

---

**Mud breeds mud: the non-linear effect of high sediment concentrations on channel infill downstream of causeways**

---

T.G. MILLIGAN, G. BUGDEN, AND B.A. LAW

*Fisheries and Oceans Canada, Bedford Institute of Oceanography,  
PO Box 1006, Dartmouth, NS, B2Y 4A2*

Understanding of the importance of fine-grained high-concentration sediment suspensions (fluid mud) in coastal and shelf sedimentary processes has improved over the past two decades. The formation of fluid mud can lead to the unexpected accumulations of fine sediment in energetic environments because of the ability of the fluid mud to suppress turbulence. Formation of fluid-mud layers and subsequent transport via gravity flows has been shown to be a key process in delivering sediment to depositional areas on the Amazon and Eel River shelves as well as to areas of accumulation on the Po River delta. Work carried out at these locations suggests that density stabilization by fluid mud at Richardson numbers near  $\frac{1}{4}$  plays a crucial role.

Construction of causeways in the late 1960s in the Upper Bay of Fundy resulted in the deposition of sediment which decreased the downstream cross-sectional areas of the chan-

nels by as much as 90%. While some infill of the channels was expected, the extent of the infill and, in the Peticodiac at least, the continuing rapid channel infill was not. The cross-sectional area of the Peticodiac River at Dover NB, more than 20 km downstream of the causeway, is still decreasing today. Underestimating the effect of high concentrations of mud on turbulence is the most likely reason that engineers failed to predict the extent of sediment infill at both Moncton NB and Windsor NS following causeway construction.