FIELD TRIP TO OBSERVE NATURAL AND RESOURCE MANAGEMENT-RELATED EROSION IN FRANCISCAN TERRANE OF NORTHWESTERN CALIFORNIA

INTRODUCTION

by

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Combinations of rock types, topographic and tectonic settings, climates, and land uses in the geologically youthful Coast Ranges of northwestern California are conducive to exceptionally rapid rates of erosion. Compilations of suspended-sediment discharge records (Judson and Ritter, 1964; Curtis and others, 1973) and landslide mapping (Radbruch-Hall and others, 1976) suggest that, despite its generally dense natural vegetal cover, this is one of the more actively eroding regions in North America. The entire North Coast region is quite erodible but local differences in proximity to major rivers and physical properties of underlying rocks (particularly the degree of tectonic shearing) result in visibly different topography. Different areas appear to have been sculpted by different erosional processes and to display different types and amounts of erosion following storm-, fire-, and resource management-induced vegetation and ground-surface disturbance.

Correspondence between terrane units, altitude, and stream sediment yields in the Coast Ranges is imperfect. This imperfection reflects in part the limited time available for the landscape to adjust to differences in bedrock erodibility. Much of the northern Coast Ranges was not emmergent until after Miocene time, and the entire region experienced complex crustal deformation throughout Neogene and Quaternary time (Wahrhaftig and Birman, 1965, pp. 321-326). The activities of man have also contributed to the imperfect correspondence between terrane units and stream-sediment yields.

The Coast Ranges are rich in timber, grazing, recreation, water, and fishery resources. Locally, significant mineral and geothermal resources are also present. Natural rates and processes of erosion severely restrict effective utilization of some of these resources and create potential resource utilization conflicts. For example, narrow valleys subjected to frequent flooding and hillslopes susceptible to landsliding cause considerable difficulty in locating, constructing, and maintaining ranch and timber access roads in ways that do not jeopardize water quality and fishery resources. Some past management actions have not fully considered these restrictions and have resulted in landscape modifications that significantly increased hillslope erosion and adversely modified stream channels. Recent management actions, particularly with regard to timber harvest, have generally been more carefully tailored to specific site conditions in order to lessen the potential for management-induced erosion. Additionally, some initial steps have been taken to repair erosion damages associated with past road construction and timber harvest.

Much of the public discussion that led to the expansion of Redwood National Park concerned the degree to which the harvest of old-growth redwood forest changed the amount and type of erosion in this naturally unstable landscape during the six major flood-producing storms of the previous 30 years. Considerable attention was also focussed on the manner in which

recently accelerated erosion and deposition had modified or threatened to modify aquatic and riparian resources of the Park; attention was focussed most closely on Park resources within the drainage basin of Redwood Creek.

Press accounts of apparently widely diverging professional opinions about application of fundamental hydrologic and geomorphic principles to Park protection issues have led some Cordilleran Section members to express interest in personally viewing field conditions in the Redwook Creek basin during the 1979 Spring meeting in San Jose, California. However, Redwood Creek is a long distance from San Jose, and travel to and from that basin provides numerous opportunities to discuss other conflicts between resource utilization, protection, and preservation in the northern Coast Ranges. Therefore, we have planned this trip around a more regional theme--natural and resource management-related erosion in Franciscan terrane of northwestern California. The purpose of the trip and the articles included in this guidebook is not to assign blame or to choose sides in these resource conflicts; rather, our purpose is to suggest that our evolving understanding of the geology and geomorphology of northwestern California may help to minimize future conflicts in this area.

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