

2009 FOREST HEALTH PROTECTION BUSINESS PLAN



US FOREST SERVICE



FOREST HEALTH PROTECTION

Cover Photo: Steven Katovich, USDA Forest Service. Eastern white pine,
Pinus strobus L. <http://www.forestryimages.org>, UGA 1479027

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FOREST HEALTH PROTECTION

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1. INTRODUCTION

Forest Health Protection (FHP) defines a healthy forest as a condition wherein a forest has the capacity across the landscape for renewal, for recovery from a wide range of disturbances, and for retention of its ecological resiliency while meeting current and future needs of people for desired levels of values, uses, products and services. Making sure America's forests meet that definition is a tough challenge by any estimate, but one FHP addresses everyday.

How FHP meets this challenge is described in this Business Plan. It addresses both FHP's vision and mission to restore, maintain, and create healthy forests; explores the core components in the programs; and explains the rationale behind its funding-allocation strategies. Finally, the Plan tiers to the US Forest Service (FS) Strategic Plan-Goal 1: Restore, Sustain, and Enhance the Nation's Forests and Grasslands.

Our vision is that the FS will maintain a robust program that protects the nation's forests from extraordinary levels of damage from both native and non-native invasive insects, pathogens, and plants. This will be done through the continued implementation of an integrated system of prevention, eradication, management and restoration. FHP will continue to work very closely with its partners to manage native and non-native pests and reduce the flow of non-native invasive forest pests into the US.

The rationale behind FHP's program-funding allocations is risk-based, scientifically valid, and transparent to stakeholders. FHP strives to optimize on-the-ground benefits by continuing to fund its core program components—**Technical Assistance, Survey and Monitoring, Treatments, and Technology Development.**

2. STRATEGIC FRAMEWORK: THE FOUR CORE PROGRAM COMPONENTS

In pursuit of its mission, to protect and improve the health of America's forests, FHP concentrates its efforts on its core program components—**Technical Assistance, Survey and Monitoring, Treatments** and **Technology Development**.

TECHNICAL ASSISTANCE

The delivery of expertise and services is at the center FHP's core program components, and is vital to its mission. It is the key to the success of FHP's Survey and Monitoring, Treatments, and Technology Development programs and accounts for about 30% of the total budget. Nationwide, FHP employs a technical staff of more than 250 specialists, including 140 entomologists and 30 pathologists, as well as experts in pesticide use, toxicology, invasive plant control, survey and monitoring, technology development, and other forest health-related disciplines. In effect, FHP employs more forest-health professionals than any other single organization in the world. Together with staff members from state agencies, they provide unique technical assistance to thousands of cooperators and customers, federal, state, county, Tribal, and private forestlands owners and stewards, across the US and abroad. To maintain optimal efficiency, FHP conducts thorough reviews of each of its programs in each Forest Service Region (including the Northeastern Area {NA} and the International Institute of Tropical Forestry {IITF}), and evaluates and redefines the appropriate level of technical assistance required for each unit.

Goals

1. Provide customers with readily available and easily understood forest-health information.
2. Maintain FHP's capacity to inform resource managers about the roles forest-disturbance agents play in the health of forest ecosystems.
3. Assist in planning and carrying out timely and effective prevention, suppression, and restoration projects.

SURVEY AND MONITORING

This program component is viewed similarly to Technical Assistance, in that it is at once essential to an effective, systematic, forest-health management program, and critical to FHP's

mission. Together with state agencies and the USDA Animal Plant Health Inspection Service (APHIS), FHP provides a comprehensive, time-tested, science-based system of survey and monitoring for the detection of forest pests. In the long run, rapid and early detection of forest pests saves more forests and money. FHP's annual allocation for Survey and Monitoring is between 15–20% of the total budget.

Goals

1. Identify changes and threats to forest health early so resource managers can quickly ascertain and implement appropriate responses.
2. Maintain survey and monitoring to identify long-term trends in forest and watershed health. This is especially important during this time of unprecedented, rapid climatic change.

TREATMENT

Acting on information generated by Survey and Monitoring activities, FHP funds treatments to prevent or suppress damages caused by insects, diseases, and invasive plants; eradicate forest pests where appropriate; and restore forest health. Funds allocated represent between 35–45% of the total budget, and are used to respond to conditions on the ground. FHP monitors these funds very closely and would make adjustments elsewhere in the program to prevent treatment allocations from falling below 35%.

Goals

1. Optimize treatment activities based on the combined analysis of data from the National Insect and Disease Risk Map (NIDRM), watershed risk maps, state assessments and response strategies, and other sources.
2. Ensure that priority treatments are completed in an effective, timely, environmentally sensitive, and economically efficient manner.
3. Reduce the potential for introduction, establishment, spread, and impact of non-native invasive species in America's forests.

TECHNOLOGY DEVELOPMENT

The emphasis of this component is the development of faster, better, and cheaper tools for detecting and monitoring forest pests, and managing and improving forest health. About 7% of the budget is allocated to this component, which is near the median of the range (5–10%) government and private business organizations allocate for technology development.

Goals

1. Provide safe, effective, and economical technologies to assess and manage outbreaks and infestations of native and non-native insect, disease, and invasive plant pests.
2. Improve the consistency, collection, presentation, and dissemination of forest health information.

3. ALLOCATION RATIONALE

FHP's annual program budget is around \$125 million, divided (roughly) over the core program areas as follows: Technical Assistance, 30%; Survey and Monitoring, 15–20%; Treatments, 35–45%, and Technology Development, 7%. The FHP Washington Office monitors and, through on-going communications and regularly scheduled program reviews, responds to requests from offices in the Regions, Northeast Area, and the International Institute of Tropical Forestry (Regions/Area/IITF). In cooperation with FHP field units, the FHP Washington Office considers shifts in allocations among these core program components, from year to year.

TECHNICAL ASSISTANCE

Delivery of core expertise and service; 30% of budget.

Allocations

Made to state agencies and the Forest Service, and are applied to (not in priority order):

- staff salaries, training, and travel
- procuring and/or maintaining equipment and facilities
- technical-assistance visits to Tribal lands, National Forests, and other federal lands
- technical-assistance visits to state and private lands when requested and needed to supplement the state agencies' expertise and abilities
- public outreach, such as the production and distribution of educational materials (e.g., Pest Alerts, Forest Insect & Disease leaflets, websites, training modules, etc.)

Investment in Technical Assistance sustains FHP's applied forest entomology, pathology, toxicology, pesticide-use and invasive plant expertise. The specialists at FHP cooperate with a network of forest-health specialists from other federal agencies, agencies in all 50 states and several US territories, universities, non-profit organizations, and other countries.

In addition, FHP funds many full-time employees who work on forest health treatment projects, survey and monitoring, and/or technology development on National Forest System (NFS) lands. Through this support, FHP effectively extends its outreach to the many Ranger Districts across the country, thereby broadening its national network of support.

Finally, funds allocated to Technical Assistance are used to: 1) maintain the facilities and equipment used to deliver FHP programs; 2) provide a basic budget to local units to support technical assistance visits, and; 3) develop and distribute public outreach educational materials.

Funds are distributed to federal Forest Service Regional units and Cooperative state agencies:

Federal

- Federal Technical Assistance allocations are based on the Regions' capacities to provide technical assistance to NFS units, other federal agencies, and other partners. Funding for each Region/Area/IITF is negotiated on a case-by-case basis and is based on the magnitude/severity of the forest-health issue(s) being faced. It includes funding for Survey and Monitoring activities listed below.

Cooperative

- Cooperative Technical Assistance funds are allocated on a shared-cost basis to state forestry agencies to deliver Cooperative Forest Health Programs on state and private forest lands. Funds from FHP, about \$4.5 million, are matched dollar for dollar by the states, resulting in a \$9 million investment (including "in-kind" contributions) overall (see next item).
- Funding of cooperative Technical Assistance is one of only two, formula-driven allocation methods used at FHP, and is based on acres of forestlands. It is important to provide each state with a base level of support; using the amount of forested area within a state as a factor is a reasonable way to assign base funding. The basic formula is that the state will receive the greater of a) \$50,000, or b) \$40,000 plus one cent per acre of non-federal forest land. This formula-derived amount is also intended to cover basic Survey activities (see Survey and Monitoring section below) in addition to Technical Assistance. Depending on needs and forest conditions, each state decides how much of the amount to dedicate to Survey and Monitoring and how much to dedicate to Technical Assistance to landowners. This funding ensures at least a minimum of activity for all states, and the minimum level of expertise necessary to maintain a nationwide system of forest health at multiple scales.

SURVEY AND MONITORING

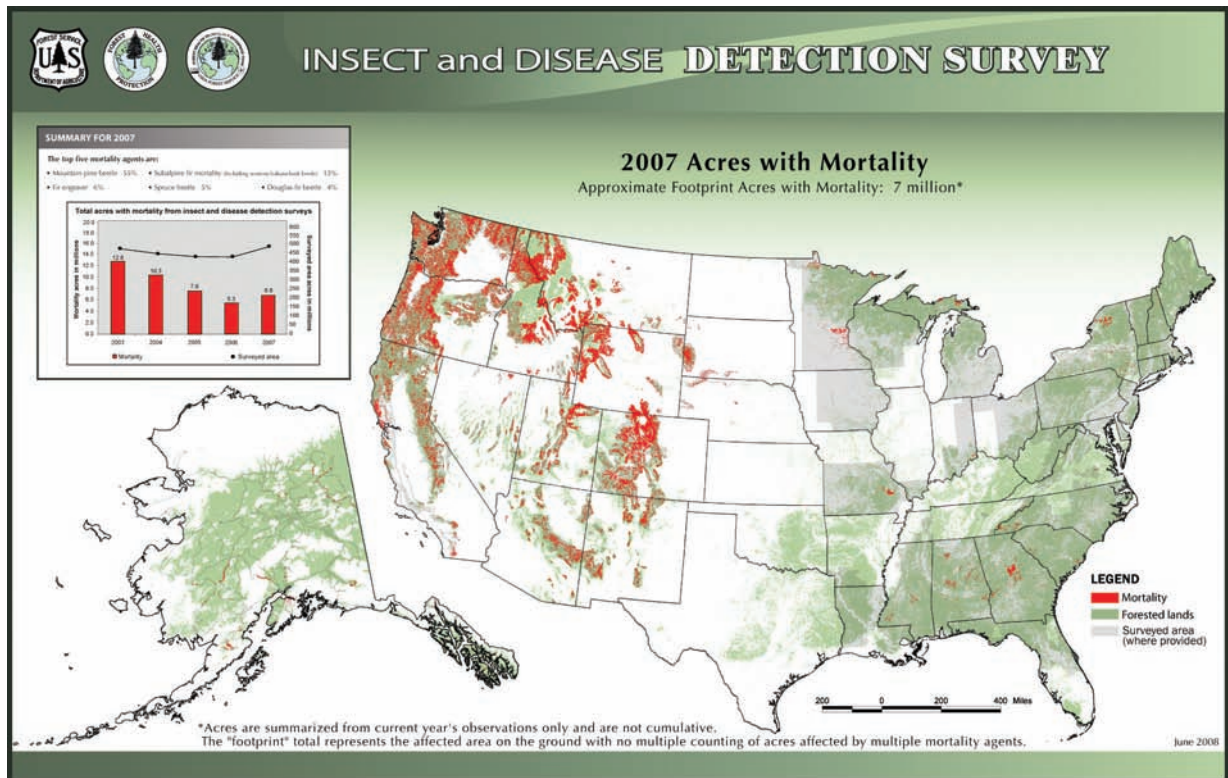
Fundamental to detecting, measuring, and evaluating forest health; 15-20% of budget.

Allocations

Funds for Survey and Monitoring are included in distributions to Forest Service Regions/Area/IITF and Cooperative State agencies in the Technical Assistance section mentioned above.

Activities funded include (not in priority order):

- aerial detection surveys
- ground surveys
- species-specific detection, monitoring, and trapping of a wide variety of insects and pathogens, including among others: southern pine beetle, western bark beetles,



Detection and Aerial Survey Overview Map. Aerial detection surveys are an efficient and economical method of collecting and reporting data on forest insects, diseases, and other disturbances. Produced by Forest Health Technology Enterprise Team, 2007.

gypsy moth, non-native bark beetles, *Sirex* woodwasp, emerald ash borer, sudden oak death, laurel wilt, and oak decline

- cooperative programs with **Forest Health Monitoring**, and support for forest-health-plot data collection, a function of Forest Inventory and Analysis in the Research and Development Deputy Area of the FS
- urban forest health management
- invasive plant detection and delimitation on lands maintained by cooperators
- organization, analysis, and dissemination of data collected by Survey and Monitoring activities

About 20% of FHP's budget is allocated to this component. This level remains fairly constant. Information obtained through survey and monitoring projects is critical in FHP's efforts to determine how funding for technical assistance and treatments, etc, is distributed among the many entities who request it. Specifically:

Federal lands survey

Funding to cover Survey and Monitoring activities on National Forest System lands is included in discussions that determine individual allocations for FS Regions/Area/IITF as described above (see Technical Assistance, Federal, above).

Cooperative lands survey

Funding is included in the Technical Assistance formula. These funds are matched by the states dollar for dollar (including “in-kind” contributions), essentially doubling the total investment. The methodology for allocation is described (see Technical Assistance, Cooperative, above).

Special allocations of funding to detect/monitor specific pests

This is based largely on incidence response. For example, to predict and measure population and infestation levels, it is necessary to trap southern pine beetle, gypsy moth, and western bark beetles, annually, and across wide geographic areas. Data from the traps are necessary to determine who will receive funds to treat which pests. When a new and threatening non-native pest is found, sufficient Survey and Monitoring resources must be allocated to monitor and delimit the extent of the pest’s establishment. The size of the allocation depends on the risk the pest represents, the value of the forest resources likely to be impacted, the level of surveying/monitoring being done by other groups or agencies (i.e., APHIS, State Departments of Agriculture), the efficacy and availability of trapping methods, and the availability of trained employees who can deploy the traps and identify what is caught. New surveys that are needed on NFS lands would increase allocations to a specific Region/Area/IITF.

Forest Health Monitoring (FHM)

This is a separate but closely related program embedded in FHP. It is a strong partnership program among federal and state representatives from all 50 states and territories, and fosters standardized survey and monitoring efforts, nationwide. It includes four components—Detection Monitoring, Evaluation Monitoring, Intensive Site Monitoring, and Research on Monitoring Techniques.

Detection monitoring

Establishes national standards for aerial and ground surveys to evaluate status and changes in the conditions of forest ecosystems.

Evaluation monitoring

Determines the extent, cause, and severity of detected pest problems.

Intensive site monitoring

Enhances the understanding of cause-and-effect relationships by linking detection monitoring to process-level studies.

Research on monitoring techniques

Leads to the development or improvement of indicators, monitoring systems, and analytical techniques.

Forest Health Monitoring takes an analytical approach to solving problems affecting forest health. It utilizes nationally standardized data from ground plots and surveys, aerial surveys, and other biotic and abiotic measures to determine the status, changes, and trends in indicators of forest health conditions. Funds allocated under this program help assure that all states participate in FHM’s activities, which includes the implementation of national standards for survey and monitoring. Base-level funding to states is based on a formula that considers the number of acres of non-federal forestland and the number of FIA monitoring plots in participating states. The states match FHP

on a 50/50 basis, creating a national investment of approximately \$5 million for the base part of the FHM program. This funding covers primarily Detection Monitoring.

Evaluation monitoring is designed to determine the extent, severity, and causes of undesirable changes in forest health, as identified through Detection Monitoring (DM) and other means. The need for EM projects arises when significant changes or trends in forest health are detected. Projects funded through EM delve into the extent, severity, and/or causes of forest-health problems. Proposals are submitted through the FHM Regional managers and are selected through comprehensive, competitive processes at the Regional and national levels.

If FHM-EM funds are granted to non-federal cooperators, such as states or universities, for evaluations of non-federal forestlands, the funds are matched dollar for dollar, effectively doubling of the investment.

Intensive Site Monitoring and Research on Monitoring Techniques are funded on a case-by-case basis as the opportunity arises.

TREATMENTS

On-the-ground treatments for about 1 million acres of highest-priority forestland, annually: 35–45%. (Note: **Technical Assistance, Survey and Monitoring, and Technology Development** are essential to determining which and how many acres actually will be treated.)

FHP does not want funding for **Treatments** to fall below 35% of total budget and makes adjustments elsewhere to prevent that from happening. Between \$1million and \$2 million is held in reserve to cover unanticipated treatments that surface after the program direction is



Air Tractor 400 spraying Btk (Foray 76B) for gypsy moth eradication project. Claiborne Co. TN. Photographer, John H. Ghent, USDA Forest Service. <http://www.forestryimages.org>. UGA2122004,

issued to the field and partners. Between \$2 million and \$2.5 million is allocated to other federal land management agencies to suppress insect pests and diseases. Funds are matched dollar for dollar (including “in-kind” investments) by the states, effectively doubling the investment.

Allocation overview

Funds are used to (not in priority order):

- increase tree vigor and overall forest health to prevent future pest infestations
- suppress existing infestations of insects, diseases, and invasive plant pests
- cooperate with APHIS to eradicate new, non-native, invasive species and native species that have migrated outside their generally-infested areas
- restore healthy and desirable forest conditions in areas recently impacted by insects, diseases, and/or invasive plants
- foster international cooperation to prevent invasive pests from entering or gaining a foothold in the US

The budget for this component is presently around 45% and is used to fund on-the-ground treatments. Generally speaking, allocations are based on recommendations from the field and Washington Office that consider Regional and national priorities.

Allocation rationale for prevention/suppression treatments of native pests

Current approach for prevention and suppression activities

FHP analyzes data from several sources, including: insect and disease risk and hazard assessments; State and Private Forestry Redesign Project national and regional assessments; predictive models and trap data; and aerial and ground survey mortality results. These analyses identify “opportunity acres” (or “hazard acres” see formula below), which can be defined as areas where prevention/suppression treatments will be most effective at producing multiple benefits for forest ecosystems and watersheds.

These acres are then refined in a competitive process to yield actual treatment acres according to:

- prevention/suppression-method efficacy
- leveraging opportunities/cooperation
- the quantity and quality of forest resources at risk
- social and/or economic consequences
- appropriateness of the role for FHP
- potential multiple benefits, such as fire risk, wildlife habitat improvement, enhanced recreation opportunities, etc.
- past performance of field units and cooperators
- Threatened and Endangered (T&E) issues, special ecological sites

New potential approach for prevention and suppression activities

FHP is developing a prevention/suppression model that predicts the actual risk of an epidemic. We hope to be able to apply this model to major pests, such as southern pine beetle, western bark beetles and gypsy moth. Models such as this one have shown they are capable of predicting where pests will occur, based on their current locations and population levels. The rationale is to use opportunity acres of

How the Deputy Chief and the Regions/Area/International Institute of Tropical Forestry (IIT) line officers allocate funds

Total needs are accumulated across the country using the methods described above. Discussions occur on an ongoing basis with the National FHP Director and the FHP Field Directors to provide final recommendations to the Deputy Chief of State and Private Forestry, per FS Manual 3400 direction. The Deputy Chief then determines the final amounts to be allocated toward treatment for each pest for each Region/Area/IITF. Once funding for each pest is received at the Regions/Areas/IITF, the regional units repeat a similar process using the concepts of risk acres and the ability to complete the job, ecological, economic and social values at risk, etc. to determine what each National Forest or State partners should receive for each pest. The Regional Forester, NA Director, or IITF Director then makes the final allocation at that level.

prevention/suppression and multiply those by the probability of pest occurrence to determine actual acres at risk, or

$$\text{hazard acres} \times \text{probability of pest occurrence} = \text{actual risk}$$

This would produce models describing which acres are most at risk to particular pests and therefore would benefit the most from management actions (treatments). Long term, these modeling efforts may become applicable to a broader range of insects, diseases and invasive plants.

Allocation rationale for eradication and management of non-native pests

Eradication and management treatments for non-native invasive insects, diseases, and invasive plants are not conducive to modeling efforts, because they are incident-response-type scenarios and unpredictable. Eradications of new, non-native species or satellite infestations of non-native species outside the areas they normally infest are high priorities, because eradication eliminates the need for future prevention and suppression treatments. Several criteria are considered when allocating funds for eradication (not in priority order):

- appropriateness of role for FHP, realizing that many possible eradication and management scenarios rely on actions being undertaken by USDA APHIS and state regulatory agencies. APHIS has the lead for new introductions of forest pests in the US
- likelihood of success in fully eradicating or managing the pest or isolated infestation (Do effective detection and treatment methods exist, and are the pest's biology and dispersal capabilities conducive to eradication efforts?)
- preliminary cost-benefit analysis
- forest resources at risk if eradication is not accomplished, based on the spread rate potential of the pest
- leveraging opportunities/cooperation
- ability of FHP and its cooperators to implement the management or eradication strategy successfully (Is there adequate staff to carry out survey and treatment activities?)
- potential social and/or economic consequences resulting from either action or non-action

Pest-specific allocation strategy/justification

Gypsy Moth

- Average of 700,000 acres treated annually (see Appendix 1, below).
- Allocation covers the Slow-the-Spread (STS) Program (prevention), suppression of outbreaks, and eradication of satellite spots outside the generally infested area. Eradication of new outbreaks is a high priority. STS efforts are somewhat predictable, thereby requiring a fairly consistent level of funding each year. In contrast, suppression costs vary from year to year and are based on current pest conditions.

STS

- is a well-developed, long-term program with predictable fixed costs each year
- has slowed the spread of gypsy moth by 60%
- has excellent detection and treatment tools
- has an excellent business model with a positive, cost-benefit analysis for gypsy moth prevention. Funding allocation recommendations are made by the STS board of directors to National FHP director.
- is highly leveraged by partners willing to conduct treatments on a cost/share basis
- is a great example of how dozens of agencies can cooperate and implement a successful program

Western Bark Beetles

- Average of 50,000 acres treated annually. (See Appendix 2, below).
- Effective prevention and suppression tools exist.
- Allocation covers prevention, suppression, and restoration work.
- Funds are directed toward suppression of existing outbreaks and toward prevention or restoration work.
- There is good integration with fuels and forest management staff areas in deciding priority acres to treat at Regional levels. Western Regions work together to recommend allocation levels to the Deputy Chief for State and Private Forestry.
- A model is being developed that would combine risk map overlays and current mortality with dispersal data to hone the allocation and improve treatment targeting.

Southern Pine Beetle (SPB)

- Average of 150,000 acres treated annually (see Appendix 3, below).
- Effective prevention and suppression tools exist.
- Funds are directed toward suppression of existing outbreaks and toward prevention or restoration work.
- There is good integration with fuels and forest management staff areas in deciding priority acres to treat at Regional levels.
- An SPB hazard map helps allocate funding to the highest priority.
- Treatment strategies are strongly integrated with those of State Foresters.

Invasive plants

- Average of 150,000 acres treated annually.
- Invasive plants play an increasingly deleterious role in forest ecosystems; accordingly, FHP has a relatively new program to recognize and mitigate the problem.
- Allocation goes to states and other non-National Forest System (NFS) cooperators to help implement treatments.
- NFS Range Management Program manages invasive plants on National Forests: FHP provides technical assistance to all federal lands to help manage invasive plants, and financial assistance to implement treatments in Hawaii and other tropical forests on federal lands.
- Allocation covers on-the-ground treatments, survey and monitoring, and technology development.
- Early detection and eradication projects have a very positive cost-benefit ratio.
- FHP is a minor but important player: This program is highly leveraged through work with a wide variety of valued cooperators and cost-sharing programs. FHP's focus is on control treatments and the development of new technologies, especially biological controls.



Mile-a-minute weed. Photographer, Leslie J. Mehrhoff, University of Connecticut.
<http://www.forestryimages.org>.
 UGA5273094

Hemlock Woolly Adelgid (HWA)

- HWA allocation is important because the pest has the potential to completely wipe out hemlocks, a keystone species. The species may be lost without FHP efforts to prevent and suppress HWA populations and pursue the development of genetically resistant hemlocks.
- HWA is impacting sensitive streams and threatened-and-endangered (T&E) habitat.
- Several treatment tools (biological control, systemic insecticides) are available and others are in the developmental stage.
- There is a high degree of social concern for and media attention to this issue.
- There is a multi-regional strategy and steering team which makes recommendations to the National FHP Director and FHP field directors.
- There is a high degree of cooperation/leveraging with both traditional and non-traditional partners.

Emerald Ash Borer (EAB)

- EAB has killed over 20-million ash trees in the US, to date.
- There is a minimal but growing level of scientific knowledge about this non-native pest's biology, dispersal and possible management options.
- This pest can have a very high impact to the valuable ash resource, but reliable estimates of social, economic, and ecological impacts are still in development.

- Methods development is needed to put effective detection and control options on the table.
- Response strategies have been inconsistent among states.
- It is not known how or if the spread of EAB can be slowed or contained: More work and pilot testing is needed.
- There is considerable need for tools to increase public and cooperator awareness.
- There is a high degree of media coverage and social concern.
- Citizen monitoring options bear investigation.
- A national EAB risk map is in place.



Emerald ash borer. Photograph, Marianne Prue, Ohio Department of Natural Resources - Division of Forestry.
<http://www.forestryimages.org>. UGA5369165

Sudden Oak Death (SOD)

- Extremely vast oak forests are at risk throughout the US.
- In Oregon, treatment is entering a new phase of containment, rather than eradication.
- There is an ongoing suppression effort in California.
- Extensive surveying and monitoring must be done to prevent and detect SOD's spread to new areas.
- Good detection tools, such as stream monitoring, exist.
- A well-developed and organized, multi-cooperator Task Force exists.
- A national SOD risk map is in place.
- There is a high degree of media coverage and social concern.

White Pine Blister Rust and Whitebark Pine pests

- White pines and whitebark pine are critical in forest ecosystems.
- Grizzly bear and Clark's nutcracker depend on whitebark pine seeds.
- Treatment is a Slow-the-Spread, containment strategy using pruning in young

plantations.

- Tests for disease resistant strains are being done.

Oak Wilt

- Very effective detection and treatment tools exist.
- Needs are localized.
- Leveraged projects are in place and participants are capable of implementing successful, multiple-cooperator containment strategies.
- Estimates of social, economic, and ecological impacts are unknown and need further study.

Sirex Woodwasp

- *Sirex* can kill a wide variety of pines: If allowed to disperse widely across the US, it could cause huge social, economic, and ecological damage.
- A national *Sirex* risk map is in place.
- FHP allocations are for survey/trapping.
- FHP is cooperating with APHIS (the lead agency on *Sirex*) to develop a biological control program using a nematode that has proven effective overseas.
- More evaluations are needed to assess its dispersal and aggressiveness in the US.

Port-Orford Cedar Root Disease

- Implementation includes slowing the spread to new watersheds.
- Genetic resistance testing is underway.

Suppression projects on other federal lands

- Allocation is set each year based on need and historical levels.
- Funds are allocated primarily to US Department of Interior and Department of Defense, although other federal departments can and do apply infrequently.
- Funding supports individual agency priorities. Funds are used to suppress a variety of pests, including: gypsy moth, hemlock woolly adelgid, dwarf mistletoes, oak wilt, and bark beetles.
- Proposals are reviewed and projects are funded based on a competitive process that considers the priorities of both the submitting agency and FHP.

TECHNOLOGY DEVELOPMENT

Improves the safety, quality, efficiency, and delivery of FHP's Technical Assistance, Survey and Monitoring, and Treatment efforts: about 7% of total budget.

Although Technology Development allocations are a relatively small part of FHP's overall budget, this component is critical because it impacts all other program components—Technical Assistance, Survey and Monitoring, and Treatments. Allocations are usually based on specific needs (not in priority order):

- better information gathering, analysis and presentation
- development of/enhancements to treatment methods
- genetic resistance for tree species at serious risk from insects and diseases

- biological control options for specific pest species
- risk/hazard maps and predictive models to better target Surveys and Treatments
- improved safety

Technology Development investments

- Forest Health Technology Enterprise Team
 - Special Technology Development Program (STDP) (a request for proposal [RFP] focused on new technology)
 - FHP Accomplishment Database
 - risk and hazard analyses such as the National Insect and Disease Risk Map (NIDRM) and the National Southern Pine Beetle Hazard Assessment
 - remote sensing aircraft, cameras and sensors
 - improved treatment technology, especially aerial application of chemicals and biocontrol development
- American Chestnut Foundation
- development and planting of blight-resistant trees
- emerald ash borer methods development
- genetic conservation of vulnerable tree species

Technology Development activities

The Forest Health Technology Enterprise Team (FHTET)

This is the nerve center for FHP's technology development. Allocations are used to (not in priority order):

- develop technologies, equipment, and training to improve the safety of all aspects of the FHP program
- investigate and develop biological control options for specific pest species
- maintain databases
- improve existing, and develop and apply new, treatment technologies
- discover and pursue tree species with natural genetic resistance to specific insect pests and diseases
- develop risk and hazard maps and models with which to better target our surveys and treatments
- apply GIS and spatial analysis tools to survey and treatment activities.

4. STATE AND PRIVATE FORESTRY COMPETITIVE REDESIGN PROCESS

This effort was conceived in response to the need for S&PF to focus its efforts on landscape-level outcomes and to improve its system of prioritizing work. National and state resource assessments will be used to develop competitive proposals for S&PF funds. It is envisioned that these assessments will utilize the latest geospatial data and analytical techniques that will focus activities in the highest priority areas. Projects that receive S&PF funding will respond directly to the national themes, as well as annual national directives developed by the Forest Service. The FS began implementing the process in 2008. In fiscal years 2008 and 2009, approximately 15% of FHP's cooperative budget is allocated to the S&PF Competitive Redesign effort.

Within this process, S&PF will focus on three national themes:

- Conserve working forest landscapes
- Protect forests from harm
- Enhance public benefits from trees and forests

5. PERFORMANCE INDICATOR

FHP uses one basic indicator to determine performance: The number of high priority acres treated. FHP modifies the indicator based on the funding source (Federal lands vs. Cooperative lands) and whether the treatment is for native or non-native pests. Depending on how the indicator is to be used, it may be expressed either as a percentage or an absolute number.

Due to the longevity of natural systems, definitive treatment outcomes are seldom immediately apparent. Understandably then, it is challenging to develop outcomes from measured outputs. If an acre was properly treated according to the best scientific prescription, and is being monitored through an inspection program, then we consider this for practicality a successful outcome and designate it as an “acre protected.”

6. COMPETITIVE FUNDING IN FHP

Competition for funding takes many shapes at FHP. There is competition: 1) among forest pests; 2) within a pest across geographic/administrative units; 3) within Request-for- Proposal (RFP) programs, such as Evaluation Monitoring (EM) within Forest Health Management and Special Technology Development Program within the Forest Health Technology Enterprise Team, and; 4) in the Redesign Process of State and Private Forestry. Competition among forest pests (see Pest-specific allocation strategy/justification, above) is addressed through discussions among National and Regional FHP Directors using data from risk maps and aerial survey mortality maps. RFPs for EM and Special Technology Development Program (STDP) have their own published allocation criteria. The Western Bark Beetle and Southern Pine Beetle programs have competition at the Regional level once the funds are received at that level. This competition is at the project level and not all National Forests receive funding, depending on the allocation criteria. The net effect of all of this is that, the only “formula” funding in the entire FHP program is for the technical assistance the states receive under the Technical Assistance core program and the state assistance under the Survey and Monitoring core program. In total, this amounts to about 6% of the FHP budget.

7. PARTNERSHIPS

Success at Forest Health Protection depends on strong partnerships at all levels—national, regional, Tribal, state and local. FHP’s partnerships, especially with the state agencies (Forestry and Agriculture), are strong and long-term. Projects and programs are cost-shared, usually on a 50/50 basis, between FHP and its state partners. Through these partnerships, FHP has access to the most extensive delivery system possible for its products.

FHP’s partnership with the Research and Development Deputy Area of the Forest Service has provided FHP with complementary scientific research on, among others, pest biology, ecology, and forest health. Whereas Forest Service R&D focuses on basic research and some applied research, FHP’s focus is on technology development projects and studies of an applied nature. Programs like the Gypsy Moth Slow-the-Spread program have been successful, largely as a result of such partnerships.

The Animal Plant Health Inspection Service (APHIS) and FHP also have a key partnership. APHIS is the lead agency for the eradication of new, invading pests. It has the authority to quarantine products sold in interstate and international trade. It can confiscate infested trees from private landowners, can survey for pests and do public outreach, among other things. Both APHIS and the FS provide technical and financial assistance to help detect and manage pests, and FHP partners with APHIS to manage established, invasive pests.

Through the Cooperative Forestry Assistance Act of 1978 (as amended in 1990), FHP provides technical and financial assistance to all of the other federal land-management agencies, including the Departments of Interior and Defense, the Army Corps of Engineers, and all Tribal nations.

Finally, FHP stays in close contact with other FS staffs, especially Forest Management; Range Management; Wildlife, Watershed, Air and Rare Plants; Forest Management Science; and Fire and Aviation Management. Together, they have formed a Sustainable Landscape Management (SLM) Board of Directors (BOD) to integrate into their respective programs decisions regarding vegetation and sustainable landscape management.

8. CONCLUSION

The Forest Health Protection program (FHP) is critical to the health of the nation's forest ecosystems and watersheds. Optimizing the program through appropriate allocations to its four core program components—**Technical Assistance, Survey and Monitoring, Treatments, and Technology Development**—requires complex assessment of many competing priorities and variables. FHP constantly evaluates its investments and adjusts them, accordingly.

The four core components are interrelated and interdependent. Within a given program component, significant allocation flexibility exists to prioritize expenditures. This is especially true for the Treatments component, in which funds can be shifted from one pest program to another based on hazard (opportunity acres), actual risk, and multiple benefits.

Many of America's forests face serious threats to their health. At risk are the benefits that forests provide—clean water, recreation, timber, and viable habitat for unthreatened, threatened, and endangered species, alike. FHP works with a broad range of cooperators and customers to achieve its mission to protect and improve the health of America's forests. FHP strives to make its program more effective, efficient, and safe. Critical to FHP's success is its strict adherence to allocation rationales that are risk-based, scientifically valid, and transparent to stakeholders.

9. APPENDICES

APPENDIX 1



The STS Program

*Slowing the Spread of Gypsy Moth
to Protect America's Hardwood Forests*



The Threat

Gypsy moth is a destructive, exotic forest pest that was accidentally introduced into the United States in 1869. It is currently established throughout the northeast and parts of the upper mid-west (red shaded area on maps).

- It feeds on over 300 species of trees but oaks are most preferred.
- 77 million acres have been defoliated by gypsy moth since 1970.
- Gypsy moth defoliation causes extensive tree mortality, reduces property values, adversely affects commerce and causes allergic reactions in sensitive individuals that come in contact with the caterpillars.
- Most (almost 70%) of the susceptible hardwood forests in the United States have not been infested by gypsy moth and are still at risk.

The Current Proactive Strategy

Since Congress funded the Slow the Spread Program (STS) in the year 2000, ten states located along the leading edge of gypsy moth populations, in cooperation with the USDA Forest Service, have implemented a region-wide strategy to minimize the rate at which gypsy moth spreads into uninfested areas. As a direct result of this program, spread has been dramatically reduced by

more than 70% from the historical level of 13 miles per year to 3 miles per year. In just 8 years, this program has prevented the impacts that would have occurred on more than 75 million newly infested acres.

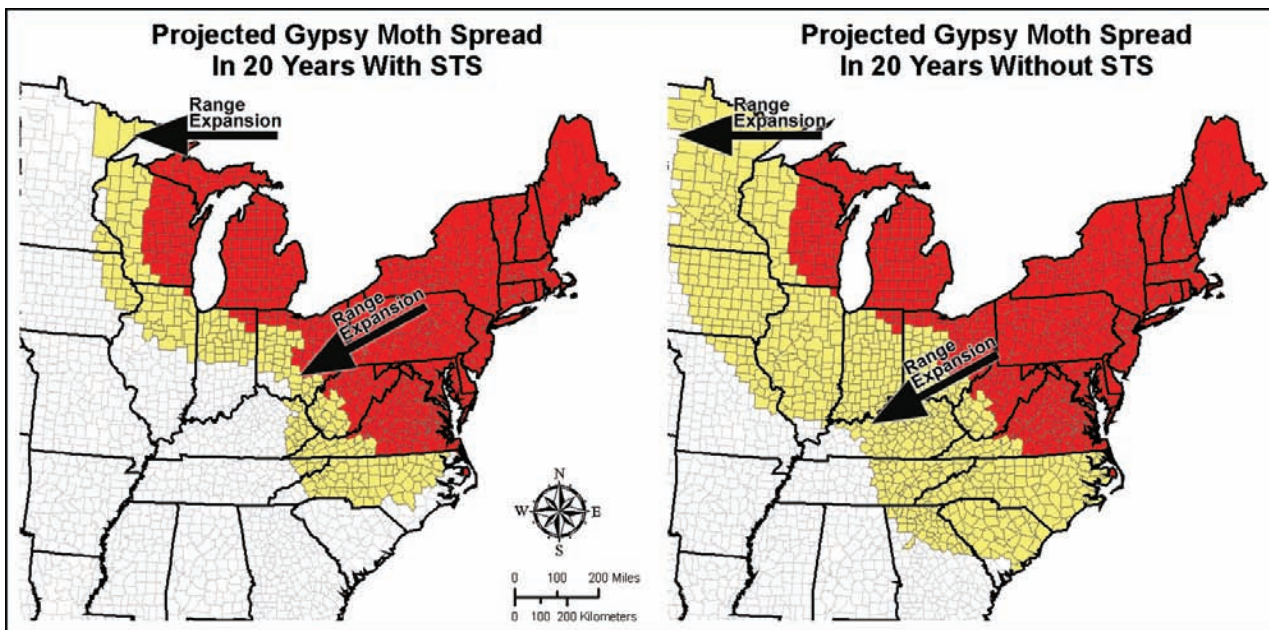
The Benefits

- STS reduces spread of this destructive pest to 3 miles per year, which will prevent infestation of more than 170 million acres over the next 20 years (compare maps).
- STS protects the extensive urban and wildland hardwood forests in the south and upper mid-west.
- STS protects the environment through the use of gypsy moth specific treatment tactics.
- STS unifies the partners and promotes a well coordinated, region-wide action based on biological need.
- STS yields a benefit to cost ratio of almost 3 to 1 by delaying the onset of impacts that occur as gypsy moth invades new areas.

The Funding

These benefits have been achieved with a partnership investment of state and federal funds ranging from \$11 million to \$13 million annually. Since its inception, the USDA Forest Service has supported the STS program as follows:

Year	2000	2001	2002	2003	2004	2005	2006	2007
Dollars (in millions)	\$8.0	\$8.3	\$10.0	\$10.9	\$11.0	\$10.0	\$9.9	\$8.25



Red shaded counties are infested as of 2007; yellow shaded counties will become infested over the next 20 years.

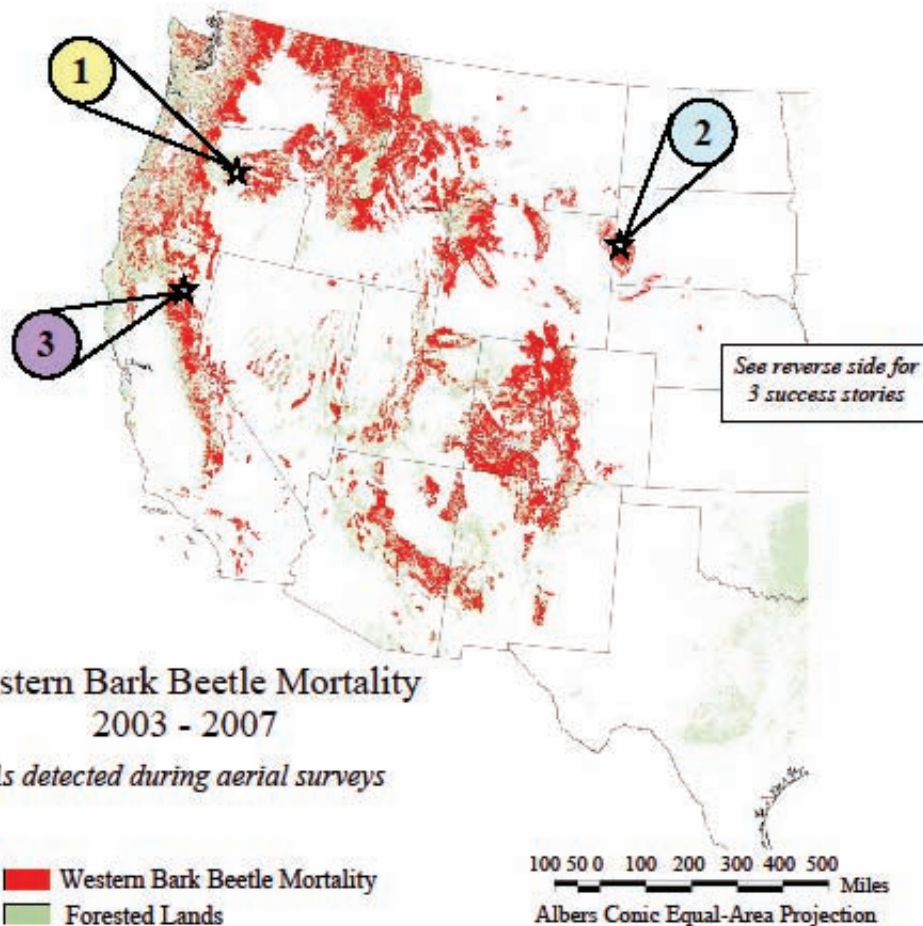


Western Bark Beetle Program



Bark beetles are an important part of western forest ecosystems and can cause high levels of tree mortality across landscapes when conditions are favorable. Older, dense stands of trees -- often stressed by drought or warmer temperatures -- are most susceptible. Many of the same factors that make forests susceptible to bark beetles also increase their hazard to catastrophic fire.

During the past 5 years, an average of 7.2 million acres with bark beetle mortality has been detected annually during the Aerial Detection Survey, and the FHP Risk Map estimates that there 22 million susceptible acres throughout the western continental U.S. and Alaska. From 2004 through 2007, the Western Bark Beetle Program was allocated \$44.7 million by Forest Health Protection to treat almost 261,000 acres on National Forests and State and private lands to reduce stand susceptibility to western bark beetles or suppress beetle populations. Many of these treatments were done on lands in the wildland-urban interface or other high-value locations, and projects often were leveraged with National Fire Plan funds.



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APPENDIX 2, continued



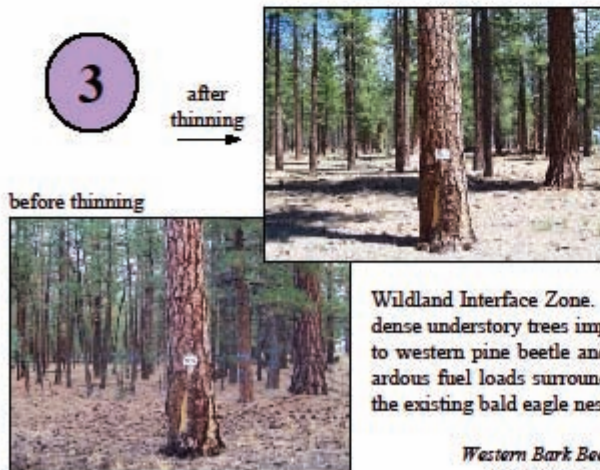
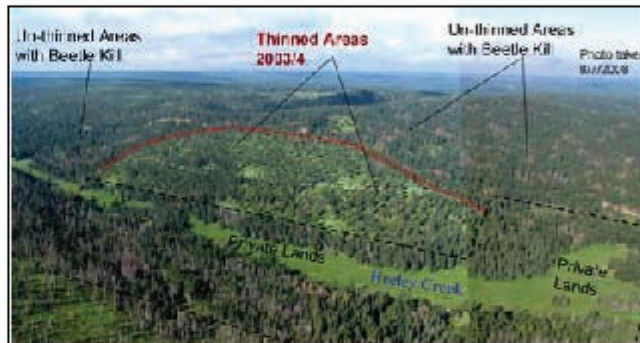
**Ochoco Ranger Station Risk Reduction
Central Oregon**

This 131-acre stand, managed primarily for recreation, is adjacent to private lands (some with residences) that were thinned 10 years ago. The large number of trees, many with “fuel ladders” of branches reaching up into the larger trees’ crowns, contributed to very hazardous fire conditions. Also, western pine beetles had attacked some of the larger pines in recent years. Many smaller trees were removed; to further reduce fire hazard, branches and bark were hand-piled and will be burned after drying.

After treatment, the large ponderosa pines were less susceptible to attacks by bark beetles, and fire hazard was also reduced due to lowered tree density and removal of ladder fuels. This project has created a defensible fuel buffer between Lookout Mountain and the Ochoco Ranger Station, and has lowered the risk of fires spreading to adjacent private lands.

**2 Deerfield HFRA
Black Hills, South Dakota**

For 5 years the Blacks Hills NF and interspersed private land owners have worked cooperatively to reduce the potential for widespread mountain pine beetle-caused tree mortality and large-scale, high intensity wildfire on 41,288 acres. Actions included removing green infested trees prior to beetle flight in heavily infested areas; aggressive commercial thinning in uninfested stands to reduce beetle susceptibility to low risk; and reducing hazardous fuel conditions by thinning, piling and burning, and chipping of fuels.



**Spalding Wildland Urban Interface
Lassen NF, California**

A collaborative effort between the Spalding community, Lassen National Forest, and Forest Health Protection resulted in thinning 592 acres of densely stocked ponderosa and Jeffrey pine forest within the Urban



Wildland Interface Zone. Thinning and removing the small, dense understory trees improved resistance of the large pines to western pine beetle and Jeffrey pine beetle, reduced hazardous fuel loads surrounding the residential and recreation area, and enhanced the existing bald eagle nesting habitat.

*Western Bark Beetle Success Stories — October 2008
US Forest Service — Forest Health Protection*

Southern Pine Beetle Prevention and Restoration Program

This success story showcases two of FHP's core program components: Treatments and Technology Development.

Success Story: Southern Pine Beetle Prevention and Restoration Program

The Southern Pine Beetle (SPB) Prevention and Restoration Program is a cornerstone in the Southern Region's effort to institute a comprehensive and integrated approach for managing SPB on state, private, and National Forest lands in all thirteen Southern Region states. This program is a welcome paradigm shift in the management of SPB, putting increased emphasis on proactive, integrated pest management strategies rather than simply responding with suppression actions once SPB outbreaks have begun.

Funding for this program has been substantial (Table 1). Maximizing on-the-ground accomplishments has been the program's main objective since its inception. From 2003 – 2008, more than 680,000 acres have been treated on state, private, and National Forest (Table 1). The cost per acre works out to \$99.

Treatments include pre-commercial thinning and first thinning of stands to create healthier conditions as well as the restoration of forests recently impacted by SPB. Ten states have used cost-share programs to directly reach more than 6,000 landowners. These cost-share programs provide incentives for landowners who have forest stands that need thinning, but who are reluctant to treat the stands due to lack of markets and contractors to accomplish the work. A fifteen-year target of two million acres treated has been set.

Table 1: Funding & Acres Treated on NFS and State & Private Lands, 2003 – 2008

	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Funding (1,000s)	\$3,700	\$10,000	\$14,000	\$17,000	\$13,500	\$9,631
NFS (acres)	N/A	24,000	17,597	23,018	22,959	8,087
State/Private (acres)	10,000	49,000	134,680	129,900	149,098	115,000
Total (acres)	10,000	73,000	152,277	152,918	172,057	123,087

New 30-meter resolution **Southern Pine Beetle Hazard Maps (Version 1.0)** produced by the Forest Health Technology Enterprise Team and funded by the SPB Prevention and Restoration Program were recently released and can be accessed at http://www.fs.fed.us/foresthealth/technology/nidrm_spb.shtml.

These maps will be used to prioritize areas where SPB Prevention and Restoration Program treatments should occur on the landscape. The maps are available as image files that can be incorporated into GIS software, allowing the maps to be overlaid with projected data layers, such as roads, water, property boundaries, known SPB spots, previous prevention treatments, and more. The maps were produced using a multi-criteria framework developed during the construction of the 2006 National Insect and Disease Risk Map (NIDRM). Models were developed from variations of existing SPB hazard rating systems for the Coastal Plain, Piedmont, and Mountain regions. Each model is constructed at a 30-meter resolution within a GIS environment using a set of forest parameter layers, such as percent host, basal area, diameter, and stand density index.