

Modeling Hydrology of the Weeks Bay Watershed

The objective of this study is to evaluate hydrology processes on the Weeks Bay watershed using the U.S. Environmental Protection Agency Hydrological Simulation Program – FORTRAN (HSPF). The HSPF model is a conceptual water quantity and water quality watershed model. The HSPF hydrology module simulates hydrologic process (interception, infiltration, soil moisture, runoff, interflow, baseflow, and deep percolation) using a water balance scheme. Flow routing through the channels is calculated by using the kinematic wave technique. Physical characteristics of the channels are represented using an empirical table relating depth, area, volume, and flow. The HSPF hydrology module has been evaluated around the world since 1960's. The study area is located in the Baldwin County, Alabama and covers around 513 km² of land surface. The watershed is primarily agricultural (47%) followed by forest land (18%), wetlands (14%) and developed areas (10%). Two main branches reach the Weeks Bay, Fish and Magnolia Rivers. Only 36% of the watershed area is gauged by the U.S. Geological Survey (USGS). Input precipitation and potential evapotranspiration time series were set up from 1999 to 2006. Analyzing several National Oceanic & Atmospheric Administration rainfall stations located in the surrounding study area annual mean precipitation is around 1,623 mm. From literature review was found that the annual water balance in the study area is yielded by 60% actual evapotranspiration, 34% runoff, and 6% deep percolation. Simulated daily streamflow was evaluated against USGS 02378500 Fish River and 02378300 Magnolia River. Manual (HSPF flow calibration tutorial) and parameter estimator techniques were used in order to optimize selected HSPF parameters. Preliminary simulated results show reasonable annual water balance values for both sub-watersheds. In addition, results show better hydrology performance of the Fish River sub-watershed simulation than the Magnolia River sub-watershed results. Further model hydrology evaluation (calibration and validation) is required.

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