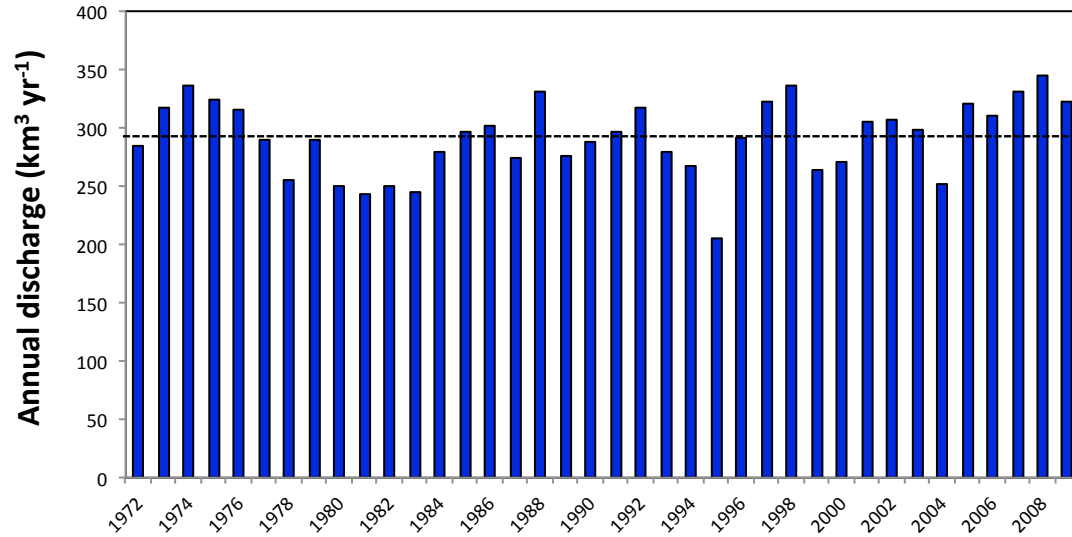


Figure S1: Annual or daily Mackenzie River discharge at Tsiigehtchic ($67^{\circ}27'21''$ N, $133^{\circ}45'11''$ W; www.ec.gc.ca/rhc-wsc/) for (A) the period 1972-2009 and (B) the years 2009 (black, this study) and 2004 (green, contemporary to the study of Emmerton et al. 2008b). Blue symbols indicate the period during which nutrient measurements were made at Inuvik and red symbols mark the main sampling period of the Malina program in the southeast Beaufort Sea.

A)



B)

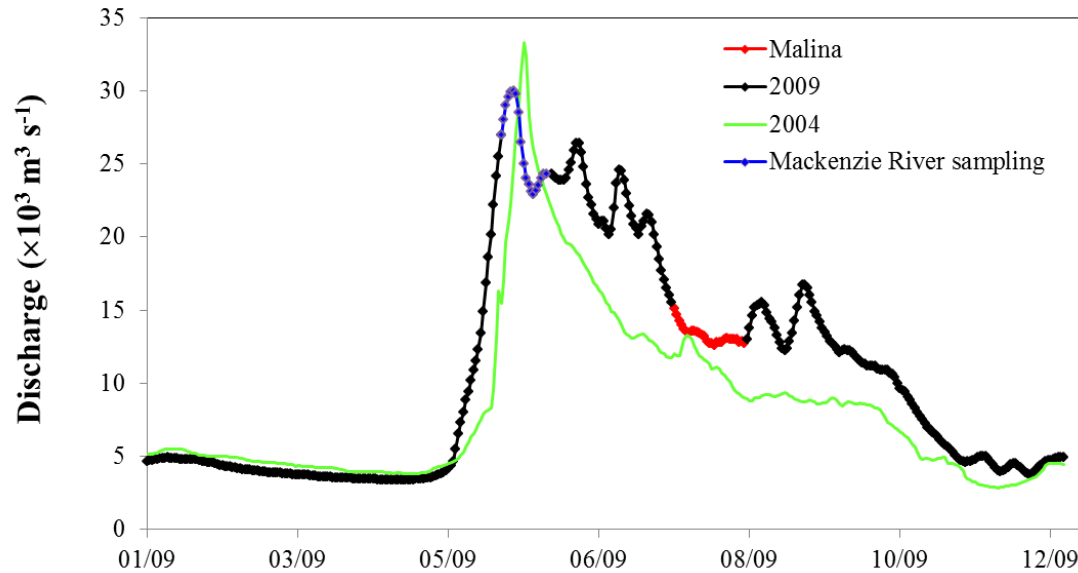


Table S1: Daily measurements of discharge and dissolved constituents in the Mackenzie River at Inuvik and Tsiigehtchic during spring 2009, with median values, coefficients of variation (CV) and the r^2 value of significant relationships (see Fig. A2) between concentration and discharge at Inuvik and Tsiigehtchic (*ns* = non-significant). These relationships are shown in Figure A3 for DON and DOC.

| Location/date | Discharge ($\text{m}^3 \text{s}^{-1}$) | DOC (μM) | TDN (μM) | Nitrate+Nitrite (μM) | DON (μM) | TDP (μM) | Phosphate (μM) | DOP (μM) | N* (μM) | N:P mol:mol |
|----------------------|---|--------------------------|--------------------------|--------------------------------------|--------------------------|--------------------------|--------------------------------|--------------------------|-------------------------|----------------|
| Inuvik | | | | | | | | | | |
| 23 May | 28000 | 1766 | 34.27 | 3.47 | 30.79 | 0.94 | 0.42 | 0.51 | -3.32 | 8.18 |
| 24 May | 29000 | 1657 | 34.27 | 4.32 | 29.94 | 0.99 | 0.20 | 0.79 | 1.07 | 21.23 |
| 25 May | 29600 | 1287 | 26.70 | 3.14 | 23.56 | 0.69 | 0.23 | 0.46 | -0.55 | 14.18 |
| 26 May | 29900 | 2520 | 50.94 | 9.41 | 41.53 | 0.94 | 0.31 | 0.62 | 4.38 | 30.23 |
| 27 May | 30000 | 1188 | 29.97 | 3.73 | 26.24 | 0.57 | 0.05 | 0.52 | 2.88 | 70.23 |
| 28 May | 29800 | | 36.72 | 5.34 | 31.38 | 0.57 | 0.03 | 0.54 | 4.91 | 201.10 |
| 29 May | 28500 | 1397 | 35.70 | 5.76 | 29.94 | 0.57 | 0.04 | 0.54 | 5.20 | 162.80 |
| 30 May | 26500 | 1138 | 27.31 | 3.90 | 23.41 | 0.51 | 0.01 | 0.50 | 3.69 | 293.67 |
| 31 May | 25000 | 958 | 26.90 | 4.24 | 22.66 | 0.43 | 0.02 | 0.42 | 3.95 | 239.41 |
| 01 June | 24000 | 1028 | 26.29 | 3.98 | 22.31 | 0.99 | 0.07 | 0.92 | 2.85 | 56.26 |
| 02 June | 23600 | 1028 | 27.92 | 4.24 | 23.69 | 0.41 | 0.04 | 0.37 | 3.53 | 95.76 |
| 03 June | 23100 | 988 | 24.45 | 3.81 | 20.63 | 0.43 | 0.05 | 0.38 | 2.96 | 71.82 |
| 04 June | 22900 | 1237 | 27.72 | 3.14 | 24.58 | 0.97 | 0.09 | 0.88 | 1.72 | 35.43 |
| 05 June | 23200 | 838 | 21.79 | 3.98 | 17.80 | 0.74 | 0.09 | 0.65 | 2.57 | 45.01 |
| 06 June | 23500 | 808 | 27.31 | 3.05 | 24.26 | 0.42 | 0.06 | 0.36 | 2.06 | 49.25 |
| 07 June | 24000 | 1078 | 26.90 | 3.22 | 23.68 | 0.59 | 0.03 | 0.57 | 2.80 | 121.30 |
| 08 June | 24300 | 988 | 26.08 | 3.56 | 22.52 | 0.46 | 0.02 | 0.44 | 3.28 | 201.10 |
| 09 June | 24300 | 888 | 23.42 | 3.39 | 20.03 | 0.40 | 0.02 | 0.38 | 3.11 | 191.53 |
| 10 June | 24400 | 908 | 23.01 | 3.39 | 19.63 | 0.46 | 0.03 | 0.43 | 2.97 | 127.68 |
| <i>median</i> | | <i>1053</i> | <i>27.31</i> | <i>3.81</i> | <i>23.68</i> | <i>0.57</i> | <i>0.05</i> | <i>0.51</i> | <i>2.96</i> | <i>71.82</i> |
| <i>CV (%)</i> | | <i>35</i> | <i>23</i> | <i>35</i> | <i>22</i> | <i>35</i> | <i>119</i> | <i>31</i> | <i>74</i> | <i>79</i> |
| <i>r²</i> | | <i>0.52</i> | <i>0.50</i> | <i>0.22</i> | <i>0.52</i> | <i>ns</i> | <i>ns</i> | <i>ns</i> | <i>ns</i> | <i>ns</i> |
| Tsiigehtchic | | | | | | | | | | |
| 25 May | | 1188 | 28.33 | 3.90 | 24.44 | 1.03 | 0.18 | 0.85 | 1.07 | 22.03 |
| 01 June | | 699 | 22.81 | 3.98 | 18.83 | 0.45 | 0.04 | 0.40 | 3.28 | 90.02 |
| 11 June | | 729 | 22.20 | 3.14 | 19.06 | 0.47 | 0.03 | 0.44 | 2.71 | 118.11 |
| <i>median</i> | | <i>729</i> | <i>22.81</i> | <i>3.90</i> | <i>19.06</i> | <i>0.47</i> | <i>0.04</i> | <i>0.44</i> | <i>2.71</i> | <i>90.02</i> |

Figure S2: Relationships between daily discharge and the concentrations of DOC and DON in the Mackenzie River (closed symbols) and at the river's outlet on the shelf (open symbols). The data plotted are from the present study (circles; river data from Inuvik and Tsiigehtchic), the PARTNERS project (triangles; Holmes et al. 2012) and the Ardex project (squares; from Emmerton et al. 2008).

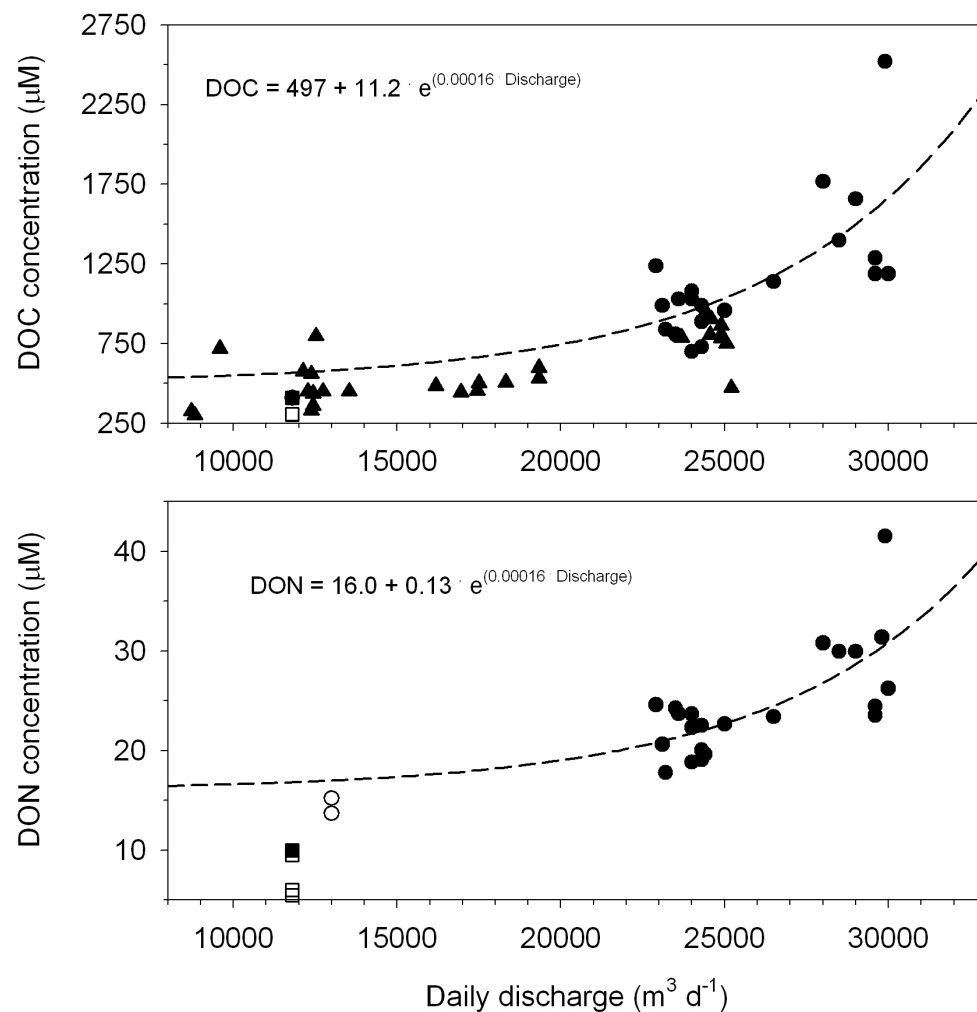


Figure S3: Relationship between daily primary production and PON concentration at the surface for deep (left side of the dashed line) and shallow (right side of the dashed line; squares = Kugmallit Bay) stations.

