



Environmental Observatory for the bay of Sept-Îles

MARINE CURRENTS

Generally speaking, marine currents are complex because they are highly variable in both space (horizontal and vertical movement) and time (daily and seasonal cycles), which makes them difficult to represent, understand, and forecast (Bourgault et al., 2017). However, knowledge of currents is essential to understanding the dynamics of the environment and its ecosystem.

Data on currents in the Bay of Sept-Îles is very limited and comes essentially from studies conducted by consulting firms for dredging or infrastructure development projects. However these studies focus mainly on port areas, such as the Pointe Noire sector (Procean, 1999; Roche, 2000; Genivar, 2005; Genivar, 2008; Genivar, 2012; SNC-Lavalin, 2012) and the area near the city of Sept-Îles and Pointe aux Basques (Roche 1991 in Belles-Isles et al., 2003) (Figure 8-2). The Baie de la Boule sector is of interest because of its highly active sedimentary dynamics, in part influenced by marine currents (Bernatchez et al., 2008b, Friesinger, 2009, Normandeau et al., 2013). The data presented in these studies is not sufficient to provide an overall picture of marine currents in the Bay of Sept-Îles area. Additional studies are required to describe water circulation in the bay. It should be noted that research on hydrodynamics in the Bay of Sept-Îles is underway as part of the CHONe II program.

A review of current knowledge suggests, however, that currents in the Bay of Sept-Îles are influenced by the bay's morphology, tides in the Gulf of St. Lawrence, surface winds, and the vertical density stratification of water masses.

Total tide flow varies between 0 and 20,000 m³/s at the entrance to the bay (Roche, 2000).
= 20,000 m³/s (20,000,000 L/s) is approximately the volume of five Olympic swimming pools per second (50m x 25m x 3m deep).

RECOMMENDATIONS

1. A new study that includes hydrodynamic modeling is recommended to complement existing data and cover the rest of the bay.
2. A series of 2D, and ideally 3D, hydrodynamic simulations should be conducted, with and without vertical stratification and tributaries, and with east and west winds. The study could be carried out with approximate vertical stratification data. In this case, it would be a generic study, i.e., with constant winds and approximate and constant vertical stratification. However the study would be more robust if detailed CTD profiles (salinity and temperature) for the entire bay were used.
3. A precise bathymetry of the entire study area is also necessary.

ICE CONDITIONS

In the Bay of Sept-Îles, shore ice starts to form in November, but doesn't spread to open water until late December (Procéan inc., 1999). A thin, loose layer of ice may cover the entire Bay of Sept-Îles as early as mid-December (Belles-Isles et al., 2003; Genivar, 2012) without hindering maritime traffic (Procéan inc., 1999). The ice leaves the Bay of Sept-Îles sometime in early April (Belles-Isles et al., 2003). The shore ice in the Bay of Sept-Îles is about 0.5 m to 1.3 m thick, whereas it can be up to 5 m thick further offshore (Belles-Isles et al., 2003).

RECOMMENDATIONS

1. To get a detailed portrait of ice conditions in the Bay of Sept-Îles, data should be gathered locally using a field study.

MARINE MAMMAL SURVEY AND MONITORING

The 2017 survey of marine mammals in the Bay of Sept-Îles was a first step in a long-term monitoring process. The 2017 data provides a baseline for tracking changes in marine mammal distribution and abundance over time in relation to environmental changes in the same sector.

TRANSECT



RECOMMENDATIONS

1. It is recommended that the survey period be extended from the beginning of May to October.
2. The sampling effort should be standardized and provide for at least two outings per week. The outings should be spread out over the entire survey period to provide significant statistics on how marine mammals occupy the area over time.
3. It is also recommended that training be provided to observers at the start of the season, including theoretical training on the basic concepts of linear transect surveys, so they fully understand why (and how) to collect field data. The training should include a field trip during which a specialist can check that observers are collecting the data properly.
4. It would be a good idea to implement the photo-ID protocol to collect additional data on marine mammal populations in the bay. Subsequent analyses of the abundance and distribution of marine mammals should be conducted and at the same time other environmental parameters should be monitored as part of the environmental observatory for the Bay of Sept-Îles.
5. It is recommended that this research be part of a long-term monitoring program.
6. To meet the criteria set out by Green Marine, of which the Port of Sept-Îles is a member, noise levels should be monitored and spatial and temporal use of the bay by various marine mammal species should be clearly established. The data should be analyzed in relation to spatio-temporal variations in noise (and acceptable noise levels) in the study area.
7. Distribution data on marine mammals should be compared with data on maritime traffic to identify areas at higher risk for collisions and detect variations in marine mammal behavior (distribution and specific behaviors) related to ship movements.

PHOTO CREDIT

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