

Verde River Navigability

Presentation to ANSAC

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Definition of Navigability

- A.R.S. § 37-1101(5)

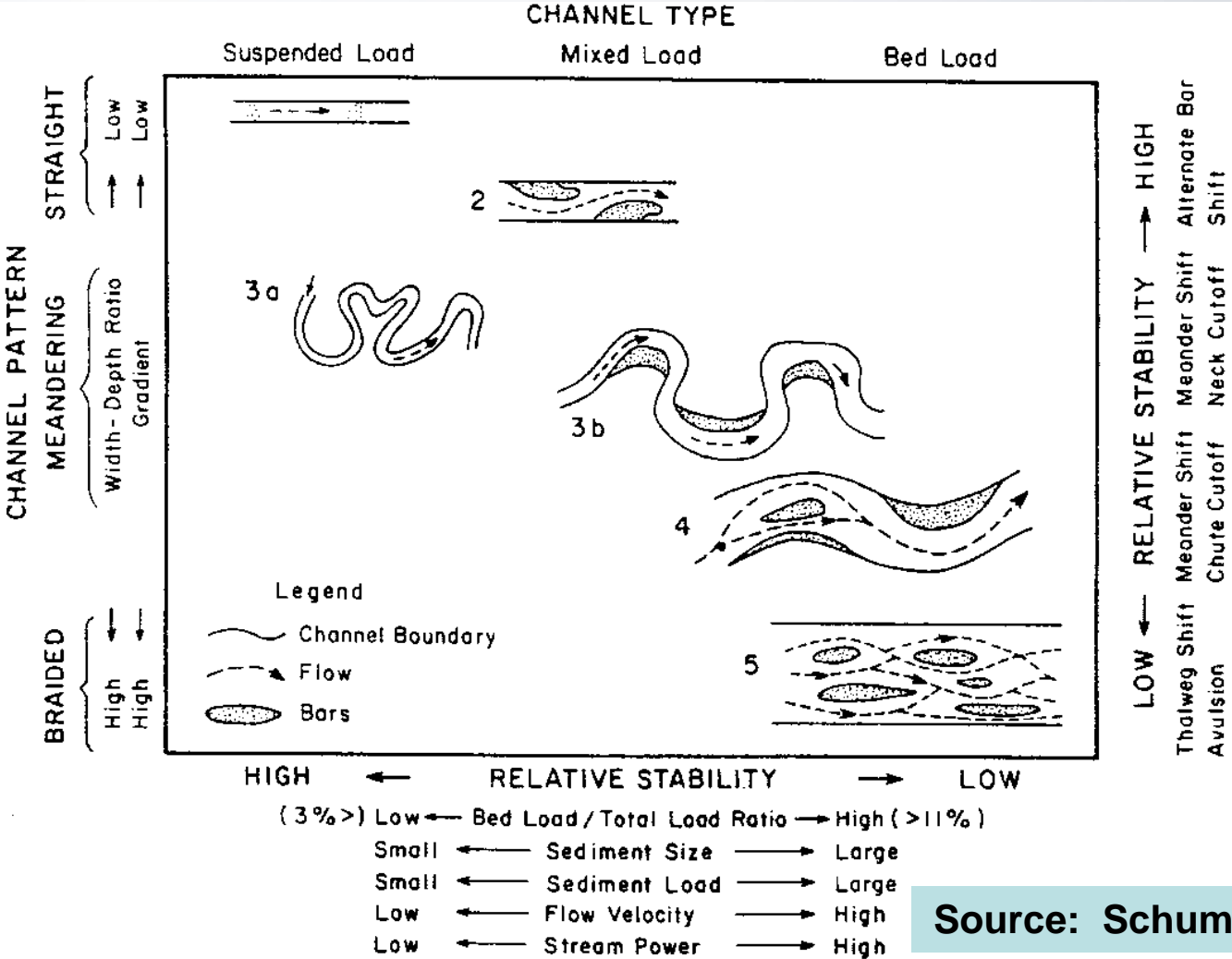
“Navigable” or “navigable watercourse” means a watercourse that was in existence on February 14, 1912, and at that time was used or was susceptible to being used, in its ordinary and natural condition, as a highway for commerce, over which trade and travel were or could have been conducted in customary modes of trade and travel on water.

Definition of Navigability

■ PPL Montana

- *...evidence [of present-day, primarily recreational use] must be confined to that which shows the river could sustain the kinds of commercial use that, as a realistic matter, might have occurred at the time of statehood.*

Channel Classification Relevant to Gila River Navigability



Source: Schumm (1981)

Examples of Channel Types

Single-thread “Navigable” Channel
U.S. v Utah

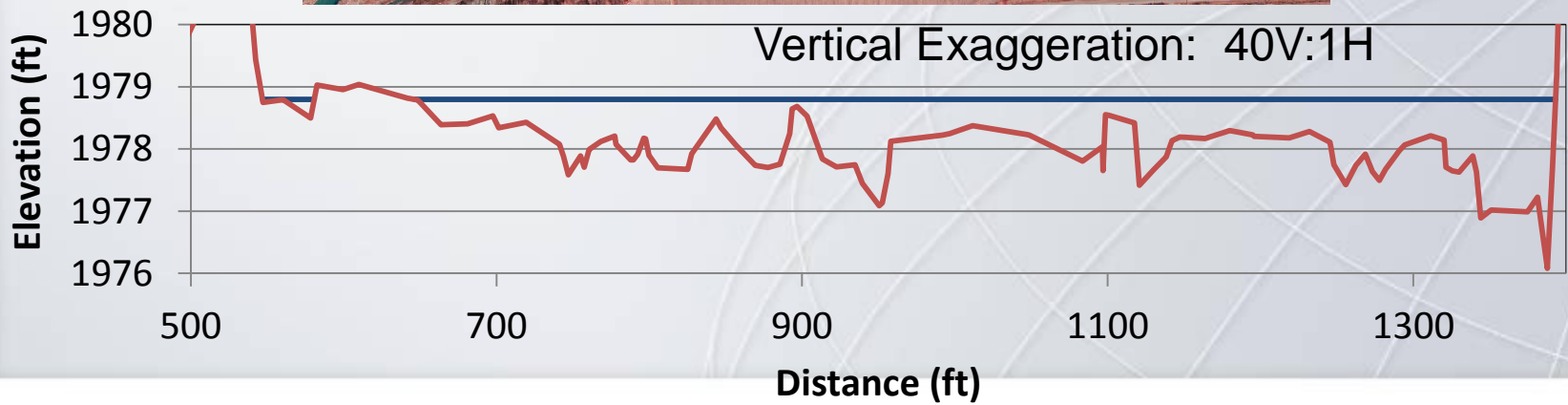
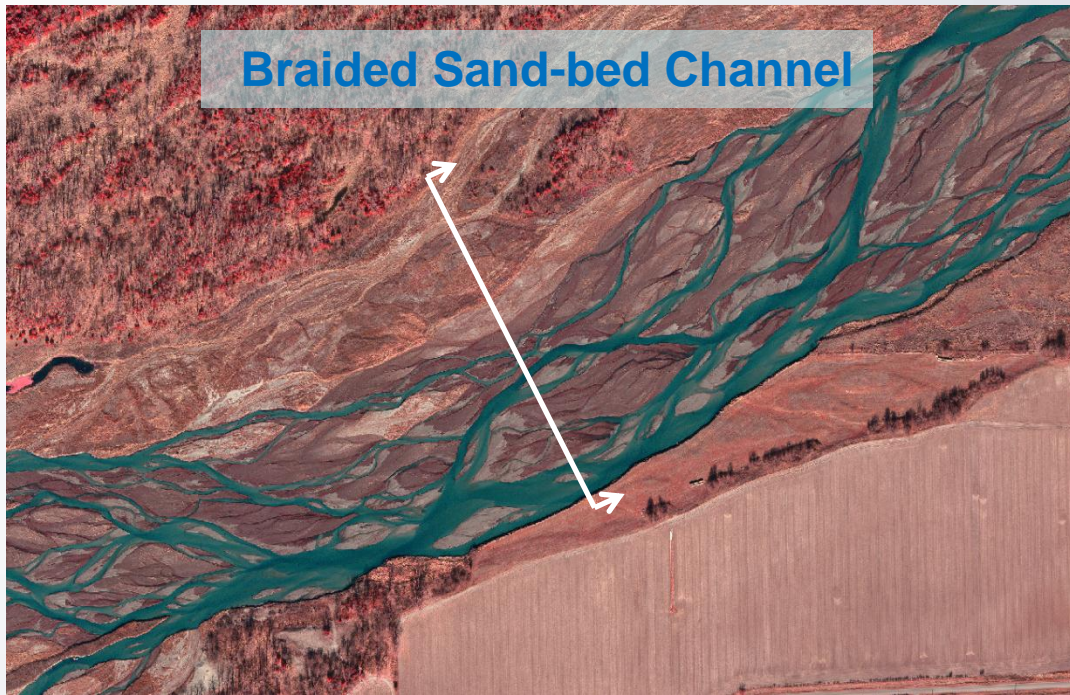


Examples of Channel Types

Single-thread Meandering Channel



Examples of Channel Types



Examples of Channel Types

Braided Cobble-bed Channel



Examples of Channel Types

Braided Cobble-bed Channel



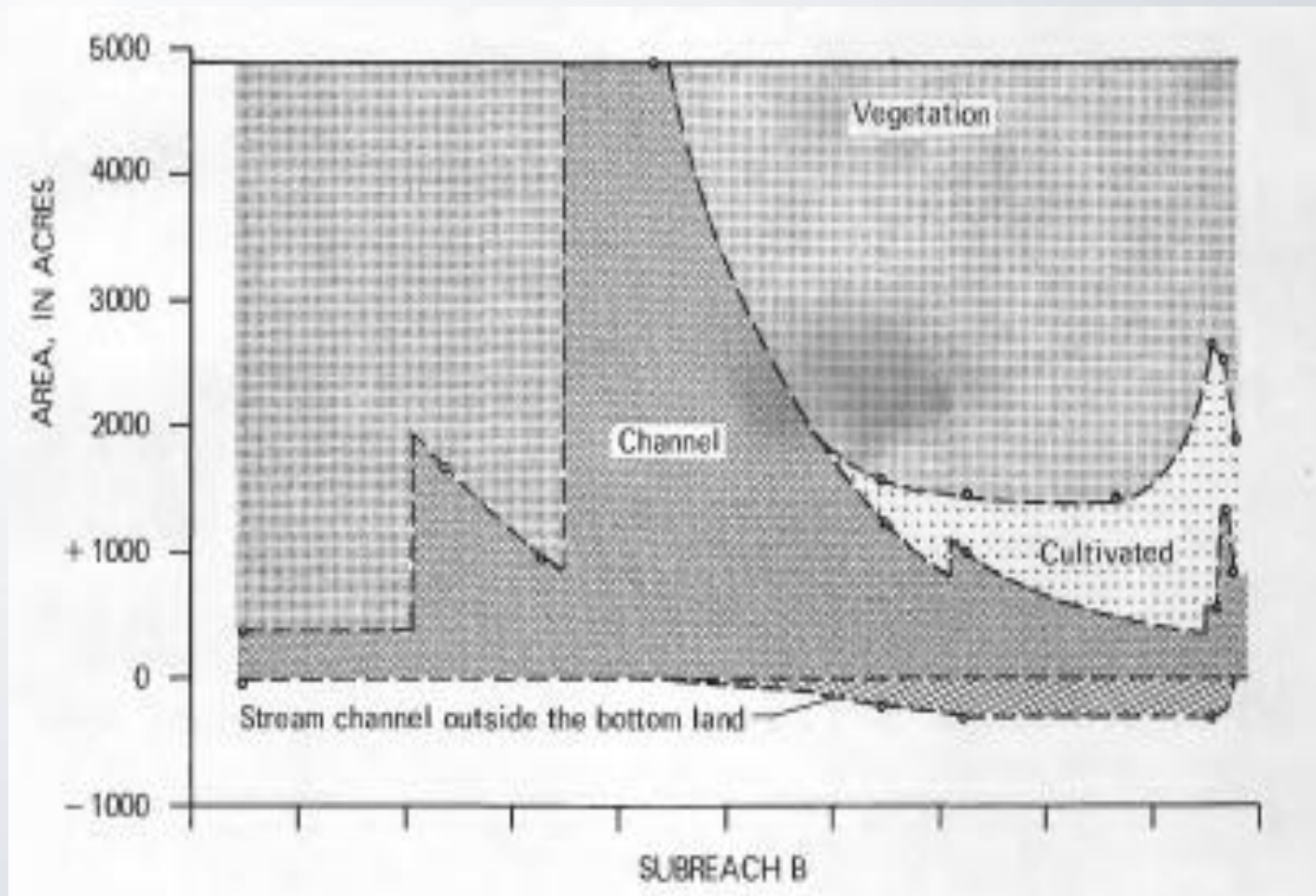
Channel Pattern IS Relevant to Navigability

- Braided channels:
 - Wide, shallow cross section
 - Multiple, unstable (i.e., shifting) channels
 - NOT conducive to boating

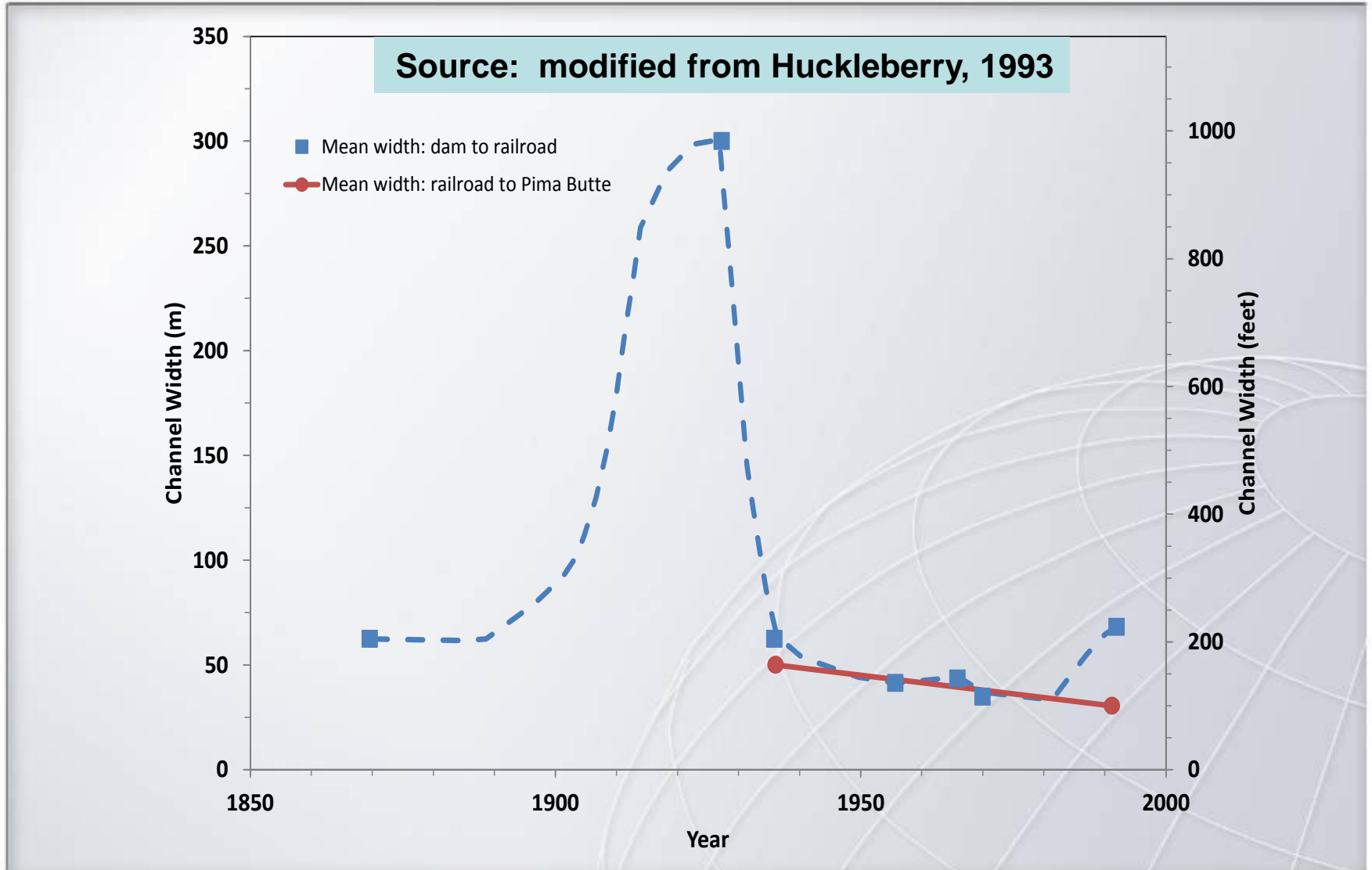


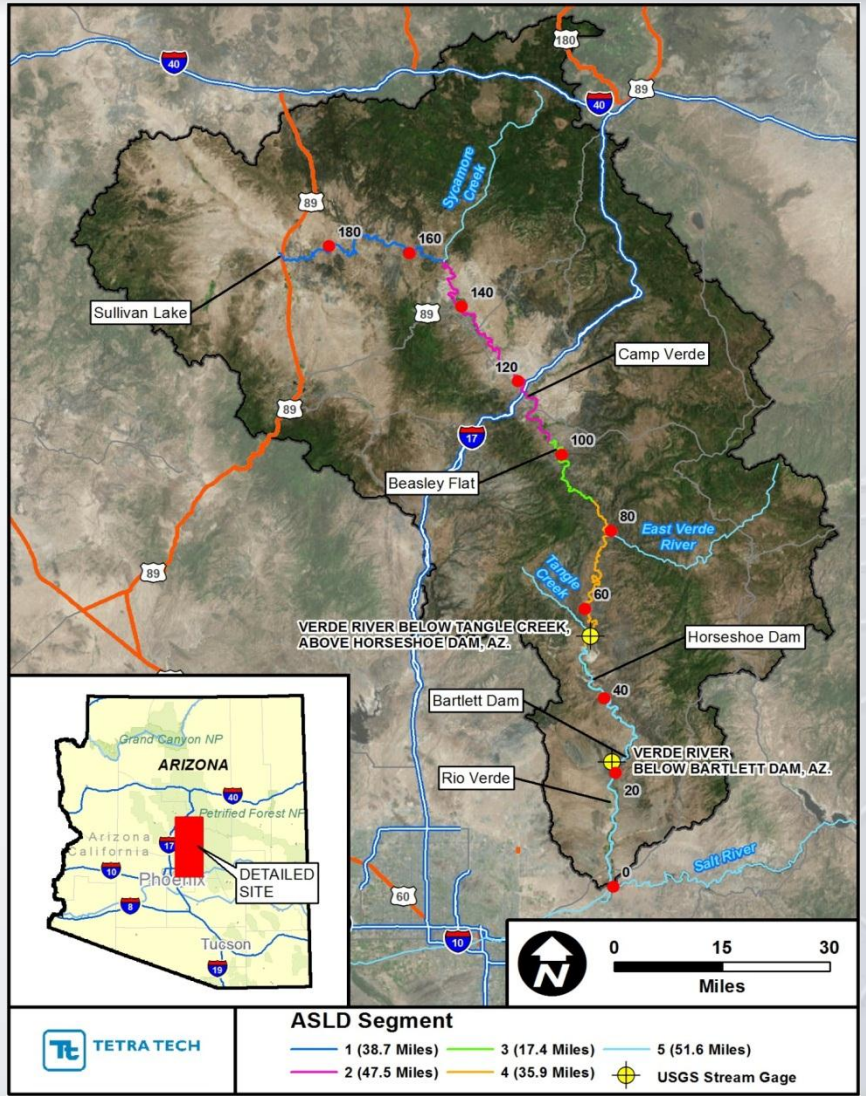
Historical changes in channel area of upper Gila River (San Simon to Pima)

Source: Burkham, 1972

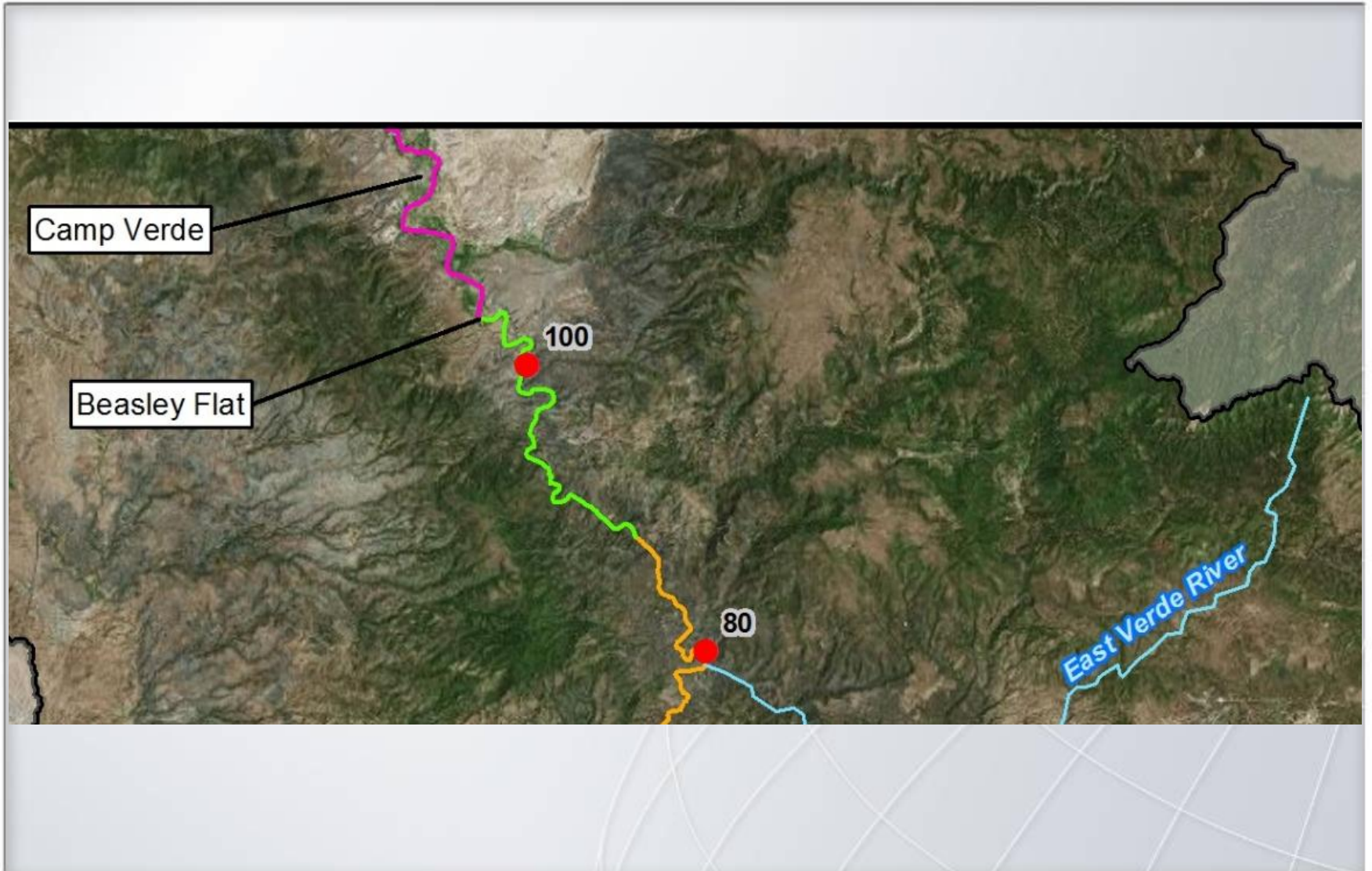


Changes in channel width for the Middle Gila River

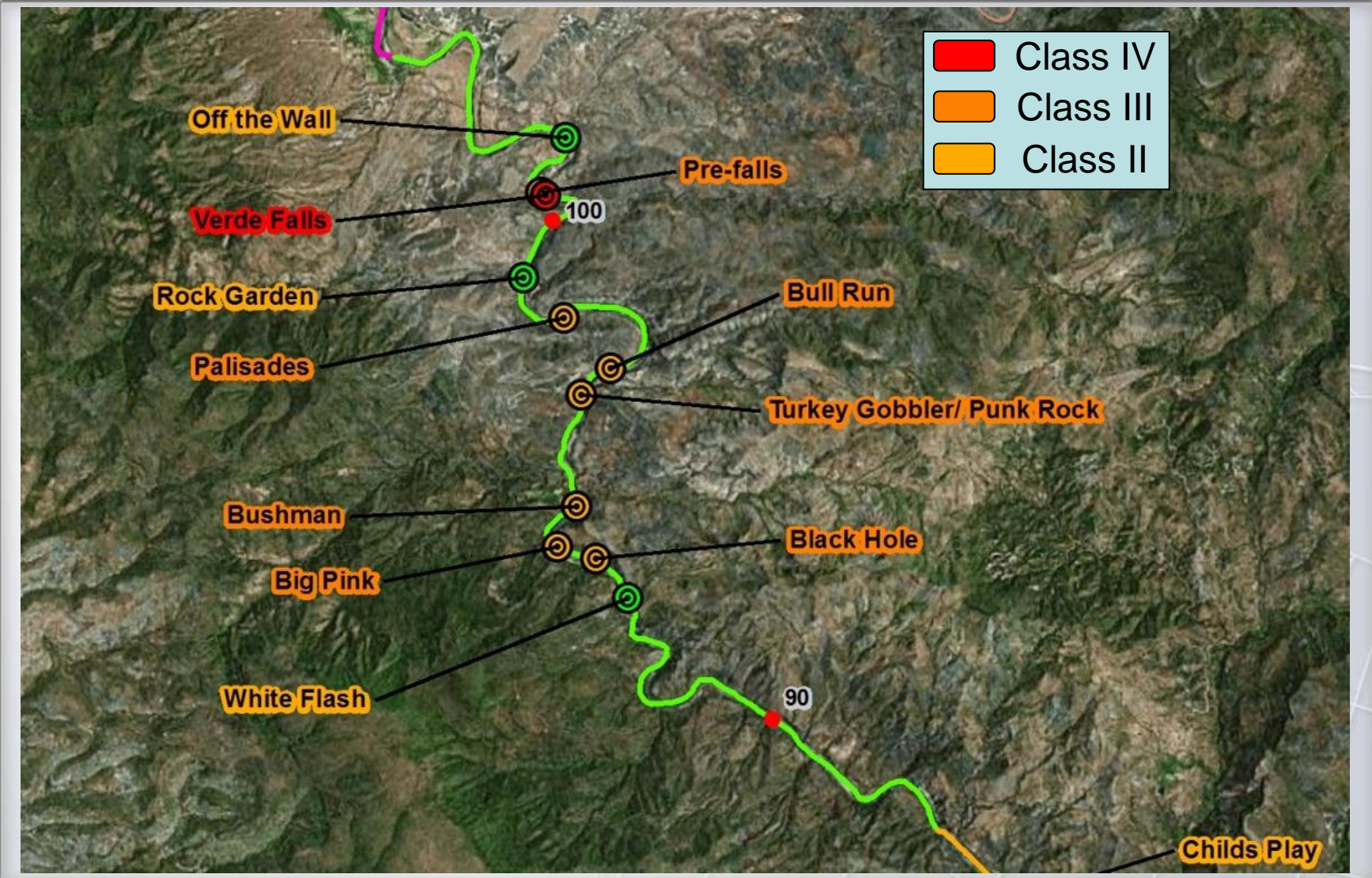




Segment 3



Segment 3



Verde Falls and Pre-falls



Black Hole Rapid



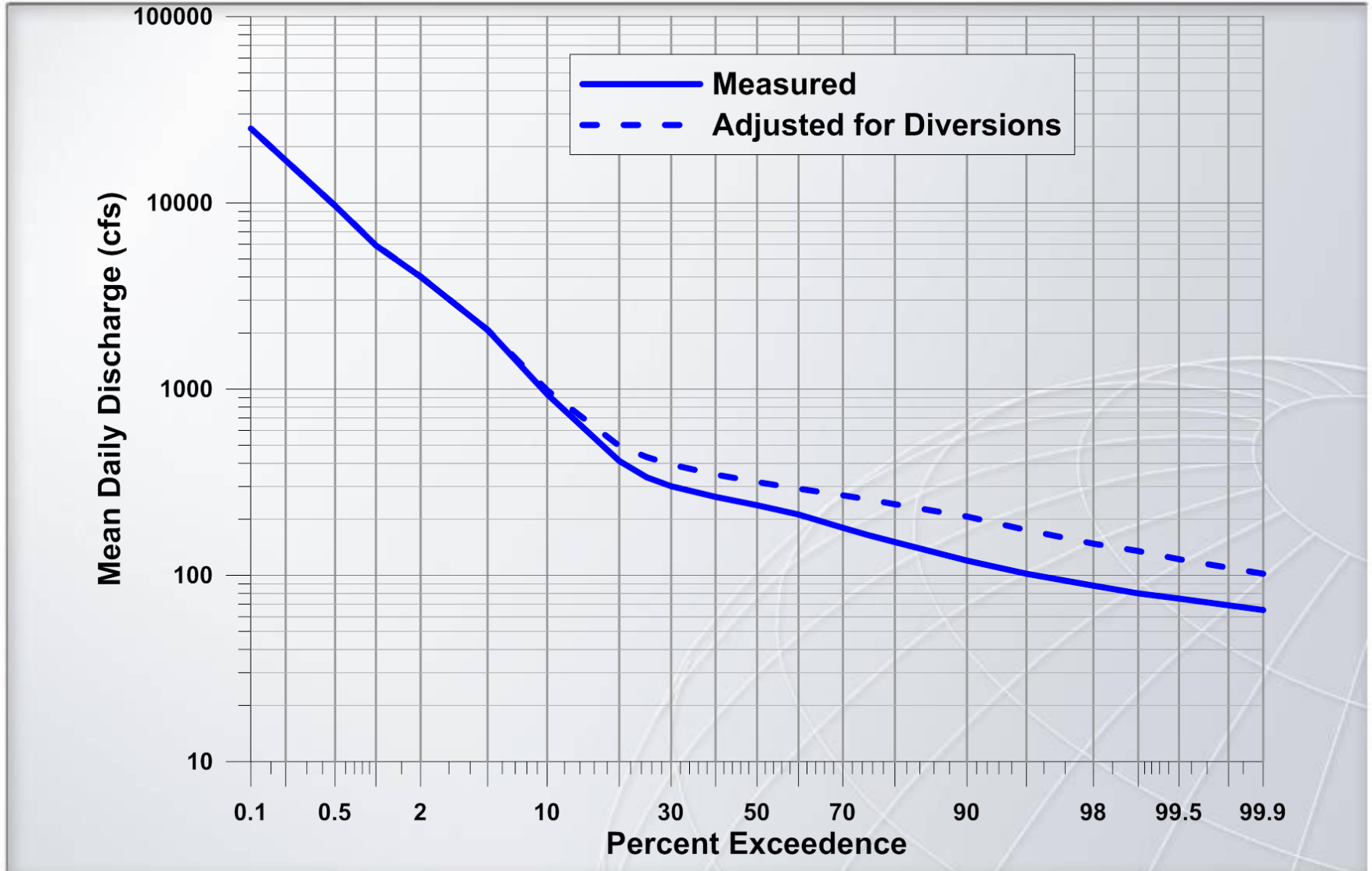
Between Beasley Flat and Verde Falls.



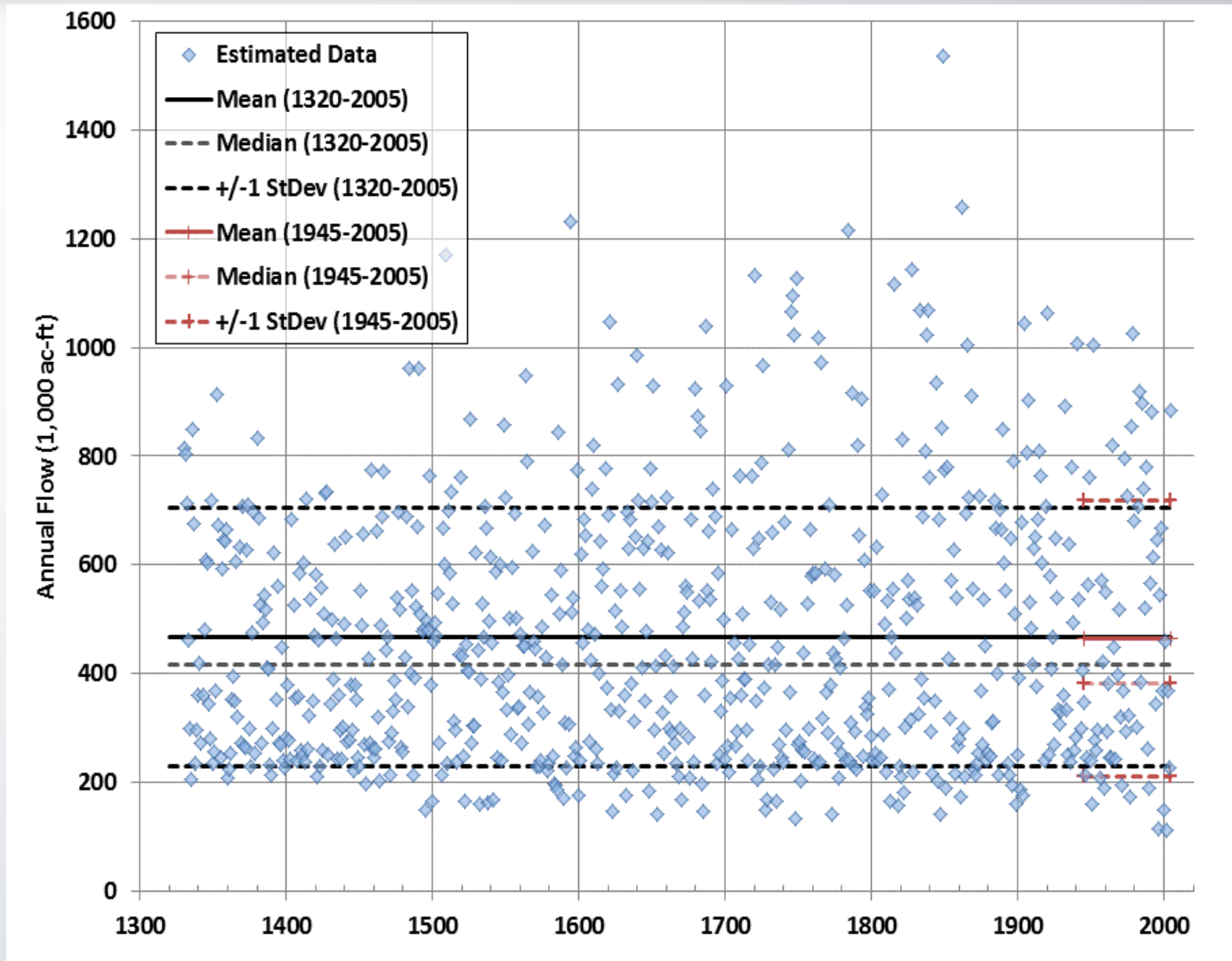
~0.8 miles upstream from Verde Hot Spring



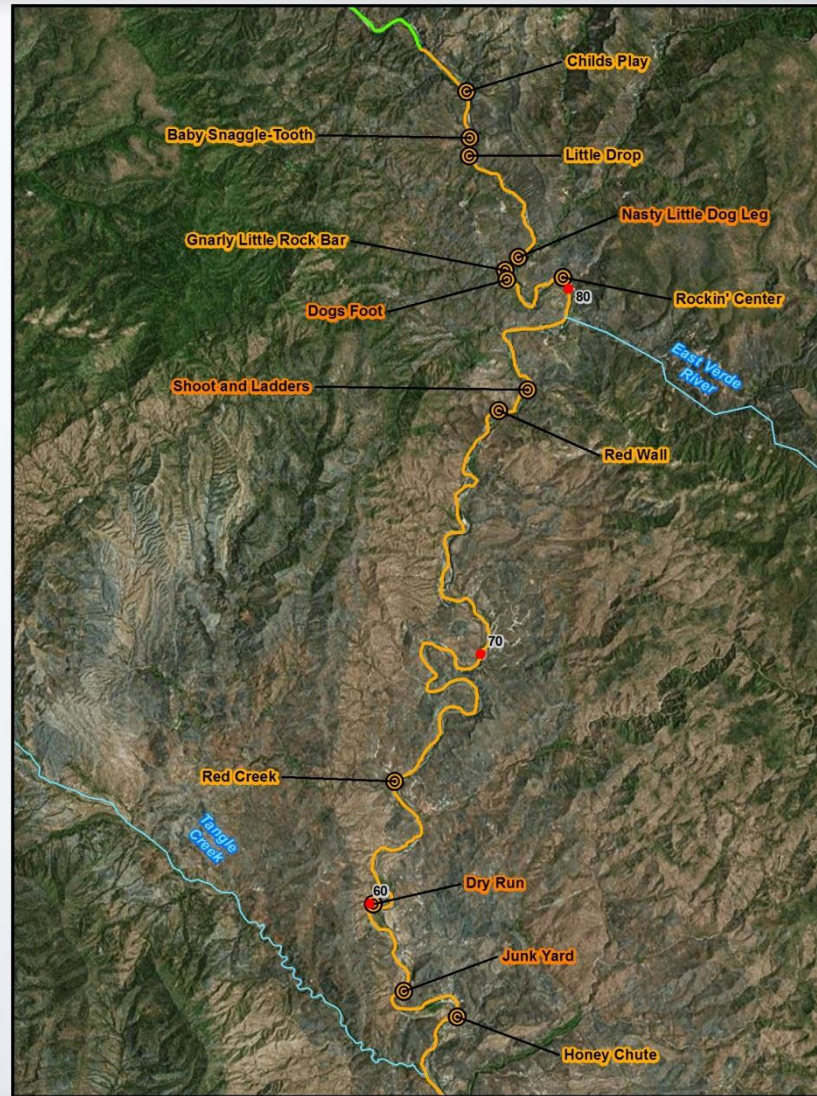
Verde Below Tangle Creek Flow Duration Curve



Estimated annual flow volumes from Meko and Hirschboeck (2008).



Segment 4



Shoots and Ladders Rapid (Class III)



Gnarly Little Rockbar Rapid (Class II)



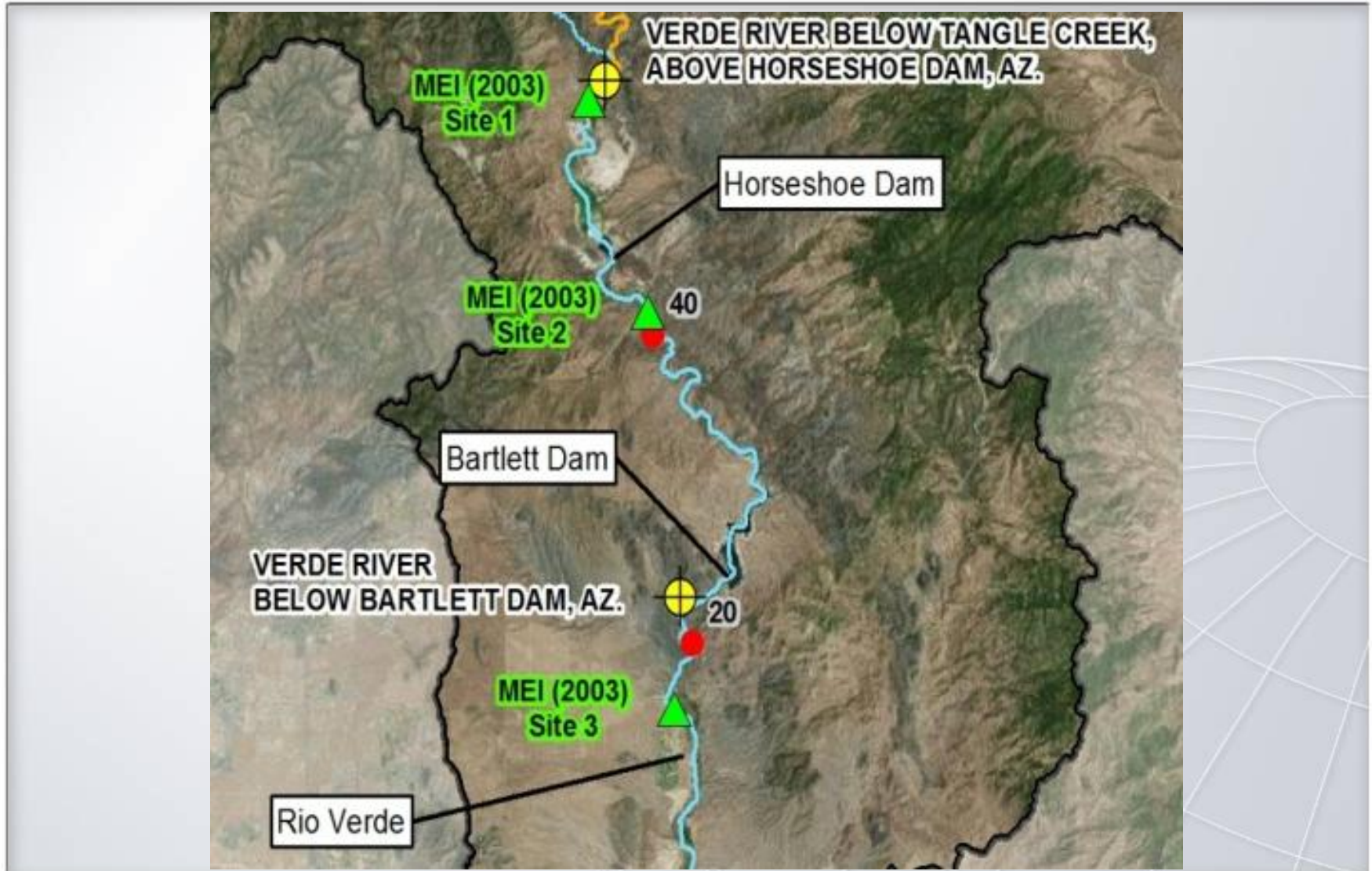
Shallow, boulder-strewn riffle near the Tangle Creek confluence



Tree-choked cobble/boulder bar just upstream from the Fossil Creek



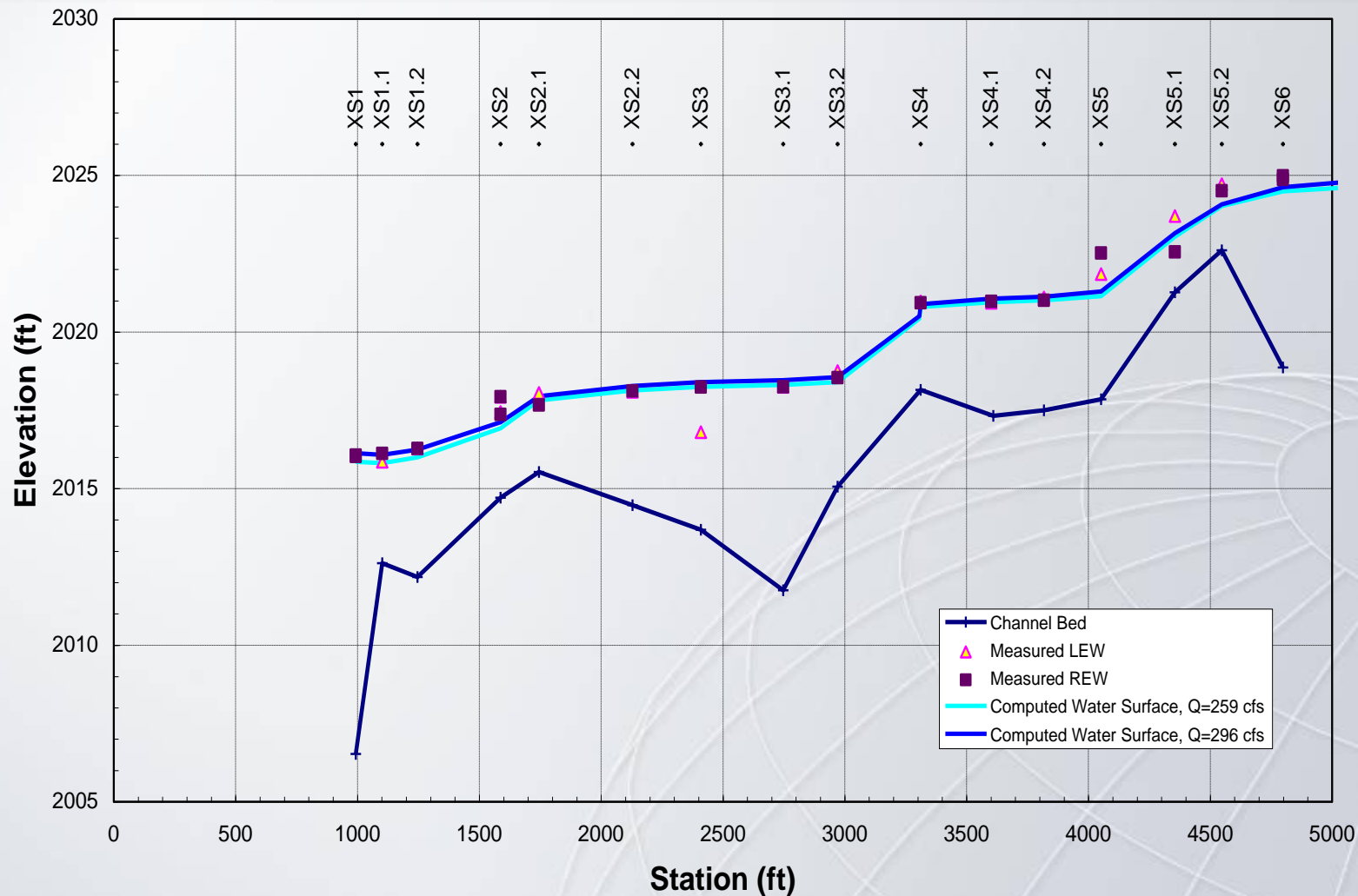
MEI (2003) study sites



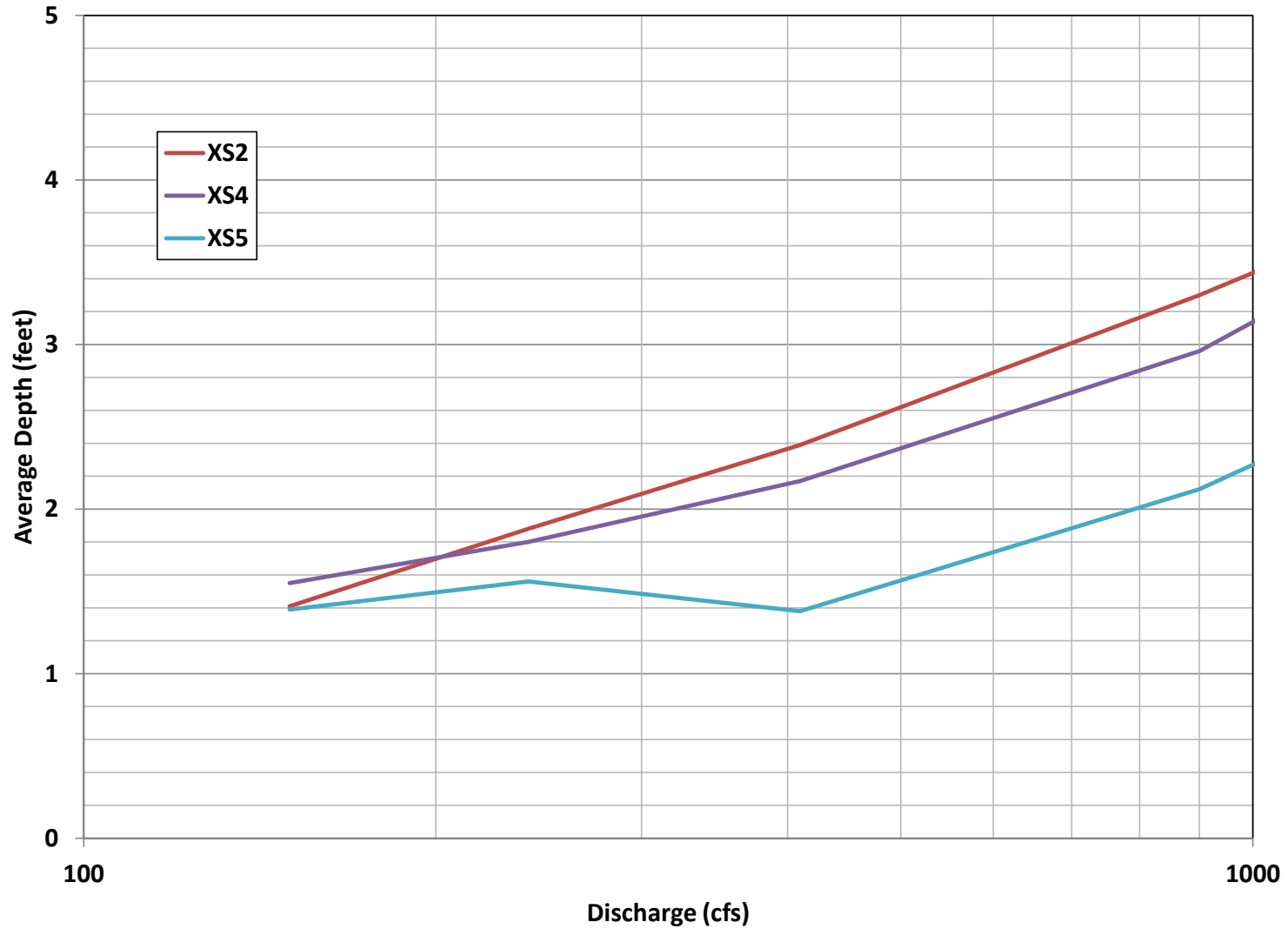
View looking upstream of MEI (2003) Study Site 1, below Tangle Creek



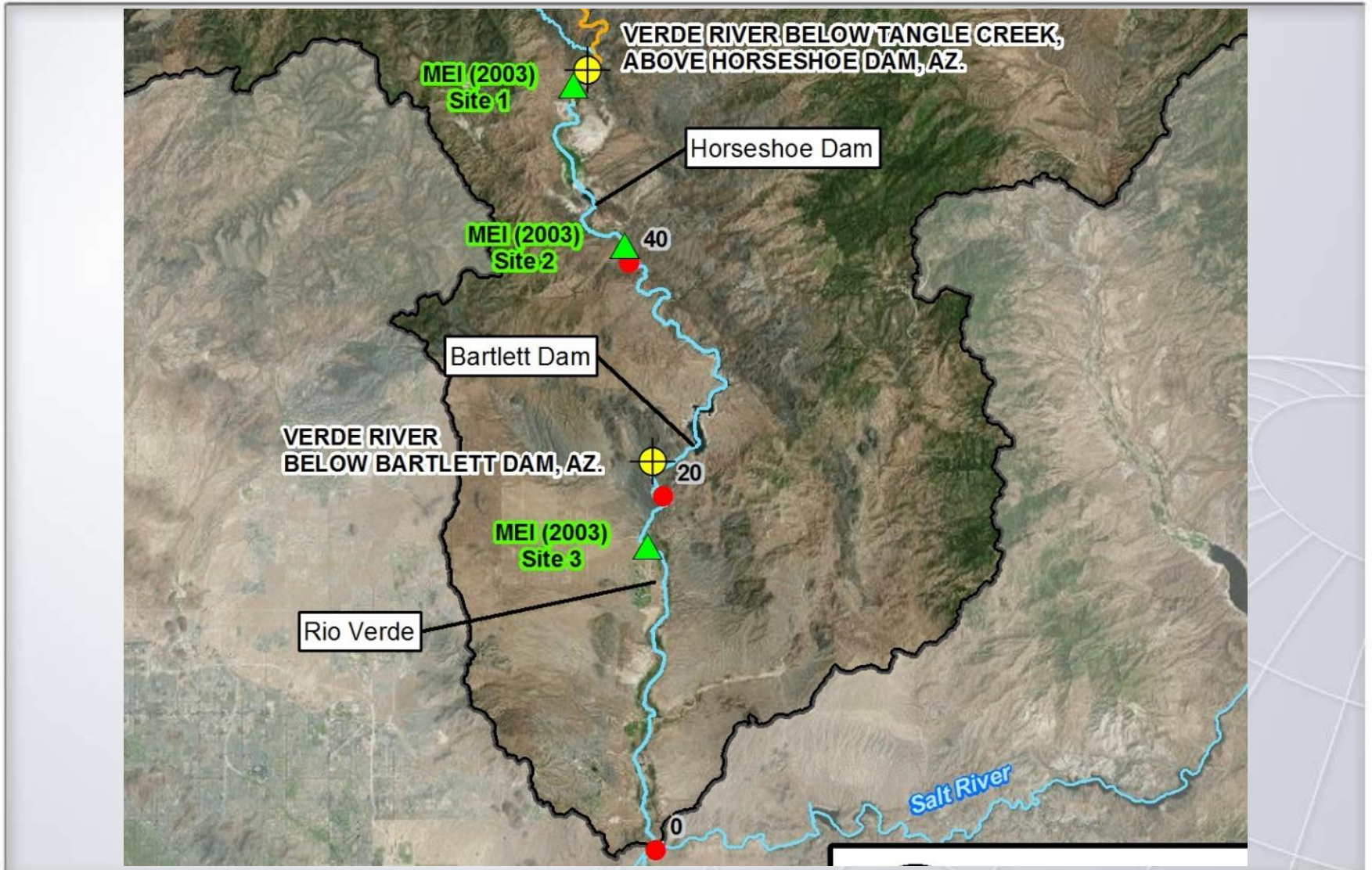
Thalweg and water-surface profiles at the MEI (2003) Study Site 1, below Tangle Creek



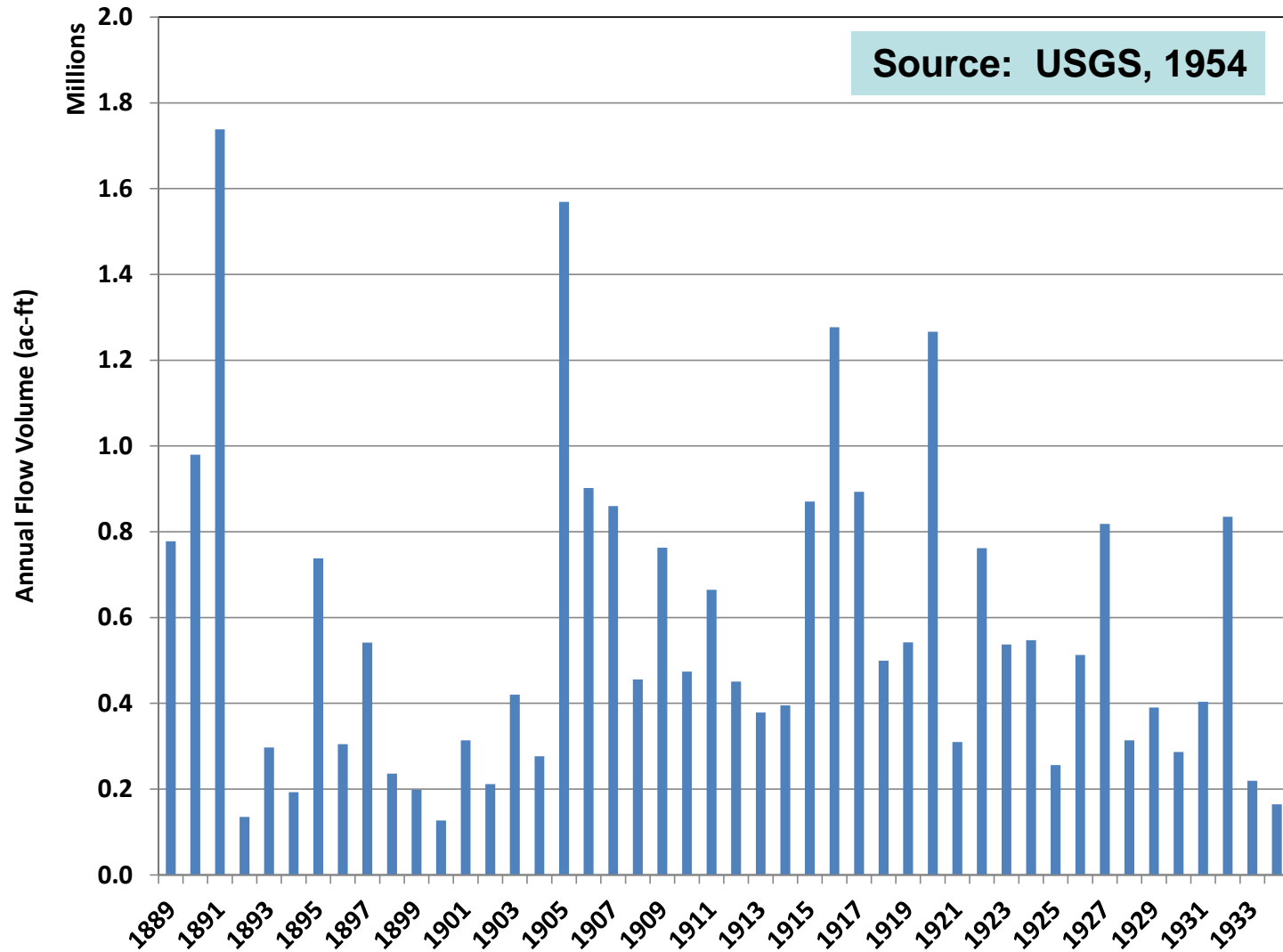
Average depth at MEI (2003) Site 1 XS2, XS4 and XS5



Segment 5



Annual flow volume below Bartlett Dam



Horseshoe Dam Site 1934



“bottom of Fort McDowell Indian Reservation” 1934



Verde and Salt River confluence 1934



~2.5 miles downstream from Horseshoe Dam



~4.5 miles downstream from Bartlett Dam



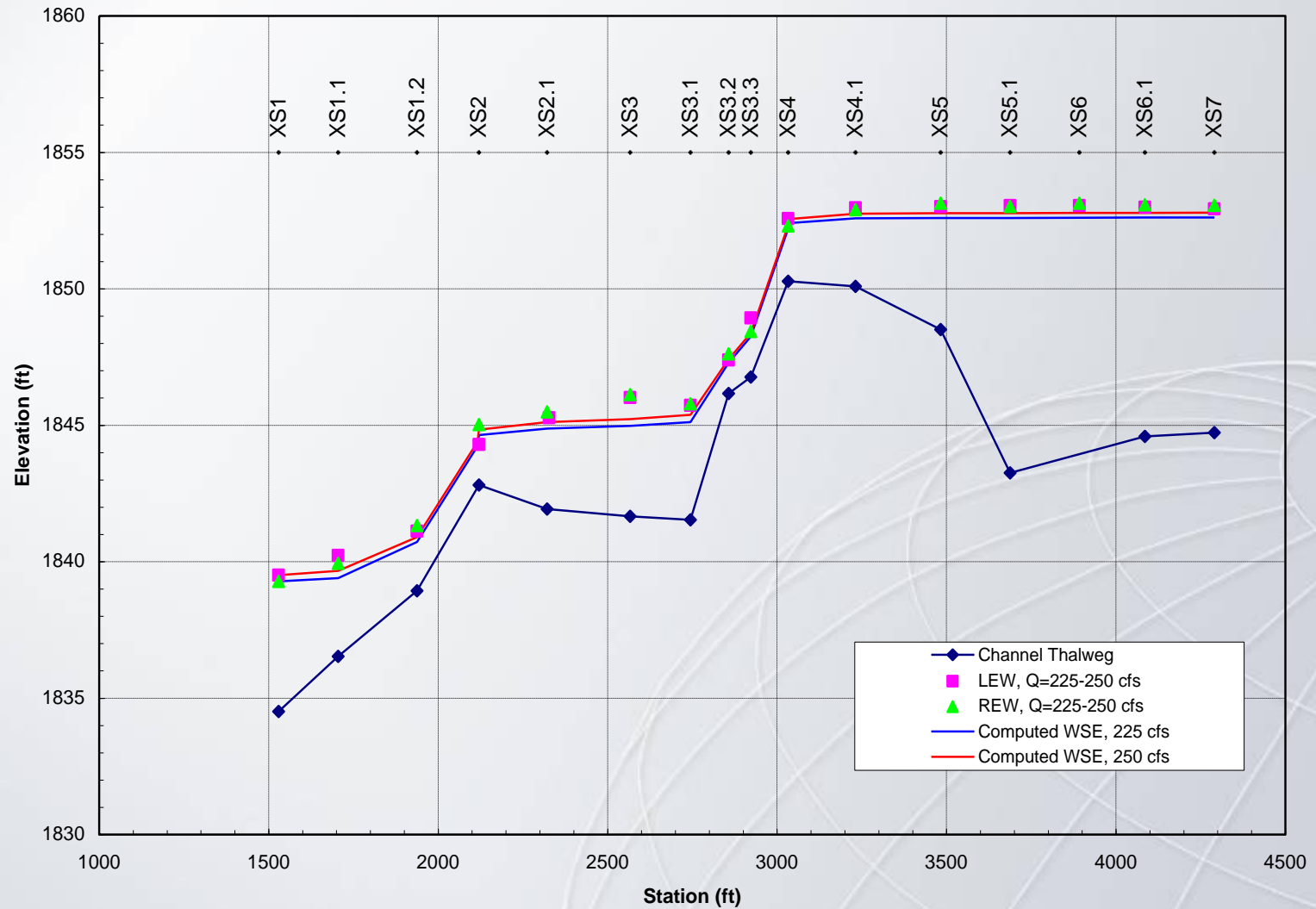
Near Rio Verde



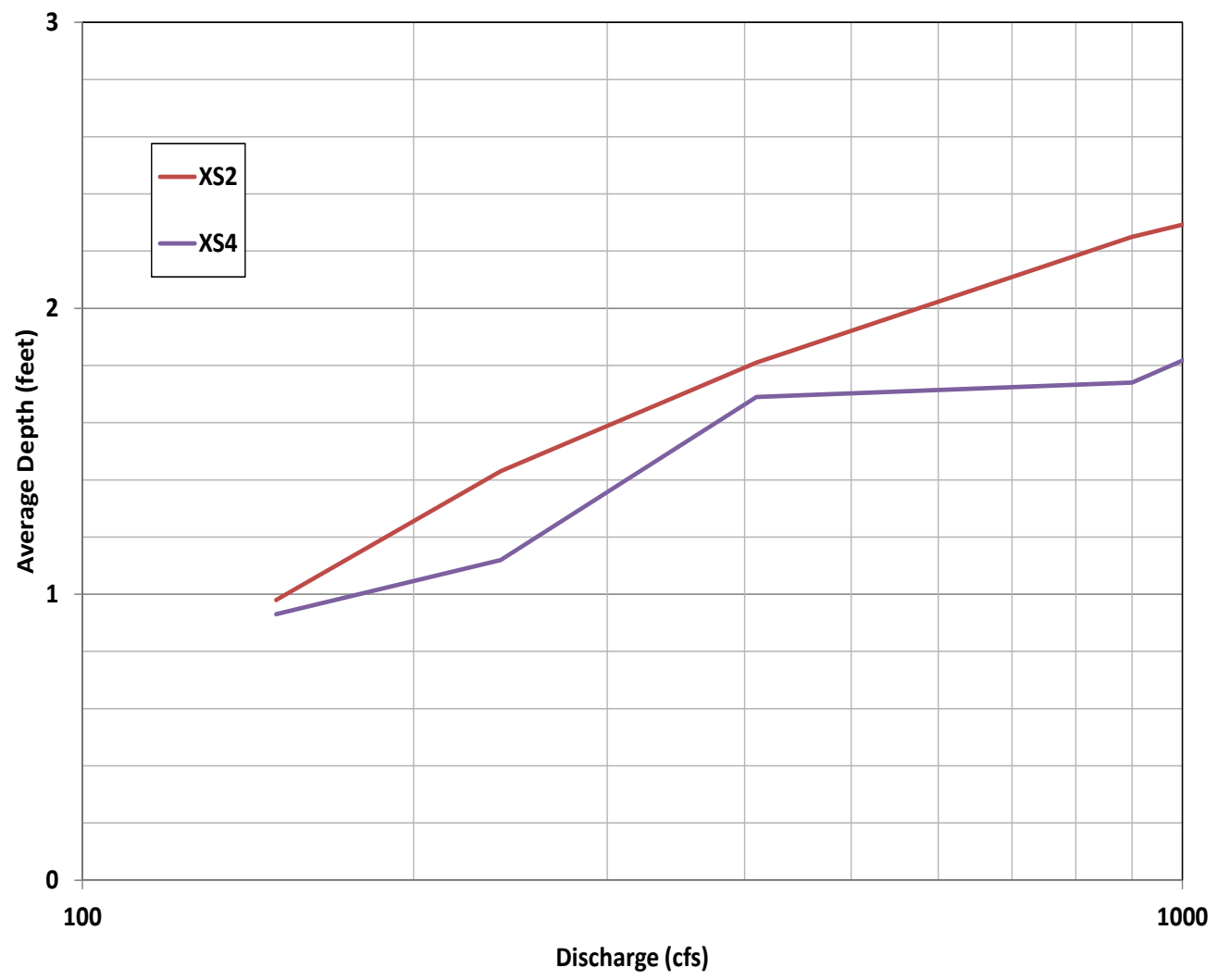
MEI (2003) Study Site 2



MEI (2003) Study Site 2



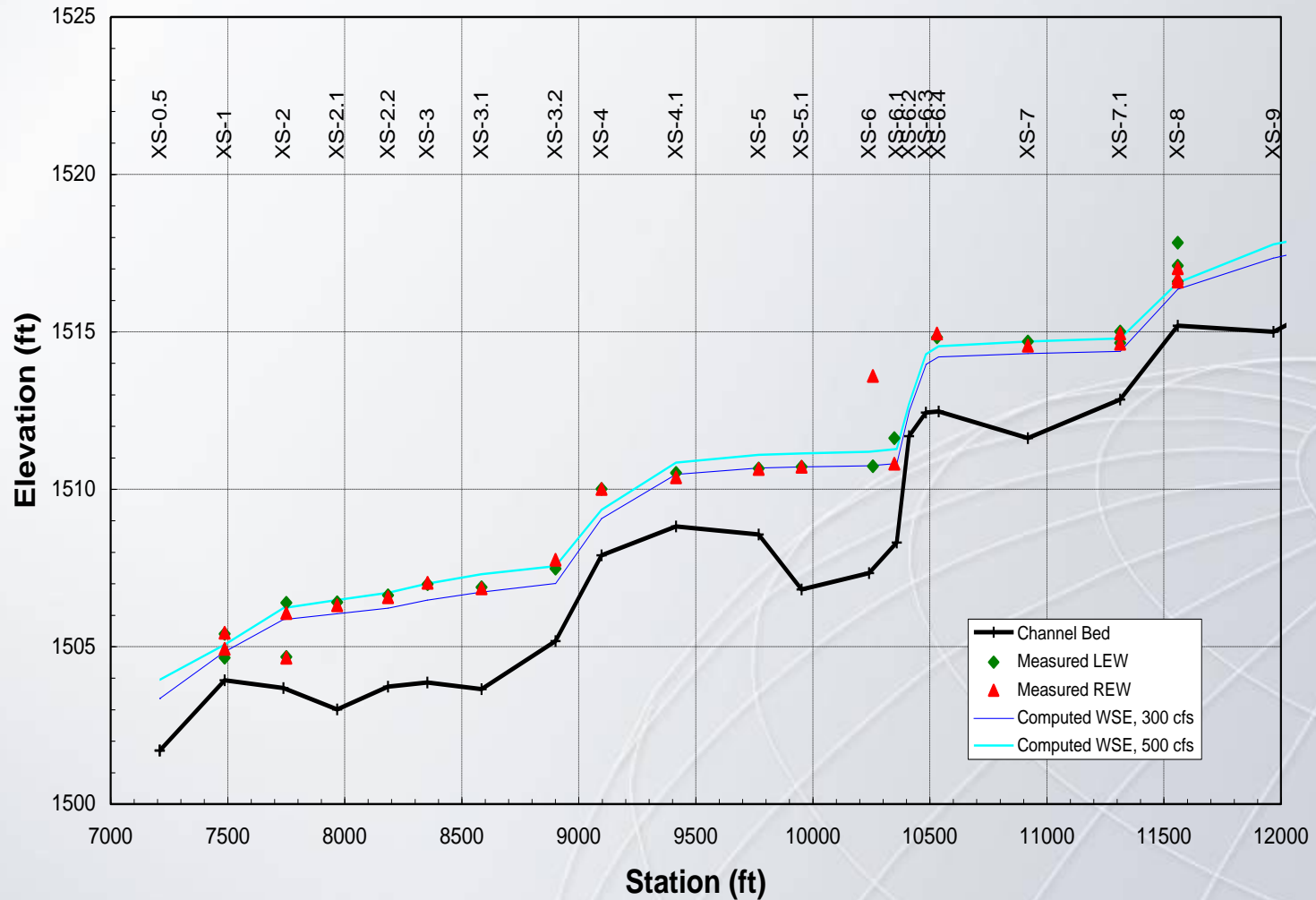
MEI (2003) Site 2 XS2 and XS4



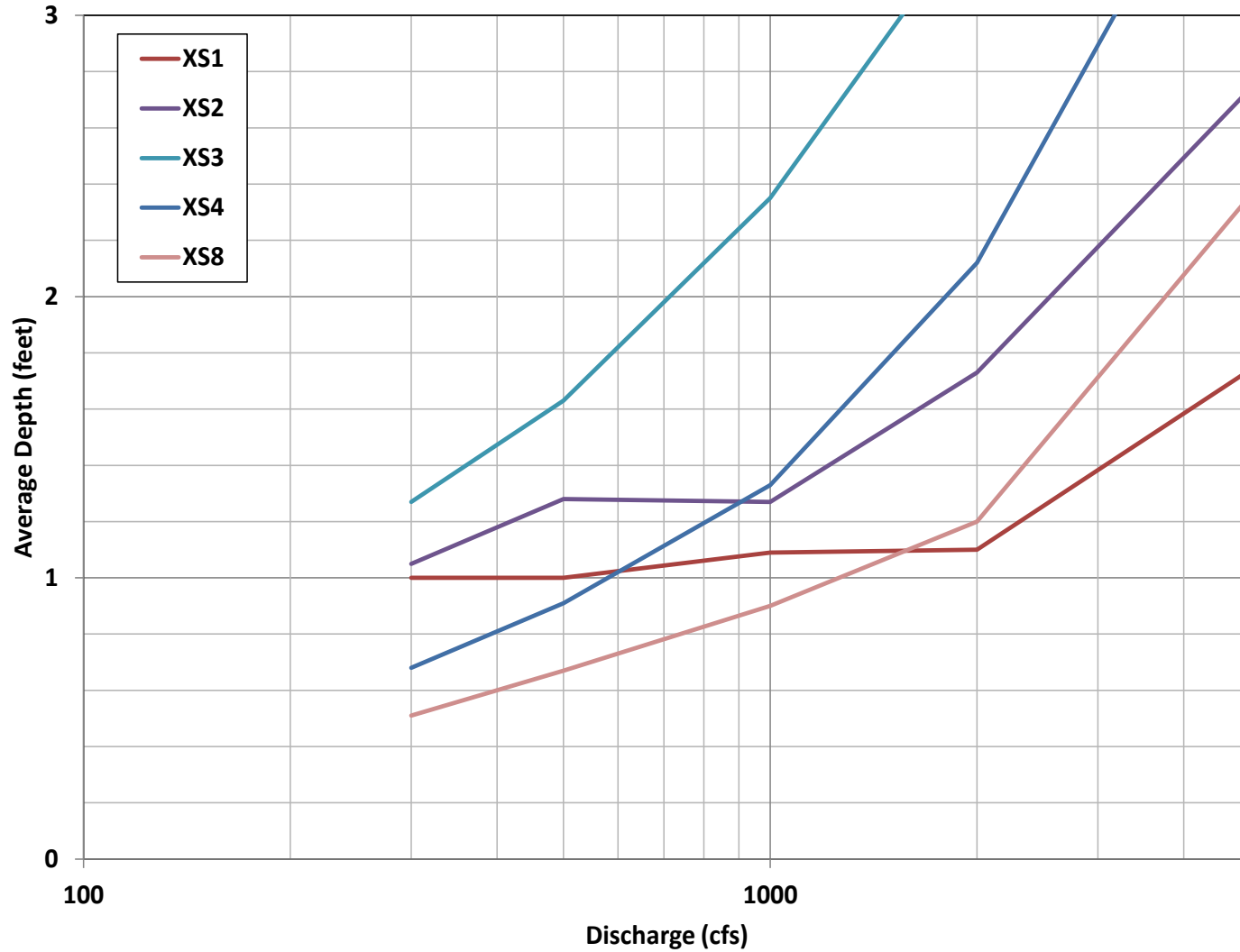
MEI (2003) Study Site 3



MEI (2003) Study Site



MEI (2033) Site 3



Summary of Opinions

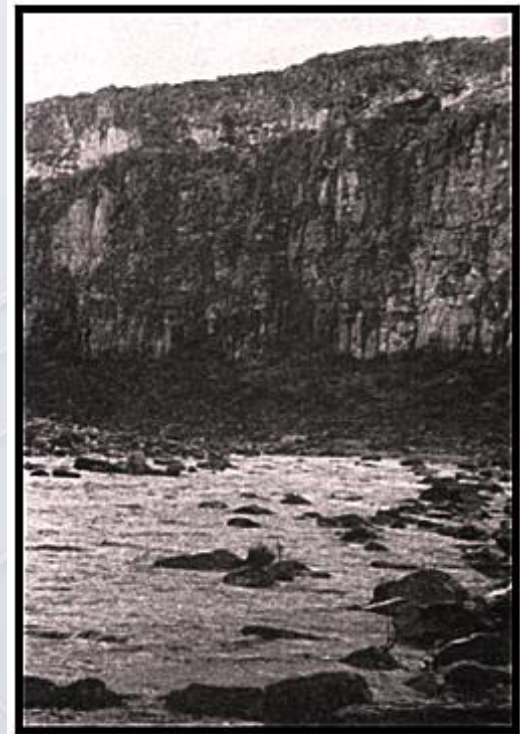
■ ASLD Segments 1 and 2

- Based on evidence presented by others, **not navigable using boats in customary use for commerce at date of statehood**



"Duff Drop" (River Mile 14.8)

Photos from Burtell (2014)



"USGS Rapids" (River Mile 40.3)

Summary of Opinions

- ASLD Segments 3 and 4
 - Narrow, bed-rock confined canyon
 - Numerous rapids
 - **Not navigable using boats in customary use for commerce at date of statehood**



Summary of Opinions

■ ASLD Segment 5

- Wider valley bottom bounded by alluvial terraces
- Island-braided character under modern (post-statehood) conditions
- Braided and highly-responsive to large floods under pre-statehood conditions
- Unstable, multi-channel character would have precluded reliable navigation with boat in customary use for commerce at statehood
- **Not navigable using boats in customary use for commerce at date of statehood**



Summary of Opinions

The Verde River was NOT susceptible to being used, in its ordinary and natural condition, as a highway for commerce, using customary modes of trade and travel on water at the time of Arizona's statehood.