Table S1. Effects of species, sex, and year and their interaction on sampling and energetic variables during guard stage. Means ± SD are presented for each species with N (year 2011/2012) in parentheses.

	Campbell		Grey-headed		F Ratio				
	Female (5/7)	Male (6/8)	Female (3/5)	Male (7/11)	Sp	Sex	Yr	Sp*Yr	Sp*Sex *Yr
Chick age (days)	8.5 ± 8.6	6.0 ± 5.0 (4)	14 ± 8.0	11 ± 6.6	5.52*	0.06	0.62	--	--
	4.3 ± 2.3 (6)	7.2 ± 2.5 (6)	7.7 ± 3.0	6.9 ± 2.3					
Pre-trip fasting duration (days)	6.8 ± 8.8 (3)	1.6 ± 1.0 (4)	3.7 ± 1.6	3.1 ± 1.1 (6)	-0.55^{t}	-1.00^{t}	-0.83^{t}	--	--
	4.2 ± 3.15	3.6 ± 3.3 (6)	4.6 ± 2.3	4.9 ± 2.2					
Post-trip nest time (hours)	1.2 ± 0.7	1.7 ± 1.3	1.3 ± 0.5	3.7 ± 5.0	-1.61^{t}	1.82^{t}	0.84^{t}	--	--
	1.1 ± 0.8	1.7 ± 2.1	1.5 ± 0.7	2.3 ± 2.0					
Pre-trip body mass (kg)	2.88 ± 0.39	3.28 ± 0.27	2.64 ± 0.12	3.15 ± 0.26	3.26	32.5*	1.33	--	--
	2.80 ± 0.13	3.13 ± 0.21	2.73 ± 0.17	3.04 ± 0.26					
TBW (% initial mass)	52 ± 1.8	53 ± 3.2	56 ± 3.3	52 ± 1.6	0.06	0.06	1.71	21.8*	4.13*
	50 ± 1.8	51 ± 1.4	56 ± 1.1	60 ± 4.4					
Mass gain (% initial mass)	3.4 ± 7.9	0.5 ± 8.2	21 ± 12	6.6 ± 4.8	11.7*	2.34	16.0*	--	--
	9.1 ± 8.9	11 ± 7.2	21 ± 10	17 ± 7.4					
Water influx (mL d^{-1})	166 ± 27.6	205 ± 94.3	244 ± 41.0	182 ± 30.6	5.58*	0.21	7.12*	--	--
	202 ± 37.4	216 ± 53.1	286 ± 103	252 ± 63.5					
DEE (kJ d^{-1})	2070 ± 596	2540 ± 782	2370 ± 1480	2480 ± 275	0.61	0.07	8.33*	--	--
	1880 ± 309	1750 ± 279	2080 ± 310	1940 ± 682					
DEE (kJ kg^{-1} d^{-1})	714 ± 214	770 ± 206	813 ± 500	765 ± 105	0.51	1.38	9.30*	--	--
	639 ± 85.5	534 ± 90.2	690 ± 101	594 ± 212					

Note: Variables that contributed to linear models are in bold. Values for 2011 are in white and 2012 are in grey. F values from three-way ANOVAs are presented for main effects and interaction effects. Only significant interactions are shown in table to conserve space. Where there are no significant interaction effects, F and P values are reported from the additive model. Transformations and distributions are described in methods. A t superscript indicates t values from gamlss functions. DEE calculated with the Speakman 1-pool model (Campbell albatross: 1775 ± 529 kJ d^{-1}; grey-headed albatross: 1846 ± 645 kJ d^{-1}) followed the same trends as the Nagy model (correlation = 0.99). *P<0.05

Table S2. Effects of species and year and their interaction on foraging behaviors during guard stage. Means ± SD are presented for each species with N (year 2011/2012) in parentheses.

	Campbell		Grey-headed		F Ratio			
	Female (5/7)	Male (6/8)	Female (3/5)	Male (7/11)	Sp	Sex	Yr	Sp*Sex
Trip duration (days)	2.4 ± 0.7	3.7 ± 0.8	4.3 ± 0.8	4.8 ± 1.7	15.8*	4.87*	1.05	--
	2.9 ± 0.6	3.0 ± 1.3	3.4 ± 0.7	4.5 ± 1.2				
Daily distance (km)	323 ± 179	481 ± 164	687 ± 196	550 ± 151	8.80*	4.99*	25.4*	7.24*
	520 ± 85	605 ± 124	855 ± 87	794 ± 118				
Maximum Range (km)	197 ± 75	594 ± 214	961 ± 92	969 ± 186	60.5*	8.95*	2.97	--
	490 ± 132	628 ± 413	900 ± 174	1074 ± 84				
Daily water take-offs	8.5 ± 2.0	8.3 ± 2.4	5.8 ± 1.8	6.7 ± 1.4	5.69*	1.33	14.9*	--
	5.5 ± 1.0	6.0 ± 2.1	4.5 ± 1.13	5.6 ± 1.8				
Percent trip on water	52 ± 18	40 ± 12	27 ± 9.2	35 ± 6.1	1.54	3.03	36.6*	5.39*
	27 ± 9.4	25 ± 8.5	16 ± 5.8	21 ± 8.0				
Mean bird air speed (m s^{-1})	8.7 ± 1.4	11.6 ± 1.7	12.1 ± 1.1	13.0 ± 2.4	1.60	10.8*	21.0*	5.63*
	12.2 ± 1.5	13.5 ± 1.3	14.5 ± 1.2	13.8 ± 0.9				
Compensation magnitude	0.56 ± 0.03	0.54 ± 0.05	0.52 ± 0.02	0.53 ± 0.04	0.02	0.81	0.18	--
	0.52 ± 0.04	0.52 ± 0.06	0.50 ± 0.08	0.56 ± 0.1				

Note: Values for 2011 are in white and 2012 are in grey. F values from three-way ANOVAs are presented for main effects and interaction effects. Only significant interactions are shown in table to conserve space. Where there are no significant interaction effects, F and P values are reported from the additive model. Transformations and distributions are described in methods. *P<0.05

Table S3. Effects of species and year and their interaction on environmental variables during guard stage. Means ± SD are presented for each species with N (year 2011/2012) in parentheses.

	Campbell		Grey-headed		F Ratio						
	Female (5/7)	Male (6/8)	Female (3/5)	Male (7/11)	Sp	Sex	Yr	Sp* Sex	Sp* Yr	Sex* Yr	Sp*Sex *Yr
Mean wind speed (m s^{-1})	6.9 ± 1.2	9.13 ± 1.5	9.3 ± 1.3	9.4 ± 1.7	0.37*	9.06*	16.0*	8.20*	--	--	--
	9.5 ± 2.6	11.0 ± 1.7	11.5 ± 0.5	10.3 ± 0.8							
Mean wind speed at takeoff (m s^{-1})	6.8 ± 1.7	9.0 ± 1.3	8.6± 1.9	9.3 ± 2.3	0.44	6.40*	8.63*	4.33*	--	--	--
	9.17 ± 2.9	10.8 ± 1.8	10.9 ± 1.5	9.9 ± 1.3							
Mean wind angle on bird (180°)	85 ± 9.3	90 ± 12	94 ± 6.0	83 ± 6.0	1.75	0.00	0.96	--	--	--	--
	82 ± 5.6	85 ± 5.4	93 ± 9.0	90 ± 5.8							
% Light wind ^{t}	5.2 ± 8.4	5.2 ± 4.3	4.6 ± 7.6	2.9 ± 5.1	-0.8*	0.00	-2.6*	0.36	2.49 *	2.58*	-2.26*
	9.11 ± 16	0.4 ± 0.7	3.3 ± 2.0	4.4 ± 3.7							
% Strong headwind ^{t}	1.1 ± 2.4	0.7 ± 1.5	1.4 ± 1.9	1.0 ± 0.9	10.07	0.31	1.89	--	--	--	--
	1.7 ± 2.11	2.4 ± 2.5	2.3 ± 0.9	1.6 ± 1.3							
% Strong tailwind ^{t}	0.0 ± 0.0	0.8 ± 1.4	2.0 ± 2.0	1.0 ± 1.0	-0.18	-2.5*	1.03	2.64*	--	--	--
	0.3 ± 0.7	1.5 ± 2.7	2.0 ± 2.7	1.2 ± 1.0							
% Crosswind	18 ± 13	33 ± 8.4	48 ± 9.3	41 ± 9.4	4.04	7.95*	13.6*	9.09 *	5.82*	--	--
	37 ± 15	44 ± 9.4	48 ± 5.0	41 ± 7.8							
Mean SST at rest (°C)	8.6 ± 0.3	7.7 ± 1.2	5.1 ± 0.7	6.5 ± 1.6	40.1*	3.18	0.15	--	--	--	--
	8.6 ± 0.3	7.5 ± 1.6	6.7 ± 1.2	5.7 ± 1.0							

Note: Variables that contributed to linear models are in bold. Values for 2011 are in white and 2012 are in grey. F values from three-way ANOVAs are presented for main effects and interaction effects. Only significant interactions are shown in table to conserve space. Where there are no significant interaction effects, F and P values are reported from the additive model. Transformations and distributions are described in methods. A t superscript indicates t values from gamlss or Tweedie functions. *P<0.05