Supplementary Material

Table S1. Step selection function analysis. Dive duration (s) as the response variable

Model		Coefficient ± S.E	t-value(d.f.)	p-value	CI % 5	CI % 95	R^2_r	R^2_c	AIC	ICC
Lmer(M1) (Null)	(intercept)	26.53 ± 1.40	18.91(4.30)	<.001***	23.06	29.95	0.00	0.03	10674	0.03
Lmer(M2)	(intercept)	50.78 ±-2.23	22.75(5.76)	<.001***	45.54	54.05				
(chosen model)	log(AAV)	-24.86 ± 0.58	-43.20(1269.86)	<.001***	-23.37	-21.34	0.58	0.66	9530	0.22
Lmer(M3)	(intercept)	37.83 ± -7.20	18.03(7.44)	<.001***	41.83	53.81				
	log(AAV)	-22.29 ± 0.52	-42.80(1269.80)	<.001***	-23.31	-21.27	0.58	0.66	9533	0.22
	log(Depth)	1.28 ± 1.43	0.90(1261.74)	0.37	-1.51	4.08				
Lmer(M4)	(intercept)	44.60 ± 4.49	9.93(107.24)	<.001***	35.80	53.41	0.58	0.66	9533	0.22
	log(AAV)*log(Depth)	-2.24 ± 2.30	-0.97(1266.52)	0.33	-6.73	2.26				
Lmer(M5)	(intercept)	37.71 ± 2.10	17.94(5.11)	<.001***	33.59	41.83	0.55	0.63	9576	0.16
	log(AVeY)	-17.49 ± 0.42	-42.01(1268.46)	<.001***	-18.31	-16.68				
Gam(M4)	(intercept)	26.19 ± 0.30	88.26	<.001***						
(k=7)		EDF	R^2 (adj)	F-value	p-value					
	s(AAV)	5.563	0.57	288.7	<.001***					

S.E; standard error
CI; confidence interval
R^2_r; marginal accounted variance
R^2_c; Conditional accounted variance

*p<.05
**p<.01
***p<.001

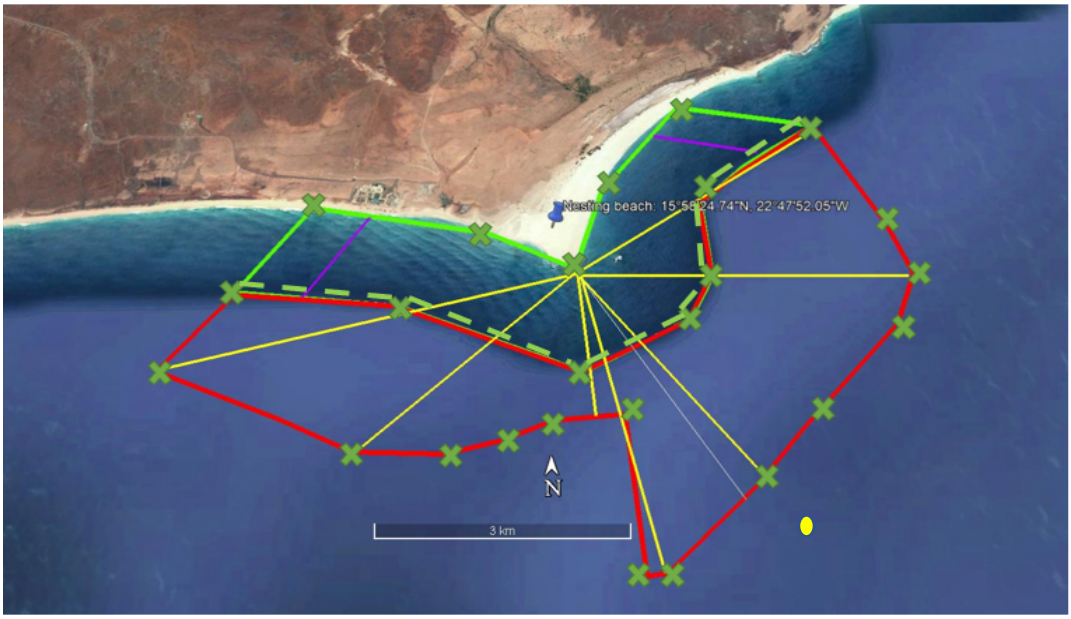

Figure S1. Bathymetry estimates around the southern coast of Boa vista (nesting site) as given by constructed polygons (green crosses denote change of angle between successive connected lines. Green polygon (perimeter = 20 km; area = 11 km^2) outlines the area of sea surrounding the nesting beach. The deeper colour of blue shown in this area is a region of shallow depth (water depth < 3 m along purple transects). Red polygon (perimeter = 27 km; area = 20 km^2) outlines an approximate boundary, beyond which water depth exceeds 20 m. Distance from the origin to the extremes of the yellow transects range from 2 to 5.3 km. The yellow circle shows an area of approximately 8 m depth, 3 km from the beach.

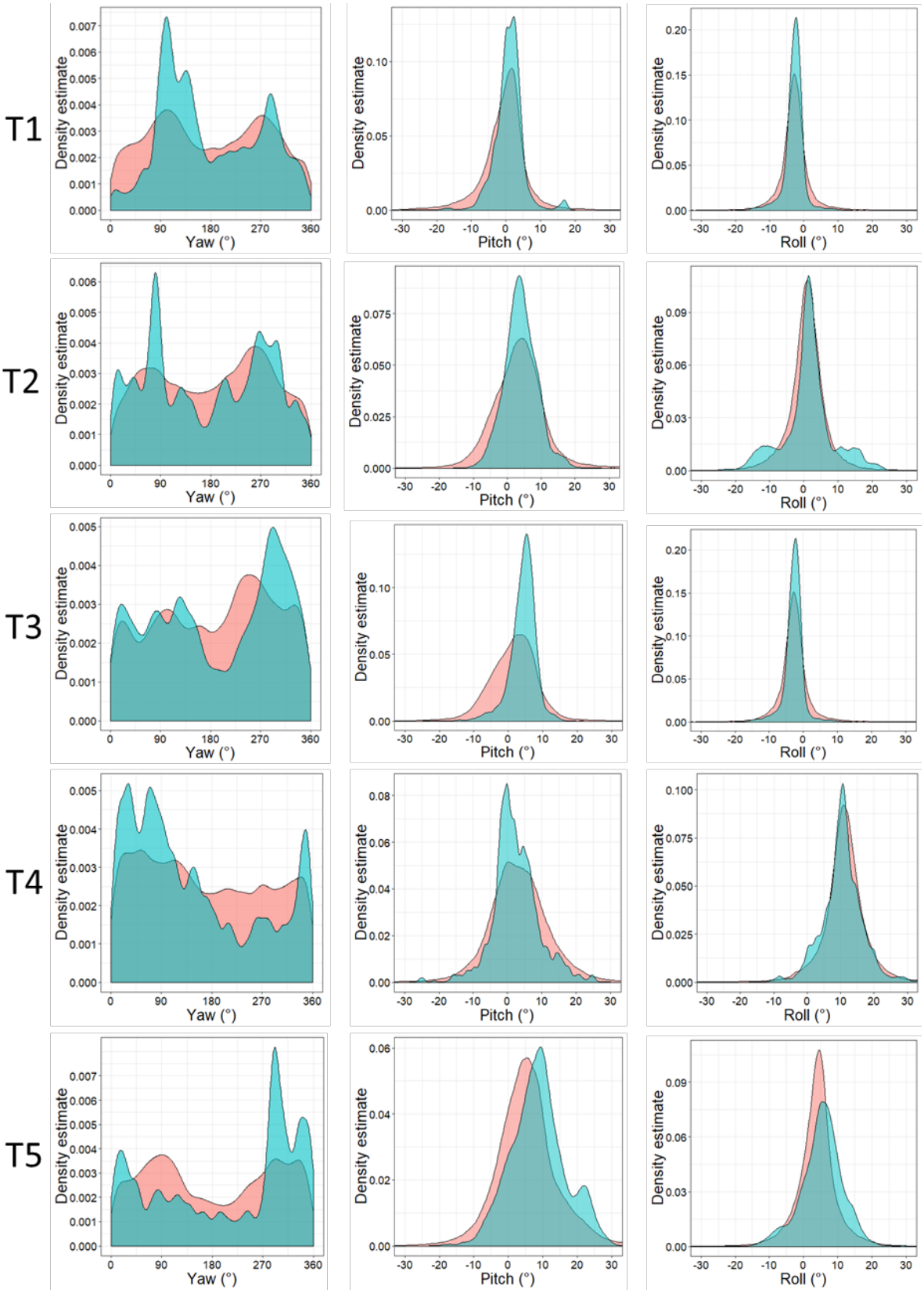

Figure S2. Density estimates for raw values of yaw (°), pitch (°) and roll (°) per turtle aggregated according to resting [blue] and active [red].

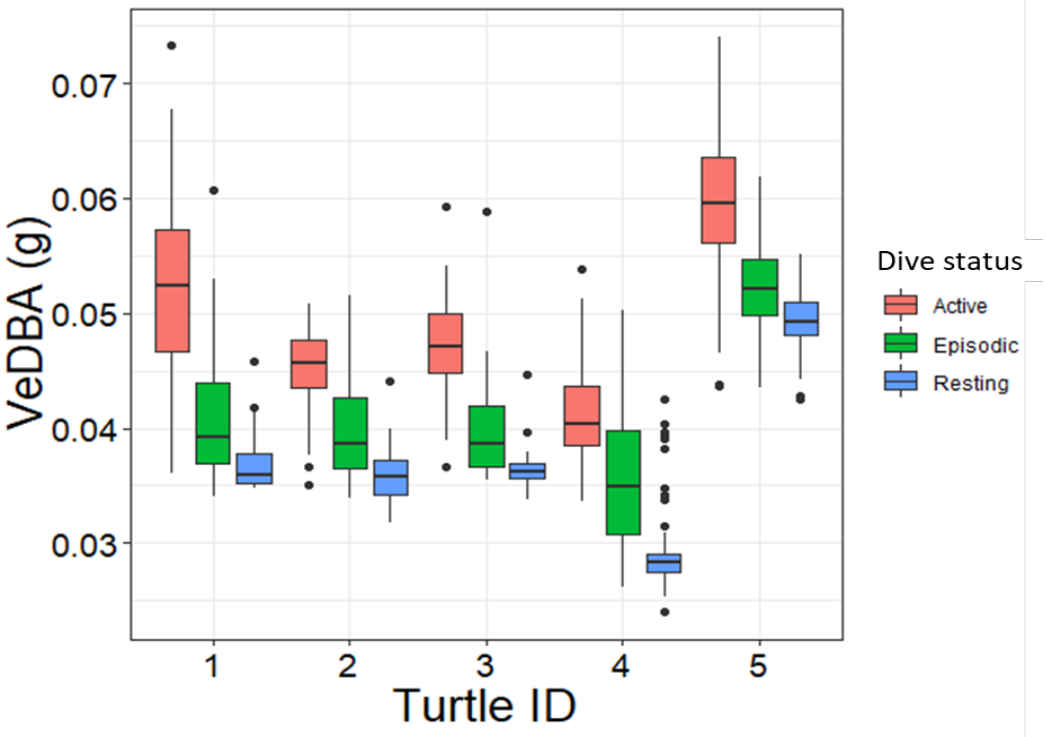

Figure S3. Mean values of VeDBA per turtle, aggregated as a function of dive status (predominately; active [red] vs episodic-rest [green] vs rest [blue]). Boxes denote the median and 25-75% interquartile range. Whiskers extend to the minimum/maximum value no further than 1.5 * IQR. Data points beyond this range are plotted individually. (VeDBA (g) = √((x^2 + y^2 + z^2), where x, y & z are the derived dynamic acceleration values from each axis).

Text S1. Limitation of using Euler angles

Typically, the derivation of each dimension's scale of rotation relies on a set vectoral orientation with each orthogonal channel representing a particular body plane (anterior-posterior, medio-lateral and dorsal-ventral) with respect to the earth's frame of reference (*cf*. Ozyagcilar 2012, Bidder et al. 2015). However, this assumption breaks down for animals that change orientations frequently at angles greater than perpendicular from their longitudinal and lateral axes of 'normal' posture and for 'severe' offsets in tag placement, in which the range for accurate angular velocity measures are restricted in one or more dimensions, whereby x, y and z values can become inversed and/or represent different 'surge', 'sway' and 'heave' planes. Nevertheless, this is only problematic in animals that frequently undertake body inversions greater than 90 degrees (which turtles do not).

References

Bidder O, Walker J, Jones M, Holton M, Urge P, Scantlebury D, Marks N, Magowan E, Maguire I, Wilson R (2015) Step by step: reconstruction of terrestrial animal movement paths by dead-reckoning. Movement ecology 3:1-16

Ozyagcilar T (2012) Implementing a tilt-compensated eCompass using accelerometer and magnetometer sensors. Freescale semiconductor, AN 4248