frontiers in Marine Science

GENERAL COMMENTARY
published: 07 October 2015
doi: 10.3389/fmars.2015.00070

Corrigendum: Spatial and historic variability of benthic nitrogen cycling in an anthropogenically impacted estuary

Sarah Q. Foster[1] *and Robinson W. Fulweiler*[1,2]*

[1] Department of Earth and Environment, Boston University, Boston, MA, USA, [2] Department of Biology, Boston University, Boston, MA, USA

Keywords: benthic nitrogen cycling, sediment oxygen demand, net denitrification, Waquoit Bay, historic variability, spatial variability

A corrigendum on

Spatial and historic variability of benthic nitrogen cycling in an anthropogenically impacted estuary

by Foster, S. Q., and Fulweiler, R. W. (2014) Front. Mar. Sci. 1:56. doi: 10.3389/fmars.2014.00056

The authors wish to include the following correction based on updated di-nitrogen (N_2) gas flux values for three cores included in the original paper (the N_2 flux values for the other 38 cores remain unchanged). This update was made in order to be consistent in our N_2 flux calculations across all cores. In the three aforementioned cores we originally used a different method to account for the instrument drift of the mass spectrometer during sample analysis. Importantly, the correction of the flux values for these three cores is small and does not change any of our data interpretations. However, in an effort to be as accurate as possible, we would like to provide the corrected values and the associated averages, statistics, and text that also need to be corrected as a result of the flux value adjustments.

For simplicity and clarity, corrections are listed below in **bold and underlined** font. The page numbers, section heading and paragraph numbers correspond to the paper's downloadable .pdf.

- Page 1. Abstract.
  - 36 μmol N_2-N m^{-2} h^{-1} changed to **38** μmol N_2-N m^{-2} h^{-1}
- Page 5. Table 2.
  - Metoxit Point (MP), 7-Jul-2011, N_2-N flux, −19 (±7.2) changed to **−22 (±10.0)**
  - Metoxit Point (MP), 11-Jul-2012, N_2-N flux, −19 (±39) changed to **−30 (±45)**
  - Childs River Estuary (CRE), 11-Jul-2012, N_2-N flux, 62 (±3.0) changed to **69 (±4.4)**
- Page 7. Figure 3. Panel D, N_2-N fluxes.
  - MP changed from −18 (±11) to **−21 (±12)**
  - CRE changed from 30 (±8.4) to **32 (±9.5)**
- Page 8. Results. Direct Measure of Sediment Net N_2 Flux. Paragraph 1.
  - $p = 0.012$ changed to $\mathbf{p = 0.010}$
  - $p = 0.042$ changed to $\mathbf{p = 0.032}$
  - $p = 0.021$ changed to $\mathbf{p = 0.014}$

OPEN ACCESS

Edited by:
Paul E. Renaud, Akvaplan-niva AS, Norway

Reviewed by:
Moritz Felix Lehmann, University of Basel, Switzerland

***Correspondence:**
Robinson W. Fulweiler
rwf@bu.edu

Specialty section:
This article was submitted to Global Change and the Future Ocean, a section of the journal Frontiers in Marine Science

Received: *14 August 2015*
Accepted: *31 August 2015*
Published: *07 October 2015*

Citation:
Foster SQ and Fulweiler RW (2015) Corrigendum: Spatial and historic variability of benthic nitrogen cycling in an anthropogenically impacted estuary. Front. Mar. Sci. 2:70. doi: 10.3389/fmars.2015.00070

Table 2 | Summary of sediment oxygen (O_2), ammonium (NH_4^+), nitrite (NO_2^-) and di-nitrogen gas per mole nitrogen (N_2-N) flux rates measured across the sediment-water interface in Waquoit Bay, MA in 2011 and 2012 (July–October).

Station (Abbr.)	Date	Sal ppt	Temp °C	O_2 μmol m^{-2} h^{-1}	NH_4^+ μmol m^{-2} h^{-1}	NO_2^- μmol m^{-2} h^{-1}	N_2-N μmol N m^{-2} h^{-1}
Sage Lot Pond (SLP)	29-Jul-2011	30.0	25.2	−2394 (±652)	11 (±60)	−2.0 (±0.2)	16 (±8.0)
	24-Aug-2011	29.3	24.5	−3016 (±206)	306 (±86)	−2.4 (±1.6)	64 (±64)
	6-Aug-2012	30.5	30.0	−2120 (±124)	310 (±68)	0.0	n.m.
South Basin (SB)	7-Jul-2011	31.9	26.0	−2551 (±452)	170 (±96)	−0.3 (±0.3)	9.1 (±9.1)
	24-Aug-2011	31.5	24.5	−1164 (±229)	3.0 (±10)	−1.7 (±0.3)	−7.6 (±23)
	11-Oct-2011	29.9	19.5	−1664 (±268)	0.0 (±0.0)	−0.2 (±0.2)	28 (±16)
	11-Jul-2012	31.6	29.0	−1561 (±277)	27 (±21)	−0.2 (±0.4)	44 (±34)
	2-Oct-2012	31.4	20.0	−1117 (±115)	29 (±22)	−1.0 (±0.2)	n.m.
Metoxit Point (MP)	7-Jul-2011	30.5	26.0	−3053 (±378)	225 (±15)	1.6 (±1.6)	−22 (±10)
	24-Aug-2011	30.1	24.5	−2233 (±122)	167 (±56)	−0.8 (±0.6)	−28 (±12)
	11-Oct-2011	29.5	19.5	−2908 (±134)	231 (±97)	−1.0 (±0.4)	−4.0 (±26)
	11-Jul-2012	31.3	29.0	−1538 (±144)	38 (±38)	−0.0 (±0.3)	−30 (±45)
	6-Aug-2012	29.5	30.0	−2456 (±281)	106 (±30)	−0.8 (±0.1)	n.m.
	2-Oct-2012	30.0	20.0	−1838 (±182)	365 (±76)	−0.3 (±0.3)	n.m.
Childs River Estuary (CRE)	7-Jul-2011	27.7	26.0	−1589 (±202)	193 (±60)	0.0 (±0.0)	22 (±11)
	29-Jul-2011	28.5	25.2	−1609 (±205)	99 (±34)	−4.6 (±1.3)	18 (±9.8)
	11-Jul-2012	30.1	29.0	−1614 (±318)	−2 (±61)	−0.7 (±0.2)	69 (±4.4)

O_2 fluxes are from the first dissolved inorganic nutrient incubation. Positive fluxes represent a net efflux of the analyte from the sediments into the water column, and negative fluxes represent a net influx of the analyte into the sediments from the water column. A net zero flux represents either a balance between analyte production and consumption process in the sediments and/or rates that are below our detection limit. Stations are listed from low to high N loading. Values represent the station means (±standard error) from triplicate or quadruplicate cores. Note that n.m. signifies parameter fluxes for which there is no measurement.

- 14 (±8.3) μmol N_2-N m^{-2} h^{-1} changed to **14 (±8.9)** μmol N_2-N m^{-2} h^{-1}
- $R^2 = 0.002$, $p = 0.766$ changed to **$R^2 = 0.001$, $p = 0.844$**
- 33 (±7.5) μmol N_2-N m^{-2} h^{-1} changed to **34 (±8.0)** μmol N_2-N m^{-2} h^{-1}
- −16 (±4.3) μmol N_2-N m^{-2} h^{-1} changed to **−18 (±5.3)** μmol N_2-N m^{-2} h^{-1}
- Sentence beginning with: "Overall, the N_2 fluxes…" changed to: "**Overall, we measured a high mean N_2 flux from Sage Lot Pond but the variability between cores was the highest compared to other stations.**"
- Sentence beginning with: "The highest mean net N fixation rate…" changed to: "**The highest net N fixation rate (−89 μmol N_2-N m^{-2} h^{-1}) was measured in a sediment core collected from Metoxit Point in July 2012.**"
- $p = 0.863$ changed to **$p = 0.881$**

• Pages 10–11. Discussion. Historic Comparisons. Paragraph 5.

- $p = 0.012$ changed to **$p = 0.013$**
- 34 (±14) μmol N_2-N m^{-2} h^{-1} changed to **36 (±16)** μmol N_2-N m^{-2} h^{-1}
- $p = 0.102$ (SLP) and $p = 0.059$ (CRE) changed to **$p = 0.084$ (SLP) and $p = 0.089$ (CRE)**
- $p = 0.012$ changed to **$p = 0.013$**

• Page 10. Figure 4. Panel C, N_2-N fluxes.

- CRE changed from 34 (±14) to **36 (±16)**

• Page 11. Discussion. Historic Comparisons. Paragraph 6.

- 551 (±227) kg N y^{-1} changed to **583 (±275)** kg N y^{-1}
- 10% (±4%) changed to **11% (±5%)**

• Page 13. Conclusions. Paragraph 1.

- $p = 0.012$ changed to **$p = 0.013$**

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

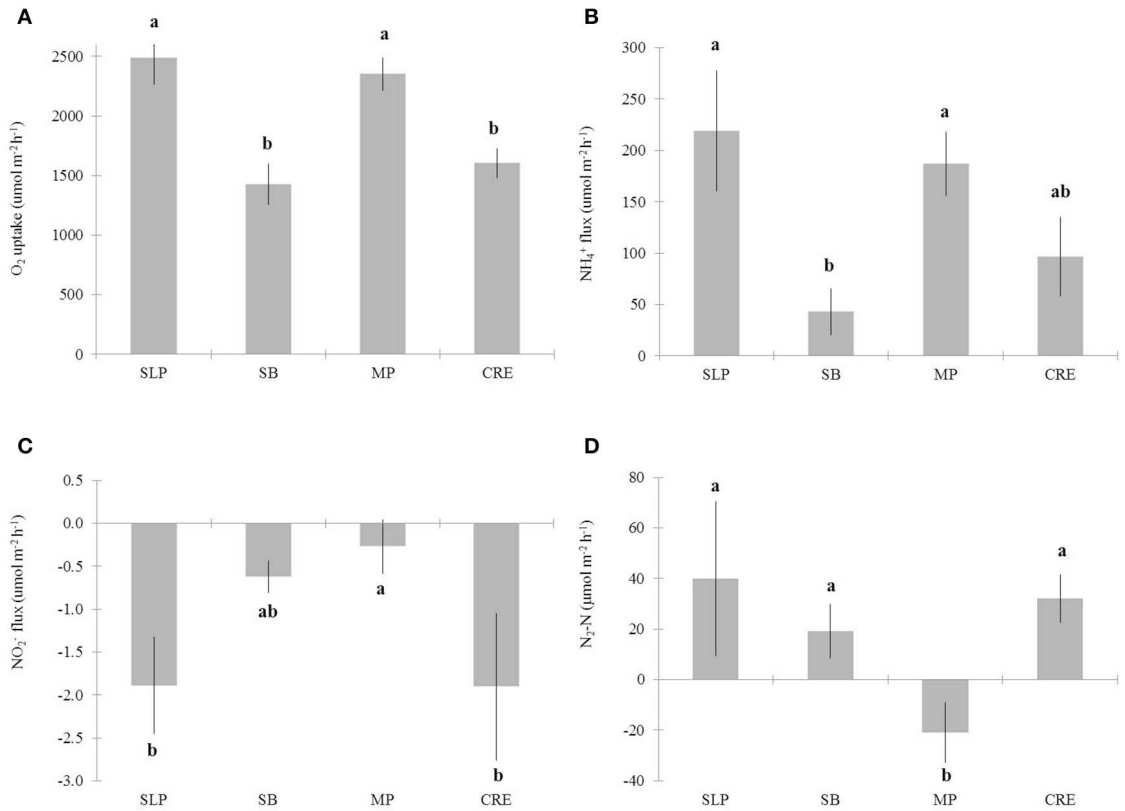

FIGURE 3 | Benthic fluxes for (A) oxygen (O_2) uptake, (B) ammonium (NH_4^+), (C) nitrite (NO_2^-), and (D) di-nitrogen gas per mole nitrogen (N_2-N), across the sediment-water interface in Waquoit Bay. Bars represent the station means (± standard error) of all cores measured on seven 2011–2012 sampling dates for O_2 uptake, NH_4^+ and NO_2^- fluxes **(A–C)** and five sampling dates 2011–2012 for N_2-N fluxes **(D)**. Stations organized from relatively low to high external nitrogen load: Sage Lot Pond [SLP, $n = 10$ **(A–C)**, $n = 6$ **(D)**], South Basin [SB, $n = 16$ **(A–C)**, $n = 13$ **(D)**], Metoxit Point [MP, $n = 21$ **(A–C)**, $n = 12$ **(D)**], and Childs River Estuary [CRE, $n = 9$ **(A–C)**, $n = 8$ **(D)**]. Note that we did find a significant difference between dates for NO_2^- fluxes ($p < 0.01$), but not for the other flux parameters. Lower case letters above the bars that are not the same indicate fluxes that are significantly different from each other ($\alpha = 0.05$).

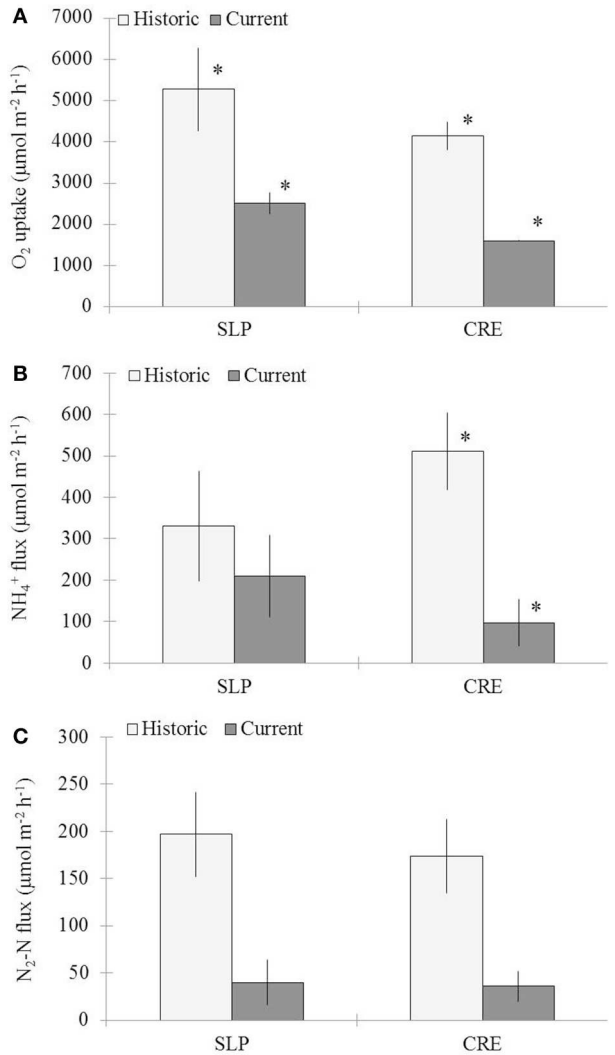

FIGURE 4 | Comparison of historic (July–October, 1992–1994) (LaMontagne, 1996) and current (July–October, 2011–2012) benthic flux rates of (A) oxygen (O_2), (B) ammonium (NH_4^+), and (C) di-nitrogen gas per mole nitrogen (N_2-N) for direct measurements made from sealed cores collected from Sage Lot Pond (SLP) and Childs River Estuary (CRE) in Waquoit Bay. Bars represent station means (± standard error) from incubation dates (SLP Historic $n = 4$, SLP Current $n = 3$ except for N_2-N flux $n = 2$, CRE Historic $n = 10$ except for NH_4^+ $n = 9$, CRE Current $n = 3$). For the comparison between historic and current means for each station stars above the bars indicate fluxes that are significantly different from each other ($\alpha = 0.05$).