

Working Group/Science Coordination Group

Draft Information Brief

Invasive Exotic Animals: Managing a Threat to Everglades Restoration

Exotic plant and animal species are defined as those species living in an area outside their native range. If they naturalize and establish free-living populations they become invasive. Invasive species have infested millions of acres of natural areas in the United States with the concomitant loss of native species, including rare and endangered species. Particularly pervasive in Florida, invasive species have been documented to alter the ecological structure and function of entire ecosystems, sometimes leading to irreversible changes in ecosystem processes and food webs.

Invasive exotic species have been documented to cause serious environmental and economic losses and the management and control of these species costs billions of dollars each year in the United States alone. Research in the United States, United Kingdom, Australia, South Africa, India, and Brazil indicates that over 120,000 non-native species of plants, animals, and microbes

have invaded. Many have caused major economic losses in agriculture and forestry, as well as negatively impacting ecological integrity (Pimentel et al. 2001). Feral cats (*Felis catus*) and pigs (*Sus scrofa*), for example, are responsible for the extinction of various native animal species around the world. Though precise economic costs associated with some of the most damaging exotic species are not available, it is estimated that non-native species invasions in the above six nations are causing more than US\$ 314 billion per year in damages (Pimentel et al. 2001).

Invasive animal species are a rapidly increasing environmental and economic problem in the Everglades. One high-profile example in the Everglades is the Burmese python. The Everglades is particularly susceptible to invasive animals for two reasons. Islands are the most vulnerable to invasive animals, and peninsular Florida functions as a climatological island, increasing its risk. South Florida is also home to numerous points of entry for invasive species, including Miami International Airport and the Port of Miami. According to US Fish and Wildlife Service records, legal wildlife shipments into the United States between 2000 and 2004 amounted to the import of over one billion individual exotic animals, representing 2,241 different species from 190 countries (Aldhouse 2007; Smith et al. 2009). This number does not include any parasites or diseases they might have harbored. And, none of the imported species were assessed for invasive potential.

While invasive exotic plants have been the focus of various planning, prevention, and management activities for the past 35 years, the focus on invasive animals essentially began within the past decade. In addition, invasive animals are much more complicated to manage and eradicate. Experts in every field (mammals, reptiles, amphibians, fish, invertebrates, etc.) are needed to work collaboratively on invasive animals. The lag in time and the expansive scope of the invasive animal issue combine for an immense challenge in the Everglades. However, the management of invasive animal species can draw from the many lessons learned regarding invasive plants. The exact methodologies may differ, but the primary strategies apply.



Ongoing scientific research provides insight into the habits and impacts of Burmese pythons in the Everglades ecosystem. Photo courtesy Everglades National Park

Strategic Management of Invasive Species in the Everglades

To assist the South Florida Ecosystem Restoration Task Force in fulfilling its inter-governmental coordination duties with respect to invasive species, the Working Group established two teams, the Noxious Exotic Weed Task Team (NEWTT) and the Florida Invasive Animal Task Team (FIATT). Through the efforts of these teams, individual agency programs for detection, eradication, control, monitoring, and research have been better coordinated and integrated, particularly at the field level. Agencies involved with these two teams developed an Everglades Cooperative Invasive Species Management Area (ECISMA) — an organizing approach well established in western states for dealing with invasive species — that provides a mechanism to coordinate invasive species management efforts in the Everglades. Together, these three groups working along with the individual agencies have developed a strategy for approaching invasive species problems in the Everglades that follows well-established, internationally accepted elements at the field level, as well as at management and policy levels.

Element 1: Prevent, Detect, and Assess

This element focuses on primary prevention by controlling importation (at United States borders—a Federal departmental-level endeavor) of species that may become invasive, but also includes a secondary level of prevention in which monitoring programs are in place to detect new species that have escaped and are becoming naturalized. It is at this initial stage of invasion that we need to be able to detect and rapidly assess the relative invasive threat of a species in order to prioritize for action under Element Two. This stage is critical for successfully eradicating new infestations and reducing the need for continued long-term costly management.

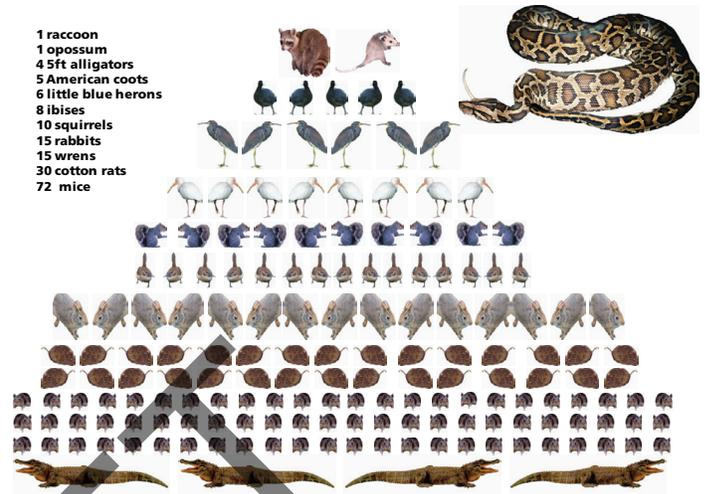
Element 2: Assess, Manage, Control, and Restore

This element seeks to determine the spatial extent and stage of an invasion and to develop control and management action plans for a species or population in a region. Assessments and recommended actions should be closely coordinated to provide agencies with a unified, regional plan for managing and controlling a species and, where appropriate, for restoring natural resources that have been impacted. This stage helps us assess the likelihood of successful eradication versus the need to implement long-term control programs.

Element 3: Inform, Advise, and Educate

This element includes all levels of communication for making people aware of the problems that invasive species pose. This includes, but is not limited to, scientific and technical findings

related to these species. Non-technical communication products developed by scientists and agencies are necessary to provide managers, policy-makers, and the public with accurate and understandable information about invasive species issues, including how agencies are responding and what the public can do to help.



Good communications, like this hypothetical diet for the growth of a 13-foot Burmese python in the Everglades, effectively relay the urgency of action. Image courtesy Dr. Stephen Secor & Skip Snow

Element 4: Organize, Coordinate, and Plan

This element includes some of the most difficult aspects of invasive species management, that of multi-agency coordination and integration. While much progress has been made at local and regional levels for the management of some species — especially in the Everglades — those who work in the field of invasive species management often find that planning, cooperation, integration, and resource sharing are the most difficult elements for managers at the field level to accomplish. These problems can be due to agency policies and regulations (or simple inertia) that slow, and sometimes prevent, interagency cooperation and integration. Upper level managers and policy makers need to make invasive species management an explicit part of their overall planning, budgeting, and coordination efforts.

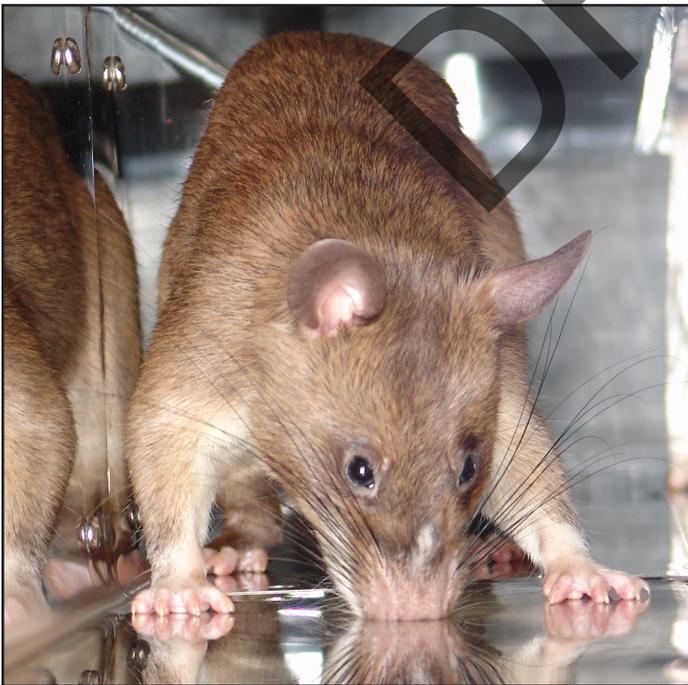
In addition to this strategy, the inter-agency community, through the coordinating efforts of NEWTT, FIATT, and the ECISMA, has produced several key documents that outline a comprehensive and coordinated approach to controlling invasive exotic plants and animals in south Florida. NEWTT developed a comprehensive plan (*Weeds Won't Wait*) for dealing with invasive exotic plants (Doren and Ferriter 2001). This plan has been in place for almost a decade and has provided guidance and a unified approach for dealing with invasive exotic plants. The Everglades invasive plant management program has provided a standard for such programs elsewhere and serves as a model for the management of invasive exotic animals.

Coordinated Management of Everglades Invasive Exotic Animals

Similar in nature to *Weeds Won't Wait*, and using the experience gained by the exotic plant management programs, FIATT has drafted an invasive exotic animal plan and a list of the exotic animals that are considered the highest priority for management (prevention, eradication, and control). This list provides a well-considered scientific consensus of those priority species, including: mammals, birds, reptiles, amphibians, and invertebrates.

Each year, the ECISMA develops a coordination action plan that includes priority regions for management of priority species, coordinated actions and strategies, and priority research programs for the control and management of these species. ECISMA has also developed an Early-detection, Rapid-assessment, Rapid-response Plan, a web-based reporting system for invasive species observations, and an online system that tracks exotic plant management projects. This system provides a uniform, cross-agency data system for entering field data on the control and management of exotic plants and also has the capability to be used for invasive exotic animals.

Because of the nature of invasive exotics management, multiple approaches are being used. Different species, at different stages of invasion, require different control techniques. For example, the giant Gambian pouched rat was detected early in its initial infestation and spread and was able to be eradicated through the use of baited traps, thus eliminating the need for a long-



The successful eradication of the Gambian giant pouched rat from the Florida Keys helps illustrate the effectiveness of early detection and rapid response. Photo courtesy APOPO International

term management program. The Burmese python and the Boa constrictor, however, have already established populations and we must now develop control approaches and strategies in response. This is a very long-term, perhaps perpetual, and extremely costly effort in both financial and ecological terms, whereas the eradication of the giant Gambian pouched rat was accomplished in less than six years, for just a few tens of thousands of dollars. Details of the status and management plans for the species discussed above can be found in the Additional Resources listed at the end of this document.

What More Can We Do?

Coordinate, Integrate, and Plan:

We need to continue to refine and develop the Invasive Exotic Animal Strategic Plan developed by FIATT. The basic elements of the plan are in place but the plan needs to be formally vetted and accepted at the appropriate levels by all the individual agencies involved. The plan must then be used by agencies and teams to implement the strategies and approaches described in the plan and to coordinate funding for invasive species management. Invasive species don't recognize borders and our planning, actions, and funding must not either. Through FIATT and ECISMA, all involved agencies should be actively refining this plan.

Prevent, Prevent, and Prevent:

The only 100% effective approach to stopping species invasions is to prevent entry. It is well documented that if a species poses a risk to invade a region, it will eventually escape and establish free-living populations once it is present. If we won't act to prevent species from entering at the United States border, then we must catch them very early after release or escape. If we don't, then we deal with the "cats" only once they are out of the bag, the most expensive, long-term, and least effective option.

Risk Analysis and Screening:

We must put national-level policies and regulations in place, based on strong risk analysis and screening tools that can scientifically evaluate the threat a species poses for invasion if introduced. There are very effective and well documented risk assessment tools in use in other nations, including Australia. These tools have been evaluated for use in the United States and found to be better than 95% accurate at assessing the threat a species poses for invasion (Gordon 2008). Even the most well-funded and comprehensive program for prevention and eradication at the local level will never be sufficient to contain and manage invasive species without the support of appropriate national-level policy.

Comprehensive National-Level Interagency Planning and Coordination:

In order for the United States to deal comprehensively and effectively with the problems of invasive exotic species, strategic planning must take place at multiple levels of government. Reliance on field level activities using low-level technological approaches like trapping will never be sufficient. A successful effort will require comprehensive extra- or inter-departmental cooperative agreements for resource sharing, budget planning, and revisions of policies that currently impede or prevent integration of agency activities for management and research. An effective example of such an approach has evolved in the management of wildfires, once the bane of individual agencies. Each agency used to become individually responsible for a fire when it crossed into their geographic area of concern, no matter where it came from or who may have caused it, and regardless of whether the agency had the resources to deal with the fire or not. Today, through the National Interagency Fire Center, all levels of government and their agencies (federal, state, and local) have a fully integrated (budgeting, planning, logistical, coordination, implementation, and action) program where all agencies act as one with regard to wildfires across the United States. This is the approach we must emulate if we are ever to manage the incalculable environmental, economic, and health threats posed by invasive exotic species. The damage and costs from invasive exotic species nationwide far exceed those of wildfires.



Purple Swamp Hen preying on hatchling native duckling in Loxahatchee National Wildlife Refuge. Photo courtesy of Tony Wellington.

A Big Problem Needs A Big Response:

When agency resources are stretched to breaking it's hard to imagine how to pay for the solution to such a massive problem. However, without sufficient resources for research, monitoring and early detection, and for those "cats" that are already out of the bag, exotic species will continue to be serious and significant threats to Everglades restoration, and natural areas everywhere. Programs like the National Interagency Fire Center have clearly proven that when adequate resources are provided and made available through a large, well-integrated resource pool, agencies are able to respond quickly (within hours) to problems and also place resources in key locations to prevent the spread of a problem through early and rapid control actions. Such programs provide a national-level framework and support structure for integration, coordination, budgeting, planning, and logistical support, thereby multiplying the effectiveness of the resources of individual agencies.

Literature Cited

- Aldhouse, P. 2007. Exotic pets pose risks to native species, *New Scientist*, Issue 2615, August 2007.
- Doren, R.F. and A. Ferriter (eds.). 2001. *Weeds Won't Wait! - The Strategic Plan for Managing Florida's Invasive Exotic Plants*.
- Gordon, D.R., D.A. Onderdonk, A.M. Fox, R.K. Socker and C. Gantz. 2008. Predicting Invasive Plants in Florida Using the Australian Weed Risk Assessment. *Invasive Plant Science and Management* Vol. 1 (2), pp. 178-195.
- Pimentel, D., S. McNair, J. Janecka, J. Wightman, C. Simmonds, C. O'Connell, E. Wong, L. Russel, J. Zern, T. Aquino and T. Tsomondo 2001. Economic and environmental threats of alien plant, animal, and microbe invasions. *Agriculture, Ecosystems & Environment*, Vol. 84 (1) March 2001, pp. 1-20.
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Additional Resources

- Florida Invasive Animal Task Team (FIATT) Draft Strategic Plan for Invasive Animals.
- Draft Early Detection and Rapid Response Plan for Everglades Cooperative Invasive Species Management Area, June 12, 2009.
- South Florida Environmental Report, Chapter 9: The Status of Non-indigenous Species in the South Florida Environment, 2009.
- Everglades Cooperative Invasive Species Management Area, Memorandum of Understanding. No. 4600001287, December 24, 2008.
- Florida Invasive Animal Task Team (FIATT) Priority Advisory List of Invasive Animal Species, March 3, 2009.
- Everglades Cooperative Invasive Species Management Area 2009 Annual Plan.