The Forest Inventory and Analysis (FIA) program of the USDA Forest Service is committed to achieving a high level of consistency through well planned Quality Assurance (QA) activities in all stages of its national core inventory system – planning, data collection, information management, compilation, and analysis.

**Quality Assurance Program**

All elements in the FIA program include QA operational techniques designed to assure and improve the quality of FIA data. These include planning, method documentation, training for field data collectors, checks of data quality, evaluation of uncertainty in survey data, peer review of analysis products, and continuous feedback to ensure that the data collection and processing system improves over time.

**Planning**

Quality Assurance planning is accomplished through preparation of formal system management and field implementation plans. The plans are compliant with the American National Standards for QA systems document parts A (Management Systems) and B (Collection and Evaluation of Environmental Data). All QA planning is reviewed by the system of FIA bands (see our FIA Bands Fact Sheet), and regional and national managers approve final plans.

**Documentation of Methods**

All phases of the FIA program produce extensive documentation of methods. A substantial amount of effort is expended in controlling the data acquisition process. The Data Acquisition Band has the primary responsibility for documenting methodologies and implementation of quality control during data collection activities. These documents are updated regularly and continually reviewed by the various bands. For example, all core field data collection methods are standardized in a National Field Methods Manual. This document is updated with refinements and improvements to the field data collection process.

**Training**

Production crews are trained, tested and certified for their ability to collect and produce data that conform to the measurement quality objectives and tolerances established for the program. In addition, experienced crew members are typically paired with new crew members to provide additional on-the-job training during the field season. Regional trainers from each unit, across the nation, meet frequently to review and update training programs and materials to ensure national consistency. In addition to meeting regularly, pre-season training sessions are held when possible. During these pre-training sessions, regional trainers from each unit “calibrate” with each other and produce training materials that will be used nationally to ensure national consistency and comparability.

**Checks for Data Quality**

Data quality checks are performed to provide for quality control during field operations. In addition, data are collected during field operations for data quality assessment and evaluation. The frequency at which the types of checks are performed are related to resource availability and complexity to complete. The following types of checks and remeasurements are performed in the FIA program:

**Hot check**—an inspection normally done as part of the training process. The inspector is present on the plot with the trainees and provides immediate feedback about their performance. This is the least complex and resource intensive to complete as the inspector usually accompanies production crew.
Cold check—an inspection done either as part of the training process, or as part of the ongoing Quality Control program. Normally the production crew is not present on the plot and the inspector has the completed crew data in-hand at the time of the inspection. The inspection can include the whole plot or a subset of the plot and is designed to provide regional field supervisors with QC information to assist in management of the inventory. This check is a bit more complex and resource intensive than the hot check in that the inspector makes a separate trip to research location.

Blind Check—a complete remeasurement of the plot performed by a different production crew. The remeasurement is done without access to the previous production crews’ data. The two data sets are maintained separately, and no production data are corrected as a result of these remeasurements. These checks are performed for the sole purpose of obtaining an estimate of measurement uncertainty for the program. This is the most resource intensive of the data quality checks. A production crew that works in a different region must travel and accrues associated costs to perform blind check. This results in lost productivity for crew that performs the blind check as well as additional expenses for travel.

Universal National Information Management
Information management is a key element in the FIA QA program. The Universal National Information Management System (UNIMS) will implement all nationally recognized equations and algorithms such as forest type, stand size and stocking in a consistent manner. The list of acceptable codes for a variable will be enforced by the database system (referential integrity). There will be a set of nationally consistent and agreed upon edit checks for data quality.

Analysis and Reporting
Assuring national consistency of analysis and reporting of FIA data is the task of the Analysis Band. National consistency in reporting is assured by development of core tables and other reporting formats which will be included in regional reports.

Quality Assessment and Evaluation
It is the goal of FIA to address uncertainty in data by conducting analysis of remeasurement data (Blind Checks). Graphical and tabular presentations of QA data are provided which evaluate regional and temporal differences (drift) and compliance with National Measurement Quality Objectives (MQO’s).

Continuous Feedback
Continuous improvement in the FIA program is assured by a variety of internal feedback procedures. The band system provides a regionally representative process for internal review of FIA procedures and products. One goal for FIA and the Techniques Research Band is for continual evaluation of the statistical procedures used to collect QA data. Interactive hands-on field checking of crews provides for consistency in field data collection, while pre-training provides for interregional calibration of training standards. These processes tend to improve the quality of data collected within the program.

Frequent meetings with production crews and supervisors throughout the field season, as well as frequent (e.g., monthly) interregional QA meetings provide feedback mechanisms for continual improvements in the data collection and quality control processes.

Example Control Chart of Transparency QA, 1999 data. X axis represents Species Number; Y Axis Represents % Differences; Horizontal Lines Represent MQO’s.