The following supplement accompanies the article

Carbon and nitrogen cycling on intertidal mudflats of a temperate Australian estuary. IV. Inverse model analysis and synthesis

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Marine Ecology Progress Series 394: 35–48 (2009)

Supplement 1. This supplement contains all the model outputs (Tables S1, S2, and S3)

Table S1. Mean ($\bar{x}$) and SD (σ) flux (mmol m^{-2} d^{-1}) outputs from the model using a cellular C:N ratio of 5 on the upper (up) and lower (lo) mudflats at Sites Castle Forbes Bay (CF) and Port Cygnet (PC) during autum (Aut), winter (Win), spring (Spr) and summer (Sum). DIC dissolved inorganic carbon; MPB: microphytobenthos; DOC, DON: dissolved organic carbon and nitrogen, respectively; NH4 (ammonium); NO3: nitrate; GRAs: grazing; POC, PON: particulate organic carbon and nitrogen, respectively; BAC: bacteria; OMT: terrestrial organic matter. Suffixes: carbon (_C) and nitrogen (_N) balance of the respective pool, and sources considered from the water column (wC, wN)

Flux	up Aut		up Win		up Spr		up Sum		lo Aut		lo Win		lo Spr		lo Sum	
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ
CF																
DICw → MPB_C	75.0	0.0	26.0	0.0	125.0	0.0	86.0	0.0	46.0	0.0	4.4	0.0	37.0	0.0	52.0	0.0
DOCw → MPB_C	5.2	3.5	3.0	0.9	14.8	3.7	5.9	4.1	4.0	2.0	0.3	0.2	4.5	1.0	4.5	2.0
NH4w → MPB_N	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
NH4 → MPB_N	1.4	0.0	0.7	0.0	0.7	0.0	0.5	0.0	0.1	0.0	0.1	0.0	0.2	0.0	0.3	0.0
DONw → MPB_N	3.7	1.6	2.0	0.7	5.7	1.4	4.0	1.8	3.4	1.1	0.5	0.1	1.3	0.3	2.2	0.7
NO3w → MPB_N	0.0	0.0	0.5	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.3	0.0
MPB_N → GRAs_N	1.9	1.5	1.7	0.8	3.5	1.5	4.3	1.9	2.0	1.2	0.3	0.2	1.1	0.3	2.6	0.7
MPB_C → DICw	10.3	3.4	4.2	1.0	19.4	4.4	11.8	3.9	6.7	2.0	0.6	0.2	5.7	1.2	7.1	2.3
MPB_C → DOC	49.0	8.2	9.9	3.6	92.2	7.2	45.2	8.8	24.6	5.7	1.0	0.7	28.4	1.5	31.7	3.5
MPB_N → DON	1.0	0.7	0.2	0.2	0.9	0.7	1.2	0.8	0.5	0.4	0.1	0.0	0.2	0.2	0.5	0.4
MPB_C → POC	11.3	8.2	6.3	4.3	10.9	7.6	13.5	9.4	8.7	6.1	1.6	1.0	2.1	1.4	5.0	3.5
MPB_N → PON	2.3	1.6	1.3	0.9	2.2	1.5	2.7	1.9	1.7	1.2	0.3	0.2	0.4	0.3	1.0	0.7
MPB_C → GRAs_C	9.7	7.4	8.6	4.2	17.3	7.4	21.4	9.3	9.9	5.9	1.5	1.0	5.3	1.4	12.8	3.5
DOC → DOCw	50.6	14.7	10.2	5.9	89.4	12.9	42.1	15.5	21.0	11.4	2.3	1.5	28.1	2.2	29.8	6.3
DON → DONw	4.4	1.6	1.6	0.7	3.6	1.4	4.3	1.8	3.2	1.1	0.5	0.1	0.7	0.3	1.8	0.7
DOC → BAC_C	24.6	17.0	11.1	7.4	24.1	15.4	28.7	18.8	22.4	13.9	3.4	2.0	4.2	2.7	12.1	7.5
POC → BAC_C	60.2	19.2	26.1	7.9	46.5	17.5	56.5	20.7	38.9	15.1	11.1	2.0	8.7	3.0	21.8	8.5
DON → BAC_N	1.8	1.3	0.9	0.6	1.6	1.2	2.1	1.5	1.2	0.9	0.5	0.2	0.3	0.2	0.7	0.6
PON → BAC_N	5.6	1.6	2.4	0.7	4.1	1.4	5.2	1.7	3.3	1.1	0.8	0.2	0.8	0.3	1.9	0.7
NH4 → BAC_N	2.3	1.3	2.7	1.5	9.7	5.6	9.3	5.5	2.9	1.7	2.9	1.7	10.1	5.6	9.9	5.7
BAC_C → DICw	54.7	3.4	23.8	1.0	45.6	4.4	55.2	3.9	39.3	2.0	8.9	0.2	8.3	1.2	21.9	2.3
BAC_C → DOC	26.2	5.8	11.4	2.1	21.3	4.9	25.6	5.8	18.8	3.8	4.7	0.5	3.9	0.9	10.2	2.4
BAC_C → GRAs_C	3.9	2.7	1.9	1.2	3.7	2.3	4.5	2.8	3.2	2.0	0.9	0.5	0.7	0.4	1.8	1.1
BAC_N → NH4	3.7	1.3	3.3	1.5	10.4	5.6	10.5	5.5	3.0	1.7	3.1	1.7	10.3	5.6	10.2	5.7
BAC_N → DON	5.2	1.2	2.3	0.4	4.3	1.0	5.1	1.2	3.8	0.8	0.9	0.1	0.8	0.2	2.0	0.5
BAC_N → GRAs_N	0.8	0.5	0.4	0.2	0.7	0.5	0.9	0.6	0.6	0.4	0.2	0.1	0.1	0.1	0.4	0.2
NH4 → NH4w	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
N2w → MPB_N	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.9	0.0
OMTwC → POC	48.9	18.6	19.8	8.2	35.6	16.8	43.1	20.1	30.2	14.7	9.5	2.3	6.6	2.9	16.8	8.1
OMTwN → PON	3.3	1.6	1.2	0.8	2.0	1.5	2.5	1.8	1.6	1.2	0.5	0.2	0.4	0.3	0.9	0.7
PC																
DICw → MPB_C	5.2	0.0	8.0	0.0	35.0	0.0	23.0	0.0	64.0	0.0	5.2	0.0	16.0	0.0	11.0	0.0
DOCw → MPB_C	0.5	0.3	0.6	0.4	2.4	1.7	1.8	1.2	4.2	3.0	0.5	0.3	1.1	0.7	0.9	0.6
NH4w → MPB_N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NH4 → MPB_N	0.5	0.0	0.7	0.0	1.0	0.0	2.3	0.0	1.0	0.0	0.5	0.0	1.6	0.0	1.1	0.0
DONw → MPB_N	0.4	0.1	0.5	0.2	1.8	1.0	1.2	0.7	2.5	1.1	0.4	0.1	0.6	0.4	0.4	0.2
NO3w → MPB_N	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MPB_N → GRAs_N	0.4	0.3	0.5	0.4	1.1	0.8	1.6	1.0	1.4	1.0	0.4	0.3	1.0	0.6	0.9	0.5
MPB_C → DICw	0.8	0.2	1.2	0.4	5.0	1.6	3.5	1.0	8.4	2.8	0.8	0.2	2.3	0.7	1.7	0.5
MPB_C → DOC	0.6	0.5	1.9	1.2	20.1	4.8	5.5	3.3	45.5	5.5	0.6	0.5	4.8	2.1	1.5	1.0
MPB_N → DON	0.1	0.0	0.1	0.1	0.5	0.3	0.3	0.2	0.8	0.6	0.1	0.0	0.3	0.2	0.1	0.1

Table S1 (continued)

Flux	up Aut		up Win		up Spr		up Sum		lo Aut		lo Win		lo Spr		lo Sum	
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ
MPB_C → POC	2.2	1.3	2.8	1.8	6.8	4.9	8.0	5.1	7.4	5.3	2.2	1.3	5.2	3.3	4.3	2.6
MPB_N → PON	0.4	0.3	0.6	0.4	1.4	1.0	1.6	1.0	1.5	1.1	0.4	0.3	1.0	0.7	0.9	0.5
MPB_C → GRAs_C	2.2	1.4	2.7	1.8	5.5	4.2	7.9	5.1	6.9	5.0	2.2	1.4	4.8	3.2	4.4	2.7
DOC → DOCw	2.0	1.7	5.4	3.6	21.0	6.7	10.6	7.1	44.5	8.4	2.0	1.7	8.6	2.6	6.6	4.5
DON → DONw	0.4	0.1	0.5	0.2	1.8	1.0	1.2	0.7	2.5	1.1	0.4	0.1	0.6	0.4	0.4	0.2
DOC → BAC_C	10.0	2.5	6.2	4.1	12.0	8.2	11.5	7.8	15.3	10.2	10.0	2.5	3.9	3.1	9.7	5.9
POC → BAC_C	31.5	2.3	26.9	4.2	30.9	9.0	45.3	8.1	31.8	11.5	31.5	2.3	21.6	3.5	42.5	5.8
DON → BAC_N	1.9	0.3	1.5	0.5	1.3	0.9	2.4	1.0	1.2	0.9	1.9	0.3	1.2	0.5	2.7	0.7
PON → BAC_N	2.0	0.2	2.1	0.3	3.1	0.9	4.2	0.8	3.0	1.0	2.0	0.2	2.6	0.5	2.9	0.4
NH4 → BAC_N	2.6	1.5	2.3	1.3	9.2	5.3	8.6	5.0	2.5	1.4	2.6	1.5	9.2	5.3	9.0	5.2
BAC_C → DICw	26.2	0.2	21.8	0.4	28.0	1.6	37.5	1.0	30.6	2.8	26.2	0.2	16.7	0.7	34.3	0.5
BAC_C → DOC	11.4	1.6	9.6	2.4	12.9	3.1	16.5	4.2	14.3	3.5	11.4	1.6	7.7	1.7	14.8	3.6
BAC_C → GRAs_C	3.9	0.7	1.6	1.1	1.9	1.4	2.7	1.8	2.2	1.5	3.9	0.7	1.1	0.8	3.0	1.7
BAC_N → NH4	3.4	1.5	3.7	1.3	10.6	5.3	11.4	5.0	3.5	1.4	3.4	1.5	11.2	5.3	11.0	5.2
BAC_N → DON	2.3	0.3	1.9	0.5	2.6	0.6	3.3	0.8	2.9	0.7	2.3	0.3	1.5	0.3	3.0	0.7
BAC_N → GRAs_N	0.8	0.1	0.3	0.2	0.4	0.3	0.5	0.4	0.4	0.3	0.8	0.1	0.2	0.2	0.6	0.3
NH4 → NH4w	0.3	0.0	0.8	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.3	0.0	0.4	0.0	1.0	0.0
N2w → MPB_N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
OMTwC → POC	29.4	2.9	24.1	4.6	24.1	8.7	37.3	9.7	24.4	11.1	29.4	2.9	16.4	4.3	38.2	6.6
OMTwN → PON	1.5	0.3	1.6	0.4	1.8	0.9	2.6	1.1	1.5	1.0	1.5	0.3	1.6	0.7	2.0	0.7

Table S2. Mean ($\bar{x}$) and SD (σ) flux (mmol m^{-2} d^{-1}) outputs from the model using a cellular C:N ratio of 8 on the upper (up) and lower (lo) mudflats at Sites Castle Forbes Bay (CF) and Port Cygnet (PC) during autum (Aut), winter (Win), spring (Spr) and summer (Sum). DIC dissolved inorganic carbon; MPB: microphytobenthos; DOC, DON: dissolved organic carbon and nitrogen, respectively; NH4 (ammonium); NO3: nitrate; GRAs: grazing; POC, PON: particulate organic carbon and nitrogen, respectively; BAC: bacteria; OMT: terrestrial organic matter. Suffixes: carbon (_C)and nitrogen (_N) balance of the respective pool, and sources considered from the water column (wC, wN)

Flux	up Aut		up Win		up Spr		up Sum		lo Aut		lo Win		lo Spr		lo Sum	
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ
CF																
DICw → MPB_C	75.0	0.0	26.0	0.0	125.0	0.0	86.0	0.0	46.0	0.0	4.4	0.0	37.0	0.0	52.0	0.0
DOCw → MPB_C	5.0	3.6	3.1	0.9	14.8	3.6	6.2	4.1	4.2	2.1	0.4	0.2	4.5	1.0	4.5	2.0
NH4w → MPB_N	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
NH4 → MPB_N	1.4	0.0	0.7	0.0	0.7	0.0	0.5	0.0	0.1	0.0	0.1	0.0	0.2	0.0	0.3	0.0
DONw → MPB_N	3.4	1.6	1.4	0.4	5.4	1.4	3.4	1.5	3.1	1.0	0.2	0.1	1.3	0.3	2.0	0.6
NO3w → MPB_N	0.0	0.0	0.5	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.3	0.0
MPB_N → GRAs_N	1.8	1.4	1.4	0.6	3.3	1.4	4.4	1.8	1.7	1.1	0.2	0.1	1.1	0.3	2.5	0.7
MPB_C → DICw	10.6	3.3	4.3	1.0	19.5	4.3	12.1	3.8	6.9	2.0	0.6	0.2	5.6	1.2	7.2	2.2
MPB_C → DOC	35.4	12.7	5.0	3.4	75.0	11.1	24.9	12.0	14.4	8.2	0.8	0.6	23.8	2.1	20.9	5.1
MPB_N → DON	0.7	0.5	0.1	0.1	0.6	0.5	0.7	0.5	0.3	0.2	0.0	0.0	0.1	0.1	0.3	0.3
MPB_C → POC	19.6	13.4	9.0	5.5	18.7	12.3	20.2	13.6	15.0	9.9	1.9	1.1	3.6	2.4	8.5	5.7
MPB_N → PON	2.5	1.7	1.1	0.7	2.3	1.5	2.5	1.7	1.9	1.2	0.2	0.1	0.4	0.3	1.1	0.7
MPB_C → GRAs_C	14.3	11.1	10.8	5.1	26.6	11.5	35.1	14.1	14.0	8.6	1.5	1.0	8.4	2.4	19.9	5.2
DOC → DOCw	35.4	12.8	5.5	3.7	72.4	11.3	22.5	12.5	12.2	8.1	1.2	0.9	23.6	2.0	19.0	5.3
DON → DONw	4.2	1.6	1.0	0.4	3.3	1.4	3.7	1.5	2.8	1.0	0.2	0.1	0.6	0.3	1.6	0.6
DOC → BAC_C	25.8	15.6	10.2	5.7	23.9	15.0	27.2	15.8	20.5	12.3	3.9	1.4	4.1	2.6	12.1	7.0
POC → BAC_C	58.2	17.5	26.5	5.8	46.7	16.8	57.0	17.5	40.4	13.6	10.6	1.4	8.9	3.0	21.7	7.9
DON → BAC_N	1.7	1.3	1.3	0.5	1.5	1.2	2.0	1.4	1.2	0.9	0.7	0.1	0.3	0.2	0.7	0.5
PON → BAC_N	5.6	1.6	2.0	0.5	4.2	1.4	5.1	1.5	3.3	1.0	0.7	0.1	0.8	0.3	1.9	0.6
NH4 → BAC_N	2.3	1.3	2.6	1.5	9.7	5.6	9.3	5.4	3.0	1.7	2.9	1.7	9.9	5.7	9.8	5.6
BAC_C → DICw	54.4	3.3	23.7	1.0	45.5	4.3	54.9	3.8	39.1	2.0	8.9	0.2	8.4	1.2	21.8	2.2
BAC_C → DOC	25.9	5.8	10.7	2.0	21.3	4.9	24.9	5.8	18.4	3.6	4.4	0.3	3.9	0.9	10.2	2.4
BAC_C → GRAs_C	3.8	2.7	2.3	1.2	3.7	2.3	4.5	2.8	3.4	2.0	1.3	0.3	0.7	0.4	1.8	1.1
BAC_N → NH4	3.7	1.3	3.3	1.5	10.4	5.6	10.5	5.4	3.0	1.7	3.1	1.7	10.1	5.7	10.0	5.6
BAC_N → DON	5.2	1.2	2.1	0.4	4.3	1.0	5.0	1.2	3.7	0.7	0.9	0.1	0.8	0.2	2.0	0.5
BAC_N → GRAs_N	0.8	0.5	0.5	0.2	0.7	0.5	0.9	0.6	0.7	0.4	0.3	0.1	0.1	0.1	0.4	0.2
NH4 → NH4w	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
N2w → MPB_N	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.9	0.0
OMTwC → POC	38.6	17.5	17.5	6.0	27.9	16.1	36.9	18.3	25.5	12.6	8.7	1.4	5.3	3.0	13.2	7.4
OMTwN → PON	3.2	1.5	0.9	0.6	1.8	1.4	2.6	1.7	1.4	1.0	0.4	0.1	0.4	0.3	0.9	0.6
PC																
DICw → MPB_C	11.0	0.0	8.0	0.0	35.0	0.0	23.0	0.0	64.0	0.0	5.2	0.0	16.0	0.0	11.0	0.0
DOCw → MPB_C	0.9	0.6	0.7	0.4	2.4	1.7	1.9	1.2	4.3	3.0	0.6	0.3	1.2	0.8	1.2	0.7
NH4w → MPB_N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table S2 (continued)

Flux	up Aut		up Win		up Spr		up Sum		lo Aut		lo Win		lo Spr		lo Sum	
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ
NH4 → MPB_N	1.0	0.0	0.7	0.0	0.9	0.0	2.3	0.0	1.0	0.0	0.5	0.0	1.6	0.0	1.1	0.0
DONw → MPB_N	0.2	0.1	0.1	0.1	1.7	0.8	0.3	0.2	2.2	1.0	0.1	0.0	0.2	0.1	0.0	0.0
NO3w → MPB_N	0.1	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MPB_N → GRAs_N	0.6	0.3	0.4	0.2	1.1	0.8	1.2	0.7	1.3	0.9	0.3	0.2	0.8	0.5	0.9	0.4
MPB_C → DICw	1.7	0.5	1.2	0.4	5.0	1.5	3.5	1.0	8.6	2.8	0.8	0.2	2.4	0.7	1.6	0.5
MPB_C → DOC	1.2	0.8	1.0	0.6	12.5	6.5	2.3	1.3	36.8	7.7	0.4	0.3	1.6	0.9	0.0	0.0
MPB_N → DON	0.1	0.1	0.1	0.0	0.3	0.2	0.2	0.1	0.5	0.4	0.0	0.0	0.1	0.1	0.1	0.1
MPB_C → POC	4.4	2.7	3.1	1.9	10.9	7.3	9.6	5.8	12.6	8.3	2.4	1.3	6.6	4.1	3.7	2.7
MPB_N → PON	0.6	0.3	0.4	0.2	1.4	0.9	1.2	0.7	1.6	1.0	0.3	0.2	0.8	0.5	0.5	0.4
MPB_C → GRAs_C	4.6	2.7	3.3	1.9	9.1	6.7	9.5	5.8	10.3	7.3	2.3	1.4	6.7	4.0	6.9	2.7
DOC → DOCw	7.1	4.5	4.0	2.7	13.8	6.3	8.6	5.5	35.8	7.2	0.5	0.4	4.5	2.9	8.0	3.9
DON → DONw	0.2	0.1	0.1	0.1	1.7	0.8	0.3	0.2	2.2	1.0	0.1	0.0	0.2	0.1	0.0	0.0
DOC → BAC_C	9.1	5.5	6.0	3.6	11.3	7.2	10.0	6.3	15.0	9.0	11.8	0.7	4.5	2.9	7.2	3.5
POC → BAC_C	43.9	5.2	26.5	3.3	31.3	7.9	46.8	6.5	31.6	10.1	31.2	0.7	20.8	3.1	47.4	4.6
DON → BAC_N	2.9	0.8	1.7	0.5	1.2	0.8	3.2	0.8	1.2	0.8	2.3	0.1	1.4	0.4	3.1	0.4
PON → BAC_N	3.2	0.4	1.8	0.2	3.2	0.8	3.4	0.4	3.0	1.0	1.9	0.0	2.3	0.2	3.0	0.2
NH4 → BAC_N	1.7	1.0	2.3	1.3	9.2	5.4	8.6	5.0	2.5	1.5	2.6	1.5	9.1	5.1	11.7	5.1
BAC_C → DICw	35.3	0.5	21.8	0.4	28.0	1.5	37.5	1.0	30.4	2.8	26.2	0.2	16.6	0.7	34.4	0.5
BAC_C → DOC	15.0	3.9	9.0	2.6	12.7	3.1	16.4	4.0	14.0	3.4	12.0	0.5	7.4	1.7	15.2	1.9
BAC_C → GRAs_C	2.7	1.7	1.7	1.0	2.0	1.3	2.9	1.8	2.2	1.5	4.9	0.2	1.2	0.8	5.1	1.2
BAC_N → NH4	4.3	1.0	3.8	1.3	10.6	5.4	11.4	5.0	3.4	1.5	3.4	1.5	11.1	5.1	13.7	5.1
BAC_N → DON	3.0	0.8	1.8	0.5	2.5	0.6	3.3	0.8	2.8	0.7	2.4	0.1	1.5	0.3	3.0	0.4
BAC_N → GRAs_N	0.5	0.3	0.3	0.2	0.4	0.3	0.6	0.4	0.4	0.3	1.0	0.0	0.2	0.2	1.0	0.2
NH4 → NH4w	1.6	0.0	0.8	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.3	0.0	0.4	0.0	0.9	0.0
N2w → MPB_N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
OMTwC → POC	39.5	6.1	23.4	3.9	20.5	8.8	37.2	9.6	19.0	9.7	28.8	1.5	14.2	5.5	43.8	5.5
OMTwN → PON	2.6	0.5	1.5	0.3	1.8	0.9	2.2	0.8	1.5	0.9	1.6	0.2	1.5	0.5	2.5	0.4

Table S3. Mean ($\bar{x}$) and SD (σ) flux (mmol m^{-2} d^{-1}) outputs from the model using a cellular C:N ratio of 15 on the upper (up) and lower (lo) mudflats at Sites Castle Forbes Bay (CF) and Port Cygnet (PC) during autum (Aut), winter (Win), spring (Spr) and summer (Sum). No values are shown for model runs which could not be solved. DIC: dissolved inorganic carbon; MPB: microphytobenthos; DOC, DON: dissolved organic carbon and nitrogen, respectively; NH4 (ammonium); NO3: nitrate; GRAs: grazing; POC, PON: particulate organic carbon and nitrogen, respectively; BAC: bacteria; OMT: terrestrial organic matter. Suffixes: carbon (_C) and nitrogen (_N) balance of the respective pool, and sources considered from the water column (wC, wN)

Flux	up Aut		up Win		up Spr		up Sum		lo Aut		lo Win		lo Spr		lo Sum	
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ
CF																
DICw → MPB_C	75.0	0.0	26.0	0.0	125.0	0.0	86.0	0.0	46.0	0.0	4.4	0.0	37.0	0.0	52.0	0.0
DOCw → MPB_C	5.7	3.7	4.9	0.5	14.8	3.6	9.5	4.3	5.3	2.2	0.7	0.1	4.5	0.9	5.6	2.2
NH4w → MPB_N	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
NH4 → MPB_N	1.4	0.0	0.7	0.0	0.7	0.0	0.5	0.0	0.1	0.0	0.1	0.0	0.2	0.0	0.3	0.0
DONw → MPB_N	2.0	0.9	0.4	0.0	5.0	1.3	0.9	0.5	1.5	0.5	0.0	0.0	1.2	0.3	1.2	0.3
NO3w → MPB_N	0.0	0.0	0.5	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.3	0.0
MPB_N → GRAs_N	1.6	1.1	0.9	0.5	3.8	1.3	3.0	1.2	1.1	0.7	0.1	0.1	1.2	0.3	2.2	0.5
MPB_C → DICw	10.6	3.4	5.2	0.5	19.3	4.4	13.0	3.8	7.2	2.0	0.8	0.1	5.6	1.2	7.7	2.2
MPB_C → DOC	22.7	14.1	0.8	0.5	37.2	19.2	9.6	6.9	10.6	8.2	0.3	0.2	13.3	4.0	6.6	5.0
MPB_N → DON	0.3	0.2	0.0	0.0	0.3	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1
MPB_C → POC	23.9	16.5	11.7	7.2	25.9	18.2	27.2	17.6	17.1	11.0	1.9	1.2	4.9	3.3	10.6	7.2
MPB_N → PON	1.6	1.1	0.8	0.5	1.7	1.2	1.8	1.2	1.1	0.7	0.1	0.1	0.3	0.2	0.7	0.5
MPB_C → GRAs_C	23.4	16.2	13.3	7.2	57.4	20.2	45.7	17.9	16.4	11.1	2.0	1.2	17.7	4.3	32.8	7.0
DOC → DOCw	21.7	10.8	0.3	0.2	37.0	12.7	6.3	3.9	2.9	2.4	0.1	0.1	13.5	3.0	3.7	2.6
DON → DONw	2.7	0.9	0.1	0.0	2.9	1.3	1.2	0.5	1.2	0.5	0.0	0.0	0.5	0.3	0.8	0.3
DOC → BAC_C	24.9	16.6	11.0	0.7	21.5	15.0	26.6	9.3	24.5	9.4	4.3	0.3	3.8	2.5	11.9	6.2
POC → BAC_C	57.6	17.6	26.7	0.8	49.3	17.0	58.3	10.5	36.7	9.6	10.1	0.3	9.3	3.0	20.8	6.8
DON → BAC_N	2.4	1.3	2.1	0.1	1.6	1.2	3.7	0.9	2.3	0.7	0.8	0.0	0.3	0.2	1.1	0.5
PON → BAC_N	4.6	1.1	1.6	0.0	4.1	1.3	3.7	0.6	2.3	0.6	0.6	0.0	0.8	0.3	1.4	0.4
NH4 → BAC_N	2.3	1.3	2.6	1.5	9.7	5.5	9.5	5.4	3.0	1.7	2.9	1.7	9.6	5.7	9.5	5.7
BAC_C → DICw	54.4	3.4	22.8	0.5	45.7	4.4	54.0	3.8	38.8	2.0	8.7	0.1	8.4	1.2	21.3	2.2
BAC_C → DOC	23.9	5.9	10.5	0.4	21.2	4.9	23.3	4.0	16.8	2.4	4.0	0.1	4.0	0.9	9.0	2.1
BAC_C → GRAs_C	4.3	2.7	4.3	0.2	3.8	2.3	7.7	2.0	5.6	1.1	1.7	0.1	0.7	0.4	2.4	1.0
BAC_N → NH4	3.7	1.3	3.3	1.5	10.4	5.5	10.7	5.4	3.0	1.7	3.1	1.7	9.9	5.7	9.8	5.7
BAC_N → DON	4.8	1.2	2.1	0.1	4.2	1.0	4.7	0.8	3.4	0.5	0.8	0.0	0.8	0.2	1.8	0.4
BAC_N → GRAs_N	0.9	0.5	0.9	0.0	0.8	0.5	1.5	0.4	1.1	0.2	0.3	0.0	0.1	0.1	0.5	0.2

Table S3 (continued)

Flux	up Aut		up Win		up Spr		up Sum		lo Aut		lo Win		lo Spr		lo Sum	
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ
NH4 → NH4w	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
N2w → MPB_N	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.9	0.0
OMTwC → POC	33.8	20.4	15.1	7.2	23.4	17.1	31.1	18.5	19.7	12.1	8.2	1.2	4.5	3.1	10.3	7.2
OMTwN → PON	3.0	1.2	0.8	0.5	2.4	1.3	1.9	1.2	1.2	0.8	0.5	0.1	0.5	0.3	0.7	0.5
PC																
DICw → MPB_C					35.0	0.0			64.0	0.0						
DOCw → MPB_C					2.8	1.7			4.2	2.9						
NH4w → MPB_N					0.0	0.0			0.3	0.0						
NH4 → MPB_N					1.0	0.0			1.0	0.0						
DONw → MPB_N					0.6	0.3			1.7	0.8						
NO3w → MPB_N					0.2	0.0			0.0	0.0						
MPB_N → GRAs_N					0.8	0.5			1.5	0.8						
MPB_C → DICw					5.1	1.6			8.4	2.8						
MPB_C → DOC					8.2	5.0			20.6	11.6						
MPB_N → DON					0.2	0.1			0.3	0.2						
MPB_C → POC					11.9	7.9			17.0	11.7						
MPB_N → PON					0.8	0.5			1.1	0.8						
MPB_C → GRAs_C					12.5	8.0			22.2	12.6						
DOC → DOCw					8.4	5.2			20.7	8.4						
DON → DONw					0.6	0.3			1.7	0.8						
DOC → BAC_C					11.6	7.4			13.6	9.5						
POC → BAC_C					30.2	7.7			33.2	10.7						
DON → BAC_N					1.9	0.7			1.4	0.8						
PON → BAC_N					2.3	0.4			2.8	0.8						
NH4 → BAC_N					9.4	5.4			2.5	1.5						
BAC_C → DICw					27.9	1.6			30.6	2.8						
BAC_C → DOC					11.8	3.2			13.7	3.3						
BAC_C → GRAs_C					2.2	1.4			2.5	1.5						
BAC_N → NH4					10.8	5.4			3.5	1.5						
BAC_N → DON					2.4	0.6			2.7	0.7						
BAC_N → GRAs_N					0.4	0.3			0.5	0.3						
NH4 → NH4w					0.5	0.0			0.0	0.0						
N2w → MPB_N					0.0	0.0			0.0	0.0						
OMTwC → POC					18.3	10.3			16.2	11.3						
OMTwN → PON					1.5	0.6			1.7	0.9						