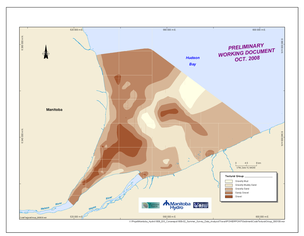
Conawapa Generation Project
Nelson River Estuary - Biophysical Environment Studies

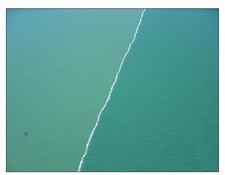
Water Quality Studies

- Baseline description of water quality characteristics (measured intermittently between 1989-2005)
- Parameters measured included:
  - Temperature
  - Salinity
  - Turbidity
  - Nutrients


Habitat Description

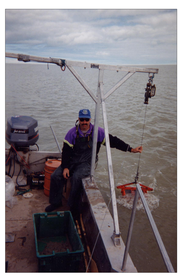
- Estuarine zones initially described based on water quality characteristics and physical environment parameters (1989)
- To provide an understanding of the dynamic environment in the estuary
- More recent physical environment studies are providing a more accurate description of aquatic habitat as it varies across the estuary under different flow, tidal, and weather conditions



Lower Trophic Level Studies

- To provide information about the aquatic food web - food supply for fish and other animals
- Initial studies describe algae, zooplankton, and benthic invertebrate distribution and abundance (1989,1990)
- Zooplankton baseline monitoring program (1994-1999)
- Benthic invertebrate sampling in intertidal zone in 2009




Fish

- Seasonal presence and abundance of fish (1989, 1990, 2005, 2006, 2009)
- Mix of freshwater and estuarine fish

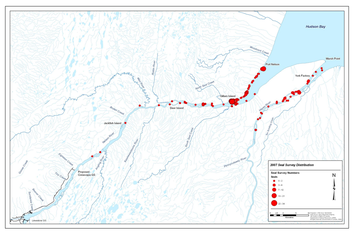
  (longnose sucker, cisco, brook trout, lake whitefish, rainbow smelt, capelin, sculpins)
- Identified as important nursery area for longnose sucker, lake whitefish, cisco, rainbow smelt
- Fish movement between the Nelson, Hayes, and Churchill rivers (lake sturgeon, brook trout, cisco, lake whitefish)

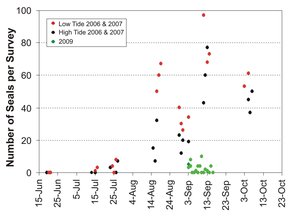


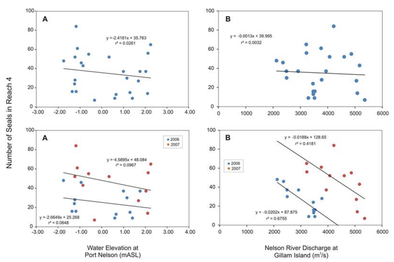


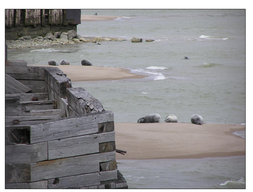
Seals

- To describe the distribution of bearded seals along the lower Nelson and Hayes rivers
- 39 aerial surveys flown at high and low tides in 2006 and 2007
- Additional opportunistic aerial surveys flown in 2009
- Distribution and number of seals near Gillam Island examined in relation to environmental parameters
- Seal abundance appears to be affected by Nelson River flow and wind speed, but less so by tide state









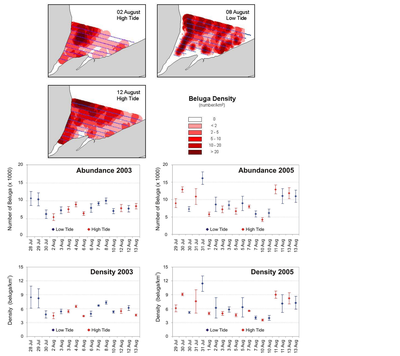
Beluga

Population Estimate (Richard 2005)

- Most recent population estimate for Seal-Churchill and Nelson estuaries is 57,300
  (95% C.L. 37,700 – 87,100)

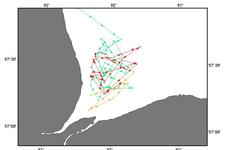
Aerial Surveys (North/South Consultants Inc.)

- To describe the distribution of beluga in the Nelson and Hayes estuaries
- 34 aerial surveys conducted at high and low tides in 2003 and 2005
- Distribution and number of whales examined in relation to tide state and Nelson River discharge



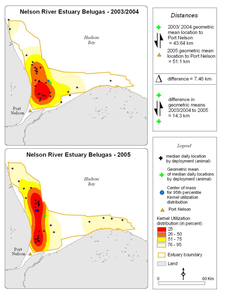
Satellite Telemetry (Fisheries and Oceans)

- To describe beluga distribution and movements in the Nelson Estuary and over their range
- Satellite-linked transmitters were attached to 15 beluga captured in the Nelson Estuary during 2002-2005

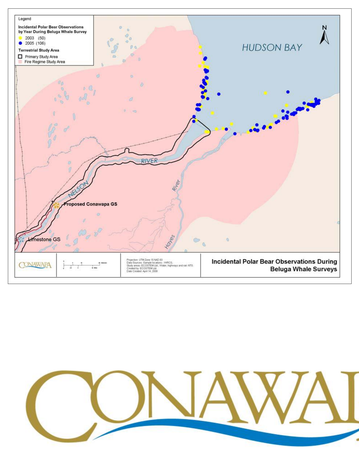
Analysis (Smith 2006)

- Telemetry and aerial survey data used to examine whether beluga distribution in the estuary changed under different Nelson River flows
- Analyses suggested that beluga were a short distance farther offshore (~ 7 km) during 2005 (higher Nelson River flow) compared to 2003-2004 (reduced Nelson River flow)



Polar Bears

- Literature review describing WHB polar bear population ecology
- To describe the summer distribution of polar bears in the Nelson and Hayes estuaries from:
  - Observations collected during beluga and seal aerial surveys (2003-2007)
  - Observations collected during all other environmental studies (2004-2008)



Manitoba Hydro

North/South Consultants Inc.
Aquatic Environment Specialists

CONAWAPA