

U.S. Department of Agriculture Report to the Invasive Species Advisory Council for their spring 2011 meeting

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A. USDA Progress on ISAC recommendations from the October 2003 meeting

- 1. ISAC recommendation: Increase efforts in economic analysis to make the case for investments in invasive species efforts.**

The Economic Research Service (ERS) is continuing the “Program of Research on the Economics of Invasive Species Management” (PREISM) initiated in FY 2003. PREISM supports economic research and the development of decision support tools that have direct implications for USDA policies and programs for protection from, control/management of, regulation concerning, or trade policy relating to invasive species. Program priorities are selected through extensive consultation with APHIS, OBPA and other agencies with responsibility for program management.

For example, ERS developed a pest-ranking decision tool for APHIS to determine which pests would be on its 2004 and 2005 Federal-State Cooperative Agricultural Pest Survey (CAPS) list, making transparent the basis for selecting the pests for which State cooperators could receive targeted pest surveillance and detections funds. Also, the rapid spread of soybean rust in South America prompted ERS, in April 2004, to publish a study of the economic and policy impacts of its windborne entry into the United States. USDA used the ERS analysis in refining rapid response strategies when APHIS confirmed the presence of soybean rust on November 10, 2004 in Louisiana. ERS extended this work to examine the value to

producers of USDA's coordinated framework to detect and report the presence of Asian soybean rust in different producing areas and released a report in 2006.

In addition to ERS-led analyses of invasive species issues, PREISM allocated about \$6.8 million in extramural research cooperative agreements through a peer-reviewed competitive process in FY 2003-08. About \$1.1 million per year were allocated for extramural agreements in FY 2005 and FY 2006; \$950,000 was allocated in FY 2007 and \$970,000 in FY 2008. **No funds have been allocated since FY09.**

PREISM-funded researchers are addressing important issues. For example, a Virginia Polytechnic Institute and State University research team collaborated with APHIS staff to analyze a rule to allow importation of avocados from Mexico, using a framework developed under a PREISM-funded agreement. The framework and economic analysis were published in the Federal Register with the APHIS rule. PREISM-funded researchers, as part of their projects, are collaborating with agencies to address invasive species issues and decisions, such as the coordination of prevention and control strategies for Brown Tree Snakes and *Miconia calvescens* in Hawaii, management of cheat grass, management of diseases transmitted between livestock and wildlife, insect resistance management in strawberry production, responses to outbreaks of foreign animal diseases, and prioritizing invasive plant management by public agencies. At the invitation of the Council on Food, Agricultural, and Resource Economics (C-Fare) and the Weed Science Society of America (WSSA), Muniswamy Gopinath (Oregon State U.) and Bruce Maxwell (Montana State U.) briefed congressional staff about their PREISM-funded projects on May 5, 2006.

ERS organizes workshops each year to provide a forum for dialogue on economic issues associated with agricultural invasive species.

Following are some preliminary findings from PREISM-funded research projects:

- Prevention and management resources should be allocated to species and strategies with the highest return (in terms of damage reduction over time). Ideally, marginal benefits and costs should be equal across species and strategies.
- Decision-support tools that follow sound economic principles and reveal underlying scientific assumptions and value judgments provide a basis for expert and stakeholder involvement in decision-making and promote efficient allocations of funds.
- Optimal invasive species management strategies depend upon the stage of the invasion and associated rates of growth and spread. Eradication may be optimal for small invasions; reduction to a containment level for larger invasions. If eradication is feasible, the effort will reduce discounted damages more if it occurs early when populations are small. Delays result in more damages. If total cost increases rapidly as population increases, eradication when the population is small followed by prevention may be the best strategy.
- Under-funded eradication or management efforts can be cost-ineffective or wasteful, with little or no effect on invasive species growth and total damage. Higher initial expenditures can reduce long term damages and control costs, even if the species is not eradicated.
- For established invasive species infestations, per unit costs of removal can increase as populations decrease or become more isolated, making complete eradication difficult or cost-inefficient. In some cases, accommodation to low levels of invasion is economically preferable to the high cost of eradication. The higher is the cost of removal, the larger the residual population that will remain which will need increased surveillance and continual management.
- Higher invasive species infestation or population growth rates reduce benefit-cost ratios of control efforts, and at high

enough rates, control might not be worthwhile. If population has surpassed that of maximum growth rate, the best strategy could be a pulse-like effort that drives populations below a critical population level and growth rate, followed by containment strategy.

- Probability of occurrence maps for invasive weeds based on GIS and other inventory or survey data and related population growth rates can improve weed management efficiency by reducing: 1) costs by targeting sites to monitor invasiveness, and/or 2) damage by initiating control of highly invasive populations before they spread.
- Coordination of regulations across U.S.-Canada, State, and provincial boundaries could: 1) more effectively reduce the cross-border spread of exotic horticultural plants that become invasive, and 2) reduce incentives for cross-border firm relocations to take advantage of more lenient regulations.
- Ecological and agronomic differences influence cross-State differences in noxious weed and weed-seed lists, but stakeholder lobbying also has significant effects.

Beginning in 2007, **NIFA's National Research Initiative (NRI) Program, Biology of Weedy and Invasive Species in Agro ecosystems**, has required an economic component in the integrated projects it funds. Specifically, the focus of such programs is the development, delivery, and implementation of ecologically-based, invasive species management programs (e.g. use of cover crops, grazing, tillage, and biocontrol agents) that include economic decision support tools to evaluate tradeoffs of different management strategies. A total of \$4 million was awarded such projects. This priority was continued in the Agricultural and Food Research Initiative (AFRI) grants program in FY09 with an additional priority focusing on the abundance of weedy and invasive species and the individual and/or collective impacts of these species on a broad suite of ecosystem services, both market and non-market, and that can

be used to evaluate tradeoffs of different management strategies. Although the Biology of Weedy and Invasive Species in Agro ecosystems Program was discontinued in AFRI in FY2010, a new grant program is being offered through the AFRI Foundation Program for FY2011 entitled “Controlling Weedy and Invasive Plants” with an emphasis on herbicide resistance management.

B. USDA progress on ISAC recommendations from the March 2004 meeting

2. ISAC recommendation: What are NISC agencies doing to avoid harm?

USDA has eight agencies included in its invasive species portfolio: Forest Service (FS), Natural Resources Conservation Service (NRCS), Animal and Plant Health Inspection Service (APHIS), Agricultural Research Service (ARS), Economic Research Service (ERS), Foreign Agricultural Service (FAS), Farm Service Agency (FSA), and National Institute of Food and Agriculture (NIFA, formerly CSREES, the Cooperative State Research, Education and Extension Service).

Securing input from the USDA agencies, the USDA Senior Invasive Species Coordinator created the USDA DO NO HARM REPORT, a report to ISAC and NISC, by fiscal year, including 3 categories of activities:

- a) Invasive Species Program activities USDA agencies are carrying out to do no harm;
- b) The way in which, when they do carry out other agency programs activities, they are also designed to do no harm; and
- c) A list of activities that ARE doing harm and the future actions the agency will take to change the activities so that they do no harm.

Within the above categories, agencies include their own activities as well as activities that are coordinated with other Federal agencies, per the mandate under the Invasive Species Executive Order.

The following Do No Harm reports have been presented to ISAC (meeting date in parenthesis):

- 04)
- FY04 report NRCS, APHIS, ARS, CSREES and ERS (Oct. 05)
 - FY04 report for US Forest Service (Feb. 05)
 - FY05 report for NRCS, APHIS, CSREES, ERS & FS (Oct. 05)
 - FY05 report for ARS (April 06)
 - FY 06 report for FS, NRCS, CSREES, and ERS (May 2007)
 - FY 06 USDA (APHIS) Do No Harm Report Part 2 (Oct. 2007)
 - FY 07 USDA Do No Harm Report (May 2008)
 - FY 08 USDA Do No Harm Report (May 2009) for APHIS, ARS, ERS, CSREES, ERS, NRCS and USFS.
 - FY09 USDA Do No Harm Report (Feb. 17, 2010) for APHIS, ARS, ERS, NIFA, ERS, NRCS and USFS.
 - FY10 USDA Do No Harm Report (14 March 2011) for APHIS, ARS, ERS, NIFA, ERS, NRCS and USFS.

Copies of all the USDA reports are available online at <http://www.invasivespeciesinfo.gov/resources/orgfedusda.shtml>

3. **ISAC recommendation: NISC should request all Federal agencies to identify existing grant programs, cooperative agreements and other mechanisms that are potential sources of funds for invasive species projects.**

USDA compiled and published a comprehensive document in 2005 with grant opportunities for work on research, technical assistance or management of invasives. The document is also available through www.invasivespeciesinfo.gov. The document has been updated annually. The “2011 USDA Grant and Partnership Programs That Can Address Research, Technical Assistance Prevention and Control” is available to ISAC and the public at www.invasivespeciesinfo.gov

C. USDA Progress on ISAC recommendations from the October 2005 meeting

4. **ISAC recommendation: NISC policy liaisons provide guidance to ISAC Leadership and Coordination**

Subcommittee regarding issues the subcommittee should address.

USDA would appreciate ISAC's support to (a) promote strengthening Federal collections, identifications and systematics efforts and capabilities; (b) promote increasing support for research (knowledge and models) and increasing the awareness of decision makers about the economic impacts of invasive species; and (c) strengthening research on invasive species and climate change.

D. USDA Progress on ISAC recommendations from the September 2006 meeting

5. ISAC recommendation: That NISC support adequate and continuing funding and staffing for classical systematics research, education and operations – including the care and maintenance of systematics collections.

Systematics clarifies the origins and movements of invasive pests, parasites and pathogens. Advances in biotechnology (including DNA sequencing, comparative genome analysis, distributed databases and high speed telecommunications) can substantially strengthen and accelerate governmental responses to these threats.

ARS funding for systematics:

FY 2008	\$20,226,698
FY 2009	\$20,474,857
FY 2010	\$21,254,128
FY 2011	----

Agricultural productivity depends on access to key inputs (rich soils, fertilizers, water, and energy), the inherent genetic potential of crops and livestock, and effective defenses against diseases, pests, and environmental extremes that reduce agricultural production and producer profitability. The capacity of agricultural research effectively rests on a dynamic foundation of invaluable living animal, plant, and microbial genetic resources, and research tools in the form of scientific

collections of preserved biological specimens. Such scientific collections are essential for ARS scientists to advance the science of systematics. To strengthen our national collections, the President included in the FY 2011 budget \$6,900,000 for ARS plant, animal, and microbial collections to:

- Advance insect systematics by use of bar-coding and other molecular methods combined in a U.S.-centered international "Insect Identification Network."
- Develop means of cryopreservation and storage of beneficial insects, pests of crops and agricultural animals, and their natural enemies.
- Strengthen key collections of microbes associated with crop disease and those microbes useful for controlling invasive crop pests and weeds.
- Develop information technologies and sciences that will be critical to the success of new biology including standardization, exchange, conservation and analysis of biological information. Expand plant genome databases. Research will expand capacity and provide graduate and post-graduate training opportunities.
- Strengthen National Plant Germplasm System by developing a gene bank system and software to facilitate germplasm management, conservation, and utilization worldwide through a new information system called "GRIN Global", and to expand capacity and conservation with a target for food security and crop protection. Research will expand capacity and provide graduate post-graduate training.

A worldwide shortage of critical expertise in systematics was recognized and documented in a three-year analysis of the field. The situation report is available on the www.itap.gov Web site. This year the Systematics Subcommittee of the Federal Interagency Committee on Invasive Terrestrial Animals and Pathogens (ITAP) will conduct a survey of Federal agencies to quantify the resources currently available and the anticipated need for ongoing support. This information will be valuable in formulating future budget requests.

E. USDA Progress on ISAC recommendations from the May 2009 meeting

8. ISAC Recommendation: Review existing authorities. Identify federal authorities relevant to biofuels. Determine their likely influence on biofuel invasiveness (i.e., prevention or facilitation). Identify gaps and inconsistencies in authorities with and among Federal departments.

USDA agencies use the Invasive Species Executive Order as guidance for their work on invasives, including work on biofuels issues.

The “USDA Energy Council Coordinating Committee” that meets regularly. USDA agencies representatives evaluate USDA agency actions, research and grants provided for energy projects, including biofuels.

The Biomass Crop Assistance Program (BCAP) was authorized in the 2008 Farm Bill and provides incentives to eligible farmers, ranchers and forest landowners for the establishment and production of biomass crops for heat, power, bio-based products and biofuels. BCAP project areas are specific geographic areas where producers grow eligible biomass crops. Producers then receive annual payments for growing those crops. The NRCS provides technical assistance and the FSA provides financial assistance for this program. For more information, visit the USDA Farm Service Agency’s website at www.fsa.usda.gov/bcap or contact Kelly Novak at 202.720.4053 or cepdmail@wdc.usda.gov

9. ISAC Recommendation: Reduce escape risks. Use/promote species (including unique genotypes) for biofuels that are not currently invasive and are unlikely to become invasive in the target region. Choose plants with a low potential for escape, establishment and negative impact. When appropriate, implement mitigation strategies to minimize escape and other risks.

The USFS National Forest System policy for selection, use, and storage of native and non-native plant materials that are used in the re-vegetation, restoration and rehabilitation of National Forest System lands are codified in the Forest Service Manual 2070 (Vegetation Ecology). Among other things, this policy requires that Forests:

1. Ensure genetically appropriate native plant materials are given primary consideration.
2. Restrict use of persistent, non-native, non-invasive plant materials to only those situations when timely reestablishment of a native plant community either through natural regeneration or with the use of native plant materials is not likely to occur. Examples include but are not limited to the following:
 - a. When emergency conditions exist where it becomes necessary to protect basic resource values (such as, soil stability, water quality, and prevention of establishment of invasive species).
 - b. When native plant materials are not available and/or are not economically feasible.
 - c. In permanently, highly altered plant communities, such as road cuts, permanent and temporary wildlife openings, log landings, skid trails, temporary roads that have been closed and are used for linear wildlife openings and sites dominated by non-native, invasive species.
 - d. In designated historical sites where maintenance of historical vegetation communities, including agricultural crops, is needed to maintain historical integrity (FSM 2630).
3. Select non-native plants as interim, non-persistent plant materials provided they will not hybridize with local species, will not permanently displace native species or offer serious long-term competition to the recovery of

endemic plants, and are designed to aid in the re-establishment of native plant communities.

4. Base determination and selection of genetically appropriate plant materials on the site characteristics and ecological setting, using the best available information and plant materials.

5. Ensure that development, review and/or approval of revegetation, rehabilitation and restoration prescriptions, including species selection, genetic heritage, growth stage and any needed site preparation, is done by a plant materials specialist who is knowledgeable and trained or certified in the plant community type where the revegetation will occur.

6. Do not use noxious weeds [*invasive plants*] for revegetation, rehabilitation and restoration projects.

7. Cooperate and coordinate within the Forest Service, with other federal agencies, organizations and private industry in the development of native plant materials and supplies.

8. Anticipate plant material needs for emergency and planned revegetation. Develop core plant lists, planting guidelines, plant material sources and seed caches and seed storage facilities.

NRCS has no intention of encouraging the growing of invasive species as biofuels, and is working with FSA to establish appropriate considerations and criteria when potentially-invasive plant materials are recommended to be cropped as bio-fuels.

ARS recognizes the environmental and economic risks associated with growing invasive plants as biofeedstocks. Therefore, in support of the President's energy plan, ARS is conducting research on energy cane and *Miscanthus*, which includes production,

invasiveness, and environmental impact assessments. ARS research programs include the development and assessment of new germplasm of both energy cane and *Miscanthus*. Sterile varieties of Miscanthus will be developed and assessed for trait stability. ARS will conduct field assessments of *Miscanthus* spread and survival within different environments, coupled with spatial population dynamics simulation models will be conducted to estimate the invasive potential of these new or proposed biofuel feedstock lines. In addition to providing recommendations for the use of such plants for biofuel production, the results will be used for further development of non-invasive biofuel feedstock cultivars. Mitigation strategies to prevent escapes during production and post harvest will be developed. Test plots will be later used as simulated abandoned fields for which control strategies are developed. The potential impacts of other proposed biofuel feedstocks, such as buffelgrass and *Arundo donax*, on disturbed lands near fields where these plants have been grown as biofuel feedstocks will be assessed. Other invasive or potentially invasive biofuel feedstocks will be included as funds become available. The five ARS Regional Feedstock Centers will provide varied geographical locations and climates at which different biofuel feedstocks of concern can be grown and assessed for minimal risk of escape from production areas during establishment, production and postharvest.

APHIS does not cultivate biofuel crops, either for research or production. Their role is to evaluate the pest risks associated with any genetically engineered plant that is proposed for use in biofuel research or for deregulation. As such, they also review management, monitoring and eradication plans to ensure their completeness.

10. ISAC Recommendation: Determine the most appropriate areas for cultivation. Use research

findings to identify the most appropriate sites (e.g., unlikely to impact sensitive habitat) for cultivation of biofuel crops within landscapes. Support for biofuel research and demonstration projects should be linked to appropriate site selection.

Such a determination is a requirement of the National Environmental Policy Act and the requisite Environmental Impact Statements to applicable federal projects, actions and/or funding.

APHIS does not select sites for cultivation, but they evaluate the potential environmental impacts that could occur at sites that have been selected by growers.

NRCS ensures that the appropriate environmental impact assessments have been done (in compliance with National Environmental Policy Act requirements) and that any negative environmental impacts to natural resources are appropriately addressed and/or mitigated.

- 11. ISAC Recommendation: Identify plant traits that contribute to or avoid invasiveness.** Incorporate desirable traits into biofuel varieties to minimize their potential for invasiveness. Use information from plant research, agronomic models, and risk analyses to guide breeding, genetic engineering, and variety selection programs.

Research is being conducted by a number of NRCS Plant Materials Centers using switchgrass, big bluestem, and Indian grass. In some studies, Centers are using Giant Miscanthus and Reed Canary grass as a control-check species.

APHIS conducts pest risk assessments to ensure that genetically engineered plants proposed for biofuel

research projects or for subsequent deregulation do not pose unacceptable plant pest risks.

12. ISAC Recommendation: Prevent dispersal.

Develop and coordinate dispersal mitigation protocols prior to cultivation of biofuel plants in each region of consideration.

NRCS response: Such considerations were voiced to the Farm Services Agency for inclusion in their rule to implement the Biomass Crop Assistance Program.

APHIS does not cultivate biofuel crops, either for research or production. Their role is to evaluate the pest risks associated with any genetically engineered plant that is proposed for use in biofuel research or for deregulation. As such, they also review management, monitoring and eradication plans to ensure their completeness.

13. ISAC Recommendation: Develop Early Detection and Rapid Response (EDRR) plans and rapid response funds in order to eliminate abandoned or unwanted populations of biofuel crops or to prevent establishment and spread of escaped invasive populations. Implement EDRR plans that cover multiple years. A flexible funding source should be established to support EDRR efforts.

The USFS Forest Health Protection Program does support an all-lands approach to EDRR programs, focusing on detecting early introductions of forest insects, specifically bark beetles, as well as invasive plants. The USFS conducts surveys to detect and delineate known invasive species so that further action may be taken if warranted. The USFS does financially support EDRR through matching grants to cooperative weed management organizations nationwide.

NRCS is a member of the Biomass Crop Assistance Program workgroup, and has raised appropriate concerns with the Farm Services Agency as they develop their rule to implement the Biomass Crop Assistance Program, as authorized by Section 9001 of the 2008 Farm Bill, to assist agricultural and forest land owners and operators with the collection, harvest, storage, and transportation of eligible material for use in a biomass conversion facility and to support the establishment and production of eligible crops for conversion to bioenergy in selected project areas. More information can be found at <http://farmenergy.org/news/bcap-funding-for-2009-announced>.

APHIS does not cultivate biofuel crops, either for research or production. Their role is to evaluate the pest risks associated with any genetically engineered plant that is proposed for use in biofuel research or for deregulation. As such, they also review management, monitoring and eradication plans to ensure their completeness.

NIFA: National Plant and Animal Diagnostic Laboratory Networks

- The safety of our plant and animal production systems is contingent upon our ability to rapidly identify foreign pathogens and other pests, whether introduced intentionally through bio-terrorism or unintentionally.
- To this end, NIFA has established two national networks of existing diagnostic laboratories to rapidly and accurately detect and report pathogens of national interest and provide timely information and training to state university diagnostic labs.
- **Kitty Cardwell**, NPL for Plant Pathology, and **Bill Hoffman**, NPL for Homeland Security, have been instrumental in organizing these efforts.
- The National Plant Diagnostic Network (NPDN) is led by five regional labs (Cornell, Florida, Michigan State, Kansas State, and California at Davis) and **one support lab** (Texas Tech).

The NPDN partners with APHIS to ensure invasive pest detections of potential regulatory significance are handled in a manner consistent with the agency's emergency management framework.

- The National Animal Health Laboratory Network (NAHLN) is led by 12 Core Laboratories and 58 total laboratories (receiving training/reagent/exercise support and being linked) in 43 states. NIFA is currently helping labs (other than the 12 core laboratories) with funding to set up electronic (secure, standards-based) messaging regarding FAD findings. These facilities will help to link growers, field consultants and other university diagnostic labs to coordinate regional detection and provide inter-regional communication in the event of an outbreak. For more information on the NAHLN see http://www.aphis.usda.gov/animal_health/nahln/downloads/NAHLNBriefingCurrent.pdf

NIFA: Pest Information Platform for Extension and Education (PIPE)

- PIPE is a system for managing pest and disease information flow via the Web.
- Provides real-time useful information to US crop producers, and a “one stop shopping” center for timely, unbiased, national, and local pest information
- Fosters good farming practices by encouraging growers to:
 - Avoid unnecessary or ill-timed chemical applications
 - Use the proper control tactics with the proper timing to manage crop loss risk
 - Document practices for crop insurance purposes

Kitty Cardwell, NPL for Plant Pathology, **Bill Hoffman**, NPL for Homeland Security, and **Marty Draper**, NPL for Plant Pathology, have been instrumental in developing the PIPE System.

14. ISAC Recommendation: Establish effective cooperation and communication among stakeholders. Identify and employ networks (e.g.,

working groups and councils) and communication forums through which the Federal agencies can work with state agencies, tribes, the private sector, and other stakeholders to reduce the risk of biological invasion via the biofuels pathway.

NRCS response: This coordination role is a good one for the National Invasive Species Council staff.

The USFS National Forest System has been working closely with the Association of Fish and Wildlife Agency's Invasive Species Committee and the Biofuels Working Group of the AFWA Agriculture committee to improve communication and increase cooperation and partnerships between the federal, state, tribal, and private sectors on issues related to the use of woody biomass and other biofuels products which may be derived from potentially invasive species. The objective is to reduce or eliminate the development and use of invasive plants as biofuels and prevent the large-scale impacts to public and private lands from these aggressive species.

15. ISAC Recommendation: Establish the Sentinel Plant Network. Support and facilitate the establishment of the Sentinel Plant Network to facilitate the early detection reporting and prevention of pests and pathogens.

FHP is continuing a Sentinel Trees project in China. In China, the project is focusing on existing plantings of North American tree species of interest. The existing plantings occur in botanical gardens, nurseries, and plantations. The implementation strategy for this project has 3 components; 1) looking at the grey literature for information on North American species of interest; 2) cataloging insects associated with selected host trees by trapping, chemical drenching, sweep nets or other techniques; and 3) periodic surveys of selected host trees. These projects develop techniques and

procedures that we can use operationally in these and other selected countries.

The USDA Forest Service, Research and Development Programs worked through NISC to **establish a sentinel plant network. With Farm Bill 2009 funding**, the American Public Gardens Association and National Plant Diagnostic Network outreach committee is developing training programs for Gardens staff, and Garden outreach programs to improve public appreciation of invasive species issues, promote citizen monitoring of new plant purchases and pest reporting, and increase public acceptance of necessary regulatory activities. Five regional training sessions for Garden staff are planned for this fall and winter.

If this network were expanded to include gardens overseas (e.g., through the Botanic Gardens Conservation International), it would inform prevention measures by monitoring North American plants exposed constantly to pests in foreign environments.

APHIS continues to closely track the progress in the development of the Plant Sentinel Network; the agency is waiting to see what develops. The information obtained through the network will be valuable for assessing the potential risk foreign pests and diseases pose to American plant resources should these exotic organisms be introduced and established in the United States.

16. ISAC Recommendation: Revise and draft NEPA guidance. ISAC recommends that NISC and the Council on Environmental Quality (CEQ) revise and draft guidance under the National Environmental Policy Act (NEPA), and make it available for public comment by October 1, 2009.

NISC staff should respond to this question. USDA and APHIS participated in the latest review of the proposed invasive species guidance in 2009.

17. ISAC Recommendation: Provide data on NISC member agencies' invasive species budgets. ISAC recommends that NISC member agencies annually provide in writing at the fall ISAC meeting their invasive species budgets for the preceding fiscal year in actual dollars and the budget for the current fiscal year (requested and enacted). The budget document should be divided into seven categories: Prevention, EDRR, Control and Management, Restoration, Research, Education and Public Awareness, and Leadership/International Coordination.

Forest Service Invasive Species Funding (in thousands).

Category	2009 Actual	2010 Estimate	2011 President's Budget	FY 2011 Estimate (Approp)
Prevention	\$33,652	\$39,218	\$28,973	
EDRR	\$12,700	\$12,700	\$13,650	
Control & Management	\$41,595	\$31,520	\$30,980	
Restoration	\$5,708	\$7,222	\$6,429	
Research	\$35,464	\$37,463	\$36,531	
Education & public awareness	\$500	\$500	\$500	
Leadership & Coordination	\$595	\$687	\$640	
Total	\$130,214	\$129,310	\$117,703	

APHIS Invasive Species Funding (in Thousands).

Category	2009 Actual	2010 Actual	2011 President's Budget	FY 2011 Estimate (Approp)
Prevention	\$103,217	\$117,127	\$109,782	\$107,050
EDRR	\$241,460	\$220,986	\$247,266	\$223,291
Control & Management	\$250,935	\$282,153	\$282,153	\$286,218
Restoration	\$0	\$0	\$0	\$0
Research	\$48,988	\$58,577	\$58,577	\$48,079
Education & public awareness	\$0	\$0	\$0	\$0
Leadership & Coordination	\$52,534	\$49,108	\$49,108	\$56,318
Total	\$697,134	\$727,951	\$746,886	\$720,956

The above 2011 appropriated budget includes cuts to the Brown tree snake program in APHIS Wildlife Services. Potential for severe loss of tourist trade in HI if brown tree snakes (BTS) become established due to undetected transport of snakes from Guam (damage from BTS would range from approximately \$593 million to \$2.14 billion annually); decreased protection of property and impact on threatened and endangered species presently found on Guam and Hawaii.

Congressional Directive to be eliminated	Funding to be Cut	Estimated Cooperative Funding Loss	Total Program Funding Loss	No. of FT & PT Employees Terminated
Hawaii/Guam WS Brown Tree Snake	\$940,000	\$660,000	1,600,000	20
Hawaii/Guam WS State Operations	\$400,000	\$380,000	\$780,000	10

ARS budget for Invasive Species Research

FY 2009 Funding for Invasive Species (total funding \$278,181 thousands of dollars):

Prevention - \$5,316
Early Detection/Rapid Response - \$7,598
Control (Management) - \$97,875
Restoration - \$294
Research - \$122,153
Education & Public Awareness - \$44,945

FY 2010 Funding Estimate for Invasive Species (total funding \$269,765 thousands of dollars):

Prevention - \$5,316
Early Detection/Rapid Response - \$7,380
Control (Management) - \$93,542
Restoration - \$444
Research - \$119,834
Education & Public Awareness - \$43,249

FY 2011 Funding Estimate, President's budget, for Invasive Species (total funding \$272,582 thousands of dollars):

Prevention - \$5,451
Early Detection/Rapid Response - \$7,854
Control (Management) - \$93,054
Restoration - \$296
Research - \$122,421
Education & Public Awareness - \$43,506

FY 2011 Funding Enacted for Invasive Species (total funding \$_____ thousands of dollars):

Prevention - \$
Early Detection/Rapid Response - \$
Control (Management) - \$
Restoration - \$
Research - \$
Education & Public Awareness - \$

NRCS Invasive Species Funding (in thousands).

NRCS funding for insects, weeds, plant diseases:

2008 Actual \$173,229

Category	2009 Actual	2010 Estimate	2011 President's Budget	FY 2011 Estimate (Approp)
Prevention	\$8,189	\$8,241	\$8,262	
EDRR	\$8,189	\$8,241	\$8,262	
Control & Management	\$81,891	\$82,406	\$82,615	
Restoration	\$24,567	\$24,722	\$24,784	
Research	\$0	\$0	\$0	
Education & public awareness	\$40,946	\$41,202	\$41,307	
Leadership & Coordination	\$0	\$0	\$0	
Total	\$163,782	\$164,812	\$165,230	

NIFA funding for invasive species for FY 09, FY 10, FY11 (in thousands of dollars): (I need the FY11 enacted figures for NIFA, Bob)

Prevention –

FY09 3,152 actual
 FY10 3,171 - estimate
 FY11 2,710 President's budget
 FY 11 ? - enacted

Early Detection/Rapid Response –

FY09 5,916 - actual
 FY10 5,956 - estimate
 FY11 5,034 President's budget
 FY 11 ? – enacted

Control (Management) -

FY09 14,178 actual
 FY10 14,285 estimate
 FY11 11,518 President's budget
 FY11 ? - enacted

Restoration -

FY09 2,445 actual
FY10 2,464 estimate
FY11 2,002 President's budget
FY11 ? - enacted

Research -

FY09 18,615 - actual
FY10 18,755 - estimate
FY11 15,065 - President's budget
FY11 ? - enacted

Education & Public Awareness -

FY09 4,126 - actual
FY10 4,159 - estimate
FY11 3,698 - President's budget
FY11 ? - enacted

Leadership and Cooperation

FY09 3,425 - actual
FY10 3,453 - estimate
FY11 2,992 - President's budget
FY11 ? - enacted

NIFA Grand Totals

FY09 51,857 actual
FY10 52,243 estimate
FY11 43,019 President's budget
FY 11 ? - enacted

G. USDA Progress on ISAC recommendations from the August 2009 meeting (included in ISAC's Biofuels White Paper dated 11 August 2009)

18. ISAC Recommendation: Establish Eradication Protocols for Rotational Systems or Abandoned Populations.

APHIS does not cultivate biofuel crops, either for research or production. Their role is to evaluate the pest risks associated with any genetically engineered plant that is proposed for use in biofuel research or for deregulation.

As such, APHIS also reviews management, monitoring and eradication plans to ensure their completeness.

NRCS reports that this issue will be part of the rules in the Biomass Crop Assistance Program which is still in rulemaking at the Farm Service Agency.

19. ISAC Recommendation: Minimize Harvest Disturbance.

APHIS does not cultivate biofuel crops, either for research or production. Their role is to evaluate the pest risks associated with any genetically engineered plant that is proposed for use in biofuel research or for deregulation. As such, APHIS also reviews management, monitoring and eradication plans to ensure their completeness.

NRCS reports that this issue will be part of the rules in the Biomass Crop Assistance Program which is still in rulemaking at the Farm Service Agency.

ARS informs that the development of strategies to prevent plant invasions will be dependent on the feedstock harvested and the region in which it was grown. ARS research on feedstock germplasm assessments and demonstration sites will include such strategies. Given available funding, additional stakeholder input as to the types of feedstocks they plan to grow and the geographic regions in which they will be grown will be used to develop additional postharvest plant invasion prevention strategies.

G. USDA Progress on ISAC recommendations from the June 2010 meeting

20. ISAC Recommendation: That agency partners submit their annual reports according to the

deadlines specified in Performance Element OC.7.1.1 of the NISC 2008-2012 National Invasive Species Management Plan, which reads: *“Each NISC member submits one formal (draft and final) report per fiscal year, tracking the implementation of the NISC 2008 Plan. NISC Staff will complete a streamlined reporting template within three months. Annual summary report by NISC is available on its website by February 28 of each year along with the individual NISC member reports.”*

All USDA agencies submitted their responses on FY09 and FY10 NISC Plan Implementation activities to NISC by the deadline for publication.

21. ISAC Recommendation: That NISC adopts the Invasive Species and the Green Economy paper and recommendations within (see below).

We (ISAC) call on the member Departments and Agencies of the National Invasive Species Council (NISC) and potential partners to:

□ Establish a national survey of invasive species, to be administered at the state-level. Support this program by substantially increasing Federal and state jobs at all technical levels to survey, identify, map, catalog, and model patterns/trends of invasive plants and animals. Include the existing state and regional invasive species committees/councils in the development and implementation process. Place priority on invasive species known or projected to have substantial impacts.

APHIS assists state partners via its National Cooperative Agricultural Pest Survey Program which uses appropriated funds and with funds from Section 10201 of the Farm Bill.

FS R&D’s Forest Inventory and Analysis group now includes invasive plants in their normal monitoring procedure. The list of plants included in the survey varies by region. A guide produced to help identify the

44 plants inventoried by the Northern Region, can be viewed at: <http://www.treesearch.fs.fed.us/pubs/34183>. A report on the results of surveys in the Southern Region can be viewed at: <http://www.invasive.org/fiamaps/>. Custom maps can be generated using the FIDO tool at: <http://apps.fs.fed.us/fido/>

- Supplement the Federal and state workforce by creating contract jobs in the private sector and offering grants to encourage business innovation and entrepreneurship (e.g., native plant and seed companies, ecosystem restoration, invasive species mapping and control services, and education/outreach programs).**
- In order to counter the dramatic decline in taxonomic capacity (i.e. the decrease in the number of people trained to identify specific species), provide grants to support research/education/training in taxonomy as well as job creation for taxonomists and parataxonomists (people who lack formal higher-level education, but who are trained to undertake species identification tasks).**
- Capitalize invasive species prevention and management needs (e.g., along roadways and on government lands) to create entry-mid level, high impact social development programs for youth and persons at risk (e.g., minimum security prison population). Establish Federal initiatives and/or offer grants to states and tribes.**
- Substantially increase Federal and state agency staffing in the areas of import/border inspection for agriculture and wildlife¹⁶, specimen identification, pest risk analysis (including pre-import screening), and invasive species program management (esp. public education/outreach, regulatory enforcement, and early detection/rapid response).**
- Establish/strengthen internships in invasive species identification, control/eradication, mapping, and monitoring for high school and college students. Support comparable Federal, state, tribal, and non-profit initiatives.**

□ Develop stronger relationships between the Federal government and green industries potentially impacted by and/or managing invasive species. For example, work with the Invasive Species Advisory Committee (ISAC) and/or NISAW to organize an Invasive Species & Green Industries Summit.

□ Mandate that, prior to receiving Federal support: 1) renewable energy projects (esp. solar, wind, and biofuel) have adequate invasive species mitigation plans in place and 2) biofuel developers/producers demonstrate that nonnative species are of low invasion risk (to the propagation site, area of potential dispersal, and along transport pathways) based on a competent invasive species risk analysis.

Any funding provided to private landowners by NRCS includes the requirement for conservation plans, a part of which is an assessment of the risk of invasive species and a plan for mitigating negative impacts from invasive species.

H. USDA Progress on ISAC recommendations from the December 2010 meeting

22. ISAC Recommendation: That NISC member agencies such as the Army Corp of Engineers, the Department of Agriculture (ARS and APHIS), and others, expand biological control efforts for invasive species, and in particular those in aquatic systems, which tend to have limited options that are often very costly. These efforts are justified based on economic analyses that suggest an average beneficial return of 10-17 fold for each dollar spent on biological control.

APHIS collaborated with the Army Corps of Engineers to produce and distribute aquatic biocontrol agents for Giant Salvinia, Hydrilla, and water hyacinth which eliminates the application of herbicides to navigable and environmentally sensitive waterways clogged with these invasive weeds.

23. ISAC Recommendation: That NISC member agencies continue to support and encourage participation in National Invasive Species Awareness Week (NISAW).

USDA, NRCS, NIFA, USFS, ARS and APHIS were very active participants in the 2011 NISAW activities, and plans to continue such active participation in the future.

24. ISAC Recommendation: That NISC adopts the Invasive Species and the Climate Change paper (attached) and recommendations within.

Invasive Species and Climate Change

Approved by ISAC on December 9, 2010

Issue

Climate change interacts with and can often amplify the negative impacts of invasive species. These interactions are not fully appreciated or understood. They can result in threats to critical ecosystem functions on which our food system and other essential provisions and services depend as well as increase threats to human health. The Invasive Species Advisory Committee to the National Invasive Species Council recognizes the Administration's commitment to dealing proactively with global climate change. However, unless we recognize and act on the impact of climate change and its interaction with ecosystems and invasive species, we will fall further behind in our effort to prevent, eradicate and manage invasive species. We are already seeing such climate change impacts and need to act now.

Decisive Action is Required

Policy makers at all levels of government must integrate invasive species considerations into climate change policies. The strong interrelationships between climate change and the dynamic nature of invasive species, changing ecosystems, and human activities necessitate such integration. It is critical that practices be developed that strengthen environmental monitoring, management and control of invasive species to minimize impacts on the broad range of ecosystem resources upon which humans depend. The physical process of climate change interacts with the biological and physical processes of the earth's ecosystems, and these are, in turn, linked to the socio-economics of human activities.

Background

Climate change and biological invasions are dynamic, interconnected and interdependent phenomena. They affect human health and well being through their impact on resources, goods and services provided by ecosystems. These ecosystems are critical to agriculture and forests, food security, water supplies and other natural resources. They affect wildlife, recreation, and public health and safety nationwide. Even without climate change, invasive species have repeatedly and rapidly disrupted many ecosystems in the US. While climate change may have either a positive or negative effect on individual invasive species, which can be projected in various models, it is likely

to have a negative effect on many specialist native species that are more restricted in their ranges. Invasive species often show higher ability to acclimate to environmental change compared to related native species. Thus, invasive species that tend to be more adaptable are expected to expand and further compromise sensitive native plant and animal communities.

The ongoing change in climate and the expected speed of this change are likely to exacerbate problems by increasing the ability of invasive species to become established, spread through, and disrupt ecosystems. At a minimum, invasive species can reshuffle the landscape for agricultural services and resources including food, fuel, feed, fiber and forests along with quickly changing land use decision pressures. As a parallel, in marine and/or aquatic ecosystems, climate change can induce fisheries collapse as mid-trophic structure species are lost opening new potential niches for tolerant invasive species. Finally, climate induced shifts in invasive disease vectors, such as those for malaria or avian flu, are of increasing concern.

Evidence indicates that climate change may alter the efficacy of management strategies for invasive species. Furthermore, changes in land cover caused by invasive plants can influence weather and climate. In some regions, both climate change and invasive species are likely to increase the frequency of wildfires which in turn will further facilitate the establishment of fire adapted invasive species leading to even more frequent and intensive fires.

Recommendations

Policy and Legal Responsibilities

We applaud the U.S. Department of Interior's establishment of a Climate Change Response Council to synthesize data and coordinate appropriate management of our nation's lands and waters. We acknowledge the U.S. Department of Agriculture's (USDA) recent presentation of the impact of climate change in its publication: "*Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States.*" We fully support the Department of Commerce's National Oceanographic and Atmospheric Administration's (NOAA) proposal to establish the NOAA Climate Service to meet essential national needs.

Executive Order 13112 requires Federal agencies to address invasive species and establishes the National Invasive Species Council to coordinate planning and response. The International Plant Protection Convention requires analyses of pest risk. Agencies may be able to integrate climate change considerations into their existing risk-assessment protocols and procedures. Environmental laws such as the Endangered Species Act and the National Environmental Protection Act (NEPA) can be used more powerfully to address invasive species.

Opportunities for Action

We call on the member Departments and Agencies of the National Invasive Species Council and potential partners to:

ISAC Recommendation: Use the Global Change Research Act of 1990 (GCRA)48 (PL 101-606) to aggregate information about the implications of a changing climate for invasive species spread so scientific data may be synthesized through existing authorities to inform policy-makers.

ARS includes invasive species as part of its climate change research program. Invasive species research is also conducted in plant and animal production research programs. The ARS climate change research program includes synthesis activities specifically designed to inform policy-makers.

FS R&D has published a synthesis of the literature on interactions of climate change and forest diseases in 2009, which can be viewed at: <http://www.treesearch.fs.fed.us/pubs/33904>. Several FS researchers co-authored a paper in the Feb 2011 special edition on Climate Change of the journal "Plant Pathology", which can be viewed at: <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-3059.2010.02406.x/abstract>

FS R&D has devoted significant resources to understanding how climate change affects bark beetle life history and tree responses to attack. A synthesis paper is accessible at: <http://www.treesearch.fs.fed.us/pubs/36133>

ISAC Recommendation: Streamline and focus agency programs

to address invasive species climate interactions effectively and efficiently by establishing:

- 1) strategic plans that anticipate climate impacts on invasives,

ARS response: The USDA Climate Change Science Plan includes invasives as a part of Element 1: Understand the direct and indirect effects of climate change on natural and managed ecosystems, including feedbacks to the climate system, and Element 2: Develop knowledge and tools to enable adaptation to climate change and to improve the resilience of natural and managed ecosystems. ARS includes invasives as part of its Climate Change, Soils and Emissions National Program Action Plan as part of Component 3: Enable agriculture to adapt to climate change with Problem statements of: Understand the responses of agricultural systems to anticipated climate change, and Understand the impact of anticipated climate change on endemic and exotic pests, weeds and diseases.

- 2) forward-looking environmental compliance documents (e.g., NEPA, nationwide Environmental Impact Statements on invasives prevention, management, and restoration)

ARS complies with NEPA mandates.

and,

3) focus awareness programs to anticipate and manage potential climate driven ecosystem changes.

ARS conducts research on the effects of anticipated climate-driven ecosystem changes. Laboratory, plot-level, landscape, and simulation-focused research are focused on developing risk management tools to maintain the resilience of agricultural systems and the natural resources base (water, soil, air) needed to maintain production and ecosystem services.

ISAC Recommendation: Assess new climate driven invasion pathways and strengthen prevention programs to address invasives in ballast water, bio-fouling, interstate and international movement of materials and equipment (e.g., energy development, wildfire response, national defense), and screening of plant and animal imports taking account of climate impacts.

ARS conducts basic and applied research on the interacting effects of climate change on endemic and exotic pests, weeds and diseases. Resistance to management actions designed to control these types of species is being addressed.

It is the goal of APHIS Veterinary Services to use climate impacts to adjust our risk-based inspection of animal and animal product imports. Currently, APHIS is assisting other countries with early warning of outbreaks (based on climate events such as El Nino), which reduces our risk of introducing pests and diseases in imports.

ISAC recommendation: Support monitoring and adaptive management programs for invasive species at the landscape scale so that natural resource managers can identify new threats and respond quickly and appropriately to invasive species in changing climatic conditions.

ARS is conducting research on remote sensing technologies to enable mapping and tracking of invasive species and the effectiveness of eradication measures.

FS R&D provides advice to land managers who plan to regenerate stands and want to incorporate climate change into their considerations. This is difficult because of the uncertainty of predictions. <http://www.treesearch.fs.fed.us/pubs/37407> . Tools are being produced to help land managers predict impacts of climate change at the landscape scale.
<http://www.treesearch.fs.fed.us/pubs/37335>

ISAC Recommendation: Foster collaboration of existing networks to address the broad geographic nature and altered management of invasive species issues in a time of climate change. This will allow the national response to be coordinated, efficient, and capitalize on current capacities using a synergistic approach.

ARS and APHIS have members in FICMNEW and ITAP to inform other Federal Agencies of our research activities on invasive species and to coordinate efforts among agencies. ARS also participates in the USGCRP Ecosystems Interagency Working Group that includes invasive species as part of its focus.

ARS and APHIS are having discussions about the importance of considering issues related to pests/pathogens/weeds as the USDA continues to develop its plans and responses to climate change. A joint workshop took place on April 1, 2011 with presentations and open discussion of potential collaboration between ARS and APHIS for scenario development, risk assessment, research needs and priorities, strategies for funding.

ISAC Recommendation: Increase research and development targeted at climate change and invasive species by supporting and expanding the USDA-ARS and US Forest Service Climate Change Programs, as well as competitive research programs such as USDA's Agricultural and Food Research Initiative, the Environmental Protection Agency's Project Grants, NSF's Conservation and Biology program, and NOAA's Sea Grant program. Better understanding of the interaction of climate change and invasive species will result in more relevant prioritization and management on the ground. This includes recognizing the economic basis for invasive species management decisions and supporting work that integrates economic, ecological and biological data providing policy and management support.

ARS is currently examining its portfolio of research projects relevant to climate change and invasive species. The goal is to expand an

informal working group of ARS scientists focused on climate change and invasive species for the purposes of increasing opportunities for collaboration.

NIFA will offer a new AFRI Challenge Area Grant Program in FY2011 entitled "Climate Change". This AFRI Challenge Area focuses on the priority to mitigate and adapt to climate change. It supports activities that reduce greenhouse gas emissions, increase carbon sequestration in agricultural and forest production systems, and prepares the nation's agriculture and forests to adapt to changing climates. The long-term outcome for this program is to reduce the use of energy, nitrogen fertilizer, and water by ten percent and increase carbon sequestration by fifteen percent through resilient agriculture and forest production systems under changing climates. In order to achieve this outcome, this program will support single-function Research, Education, and Extension Projects, multi-function Integrated Research, Education, and/or Extension Projects, and Food and Agricultural Science Enhancement (FASE) Grants applications that address one of the Program Area Priorities (see Climate Change RFA for details at: http://www.nifa.usda.gov/funding/afri/afri_program_deadline_dates.html).

ISAC recommendation: Use climate matching and ecological niche models to prioritize management of species that are most likely to cause the greatest harm in the future as a result of climate change. This will require the Federal response to be coordinated, empowered, and appropriately funded.

ARS responds to priorities for research gathered from customer-stakeholder workshops, science collaborators and Federally-mandated priorities. NRCS has historically been a key source of this information for ARS. ARS is currently in dialogue with APHIS concerning priorities for research and development of relevant technologies.

I respectfully submit this report to ISAC. If you have any questions, do not hesitate to contact me. Thank you.

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