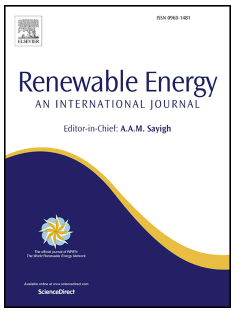
Accepted Manuscript



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PII: S0960-1481(16)30889-8

DOI: 10.1016/j.renene.2016.10.024

Reference: RENE 8212

To appear in: *Renewable Energy*

Received Date: 23 February 2016

Revised Date: 12 September 2016

Accepted Date: 13 October 2016

Please cite this article as: O'Donncha F, James SC, Ragnoli E, Modelling study of the effects of suspended aquaculture installations on tidal stream generation in Cobscook Bay, *Renewable Energy* (2016), doi: 10.1016/j.renene.2016.10.024.

Modelling Study of the Effects of Suspended Aquaculture Installations on Tidal Stream Generation in Cobscook Bay

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Abstract

Recent endeavours have focused on the possibility of developing multi-use marine areas that integrate aquaculture with marine renewable energy device deployment. This work investigates both the individual and the combined impacts of suspended long-line mussel farms (canopies) and tidal stream devices. An amended version of an existing three-dimensional hydro-environmental code was used to describe the effects of both the aquaculture canopies and the tidal energy devices. The model was applied to a designated tidal energy test site on the East Coast of the United States, Cobscook Bay, ME. The quantifiable energy production capacity of the tidal stream devices with and without suspended canopies was considered. The effects of both types of structures on hydrodynamics and solute transport were analysed including flushing studies to quantify renewal timescales in the bay. Results demonstrate potential to optimise energy generation by combining turbine arrays with suspended aquaculture canopies. Combining MHK and aquaculture installations did not significantly impact the physical environment beyond the effects of the aquaculture canopies alone. Moreover, the potential energy production capacity was increased by up to 19% due to flow diversion and acceleration induced by the aquaculture canopies.

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