

**ENV Report 4 - *Prediction of Vessel-Generated Waves with Reference to Vessels Common to the Upper Mississippi River System*** by Robert M. Sorensen

**ABSTRACT**

The waves generated by a moving vessel can disturb other vessels in navigation channels and marinas, damage shoreline structures, and cause the erosion of unprotected riverbanks. The erosion of unprotected riverbanks is of particular importance on the Upper Mississippi River System (UMRS). In this connection, there is a need to be able to predict the characteristics of the free waves generated by a given class of vessel and mode of operation. These characteristics include the wave period and direction of propagation, but most importantly the wave height. The wave period and direction of propagation can be predicted analytically for a given speed and water depth of the vessel; however, the wave height depends on additional factors including the hull form and operating draft of the vessel, the distance from the sailing line, and possibly the cross-section geometry of the channel. Nine models, all having a strong empirical base for predicting the generated wave height, were identified and evaluated based on the vessels common to the UMRS. Most of the models are restricted in some way, such as being applicable only to certain vessel types or to limited channel conditions. The three models having possible application to the UMRS were evaluated for their specific applicability and available field measurements of vessel wave height. This model evaluation produced limited results that can be significantly improved by comparison with additional field data. The final section of this report includes an annotated bibliography on the available and pertinent literature on vessel-generated waves.