

**WEEDS
WON'T
WAIT !**



**The Strategic
Plan for
Managing
Florida's Invasive
Exotic Plants**

**Part Four:
Executive
Summary of the
Strategic Plan**



Cover photo: Old World Climbing Fern (*Lygodium microphyllum*) smothering a forest habitat.

Old World Climbing Fern occurs predominantly in southern Florida while Japanese Climbing Fern (*Lygodium japonicum*) occurs in northern Florida. *Lygodium* sp. are spreading at an alarming rate. Several new populations have been discovered throughout Florida including Big Cypress National Preserve and the Florida Panther Refuge. Some are convinced that *Lygodium* may become the next Melaleuca.

Photo courtesy of the South Florida Water Management District.

WEEDS WON'T WAIT!

PART FOUR EXECUTIVE SUMMARY OF

THE STRATEGY FOR MANAGING INVASIVE EXOTIC PLANTS IN FLORIDA

**A REPORT TO THE SOUTH FLORIDA ECOSYSTEM RESTORATION
TASK FORCE AND WORKING GROUP**

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SUPPORT AND PARTNERSHIP OF THE
AGENCY MEMBERS OF THE
NOXIOUS EXOTIC WEED TASK TEAM**

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US Dept. of Agriculture - Animal & Plant Health Inspection Service

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F FOREWORD

*“A land ethic for tomorrow should be as honest
as Thoreau’s Walden, and as comprehensive
as the sensitive science of ecology.*

*It should stress the oneness of resources
and the live-and-help-live logic
of the great chain of life.*

*If, in our haste to “progress”
the economics of ecology are disregarded
by the citizens and policy makers alike,
the result will be an ugly America”*

*Stewart Lee Udall
Secretary of the Interior 1960 - 1969*



STRATEGIES FOR SUCCESS

WHAT'S THE PROBLEM WITH INVASIVE EXOTIC SPECIES, AND IS IT REALLY AS BAD AS THEY SAY?

The problems with Invasive species are not limited to South Florida, or Florida or even the US. They have become one of the most serious global ecological dilemmas today. Biological pollution is rapidly becoming one of the most important environmental topics for the 21st Century. Invasive species are hurdling environmental obstacles and evolutionary time scales at jet speed and in numbers that defy imagining. Human intervention has effectively shattered the planet's ecological barriers to species movement, a situation without precedent in the entire history of life.

BIOINVASION AND BIODIVERSITY ARE LINKED

Introduced species have become a significant component of human-caused global environmental change. Even though this fact has been understood for some time, most people, even many scientists have failed to recognize or appreciated the seriousness and potential magnitude of the issue. Biological invaders are capable of altering ecosystem structure and function. The long-term consequences of global ecological alterations in disturbance regimes, nutrient dynamics, soil and water chemistry, changes in species dominance, community composition and structure and recruitment, evapotranspiration, erosion, soil formation, microclimate, competition, etc. are basically unknown.

The wholesale and uncontrolled movement of biological organisms by humans has essentially eliminated the natural biogeographic barriers that originally created and sustained the major floral and faunal regions of earth and are obscuring the distinctiveness of the earth's biota. While many of these plants and animals are considered essential to human health and welfare and are not regarded as threats to biodiversity, they are often a reflection of other human caused change such as land development, which also threatens biodiversity. Some non-indigenous species have caused enormous economic losses, especially in agriculture. Some species affect the structure and function of ecosystems or the preservation or restoration of native biological diversity. While economic costs may be able to be documented and cost-risk analyses for these species may be possible (although little has actually been done in this regard), the loss of natural ecosystems and native biodiversity is seldom measurable in economic terms and sometimes considered an unfortunate byproduct of economic growth.

Humans affect bioinvasion by eliminating the natural barriers to species movement. Bioinvasion reduces biodiversity through direct loss, extirpation or extinction of species and through introduction of pests and diseases.

THE ECOLOGY OF INVASION

Why Do Some Species Seem More Invasive Than Others? Why Do Some Ecosystems Seem More Invasible Than Others? What Contributions Can the Current Science Provide Toward Understanding the Ecology, the Risk, the Prediction, and the Management of Invasion Events?

Recent research has begun to focus on the fundamental questions of invasion ecology. Questions like, “what makes some species more invasive than others?” or “what makes some ecosystems more invasible than others?” While some useful predictive information is becoming available for individual species that are the focus of specific research projects, useful generalizations that can be applied to species characteristics overall or ecosystem properties have not developed because sufficient quantitative studies are not currently available.

Several theories have been developed from the available science related to what is generally known about the characteristics of invaders and invaded ecosystems, and the more decided theories developed from specific ecological studies.

The principal theories include:

ALTERATION OF ECOSYSTEM PROCESSES THEORY

Invasive species that are capable of altering ecosystem processes or characteristics are generally thought to be the most serious of invaders and are likely to have the most dramatic effects on ecosystems. They often differ in life form from native species, and usually cause change either by creating new habitat or modifying existing habitat. Alteration of ecological factors such as hydrology, biogeochemistry, stand structure, resource utilization and competition are well documented in the literature, and the number of invasive species capable of altering ecosystem functions and properties is probably much higher than previously thought.

DISTURBANCE CREATES GAPS THEORY

Disturbance is often attributed to enhancement of invasion especially in “island-like” areas such as south Florida in particular where either natural disturbance is prevalent or where significant and widespread human alteration of the natural system has occurred. However there are many examples of exotic species invading undisturbed habitats and out competing native species.

OPEN-NICHE THEORY

Initially it was thought that if evolution and species migration filled all a plant communities ‘niches’ that community was considered ‘species-saturated’ and was impervious to invasion by exotic species. The scientific evidence related to this concept is inconsistent at best, and more recent research suggests that higher native species richness does not impart resistance to exotic species invasion and some research has even shown a positive correlation of exotic species invasion with high native diversity.

LACK OF PREDATORS AND PATHOGENS THEORY

This theory presumes that introduced species become invasive because they are introduced without their natural pests and diseases and with an assumed concomitant reduction in competition. Some species are reported to grow and reproduce more robustly in the absence of predators, indicating that predator-free exotic species may enjoy an advantage over native species but the lack of predators is not always associated with invasiveness. However, the lack of predators is a key concept in the rationale for biological control.

FASTER REPRODUCTIVE POTENTIAL THEORY

Many invasive species show either a rapid vegetative growth rate compared to native homologues. Several species in Florida (such as hydrilla and water hyacinth) are documented to be able to reproduce much faster than the native plants in the same habitat. This theory is closely allied with following concept relating to the questions of poor adaptation in native species versus better adaptation in exotic species.

POOR ADAPTATION IN NATIVE SPECIES THEORY

It is unclear whether some native species in their native ecosystem are truly less well adapted or tolerant, or if exotic species are simply better able to utilize existing resources or take advantage of reproductive opportunities (Also see previous theory on faster reproductive potential). Research indicates that the later two concepts certainly apply in many well documented instances, and that invasive species capable of altering ecosystem properties may also create a relatively novel environment to which the native species may no longer be adapted.

AVAILABILITY INCREASES INVASIBILITY THEORY

There is convincing evidence that the more available a species is the greater the opportunity for eventual establishment of self-sustaining populations. The increase in availability of new species over time, and the repeated availability of existing species also appears to increase the absolute invasion rate. People are the major cause of species homogenization.

SUMMARY

The Basics of Bioinvasion

Most if not all of the exotic species that become invasive share many traits that help account for their invasive properties. The theories that endeavor to explain how and why these species are able to become invasive overlap in many instances, and most species share characteristics of invasiveness that includes behavior, genetics, physiology, and demography.

How well do these theories predict species invasiveness or ecosystem invasibility? Unfortunately science currently offers no adequate solutions to this vexing problem. Invasion characteristics of individual species may be predictable using biological characters where sufficient data exist. Broader generalizations are usually limited to

plant physiology, species behavior, genetics or demography of single species, or rarely congeneric species.

Invasive species are the second biggest cause of the loss of global biodiversity after habitat loss. Bioinvasion is here to stay and will only get worse if we continue to deal with the problems of exotic species in a piecemeal and parochial fashion. The message is loud and clear—we must act cooperatively, collectively, and decisively—if we are to halt the inevitable loss of our natural environment and other natural resources to non-native invasive species. Business as usual has not and will not work.

In reviewing the available strategies and plans—from the global to the national to the local level—for managing invasive exotics on a site or species basis, a consistent set of six basic components was common to virtually every plan. Management plans are still focusing on one or a few species or places at a time.

As important as planning for individual- and site-based species management is, it is equally important that future planning efforts become large-scale in order to better account for the complexity and extent of the invasive species problem. None of the plans reviewed were implemented at the ecosystem or large scale effort and this may well be because, in spite of numerous calls for such planning in the literature, no one seems to know exactly what it means to manage invasive exotic species at the ecosystem level.

The following six basic components elements were identified as essential in nearly every plan or recommendation reviewed:

- 1. A Clear and Definite Goal**
- 2. A Cross-Unit/Multi-Level Organizational Element**
- 3. An Integrated Means of: Preventing, Prioritizing, Assessing, Managing, and Studying, Exotic Pests.**
- 4. An Emphasis on appropriate and Harmonious Policies and Regulations.**
- 5. A Means of Transferring Information and Technology**
- 6. Consistent and Sufficient Resources**

WHAT'S BROKEN?

WHY EXISTING WEED MANAGEMENT MEASURES ARE NOT ADEQUATE

Rudimentary elements of a good invasive exotic plant management strategy—legislation, coordination, planning, research, education, training, and resource input—have been in place in Florida for years. While Florida is well ahead of most other states, programs within the state have been implemented with varying degrees of commitment, coordination and success, often stemming from a failure by agency and political leaders to appreciate the full scope and significance of the problem, and because of direct conflicts with special interest groups like the nursery industry. Research in particular has been inadequate and usually only focused on the species of immediate concern rather than taking a broader approach to invasion biology generally.

The following 13 points provide the context in which the invasive exotic plant management strategy is developed. In some cases, improvements to invasive species management through reorganizing or rethinking existing measures are recommended; in others we recognize that new procedures will be required.

1. Local-thinking and a lack of multi-agency integration have typified weed management

No formal organizing body exists that adequately and directly represents all agencies and organizations that have primary involvement in the array of invasive exotic plant issues such as research, planning, management, regulation, policy development, and education. Because of the lack of coordination invasive species management is fragmented.

2. Lack of appropriate mechanisms for assessing and prioritizing statewide and bioregional invasive exotic species issues

In Florida, there is a need for a formally recognized multi-agency organization with direct representation from key agencies and indirect representation from other agencies and non-governmental organizations (NGOs) and others may be only proximally involved with invasive exotic plant issues. Procedures must also be put in place to ensure an integrated and coordinated approach to assessing the significance and priority of particular weed issues Florida-wide.

3. Exotic plant invasion is slow and deceptive

Weed problems are often slow to develop. The status of invasiveness may be attained by a species on a time scale that works against methodical observations of encroachment. Plants that appear benign for many years or even decades may suddenly spread rapidly. There is a need to recognize these species during their incipient phase or even prior to introduction.

4. Disturbance and invasion are closely linked

While disturbance is not necessary for invasion, weeds are encouraged by disturbance and disturbance can take many different forms. Disturbance of the natural environment is often a consequence of economic and social development. Many of the most significant weed problems are plant species that have evolved to colonize disturbed habitats. In order to manage the weed problems that may be a consequence of this phenomenon we need to develop land-use and restoration systems that cause minimal disturbance to the natural environment.

5. Failure to acknowledge the seriousness of the problem

There has been a pervasive failure to recognize the scope and seriousness of invasive exotic plants. The public (and many policy-makers) generally gives inadequate regard to weeds, especially those of natural areas. Even conservation organizations have not given invasive species the attention they merit and have been slow to recognize invasive exotic species as a serious threat to natural areas.

6. Agriculture has dominated the weed issue

Historically weed problems have been treated principally as an agricultural issue. Today, funding for agricultural weed problems and weed problems associated with human nuisance issues receives the vast majority of invasive species funding and support.

7. Shortcomings in prevention

While the US already has many established invasive exotic species, there are an estimated 25,000 additional 'recognized' weeds worldwide. Only about 3,000 of these species are known to occur in the continental US. Except for certain listed species of plants (those on the Federal Noxious Weed and Seed Lists), plants themselves are not prohibited from entry even if they are documented as a species that is known to be an invasive weed in the US or elsewhere.

8. No process for conflict resolution

Stakeholders and even agencies that may represent the interests of a particular user group, often hold differing opinions on invasive exotic species issues. What may be a serious pest to one group—like elephant grass (*Pennisetum purpureum*) is to natural lands managers—is a desirable forage and silage crop that is still the subject of research for improved cultivars by other groups—in this case the UDSA and FDACS. These conflicts occur at every level of government. These differences can often lead either by design or default to acceptance of the status quo, which works in favor of the weeds.

9. Belief that chemical control is the answer

Approaches that include mechanical, ecological and system management have generally been neglected in favor of cost and convenience. Chemical control is a vital and useful part of invasive exotic plant management but it must be realized that it is only one part of a complete management program.

10. Belief that biological control is the answer

Probably because of the confusion with different kinds and uses of biological agents, people generally hold one of two extreme views regarding biological weed control. Either they believe that biological control is a panacea that can eliminate all pest problems. Just as with chemical control there is a failure to realize that classical biological control is not a panacea, but is one important component of a carefully developed and integrated management program.

11. Inconsistencies and gaps in legislation and regulation

Federal, state and local legislation dealing with the spread of invasive exotic species is a hodgepodge of uncoordinated and unfocused laws and regulations. Regulatory coverage is not coherent, nor was it strategically developed.

12. Inconsistent or insufficient resources

The resources currently devoted to the problem are not commensurate with the risks posed. It is also quite clear that resources devoted to effective prevention of introduction of potentially harmful species can return manifold millions or billions of dollars in future control costs. The need for additional funds is understood and in some cases being addressed, however, a more urgent issue is the problem of inconsistent and uncoordinated utilization of existing resources.

13. Insufficient research and study of invasion ecology

The development of a comprehensive and integrated science program to delve into the complexities of invasion ecology is essential if we are to seriously tackle these two questions that form the nexus of all invasive species ecology. Like management, research in invasion ecology has been piecemeal, and while many useful products are available there has never been a coordinated approach of inquiry into these questions.

FIXING IT, HOW TO GET FROM WHERE WE ARE TO WHERE WE NEED TO BE:

DEVELOPING THE RIGHT STRATEGIES,
IDENTIFYING THE RIGHT CONCEPTS AND GOALS,
IMPLEMENTING THE RIGHT ACTIONS,
GETTING THE RIGHT OUTCOMES

CONCEPT NUMBER 1

ASSESS, MANAGE, CONTROL AND RESTORE

GOAL 1: Reduce the impact and contain the distribution of existing significant invasive exotic plant and other weed problems

OUTCOME:

Natural areas are free of the harmful effects of invasive exotic plants

Steps:

- A. Establish procedures, mechanisms, and information network to assist in identifying, assessing, and ranking weed problems on an integrated statewide, eco-regional or unit area basis.
- B. Establish procedures for the development and revision of integrated species-based management plans to provide for coordinated actions against priority weed problems.
- C. Develop integrated plans and implement cross-agency control programs for highest priority problems.
- D. Develop science program to support implementation of assessment, management, control and restoration actions and support ecosystem level management.

CONCEPT NUMBER 2

ASSESS, DETECT AND PREVENT

GOAL 2.1: Prevent new weeds being introduced that could become problems in natural areas and prevent incipient weed populations in natural areas from spreading

OUTCOME:

Reduced spread of weeds into natural areas and reduced risk of introducing new weed species

Steps:

- A. Develop science-based procedures for assessing the invasive potential of new and existing species.
- B. Develop and implement more effective interdiction actions at importation sites.
- C. Develop science-based techniques and procedures consistent among agencies to detect incipient populations of existing plants or newly introduced species (Also see Concept 1, step D, action D-4.2).
- D. Develop and implement capability for rapid-response to control or eradicate incipient populations of invasive plant species or significant new weed problems.

CONCEPT NUMBER 3

INFORM, ADVISE AND EDUCATE

GOAL 3: Generate public awareness of the invasive exotic plant problems and broad support for efforts to control invasive exotic plants

OUTCOME:

Better-informed and more supportive policy makers, scientists, industry and public

Steps

- A. Integrate invasive species issues, identification, ecology and management into academic courses and institutions and agency training.
- B. Engage the public in the invasive exotic plant issues and in early detection and reporting of suspected new species or infestations.
- C. Identify key public and policy groups and establish partnerships to create a network for collaboration and provide information to policy makers and managers.

- D. Provide support to the horticultural and agricultural industries to ensure an economically viable horticultural industry that is responsive to the need for preventing the introduction of invasive exotic species and is compatible with a sustainable and viable natural ecosystem.

CONCEPT 4

ORGANIZE, COORDINATE AND PLAN

GOAL 4: Marshall federal, state, regional and local actions and resources on invasive exotic plants to provide integrated, consistent, cost efficient and effective weed management

OUTCOME:

Agency programs and planning for control and management are integrated and agency actions are coordinated

Steps

- A. Establish a formal multi-agency organization with mechanisms to implement the state invasive exotic plant management strategy to provide a consistent, continuous capability for cost effective, efficient, integrated and sustainable weed management.
- B. Write the strategic implementation plan that identifies agency roles and actions, and short and long-term strategic elements to establish priorities for funding and execution.
- C. Coordinate Florida-wide agency actions and integrate with national and international control efforts in order to integrate planning and management programs.
- D. Develop an inter-agency supported research, education and training capacity to ensure scientific rigor and currency, and integration and coordination of weed management.

How this Strategic Plan Fits with the National Planning Efforts

Put simply, in one form or another almost every other document reviewed provided sound strategic principles and concepts and thus presented some insights toward the development of this strategy. The result is a strategic plan that contains not only the concepts and principles inherent in good invasive species management applicable at the local and global levels, but also incorporates measurable outcomes and actions specific to helping implement an effective invasive exotic plant management program for Florida and the Everglades. In addition, several members of NEWTT have also been participating in the concurrent national level planning efforts and this plan benefited

from that involvement. As a result, coordination and integration with national planning efforts has been built into this plan.

GET REAL!

ARE ANY OF THESE CONCEPTS, GOALS, STEPS AND ACTIONS PRACTICAL AND WILL THEY HELP?

OVERVIEW

Implementing an effective program of invasive species management will be a complex, long-term and predictably onerous task. But unless we face this issue directly the real nightmare would be to do nothing and wait until the problem is intractable, an all too common situation. At that point everyone, including industry, would be calling for something to be done and it will probably be too late for our natural areas.

Successful invasive species management will require that policymakers and the public alike accept the value of preserving natural areas and agricultural resources, and acknowledge invasive species management as an essential component of ecosystem preservation. Controlling just the few plants that everyone can agree are pests will continue to be ineffectual.

Without scientific certainty public policy and law have typically required “the public” to carry the burden of proof that a particular activity or thing is harmful, while those undertaking potentially harmful activities and the products of those activities are considered innocent until proven guilty. This burden of scientific proof, especially in light of the enigmatic nature of biological pollution, has posed a significant deterrent to activities to protect the environment from many forms of pollution including biological pollution. Only after significant harm occurs are corrective actions usually taken. By that point it may either be too late or extremely costly to reverse.

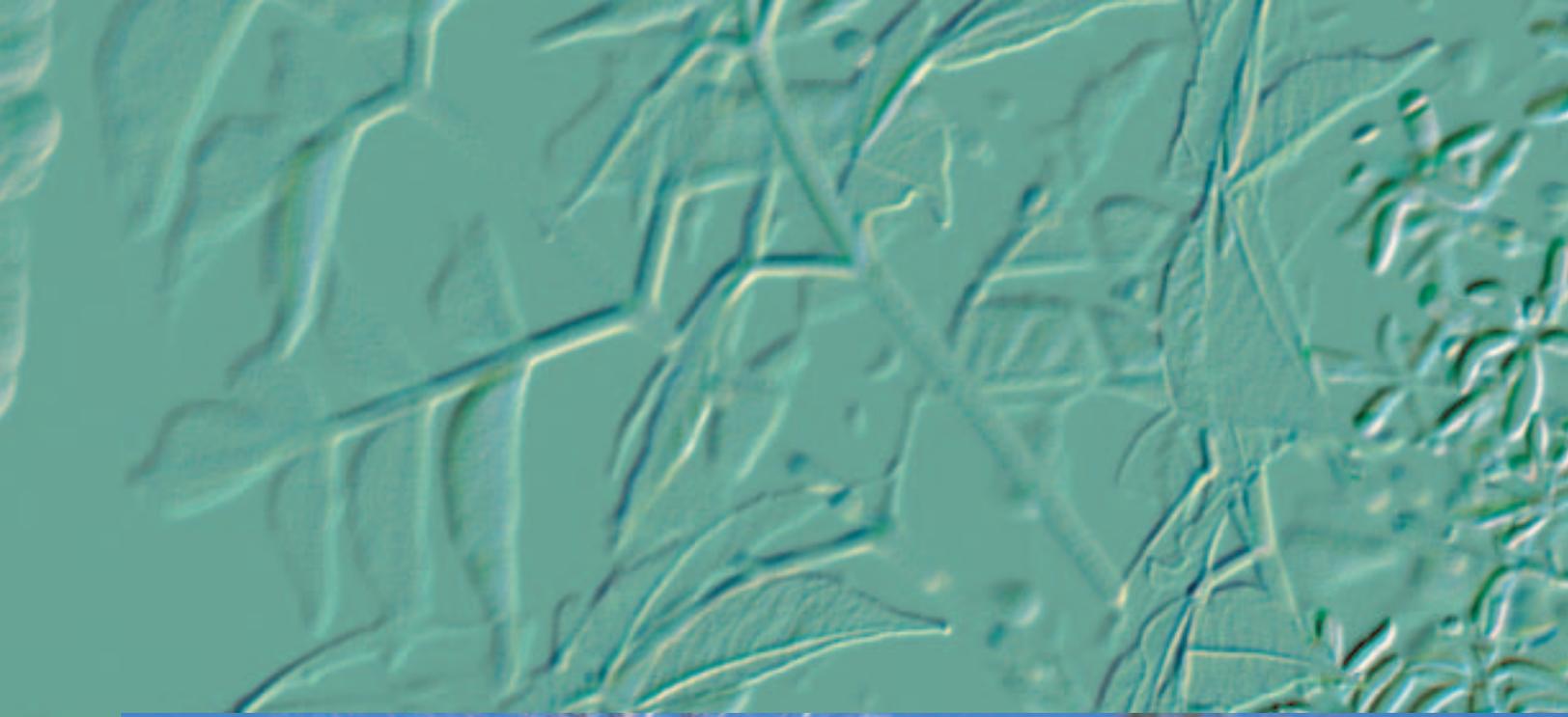
Invasive exotic plants clearly fit into this typical pattern of US regulation. Anyone can legally bring plants or seeds (and many other exotic life forms) into the US with virtual disregard to the possible weedy or invasive nature of the plant. Yet once a plant becomes a pest, those responsible for bringing it are not accountable for the damage, often pointing out that there was no clear scientific proof that a particular species would be invasive.

The Strategic Plan provides examples of approaches and current practices for managing exotic invasive plants. The examples provided are not all-inclusive and are only intended to provide illustrations of existing and proven programs or activities that have successfully applied some of the key strategic approaches to invasive species management.



HAT ARE THE 5 MOST IMPORTANT THINGS WE SHOULD DO RIGHT AWAY?

- 1. ORGANIZE (SEE CONCEPT 4, STEP A)**
- 2. WRITE THE STRATEGIC IMPLEMENTATION PLAN (SEE CONCEPT 4, STEP B)**
- 3. PRIORITIZE SPECIES FOR CONTROL AND WRITE THEIR CONTROL PLANS (SEE CONCEPT 1, STEP A)**
- 4. DEVELOP A MEANINGFUL LEVEL OF STANDARDIZATION NEEDED FOR A COMMON LEVEL OF INTER-OPERABILITY AMONG AGENCIES (SEE CONCEPT 1, STEP A)**
- 5. DEVELOP AN EARLY-WARNING AND RAPID-RESPONSE CAPABILITY (SEE CONCEPT 2, STEP D)**



Ex