

**ENV Report 35 - Mortality of fish early life stages resulting from hull shear associated with passage of commercial navigation traffic** by Thomas Keevin.

Mortality of fish early life stages was measured in a Couette cell to simulate fluid shear stress resulting from passage of a barge hull in the water column. Mortality was measured for three shear stress levels at three exposure times for five fish species: larval shovelnose sturgeon *Scaphirhynchus platorynchus*, larval bigmouth buffalo *Ictiobus cyprinellus*, larval blue catfish *Ictalurus furcatus*, juvenile bluegill *Lepomis macrochirus*, and juvenile largemouth bass *Micropterus salmoides*.

Mortality values were compared with calculated barge hull shear stress levels to determine the potential for mortality of fish early life stages in relation to commercial navigation traffic. There was no significant mortality of shovelnose sturgeon, blue catfish, bluegill, and largemouth bass at shear stress levels produced by barges in the upper Mississippi River. However, the hull of a high-speed tow (4.0m/sed) with a 1.22-depth/draft ration will produce a shear stress or 250 dynes/cm<sup>2</sup> in 5 percent of the zone beneath the tow. This is the only area in the water column where hull shear stress values approach levels causing significant (P<0.05) mortality of bigmouth buffalo larvae. Therefore, it is unlikely that barge hull shear stress will result in substantial mortality of larval and juvenile fishes.