

# A GIS TO SELECT PLANT SPECIES FOR EROSION CONTROL ALONG CALIFORNIA HIGHWAYS

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## Abstract

Through road construction and maintenance activities, the California Department of Transportation (Caltrans) actively manages roadside rights-of-way that transect California's 41 million hectares (101 million acres), spanning over 3,000 meters of elevational change from seashore to subalpine. State and federal highways are grouped into 12 districts, each encompassing from one to 11 of the state's 58 counties. District personnel are typically responsible for implementing site-specific adaptations of general statewide guidelines for short- to long-term erosion control following construction or storm damage. Many erosion control projects involve reestablishing vegetation through seeding where the precarious life stages of germination and establishment are controlled by both unpredictable short-term weather events and often physically inappropriate seedbeds. Many revegetation failures result from improperly siting species such that individual plants are expected to germinate, grow, and persist in locations or on topographic aspects that present physical extremes in solar radiation, temperature, precipitation, surface water flow, or wind beyond their genetically-determined physical tolerances. Each district includes enough environmental heterogeneity that revegetation using a few, district-wide seed mixes will not adequately meet the need for erosion control among diverse project sites. Consequently, a geographic information system (GIS) is being developed which allows employees to rapidly access lists of plant species for revegetation that are both ecologically appropriate for the project site and potentially useful in minimizing erosion from roadcuts and roadsides. This GIS uses hydrologic units of CALWATER at 1:24000 as a means to link physiographic and climatological data together with presence or absence of selected plant species in each hydrologic unit. Plantclimate classifications follow the 19 general plantclimates depicted on the California Plantclimates map devised by the University of California Cooperative Extension Service in 1967, and revised in 1979. These 19 general plantclimates are being refined using elevation contours and topographic aspects derived from digital elevation models to allow assignment of different plantclimates to portions of hydrologic units that exhibit steep elevational gains or considerable landform diversity. Through the overlay of other data depicting county boundaries, roads, and places, users are able to locate project sites, query the plant species climate matrix, and export data tables to spreadsheets or reports. Guidebooks that index the same plant species climate matrix through a standard *route+county+mile/km* georeferencing system make these data available to district personnel in another format as well.

**Key Words:** Revegetation Specifications, Plants, Climates, Geographic Information Systems, Caltrans