LA ROMAINE HYDROELECTRIC COMPLEX PROJECT – SCIENTIFIC ASSESSMENT OF THE IMPACT STUDY, MARINE COMPONENT

Context

The Fish Habitat Management Branch (FHMB) has asked Quebec Region's Science sector to review the La Romaine project impact assessment. Within the framework of this project, Hydro-Quebec Production expects to build a hydroelectric complex of 1,550 MW on the Romaine River, located on the north shore of the St. Lawrence River near Havre-Saint-Pierre. This complex will include four hydroelectric developments with an average annual energy production of 8.0 TWh per year. Within the framework of this project, the DFO will have to determine the project's effects on fish and on their habitat in freshwater and in the marine environment. The DFO's Science sector is being solicited to provide science advice essentially pertaining to certain components of the marine environment. The response from the Science sector will likely be used to help FHM meet its obligations under the *Fisheries Act* (FA), the *Canadian Environmental Assessment Act* (CEAA) and the Policy for the Management of Fish Habitat. The request by FHM is to ensure that the DFO possesses all the necessary data and information to determine the project's potential effects on fish and their habitat. The request was sent to the Science Advice, Information and Support Branch (SAISB) on March 28, 2008.

Background

The implementation of the work being studied should produce changes in the hydrologic regime of the Romaine River. Overall, there will likely be a flow increase in winter and a significant drop in spring flooding. The flow regime in summer should be closer to what is found in natural conditions, but it could change due to pluviometry and management requirements. There should also be leading-edge management practices which will produce daily turbinated flow rate variations between 200-400 m^3/s, thereby changing the freshwater inflow at the river mouth. In addition, based on available information, this flow could be much weaker for around 24 days (varying between 17 and 59 days depending on the magnitude of the flooding) in spring during the second filling phase of the Romaine-2 reservoir in 2014.

These changes are likely to cause a redistribution of the freshwater inflow, a shift in the freshwater-saltwater interface, current changes and possibly a reworking of the sediment in the Romaine River Delta.

It is understood that the composition of the benthic fauna is intimately linked to, among other things, the nature of the substrate, bathymetry and salinity. The expected changes to these elements in the Delta could have an impact on abundance, distribution and on the establishment of different species that form the benthic community as well as on the eelgrass beds found there.

The conclusions that were drawn in the impact study indicated that the Delta presented more stable and increased marine conditions because of flow management. In current conditions, the spring flooding recurrently leaches the sediment and benthic community. The project is likely to change the conditions, because powerhouse operations should cause a reduction of large-scale flooding which is responsible for leaching the sediment in the Delta.

Considering the significance of the environment's physical conditions, for all trophic levels, it is critical that the information presented in the impact study provides a way to assess, as effectively as possible, the project's impact on fish habitat at the mouth of the Romaine River.

Analysis and Responses

Benthic Community

The impact study indicates that the changes to the hydrologic regime will make the Delta more stable and increase marine conditions, and consequently, it is likely that the benthic community will increase its diversity and reach greater maturity. According to the study, "soft-shell clams will also benefit from these conditions by extending their range because of improved living conditions". Consequently, the proponent concluded that "the abundance and diversity of benthic populations will slightly increase and feeding conditions for fish will improve".

1) Is the data provided in the study sufficient to draw such a conclusion? If not, what information would be required?

This report only contains sparse information on clams. A few samples were collected and indicated that population density was weak (around 1.9 to 4.4 harvest-size individuals per m^2), but nothing is mentioned about size structure and pre-commercial densities, and these densities do appear to be weak in fact. A study on the soil animal population by Desrosiers et al. (1984) conducted following a landslide in Pakuauashau Bay, a few km east of the Romaine River mouth, mentioned high density clam populations, between 50-150 ind./m^2, and even reaching over 1,000 ind./m^2 in an area. Variability is based on altitudinal and horizontal axes. This study did not only include size structure assessments.

It is some surprise that the study immediately concluded that the area had no commercial interest, which is probably true. However, just because the density of commercial clams is weak is not enough to conclude that interest is lacking. It also indicated that because sediment supply will only drop by about 6,000 m^3 $year^{-1}$ to 4,000 m^3 $year^{-1}$, which only represents a fraction of the existing sediment, there will be little impact on the environment. It is possible that this missing sediment is precisely what plays a significant role in preventing bank erosion. It is difficult to draw this conclusion at this point. The study also mentioned the annual habitat reworking and implied that this caused the habitat to return to a "stage zero" habitat every year and consequently, any impact would only be positive. There is no data to support this conclusion: are all the clams younger than one-year old? Was an annual population cycle conducted? The study provided did not mention any of this.

The conclusion about a moderate positive effect may be correct. But the information to support it is insubstantial and incomplete.

Benthic Community (other than clams and crab)

According to the study, there will be more stable and increased marine conditions and this would enhance the benthic community's ability to increase its diversity and reach greater maturity. If the hydrodynamic model predictions are accurate, abundance and diversity of benthic populations will in fact increase in the affected area because indices such as diversity and secondary productivity are usually negatively correlated with the disturbance level. This being said, the structure of these communities will also be altered. Therefore, this will not only increase secondary productivity for benthos, it will also support another fish community. The structure of benthic communities can also be altered by potential changes in sediment. Even with the assurance provided on page 22-19:

"The current will be slower in the river mouth area, slowing the sediment movement, which will already be diminished due to the reduced load at the mouth. The only area that can be affected by these changes is the central channel, which is the only sediment movement channel."

and

"Flow conditions in the river mouth area will not produce increased accumulation, and fine sediment will continue to be evacuated towards the Mingan channel. Fine sediment accumulation in the continental borderland bays and on certain flats sheltered by some islets will not change."

and on page 29-13:

"These changes will mostly occur in the central channel, whereas few changes are expected in the eastern and western channels."

Based on their own studies, the flow of the "Eastern Channel" (see Map 22-3) will be significantly reduced (see Figure 22-3 and the text on page 22-15). We can therefore predict that sediment in this area will also change due to reduced leaching activity from the spring flow, perhaps with an increase of organic matter, silt and other small sediment. This type of alteration could produce changes in the type of community occurring in this area.

To sum up, the data provided indicates that there will be more stable and increased marine conditions for benthic communities and they will also likely become more productive. However, they will also be different and they will support different fish communities. Their own data does not support their conclusions in terms of sediment.

Eelgrass Beds

Eelgrass beds were indexed, characterized; their size assessed and based on the study, there is no expected impact on them. Eelgrass slows the current and helps with the sedimentation of organic and inorganic matter and the settlement of larvae and plankton. Therefore, they are very productive and represent significant feeding and reproduction areas and shelters for forage fish species.

Eelgrass is a plant that colonizes areas with varying salinity conditions. Nevertheless, once it is implemented, it becomes dependant on the characteristics of its new site. The change in freshwater inflow and saltwater intrusion could impact the distribution and area covered by

eelgrass, which is very important for fish habitat. Therefore, it is important to make sure that this component is treated appropriately in the impact study.

2) Does the information contained in the impact study provide an effective means of assessing the project's impact on this component?

Eelgrass beds are areas of high primary and secondary productivity. They represent significant feeding and reproduction areas and nursery sites for different forage fish species. They are feeding grounds for aquatic birds and represent the brant's exclusive foodstuff.

The necessary data and analyses for assessing the project's impact on this component are mostly physical in nature. As there were no sedimentology experts, issues concerning the project's impact on eelgrass beds were reviewed based on a biological point of view in the answers provided below. In terms of the information contained in the impact study, there was little data stemming directly from the eelgrass beds *(average natural salinity, or minimum and maximum?) between 10 and 30 between May and November (map 22-4)*. An increased flow in winter could lead to a drop in salinity and a temperature increase, and a reduced flow in spring and summer could lead to a drop in temperature and an increase in salinity.

3) Can changes in saltwater intrusion and other modifications (current, sediment supply, bathymetric changes) have a negative impact on the survival of eelgrass beds or on the area covered by eelgrass?

Proponents argue that, in the eastern part of the river mouth which includes eelgrass beds, the water masses will not undergo any significant change, this region is only slightly influenced by the freshwater flow and salinity conditions and the substrate will not change in proximity of the eelgrass beds. They also claim that the ice cover will not change in the river mouth (except for frazil ice at the Brillant Rapids and at the chute à l'auberge).

It is surprising that none of these variables will be modified with the changes in freshwater flow at different times of the year. In addition, are average values mentioned? It is known that naturally, eelgrass undergoes a range of changes during the period of one day (tides), a month (spring tide/neap tide) or a year (winter under ice versus spring flooding versus summer). If the pattern changes, the sequence and frequency of this variability, there could be consequences on the eelgrass. Studies have shown the impact of hydroelectric dams on eelgrass beds (in some cases a disappearance) (Bernard et al. 2005; van Katwijk et al. 2000). Dr. Fred Short, an American research scientist specializing in eelgrass at the Jackson Estuarine Laboratory, has linked the decline of eelgrass in James Bay to hydroelectric development. Therefore, it is important to handle this issue carefully.

Here is what could affect eelgrass distribution and range, considering that there will be changes in freshwater inflow and saltwater intrusion as well as other changes:

Temperature and Salinity Variations
Typically, eelgrass grows in estuarine conditions and can handle a wide range of salinity levels (5-32). However, excessively high temperature and salinity (> 28ºC and > 26‰ respectively) or excessively low can impact its growth (van Katwijk *et al.* 1999; Touchette *et al.* 2003; Den Hartog, 1970, Kamermans *et al.* 1999). The growth of vegetative stalks is optimal at 10-15ºC and reproductive stalks at 15-20ºC (Den Hartog, 1970). The optimal salinity for growth is around 20‰. In addition, even though eelgrass can tolerate significant temperature and salinity variations, if it is outside its comfort zone too often, it will undergo a stress which could decrease

its growth and the build-up of energy reserves. These reserves are stocked by the plant in summer and are particularly important at our latitudes, where the foliar system is removed every year by the shifting winter ice and has to re-grow every spring (Robertson and Mann, 1984). These reserves also allow the plant to survive during long winters under the ice. Also, under high salinity and temperature conditions, the plant is more vulnerable to disease (Greve *et al.* 2003).

Water Quality
Water clarity is a very significant factor for the growth and survival of eelgrass. Photosynthesis depends on the availability of light. In addition, muddy water (e.g. suspended sediment) is detrimental. Changes to water current strength can have an impact of coastal erosion, which can increase turbidity and impact photosynthesis. This phenomenon was observed by the aboriginals in James Bay following the harnessing of Grande Rivière. Also, according to the proponent, the water will be slightly more coloured the first two years (humic and fulvic acid). This coloration should be measured according to its impact on eelgrass (duration, intensity, location, period of the year).

Ice Cover
The ice cover protects the eelgrass in winter. The instability of the ice (breaking and shifting) could have a significant abrasive effect on the eelgrass.

Cumulative Effects of the Various Stresses
The cumulative effects of the various stresses could diminish production, a drop in the plant's energy reserves (carbohydrates) which would threaten its ability to survive the long winter under the ice.

4) If necessary, can the effects that these impacts have on the environment's productivity and on the food chain be measured?

In the event that eelgrass deteriorates or disappears, it is obvious that this will impact primary production and wildlife (benthos, fish, birds) that reside there.

<u>Planktonic Production and Snow Crab</u>

In January 2007, the proponent and scientists from the ISMER presented to the DFO the results from the study on the effects of the Romaine River hydroelectric development on biological and physical conditions in the Mingan Channel and on snow crab. During this meeting, DFO scientists raised some additional issues and comments that the proponent agreed to address.

5) Have the issues concerning planktonic productivity and snow crab been adequately addressed, and does the information provided answer the questions from Sciences, such as:

   a. On the settlement patterns of young snow crab on the bottom

During the meeting between the proponent and scientists from the MLI, two comments were made. These comments are mentioned below along with the answers provided by the relevant scientists.

"Seeing as there was a one-month difference between the crab samples taken in the east and west sectors of the channel, this could impact the small crab distribution results over time. It

would also be important to break-down the spatial crab distribution results while accounting for the different cohorts potentially represented within the 0-25mm carapace width category in order to determine where juvenile crabs settle."

The issue of the one-month difference between crab samples collected in the eastern and western sectors of the channel was not mentioned in the study, neither were the potential perception consequences of the distribution of juvenile snow crab. For example, a one-month difference in sampling can change our perception of abundance and spatial distribution of the very first snow crab benthic stage, because its settlement on the bottom can extend over a few months (Lovrich et al. 1995).

The analysis of the crab occurring within the 0-25 mm category has not been refined. How many development stages, or instars, are represented in this category and what are the size limits that categorize each development stage? A histogram of carapace width (CW) frequency would answer that question. The occurrence of several CW modes within this category would lead to the conclusion that recruitment to the population has occurred regularly over previous years (for example, there would likely be a mode around 3 mm, 7 mm and one around 15 mm representing as many year-classes). Size limits that have been set for each development stage will provide a deeper analysis of the spatial distribution of juveniles per year-class (see below).

"Document the occurrence of megalopes or the first juvenile stages of crab in relation to substrate."

The information on juvenile spatial distribution was not fully detailed. The objective of this question was to see whether there was a link between the river's plume, as it currently exists, and the settlement on the bottom and the subsequent survival of the snow crab's first development stage.

What is the distribution of crab (where) recruited to the population in 2005 (i.e. crab of around 3 mm CW at the time of the sampling) and in 2004 (i.e. crab of around 7 mm CW at the time of the sampling)? Are these crabs more closely associated at the mouth of the Romaine River than the entire 0-25 mm category? What is the nature of the sediment they are associated with? Could the increased sediment stability resulting from the decreased flow of the river compromise the ability of small crabs to bury themselves (and subsequently increase their natural mortality)? There is a partial answer to these questions on page 29-24, where complementary information on what is presented in section 29.1.4.2 is provided (p 29-10 and 29-11). However, first of all, all the relevant results on snow crab abundance and distribution must be presented in the first section (section 29.1.4.2) and the second section should only contain the description of the impact by integrating the information presented previously. Secondly, at the end of the third paragraph of the part entitled "Detailed description of the residual impact" on page 29-24, it appears that the study concluded that the first development stage preferably settles west, based on a higher "proportion" of crab smaller than 15 mm CW in the west (old river delta) than in the east (current delta). This type of size grouping mixes individuals with a dispersal ability that is nil or very weak (the first three development stages, I, II and III that measure around < 8-9 mm CW), whose spatial distribution is likely to reflect the area where they settled, with individuals belonging to development stages IV and V (>8-9 mm CW) which are increasingly mobile and whose spatial distribution does not necessarily reflect the area where they settled. In light of the size structure analyses requested earlier (and should provide specific size limits for the first development stages), it would be important to create a spatial distribution map for each of the two first year-classes (development stages I and II-III). Analysis and interpretation of the spatial distribution of the first benthic stages must (i) only

concern the first year-class (and if necessary the second year-class, if the number of individuals from the first is too low), (ii) address abundances and not proportions and (iii) account for time lags in sampling between the eastern and western parts (see comments above).

b. Validate the relationship between salinity and Chromatographic dissolved organic matters (CDOM) and the limits of the 3D model.

If this is not the case, what information would be required to properly assess the current situation or the anticipated impacts?

During the meeting between the proponent and scientists from the MLI, a few comments were made. These comments are mentioned below along with the answers provided by the relevant scientists.

"Document the input of nutrients and organic matter in the current and future Romaine River".

The DFO asked that the input of nutrients and organic matter in the Romaine River be documented; elements that are now in the impact study – Chapter on water quality. This element is discussed briefly in the section "Biological Oceanography". In the latter chapter, it was indicated that *surface freshwater, weak in nutrients, would dilute the richer saltwater and limit primary production*. This conclusion is based on simulations using an NPZD (nitrate, phytoplankton, zooplankton and detritus) type tri-dimensional model. However, the detailed assessment of the report by Saucier *et al.* (2007) revealed that the input of nutrients and other constituents (e.g. organic matter) from the Romaine River are not considered or only slightly considered as marginal in their simulations. In this context, it is not surprising that the freshwater input from the Romaine River was only able to dilute the saltwater in their simulations. This being said, their conclusions do nevertheless seem likely in terms of nitrates and their influence on primary productivity during spring, summer and fall. In fact, the concentrations of nutrients in the river reported in the study are generally low from spring to fall and possibly only contribute a bit to the primary productivity at the river mouth. However, the study makes no mention of the input of dissolved and particulate organic carbon from the Romaine River, which could contribute to the environment's productivity (regenerated primary production and secondary production) and more specifically during the spring when nutrient concentrations limit the new primary production in the Mingan Channel. In fact, the current total concentrations of organic carbon in the Romaine River are around 3mg C /L. Based on a current average spring flow of 840 m^3/sec at the mouth of the Romaine River; this would result in an input of 311 million grams of carbon per day during the current flooding. The decrease of the organic matter input from the Romaine River to the marine environment following the proposed development should be assessed and discussed in this report.

"Document the contextual representativeness of the 2001 choice for the bio-physical modeling in terms of climate, hydrology, etc."

This element now appears in the report by Saucier *et al.* (2007). Their justifications seem to be acceptable.

"Interpret the NPZ model results: secondary production"

In the NPZ models, the zooplankton component is mostly aimed at generating mortality in the phyto and micro zooplankton components, and their gross production is relatively well controlled by the physico-chemical processes (stratification, nutrients, etc) generated by the model. The

zooplankton component is controlled by wide ranging functions (growth rate, energy assimilation, mortality, etc) which are not necessarily representative of zooplankton's complex behaviour and processes (vertical distribution/migration and displacement towards different water masses, affinity with salinity, etc). DFO scientists have strongly recommended that conclusions from the modelling study be limited because of the limitations of the model used. Considering the nature of NPZD models, any zooplankton extrapolation would appear to be risky and unjustified.

"Validate the relationship between salinity and CDOM and document the limits of the model"

One of the conclusions from the modelling study was that the decrease in spring flooding would increase primary productivity in the river mouth area because the turbidity associated with the water plume would be reduced. This decrease in turbidity was simulated from a relationship between salinity and a light attenuation coefficient in the water column. This model's limits and its consequences on the simulations are described in the report by Saucier *et al.* (2007). The conclusions appear to be valid.

"Assess whether the flow changes caused by the hydroelectric development can affect the depth of the winter convection in the Mingan sector"

This element appears in the report by Saucier *et al.* (2007). Their results confirm that winter stratification increases and has a significant, but non-inhibitory impact by reducing turbulence activity and the vertical distribution of nutrients. However, the effect on the nutrients level would be relatively low according to their simulations. In addition, simulations using extreme flow scenarios in winter were made and were acceptable.

Conclusions on baleen whales: no impact on their zooplankton prey

The study concluded that the La Romaine hydroelectric development will not impact the baleen whale's zooplankton prey. This conclusion was based on NPZD model simulations. In light of the previous point concerning secondary production, the impact study's conclusion appears highly doubtful. Such a conclusion should only be based on field data and/or on a combined biological-physical model in 3-D of the whale's preferred zooplankton species, such as large calanoids or krill.

6) The proceedings from the July 27th, 2005 meeting indicated that the filling of the reservoirs would cause organic matter to decompose and could make humic compounds available, which can potentially lead to the development of toxic algae. This issue was not raised in the impact study.

   Because the presence of toxic algae can cause the closure of shellfish beds (DFO responsibility), we will ask the proponent to indicate the specific risks of occurrence of this problem in terms of filling the reservoirs and with the presence of existing hydroelectric developments. In order to make this request more specific, could you indicate, using your expertise, any concerns regarding the study area and other elements that should be included.

Relationship Between Toxic Algae and Humic Substances

Literature shows considerable evidence that humic substances enhance the growth of certain toxic algae species such as dinoflagellates (e.g. *Alexandrium*). In the Gulf of St. Lawrence,

Alexandrium tamarense is the most common species, producing paralytic toxins, which can impact fish survival, contaminate molluscs and force the closure of shellfish areas, and in the worst case scenario, have adverse effects on human health. Gagnon *et al.* (2005) showed how humic substances from rivers on the north shore of the Gulf influence the growth of this species in shellfish culture facilities. In addition, recent studies have shown that the flowering of *Alexandrium* in river plumes could also be influenced by phosphate concentrations (Fauchot et al. 2005). An increase of humic substances and phosphate is expected in the Romaine River during the first few years of the project, which will cause an increase in these substances at the river mouth. The impact of humic substances and phosphate in the marine environment and their relationship to the growth of toxic algae has not been discussed in the current report. It should also be noted that the study does not present any direct measurement of humic substances.

Current Status of Toxic Algae Populations in the Study Area

The closest sampling stations to the Romaine River from the MLI's toxic algae monitoring program are at Natashquan (around 120 km east) and Sept-Îles (around 150 km west). A long-term temporal series of observations have existed at these two stations since at least 1994. In the case of Sept-Îles, significant populations (>5000 cells/L) have been observed almost every year. At Natashquan, populations have exceeded the 1,000 cells/L threshold only once since 1994 and have generally remained very low. Nevertheless, *A. tamarense* has been present at Natashquan every year. Therefore, the occurrence of this species is likely in the Mingan sector.

Other toxic dinoflagellate species also exist in the area, including *Dinophysis spp.*, a genus responsible for diarrhetic shellfish poisoning. The impact of humic substances on *Dinophysis* has not yet been studied as far as we can see.

Marine Sediment and Toxic Algae:

Alexandrium type dinoflagelletes produce cysts, a very resistant life stage that allows the organism to survive for several years in the sediment. It has not been confirmed whether the reduced spring flooding enhances the accumulation of cysts in the sediment. This aspect was not documented in the impact study.

Marine Mammals

The fact that there is a centre for studying marine mammals nearby the study area, the MICS, provides some data on the species that occupy the sector being studied. However, the MICS observes marine mammals mostly during marine mammal watching trips and mostly targets larger marine mammals, such as blue whales, fin whales and humpback whales.

Based on our understanding of the file, the impacts that can affect marine mammals occurring in the study area solely concern a potential impact on their food source. The impact study did not indicate there was any anticipated negative impact on planktonic, benthic or fish communities in the Mingan Channel. Therefore, the project is not likely to affect marine mammal prey or their habitat.

Following the impact study analysis, we agree that the project is not likely to affect baleen whales feeding on zooplankton. However, it is more difficult to determine whether or not it will impact marine mammals (seals, minke whales and odontoceti) feeding on fish. In addition, we

agree that eelgrass beds contribute to the productivity of the environment and that an impact on these could later affect small marine mammal prey.

7) Do the marine mammal specialists agree with our conclusions, and do they have other concerns regarding the project's potential effects on marine mammals?

The overall conclusions regarding the effects on marine mammals seem to be appropriate, except perhaps for a few elements concerning the advice provided on the benthic community, eelgrass beds and planktonic production.

It is somewhat unlikely that the predicted hydrological and physical changes during the period of operations will have a direct impact on marine mammals in the area. The effects on marine mammals, if there are any, would likely be indirect via an impact on prey production and distribution. As mentioned previously, the benthic communities in the area covered by the impact study would become more marine, more stable, likely more productive and could support a different fish community. As for eelgrass beds, it was mentioned that they could deteriorate or disappear with effects on species using this habitat. Finally, extrapolations and predictions for zooplankton from the NPZD model are highly doubtful and the conclusions that there would be no impact on zooplankton prey for baleen whales should only be based on field data and/or on a combined biological-physical model in 3-D of the whale's preferred zooplankton species (large calanoids and krill). This could likely have an impact on prey availability in the area covered by the impact study. Nevertheless, even with the uncertainty regarding the issues mentioned previously, and unless the effects on benthic communities, on eelgrass, on secondary production and on distribution in the area covered by the impact study represent a significant production component for each of these species for a wider area (e.g. Minganie, Jacques-Cartier Strait, Northwest Gulf), we support the conclusion that the project could have a local impact on individuals using this area, particularly species feeding on fish, but is likely to only have a marginal effect on marine mammal populations.

8) Does the data used by the proponent provide a real portrait of all the marine mammals (pinnipeds, odontoceti and minke whales) occurring in the sector and of their use of the area? If not, does the DFO have the necessary data to complete the reference state on this issue?

The last paragraph of section 29.1.1 mentioned that the assessment of the marine mammals' use of the Romaine River mouth and Mingan Channel was conducted by the Mingan Island Cetacean Study. It involved a literature review, a database summary from the station for the 1984-2001 period, four fly-overs in August 2001, a collection of recorded fortuitous observations in the field, and finally casual observations from May to October along the Mingan Channel. The method may have been described in a previous section, but the information provided in section 29.1.1 did not indicate a review of any data, method or reference list. Therefore, it is impossible to determine whether the method was effective or the data valid.

The DFO does not have any data on the use of this specific area. The studies conducted on the distribution and movements of marine mammals in the northern Gulf were aimed at assessing abundance, distribution and migration of marine mammals throughout the northern Gulf of St. Lawrence, and they do not provide a way to compare or validate the information presented in this impact study.

Conclusion

The part that addresses the marine components of the Romaine River hydroelectric development project impact study was reviewed by the specialists at the Maurice Lamontagne Institute. The objective of this review was to make sure that the information presented by the proponent was sufficient to effectively assess the project's impact on fish habitat at the mouth of the Romaine River. Certain concerns had been raised during preliminary meetings between the proponent and DFO.

Based on the information found in the report, the impact on clam populations in the study area is likely only marginal, even though a considerable amount of uncertainty still exists. As the proponent indicates, benthic communities will likely become more marine and stable and more productive as well. However, they will likely also be different and they will support different fish communities. Even though eelgrass can colonize sites with varying salinity levels, it nevertheless becomes dependant on the characteristics of the home site. The changes expected following the completion of the project could bring certain changes in terms of local physical characteristics, which could affect the distribution and area covered by eelgrass beds.

The issues that were raised during previous meetings with the proponent concerning snow crab were not entirely answered and some of the data provided was not sufficiently detailed or developed to support the proponent's conclusions, such as the project's impact on the settlement areas for juvenile stages. In terms of planktonic production, the concerns that were raised by MLI scientists on issues related to the use of the NPZD model were adequately answered overall, even though certain extrapolations appear to be sometimes risky. As for toxic algae, the study does not mention the potential impact of humic substances and phosphate in the marine environment and their possible relationship to the growth of toxic algae in the sector, which could lead to local shell bank closures. Finally, the completion of this project could have a local impact on a few marine mammals occurring in the sector, but generally, marine mammal populations are not likely to be overly disturbed.

To summarize, although the project that has been presented may have some local impacts, particularly on benthic communities and on eelgrass beds, the overall impact on the marine environment appears to be minimal based on the information provided by the proponent.

Contributors

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Date: May 28, 2008

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Correct citation for this publication:

DFO. 2008. La Romaine hydroelectric complex project – scientific assessment of the impact study, marine component. DFO Can. Sci. Advis. Sec. Sci. Resp. 2008/012.