Lagrangian Drifts in the Tide and Wind-Driven Dyes Inlet, WA*

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ABSTRACT

Dyes Inlet, a sub-estuary of the Puget Sound estuarine system, is located in the region of (-122^0 43', 47^0 39') and (-122^0 38', 47^0 34'), north of City of Bremerton. The Inlet connects to Sinclair Inlet to the south through the Washington Narrow. Pacific Ocean tides enter through the mouth of the Puget Sound and propagate to both Inlets from Brownsville, to the north and Clam Bay, to the South. Hydrodynamics in Dyes Inlet are complicated, encompassing multiple, yet unique, hydrodynamic phenomena. These observed phenomena include jet plumes, local vortices, wind-driven and tide-driven circulations. To understand and quantify transport in Dyes Inlet, four drogue release studies were conducted. For each study, surface drogues were released during flood tides. Each drogue has a Global Positioning System (GPS) device onboard. After the drogues were retrieved within 1-6 hours, the GPS data were downloaded to a PC and the trajectories of the drogues were obtained. Trajectory data were compared with the predicted results from the 3-D hydrodynamic model, CH3D. Local winds and tides were included in analysis and their effects on the drogue drifts were quantified. Results of the drogue study are used to study fate and transport of fecal coliforms, discharged from about 12 CSOs (Combined Sewage Overflows) in the Washington Narrow. The study shows that a combination of field data, including ADCP data and drogue trajectory data, and the calibrated 3-D hydrodynamic transport model, CH3D, provides accurate and effective predictions of fecal coliform evolutions in Dyes Inlet.

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