

San Diego Association of Geologists (SDAG) One Stop Wonder (OSW) Field Trip
Meet 10:00am Saturday December 4, 2021
Lusardi Formation of Alpine: Evidence, Landscape and Setting
Leader Dr. Pat Williams

Location: <https://goo.gl/maps/MqfP7C6wh8yT8Jng7>

Parking Map (Calle De Compadres & South Grade Road, Alpine, CA)

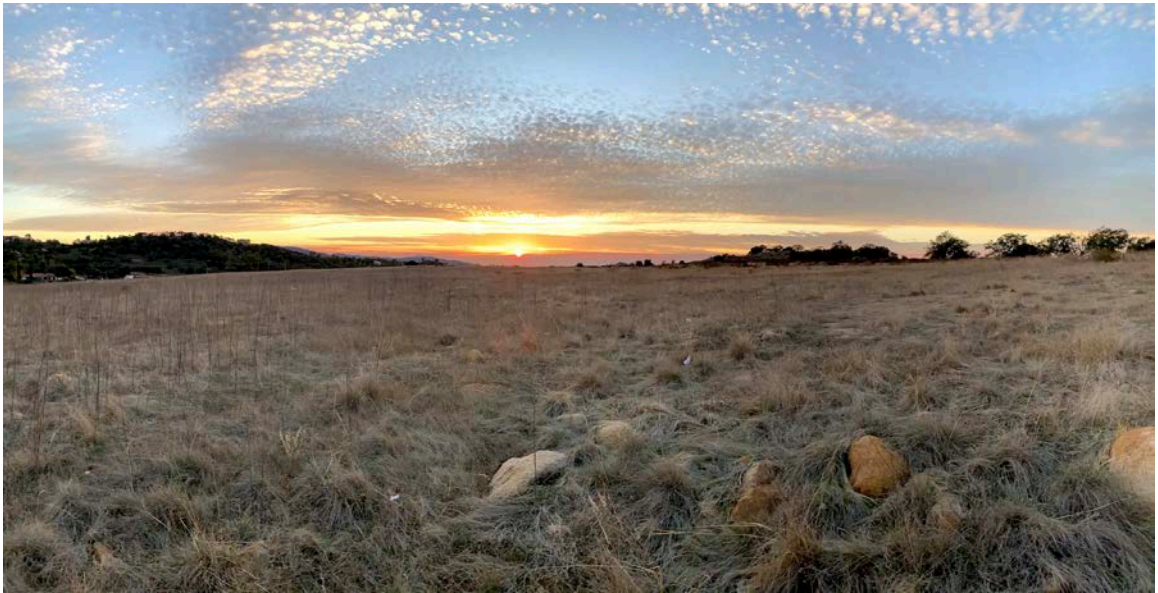


The Lusardi Formation was mapped and described in Alpine by Victoria Todd, (1980, 2004 – Figures 1, 2). In its type location near Rancho Santa Fe, the Lusardi is described as crudely bedded-to-massive cobble - boulder conglomerate with thin lenses of well-sorted, medium-grained arkosic sandstone (Nordstrom, 1970). Clast content includes quartzite, hornfels, silicified tuffs, breccias, quartz diorite, diorite, and gabbro. Nordstrom suggests that deposition in western areas was by fluvial and mass transport processes on alluvial fans. In western areas thicknesses can exceed 120m. In eastern areas (Poway, Alpine) the Lusardi is a shallow surface feature with mapped occurrences tracing plausible river geometries in Poway and Alpine. In one location (Wright's Field) all or most of a broad (up to 350m) river outline appears to be preserved with indications of relict thalweg and point bar features. The Lusardi is the oldest sedimentary formation of San Diego County and represents drainage from the Peninsular Range Batholith during the late Cretaceous ~ 80 to 100 MYBP interval (e.g. Kennedy, Kimbrough, Girty, Herzig, Abbott). The Lusardi Formation underlies deposits of the Cretaceous (Campanian) Point Loma formation (e.g. Kennedy 1975) and overlies intrusive rocks of the Peninsular Ranges Batholith that have cooling ages in the range of 100 to 110 million years (many authors, see discussion of Todd 1995). Preservation of a landscape dating from Lusardi time is not only rare and unique, it is unexpected and required special circumstances to persist so long in such a deeply weathered landscape.

- A Field Guide (in preparation) describes features of the Alpine Lusardi, summarizes literature, and introduces a few questions for discussion.
- Figures 1 to 3 of the guide, and sample photos are attached below



The Lusardi Formation underlies and defines much of the grassland extent of Wright's Field. Apparent point bar features in foreground and left background.



Native needle grass flourishes on nearly impermeable Lusardi Formation. Several lithologies of rounded boulders characterize the Lusardi (described at various sites), are meta-quartzite, hornfels, silicified tuffs, breccia, quartz diorite, diorite, and gabbro. All are believed to have local provenance. Trees on the right are Engelmann oak.



View of native grassland developed on Lusardi Formation at the park site, note slight upland associated with apparent point bar geometry on right horizon and positive topographic feature along Lusardi midline.

Todd 1980, Geologic Map of the Alpine Quadrangle (excerpt), USGS Prof. Paper 80-82

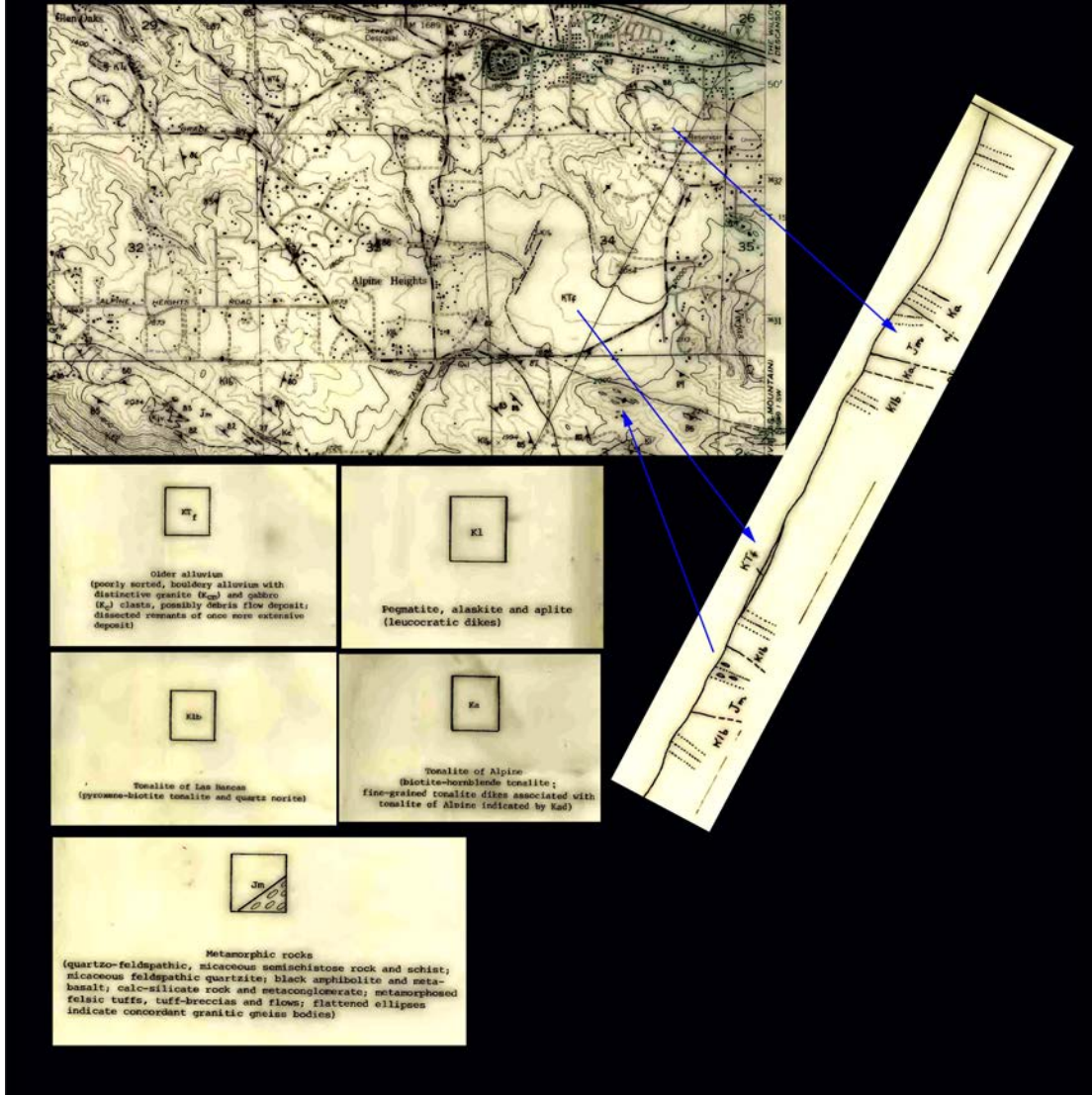


Figure 1- Victoria Todd (1980) Alpine quadrangle. “KTf” is identified as Lusardi Formation on Todd’s El Cajon sheet (2004). San Diego County proposes to construct a "regional active sports park" on the eastern most accessible (and widely visited) 27 acres of the Lusardi grassland and Engelmann Oak woodland.

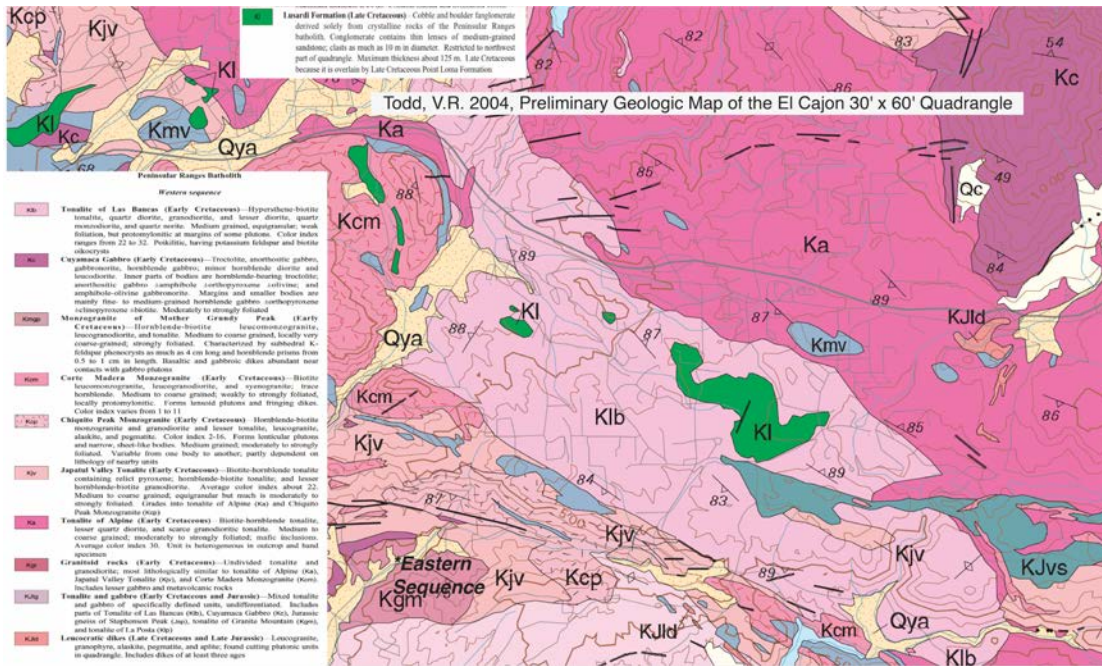


Figure 2- Excerpted from Todd (2004)

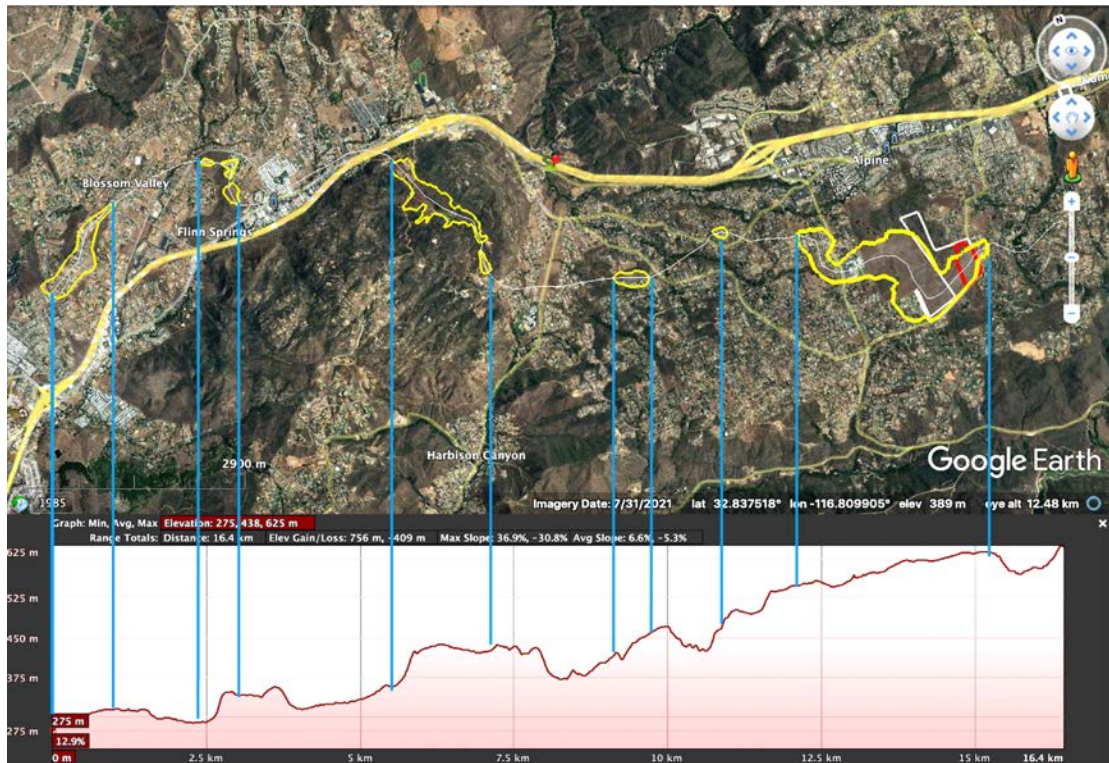


Figure 3- Cross section through Todd 2004 mapped Lusardi occurrences (outlined in yellow). Cross section has modest distortion due to length of interpreted stream geometry. Note apparent gradient (1%) gemdistortion
 Most of the topographic highs along the profile are within Todd's Lusardi occurrences and consistent with common inverted topography of the Lusardi. Net elevation change in the profile is 310m over 15k, a 2% gradient. The local extent, geometry and morphology of the overall feature support it's mapping as Lusardi. The 45-meter-deep channel of Viejas Creek, just east of the easternmost Lusardi occurrence suggests stream capture may have beheaded the active Lusardi stream course. Other major dips along the profile correspond with various San Diego River tributaries.