

Environmental Monitoring Advisory Committee (EMAC)

EMAC Recommendations Regarding the FORCE Environmental Effects Monitoring Program (EEMP) for the Fundy Tidal Power Project

**Submitted April 15, 2011
Report to FORCE**

INTRODUCTION

EMAC is charged with the task of reviewing and advising FORCE on the proposed Environmental Effects Monitoring Program (EEMP) as outlined in Section 6 of the Environmental Management Plan (EMP) dated October 16, 2009. The EMP was approved by the Nova Scotia Department of the Environment (NSE) and Fisheries and Oceans Canada (DFO), with the understanding that EMAC would provide advice on the adequacy of the EEMP to FORCE, and FORCE would adjust the EEMP as appropriate. It has been recognized by all parties involved that the Minas Passage has unique challenges for environmental monitoring and that an “adaptive management” approach will be utilized for ongoing advice in regard to environmental effects monitoring.

As a first step in addressing this task the EMAC members undertook a comprehensive review of the EA Registration and appendices, as well as the monitoring studies completed since the submission of the that document, and a preliminary review of new information related to environmental monitoring methods and technologies. They also held discussions with consultants and research scientists who had relevant expertise and experience.

BACKGROUND

EMAC submitted its first set of EEMP recommendations to FORCE on April 13, 2010. In the preamble to the report the Committee offered some general observations focusing on the need to set clearly defined and quantitative objectives, a comprehensive review and analysis of existing data, coordination/cooperation among parties conducting monitoring programs, and the establishment of a data management system. It was also noted that since there are limited proven monitoring options for fish and marine mammals in high-current environments like that of the Minas Passage, there will be overlap between research and monitoring programs.

There was also general agreement that the monitoring priorities should focus first on fish movement and detection of avoidance behaviour and strikes, with potential mammal impacts as the next priority. The 21 specific recommendations in the 2010 report were organized under eight specific biological/physical themes and allocated to high or lower priority rankings. Those

recommendations formed the basis of the monitoring program conducted during the summer and fall seasons of that year.

The general observations, agreements, professional judgments, classification system and priorities noted above, as well as the established monitoring themes and priorities, continue to be valid and provide the framework for this 2011 report and recommendations to FORCE.

GENERAL OBSERVATIONS

During EMAC deliberations, a number of overriding issues, challenges and opportunities were discussed and debated as they relate to the recommendations concerning the 2011 monitoring program. The general observations arising from these discussions are summarized below:

- Since the NSPI/Open Hydro turbine that was deployed in the FORCE Demonstration Area in the Minas Passage only operated for a limited period of time, there was little opportunity to collect data that would directly relate to potential impacts. It is noted that NSPI/OH is currently undertaking an analysis of the data collected by the turbine monitoring systems, including confirmation of duration of turbine operation.
- The subsequent removal of the turbine has provided an unexpected window of opportunity to conduct further baseline studies within the FORCE Demonstration Area and associated control areas before other turbines are deployed in 2012.
- For some of the established biological themes, the 2010 monitoring program did not start early enough in the spring or extend late enough into the fall to provide data on critical migration periods.
- The results of the 2010 monitoring program underline the challenges of monitoring the distribution and movement of marine species posed by the extremely dynamic physical environment of the Minas Passage.
- The majority of the monitoring activities recommended in the 2010 report to FORCE were fully or partially completed, although in some cases interpretation of the data may be compromised due to sampling challenges and difficulties. In some cases, the 2010 studies will provide information for the improved design of studies recommended for 2011.

COMMENTS AND RECOMMENDATIONS

(A) HIGH PRIORITY PROGRAMS (Immediate Implementation)

Fish Migration and Behaviour

During the 2010 monitoring program, researchers working with funding from OEER, FORCE, OTN and NSERC developed the basic design for an acoustic fish tracking program and successfully tracked the movements of striped bass, Atlantic sturgeon and American eel (species of special concern – COSEWIC) during July to November 2010. FORCE has an opportunity to capitalize on this initiative and expand the number of fish and species tagged (add Atlantic salmon smolts) to improve the scope and statistical robustness of the project. Coverage of fish movements in 2011 should begin earlier (April) and continue through to November to take advantage of previously tagged fish (still transmitting signals in 2011) and fish migrations into and out of the Basin. This is a high priority project which could be cost-shared with research funding programs.

Although initial discussions were held with weir fishers in April, 2010, no further initiative was taken with regard to their involvement in a fish monitoring program. The intent is to arrange with weir fishers, as well as other fishers in the area, the provision of catch data (species and seasonality of occurrence) in order to better define fish migration patterns and timing in the Minas Passage. It was also noted that there could be some value in reviewing weir catch data held by DFO, although the aggregation of such data by fishing regions may be somewhat limiting for EEM monitoring purposes. There was even some discussion about the possibility of EMAC/FORCE leasing an existing weir for dedicated monitoring.

There has been some difficulty in using conventional netting techniques to collect data on fish occurrence and abundance within the FORCE Demonstration Area. There is need for a review of fish monitoring technologies and netting options for high flow environments, with an assessment of their suitability for use in Minas Passage. This review would be a low-cost study and should proceed as soon as possible so that suitable monitoring approaches can be identified prior to turbines being deployed in 2012.

Recommendations:

- 1) FORCE should support the expansion and enhancement of the acoustic fish tracking research program which commenced in 2010. This would require vessel time, additional acoustic receivers, and acoustic transmitters (tags) for several high profile fish species, including Atlantic salmon. The tag detection period in 2010 should span April to November.**
- 2) EMAC recommends that FORCE engage local fishers (weir, lobster, First Nations representatives and others) that fish in the Minas Channel / Passage area, in a**

workshop in the spring or summer 2011 to identify opportunities to engage in a cooperative program whereby catch data can contribute to a fish monitoring program.

- 3) FORCE should investigate the value of reviewing existing weir data held by DFO, to determine if detailed analysis of this data could be undertaken to assist in assessing fish movements in the Minas Passage and adjacent areas.**
- 4) EMAC recommends that FORCE conduct a review of fish monitoring technologies and netting options, with an assessment of their suitability for use in the Minas Passage environment.**

Marine Mammals

Based on the results of the FORCE-funded passive acoustic monitoring (PAM) project (using C-PODs), conducted from August to November 2010, EMAC highly recommends continuation of the project for the detection of dolphins and porpoises. The 2011 monitoring program should ensure broad spatial coverage, inside and outside the FORCE Demonstration Area, and should run from April through November.

The vessel-based observer surveys of marine mammals conducted in 2010 were considered successful and should be continued in 2011, particularly from June through August. It is linked with the continuous passive acoustic monitoring project in that it acts as species confirmation of acoustically detected marine mammals. It also monitors seals which are not otherwise monitored. Note: FORCE has engaged a consultant to begin shore-based surveys of marine mammals in March, in association with shore-based seabird surveys.

Recommendations:

- 5) EMAC recommends that vessel-based observer surveys of marine mammals be conducted from June through August 2011 following the same sampling protocols as employed in the 2010 surveys. In addition, recordings of observations from vessels of opportunity should be encouraged.**
- 6) FORCE should support the continuation of marine mammal monitoring using continuously recording passive acoustic devices (e.g. C-PODs), with data collection during April to November, within and outside the FORCE Demonstration Area. As this is a high-cost project, opportunities for cost-sharing with other funding sources and/or agencies should be pursued.**

LOBSTERS

It is the opinion of EMAC that the lobster catch rate studies conducted in 2010 in the vicinity of the FORCE Demonstration Area should be continued as a high priority in 2011, although with some important changes. Experience has shown that, in spite of some trap retrieval challenges due to the extreme currents, sampling in the area is possible. To ensure statistical rigor in future work, we recommend a more robust “before-after-control-impact”

(BACI) sampling design, as proposed during an independent expert review of the existing datasets.

The new sampling design should allow for a testing of differences in catch rates before and after turbine deployments, near and far from the turbines and up/down current vs. cross current. The critical time period for study in 2011 is September when the catch rates are high and the fishery is not operating. FORCE might also consider a spring catch rate study, either in 2011 (if possible) or in 2012 prior to turbine deployment.

EMAC discussed the possible design of a lobster tagging study to better understand the movement patterns of lobsters through Minas Passage. A tagging study, however, would be high cost study and may be better suited as a research project.

Recommendations:

- 7) EMAC recommends that FORCE support a lobster catch rate study in the general area of the FORCE Demonstration Area using the proposed BACI sampling design. Sampling should be undertaken in September 2011, prior to the fall lobster fishing season.**

MARINE BIRDS

Shore- and vessel-based marine bird surveys were conducted in 2010 using standardized sampling procedures and data interpretation guidelines. It is recommended that similar surveys be conducted in 2011 with some slight changes: (i) focus more on deep diving birds since they would appear to be most at risk of direct interaction with the turbines and (ii) sample during March-April (spring migration) and in December (overwintering deep divers). Note: FORCE has engaged a consultant to begin shore-based surveys in March, in association with marine mammal surveys.

Recommendations:

- 8) EMAC recommends regular shore-based surveys of marine birds using sampling procedures similar to those employed in the 2010 monitoring program, with the addition of surveys during March-April to catch the spring migration, and in November to catch overwintering deep diving birds.**

(B) OTHER PROGRAMS

Fish Migration and Behaviour

An echo-sounder survey coupled with coincident netting in order to identify species and relative abundance has the potential to be an important monitoring component but has proven difficult and expensive to conduct. Studies in 2010 showed that the netting (mid-water trawl) part of the program could not confirm the identity of species comprising sonar indicated biomass. At the present time it is not possible to determine if the study can meet its objectives.

Although EMAC did not make a final decision concerning the value of this program, it was recommended that it be suspended until the Final Report for the 2010 surveys has been reviewed, at which time the value and need will be reassessed.

It was noted that while no trawl data are available for the months of April and May 2010, an important period for fish migration, echo-sounder survey data for April and May 2010 are available (collected by NS Power).

Recommendations:

- 9) EMAC recommends suspending the project involving coincident echo sounding and netting until a review of the Final Report from the 2010 surveys is available, at which time the value of and need will be reassessed.**

Benthic Habitat and Scour

There was consensus that sufficient information is available (still photos, video, side scan sonar and multibeam data) to better describe the benthic habitat and community and to attempt to develop a benthic classification for the general area of the FORCE Demonstration Area, in particular potential scour areas up to one kilometer up/down stream of the turbine berth sites. Although it is considered to be of medium priority, EMAC recommends this work be undertaken in 2011 if resources are available.

The study would involve a comprehensive review and synthesis of all available and relevant information with the objective of developing a classification system for benthic communities based on physical habitat, flora and fauna. For spatial analysis and mapping purposes, the data would need to be geo-referenced.

Recommendations:

- 10) EMAC recommends that, using all forms of existing information, a study be conducted to examine the nature and extent of various benthic communities within the FORCE Demonstration Area. The study should also identify areas and habitat features for which data are not available (i.e. gap analysis), and should include a review and evaluation of various methodologies used for assessing / classifying benthic communities.**

Acoustic Environment

Characterizing background “noise” in the Minas Passage is considered a high priority, and for this and other reasons, FORCE has already committed to addressing this issue under the FORCE Research Program (RFP released).

EMAC members did discuss some of the considerations necessary for properly characterizing the acoustic environment, including: (i) the need to identify and demonstrate

the appropriate instrumentation, (ii) accounting for the variation linked to tidal cycles, seasons and storm events and (iii) ensuring that the frequency range covered includes the frequencies of significance for marine mammals and fish.

Recommendations:

- 11) FORCE has released a RFP for baseline studies on the acoustic environment in Minas Passage. EMAC considers the proposed work to be sufficient for establishing baseline conditions for the EEMP.**

Conductivity and Temperature with Depth (CTD), Suspended Particulate Matter (SPM) and Currents

EMAC considered the need for, and feasibility of, attaching CTD and turbidity sensors to moored platforms. There was a consensus, however, that this is not currently warranted because sufficient CTD and SPM data are available from prior studies and because the water column in the Minas Passage is well mixed.

Test turbines in the FORCE Demonstration Area are unlikely to affect turbidity levels. But suspended sediments may have an impact on structures deployed. Any assessment of the potential impact of suspended sediments on underwater infrastructure would need to be undertaken by a berth holder.

It was noted that FORCE will undertake detailed current velocity and turbulence assessments in the FORCE berth sites in 2011, based on data gaps and recommendations from discipline experts.

Recommendations:

- 12) Sufficient CTD and SPM data are available from prior monitoring and other sources. A specific program to monitor CTD and SPM during 2011 is not required for the EEMP.**
- 13) Monitoring of the currents in the FORCE Demonstration Area will be conducted under a FORCE research program. Any additional monitoring of currents is not needed for the EEMP.**