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December 2, 1971

MEMORANDUM TO NATURAL RESOURCES AND CONSERVATION COMMITTEE MEMBERS AND ALL NEWS MEDIA

Attached is a summary statement by Dr. Robert R. Curry, Associate Professor of Environmental Geology at the University of Montana. Curry is a nationally recognized geologist who received his Doctorate in Philosophy from the University of California at Berkeley and who is a specialist in hillslope erosion, in the recent development of California landscapes and in river hydrology.

Curry has published 40 papers on these subjects and has devoted considerable time, in the last decade, to the study of the effects of forest practices on land stability in the Coast Ranges of Northern California and Oregon.

His central thesis is that "landslide and surface erosion, largely resulting from current and past construction of logging roads, is causing loss of soils faster than their natural rate of formation in all measured watersheds where extensive logging road construction is occurring."

CALIFORNIA STATE ASSEMBLY, NATURAL RESOURCES COMMITTEE

Eureka, California

December 6, 1971

STATEMENT

of Dr. Robert R. Curry
Associate Professor of Environmental Geology
University of Montana, Missoula, MT

I would like to summarize my findings for the coastal Douglas-fir/Hemlock and Redwood regions. The bases for these statements may be found in my 1971 testimony to U.S. Senate Interior Committee, Assemblyman Z'Berg's California State Assembly Committee reports of 1965-67, affidavits prepared in conjunction with studies of Redwood Creek logging in 1971, and published testimonies to the above agencies of Dr. Clyde Wahrhaftig of the University of California, Department of Geology and Geophysics; Professor Donald Gray, Department of Civil Engineering, University of Michigan, Ann Arbor; Dr. James Wallis and Dr. Eugene Kojan for work done for the Pacific Southwest Forest and Range Experiment Station in Berkeley; and the November, 1971, U.S. Geological Survey letter-report from Dr. R. J. Janda of the Menlo Park office released through the Washington, D. C. Geological Survey director's office.

In briefest fashion, current logging practices in northern California do not guarantee sustained yield. Landslide and surface erosion, largely resulting from current and past construction of logging roads, is causing loss of soils faster than their natural rates of formation in all measured watersheds where extensive logging road construction is occurring. Although landslides do occur naturally in undisturbed forest cover, tree removal does demonstratably reduce slope stability by decreasing its strength through release of the vertical loading component. Further, roads are most frequently the loci of initiation of landslides due to their effects on changes in slope strength and infiltration of water. Such losses have been occurring since approximately the end of the 2nd World War.

Soil compaction associated with roadbuilding, log skidding and landing, and construction of 'lays' for felling larger redwoods, greatly increase local surface runoff and gullying, even though the sediment thus produced may not reach the water courses to be measured. The combined effects of these processes is to yield erosion rates, as measured from suspended and bed load measurements in the north coastal rivers, that are three to 100 times the most reasonable conservative estimates of soil formation. Thus, through manipulation, these soils are being lost surely, and in some cases rapidly. Since soils are generally deep in this region, immediate effects upon forest productivity are not always seen, but can be predicted to occur in most cases in 70-300 years. Erosional upset of the soil equilibrium causes deforestation, even where second and third timber crops grow with more vigor than the original old-growth. Upsetting long-term geologic equilibria is a common agricultural practice designed to produce short-term increased yields. For forests with 40-200 year rotations, this practice on unstable soils is short-sighted indeed. Areas denuded of their soils

in northern California do not produce any forests with presently available species except in a few areas where non-commercial digger pine or scrawny Douglas-fir fill primary soil successional niches.

The controversy over acceptable soil loss is reaching large dimensions at present. In general, the agronomists and agriculturally-based agencies and schools hold that more soil loss is acceptable than do the geological professions who look upon the problem over a longer time scale. Geologically, there is no doubt that current logging will eventually greatly decrease the biological productivity of northern California's presently forested areas through erosion of soil. The arguments center around rates of loss versus rates of soil formation - how many cuts can be gotten? In my professional opinion, the total areas of Site I through Site III Douglas Fir and Redwood forests in northern California will decrease, under current management practices, by about 20 percent per century. This estimate is based upon the optimistic assumption that fewer and less-compacted roads will be built in the future, smaller equipment will be chosen over larger due to decreases in sizes of trees to be harvested, and that much more stringent forest use laws will be promulgated such that water quality is protected to the extent that watershed slopes, outside the areas of channelized water flow, are finally realized to be an integral part of the watershed system. An honestly enforced water quality standard such as Oregon's which, for example, specifies that no activities will be permitted that cause any measurable increases in natural stream turbidities when natural turbidities are less than 30 Jackson Turbidity Units or more than a 10 percent cumulative increase in natural stream turbidities when stream turbidities are more than 30 JTU...' would go a long way toward aiding in increased long-term forest yields <u>if</u> such laws were coupled with a reasonable standards to establish

'natural turbidities' as a function of storm intensities so that a different standard would be applied for different runoff magnitudes, and where such laws were coupled with other enforceable regulations to prevent soil compaction, disruption of soil horizons and structure, and localized erosion.

Another chief concern of my own research, but one for which we do not yet have incontrovertable northern California data simply because no research has yet been done here, is that of soil nutrient loss due to upset of the biogeochemical cycles within the soil following clear-cutting or similar practices exposing large areas of temporarily unvegetated soil to sunlight and surface leaching. In some forest types, as nearby as the central Oregon Cascades, nutrient leaching during the short periods when forest soils remain unvegetated after clear-cutting, is progressing to such an extent that, assuming 40-80 year future rotation and even-aged management in clear-cut areas of 20 acres or more, critical losses of nutrients such as phosphorus and nitrogen, even where mineralogically available in excess, may severely limit forest productivity in periods of time on the order of 100-400 years depending upon rates of revegetation and total nutrients presently stored in the soil. This soil nutrient loss occurs without any erosion, although it does produce measurable changes in surface water chemistry and is aminiable to legal protection where water quality is to be monitored. Even in the absence of scientific knowledge about the occurrence of this phenomenon in northern California, legislative action to protect against such occurrences is fully plausible at this time and need not interfere with sould logging practices.