

# Challenges of Inventorying and Monitoring Oak Woodlands<sup>1</sup>

Charles L. Bolsinger<sup>2</sup>

California's oak woodlands are inventoried periodically by the USDA Forest Service as part of the nationwide Forest Inventory and Analysis (FIA) effort. Forest inventories were originally authorized by the McSweeney-McNary Forest Research Act of 1928. Fifty years later Congress reaffirmed the need for forest inventories in the Forest and Rangeland Renewable Resources Research Act of 1978. FIA inventories in California are conducted by the Pacific Northwest Research Station (PNW) in Portland, Oregon. PNW collects data on lands outside National Forest, and the Pacific Southwest Region of the Forest Service collects data on National Forest lands. About 84 percent of the oak woodland in California is outside National Forests, including about 69 percent in private ownership, and 15 percent in State and National Parks, military reservations, Bureau of Land Management holdings, and miscellaneous public tracts. PNW has the responsibility for compiling, analyzing, and reporting the data for all ownerships.

The inventory cycle is about 10 years, subject to variations related to budget and other factors. Data currently being compiled from a mid-1990's inventory will update a mid-1980's inventory (Bolsinger 1988). The rest of this paper deals with PNW's inventory of privately owned oak woodlands in California, an area of about 5 million acres.

The inventory design is Cochran's (1977) double sampling for stratification. The primary sample consists of several thousand aerial photo plots which are classified by land use and broad vegetation and density classes. A secondary sample of several hundred of the photo plots visited on the ground provides a check of the aerial photo classification and details on tree and stand characteristics. Ground plots consist of three to five subplots distributed over a 2-ha area. More than a million data items were recorded on these plots in the latest inventory, including tree measurements, ground cover, and physiographic factors. About half of the plots have been visited twice and provide detailed information on change in land use and vegetative cover, and tree growth, mortality, and removal.

Most of the technical problems of inventorying California's oak woodlands have been worked out and used successfully for at least 15 years (Bolsinger 1988, Pillsbury and Brockhaus 1981, Pillsbury and Kirkley 1984). As forest inventories go, the oak woodlands would seem to present few problems. As one forester commented while driving through the oak-dotted grasslands, "A piece of cake." Challenges there are, however, and in two areas not covered in my curriculum when I was an undergraduate in forestry school: people skills and sleuthing ability.

People, specifically the owners of the hardwood range, presented the biggest single challenge in the oak woodland inventory. Getting permission to go onto the land was first and foremost. Landowners were contacted by letter, and sometimes later by phone, to ask for their cooperation. Most landowners—96 percent—were cooperative, but the process was anything but straightforward.

---

<sup>1</sup>Presented at the Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues, March 19-22, 1996, San Luis Obispo, Calif.

<sup>2</sup>Research Forester, Forestry Sciences Laboratory, Pacific Northwest Research Station, USDA Forest Service, P.O. Box 3890, Portland, OR 97208-3890.

The owners of many properties had changed since the county courthouse records had been posted. Several owners had died. In a few cases, crews found that there were errors in the ownership records, and the real land owner had no clue we were coming until we showed up. Among the problems were lands registered under one name and occupied or managed by someone else, or listed as a bank, or title or trust corporation, or in receivership or other in-between status. Absentee owners were common, with the addresses ranging from Kings City to Kuwait. Some owners who gave us permission, in writing, changed their minds by the time crews arrived. In a couple of cases, an owner gave crews permission, and then another family member decided against it. In one case crews were asked to leave when they were half finished measuring an inventory plot.

Though we were denied access to only 4 percent of the plots (in a previous inventory we were denied access to 2 percent), statewide, the plots that we were not allowed to visit tend to be clustered in certain geographic areas, and do not represent average conditions. Denied access has probably introduced some bias into the inventory. Why do land owners deny access to inventory crews?

Reasons given include:

*Fear of regulation.* Several landowners in Tulare and Kern Counties were afraid crews would find *Pseudobahia tulare*, a listed endangered plant, on their lands. Some landowners were concerned that other plants on their land might later be listed, or that other conditions as noted on inventory records would somehow be used to prove that their management practices were violating some regulation or law. Some owners were concerned that the inventory crews might classify their land as "critical wildlife habitat," resulting in restrictions on land use activities. It did not matter that we were not evaluating management practices or classifying critical habitat. What mattered was what landowners thought.

*Fear of liability* for injuries received by inventory crews. At least one owner denied access after refusing to accept the release statement provided by the Forest Service.

*Fear that inventory crews would damage property or leave gates open.*

*Unstated or unspecified fears*, which are known or thought to include the following reasons: presence of drug-producing plants (marijuana or opium poppies); anti-government sentiment and a chance to say "no" to Feds; the notion that allowing access may result in higher property taxes, or conversely that denying access may lower Federal taxes; that allowing one crew on the land will set some kind of precedent and many other crews will follow. One landowner expressed concern that the inventory crew's vehicle would leave ruts that could become gullies, a reasonable concern by a good land steward. The crew offered to walk to the plot from a gravelled road, but was still denied access to the land.

Next to dealing with landowners, a major challenge is finding plots that were established at an earlier date. Forest Service plots in the oak woodland were established in the 1980's and relocated and measured in the 1990's. During the 10-year period a lot happened out in the hardwood rangelands: many plots were affected by tree cutting, road-building, residential and commercial development, livestock grazing, insects, disease, fires, floods, windstorms, and landslides. Natural vegetation succession was also a factor, and, in a few areas, the growth of stump sprouts had transformed open "savannas" into oak jungles.

Inventory crews rose to the challenge and "sleuthed out" more than 98 percent of the plots. Relocating plots, including matching up trees tallied in previous projects, is time-consuming and costly. It is considered essential, though, for quantifying change in the hardwood range, including trends in land use by cause, changes in stand characteristics (type, size, density, understory, health), tree growth, mortality, and tree cutting.

Plots are marked on aerial photographs and “monumented” on the ground with distance and azimuth to “witness trees” and other features. If any one of the three to five subplots is found, the others can be located by measuring off distances at the appropriate azimuths. Each tally tree is marked with a numbered tag near the ground and a nail at breast height. Azimuth and distance from plot center are recorded for each tree.

Heavily disturbed plots presented the biggest challenge. The best technique for finding these plots is whatever works. Among them: Landowners were often helpful in telling crews where they had cut trees that had tags on them, or where the plot was located in reference to new developments. One crew found tree tags still attached to logs in a stack by a road 100 m from the plot and followed skid roads to the plot area. Some trees on a “conversation-piece” plot on an unstable slope slid out of the plot, and some slid in between inventories. A more common situation was to find a plot or a portion of a plot altered by heavy machinery—trees and brush pushed into piles, vegetation scraped off, all evidence of the plot destroyed. Such plots were usually relocated by measuring from nearby locations that had not been heavily disturbed, or if the entire area had been altered, by triangulating and measuring in from areas outside of the disturbed area. Where the plot was entirely wiped out, a new plot was located in the area and new data collected, unless, of course, the plot area was converted to a housing tract, highway, or other non-wildland development.

Take-home lesson: Every aspect of the resources on the hardwood rangelands is changing, and perhaps none at a faster rate than the people who have the most influence on the future of the hardwood rangelands—the landowners. It is something to keep in mind by anyone planning an inventory and monitoring project or, for that matter, developing programs to manage or protect these lands.

## References

- Bolsinger, Charles L. 1988. **The hardwoods of California's timberlands, woodlands, and savannas.** Resource Bulletin PNW-RB-148. Portland, OR: Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture; 148 p.
- Cochran, W.G. 1963. **Sampling techniques.** 2d ed. New York: John Wiley & Sons; 413 p.
- Pillsbury, Norman H.; Brockhaus, John A. 1981. **Hardwood biomass maps for California's central coast.** San Luis Obispo, CA: California Polytechnic State University; 12 p.
- Pillsbury, Norman H.; Kirkley, Michael L. 1984. **Equations for total, wood, and sawlog volume for thirteen California hardwoods.** Res. Note PNW-414. Portland, OR: PacificNorthwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 52 p.

