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Subject: Review of Fire Hazard Assessment section of San Jose Water Company NTMP. Report prepared by TSS Consultants, Rancho Cordova, CA., May 2006.

Dear Rick,

I have thoroughly reviewed this document and have visited the redwood forests that this plan applies to in the Santa Cruz Mountains. I have discussed the issues raised in this plan and my responses to them with Dr. Mark Finney at the USFS Missoula Montana Fire Lab. Mark did his PhD research on coast redwood fire ecology at UC Berkeley (Finney 1991) and is an expert in this field. Mark was fully supportive of my assessment of this project.

The critical question that must first be answered in this analysis is 'Do the redwood forests in the proposed project area pose a fire hazard problem to the surrounding urban-wildland intermix communities?'

After reading the literature applicable to this area, visiting the forest, and talking with Dr. Finney, I believe the answer is no. Redwood forests have the highest canopy cover, height, and densities for any vegetation type in the Santa Cruz Mountains and such characteristics influence their local microclimate (Dawson 1998). Specific microclimate changes include increases in relative humidity, decreases in surface air temperatures, and reduction in ground level windspeeds. Surface and ground fuels would subsequently have higher moisture contents in coast redwood forests when compared to the surrounding grasslands and shrublands.

Removing forest canopy by thinning this forest would not effectively reduce potential fire behavior and effects, especially in areas where redwood is the dominant species. Redwood foliage is not particularly flammable and there are few records of crown fires in redwood forests. The 2003 Canoe Fire in Humboldt Redwood State Park is probably the fire that produced the highest severity effects in the redwood region in the last 50 years. It was ignited by lightning and burned over 10,000 acres. In the late 1980s a large snowfall in this region preceded this fire and it resulted in many broken branches and tree-tops. These materials accumulated on the forest floor resulting in very high surface fuel loads. When these were burned during the Canoe Fire some areas of relatively high severity were produced. This was primarily a function of heavy surface fuels, not canopy fuels. Both Dr. Finney and I believe the most effective way to reduce potential fire behavior in redwood forests in by reducing woody surface fuels. The best method to reduce woody surface fuels in redwood forests is by prescribed fire.

Experiences in prescribed burning in redwood forests demonstrate the sensitivity of this forest type to changing weather conditions. A minimum relative humidity of 50 percent is needed to successfully burn redwood litter (Finney 1991, Stephens and Fry 2005). It is possible to burn under higher humidities into the early evening for approximately 30 minutes, but once relative humidity increased to 60 percent, burning is no longer possible. Redwood responds very quickly to relative humidity changes. With heavy fog in the morning, it is possible to burn by 2 pm in the same afternoon if off-shore winds are present. It is possible to use prescribed fire in the redwood forests owned by the San Jose Water Co. Relatively small areas (20-100 acres) could be burned in one week with the right weather conditions. The biggest problem encountered in such burning operations would be smoke production. The area has many residents and the surrounding air-sheds would transport smoke into more populated areas. Still under-burning is probably the best method that could be used to reduce potential fire behavior and effects in this forest. Fire was once an important ecosystem process in redwood forests before fire suppression and Native American burning practices were eliminated (Stephens and Fry 2005).

If thinning occurred it would open up the canopy and this would probably result in a forest with higher fire hazards. Lop and scatter of activity fuels is the slash treatment proposed by this plan because burning is deemed infeasible. Given these constraints, trying to limit the height of the lop and scatter slash treatment is a good idea, but I don’t believe that this would result in a forest with lower fire hazards. Forest openings could be filled in by tanoak or other more flammable species, this would increase fire hazards. If these forests were dominated by Douglas-fir my assessment would be different. Douglas-fir can sustain high intensity crown fires under severe fire weather conditions. My assessment of the proposed project area yielded few Douglas-fir trees, those that were found were normally in small clumps.

Fire history research in redwood forests has documented the ecological role of fire in these ecosystems (Jacobs et al. 1985, Stuart 1987, Finney and Martin 1989, Brown and Swetnam 1994, Brown and Baxter 2003, Stephens and Fry 2005). Fires perform many ecological functions in redwood forests including recycling woody and detritus fuels, preparing mineral seed beds, facilitating vegetative reproduction, and reducing understory vegetation. This would be another reason to use prescribed fire in managing these redwood forests.

Redwood trees produce thick bark at relatively young ages and they have the ability to resprout after being completely scorched by fire (Finney and Martin 1993). The ability to resprout after all needles have been killed by thermal injury is rare in coniferous trees. I did visit the area of redwood forest that was burned by the 1985 Lexington Fire. Bark char was still present on most redwood trunks in this area. High bark char heights are easy to produce in redwood forests because fire will move up the trees fibrous bark very easily, even under moderate weather conditions. I have seen this personally during prescribed fires in redwood forests. Bark char height on Douglas-fir trees would be a better estimate of flame heights during the 1985 Lexington Fire.

The Fire Hazard Assessment correctly points out that no fuel treatment will eliminate fire. Fuel treatments will only modify potential fire behavior and effects. It is also true that another severe wildfire in the adjacent chaparral could pose a threat to the homes in the adjacent redwood forest. If homes were constructed with materials that were not combustion resistant (such as wood shake roofs, etc.), they could easily be ignited by embers produced by a chaparral fire. Residents living in areas adjacent to the redwood forests owned by the San Jose Water Co should take steps to reduce the flammability of their homes. Removing flammable vegetation away from structures should also be done.

If the forests in the study area were relatively young (1-30 years) and regeneration was produced by clear-cutting, targeted thinning treatments could be effective in reducing potential fire behavior and effects. Such treatments have been done in dense, shrub like-redwood forests at Redwood National Park in northern California. The redwood forests in this study area are over 100 years old and don't have the characteristics of recently clear-cut forests.

Technically the Fire Hazard Assessment (FHA) document is basically sound. Most of the methods used to assess potential fire behavior and effects are similar to what Jason Moghaddas and I did in two studies on mixed conifer forests in the Sierra Nevada (Stephens and Moghaddas 2005a; b). The FHA used a combination of field data, remotely sensed data, and archived data on weather and fuel moisture. The computer program FlamMap was used to assess fire behavior. The authors note that there are no alometric equations available to allow an objective estimate of crown fuels from the redwood forests analyzed in this work. This is true and the report proposes some intense field sampling to remedy this problem. Even if this data were obtained it would not change my opinion of this proposed project.

In summary, I believe the forest treatments outlined in the FHA would not result in a reduction of potential fire behavior and effects in these redwood forests.

Sincerely,
Scott Stephens

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