

**Dept of Environmental Science, Policy, and Management**

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Dan Jiron
Region 5, Deputy Regional Forester
USFS Regional Office
Vallejo, CA 94592

Dear Deputy Regional Forester Jiron:

Thank you for hosting us on May 24th to discuss the Sierra Nevada Adaptive Management Project (SNAMP) and the implications of reduced funding and a condensed post-treatment timeline on the project's future. As suggested at the meeting, the SNAMP UC Science Team has discussed the proposal to complete SNAMP with seven years of funding from the US Forest Service, and in this letter, we summarize for you the Science Team's overall response and also append individual team responses. This response is an initial effort to move the dialog along regarding the future of SNAMP. We anticipate further discussion between the UC Science Team and the Memorandum of Understanding Partners (i.e., the federal and state agencies involved in SNAMP) once funding levels are better known, followed by a public meeting to present the proposal to and solicit feedback from all interested stakeholders.

First, to recap, SNAMP and USFS funding for the project began in 2007. The SNAMP Workplan outlines a 2-2-1-2 schedule of research: two years of pre-treatment data collection (2007-2008), two years of forest treatment implementation (2009-2010), one year of ecosystem recovery (2011), and two years of post-treatment data collection (2012-2013). Please note that several teams, including the Wildlife, Water, and Public Participation teams, continue data collection during all years of the project. The SNAMP budget plan includes a lower level of additional funding in the eighth year to prepare the final report, thus resulting in a total of eight years of funding for a seven year study.

Treatments at both study sites, Last Chance and Sugar Pine, have been delayed by two years from this original timeframe and are now expected to be completed in 2012. Delays in state funding and state-purchased field instruments have also resulted in delays that have impacted the Water and Spatial Teams' research. Given the current and expected continuation of declining budgets for the agencies that fund SNAMP, the UC Science Team considered whether it would be feasible to fulfill the core research objectives of the project with the original USFS commitment of seven years of full funding and an eighth year of lower-level funding for preparation of the final report. This proposed schedule condenses the post-treatment phase of the research from three to two years by eliminating the ecosystem recovery year. 2014 would be the final year for data collection and the seventh year of full USFS funding, followed by a portion of 2015 for report preparation using the eighth year lower-level USFS funding (please see attached timeline).

The UC Science Team discussed this proposal on June 15, 2011, and then each team evaluated the specific impacts on its research. We did not reach consensus on whether it was feasible to fulfill the core research objectives of SNAMP with only two post-treatment years and no ecosystem recovery

year. The Fisher Team does not anticipate being able to attain a sufficient sample size within the condensed timeframe to make meaningful inferences about the effects of forest treatments upon fisher. All other teams report that they expect to be able to continue to provide information that will be useful to the Forest Service and other agencies within the proposed timeframe, with important caveats.

First, each team has a unique set of constraints and challenges associated with condensing the post-treatment phase of SNAMP, and some of their research questions will need to be dropped or altered. Each team differs regarding which option might be a viable alternative for their research. For example, the Forest Ecosystem Health and Fire Team presents several options in their response and has the ability to scale back staff in some years, while the wildlife teams do not have this flexibility of reducing staff levels in some years. Individual team responses are outlined at the end of this letter, including the Fisher Team's rationale for their assessment.

Second, treatments at the Sugar Pine and Last Chance Projects will need to be completed by October 1, 2012. This is necessary because the post-treatment LiDAR flight will need to occur in early October before leaf fall but cannot happen until all treatments are completed. Treatment completion by October 1, 2012, also provides adequate time for delivery of the LiDAR data from the contracting operator (which can take 6 months from the time of the flight) and for subsequent data processing before the LiDAR data can be used by the other teams.

Third, the teams will need a year following the final collection of post-treatment data to complete their analyses and write up their findings, and also to integrate all the teams' results into the final SNAMP report. If USFS is able to fulfill their commitment of lower-level funding for this report writing period, then the funding could cover that period. If not, the teams would need a combination of additional funding from other sources, the ability to carry forward funds from a previous year, or, at the very least, a no-cost extension to cover this time period.

As you will see from the details below, the UC Science Team has wrestled with the challenge. Our goal has always been to do exceptional science that answers pressing forest management questions in the Sierra Nevada. We have also fully embraced an active adaptive management process that meaningfully engages the public. We take our mission as scientists at public universities seriously. We hope to provide scholarship that benefits the public. Collectively, we think the Sierra Nevada is worth the effort. As noted above, this response is an effort to move the dialog along regarding the future of SNAMP. We look forward to further discussion. Please contact me (510-643-0684; jbattles@berkeley.edu) if you have any questions.

Sincerely yours,



John J. Battles
Professor and Chair, Ecosystem Sciences
Lead PI, UC Science Team on the Sierra Nevada Adaptive Management Project

Individual Team Responses

FIRE AND FOREST ECOSYSTEM HEALTH

Option 1: Assumption: forest treatments would be completed prior to the summer 2013 field season. If so, we could finish the experiment as planned regarding the efficacy of SPLATs on fire behavior at Sugar Pine and Last Chance. We'd accomplish this task by concentrating all post-treatment re-measurements in one field season. This approach has some added costs in equipment (need enough instruments to support to field crews).

The primary scientific "costs" of the schedule change is that there would not be enough time to empirically measure the impact of the treatments on the growth and survivable probability of the trees. The change in the survivorship probability of the trees was a direct test of the extent and magnitude of the treatments on one component of forest health. In other words, we had hoped to examine the contention that the reduction in tree density associated with SPLATs would improve the health of the forest. Our survivorship models for mixed conifer species typically have three components: 1) long-term growth trend during the last 20-30 years; 2) recent growth increment (typically the last 3-5 years); and 3) the number of abrupt growth declines. Thus, the original timeline's four-year response window was already a minimum. Any shorter response would not be scientifically justifiable. Thus, we are recommending that we revise our work plan with respect to forest health, as follows.

Instead of relying on a direct empirical test, we would use data already collected and models already built to examine correlations between tree growth and forest characteristics (canopy cover, tree density, forest type) and then extrapolate from these correlations to estimate the likely impact of the fuel treatments. We would not collect another ecologically relevant sample of the tree growth in the reference and treated watersheds at the 2 sites. It may be worthwhile to collect post-treatment tree cores in the treated watersheds ONLY to see if the selective thinning did target the less healthy individuals in the population. However, it is essential to note both options represent either a less direct approach or a less informative measure of the impact of SPLATs on tree growth and survival. We would still consider our results within the context of a larger perspective of forest health (e.g., change in fire resilience, impacts of water quality, population growth of owls/fisher). However, we will not be able to conduct an independent and robust test of the idea that reducing canopy tree density has widespread and positive benefits for the remaining trees (i.e., improves the health of the forest). The budgetary implication of the revised work plan is a net savings over 2 years of approximately \$70,000. However, if we agree to proceed with this option, we would have to re-budget the last 2 years of SNAMP to reflect these changes.

Option 2: Fire and forest health plan with 7 years of funding and a 1-yr no cost extension.

However, assume that 2nd phase of the fuel treatments (mastication, burns) are NOT complete by the start of the 2013 field season.

We could employ the same timeline. However, our fire behavior analysis would use the empirical results to measure the impacts of the treatments accomplished but would have to resort to simulation models to estimate effects of treatments planned yet not implemented.

Option 3. Fire and forest health with same total amount funding anticipated for 7 consecutive years but spread over 9 or more years.

The strategy is similar to Option 1. Basically the FEFH team would downscale to minimum staffing in interim years and then spin-up for one busy field season followed by 18 months to clean, analyze, and interpret results. The trouble with Option 3 is that other teams in SNAMP cannot “spin-up and down” with discrete field seasons like the FFEH team can. Thus, integration with the other teams is lost or severely compromised.

FISHER TEAM

SNAMP fisher study should continue for 8 years as agreed to at the beginning of project. Fisher Team can readily publish a variety of new and interesting facts about fisher biology at any time. But, unless Fisher Team continues the work for the full 8 years agreed to at the outset, it will not be able to provide answers to the management questions posed in the adaptive management process.

(1) The BACI experimental design was established by consensus of all PIs to require 7 years of field work plus a year to analyze and publish the results. Fisher Team developed the study design and provided the budget for what it determined was the least cost effort to answer the primary questions posed by the adaptive management process. Fisher Team holds that this is the absolute minimum needed; in fact, 10 years may be the real minimum because the fisher can live to 9 years of age and black oak acorn mast crops occur only about once a decade. Such time scales require studies lasting much longer than the usual short-term research projects.

(2) Arbitrarily eliminating the Ecosystem Recovery year not only compromises our ability to discriminate between short term and long term responses, but also reduces the number of *fisher life spans* we will be able to track over the life of the study. Fisher Team's sample is *a fisher life span*; knowing when a fisher was born, what its home range was throughout its life, how many young it produced, and where, when and what each fisher died of. Fisher Team has amassed a sample of

about 10 fisher life spans to date. Fisher Team needs an absolute minimum sample of 42, or even better 50: this power analysis will be presented at the Fisher IT meeting on July 19.

(3) Because the Forest Service was not able to carry out the SPLAT treatments according to our original schedule (1-2 years late), the fisher study will require three years post treatment to carry out the originally agreed upon study design. Fisher study requires continuous day-to-day monitoring of individual fishers in the population, which will require substantial additional cost to the Forest Service to complete the work. Fisher Team understands that financial situation is difficult and will continue to do everything possible to be frugal and reduce costs over these additional years.

Beginning in Project Year 2, the fisher project has not been receiving the minimum level of funding requested to carry out the project. Fisher Team agreed to participate in the SNAMP project if its minimum budget was provided. Fisher Team will need 4 new trucks before the study is completed. Fisher Team has absolutely no room for “down time” because crew must be in the field every day to detect and retrieve fisher mortalities within 24 hours of death. The original budget included funding for vehicle replacement, but funds received to date have not included vehicle replacement funds.

Fisher Follow-up from Battles. I have outlined a refinement of the options for the fisher research based on my discussion with PI Barrett on 7/11/2011. To clarify, the underfunding referred to by the fisher team represents the cumulative SNAMP wide underfunding of approximately 85% that all teams have experienced.

Option 1: Funding and timeline needed to answer original question about management impact of fisher population dynamics.

Fisher Team has weathered the chronic underfunding by revising some aspects of their workplan (e.g., scat dogs and fecal matter analysis was not conducted). Based on thorough budget review, including estimates of the costs to replace their vehicles, the Fisher Team has concluded that they can complete the study if they received the original funding levels for Year 6 and two following years for a total of 8 years of full funding.

Funding at original budget levels for eight full years.

Full funding for Year 6

Direct to UC B in the Yr 6 budget -- \$636,542

Indirect (continuation of air support) - \$325,000 (estimated)

TOTAL = \$964,542

USFS commitment to similar levels of funding (approximately \$950,000/yr) for three years post-treatment: if October 2012 is the end date for treatment completion that works out to funding through October 2015.

Option 2: Continue with “available smaller budget” to capitalize on the investment.

The continuation would contribute key insights regarding fisher biology and ecology but would not be able to answer with rigor the key question envisioned by SNAMP. The Fisher Team could NOT quantify the impact of forest management on fisher population dynamics with a reduced budget.

Further Fisher Team follow-up, July 20, 2011

At the Fisher Team IT meeting on July 19, 2011, PI Barrett described the reasons the Fisher Team requires full funding and full post-treatment data collection and then presented three alternatives for the Fisher Team’s future:

- 1) PI Barrett will resign from SNAMP, leaving PI Sweitzer to continue with funds provided.
- 2) Fisher Team will change the SNAMP study goals to simply provide information on fisher biology but not on the effect of forest fuel treatments on fisher.
- 3) Fisher Team will answer all adaptive management questions with full funding and full research timeline as proposed.

OWL

Owl Team would continue research if funding ended after the October 2014 field season, with an extension to 2015 to complete the writing of the report.

With only two years of post-treatment data, we are uncertain if we will have an acceptable probability of detecting changes in owl vital rates such as survival, reproduction, and occupancy in response to SPLATS. We are currently conducting power analyses to determine how many post-treatment years will be needed to achieve high power to detect such changes and expect to have some results available by Sept 30, 2011 (i.e., at the time of the Science Team meeting). Given that owls often continue to occupy sites for multiple years following large-scale disturbance (such as wildfire), it is quite possible that two years of post-treatment data will not be sufficient, and that longer-term study will be needed. We suspect that we will be able to detect acute effects such as changes in owl activity centers (if such changes do indeed occur) with only two years of post-treatment data. Because we have accumulated location data for nests and roost sites of owls, we

should be able to detect changes in the locations of activity centers if owls move away from SPLATS.

Even without conducting a power analysis, we are confident that one year of post-treatment data will be inadequate to detect any impacts of SPLATs on owl vital rates. Thus, all treatments would need to be completed in the fall of 2012 to ensure that we can sample owls for two full field seasons following the completion of SPLATs. As mentioned above, power analyses we are currently conducting will be required to determine if two years of post-treatment data are adequate.

Also, timber harvesting on private lands is occurring in a number of treatment and control territories that could complicate the interpretation of the effects of SPLATs on owls. Thus, we need reliable information about timber harvests on private land in order to include the effects of private lands on owl vital rates in our models. Lone Star Timber has provided information about the timing and location of harvests near spotted owl territories, but after several requests, Sierra Pacific Industries has not provided such information. Assistance from the management agencies in this effort would be helpful.

Finally, our study is contingent on the continuation of the Eldorado owl study because of sample size issues (i.e., $n=1$ treatment territory using SNAMP study area alone). In addition, maintaining the current level of funding is critical because we must also conduct post-treatment vegetation sampling as well as monitoring owls and checking for reproduction, survival, and occupancy. For example, if funding is reduced and we cannot do post treatment vegetation sampling, we would only have two forms of treatment effect predictor variables (categorical [treatment or not treatment] and treatment area [gross size of area treated]).

PUBLIC PARTICIPATION

PPT will be able to continue to facilitate meetings, track learning and information flow, collect data from meeting evaluations, interviews, and possibly the "after" survey. We will continue to publish, but the main barrier to publication so far for us has been that no treatments have happened yet, so that area will be weighted to the possibly truncated second part of the project.

PPT may have to give up any general survey that required human subjects approvals from the federal government; this can take 2 years to obtain. However, PPT can begin the process of getting approval now.

The ability to facilitate public input into integrated data interpretation and use would be limited because we will still be collecting data in 2014. There would be no money to pay for the IT meetings nor money to pay for salaries for people to run public meetings, particularly IT meetings for each team, when the UCST is writing up its results, yet, under the current workplan, the public is a partner in the final recommendations. This part of the workplan would need to be dropped and the public removed from that last link in the adaptive management cycle. We will need to be up front about it with the public and apologize that we would not have funding to take comments on the draft recommendations before they are made final. USFS could take the responsibility of incorporating the public into the last part of the AM cycle. This will be a divergence from the third party model and might make people uncomfortable.

We also would have no funding to report back to the communities through UCCE presentations to local groups. We would like to make a presentation in each of the study areas and invite everyone. Holding back some funding for meetings, perhaps one IT for each team and one synthesis conference, a year or so later would help, but we would not have funded staff time to organize and run them.

We will not be able to do the meta analysis. PPT's ability to do an evaluation of the project would be hindered because the project ends in a data collection year.

SPATIAL

Spatial Team would consider continuing, as we think there are some key areas of post-treatment lidar analysis that will be of use to the FS.

Spatial Team would have to give up analysis time. How much time is unknown, as the lidar contractor NCALM can take up to 6 months to deliver the data. This will further shorten our processing time.

Spatial Team's needs the ability to carry-forward funds into year 8 and the ability to have sufficient funding for staff to perform analysis.

WATER

Water Team would like to request a no-cost extension and, if possible, do the planned 3 years of post-treatment measurements, in parallel with the modeling. Measurements in the 3rd year could possibly be scaled back, depending on how the next 2 years go.

With the no-cost extension, Water Team could meet the objectives. Without the no-cost extension, Water Team will be able to make more general conclusions using other data sets to supplement results. At the very least, Water Team needs to get full funding on time, or reasonably on time. We are working under Year 3 funding right now.

SNAMP General Research Timeline (revised)

