



SNAMP Fire and Forest Ecosystem Health (FFEH) Final IT Meeting
May 15, 2014, 10 am – 2 pm USFS Wildfire Training Center, McClellan, Ca.

In Attendance:

John Battles – UC Berkeley
John Buckley – Central Sierra Env. Res. Center
Brandon Collins – UC Berkeley & USFS PSW
Marie Davis – Placer County Water Agency
Patricia Flebbe – USFS Region 5
Danny Fry - UC Berkeley
Peter Hopkinson - UC Berkeley
Kim Ingram – UC Cooperative Extension
Susie Kocher – UC Cooperative Extension
Justin Johnson - CalFire
Anne Lombardo – UC Cooperative Extension

Lynn Lorenson – Nevada Co. Res. Cons.District
Dave Martin – USFS Sierra National Forest
Dave Passovoy - CalFire
Larry Peabody – USFS Tahoe National Forest
Carlos Rameriz – USFS Region 5
Tony Rodarte – USFS Tahoe National Forest
Klaus Scott – California Air Resources Board
Karina Silvas-Bellanca – Sierra Forest Legacy
Ben Solvesky – Sierra Forest Legacy
Scott Stephens – UC Berkeley

Power Point Presentations:

1. Presentation on the study sites:
http://snamp.cnr.berkeley.edu/static/documents/2014/06/05/FFEH-IT-Meeting_Study-Sites-Update_Presentation.pdf
2. FFEH Vulnerability Profiles Presentation:
http://snamp.cnr.berkeley.edu/static/documents/2014/06/05/FFEH-IT-Meeting_Vulnerability-Profiles_Presentation_20140515.pdf
3. FFEH Landscape Assessment Framework Presentation:
http://snamp.cnr.berkeley.edu/static/documents/2014/06/05/FFEH_Landscape-Assessment-Framework_Presentation_20140515.pdf . It is noted the slide #7 contains only HYPOTHETICAL numbers.
4. Brief Final SNAMP report outline provided by Peter Hopkinson from Project Integration Management. http://snamp.cnr.berkeley.edu/static/documents/2014/05/23/FFEH-Final-Report-Outline-Presentation_20140515.pdf.
5. Meeting Recording: Scroll down to the FFEH meeting 5/15/2014 and you will find some great footage of the presenters at <http://snamp.cnr.berkeley.edu/events/>.

I. Welcome and guidelines:

Susie Kocher welcomed the group to the final integration meeting for SNAMP's Fire and Forest Ecosystem Health team. This group was all familiar with the safety speech for the meeting facility, so we were able to skip it. Everyone present got a chance to introduce themselves and share any expectations they might have for the meeting.

II. Framework for assessing impact of SPLAT's on fire behavior:

Two basic **vegetation maps** have been created using SNAMP Lidar data and NAIP imagery (National Agricultural Imagery Program); one prior to treatments in 2007 and the other following treatments in 2013 for both sites; Last Chance and Sugar Pine. For Last Chance, whose map is farther along, there are about 1,500 polygons representing like vegetative structures. Treatment areas were then identified on the maps allowing for a change in fuels and forest structure attributes to become evident.

The treatments focusing on surface fuels in Sugar Pine provided less evidence of change. If treatments were predominantly done in the understory, as they were in fisher territory, detectable changes in canopy cover were less evident. Waveform lidar may inform this discussion in the future, beyond the SNAMP study.

Fire modeling of the different scenarios can detect differences in fire effects on the landscape with or without treatments, therefore predicting a change in fire behavior as result of the treatments. FARSITE is the primary model being used for post treatment fire modeling although the pre-project data was modeled using FLAMMAP instead. FLAMMAP determines the conditional burn probability by randomizing fire ignitions on the landscape and is looking for hotspots; places that burn more often and more severely no matter where the ignition starts. The number of times any pixel burns after all those random ignitions is equal to the conditional burn probability. Many layers are considered including topography maps, fuels and vegetation maps, fuel conditions, and weather..

In contrast to the a probabilistic approach of FLAMMAP, , FARSITE models the effects of **one** problem fire, meaning that a specific problem fire must be defined for the modeling effort. The team will be linking FARSITE with Forest Vegetation Simulator (FVS - FFE) to connect fire behavior with **fire effects**. It is used to look at the effects of average flame lengths per polygon to help relate fire's effects to structure modification and number of trees killed. This identifies the different effects in treated and untreated areas. Modeling efforts focus on "extreme" fire conditions, as these are the ones most troublesome and most likely to burn in our suppression environment.

The team will be modeling the effects of fire over time. FVS will be used to grow the stands to 10, 20, and 30 years from the treatments. Our earlier research showed that treatment effects were not detectable 30 years after implementation. The team said models often underestimate the real effects of fire, particularly in terms of the convective heat transfer mechanism (versus radiant heat). Models offer a look at trends and are certainly not infallible.

***Question:** Will the team be seeking local expertise on likely ignition spots and the specific problem fire to model?*

***Answer:** Yes, they got input at Last Chance and will also consult with the Bass Lake District when they are ready to model the Sugar Pine project.*

***Question:** Patricia Flebbe suggested that Brandon Collin's PowerPoint slide "Model forest change over time" slide #7 be modified that the data graphed is totally hypothetical. She also suggested that we be explicit regarding the limitations of fire model and how it affects the interpretations that you can make.*

***Answer:** The Forest Team will certainly do that.*

Re-measuring treatments at Last Chance:

The project included 4 firesheds (2 treated and 2 control) covering almost 25,000 acres with an estimated 8000 canopy sized trees measured in the Last Chance study area. . There are 382 vegetation and fuel plots at the Last Chance that sample seven different vegetation types. . About 18% of the landscape was treated there. Forest Team researchers reviewed the data collected post treatment at Last Chance. The following plots were re-measured in different treatment types: Mastication – 5, Thinning - 34, Cable thinning - 2, Tractor thinning - 32, Prescribed fire -10. The prescribed fire used did not cause a lot of change in the overstory. (The Eldorado Habitat Analysis has just come out in Ecological Applications.)

Using vulnerability profiles to quantify forest health:

Dr. John Battles discussed the dependence of forest health and density on each other using the Reinke Reference Curve, the equation for stand mortality and the self-thinning rule. The effects of competition on tree growth and death are profound - the more trees per acre, the smaller the diameter of trees due to the slower growth in a crowded forest. There is plenty of evidence for this in trees in the Sierra. Both the metabolic scaling theory of biology and allometry equations derived from field data show the fundamental biological principle that some trees will outpace others. Therefore thinning a dense overgrown forest ought to improve forest health and reduce fire risk. Resilience is the goal.

A key question being asked by this work is whether treatments designed to modify fire behavior also improve forest health. The team has been working on a measure of vitality that quantifies an

individual tree's probability of survival. Tree cores have been collected and processed to look at long term growth and then vulnerability profiles were developed for different tree species. The team has been working on modeling tree survival to produce a vulnerability index by tree species and size class. 1% mortality is normal, one tree in 100 typically dies every year.

Capturing the effects of cambium kill during fires is challenging, as it is often delayed. Some trees in the Rim Fire area appeared green right after the fire but were dead in 2 to 3 months, without beetle infestations. So delayed change is a challenge. Cable logged areas in the American Fire had high fuels levels because it was not feasible to remove much small material using cables. Instead activities fuels were lopped and scattered and left on site. As a result, there was a lot of fuel and so high residence times for the fire burning in those areas caused more trees to die than normal due to cambium loss.

Effects of various treatments were calculated for trees per hectare and biomass in different tree class sizes. This was informed by the Fire and Fire Surrogate Study conducted at UC Berkeley's Blodgett Research Forest which is very near the Last Chance site. Mechanical treatments at Blodgett produced a forest health response that was surprising both in magnitude and longevity. Mechanical treatments plus fire at Blodgett produced the lowest predicted vitality. Mechanical treatment only had the lowest observed mortality, in part because follow up fire in the mechanical and fire treatment was done in the same year without time for the masticated material to decompose. Dr. Scott Stephens did report that masticated material seems to decompose quicker than he expected.

Update on Sugar Pine SPLAT assessment:

Dr. Scott Stephens started with a special thanks to Dave Martin, Larry Peabody and Tony Rodarte for their work with SNAMP over the years. He went on to say that over 250 plots were inventoried pre and post treatment, over 6,000 trees were measured twice and there were over 13 miles of transects. The pre-treatment data collected in 2007/08 included 284 plots. In 2013, 257 post-treatment plots were measured including 8 masticated plots and 31 thinned plots.

So far, not having received all the polygons yet, it appears that only 39 of 250+ plots were affected by the treatment but there is more data coming. Lidar data shows that canopy cover has not changed very much, so modeling any changes in fire behavior will be difficult too.

***Question:** How does the duff layer contribute to fire model predictions? It is very deep in the Sugar Pine area.*

***Answer:** The forest team responded that this is a huge limitation of fire models as they do NOT consider duff at all. This could perhaps underestimate some tree mortality due to the longer time the thick duff supports fire at the base of the trees.*

Question: *Does the FFEH team look at canopy height? For fire managers, canopy base height is important. Changes in it would be important.*

Answer: *Yes, Lidar data and plot data both measures canopy base height which is used by the fire models to predict fire behavior.*

Lidar was helpful in efforts to scale up from the watershed to the fireshed, taking 400+ plots up to 1,500 polygons. It was also helpful in quantifying characteristics of den trees. A language still needs to be developed for Lidar and fire and forest teams to be able to communicate efficiently; as the two disciplines are learning how to cross walk their work. Waveform lidar may help get at ground characteristics better, but its scope is more local.

Overview of metrics from fire/forest models to wildlife and water teams

The FFEH team is providing baseline metrics and their change as a result of the treatments for the other teams to then consider the impacts of on their resources. This is another reason they are using the fire model FARSITE, because the output more closely fits wildlife team data needs including canopy cover, density of trees by class size and veg type. They are not passing on information on snags as that was not requested.

For the water team, they are forwarding on data on veg type, canopy cover, leaf area index, shrub cover and ground cover. For the forest health work, modeled results on polygon level density, mortality (especially of large trees) and live crown ratio will be used. The FFEH team was very careful to stick with metrics they could model into the future. The other teams will use these metrics in their own modeling schemes.

SNAMP final report format

Peter Hopkinson gave a quick review of the SNAMP final report titled “Learning adaptive management of Sierra Nevada forests: An integrated assessment”.

- Chapter 1: Introduction, history of SNAMP, project framework
- Chapter 2: Site description
- Chapter 3: Compilation of extended abstracts that will inform the integrated assessment and recommendations in chapters 4 and 5
- Chapter 4: Integrated resources assessment
- Chapter 5: Integrated management recommendations
- Chapter 6: Executive summaries of resource-specific findings with resource-specific management recommendations
- Appendices and the 2014 final report timeline

The whole UC Science Team will work to come up with universal management recommendations around all this information. Any lack of consensus will be shared. MOU and stakeholder comments to these recommendations will be captured as a good balance to our discussions and shared. Having a minority response from the UCST will allow managers to choose which resources to manage for if there are mutually exclusive activities.

Question: *How much detail about the challenges SNAMP has faced carrying out the research will be in the SNAMP final report?*

Answer: *John Battles said he wasn't sure yet. USFS representatives agreed that any limitations that might influence results should be shared.*

Question: *What is the difference between **chapter 3** and chapter 6? They sound very much alike.*

Answer: *Management recommendations in Chapter 5 will be integrated across resources while recommendations in Chapter 6 will be from individual teams. Chapter 3 will comprise results from each team that are directly relevant to the integrated assessment/management recommendation chapters (4 & 5). Chapter 6 will be summaries of teams' **resource-specific** results and recommendations. Yes, all the recommendations are for public lands.*

Question: *How much will the recommendations focus on maintaining live large trees? That is why many stakeholders are involved because they are worried about mortality effects on large trees.*

Answer: *Tree mortality and modeling predictions will quantify mortality for individual tree size classes so this concern will be addressed.*

Question: *What will be on the cover of the report?*

Answer: *We haven't given that much thought. There were a number of suggestions made including holding a high school art contest.*

Wrap up, next steps and evaluation

Data flow: The FFEH team will send their fire modeling results to the owl team first, as Last Chance has been done first. Their focus will next be turned to completing the fire modeling at Sugar Pine once all the treatment data is received (Final polygons have been received as a result of conversations at this meeting).

Action item: *Dave Martin asked the forest team to consult with the Bass Lake RD on the most likely fire ignition point to use in the FARSITE model at Sugar Pine. His fuels staff would also have input on the expectations about passive/active crown fire (Passive crown fire may kill clump of trees, but active crown fire removes the chance of future propagation, as soil and seeds are burned so badly). The Aspen fire will be used for local fire conditions in the Sugar Pine area. The American Fire conditions will serve as a good comparison for the northern site.*

Stakeholder perceptions of thinning: Patricia Flebbe said she was hoping that the Public Participation Team could help the Forest Service identify what stakeholders think about the treatments. Susie explained that there is a bit of a time problem. Adriana is finishing the interviews and doing a final email survey this summer, before many stakeholders have seen the treatments or been able to absorb the final report. Ideas about overcoming the time lag were discussed.

Action Item: *Susie will work with PPT to look at gathering stakeholders post-thinning perceptions on a final fieldtrip to Sugar Pine and Last Chance.*

Action Item: *PPT will look at Patricia's question about how PPT is integrated into biophysical integrated assessment. It is not very clear from the diagram.*

Final public input process: Patricia Flebbe suggested that PPT make meeting announcements a bit more flashy, to grab the attention of an over emailed crew. We can advertise future SNAMP meetings through the Sierra Dialog; using Constant Contacts can help with readability.

Dave Martin suggested we have a final fieldtrip to the Sugar Pine site in October of 2014.

Action Item: *Anne Lombardo will work with Dave to help support a final field trip to Sugar Pine in the fall.*

The potential for a SNAMP conference after December 2014 was also discussed. The advantage would be to reach a broader audience who would be very interested in the report and its effects on Sierra Nevada forest management. This could be a one or two day conference in February or March, while the outreach team is still funded.

Action Item: *Susie will explore holding a SNAMP symposium in winter/spring 2015.*

Evaluation: Participants said they appreciated the open dialogue at the meeting, with the lack of soap boxes being used. The lectures were understandable, and organized. The room set up was good as was the lunch. They also filled out paper evaluation surveys – the results are described below.

Evaluation results from 5-15-2014 Forest Integration Team meeting (N = 16)

