

DISCUSSION¹**"Erosion on Logging Roads in Redwood Creek, Northwestern California,"
by Raymond M. Rice²***Randy Klein, Vicky Ozaki, Greg Bundros, and Mary Ann Madej³*

We are pleased to acknowledge Dr. Rice's effort to evaluate the effectiveness of the California Forest Practice Rules (FPRs) in preventing erosion on forest roads. He makes several valid points regarding improvements in California forest practices with passage of the Z'berg-Nejedly Forest Practice Act of 1973 and subsequent additions. However, we feel the author's conclusions regarding the efficacy of California's Forest Practice Rules are unfounded based on the data he presents.

A serious limitation in Dr. Rice's study is the fact that he bases much of his conclusions on the claim that the winters of 1995-1997 (just prior to his study period) were severe enough to adequately 'test' current road construction and maintenance practices. Previous road erosion studies cited by Dr. Rice (Best *et al.*, 1995; Weaver *et al.*, 1995) reported much higher erosion rates. These studies measured erosion from all roads over a period that included a 50-year flood (in 1964) and several 10- to 25-year floods (in 1972 and 1975) (Coghlan, 1984). In contrast, recurrence intervals for peak flows on Lacks Creek (within Dr. Rice's study area) during the period of his study (1995-1997) were only 1.2-, 3-, and 7-years respectively [based on gage records from Redwood National and State Parks (RNSP) and the U.S. Geological Survey (USGS)]. Storm rainfall depths recorded at Lacks Creek and the nearby USGS gage Redwood Creek near Blue Lake (No. 11481500) were of similarly low magnitude (2- to 7-year recurrence interval) (Goodridge, 1989) during Dr. Rice's hydrologic 'test' period. To attribute the lower erosion rates found by the author solely to improvements in forest practices

ignores the large influence of storm severity on erosion rates. Higher rainfall intensities than those in the three years preceding Dr. Rice's study are needed to realistically evaluate the performance of current forest road standards in preventing erosion during severe storms.

It is also important to note that the previous studies cited by the author (Best *et al.*, 1995; Weaver *et al.*, 1995) measured the entire population of erosion sites along all roads within the basins and did not extrapolate erosion volumes from a sample. In contrast, the author randomly selected sites, covering only about 10 percent of the road network. Recent data from 100 percent sampling of road erosion (on file at RNSP, Arcata, California) show that: (1) only 5 percent of the erosion features contribute 84 percent of the total erosion volume, and (2) 10 simulations of simple random sampling of 10 percent of the full data set indicated that such sampling would have underestimated the true erosion volume by 27 to 86 percent in nine out of ten cases. McCashion and Rice (1983) also support this observation in their study of erosion from logging roads and noted that, "The overwhelming influence of a few large events (i.e., erosion sites) was evident . . . and . . . That a few large events are responsible for so much erosion seems to be typical in northwestern California." With such highly skewed distributions, random sampling is not efficient, and stratified sampling based on geomorphic variables would probably give a more realistic estimate of total erosion.

Through cooperative agreements, RNSP is assisting local landowners with inventories of their road

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systems to identify and prescribe treatments for erosion prevention and secure funding for corrective work. Such a program would not be necessary in Redwood Creek or other north coast basins were there not serious and recognized erosion threats left unaddressed by the FPRs. Although we are pleased to note the road system in Dr. Rice's study area did not produce much sediment during moderate storms, the true test of the revised FPRs awaits a large storm event.

LITERATURE CITED

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