Statement for Regional Forester Bradley Powell
Concerning Landscape-Level Fuel Management Strategies
and the Sierra Nevada Forest Plan Amendment
Draft Environmental Impact Statement

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September 11, 2000

Dear Brad,

Recently I received an e-mail message from George Terhune, a member of the Quincy Library Group (QLG), concerning an August 19 meeting involving a delegation of QLG members, Senator Feinstein, Deputy Secretary of Agriculture Rominger, and you. The purpose of the meeting reportedly was to discuss progress in implementing the HFQLG Pilot Project, the effect of the Sierra Nevada Forest Plan Amendment (SNFPA) process on the Pilot Project, and appropriations for implementing the Pilot Project. According to George, during the course of the conversation you cited me by name as a fire scientist who favors the SNFPA "SPLATs-from-the-start" fuel treatment strategy over the QLG strategy of "DFPZs-first-then-area-treatments" (George's terms, but apt enough descriptions of these alternative strategies).

My first purpose in sending you this statement is to correct this misconception. I do not "favor" "SPLATs-from-the-start," at least for wholesale application in the Sierra Nevada considering our current understanding of their efficacy, and I have never expressed such a preference to anyone. My main concerns have to do with the translation of Mark Finney's excellent theoretical concept (Finney in press) into actual practice on real landscapes. I have stated these concerns in comments on the DEISs for HFQLG and SNFPA, and they are detailed later in this statement. Given our current state of knowledge about landscape-level fuel management strategies, I continue to support the ideas and concepts expressed in the SNEP fuel strategies paper (Weatherspoon and Skinner 1996).

The need for this correction highlighted a need and opportunity to discuss alternative fuel management strategies more fully in the context of the SNFPA EIS effort, especially considering the prominence of fuel management in the EIS. Thus the second and more important purpose of this statement is to offer some comments that address the question: what do we know and not know about these alternative strategies and, given our state of knowledge, how should the EIS team proceed in moving from the DEIS to the FEIS (or RDEIS?)? I have invited my colleague Carl Skinner to join me in the remainder of this statement because of his extensive experience and expertise in Sierra Nevada fire management issues and because he coauthored the SNEP fuel strategies paper (Weatherspoon and Skinner 1996). Our discussion applies to forested, primarily conifer-dominated, ecosystems.

What Do We Know and Not Know About Alternative Fuel Management Strategies?

The relevant scientific information for fire and fuels issues in the DEIS falls into two general categories: (1) effects of fuels and fuel treatments on relatively localized fire behavior; and (2) effects of alternative landscape configurations and total areas of treatments on subsequent spread rate, size, and severity of wildfires.

Localized Effects of Treatments

The first category has had considerable study, and much of the work has been incorporated into a number of fire models, including the spatial fire simulator FARSITE (Finney 1998). The DEIS generally reflects a good understanding and use of this body of science. Understanding crown fire behavior (including initiation, spread, and spotting) in relation to various dead and live fuel components is key to assessing the efficacy of SPLATs and DFPZs. This area of science is less well developed than surface fire behavior, but the necessary elements of it (for example, as summarized in Agee 1996 and Agee et al. 2000) are included in the DEIS.

Landscape-Level Effects of Treatment Configurations

With regard to alternative landscape configurations, it is important first to recognize (and probably to emphasize a little more in the FEIS) that properly implemented and maintained fuel treatments will result in reduced fire severity *within the treated areas*, regardless of configuration of the treatments. The question is whether strategic placement of treatments, in the form of SPLATs, DFPZs, or some other configuration, can accrue benefits *outside the treated areas* in terms of spread rate, severity, and/or ease of suppression (i.e., reducing spread into untreated areas). This second category—effects of alternative landscape configurations of fuel treatments—has a much poorer scientific basis than does localized effects of treatments. Large spatial and temporal scales, combined with the uncertainties of multiple stochastic events and processes, make this a very difficult problem to deal with scientifically. The problem is practically impossible to tackle from a traditional experimental approach. Retrospective studies are infeasible because of the lack of appropriate contrasts in landscape configurations of past treatments. In fact, nothing that could be considered strategic fuel management has ever been implemented in forested ecosystems at an adequate spatial scale and for a sufficient period of time (i.e., treatments maintained over time) to provide useful reference or predictive information for the SNFPA EIS. Past efforts to implement shaded fuelbreak systems probably come closest to providing some information. However, the mixed results attributed to fuelbreaks (Agee et al. 2000, Weatherspoon and Skinner 1996) provide scant useful reference for DFPZs because fuelbreaks almost always have been considerably narrower than widths favored for DFPZs, and they have not been maintained, both of which factors reduce any effectiveness they might have. It is an extremely important point that DFPZs, SPLATs, or any other fuel treatment areas *must be maintained* over time if they are to retain either their localized or strategic effectiveness. The institutional will and support for maintenance are essential to the success—at least from a fire management standpoint—of any selected EIS alternative that has a significant component of strategic fuel management.

What light can modeling and expert opinion shed on the likely efficacy of alternative fuel treatment strategies? To the extent that appropriate models can be brought to bear on the subject, expert opinion should go hand in hand with modeling in order to feed the assumptions and parameters (or ranges of parameters used in sensitivity analyses) needed to run the models. Expert opinion may also have value outside a modeling context. It is no news to anyone that

SPECTRUM is a very poor modeling framework for dealing with highly stochastic and highly spatial landscape-level fire and fuels issues. Unfortunately, there seems to be no other choice for the SNFPA EIS effort without a substantial time extension. Since fire-related consequences of the EIS alternatives had to be front-loaded into SPECTRUM, the modeling necessarily relied heavily on assumptions based on expert opinion. The nature and basis of many of those assumptions need to be made clearer in the FEIS. When it becomes available, SAFE-D should be a much better tool for dealing with fire issues, but inherently high levels of uncertainty will still exist. Expert opinion in and of itself does not contribute a great deal of certainty to assessing relative benefits of SPLATs and DFPZs. The experts are "all over the map," precisely because the scientific and experience bases are so weak. Advocacy on this issue has tended to generate more heat than light. The following subsections highlight what we see as key attributes, assumptions, and uncertainties about SPLATs and DFPZs.

SPLATs. Finney (1999, in press) has undertaken some excellent, innovative, and much-needed theoretical work to assess the effects of alternative landscape configurations of fuel treatments. He has found that patterns of disconnected fuel treatment patches that overlap in the direction of heading fire spread theoretically reduce overall fire spread rate and fireline intensity. In essence, this occurs because the treatment pattern reduces the heading portions of the fire (faster spread, higher intensity) and increases the flanking portions (slower spread, lower intensity) in the untreated "matrix." The implications of such an effect, if translatable from theory to real landscapes, would clearly be quite significant. The benefits of fuel treatment in reducing fire size and severity would be enhanced disproportionately to the percent of the landscape actually treated, without any assumptions of suppression. But reducing fire spread rate and intensity would also increase suppression effectiveness, thereby further multiplying the benefit of this strategy. As you know, the SNFPA EIS team has dubbed this overlap fuel treatment pattern "SPLATs" (strategically placed area treatments). Informally, they refer to the disproportionate treatment effect as the "Finney effect."

We believe that Mark Finney's theoretical work in this area is quite sound, and we strongly encourage further exploration and development of this concept. We do have questions, however, about how Finney's theory is likely to translate into actual practice on real landscapes. In essence, how do the key assumptions of the theory play out in the real world? And to the extent that these assumptions are not met in practice, how much of the "Finney effect" is lost? It is important to note that, both in his papers (Finney 1999, in press) and in personal conversations, Mark readily acknowledges the concerns we discuss below about how well the theory might work in practice. We believe that he is interested in pursuing these questions about practical applicability of his theory, at least to the extent possible through computer simulations. In contrast, the DEIS was notably silent (at least as far as we could find) about assumptions of the theory and any uncertainties about achieving the "Finney effect" from widespread application of SPLATs. Given that (1) fire/fuel management is a central focus of the entire DEIS; (2) fuel treatment drives most of the proposed manipulative management activities, which in turn affect all other resources and values, for better or worse; and (3) SPLATs represent the fuel treatment strategy employed in several DEIS alternatives, including the two preferred alternatives, this seems like a fairly serious omission. Simply citing Finney's work is not adequate.

One important basic assumption of Finney's (in press) theory is that treated areas will support a much lower rate of spread than untreated areas. This assumption is necessary in order for fire to move through a treated block (one of a series of overlapping blocks) during the same period of time in which fire moves around the block (much of it as flanking fire) through untreated forest to reach the same point. The assumption of a large untreated:treated rate of spread ratio is well-founded and perfectly logical for some short period of time after treatment. But in the generally more open environment of treated stands, an increase in relatively flashy herbaceous fuels will often—and sometimes quickly—occur. Furthermore, treated stands will tend to dry out faster (more insolation and wind) and have higher surface windspeeds. Taken together, these factors could substantially increase rate of spread in treated units (although intensity would continue to be low), which might significantly impinge on the basic rate of spread assumption over much of the life of the treatment. Finney (in press) acknowledges this concern and considers the associated need to schedule maintenance treatments across space and time to be a very challenging practical problem.

The theory underlying SPLATs (Finney 1999, in press) assumes quite specific repeating geometric patterns of treated blocks on a flat surface. As Finney (in press) points out, however, these idealized and artificial treatment patterns would probably never be achievable or even desirable in practice. This is certainly the case for real landscapes with significant topographic variability, which apply in most Sierra Nevada forests. Even with the relatively flat terrain of portions of the east side, a variety of factors would probably constrain the idealized treatment pattern.

During recent discussions with some members of the EIS team in Sacramento, it was instructive to examine a GIS map showing fuel treatments that presumably conformed to standards and guidelines for SPLAT locations under Alternative 6. The shaded (treated) areas covered roughly the upper two-thirds of slopes on south and west aspects. One key question, however, was never answered to my (Weatherspoon's) satisfaction: Do the shaded areas represent areas of complete fuel treatment, so that 30 to 40 percent of the entire landscape is actually treated, or do they represent areas *within which* SPLATs are placed, so that 30 to 40 percent of the shaded areas are treated in overlapping, unconnected patches? Different team members seemed to have different interpretations, and the wording in the DEIS (e.g., last paragraph of p. 2-99 versus S&G F05E on p. D-26) seems similarly inconsistent. The point to be made here is that these different interpretations of SPLAT locations highlight an apparent tradeoff between theoretical treatment patterns and practicality. Long—and often steep—south- and west-facing slopes theoretically could accommodate patterns of SPLATs that would approach the ideal geometry. Our sense, however, is that they would be quite impractical to install and maintain over time. Conversely, complete treatment of the mapped areas—upper slopes on south and west aspects—makes sense practically, ecologically, and for fire management purposes. However, the spatial arrangement of treated areas in this case bears little resemblance to the theoretical pattern of overlapping, unconnected treatment patches.

As actual treatment pattern on a real landscape deviates from an idealized pattern on an artificial landscape, how much of the "Finney effect" is retained (assuming for the moment that the untreated:treated rate of spread ratio is not an issue)? We certainly cannot answer that question, but consider it an important one to be addressed. Given current modeling tools, multiple

FARSITE simulations seem the only way to address the question. Alternative landscape configurations of fuel treatments were compared using FARSITE simulations on two actual landscapes on the Lassen and Plumas National Forests (Finney 1999), in connection with the HFQLG EIS. Results were rather inconclusive. Evidently no such simulations have been run for the SNFPA EIS effort, using standards and guidelines appropriate for the proposed SPLATs. The team has relied on expert opinion for the magnitude of the "Finney effect" to be front-loaded into the Spectrum runs. The extent to which this expert opinion incorporated some estimated falldown from the theoretical effect because of the possible real world constraints discussed here is unclear, since no such constraints were mentioned in the DEIS. It is our understanding that limited FARSITE simulations are now planned before the team prepares the FEIS.

SPLATs should have value even with a very small or zero "Finney effect." They would provide localized protection from severe fire effects just like any other fuel treatment area. SPLATs also would provide a range of ecosystem benefits associated with moving toward more open, large-tree-dominated stand conditions, especially if treatment areas are concentrated on upper south- and west-facing slopes.

The bottom line: We strongly support further investigation of Finney's theory of overlapping treatment blocks to reduce overall fire spread rate and intensity. We believe, however, that considerable uncertainties accompany the translation of this concept from theory to actual implementation on real landscapes. Regardless of whether a significant "Finney effect" is actually achieved in practice, SPLATs should accrue benefits in terms of fire hazard reduction and improvements in forest conditions.

DFPZs. Weatherspoon and Skinner (1996) provide a basic rationale and description of DFPZs. A key point is that DFPZs should not be regarded as "an alternative" or standalone strategy. Rather, the DFPZ component of a broad fuel management strategy is best viewed as a set of initial, strategically located entries into the landscape—places from which to build out in treating other appropriate parts of the landscape—not as an end in itself. The "theory" is that DFPZs may provide a measure of protection against large fires (assuming suppression forces are present) while longer-term, area-wide treatments are being implemented (Agee et al. 2000). If SPLATs turn out to be both effective and practical on real landscapes, then much of the focus of subsequent area-wide treatments in an initial-DFPZ strategy probably would be on implementing SPLATs. An either/or dichotomy—DFPZs *or* area treatments—is not consistent with the initial-DFPZ approach envisioned in Weatherspoon and Skinner (1996) and Agee et al. (2000). Yet the DEIS (e.g., pp. 3-144 and 3-162) leaves the clear impression that such a dichotomy exists.

DFPZs are designed to facilitate suppression by providing broad zones within which firefighters can work more safely and efficiently (Weatherspoon and Skinner 1996). They are not intended to stop fires by themselves. An assumption of an initial-DFPZ strategy is that it will have some real benefit to suppression—i.e., that some wildfires will be stopped at smaller sizes than would be the case without DFPZs. An important point, however, is that the overall value of this strategy does not depend entirely—or even in large part—on the early success of a DFPZ network in stopping fires, for several reasons: (1) the treated areas within the DFPZs themselves will be protected from severe fire effects just like any other fuel treatment area; (2) DFPZs should provide useful anchor lines for subsequent prescribed burning and other area-wide fuel treatments; (3) the probability of successful suppression in properly-maintained DFPZs will undoubtedly increase as area-wide treatments (an integral part of the strategy) progress; and (4) a range of ecosystem benefits not directly related to fire should result from DFPZ construction, by moving toward more open, large-tree-dominated stand conditions along ridges and upper south- and west-facing slopes—the topographic locations in which such stand conditions probably would have been most common historically.

Some people object to DFPZs because of wildlife and esthetic concerns, based at least in part on a mental image of DFPZs as sparse, monotonous, sharp-edged, sterile interruptions of connectivity. Yet, due in large part to their width, DFPZs need not have such an appearance, and in fact can encompass considerable structural diversity, including "feathering" of edges into the adjacent forest, while still meeting their objectives for fire behavior and firefighter safety (Weatherspoon and Skinner 1996). Furthermore, local managers should retain flexibility to leave sections of DFPZs untreated or treated to a lesser fire standard where deemed necessary for wildlife connectivity, consistent with the land allocation (e.g., the fire/wildlife balance point may be different in urban-wildland intermix areas).

The development in SNEP of an approach that included DFPZs as a prominent *initial* component of a broader, longer-term fuel management strategy evolved from (1) a review of published and unpublished fuel management strategies, and (2) a fuel strategies workshop, sponsored by SNEP, that brought together a diverse group of experienced fire/fuels managers. These two sources of information seemed to point to some degree of convergence of thinking (at that time, at least) about the fuel problem and some components of a strategy to deal with it. Weatherspoon and Skinner (1996) synthesized this information into a potential fuel management "strategy" consisting of a set of principles and ideas for land managers to consider during development of landscape-specific strategic plans.

During the course of the SNEP process, modeling efforts using FARSITE (van Wagtendonk 1996) and SAFE FORESTS (Johnson et al. 1996, Sessions et al. 1996) tended to support the initial-DFPZ concept. Using an idealized landscape for his simulations, van Wagtendonk (1996) found that none of his fuel-treatment scenarios supported fires that would spot across a 390-m fuelbreak under 95th percentile weather conditions. Finney (1999), however, found extensive spotting across fuelbreaks of this width, and suggested that van Wagtendonk's results may have been due to his use of constant windspeeds rather than a more realistic gusty wind. Simulations by Johnson et al. (1996) and Sessions et al. (1996) using SAFE FORESTS indicated that DFPZs reduce the acreage burned by wildfires by up to 1/3 over 50 years. Probability of successful suppression using DFPZs depended on modeled flame lengths approaching and within the DFPZs. Modeled efficacy of DFPZs for suppression in these studies obviously depended on key assumptions based on expert opinion. In his FARSITE modeling of fire movement through alternative fuel treatment configurations, Finney (1999, in press) did not assume or simulate suppression activities, in part because of the many assumptions required concerning resource availability and tactics. Some knowledgeable fire people have pointed out that a serious problem with a DFPZ strategy is that DFPZs are least likely to be effective at the very times when they are most needed—i.e., during extreme weather conditions (when long-range spotting, including spotting across DFPZs, is most likely) and multiple ignitions (when suppression resources become most limiting, and thus often not available for manning DFPZs), the times when acreage of large, severe fires typically increases most rapidly. This is certainly a legitimate concern. Two responses may be pertinent, however: (1) Well-constructed and well-maintained DFPZs should increase suppression efficiency considerably, so that, for example, relatively few firefighters could conduct backfiring operations much more quickly than would otherwise be possible. (2) DFPZs should not be considered a standalone strategy (as opposed to an initial phase of broader landscape treatment) or a strategy whose value depends entirely on early success in stopping fires, as discussed earlier in this subsection.

The bottom line: While the overall strategy we described during the SNEP process (Weatherspoon and Skinner 1996) continues to make sense to us, expert opinion definitely seems divided. We consider it likely that several kinds of benefits not directly related to fire suppression, as described in the second paragraph of this subsection, would be realized from an initial-DFPZ strategy. However, the efficacy of this strategy for substantially reducing the area burned by large, high-severity wildfires *in the short term* (i.e., before significant area-wide fuel treatments could be implemented) remains uncertain.

SPLATs and DFPZs—Some Common Considerations. In any modeling or even conceptual comparisons of SPLATs and DFPZs, treatment implementation for the two strategies should take place at the same rate over time. The variable should be where or how the given treatment acres are allocated during a given period. As indicated earlier, DFPZs represent just the initial component of a broader landscape strategy of fuel treatment (Agee et al. 2000, Weatherspoon and Skinner 1996), so the strategy is not "complete" as soon as the DFPZs themselves are installed. Consequently, the following DEIS comparison of SPLATs and DFPZs in terms of relative area treated (p. 3-144) is incorrect: "The SPLAT strategy treats a relatively large proportion of the landscape…" whereas the DFPZ "strategy treats a lower proportion of the landscape…"

Maintenance is critical to the continued effectiveness of any fuel treatment area, certainly including both SPLATs and DFPZs. The contiguous nature and relative accessibility of DFPZs should make maintenance treatments relatively efficient and inexpensive. Maintenance costs for subsequent area-wide treatments in an initial-DFPZ strategy may be higher than costs for maintaining the DFPZs themselves, but costs will depend on accessibility, dispersion, and size of treatment units. On average, maintenance costs for SPLATs are likely to be higher because units by definition are dispersed. Costs for SPLATs could increase further if more frequent maintenance were required to sustain a favorable untreated:treated rate of spread ratio.

Examining the previously-mentioned GIS map of SPLAT locations was interesting from another standpoint: If it is assumed that shaded areas represent areas of complete fuel treatment at the end of 25 years, the pattern is remarkably similar to what an initial-DFPZ strategy might produce at that point in time, given equal treatment areas between the two strategies. Main ridges are continuously treated, and even widths of treated areas are comparable to those discussed for DFPZs. Topographic positions of other treated areas on the landscape appear similar to those that might be expected for area-wide treatments in an initial-DFPZ strategy. The only obvious difference is the absence of a closed network of DFPZs that would include stream crossings—probably the least important part of a DFPZ strategy. Based on evidence from this single map, therefore, there seem to be indications that DFPZ and SPLAT strategies may differ most in the early years but converge over time. However, the mapped treatment pattern at 25 years has little resemblance to Finney's theoretical distribution of treatment blocks. So it may well be that the shaded areas are supposed to represent areas *within which* SPLATs are placed, in which case there is much less convergence between the two strategies.

Given Our State of Knowledge About Fuel Strategies, How Should the EIS Team Proceed?

Considering the prominence of fuel management in the EIS and the substantial uncertainties surrounding the basic fuel treatment strategies proposed in the EIS alternatives, we suggest the following approach:

Provide a Better Characterization of Alternative Fuel Strategies

As noted earlier, the DEIS does not adequately characterize SPLAT and DFPZ strategies or disclose key assumptions, limitations, and uncertainties associated with each strategy. As a minimum, the EIS team must develop and display this information completely and clearly in the FEIS to inform you fully as a decisionmaker and to provide agency personnel and the public with a rational basis for the decision ultimately made. Discussions with Berni Bahro and others suggest that DEIS deficiencies in this area will be corrected in the FEIS. We hope that the material in this statement will assist in that effort.

Model Alternative Fuel Strategies to the Extent Possible

The inability of SPECTRUM to deal with fire issues appropriately is a serious concern. It is unfortunate that SAFE-D was not available for use in the SNFPA EIS effort. Evidently it will not be available for incorporation into the FEIS if you and other Forest Service officials decide that December 2000 is a firm deadline for completion of the FEIS and the ROD. If the deadline is extended, with or without the additional step of a RDEIS, SAFE-D clearly should be used to analyze the alternatives if the respective EIS/SAFE-D timelines make it possible. In any case, we hope that the Region will continue to support and encourage the speedy completion of SAFE-D. If SAFE-D analyses cannot be incorporated into the FEIS and ROD, we recommend that the ROD provide enough flexibility within an adaptive management framework for post-ROD SAFE-D analyses (perhaps at sub-regional and/or individual Forest scales) to be used to help guide management.

Within the timeline of a December 2000 ROD, it is possible to run a series of FARSITE simulations to help test the expert opinion-based fire/fuels assumptions that have been front-loaded into SPECTRUM. Obviously, only a very small sample of combinations of the pertinent variables—e.g., terrain, fuel models (for both treated and untreated stands), weather streams, landscape configuration of treatment units—can be tested in the time available. But a few simulations are better, and more defensible, than none. As noted earlier, we understand that the EIS team now plans to conduct some of these kinds of FARSITE simulations.

Acknowledge Major Uncertainties and Incorporate Real, Explicit Adaptive Management into the ROD

As much of an improvement in modeling capabilities as SAFE-D should provide for regional analyses that incorporate fire, we will still be left with major uncertainties. Some examples:

1) At or near the top of the list is future climate and associated wildfire acreage and severity. Sensitivity analyses are useful for dealing with some kinds of uncertainties by bracketing likely outcomes. They are not very useful, however, when two different—and both quite reasonable—assumptions about future wildfire acreage turn the EIS alternatives on their heads in terms of likely outcomes and rankings (per information from Klaus Barber).
2) Earlier we pointed out significant uncertainties about the efficacy of SPLATs and DFPZs. Some of those uncertainties—e.g., change over time in untreated:treated rate of spread ratio in SPLATs, benefits of DFPZs for suppression, practicality and costs of maintenance for both strategies—cannot be readily modeled because basic information is lacking.
3) We certainly lack basic information about the effects of the EIS alternatives (most of which are strongly influenced by type and degree of fuel treatment) on future viability of wildlife species. Not only are habitat "requirements" for many species poorly defined, but also the probability of achieving and/or retaining target habitat characteristics is very difficult to predict. Probability of future wildfires and probable non-fire-related tree mortality (especially mortality of large trees)—both tied strongly to future climate as well as to management activities—are major reasons for the uncertainty. Expert opinion about viability can yield quite different ranking of alternatives depending on assumptions of the experts about the factors just mentioned.

We recommend an approach that (1) directly and openly acknowledges these and other major uncertainties inherent in analyses of the EIS alternatives; (2) acknowledges that because of this high degree of uncertainty, and because of the great natural variability within the Sierra Nevada, a "one-size-fits-all" management approach for Sierra Nevada National Forests is unwise and difficult to defend; and (3) consequently proceeds to lay out an explicit adaptive management framework within which the Forests, the Region, and PSW Station and other scientists can jointly begin to resolve the uncertainties and adjust management accordingly.

Such an adaptive management framework, we believe, should incorporate the concept of actually employing contrasting management strategies on a number of large landscapes, at least initially. Some of the current EIS alternatives might provide the basis for these strategies. It may be desirable to include a comparison of the fuel treatment strategies discussed in this statement. In any case, the adaptive management framework should be designed to address key issues and key uncertainties surrounding forest management in the Sierra Nevada. It should include a well-defined mechanism for comparing strategies and for determining when and how to implement appropriate course corrections. This mechanism should allow managers to adapt to (1) newly-developed information about consequences, practicalities, and costs of alternative management strategies; (2) inherent intraregional differences; and (3) ideally even climate change. The adaptive management framework would provide a clear focus for monitoring activities as well as opportunities for collaborative research. And it would go hand-in-hand with strong modeling efforts, which would include development and refinement of models as well as their use in concert with research and monitoring activities.

We recommend that such an explicit adaptive management framework be included in at least a few of the alternatives in the FEIS (or RDEIS?). The DEIS provides little detail about planned adaptive management, but it does indicate that a plan will be more fully developed for the FEIS. In preparing this plan, we hope the EIS team will consider some of the ideas mentioned here. It seems that opportunities for real learning will be much greater if contrasting strategies can be compared over time than if only a single overall strategy is implemented.

Does the HFQLG Pilot Project make possible a useful adaptive management-type comparison of management strategies, especially fuel management strategies? First, comparison of the Pilot Project with a single management regime selected for the rest of the Sierra Nevada, while probably providing a few useful lessons, would be quite weak—a single "replication" implemented in a subregion substantially different from other portions of the range. Furthermore, it is not clear from what we could find in the DEIS that fuel management plans for the HFQLG area after the initial 5 years of the Pilot Project are comparable in intensity to those for the rest of the SNFPA area. Unless fuel management in the HFQLG area progresses to area-wide treatment beyond 5 years at the same rate as for the rest of the Forests, there is no basis for a comparison of fuel management strategies.

In summary, we believe that a strong adaptive management component is key to the success of the SNFPA EIS effort. We urge the team to consider an adaptive management framework that incorporates contrasting management strategies on large landscapes as a means of facilitating more effective learning. Openly acknowledging uncertainty and setting out a plan to address it in a major collaborative learning process should be much more defensible—legally as well as scientifically—than glossing over uncertainty and making a necessarily ill-informed decision that in effect would put all our eggs in one untested basket. A little extra effort and time now might save more time later in responding to appeals and lawsuits, but more importantly, it could yield big dividends down the road in the form of better management of the Sierra Nevada.

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Brad, we hope that this statement has provided some useful information for you and for members of the EIS team. Please let us know if you have questions about it.

Sincerely,

/s/ Phil Weatherspoon
/s/ Carl Skinner