	4	9	2	1.956	13.189	15.145	2	11	13	0.978	1.199	0.816	0.467
48	23	12	1	0.310	49.012	49.322	2	19	21	0.155	2.580	0.060	0.942

shaded populations were graphed on Figure 6.4 in chapter 6.4

* a significant relationship was found in this population but the sample sizes of each kangaroo species were too small to consider this result meaningful.

APPENDIX C

WOMBAT STABLE ISOTOPE STUDY

RAW DATA AND STATISTICAL RESULTS

Appendix C Table C-1. Carbon and nitrogen stable isotope results for wombat bone collagen

Population and specimen ID#	C:N ratio	$\delta^{13}\text{C}$ bone collagen	$\delta^{15}\text{N}$ bone collagen
1. Brookfield Conservation Park (n=7)			
W7	3.2	-22.18	4.86
W8	3.2	-21.81	4.98
W67	3.2	-22.91	6.19
W68	3.1	-22.17	5.37
W69	3.2	-22.87	6.00
W633	3.2	-21.63	6.45
W634	3.2	-22.31	6.31
Group mean		-22.27	5.74
Standard deviation		0.49	0.66
2. Alpine NSW (n=5)			
W506	3.1	-23.95	3.35
W507	3.2	-25.38	3.13
W659	3.2	-24.07	2.72
W804	3.2	-22.91	3.39
W809	3.2	-23.90	5.00
Group mean		-24.04	3.52
Standard deviation		0.88	0.87
3. Tharwa (n=6)			
W408	3.1	-20.99	5.17
W412	3.3	-22.31	5.30
W630	3.2	-19.74	5.40
W721	3.2	-22.41	6.76
W802	3.1	-21.71	2.21
W810	3.2	-21.95	3.58
Group mean		-21.52	4.74
Standard deviation		1.01	1.60
4. Braidwood (n=17)			
W16	3.3	-21.33	4.77
W52	3.2	-21.73	3.59
W433	3.2	-18.53	4.22
W434	3.3	-20.62	2.74
W435	3.2	-20.47	4.51
W436	3.2	-20.67	4.58
W437	3.2	-20.49	3.53
W438	3.1	-23.07	2.77
W439	3.2	-23.12	1.76
W450	3.2	-19.07	5.02
W637	3.1	-22.3	3.65
W638	3.2	-19.68	4.16
W868	3.2	-18.89	5.09
W870	3.2	-19.11	6.00
W871	3.2	-20.26	3.61
W873	3.2	-20.76	3.06
W876	3.2	-21.20	3.72
Group mean		-20.66	3.93
Standard deviation		1.37	1.04
5. Epping Forest National Park (n=17)			
1001	3.1	-8.96	8.45
1002	3.2	-9.13	8.59
1003	3.3	-9.79	8.36
1004	3.2	-9.39	7.54
1005	3.2	-10.99	7.85
1006	3.2	-10.42	6.46
1007	3.1	-9.72	9.05
1008	3.2	-9.07	8.39
1009	3.3	-10.36	7.19
1011	3.2	-9.04	8.62
1012	3.2	-9.43	8.01
1013	3.2	-10.09	10.22
1015	3.3	-9.76	8.86
1016	3.2	-9.33	7.80
1017	3.2	-9.21	9.34
1019	3.2	-8.86	8.56
1020	3.1	-9.54	8.01
Group mean		-9.59	8.31
Standard deviation		0.59	0.86

Appendix C Table C-2. Wombat faeces carbon isotope results

Population faeces sample names	Collection date	$\delta^{13}\text{C}$ faeces
2. Alpine NSW (n=6)		
WF F87- Avg.	May-02	-29.91
WF F89- Avg.	Jul-02	-30.11
WT F30- Avg.	Jul-02	-29.96
W804_F27- Avg.	Sep-02	-29
WF F78- Avg.	Sep-02	-28.27
WF F88- Avg.	Feb-03	-27.04
Group Mean		-29.05
Standard deviation		1.21
3. Tharwa (n=5)		
WT F31- Avg.	Jun-02	-28.71
W654_F54- Avg.	Aug-02	-28.2
WT_F32- Avg.	Dec-02	-27.8
WT F104- Avg.	Mar-03	-25.64
WT_F45- Avg.	Mar-03	-24.2
Group Mean		-26.91
Standard deviation		1.91
5. Epping Forest National Park (n=14)		
NHW_F1- Avg.	1-Jan-99	-14.6
NHW F1a- Avg.	1-Jan-99	-14.12
NHW F3- Avg.	18-May-99	-13.77
NHW F4- Avg.	11-Sep-99	-14.24
NHW_F5- Avg.	10-Dec-99	-14.4
NHW F6- Avg.	1-Jun-00	-13.49
NHW_F7- Avg.	26-Oct-00	-15.4
NHW F8- Avg.	1-Dec-00	-13.33
NHW aF12	1-Feb-01	-14.09
NHW aF13	Jun-01	-14.55
NHW aF14	Aug-01	-13.38
NHW_F10- Avg.	11-Oct-01	-15.7
NHW_F11- Avg.	12-Dec-01	-14.1
NHW bF74	12-Dec-01	-14.96
Group Mean		-14.30
Standard deviation		0.7

Appendix C Table C-3. Carbon and oxygen isotope results for W69 incisor sub-samples

Site 1 Brookfield CP. W69 Sub- sample number	Sub-sample $\delta^{13}\text{C}$	Sub-sample $\delta^{18}\text{O}$	Distance of sub- sample from base of tooth (mm)
1	-12.64	2.68	3.6
2	-13.3	3.78	6.0
3	-14	3.82	8.3
4	-14.41	2.72	10.7
5	-14.54	2.31	13.1
6	-14.35	1.96	15.5
7	-14.17	1.31	17.9
8	-14.12	0.96	20.3
9	-14.11	0.52	22.7
10	-13.77	0.19	25.0
11	-13.54	0.09	27.4
12	-13.44	0.28	29.8
13	-13.53	0.38	32.2
14	-13.45	0.74	34.6
15	-13.45	1.05	37.0
16	-13.57	0.81	39.3
17	-13.45	1.15	41.7
18	-13.41	1.21	44.1
19	-13.51	1.08	46.5
20	-13.59	0.66	48.9
21	-13.24	1.17	51.3
22	-13.12	1.34	53.7
23	-13.23	1.23	56.0
24	-13.5	0.86	58.4
25	-13.73	1.04	60.8
26	-14.05	1.15	62.0
mean value	-13.66	1.33	
standard deviation	0.44	0.97	

Appendix C Table C-4. Carbon and oxygen isotope results for W633 incisor sub-samples

Site 1 Brookfield CP. W633 Sub-sample number	Sub-sample $\delta^{13}\text{C}$	Sub-sample $\delta^{18}\text{O}$	Distance of sub-sample from base of tooth (mm)
1	failed sample	failed sample	2
2	f	failed sample	3.5
3	-13.52	1.62	5
4	-13.51	1.83	6.5
5	failed sample	failed sample	7.25
6	-13.62	1.8	8.25
7	-13.67	1.97	9.5
8	-13.64	2.45	11
9	-14.13	2	12.5
10	-14.12	2.3	13.5
11	-14.12	2.5	14
12	-14.26	1.86	15.5
13	-14.26	1.74	17.5
14	-14.26	1.49	19
15	-14.11	1.37	20.5
16	f	f	21.5
17	-13.81	1.28	22.5
18	-13.77	0.86	24
19	-13.61	0.71	25.5
20	-13.49	0.7	27
21	-13.47	0.46	28.5
22	-13.4	0.01	29.5
23	-13.21	0.21	30.5
24	-13.23	0.16	31.5
25	failed sample	failed sample	32.5
26	-13.1	0.28	33.5
27	-13.1	0.26	34.75
28	-13.07	0.39	36.25
29	-13.04	0.44	37.5
30	-13.1	0.44	38.5
31	-13.09	0.76	39.5
32	-13.19	0.77	40.5
33	-13.17	0.79	41.5
34	-13.18	0.89	42.5
35	-13.2	0.81	43.5
36	f	f	44.5
37	-13.13	1.06	45.5
38	-13.14	1.12	46.5
39	-13.2	0.67	47.5
40	-13.2	0.86	48.5
41	-13.37	1.57	49.75
42	-13.48	1.45	51
43	-13.75	1.08	52.25
44	-13.8	1.35	53.5
45	-13.68	1.66	54.5
46	-13.76	1.64	55.5
47	-13.81	1.71	56.5
48	-13.87	2.03	57.5
49	-14.03	2.01	58.5
50	failed sample	failed sample	59.5
51	-14.2	1.75	60.5
52	-14.34	1.59	61.5
53	-14.3	1.57	63
54	-14.27	1.58	64.5
55	-14.23	1.32	66.25
56	-14.21	1.08	68
57	-13.7	0.48	69.25
58	-13.95	0.57	70
59	-13.91	0.49	71
60	-13.85	0.84	72
mean value	-13.65	1.18	
standard deviation	0.42	0.64	

Appendix C Table C-5. Carbon and oxygen isotope results for W506 incisor sub-samples

Site 2. Mt Kosciuszko NP. W506 Sub-sample number	Sub-sample $\delta^{13}\text{C}$	Sub-sample $\delta^{18}\text{O}$	Distance of sub-sample from base of tooth (mm)
1	failed sample	failed sample	0.75
2	-16.00	-2.99	2.25
3	-16.14	-2.61	3.75
4	-16.15	-2.12	5.25
5	-16.19	-1.70	6.75
6	-16.44	-0.91	8.25
7	-16.82	-1.49	9.75
8	-17.16	-2.17	11.25
9	-17.33	-2.93	12.75
10	-17.06	-2.74	14.25
11	-16.91	-2.55	15.75
12	-16.92	-2.32	17.25
13	-16.97	-2.58	18.75
14	-16.95	-2.75	20.25
15	-16.97	-2.84	21.75
16	-16.93	-2.85	23.25
17	-16.80	-2.91	24.75
18	-16.78	-2.81	26.25
19	-16.73	-2.55	27.75
20	-16.79	-2.59	29.25
21	-16.80	-2.57	30.75
22	-16.74	-2.45	32.25
23	-16.67	-2.21	33.75
24	-16.59	-2.11	35.25
25	-16.60	-2.19	36.75
26	-16.60	-1.99	38.25
27	-16.55	-1.80	40.5
28	-16.51	-1.66	42.75
29	-16.49	-1.52	44.25
30	-16.51	-1.62	45.75
31	-16.19	-0.96	47.25
32	-16.10	-0.80	48.75
33	-16.15	-0.80	50.25
34	-16.20	-0.91	51.75
35	-16.25	-1.04	53.25
36	-16.30	-1.28	54.75
37	-16.35	-1.09	56.25
38	-16.47	-1.34	57.75
39	-16.42	-1.44	59.25
40	-16.42	-1.47	60.75
41	-16.44	-1.49	62.25
42	-16.43	-1.65	63.75
43	-16.50	-1.38	65.25
44	-16.58	-1.60	66.75
45	-16.58	-1.56	68.25
46	-16.63	-1.65	69.75
47	-16.72	-1.91	71.25
48	-16.76	-2.06	72.75
49	-16.77	-2.34	74.25
50	-16.81	-2.57	75
mean value	-16.59	-1.96	
standard deviation	0.30	0.65	

Appendix C Table C-6. Carbon and oxygen isotope results for W881 incisor sub-samples

Site 3, Tharwa, W881 Sub-sample number	Sub-sample $\delta^{13}\text{C}$	Sub-sample $\delta^{18}\text{O}$	Distance of sub-sample from base of tooth (mm)
1	-12.47	-0.93	1
2	-12.41	-0.56	2.5
3	-12.32	-0.32	5
4	-12.18	-0.36	7
5	-12.02	-0.57	8.75
6	-12.11	-0.89	10.25
7	-12.15	-1.26	12
8	-12.17	-1.05	13.75
9	-12.28	-1.27	15.25
10	-12.45	-1.29	16.5
11	-12.71	-1.49	18
12	-12.96	-1.59	20
13	-13.38	-1.93	21.5
14	-13.61	-2.15	23
15	-13.83	-2.24	24.5
16	-14.05	-1.61	26
17	-14.30	-2.21	27.25
18	-14.62	-2.58	28.75
19	-14.79	-2.84	30.5
20	-14.95	-3.15	31.5
21	-15.04	-2.96	33
22	-15.12	-3.37	34.5
23	-15.17	-3.71	35.5
24	-15.23	-3.93	37
25	-15.13	-3.97	38.5
26	-15.09	-4.28	40
27	-14.92	-4.23	42
28	-14.57	-4.16	44
29	-14.38	-3.99	46
30	-14.07	-3.49	47.5
31	-14.04	-3.46	49
32	-14.14	-3.36	50.5
33	-14.24	-3.29	51.75
34	-14.04	-2.88	53.25
35	-14.20	-3.35	54.5
36	-13.70	-2.48	56
37	-13.46	-2.14	58
38	-13.49	-1.83	59.5
39	-13.50	-1.58	60.5
40	-13.60	-1.47	61.75
41	-13.64	-1.16	63.25
42	-13.53	-0.88	64.5
43	-13.62	-0.94	65.5
44	-13.65	-0.83	66.75
45	-13.95	-0.95	68.25
46	-14.25	-1.40	69.75
47	-14.43	-1.79	71.75
48	-14.67	-2.50	73.25
49	-14.81	-3.26	74.75
50	-15.05	-3.85	77
51	-15.07	-4.46	78.5
52	-15.09	-4.46	79
mean value	-13.86	-2.32	
standard deviation	1.00	1.24	

Appendix C Table C-7. Carbon and oxygen isotope results for W52 incisor sub-samples

Site 4. Braidwood. W52 Sub-sample number	Sub-sample $\delta^{13}\text{C}$	Sub-sample $\delta^{18}\text{O}$	Distance of sub- sample from base of tooth (mm)
1	failed sample	failed sample	1.0
2	failed sample	failed sample	2.9
3	failed sample	failed sample	4.8
4	-15.40	-1.12	6.7
5	-15.14	-1.34	8.6
6	-14.84	-1.64	10.6
7	-14.98	-1.43	12.5
8	-15.04	-1.82	14.4
9	-15.15	-1.98	16.3
10	-15.17	-2.05	18.3
11	-14.87	-2.02	20.2
12	-14.41	-1.68	22.1
13	-13.72	-1.56	24.0
14	-13.24	-1.25	25.9
15	-12.86	-1.29	27.9
16	-12.41	-1.29	29.8
17	-11.75	-1.24	31.7
18	-11.24	-1.24	33.6
19	-10.80	-1.38	35.5
20	-10.17	-1.33	37.5
21	-9.92	-1.45	39.4
22	-9.71	-1.31	41.3
23	-9.87	-1.02	43.2
24	-10.34	-0.63	45.1
25	-10.91	-0.45	47.1
26	failed sample	failed sample	49.0
27	-12.42	-0.47	51.9
28	-13.15	-0.82	54.7
29	-13.77	-0.81	56.7
30	-14.35	-1.06	58.6
31	-15.05	-1.43	60.5
32	-15.52	-1.89	62.4
33	-15.98	-2.11	64.4
34	-16.26	-2.47	66.3
35	-16.59	-2.52	68.2
36	-16.78	-2.61	70.1
37	-17.01	-2.77	72.0
38	-17.20	-3.00	73.0
mean value	-13.71	-1.54	
standard deviation	2.29	0.64	

Appendix C Table C-8. Carbon and oxygen isotope results for W450 incisor sub-samples

Site 4. Braidwood. W450 Sub-sample number	Sub-sample $\delta^{13}\text{C}$	Sub-sample $\delta^{18}\text{O}$	Distance of sub- sample from base of tooth (mm)
1	-14.82	-3.11	4
2	-14.58	-2.78	8.35
3	-14.46	-2.82	9.8
4	-13.61	-3.75	11.95
5	-13.02	-3.71	14.5
6	-13.09	-4.22	17
7	-13.05	-4.09	19
8	-12.90	-4.00	20.75
9	failed sample	failed sample	22.75
10	-12.71	-3.50	25
11	-12.32	-3.46	27
12	-12.10	-3.09	28.4
13	-11.79	-2.76	29.2
14	-11.61	-2.64	30.8
15	-11.42	-2.56	32.75
16	-11.18	-2.55	34.25
17	-10.82	-2.25	35.25
18	-10.58	-2.11	36
19	-10.23	-2.01	37.25
20	-9.85	-1.97	39.5
21	-9.48	-1.99	42
22	-9.27	-1.90	44
23	-9.28	-1.75	45.5
24	-9.10	-1.60	46.5
25	-9.19	-1.42	47.75
26	-9.46	-1.50	49.25
27	-9.90	-1.50	50.75
28	-10.32	-1.35	52.25
29	-10.80	-1.70	54
30	-11.49	-1.61	56
31	-11.69	-1.61	57.5
32	-12.13	-1.76	58.5
33	-12.58	-1.76	59.5
34	-13.09	-1.38	60.5
35	failed sample	failed sample	61.75
36	-13.90	-1.58	63
37	-14.52	-1.09	64.25
38	-15.11	-1.16	65.5
39	-15.5	-1.38	67
40	-15.95	-1.71	68.5
41	-16.45	-0.85	69.5
42	-16.85	-0.78	70.5
43	-17.08	-1.18	72
mean value	-12.37	-2.19	
standard deviation	2.31	0.90	

Appendix C Table C-9. Carbon and oxygen isotope results for W873 incisor sub-samples

Site 4. Braidwood. W873 Sub-sample number	Sub-sample $\delta^{13}\text{C}$	Sub-sample $\delta^{18}\text{O}$	Distance of sub- sample from base of tooth (mm)
1	-13.24	2.25	2
2	-13.35	2.09	5
3	-13.80	0.89	6.75
4	-14.06	0.39	9.25
5	-14.12	0.17	11.75
6	-14.05	-0.32	13.75
7	-13.89	-0.56	15.5
8	-13.88	-0.82	17
9	-14.13	-1.32	19.5
10	-14.08	-1.45	21.75
11	-13.97	-1.78	23.25
12	-13.71	-2.07	25
13	-13.56	-2.16	26.5
14	-13.26	-2.26	27.75
15	-12.90	-2.49	29.25
16	-12.39	-2.45	30.75
17	-11.74	-2.27	32.75
18	-11.34	-2.47	34.5
19	-11.01	-2.47	35.5
20	-10.70	-2.68	36.5
21	-10.73	-2.68	38
22	-10.60	-2.31	39.5
23	-10.75	-2.12	40.5
24	-11.16	-2.01	42.5
25	-11.54	-2.04	45
26	-11.93	-1.99	47
27	-12.09	-1.85	49.25
28	-12.40	-1.72	50.75
29	-12.71	-1.87	51.75
30	-13.10	-2.20	53.5
31	-13.81	-2.90	55.5
32	-14.05	-3.08	57.25
33	-14.36	-3.49	58.5
34	-14.50	-3.83	60
35	-14.56	-4.22	61.75
36	-14.55	-4.57	63.5
37	-14.42	-4.77	65.25
38	-14.25	-4.66	67.25
39	-13.64	-4.27	69.75
mean value	-13.03	-2.01	
standard deviation	1.28	1.64	

Appendix C Table C-10. Carbon and oxygen isotope results for W1016 incisor sub-samples

Site 5, Epping Forest NP. W1016 Sub-sample number	Sub-sample $\delta^{13}\text{C}$	Sub-sample $\delta^{18}\text{O}$	Distance of sub-sample from base of tooth (mm)
1	-1.31	1.26	1.5
2	-1.32	2.07	3.75
3	-1.36	2.75	5.25
4	-1.42	3.38	6.5
5	-1.48	3.64	8.25
6	-1.59	3.64	10
7	-1.59	3.93	11.25
8	-1.71	3.55	12.5
9	-2.45	2.81	13.75
10	-2.22	3.02	15.25
11	-2.14	2.95	16.5
12	-1.91	3.13	17.5
13	-2.00	2.99	18.75
14	-1.75	3.33	20
15	-1.49	3.27	21.25
16	-1.61	2.80	22.5
17	-1.88	2.59	23.5
18	-1.88	2.50	24.75
19	-1.93	2.34	26
20	-1.88	2.49	26.75
21	-1.83	2.40	27.5
22	-1.78	2.26	28.75
23	-1.79	2.28	30.25
24	-1.57	2.28	31.25
25	-1.55	2.23	31.75
26	-1.47	2.13	32.5
27	-1.39	2.09	33.75
28	-1.43	2.16	35
29	-1.46	2.13	35.85
30	-1.41	2.12	37.35
31	failed sample	failed sample	39
32	-1.29	2.17	40
33	-1.98	2.19	41.25
34	-1.28	1.95	42.5
35	-1.18	2.09	43.75
36	-1.09	1.93	45
37	-1.16	1.92	46
38	-1.23	1.71	46.8
39	-1.15	1.43	47.55
40	-1.15	1.41	48.75
41	-1.14	1.3	50.25
42	-0.96	1.17	51.5
43	-1.09	1.17	52.5
44	-1.15	1.13	53.5
45	-1.12	1.21	54.5
46	-1.34	1.13	55.5
47	-1.39	1.16	56.5
48	-1.52	1.06	57.5
49	-1.85	1.03	58.75
50	-2.05	0.93	60.25
51	-2.14	1.33	62
52	-2.20	1.38	63.5
53	-1.93	1.54	64.5
54	-2.06	1.14	66
55	-2.21	1.19	67.5
56	-2.13	1.02	69
57	-2.02	1.02	71
58	-1.89	0.98	73
59	-1.81	1.06	75
60	-1.59	0.19	77
mean value	-1.62	2.02	
standard deviation	0.36	0.86	

Appendix C Table C-11. Part A: One-way ANOVA test results (SigmaStat™V.9) for wombat population bone collagen $\delta^{13}\text{C}$ values. **Part B:** Summary of multiple comparisons -testing for significant differences in wombat populations bone collagen $\delta^{13}\text{C}$ results

Part A: One- Way ANOVA test					
Source of Variation	Degrees of Freedom	Sum of Squares	Mean of Squares	F-statistic	P significance
Between Groups	4	1701.171	425.293	440.255	<0.001
Residual	47	45.403	0.966		
Total	51	1746.574			
Normality Test:	Passed	(P = 0.094)			
Equal Variance Test:	Passed	(P = 0.068)			
The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)					
Part B: Post- Hoc- All Pairwise Multiple Comparison Procedures (Tukey Test):					
koala populations compared	Difference of Means	q-statistic	P significance	P<0.050	
5. Epping Forest vs. 2. Mt. Kosciusko	14.448	5	40.864	<0.001	Yes
5. Epping Forest vs. 1. Brookfield	12.674	5	40.608	<0.001	Yes
5. Epping Forest vs. 3. Tharwa	11.925	5	36.134	<0.001	Yes
5. Epping Forest vs. 4. Braidwood	11.071	5	46.442	<0.001	Yes
4. Braidwood vs. 2. Mt. Kosciusko	3.378	5	9.553	<0.001	Yes
4. Braidwood vs. 1. Brookfield	1.603	5	5.137	0.006	Yes
4. Braidwood vs. 3. Tharwa	0.854	5	2.587	0.369	No
3. Tharwa vs. 2. Mt. Kosciusko	2.524	5	5.997	0.001	Yes
3. Tharwa vs. 1. Brookfield	0.75	5	1.938	0.649	No
1. Brookfield vs. 2. Mt. Kosciusko	1.774	5	4.36	0.027	Yes

SigmaStat™ (V.9) data presentation explanation: A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist

Appendix C Table C-12. Part A: One-way ANOVA test results (SigmaStat™V.9) for wombat population bone collagen $\delta^{15}\text{N}$ values. **Part B:** Summary of multiple comparisons -testing for significant differences in wombat populations bone collagen $\delta^{15}\text{N}$ results

Part A: One- Way ANOVA test					
Source of Variation	Degrees of Freedom	Sum of Squares	Mean of Squares	F-statistic	P significance
Between Groups	4	198.356	49.589	49.311	<0.001
Residual	47	47.265	1.006		
Total	51	245.621			
Normality Test:	Passed	(P = 0.562)			
Equal Variance Test:	Passed	(P = 0.681)			
The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001).					
Part B: Post- Hoc- All Pairwise Multiple Comparison Procedures (Tukey Test):					
koala populations compared	Difference of Means	q-statistic	P significance	P<0.050	
5. Epping Forest vs. 2. Mt. Kosciusko	4.791	5	13.28	<0.001	Yes
5. Epping Forest vs. 1. Brookfield	4.381	5	18.011	<0.001	Yes
5. Epping Forest vs. 3. Tharwa	3.572	5	10.609	<0.001	Yes
5. Epping Forest vs. 1. Brookfield	2.572	5	8.078	<0.001	Yes
1. Brookfield vs. 2. Mt. Kosciusko	2.218	5	5.343	0.004	Yes
1. Brookfield vs. 4. Braidwood	1.808	5	5.678	0.002	Yes
1. Brookfield vs. 3. Tharwa	1	5	2.534	0.39	No
3. Tharwa vs. 2. Mt. Kosciusko	1.219	5	2.838	0.279	No
3. Tharwa vs. 4. Braidwood	0.808	5	2.401	0.445	Do Not Test
1. Brookfield vs. 2. Mt. Kosciusko	0.41	5	1.137	0.928	Do Not Test

SigmaStat™ (V.9) data presentation explanation: A result of "Do Not Test" occurs for a comparison when no significant difference is found between two means that enclose that comparison. For example, if you had four means sorted in order, and found no difference between means 4 vs. 2, then you would not test 4 vs. 3 and 3 vs. 2, but still test 4 vs. 1 and 3 vs. 1 (4 vs. 3 and 3 vs. 2 are enclosed by 4 vs. 2: 4 3 2 1). Note that not testing the enclosed means is a procedural rule, and a result of Do Not Test should be treated as if there is no significant difference between the means, even though one may appear to exist

Appendix C Table C-13. Calculated statistics for correlations between wombat bone collagen $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values and enamel carbonate $\delta^{18}\text{O}$ values and mean annual climate data

Isotope and tissue	Statistics	Climate variables				
		Precipitation	Potential evaporation	Daily max. temperature	3pm % relative humidity	Moisture balance
Bone collagen $\delta^{13}\text{C}$	Pearson's correlation coefficient	-0.252	0.855	0.879	-0.61	-0.687
	P value	0.682	0.0646	0.0496	0.274	0.2
	Number of populations	5	5	5	5	5
Bone collagen $\delta^{15}\text{N}$	Pearson's correlation coefficient	-0.563	0.962	0.984	-0.878	0.88
	P value	0.323	0.00898	0.00235	0.0503	0.0491
	number of populations	5	5	5	5	5
Incisor[†] enamel carbonate $\delta^{18}\text{O}$	Pearson's correlation coefficient	-0.813	0.886	0.916	-0.940	-0.925
	P value	0.014	0.003	0.001	0.001	0.001
	Number of individuals	8	8	8	8	8

[†] Correlations used the mean of the intra-tooth $\delta^{18}\text{O}$ microsample values, of each wombat.