April 2003

Forest Health Monitoring:

A National Strategic Plan

BACKGROUND

Forest Health Monitoring (FHM) is a national program designed to determine the status, changes, and trends in indicators of forest health (http://fhm.fs.fed.us). From its inception in 1990 in the New England states, the FHM program has expanded to encompass all the forested lands of the United States. The FHM program uses data from ground plots and surveys, aerial surveys, and other biotic and abiotic data sources and develops analytical approaches to address forest health issues that affect the sustainability of forest ecosystems. Sustainability is assessed in accordance with the Santiago Declaration and Accompanying Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests[1]. FHM covers all forested lands through a partnership involving USDA Forest Service, State Foresters, and other state and federal agencies and academic groups. This diverse group of partners contributes to FHM activities such as program development, program management, training, survey and plot data collection, analysis, quality assurance, reporting, assessment, and indicator development. FHM targets forest health issues and concerns raised by the program partners, such as outbreaks of exotic and native forest pests, air pollution, fire, extreme weather, and human activities.

The mission of the Forest Health Monitoring Program is to develop and implement a cooperative multi-agency program to monitor, assess, and report on the status, changes and trends in forest ecosystem health in a timely manner.

To accomplish this mission, the FHM Program conducts activities necessary to:

-Estimate with known confidence the current status, changes, and trends in selected indicators of forest ecosystem condition;

-Identify associations between changes or trends in indicators of forest ecosystem condition and indicators of natural and human-caused stressors, including changes in forest extent and distribution;

-Provide information on the health of the nation's forest ecosystems in annual summaries and periodic interpretive reports for use in policy and management decisions;

-Identify mechanisms of ecosystem structure and function through long-term monitoring of ecosystem processes at intensively monitored sites;

[1] See on world wide web: (http://www.fs.fed.us/land/sustain_dev/sd/sfmsd.htm)

-Improve the effectiveness and efficiency of Forest Health Monitoring through directed research.

Organizationally, FHM is a national program that is implemented regionally - Northeast, Northcentral, South, Intermountain, and West Coast (Figure 1).

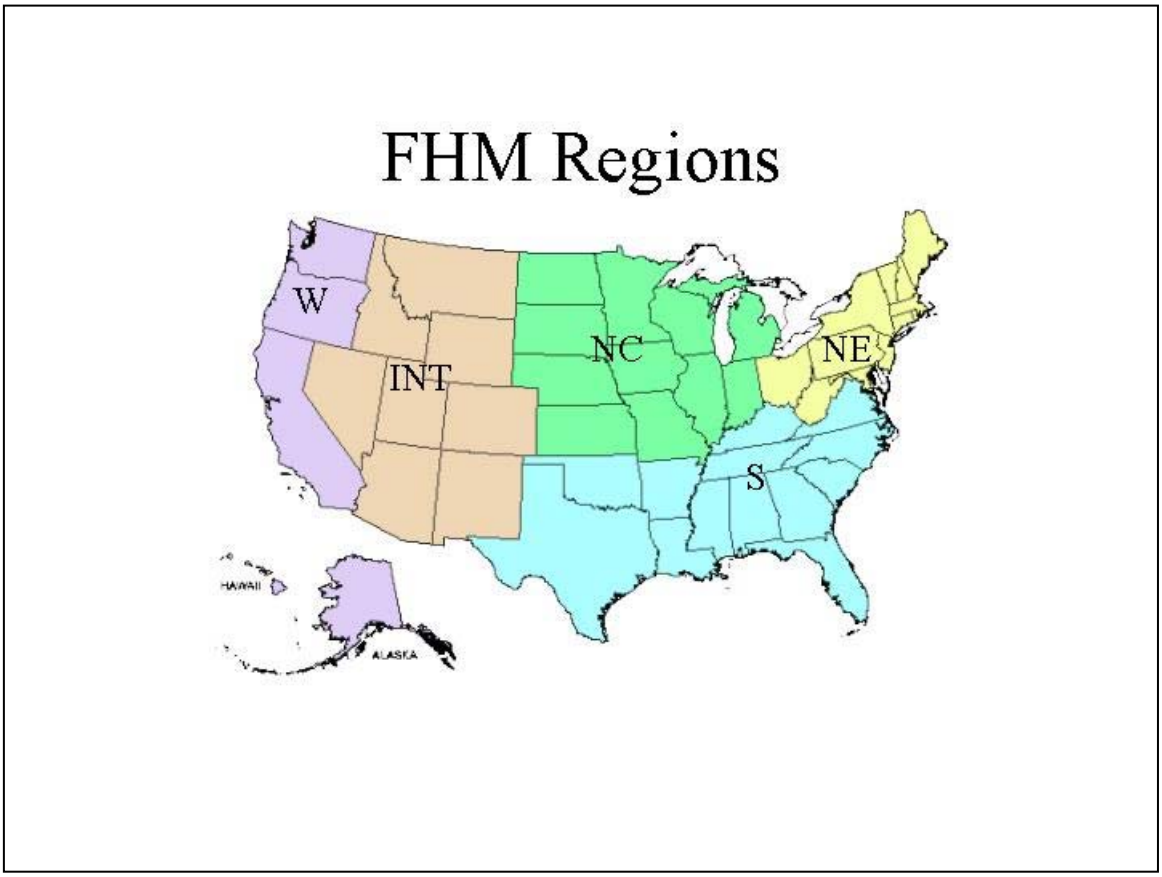

Figure 1. Forest Health Monitoring Regions

The FHM program is comprised of the following interrelated monitoring activities:

- **Detection Monitoring** – nationally standardized aerial and ground surveys to evaluate status and change in condition of forest ecosystems;
- **Evaluation Monitoring** - projects to determine extent, severity, and causes of undesirable changes in forest health identified through Detection Monitoring;

- **Intensive Site Monitoring** - to enhance understanding of cause-effect relationships and assess specific issues at multiple spatial and temporal scales;

- **Research on Monitoring Techniques** – to develop or improve indicators, monitoring systems, and analytical techniques, such as, urban and riparian forest health monitoring, early detection of invasive species, multivariate analyses of forest health indicators, and geospatial statistics.

- **Analysis and Reporting** - synthesis of information from various data sources within and external to FHM to produce issue-driven reports on status and change in forest health at National, Regional, and State levels.

All of these program components are linked (Figure 2). Information on forest health indicators from Detection Monitoring drives assessments of extent, severity, and probable causes of changes in forest health in Evaluation Monitoring. Intensive Site Monitoring conceptually links to the other components by allowing a more rigorous evaluation of cause and effect relationships, determining thresholds for indicators of forest health and linking to studies on key ecosystem processes that shape forest ecosystems. Research on Monitoring Techniques supports monitoring at all scales. Analysis and reporting of results from all of the FHM components provides timely information to help support land management policies and decisions.

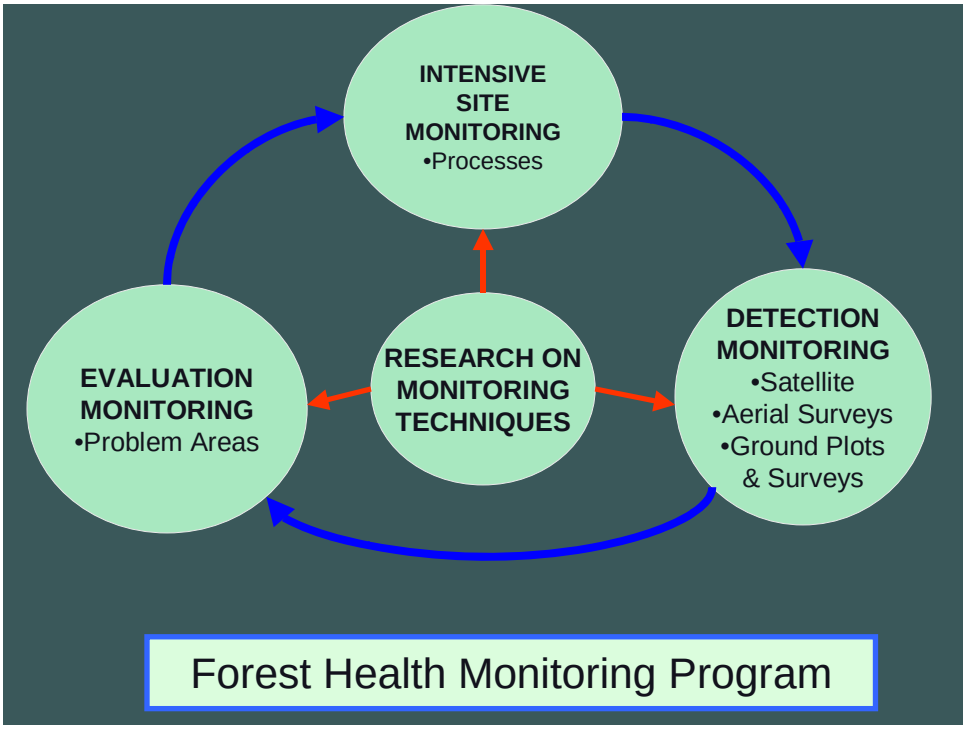

Figure 2. Forest Health Monitoring Program Components

LINKAGES

FHM is a long-term, national program that strives to provide scientifically sound information that meets legislative requirements as well as land management, research and policy needs. To do this, FHM builds on existing programs such as FS and State Forest Health Protection (FHP) programs, FS Forest Inventory and Analysis (FIA), FS National Forest System inventory and monitoring programs, and research conducted by State agencies, Forest Service Research and Development and university cooperators. This National FHM Strategic Plan is coordinated with and responds to existing agency planning documents and direction.

STRATEGIC PLAN PURPOSE

The Strategic Plan will be used to guide FHM activities over the next five years. It is a national FHM Strategic Plan transcending the particular issues or concerns of any single region or agency. In developing this Plan, the FHM Management Team (representing all the major partners of the FHM program) identified key technical and administrative issues facing FHM. Goals and strategies were developed describing what the FHM program plans to achieve. The Strategic Plan supports the policies and direction of FHM participants to monitor, maintain, and improve forest ecosystem health. Specific actions and resource needs will be developed in National and Regional Action Plans.

Goals:

1. Detect forest health changes at multiple spatial scales.

Rationale: The FHM program is a collaborative effort among partners to detect what temporal deviations from baseline conditions have occurred in forest ecosystems. Detection at different spatial scales is necessary to adequately describe disturbance events that vary in magnitude. Timely detection of adverse changes in forest health is required for effective management response (esp. for invasive species).

Strategy:

a. Annually collect and analyze aerial and ground survey data using nationally standardized methods.
b. Incorporate data from FHP, FIA and other sources into analyses.

c. Develop and implement with FHP, approaches for risk-based early detection of invasive species.

2. Identify and evaluate causes of detected forest health changes.

Rationale: As changes in forest health are detected, evaluations of probable causes involve collaborative efforts with partners. Results from these evaluations increase our understanding of environmental influences that affect forest health.

Strategy:

a. Respond to current issues in forest health (e.g. insect or disease outbreaks, fire risk, air pollution).
b. Evaluate problem areas identified in National, Regional, State Forest Health Reports.
c. Adequately assess problems that are important at local, regional, and national scales.

3. Report on forest health in a timely manner to facilitate proactive management responses.

Rationale: Natural resource policy- and decision-makers, and the public continue to receive conflicting, incomplete reports on the status of the nation's forest health. To respond to these reports and to constituent concerns, more complete, accurate and unbiased information is needed on which to base decisions and responses.

Strategy:

a. Provide factual and scientifically credible information on status and trends of forest ecosystem health in a timely manner.
b. Tailor reports to meet various customer needs by using different formats and distribution techniques.
c. Develop guidelines for consistent and frequent reporting products at National, Regional and State levels.
d. Develop risk assessments of forest health problems.
e. Establish a feedback procedure that determines whether customer needs are met.

4. Develop and apply new monitoring techniques to address evolving forest health issues.

Rationale: The increasing complexity of forest health issues requires novel approaches that utilize state of the art monitoring methods for a variety of

indicators. New monitoring approaches are needed for underrepresented forest ecosystems, such as urban and riparian forests.

Strategy:

a. Develop new approaches to sample and analyze forest health indicators.
b. Develop a survey design for urban forest health monitoring.
c. Develop a survey design for riparian forest health monitoring.

5. Enhance understanding of the processes and mechanisms responsible for significant changes in forest health.

Rationale: Intensive monitoring of key ecosystem components and processes can explore the interrelated mechanisms in forest ecosystems. New approaches are needed to link extensive monitoring networks with process-level studies that can answer key forest health questions.

Strategy:

a. Report on accomplishments of Delaware River Basin project as a demonstration of Intensive Site Monitoring (ISM).
b. Explore opportunities to install additional ISM sites.
c. Provide long-term support for established ISM sites.

6. Ensure program credibility, efficiency and accountability.

Rationale: FHM program is a multi-faceted program that involves many types of cooperators and efforts. A rigorous scientific base is essential to maintain a high level of program credibility. The complexity of the FHM program requires careful planning and tracking of activities to insure timely delivery of expected products.

Strategy:

a. Maintain a comprehensive Quality Assurance/Quality Control program that ensures collection of high quality data with known measurement error.
b. Improve access to survey data through improved information management and by providing data in readily available formats.
c. Develop Business Plans that prioritize efforts at National and Regional levels.
d. Clarify roles, responsibilities and accomplishment targets.
e. Prepare annual accomplishment reports.

SUMMARY AND OUTLOOK

Healthy forests are vital to our country. Regardless of whether forests are dry and sparse chaparral of the desert Southwest, multi-layered conifers of the moist Northwest, or mixed hardwood forests of the East, they offer unique biological, economic, and societal values. They provide water for our use, habitat for wildlife, timber for building materials and other products, solitude for our souls, and a wide range of recreational opportunities. Recognizing how human and natural stressors affect these forest ecosystems is fundamental for understanding their health and status, both now and in the future.

The task of the FHM program to assess changing forest health conditions across different landscapes having diverse ownerships is a challenging under- taking. This Strategic Plan, in conjunction with other FHM technical and administrative plans, provides important direction on how to accomplish this task with support and review by many different participants. The expected result is a strong, functional multi-agency FHM Program that is responsive to customer needs and has the capacity to detect, monitor, assess, and report on status, changes, and trends in forest ecosystem health.