



Forest Health Monitoring



Intensive Site Monitoring



Background

Intensive Site Monitoring is the intensive, continuous measurement and analysis of key components and processes of the most important forest and grassland ecosystems at sites biologically representative of those ecosystems. Intensive Site Monitoring is one of four integrated tiers of the national Forest Health Monitoring Program. When problems are noted through Detection Monitoring, we often need to examine further to establish the magnitude of the problem. This is done through Evaluation Monitoring, which is a more intense look at a specific problem in a specific area. Many times the causal agent is inferred from past experience (for example, defoliation due to gypsy moth infestation). Occasionally the causal agent may not be obvious. In this case, we might draw on information from the third tier of FHM, Intensive Site Monitoring where we conduct formal research in small areas to test hypotheses concerning cause and effect relationships.

Vision

The concept of ISM was designed to:

1. Measure process-level indicators in a consistent manner across a small but representative number of sites. These indicators are measured frequently in order to capture short-term patterns in ecosystem dynamics. Measurements are planned to continue for decades in order to evaluate longer-term trends as well.
2. Set thresholds for indicators measured in detection monitoring phase of the enhanced Forest Inventory and Analysis (FIA) program by relating them to the ecological processes measured at ISEM sites.
3. Provide the background base line monitoring information for cause and effect studies of forest health at ISEM sites.

A national network of sites is envisioned that would represent the major forest and range ecosystems of the United States including forests, grasslands, riparian areas, and urban systems. These will be located on experimental forests, watersheds, and ranges and supplemented by research natural areas. The phase-3 grid of the enhanced FIA plot network will be intensified on the ISM sites to provide statistical linkage of monitoring and detailed studies of management options conducted on experimental sites with the rest of the ecosystems (phase-4 grid). Besides the FIA indicators, other information will be collected to help answer important research, health, and management questions relating to issues such as effect measures of sustainability, soil productivity, nutrient cycling (including carbon sequestration), vulnerability to invasive species, water quality and quantity, and meteorological effects. ISM results can be used to assess natural range of variability, build and test indicators of sustainability, and determine trigger points that require management action. ISM sites will serve as reference sites as called for in the new planning rule and will provide validation monitoring data to test the assumptions built into the agency's land and resource management plans. This latter type of monitoring has been required for years but little has been done to redeem these responsibilities. Intensive sites will also help to build and test process-based ecosystem models, frame retrospective analyses, and serve as useful environmental education sites.

Collaboration With Other Monitoring Programs

ISM is managed by FHM and is a joint effort of Research and Development and State and Private Forestry. It also has potential, however, to meet critical reference condition, base line, and validation monitoring for the National Forest System. State and Private Forestry will involve state partners in ISM to help address state policy issues. There are many

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other federal agencies involved in intensive site research and monitoring (such as those collaborating on the LTER network), and there are numerous opportunities to coordinate studies, synchronize protocols, and share expertise and data with these agencies. Some potential partners include:

- United States Geologic Survey (USGS)
- Pacific Southwest Region - Riverside Fire Sciences Lab
- USDA Forest Service Experimental Forests and Ranges
- Long Term Ecological Research (LTER) Network
- National Ecological Observation Network (NEON)
- National Aeronautics and Space Administration (NASA)
- Natural Resource Conservation Service (NRCS)

Monitoring Landscape Change and its Effects in the Delaware River Basin

In FY 2000 FHM initiated a proof-of-concept ISM pilot in the Delaware River Basin. This pilot brought together different agencies (USGS, EPA, NRCS, and NASA), linking different media (forests, water, and air) across different scales (small to large watersheds) to address complex ecosystem questions that we can't address adequately in an isolated fashion. The Office of Science, Technology, and Policy of the White House identified the Delaware River basin pilot as the only collaborative effort that is testing the multi-agency national environmental monitoring framework.

The pilot monitoring focused on several important regional issues:

- Causes, consequences, and regional extent of calcium depletion
- Changes in forest biomass and productivity

- Identification and monitoring of forests vulnerable to non-native invasive pests
- Forest fragmentation and associated ecosystem changes
- Effects of forest cover changes on water quality of the Delaware River

Lesson Learned:

- The Delaware River Basin collaborative monitoring project is "State-of-the-art".
- Link with process research is a major advance and may pave the way for future expansion.
- Regional monitoring needs for selected issues are met.
- Interagency collaboration facilitates an integrated approach to ecosystem monitoring.
- New techniques can be readily implemented by ongoing programs (Forest Service FIA & FHM; USGS NAWQA; NASA Earth Enterprise; State programs).

Foundation Document:

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