ABSTRACT

THE INFLUENCE OF TREE MORPHOLOGY ON STEMFLOW
IN A REDWOOD REGION SECOND-GROWTH FOREST

by

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Stemflow is the portion of rainfall which, having been intercepted by the forest canopy, reaches the ground by running down the stems of trees. Stemflow volumes from coast redwood, Douglas-fir, and tanoak were collected from January 2000 to April 2001 in the Caspar Creek Watershed in Mendocino County, California. Average funnelling ratios reveal a greater contribution to stemflow from the crowns of tanoak and Douglas-fir trees than from those of redwood trees. An in situ bark texture experiment designed to isolate the stem from the crown was conducted on one tree of each species. A technique of measuring gross bark surface area was developed and applied to the study trees. Bark texture increased the gross bark surface areas by 33%, 15% and 2% in redwood, Douglas-fir, and tanoak, respectively. Gross bark surface area of the isolated segments of stem accounted for 99% of the variation in the volume of water recovered
from the three trees during the bark texture experiment. A linear regression model based on the percent of positively inclined branches, the crown projection area, and the stem surface area explained 88 percent of the variation in the stemflow volumes measured during the study period. Depth of rainfall prior to stemflow inception was estimated on one tree of each species by analyzing five discrete rainfall events. Average rainfall depth varied from 5 mm prior to the inception of stemflow from the tanoak, to 14 mm prior to the inception of stemflow from the redwood. The Douglas-fir averaged 11 mm of rainfall prior to stemflow inception.