United States Department of Agriculture | Forest Service | Rocky Mountain Research Station | 5775 Highway 10 West Missoula, MT 59808

October 22, 2007

Ms. Leslie Markham
California Department of Forestry and Fire Protection
135 Ridgeway Ave.
Santa Rosa, CA 95401

Re: Bohemian Grove NTMP 1-06NTMP-011 SON

Dear Ms. Markham:

I write this letter regarding the above-referenced nonindustrial timber management plan (plan or NTMP).

I am a Research Forester with the U.S. Forest Service, Rocky Mountain Research Station, in the Fire Behavior Project at the Fire Sciences Laboratory in Missoula Montana. My current research interests are fire behavior and fire behavior modeling. Before taking this current position, I spent 7 years as a research scientist and consultant, and 2 years as a fire ecologist with Sequoia National Park. I received my Ph.D. in wildland fire science from University of California, Berkeley in 1991 studying prescribed fire and effects in the coast redwood forests. I earned my M.S. in fire ecology at University of Washington in 1986 working on fire history and effects in North Cascades National Park. I have a B.S. degree in forestry from Colorado State University (1984). My curriculum vitae and list of publications is attached.

In preparing this letter I reviewed the following: (1) the Bohemian Grove NTMP; (2) the Department of Fish and Game's December 1, 2006, Focused Preharvest Inspection Report; (3) the Department of Fish and Game's April 19, 2007, memo sent from Stacey Martinelli to CDF's Ron Pape; (4) Dr. Scott Stephens's *Review of Fire Hazard Assessment Section of San Jose Water Co. NTMP*; (5) Dr. Philip Omi's *Review and Critique, Report on San Jose Water Co. Fire Hazard Assessment*; and (6) Mr. Richard E. Montague's *Wildland Fire Analysis and Comments* regarding San Jose Water Co. NTMP.

Having reviewed these documents regarding the non-industrial timber harvest in the Bohemian Redwood grove, I find that my interpretations of the present situation are substantially the same as expressed by Dr. Stephens, Dr. Omi, and Mr. Montague regarding the San Jose Water Company lands.

Let me begin by saying that my research on fire in redwood forests ended in the early 1990s but I have remained interested and familiar with the more recent literature on the subject. I think that some review of fire and forest ecology of redwood forests can be of use in informing management. The fire history work that I and others have done in forests throughout the distribution of coast redwood trees suggests that fire was very frequent prior to displacement of Native Americans in the mid-1800s. Many studies revealed at least one fire per decade,

sometimes several per decade. Most of these fires are thought to be "surface fires", meaning they were confined to burning fuels on the ground surface, since the redwood and Douglas-fir trees survived them. The notion that native peoples were responsible for the majority of these fires throughout the coastal forests is supported by the ethnographic studies as well (see Lewis 1973, Boyd 1999). Thus, when these civilizations were disrupted by European settlement, the pre-existing fire regime was dramatically altered. Not only did settlers bring technology that made use of large redwood trees, they showed little appreciation that fire had been an essential ecological agent in these forests for thousands of years.

The combined effect of logging and withholding of fire has important effects on the fuel dynamics and subsequent wildfires. Logging tends to remove the largest and most valuable trees, exposing the ground surface to sunlight and winds, and allows the rapid growth of residual trees and existing shrubs and sprouting vegetation. From a fire standpoint, this vegetation so close to the ground can increase fire spread rate and intensity – both common measures of hazard. Remaining trees are susceptible to injury or death since they are smaller in diameter and shorter. Redwood is somewhat unusual as a sprouting conifer, and the basal sprouts are an important means of forest recovery, but even with vegetative regeneration in the fast-growing redwood region, forest development requires many decades, meaning an increasing hazard for this period. Even without logging, the absence of surface fire in redwood forests leads to increasing amounts of large woody material and density of shrubby vegetation, which can produce fire behavior that is difficult to manage and which causes injury or death even to the largest redwood trees. Examples of these effects are found on the Canoe fire in Humboldt Redwoods State Park. The Canoe fire also showed that crown fire is quite rare in redwood, even under extreme weather conditions.

So, regarding the proposed timber harvest plan in the Bohemian Grove, there seems to be a discrepancy between the details of the written plan and the intention of this forest management activity to mitigate fuel hazard. If the intention is indeed to mitigate the behavior of some future fire, why was no analysis presented on the current fuel hazard situation or on any changes in fire behavior that are expected from the treatments? Without a specific concern about wildfire and potential effects, I can't follow a logical path that leads to the conclusion that this harvesting plan will lead to a desired change in hazard. A great deal of information is presented on the expected volume of wood to be removed, suggesting to me that this plan is little more than a strategy for extracting commercially valuable products from the forests. Even if the logging could possibly lead to some reduction in hazard, I can find no evidence of an analysis capable of supporting this conclusion.

Now, an argument might be advanced that logging has a role in forest restoration – restoring or accelerating the development of old-growth forest structure. In many forest types, this rationale seems legitimate. For example, ponderosa pine forests are now much denser than evidence suggests was the historical condition, because, similar to redwood forests, fires have been excluded for over a century. Without surface fire, in-growth of young trees, often tolerant of the shade and competition, have increased continuity of the canopy (horizontally and vertically), leading to hazardous fuel conditions that are difficult to remedy with prescribed fire until a more open structure is achieved. Silvicultural prescriptions are appropriate for removing much of the younger cohort of trees, leaving the older and more fire resistant ponderosa pine that occupy the

overstory. However, redwood forests are ecologically unlike ponderosa pine forests in almost every conceivable way, meaning that this notion of restoration does not apply to old growth redwood. Redwood trees live for millennia or more than 10 to 20 times the fire exclusion period experienced since settlement (most other trees, including ponderosa pine live for 200-500 years); this leaves relatively little time for dramatic structural changes to have occurred. Redwoods often reach several hundred feet in height, meaning their foliage is elevated far above the surface fires and difficult to ignite. Redwoods have very thick bark and have few lethal insect or fungal enemies, meaning that introduction of prescribed fire is less complicated by concerns of unintended mortality. Restoration of second-growth or cutover redwood forests, however, could benefit from silvicultural activities designed to enhance the growth of redwoods (sprouts or seed-origin reproduction) by reducing the dominance of hardwoods or, in some cases, of Douglas-fir.

If the owners of the Bohemian Grove are concerned about fire and fuel hazards, there are legitimate treatments that can be taken to produce the intended benefits. These treatments will generally consist of surface fuel removal (often by burning), removal of shrubs, and possibly trees with foliage that is low enough to ignite from a surface fire. Since the foliage of the largest trees is held high above flames and heat generated from a fire burning on the ground surface, it is the least susceptible to ignition and would be of least concern for manipulation in a fuel treatment. Certainly, given our understanding that large redwoods and Douglas-fir trees are the most resistant and resilient to fire damage, any legitimate fuel management prescription would specify retaining these trees. It is my opinion that for this plan, or any plan, to be considered for purposes of fuel treatment, it would need to present an analysis of the fuel hazards and how those would change following treatment.

Sincerely,

Mark A. Finney

Research Forester
Rocky Mountain Research Station
Fire Sciences Laboratory
5775 Hwy 10 West
Missoula, MT 59802

406.329.4832
mfinney@fs.fed.us