

Background Paper on Systematics

Prepared by the ISAC Committee on Research, May 22, 2015

Systematics is the science that identifies and groups organisms by understanding their origins, relationships, and distributions. It is fundamental to understanding life on earth, crops, wildlife, and diseases, and provides the scientific foundation to recognize and manage invasive species. Invasive species are a growing threat to biosecurity; human and animal health; agricultural security and trade; environmental security; and economic health.

The Federal Interagency Coordinating Committee for Invasive Terrestrial Animals and Pathogens (ITAP) Systematics Subcommittee prepared the Situation Report, "Protecting America's Economy, Environment, Health, and Security against Invasive Species Requires a Strong Federal Program in Systematic Biology" (2008). The purpose was to create awareness of the crisis in systematics in Federal agencies and to advocate the need for a permanent, viable, and coordinated Federal Systematics Program.

The Situation Report demonstrates how systematics is a vital cornerstone for work on biodiversity and invasive species. It describes the crisis in systematics:

- Lack of systematists;
- Lack of training at universities and post graduate training/mentoring;
- Lack of permanent, life-long job opportunities in systematics;
- Biological collections are incomplete and/or in poor condition; they languish in substandard facilities, lacking adequate staffing, technology, and coordination.
- Lack of appropriate facilities for collections (e.g., buildings with climate control, fire prevention, information technology hardware/software, research labs, plans for continuation of operations in case of a natural or terrorist catastrophic event).
- Lack of a comprehensive national/global exchange of bio-informatics.

Where is the crisis in systematics happening? It is evident in many places: in the United States Federal government; at universities, zoological parks, and botanical gardens; as well as in similar institutions in other countries.

The Situation Report includes a recommendation for a

comprehensive survey of the federal systematics capacity and needs. The survey will inform a 10 year Action Plan by the federal government to enhance the systematics capabilities of federal agencies with the vision *"To strengthen national and global systematics to enable prediction, effective prevention, and management of invasive species to ensure biosecurity; public health; economic, environmental, and agricultural security; and sustainability"*. The Plan will delineate actions and budget estimates for consideration by Agency and Congressional decision makers. It will catalyze strengthening of systematics resources for Federal agencies to predict, prevent, and manage invasive species.

The Invasive Species Advisory Committee (ISAC) makes recommendations to the Federal government agencies that have an invasive species portfolio. This systematics recommendation strives to motivate action in the agencies that have been identified in the Situation Report as the agencies with systematics capabilities in the Federal government.

The USDA Agricultural Research Service (ARS) and the Smithsonian Institution are repositories of a large amount of the systematics collections and human capabilities for systematics essential work on invasive species. Conducting the Survey of their systematics capabilities and needs is urgent. The Survey will describe actions in research, specimen-based collections, a biodiversity informatics network, and educating future systematists.

Systematics expertise and use is distributed across the federal agencies so participation needs to be inclusive and coordinated, particularly in the areas of research, specimen-based collections, informatics networks, and the education of future systematists. The Situation Report recommends that a Systematics Interagency Coordinating Group incorporating relevant federal agencies monitor implementation of the Plans; document successes and failures; and provide information to the White House, Office of Management and Budget, and federal agencies to facilitate decision-making on systematics programs.

ISAC recommends that:

1. The USDA Agricultural Research Service (ARS) and the Smithsonian Institution conduct a survey and gap an-

alysis of their Federal systematics collections, associated resources, and capabilities.

2. Survey results should be translated into an ARS 10 Year Systematics Action Plan and a Smithsonian Institution 10 Year Systematics Action Plan.
3. The Plans should be used by agency leaders to improve the systematics capabilities and resources of the agencies in all taxa to strengthen their ability to predict, prevent and manage invasive species.
4. The coordination of federal systematics efforts referenced in the Federal Interagency Committee for Invasive Terrestrial Animals and Pathogens (ITAP) *Situation Report* should be implemented.¹
5. The ITAP's Systematics Subcommittee should assist the agencies in the Surveys recommended by the Situation Report.

¹ Federal Interagency Committee on Invasive Terrestrial Animals and Pathogens (ITAP) Systematics Subcommittee. 2008. Protecting America's Economy, Environment, Health, and Security against Invasive Species Requires a Strong Federal Program in Systematic Biology.