

SUPPLEMENTARY MATERIAL for

Subspecies definitions and legislation: from eastern wallaroo (*Osphranter robustus robustus*) to euro (*Osphranter robustus erubescens*)*

*In memory of Professor G.B. Sharman

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Table S1. Summary of corrected male measurements for each site. South Australia, western New South Wales and western Queensland. (See Figure 1 for locations and present taxonomic status.)

Character	Site						
	Balcanoona, SA	Yandama, NSW	Fowlers Gap, NSW	Adavale, Qld	Aramac, Qld	Charleville, Qld	West Tambo, Qld
<i>External body measurements</i>							
Corrected head length by site	1.21±0.01(5)	1.22±0.02(2)	1.21±0.01(55)	1.23±0.02(3)	-	-	-
Corrected foot length by site	3.36±0.07(5)	3.25±0.12(2)	3.30±0.03(43)	3.13±0.10(3)	-	-	3.33±0.06(8)
Corrected leg length by site	5.07±0.10(5)	5.32±0.16(2)	5.31±0.04(42)	5.24±0.13(3)	-	-	5.23±0.08(8)
Corrected total length by site	19.9±0.44(5)	20.42 (1)	20.43±0.15(43)	20.08±0.57(3)	-	-	20.19±0.35(4)
Corrected ear length by site	-	-	1.59±0.02(25)	1.40±0.05(3)	-	-	1.42±0.03(8)
Corrected ear width by site	-	-	1.06±0.03(25)	0.87±0.04(3)	-	-	-
<i>Skull measurements (brain case)</i>							
Corrected frontal height by site	0.66±0.01(5)	0.67±0.02(2)	0.66±0.004(37)	0.66±0.02(2)	0.63±0.01(5)	0.64±0.01(5)	0.67±0.01(8)
Corrected palatine length by site	0.24±0.01(5)	0.24±0.02(2)	0.25±0.003(43)	0.24±0.01(3)	0.24±0.01(6)	0.21±0.01(5)	0.24±0.01(8)
<i>Skull measurements (muzzle)</i>							
Corrected basal length by site	1.71±0.03(5)	1.75±0.04(2)	1.77±0.01(43)	1.68±0.03(3)	1.68±(0.02(6)	1.69±0.03(5)	1.68±0.02(8)
Corrected nasal length by site	0.74±0.02(5)	0.72±0.03(2)	0.76±0.01(42)	0.77±0.02(3)	0.79±0.02(5)	0.80±0.02(4)	0.77±0.02(8)
Corrected nasal width by site	0.28±0.01(5)	0.27±0.01(2)	0.29±0.003(42)	0.28±0.01(3)	0.28±0.01(6)	0.28±0.01(4)	0.29±0.01(8)

Corrected muzzle width by site	0.35±0.01(5)	0.37±0.02(2)	0.38±0.003(41)	0.38±0.01(3)	0.38±0.01(6)	0.38±0.01(4)	0.37±0.01(8)
Corrected maxilla length by site	0.59±0.02(5)	0.61±0.03(2)	0.62±0.01(43)	0.59±0.02(3)	0.59±0.02(6)	0.60±0.02(4)	0.61±0.01(8)
Corrected premaxilla length by site	0.38±0.01(5)	0.37±0.02(2)	0.39±0.004(41)	0.37±0.02(3)	0.35±0.01(6)	0.37±0.01(5)	0.35±0.01(8)
<i>Skull measurements (lower jaw)</i>							
Corrected mandible length by site	1.32±0.02(5)	1.38±0.02(2)	1.38±0.01(43)	1.33±0.03(3)	1.36(1)	1.33±0.02(5)	1.33±0.02(8)
<i>Skull measurements (nerves)</i>							
Mandible nerve length by site	0.11±0.01(5)	0.09±0.02(2)	0.11±0.01(42)	0.10±0.01(3)	0.09±0.01(6)	0.08±0.01(5)	0.13(1)
Orbital nerve length by site	0.25±0.01(5)	0.23±0.01(2)	0.23±0.003(43)	0.20±0.01(3)	0.21±0.01(6)	0.19±0.01(5)	0.20±0.01(8)

S1 (continued). Summary of corrected male measurements for each site. Central and North-eastern Queensland. *Combined sample from Townsville, Ravenswood and Torrens Creek.. (See Figure 2 for locations and present taxonomic status.)

Character	Site					
	East Tambo, Qld	Springsure, Qld	Clermont, Qld	Mitchell, Qld	Hughendon, Qld	'reginae', Qld*
<i>External body measurements</i>						
Corrected head length by site	-	-	1.25±0.02(3)	-	-	1.21 (1)
Corrected foot length by site	3.31±0.05(10)	0.05(10)±	-	3.29±0.08(4)	-	3.58±0.08(4)
Corrected leg length by site	5.07±0.07(10)	5.24±0.08(8)	-	5.06±0.13(4)	-	5.19 (1)
Corrected total length by site	19..34±0.31(10)	20.98±0.35(8)	-	19.05±0.49(4)	-	19.04 (1)
Corrected ear length by site	1.35±0.03(10)	1.30±0.03(8)	1.30±0.05(3)	1.34±0.04(4)	-	1.32±0.05(3)
Corrected ear width by site	-	-	0.86±0.04(3)	-	-	-
<i>Skull measurements (brain case)</i>						
Corrected frontal height by site	0.63±0.01(11)	0.64±0.01(8)	0.64±0.02(2)	0.63±0.01(4)	0.61±0.02(2)	0.64±0.01(5)
Corrected palatine length by site	0.24±0.01(11)	0.25±0.01(8)	0.26±0.01(3)	0.26±0.01(3)	0.25±0.02(2)	0.24±0.01(5)
<i>Skull measurements (muzzle)</i>						
Corrected basal length by site	1.66±0.02(10)	1.66±0.02(8)	1.69±0.03(3)	1.65±0.03(4)	1.72±0.04(2)	1.67±0.03(5)
Corrected nasal length by site	0.74±0.01(10)	0.78±0.02(8)	0.79±0.03(3)	0.73±0.02(4)	0.78±0.03(2)	0.76±0.02(5)
Corrected nasal width by site	0.29±0.01(10)	0.30±0.01(8)	0.31±0.01(3)	0.29±0.01(4)	0.29±0.01(2)	0.29±0.01(5)

Corrected muzzle width by site	0.34±0.01(11)	0.35±0.01(8)	0.36±0.01(3)	0.35±0.01(4)	0.36±0.02(2)	0.36±(0.01(5)
Corrected maxilla length by site	0.58±0.01(11)	0.55±0.01(8)	0.59±0.02(3)	0.53±0.02(3)	0.60±0.03(2)	0.58±0.02(5)
Corrected premaxilla length by site	0.39±0.01(11)	0.37±0.01(8)	0.39±0.02(3)	0.35±0.02(3)	0.33±0.02(2)	0.37±0.01(5)
<i>Skull measurements (lower jaw)</i>						
Corrected mandible length by site	1.32±0.01(11)	1.33±0.02(8)	1.34±0.03(3)	1.34±0.03(3)	1.34±0.04(2)	1.30±0.02(4)
<i>Skull measurements (nerves)</i>						
Mandible nerve length by site	-	-	0.11±0.01(3)	-	0.09±0.02(2)	0.11±0.01(5)
Orbital nerve length by site	0.20±0.01(11)	0.22±0.01(7)	0.22±0.01(3)	0.22±0.01(4)	0.20±0.01(2)	0.19±0.01(5)

S1 (continued). Summary of corrected male measurements for each site. South-east Queensland and eastern New South Wales. (See Figure 1 for locations and present taxonomic status.)

Character	Injune, Qld	Coolatai, NSW	Jeogla, NSW	Mittagong, NSW
<i>External body measurements</i>				
Corrected head length by site	1.24±0.11(8)	1.28±0.015(5)	1.26 (1)	1.22 (1)
Corrected foot length by site	3.27±0.04(19)	3.43±0.07(5)	3.50 (1)	3.14 (1)
Corrected leg length by site	5.19±0.06(17)	5.40±0.10(5)	5.22 (1)	5.01(1)
Corrected total length by site	19.65±0.23(18)	20.51±0.44(5)	20.09 (1)	18.80 (1)
Corrected ear length by site	1.36±0.02(19)	1.38±0.04(4)	-	1.19 (1)
Corrected ear width by site	0.92±0.03(8)	0.92±0.04(4)	-	0.82 (1)
<i>Skull measurements (brain case)</i>				
Corrected frontal height by site	0.64±0.01(18)	0.66±0.01(7)	0.64(1)	0.64(1)
Corrected palatine length by site	0.24±0.01(19)	0.25±0.01(7)	-	0.23(1)
<i>Skull measurements (muzzle)</i>				
Corrected basal length by site	1.66±0.01(19)	1.75±0.02(7)	1.76 (1)	1.66 (1)
Corrected nasal length by site	0.76±0.01(19)	0.80±0.02(7)	0.79 (1)	0.73(1)
Corrected nasal width by site	0.29±0.01(18)	0.31±0.01(7)	0.31 (1)	0.31 (1)

Corrected muzzle width by site	0.35±0.01(19)	0.38±0.01(7)	0.36((1)	0.39(1)
Corrected maxilla length by site	0.56±0.01(19)	0.58±0.01(7)	0.54(1)	0.58(1)
Corrected premaxilla length by site	0.37±0.01(18)	0.39±0.01(7)	0.44(1)	0.37(1)
<i>Skull measurements (lower jaw)</i>				
Corrected mandible length by site	1.30±0.01(18)	1.34±0.02(7)	1.30(1)	1.33(1)
<i>Skull measurements (nerves)</i>				
Mandible nerve length by site	0.09±001(8)	0.10±0.01(7)	0.09(1)	0.12(1)
Orbital nerve length by site	0.21±0.003(19)	0.20±0.01(7)	0.20(1)	0.21(1)

Table S2. Summary of corrected female measurements for each site. South Australia, western New South Wales and western Queensland. (See Figure 2 for locations and present taxonomic status.)

Character	Site					
	Balcanoona, SA	Yandama, NSW	Fowlers Gps, NSW	Adavale, Qld	Aramac, Qld	West Tambo, Qld
<i>External body measurements</i>						
Corrected head length by site	1.21±0.01(5)	0.23±0.02(2)	1.21±0.01(51)	1.21±0.01(6)	-	-
Corrected foot length by site	3.16±0.06(5)	3.25±0.09(2)	3.11±0.02(43)	2.98±0.05(6)	-	3.32±0.08(3)
Corrected leg length by site	4.79±0.08(5)	4.81±0.13(2)	4.78±0.03(42)	4.79±0.08(6)	-	4.83±0.11(3)
Corrected total length by site	18.77±0.41(5)	20(1)	18.7±0.14(42)	18.45±0.38(6)	-	18.84±0.53(3)
Corrected ear length by site	-	-	1.60±0.02(24)	1.48±0.03(6)	-	1.48±0.04(3)
Corrected ear width by site	-	-	1.06±0.01(24)	0.97±0.03(6)	-	-
<i>Skull measurements (brain case)</i>						
Corrected frontal height by site	0.66±0.01(5)	0.65±0.02(2)	0.66±0.01(42)	0.65±0.01(5)	0.65±0.02(6)	0.65±0.01(3)
Corrected parietal length by site	0.25±0.01(4)	0.22±0.02(2)	0.25±0.01(42)	0.22±0.01(6)	0.23±0.01(6)	0.25±0.01(3)
<i>Skull measurements (muzzle)</i>						
Corrected basal length by site	1.67±0.02(5)	1.68±0.03(2)	1.71±0.01(45)	1.64±0.02(6)	1.60±0.02(6)	1.62±0.03(3)
Corrected nasal length by site	0.71±0.02(5)	0.71±0.03(2)	0.72±0.01(43)	0.70±0.02(5)	0.74±0.02(4)	0.75±0.02(3)
Corrected nasal width by site	0.29±0.01(5)	0.26±0.01(2)	0.28±0.01(44)	0.27±0.01(6)	0.29±0.01(6)	0.29±0.01(3)

Corrected muzzle width by site	0.35±0.01(5)	0.35±0.01(2)	0.36±0.01(45)	0.36±0.01(6)	0.33±0.01(6)	0.32±0.01(3)
Corrected maxilla length by site	0.59±0.02(5)	0.58±0.02(2)	0.58±0.01(44)	0.61±0.01(6)	0.56±0.01(6)	0.55±0.02(3)
Corrected premaxilla length by site	0.36±0.01(5)	0.37±0.02(2)	0.38±0.001(44)	0.36±0.01(6)	0.34±0.01(6)	0.37±0.01(3)
<i>Skull measurements (lower jaw)</i>						
Corrected mandible length by site	1.31±0.02(5)	1.32±0.03(2)	1.34±0.01(45)	1.31±0.02(6)	1.34±0.03(2)	1.31±0.03(3)
<i>Skull measurements (nerves)</i>						
Mandible nerve length by site	0.12±0.015)	0.11±0.01(2)	0.12±0.01(42)	0.09±0.01(6)	0.10±0.01(6)	-
Orbital nerve length by site	0.23±0.01(5)	0.23±0.02(2)	0.23±0.01(44)	0.22±0.01(6)	0.19±0.01(6)	0.19±0.01(3)

S2 (continued). Summary of corrected female measurements for each site. Central and North-eastern Queensland. *Combined sample from Townsville, Ravenswood and Torrens Creek. (See Figure 1 for locations and present taxonomic status.)

Character	Site				
	East Tambo, Qld	Springsure, Qld	Clermont, Qld	Mitchell, Qld	'reginae', Qld*
<i>External body measurements</i>					
Corrected head length by site	-	1.20±.01(6)	-	-	-
Corrected foot length by site	3.10±0.08(3)	3.04±0.05(7)	-	3.06±0.08(3)	3.13±0.08(3)
Corrected leg length by site	4.77±0.11(3)	4.77±0.07(7)	-	4.84±0.11(3)	-
Corrected total length by site	18.34±0.53(3)	17.82±0.35(7)	-	18.52±0.53(3)	-
Corrected ear length by site	1.40±0.03(3)	1.36±0.03(6)	1.30±0.03(8)	1.45±0.04(3)	1.32±0.04(3)
Corrected ear width by site	-	-	0.92±0.03(8)	-	-
<i>Skull measurements (brain case)</i>					
Corrected frontal height by site	0.62±0.01(3)	0.63±0.01(7)	0.61±0.01(9)	0.67±0.01(3)	0.62±0.01(3)
Corrected parietal length by site	0.26±0.01(3)	0.25±0.01(7)	0.25±0.01(8)	0.26±0.01(3)	0.23±0.01(3)
<i>Skull measurements (muzzle)</i>					
Corrected basal length by site	1.57±0.03(3)	1.60±0.02(7)	1.65±0.01(9)	1.69±0.03(3)	1.58±0.03(3)
Corrected nasal length by site	0.72±0.02(3)	0.71±0.02(7)	0.73±0.01(9)	0.78±0.02(3)	0.69±0.02(3)
Corrected nasal width by site	0.28±0.01(3)	0.30±0.01(7)	0.29±0.01(9)	0.28±0.01(3)	0.28±0.01(3)

Corrected muzzle width by site	0.32±0.01(3)	0.33±0.01(7)	0.34±0.01(9)	0.33±0.01(3)	0.34±0.01(3)
Corrected maxilla length by site	0.55±0.02(3)	0.52±0.01(7)	0.55±0.02(9)	0.63±0.02(3)	0.57±0.02(3)
Corrected premaxilla length by site	0.33±0.01(3)	0.36±0.01(7)	0.36±0.01(9)	0.38±0.01(3)	0.33±0.01(3)
<i>Skull measurements (lower jaw)</i>					
Corrected mandible length by site	1.28±0.03(3)	1.27±0.02(7)	1.31±0.02(9)	1.31±0.03(3)	1.26±0.03(3)
<i>Skull measurements (nerves)</i>					
Mandible nerve length by site	-	-	0.11±0.01(9)	-	0.08±0.01(3)
Orbital nerve length by site	0.20±0.01(3)	0.20±0.01(7)	0.20±0.01(9)	0.21±0.01(3)	0.18±0.01(3)

S2 (continued). Summary of corrected female measurements for each site. South-east Queensland and eastern New South Wales. (See Figure 2 for locations and present taxonomic status.)

Character	Site			
	Injune, Qld	Coolatai, NSW	Jeogla, NSW	Mittagong, NSW
<i>External body measurements</i>				
Corrected head length by site	1.24±0.01(11)	1.29±0.01(6)	1.21(1)	1.27(1)
Corrected foot length by site	3.06±0.03(15)	3.14±0.05(7)	3.10(1)	3.02±0.09(2)
Corrected leg length by site	4.88±0.05(15)	4.83±0.08(6)	4.64(1)	4.69(1)
Corrected total length by site	18.42±0.24(15)	18.62±0.35(7)	18.92(1)	18.06±0.65(2)
Corrected ear length by site	1.41±0.02(13)	1.36±0.04(4)	-	1.21±0.05(2)
Corrected ear width by site	0.99±0.03(8)	1.02±0.04(4)	-	0.84±0.05(2)
<i>Skull measurements (brain case)</i>				
Corrected frontal height by site	0.64±0.01(15)	0.66±0.01(7)	0.62(1)	0.66±2)
Corrected parietal length by site	0.25±0.01(15)	0.24±0.01(7)	0.23(1)	0.24±0.02(2)
<i>Skull measurements (muzzle)</i>				
Corrected basal length by site	1.61±0.01(15)	1.62±0.02(7)	1.67(1)	1.65±0.03(2)
Corrected nasal length by site	0.71±0.01(13)	0.74±0.02(7)	0.79(1)	0.78±0.03(2)
Corrected nasal width by site	0.30±0.01(15)	0.29±0.01(7)	0.32(1)	0.32±0.01(2)

Corrected muzzle width by site	0.35±0.01(15)	0.34±0.01(7)	0.41(1)	0.35±0.01(2)
Corrected maxilla length by site	0.53±0.01(15)	0.52±0.01(7)	0.54(1)	0.57±0.02(2)
Corrected premaxilla length by site	0.37±0.01(15)	0.37±0.01(7)	0.41(1)	0.38±0.02(2)
<i>Skull measurements (lower jaw)</i>				
Corrected mandible length by site	1.29±0.01(15)	1.24±0.02(7)	1.33(1)	1.28±0.03(2)
<i>Skull measurements (nerves)</i>				
Mandible nerve length by site	0.12±0.01(10)	0.09±0.01(7)	0.11(1)	0.11(0.01(2)
Orbital nerve length by site	0.19±0.01(15)	0.20±0.01(7)	0.18(1)	0.21±0.02(2)

Table S3. Comparison of male and female skull and body measurement (corrected by basal width) based on euro data set from Fowlers Gap.

Character	Female	Male	t-Test		
	m±SE(N)	m±SE(N)	d.f	t-value	Probability
<i>Age</i>					
<i>External body measurements</i>					
Corrected head length by site	1.217±0.004(51)	1.215±0.004(55)	104	0.369	0.713ns
Corrected foot length	3.106±0.022(43)	3.304±0.022(43)	84	6.256	<0.0001***
Corrected leg length	4.781±0.030(42)	5.31±0.030(42)	82	12.659	<0.0001***
Corrected total length	18.713±0.145(42)	20.426±0.144(43)	83	8.348	<0.0001***
Corrected ear length	1.603±0.018(24)	1.587±0.0178(25)	47	0.599	0.552ns
Corrected ear width	1.060±0.014(24)	1.062±0.014(25)	47	0.121	0.904ns
<i>Skull measurements (brain case)</i>					
Corrected frontal height	0.664±0.004(42)	0.660±0.004(37)	77	0.606	0.547ns
Corrected parietal length	0.249±0.004(42)	0.252±0.004(43)	83	0.565	0.574ns
<i>Skull measurements (muzzle)</i>					
Corrected basal length	1.715±0.007(45)	1.774±0.008(43)	86	5.549	<0.0001***
Corrected nasal length	0.715±0.006(43)	0.760±0.006(42)	83	4.967	<0.0001***
Corrected nasal width	0.278±0.002(44)	0.286±0.002(42)	84	2.081	0.04*

Corrected muzzle width	0.356±0.004(45)	0.385±0.004(41)	84	5.594	<0.0001***
Corrected maxilla length	0.583±0.005(44)	0.615±0.006(43)	85	4.128	<0.0001***
Corrected premaxilla length	0.378±0.004(44)	0.393±0.004(41)	83	2.901	0.005**
<i>Skull measurements (lower jaw)</i>					
Corrected mandible length	1.345±0.007(45)	1.378±0.007(43)	86	3.518	0.001**
<i>Skull measurements (nerves)</i>					
Mandible nerve length	0.117±0.003(42)	0.108±0.003(42)	82	1.99	0.05*
Orbital nerve length by site	0.223±0.003(44)	0.234±0.003(43)	85	2.48	0.015*

Table S4. A summary of the analysis of variance results for each character (corrected by basal width) by collecting site.

Character	Female			male		
	d.f	F ratio	Probability	d.f	F ratio	Probability
Age by site	100	1.79	0.067ns	91	1.1	0.375ns
<i>External body measurements</i>						
Corrected head length by site	8	6.59	<0.0001***	9	2.69	0.009***
Corrected foot length by site	12	1.74	0.07ns	12	0.05	0.06
Corrected leg length by site	11	0.8	0.63ns	12	1.66	0.09
Corrected total length by site	11	0.92	0.53ns	12	1.84	0.04*
Corrected ear length by site	10	16.91	<0.0001***	10	17.39	<0.0001***
Corrected ear width by site	5	7.51	<0.0001***	5	10.85	<0.0001***
<i>Skull measurements (brain case)</i>						
Corrected frontal height by site	14	2.8	0.002**	16	1.89	0.03*
Corrected parietal length by site	14	1.85	0.04*	15	1.75	0.051ns
<i>Skull measurements (muzzle)</i>						
Corrected basal length by site	14	10.12	<0.0001***	16	5.63	<0.0001***
Corrected nasal length by site	14	1.73	0.06ns	16	1.23	0.25ns
Corrected nasal width by site	14	2.3	0.008**	16	1.33	0.19ns

Corrected muzzle width by site	14	3.9	<0.0001***	16	3.37	<0.0001***
Corrected maxilla length by site	14	5.45	<0.0001***	16	3.23	0.0001***
Corrected premaxilla length by site	14	2.28	0.005***	16	3.28	0.0001***
<i>Skull measurements (lower jaw)</i>						
Corrected mandible length by site	14	4.02	<0.0001***	16	2.79	0.001***
<i>Skull measurements (nerves)</i>						
Mandible nerve length by site	10	3.58	0.0006***	16	2.79	0.001***
Orbital nerve length by site	14	2.98	0.0007***	16	2.79	0.001***

Fig. S1. Figure showing the measurements used in this study.

