

BACKGROUND: FORCE ENVIRONMENTAL EFFECTS MONITORING PROGRAM

FORCE is Canada's leading research centre for the demonstration and evaluation of "in-stream" tidal turbines. Fundamental to FORCE's mandate is an environmental effects monitoring program (EEMP) to determine any effects from tidal turbines at the FORCE site.

As turbine deployments are expected over the next few years, FORCE and regulators will have opportunity to adapt environmental monitoring approaches over time, both to better understand what effects turbines may have on the environment, and to report on the monitoring results and any identified effects to the public.

Environmental monitoring has been ongoing at FORCE:

- In 2007, studies began as part of FORCE's Environmental Assessment (EA) approval. These documents are posted here: <http://fundyforce.ca/environment/environmental-assesment/>
- In 2009, federal and provincial governments granted EA approval with the condition that an EEMP program be in place
- From 2009 to 2013, FORCE completed 20 monitoring studies, including fish characterization, seabirds, marine mammals, lobster tracking, marine noise, benthic habitat, electromagnetic fields, and more. These studies are posted here: <http://fundyforce.ca/environment/monitoring/>

A turbine was operational at the FORCE site between 2009 and 2010. Since its removal, no tidal turbines have been present at the FORCE site. So studies conducted between 2009 and 2015 have largely focused on the collection of background data, rather than turbine monitoring. This situation will change with the planned deployment of two cable-connected turbines in 2016 followed by additional deployments in subsequent years.

FORCE's new EEMP was developed in consultation with SLR Consulting (Canada), provincial and federal regulators, and FORCE's environmental monitoring advisory committee (EMAC) - which includes representatives from scientific, government, fishing, and First Nations communities. The EEMP is designed to:

- monitor the environmental effects of operating turbines
- focus on five subject areas: lobsters, fish, marine mammals, marine seabirds and marine noise
- cover initial turbine deployments over the time period 2016 – 2021
- accommodate unforeseen changes in turbine deployment schedules
- be modified to adapt to initial monitoring results and input from regulators and EMAC

Within the FORCE site, each developer has a dedicated berth about 200 m in diameter, designed to accommodate their tidal turbine. The berth holder in turn will deploy, operate and test their turbine technologies, which will be connected to the electrical grid through dedicated subsea cables. Berth holders are responsible for monitoring “near field” effects within a 100 m radius of their turbines; FORCE is responsible for monitoring “mid field” effects outside of this zone within the FORCE site. FORCE will:

- report results from both the FORCE and berth holder EEMPs to regulators
- make EEMP reports available to the public online:
<http://fundyforce.ca/environment/monitoring/>

Accompanying the release of the EEMP, FORCE issued requests for proposals to conduct monitoring studies related to:

- marine fish
- marine mammal data analysis
- lobster catchability
- marine seabirds

Tenders for these monitoring studies can be accessed here:

fundyforce.ca/media-center/opportunities/

SPECIFIC EEMP STUDY AREAS:

Fish monitoring is designed to measure fish distributional changes that reflect behavioural responses to the presence of turbines. The program uses down-looking hydroacoustic monitoring techniques, analyzes fish vertical distributions, and provides an encounter probability model (to compare fish distribution with the dimensions and locations of turbines).

Marine mammal monitoring is designed to detect permanent avoidance and changes in the distribution of the Harbour porpoise, which is the only marine mammal that has been observed to consistently utilize the FORCE site. The program consists of deploying C-POD hydrophones, which listen for mammal “clicks.”

Lobster monitoring is designed to answer the question: “does the presence of the turbine affect the number of lobster entering the traps?” The program uses commercial lobster traps and compares catch volumes within the turbine area (where turbine effects may occur) to control areas (where no turbine-related effects are anticipated).

Marine noise monitoring compares noise levels between turbines and ambient noise, and predicts effects on marine biota.

Seabird monitoring is designed to obtain site-specific species abundance and behaviour data, which can be used to establish whether the installation and operation of turbines displaces seabirds from habitual waters, and to identify any changes in behaviour.

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