ENV Report 29 - ***Abundance of Fishes in the Navigation Channels of the Mississippi and Illinois Rivers and Entrainment Mortality of Adult Fish Caused by Towboats*** by Steve Gutreuter, John M. Dettmers and David H. Wahl

ABSTRACT

This study quantified the abundance and composition of larval fishes in the navigation channel, as well as side channel and backwater areas, for the purpose of providing these data for input into models of losses of adult-fish equivalents, production foregone, and recruitment foregone. We also have developed methods to estimate abundance and entrainment mortality of juvenile and adult fishes in navigation channels of large rivers. Our estimates of the abundance of all life stages of fish suggest that substantial year-to-year variability in timing of appearance in the navigation channel and in density of fishes does occur, but the duration of the current study was not sufficient to determine to what extent this variability might affect entrainment mortality rates. Gizzard shad was the only species observed freshly killed in our specialized entrainment sampling behind towboats. We estimate that 9.5 adult gizzard shad are killed or seriously injured, on average, per km of travel by each towboat, with an 80% confidence interval of 3.8-22.8 fish/km. observed additional freshly killed adult gizzard shad, shovelnose sturgeon, and smallmouth buffalo in our ambient abundance samples. We developed a statistical method to estimate entrainment mortality rates of adult shovelnose sturgeon and smallmouth buffalo from the combined entrainment and ambient samples. These ancillary entrainment mortality estimates or shovelnose sturgeon and smallmouth buffalo are each 2.4 adult fish/km of tow travel, with 80% confidence intervals of O-6.0 fish/km of tow travel. Because the confidence intervals for shovelnose sturgeon and smallmouth buffalo include zero, we believe that it is reasonable to conclude only that entrainment mortality cannot be disregarded as an important component of their dynamics in the navigation channels of the Upper Mississippi River System. The freshly wounded fish from which all these estimates were obtained were all observed during fall and early winter, suggesting a substantial seasonal effect that cannot be confirmed because the study included only one fall-winter sampling period. This work has provided a much clearer picture of the fish assemblage that uses the navigation channel and has successfully generated the first estimates of entrainment mortality inflicted by towboats. However, substantial uncertainty remains, suggesting the need for additional refinement as river managers seek to determine the potential impacts of commercial navigation on fishes within the navigation