ommercial Navigation

"Two factors are critical to safe and efficient navigation; the available depth of water, and the currents created by water flow"

How do water levels in Lake Ontario and the St. Lawrence River relate to Commercial Navigation Interests?

Ships are affected by low water levels, very high water levels and high velocities.

The marine industry, the Canadian Coast Guard and the U.S. Army Corps of Engineers have taken several measures to help commercial vessels optimize their use of the available water column: improved water levels predictions, implementation of an electronic water-levels monitoring and prediction system in the Port of Montreal, study on the required underkeel safety margin and new ship designs increasing the amount of cargo carried for the same draft. However, these measures are not sufficient to compensate for the losses occurring due to recurrent low water levels.

As an example, a laker type bulk carrier will load approximately 35 metric tons (MT) less for each centimeter (cm) of draft lost due to low water levels. A container ship will leave about 5 containers behind on the dock for each cm of draft lost. In addition, vessels coming from

overseas have to reduce their loads even further to allow for a safety margin due to the difficulty of accurately predicting water levels 15 or 20 days prior to arrival. On a cumulative basis, this means that more vessel trips will be required to carry the same amount of cargo, thus increasing the overall cost of transportation and ultimately impacting the competitiveness of key stakeholders such as ports, the St. Lawrence Seaway and the Canadian marine industry. Increased transportation costs will also affect the price of goods and may threaten the economic viability of entire regions.

For the ocean transporters and the active ports between Quebec City and Montreal, chart datum (which corresponds to an elevation of 5,55 meters (m) at the Port of Montreal, Jetty no 1 gauge) is considered the critical threshold or minimum acceptable level. A level enabling most ships to load at their design draft would be 30 cm above chart datum and the comfort zone where even the larger ships could optimize their load would be at 60 cm above chart datum.

On the other side of the equation, excessively high water levels and flows also affect navigation. In addition to the obvious risk of flooding of berths and installations, high water levels can cause strong currents. Strong currents due to high flows can necessitate reduced speed and interruptions to navigation for safety reasons, as maneuvers in strong currents can be hazardous in restricted channels and lock approaches. High water levels and flows also increase the risk of erosion. The Seaway authorities regulate the speed of vessels in areas affected by erosion and require vessels to slow down when critical water levels are reached.

During the winter, good ice management is critical to ensure trouble free navigation. When ice is first being formed, high outflow increases have to be minimized to first allow the formation of a stable ice cover. Once the ice cover has formed, high outflow increases have to be kept to a minimum to keep this ice cover intact, and thus avoid ice jams and delays that might be caused by floating pieces of ice.

In addition to being an essential tool to the Canadian economic development, marine transportation offers major advantages for the protection of the environment, with 10 times less green houses gas emissions per ton/km than road transportation and 37 times less accidents per ton/km. A typical Laker ship can carry a cargo equivalent to approximately 810 truckloads, thus reducing congestion and maintenance costs on our roads. If due to low water levels or reduce speed, more vessel trips are required to carry imports and exports and as some level of transfer from ships to truck is likely to occur, the result will also be an increase in green house gas emissions.

Why was the Commercial Navigation Technical Working Group (TWG) created?

The primary purpose of the Commercial Navigation Technical Working Group (CNTWG) is to document and quantify the constraints faced by commercial navigation due to variations of water levels and flows, and provide adequate data to the Study Board for the development of a new regulation plan that could best meet the expectations of the various stakeholders.

What are the Group's goals for the Study?

The main goals of the Commercial Navigation Technical Working Group (CNTWG) are to:

- Identify critical water levels and flows that affect commercial navigation

- Document the impact of straying from water levels and flows defined in the metrics:
  - Define the impacts of flow variations on the ice cover
  - Quantify the direct economic impact on transportation costs
  - Qualify the economic and social impacts associated with modal shifts and loss of competitiveness
  - Develop an economic impact model based on hydraulic regimes provided by the Study Board
  - Develop a set of transportation cost curves based on the economic impacts identified.

How will the Group achieve these goals?

The members of the Commercial Navigation Technical Working Group (CNTWG), which includes experts from the port authorities, the shipping industry, the Seaway authorities, the US Army Corps of Engineers, Transport Quebec and the Canadian Coast Guard, have combined their specific knowledge of the impacts of water level variations and identified three main data needs that will require more research to achieve the Study's goals:

- The need to develop a complete database on traffic transiting in the Study area

- The need to document information on ice management procedures

- The need of studies quantifying the economic impacts of water level variations on the shipping industry as a whole.

The CNTWG has chosen to employ consultants to evaluate the impacts of water level and flow variations on commercial navigation.

What were the Group's Year 1 Objectives?

- To identify metrics indicating water levels and flows considered as critical for commercial navigation.

- To identify the information required in a traffic database to provide sufficient and reliable input in a transportation cost model

- To document the winter ice management procedures

What were the Group's Year 1 achievements?

- 41 metrics have been identified. This document defines benchmarks above or below which water levels and flows begin to have an impact on commercial navigation.

- A marine consultant was appointed to produce a traffic database compiling technical information about vessels, voyages, ports and cargoes. This database covered the area between Montreal and Bécancour and included voyages made between 1995 and 1999.

- The traffic database was produced on CD-Rom and a user's guide was published

What were the Group's Year 2 Objectives?

- To complete the work started in Year 1 and ensure a proper follow up of the work done by consultants

- To begin the development of the impacts evaluation model, using information gathered in the metrics, the 2 parts of the traffic database, the hydraulic regimes provided by the Study Board and information contained in previous studies.

What were the Group's Year 2 achievements?

- The "Management of Ice Cover Operational Procedures" study was completed and a first draft submitted to the project manager for review by the working group. A final report was subsequently submitted.

- Interest satisfaction curves were defined based on the 41 metrics and incorporated into the mock evaluation model designed by the PFEG

- The CNTWG awarded another contract to a different consultant to define the "Management of Ice Cover Operational Procedures"

- A first draft of the terms of reference defining the required outputs for the impact

evaluation model was produced

- The 41 metrics were reviewed

What are the Group's Year 3 objectives?

- To complete the database produced in Year 2 so that it includes traffic between Montreal and Kingston for the sample years 1995 to 1999.

- To review the terms of reference in light of advice and information received by the new PFEG economic advisory group

- To produce an evaluation of the economic impacts of water levels on commercial navigation which would include a transportation cost model based on the work done in Year 1 and 2

- To produce a set of transportation cost curves based on the economic impacts model

What are the Group's Year 3 achievements and schedule (as of July 2003)?

- Define 22 proposed criteria for the first version of the new plan

- The contract for the second part of the database was awarded to a consultant and should be completed at the end of September

- The evaluation of impacts contract should be awarded to a consultant within the upcoming weeks. The group hopes to review the first draft of this study at the end of December.

- The definition of transportation cost curves will start as soon as enough information from the evaluation model is available.