U.S. Department of Agriculture
Forest Service
Invasive Species Activities
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Background:

Invasive species are among the most significant environmental and economic threats facing our Nation's aquatic and terrestrial ecosystems. A species is considered to be invasive if it meets two criteria: (1) it is nonnative to the ecosystem under consideration, and (2) its introduction causes, or is likely to cause, economic or environmental harm or harm to human health (Executive Order 13112, 1999). Invasive species endanger native species and threaten ecosystem services and resources, including clean water, recreational opportunities, sustained production of wood products, wildlife and grazing habitat, and human health and safety. Property values are also adversely affected, and cities, counties, and small landowners are often disproportionally impacted. Adverse effects from invasive species can be exacerbated by interactions with fire, native pests, weather events, human actions, and environmental change. Invasive species cause billions of dollars in damage each year. Estimated damage from invasive species worldwide has been totaled at more than $1.4 trillion per year—5 percent of the global economy.

Burgeoning global trade and transportation have facilitated the distribution of many species among continents well beyond their native range. Species introductions have enhanced the probability of exotic establishment. The spread and persistence of invasive species result in high levels of environmental damage, significant control and other economic costs, and social impacts including harm to human health and well-being. Because the number of people living in, accessing, and using forests, grasslands, and water resources is continually increasing, the likelihood of invasive species being spread through transportation and recreational activities is also rising. As a result, many species of invasive plants, insects, pathogens, terrestrial animals, and aquatic organisms are already established in forest, grassland, and aquatic ecosystems. The harm currently caused by the numerous invasive species in the United States, combined with the likelihood of new introductions, necessitates that the Forest Service have a comprehensive approach to guide current and future activities related to invasive species management to reduce undesirable impacts.

Strategically investing in programs and projects to address invasive species threats will help reduce the economic and environmental impacts of invasive species on all lands.

Forest Service Work to Eradicate and Mitigate the Threat of Invasive Species:

<u>Program Integration of Research and Management Activities</u>

The Forest Service has an integrated invasive species research and management program across the agency. Forest Service programs work together to prevent, control, eradicate, and mitigate the threat of invasive species under a common *Framework.* The *Forest Service National Strategic Framework for Invasive Species Management*

(http://www.fs.fed.us/publications/invasive/invasive-framework-2013.pdf) provides broad strategic guidance for all Forest Service programs within the National Forest System (NFS), Research and Development (R&D), and State and Private Forestry—with a common goal. The Forest Service has issued national policy direction for all aquatic and terrestrial invasive species management activities conducted across the NFS, including activities targeting invasive plants, pathogens, vertebrates, invertebrates, and other high-risk invasive species. This policy was released as part of the agency directives system as Forest Service Manual 2900 *(Invasive Species Management)* in 2011, and is unique among Federal land management agencies—emphasizing invasive species management integration across multiple agency programs. This national policy has increased the effectiveness, accountability, and transparency of the agency's invasive species program, and expanded collaborative efforts with internal and external partners.

Forest Service programs address a wide variety of aquatic and terrestrial invasive species threats and provide support to manage invasive species across the landscape. Forest Service invasive species research and management programs focus on four key elements for invasive species research and management: (1) prevention, (2) early detection and rapid response (EDRR), (3) control and management, and (4) restoration and rehabilitation. These four elements are not separate and distinct from one another; they overlap and form an integrated adaptive approach for addressing invasive species. Forest Service invasive species management and research activities are coordinated and accomplished by networking with local, county, State, Tribal, Federal, and international partners at all levels. The Forest Service directly conducts invasive species prevention, control, and restoration activities on aquatic and terrestrial areas of the 193-million acre NFS, and provides management support to neighboring private, Tribal, and State lands. On average, the agency treats nearly 400,000 acres to prevent and control priority invasive species on national forests and grasslands each year.

Improved knowledge development, communication, coordination, and information sharing enables the Forest Service to stay apprised of local issues and advances, while remaining relevant and connected with local expertise that is valuable in planning, prioritizing, and implementing invasive species management activities. Forest Service programs at the local level also provide support for invasive species education and awareness efforts, often providing materials and expertise about invasive species at the community level.

Forest Service Technical and Financial Assistance

The Forest Service provides a significant amount of support to local, State, and regional groups by providing technical and financial assistance to address priority invasive species issues. For example, the Forest Service provides technical and financial assistance to State cooperators to conduct an EDRR program for invasive bark beetles. In addition, the Forest Service provides significant support to Cooperative Weed Management Areas; Cooperative Invasive Species Management Areas; and other organizations in the public and private sectors in order to promote a collaborative approach to mitigate, manage, and adapt to invasive species threats across the landscape, while improving and sharing information. The Forest Service provides essential matching funds and technical assistance to local organizations, States, and regional Cooperative Weed Management organizations to combat invasive species across the Nation through a variety of national grant programs.

The Forest Service also works closely with Federal and State partners to control and manage insects, pathogens, and plants affecting forests outside of this public land system, and provides assistance to other Federal agencies to identify and prioritize potential invasive species and identify high-risk pathways. For example, the Forest Service works closely with the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) to identify pathways for potentially invasive woodborers and defoliators, and helped develop more targeted survey methodologies for invasive species already established in the United States, such as gypsy moth and emerald ash borer. For example, in coordination with APHIS, the Forest Service has a shared responsibility for the eradication of new and isolated infestations of gypsy moths. For many of the invasive species established in the United States., the Forest Service has developed cost-effective tools and techniques to manage and reduce the impacts of infestations. Forest Service research indicates that without the gypsy moth Slow-the-Spread program, over 50 million acres of forests in the southern and western United States would be infested. An economic analysis of this program has shown it has a benefit:cost ratio of 3:1, meaning the Federal investment is leveraged significantly with partner dollars and in-kind contributions, resulting in more acres treated and a more effective program. This program treats more than 400,000 acres of non-Federal lands each year to keep gypsy moth populations low and thereby reduce the potential for spread.

The Forest Service also works with cooperators to treat other invasive species such as hemlock woolly adelgid (10,000 acres in 2014), sudden oak death (65 acres in 2014), invasive plants (48,000 acres in 2014), and white pine blister rust (3,200 acres 2014).

To conserve the genetic biodiversity of forest tree species at risk due to insects, diseases, and other stressors, Forest Health Protection has an active gene conservation program. Currently, the primary focus is on conserving priority species through long-term seed storage of species such as whitebark pine, bristlecone pine, limber pine, Atlantic white cedar, and table mountain pine. New efforts are underway with partners to look at ways of conserving at-risk species whose seed cannot be stored long term.

Along with State and other Federal cooperators, the Forest Service surveys more than 400 million acres each year to detect invasive, as well as harmful native, insect, pathogen, and plant species, using the most effective and efficient tools for aerial and ground surveys. Also in cooperation with States, the Forest Service conducts stream, aerial, and ground surveys to detect the fungal agent that causes sudden oak death. Early detection stream baiting is focused in the regulated States of Oregon, California, and Washington, with added emphasis in nine eastern and southern States (Alabama, Mississippi, Florida, Georgia, North Carolina, South Carolina, Texas, Pennsylvania, and New York) determined to have the greatest likelihood of sudden oak death development based on climate risk maps and nursery infestations.

The Forest Service also safeguards forests through development of biological control tools and registration of certain pesticides to combat the spread of invasive forest pests. In a coordinated effort with Forest Service R&D and university partners, Forest Health Protection has fostered the identification and release of biological control organisms against the hemlock woolly adelgid, and is currently working on organisms to control the winter moth infestation in New England. When there is a lack of commercial interest, the Forest Service researches, develops, and registers pesticides such as Gypchek, a virus used to control gypsy moths. The Forest Service

maintains registration on several pesticide products to keep them available to combat forest pests. Additionally, the Forest Service provides technical information and expertise to cooperators on pesticide use in forestry.

Research Activities

The Forest Service conducts critical research to develop and improve on-the-ground operations in prevention, detection, and control of key invasive species, and rehabilitation and restoration of ecosystems impacted by invasives and other disturbances. The Forest Service has strong research partnerships with international, Federal, State, and Tribal collaborators to help focus research efforts to the most needed areas, and leverage resources to maximize productivity. The agency has developed a Research Strategy and Vision that articulate how R&D will provide—over the next 10-15 years—the tools needed to ensure sustained production of goods, services, and values from our natural resources. The agency's invasive species research is a balance of focused research on key species and broader ecosystem-based research to understand trends and relationships among disturbances and their longer term impacts within an ecosystem. Current research focuses on the following:

- Investigating invasive species biology, ecology, interactions, and impacts;
- Developing methods to forecast and prioritize invasive species;
- Improving invasive species detection and diagnostic technology;
- Developing more effective management methods for high-priority species.

Conclusion:

The Forest Service has an active program on invasive species, covering aspects of management, control, research, and education. The program is well integrated across the agency, providing knowledge, technology, and management tools and funding. The all lands approach covers private landowners, States, Tribal, other Federal agencies, nongovernmental organizations, and the academic community on both a local and national basis. The Forest Service also has strong international ties to address invasive species before they reach our shores as well as to prevent our native species from becoming invasive overseas.