Examples of Sediment Transport Issues for Texas Senate Bill 3

Franklin T. Heitmuller

November 2008
Historical Suspended-Sediment Load

- Historical suspended-sediment load data are available in various TWDB (and predecessor agencies) reports until the 1980s

08211000 Nueces River near Mathis, Texas

- Closure of Wesley E. Seale Dam in 1958
Historical Suspended-Sediment Load

- Only considering high-flow events since 1964

08211000 Nueces River near Mathis, Texas

![Graph showing the relationship between event mean streamflow and event mean suspended sediment load.](chart.png)
Historical Suspended-Sediment Load

08210000 Nueces River near Three Rivers, Texas
08211000 Nueces River near Mathis, Texas

Annual suspended sediment load, in tons

Hydrologic year (October to September)
SSC Nueces River near Three Rivers, TX - October 1946 floods

Suspended-sediment concentration hysteresis loops
Suspended-Load Monitoring

• Suspended-sediment load monitoring ($25–$30k/year)
  – Includes periodic sampling and lab fees

• Equipment
  – DH-95 (rigid bottle; 15 feet max)
  – DH-2 (1-liter bag; 37 feet max)

From Davis (2005)
Bedload Monitoring

• Sand-bed streams
  – Notoriously difficult to accurately measure
    • Rising limb / falling limb scour and fill processes
    • Antecedent conditions (1\textsuperscript{st} flood OR 3\textsuperscript{rd} of 3)
  – Recommended to only measure a couple of times per year to verify/calibrate bedload equation (e.g., Einstein model)

• Equipment
  – BMH-60 (bed material composition)
  – BL-84 (bedload)

From Davis (2005)
Bedload Models

• Provide estimates of bedload transport that can be verified or calibrated by field measurements

• Refer to Gomez and Church (1987), Stevens and Yang (1989), and Robert (2003)

• The Einstein model has been recommended by a colleague (Dennis Evans, personal communication, 2008) for sand-bed streams
  – Requires bed-material particle size, channel slope, and water temperature for computation
Sediment Relation to Channel and Habitat

- Changes in sediment-load and streamflow dynamics result in changes to physical channel conditions and hydraulics over time.

08116650 Brazos River near Rosharon, Texas

From Heitmuller and Greene (in review)

1967-1976
References


