Table S1. Characteristics of the examined green turtles (*Chelonia mydas*, n = 250) organised by study sites (mean ± standard deviation). Locations examined included a foraging site with low anthropogenic impact that served as a control site (Howick Group of Islands, HG), a foraging site located in an industrial region (Townsville Region, TR), a foraging site affected by agricultural run-off (Upstart Bay, UB), and a nesting site with low anthropogenic impact (Milman Islet, MI).

Maturity and Parameter	Foraging control (HG, *n* = 155)	Foraging industrial (TR, *n* = 40)	Foraging agricultural (UB, *n* = 35)	Nesting low impact (MI, *n* = 20)
Sampling dates (month/year)	08/2018 and 08/2019	06-10/2019	11/2018	01-02/2019
Immature turtles (< 90 cm CCL)				
Sample size (*n*)	Total: 89	Total: 40	Total: 24	NA
Juveniles	*55*	*40*	*20*	
Subadults	*34*	*NA*	*4*	
CCL (mean cm ± SD)	63.8 ± 13.9	46.3 ± 4.8	56.4 ± 12.6	
Juveniles	*55.0 ± 7.6*	*46.3 ± 4.8*	*52.1 ± 7.9*	
Subadults	*79.0 ± 7.5*	*NA*	*78.1 ± 8.9*	
Mass (mean kg ± SD)	33.1 ± 21.8	10.8 ± 3.7	22.4 ± 18.1	
Juveniles	*19.1 ± 7.5*	*10.8 ± 3.7*	*15.6 ± 6.6*	
Subadults	*57.0 ± 16.6*	*NA*	*56.8 ± 19.1*	
BCI (mean ± SD)	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1	
Juveniles	*1.2 ± 0.1*	*1.2 ± 0.1*	*1.1 ± 0.1*	
Subadults	*1.2 ± 0.1*	*NA*	*1.2 ± 0.1*	
Sex (*n*)	F:27, M:6, U:56	U:40	U:24	
Juveniles	*F:27, M:6, U:22*	*U:40*	*U:20*	
Subadults	*U:34*	*NA*	*U:4*	
Cloacal temperature (mean ^{o}C ± SD)	30.6 ± 3.1	27.7 ± 3.7	36.7 ± 2.3	
Juveniles	*30.1 ± 3.3*	*27.7 ± 3.7*	*37.3 ± 1.9*	
Subadults	*31.5 ± 2.5*	*NA*	*34.0 ± 2.2*	
Time after capture (mean h ± SD)	4.0 ± 0.0	8.0 ± 10.4*	1.7 ± 0.6	
Juveniles	*4.0 ± 0.0*	*8.0 ± 10.4**	*1.7 ± 0.5*	
Subadults	*4.0 ± 0.0*	*NA*	*1.8 ± 1.0*	
Ambient temperature (mean ^{o}C ± SD)	29.5 ± 2.9	27.1 ± 2.4	36.0 ± 4.2	
Juveniles	*29.3 ± 2.6*	*27.1 ± 2.4*	*36.8 ± 4.0*	
Subadults	*30.1 ± 3.7*	*NA*	*31.8 ± 2.2*	
Adult turtles (≧ 90 cm CCL)				
Sample size	Total: 66	NA	Total: 11	Total: 20
CCL (mean cm ± SD)	100.4 ± 7.3		103.1 ± 7.1	103.3 ± 4.0
Mass (mean kg ± SD)	116.3 ± 22.5		138.4 ± 29.1	117.1 ± 11.6
BCI (mean ± SD)	1.2 ± 0.1		1.3 ± 0.2	1.1 ± 0.1
Sex (*n*)	F:46, M:20		F:11	F:20
Cloacal temperature (mean ^{o}C ± SD)	30.9 ± 2.8		34.1 ± 2.2	27.2 ± 2.5
Time after capture (mean h ± SD)	4.0 ± 0.0		2.1 ± 1.0	1.5 ± 0.0
Ambient temperature (mean ^{o}C ± SD)	29.3 ± 2.8		31.2 ± 3.2	NA

(Immature turtles) immature turtles, which include juvenile and subadult individuals < 90 cm CCL; (Adult turtles) mature turtles, i.e., adult individuals ≧ 90 cm CCL; (n) sample size; (CCL) curved carapace length (cm); and (BCI) Fulton's body condition index, which was calculated following the equation detailed in Bjorndal et al. (2000), i.e., Fulton's condition factor K = body mass/length^3 x 10,000. Sex was categorised in (U) undetermined, (F) female, (M) male. (NA) not applicable. Time after capture is an approximate value of the time that passed between capture and BIA measurement.

* Six out of 250 turtles were released the day after capture, since these turtles were used for a related calibration study on the following day (Kophamel et al. 2022d). These six turtles were kept overnight in enclosed pools in accord with all appropriate regulations and permits. The pools were designed for keeping turtles and saltwater crocodiles and were located at the facilities of the Department of Environment and Science, Townsville).

Table S2. Post-hoc multiple comparison tests for predicted mean adipose tissue percentage in green turtles (*Chelonia mydas*) across (A) life stages, (B) study sites, and (C) life stages across study sites (*n* = 250). Kenward-Roger method for computing the degrees of freedom. Tukey Method for *P* value adjustment (α = 0.05). (SE) standard error of the estimate; (df) degrees of freedom; and (null) null hypothesis ("no difference"), with 1=true and 2=false. Significant *P* values (< 0.05) are highlighted in bold.

(A) Life stages

Contrast	ratio	SE	df	null	t ratio	*P* value
adults / juveniles	1.47	0.22	215	1	2.58	**0.03**
adults / subadults	1.32	0.12	214	1	3.22	**0**
juveniles / subadults	0.90	0.09	216	1	-1.08	0.53

(B) Study sites

Contrast	ratio	SE	df	null	t ratio	*P* value
Howick Group of Islands / Milman Islet	0.74	0.09	167.8	1	-2.35	0.09
Howick Group of Islands / Townsville Region	0.81	0.07	199.9	1	-2.46	0.07
Howick Group of Islands / Upstart Bay	0.66	0.08	95.4	1	-3.41	**0.01**
Milman Islet / Townsville Region	1.09	0.12	213.6	1	0.78	0.87
Milman Islet / Upstart Bay	0.89	0.08	218.9	1	-1.2	0.63
Townsville Region / Upstart Bay	0.82	0.08	127.3	1	-2.11	0.16

(C) Life stages across study sites

Contrast	ratio	SE	df	null	t ratio	*P* value
Howick Group of Islands						
adults / juveniles	1.47	0.22	215	1	2.58	**0.03**
adults / subadults	1.32	0.12	214	1	3.22	**0**
juveniles / subadults	0.90	0.09	216	1	-1.08	0.53
Milman Islet*						
adults / juveniles	NA	NA	NA	NA	NA	NA
adults / subadults						
juveniles / subadults						
Townsville Region*						
adults / juveniles	NA	NA	NA	NA	NA	NA
adults / subadults						
juveniles / subadults						
Upstart Bay						
adults / juveniles	1.47	0.22	215	1	2.58	**0.03**
adults / subadults	1.32	0.12	214	1	3.22	**0**
juveniles / subadults	0.90	0.09	216	1	-1.08	0.53

* Milman Islet is a nesting beach where only adult, female turtles can be sampled; and in Townsville Region only juvenile turtles were found. Contrasts across life stages were not performed for these two locations.

Table S3. Post-hoc multiple comparison tests for predicted Fulton's body condition index in green turtles (*Chelonia mydas*) across (A) life stages, (B) study sites, and (C) life stages across study sites (*n* = 250). Kenward-Roger method for computing the degrees of freedom. Tukey Method for *P* value adjustment (α = 0.05). (SE) standard error of the estimate; (df) degrees of freedom; (null) null hypothesis ("no difference"), with 1=true and 2=false. Significant *P* values (< 0.05) are highlighted in bold.

(A) Life stages

Contrast	ratio	SE	df	null	t ratio	*P* value
adults / juveniles	-0.09	0.06	134.5	1	-1.49	0.3
adults / subadults	-0.06	0.05	8.75	1	-1.21	0.48
juveniles / subadults	0.02	0.04	51.4	1	0.59	0.82

(B) Study sites

Contrast	ratio	SE	df	null	t ratio	*P* value
Howick Group of Islands / Milman Islet	0.09	0.03	176.3	1	2.64	**0.04**
Howick Group of Islands / Townsville Region	-0.03	0.03	27.8	1	-0.84	0.84
Howick Group of Islands / Upstart Bay	-0.02	0.03	100.1	1	-0.75	0.87
Milman Islet / Townsville Region	-0.12	0.05	62.6	1	-2.40	0.09
Milman Islet / Upstart Bay	-0.11	0.04	148.7	1	-2.64	0.05
Townsville Region / Upstart Bay	0.01	0.03	210.7	1	0.23	1

(C) Life stages across study sites

Contrast	estimate	SE	df	null	t ratio	*P* value
Howick Group of Islands						
adults / juveniles	-0.09	0.06	134.5	1	-1.49	0.3
adults / subadults	-0.06	0.05	8.8	1	-1.21	0.48
juveniles / subadults	0.02	0.04	51.4	1	0.59	0.82
Milman Islet*						
adults / juveniles	NA	NA	NA	NA	NA	NA
adults / subadults						
juveniles / subadults						
Townsville Region*						
adults / juveniles	NA	NA	NA	NA	NA	NA
adults / subadults						
juveniles / subadults						
Upstart Bay						
adults / juveniles	-0.09	0.06	134.5	1	-1.49	0.3
adults / subadults	-0.06	0.05	8.8	1	-1.21	0.48
juveniles / subadults	0.02	0.04	51.4	1	0.59	0.82

* Milman Islet is a nesting beach where only adult, female turtles can be sampled; and in Townsville Region only juvenile turtles were found. Contrasts across life stages were not performed for these two locations.

Table S4. Predicted adipose tissue (percentage) for green turtles (*Chelonia mydas*) across study sites and life stages. Adipose tissue was predicted using equation 1. Sites examined included: a foraging site with low anthropogenic impact that served as a control site (Howick Group of Islands, HG); a foraging site located in an industrial region (Townsville Region, TR); a foraging site affected by agricultural run-off (Upstart Bay, UB); and a nesting site with low anthropogenic impact (Milman Islet, MI). Table S2 is also available in a graphical format in Figure 3 and Figure 4.

Life stage and Parameter	**Foraging control (HG, *n* = 155)**	**Foraging industrial (TR, *n* = 40)**	**Foraging agricultural (UB, *n* = 35)**	**Nesting low impact (MI, *n* = 20)**
Sampling dates (month/year)	08/2018 and 08/2019	06-10/2019	11/2018	01-02/2019
Juveniles (< 65 cm CCL)	**n = 55** (22⚥ : 27♀ : 6♂)	**n = 40** (40⚥)	**n = 20** (20⚥)	**n = 0** (0⚥)
Mean ± SD	3.0 ± 0.5	3.7 ± 0.6	4.5 ± 0.6	NA
df	50.8	66.3	48.9	
Confidence levels (95%)	1.8-5.0	2.3-6.0	2.9-7.1	
Subadults (65-90 cm CCL)	**n = 34** (34⚥)	**n = 0** (0⚥)	**n = 4** (4⚥)	**n = 0** (0⚥)
Mean ± SD	3.3 ± 0.4	NA	5.1 ± 0.5	NA
df	22.7		17.8	
Confidence levels (95%)	2.2-5.2		3.5-7.4	
Adults (> 90 cm CCL)	**n = 66** (46♀ : 20♂)	**n = 0** (0♀ : 0♂)	**n = 11** (11♀)	**n = 20** (20♀)
Mean ± SD	4.4 ± 0.6	NA	6.7 ± 0.8	6.0 ± 0.8
df	28.9		24.6	36.6
Confidence levels (95%)	2.8-7.0		4.5-9.9	3.9-9.1

(⚥) unknown sex; (♀) female; (♂) male. (CCL) curved carapace length, cm; (SD) standard deviation; (df) degrees of freedom.

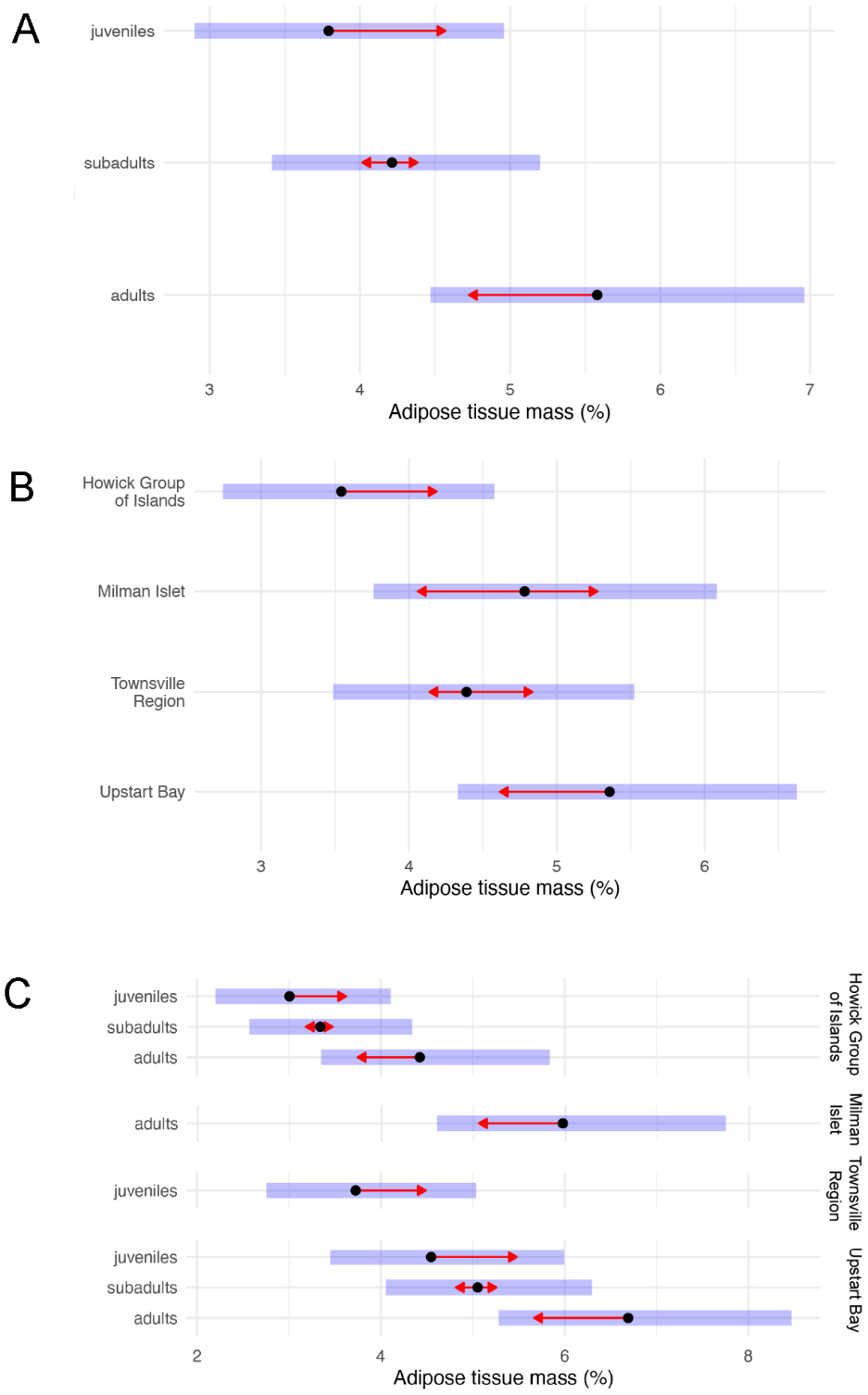

Figure S1. Graphical summary of post-hoc multiple comparison tests for predicted mean adipose tissue percentage in green turtles (*Chelonia mydas*) across (A) life stages, (B) study sites, and (C) life stages across study sites (*n* = 250). (Blue bars) Confidence intervals for the estimated marginal means; (red arrows) confidence intervals for the comparisons among estimated marginal means. Non-significant ($P < 0.05$) difference assumed when arrows overlap. Tukey Method for *P* value adjustment ($\alpha = 0.05$). Contrasts across life stages for Milman Islet and Townsville Region were not performed, since Milman Islet is a nesting beach where only adult female turtles can be sampled; and in Townsville Region only juvenile turtles were found.

DESCRIPTION OF PARAMETERS EXAMINED AND CODES USED IN THE DATASET

The datasets used in this study (.xlsx, .ods., and .csv formats) are available at James Cook University Data Repository under the following link: https://doi.org/10.25903/73jy-ky07

Parameter	Unit	Description
id		Animal ID
year		Year of sampling
date		Date of sampling (year/month/day)
location		Location, with details on reef sampled: Howick Group of Islands (Combe Reef and Ingram Reef), Townsville Region (Cleveland Bay and Toolakea Beach), Upstart Bay, and Milman Islet
location_merged		Location: Howick Group of Islands (Combe Reef and Ingram Reef), Townsville Region (Cleveland Bay and Toolakea Beach), Upstart Bay, and Milman Islet
status		Status of sampled turtles (wild)
measurement		Repeated measurement: (1) sampled once; (2) sampled twice; (3) sampled thrice
recap		Recapture status: (p) primary, i.e., first time captured; (isr) inter-season recapture, i.e., captured on several field trips; (wsr) within season recapture, i.e., repeatedly captured within the same field trip
lifestage		Life stage: (j) juvenile; (sa) subadult; (a) adult
sex		Sex: (i) undertermined; (f) female; (m) male
ccl	centimetres	Curved carapace length (CCL)
scl	centimetres	Straight carapace length (SCL)
weight	kilogram	Total body mass
bci		Body condition index
ph_ex		Physical examination: (1) yes
temp_air	celsius	Air temperature
temp_cloaca	celsius	Cloacal temperature
postfeeding_h	hours	Estimated hours after feeding
blood		Blood sampling: (1) yes; (0) no
istat		Use of a handheld i-STAT blood analyser: (0) no
bia_postcapt_h	hours	Hours that have passed between capture and BIS examination
position		Position in which the turtle was placed during BIS examination (prone and supine)
smear		Blood smear: (1) yes; (0) no
biochem		Biochemical analysis of the blood samples: (1) yes; (0) no
pcv	%	Packed cell volume
SEEperc_avg		Mean standard error of the estimate of the BIS measurements
SEEperc_sd		Standard deviation of the mean standard error of the estimate of the BIS measurements
R0_avg	ohm	Mean resistance at zero frequency (R0)
R0_sd	ohm	Standard deviation of Resistance at zero frequency (R0)
R0_cv		Coefficient of variance of the mean resistance at zero frequency (R0)
R0_scl_meas		Impedance index (length^2/resistance), calculated using R0 and SCL
R0_ccl_meas		Impedance index (length^2/resistance), calculated using R0 and CCL
Ri_avg	ohm	Mean intracellular resistance
Ri_sd	ohm	Standard deviation of intracellular resistance (Ri)
Ri_cv		Coefficient of variance of the mean intracellular resistance (Ri)
Ri_scl_meas		Impedance index (length^2/resistance), calculated using Ri and SCL
Ri_ccl_meas		Impedance index (length^2/resistance), calculated using Ri and CCL

Rinf_avg	ohm	Mean resistance at infinite frequency
Rinf_sd	ohm	Standard deviation of resistance at infinite frequency (Rinf)
Rinf_cv		Coefficient of variance of the mean resistance at infinite frequency (Rinf)
Rinf_scl_meas		Impedance index (length^2/resistance), calculated using Rinf and SCL
Rinf_ccl_meas		Impedance index (length^2/resistance), calculated using Rinf and CCL
R50_avg	ohm	Mean resistance at 50 kHz (R50)
R50_sd	ohm	Standard deviation of resistance at 50 kHz (R50)
R50_cv		Coefficient of variance of the mean resistance at 50 kHz (R50)
R50_scl_meas		Impedance index (length^2/resistance), calculated using R50 and SCL
R50_ccl_meas		Impedance index (length^2/resistance), calculated using R50 and CCL
Xc50_avg	ohm	Mean reactance at 50 kHz
Xc50_sd	ohm	Standard deviation of Reactance at 50 kHz (Xc50)
PhA50_avg	degrees	Mean phase angle at 50 kHz
PhA50_sd	degrees	Standard deviation of Phase angle at 50 kHz (ph50)
adipose_mass_R50scl	kg	Adipose tissue mass estimated using impedance index SCL^2/R50
adipose_perc_R50scl	%	Adipose tissue percentage estimated using impedance index SCL^2/R50
adipose_mass_R50ccl	kg	Adipose tissue mass estimated using impedance index CCL^2/R50
adipose_perc_R50ccl	%	Adipose tissue percentage estimated using impedance index CCL^2/R50
comments		Additional comments
repeated		Repeated measurement available from the selected individual: (Y) yes; (N) no