SEDIMENT CHARACTERISTICS AND SEDIMENT TRANSPORT MODELING FOR THE SAGINAW RIVER NAVIGATION CHANNEL

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The Saginaw River is a 22.4-mile-long (36.0 km)[2] river located in mid-Michigan and is formed by the confluence of the Tittabawassee and Shiawassee rivers southwest of Saginaw. It flows northward into the Saginaw Bay of Lake Huron. The watershed area is 6,132 square miles (15,881 km^2) and contains 315 dams. The Saginaw River is an important shipping route for mid-Michigan, passing through the cities of Saginaw and Bay City and is one of Michigan's few inland navigable rivers. To maintain the depth of the navigation channels, the Saginaw River is subject to frequent dredging. Since 1963, the Saginaw River navigation channel has been dredged 81times. A total of 22,967,252 cubic yards of sediment were removed at a cost of $65,721,086.

Prior to removal of sediment, the dredged material is subject to a pre-dredge sediment quality assessment. Since 1967, 15 sediment quality assessments have been conducted by the U.S. Army Corps of Engineers; these sediment samples were collected and tested for a variety of physical and chemical characteristics. In this paper, the sediment quality of the Upper and Lower Saginaw River, as well as Saginaw Bay are presented and discussed in conjunction with sediment transport model assumptions.

In addition, an overview of the extensive sediment transport modeling that has been conducted by the U.S. Army Corps of Engineers is discussed in relationship to the total sediment load that is transported from the Saginaw River to Saginaw Bay. These USACE studies have determined that the total sediment load from the Saginaw River to Saginaw Bay ranges from 238,099 to 280,525 tons/year. Sediment flux to the Saginaw Bay was also estimated using the BQART equation that was developed by Syvitski and Milliman (2007). Using the BQART equation, the total sediment load for the Saginaw River was calculated to be 298,724 tons/year at a mean flow (8,320 cubic feet per second) and is similar to the estimates developed by the USACE. Lastly, during the preparation of this paper, it is apparent that the GIS resources that have been developed the MDEQ and State of Michigan can potentially be used to develop a new equation that can be used for smaller streams (<30 m^3/sec) that dominate the Great Lakes region. These areas of further research are presented in this paper.