Soil-Geomorphic and Geoarchaeological Investigations at the Tomato Springs Site

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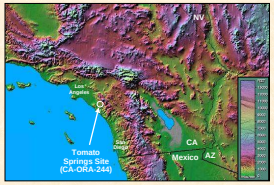
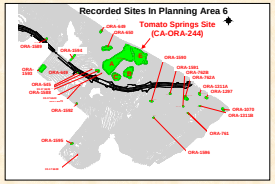
Introduction

A soil-geomorphic investigation was completed at the Tomato Springs site (CA-ORA-244), an important ethnohistoric village and prehistoric settlement located in the western foothills of the Santa Ana Mountains in southern California. The site is spread across the slopes and summits of two prominent ridges sandwiched between Bee and Round canyons. Soils on-site consist chiefly of the San Andreas (Typic Haploxerolls) and Cieneba (Typic Xerorthents) series.

This study was undertaken to help target archaeological excavations in the richest intact parts of the site. The slope classification of L. C. King (1957) was used to help explain artifact densities and distributions across the flat to moderately steep terrain of the site. Soil and topographic variability associated with different slope elements and associated geomorphic processes provided information that was helpful in interpreting the formation, alteration, and preservation of cultural deposits at the site.



Location of the Tomato Springs site in southern California.



The Tomato Springs site is the largest archaeological settlement in Planning Area 6, an area planned for a housing construction project.

Research Objectives

- Document and interpret the soil stratigraphy of the Tomato Springs site
- Assess degree of stratigraphic integrity on terraced hillslopes and eroded ridges
- Evaluate artifact density for different landscape positions and soils

Methods

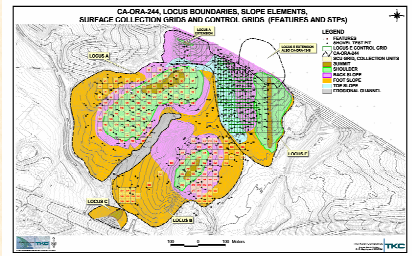
- Soils were described in 38 1-m² test pits and 19 backhoe trenches placed in different loci of the site.
- Artifact densities were calculated for each locus by slope element and soil horizon.

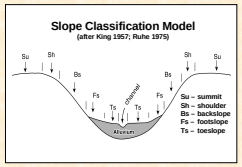
Northwest view of Locus A from Locus B. Agricultural terraces were built on the hillslopes.

South view of Locus B from Locus A.

Locus A, Test Pit 3 on summit: midden soil has high artifact density, but the A horizon is disturbed by bioturbation.

Locus A, Test Pit 32 on summit: midden soil is eroded, and high artifact density results from artifacts left as lag deposits on the surface.

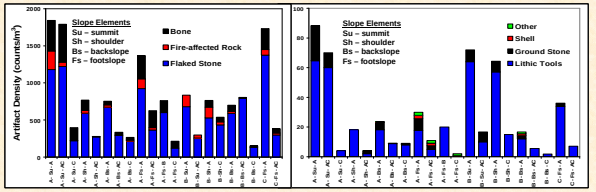




Artifact densities and distributions were analyzed in relation to these five slope elements, which were mapped onto the Tomato Springs site map (see map above).

Locus A, Test Pit 19 on footslope: thick A horizon has a high artifact density and high stratigraphic integrity.

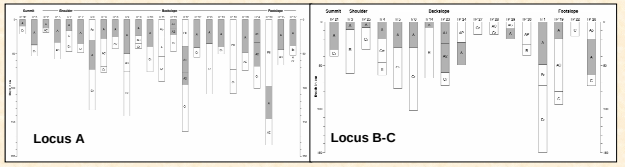
Locus A, Trench 13 on backslope: thin soils above bedrock on steeper slopes have low artifact densities.



Artifact densities for flaked stone, fire-affected rock, faunal bone, lithic tools, ground stone tools, shell, and other artifacts in Loci A-C by slope element and soil horizon. Highest artifact densities are in: (1) Loci A and C, (2) A horizons, and (3) summits and footslopes. Lowest artifact densities are in: (1) Locus B, (2) C horizons, and (3) backslopes.

Effects of Soil-Geomorphic Processes on Cultural Deposits

Slope Element	Dominant Geomorphic Processes	Artifact Density and Stratigraphic Integrity
Summit	- Sheetwash erosion - Seepage - Pedogenesis	- High artifact density - Patchy artifact lags and intact deposits exist
Shoulder	- Heavy sheetwash erosion - Soil creep	- Moderate artifact density - Upper A horizon stripped by sheetwash erosion
Backslope	- Sediment transport - Mass movement by flow, slide, slump, and creep	- Low artifact density - Artifacts subject to erosion and transport
Footslope	- Colluvial deposition - Redeposition by mass - movement and slopewash - Pedogenesis	- Moderate to high artifact density and integrity - Artifacts buried in thick colluvial deposits
Toeslope	- Alluvial deposition	- Low artifact density - Only found in Locus E



Soil stratigraphy of test pits and backhoe trenches.

Summary and Conclusions

- The intensity of human land use, as measured by artifact types and distributions, varies dramatically across the Tomato Springs site. Artifacts are concentrated in the A horizons of summits and footslopes, as well as in lag deposits on shoulder slopes. The thickest cultural deposits occur on footslopes.
- Erosion and modern agricultural terrace construction has disturbed parts of the site, especially the more elevated landscape positions. Cultural deposits are best preserved on colluvial footslopes, in alluvial valleys, and on the lower parts of agricultural terraces on the backslopes.
- King (1957) and Ruhe's (1975) slope classification provides a useful framework for making geoarchaeological assessments, especially at sites in hilly terrain such as the Tomato Springs site.

References Cited

King, L. C. (1957). The uniformitarian nature of hillslopes. *Transactions of the Edinburgh Geological Society* 17: 81-102.

Ruhe, Robert V. (1975). *Geomorphology: Geomorphic processes and Surficial Geology*. Houghton-Mifflin, Boston, Massachussetts.

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