Supplement of Biogeosciences, 17, 5599–5613, 2020
https://doi.org/10.5194/bg-17-5599-2020-supplement

Biogeosciences Open Access EGU

Supplement of

Stable isotopes track the ecological and biogeochemical legacy of mass mangrove forest dieback in the Gulf of Carpentaria, Australia

Yota Harada et al.

Correspondence to: Yota Harada (yota.harada@griffithuni.edu.au)

Table S1. Mangrove seedling and sampling densities (ind. per m^2).

	Unimpacted (Mean, SE)	n	Impacted (Mean, SE)	n
2016	6.2, 0.7	124	0.2, 0.1	143
2017	5.5, 0.5	161	4.2, 0.4	175
2018	13.8, 1.6	80	7.1, 0.5	117

Table S2. Leaf CNS isotope values across intertidal zones.

Forest	Sampling plot	Mean			SE			n
		$\delta^{15}N_{AIR}$	$\delta^{13}C_{VPDB}$	$\delta^{34}S_{VCDT}$	$\delta^{15}N_{AIR}$	$\delta^{13}C_{VPDB}$	$\delta^{34}S_{VCDT}$	
Unimpacted	forest edge, land	5.3	-28.6	20.0	0.5	0.5	1.5	3
Unimpacted	high	4.1	-27.7	12.0	0.1	1.4	2.7	3
Unimpacted	mid	4.4	-28.9	8.9	0.4	1.0	2.6	3
Unimpacted	low	3.9	-29.4	7.1	0.3	0.6	1.1	3
Unimpacted	forest edge, ocean	4.2	-27.6	14.9	0.6	0.4	1.5	3
Impacted	forest edge, land	5.1	-25.3	19.8	0.1	0.4	1.8	3
Impacted	high	5.3	-25.6	16.6	0.7	0.5	2.6	3
Impacted	mid	5.2	-26.2	13.4	0.3	0.5	2.9	3
Impacted	low	4.9	-26.7	9.8	0.1	0.5	1.2	3
Impacted	forest edge, ocean	1.0	-25.4	7.9	1.1	0.7	1.1	3

Table S3. Surface (<0.5cm) sediment C isotope values across intertidal zones.

Forest	Sampling plot	Mean		SE		n
		%C	$\delta^{13}C_{VPDB}$	%C	$\delta^{13}C_{VPDB}$	
Unimpacted	forest edge, land	2.76	-25.1	1.17	1.0	3
Unimpacted	high	1.54	-23.6	0.35	0.2	3
Unimpacted	mid	1.62	-24.3	0.24	0.5	3
Unimpacted	low	1.84	-24.7	0.46	0.3	3
Unimpacted	forest edge, ocean	2.33	-23.6	0.91	1.1	3
Unimpacted	mud flat	1.02	-21.8	0.05	0.5	3
Impacted	forest edge, land	1.02	-22.4	0.22	0.8	3
Impacted	high	1.01	-22.2	0.18	0.3	3
Impacted	mid	1.32	-22.1	0.30	0.1	3
Impacted	low	1.24	-21.0	0.12	0.6	3
Impacted	forest edge, ocean	0.71	-21.0	0.10	0.6	3
Impacted	mud flat	0.58	-21.2	0.11	0.5	3

Table S4. Stable C, N and S isotopic compositions of animals

Forest	Year	Group	Taxa	$\delta_{13}C$	SE	$\delta_{15}N$	SE	$\delta_{34}S$	SE	n
Unimpacted	2016	algae feeder	*Tubuca signata*	-17.4	0.3	6.7	0.3	14.3	1.0	3
Unimpacted	2017	algae feeder	*Tubuca signata*	-17.1	0.8	6.0	0.2	14.2	0.2	3
Unimpacted	2018	algae feeder	*Tubuca signata*	-16.5	0.4	6.9	0.2	14.7	0.2	5
Unimpacted	2017	filter feeder	*Saccostrea* sp.	-19.3	0.2	7.8	0.1	13.5	0.4	3
Unimpacted	2018	filter feeder	*Saccostrea* sp.	-20.2	0.1	6.9	0.2	14.0	0.3	3
Unimpacted	2016	grazer	*Telescopium telescopium*	-20.3	0.1	7.1	0.0	10.9	1.0	2
Unimpacted	2017	grazer	*Telescopium telescopium*	-18.2	1.1	6.4	0.1	12.0	1.1	3
Unimpacted	2018	grazer	*Telescopium telescopium*	-18.4	0.8	7.3	0.2	11.3	0.9	6
Unimpacted	2016	leaf feeder	*Parasesarma* or *Episesarma*	-21.0	0.3	7.7	0.3	11.5	1.0	3
Unimpacted	2017	leaf feeder	*Parasesarma* or *Episesarma*	-21.1	0.8	8.1	0.4	12.9	2.0	4
Unimpacted	2018	leaf feeder	*Parasesarma* or *Episesarma*	-22.0	0.5	7.9	0.4	15.0	0.7	4
Impacted	2016	algae feeder	*Tubuca signata*	-15.7	0.7	7.5	0.2	17.0	0.2	3
Impacted	2017	algae feeder	*Tubuca signata*	-15.4	0.8	8.4	0.4	15.5	0.3	3
Impacted	2018	algae feeder	*Tubuca signata*	-15.1	0.2	7.3	0.4	16.7	0.2	6
Impacted	2017	filter feeder	*Saccostrea* sp.	-19.0	0.5	7.9	0.1	14.5	0.4	3
Impacted	2018	filter feeder	*Saccostrea* sp.	-20.0	0.0	7.5	0.1	15.2	0.2	3
Impacted	2016	grazer	*Telescopium telescopium*	-16.2	0.1	7.5	0.0	14.1	0.7	2
Impacted	2017	grazer	*Telescopium telescopium*	-16.7	0.8	7.2	0.1	14.7	0.4	3
Impacted	2018	grazer	*Telescopium telescopium*	-16.0	0.5	7.8	0.2	14.5	0.2	6
Impacted	2016	leaf feeder	*Parasesarma* or *Episesarma*	-18.6	0.0	9.0	0.4	15.7	0.1	2
Impacted	2017	leaf feeder	*Parasesarma* or *Episesarma*	-18.3	0.1	9.0	0.3	16.0	0.5	3
Impacted	2018	leaf feeder	*Parasesarma* or *Episesarma*	-18.0	0.7	7.7	0.9	19.4	1.2	3

Table S5. C isotopic compositions in essential amino acids (EAAs)

Forest	Common name	Taxa	n	EAA (mean, SD)					mean of five EAAs
				Lys	Ile	Val	Leu	Phe	
Unimpacted	Algae feeder	Tubuca signata	3	-15.3, 2.1	-18.8, 1.3	-23.5, 1.1	-24.4, 1.5	-27.5, 1.5	-21.9
Unimpacted	Leaf feeder	Sesarmidae	3	-19.7, 1.7	-22.7, 1.9	-26.8, 2.0	-27.6, 1.9	-29.7, 1.0	-25.3
Unimpacted	Grazer	Telescopium Telescopium	3	-18.1, 1.5	-21.3, 1.6	-25.9, 2.0	-26.3, 1.9	-28.3, 2.2	-24.0
Unimpacted	Filter feeder	Crassostrea (oyster)	2	-16.8, 0.6	-18.6, 0.2	-24.7, 0.3	-26.0, 0.3	-27.6, 0.2	-22.8
Unimpacted	Mangrove	Avicennia marina	2	-22.8, 0.4	-25.0, 0.7	-32.5, 0.5	-34.8, 0.4	-28.8, 0.9	-28.8
Unimpacted	MPB		1	-23.4	-25.2	-30.3	-30.5	-27.8	-27.4
Impacted	Algal feeder	Tubuca signata	3	-13.9, 2.2	-17.3, 1.4	-22.4, 1.5	-23.2, 1.7	-26.0, 2.2	-20.5
Impacted	Leaf feeder	Sesarmidae	2	-17.8, 0.3	-21.4, 0.4	-25.0, 0.2	-26.0, 0.1	-29.2, 0.1	-23.9
Impacted	Grazer	Telescopium Telescopium	3	-17.1, 1.2	-19.2, 1.1	-23.9, 1.1	-24.5, 1.1	-26.5, 1.2	-22.2
Impacted	Filter feeder	Crassostrea (oyster)	2	-17.5, 0.0	-18.5, 0.4	-24.7, 0.4	-25.7, 0.3	-28.1, 0.3	-22.9
Impacted	Mangrove	Avicennia marina	2	-21.8, 1.1	-23.6, 0.2	-30.4, 0.9	-33.0, 0.0	-26.4, 0.6	-27.0
Impacted	MPB		1	-15.5	-18.6	-23.4	-22.9	-23.2	-20.7

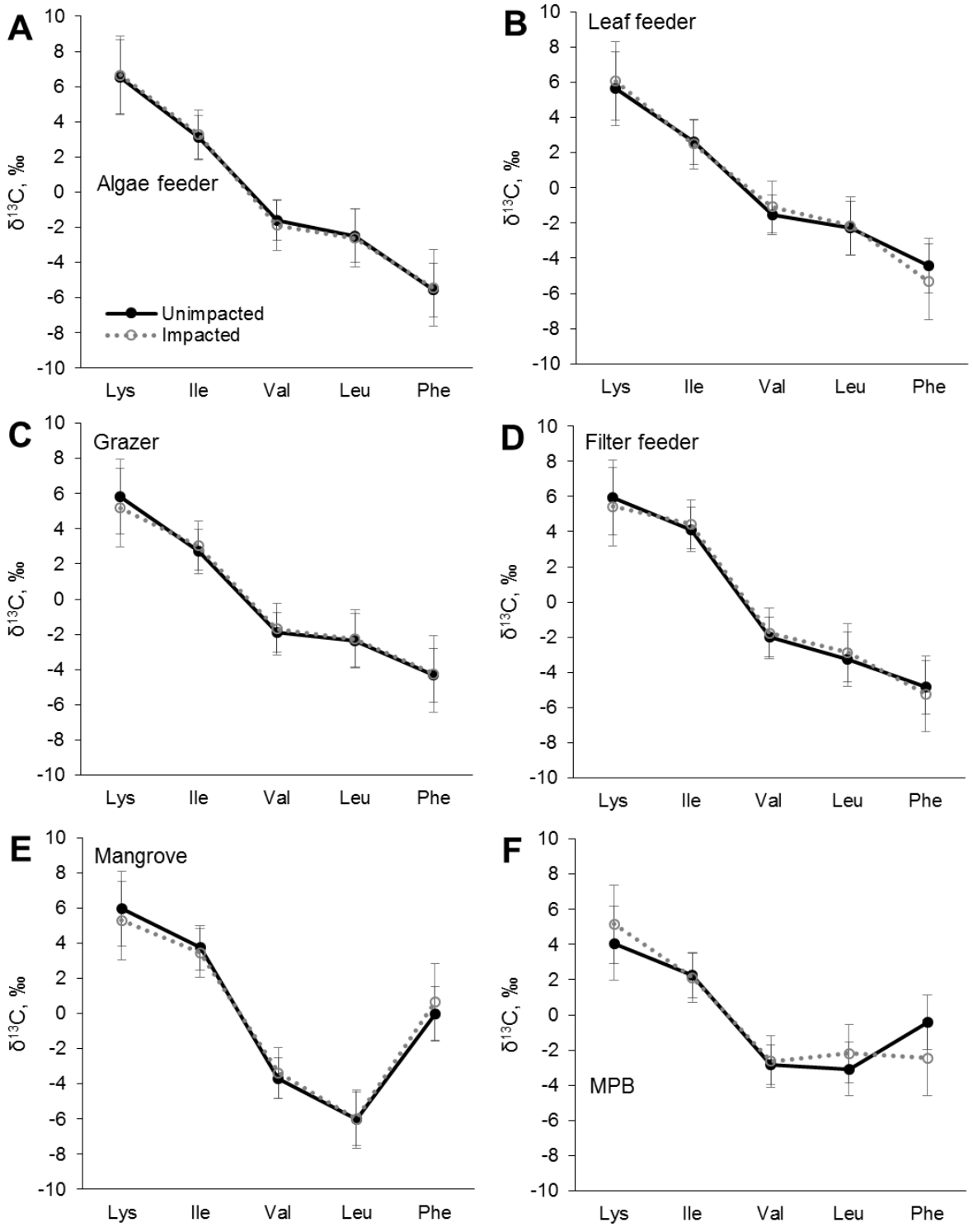

Figure S1. Normalized $\delta_{13}C_{EAA}$ fingerprint patterns of four mangrove consumer groups and resources including mangrove leaves and MPB from the unimpacted and impacted mangrove sites during 2017 (20 months after the dieback). The values were normalized to the mean $\delta_{13}C$ value of five EAA in the sample as per Larsen (2009). Error bars show ± SD. The normalized $\delta_{13}C_{EAA}$ fingerprint patterns did not differ between the forests for all the samples (PERMANOVA $p > 0.05$, Table 3).