



# Forest Inventory & Analysis Phase 2 and Phase 3: Ground Measurements



## FIA Fact Sheet Series

The FIA program has recently made a number of changes including: transitioning from periodic surveys to annual surveys, increasing our capacity to analyze and publish data, and merging the FIA and FHM plots into a single three-tiered (or phased) FIA system.

Phase 1 is the traditional aerial photography and/or remote sensing activity used to characterize the acreage of forest and non-forest land in the US. Phase 2 are the traditional FIA ground plots that focus on forest and tree information as it relates to timber but not exclusively. Phase 3 are the ground plots previously installed and measured by the FHM program, and are a subset of the phase 2 plots. It is on phase 3 plots that information relating to forest health is collected.

The National Core Field Guide for P2 and P3 is used by all FIA units to describe how to collect a core set of forest inventory and forest health data. In addition, each FIA unit collects additional variables at the regional level to meet their regional and local needs. The National Core Data Elements are consistent across all of the US.

For a copy of the current National Core Field Guide please visit the National FIA web page. (Note: see webpage address at the end of this document.)

**Data Collection.** Data are collected by permanent or temporary Federal employees; State employees through cooperative agreements; or non-government sources (universities, private contractors, etc.) via contract. The FIA units have experience with all of these options. Each field unit develops staffing

plans that provide for flexibility to take advantage of local conditions. All field data collectors receive standardized training and must pass a certification test before collecting data.

**Quality Assurance.** The present Quality Assurance (QA) program, includes documentation of methods, training for data collectors, checks of data quality, peer review of analysis products, and continuous feedback to ensure that the system improves over time. Field crews enter measurements into portable data recorders (PDRs) in the field. The PDR software includes a high level of real-time error checking as data are entered. QA data and analyses will be included in publications and made available.

**Core Variables.** The annual inventory program includes a nationally consistent set of core measurements, collected on a standard field plot, with data managed, processed, analyzed, and reported uniformly. The set includes ecological variables not previously collected consistently in all regions. Because a nationally consistent set of core variables is needed to respond to legislative mandates and address customer information needs across scales, field units use the national definitions and measurement protocols established for the core variables on all forest land.

**Phase 2.** Phase 2 is the field data collection activity that occurs on the standard FIA plot grid (1 plot per 6,000 acres). Forested plots are installed and measured regardless of intended use or any restrictive management policy. It is on these field locations that the majority of data collection activities occurs.

Plots are installed across all ownership groups. Public and private owners awareness of the program and granting access to the forest land is essential to the success of the program. To protect the privacy of a participating landowner, the exact plot location coordinates are kept confidential.

Maps, aerial photographs/imagery, and GPS units are utilized to properly install the ground plots. The information on the photo is used to establish a starting point (SP). The SP is a easily recognizable monument that can be seen on the photo and/or found by using land use patterns. The crew then navigates to the plot center (PC) either by this information or via the use of a GPS instrument. Once the crew has traversed along the azimuth and distance to PC from the SP, the crew will examine the photo and verify that they are actually at PC and GPS readings are recorded. All of this information is useful for future FIA field crews to re-locate the plot. Any additional information that future crews need in collecting the data is also included in the general plot notes.

On all our forested field plots, we gather quantitative and qualitative measurements that describe

- Tree diameter, length, damage, amount of rotten or missing wood, and tree quality.
- Tree regeneration.
- Site quality information.
- Stocking.
- General land use.
- General stand characteristics such as forest type, stand age, and disturbance.
- Changes in land use and general stand characteristics.
- Estimates of growth mortality, and removals.

Change estimates are determined by comparing data from the same plot at two different measurement time periods, usually 5 to 10 years.

**Phase 3.** On a subset of the Phase 2 plots (one Phase 3 plot per 16 Phase 2 plots), we collect a more extensive set of data. These measures relate to forest ecosystem function, condition, and health. Due to the seasonality associated with some of these measurements, the Phase 3 data are generally collected during a three-month window – June, July, and August. The current measurements on the Phase 3 subset of plots can be grouped into the following categories:

- **Crown Conditions** – generally good crown conditions are signs of vigorous trees and poor crown conditions are symptoms of trees under stress.
- **Soil Condition** – soil erosion and compaction are measured and soil samples are collected for analysis of physical and chemical properties including estimates of site fertility.
- **Lichen Communities** – lichen species richness and abundance are measured on the plot. The presence or absence of certain lichen species indicates air quality, climate changes, and ecosystem biodiversity.
- **Vegetation Diversity and Structure** – the composition of vegetation (species and growth forms), abundance, and spatial arrangement in the forest are measured to determine such things as vegetative diversity, presence and abundance of exotic and introduced plant species, fuel loading, wildlife habitat suitability, and carbon cycling.
- **Down Woody Debris** – measurements of the amount of coarse and fine wood on the ground can estimate carbon storage, soil erosion potential, fire fuel loading and, combined with the vegetation structure data, wildlife habitat.

- **Ozone bioindicator data** – certain plant species are sensitive to ozone exposure. On a separate grid, ozone sensitive species are evaluated for the presence of ozone injury during the late summer.

**Plot Layout.** An FIA plot consists of a cluster of four circular subplots spaced out in a fixed pattern. The plot is designed to provide a sampling location for all P2 and P3 measurements.

Subplots are never reconfigured or moved; a plot may straddle more than one ‘condition class’ such as two different forest types or a forest and a meadow. A condition class is defined as a specific combination of environmental attributes such as land use, forest type, stand age, and other attributes which collectively describe a homogeneous area. Every plot exists in at least one condition class, and may include more than one. If multiple condition classes occur on a

plot, each condition class is described separately.

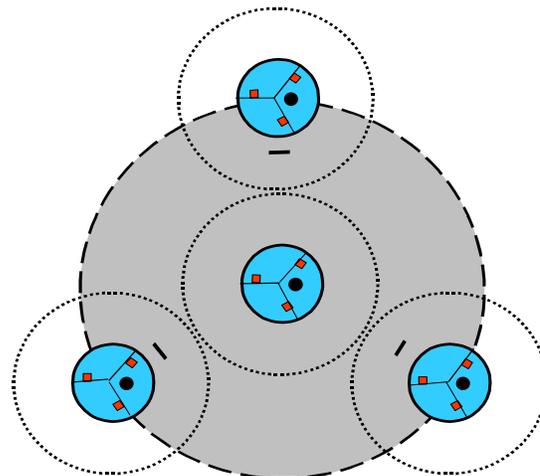
Forested condition classes are further subdivided by the following groups (listed in order of priority): reserved status, owner group, forest type, stand size class, regeneration status, and tree density. If any of these attributes changes within a plot, then an additional condition class is defined and described. The rest of the variables within the condition class level data are used to describe the condition class in more detail, but changes in these auxiliary variables are not used to define an additional condition class.

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**For more information about the FIA Program:**

- See our “FIA Contacts” Fact Sheet
- Visit our national FIA website: <http://www.fia.fs.fed.us>

## Phase 2/Phase 3 Plot Design



	<b>Subplot</b>	24.0 ft (7.32 m) radius
	<b>Microplot</b>	6.8 ft (2.07 m) radius
	<b>Annular plot</b>	58.9 ft (17.95 m) radius
	<b>Lichens plot</b>	120.0 ft (36.60 m) radius
	<b>Vegetation plot</b>	1.0 m <sup>2</sup> area
	<b>Soil Sampling</b>	(point sample)
	<b>Down Woody Debris</b>	24 ft (7.32 m) transects