

A Third Experiment at the Caspar Creek Experimental Watersheds

Salli F. Dymond, USDA Forest Service Pacific Southwest Research Station, 1731 Research Park Dr., Davis, CA 95681, 530-759-1752, sdymond@fs.fed.us

Elizabeth T. Keppeler, USDA Forest Service Pacific Southwest Research Station

Since their establishment in 1962, the Caspar Creek Experimental Watersheds have provided foresters, land managers, researchers, and citizens with information that has influenced forest management in northwestern California. The primary goal in establishing Caspar Creek was to understand how harvesting timber could affect streamflow and suspended sediment concentrations (SSC). Two major experimental treatments have been conducted at Caspar Creek: the South Fork Experiment (1967 – 1973) and the North Fork Experiment (1985 – 1992). Beginning in 2000, a network of sub-watersheds in the South Fork were instrumented in anticipation of a third experiment that would investigate the impact of harvesting on streamflow and sedimentation under updated California Forest Practice Rules.

Results from the first two Caspar Creek studies have contributed to the body of knowledge for a wide range of watershed topics, including (but not limited to) cumulative effects, changes in peak flows with timber harvest, logging-related sediment production, management of headwater channels, impacts of timber harvesting on subsurface flow, nutrient cycling impacts associated with clearcutting, and design of water quality monitoring programs. The third experiment at Caspar Creek is designed to expand upon the findings of the first two experiments by investigating hydrological, geomorphic, and ecological processes in coast redwood forests at the tree, plot, hillslope, sub-basin, and catchment scales. This study will look at the effect of stand density reduction (i.e., reducing the quantity of trees) on watershed processes and characteristics on sites that have been historically managed for timber. The overarching objective of the third experiment is to quantify the influence of forest stand density reduction on watershed processes while utilizing the current California Forest Practice Rules.

Harvesting of the South Fork Caspar Creek will occur from 2017 – 2018. Of the nine gauged sub-watersheds, three will be set aside as long-term controls (0% harvest). The remaining watersheds will be harvested along a continuum of intensities ranging from a 25% to 75% reduction in the initial stand leaf-area-index (LAI). The stand LAI is calculated using allometric equations for coast redwood trees based on tree diameter. Multiple research projects will occur in conjunction with the third experiment including: improvement of mechanistic understanding of how timber harvesting influences the delivery of water from hillslopes to streams; investigations into the effects of stand density reduction on daily, seasonal, and annual streamflow, sedimentation, soil moisture, groundwater, and evapotranspiration; understanding the effects of contemporary forest practices on macroinvertebrate assemblages and stream nutrients; identification of the sources of stream channel sediments to determine if the level of stand density reduction influences sediment sources in the channel; determination of the erosional consequences of legacy road rehabilitation; and many others. The third experiment will result in a systematic understanding of the connection between forest light dynamics and watershed

processes that can be used to develop sound management practices in similar Coast Range watersheds in the future.