Advances in the miniaturization of microelectronics has contributed to the proliferation of small, low cost autonomous underwater vehicles (AUVs). The small size and low entry cost come with a tradeoff of simple navigation systems, typically dead reckoning (DR) using speed determined via propeller counts and heading from a low cost micro-electromechanical system (MEMS) inertial measurement unit (IMU), whose error grows unbounded without an external fix source and is compounded by the bias in the speed measurement due to the change in hydrodynamics from the factory condition. Additionally, capabilities such as water current velocity measurement requires equipment that is not only expensive, but also whose size and power consumption can affect operating characteristics. This thesis expands on research using one-way travel time inverted USBL (OWTT-iUSBL) to calculate current velocity without a Doppler velocity log (DVL) or acoustic Doppler current profiler (ADCP). An extended Kalman filter (EKF) is proposed that, in addition to calculating the current velocity, estimates and corrects for the bias in the speed measurement. Using data collected at the Massachusetts Institute of Technology (MIT) Sailing Pavilion, it is shown that current velocities can be reasonably calculated using OWTT-iUSBL data as compared to calculations using long baseline (LBL) data.