Forest Inventory and Analysis
Sampling and Plot Design

FIA Fact Sheet Series

Overview. The FIA Program collects, analyzes, and reports information on the status, trends, and condition of America's forests: how much forest exists, where it exists, who owns it, and how it is changing, as well as how the trees and other forest vegetation are growing and how much has died or has been removed in recent years.

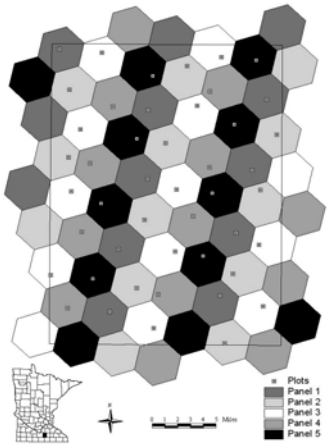
The components and characteristics of the FIA Program that relate to sampling and plot design include:

* Coverage - A single inventory program to include all forested lands in the US, regardless of ownership or availability for forest harvesting. The new program includes all forest land in all 50 States plus all of the territories and possessions of the US. It covers all public and private forest land such as reserved areas, wilderness, National Parks, defense installations, and National Forests.

* Sampling Intensity - The new program includes the measurement of a fixed proportion of the plots in each State, each year, known as annual inventory. Each portion of the plots is known as a panel. The legislative mandate requires measurement of 20% of the plots in each State, each year, to be achieved through a federal-state partnership. Plans have also been developed for less intensive sampling levels of 15% per year and 10% per year. We have agreed that the base federal program to be implemented in all states will include sampling levels of 15% per year in the eastern US and 10% per year in the western US.

* Precision - The plot intensity assumes that enough plots are measured to satisfy precision standards for area and volume estimates, which are consistent with historical levels. Individual States may choose to increase the sample intensity by installing additional plots, at their own expense, in order to increase the precision. However, one of the advantages of the proposed annual inventory system is that it will provide maximum flexibility to States to engage in such intensifications.

* National Sampling Design - A nationally uniform cell grid has been super-imposed over our existing set of sample locations, in order to provide a uniform basis for determining the annual set of measurement plots.



Phase 2 hexagons from Waseca Co. Minnesota and the selected Phase 2 plots for each cell by panel.

This system will eliminate existing discrepancies in the sample intensity between States and regions, and will provide a standard frame for integrating FIA and for linking the program's other data sources such as satellite imagery, spatial models, and other surveys.

* Core Variables - The FIA program includes a national set of core measurements (including some forest health variables collected on a subset of the plots), collected on a standard field plot.

* Data Collection - All field data collectors, regardless of whether they are Federal, State, or contractor receive standardized training and pass a certification test before collecting data.

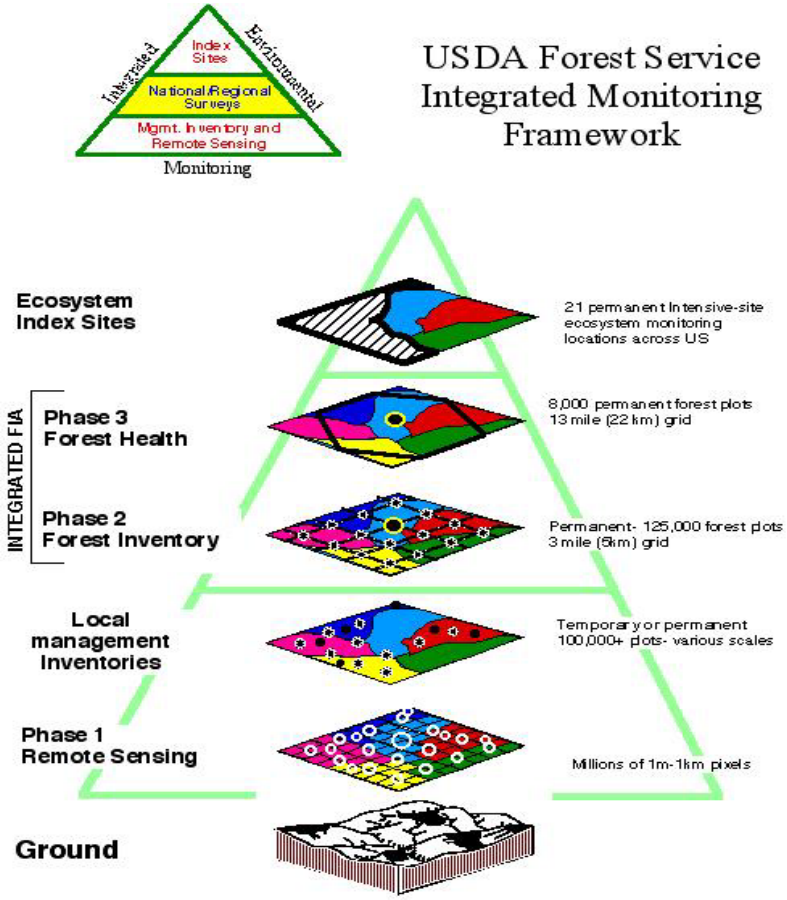
* Quality Assurance (QA) - The present QA program includes training for data collectors, documentation of methods, checks of data quality, peer review of analysis products, and continuous feedback to ensure that the system improves over time.

Forest Inventory and Analysis. In response to legislative direction , the USDA Forest Service significantly enhanced FIA by changing from a periodic survey to an annual survey, by increasing our capacity to analyze and publish data, and by merging the FIA and the FHM sampling designs. The wide array of data collected on the Nations' forested ecosystems are used by a diverse set of customers for many purposes.

The enhanced FIA program consists of three phases or tiers.

* Phase 1 - Phase 1 is the aspect of data collection related to remotely sensed data in the form of aerial photographs, digital orthoquads, and satellite imagery. This accomplishes two tasks, intial plot measurement via remotely sensed data and stratification. This activity is accomplished in the office. A Phase 1 "photo point" is characterized as forest or nonforest. A subset of the photo points are selected for field data collection (Phase 2).

* Phase 2 – This component consists of one field sample site for every 6,000 acres. Field crews collect data on forest type, site attributes, tree species, tree size, and overall tree condition on accessible forest land.



* Phase 3 – This component consists of a subset of Phase 2 sample plots that are measured for a broader suite of forest health attributes. There is approximately one Phase 3 plot for every 16 Phase 2 plots; or one Phase 3 plot for every 96,000 acres. These attributes include tree crown conditions, lichen community composition, understory vegetation, down woody debris, and soil attributes. Soil samples are sent to a laboratory for chemical analysis. Finally, an associated sample scheme exists to detect and monitor ozone injury on forest vegetation.

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 frame for all P2 and P3 measurements.

Most tree measurements are taken within the subplots. Seedlings, saplings and other vegetation are measured on the microplots. Annular plots are used for tree measurements that require collecting a physical sample. This allows the subplots to remain unaltered by sample collection.

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 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 classified by the following groups 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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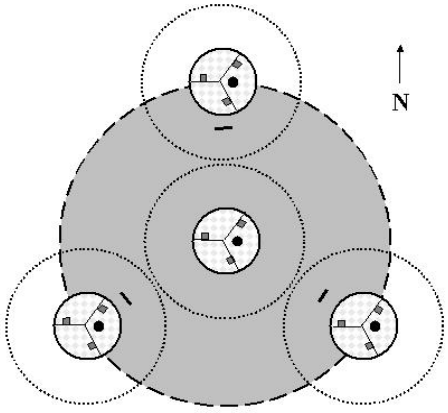
For more information about the FIA Program:

- See our "FIA Contacts" Fact Sheet
- Visit our national FIA website: http://www.fia.fs.fed.us

Phase 2/Phase 3 Plot Design



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