Upstream River Impacts due to Reservoir Sedimentation

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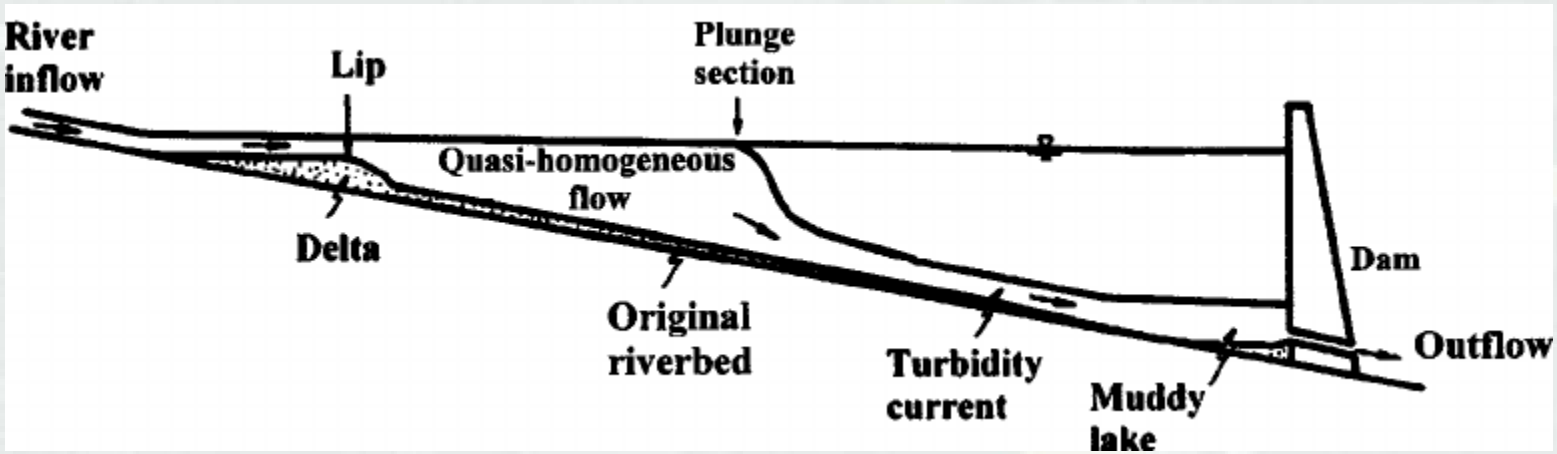
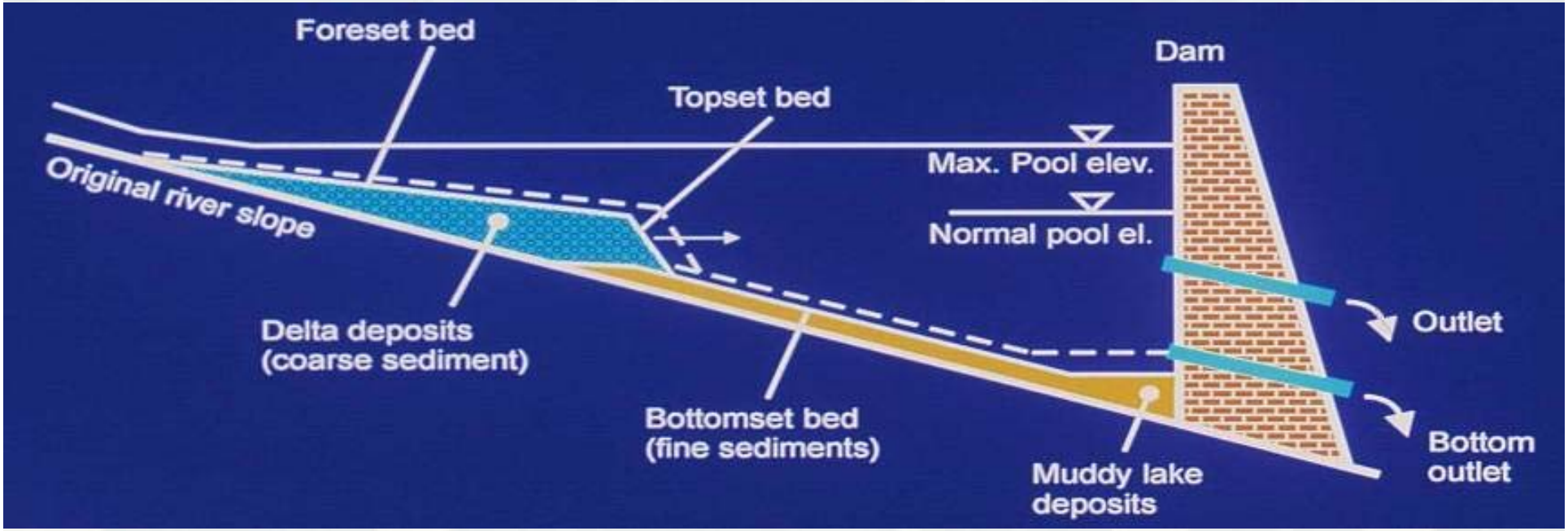
ERDC
Engineer Research and Development Center

What Happens to the River above a Reservoir?

- Sediment deposition due to the reduced flow velocity at the mouth of a reservoir causes sediment deposition and the growth of a delta in downstream and upstream directions
- The typical reservoir delta diagram does not show this process




Foreset bed
Topset bed
Dam
Max. Pool elev.
Normal pool el.
Original river slope
Outlet
Delta deposits
(coarse sediment)
Bottomset bed
(fine sediments)
Bottom
outlet
Muddy lake
deposits

Some reservoir diagrams DO show upstream aggradation

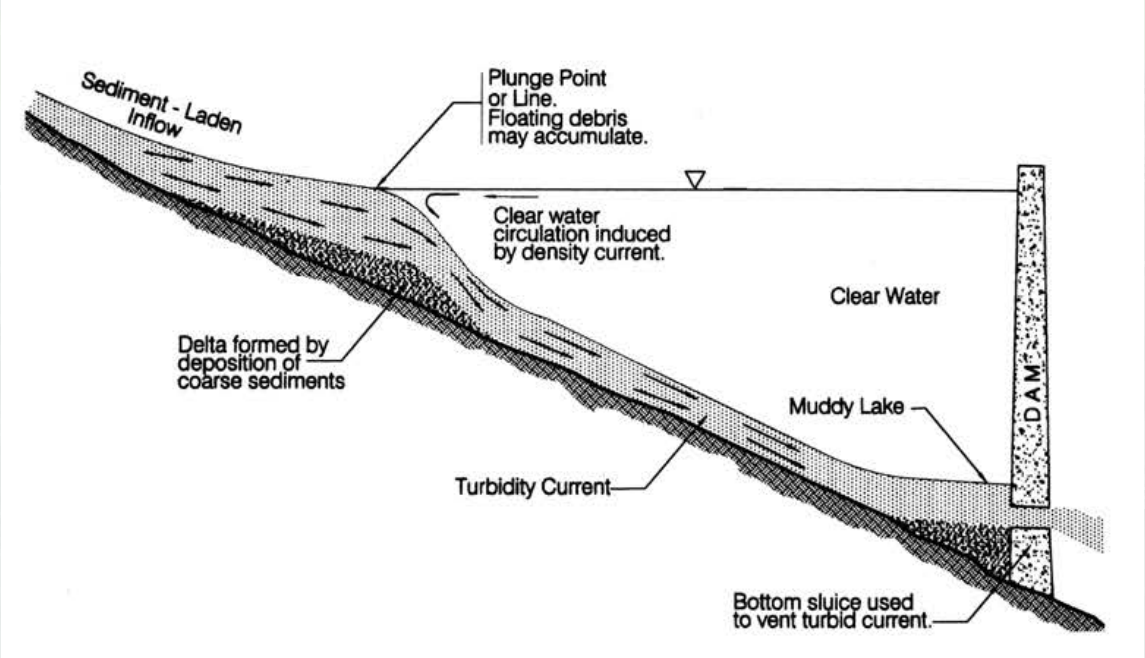
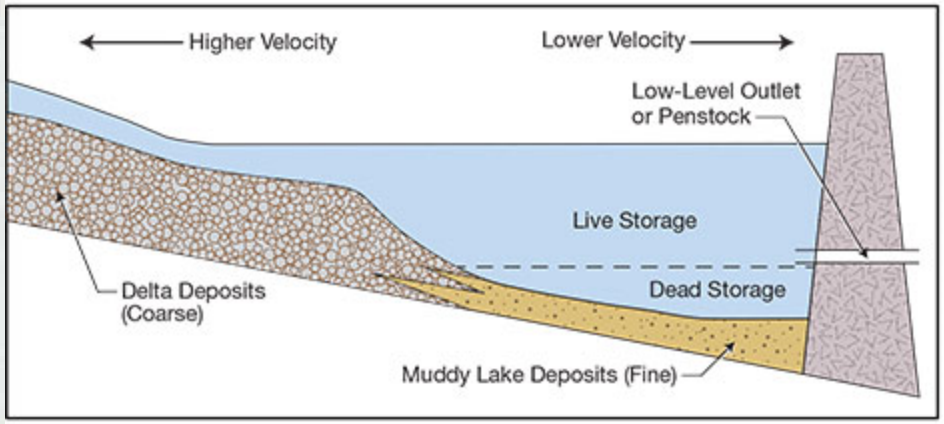


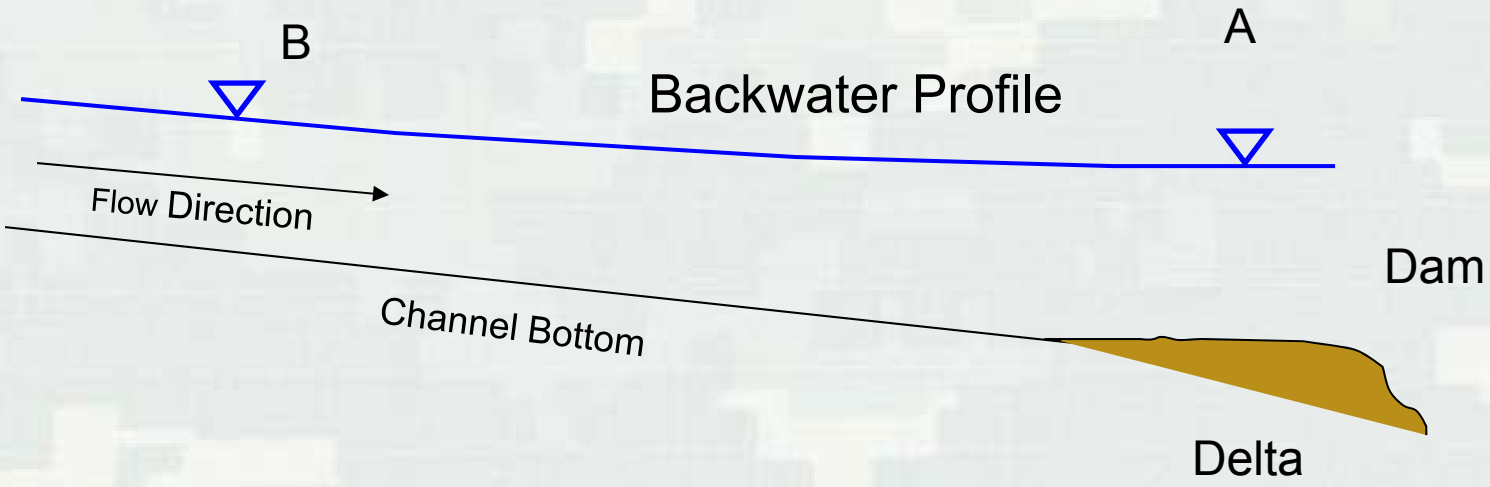
Figure 1 — Typical Reservoir Sediment Profile*



Typically, sedimentation in the reservoir behind a dam takes the form of progressively finer materials being deposited as the flows approach the dam.

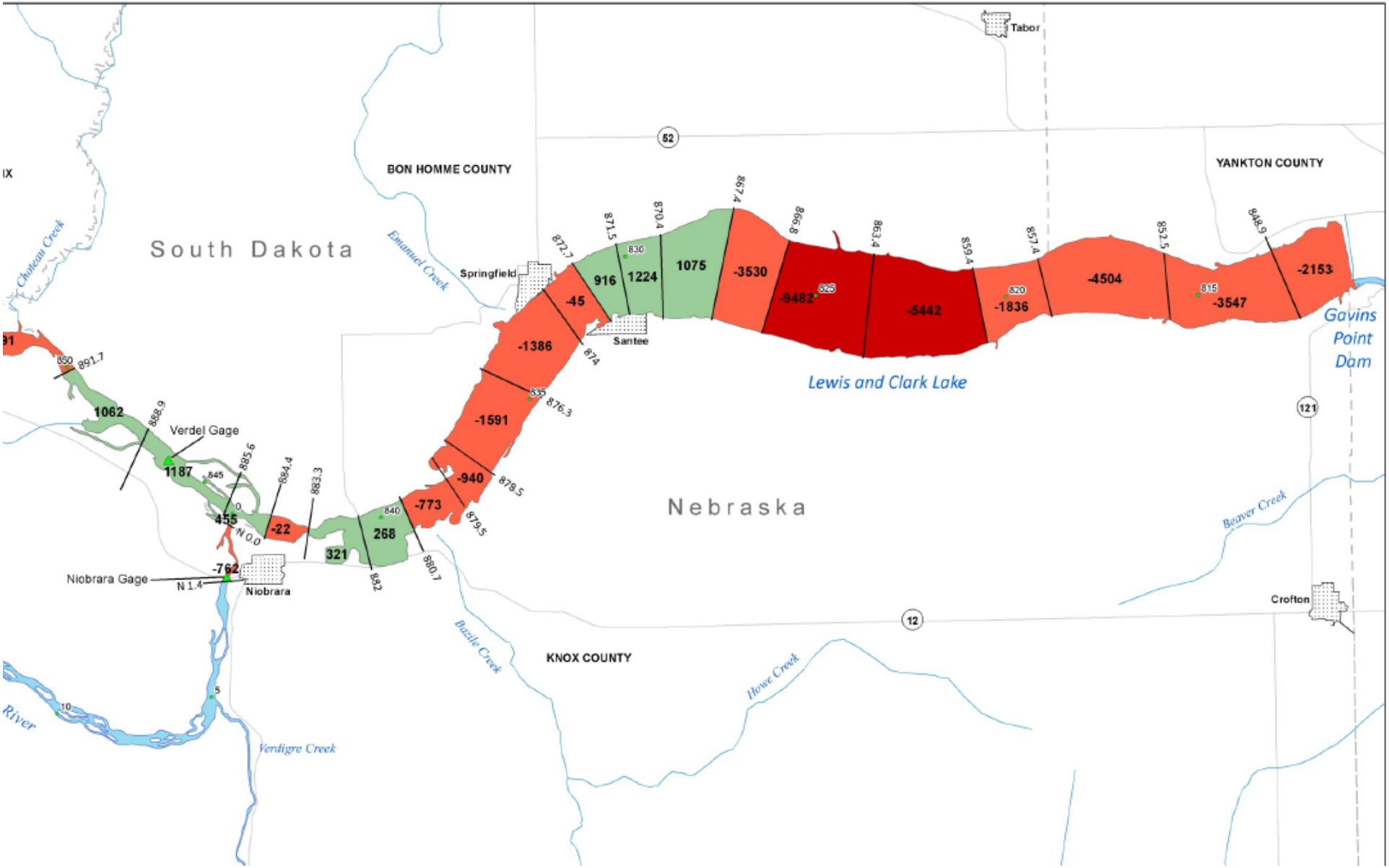
*Adapted from Morris, G.L. and J. Fan, *Reservoir Sedimentation Manual*, McGraw-Hill, New York, 1998.

Dam Influence



The flow elevation upstream at location B is affected by the elevation at A, this is called a backwater profile. As sediment deposits and the delta height increases, the backwater upstream impact also increases

What does Deposited Sediment do Above a Reservoir?



Deposition of Sediment Above the Reservoir Pool – Aerial Image

Changes in Stage Above Reservoir

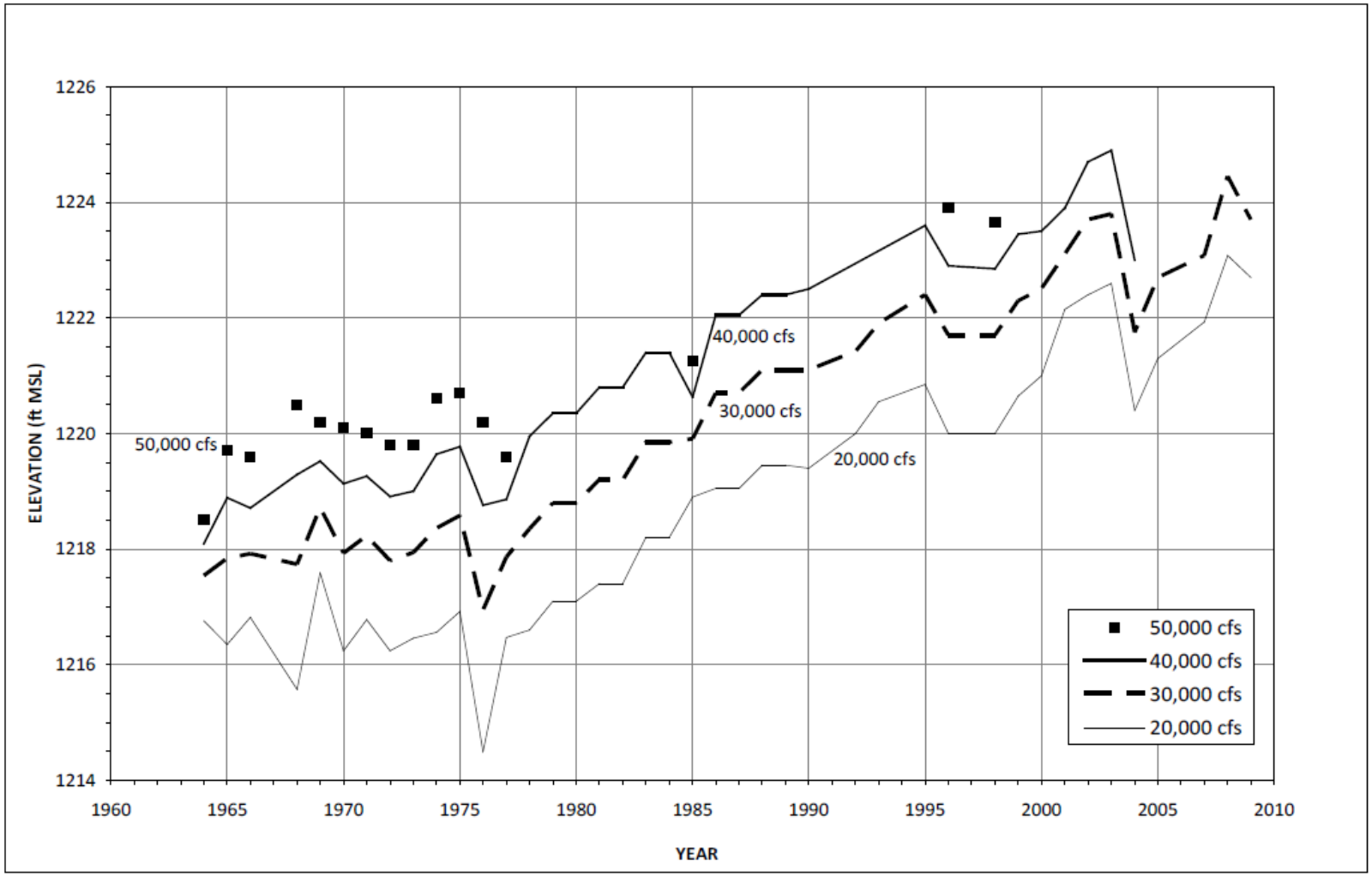


Figure 4-3. Stage Trends – Verdel Gage (1960 RM 845.91)

Summary of Impacts

- Increased river stages
  - Reduced channel capacity
  - Lower discharges cause flooding – limit upstream discharge
  - Changes in land use/riparian and aquatic habitat
  - Bank instability
- Elevated groundwater
  - Flooded basements
- Sediment deposits migrating upstream
  - Boat ramps/river access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