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Establishing the Yosemite Forest *Dynamics Plot*

Article by Ric Moore, PLS and James A. Lutz, PhD, page 14

The Professional Practices Committee

Surveyor's Friend or Foe?

Article by David E. Woolley, PLS, page 10

NSPS Enters Its Second Decade of Involvement with the Boy Scouts Surveying Merit Badge

Article by Curt Sumner, PLS, page 12

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By: Ric Moore, PLS and James A. Lutz, PhD

Establishing the Yosemite Forest Dynamics Plot

It was 1930 and the initial impact of the previous year's stock market crash was still being felt throughout the nation. After decades of political fighting and maneuvering, timber companies were beginning to stir again, despite the lull in the economy. Signs of tentative plots for timber harvesting were starting to appear in relatively untouched, old growth forests through the western United States.

These events had not escaped notice from the new "environmentalists", which in some cases had the financial support from "old money". John D. Rockefeller, Jr. and the foundation that bears his name, through a cooperative agreement with the Federal Government, purchased approximately 3,000 acres near the western edge of Yosemite National Park, thereby protecting some of the largest and healthiest sugar pines in the country from harvesting (Figure 1).

Early one morning in June 2009, a group of university researchers and land surveyors were standing at the end of a long dirt road – previously the roadbed of a railroad logging spur line – gazing upward at the expanse of forest that lay before them. Jim Lutz, PhD, a Research Associate at the College of Forest Resources at University of Washington (http://faculty.washington.edu/jlutz/), had been organizing the cooperative effort with California land surveyors months before. The task was to establish the Yosemite Forest Dynamics Plot (YFDP) in the middle of this

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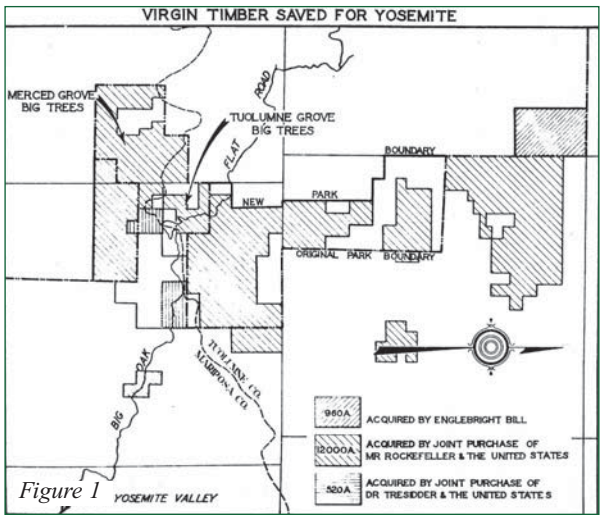

Figure 1

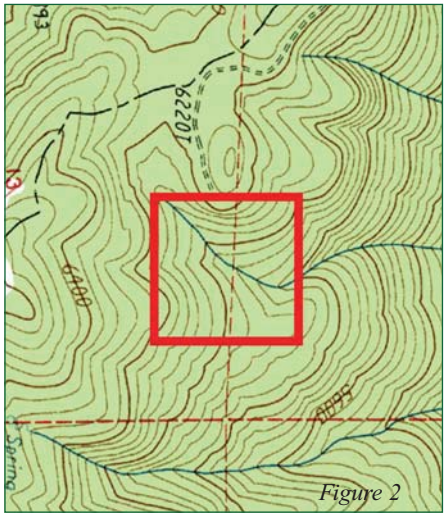

Figure 2

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old-growth stand of sugar pine and white fir (http://faculty.washington.edu/jlutz/index_YFDP.htm).

One of only five large scale forest dynamics plots in North America, and one of only 35 in the world (http://www.ctfs.si.edu/plots/), our job was to survey a 25 hectare grid (500m x 500m) at 20 meter intervals to assist the researchers with identifying, mapping and tagging all woody stems greater than 1 cm in diameter at breast height. As land surveyors, we have generally been trained that a tree is not really a "tree" until it is a minimum of 3.5 inches in diameter at chest height. It was explained to us that while we were following the general forestry definition, "tree" that was 1 cm or greater at chest height relative to the 20 meter grid. At about this time, we collectively noted that we had committed to the easier part of the project…or at least we thought so that first evening by the campfire.

The project area (Figure 2) was generally oriented in a cardinal direction, located in complex terrain, generally facing north, northeast and northwest somewhere in the middle of the Rockefeller Grove. It had an elevation change of approximately 100m to 150m across the project site, and included a number of steep natural drainage courses. The topography made the task moderately challenging, but the trees and the research requirements made it even more so.

Photo mosaic by: Karen Blake.

their research involved investigating more subtle forest dynamics. The researchers were interested in the recruitment and mortality of small trees, and also the competition between trees and shrubs. Furthermore, the researchers were investigating the rates of decay of standing dead trees, because these standing dead trees are important wildlife habitat.

After we completed the grid, the advance team of researchers would be joined by about 30 more volunteers to identify and measure each tree, as well as map each

Figure 3

Figure 4

The largest trees on the site exceeded six feet in diameter (Figure 3), and the logs on the ground were equally large. Furthermore, because small trees and shrubs were "data", we could not "brush out" the lines. Instead, the intrepid undergraduates held shrubs out of the way so the line was clear (Figure 4).

Prior to arriving at the park, Jim Lutz, acting on the advice of Berk Blake, PLS, out of Buellton, CA, generated a coordinate file for all of us to upload to our data collectors so we were ready to begin the first morning. Jim Lutz

Figure 1
Additions to Yosemite National Park including the Rockefeller purchase of 1930.
Map: Courtesy of Yosemite National Park

Figure 2
Location of the Yosemite Forest Dynamics Plot.
Map: Scott DeLaMare

Figure 3
John Knox, PLS surveying around an old-growth sugar pine.
Photo by: Molly Barth.

Figure 4
University of Washington undergraduate Jim Syvertsen holds back white fir foliage for a clear line.
Photo by: Berk Blake

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Establishing the Yosemite Forest *Dynamics Plot*

Figure 5

had previously walked the site and chose an initial point and backsight for all of us to start our survey from.

We had nine days to collectively establish as much of the grid as possible before the "tree taggers" arrived to begin their tasks. Due to the daunting feeling that we would not be able to complete the entire grid before tree tagging began, and the fact that everyone's onsite schedule varied, we decided to separate into four survey crews consisting of undergraduate and graduate research students and at least one land surveyor. For some of the volunteers, this would be their first time with hands-on experience using traditional survey equipment, especially in this environment. The more training that the land surveyors could instill during the first week, the better chance the university researchers had for continuing with the grid layout after we left the site.

One crew led by Berk Blake and Jon Bratt headed east through the middle of the grid. Rob McMillan teamed with Jim Lutz's crew to proceed southerly along the west boundary to establish the southwest corner, and then east along the south boundary to intersect with Blake's crew near the southeast corner. Two other crews, one lead by John Knox and the other by Marta Alvarez and Ric Moore, had the task of running several parallel grid lines from the west boundary easterly to intersect with Blake and Lutz.

The undergraduates learned their tasks well, with two individuals learning to run the gun and setup in under five minutes – not bad progress for a week of training (Figures 5 and 6). Overall accuracy for the group of professionals and amateurs was well within the parameters the researchers need to examine spatial aspects of forest development. The two longest lines were about 700m each, with one being run by Berk Blake and the other by the UW researchers. All work closed within an accuracy of 18cm northing, 5cm easting, and 3cm vertical.

A stainless steel rod was driven into the ground at each grid intersection with a blue flag marking the location. At the park's request, permanent tags were applied to each rod and the blue flags removed at the end of the project.

The large number of trees surveyed will allow researchers to identify small changes in the rates and causes of mortality. For example, if drying conditions are increasing the mortality of larger trees, death rates should be higher in warmer, drier years. But since mortality rates are low to begin with (these trees live hundreds of years), it takes a lot of trees to separate out the real causes of forest change from the noise in the data. After four long days, the

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Figure 6


Figure 7

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Some of the many project participants:
(Standing) Charlie Wenger, Josh O'Neil, Karen Blake, Berk Blake, Jon Bratt (Kneeling) Student, Camila Tejo, Alana Lautensleger, Jim Lutz
Photo by: Rob McMillan

southerly portion of the grid was established and the researchers spent the remainder of their time extending the grid northerly with the assistance of a couple remaining land surveyors.

By the end of the three-week stint, we were just shy of 20 hectares of surveyed grid points, and the tree taggers (Figure 7) had tagged and mapped 10.24 hectares – more than 10,000 trees. Including surveyors, students, and scientists, over 50 people participated in the 2009 "research pulse. There's still part of the plot to finish next year, and we are already looking forward to wrapping up the job. ❖

Land Surveyors involved in the Yosemite Forest Dynamics Plot project were: Marta Alvarez, Berk Blake, Karen Blake, Jon Bratt, John Knox, Rob McMillan, Ric Moore, and Greg Rice. Special thanks to Ric Moore for sharing this very cool story with the California Surveyor. – Editor

Figure 5
University of Washington undergraduate Alana Lautensleger shows her enthusiasm for surveying. Note tied tree branches in the background.
Photo by: Jim Lutz.

Figure 6
Alina Cansler operating the Nikon Total Station.
Photo by: Ric Moore

Figure 7
University of Washington graduate student Keala Hagmann tags a tree.
Photo by: Jim Lutz.