

# **2016 EL DORADO FORESTRY CHALLENGE**

## **FOCUS TOPIC QUESTION**

### **Introduction:**

The topic for 2016 is Prescribed Fire Planning at Leoni Meadows Camp. Fire behavior models are an important tool, allowing forest managers to predict what will happen when they intentionally set a fire to the forest, also known as a prescribed burn, as well as how fast, how hot, and in what direction a wildfire may move given fuels conditions and seasonal weather conditions. Your team will be using forest fuels measurements and computer modeling programs to predict fire behavior on a 99-acre unit at Leoni Meadows. Teams will then use that information to write a “prescription” outlining the recommended conditions for setting an understory prescribed fire in the study area.

### **Focus Topic Fieldtrip Location:**

We will be traveling by Leoni bus to an outer area of their 960 acre property. We will concentrate our field study on a 99 acre treatment area on the forest (called a “unit”), where fuel treatment/reduction took place in 2007 and 2008. After teams collect data at the unit, we compile the information and deliver it back to you with the information needed to simulate a fire with the modeling software.

### **Background Information:**

#### **Leoni Meadows Camp**

Leoni Meadows Camp is a 960-acre property purchased by the Northern California Conference of Seventh Day Adventists in 1974. Prior to this purchase, it was a working cattle ranch. Today, its primary use is as a recreation site, hosting conferences, retreats, and summer camp. The area was logged extensively during the gold rush and into the 1930’s. The last large-scale harvest operation was done in 1995-1996, under a commercial Timber Harvest Plan (THP). The revenue from that harvest was put into an endowment fund, and the interest from that fund is used each year to pay for forestry work such as thinning, burning, and removal of dead and dying trees. In 2009, Leoni Meadows hired a Registered Professional Forester (RPF), Mark Stewart, to prepare a Non-Industrial Timber Management Plan (NTMP). The plan allows for periodic harvest using single tree selection.

Seven vegetation management projects have been completed on the property to reduce fuels and help prevent damage from a catastrophic wildfire. Three of

those were supported with grant funding, including the area, or “unit” where we will be working. Our study area had a state-funded grant in 2007 and 2008 that cut small trees, piled the slash, and burned the piles. The other four vegetation management projects at Leoni were funded entirely with interest from the endowment. A map with the location and dates of those projects is provided, as well as a map of the unit with plot centers marked.

### **Brown’s Transects**

James K. Brown was a research scientist in the 1970’s for the US Forest Service at the Northern Forest Fire Laboratory in Missoula, Montana. He developed a way to determine fuel load by sampling downed woody material that is still in use today.

The method is rapid and easy to use and can be applied to naturally fallen debris and activity generated slash. The method involves counting downed woody pieces that intersect sampling planes and measuring the diameters of pieces larger than 3 inches in diameter. The piece counts and diameters permit calculation of tons per acre. A “Go/No Go” gauge is used to classify the different size categories.

**BehavePlus** is a fire modeling system and a Windows® based computer program that can be used for any fire management application that involves modeling fire behavior and fire effects. The system is composed of a collection of mathematical models that describe fire behavior, fire effects, and the fire environment. The program simulates rate of fire spread, spotting distance, scorch height, tree mortality, fuel moisture, wind adjustment factor, and many other fire behaviors and effects. It is commonly used to predict fire behavior in several situations (<https://www.firelab.org/project/behaveplus>).

It was developed by Patricia Andrews, a US Forest Service researcher at the Rocky Mountain Research Station at Fort Collins, Colorado. It was originally designed for use with wildfire, but is widely used for planning prescribed fire.

**FOFEM** (a First Order Fire Effects Model) is a computer program for predicting tree mortality, fuel consumption, smoke production, and soil heating caused by prescribed fire or wildfire.

First order fire effects are those that concern the direct or indirect or immediate consequences of fire. First order fire effects form an important basis for predicting secondary effects such as tree regeneration, plant succession, and changes in site productivity, but these long-term effects generally involve interaction with many variables (for example, weather, animal use, insects, and disease) and are not predicted by this program. Currently, FOFEM provides

quantitative fire effects information for tree mortality, fuel consumption mineral soil exposure, smoke, and soil heating.

It was developed by Robert Keane and Duncan Lutes, US Forest Service researchers for the Rocky Mountain Research Station (<https://www.firelab.org/project/fofem>).

### **Our Procedure:**

1. Thursday Morning: We will travel by bus to the 99-acre unit. Each team will be assigned one plot, and your team will conduct a downed woody debris inventory using Brown's methodology, collecting your data on a tally sheet.
2. Thursday Early Afternoon: We will collect your team's data sheet, enter it into a spreadsheet, and return it to you as an Excel file so you have all of the data collected by all teams.
3. Thursday Late Afternoon: We will guide you through the process of converting all plot data and calculate fuel loading for each size category of fuel. With guidance, you will enter your data into a computer model, and try running the model under a variety of weather conditions, and directions of burn (head fire versus a backing fire).
4. Your team will create a custom prescription that will outline the best conditions to achieve the objectives of your burn.

### **Additional factors that can be described in the presentation:**

- Location: Where is your unit located? How large is it?
- Description: Describe the topography and vegetative cover.
- Fuel Loading: What is the fuel load in tons per acre of different sizes of fuel? What is the average tons per acre of all downed woody debris on the unit?
- Control lines: Where will your burn boundary be? How will the fire be contained?
- Objectives: Why are you going to burn this? Is it really necessary?
- Fire Behavior Analysis: What are the ranges of conditions that will give you the desired results?
- Timing: What season will you burn? What time of day? Do you want to burn right before, during, or after a weather event?
- Contingency Plan: What are you going to do if the fire gets outside your control lines?

## **Resources:**

You will be given several resources on a flash drive to load onto your team computer. You can use these resources to help you understand the topic, to do the calculations for fuel loading, and enhance your PowerPoint.

## **Preparing Your Presentation:**

Your role is to advise the property owners/managers about the best conditions under which to put fire to the ground. You need to tell them why your prescription is safe, won't get out of control, but will achieve the desired objective of eliminating 90 to 100% of the downed woody debris in the unit. Your analysis needs to state the risk of burning live mature trees under the prescription you choose.

Your presentation needs should address the following topics:

1. Background information on Leoni Meadows
2. The role of fire in mixed conifer forest ecology
3. The history of harvest activity and post-harvest treatment in the unit
4. Brown's transects methodology
5. Your team's data collection on the unit, and calculations to determine fuel load.
6. Results of running a fire model for the averaged data for the unit.
7. Your recommendation for optimum conditions for conducting a prescribed burn on the unit, including ranges for the best:
  - Time of year
  - Temperature
  - Wind speed
  - Relative humidity

## **Final Product:**

Your goal is to produce a PowerPoint presentation no longer than 15 minutes in length that presents your fire prescription for the unit. You are encouraged to use photos and information collected on the fieldtrip, interviews with resource professionals during the Challenge, and the maps, tables, and information in the resources provided. Additionally, use the judges' score sheet as a checklist, to make sure you cover the items on which you will be scored.