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Project: Estuarine Water Quality Study,
Hydrodynamic Modeling of Back
River and Eel Pond, Bourne,
Massachusetts

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An hydrodynamic study was performed for the Back River system, which is located within the town of Bourne, Massachusetts, in the northern reaches of Buzzards Bay. The Back River system has two major subdivisions, Back River and Eel Pond. Back River is a tidal river that connects Phinneys Harbor to a moderately shallow embayment with approximately 70 acres of salt marsh. The total surface coverage of the Back River system, including the salt marsh is approximately 150 acres. Circulation in the Back River system is dominated by tidal exchange with Buzzards Bay.

A numerical hydrodynamic model of the Back River system was developed for this study. Using bathymetry survey data collected specifically for this study, a model grid mesh was generated for use with the RMA-2 hydrodynamic code. Tide data collected at Phinneys Harbor were used to define the open boundary condition that drives the circulation of the model, and data from two locations within the system were used to calibrate and verify model performance to ensure that it accurately represents the dynamics of the real, physical system.

The calibrated computer model of the Back River system was used to compute the flushing rates of each of the sub-embayments of the system. Though water quality in an embayment cannot be directly inferred by use of the computed flushing rate alone, it can serve as a useful indicator of an embayments flushing performance relative to others in the system. The ultimate utility of this hydrodynamic model is as input into a constituent transport model, where water quality constituents like nitrogen are modeled to determine the real water quality dynamics of a system.

