

Environmental Monitoring Advisory Committee (EMAC)

EMAC's Recommendations on the FORCE Environmental Effects Monitoring Program (EEMP) for the Tidal Energy Demonstration Project

April 2010

Introduction

The Environmental Monitoring and Advisory Committee (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 presents unique challenges for environmental monitoring and that an "adaptive management" approach should be utilized for ongoing advice in regard to environmental effects monitoring.

This task has required a significant effort by EMAC members, including reviews of the EA Registration Document and associated appendices, and monitoring studies completed since the submission of the Environmental Assessment (EA) document, discussions with consultants and research scientists, and a preliminary review of new information related to environmental monitoring methodologies and technologies.

The focus for these initial recommendations relate to EEM in the marine environment, particularly as it relates to fish and marine mammals. It is noted that there are limited proven monitoring options for fish and marine mammals in high current environments like that of the Minas Passage. In contrast, the physical parameters are better understood and use standard monitoring technologies. The comments and recommendations provided here follow the first turbine deployment (Nova Scotia Power Inc) in the Crown Lease Demonstration Area in the Minas Passage (November 12, 2009). They are intended to provide direction on changes to optimize the Environmental Effects Monitoring Program (EEMP) to be implemented in 2010.

General Observations

During EMAC deliberations, the following general observations were made:

- The main function of the Environmental Effects Monitoring Program (EEMP) is to verify the assumptions and predictions in the Environmental Assessment Registration Document. However, the EA predictions are generally too qualitative in nature. The proposed EEM programs need clearly defined and quantitative objectives.
- There was general agreement that the top priority for review and advice to FORCE relates to fish movement through Minas Passage and the detection of turbine avoidance and fish / device contact (i.e. strikes). The potential for impacts on marine mammals was the next priority.

- For some aspects of the EEMP (e.g. benthic surveys), FORCE should focus on the analysis and interpretation of the existing data (surveys in 2009) prior to conducting more surveys of the same type. Further examination of existing data will better inform decisions regarding proposals for the next phases of development.
- Field studies that require boat/vessel time should be coordinated to optimize use of funding and to enhance collaboration and communication between FORCE subcontractors, DFO scientists, researchers, fishers and others.
- Local fishers' knowledge of fish movement and migration should be sought via the existing Fishers Contact Committee and/or smaller specific groups such as weir fishers. The Mi'kmaq of Nova Scotia should also be consulted.
- To allow for repeatability in data collection and comparison over the duration of the project, monitoring protocols, once established, should not be changed unless necessary.
- The EEMP will generate considerable amounts of data on an ongoing basis. Data management will be critical to ensure the integrity of the information and accessibility by regulators and other interested parties.

Comments and Recommendations for 2010

Fish Migration and Behaviour

While fish are currently the highest priority for EEM, monitoring of fish in the Passage presents numerous challenges. The monitoring program needs to adopt sampling methods and technology that are suitable for high flow, macro-tidal environments and should involve input from local fishers, including weir fishers, and the Mi'kmaq of NS who have a long-standing relationship with the Bay of Fundy. New fish monitoring technologies are currently being investigated and tested (e.g. 3-dimensional multibeam sonar). Other approaches could include fish finding sonar surveys coupled with netting to identify species. It was noted that a fish tagging and acoustic tracking research project is currently underway in the Passage and that FORCE has an opportunity to contribute to research undertaken in this project.

Recommendations:

- 1) Proceed with echo-sounder surveys to identify fish biomass, coupled with netting experiments to identify fish species. Surveys should be conducted when common species are known or expected to be present in the Minas Passage.**
- 2) Conduct a review of fish movements and migration in the Minas Channel/Passage and Minas Basin using published literature and advice from fisheries experts, local fishers and the Mi'kmaq of Nova Scotia.**
- 3) Engage local weir fishers and community groups in a cooperative monitoring program, where feasible.**

- 4) **Conduct a review of fish monitoring technologies and netting options, with an assessment of their suitability for use in the Minas Passage (as a means of identifying fish species and their “condition”, both upstream and downstream of operating turbines).**
- 5) **Host (or co-host) a 1-day workshop focused on technologies and sampling methods that have potential for use in monitoring fish and marine mammals in the Minas Passage (e.g. hydro-acoustics, netting).**
- 6) **Enhance the acoustic fish tracking research program currently underway by providing additional project support (e.g. acoustic tags, vessel time). This will allow a larger number of fish to be tracked as they move in and through the Minas Passage and Channel.**
- 7) **Conduct shore-based observations of seabirds in and near the demonstration area as a potential indicator of the presence of fish (especially fish schools) and fish strikes / mortality (see Marine Birds). The Community Liaison Committee should be involved in discussions of any shore-based monitoring.**

Marine Mammals

Marine mammals are known to be more common in the outer Bay of Fundy than in the Minas Passage and inner Bay. July and August are the months during which marine mammals (largely porpoises and seals) are most likely to be observed in the Minas Passage. A survey of available information reveals low numbers of marine mammal strandings and mortalities in Minas Channel, Passage and Basin. Although their abundance is not high, an assessment of marine mammal use of the Minas Passage and potential risk of interaction with in-stream turbines should be addressed.

Recommendations:

- 1) **Undertake observer surveys of marine mammals from vessels in the July/August period and opportunistic surveys from vessels during other times.**
- 2) **Conduct shore-based surveys of marine mammals in and near the demonstration area.**
- 3) **Seek direction on survey protocols from the DFO Mammal Division.**
- 4) **Deploy Passive Acoustic Monitoring devices (e.g. C-POD) for the detection and identification of marine mammals in the turbine demonstration area and at a reference location.**

Lobsters

Lobster catch rate studies in 2009 confirmed an abundance of lobsters in the Minas Passage. While this area may be important for lobster movement, deployment of a few turbines in the Passage is unlikely to affect lobster migration. If turbine arrays are later approved for deployment in the demonstration area, FORCE should consider conducting a well designed lobster tagging study to track lobster movements and use of the Minas Passage area.

Recommendation:

- 1) **Continue the lobster catch rate studies, with a study in Spring 2010 (May/June) using 2 traps per line (where safe to do so) and one reference site; evaluate results, and if required for an adequate record of seasonal abundance, undertake a Fall 2010 survey.**

Marine Birds

Diving birds, which could be impacted by turbines (i.e. strikes), are generally found in low abundance in the Minas Passage. Gulls, however, are more common and may be a potential indicator of fish mortality at and near the turbine site. Regular shore-based monitoring of marine birds is likely to provide useful information to supplement vessel surveys.

Recommendations:

- 1) **Conduct regular shore-based surveys of seabirds, commencing in spring, and opportunistic collection of data on seabirds when boat charter work is conducted in the Minas Passage.**
- 2) **Consult with the Canadian Wildlife Service regarding seabird survey protocols and training.**
- 3) **Engage, where possible, local community groups or members to assist with shore-based seabird monitoring.**

Benthic Habitat and Scour

There are now significant numbers of photos of the bottom of the Minas Passage (>2000). These, coupled with information on the physical conditions of the bottom, provide a base of information for more detailed analysis of the benthic environment. For examination of bottom scour due to turbine infrastructure, side scan sonar is the preferred method; video footage and photographs near the turbine infrastructure will be more difficult to obtain. For turbine arrays, benthic surveys will need to be much broader in scope and include surveys over defined distances upstream and downstream of the turbines.

Recommendations:

- 1) **Conduct an evaluation of the benefits and limitations of methodologies used for assessing bottom conditions.**
- 2) **Use side-scan sonar to detect the direct impact of the turbine and gravity base (i.e. scour at feet and around base) following the removal of the NSPI (OpenHydro) demonstration unit.**

- 3) Undertake a description and classification of the benthic communities in the Passage using the existing set of photographic records of the bottom and information from side scan sonar and/or multi-beam surveys.**

Acoustic Environment

A report on the analysis of the 2009 preliminary acoustic surveys (background noise and noise after deployment), which used a passive hydrophone technique, is forthcoming. Other passive hydrophone techniques and fixed bottom hydrophones and “drifting ear” methodology are available and should be considered for use.

Recommendation:

- 1) Complete data analysis of existing acoustic survey data as soon as possible.**
- 2) FORCE should investigate, in cooperation with NSPI, the use of passive and fixed hydrophone techniques for acoustic monitoring at the Reference site and the site of turbine deployment.**

Currents and Waves; Conductivity and Temperature (CTD); Suspended Particulate Matter (SPM)

To date, FORCE and DFO have collected Acoustic Doppler Current Profiler (ADCP) data from numerous sites and times in the Passage and Minas Basin. Suspended sediment and conductivity / temperature with depth data are also available from surveys conducted in 2009.

Recommendations:

- 1) Consult with DFO scientists regarding information gaps, if any, and ADCP/wave data collection and processing needs prior to undertaking additional surveys in 2010.**
- 2) Investigate the feasibility of attaching a CTD with a turbidity sensor to deployed platforms, and where possible conduct additional CTD profiles and suspended sediment sample collections during scheduled day trips to the Passage (i.e. opportunistic data / sample collection).**