

INVASIVE SPECIES: a biological wildfire

By Tom Stohlgren

Resource managers throughout the country are quick to realize that the ecological, economic, and human-health costs associated with invasions of nonnative species may be as catastrophic as wildfire. Lightning-like strikes have occurred, for example, in Haleakala National Park (Hawaii) in the form of avian malaria and Argentine ants, as Brazilian peppertree throughout the Everglades and kudzu in the South, a storm of tamarisk throughout southwestern parks and monuments, a lake trout from the Great Lakes in Yellowstone Lake, and a brown tree snake in Guam. Moreover, flame-like spread of Dutch elm disease, chestnut blight, white pine blister rust, and sudden oak death has devastated forests throughout the United States. Despite continuous new threats like West Nile Virus and the snakehead fish, however, a coordinated effort to battle invasive species has not occurred. Where is the “National Interagency Fire Center” for biological wildfires when we need it?

The U.S. Geological Survey (USGS) is spearheading the development of such an interagency center. The USGS

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National Institute of Invasive Species Science at the Fort Collins Science Center is an interagency consortium with nongovernmental partnerships that directly addresses invasive species issues on public and adjacent lands. To predict and reduce the harmful effects of nonnative plants, animals, and diseases in natural areas throughout the United States, the U.S.

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Geological Survey established the institute to develop a comprehensive plan for stomping out invasive species, to provide national leadership, and to disseminate and synthesize up-to-date, accurate data and research from many sources. The institute applies a strategic approach to information management, prevention, early detection, research and modeling, technical assistance, and outreach. The newly built Fort Collins Science Center, Colorado, where the institute is based, coincided with organizational restructuring that emphasizes invasive species as one of the top eight USGS research focus areas and one of the top environmental threats of the 21st century.

Staffs at the institute began by collecting and synthesizing national databases on nonnative plants, nonindigenous fishes, birds, and wildlife diseases (table 1), including a systematic evaluation of the nation’s

Table 1. National databases for invasive species

Group of Invasive Species	Primary Investigator	Program
Nonnative plants	John Kartesz	Biota of North America Project
Nonindigenous fishes	Pam Fuller	USGS South Florida and Caribbean Science Center
Birds	John Sauer	Patuxent Wildlife Research Center
Birds	Bruce Peterjohn	USGS Bird Conservation Node of the National Biological Information Infrastructure
Wildlife diseases	Josh Dein	USGS National Wildlife Health Center

530 or so wildlife refuges via electronic questionnaires sponsored by the U.S. Fish and Wildlife Service. Another important aspect of the program is to improve predictive models of invasions (or “ecological forecasting” models) with the help of sponsored research by NASA Goddard Space Flight Center. We are developing predictive models for Rocky Mountain National Park (Colorado), the Grand Staircase–Escalante National Monument (Utah), and the Cerro Grande Fire area near Bandelier National Monument (New Mexico). Other efforts include mapping the highest priority invasive weeds throughout Colorado in partnership with the state, Colorado State University’s Agricultural Experiment Station, and county weed coordinators.

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To help manage the volume of information on nonnative species, we created the Invasive Species Information Node as part of the National Biological Information Infrastructure—a broad, collaborative program to provide increased access to data and information on the nation’s biological resources (see <http://www.nbio.gov/>). When fully operational, the Invasive Species Information Node will:

- Evaluate the invasion of multiple biological groups (and several invasive species) simultaneously, relative to habitat and ecosystem maps, land-use maps, and “change detection” satellite information and models.
- Zoom in on particular states, parks, refuges, and natural areas by merging data sets from many sources into single, dynamic representations of the highest priority problem species and problem areas.
- Access invasive species information and models on local, state, regional, and national scales.
- Quickly assess vulnerability to invasion, current invasions, potential spread of species, natural barriers to invasion, and the economic and ecological effects of invasive species.

The node will increase accessibility of data, accelerate the sharing of information, and promote the use of predictive modeling in developing strategic, proactive approaches to invasive species containment and control. Specifically for the National Park Service, we will assist in evaluating local, regional, and national patterns of control efforts by the Exotic Plant Management Teams. By mapping the location of target species in relation to derived environmental data (e.g., slope, aspect, elevation, and community type), we will be able to quantify patterns of current invasion and probable distributions of priority species, as well as assess the vulnerability of habitat types to invasion. Immediately summarized data and models will help guide strategic control and restoration strategies.

The core aspect of our work is sharing data and information, which will improve predictive modeling. Sharing data and information promotes a proactive rather than reactive approach to the management of invasive species. The USGS National Institute of Invasive Species Science and National Biological Information Infrastructure are committed to the long-term delivery of unbiased, scientific data in support of resource management of public lands.

About the author

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