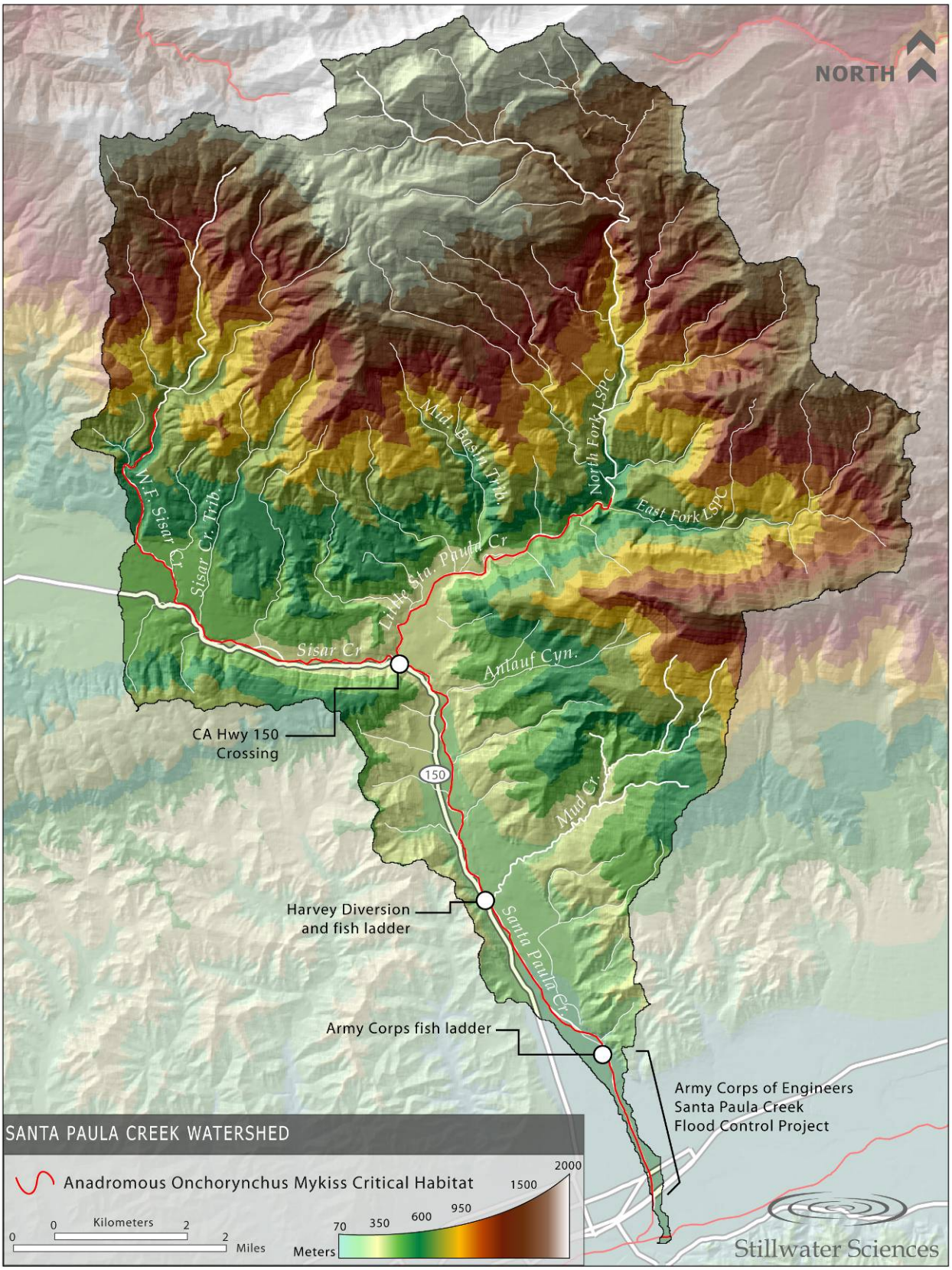


Figure 1-1. Santa Paula Creek watershed.

Figure 2-1. Relief map of southern California, displaying the east–west orientation of the Transverse Ranges relative to the predominant NW grain of the topography along the California coast.

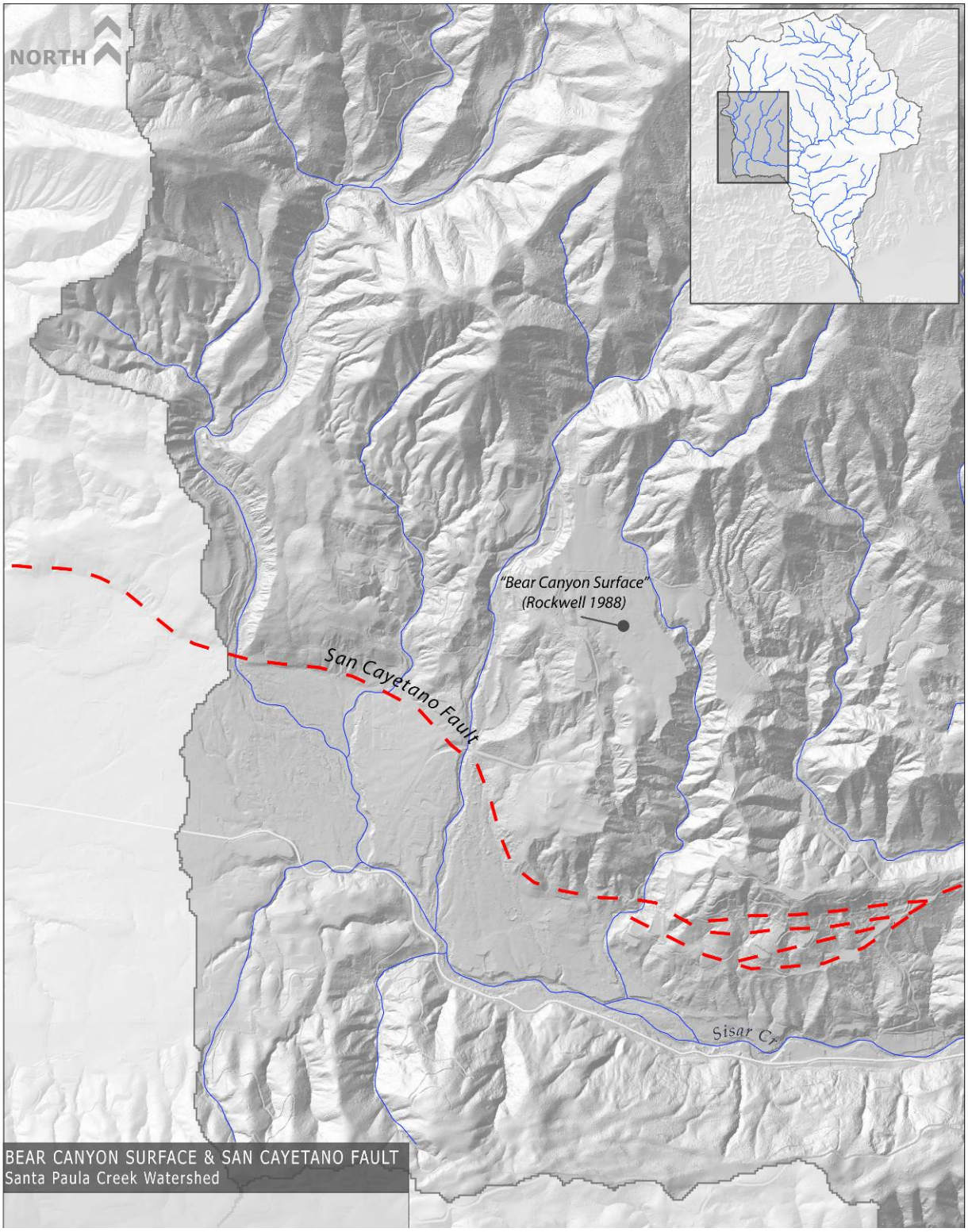


Figure 2-2. The "Bear Canyon surface" (Rockwell 1988) is well-displayed as a remnant uplifted flat in the right-center part of this DEM image (view is 5 km east-west). The San Cayetano fault runs approximately along the southern base of the surface, trending ESE in this area (drawn from Tan and Irvine [2005]).

Figure 2-3. Differential resistance to weathering in sandstone (light-colored boulders) and siltstone (crumbled dark piles).

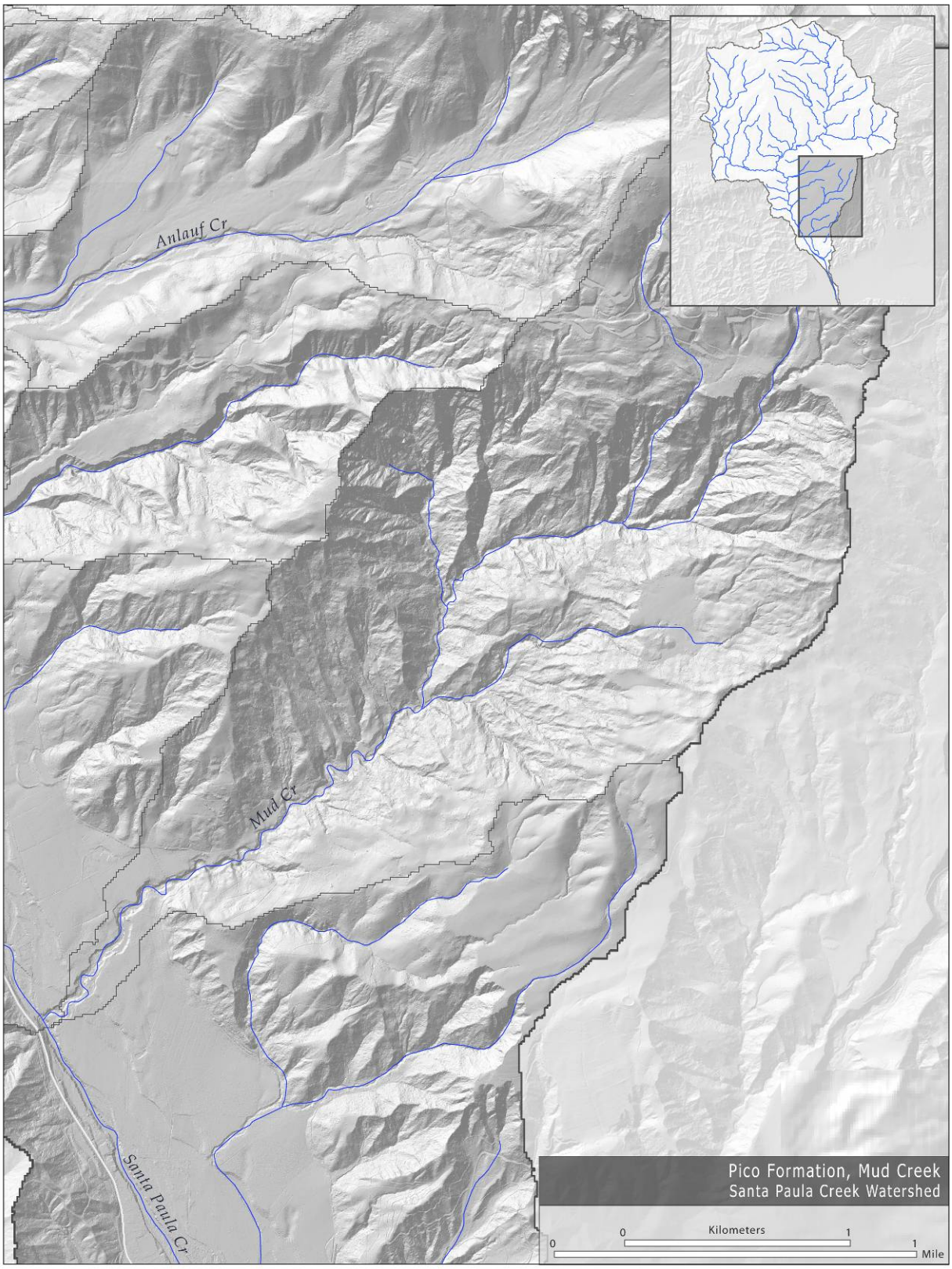


Figure 2-4. Erosional morphology of the Pico Formation, particularly well displayed in the upper watershed of Mud Creek.

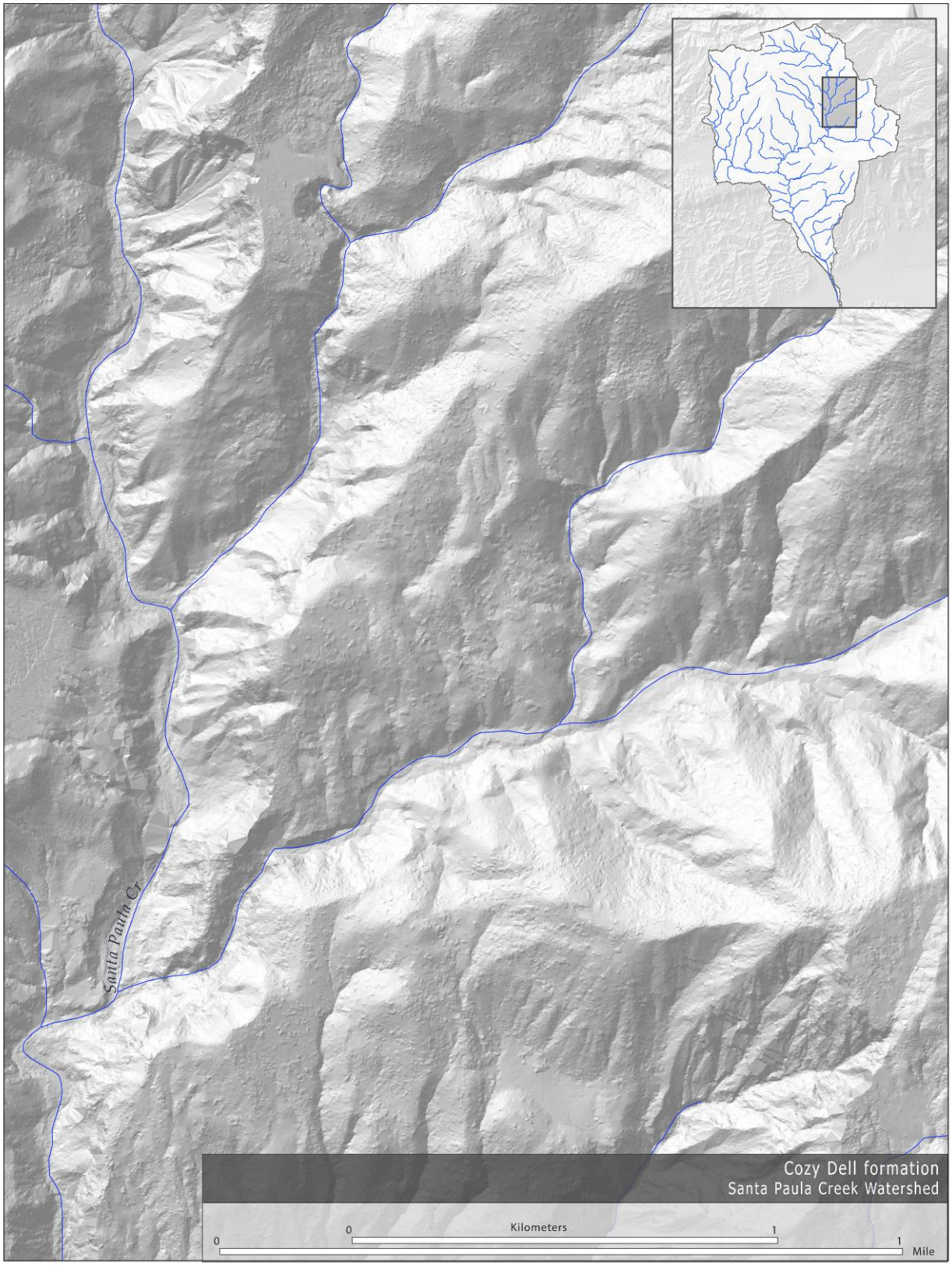


Figure 2-5. Erosional morphology of the Cozy Dell Formation, in the northeastern-most part of the Santa Paula watershed.

Figure 2-6. Alluvial sediment derived from a primarily sandstone-draining channel. Arrow points to notebook (yellow; 10 × 18 cm) in center of picture for scale.

Figure 2-7. Low-sediment-yielding landscape developed on the dip slope of the Matilija Sandstone.

Figure 2-8. The west-facing cliffs of Topatopa Bluff. Bedding in the east-dipping sandstone of the Matilija Formation is evident.

Figure 2-9. Rockfall delivery of sandstone into Santa Paula Creek. Arrow points to notebook (12 × 18 cm); large boulder is ~5 m high.

Figure 2-10. View of Santa Paula Creek a) just upstream of the major sandstone-delivery zone of Figure 2-9 (note the bedrock exposures in the banks and bed of the channel); and b) downstream of sandstone delivery zone.

LOW
Shale Forest 10-20%

MEDIUM
Shale Scrub 10-20%

HIGH
Shale Ag/grass 10-20%

Figure 2-11. Characteristic photographs of vegetation in areas with a) low, b) medium, and c) high sediment-delivery rates.

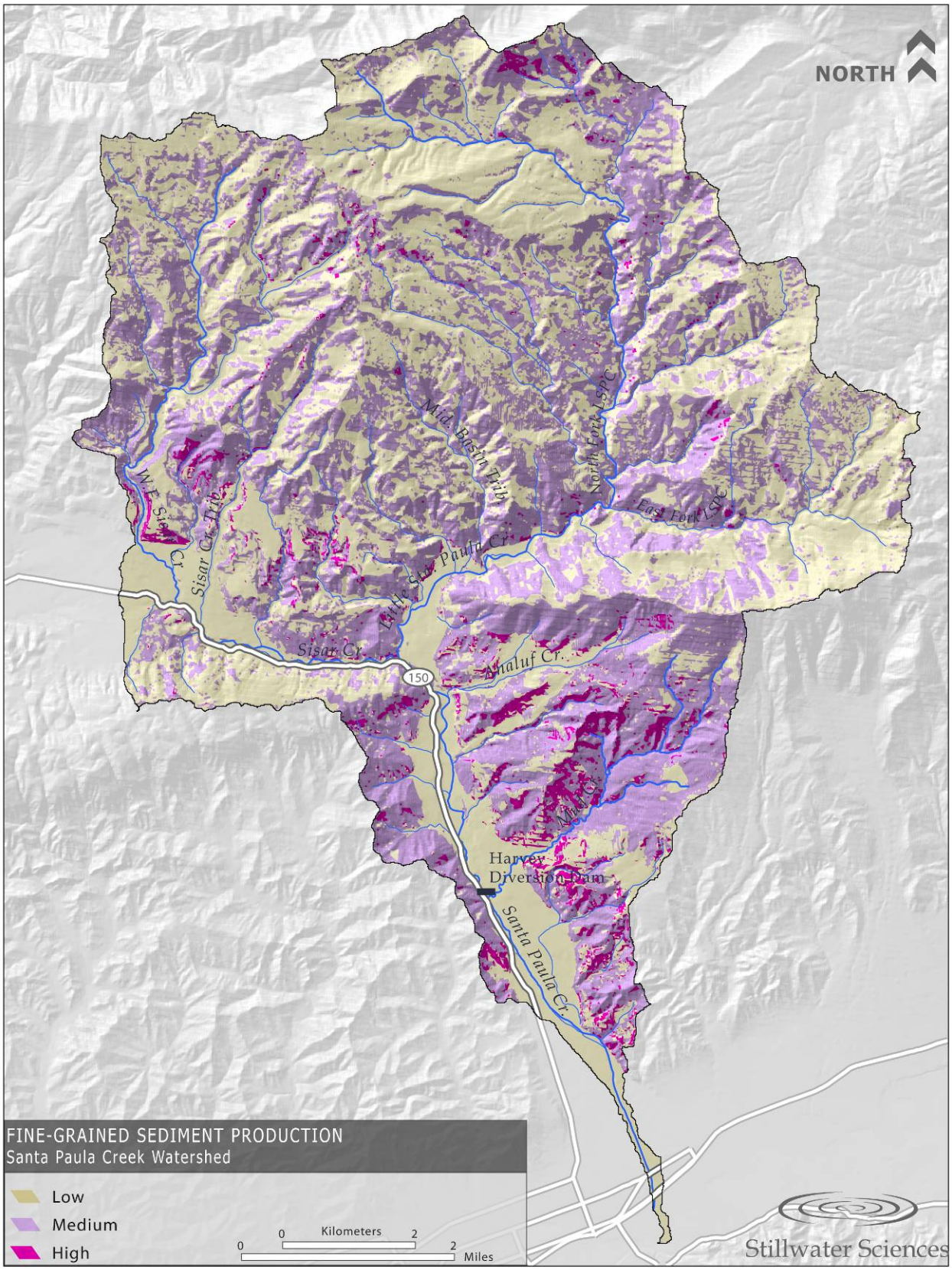


Figure 2-12. Fine grained sediment production in Santa Paula Creek watershed.

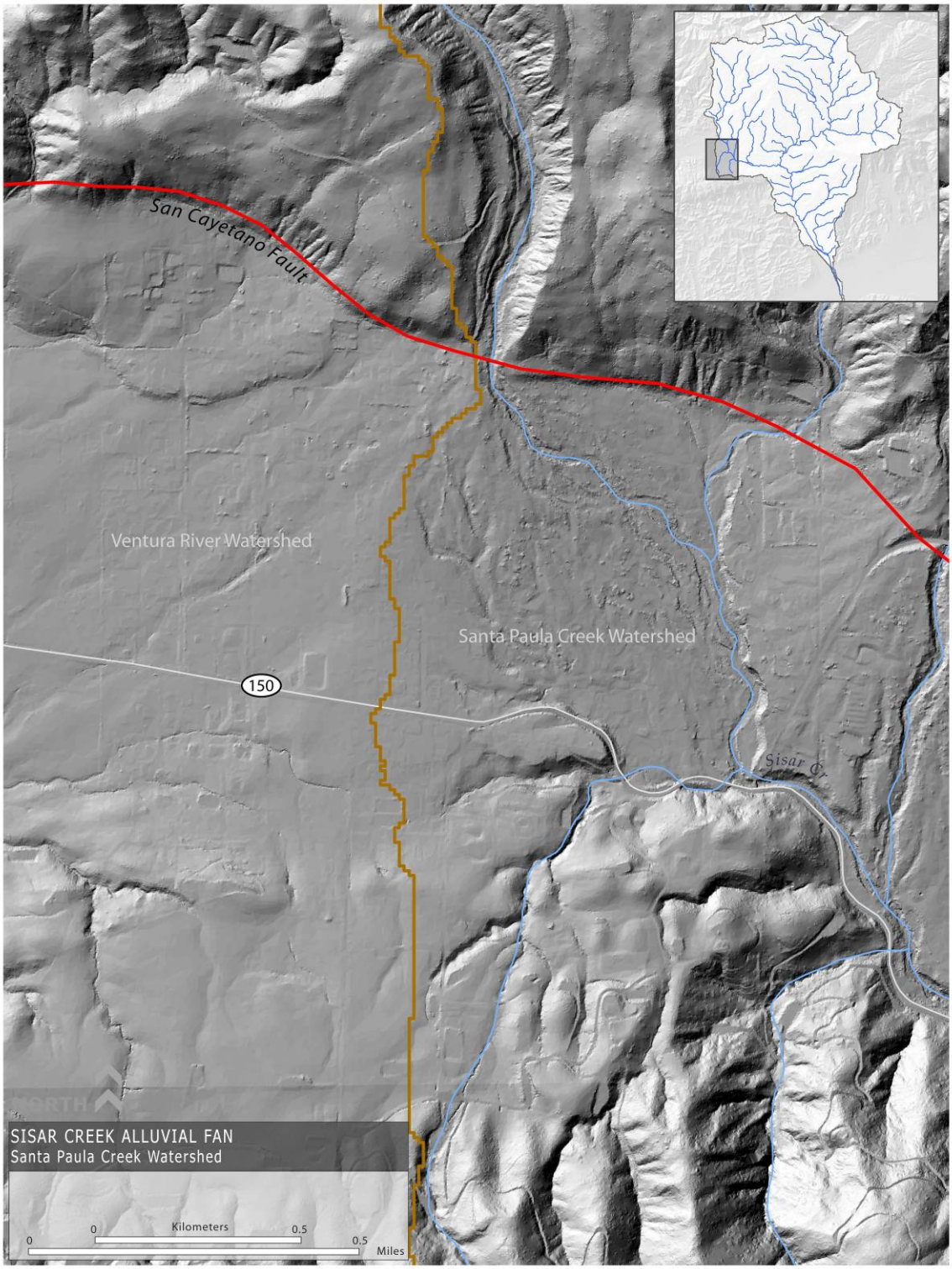


Figure 2-13. Sisar Creek (and, to the east, lower Bear Creek) at their emergence from the rangefront. A broad alluvial fan has developed from the high sediment load of these channels that cannot be transported along the lower gradient of the valley. Based on the pattern of channel features in the western half of this image, Sisar Creek has obviously flowed both east to Santa Paula Creek (as, at present) and to the west across the current watershed divide (irregular north-south brown line in figure).

Figure 2-14. Sandstone source in the eroding unconsolidated terraces flanking lower Santa Paula Creek.

Figure 2-15. Sandstone interbeds of the shale-dominated Cozy Dell Formation (foreground). The Coldwater Sandstone formation is visible in the middle distance along the same ridge.

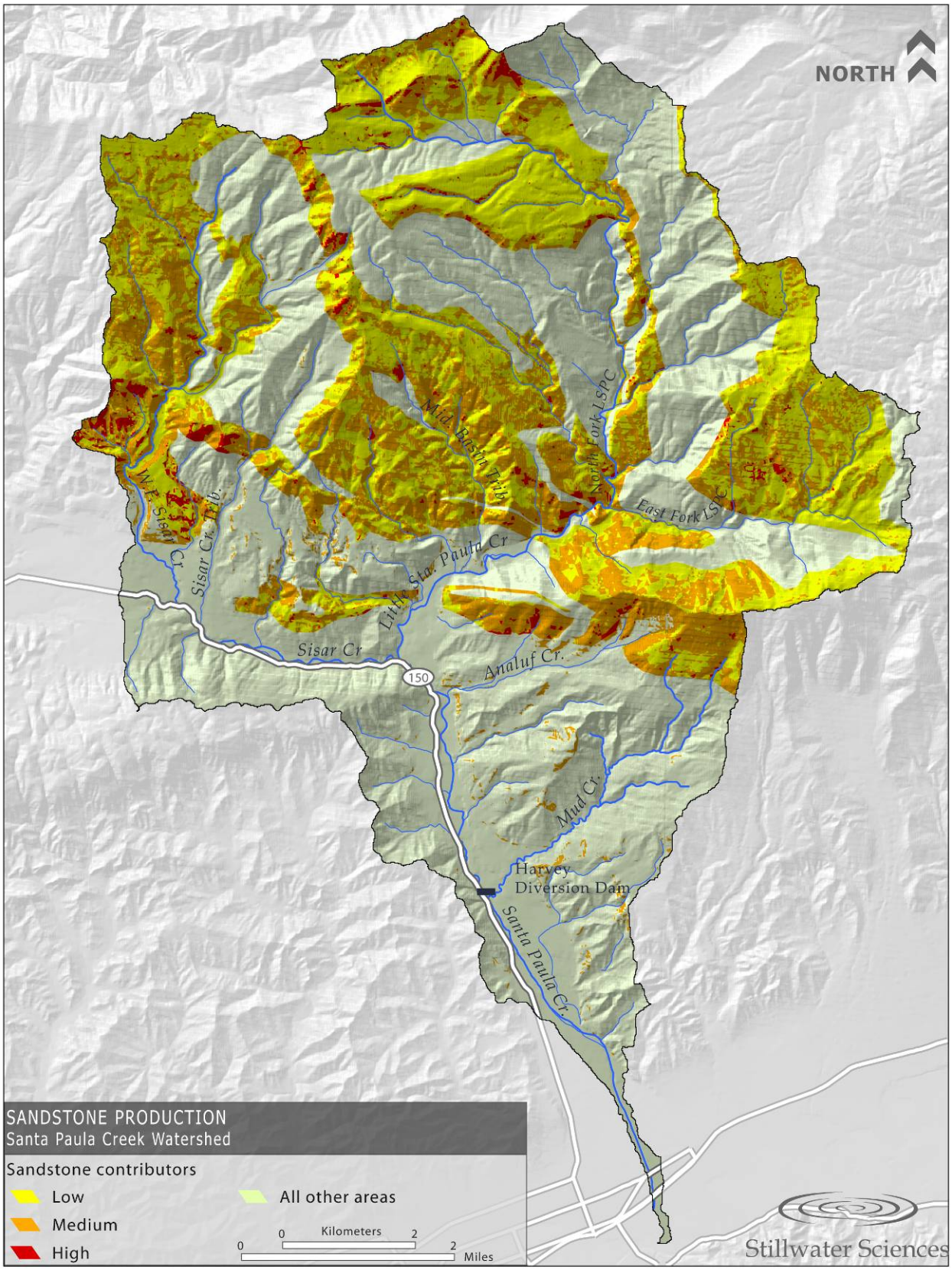


Figure 2-16. Sandstone production in Santa Paula Creek watershed.

Figure 2-17. Santa Paula Creek crossing of the San Cayetano fault. Dashed lines show mapped strands; the dotted line is unmapped but is strongly suggested by the pattern of bedrock outcrops. Over the course of about 1 km, the transported sediment load of the channel is apparently reduced by a substantial fraction, as indicated by the width of the active meander/braid belt upstream of each valley narrowing. Assessing tectonic-related changes in transport through this reach is confounded by the correspondence of the southern-most fault crossing with the Highway 150 bridge.

Figure 2-18. Recent scour of Santa Paula Creek associated with bedload-transport-restricting structures and presumably expressing an imbalance between transport capacity and sediment supply (a) below the lower Highway 150 crossing; and (b) below the Harvey Diversion Dam.

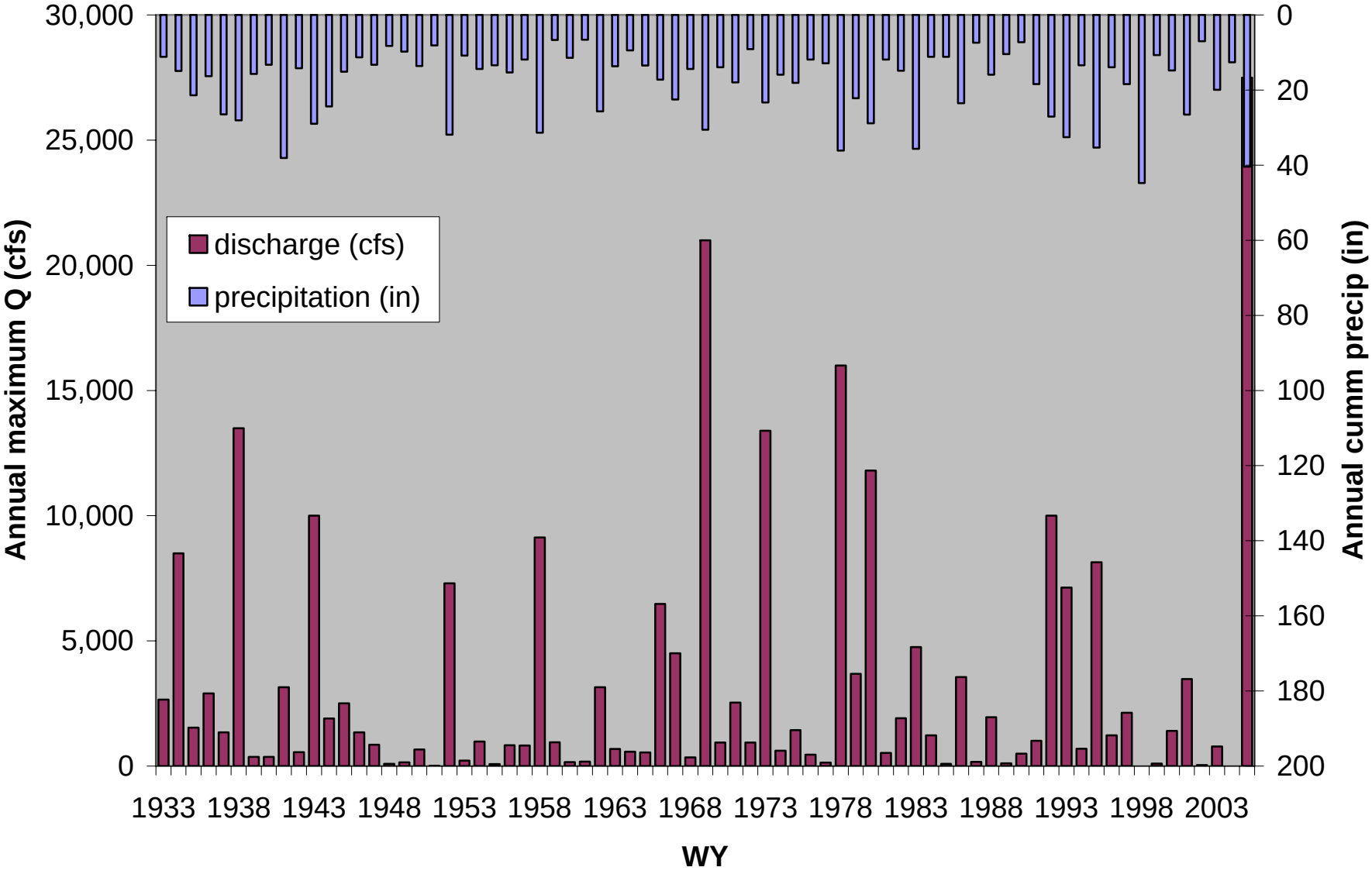


Figure 3-1. Annual discharge and precipitation data for Santa Paula Creek at Santa Paula. Discharge is from USGS gage 11113500 and precipitation is from VCWPD gage 254A.

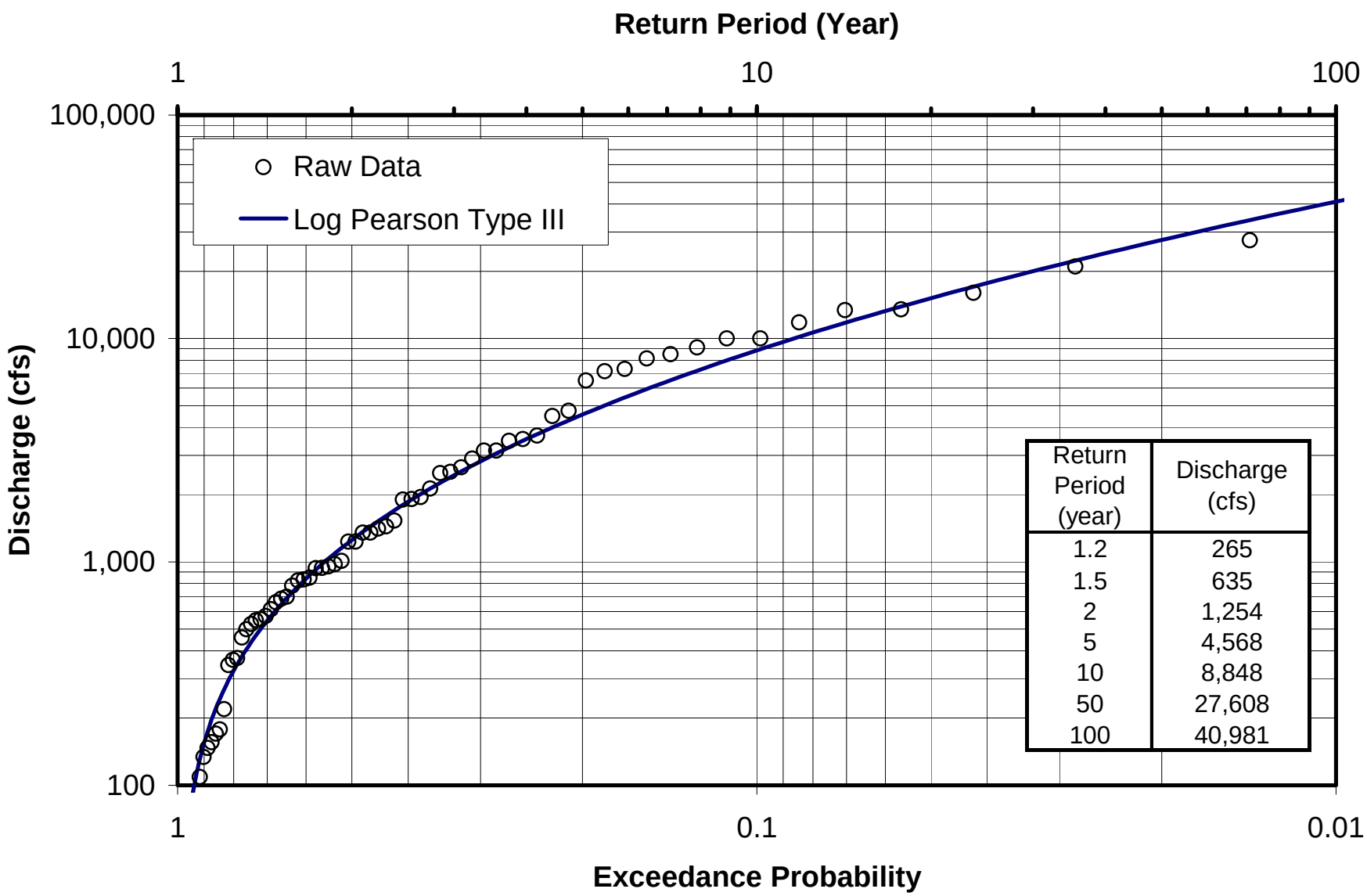


Figure 3-2. Flood frequency curve for Santa Paula Creek at Santa Paula (WY 1933–2005) [USGS gage 11113500].

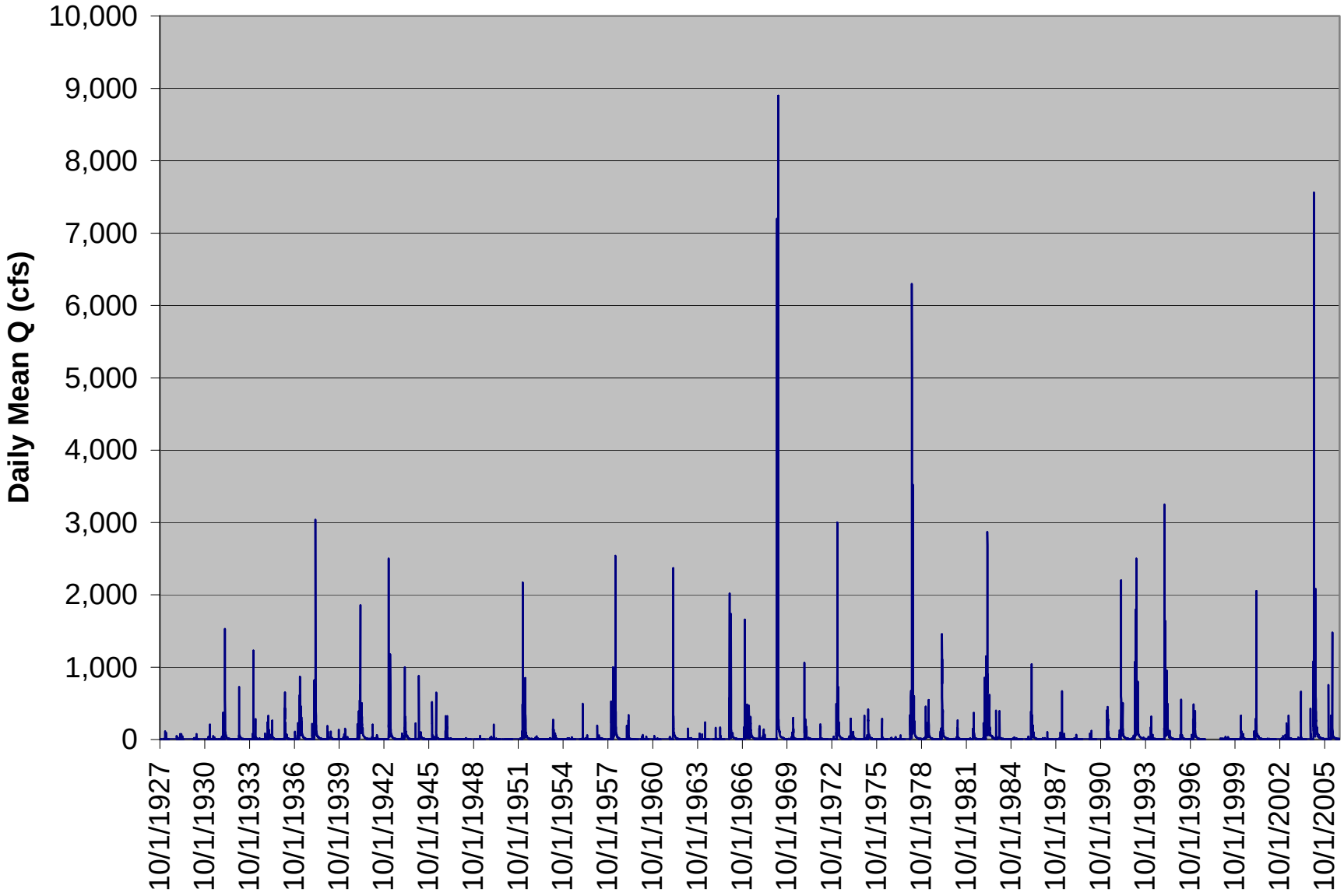


Figure 3-3. Daily mean discharge Santa Paula Creek at Santa Paula [USGS gage 11113500].

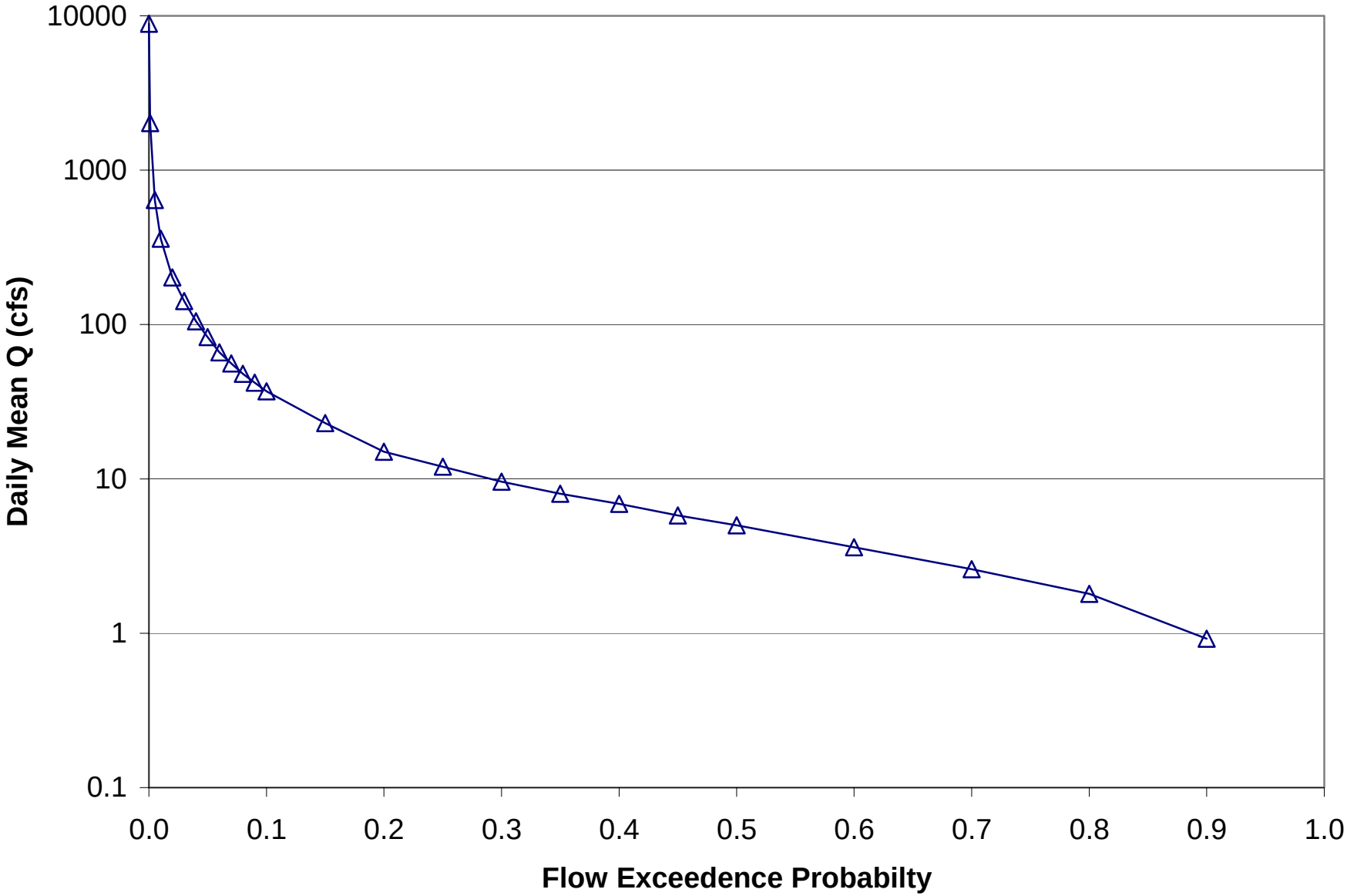


Figure 3-4. Daily mean flow exceedence probability for Santa Paula Creek at Santa Paula [USGS gage 11113500].

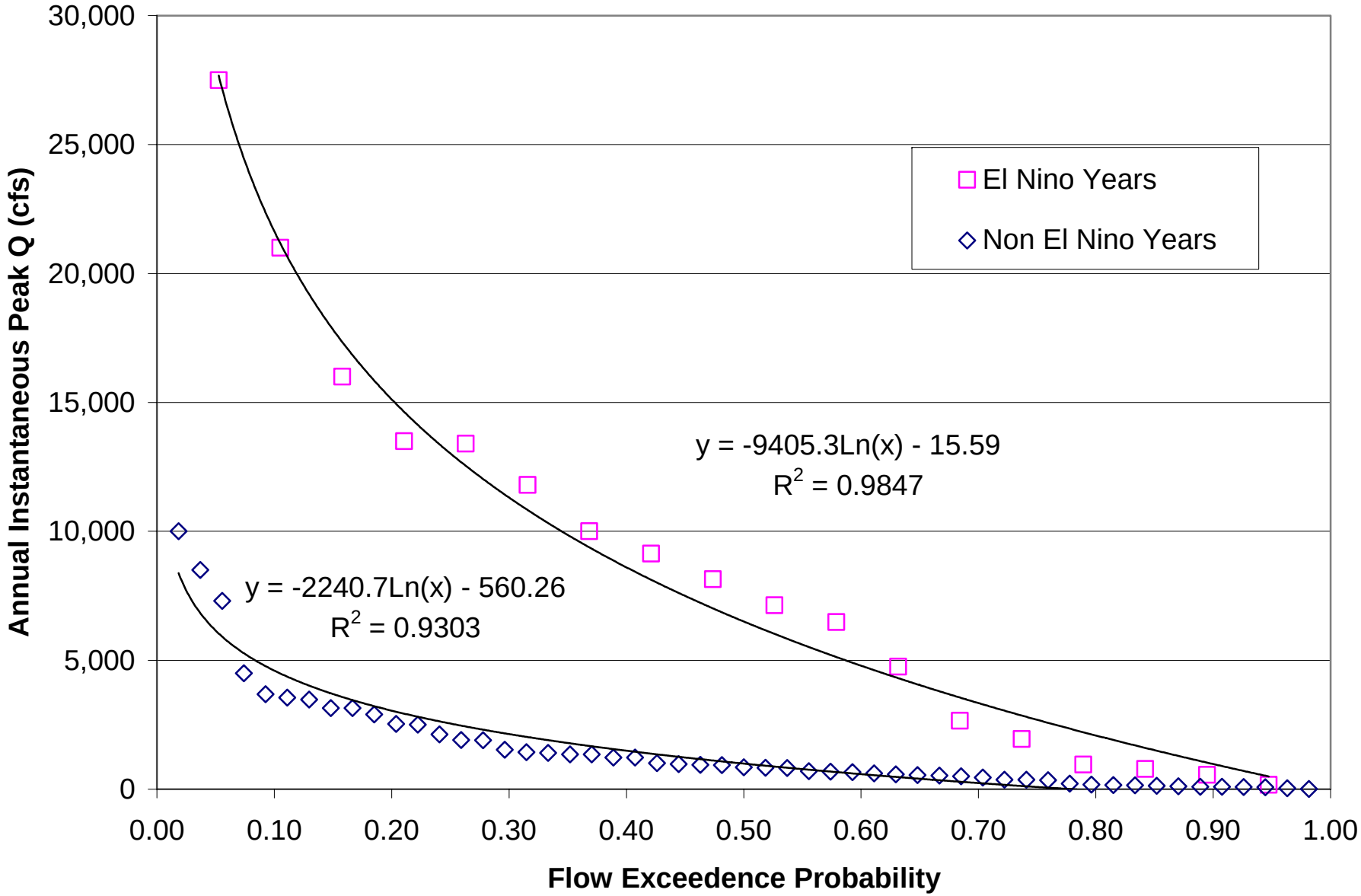


Figure 3-5. Flow exceedence for El Nino/non-El Nino years (WY 1933–2005) for Santa Paula Creek at Santa Paula [USGS gage 11113500].

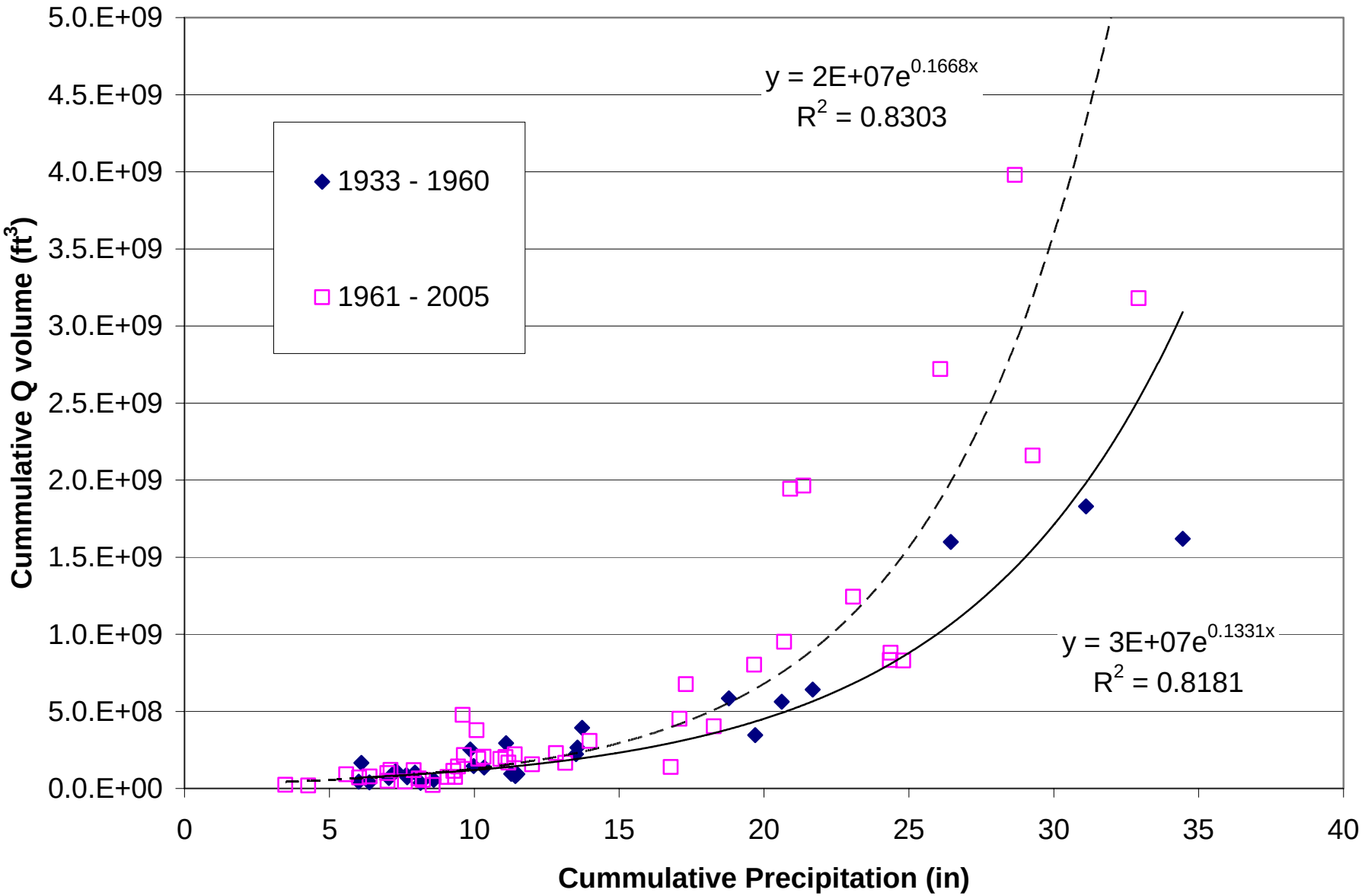


Figure 3-6. Relationship between cumulative discharge and precipitation (WY 1933–2005) for Santa Paula Creek at Santa Paula [USGS gage 11113500].

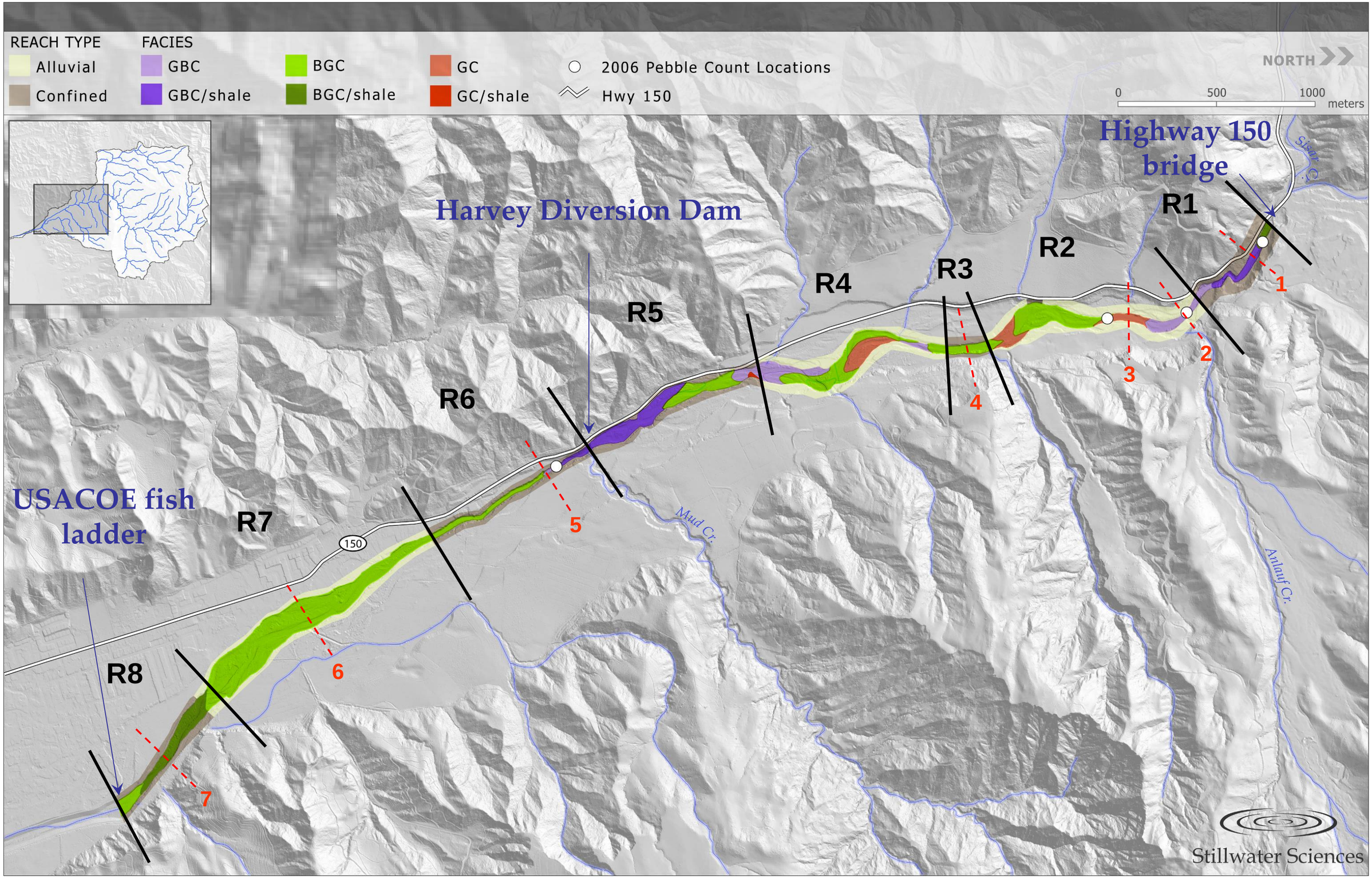


Figure 3-7. Plan view of the Santa Paula Creek watershed from the Highway 150 bridge crossing to the USACOE fish ladder including a facies map and pebble count locations (points), reach delineations (solid lines), and cross-sections where critical discharge for mobilizing coarse sediment was calculated (dashed lines).

Figure 3-8. At the upstream end of R1 looking downstream

Figure 3-9. In the middle of R2 looking downstream.

Figure 3-10. At the upstream end of R3 looking downstream.

Figure 3-11. In the middle of R4 looking downstream.

Figure 3-12. In the middle of R5 looking downstream.

Figure 3-13. At the upstream end of R6 looking downstream.

Figure 3-14. In the middle of R7 looking downstream.

Figure 3-15. At the downstream end of R8 looking upstream.

Figure 3-16. Looking upstream at Highway 150 bridge.

Figure 3-17. Looking upstream at Highway 150 grade control structure and channel incision.

Figure 3-18. Looking downstream at the Southern Pacific Transportation Company (SPTC) truss bridge.

Figure 3-19. Looking downstream at Telegraph Avenue bridge.

Figure 3-20. Looking upstream at damage to Harvey Diversion Dam following 2005 storm event.

Figure 3-21. Looking downstream at Harvey Diversion Dam fish ladder.

Figure 3-22. Looking upstream at US Army Corp of Engineers (USACOE) fish ladder.

Figure 3-23. Looking downstream at right bank spur dikes in R4.

Figure 3-24. Looking downstream at channel realignment in R5.

Figure 3-25. Looking downstream at boulder steps below Harvey Diversion Dam.

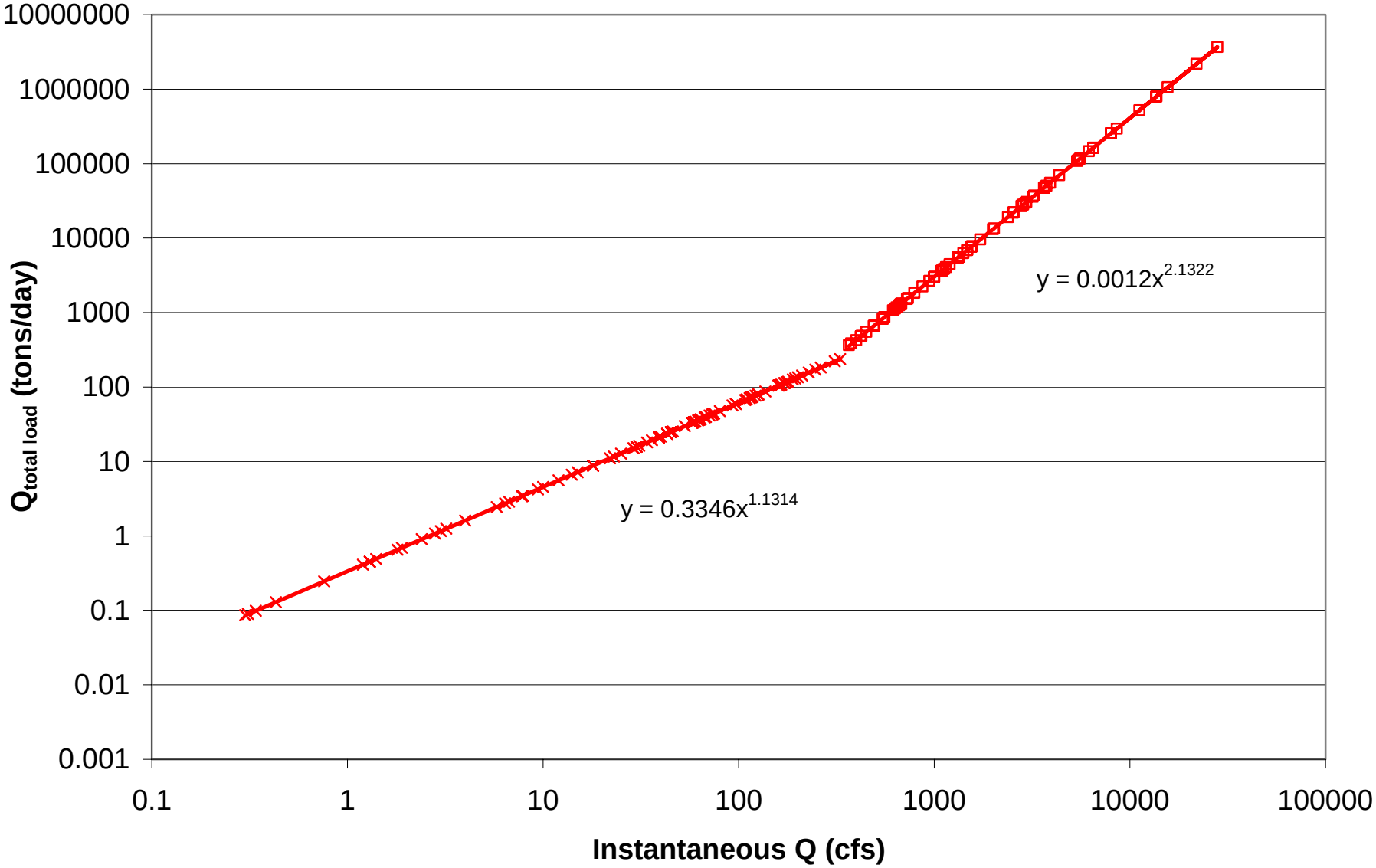


Figure 3-26. Sediment rating curve (suspended sediment load + bedload) for Sespe Creek at Fillmore [USGS gage 11113000] used to determined sediment yield within Santa Paula Creek.

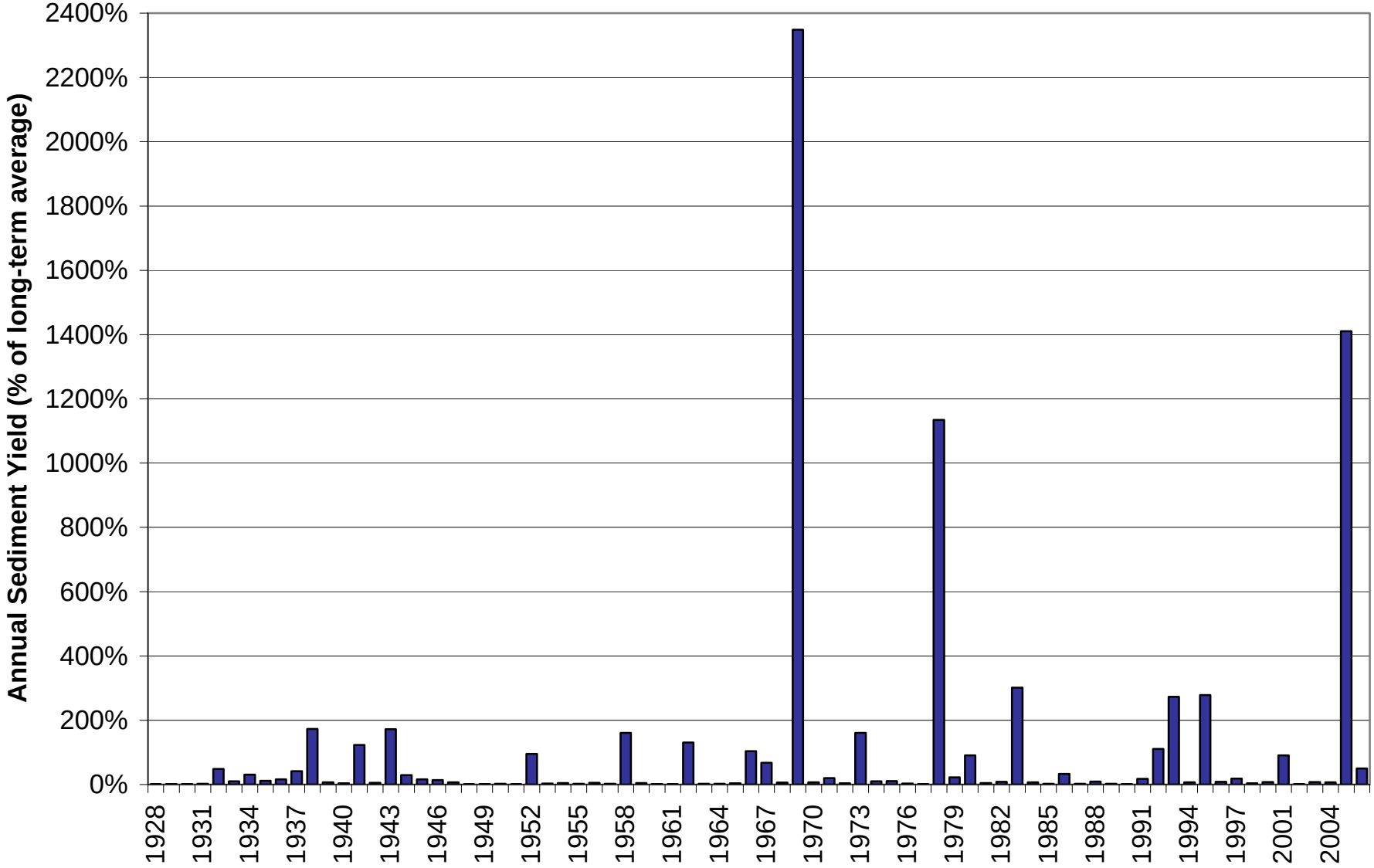


Figure 3-27. Calculated total sediment yield (as percentage of the long-term average) for Santa Paula Creek at Santa Paula [USGS gage 11113500] using Sespe Creek at Fillmore [USGS gage 11113000] sediment rating curve.

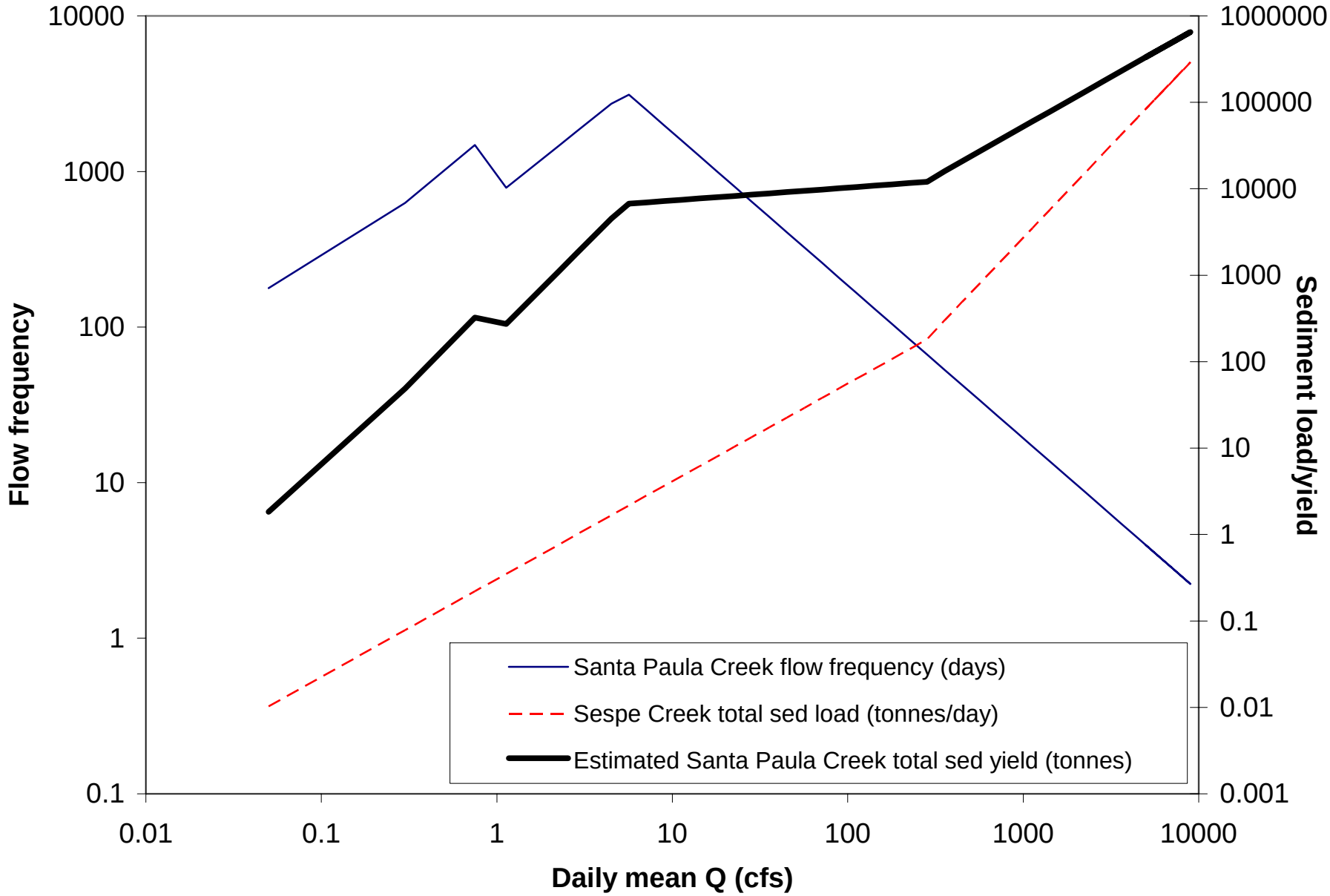


Figure 3-28. Flow frequency and total sediment load (suspended sediment + bedload) as functions of daily mean flow for Santa Paula Creek at Santa Paula [USGS gage 11113500] and sediment discharge for Sespe Creek at Fillmore [USGS gage 11113000].

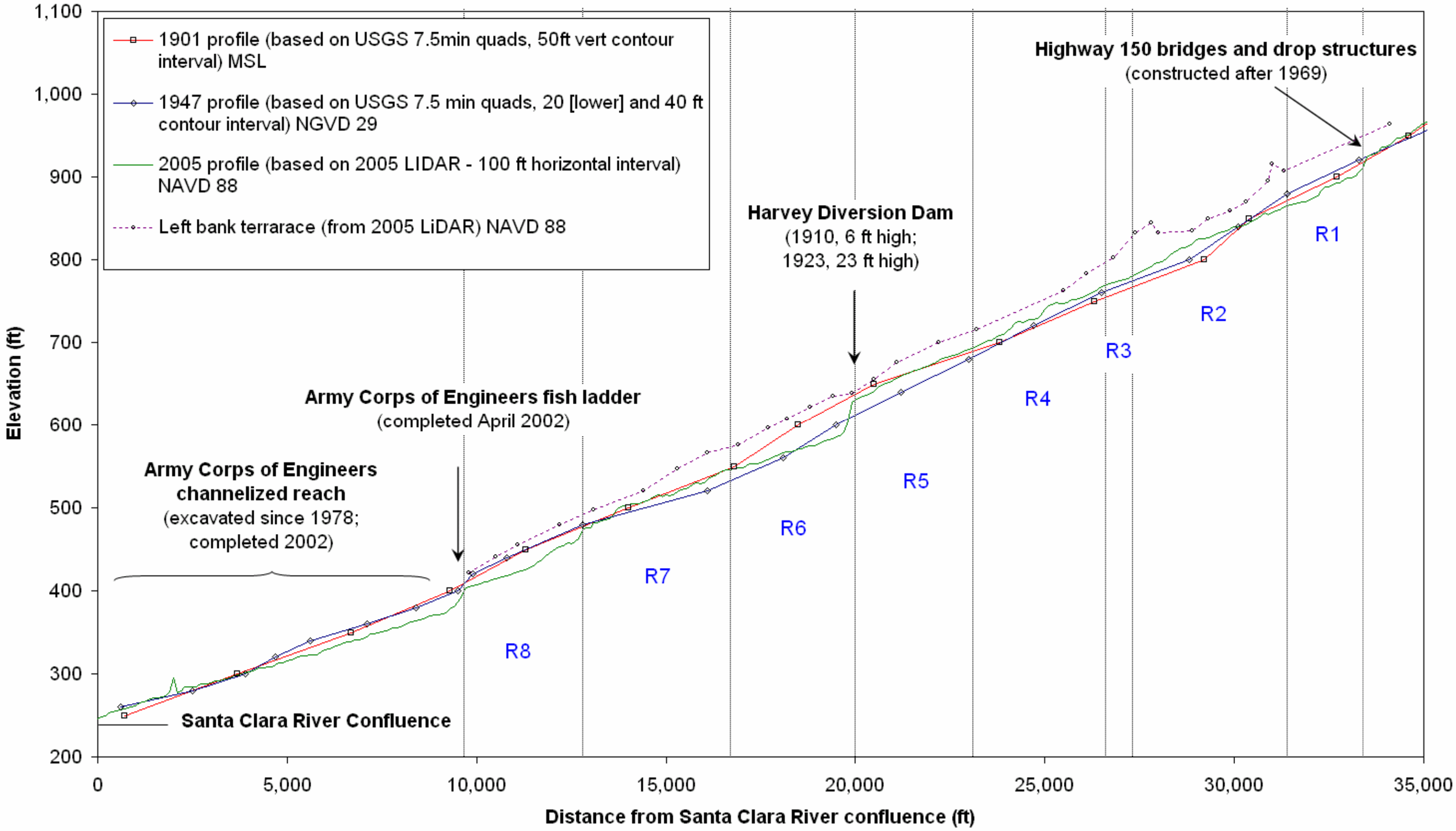


Figure 3-29. Longitudinal profiles (1901, 1947, and 2005) for Santa Paula Creek from the Highway 150 bridge to the confluence with the Santa Clara River.

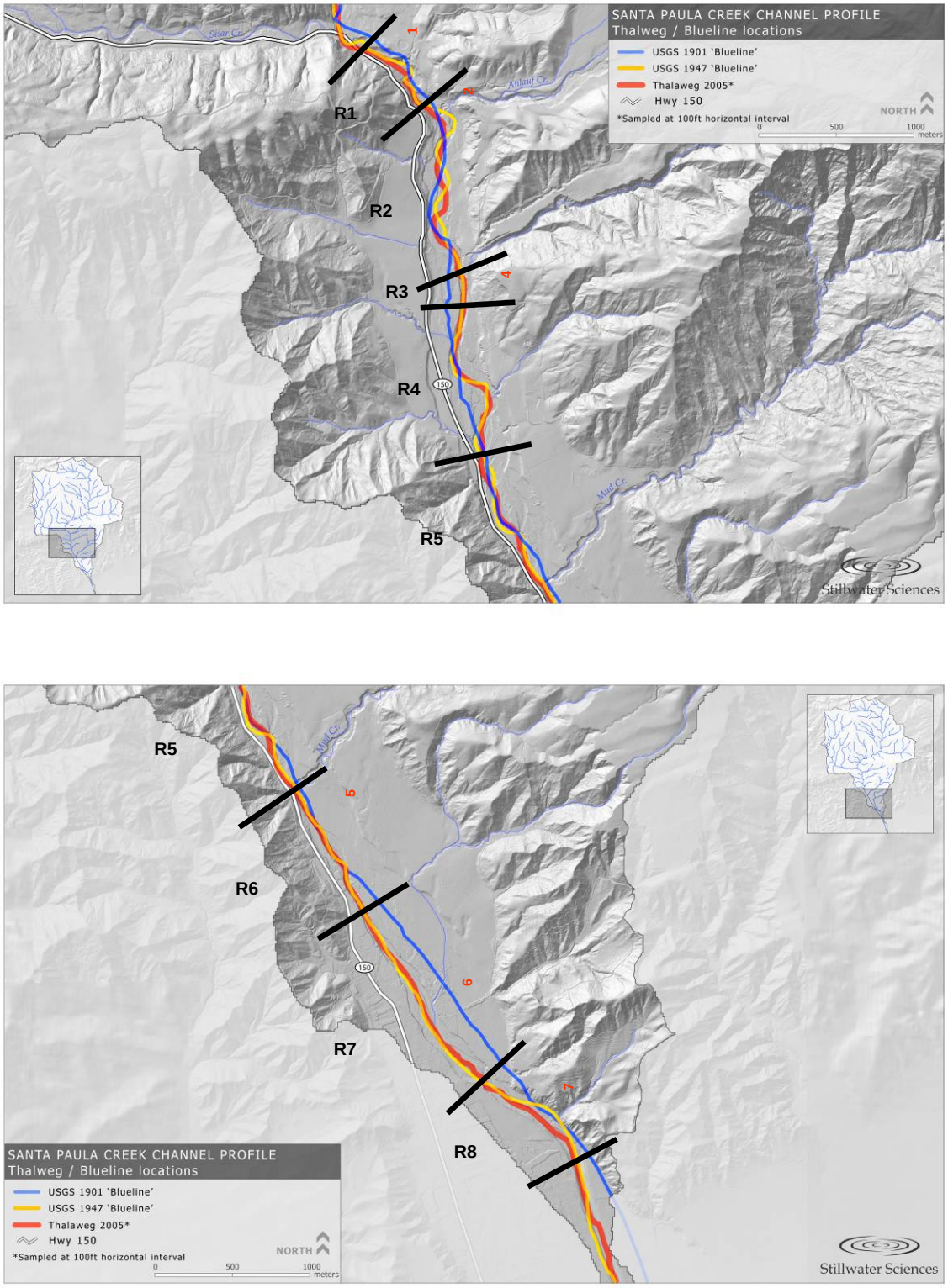
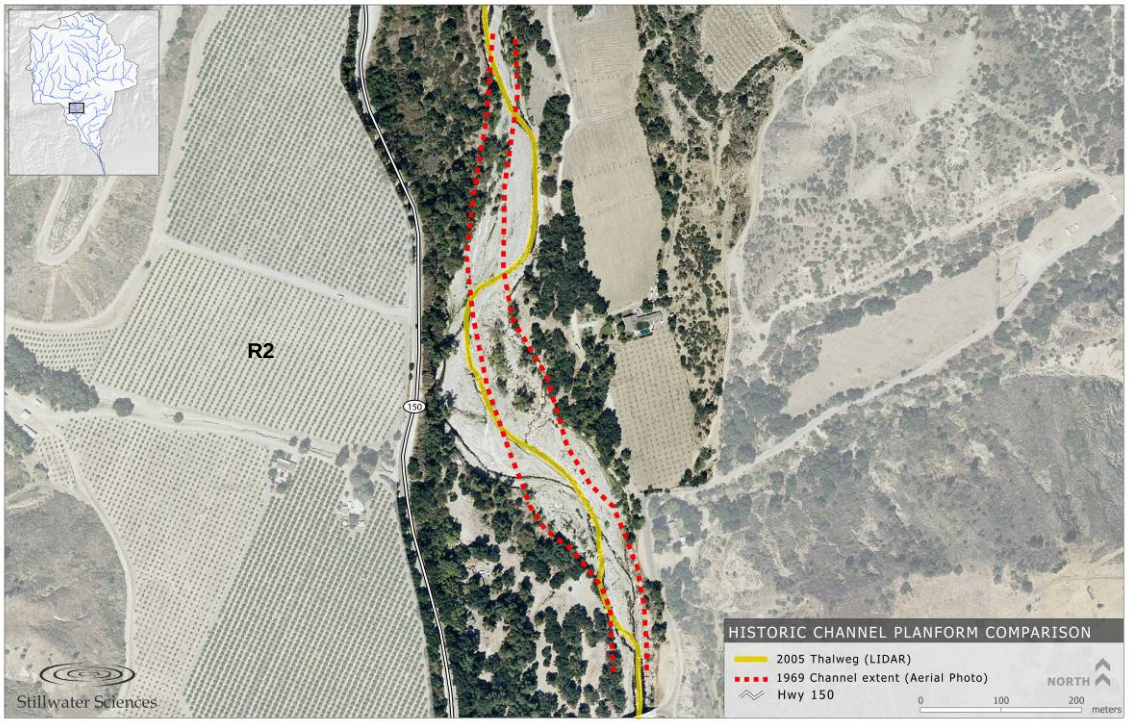


Figure 3-30. Historic (1901 and 1947) and current (2005) channel thalweg location from (a) the Sisar Creek confluence to Mud Creek confluence, and (b) the Mud Creek confluence to USACOE fish ladder.



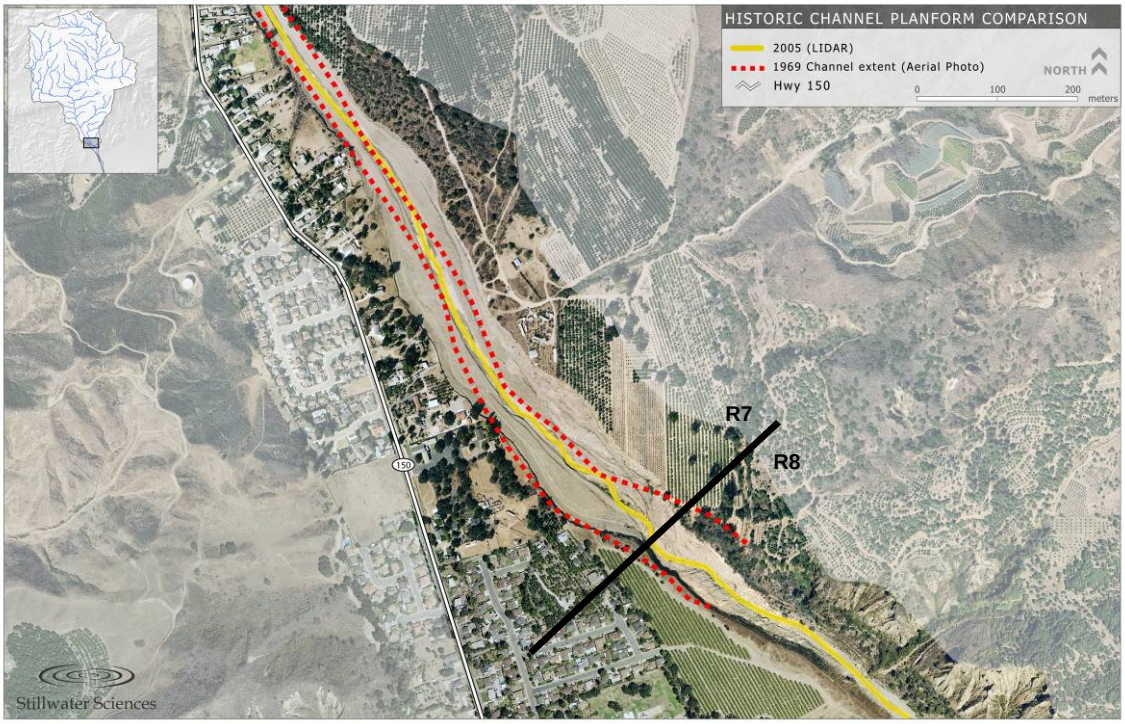
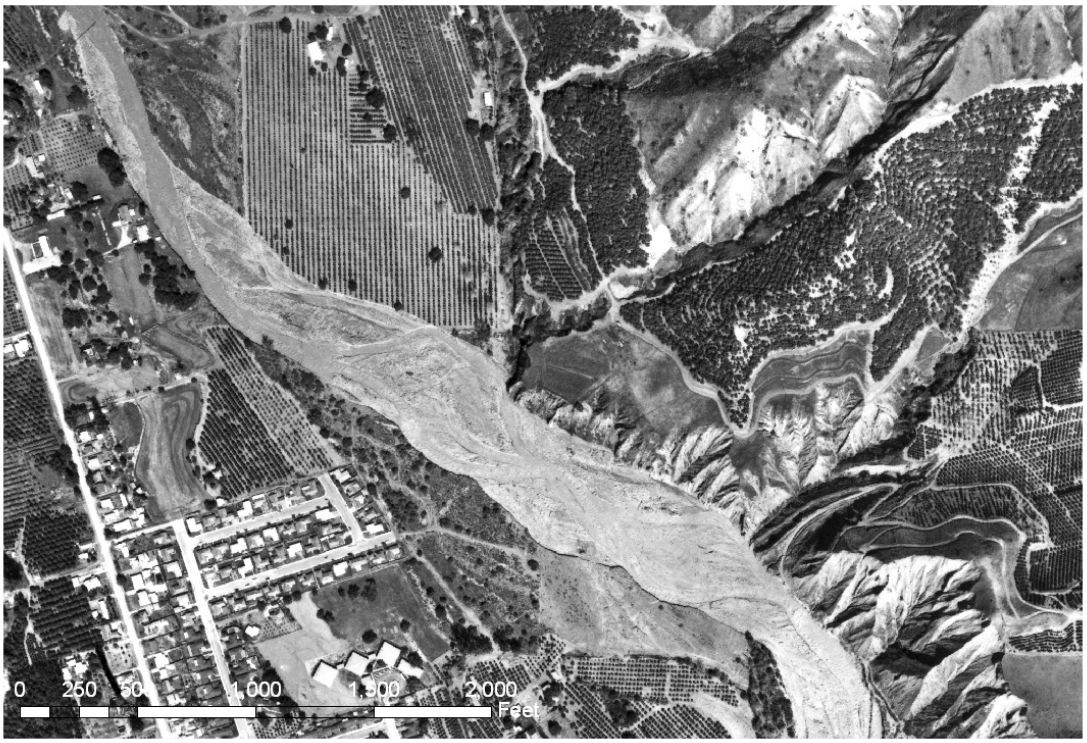


Figure 3-31. Historic (1969) and current (2005) channel width in (a) R2 and (b) R7/R8.



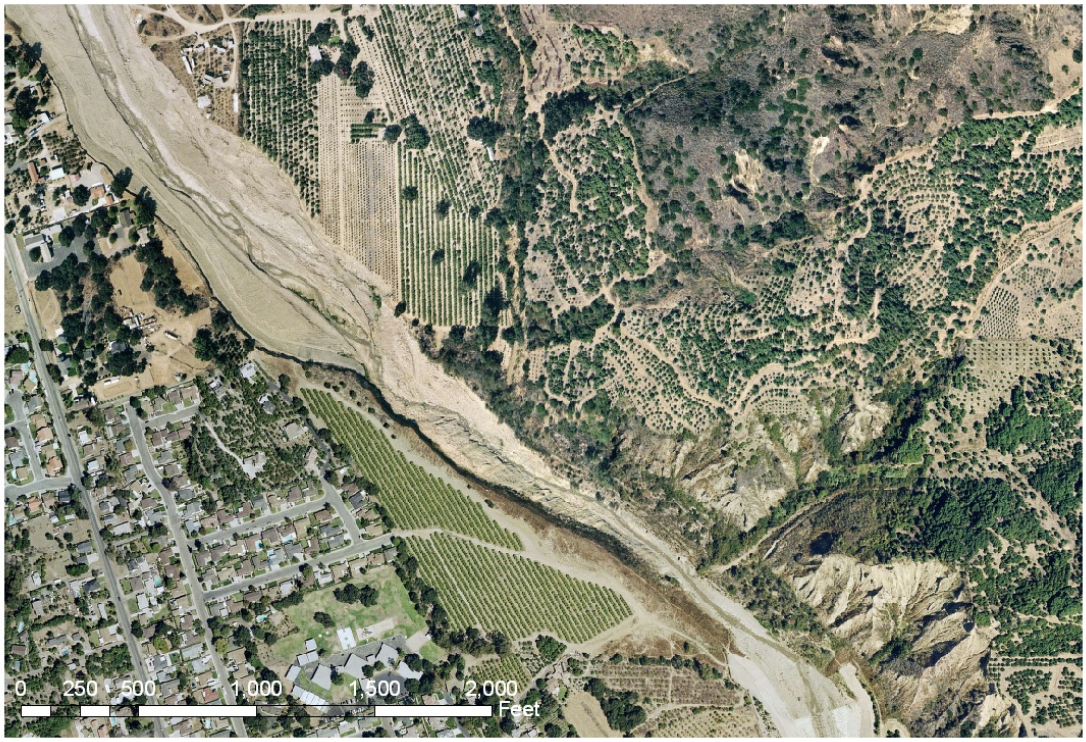


Figure 3-32. Aerial photographs of R8 in (a) 1969 and (b) 2005.