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Author(s): Randy G. Westbrooks

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## New Approaches for Early Detection and Rapid Response to Invasive Plants in the United States<sup>1</sup>

RANDY G. WESTBROOKS<sup>2</sup>

**Abstract:** Currently, the Federal Interagency Committee for the Management of Noxious and Exotic Weeds is leading a national effort to develop and implement a National Early Detection and Rapid Response System for Invasive Plants in the United States. Ultimately, the system will be part of an All Taxa Early Detection and Rapid Response System under the National Invasive Species Management Plan. The overall purpose of developing such a system for invasive plants is to provide a coordinated framework of public and private partners to more effectively address new invasive plants through: (1) early detection and reporting of suspected new plants to appropriate officials, (2) identification and vouchering of submitted specimens by designated botanists, (3) verification of suspected new state, regional, and national plant records, (4) archival of new records in designated regional and plant databases, (5) rapid assessment of confirmed new records, and (6) rapid response to new records that are determined to be invasive. Currently, the U.S. Geological Survey is cooperating with state and regional partner groups in New England, the Gulf Coast, and the West to develop and field-test elements and processes that were identified in the Conceptual Design Plan. Once fully implemented across the nation, the proposed system will provide an important second line of defense against invasive plants that complements federal efforts to prevent unwanted introductions at the ports of entry.

**Additional index words:** Early detection, invasive plants, rapid assessment, rapid response.

**Abbreviations:** EDRR, early detection and rapid response; FICMNEW, Federal Interagency Committee for the Management of Noxious and Exotic Weeds.

### INTRODUCTION

Throughout history, as people colonized the Earth, they carried their cultivated plants and domesticated animals along with them. Since the advent of European colonization, about 50,000 taxa of plants and animals (species, varieties, and hybrids) have been introduced to the United States. Although the vast majority of these species are well behaved and provide immense benefits to human society, a small percentage of them have escaped from cultivation and are causing serious threats to crop production, or natural ecosystems, or both. To date, about 4,200 species of introduced plants, or about 8.4% of total introductions, have escaped from cultivation and established free-living populations within the country. Recently, researchers at Cornell University estimated the costs of exotic invasive species to the American economy to be about \$138 billion per year (Pimentel 2002). Unlike chemical pollutants, which can be eliminated

from usage and will eventually breakdown in the environment, invasive species can reproduce and spread, causing ever-increasing problems.

Increased international trade in ornamental plants (including seeds) is a special concern because many of the currently known exotic invasive plants in the United States were originally imported as ornamentals (Westbrooks 1998). Increased trade in ornamental plants with megadiversity countries such as China and South Africa will likely increase this problem. Although the majority of introduced species are not harmful to the American economy or the environment, a small percentage of them are very damaging and need to be detected as soon as possible.

To date, efforts to address many widespread invaders have been confounded by the conflict between control efforts and the need to minimize collateral environmental damages they sometimes cause (both biological and chemical). As a result, except in cases where public welfare is clearly at risk (e.g., invasive species that would negatively affect human health, important industries, or important conservation resources), there is often a tendency to ignore many invasive species because of the

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<sup>2</sup> Invasive Plant Coordinator, U.S. Geological Survey, 233 Border Belt Drive, Whiteville, NC 28472. Corresponding author's E-mail: rwestbrooks@usgs.gov.

lack of environmentally acceptable control methods. The decision to tolerate the problem (invasive species) at the expense of the cure (some forms of control) has led to an ecological crisis of epic proportions, with no simple solutions in sight.

Because there is so little awareness of this issue, it will take a large and concerted effort to develop public support and to marshal the necessary resources that will be needed to effectively address this new environmental threat. Clearly, landowners and managers, as well as gardeners who have a strong connection to the land and understand the importance of wildlands, can provide a major leadership role as we grapple with this “silent, invisible invasion.”

### STRATEGIES FOR ADDRESSING INVASIVE SPECIES

Clearly, there is no single strategy that will completely solve the invasive species problem. However, a combination of strategies will work to minimize it. These include prescreening of intentionally imported species for invasiveness, inspection and pest mitigation at the borders, early detection and rapid response (EDRR) to new invaders, and long-term management of established, widespread taxa.

Of all these options, EDRR is the most cost effective and most environmentally sound approach because of the following reasons: (1) EDRR does not restrict trade and movement of species that may or may not become invasive, (2) EDRR addresses only species that have established free-living, self-perpetuating populations, (3) EDRR causes minimal and short effects on the invaded habitat regardless of the methods that are used for eradication of the population, and (4) EDRR aims to restore the invaded habitat to a natural balance.

### NEW APPROACHES FOR EDRR TO NEW INVASIVE PLANTS

To minimize the establishment and spread of new invasive plants in the United States, the U.S. Geological Survey is cooperating with the Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW), the Invasive Plant Atlas of New England project, and a number of state and local partner groups to develop a National Early Detection and Rapid Response System for Invasive Plants in the United States. The primary goal of the proposed system will be to ensure that new species are detected early, reported, and assessed to determine whether control actions should

be taken to limit their establishment and spread to vulnerable habitats. The recent appearance of giant salvinia (*Salvinia molesta* D. Mitchell #<sup>3</sup> SAVMO), a floating fern from South America in waterways of nine southern states, is an example of species that need to be detected soon after arrival and establishment (Figure 1).

### SYSTEM OVERVIEW

To achieve this goal, a coordinated framework of new and established public and private partner groups at the local, state, regional, and national levels is being organized to more effectively address new invasive plants through (1) early detection and reporting of suspected new plants to appropriate officials (through volunteer groups and active surveys), (2) identification and vouchering of submitted specimens (by designated botanists), (3) verification of suspected new state, regional, and national plant records (by State Weed Teams and FICMNEW), (4) archival of new records in designated regional and plant databases (e.g., the United States Department of Agriculture Plants Database), (5) rapid assessment of confirmed new records (by federal and state scientists), and (6) rapid response to new records that are determined to be invasive (by landowners, or cooperative weed management areas, or both).

Refer to the flow chart in Figure 2 for an overview of the components of the EDRR system.

### BIOLOGICAL PROTECTION—A NEW LAND CONSERVATION ETHIC FOR THE 21ST CENTURY

In the second half of the 20th century, enormous strides were made in establishing an environmental protection ethic for preventing wildfires (Smokey Bear), chemical pollution, littering (EPA, Woodsy Owl), and to promote recycling. As we enter the 21st century, the silent ecological explosion that is being caused by invasive species will require a comparable effort to protect agriculture and biodiversity. Although increased efforts through prescreening of imported plants, border inspections, early warning and rapid response, and long-term management will provide added protection against biological invasions, it is critically important to have public understanding and cooperation in minimizing the introduction, establishment, and spread of invasive plants. Just as people have been taught to protect the environment (e.g., dispose of motor oil properly), people must

<sup>3</sup> Letters following this symbol are a WSSA-approved computer code from *Composite List of Weeds*, Revised 1989. Available only on computer disk from WSSA, 810 East 10th Street, Lawrence, KS 66044-8897.



Figure 1. Giant Salvinia, a devastating new aquatic weed in wetlands of Pender County, North Carolina.

be taught to protect the biological component of the environment as well. It is vitally important to encourage people to use horticultural and erosion-control plant species that will not spread or be spread from the places where they are planted. Reporting of suspected new plants to state and local officials is the first and most important element of this proposed new system.

#### **THE ROLE OF GARDENERS AND LAND MANAGERS IN ADDRESSING NEW INVASIVE PLANTS**

Because of their love for the outdoors and their strong connection to the land, gardeners and land managers can greatly assist in the national effort to prevent the introduction and spread of exotic invasive plants as follows: (1) use native or noninvasive exotic plants for landscaping, (2) eradicate and prevent the spread of new invasive

plants when possible, (3) volunteer to help remove exotics from area parks and public lands, (4) help increase awareness and understanding of the invasive species problems, and (5) report unknown new plants to local and state officials.

#### **DISCUSSION**

Ultimately, the most convincing reason for developing an effective capability for EDRR to new invasive plants is the staggering toll they are having on the U.S. economy. In 1994, the economic effect of invasive plants on the U.S. economy was estimated to be \$20 billion or more, including control costs and losses. Because the introduced plant species account for about 65% of total invasive plant problems (Westbrooks 1998), their total economic effect on the U.S. Economy (at that time) was about \$13 billion per year (Bridges 1994). In 1999, re-

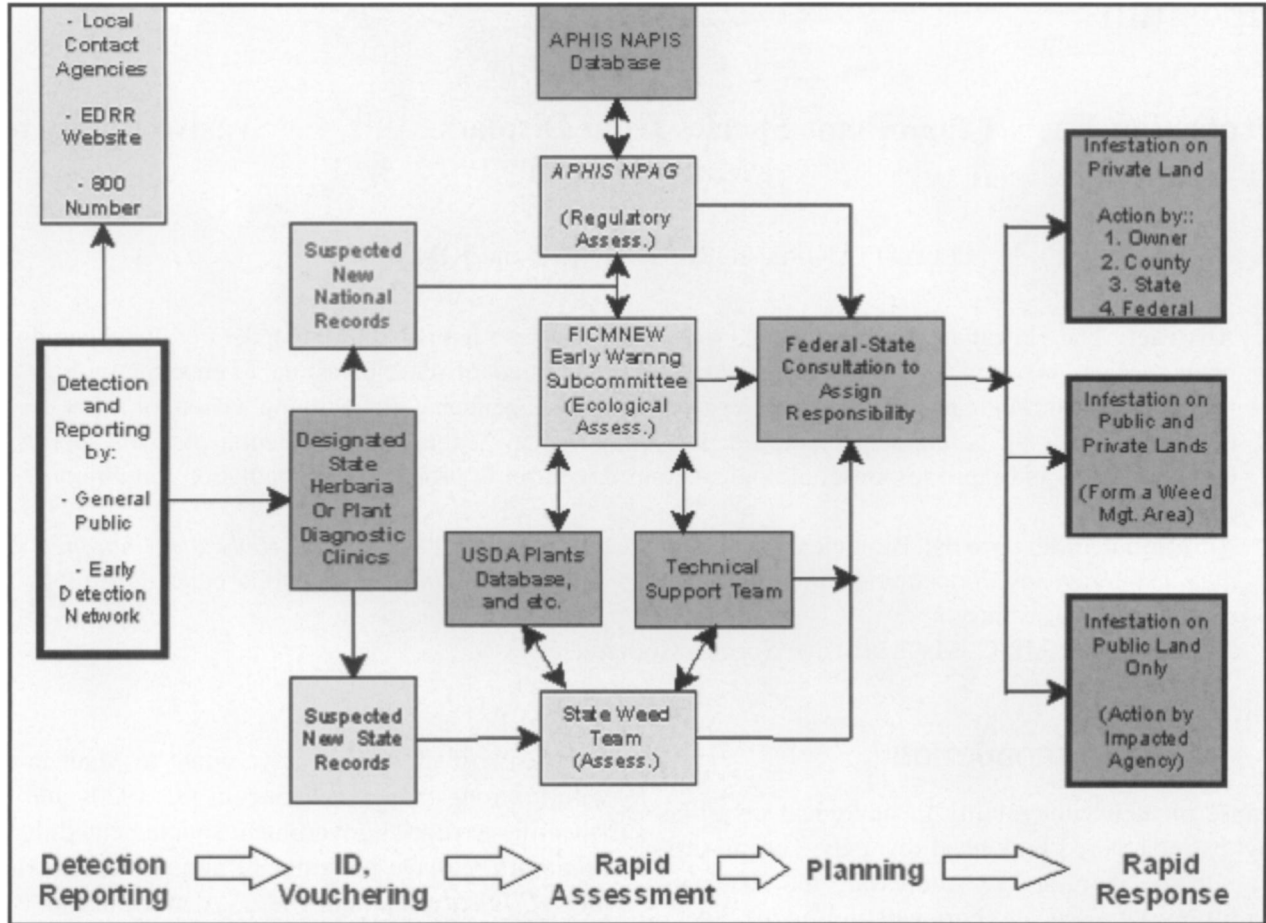


Figure 2. Proposed National Early Detection and Rapid Response System for Invasive Plants in the United States.

searchers at Cornell University released a study that estimated annual costs associated with all nonindigenous species in the United States to be at least \$138 billion annually. This included an estimated cost of \$34.7 billion per year because of introduced invasive plants (Pimentel et al. 1999). Clearly, we need to minimize such costs to the U.S. economy, and to future generations, through every means available.

Once implemented nationwide, the proposed system will provide an important second line of defense against invasive plants that complements federal efforts to prevent unwanted introductions at the ports of entry. With both prevention and early warning systems in place, the nation will be better able to defend against future economic and environmental losses because of “plants out

of place.” Although this approach has been developed specifically for early detection of invasive plants, it should serve as a good model for developing EDRR systems for other taxa, including aquatic nuisance species.

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