

## **Invasive Species of Forest in the United States**

### **Scope of Problem**

The threat of aquatic and terrestrial invasive species is one of the greatest natural resources concerns in the United States. Their prevention and control is operationally critical to meeting the stewardship mission of the USD Forest Service. Thousands of species of invasive plants, invertebrates, fishes, diseases, birds, and mammals threaten ecosystem function, economic stability, and human health. Second only to direct habitat destruction, invasive species are the greatest threat to native biodiversity and alter native communities, nutrient cycling, hydrology, and natural fire regimes. Direct and indirect impacts of invasive species have contributed to the decline of approximately 46% of all listed threatened and endangered species. Public recreational opportunities and experience have been severely degraded by rapid infestations of invasive species, in many cases hampering access, reducing recreational quality and enjoyment, and decreasing the aesthetic values of public use areas.

Nationally, invasive species cost Americans over \$137 billion each year, with a large portion of the impacts affecting public lands and agriculture. As the largest land managing agency within the Department of Agriculture, the Forest Service has a significant role in battling these insidious invaders and has stepped forward to work collaboratively at the local, State and National levels. The economic threats from invasive species to Forest Service timber and other production operations are significant and cannot be marginalized, and the linkage between the spread of invasive species and increased wildfire frequency and intensity has been well documented. It has been estimated that invasive plants occupy nearly 133 million acres of National Forests and rangelands, other Federal ownerships, State, Tribal and private lands, and are spreading at a rate of nearly 1.7 million acres per year. It is estimated that invasive plants cause an estimated \$13 billion annually. Insect and disease problems continue to increase and plague millions of acres of private, State, and National forests in nearly every region of the nation.

Due to the broad range of pathways for invasive species to enter and become established within our nations forests and rangelands, the rate of new infestations is growing exponentially. Also, due to overstocking of many forested areas, the threat of infestations of insects, pathogens and invasive plants is greatly enhanced. It is estimated that 70 million acres of the nations forests are at threat of infestations of insects and disease mortality, including 21 million acres by western bark beetles. Compliance with the requirement of the National Environmental Policy Act governing agency actions, and subsequent appeals

and litigation has slowed the USDA Forest Service efforts in completing many projects designed to improve forest health.

**Definition of Invasive Species:** An invasive species is defined as a species that is 1) non- native to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm to human health (Executive Order 13112).

## **Introduction**

America's forests cover 747 million acres, of which 20 percent are on National Forests System lands, 49 percent are owned by non-industrial landowners, 8 percent by States, 13 percent by other Federal agencies, and 10 percent by industrial landowners. See Figure 1 Forest Cover Types in the United States. This forest land is an invaluable asset to the American people, providing water, recreation, wildlife habitat, and future timber. Maintaining the health and sustainability of natural resources is a national security issue and the United States Department of Agriculture (USDA) Forest Service remains committed to the protection of these resources. America's forests continue to face many catastrophic risks, including fires, invasive species, and fragmentation.

Forest Service definition of a healthy, sustainable forest - 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.

The USDA Forest Service works collaboratively with State foresters, State departments of agriculture, and other USDA agencies, including Animal and Plant Health Inspection Service (APHIS) to protect America's forests from native and introduced insects, pathogens, and invasive plants. The FHP program provides services to Federal, State, Tribal, and private managers of forest lands. Services include technical information and assistance in management and control of forest insects, diseases, and invasive plants; forest health monitoring; technology development; and pesticide use.

This report provides a summary of current forest ecosystem health issues in America's forests. There are three general areas of concern:

- Nonnative invasive insects and pathogens
- Invasive plants
- Outbreaks of native insects

## **Nonnative Invasive Insects and Pathogens**

Global trade and travel are causing an unprecedented movement of animals, plants, and microorganisms across continents and oceans. All too often, these nonnative species are invasive and can cause impacts that are extremely costly to both U.S. economy and environment. When brought into new ecosystems, nonnative invasive species have no natural enemies and can cause extensive damage. Nearly 50 percent of the plants and animals on the Federal endangered species list have been negatively impacted by nonnative invasive plants, animals, insects, and microbes. These species threaten biodiversity and have caused catastrophic damage to agriculture, forest products, recreation, and natural resources across North America. Examples include yellow star thistle, leafy spurge, gypsy moth, American chestnut blight, and white pine blister rust.

### **Figure 1 United States Forest Cover Types**

In February 1999, the President issued executive Order 13112 on Invasive Species, establishing the national Invasive Species Council. The council provides, for the first time, a coordinated effort of 10-member departments. In October 2001, the council completed a management plan, Meeting the Invasive Species Challenge, to address the Executive Order. The plan is designed to raise public awareness and control the introduction and spread of nonnative invasive pests. According to the plan, the economic cost of invasive species is estimated at \$137 billion every year.

The USDA forest Service alone spends more than 450 million to control the introduction and spread of nonnative species and approximately \$50 for native species. The control efforts include refining, developing, and deploying a broad array of technologies to minimize the impacts of invasive species; technology includes remote sensing, computer modeling, mechanical treatments, biopesticides, biological controls, and conventional pesticides. The USDA Forest Service and APHIS have started an early detection and rapid response program to detect and promptly eradicate any new invasive species. Invasive pests are dealt with as aggressively as possible, within budget constraints, before they become well established.

## Selected Example of Major Invasive Affecting U.S. forests

### Emerald Ash Borer

The invasive emerald ash borer, a recently introduced pest, is threatening ash in North American forests, urban plantings, and shelterbelts. Critical, time sensitive research is needed on the borer's basic biology, ecology and management. At the present time, information is insufficient to support ongoing detection efforts and to develop effective strategies for containing the infestation, reducing beetle density or eradicating this pest.

#### **Background:**

In 2002, the emerald ash borer, *Agrilus planipennis*, was discovered in dead and dying ash in a 5- country region around Detroit, Michigan and in neighboring Windsor, Ontario, Canada. The borer, which was introduced into Michigan about five years ago, is native to China, Korea, Japan and other Asian countries.

A recent federal and state survey of ash in southwest Michigan determined that the outbreak covers over 2000 square miles. In Southwest Michigan, 49.1 percent of the trees were surveyed and an estimated 5.2 million ash trees are dead or declining. The state of Michigan has quarantined movement of ash trees and ash wood products from several counties around Detroit to reduce the chance of transporting emerald ash borer outside of the currently infested area.

In Michigan, only ash has been attacked; in Asia, elm, walnut and chestnut may be attacked. The borer may have a major impact on forests across the US. Ash is a major component of natural and urban forests in the east and central United States and urban areas in the west. The potential value loss in nine major urban centers is estimated at \$20-60 billion for 30-60 million ash trees. Losing urban ash is also critical because ash has been the primary replacement tree for American elm.

Information on biology, detection and control of emerald ash borer is limited to under a paragraph in the Chinese literature. Currently, infestations are detected by visually examining each tree for exit holes left by emerging adults. "Control" is limited to removal and destruction of infested trees, although preliminary testes indicate that tree injections may work provide some control.

## Needs:

Research is needed to obtain information on the basic biology and ecology of emerald ash borer and tools for assessing ecosystem risk, detection and control that managers must have to formulate effective management strategies.

### Scolytus schevyrewi – A Bark Beetle New to the United States

Scolytus schevyrewi is native to eastern Russia, China, and Korea. The beetle was collected in the rapid detection bark beetle pheromone traps set in Aurora, CO (a suburb of Denver) and Ogden, UT, starting in the April 2003 and is considered very invasive. Dr. James LeBonte, Oregon Department of Agriculture, first identified the beetle as new to the United States. At this time there is no common name for this beetle and it is currently not known how damaging this insect can potentially be.

APHIS has increased their detection effort for this bark beetle in Colorado, Utah, and several adjacent states. The Forest Health Protection (FHP) rapid detection group along with staff of other FHP offices in the West and the Colorado State Forest Service are assisting APHIS.

In Colorado, S. schevyrewi has been collected all along the Front Range from Pueblo to Fort Collins and has been found in Durango in the southwest and in Lamar, a town in southeastern Colorado. In Utah, the bark beetle has been found in Ogden, Salt Lake City, and in eastern Utah. The beetle was found from samples from fresh wood of American, rock, and Siberian elms.

The biology of S. schevyrewi is similar to that of S. multistriatus. The beetle completes a generation in about two months (fresh attacks in late April and early May in the Denver area and brood emergence by early July). We expect that S. schevyrewi will complete 2-3 generations per year in the Denver area. The literature suggests that the beetle has a feeding period on branch junctions like that of S. multistriatus. The egg galleries are very similar between these two bark beetle species.

### Sudden Oak Death

Sudden Oak Death (SCD)- a disease by *Phytophthora ramorum*, a newly discovered pathogen of uncertain origin – has killed thousands of trees in coastal, mixed evergreen forests and urban-wildland interfaces in California and southern Oregon. It kills coast live oak, California black oak, shreve oak,

tan oak trees, and madrone and infects several other plant species, including rhododendron, manzanita, California bay laurel and buckeye, evergreen huckleberry, and big leaf maple. The disease degrades ecological processes and watershed functions and lowers forest productivity. It reduces aesthetic, recreational, and economic values and leaves forests susceptible to invasive plant infestations. Dead trees add fuel to an already high fire risk.

We don't know enough about how the disease spreads and its biology. We know it is spreading rapidly and has been found in nursery stock (particularly rhododendron) in a few ornamental nurseries, raising concerns that it could be transported to and infect the extensive, susceptible oak forests of the eastern United States. The oak-hardwood forest is the largest forest type in the United States.

In response to the current outbreak:

- The USDA Forest Service has spent over \$5 million to research, monitor, manage, and educate the public about SOD. The USDA Forest Service is also working closely with APHIS to assist in implementing quarantine and to regulate the transportation of wood, bark, and nursery stock that might harbor the SOD pathogen.
- California and Oregon implemented State regulations, prior to the release of the Federal regulations, to prevent the spread of this disease. The States are coordinating their respective regulations with APHIS.

Through the California Oak Mortality Task Force, a public-private coalition, the USDA Forest Service lead Federal, State, and local partners in implementing effective SOD research, monitoring, management, and education programs to protect the Nation's oak forests.

In 2000, USDA Forest Service provided funds to help investigate the cause of this disease. Investigations led to the discovery that the primary cause of SOD is a previously undescribed species of *Phytophthora*. In 2001, the USDA Forest Service provided additional funds to determine the extent and severity of SOD in oaks and other native plants in California and Oregon. The funds were also used to develop diagnostic and survey methodologies for the SOD pathogen, evaluate fungicide treatments and other management strategies, and assess the fire risk and other ecosystem effects of accelerated oak mortality. The USDA Forest Service continues to support cooperative efforts in 2002 to monitor the disease development and spread. Forest Health Monitoring surveys detected the pathogen in southwestern Oregon. In the fall of 2001, the Oregon Department of forestry attempted to eradicate the pathogen. Monitoring efforts to determine the effectiveness of the eradication treatment are underway.

## **White Pine Blister Rust: Pathways to Restoration**

White pine blister rust (WOBR), an introduced fungus from Asia, has decimated several species of native white pines across the American West and Canada. Native white pines are an integral part of the natural biodiversity of western forests. The ecological and economic impacts have been most acute on the two large commercial species- western white pine and sugar pine. WPBR entered North America through the east and west coasts on European nursery stock around 1910. In the West, it quickly spread from Vancouver, British Columbia, Canada, south through the Cascade and Sierra Nevada, and east into the Rocky Mountain states of Idaho, Montana, Colorado, Wyoming, and New Mexico. The pest has also inflicted severe ecological damage in high-altitude whitebark and limber pine forests. In susceptible stands, WPBR can kill over 95 percent of mature trees, effectively altering a forest ecosystem forever.

Strategies for control include:

- Restoration of white pine forests through development and planting of white pines, which are genetically resistant to WPBR. More than 8 thousand acres of forest lands have been planted with resistant seed from seed orchards and proven resistant seed trees.
- Research of white pines through deployment of silviculturally integrated practices, such as pruning the infected plantation trees and planting in low hazard areas.
- The USDA Forest Service has extension on-going resistance-breeding programs that began in the 1950s. These breeding programs continue to discover and develop WPBR- resistant varieties of white pines and have helped save the western white and sugar pine from extinction. In California, a total of 1,329 proven resistant seed trees have been identified, and two seed orchards are established. In the Pacific Northwest, the resistance-breeding program supports 40 seed orchards. The Rocky Mountain Region has identified more than 3,100 trees and planted 96,255 acres with WPBR-resistant white pine seedlings.

## **Gypsy Moth: Slowing the Spread**

Since 1930, gypsy moth has defoliated more than 80 million acres of forests in the Eastern United States, with most of that damage occurring during the past 20 years. A hardwood defoliator native to Europe and Asia, gypsy moth arrived in the United States in the 1800s, established itself in the oak forests of southern New England, and then spread south and west across 19 States. Occasionally, it

appears in western forests but has been successfully eradicated each time. Unfortunately, gypsy moth is now a permanent resident of eastern forests.

During outbreaks, moth populations often outpace the few natural enemies, parasites, predators, and pathogens that attack them. The gypsy moth feed on the delicate first flush of leaves in the spring. It prefers oaks, but it will feed on 500 species of woody plants. The attacked trees become highly susceptible to secondary attacks from other insects and pathogens. Often, the trees die. The deaths alter the forest ecosystem dramatically; usually dead oaks are replaced not with more oaks, but with other species that do not produce as much mast for wildlife.

In response to this pest, the USDA Forest Service adopted the following strategies:

Implementing programs and providing technical and financial assistance to States and other Federal agencies to suppress and slow the spread of gypsy moth in the East.

Detecting and eradicating- along with APHIS, State governments, and other Federal agencies-localized introductions of gypsy moth in the West.

A gypsy moth virus and aerial treatments with biological and chemical insecticides conducted over 460,000 acres in 2001 have effectively suppressed or slowed the spread of gypsy moth in nine Northeastern States. The USDA Forest Service's Gypsy Moth-Slow-the Spread program slows the southwesterly spread of the insect by 60 percent through concentrated monitoring and by using environmentally benign mating disruption techniques. After discovering adult gypsy moths in pheromone traps in seven Western States in 2000, steps were taken that eradicated the pest from these States. The USDA Forest Service and many other cooperators continue to develop new controls and delivery methods to use against this pest.

### **Eastern Hemlock forests Are Dying: Hemlock Woolly Adelgid**

The hemlock woolly adelgid (HWA) is one of the most serious forest pests threatening eastern forests. The insect affects two species of eastern hemlocks and trees can die within 4 years of infestation. Native to China and Japan and introduced to the American Northwest in the 1920s, it has spread quickly across the eastern US in the 1950s. Fortunately, the western hemlock has proven resistant to HWA. Unfortunately, the eastern hemlock is highly susceptible to HWA. Beginning in the 1950s, the pest began a destructive march north and south through eastern forests. Today, it infests nearly half of the hemlock forests across 11 States from Massachusetts to South Carolina and as far west as the southwest tip of West Virginia.

Eastern hemlock is a pivotal component in eastern forest ecosystems. It is especially important along streams and creeks where its shade helps control water temperatures, thereby helping to sustain aquatic ecosystems. Eastern hemlocks span the Eastern United States from Maine west to northern Wisconsin and south along the Appalachians to north Georgia. The span also includes small pockets in Indiana and Mississippi. To arrest the pest's advance, the USDA Forest Service has:

- Implemented spray programs on individual trees wherever practical and environmentally safe, such as in nonriparian settings.
- Identified, developed, and released HWA- specific biological control agents.
- Developed an integrated plan to address the problem as funding permits.

The USDA Forest Service identified a number of pathogens and predators not native to the United States that would attack HWA. The most effective to date is the Japanese ladybird beetle. This predator attacks only HWA, will feed on all stages (egg to adult) of HWA, and, in sufficient numbers, will consume up to 97 percent of a HWA population. Since 1999, the USDA Forest Service has raised and released over half-a-million beetles in nine States. Additional research, development, and subsequent management actions are expected to reduce the impacts of this destructive pest.

### **Invasive Plants**

Thousands of invasive plant species have been introduced into the United States. About 1,400 are recognized as pests that pose significant threats to the biodiversity of forest and grassland ecosystems. Federal natural resource agencies list 94 species of exotic plants as noxious weeds, and many more appear on States' lists. Experts estimate that well over 100-million acres are infested with invasive plants and that between 8-and 20 million acres are being added every year. An estimated 3.6 million acres on national Forest System lands are infested.

Many of the invasive plants are not native to the United States. Therefore, they have no natural enemies to limit their reproduction and spread. Although rangelands are the primary targets of many invasive plants, they are showing up everywhere-in forests, parks, preserves, wilderness areas, wildlife refuges, croplands, and urban species. Invasive plants threaten two-thirds of the habitat of all threatened and endangered species.

Two federally coordinated efforts are:

- The Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW) – comprised of 17 Federal agencies with a common goal to develop biologically sound techniques to manage invasive plants on all lands.
- The National Fire Plan – focused on rehabilitating and restoring forests and rangelands, specifically reducing the spread of noxious weeds.

In 2001, the USDA Forest Service spent over \$27 million implementing provisions of the National Fire Plan to prevent and control the spread of noxious weeds on more than 145,000 acres of National Forest System lands. Part of these funds, \$3.5 million, was allocated to Idaho and Montana to protect approximately 93,000 acres of State and private lands from invasive weeds.

The USDA Forest Service and its cooperators are conducting extensive research and development that is needed on biological control agents many invasive plants, such as mile - a- minute weed, a major problem in five Northeastern States. Biological control agents are showing some success in slowing the spread of invasive plants, such as leafy spurge in the West.

Selected Examples of Invasive Plants Affecting U.S. Forests

### **Leafy Spurge**

Leafy spurge is the classic nonnative, invasive plant. Arriving on North America from Eurasia in the 1890s, it now infests over 2.5- million acres of rangeland in Southern Canada and the Northern United States. At maturity, it can reach heights of 7 feet. Leafy spurge can kill cattle and horses, and its sap can cause irritation to the eyes, mouths, and digestive systems of all domestic and wild grazing animals, except goats and sheep. The sap can also cause blistering, severe dermatitis, and permanent blindness among humans. Seedpods explode when touched, scattering seeds up to 15 feet. It has a nutrient- strong taproot system that can reach soil depths of 20 feet. Pulling the plant actually encourages it to spread.

Although conventional herbicides are effective against leafy spurge, they have a limited use. Due to this limited use, the USDA Agricultural Research Service, in cooperation with APHIS, developed and evaluated approaches to managing leafy spurge. Now a cooperator, the USDA Forest Service is researching and applying several biological control agents to suppress the pest's spread, including:

- Grazing goats and sheep.
- Fungal controls that kill the plant by causing root rot.
- Flea beetles that feed specifically on leafy spurge.

Of these three, the flea beetles appear to be most effective against this pest, especially when used as an integral part of a pest management approach that includes grazing by sheep and goats and use of conventional herbicides whenever possible. Imported from Asia, beetle populations have been established in Montana, the Dakotas, and Wyoming. Adult insects weaken the plants by attacking leaves and stems, and the larvae feed upon the roots. The USDA Forest Service and other cooperators are refining laboratory techniques so that the beetles can be mass produced.

### **Mile-a-Minute Weed**

Mile-a-minute weed is a prickly, annual vine that, true to its name, grows very rapidly and overpowers virtually all vegetation in its path. Originally from Asia, it first appeared on the west coast in the 1890s. In 1946, it was found in nurseries in Pennsylvania. It has spread to New York, Ohio, Maryland, New Jersey, Virginia, West Virginia, Delaware, and the District of Columbia. Seeds are spread by birds and rodents and are carried in rivers and streams. The plant is an excellent climber and easily overpowers, engulfs, and displaces much of the native flora in its path. It invades nurseries, forest openings, railroads, utility rights-of-way, roadsides, and riverbanks. It also threatens forest regeneration and recreational activities. In short, mile-a-minute weed is degrading plant diversity in North America.

Controlling the spread of mile-a-minute weed presents a tremendous challenge to forest and rangeland managers. The USDA Forest Service and its cooperators are working diligently to identify and apply effective biological controls to use against this nonnative pest, including:

- Identifying over 20 varieties of fungi that attack and / or kill the weed. Additional tests on the fungi are planned.
- Evaluating three insects from China known to attack the weed. One of the insects in particular, a weevil shows promise for future release.

### **Outbreaks of Native Insects**

Although native insects don't fall into the EO's definition of invasive species, they are an important damaging agent in the United State. Examples include southern pine beetle and western bark beetles are causing significant mortality.

Native insects such as bark beetles in the West and southern pine beetle in the South act as “agents of change” in conifer forests. At the endemic level, they play a critical role in the development, aging, and rebirth of entire forests. At the landscape level, insect- caused mortality contributes to the structural and mosaic diversity within ecosystems. Insects can also cause major disturbances within U.S. forests. For example, tree mortality due bark beetle outbreaks can be extensive, affecting thousands of acres.

Certain circumstances can exert uncommon stress on forests and predispose them to extraordinary insect outbreaks and damage. These circumstances include drought, overstocking, and large areas of again forest. During the last decade, several of these circumstances have arisen simultaneously, causing extensive tree mortality. In turn, that mortality has threatened wildlife, endangered and threatened species habitat, and degraded recreational quality. The increased mortality has contributed to considerable fuel accumulation, which in turn increases the risk of catastrophic fires.

In 2001, the USDA Forest Service spent about \$10 million to suppress and prevent bark beetle outbreaks. Because more work is needed, the USDA Forest Service has developed management plans to address the problem in an integrated manner and will implement these long-term plans as funding permits.

### **Southern Pine Beetle: Laying Waste to Southern Forests**

Southern pine beetle (SPB) is the most destructive forest in the South. Over 90 million acres of southern forests are at a moderate to high risk of SPB infestation. In 2001, due to a combination of a mild winter and a prolonged drought, the South experienced its most severe and prolonged SPB outbreak in history. SPB infested tens of thousands of acres and caused over \$200 million in damages. A single SPB “spot” (outbreak) can spread very quickly and cover up to 1,000 acres in one season. The situation was especially dire in Alabama, where more than 25,000 SPB spots have been detected. In the Southern Appalachian Mountains, SPB has killed thousands of acres of pines. It has killed more than 70 percent of the pine forest habitat of the red cockaded woodpecker, a federally listed endangered species, on the Daniel Boone National Forest in southern Kentucky.

In response, the USDA Forest Service has:

- Stepped up its funding of programs to detect, and prevent SPB infestation and restore southern pine forests.
- Modernized and improved computer modeling and tracking technology-including the Southern Pine Beetle Information System (SPBIS), which enables national forest field staffs to quickly log information about SPBspots and schedule, execute, and monitor treatments on those spots.

In 2001, the USDA Forest Service doubled its financial commitment from the previous year and provided over \$13 million to fund SPB suppression projects on Federal, State, and private lands developed and will be implemented as funding permits.

### **Mountain Pine Beetle in Colorado: Cooperative Management**

The mountain pine beetle (MPB) kills more pines American West than any other bark beetle. A regional assessment conducted by USDA Forest Service staff of the forest in Vail's wildland-urban interface found that almost all of the 34,000 acres of lodgepole pine in the area were at moderate to high risk of MPB infestation because of tree age, density, and drought.

Vail, CO, the site of the 1999 World Alpine Ski Championships, is a world- class recreation setting. Vail also has some of the most valuable real estate in the United States. Among Vail's natural treasures is the nearby white River National Forest, a large, and mostly wild, expanse of forest land. Increases in MPB infestation among Vail's lodgepole pine forests started in 1996. Increases in the MPB infestation were also detected in the forest around the Steamboat Springs area. The management of these outbreaks highlighted the importance of early communication and better understanding of science-based management methods to implement suppression and restoration practices within the wildland-urban interface.

Sensitive to community concerns, while recognizing the urgent need to address the growing MPB problem, the USDA Forest Service:

- Initiated a cooperative effort to address landowner and public concerns with the Colorado State Forest Service, the Town of Vail, and the ski area management company, Vail Associates.
- Devised and implemented a comprehensive plan to address the MPB problem.

Since 1997, the USDA Forest Service has provided technical assistance through the Colorado State Forest Service. This assistance has helped implement prevention and suppression programs on private property, within the White River national Forest, and on property owned by the Town of Vail. The USDA Forest Service has also conducted programs to peel and remove bark from beetle-infested trees in isolated locations, conducted field trials to identify and deploy pheromones effective against MPB, and applied insecticides to select individual trees. In April 2002, the USDA Forest Service published *Western Bark Beetle Report: A Plan to Protect and Restore Western Forests*, which addresses the prevention, suppression, and restoration needs related to bark beetle outbreaks.

The USDA Forest Service is an active member of the Bark Beetle Information Task Force that helps residents of Routt Count and surrounding areas understand the potential effects of bark beetles on national forests and state and private lands. The task force was formed in 1999 to provide the public with information about bark beetles and potential tree mortality so that they could make informed decisions about protecting their private property and provide meaningful input on proposed actions on public lands.

### **Risk Map**

Figure 2 is the risk map for insect and disease potential within the United States. It depicts where USDA Forest Service scientists predict mortality will occur over the next 15 years. Areas in red will experience at least 25 percent mortality over and above normal levels (under 1 percent per year) due to the actions of insects and pathogens. The map is not site-specific. It is a coarse-filtered map and, with other data, is used to plan where treatment will take place. Based upon our definition of risk, it depicts about 70 million acres at risk out of total of 749 million acres of forest land in the United States. Four pests are responsible for 66 percent of the risk acres: gypsy moth in the East, southern pine beetle in the South, root disease in the Interior West, and bark beetles in the West.

## Forest Service Budget for 2004

FY 2004 Budget in Dollars in Thousands and includes both native and non-native invasive species

<b>Forest Service Programs</b>	<b>2001 Actual</b>	<b>2002 Current's Estimate</b>	<b>FY2003 President's Budget</b>	<b>FY 2004 President's Budget</b>
<b>Forest and Rangeland Research</b>	13,183	10,034	7,940	14,540
<b>International Programs</b>	575	575	575	575
<b>National Forest System</b>	8,000	10,400	16,200	18,300
<b>Sate &amp; Private Forestry</b>				
S & PF: Forest Health	20,600	40,121	45,000	59,152
S&PF: Pest Mgmt. Emergency	12,472	0	0	0
S&PF::Emerging Pest and Pathogens Fund	0	0	11,968	0 <sup>1</sup>
<b>Total Forest Service</b>	<b>54,830</b>	<b>61,130</b>	<b>81,683</b>	<b>92,535</b>