

Redwood Trees, Fog Water Subsidies, and the Hydrology of Redwood Forests¹

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Fog is a defining feature of the coastal California redwood forest and fog inputs via canopy drip in summer can constitute between 10 to 45 percent of the total water input each year. Furthermore, between four to eight percent of fog-water can be directly absorbed by the tree crowns following heavy fog events. Site-to-site and inter-annual variation in fog inputs is significant and has a marked influence on a host of tree and forest processes. Together, root water uptake from canopy drip and direct fog uptake by foliage has a significant and positive influence on several aspects of redwood tree water relations including the degree of water stress and how water stress determines tree distribution, growth, size as well as stand water balance. How the spatial and temporal variation and dynamics of fog inputs influences hydrological processes from the stand to the region scale is an issue in need of further research; it is a neglected, yet we believe pivotal part of redwood forest ecology and hydrology. Our goal is to use our ecological and physiological knowledge of plant and stand water relations to inform research and eventually management issues linked to the hydrology of the redwood region. We believe that armed with some basic understanding of redwood's water requirements and water use patterns, particularly in relation to the water subsidies provided by fog in summer, that more sound and sustainable water resource management policies could be achieved. As we look to the future of the redwood region, how water resource issues are dealt with must be part of any successful and sustainable management framework. We propose a framework based on the research we are currently involved in.

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