1107-92-112   **Yu Jin*** (`yjin6@unl.edu`), Department of Mathematics, University of Nebraska-Lincoln, Lincoln, NE 68588, and **Frank Hilker**, **Mark A. Lewis** and **Peter Steffler**. *Seasonal Invasion Dynamics in a Spatially Heterogeneous River with Fluctuating Flows.*

A key problem in environmental flow assessment is the explicit linking of the flow regime with ecological dynamics. We present a hybrid modeling approach to couple hydrodynamic and biological processes, focusing on the combined impact of spatial heterogeneity and temporal variability on population dynamics. We derive the water depth and current from a hydrodynamic equation for variable stream bed water flows and substitute these quantities into a reaction-diffusion-advection model that governs population dynamics of a river species. We then establish the existence of spreading speeds and the invasion ratchet phenomenon for periodically alternating pool-riffle rivers that are subjected to seasonally varying flows, using a mixture of mathematical approximations and numerical computations. (Received January 08, 2015)