Rovinsky et al. 2020
Supplemental Material

S1: Notes on historical thylacine body masses
Recorded thylacine body masses

Crisp (1855)

The specimen (male) described by Crisp (1855) resided at the Zoological Society of London (ZSL) Gardens after being snared in Tasmania in 1849 until its death (possibly in 1853; Sleightholme & Campbell, 2018). Crisp noted that the animal was "excessively fat" at the time of death, was weighed at 33 lbs (~15 kg), and measured 2 ft. 9.5 in. (approx. 851 mm) from nose to root of tail, with a tail 15 inches (381 mm) in length.

ZSL London Zoo Death Book No. 739 (1914)

This specimen was a female, purchased from the Beaumaris Zoo, Hobart, in April of 1910. The animal died June 1914, and had a recorded weight of 29 pounds (~13.2 kg) in the post mortem record.

ZSL London Zoo Death Book No. 1426 (1914)

This male specimen, was purchased from the Beaumaris Zoo, April 1914. It died seven months later in November of 1914. Recorded mass in the post mortem was 57.5 pounds (~26.1 kg).

Berns & Ashwell (2017)

The thylacine in Berns & Ashwell (Berns & Ashwell, 2017), is specimen USNM 125345 (14.97 kg).This is the male pouched young in the Joseph M. Gleeson 1902 'Family portrait' – the only known painting from life of a thylacine and her offspring. The specimen entered the collection records in January 1905, and so was at least 2-3 years of age at death. Notably, the M4 had not reached full occlusal position at the time of death, indicating that the specimen was not yet a dentally mature adult (see: Smithsonian National Museum of Natural History Mammal Collections: http://n2t.net/ark:/65665/30f03f85e-2a54-45ee-b968-46d8de58a9ec).

These four recorded masses (one female, three males) average to 17.3 kg.

Periodical reports.

Weights bolded (emphasis and metric conversion my own).

Sydney Gazette, 21/4/1805, p.3, quoting correspondence by Lt. Governor William Paterson:

"An animal of a truly singular and novel description was killed by dogs the 30th of March on a hill immediately contiguous to the settlement at Yorkton Port Dalrymple; from the following minute description of which, by Lieutenant Governor PATERSON, it must be considered of a species perfectly distinct from any of the animal creation hitherto known, and certainly the only powerful and terrific of the carnivorous and voracious tribe yet discovered on any part of New Holland or its adjacent islands.

‘It is very evident his species is destructive, and lives entirely on animal food; as on dissection his stomach was found filled with a quantity of kangaroo, weight 5 lbs, the weight of the whole animal **45 lbs (20.4 kg)**. From its interior structure it must be a brute peculiarly quick of digestion; the dimensions were, from the nose to the eye 4 ½ inches; length of the eye, which is remarkable large and black, 1 ¾ inches; breadth of the eye ¾ of an inch; from the nose to the extent of the mouth in the upper jaw, 6 inches; and to the extent of the under jaw, 4 ½; breadth of the forehead, 5 ¾ inches; from the eye to the ear, 3 ¾ inches; the ear round, diameter 3 inches; from the ear to the shoulder, 1 foot; from the shoulder to the first stripe, 7 inches; from the first stripe to the extent of the body, 2 feet; length of the tail, 1 foot 8 inches; length of the fore leg 11 inches; and of the forefoot, 5 inches; the forefoot with 5 blunt claws; height of the animal before, 1 foot 10 inches; stripes across the back 20, on the tail 3; 2 of the stripes extend down each thigh; length of the hind leg from the heel to the thigh, 1 foot; length of the hind foot, 6 inches; the hind foot with 4 blunt claws, the soles of the feet without hair; on each side of the mouth are 19 bristles, length of each 4 inches; and 6 bristles on each side under the ear, 9 on the lower jaw upon each side, and 8 under the throat; 8 fore teeth in the upper and lower jaw, 3 single teeth also in each; 4 tusks, or canine teeth, length of each 1 inch; circumference of the head before the ears, 1 foot 6 inches, and behind the ears, 1 foot 5 inches; smallest part of neck, 1 foot 4 inches; circumference before the shoulder, 2 feet; the body short hair and smooth, of a greyish colour, the stripes black; the hair on the neck rather longer than that on the body; the hair on the ears of a light brown colour, on the inside rather long. The form of the animal is that of the hyaena, at the same time strongly reminding the observer of the appearance of a low wolf dog. The lips do not appear to conceal the tusks.’”

Launceston Examiner, 14/3/1868, p.2:

“ENCOUNTER WITH A HYENA.—On Thursday, the 4th instant, Mrs. Thomas Harman—who resides in a lonesome place about a mile from the Black River bridge—was much disturbed in the absence of her husband by hearing a noise among some young pigs, and on going to ascertain the cause was immediately attacked by a spotted hyena which followed her to the house, somewhat checked by a little dog. Mrs. Harman procured a large stick or bludgeon and again sallied forth. Two small dogs had then attacked the animal; one fastened itself to the throat of the hyena, and prevented the ferocious brute from using its full power, thus enabling Mrs. Hartman to kill it after a considerable battle.

The hyena though common on this side of Tasmania is seldom seen and rarely visits the settled parts. I killed one of them some years ago weighing **72 lbs (32.7 kg)**. after it had destroyed 25 sheep—eight of them in one night. I put the sheep afterwards in my barn-yard, and had a watch kept. The hyena came as soon as it was dark and killed a sheep, but was shot down with coarse slugs of lead, when he made a furious onslaught on the man, who fought for his life, breaking a double-barrel gun to pieces in the fight. The hyena has immensely powerful teeth and equally strong jaws, enabling him to break almost any bone with perfect ease.”

Cornwall Chronicle, 2/9/1868, p.4:

“NATIVE TIGER.—A large specimen of the Tasmanian tiger was caught in a kangaroo snare, at the Silver Mines, last week. It weighed **67 lbs. (30.4 kg)**, and had a mouth well filled with wolf-like teeth. The skin has been forwarded to Mr John Thomson.”

Le Soef, 1875 (in Commissioners of the Victorian Intercolonial Exhibition), p.261:

“The devil and Tasmanian tiger are formidable beasts, and make great havoc amongst the flocks. The tiger is a low, long-bodied animal, with powerful forequarters, and a dog-like head, weighing sometimes from **60 lb. to 70 lb (27.2—31.8 kg)**. The devil, though not so large, is far more hideous in appearance than the tiger.”

Launceston Examiner, 28/5/1887, p.2:

"TASMANIAN TIGER.—We have been shown the skin of a very fine specimen of a Tasmanian tiger, bearing sixteen stripes, which was recently killed by Mr. W. T. Freeman, at Harrymount, near Avoca, the property of Mr. Frank O'Connor, of Benham. His tigership measured five feet from tip to tip, and weighed about **60 lbs. (27.2 kg)**, while his height was about 2ft. 6in. We understand that the skeleton of the animal has been secured by a naturalist, who is on a visit to Tasmania for the Calcutta Museum, by whom two native devil skeletons were also recently secured at Bonney's Plains, the property of Mr. J. Rigney, for the same institution."

Launceston Examiner, 22/11/1887, p.2:

"FROM a correspondent we learn that a large native tiger was recently killed on Christmas-hill (near Elizabeth Town), about a mile from Forest Hall, by Messrs. Jas. and E. Aylett and A. Walsh. Their sheep dogs started the tiger and brought him to bay, and the men ran up thinking a badger had been found. On seeing it was a tiger E. Aylett caught it by the tail and held it till Walsh came up with an axe and killed it. The animal measured 7ft. from the tip of his nose to the end of his tail, and weighed **65.5 lb (29.7 kg)**. Mr. Aylett intends having the skin stuffed. One would have thought these animals had long since deserted so old a settled district as that in which this tiger was found."

Wellington Times, 28/7/1892, p.2:

"HOUSETOP NOTES.—Our correspondent writes under Tuesday's date:—The weather here for the past month has been worse than any experienced for many years. The prospects of the claims are very good, the Burnie Tin Association have a splendid looking lode 8 lb to 10 lb of 60 per cent ore to the dish can be washed out of the best of it, and the whole formation, 4ft wide, carries tin; the alluvial s also payable. A large native tiger was caught here on Friday last by Mr. A. Tengdahl; the animal weighed **116 lbs (52.6 kg)** and the skin measures 6ft 7in long by 4ft across. He was caught in a spring snare, but broke the springer and got away for a considerable distance, but the broken portion of the pole caught in some bushes, and by going round and round he got hopelessly entangled and was shot. The beast is the largest of the kind I have heard of and has a beautifully marked skin with 17 broad black stripes across its back."

Notes on specific thylacines.

These anecdotal reports seem to range from the extremely detailed and believable, such as that of Paterson (1805), to those that are somewhat more fanciful and invite scepticism.

If the Wellington Times (1892) thylacine was 6ft 7in (2007 mm) long, then by the principle of geometric similitude with the Paterson 1805 thylacine (approx. 6ft ¾in [1848 mm] from the above detailed description), the Wellington Times thylacine would be expected to weigh approximately 26.1 kg, not the stated 52.6 kg. Similarly, the Launceston Examiner (28/5/1887) thylacine, measured at 5 ft (1524 mm) from "tip to tip" would be expected to weigh approximately 11.4 kg, not the stated ~27.2 kg (~60 lbs).

In contrast, the "large" Launceston Examiner (22/11/1887) thylacine, measured at 7ft (2134 mm) would be expected to weigh approximately 31.4 kg, only 5.7% difference from the stated 29.7 kg (65.5 lbs). This serves to underscore the disparity between reliable and potentially unreliable anecdotal reports, and the difficulty in assessing their veracity.

It is evident from reading Le Soef (1875) that the upper limit of the thylacine's size was being addressed "…sometimes from 60 lb to 70 lb…", not an average size range, and perhaps inflated to 'upsell' the exhibition. It is likely, though unprovable, that the above specimens, regardless of actual size, also represent this upper limit bias. It is admittedly a "just so" expectation, but with a bounty in place by the 1830's, we could expect the sighting and capture of a thylacine to be a relatively routine occurrence, with only outstanding specimens being newsworthy. Note how often adjectives such as "large", "fine", etc., occur in the periodical reports.

A comparison with the four masses provided in the scientific literature (~17.3 kg) and those given in the periodicals shows a dramatic difference. The mean value for the masses in the periodicals is 31.5 kg, and even removing the Wellington Times (1892) value as an outlier gives a mean mass of over 28 kg, nearly 40% larger than the values given in the literature.

References S1

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S2: Specimen list

Table S2a: Specimen list. The “Linear metrics”, “Body mass”, and “3D GM” columns indicate if the specimen was analysed via those methods.

Specimen	Sex	Cranium	Mandible	Postcrania	Scan type	Linear metrics	Body mass	3D GM
AM M 1821	U	Yes	Yes		Surface	Yes	Yes	
AM M 19465	M	Yes	Yes		Surface	Yes	Yes	Yes
AM M 27836	U	Yes			Surface	Yes	Yes	
AM M 401	U	Yes	Yes		Surface	Yes	Yes	
AM M 402	U	Yes	Yes		Surface	Yes	Yes	
AM M 763	U	Yes	Yes		Surface	Yes	Yes	
AM M 767	U	Yes			Surface		Yes	
AM M 768	U	Yes	Yes		Surface	Yes	Yes	
AM M 769	U	Yes	Yes		Surface	Yes	Yes	
AM M 771	U	Yes	Yes		Surface	Yes	Yes	
AM M 788	U	Yes	Yes		Surface		Yes	
AM M 789	U	Yes	Yes		Surface		Yes	
AMNH 144316	M	Yes	Yes		Surface	Yes	Yes	
AMNH 146829	U	Yes			Surface	Yes	Yes	
AMNH 35244	M	Yes	Yes	Yes	Surface	Yes	Yes	
AMNH 35866	U	Yes	Yes	Yes	Surface	Yes	Yes	
AMNH 42259	U			Yes	Surface		Yes	
NHMUK ZD 1963.8.30.1	M	Yes	Yes	Yes	Surface	Yes	Yes	
NHMUK ZD 1972.175	M	Yes	Yes		Surface		Yes	
NHMUK ZD 1839.6.11.3	F	Yes	Yes		Surface	Yes	Yes	Yes
NHMUK ZD 1846.4.4.1	M	Yes	Yes		Surface	Yes	Yes	Yes
NHMUK ZD 1852.1.16.7	F	Yes	Yes		Surface	Yes	Yes	Yes
NHMUK ZD 1852.1.16.8	F	Yes	Yes		Surface	Yes	Yes	
NHMUK ZD 1972.665	M	Yes			Surface	Yes	Yes	Yes
NHMUK ZD 1972.666	F	Yes	Yes		Surface	Yes	Yes	Yes
NHMUK ZD 1883.8.22.1	M	Yes			Surface	Yes	Yes	
NHMUK ZD 1893.4.13.1	F	Yes	Yes		Surface	Yes	Yes	
LEEDM C.1869.46.2.4088	U	Yes	Yes		Surface	Yes	Yes	
LEEDM C.1869.46.4.4087	U	Yes	Yes		Surface	Yes	Yes	
LEEDM C.1869.46.5.4091	U	Yes	Yes		Surface	Yes	Yes	
NHM 1000	U	Yes	Yes		Surface		Yes	
NHM 1002	U	Yes	Yes		Surface	Yes	Yes	
USNM 124662	F	Yes	Yes	Yes	CT	Yes	Yes	
USNM 155407	M	Yes	Yes	Yes	CT	Yes	Yes	
USNM 38801	M	Yes	Yes	Yes	CT		Yes	
NMV C 2163.1	M	Yes	Yes		Surface		Yes	

NMV C 28178	U	Yes	Yes	Yes	Surface		Yes	
NMV C 28744	F				Surface		Yes	
NMV C 5741.2	F			Yes	Surface		Yes	
NMV C 5742.1	F	Yes	Yes	Yes	Surface	Yes	Yes	Yes
NMV C 5746.1	M	Yes	Yes	Yes	Surface	Yes	Yes	
NMV C 5748.1	F	Yes	Yes		Surface	Yes	Yes	
NMV C 5749	M	Yes	Yes		Surface	Yes	Yes	Yes
NMV C 5750.1	F	Yes			Surface	Yes	Yes	
NMV C 5752.2	F			Yes	Surface		Yes	
NMW 19.330.46	U	Yes	Yes		Surface	Yes	Yes	
NMW 27.409.9	U	Yes	Yes		Surface	Yes	Yes	
NRM 566599	F	Yes	Yes	Yes	CT	Yes	Yes	
QM 11445	U	Yes	Yes		Surface		Yes	
QM 11446	U	Yes	Yes		Surface		Yes	
QM 1968	U	Yes	Yes		Surface		Yes	
QVM 1958:1:27	M	Yes	Yes		Surface		Yes	
QVM 1958:1:29	U	Yes	Yes		Surface		Yes	
QVM 1962:1:54	U	Yes	Yes		Surface	Yes	Yes	
QVM 1962:1:57	U	Yes			Surface	Yes	Yes	
RBINS 31.Z	U	Yes	Yes		Surface	Yes	Yes	
RBINS 32	U	Yes	Yes		Surface	Yes	Yes	
RBINS 32.B	U	Yes	Yes		Surface	Yes	Yes	
SAM M 1953	M	Yes	Yes		Surface	Yes	Yes	Yes
SAM M 1955	U	Yes	Yes		Surface	Yes	Yes	
SAM M 1959	F	Yes	Yes	Yes	Surface	Yes	Yes	Yes
SAM M 1960	U	Yes	Yes	Yes	Surface	Yes	Yes	
SAM M 922	F	Yes	Yes		CT	Yes	Yes	Yes
SAM M 95	M	Yes	Yes	Yes	Surface	Yes	Yes	Yes
SMNS Z-MAM 002019	M	Yes	Yes	Yes	Surface	Yes	Yes	
TMAG A 1238	U	Yes			Surface	Yes	Yes	
TMAG A 1239	U	Yes			Surface		Yes	
TMAG A 1240	U	Yes	Yes		Surface		Yes	
TMAG A 1242	U	Yes			Surface	Yes	Yes	
TMAG A 1244	U	Yes			Surface	Yes	Yes	
TMAG A 1245	U	Yes			Surface		Yes	
TMAG A 1246	U		Yes		Surface		Yes	
TMAG A 1276	U	Yes	Yes		Surface	Yes	Yes	
TMAG A 1298	M				Surface		Yes	
TMAG A 1989	U		Yes	Yes	Surface		Yes	
TMAG A 1990	U				Surface		Yes	
TMAG A 2062	U		Yes		Surface		Yes	
TMAG A 2313	U		Yes		Surface		Yes	
TMAG A 244	U	Yes	Yes		Surface	Yes	Yes	
TMAG A 2455	U		Yes	Yes	Surface		Yes	
TMAG A 295	U	Yes	Yes		Surface	Yes	Yes	
TMAG A 297	U	Yes	Yes	Yes	Surface	Yes	Yes	

TMAG A 312	F	Yes	Yes	Yes	Surface		Yes	
TMAG A 315	M	Yes	Yes		Surface		Yes	
TMAG A 321	M	Yes	Yes	Yes	Surface	Yes	Yes	Yes
TMAG A 890	U	Yes	Yes		Surface	Yes	Yes	
UMZC A6.7/19	U	Yes	Yes		Surface	Yes	Yes	
UMZC A6.7/3	U	Yes		Yes	Surface	Yes	Yes	
UMZC A6.7/8	F	Yes	Yes	Yes	Surface	Yes	Yes	Yes
WAM 195	U	Yes	Yes	Yes	Surface	Yes	Yes	
ZMB Mam 2986	M	Yes	Yes		Surface	Yes	Yes	
ZMB Mam 4264	F		Yes		Surface	Yes	Yes	
ZMB Mam 47902	M	Yes	Yes		Surface	Yes	Yes	

Table S2b: Morphosource DOIs for volumetric models.

Specimen	Description	doi
NMV C 28178	Textured volumetric sculpture	doi:10.17602/M2/M117328
NMV C 28178	Complete skeleton	doi:10.17602/M2/M117619
NMV C 28744	Taxidermied skin (mounted)	doi:10.17602/M2/M117324
NRM 566599	Complete skeleton	doi:10.17602/M2/M117337
NRM 566599	External surface of alcohol preserved specimen	doi:10.17602/M2/M117338
TMAG A312	Textured volumetric sculpture	doi:10.17602/M2/M117333
TMAG A 1298	Taxidermied skin (mounted)	doi:10.17602/M2/M117336
TMAG A 315	Complete skeleton (mounted)	doi:10.17602/M2/M117334
TMAG A 315	Textured volumetric sculpture	doi:10.17602/M2/M117335
TMAG A312	Complete skeleton	doi:10.17602/M2/M117618

Note on S2:

We chose to reassign one sexed specimen (UMZC A6.7/3) to unknown. The specimen is listed in collections as male, and is noted to have derived from the skin UMZC A6.7/4. Moeller (1968) expressed doubt as to the correct sex assignment of the cranium and the attribution to the skin. We have not been able to inspect the skin for sex characteristics, but note that the cranium is adult, but very small and gracile, even if female (CBL: 189.6 mm; female mean 196.3, SD 8.96; see **Table S11** below). With this history in mind and the strongly aberrant size of the specimen, we feel that it is more conservative to change the sex to unknown in the analyses and attempt to *post hoc* assign the sex.

References S2

Moeller HF. 1968. Zur Frage der Parallelerscheinungen bei Metatheria und Eutheria: Vergleichende Untersuchungen an Beutelwolf und Wolf. *Zeitschrift für Wissenschaftliche Zoologie* 177:283-392.

S4: Diet and body mass data.

Table S4a: Specimen diet, body mass, and prey size. "Ref" number refers to reference list below in **Table S4b**.

Taxa	Mass (kg)	Prey mass (kg)	Reference
Acinonyx jubatus	46.50	36.00	Hayward et al., 2006
Atilax palidunosis	3.30	0.05	Baker, 1989
Bassariscus sumichrasti	0.75	0.03	Carbone et al., 2007
Canis lupaster	11.00	2.00	McShane & Grettenberger, 1984
Canis aureus	11.00	1.00	Lanszki & Heltai, 2002; Giannatos et al., 2010
Dingo	15.00	10.00	Whitehouse, 1977; Newsome et al., 1983; Paltridge, 2002
Canis latrans	13.30	5.00	Andelt et al., 1987; Kitchen et al., 1999
Canis lupus	50.00	50.00	Gade-Jorgensen & Stagegaard, 2000; Capitani et al., 2003; Reed et al., 2006; Stenglein et al., 2011
Canis simensis	14.70	1.00	Sillero-Zubiri & Goettelli, 1995
Caracal caracal	12.80	5.00	Melville et al., 2004; Braczkowski et al., 2012
Chironectes minimus	0.70	0.05	Galliez et al., 2009; Marshall, 1978
Chrysocyon brachyurus	22.00	2.00	Motta-Junior et al., 1996
Civettictus civetta	13.50	1.00	Angelici, 2000
Crocuta crocuta	62.50	100.00	Holekamp et al., 1997; Hayward, 2006
Cryptoprocta ferox	7.10	1.30	Dollar et al., 2007
Cuon alpinus	19.00	160.00	Johnsingh, 1982; Hayward et al., 2014
Dasyurus geoffroyii	1.10	0.13	Soderquist & Serena, 1999
Dasyurus hallucatus	0.60	0.05	Oakwood, 1997; Pollock, 1999
Dasyurus maculatus	2.70	2.80	Belcher, 1995; Glen & Dickman, 2006
Dasyurus viverrinus	1.10	0.01	Blackhall, 1980; Godsell, 1983
Didelphis marsupialis	3.00	0.12	Cordero & Nicolas, 1987
Felis chaus	6.56	0.93	Carbone et al., 2007
Felis lybica	3.90	0.50	Palmer & Fairall, 1988
Galerella sanguinea	0.60	0.10	Graw & Manser, 2017
Genetta maculata	1.90	0.10	Angelici, 2000; Angelici & Luiselli, 2005
Gulo gulo	19.50	2.00	Landa et al., 1997; Dalerum et al., 2009; Koskela et al., 2013

Herpailurus yagouaroundi	6.80	1.00	Tófoli et al., 2009
Leopardus pardalis	12.50	1.00	de Villa Meza et al., 2002; Abreu et al., 2007
Leptailurus serval	14.00	0.05	Nbowland & Perrin, 1993
Lupulella adustus	10.30	3.00	Atkinson et al., 2002
Lupulella mesomelas	14.50	3.00	Bothma, 1966; Loveridge & Macdonald, 2003
Lutreolina crassicaudata	0.70	0.05	Facure & Ramos, 2001; Caseres et al., 2002
Lycalopex culpaeus	8.90	2.00	Zapata et al., 2005
Lycalopex gymnocercus	5.40	0.01	Varela et al., 2008; Castillo et al., 2011
Lycaon pictus	27.00	50.00	Creel & Creel, 2002; Courchamp et al., 2002
Lynx lynx	27.00	15.00	Odden et al., 2006
Lynx pardinus	12.68	1.50	Carbone et al., 2007
Martes martes	1.10	0.12	Clevenger, 1993
Martes pennanti	4.43	0.78	Carbone et al., 2007
Meles meles	9.37	0.03	Carbone et al., 2007
Mephitis mephitis	3.50	0.01	Azevedo et al., 2005
Mungos mungo	1.44	0.01	Carbone et al., 2007
Mustela erminea	0.27	0.05	Carbone et al., 2007
Mustela frenata	0.15	0.02	Carbone et al., 2007
Mustela nivalis	0.09	0.03	Carbone et al., 2007
Mustela putorius	0.90	0.10	Carbone et al., 2007
Neovison vison	1.20	1.30	Gilbert & Nancekivell, 1981; Valenzuela et al., 2013
Nyctereutes procyonoides	6.07	0.05	Carbone et al., 2007
Otocyon megalotis	4.20	0.001	Bothma 1966; Klare et al., 2011
Panthera leo	140.50	137.25	Carbone et al., 2007
Panthera onca	69.30	31.00	Schaller & Vasconcelos, 1978; Rabinowitz & Nottigham, 1986; Farrell et al., 2000; de Oliveira, 2002
Panthera pardus	42.80	23.00	Johnson et al., 1993; Henschel et al., 2005
Panthera tigris	177.25	189.25	Carbone et al., 2007
Panthera uncia	52.00	52.00	Anwar et al., 2011; Chetri et al., 2017
Paradoxurus hermaphroditus	4.00	0.10	Nakashima et al., 2010
Philander opossum	0.40	0.03	Hershkovitz, 1997; Castro-Arellano et al., 2000

Procyon lotor	6.00	0.04	Schoonover & Marshall, 1951
Proteles cristata	8.33	0.001	Carbone et al., 2007
Puma concolor	66.50	28.70	Iriarte et al., 1990; Farrell et al., 2000; de Oliveira, 2002; Moreno et al., 2006
Sarcophilus harrisii	8.00	0.80	Jones & Barmuta, 1998; Pemberton et al., 2008
Speothus venaticus	6.00	4.00	Zeurcher et al., 2005; de Souza Lima et al., 2009
Urocyon cinereoargenteus	5.00	0.04	Hockman & Chapman, 1983
Viverra tangalunga	5.00	0.03	Colon & Sugau, 2012
Viverricula indica	2.70	0.02	Chuang & Lee, 1997
Vulpes cana	0.97	0.03	Carbone et al., 2007
Vulpes chama	4.00	0.01	Bothma, 1966; Klare et al., 2014
Vulpes lagopus	5.20	0.05	Anthony et al., 2000
Vulpes macrotis	1.48	0.70	Carbone et al., 2007
Vulpes rueppellii	2.40	0.02	Lindsay & MacDonald, 1986
Vulpes velox	2.10	1.35	Carbone et al., 2007
Vulpes vulpes	8.00	0.05	Sidorovich et al., 2005; Jędrzejewski & Jędrzejewska, 1992

References S4

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S5: Comparison of thylacine body mass estimates.

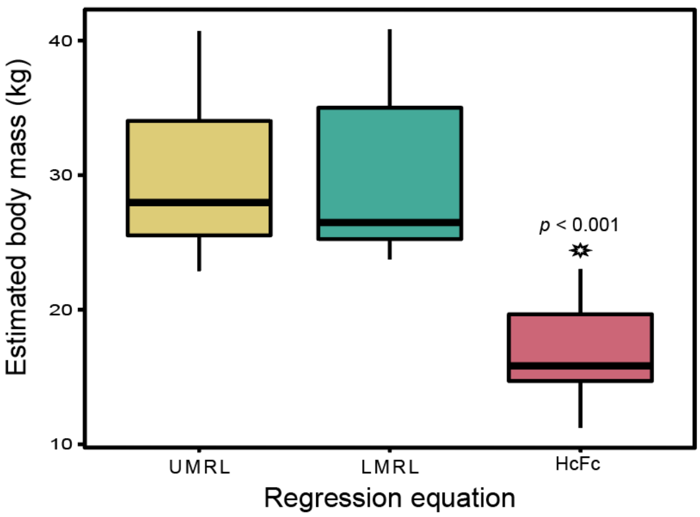

Figure S5: Wilcoxon ranked-sum test of body mass estimates via Myers (2001) dental UMRL/LMRL regressions and Campione & Evans (2012) stylopodial circumference regressions (n = 19). Abbreviations as in text.

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Table S6: Body mass regression and volumetric methods comparison. Abbreviations as in text. Density values for the low (ρ = 893.36 kg/m^3) and high (ρ = 1000.00 kg/m^3) estimates follow Sellers et al. (2012) and Alexander (1985), respectively. Estimates marked with an asterisk* derive from scanned taxidermy mounts. All masses in kilogram

s

Specimen	UMRL ± 9%	LMRL ± 10%	HcFc ± 25%	Convex hull (low)	Convex hull (high)	Volumetric model poor condition (low)	Volumetric model poor condition (high)	Volumetric model ideal condition (low)	Volumetric model ideal condition (high)
NMV C28178	22.87	23.91	11.24	9.50	10.64	10.75	12.03	12.26	13.73
NMV C28744	—	—	—	—	—	—	—	13.69*	15.32*
NRM 566599	25.05	24.85	14.77	13.27	14.85	7.99	8.95	—	—
TMAG A1298	—	—	—	—	—	—	—	20.32*	22.75*
TMAG A312	26.00	23.76	15.58	14.23	15.93	18.23	20.41	20.73	23.20
TMAG A315	36.16	37.79	23.02	19.71	22.07	23.86	26.70	27.30	30.56

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S7: Linear metrics

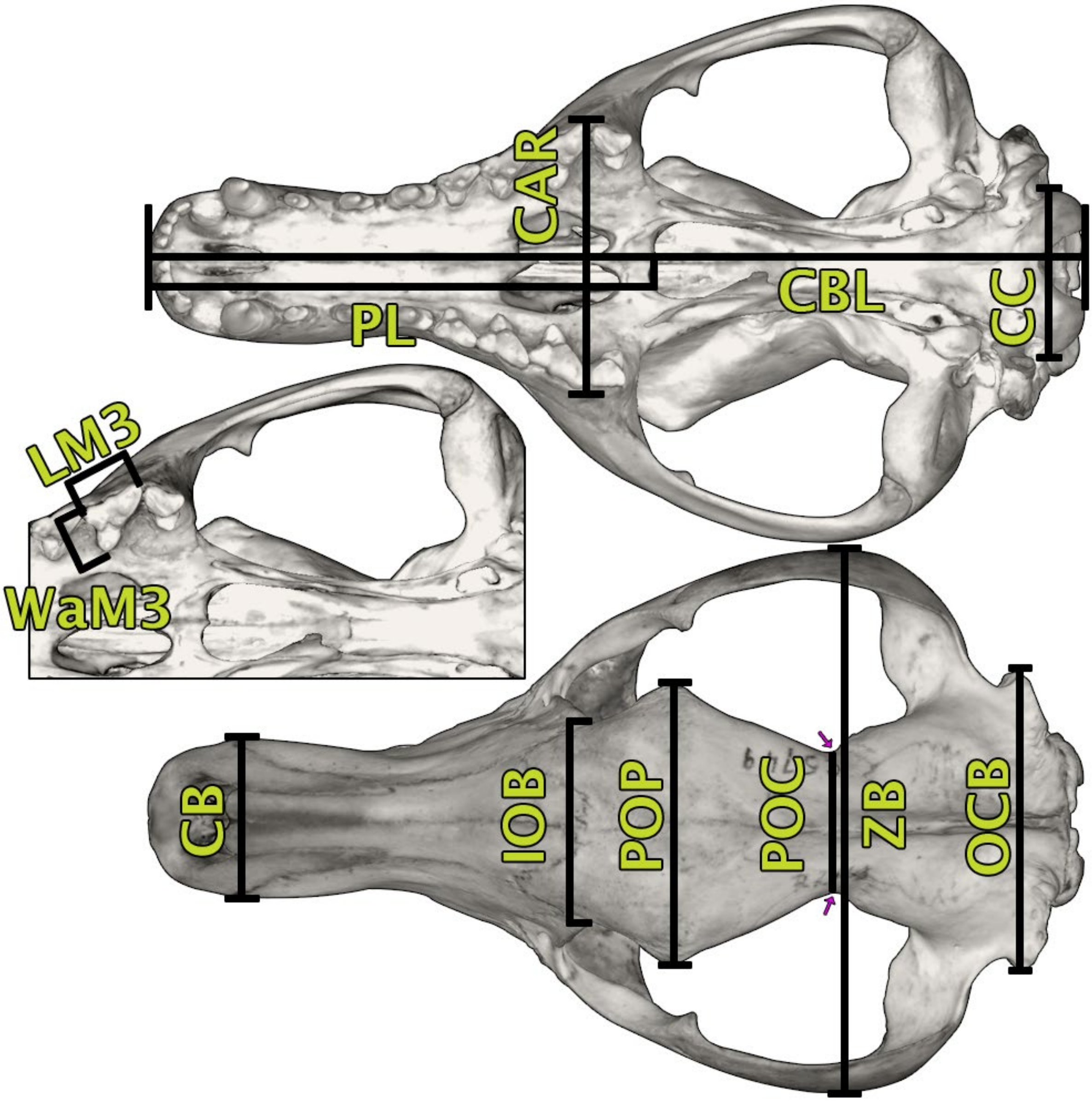

Figure S7: Cranial linear metric explanations. CAR = breadth across the carnassials; CB = breadth across the canines; CBL = condylobasal length; CC = breadth across the occipital condyles; IOB = interorbital breadth; LM3 = length of M^3; OCB = occipital breadth; PL = palatal length; POC = width across the postorbital constriction; POP = breadth across the postorbital processes of the frontal; WaM3 = greatest anterior width of the M^3; ZB = zygomatic breadth.

S7: Linear metric data

Table S7: Thylacine craniodental linear metrics. Abbreviations as in Fig. S7; all metrics in millimetres. Specimen UMZC A6.7/3 listed as unknown sex.

Specimen	Sex	CBL	CC	CAR	PL	CB	IOB	POP	POC	ZB	OCB	LM3	WaM3
NHMUK ZD 39.6.11.3	F	194.5	34.0	58.4	108.7	32.4	41.6	61.7	32.9	110.2	58.4	13.8	10.7
NHMUK ZD 52.1.16.7	F	196.3	32.8	60.3	107.4	32.9	42.8	62.9	33.0	114.0	61.3	14.2	10.9
NHMUK ZD 52.1.16.8	F	191.2	32.7	59.4	101.4	31.2	39.0	56.9	33.2	104.5	58.1	14.5	11.2
NHMUK ZD 72.666	F	197.7	33.5	61.9	105.0	32.1	43.8	64.4	35.3	113.3	61.8	14.6	11.4
NHMUK ZD 93.4.13.1	F	205.6	35.4	61.5	110.3	34.9	40.6	58.9	33.3	114.2	63.4	15.5	11.7
USNM 124662	F	207.0	32.7	61.0	113.2	33.7	43.4	63.2	34.9	111.0	63.8	14.5	11.2
NMV C 5742	F	202.8	33.7	60.1	110.4	34.3	42.0	63.6	33.9	109.9	62.1	14.6	11.4
NMV C 5748.1	F	188.3	32.7	58.1	103.4	31.6	38.6	55.9	34.8	104.0	58.1	13.8	10.2
NMV C 5750.1	F	183.7	33.1	57.4	101.2	32.0	37.5	55.9	32.8	102.7	57.3	13.5	10.7
NRM 566599	F	201.4	33.4	59.7	108.8	33.0	45.5	65.2	34.1	111.8	60.3	13.6	10.7
SAM M M 1959	F	209.6	35.0	62.8	112.4	35.7	46.9	65.8	36.1	116.6	64.9	15.9	12.3
SAM M M 922	F	185.9	33.2	56.1	107.3	30.2	42.3	62.5	35.0	107.7	59.4	13.5	10.6
UMZC A6.7/8	F	202.5	34.1	60.2	107.1	33.6	41.4	62.4	34.7	111.1	61.9	14.5	10.8
ZMB MAM 4269	F	182.3	32.0	56.1	102.1	29.7	39.3	59.8	33.1	103.0	55.6	12.7	9.7
AM M 19465	M	226.2	36.5	65.2	119.0	37.6	46.8	65.9	35.7	125.7	71.7	15.0	12.0
AMNH 144316	M	245.7	39.2	67.1	128.4	43.2	51.8	73.0	36.0	140.8	77.0	15.6	12.8
AMNH 35244	M	224.3	37.4	65.9	118.5	37.3	49.5	71.4	35.7	129.1	69.4	15.6	12.3
NHMUK ZD 1963.8.30.1	M	234.4	36.6	67.4	125.8	40.8	51.7	72.6	35.7	139.5	70.4	16.1	12.4
NHMUK ZD 46.4.4.1	M	230.5	37.0	68.5	123.6	40.2	52.3	77.6	35.8	139.5	73.5	15.4	11.7
NHMUK ZD 72.665	M	225.2	38.8	63.3	120.2	37.9	45.8	65.0	34.7	124.5	69.8	15.4	12.2
NHMUK ZD 83.8.22.1	M	221.4	34.8	67.4	114.6	38.7	48.3	68.5	34.6	132.4	72.5	15.9	12.0
USNM 155407	M	211.0	34.6	62.8	113.7	36.0	47.5	68.6	35.5	121.2	65.4	14.2	11.5
NMV C 5746.1	M	232.2	37.1	66.9	126.0	40.5	48.7	70.4	35.4	132.9	73.2	16.4	12.9
NMV C 5749	M	229.1	40.5	67.3	124.8	39.1	48.8	68.5	34.4	132.5	73.3	16.2	12.3
SAM M 1953	M	243.5	40.0	66.9	132.1	41.6	54.3	77.0	36.7	142.7	74.7	15.5	12.0
SAM M 95	M	245.4	37.9	68.1	134.7	42.1	52.0	75.7	35.4	143.5	75.2	16.0	12.5
SMNS Z-MAM 2019	M	224.4	35.3	64.3	119.0	38.6	49.4	69.7	33.5	136.9	71.4	14.7	11.3

TMAG 321	M	252.6	40.2	70.5	131.9	44.3	56.4	78.4	36.8	149.4	79.8	16.4	13.0
ZMB MAM 2986	M	208.9	37.4	62.6	113.3	34.3	45.1	63.8	33.7	116.6	65.3	14.8	12.4
ZMB MAM 47902	M	221.0	36.2	63.7	117.8	37.3	49.5	71.5	34.9	126.1	68.9	14.5	12.0
AM M 1821	U	224.0	33.8	64.2	117.1	35.8	49.1	72.0	38.0	118.8	66.5	15.5	12.3
AM M 27836	U	191.1	32.5	60.0	101.6	32.2	39.1	57.4	32.9	107.0	59.6	14.0	10.9
AM M 401	U	250.0	41.1	71.9	134.4	44.6	54.8	77.9	37.2	149.3	79.2	17.2	13.0
AM M 402	U	194.5	33.0	58.9	105.0	32.5	40.6	61.1	33.3	108.3	59.3	14.1	10.9
AM M 763	U	247.5	39.1	71.0	130.3	43.0	56.0	78.6	38.2	146.2	77.3	16.6	12.3
AM M 768	U	228.3	37.7	66.8	122.6	41.6	49.1	69.6	35.7	137.5	72.8	15.5	11.9
AM M 769	U	229.3	38.3	68.8	118.2	39.2	46.9	64.4	35.0	131.5	72.8	15.6	12.4
AM M 771	U	192.0	35.4	61.3	102.1	32.4	41.9	61.3	33.4	113.1	60.6	14.5	11.1
AMNH 146829	U	205.1	34.3	61.2	109.6	34.7	43.1	64.6	35.9	110.0	61.2	15.2	11.3
AMNH 35866	U	207.2	35.0	62.2	110.6	35.1	44.7	64.8	34.7	115.7	65.4	15.2	11.2
LEEDM C.1869.46.2.4088	U	246.1	36.4	70.6	127.9	42.2	53.8	76.9	37.8	139.2	75.4	17.6	13.8
LEEDM C.1869.46.4.4087	U	232.1	40.3	68.3	122.9	40.6	49.6	71.6	34.7	133.8	74.7	16.9	13.1
LEEDM C.1869.46.5.4091	U	227.4	38.1	65.1	117.3	38.4	47.0	65.4	35.0	130.4	72.5	15.7	12.1
NHM 1002	U	201.5	34.2	61.0	107.8	33.4	42.5	61.2	33.7	112.6	63.1	14.0	10.7
NMW 19.330.46	U	190.9	32.8	58.2	102.2	30.5	39.4	59.7	33.4	104.0	61.0	14.3	10.7
NMW 27.409.9	U	192.0	32.8	58.9	103.0	32.0	37.3	55.5	31.7	103.2	60.7	14.6	11.2
QVM 1962:1:54	U	187.3	33.5	59.6	99.2	31.3	39.1	58.9	34.6	108.8	62.1	13.8	10.9
QVM 1962:1:57	U	194.1	33.1	57.9	103.0	31.9	41.7	63.9	34.7	106.5	59.6	13.5	10.7
RBINS 31.Z	U	237.0	36.2	67.3	125.8	39.3	49.1	68.8	35.4	130.2	71.8	16.4	13.0
RBINS 32	U	207.3	36.3	61.0	111.7	33.7	42.9	64.0	36.1	114.2	63.3	14.9	10.9
RBINS 32.B	U	197.7	35.1	60.3	105.7	32.9	39.7	60.5	34.6	101.2	61.2	14.8	11.3
SAM M 1955	U	234.1	37.4	68.0	126.4	41.3	51.6	73.5	36.6	140.7	72.4	15.0	12.5
SAM M 1960	U	210.0	34.4	61.3	114.9	34.7	44.6	65.4	33.2	117.2	63.5	14.1	11.4
TMAG 1238	U	212.5	34.5	60.1	112.6	35.3	47.3	69.5	36.4	115.3	63.9	14.8	11.3
TMAG 1242	U	205.4	34.8	61.1	107.8	33.3	41.9	59.8	34.5	113.0	61.5	14.2	11.6
TMAG 1244	U	240.4	38.8	63.8	125.4	39.3	51.3	75.1	36.6	138.8	73.1	14.9	12.4
TMAG 1276	U	210.3	35.3	59.7	110.1	34.4	44.6	63.4	35.4	113.3	64.4	13.9	12.0

TMAG 244	U	234.7	38.2	65.4	119.5	37.4	48.2	71.1	37.1	122.5	71.4	16.0	12.6
TMAG 295	U	197.3	35.3	59.9	105.5	34.0	41.7	61.8	35.6	109.4	61.0	14.3	10.5
TMAG 297	U	222.5	37.2	63.1	121.1	37.4	49.1	68.6	37.2	125.5	68.3	14.8	12.1
TMAG 890	U	228.6	35.5	67.0	120.2	39.9	48.7	70.5	36.4	130.8	71.0	15.9	13.0
UMZC A6.7/19	U	234.5	37.3	70.2	122.9	42.2	50.8	73.2	37.1	136.9	72.2	16.7	12.5
UMZC A6.7/3	U*	189.6	33.1	58.7	102.0	30.8	39.2	57.7	34.5	104.9	58.0	13.7	10.8
WAM M 195	U	213.4	37.3	66.1	110.2	35.8	42.9	61.7	33.7	125.0	69.4	14.7	12.6

S8: 3D Geometric Morphometric (3D GM) landmarks

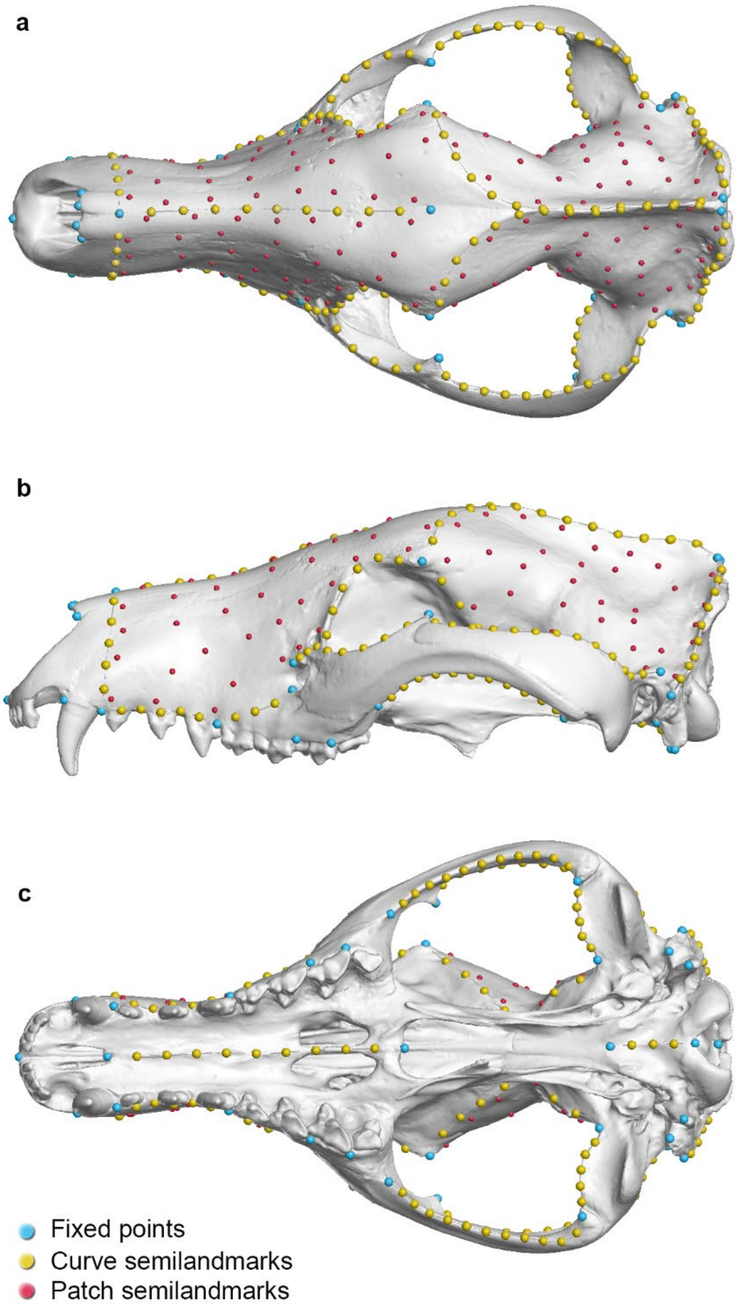

Figure S8: Landmark and semilandmark template set. Fixed points (blue) generally anchor curves, with some minima/maxima or functional sets (e.g., mesial and distal limits of the maxillary carnassial). For definitions, see **Table S8**.

Table S8: 3D GM landmark protocol and definitions.

Point	Definition	Type	Paired	Semi-landmarks
1	Anteriormost extent of premaxilla at midline (Prosthion)	Fixed	-	-
2	Anteriormost nasal (L)	Fixed	yes	-
3	Anteriormost nasal (R)	Fixed	yes	-
4	Anterior nasopremaxilla (L)	Fixed	yes	-
5	Anterior nasopremaxilla (R)	Fixed	yes	-
6	Mesial canine alveolar margin in lateral view (L)	Fixed	yes	-
7	Mesial canine alveolar margin in lateral view (R)	Fixed	yes	-
8	Distal canine alveolar margin in lateral view (L)	Fixed	yes	-
9	Distal canine alveolar margin in lateral view (R)	Fixed	yes	-
10	Midline at point coplanar with & dorsal to 8/9	Fixed	-	-
11	Midline at posterior edge of incisive foramen	Fixed	-	-
12	Distal alveolar margin of P3 in lateral view (L)	Fixed	yes	-
13	Distal alveolar margin of P3 in lateral view (R)	Fixed	yes	-
14	Dorsal border of infraorbital foramen (L)	Fixed	yes	-
15	Dorsal border of infraorbital foramen (R)	Fixed	yes	-
16	Ventral border of infraorbital foramen (L)	Fixed	yes	-
17	Ventral border of infraorbital foramen (R)	Fixed	yes	-
18	Mesial alveolar margin of carnassial in lateral view (L)	Fixed	yes	-
19	Mesial alveolar margin of carnassial in lateral view (R)	Fixed	yes	-
20	Distal alveolar margin of carnassial in lateral view (L)	Fixed	yes	-
21	Distal alveolar margin of carnassial in lateral view (R)	Fixed	yes	-
22	Postorbital process (L)	Fixed	yes	-
23	Postorbital process (R)	Fixed	yes	-
24	Midline at point in line with 22/23	Fixed	-	-
25	Postorbital process of zygomatic (R)	Fixed	yes	-
26	Postorbital process of zygomatic (L)	Fixed	yes	-
27	Ventrodistal inflection of jugal with maxilla (R)	Fixed	yes	-
28	Ventrodistal inflection of jugal with maxilla (L)	Fixed	yes	-
29	Midline at distalmost interpalatine	Fixed	-	-
30	Anterolateral point of glenoid on squamosal (L)	Fixed	yes	-
31	Anterolateral point of glenoid on squamosal (R)	Fixed	yes	-
32	Anteromedial point of glenoid on squamosal (L)	Fixed	yes	-
33	Anteromedial point of glenoid on squamosal (R)	Fixed	yes	-
34	Midline of basicranium at anterior extent of auditory bullae	Fixed	-	-
35	Posterior inflection of zygomatic with neurocranium (R)	Fixed	yes	-
36	Posterior inflection of zygomatic with neurocranium (L)	Fixed	yes	-
37	Lateralmost point of nuchal crest (R)	Fixed	yes	-
38	Lateralmost point of nuchal crest (L)	Fixed	yes	-
39	Ventralmost point of mastoid process (R)	Fixed	yes	-
40	Ventralmost point of mastoid process (L)	Fixed	yes	-
41	Ventralmost point of paracondylar process (R)	Fixed	yes	-
42	Ventralmost point of paracondylar process (L)	Fixed	yes	-
43	Ventral border of foramen magnum at midline (Basion)	Fixed	-	-
44	Dorsal border of foramen magnum at midline (Opisthion)	Fixed	-	-

45	Confluence of temporal and nuchal crests (R)	Fixed	yes	-
46	Confluence of temporal and nuchal crests (L)	Fixed	yes	-
C1	Curve between points 10 & 26 (dorsum of rostrum)	Curve	-	9
C2	Curve between points 11 % 29 (palatal curve)	Curve	-	9
C3	Curve between points 9 & 10 (rostral arc at canine)	Curve	-	5
C4	Curve between points 8 & 10 (rostral arc at canine)	Curve	-	5
C5	Curve between points 9 & 13 (alveolar margin)	Curve	-	5
C6	Curve between points 8 & 12 (alveolar margin)	Curve	-	5
C7	Curve between points 23 & 25 (orbital rim R)	Curve	-	11
C8	Curve between points 22 & 26 (orbital rim L)	Curve	-	11
C9	Curve between point 15 & anterior rim of orbit (dorsal infraorbital foramen R)	Curve	-	3
C10	Curve between point 14 & anterior rim of orbit (dorsal infraorbital foramen R)	Curve	-	3
C11	Curve between points 17 & 13 (ventral infraorbital foramen R)	Curve	-	3
C12	Curve between points 16 & 12 (ventral infraorbital foramen L)	Curve	-	3
C13	Curve between points 25 & 35 (dorsal zygomatic border R)	Curve	-	13
C14	Curve between points 26 & 36 (dorsal zygomatic border L)	Curve	-	13
C15	Curve between points 27 & 31 (ventral zygomatic border R)	Curve	-	11
C16	Curve between points 28 & 30 (ventral zygomatic border L)	Curve	-	11
C17	Curve between points 31 & 33 (anterior border of glenoid R)	Curve	-	5
C18	Curve between points 30 & 32 (anterior border of glenoid L)	Curve	-	5
C19	Curve between points 34 & 43 (basicranial curve)	Curve	-	3
C20	Curve between 22 & 46 (temporal crest L)	Curve	-	13
C21	Curve between 23 & 45 (temporal crest R)	Curve	-	13
C22	Curve between 38 & 46 (nuchal crest L)	Curve	-	9
C23	Curve between 37 & 45 (nuchal crest R)	Curve	-	9
C24	Curve between 22 & 32 (infratemporal crest L)	Curve	-	7
C25	Curve between 23 & 33 (infratemporal crest R)	Curve	-	7
P1	Patch bordered by c1, c3, c5, c7, c9, c11 (rostal patch R)	Patch	-	36
P2	Patch bordered by c1, c4, c6, c8, c10, c12 (rostral patch L)	Patch	-	36
P3	Patch bordered by c21, c23, c25 (neurocranial patch R)	Patch	-	36
P4	Patch bordered by c20, c22, c24 (neurocranial patch L)	Patch	-	36

The meshes were initially imported into Geomagic Studio 2014. They were aligned to a horizontal plane defined by the dorsalmost point of the right external auditory meatus and the ventralmost point of the left and right orbital rim (≈ Frankfort horizontal), and a sagittal plane. These oriented meshes were then imported into Viewbox 4 for landmarking.

Several points and curves were defined and placed relative to these planes (e.g., the anterior rostral curves are perpendicular to the horizontal and sagittal plane at the level of the mesial canine alveolus). Fixed points were generally used to define limits for curves, and curves generally used to define limits for the facial and neurocranial patches, with some exceptions (e.g., the zygomatic arches).

A single specimen was used as a reference template on which all landmarks were manually placed. Each subsequent specimen was landmarked with fixed points and curve semilandmarks, which were then used to transpose and place the patch points via thin spline deformation. Once all specimens were fully landmarked, a mean landmark shape was calculated from the full specimen list and used as a reference set for the sliding procedure. Using the Batch Processing function of Viewbox 4, semilandmarks were allowed to slide to minimise bending energy in relation to this reference set, then projected back upon the mesh surface six times, with each repetition resulting in lesser bending energy. After all specimens completed this procedure, this new set of landmarks and slid semilandmarks was used to calculate a mean landmark shape, and the semilandmarks again slid to this reference and projected onto their respective meshes six times. This iterative procedure was itself performed a total of six times, after which the landmarks are considered homologous.

S9: Corrected body mass regression equations

Table S9: Body mass equations ranked by adjusted R^2 value.

Regression	Equation	SE	Adjusted R^2	PPE
cCBL	$\ln \textit{Body mass} = 2.2396(\ln x) - 9.2149$	1.001738	0.8188	0.04743
cUMRL	$\ln \textit{Body mass} = 3.0549(\ln x) - 8.9161$	1.004586	0.7236	0.08608
cLMRL	$\ln \textit{Body mass} = 2.2396(\ln x) - 8.7165$	1.004958	0.7028	0.08384

S10: Estimated thylacine body masses

Table S10: Thylacine body mass estimates. All values in kilograms. Abbreviations as in text. Best estimate mass follows ranking in text (cCBL, HcFc, cUMRL, cLMRL) in order of preference.

Specimen	Sex	HcFc ± 25%	cUMRL ±8.6%	cLMRL ±8.4%	cCBL ±4.7%	Total min	Total max	Best estimate mass
AM M 1821	U	NA	19.83	18.67	18.30	17.10	21.54	18.30
AM M 19465	M	NA	18.86	17.64	18.70	16.16	20.48	18.70
AM M 27836	U	NA	13.67	NA	12.82	12.21	14.85	12.82
AM M 401	U	NA	23.53	23.93	23.40	21.50	25.94	23.40
AM M 402	U	NA	13.50	14.18	13.34	12.34	15.37	13.34
AM M 763	U	NA	22.57	22.34	22.88	20.47	24.51	22.88
AM M 767	U	NA	21.51	NA	22.24	19.66	23.36	22.24
AM M 768	U	NA	17.92	20.18	19.09	16.38	21.87	19.09
AM M 769	U	NA	18.65	19.55	19.28	17.04	21.19	19.28
AM M 771	U	NA	13.33	16.01	12.96	12.18	17.35	12.96
AM M 788	U	NA	21.51	19.02	19.21	17.43	23.36	19.21
AM M 789	U	NA	13.93	14.85	13.90	12.73	16.10	13.90
AMNH 144316	M	NA	20.83	22.05	22.51	19.04	23.90	22.51
AMNH 146829	U	NA	14.28	NA	15.02	13.05	15.73	15.02
AMNH 35244	M	19.09	18.86	18.41	18.35	14.32	23.86	18.35
AMNH 35866	U	14.68	14.55	15.54	15.37	11.01	18.35	15.37
AMNH 42259	U	16.74	NA	NA	18.83	12.56	20.93	18.83
NHMUK ZD 1963.8.30.1	M	19.69	21.86	20.45	20.25	14.77	24.61	20.25
NHMUK ZD 1972.175	M	NA	18.86	20.00	NA	17.24	21.68	18.86
NHMUK ZD 39.6.11.3	F	NA	13.58	14.40	13.34	12.41	15.61	13.34
NHMUK ZD 46.4.4.1	M	NA	17.21	18.41	19.51	15.73	20.44	19.51
NHMUK ZD 52.1.16.7	F	NA	12.91	14.55	13.61	11.80	15.77	13.61
NHMUK ZD 52.1.16.8	F	NA	13.50	15.16	12.83	12.22	16.43	12.83
NHMUK ZD 72.665	M	NA	18.97	NA	18.52	17.34	20.60	18.52
NHMUK ZD 72.666	F	12.91	14.55	14.93	13.83	9.68	16.18	13.83
NHMUK ZD 83.8.22.1	M	NA	17.31	NA	17.83	15.82	18.80	17.83
NHMUK ZD 93.4.13.1	F	NA	15.47	17.47	15.10	14.14	18.93	15.10
LEEDM C.1869.46.2.4088	U	NA	25.78	25.16	22.59	21.52	28.00	22.59
LEEDM C.1869.46.4.4087	U	NA	16.13	20.82	19.81	14.74	22.57	19.81
LEEDM C.1869.46.5.4091	U	NA	19.72	18.67	18.93	17.10	21.42	18.93
NHM 1000	U	NA	20.05	19.73	19.68	18.08	21.78	19.68
NHM 1002	U	NA	14.55	13.32	14.44	12.20	15.80	14.44
USNM 124662	F	13.79	16.13	15.16	15.33	10.34	17.52	15.33
USNM 155407	M	17.82	16.52	15.78	16.00	13.37	22.28	16.00
USNM 38801	M	22.43	20.94	19.10	NA	16.82	28.04	22.43
NMV C 2163.1	M	NA	16.41	17.94	NA	15.00	19.44	16.41
NMV C 28178	U	11.24	13.58	14.33	NA	8.43	15.53	11.24
NMV C 5741.2	F	11.12	NA	NA	NA	8.34	13.90	11.12
NMV C 5742.1	F	13.74	15.19	15.39	14.64	10.31	17.18	14.64
NMV C 5746.1	M	19.63	18.86	20.64	19.83	14.72	24.54	19.83
NMV C 5748.1	F	NA	13.56	13.73	12.40	11.81	14.88	12.40
NMV C 5749	M	NA	20.27	20.00	19.24	18.32	22.01	19.24
NMV C 5750.1	F	NA	10.73	NA	11.73	9.81	12.29	11.73

NMV C 5752.2	F	14.82	NA	NA	NA	11.12	18.53	14.82
NMW 19.330.46	U	NA	14.20	14.25	12.79	12.18	15.44	12.79
NMW 27.409.9	U	NA	14.37	15.39	12.96	12.35	16.68	12.96
NRM 566599	F	14.77	14.64	14.78	14.42	11.08	18.46	14.42
QM 11445	U	NA	18.86	18.24	20.41	16.71	21.38	20.41
QM 11446	U	NA	11.61	12.69	NA	10.61	13.75	11.61
QM 1968	U	NA	20.05	21.29	19.97	18.32	23.07	19.97
QVM 1958:1:27	M	NA	22.80	21.20	NA	19.42	24.76	22.80
QVM 1958:1:29	U	NA	13.58	13.82	11.61	11.06	14.98	11.61
QVM 1962:1:54	U	NA	12.99	14.11	12.26	11.68	15.29	12.26
QVM 1962:1:57	U	NA	13.33	NA	13.28	12.18	14.48	13.28
RBINS 31.Z	U	NA	22.80	22.05	20.76	19.78	24.76	20.76
RBINS 32	U	NA	17.01	16.17	15.38	14.65	18.47	15.38
RBINS 32.B	U	NA	15.19	15.78	13.83	13.17	17.10	13.83
SAM M 1953	M	NA	21.51	20.18	22.06	18.49	23.36	22.06
SAM M 1955	U	NA	19.39	21.10	20.20	17.72	22.87	20.20
SAM M 1959	F	14.72	16.04	17.23	15.77	11.04	18.67	15.77
SAM M 1960	U	15.78	15.28	15.39	15.83	11.84	19.73	15.83
SAM M 922	F	NA	13.50	12.83	12.05	11.48	14.66	12.05
SAM M 95	M	21.60	21.28	21.96	22.45	16.20	27.00	22.45
SMNS Z-MAM 002019	M	19.93	17.72	19.73	18.37	14.95	24.91	18.37
TMAG 1238	U	NA	18.13	NA	16.26	15.49	19.69	16.26
TMAG 1239	U	NA	19.39	NA	17.63	16.79	21.06	17.63
TMAG 1240	U	NA	15.85	19.64	21.35	14.49	22.36	21.35
TMAG 1242	U	NA	15.66	NA	15.07	14.31	17.01	15.07
TMAG 1244	U	NA	19.18	NA	21.43	17.53	22.45	21.43
TMAG 1245	U	NA	21.28	NA	NA	19.45	23.11	21.28
TMAG 1246	U	NA	NA	17.06	NA	15.63	18.49	17.06
TMAG 1276	U	NA	14.73	14.85	15.89	13.46	16.64	15.89
TMAG 1989	U	NA	NA	17.47	NA	16.01	18.93	17.47
TMAG 1990	U	11.70	NA	NA	NA	8.78	14.63	11.70
TMAG 2062	U	NA	NA	17.56	NA	16.09	19.03	17.56
TMAG 2313	U	NA	NA	21.48	NA	19.68	23.28	21.48
TMAG 244	U	NA	23.28	20.36	20.31	18.65	25.28	20.31
TMAG 2455	U	NA	NA	21.57	NA	19.76	23.38	21.57
TMAG 295	U	16.58	14.28	14.25	13.77	12.44	20.73	13.77
TMAG 297	U	NA	18.34	19.19	18.02	16.76	20.80	18.02
TMAG A 312	F	15.58	15.10	14.25	NA	11.69	19.48	15.58
TMAG A 315	M	23.02	19.83	20.64	NA	17.27	28.78	23.02
TMAG A 321	M	NA	23.77	22.54	23.95	20.65	25.82	23.95
TMAG 890	U	18.69	21.74	20.55	19.15	14.02	23.61	19.15
UMZC A6.7/19	U	NA	20.72	20.09	20.27	18.41	22.50	20.27
UMZC A6.7/3	U	NA	13.07	NA	12.60	11.94	14.20	12.60
UMZC A6.7/8	F	19.63	15.38	15.00	14.60	13.74	24.54	14.60
WAM M 195	U	17.17	18.23	17.47	16.41	12.88	21.46	16.41
ZMB Mam 2986	M	15.83	17.92	17.56	15.65	11.87	19.79	15.65
ZMB Mam 4264	F	NA	NA	13.32	11.54	10.99	14.44	11.54
ZMB Mam 47902	M	NA	18.65	19.02	17.75	16.91	20.61	17.75

S11: Thylacine cranial descriptive statistics.

Table S11: Descriptive statistics for *Thylacinus cynocephalus* cranial linear measurements for adult known-sex females, males and total mixed-and unknown-sex sample. All measurements are in millimeters. F-statistic and *p*-values are from a MANOVA of natural log transformed linear measurements of known female and male specimens by sex, with significant *p*-values after Benjamini-Hochberg correction (FDR = 0.10) bolded and italicised

Measure	Sex	*n*	Mean	SD	CV%	Min	Max	*F*(1,28)	*p*
CBL	Female	14	196.3	8.96	4.56	182.3	209.6	73.3	*<0.001*
	Male	16	229.7	12.28	5.35	208.9	252.6		
	Total	64	214.7	19.50	9.08	182.3	252.6		
CC	Female	14	33.5	0.94	2.80	32.0	35.4	56.8	*<0.001*
	Male	16	37.5	1.86	4.96	34.6	40.5		
	Total	64	35.7	2.38	6.65	32.0	41.1		
Car	Female	14	59.5	2.06	3.46	56.1	62.8	69.6	*<0.001*
	Male	16	66.1	2.27	3.43	62.6	70.5		
	Total	64	63.3	4.07	6.43	56.1	71.9		
PL	Female	14	107.1	3.95	3.69	101.2	113.2	61.3	*<0.001*
	Male	16	122.7	6.76	5.51	113.3	134.7		
	Total	64	114.7	9.63	8.40	99.2	134.7		
CB	Female	14	32.7	1.71	5.23	29.7	35.7	68.0	*<0.001*
	Male	16	39.3	2.68	6.80	34.3	44.3		
	Total	64	36.2	4.00	11.02	29.7	44.6		
IOB	Female	14	41.8	2.66	6.37	37.5	46.9	61.3	*<0.001*
	Male	16	49.9	3.05	6.12	45.1	56.4		
	Total	64	45.8	4.97	10.84	37.3	56.4		
POP	Female	14	61.4	3.34	5.45	55.9	65.8	42.7	*<0.001*
	Male	16	71.1	4.45	6.26	63.8	78.4		
	Total	64	66.3	6.24	9.41	55.5	78.6		
POC	Female	14	34.1	1.06	3.11	32.8	36.1	11.0	*0.0026*
	Male	16	35.3	0.93	2.65	33.5	36.8		
	Total	64	35.0	1.43	4.09	31.7	38.2		
ZB	Female	14	109.6	4.51	4.12	102.7	116.6	85.8	*<0.001*
	Male	16	133.3	9.05	6.79	116.6	149.4		
	Total	64	121.6	13.76	11.31	101.2	149.4		
OCB	Female	14	60.5	2.73	4.52	55.6	64.9	90.8	*<0.001*
	Male	16	72.0	3.84	5.34	65.3	79.8		
	Total	64	66.7	6.34	9.51	55.6	79.8		
LM3	Female	14	14.2	0.84	5.87	12.7	15.9	20.4	*<0.001*
	Male	16	15.5	0.68	4.41	14.2	16.4		
	Total	64	15.0	1.03	6.85	12.7	17.6		
WaM3	Female	14	11.0	0.64	5.86	9.7	12.3	36.2	*<0.001*
	Male	16	12.2	0.48	3.89	11.3	13.0		
	Total	64	11.7	0.86	7.31	9.7	13.8		

S12: Major-axis regressions.

Table S12a: Results of bivariate major axis regression analyses of the known-sex adult thylacine samples (n = 14 female; 16 male). Values are natural log-transformed linear metrics on condylobasal length. Significant *p*-values after Benjamini-Hochberg correction (FDR = 0.10) are bolded.

Condylobasal length								
	Sex	Slope	Intercept	R^2	Slope ≠ Isometry	Slopes differ	Intercepts differ
CC	Female	0.485	0.951	0.440	0.032	0.195	0.549
	Male	0.890	-1.215	0.418	0.717		
CAR	Female	0.736	0.201	0.803	0.050	0.351	0.986
	Male	0.588	0.997	0.665	**0.011**		
PL	Female	0.776	0.576	0.718	0.182	0.177	0.229
	Male	1.029	-0.786	0.904	0.745		
CB	Female	1.159	-2.634	0.829	0.280	0.493	0.399
	Male	1.287	-3.326	0.938	**0.002**		
IOB	Female	1.570	-4.557	0.503	0.130	0.375	0.534
	Male	1.164	-2.418	0.709	0.388		
POP	Female	1.344	-2.980	0.396	0.417	0.838	0.219
	Male	1.231	-2.429	0.586	0.367		
POC	Female	0.435	1.230	0.189	0.146	0.851	0.158
	Male	0.382	1.489	0.452	**0.002**		
ZB	Female	0.889	0.003	0.731	0.514	0.084	0.644
	Male	1.312	-2.241	0.834	0.037		
OCB	Female	1.005	-1.206	0.865	0.965	0.994	0.228
	Male	1.004	-1.182	0.858	0.972		
LM3	Female	1.343	-4.436	0.669	0.166	0.125	**0.006**
	Male	0.767	-1.432	0.466	0.365		
WaM3	Female	1.369	-4.833	0.609	0.193	0.073	0.079
	Male	0.580	-0.649	0.304	0.178		

Table S12b: Results of bivariate major axis regression analyses of the known-sex adult thylacine samples (n = 14 female; 16 male). Values are natural log-transformed linear metrics on best-estimate body masses. Significant p-values after Benjamini-Hochberg correction (FDR = 0.10) are bolded.

Body mass							
	Sex	Slope	Intercept	R^2	Slope ≠ Isometry	Slopes differ	Intercepts differ
CC	Female	0.187	3.023	0.440	0.043	0.340	0.098
	Male	0.295	2.750	0.418	0.713		
CAR	Female	0.310	3.277	0.802	0.661	0.293	0.545
	Male	0.241	3.478	0.666	0.078		
PL	Female	0.316	3.849	0.718	0.805	0.086	0.561
	Male	0.444	3.495	0.904	***0.009***		
CB	Female	0.482	2.226	0.829	0.027	0.315	0.725
	Male	0.561	2.010	0.938	***<0.001***		
IOB	Female	0.519	2.377	0.504	0.205	0.711	0.664
	Male	0.456	2.559	0.709	0.117		
POP	Female	0.401	3.069	0.397	0.621	0.812	0.901
	Male	0.444	2.949	0.586	0.258		
POC	Female	0.141	3.160	0.189	0.056	0.896	0.280
	Male	0.154	3.108	0.451	***0.002***		
ZB	Female	0.359	3.759	0.731	0.648	0.053	0.101
	Male	0.546	3.275	0.834	***0.003***		
OcB	Female	0.427	2.986	0.865	0.063	0.979	0.067
	Male	0.425	3.016	0.858	0.052		
LM3	Female	0.509	1.325	0.668	0.093	0.079	0.101
	Male	0.273	1.931	0.466	0.483		
WaM3	Female	0.497	1.095	0.608	0.153	0.038	0.900
	Male	0.194	1.926	0.304	0.120		

S13: 3D GM analyses

Table S13a: Principle components analysis and ANOVA of the principle components for *Thylacinus cynocephalus* cranial 3D geometric morphometrics. Results are presented for the total sample (n = 64). Significance of ANOVA results adjusted via the Benjamini-Hochberg procedure (FDR = 0.10); significant results are bolded.

Component	Variance %	Cumulative %	F(1,12)	p
PC 1	27.34	27.34	22.41	**<0.001**
PC 2	17.04	44.38	2.45	0.225
PC 3	14.26	58.64	<0.01	0.0890
PC 4	9.30	67.94	0.81	0.556
PC 5	6.29	74.23	0.08	0.515
PC 6	4.76	78.99	<0.01	0.440
PC 7	4.62	83.61	0.38	0.547
PC 8	3.96	87.60	0.93	0.122
PC 9	3.76	91.32	0.05	0.785
PC 10	2.88	94.21	0.01	0.312
PC 11	2.32	96.53	0.07	0.783
PC 12	1.83	98.36	<0.01	0.807
PC 13	1.64	100.00	0.02	0.905

Table S13b: Procrustes coordinates regression analyses. Significant results are bolded.

	Df	SS	MS	R^2	F	Z	*P*
log(Csize)	1	0.0033272	0.0033272	0.25075	4.016	3.591	**0.001**
Residuals	12	0.0099416	0.0008285	0.74925			
Total	13	0.0132688					
sex	1	0.0028882	0.00288816	0.21767	3.3387	3.1372	**0.001**
Residuals	12	0.0103806	0.00086505	0.78233			
Total	13	0.0132688					
log(Csize)	1	0.0033272	0.0033272	0.25075	4.2065	3.5910	**0.001**
sex	1	0.0010372	0.0010372	0.07817	1.3113	1.0928	0.142
log(Csize):sex	1	0.0009949	0.0009949	0.07498	1.2578	1.2510	0.108
Residuals	10	0.0079095	0.0007909	0.59610			
Total	13	0.0132688					

S14: Sexual Dimorphism Index

Table S14: Sexual Dimorphism Index (SDI) values for thylacines and select comparative marsupial and placental carnivores.

Taxon	Female mass (kg)	Male mass (kg)	SDI	Data Source
Thylacinus cynocephalus	13.69	19.74	44.19	**This study**
	s = 1.51	*s* = 2.48		
	n = 17	*n* = 21		
Dasyuridae				
Dasyurus geoffroii	0.89	1.31	47.19	Serena & Soderquist, 1988
Dasyurus hallucatus	0.45	0.76	68.89	Oakwood, 1997
Dasyurus maculatus	1.67	3.23	93.41	Jones, 1997
Dasyurus viverrinus	0.71	1.11	56.34	Jones, 1997
Sarcophilus harrisii	5.40	8.43	56.11	Jones, 1997
Canidae				
Canis latrans	12.50	14.00	12.00	Bekoff, 1977
Canis lupus	36.50	50.00	36.99	Mech, 1974
Canis simensis	12.80	16.20	26.56	Sillero-Zubiri & Gottelli 1994
Chrysocyon brachyurus	22.70	23.80	4.85	Silva & Downing, 1995
Cuon alpinus	11.50	15.80	37.39	Sillero-Zubiri et al 2004
Lupulella mesomelas	7.70	8.40	9.09	Walton & Joly, 2003
Lycalopex culpaeus	5.40	6.50	20.37	Sillero-Zubiri et al 2004
Lycaon pictus	24.00	28.00	16.67	Sillero-Zubiri et al 2004
Vulpes vulpes	5.30	6.30	18.87	Sillero-Zubiri et al 2004
Felidae				
Caracal caracal	9.72	13.50	38.89	Silva & Downing, 1995
Lynx lynx	18.80	19.60	4.26	Silva & Downing, 1995
Neofelis nebulosa	9.45	12.00	27.98	Silva & Downing, 1995

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S15: Sex assignment of unknown-sex thylacines.

Table S15: Unknown-sex specimen *post hoc* sex assignment. Thylacines with body mass less than two standard deviations from the male mean (mass < 14.8 kg) were labelled as "female", and with body mass greater than two standard deviations from the female mean (mass > 16.7 kg) as "male". Specimens agreeing in *post hoc* sex prediction between mass and cranial LDA assignment were ascribed to that sex. Discordant sex assignments (n = 3) are bolded and italicised. For discussion regarding specimen UMZC A6.7/3 see Note in **S2** above.

Specimen	Sex (listed)	Body mass sex assignment	LDA sex assignment	Sex assignment (this study)
NHMUK ZD 1972.666	F	F	F	-
NHMUK ZD 1839.6.11.3	F	F	F	-
NHMUK ZD 1852.1.16.7	F	F	F	-
NHMUK ZD 1852.1.16.8	F	F	F	-
NHMUK ZD 1893.4.13.1	F	U	F	-
NMNH 124662	F	U	F	-
NMV C 5741.2	F	F	NA	-
NMV C 5742.1	F	F	F	-
NMV C 5748.1	F	F	F	-
NMV C 5750.1	F	F	F	-
NMV C 5752.2	F	U	NA	-
NRM 566599	F	F	F	-
SAM M M 1959	F	U	F	-
SAM M M 922	F	F	F	-
TMAG 312	F	U	NA	-
UMZC A6.7/8	F	F	F	-
ZMB MAM M 4264	F	F	F	-
AM M 19465	M	M	M	-
AMNH 35244	M	M	M	-
AMNH 144316	M	M	M	-
NHMUK ZD 1972.665	M	M	M	-
NHMUK ZD 1972.175	M	M	NA	-
NHMUK ZD 1963.8.30.1	M	M	M	-
NHMUK ZD 1846.4.4.1	M	M	M	-
NHMUK ZD 1883.8.22.1	M	M	M	-
NMNH 38801	M	M	NA	-
NMNH 155407	M	U	M	-
NMV C 2163.1	M	U	NA	-
NMV C 5746.1	M	M	NA	-
NMV C 5749	M	M	M	-
QVM 1958:1:27	M	M	NA	-
SAM M M 95	M	M	M	-
SAM M M 1953	M	M	M	-
SMNS Z-MAM M 2019	M	M	M	-
TMAG 315	M	M	NA	-

TMAG 321	M	M	M	-
ZMB MAM M 2986	M	U	M	-
ZMB MAM M 47902	M	M	M	-
AM M 401	U	M	M	M
AM M 402	U	F	F	F
AM M 763	U	M	M	M
AM M 767	U	M	NA	U
AM M 768	U	M	M	M
AM M 769	U	M	M	M
AM M 771	U	F	F	F
AM M 788	U	M	NA	U
AM M 789	U	F	NA	U
AM M 1821	U	***M***	***F***	U
AM M 27836	U	F	F	F
AMNH 35866	U	U	F	U
AMNH 42259	U	M	NA	U
AMNH 146829	U	U	F	U
LEEDM C.1869.46.2.4088	U	M	M	M
LEEDM C.1869.46.4.4087	U	M	M	M
LEEDM C.1869.46.5.4091	U	M	M	M
NHM 1000	U	M	NA	U
NHM 1002	U	F	F	F
NMV C 28178	U	F	NA	U
NMV C 2009	U	NA	NA	U
NMW 19.330.46	U	F	F	F
NMW 27.409.9	U	F	F	F
QM 11445	U	NA	NA	U
QVM 1958:1:29	U	F	NA	U
QVM 1962:1:54	U	***F***	***M***	U
QVM 1962:1:57	U	F	F	F
RBINS 32	U	U	F	U
RBINS 31.Z	U	M	M	M
RBINS 32.B	U	F	F	F
SAM M M 1955	U	M	M	M
SAM M M 1960	U	U	M	U
TMAG 244	U	***M***	***F***	U
TMAG 295	U	F	F	F
TMAG 297	U	M	M	M
TMAG 890	U	M	M	M
TMAG 1238	U	U	F	U
TMAG 1239	U	M	NA	U
TMAG 1240	U	M	NA	U
TMAG 1242	U	U	M	U
TMAG 1244	U	M	M	M
TMAG 1245	U	M	NA	U
TMAG 1246	U	M	NA	U

TMAG 1276	U	U	M	U
TMAG 1989	U	M	NA	U
TMAG 1990	U	F	NA	U
TMAG 2062	U	M	NA	U
TMAG 2313	U	M	NA	U
TMAG 2455	U	M	NA	U
UMZC A6.7/19	U	M	M	M
UMZC A6.7/3	M*	F	F	F
WAM M 195	U	U	M	U
QM 11445	U	M	NA	U
QM 11446	U	F	NA	U
QM 1968	U	M	NA	U