

## Field Tech: In the Field with a Forest Service FIA Crew

By Steve Wilent, *Source* Managing Editor

Most every forester knows at least a little about the US Forest Service's Forest Inventory and Analysis (FIA) program and its work to inventory the nation's forest resources. FIA data are used for a wide variety of purposes, such as quantifying trends in conifer mortality in Colorado, where the mountain pine beetle has devastated lodgepole and other pines. FIA data play a key role in the National Woodland Owner Survey (see "Survey: 14 Percent of Family Forestland Owners to Sell or Transfer Land within Five Years," December 2008). The Carbon Online Estimator tool, developed by the Forest Service and the National Council for Air and Stream Improvement Inc. (NCASI), also uses FIA data (see "Free Tools for Estimating CO<sub>2</sub> Stocks in Your Forest," February).

Last year, FIA supplied information for 483 spatial data requests and more than 50,000 online data retrievals. Also in 2008, FIA inventoried 47,559 plots, 12 percent of the nearly 400,000 remote-sensing and ground plots it has established. More than 560 employees, contractors, and cooperators performed the work. The FIA Fiscal Year 2008 Business Report, available online at [www.fia.fs.fed.us](http://www.fia.fs.fed.us), has much more information.

In late May I had the opportunity to accompany an FIA crew as it measured a plot on the Umatilla National Forest in north-eastern Oregon. The crew of two included Andy Hoff, a forest ecologist, and Mike Boldt, a forestry technician; both are based at the Forestry and Range Sciences Lab in La Grande.

We were accompanied by Jane Terzibashian, a forest ecologist, and Dan Coles, a forester, both from the Portland Forestry Sciences Laboratory, which is part of the Pacific Northwest Research Station. Terzibashian and Coles were performing a "hot check" of Hoff's and Boldt's work, an informal, real-time assessment of a crew's techniques and data quality as it makes its measurements. Other FIA inspections include "cold checks," in which a quality control team later remeasures a plot and compares its data with the original inventory, and "blind checks," in which a quality control team remeasures a plot but does not have the original inventory data. Blind checks serve as the basis for estimating measurement variation, rather than individual crew performance.

### On the Plot

We left the lab in La Grande at 7:30 AM and drove for nearly an hour to a roadside marker left a decade earlier by the last crew to measure this particular plot (FIA strives to revisit ground plots in the western United States at least once every 10 years and every seven years east of the Mississippi River). Then, following that crew's directions, we walked about a quarter mile to the plot. Not all FIA plots are so near roads. Hoff, Boldt, and the others talked of long, steep, brushy routes that take real effort and many hours to reach.

Within a few minutes of our arrival, the crew got down to



**Forest ecologist Andy Hoff enters data into a field computer at an FIA plot.**

work. After installing a new plot-center stake, Boldt replaced old, faded marker tags on a reference-point tree and two subplot witness trees (each of the four subplots is referenced by at least two witness trees; the center of subplot 1 is also the center of the entire plot). Hoff began the process of measuring fuels on the plot. Terzibashian and Coles observed but also made various measurements.

Each plot includes four subplots (24-foot radius, about 1/24 acre) for tallying trees larger than five inches dbh and measuring understory vegetation. Within each subplot is a microplot (6.8 foot radius, about 1/300 acre) for counting tree seedlings and saplings and collecting data on fine fuels. Trees 24 inches dbh and larger are measured in four macroplots (58.9 foot radius, 1/4 acre); and trees 32 inches dbh and larger (48 inches in western Oregon) are measured in each one-hectare plot (185.1-foot radius) on federal land covered by the Northwest Forest Plan.

Note that there are differences among the four FIA regions in what is sampled. For example, trees in macroplots and hectare plots are measured only in the Pacific Northwest region. There also are differences within regions based on location, such as the sizes of trees measured on one-hectare plots as mentioned in the previous paragraph.

Typical crew equipment includes a laser rangefinder, clinometers, hand compasses, a GPS receiver, engineer's tapes, logger's tapes, and a handheld field computer. Also on the list: aerial photos, topo maps, a hatchet, a hammer for nailing ID tags to trees, a range pole, a plumb

bob for making accurate distance measurements, and an FIA field manual (the manual for California, Oregon, and Washington is nearly 350 pages). In addition, crews carry field guides for identifying trees, shrubs, herbaceous plants, insects, and diseases. Terzibashian said crews also carry plastic zip-lock bags, knives, and other supplies for collecting and transporting samples of plants they can't identify.

Another item not on any official equipment list: a "duty stick," a stout, straight length of wood (alder, in this case) exactly 4.5 feet long. According to Coles, some crews carry such an all-purpose rod for everything from locating the point on a tree at which to measure dbh to fending off rattlesnakes.

Of the many elements of a forest measured in FIA inventories, down woody materials is one of the most important. Pacific Northwest FIA procedures call for inventorying coarse and fine woody debris, litter, duff, dead herbs and shrubs, and fuel-bed depth. Inventories of this material are critical to assessing soil water and nutrient cycling, wildlife habitat, wildfire risk, and potential fire behavior, as well as the amount of carbon sequestered in forests, a resource that is sure to become more important as US and regional greenhouse-gas emissions regulations are put in place.

Boldt and Coles explained and demonstrated procedures for inventorying coarse wood debris (CWD). Two 58.9-foot transects are established at each subplot. All pieces of CWD that intersect the transect are tallied and measured if they are three inches in diameter or greater at the intersection and are at least three feet long. The length and diameters at the small end, large end, and at the transect intersection are recorded for each qualifying piece, along with other factors such as species and decay class. Terzibashian and Hoff demonstrated the tallying of fine woody debris (FWD) by three size classes: 0.01–0.24 inches and 0.25–0.9 inches along a six-foot transect and 1.0–2.9 inches on a 10-foot transect.

Terzibashian said the FWD and CWD protocols are regional add-ons to the FIA's National Core Field Guide, which does not

include fuels-inventory protocols. The Pacific Northwest's fuels protocols are similar to those typically used in stand-alone fuels inventories, such as those used by the National Forest Health Monitoring program.

At the office, Terzibashian said, the crew would download the day's data from the field computer, check the data for errors, add any additional data collected, and then pass the information on to the regional FIA office, where staff will subject the data to additional quality checks before making the information available to researchers and the general public.

"We've always worked to develop new ways to ensure that the data we collect get better and better. A lot of our resources go toward error-checking and data quality," said Terzibashian. "Until fairly recently, many FIA records were hand-written. With today's technology, we can do many things that weren't possible even a few years ago."

Boldt, Coles, Hoff, and Terzibashian demonstrated admirable dedication to collecting high-quality data. Although I observed them for only one day, it was obvious that they are highly experienced and professional FIA personnel. Our lunch break was brief—about 20 minutes. The crew seemed more interested in getting back to work than in eating, and I don't think that attitude was an attempt to impress me. After the fourth and final subplot was finished at about 5 PM, the crew engaged in a lively discussion of the effect of *Phellinus pini* on Engelmann spruce; crew members had found several conks on one spruce on that plot. Here again, they seemed more interested in the discussion, and in identifying a large owl that we had seen near the plot, than in rushing back to the lab. If other crews operate like this one, then I have a great deal of faith in the accuracy of FIA data.

*The entire December 1999 issue of the Journal of Forestry was devoted to FIA and is available as a single PDF file from the FIA website, [www.fia.fs.fed.us](http://www.fia.fs.fed.us).*