Sierra Nevada Adaptive Management Project Forest Health Field Trip Notes
Oakhurst, CA May 28th 2009, 9:00 to 12:30 pm

In Attendance:

Julie Antonio	John Flaherty	Leonard Kelly	Sherri Paulsen
John Battles	Pam Flick	Linda Kelly	Michael Price
Lee Belali	Joanne Freemire	Susie Kocher	Susan Roberts
Matt Bissell	Alan Gil	Della Leavitt	Gary Roller
Steve Brink	Lisa Gymer	Anne Lombardo	Rob Roy
Sue Britting	Jeannie Habben	Reid Marks	John Sanders
Kim Carr	Steve Hanna	Adele Marks	Thomas Stratman
Teresa Chuang	Terry Hil	Dave Martin	Matt Stuemky
Jill Coppler	Ann Huber	Neil McDougald	Charisse Sydoriak
Larry Duysen	Carolyn	Rick Messier	Steve Thompson
Tom Eliason	Huntsaker	Darca Morgan	Elizabeth Van
Patrick Emmert	Lynn Huntsinger	Max Norton	Wagendonk
Tom Erfid	Mike Jura	Lowell Paulsen	

I. Introduction: After introductions, John Battles described the goal of the field trip as familiarizing participants in SNAMP and other interested members of the public with forest health concepts and research methods. John explained the background of the Sierra Nevada Adaptive Management Project and the work being done to understand the impacts and tradeoffs on many resources (wildlife, water quality and quantity, fire behavior and forest health) by USFS fuels treatment projects.

II. Forest health concepts: The forest health team is focusing on tree health as an important and measurable component of forest health. Their goal is to quantify the probability of survival of individual trees and then scale these individual estimates to a larger landscape by examining the distribution of individual tree survival probabilities across an entire stand. This will be done both before and after treatment by the USFS in the Sugar Pine project (and at a control area in Nelder Grove where no treatments are planned).

The probability of survival of trees that have reached the canopy is about 99% each year. It often takes many agents to kill a tree in the absence of a catastrophic event, including competition from other trees, insects, pathogens or physical damage. Trees allocate their resources first to leaves and roots, then metabolism, reproduction and repelling insects. Left over energy is then stored as wood around the trunk of the tree through diameter growth. A wider tree ring indicates more vigorous growth than a narrow ring and therefore a healthier tree. Some variation is a result of differences in climate from year to year. However, trees that are unhealthy and declining will reduce growth and show a pattern of smaller tree rings over time. This pattern

can be used as a predictor of tree mortality. The forest team has cored thousands of live and dead trees to quantify the patterns of tree growth that occur before trees die. Some of this work has been published in scientific journals including Ecology and the Canadian Journal of Forest Research.

The team's SNAMP research focuses on examining the long term tree ring growth and width of trees over a 40 year record. The effect of the treatment on the overall distribution of survival probabilities of trees in the forest will be identified by comparing the post treatment survival probability distribution to the pre-treatment survival probability distribution. The forest in the Nelder Control area will be used to filter out responses due to climatic conditions, or other conditions not related to treatments. Although the distribution of tree species in the treatment area is probably not what it would have been prior to fire exclusion (more white fir), the team will not be assuming any particular healthy reference conditions or distributions. Instead they will gauge change in survival probabilities within two years of the treatment. The impact may end up being different on different species of trees. The extensive coring that this research approach requires is probably too time consuming / expensive for USFS management, but the hope is that tree ring growth can be correlated to other metrics or combinations of metrics being collected, including live crown ratio, vigor, diameter, and density.

III. Forest health research methods: Participants drove to a location in the Sugar Pine project on the American River ranger district. At this spot, Gary Roller of the forest team showed the group how to use an increment borer to core a tree. The borer is a simple yet expensive tool. It is important to aim the bit correctly and apply steady pressure while turning. The extractor is then inserted to pull out a core which can then be analyzed.

John Sanders explained how the tree cores are analyzed. The cores are extracted, labeled and carried to the lab where they are mounted on plywood and sanded with progressively finer sandpaper (up to 600 grit). They are measured with a microscope and a sliding stage which is slid via a handle while the rings are viewed through the microscope. A button is pushed at the beginning and the end of each ring, and a computer records the width. COFECHA software is used to cross date cores and look for errors.

Participants then broke into six groups with a SNAMP group leader to core trees. Many small group discussions occurred. All the groups reported back at the end of the day on what they had learned.

IV. Next steps: At the end of the field trip, announcements about upcoming events were made:

- July/August - USFS field trip to look at the Sugar Pine project treatments that are scheduled for next year
- June 3rd & 4th- Spatial Team LiDAR workshop - Oakhurst and Foresthill
- July 11th - Spotted Owl team research methods field trip near Foresthill
- July 15th - Pacific Fisher team integration team meeting near Davis
- Last week in August - Water team field trip in Oakhurst
- September 1st - Water team field trip near Foresthill
- October 20th - SNAMP annual meeting, Sacramento

The handout given out by the SNAMP UC Forest Team follow on the next two pages.

John Battles, Ann Huber, Anne Lombardo,
Gary Roller, and John Sanders
UC Science Team, Oakhurst, CA -- May 28, 2009

http://snamp.cnr.berkeley.edu/

An ecological perspective on forest health

Introduction

Many conceptions of forest health but unlike beauty, health is NOT entirely in the eye of the beholder.

Health can be measured. Our definition: health is the probability of survival.

SNAMP approach: healthy trees are essential to a healthy forest.

Tree health

Like any group, the health of individual trees will vary.

On average, we expect the less healthy trees to die sooner than the more healthy trees

The relevant information is the distribution of health among trees in the forest.

Measuring tree health

Trees are hard to kill. Typically < 1% of the canopy trees die each year (exception – young forests).

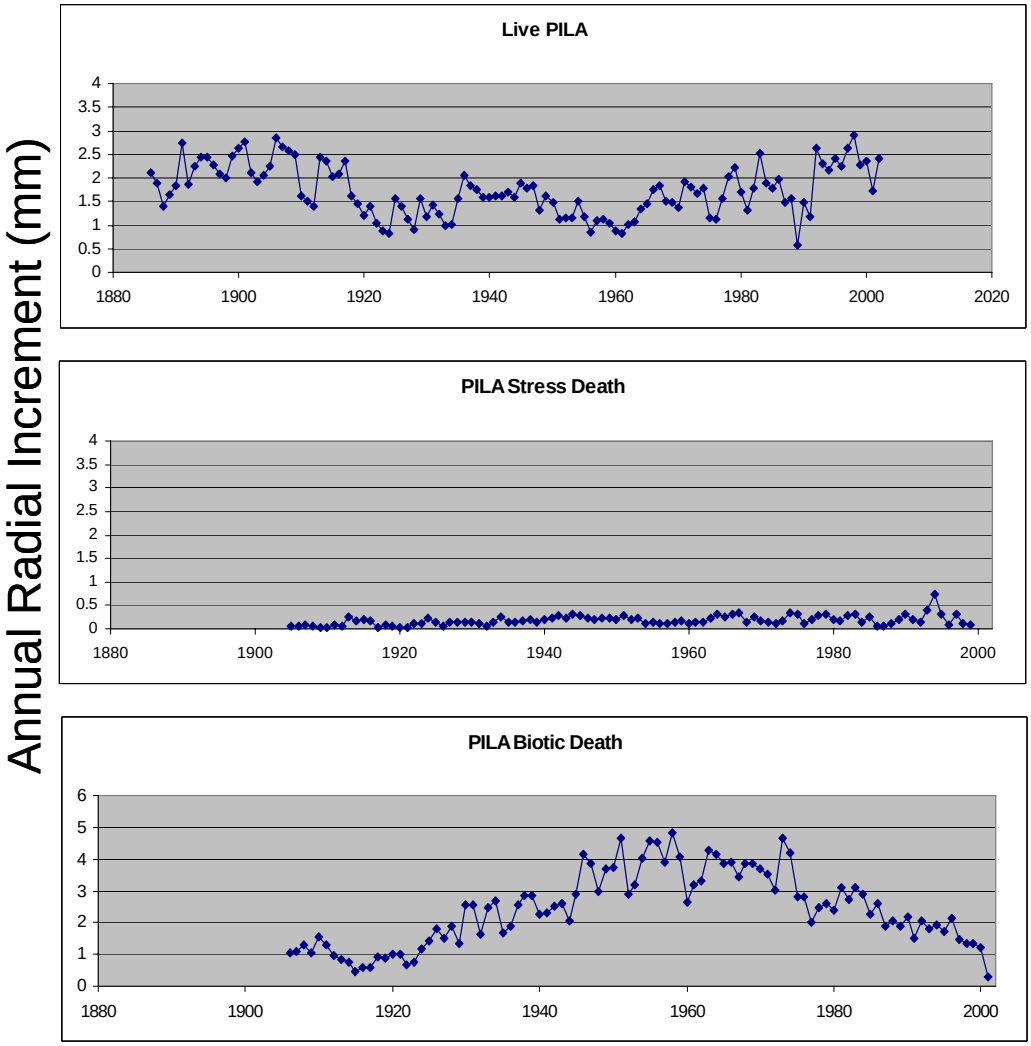
Often, it takes many agents acting together over an extended period to kill a tree
(exceptions – catastrophes like fires, hurricanes, or ice storms).

What are the predictor(s) of tree mortality?

OK predictors
Crowding, insect attack, pathogen infection, damage, live crown ratio

Best predictor – record of long-term growth

Tree rings – temperate trees record annual growth throughout their lifetime. Health is a cumulative process.



Vulnerability profiles. An example comparing sugar pine populations (PILA). The vulnerability profiles for a population without blister rust and one with blister rust present.