

## ***Interactive comment on “A nitrogen budget for the Strait of Georgia, British Columbia” by J. N. Sutton et al.***

### **Anonymous Referee #1**

Received and published: 27 June 2013

**General Comments** This paper presents the nitrogen budget for the St Georgia, Canada. The budget makes advances over previous N budgets by incorporating particulate nitrogen, additional inputs such as pulp mills, aquaculture and processes such as remineralization, denitrification, etc. The authors have captured an amazing amount of data and summarized it succinctly. The paper is concisely written and in some cases some expansion is warranted.

**Specific Comments** Pg 7141 L 10-15 - it is not clear whether the samples were from the surface or several samples over a depth profile. It is disappointing that NH<sub>4</sub> and DON concentrations were not analyzed.

Pg 7144 L3 see estimates by Pawlowicz et al. that are higher than Harrison et al. 1983.

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Sections 2.8 to 2.10 - these inputs usually have relatively high NH<sub>4</sub> that has not been included in your estimates of DIN.

Pg 7147 L19 - Your statement that the PP in the south = north is only based on Chl and nutrients. I'm surprised that they are the same since it is often assumed that the north is less than the south. You should give Chl/m<sup>2</sup> (water column integrated). Where your Chl/m<sup>3</sup> values for the surface or avg for the water column - for what years- seasons, etc. This is a case where this section needs to be expanded.

Pg 7152 - there must be useful comparable data from Puget Sound. You have no reference to Puget Sound in the whole paper.

Pg 7153 L15 - while there may be no data on DON in rivers, I am sure that there are data for the SoG. Since it is likely that DON is comparable to DIN in the SoG (similar to other systems), then you should include a few key calculations assuming the DON is similar to DIN.

Pg 7153 L20 - similarly, there are NH<sub>4</sub> data for the SoG and it would be useful to convince readers (with a few calculations) that including NH<sub>4</sub> does not change your overall general conclusions (just like you have done for denitrification on the next page).

Pg. 7155 - L5 - give a number/percent instead of the vague "small proportion".

Table 1 - expand the Table legend to include date of the data - data from –and reference to the map in Fig. 1. Make reference to the Logs and lats of the stations (in a data report). What do you mean by 'area' for each station?

Fig. 1 - Legend says that the longs and lats are given in data tables – I could not find them. This fig should be made as big as possible so that readers can see all of the important information in it.

Fig. 2 PN is given as % (of what)? The blue color is not easily distinguishable from the black - make them a different color if you are going to use color. I could not determine that there were "open" diamonds - looked filled due to the small size. The fig shows 22

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cores but the legend says 20. What years are these data for?

Fig. 3 Where are these data from (Table 1?). What years?

Fig. 4 - This is a very visually friendly depiction of the N cycle for SoG. However, it need further explanation in the figure legend (please expand it). Why does the PN in the south split into 2 sections and what is the 980 splitting off represent? in the DIN section, the arrow for denitrification should be up - representing a loss of N (see Pg. 7154 L19).

Additional References Need references for Puget Sound - especially northern PS. Look up recent references (about 2008-12) for Pawlowicz et al 2007 *Atm Ocn* 45: 173-193 (2007) and 2 other papers on Carbon flow and plankton ecology Dynamics of community production and respiration

Collins et al. 2009 *CJFAS* 66:1567

Classic physical oceanography refs LeBlond 1983 *CJFAS* 40:1033 Thomson 1981 book on physical oceanography

Technical comments Pg. 7144 - L4 - Harrison et al. is repeated twice - remove one.

Pg. 7149 - L21 - remove this and insert is – but is not likely to be—

Pg. 7150 L10 - insert and – water column and therefore,—

Table 5 - Groundwater – in the first column–130-391 should have a superscript 1 since it comes from Mackas and Harrison (1997).

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