MAINTENANCE DREDGING, ACCESS CHANNEL, MINES SELEINE, GRANDE-ENTRÉE LAGOON, MAGDALEN ISLANDS – CONSULTATION ON THE NEW AT- SEA DISPOSAL SITE FOR DREDGED SEDIMENTS

Context

The maintenance dredging of the Mines Seleine in the Magdalen Islands, Quebec, has been done recurrently since 1992, and the management approach for the dredged material has been disposal at sea. Because the residual space from the old disposal site (disposal site D) is now filled up, a new disposal site, designated disposal site E, is being proposed. The 2007 maintenance dredging will involve a volume of around 300,000 m^3 of sediments and will require an area of 36 hectares (600 m X 600 m) for disposal at sea.

The DFO estimates that the project will produce some losses to fish habitat, and has decided to issue an authorization under Section 35 (2) of the Fisheries Act. The decision to issue this authorization is a trigger for the Canadian Environmental Assessment Act (CEAA). Environment Canada must also issue a disposal at sea permit under the Canadian Environmental Protection Act, and Transport Canada a hazard-to-navigation permit under the Navigable Waters Protection Act, which also makes these departments responsible for conducting an environmental review. In order to make sure the selected site is adequate, the Fish Habitat Management Branch (FHMB) solicited the DFO Science Branch at the MLI in order to obtain a science advice on the two following items: (1) dredging impacts, and (2) disposal site. The request was sent to the science advice, information and support branch (SAISB) on December 4, 2006, and a response was required by January 5, 2007.

Analysis and response

Part 1: Dredging impacts

Lobster

Figure 1.2 (page 6 of the environmental impact study) indicates the location of the chainages.

The last mitigation measure update aimed at reducing the dredging impacts on lobster migration in the channel was done by the proponent last October 3rd and mentions that: "*…no dredging in the channel (chainages 7,350 m to 8,650 m) from May 15th to June 15th and from October 1st to the 31st."*

Question 1 Are these dates appropriate for protecting the lobster migration period in the channel?

The proponent amended the spring period during which no dredging will be done in the channel area (chainages 7,350 m to 8,650 m) based on the information provided in the Munro and Therriault report (1981). In this report, the authors mentioned that lobster enter the lagoon from mid-May to mid-June. In addition, the same authors published a primary article in 1983 on the same subject in which they mentioned that the arrival in the lagoon could extend to late June or early July (p. 916). In light of this information, it would be wise to extend at least until early July the no-dredging period in the channel. The requested amendment for no dredging during the fall period reflects more precisely the migration period mentioned by Munro and Therriault (1983) (from the beginning to the end of October).

The authors also suggested that a temperature increase to 11^{o}C in the lagoon and the development of a thermal gradient between the lagoon and the coast would encourage the movement of lobster towards the lagoon in spring. In fall, a temperature below 11^{o}C would encourage lobster to move out of the lagoon. If lobster movements are in fact conditioned by temperature, multiyear variations should be observed in terms of migration dates since the thermal regime varies from one year to another. It is impossible to predict when the 2007 migrations will occur (spring and fall), therefore it would be wise to extend the window to be on the safe side.

Question 2 Is the 8,650 m maximum chainage targeted by this mitigation measure sufficient to protect lobster migration or should we extend the no-dredging area even further towards the outside of the lagoon?

To answer this question, we would have to be able to position the lobster migration corridor. If lobsters use the channel, dredging activities between chainages 8,650 m and 10,720 m could in fact affect their migration. However, if lobsters use the shoals west of the channel or use the channel at chainages below 8,650 m (necessary route for lobsters arriving from the east), it is possible that migration could occur without any constraint. We do not have sufficient information on exact locations of lobster movements to answer this question. A sensible approach would be to extend the no-dredging area a little wider during the migration period.

Atlantic herring

Figure 1.2 (page 6 of the environmental impact study) indicates the location of the chainages.

Question 3 Could the planned dredging of the channel outside the lagoon (chainage 8,650 m to 10,720 m) during the months of May and June have an impact on Atlantic herring migration in the lagoon or on their reproduction?

The Grande-Entrée lagoon is currently one of the most significant spawning sites for Atlantic herring (spring component) in the Magdalen Islands. This component was depleted by over-fishing in the 1970s, but was restored by the mid-1990s and has provided significant annual catches up to 2005.

Atlantic herring spawn in a large portion of the Grande-Entrée lagoon, usually between mid-April and mid-May, although early April spawning has been observed. Atlantic herring also spawn outside the lagoon near the coast in depths reaching 10 meters. Atlantic herring eggs fastened to the bottom and remain there until they hatch. In spring, hatching occurs after 30 days at a temperature of 5°C. The Grande-Entrée lagoon has been the most significant fishing area for Atlantic herring in the Magdalen Islands in recent years. Fishing is done using gillnets during the

spawning season, in which large numbers of adults are found both inside and outside of the lagoon.

In the spring of 2006, there was a significant drop in Atlantic herring abundance in the Islands and a 90% drop in catches compared to 2005. The component of spring spawners is declining in all southern Gulf areas, and measures to reduce the fishing effort and protect spawning grounds are expected for 2007. During the local small pelagic advisory committee meeting held on November 7, 2006 in the Islands, the members recommended a fishing ban for Atlantic herring in certain areas by closing all interior bays, including the Grande-Entrée lagoon, during the 2007 season. In addition, they recommended a reduction in the maximum number of nets used outside the lagoons.

Dredging activities during the spawning period could affect Atlantic herring behaviour in the lagoon during spawning and thus impact its success. In addition, dredging in May and June could lead to increased mortality for Atlantic herring eggs due to suspended and resedimentation of particles around the dredged areas (spawning grounds cross dredging areas). The channel dredging expected outside the lagoon during May and June in a coastal spawning area could have a negative impact on reproductive success and larval survival, particularly during this low abundance period for Atlantic herring. A 2-3 month buffer period without any dredging activities following Atlantic herring egg-laying is necessary for the hatching and larvae dispersion. Consequently, it would be particularly important that dredging activities not occur before mid-July in this sector.

Part 2: Disposal site

Stability of the proposed disposal site

See details in Section 2.2.1.6 of the impact study, pages 25 to 33.

Question 4 Does the information provided by the proponent give a view of the long term fate of the sediments disposed at the new site? If not, what information is missing?

The essential parts of the analysis of currents and waves influence on the modelling and sediment dispersion are presented on pages 31 and 32 of the document. The facts presented on these pages are correct. The wind generated currents are not sufficient to disperse or suspend sand from the bottom on account of its particle size. There must be some wave action for this to occur. Wave action drops with depth, so the choice of this new disposal site at depths of 15.1 and 15.9 meters is wise. In addition, the wind generated currents drop slightly further off the coast. Because the new site is further off the coast than disposal site “D”, its action will be lower as well.

In comparison, in his study of the old disposal site (D), located in depths of 13 and 13.5 meters, Mr. Yann Ropars (2002) showed that erosion occurred between 1982 and 2001. We can therefore predict that erosion will occur at a lower rate at this new site. In addition, this whole area in the Magdalen Islands is subject to sediment movements. Conclusions from the study on the dynamics of disposal site “D” will also apply to this new site, i.e. adjacent areas will continue to exchange sediments with dredging disposal areas. However, because the dredged material is of the same nature as the sand already found on the bottom, the impacts will be mitigated.

Benthic fauna

See details in Appendix 4 of the impact study.

Question 5 Following the amendments to the disposal site characteristics (bathymetry, nature of the substrate …) brought on by sediment immersion, is it possible to determine whether the composition of the benthic community at disposal site E will remain the same?

Sampling carried out by the proponent is ample enough to describe the benthic communities at disposal site E as well as at control sites (reference areas east and west, F). Overall, the two reference areas were very similar to disposal site E, other than the fact that there was a lower abundance at the reference sites. It is entirely possible that after dredging and deposition, benthic communities in disposal site E will, after a few years, return to a natural composition for a sandy bottom. Because of the difference in particle size between the sand in the site to be dredged and the sand in disposal site E (finer particles in disposal site E), the composition of communities before and after dredging may differ moderately, but the core of the communities should remain the same. This being said, the only way to validate this theory is to conduct sampling after a few years.

Question 6 Can the commercial species currently present recolonize the disturbed habitat? If so, can we estimate whether they will be more abundant than they currently are?

In the previous science advice written in 2005, it is mentioned that “macrofauna assemblages are no doubt controlled by a complex set of environmental variables (i.e. interactions between the hydrodynamic regime, the microtopography and particle size). Added to this, there are the seasonal and annual organism distribution and abundance variations.” Consequently, sediment disposal can impact commercial benthic molluscs on a more or less consistent basis. The persistence of the impacts will depend on the size of the disturbed area and on the differences between the types of sediments at the dredged area and disposal site. If sediments are similar to those found at the disposal site, recolonization should occur rapidly by the species present at the disposal site. Sediments of a very different particle size to that at the disposal site could be recolonized by other species. In cases where sediments are similar, it is reasonable to believe that the impact will be marginal and short term.

Although lobsters prefer rocky habitats, they also frequent soft bottoms when feeding. They frequent them more specifically towards the end of summer, after the moulting period, when they are actively in search of food. In the context where lobsters use soft bottoms for feeding, it is very likely that they will not frequent disposal site E until a new community (epifauna and infauna) has developed. Because the sediments deposited there are of similar nature and quality to those already present on the bottom, it is likely that within medium term (2-4 years), an invertebrate benthic community similar to the one observed prior to the sediment disposal will develop, and therefore the occurrence of lobster will resume.

Lobster

Question 7 Is the new disposal site currently a favourable wintering area for lobster? If so, can we expect negative impacts to this function of the habitat following the disposal of sediments?

Some lobsters use the soft bottom as habitat. They dig trough-shaped depressions in the sand. This behaviour is observed more specifically in larger size lobsters that have difficulty finding large enough shelters in the rocky substrate. Disposal site E could represent a likely site for trough digging, and certain lobsters may very well winter there. The disposal of a new stratum of sediments could momentarily prevent the digging of these troughs. However, because the sand from the channel is of the same quality and nature than that at the disposal site, once stabilized and consolidated, it could represent a favourable site for digging troughs. This being said, the number of lobsters using this type of habitat as shelter is probably quite low.

Conclusions

The assessment of dredging and disposal site impacts was done based on currently available knowledge. The questions in terms of dredging impacts mostly concerned their impact on lobster and Atlantic herring migration. In order to limit impacts on these two species, it is recommended to prohibit all dredging in spring until mid-July and also in October. It is also recommended to extend the no-dredging area a little further off shore during the lobster migration period. With regards to the disposal site and its recolonization, there doesn't appear to be any major problem. The new site is sufficiently deep and far from the coasts that it should not undergo any major erosion. With respect to the recolonization of the site, the similar nature of the sediments at the dredged site and disposal site should allow for the same species to recolonize over the next few years. However, the only way to be certain is to conduct another sampling campaign in a few years.

Contributors

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Sources of information

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