

Description: Extent of coastal sand dunes in the mid-1800s in central, southern and northern California. Attributes:

- FID: Unique ID
- Habitat: Habitat or land-use type
- Year: Date when T-Sheet or other historical resource was produced
- T_sheet: Name of historical map ('T-Sheet') or other resource used to map historical dune extent
- Area_km: Area in km²
- Shape_Area: Area in m²

Projected Coordinate System:

- CenCal and NoCal: NAD 1983 (2011) UTM Zone 10N
- SoCal: NAD 1983 (2011) UTM Zone 11N

Methodology:

High-resolution scans of T-sheets (n = 140) produced between 1845 and 1934 were obtained from the NOAA Index of Non-Georeferenced Manuscripts and the National Archives Records Administration (NARA). Following a similar approach to Grossinger et al. (2011), who used T-sheets to map the historical extent of coastal wetlands in southern California, we generated a historical inventory of coastal sand dunes through a systematic process of georectification, vectorization, interpretation, and classification.

North American Datum (NAD) 1927 graticules spaced at one-minute intervals were used to digitally align the T-sheets, with an average of 11 control points used to georeference each map. The mean root-mean-square-error (RMSE) derived from these control points was 0.000049 ± 0.000030 decimal degrees (approximately 5 ± 3 m, mean $\pm$ SD) indicating low levels of distortion. The T-sheets were then reprojected to NAD 1983 (2011) using ArcGIS Pro software (version 3.2.2; Esri, Redlands, California, USA). Distinct corresponding features (i.e., road intersections, rocky outcrops, buildings) identified in contemporary aerial imagery (NAIP 4-Band Imagery) downloaded from the NOAA Data Access Viewer website (<https://coast.noaa.gov/dataviewer>) were then used to evaluate the positional accuracy of a representative sample of T-sheets (n = 66) from across California using five control points per map (RMSE = 8.16 ± 3.42 m). Unfortunately, every T-Sheet could not be evaluated this way due to a lack of corresponding features, especially in rural areas of central and northern California with no urban centers. However, given the consistency of our approach and geographical spread of the maps that were evaluated, we believe the T-sheets can be considered broadly accurate to around 10–20 m.

In cases where T-sheets were unavailable, damaged, or insufficiently detailed, the historical locations and extents of coastal dunes were determined and/or reviewed using additional resources. This includes early aerial photographs obtained from the University of California Santa Barbara (UCSB) Library, oblique aerial images and terrestrial photographs obtained from public libraries and local historical societies, regional-scale maps of dune extent (Cooper, 1967; Zeller, 1962), historical topographic maps produced by the U.S. Coast Guard and U.S. Geological Survey (USGS), and geological maps produced by the USGS, California Geological Survey, and Dibblee Geology Center. While many of these resources were obtained in formats containing geospatial information (e.g., GeoTIFF), several maps and photographs required georectification using latitude/longitude graticules or fixed, physical features identifiable in contemporary imagery.

Once the historical maps and photographs were georeferenced, vectors of different habitat types were created using manual (heads-up) digitization. In cases where T-sheets overlapped, earlier maps were relied on to resolve differences, except when later maps were more detailed (Grossinger et al., 2011). Although a full suite of coastal environments is shown in T-sheets, we focused on mapping coastal dunes and related features. In total, over 1,500 polygons were mapped, interpreted, and classified into 11 different habitat types. This includes active dunes, stable (vegetated) dunes, and relict dunes (i.e., those formed over Holocene or Late Pleistocene), wetland environments (i.e., swales), grassland and/or forested areas, and infrastructure (i.e., buildings and roads) as well as 'transitional' environments which, due to their location, environmental setting, and proximity to sediment source, may have supported ephemeral dune systems. These transition zones include spits and barriers close to river mouths ('Estuary–Beach' environments), beaches supporting incipient dunes without a clearly defined foredune ('Beach–Dune' environments) or at the base of coastal bluffs ('Dune–Bluff' environments), and ephemeral wetlands located within or adjacent to dune fields ('Dune–Wetland' environments).

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