# Navigation Impacts due to Offshore Wind Developments: Modelling of Collision and Allision Incident Frequencies

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During the regulatory process for offshore wind developments in the United States a Navigation Safety Risk Assessment (NSRA) is needed by the United States Coast Guard. In support of the NSRA requirements, Baird has developed its own proprietary in-house modelling suite based on published theory called the Navigational and Operational Risk Model (NORM). NORM can assess and quantify navigational risk for both defined and open-water waterway conditions, with the latter being important for understanding actively fishing vessel risk. NORM can calculate navigational risk in both conditions and is geared towards quantifying the change in risk due to potential installations, or changes in waterway conditions. NORM can calculate the occurrence frequency of head-on collisions, overtaking collisions, crossing collisions, powered allisions, and drifting allisions. These calculations can be performed for intra-class, inter-class, and overall traffic risk analyses.

The NORM model simulates post construction scenarios using an Agent-Based Model (ABM) in which vessels are represented as autonomous “agents” that dynamically interact with other vessels and fixed structures such as wind turbine generators. Vessel movements are generated within the model based on the spatial and temporal variability of AIS data using a Monte-Carlo probabilistic approach. Potential vessel collisions and allisions are computed from the model results. The NORM ABM approach has been validated against well-established statistical approaches documented in technical literature.

This presentation will demonstrate the range of NORM functionality, including the spatial incident frequency maps and the ability to model the impact of several adjacent lease areas. In addition, we will discuss lessons learned, next steps, and the future of navigation incident frequency modelling to better understand active fishing vessel impacts. The goal is to develop a greater understanding of the navigational risk associated with offshore wind developments in Nova Scotia, which will be important for improved ocean user co-existence and safety.