Sediments, CDOM and nutrient flow in the Nelson–Hayes Estuary

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Nelson Estuary survey
(BaySys2010)
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Sediments, major nutrients and chlorophyll in the Nelson/Hayes estuary
August and September 2006

[Graphs showing relationships between TSS, Chlorophyll, NO2-NO3, and Salinity for Nelson transects and Hayes transects.]
Remote sensing of the Nelson/Hayes plume (MERIS-derived data)

Difference $\propto$ sediment derived from nearshore processes

CDOM

Suspended Sediment
Suspended solids concentration
20 July 2010 (Landsat 5 TM)
Suspended solids concentration
20 July 2010 (Landsat 5 TM)

Satellite image is MODIS 14:00 CDT 21 Sept 2006.
Manitoba Hydro
Mooring Locations
Manitoba Hydro Mooring 4. Turbidity at 0.5 m below surface & 1 m above bottom (z~8 m).
Red lines indicate mean acoustic (Nortek RDCP) return signal strength at 12 m above bottom and mean optical turbidity (Seapoint turbidity meter) at 10 m above bottom.
2 km X 10 m X 0.2 m/s = 4000 cu m/s
Annual suspended solids load of the Nelson River at the mouth (minimum):

- Average concentration: 100 g/cu m
- Average discharge: 4000 cu m/s
- Duration of high sediment loading: 8 months
- Total load: 8,400,000 tonnes/year

Annual suspended solids load of the Nelson River upstream of the mouth:

- 1,900,000 tonnes/year  KGS Acres for Manitoba Hydro
- 1,500,000 tonnes/year  Environment Illimité for Manitoba Hydro
Ice circulation in the Nelson estuary
Ice circulation in the Nelson estuary region

11 March 2009
Canoe party along lower Nelson River, 1878.
From the Sir Sandford Fleming collection, Public Archives of Canada.
Taken by Robert Bell, Geological Survey of Canada.
Cross-channel current velocity distribution

ADCP line H
Currents at ebb and flood tide
ADCP line H (Manitoba Hydro, 22 August 2005)
ArcticNet Freshwater/Marine Publications

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• St-Laurent, P., F. Straneo, J.-F. Dumais, and D.G. Barber. 2008. What controls the dispersion of riverine fresh water in Hudson Bay during the summer?
Annual erosion to compensate for isostatic rebound

Uplift rate: 0.01 m/a
Head of tide to 2 m isobath: 200 km²
Sediment eroded annually:
  Volume: 2,000,000 m³/a
  Weight (@2500 kg/m³): 5,000,000 tonnes/a