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KEVIN E. REGAN*  

The Need for a Comprehensive Approach to Protecting Rare Plants: Florida as a Case Study

ABSTRACT

There has been disproportionately little interest in the decline of rare plant species. Florida is an interesting case study because it contains a large number of rare plant species, is representative of the major threats to rare plant species, and has plant protection laws that are typical of most states. Analysis of the legal and management framework for rare plant protection in Florida suggests the need for improvement at both the federal and the state level. It also suggests the importance of a comprehensive approach to rare plant protection that maintains the dual focus of protecting individual plant species and habitat generally.

I speak for the trees, for the trees have no tongues.1

I. INTRODUCTION

There is increasing scientific, political, and legal concern about the loss of biodiversity and protecting species from extinction. This concern is manifested in a number of legislative efforts to protect species, many of which have focused on protecting animal species. There has been disproportionately little interest in the problems associated with the decline of plant species.2 Florida is an interesting case study because it contains a large number of rare plant species3 and its plant protection

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2. For example, only two percent of Endangered Species Act funding nationally is devoted to plants. SOUTHEAST ENVT'L. RES. PROGRAM & CENTER FOR PLANT CONSERVATION, AN ACTION PLAN TO CONSERVE THE NATIVE PLANTS OF FLORIDA pt. III(C)(1) (1995) [hereinafter ACTION PLAN]. This document can be accessed through the Everglades Digital Library, available at http://www.fiu.edu/~glades/serp/action/community.html (last visited Apr. 11, 2004).

3. In this article, a rare plant species is defined as a scarce plant species that may or may not have received a protected status designation such as “endangered” or
laws are typical of those of most states in that they are weaker than the laws that protect animal species. Analysis of the problems associated with rare plant protection in Florida suggests the need to improve the existing legal framework and its implementation at both the federal and state level. It also suggests the importance of a comprehensive approach to rare plant protection that maintains the dual focus of protecting individual plant species and habitat generally.

This article examines the legal bases for rare plant protection in Florida and explores some of the obstacles that hinder rare plant protection and conservation efforts in Florida and throughout the United States. Part II describes the problems associated with the loss of plant species and explores the rationales for protecting rare plant species in general. Part III discusses the legal bases for rare plant protection in Florida. It first provides an overview of federal legal protection for rare plant species, focusing on the Endangered Species Act, and then discusses state legal protection, focusing on the primary laws regulating rare plant species in Florida. This part also discusses the need for a comprehensive approach to rare plant protection and explores some recent conservation efforts that may reflect a movement toward such an approach in Florida. Part IV provides suggestions for improving rare plant protection at both the federal and state level.

II. THE IMPORTANCE AND DIFFICULTY OF PROTECTING RARE PLANT SPECIES

A. Rationales for Protecting Plant Species

There are ecological, economic, and ethical rationales for protecting plant species. In terms of ecology, there is a complex relationship between plant and animal species. Because humans depend

"threatened." See Linda McMahan, Comment, Legal Protection for Rare Plants, 29 AM. U. L. REV. 515, 515 n.1 (1980) (framing the issue broadly in terms of "rare plants" rather than just "endangered" or "threatened" plants). McMahan's student comment has been described as the leading authority on the subject of legal protection for rare plants. George C. Coggins & Anne F. Harris, The Greening of American Law?: The Recent Evolution of Federal Law for Preserving Floral Diversity, 27 NAT. RESOURCES J. 247, 248 n.2 (1987). There are problems surrounding the terminology regarding endangered species and endangered plant species in particular. See infra Part II.C.

4. See McMahan, supra note 3, at 547 n.183.
7. See generally ANTHONY HUXLEY, GREEN INHERITANCE (1985) (examining the relationship between plants and human society).
on plants for oxygen, food, shelter, and many other needs, there are many anthropocentric justifications for protecting plant species. In addition, there is increasing acceptance of the biocentric argument that plants have inherent value independent of humans and deserve to be protected.\(^8\) This article provides only an overview of the main rationales for plant protection.\(^9\)

Plants provide a number of ecological functions that humans and other animals rely on. Most of the oxygen in the earth’s atmosphere is a product of the photosynthetic activity of plants, which are usually the basis of the food chain. It has been observed that “[a] single plant may support as many as fifteen to twenty different species, including bacteria, fungi, insects, and other plants and animals.”\(^10\) Thus, the destruction of a plant species may cause the destruction of many organisms that depend on it. The maintenance of biological diversity, including plant species, “enhances the ability of the biosphere to respond to changes in the world’s physical conditions.”\(^11\)

Plants offer a number of direct and indirect economic benefits to humans. For example, “[p]lants produce thousands of complex chemicals that have been profitably exploited for business and industrial uses.”\(^12\) As a result, plant species may represent future sources of food, medicines, or other useful products.\(^13\) Throughout history the lives of humans have been intertwined with plants,\(^14\) and the extent of humans’ reliance on plants for survival and livelihood justifies the conservation of plant species.

The environmental community increasingly recognizes the need to preserve species for reasons independent of humans.\(^15\) Such biocentric approaches argue that all species, including plants, have an inherent right to existence. Some environmentalists argue that preservation issues


\(^9\) For more in depth analysis of these rationales, see McMahan, supra note 3, at 516-19; Coggins & Harris, supra note 3, at 251-60.

\(^10\) Coggins & Harris, supra note 3, at 252.

\(^11\) McMahan, supra note 3, at 517. Concerns about global climate change are increasing as a result of awareness that various human activities contribute to carbon dioxide emissions. Plants may play an important role in the sequestration of carbon dioxide and the earth’s ability to respond to these emissions.

\(^12\) See Coggins & Harris, supra note 3, at 256.

\(^13\) McMahan, supra note 3, at 518-19.

\(^14\) See generally Huxley, supra note 7 (examining the relationship between plants and humans throughout history).

\(^15\) See Rolston, supra note 8, at 43-46.
are moral issues. There is an interesting distinction between the ownership of individuals of a plant species and the ownership of an entire plant species. These situations can occur when someone owns land containing the last remaining individuals of a species. Many advocates of the ethical argument for plant preservation assert that human beings have a moral obligation to protect other species and that individuals should not control the fate of an entire species.

It has been noted that "anyone who gives the matter more than passing thought must concede the need for preservation of plant species in the abstract." The rationales for conserving plant species alluded to in this article are interrelated, and thus there is much overlap between them. In addition, it is difficult to weigh the relative importance of different rationales for protection. Such a determination is better made in the context of deciding whether to protect a particular plant species or area of habitat. For example, a rare plant species that supports many other organisms may be more easily protected under an ecological rationale. Similarly, a rare plant species that is related to a species that has known pharmaceutical properties may be more easily protected under an economic rationale. However, in the case of a rare plant species about which very little is known, an ethical rationale may be the best reason to protect the plant.

B. Major Threats to the Survival of Plant Species

The three major causes of endangerment of plant species are habitat destruction, taking, and the introduction of exotic (i.e., non-native) plant species. Habitat destruction is generally regarded as the most serious threat to rare plant species. This broad category of harm

16. One author notes, "Few will deny that there is a moral issue here: a simple enough axiom that we should not, for our own immediate comfort and gain, destroy plant life so wantonly and with so little thought for the future." HUXLEY, supra note 7, at 186.
17. See Rolston, supra note 8, at 48. See infra note 115.
18. Coggins & Harris, supra note 3, at 259.
19. Aldo Leopold, an early ecologist, rejected basing species preservation on short-term economic values:

Of the 22,000 higher plants and animals native to Wisconsin, it is doubtful whether more than five percent can be sold, fed, eaten, or otherwise put to economic use. Yet these creatures are members of the biotic community and if (as I believe) its stability depends on its integrity, they are entitled to continuance.

Id. at 258 (citing Aldo Leopold, The Land Ethic, in A SAN COUNTY ALMANAC, WITH ESSAYS ON CONSERVATION FROM ROUND RIVER 246-47 (1949)).
20. The introduction of foreign species is sometimes referred to as "biological pollution." See Coggins & Harris, supra note 3, at 264.
21. See McMahan, supra note 3, at 519-20; Coggins & Harris, supra note 3, at 261.
results from a number of human activities such as agriculture, forestry, development, and construction.

The second major threat to the survival of plant species is taking.22 Taking includes activities that are directed at individual plants or populations, such as killing, harming, picking, uprooting, trampling, or collecting.23 One author explains that "[r]arity, beauty, and market value all encourage this form of destruction."24 Theft, vandalism,25 and intentional eradication26 are also motivations for taking that may pose a more significant threat to plants than animals.

A third, and increasingly significant, threat to plant species is the introduction of exotic plant species.27 Exotic plant species can have a detrimental effect on native vegetation by out-competing native species and diminishing species diversity. The variety of threats posed to plants in general, and rare plants in particular, suggests the need for a comprehensive legal approach to rare plant protection.28

C. The Terminology of Rare, Endangered, and Threatened Plant Species

One factor that increases the difficulty of communication about species in danger of extinction is the lack of consistent terminology within legal, scientific, and management communities. In this article, a rare plant is defined as a scarce plant species that may or may not have been designated with a legally protected status such as “endangered” or “threatened.”29 An “endangered species” is defined in federal law as “any species which is in danger of extinction throughout all or a significant portion of its range.”30 A “threatened species” includes “any species that is likely to become an endangered species within the

22. See McMahan, supra note 3, at 520.
23. Coggins & Harris, supra note 3, at 263.
24. McMahan, supra note 3, at 520.
25. Id. at 521.
26. See discussion of the San Diego mesa mint (Pogogyne abramsii), infra note 120.
27. One source estimates that man has accidentally or purposefully introduced over 1800 species of foreign vascular plants into the continental United States and over 2000 species into Hawaii. EDWARD S. AYENSU & ROBERT A. DEFILIPPS, ENDANGERED AND THREATENED PLANTS OF THE UNITED STATES 25-26 (1978). This source provides an excellent overview of the problems associated with the decline of rare plants in the United States. Without the native diseases and pests that regulate their populations, exotic species can out-compete native species. Id. at 26.
28. See McMahan, supra note 3, at 522.
29. See supra note 3.
30. 16 U.S.C. § 1532(6) (2000). This protection does not extend to members of the "Class Insecta determined...to constitute a pest whose protection...would present an overwhelming and overriding risk to man." Id.
foreseeable future throughout all or a significant portion of its range." \(^3^1\) These definitions have provided the basis for state legislators seeking to define the same terms. However, fundamental terms such as "endangered" and "threatened" can have different meanings in various legal, scientific, and management contexts. \(^3^2\) This article uses the term "protected species" to refer generally to a species that receives legal protection under federal or state law and specifies the meaning of terms such as "endangered" or "threatened" when using them in a federal or state context.

Biologists draw a distinction between rarity and endangerment in the context of plant species. \(^3^3\) Rarity is an expression of the pattern of distribution and abundance of a species at a specified time. \(^3^4\) That is, some plants naturally occur less frequently than others. \(^3^5\) Endangerment refers to factors (generally human related) that make a particular species more susceptible to decline or extinction. \(^3^6\) Typically, a species that occurs infrequently is more susceptible to decline or extinction than one that occurs frequently. \(^3^7\) Thus, almost all species that are susceptible to endangerment are rare. \(^3^8\) However, biologically speaking, a species that is rare will not necessarily suffer decline or extinction.

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\(^3^1\) Id. § 1532(20).

\(^3^2\) Thus, it is useful for biologists, resource managers, and lawyers to be aware of differences in terminology among different fields. See infra Part IV.A.

\(^3^3\) See, e.g., Larry E. Morse, Plant Rarity and Endangerment in North America, in RESTORING DIVERSITY: STRATEGIES FOR REINTRODUCTION OF ENDANGERED PLANTS 7, 7-8 (Donald A. Falk et al. eds., 1990). Scientific names are especially important in the case of discussing a plant species, which often has several different common names. The scientific name is "the key to unlocking the vast body of information in the world's technical literature" and avoids the confusion that can arise from the use of common names. DANIEL B. WARD, RARE AND ENDANGERED BIOTA OF FLORIDA: PLANTS xi (1979).

\(^3^4\) Morse, supra note 33, at 7-8. One author illustrates rarity by pointing out that, "[w]hen Columbus landed in the Americas five centuries ago, presumably there were many rare species among the native plants of the Western Hemisphere. Some of these may have become more common in the following centuries, while others have become more rare." Id.

\(^3^5\) Some plants may occur in only a particular microhabitat or set of environmental circumstances. For example, the San Felasco spleenwort (Asplenium monanthes) was only found in a particular rocky ravine in San Felasco Hammock, Alachua County, Florida. Six plants were recorded as present in 1969, but the species has not been seen since and is believed extinct. WARD, supra note 33, at xvii-xix.

\(^3^6\) Morse, supra note 33, at 7.

\(^3^7\) Id.

\(^3^8\) However, even very common species can be susceptible to endangerment by threats such as exotic pests or disease. See id. One example of this situation is the decline of the American chestnut (Castanea dentata) in the United States. Id. Commercial exploitation can also reduce a common species' abundance, as is the case with various species of cacti and the American ginseng (Panax quinquefolius). Id. at 8.
Nevertheless, the distinction between rare species and those plant species that are susceptible to decline or extinction may be unnecessary for conservation purposes. There are limitations to available scientific knowledge about many rare plant species, and it is difficult to determine whether a scarce plant is susceptible to endangerment or not. Furthermore, the fact that a plant occurs less frequently increases the likelihood of its future endangerment. Thus, a comprehensive approach to rare plant protection requires protecting plants that are scarce as well as those that are susceptible to endangerment. This article frames the issue broadly in terms of the protection of rare plant species as opposed to only “endangered” or “threatened” plant species.

D. Florida’s Rare Plant Species

Florida is a particularly relevant case study for examining rare plant protection because it is among the states with the greatest plant diversity, along with Hawaii, California, and Texas, and is representative of the major threats to rare plant species. There are approximately 3500 species of vascular plants in Florida, the majority of which are native. Florida also has a high number of globally rare plant species, a number of which are found nowhere else on earth.

Rare plant species typically require a particular set of environmental conditions, or microhabitat, in order to grow. The

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39. See infra Part II.E.
40. See infra Part III.F.
41. Defining the level of scarcity necessary to merit concern presents major problems within the scientific community. See discussion infra Part II.E.
42. See discussion infra Part III.F.
43. See George D. Gann & Noel L. Gerson, Focus: Rare Plant Mitigation in Florida, in RESTORING DIVERSITY: STRATEGIES FOR REINTRODUCTION OF ENDANGERED PLANTS 373, 373 (Donald A. Falk et al. eds., 1990).
44. WARD, supra note 33, at xi. Ward classified 2523 species (73 percent) as native and 925 species (27 percent) as introduced. Gann & Gerson, supra note 43, at 374 (citing Daniel Ward, How Many Plant Species Are Native to Florida?, 9 THE PALMETTO No. 4, at 3-5 (1990)). Ward notes that it is typically native plants that “generate the most intense biological interest, the most intriguing problems in plant distribution and classification, and the greatest appeal to those who see in its flora the characteristics and charm that make Florida unique.” WARD, supra note 33, at xi.
45. See Morse, supra note 33, at 9; Gann & Gerson, supra note 43, at 374. Estimates of the number of endemic species in Florida have varied among different taxonomists. Id. Harper listed 427 endemic species for the state, approximately one-sixth of the state flora. Id. However, Muller listed only 235 endemic vascular plants and 40 near endemics for the state, or approximately eight percent of the total flora. Gann & Gerson, supra note 43, at 374.
46. One author eloquently explains how rare plants often are uniquely adapted to their environments:
specificity of habitat requirements of rare plants increases the susceptibility of rare plant species to endangerment, particularly when humans alter habitats occupied by rare plants. Thus, for the purposes of biological study, knowledge of the precise habitat in which a rare plant grows is often of greater significance than a more general geographic description of the range in which the plant occurs.\textsuperscript{47}

As is the case in many other parts of the United States, the native plant species of Florida have been negatively affected by habitat disturbances.\textsuperscript{48} Development pressures have affected portions of Florida for over 400 years.\textsuperscript{49} These anthropogenic disturbances have included logging and agriculture in the northern portions of the state, conversion to citrus in central Florida, and drainage in southern Florida.\textsuperscript{50} More recently, urban and suburban development and a variety of other activities, from phosphate mining to fish farming, represent major sources of habitat destruction.\textsuperscript{51} As a result, large portions of the habitats of Florida's native plants have been lost.\textsuperscript{52} Some of the habitats with concentrated endemism and scarcity, such as the Lake Wales Ridge and the Miami Rock Ridge, "have been all but obliterated."\textsuperscript{53}

In addition to habitat destruction, a significant number of rare plant species are being destroyed by selective removal from undisturbed

\begin{quote}
Sometimes they live on the cutting edge of exploratory probing...they occupy niches that have always been rare. Whatever the explanation of their rarity, they offer evidence, promise, and memory of an inventive natural history. Even more poignantly than the common, they are a sign of life persisting in struggling beauty, flourishing, pushing on at the edge of perishing. The rare flower—if one opens to a wider, philosophical perspective—offers a moment of perennial truth. Life is a many-splendored thing; extinction of the rare forms dims this luster.

Rolston, supra note 8, at 56.
\end{quote}

\textsuperscript{47} For information on the relative distribution of different habitats in Florida in which rare plants occur, see Table 17-2 in Gann & Gerson, supra note 43, at 376. See also WARD, supra note 33, at xii. Field botanists typically search for a given species by first referring to the general area where the plant may be expected to be found according to mapped distribution and then looking for the habitats or plant associations in which the species is known to occur. \textit{Id.}

\textsuperscript{48} See Gann & Gerson, supra note 43, at 374.

\textsuperscript{49} \textit{Id.} at 374–75.

\textsuperscript{50} \textit{Id.} at 375.

\textsuperscript{51} \textit{Id.}

\textsuperscript{52} \textit{Id.} Over 90 percent of the high pine community has been lost. \textit{Id.} Similarly 85 percent of the Florida scrub habitat, over half of the wetlands, and at least 20 percent of coastal uplands have been lost. \textit{Id.}

\textsuperscript{53} \textit{Id.} The Lake Wales Ridge is an elongated area of raised and usually dry soils that extends from central Highlands County to Marion County. WARD, supra note 33, at xv. This area contains a larger number of endemic plant and animal species than anywhere else in the state. \textit{Id.}
habitat. One botanist explains that "[a]n active trade exists in Florida, partly commercial but largely informal, by which plants are gathered from the wild and distributed to horticulturists and hobbyists for backyard and greenhouse cultivation." It has been especially difficult to protect certain species from horticultural collectors. These species include orchids, bromeliads, cacti, ferns, and insectivorous species. Such pressures from collecting may be more pronounced among plant species than animal species.

In addition to habitat disturbance and collection, exotic plant species pose a significant threat to Florida's rare plant species. Hundreds of exotic plants have been introduced into Florida, a number of which are aggressive invasive species that are significantly damaging native ecosystems. One 1995 study notes that "[w]ithin the U.S., probably only in Hawaii have non-indigenous plants had a more detrimental effect on native plant communities." Notable examples of invasive plants include the Brazilian pepper (Schinus terebinthifolius), which has overrun thousands of acres of Everglades National Park, and trees such as melaleuca (Melaleuca quinquenervia) and Australian pine (Casuarina equisetifolia). Similarly, hydrilla (Hydrilla verticillata) is an invasive aquatic plant species that presents serious problems within Florida's

54. Ward, supra note 33, at xiii.
55. Id.
56. Id.
57. Id. There has been "rapacious collecting" of certain rare plant species, even within protected areas such as the Everglades National Park, state parks, and other federal and private preserves. Id.
58. Species of the orchid family (Orchidaceae) are especially coveted by collectors. See SUSAN ORLEAN, THE ORCHID THIEF (2000). This national nonfiction bestseller, subtitled "A True Story of Beauty and Obsession," describes the arrest and subsequent trial of four individuals involved in a scheme to steal orchids from Fakahatchee strand in Florida. This book describes the passion that collectors have for rare orchid species. The Fakahatchee is a cypress swampland that supports a multitude of tropical species not found elsewhere in the state. WARD, supra note 33, at xv, xvii.
59. The collecting of rare wild cacti presents a major problem both nationally and internationally. See McMahan, supra note 3, at 521 n.26. Several western states have enacted stringent laws to control trade in these rare species. Id. at 543–45. See, e.g., ARIZ. REV. STAT. §§ 3-901–908; California Desert Native Plants Act, CAL. FOOD & AGRIC. CODE §§ 80001–80075 (2004).
60. WARD, supra note 33, at xiii.
61. See ACTION PLAN, supra note 2, pt. II(C)(2)(e).
62. Id.
63. Id. pt. III(C)(5)(b).
waterways. Hydrilla can literally choke waterways to the point of impeding navigation.

Invasive plant species such as melaleuca and hydrilla not only dominate disturbed sites, but they also out-compete native species and replace native communities. One of the key factors in the success of invasive plant species is the absence of coevolved biological controls, which limit the spread of these plant species within their natural ranges. Halting the spread of invasive plant species has proved difficult, and a good deal of money has been spent on control efforts. As a result of these problems, there has been increasing recognition of the need for a statewide plan to deal with exotic species issues in Florida.

E. The Difficulty of Studying Rare Plants and the Lack of Available Data

The difficulty of studying rare plants in Florida, as well as the current lack of available data, exemplifies the struggles of researchers and resource managers in many states. One factor that complicates the study and conservation of rare plants is the lack of uniformity of identification of plant species. Some species are inherently more difficult to identify than others, such as those having very small flowers or a close resemblance to another species. In contrast, other species have large, distinctive flowers or other features that make the plant more notable to the observer. Plants differ from animals in that there is a

65. Id.
67. Id. See discussion supra notes 27-28 and accompanying text.
68. Id. Nearly $2 million has been spent on melaleuca control in Everglades National Park and nearby Big Cypress National Preserve since the mid-1980s. Id. Exotic plant control projects have been promoted and facilitated by the Exotic Pest Plant Council, a non-profit organization of agency biologists and private individuals that has assisted municipalities and agencies in the development and implementation of exotic pest plant control programs. Id.
69. Flowers play an important role in the identification of plant species. Plants with small flowers, such as grasses, can be especially hard to identify to the species level of taxonomy. Ward, supra note 33, at xi.
70. This fact poses an epistemological problem: there is generally more scientific information available for plant species that are distinctive and noticeable to humans. Thus, the available knowledge about rare plants and designation of protected status heavily reflect human aesthetics and values. "Of the many plant species that are declining in number, a relative few may be singled out for concern because of their beauty, their historical interest, or their biological importance." Ward, supra note 33, at xi.
higher degree of variation among individuals within a species. In addition, two populations of the same species may have different characteristics as a result of environmental factors.\textsuperscript{71} As a result, there can be disagreement among plant taxonomists (botanists specializing in plant identification and classification) about whether two individual plants are the same species.\textsuperscript{72}

The difficulty of identifying and studying particular species also causes problems with the uniformity of decisions as to whether a plant species is in need of legal protection. While it is desirable that two plant species with similar levels of endangerment are afforded the same protected status, there are inherent obstacles to the uniformity of such decisions considering the present level of knowledge.\textsuperscript{73} Certain plant families,\textsuperscript{74} usually those with small, inconspicuous flowers and those that contain a large number of species, are markedly underrepresented in terms of being afforded protected status.\textsuperscript{75} Thus, it is estimated that the actual number of rare plants in danger of extinction in Florida may be greater than the listed number by a factor as small as two or as large as seven.\textsuperscript{76}

Another factor that makes determining the level of endangerment of rare plant species difficult is the fact that it is much harder to determine whether or not a plant species is extinct than is the case with many animal species.\textsuperscript{77} Unlike animals, plants are capable of asexual reproduction. Furthermore, many plants are adapted for existence in small groups or as scattered individuals. Such properties enable many species of plants to survive even though there are only a few individuals left. As a result, statements about the extinction or extirpation\textsuperscript{78} of a plant

\begin{itemize}
\item \textsuperscript{71} See Lynn S. Kutner & Larry E. Morse, Reintroduction in a Changing Climate, in RESTORING DIVERSITY: STRATEGIES FOR REINTRODUCTION OF ENDANGERED PLANTS 23, 29 (Donald A. Falk et al. eds., 1990).
\item \textsuperscript{72} For example, J.K. Small, who estimated the total number of species in Florida, has been characterized as a taxonomic "splitter," and thus his estimate for the total number of species is higher than that of others. See Gann & Gerson, supra note 43, at 373–74.
\item \textsuperscript{73} See WARD, supra note 33, at xii.
\item \textsuperscript{74} Families are a broader level of taxonomic classification than species. See supra note 33.
\item \textsuperscript{75} WARD, supra note 33, at xii.
\item \textsuperscript{76} See id. at xii.
\item \textsuperscript{77} Id. at xvii. Extinction is harder to document in plants than in animals, particularly when compared with birds and large mammals. Id. Animals, which are higher on the food chain, typically occur in fewer numbers than plants and are often more noticeable. Id. Furthermore, because animals are mobile, they occupy a niche that is larger than that of plants and, thus, are more readily observed at some point in their daily or yearly cycle. Id.
\item \textsuperscript{78} Extirpation describes local extinction. Although it is equivalent to extinction for a given area, it is still possible that a species may be reintroduced by human intervention or other means. Id.
\end{itemize}
species tend to be less certain than those about an animal species.\textsuperscript{79} Often a plant species thought to have become extinct will be found at another location or in another growing season.\textsuperscript{80}

The fact that rare plants occur infrequently increases the difficulty of compiling scientific information about them. In addition, the large number of plant species and variety of habitats in Florida,\textsuperscript{81} as well as the high degree of interregional and seasonal variability,\textsuperscript{82} makes it even more challenging to study rare plants in the state. In addition, there has been relatively little research involving rare plants in Florida.\textsuperscript{83} Thus, there are serious limitations to the available scientific knowledge about rare plant species,\textsuperscript{84} which complicates the legal protection and management of rare plant species.\textsuperscript{85}

\section*{III. EXISTING LEGAL PROTECTION FOR RARE PLANT SPECIES}

\subsection*{A. The Distinction between Plants and Animals at Common Law}

While an in-depth analysis of the historical evolution of differences between treatment of plants and animals at common law is beyond the scope of this article, it is important to acknowledge that there has traditionally been a legal distinction between flora and fauna.\textsuperscript{86} This distinction has shaped the existing legal protection for plant species. American plant protection law began as a facet of wildlife law, but parallels between wildlife law and plant law are limited.\textsuperscript{87}

\begin{footnotesize}
\begin{enumerate}
\setcounter{enumi}{78}
\item See \textit{id.} \textsuperscript{79}
\item WARD, \textit{supra} note 33, at xvii. \textsuperscript{80}
\item See \textit{id.} at xii. \textsuperscript{81}
\item ACTION PLAN, \textit{supra} note 2, pt. III(C)(1). \textsuperscript{82}
\item See \textit{id.} \textsuperscript{83}
\item See \textit{WARD, supra} note 33, at xii. In addition, the fact that there are relatively few botanists in Florida and the absence of a published state's flora further limit the available scientific information. \textit{Id. A possible solution is to increase the funding for research involving Florida's rare plant species. See infra Part IV.B.} \textsuperscript{84}
\item See \textit{WARD, supra} note 33, at xi. Ward notes that,\
\[\text{[i]f protective measures are to be effective, a sizable amount of information about the plant must be gathered: its taxonomy, its description, its range, its habitat, the basis for its classification according to its level of endangerment, and the observer's recommendations as to how its population decline can be halted.}\] \textit{Id.} \textsuperscript{85}
\item For a more thorough treatment of this evolution, see McMahan, \textit{supra} note 3, at 526–33; see generally MICHAEL BEAN, THE EVOLUTION OF NATIONAL WILDLIFE LAW (rev. & expanded ed., 1983) (a comprehensive treatise). \textsuperscript{86}
\item Coggins & Harris, \textit{supra} note 3, at 271. \textsuperscript{87}
\end{enumerate}
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At early English common law, the legal characteristics of plants differed significantly from those of animals. Because of their mobility, wild animals were regarded as incapable of individual ownership. Although an individual might have had a temporary possessory interest in a wild animal on his or her property, that interest was extinguished if the animal escaped from the individual’s control. However, in the case of plants, the ownership of an individual plant accompanied the title to the property on which it grew. It seems that the most important reasons for the distinction between plants and animals was the limited mobility of plants rather than their classification as plants.

Wildlife law usually considers the overall health of species populations before authorizing the taking of valuable game. In contrast, most plant protection laws, including the ESA and other statutes discussed in this article, are concerned with species in imminent danger of extinction. These laws fail to protect a plant species before its population has declined to the point of being threatened or endangered.

In many ways, wildlife law is more developed than the law of plant protection and is capable of providing more comprehensive protection for animal species. The fact that there have traditionally been legal distinctions between plants and animals helps explain the discrepancy of protection levels for plants and animals under statutes, such as the ESA, that address both.

88. Id. at 271 n.173; McMahan, supra note 3, at 526. This categorization facilitates the marketability of crops, generally regarded as personalty, and reflects the rationale that such crops do not permanently enhance the value of the realty. Coggins & Harris, supra, at 271 n.173.

89. McMahan, supra note 3, at 526 (citing 2 W. Blackstone, Commentaries *14). See also Pierson v. Post, 3 Cai. R. 175 (N.Y. Sup. Ct. 1805) (describing the historical development of the rule of capture, by which title to wild animals could be obtained).

90. McMahan, supra note 3, at 528. See also Woodland v. Lyon, 298 P.2d 380, 381 (Idaho 1956) (grasses growing from perennial roots are real property).

91. See McMahan, supra note 3, at 526 n.54. Sedentary animals, like oysters or mussels, have been held to be owned by the owner of the property to which they are affixed. Id.

92. See McMahan, supra note 3, at 528. By the late 1800s, most states had laws to preserve and protect wild game, and the U.S. Supreme Court upheld such laws as being within the state’s right, as owner of the game and wielder of police power. Id. See Geer v. Connecticut, 161 U.S. 519, 528 (1896) (upholding a Connecticut law that prohibited the possession of certain game birds with intent to ship them out of state), overruled by Hughes v. Oklahoma, 441 U.S. 322 (1979).

93. Coggins & Harris, supra note 3, at 271.

94. See id. at 272.
Federal authority for rare plant conservation is derived from the same constitutional bases as federal conservation measures for wildlife, including the constitutional powers of treaty, property, and commerce.96 This section focuses on the Endangered Species Act, which is the cornerstone of federal rare plant protection within the United States.97 The ESA is also one of the primary sources of legal protection for rare plants within individual states.98 Several sections of the ESA are especially relevant for protecting plant species.99 However, the Act is not without weaknesses regarding plant species protection, and these weaknesses warrant discussion.100

95. This article focuses on the domestic protection for rare plants, but international protection also plays an important role in rare plant protection. The United States is a signatory to two international treaties that are intended to protect plants as well as animals: the 1940 Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (Western Hemisphere Convention) and the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Coggins & Harris, supra note 3, at 266–67. The purpose of the Western Hemisphere Convention is to promote cooperation among the signatories to conserve plant and animal species in their native habitats. Id. at 267. The purpose of the 1973 CITES Convention, agreed to by 80 nations, is to control trade in species threatened by over harvesting. Id. As implemented domestically, these two treaties contribute to both international and domestic plant preservation efforts. Id. However, several critics of such treaties note that the level of implementation falls short of meeting the goals stated in the treaties. See generally Jonathan Kazmar, The International Illegal Plant and Wildlife Trade: Biological Genocide?, 6 U.C. DAVIS J. INT’L L. & POL’Y 105 (2000) (discussing the problems with illegal trafficking of plant and animal species).

96. For further explanation of these constitutional bases, see McMahan, supra note 3, at 533–37.

97. See Coggins & Harris, supra note 3, at 278 (tracing the evolution of the ESA through various amendments and emphasizing the particular parts of the statute that are relevant for plant conservation).

98. Indeed, most state legal protections for rare plants are modeled after the ESA. See Jeffrey J. Rachlinski, Protecting Endangered Species Without Regulating Private Landowners: The Case of Endangered Plants, 8 CORNELL J. L. & PUB. POL’Y 1, 11 (1998).

99. There has been a considerable amount of scholarly attention focused on the ESA and it is impossible to summarize in a single article all of the issues that may have bearing on the protection of rare plants. For a more complete guide to interpreting the ESA generally, see DANIEL J. ROHLF, THE ENDANGERED SPECIES ACT: A GUIDE TO ITS PROTECTIONS AND IMPLEMENTATION (1989). For a more thorough analysis of the implications of the ESA for rare plant species and an historical treatment of the evolution of these prohibitions, see Coggins & Harris, supra note 3, at 278–304.

100. This article focuses on the major limitations of the ESA’s protections for plants compared to those for animals. For a more complete analysis of the limitations of the ESA in its ability to protect species generally, see Coggins & Harris, supra note 3, at 278–304.
Section 4 of the ESA provides a listing process for designating which species are entitled to legal protection. The U.S. Fish and Wildlife Service (FWS) has primary responsibility for implementing the ESA on land and in freshwater habitat. Section 4 requires the FWS to determine whether a species is endangered or threatened and to designate critical habitat for these species. Section 4 also requires the FWS to develop and implement a recovery plan designed to facilitate species recovery to the point that the listed species no longer needs the Act's protections. The FWS has listed significantly fewer plant species than animal species, which reflects the discrepancy between the treatment of plants and animals under the ESA.

Section 7 of the ESA protects endangered and threatened species from being harmed by the actions of federal agencies. All federal agencies must insure, through a consultation process with the FWS or National Marine Fisheries Service (NMFS), that their actions are "not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification" of such species' habitats.
of such species’ critical habitat. In addition to the consultation requirement, Section 7 also states that federal agencies shall carry out “programs to conserve endangered and threatened species.”

Section 9 of the ESA provides protection for endangered species by prohibiting certain actions by any “person,” including any corporation or government entity. Section 9’s restrictions on individual actions differ with regard to plants and animals. Section 9 makes it unlawful to “take” any endangered animal species, including on privately owned land. The ESA defines “take” as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in any such conduct.” The FWS’s expanded definition of “take” includes any “significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.”

Originally, the ESA did not prohibit the taking of listed plants. A provision added in 1982 made it illegal to “remove and reduce to

108. Id. § 1536(a)(2). In Tennessee Valley Authority v. Hill, 437 U.S. 153, 173–74 (1978), the Supreme Court strictly interpreted the language of Section 7, requiring that the completion of a major public works project (the Tellico Dam) be halted because of its potential adverse impact on a small species of fish called a Snail darter. Later, Congress passed an exemption that allows a federal action to continue, despite the fact that it may “jeopardize” a species, if a Cabinet-level “Endangered Species Committee” grants approval of the action. 16 U.S.C. § 1636(e)–(h) (2000). This committee is commonly referred to as the “God squad” because it has the ability to make decisions about the continued existence of a species.

109. 16 U.S.C. § 1536(a)(1) (2000). However, this provision has been interpreted as being merely an enabling provision rather than a requirement that agencies devote their resources to conservation. Rachlinski, supra note 98, at 4 n.17. See, e.g., Carson Truckee Water Conservancy Dist. v. Clark, 741 F.2d 257 (9th Cir. 1984) (holding that the ESA allows, but does not require, a federal agency to take steps to encourage the recovery of a listed species).

110. 16 U.S.C. § 1538 (2000). The prohibitions of section 9 regarding endangered species generally apply to threatened species, except as the secretary has specified otherwise. Id. § 1538(a)(C).

111. Id. § 1538(a)(1)(B)–(C).

112. Id. § 1532(19).


114. See Coggins & Harris, supra note 3, at 278 n.227 and accompanying text. However, the original version of the ESA contained several provisions that explicitly addressed plants. For example, one section directed the Secretary of the Smithsonian Institution to prepare a report on endangered and threatened plant species and to recommend necessary conservation measures. Coggins & Harris, supra note 3, at 279. This Smithsonian Institution report, which was first published in January of 1975, listed more than 3000 native plants thought to be extinct, threatened, or endangered. Id. This report has been expanded and reprinted in book form. See generally AYENSU & DEFILIPPS, supra note 27. The FWS later published a notice announcing that the report had been accepted as a petition under the ESA to list the plants in the report as endangered or threatened. Coggins & Harris, supra
possessions" or "maliciously damage or destroy" any listed plant on federal land.\textsuperscript{115} The FWS has interpreted the phrase "remove and reduce to possession" to proscribe the removal of an endangered plant only when combined with possession of the plant.\textsuperscript{116} In the case of vandalism or other forms of destruction that do not involve possession, section 9 is not violated.\textsuperscript{117}

In the case of plants not occurring on federal land, section 9 only prohibits removal of an endangered plant if it is removed in knowing violation of state law.\textsuperscript{118} The ESA makes it illegal to "remove, cut, dig up, or damage or destroy" a listed plant "in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law."\textsuperscript{119} Absent any state restriction, however, private landowners are free to destroy listed plants on their property.

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\textsuperscript{115} 16 U.S.C. § 1538(a)(2)(A)-(E) (2000). This provision states:

Except as provided in sections 1535(g)(2) and 1539 of this title, with respect to any endangered species of plants listed pursuant to section 1533 of this title, it is unlawful for any person subject to the jurisdiction of the United States to—

(A) import any such species into, or export any such species from, the United States;

(B) remove and reduce to possession any such species from areas under Federal jurisdiction; maliciously damage or destroy any such species on any such area; or remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law;

(C) deliver, receive, carry, transport, or ship in interstate or foreign commerce, by any means whatsoever and in the course of a commercial activity, any such species;

(D) sell or offer for sale in interstate or foreign commerce any such species;

or

(E) violate any regulation pertaining to such species or to any threatened species of plants listed pursuant to section 1533 of this title and promulgated by the Secretary pursuant to authority provided by this chapter.

\textsuperscript{116} Coggins & Harris, supra note 3, at 296. Thus, only if a person removes an endangered plant from land under federal jurisdiction and continues to possess it would the provisions of the Act be violated. Id. The agency cited the collection of plants, the transplantation of plants to non-federal property, and the gathering of seeds or cuttings as examples of prohibited activities. Id. The prohibition of such activities may prevent concerned individuals from attempting to transplant or preserve the genetic material of rare plants that are about to be destroyed by the activities of private individuals. However, many transplant efforts are unsuccessful. See infra note 138.

\textsuperscript{117} Coggins & Harris, supra note 3, at 296.


\textsuperscript{119} Id.
The ESA even ignores landowners who intentionally or maliciously destroy listed plants on their property. Destruction of endangered plant species and their habitats by owners who are resentful of the presence of the plants on their property has been documented in several instances.\textsuperscript{120} Similarly, destruction by landowners that is incident to activities such as land development does not violate ESA regulations.\textsuperscript{121} In addition, the Act does not address certain activities that can be especially damaging to populations of rare plant species on private land, such as commercial or private collecting for local sale, collecting for home gardens, and collecting for scientific research and herbariums.\textsuperscript{122}

A 1998 study compared the effect that state statutes restricting private landowners have on protected plant species by comparing the condition of listed plant species with that of animal species within different states.\textsuperscript{123} The results of this study indicate that “plants that depend on private property for their habitat do not fare well, and that they fare much worse in those states that do not restrict private landowners.”\textsuperscript{124} Such results illustrate that legal distinctions between plants and animals under the ESA can have real world effects on rare plant species.

In terms of implementation of the ESA in Florida, the FWS has made substantial progress in documenting the distribution and habitats of the state’s rarest plants and has succeeded in developing recovery plans for species in some areas, most notably the Everglades.\textsuperscript{125} In the past, the FWS has been criticized for being slow to add new listings in Florida despite strong evidence of endangerment.\textsuperscript{126} Until recently, FWS recovery plans have been criticized as being “formulaic documents that
provided little guidance for resource managers" and funding for these plans was very limited. However, there may be a trend toward a more comprehensive and effective approach to executing recovery plans within Florida.

C. State Protection for Rare Plant Species: Florida as a Case Study

Most states have adopted their own endangered species statutes, some of which explicitly provide protection for rare plants. These state laws generally resemble the ESA in that they establish procedures for designating or listing protected plants, regulate certain activities that harm these plants, and impose penalties for violations. The Preservation of Native Flora of Florida statute (PNFFS) and the related Endangered Plant Advisory Council statute (EPACS) are the primary sources of state protection for rare plants in Florida. Essentially, these statutes regulate the harvesting and commercial exploitation of protected plant species. These two statutes function as an analog of the ESA at the state level and are typical of many states’ legislative efforts to protect rare plant species. This section highlights the key provisions of these statutes and explores their limitations.

The PNFFS was intended to "provide recognition of those plant species native to the state that are endangered, threatened, or commercially exploited." The statute provides for the goal of protecting native flora from unlawful harvesting on both public and privately owned lands. The PNFFS also establishes a permitting system in an effort to "provide an orderly and controlled procedure for restricted harvesting of native flora from the wild, thus preventing wanton exploitation of native species of flora." The legislative declaration section also expresses the intent to "encourage the propagation of native species of flora" and to "provide the people of [Florida] with the information necessary to legally harvest native plants

127. Id.
128. See discussion of South Florida Multi-Species Recovery Plan, infra Part III.F.
129. McMahan, supra note 3, at 545.
130. FLA. STAT. ch. 581.185 (2002).
131. Id. ch. 581.186.
132. Under the Act, "harvest" means "to dig up, remove, or cut and remove from the place where grown." Id. ch. 581.185(2)(c).
133. See ACTION PLAN, supra note 2, pt. III(C)(3).
134. See McMahan, supra note 3, at 547 n.183.
136. Id.
137. Id.
so as to ultimately transplant those plants with the greatest possible chance of survival."

The definitions section of the statute establishes three categories of protected plants: endangered, threatened, and commercially exploited. Endangered plants are defined as "species of plants native to the state that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue." Threatened plants are defined as "species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in such number as to cause them to be endangered." Commercially exploited plants are defined as "species native to the state which are subject to being removed in significant numbers from native habitats in the state and sold or transported for sale." The "commercially exploited" category represents a somewhat broader level of protection than that of the ESA, regulating plants that are not yet "threatened" but which may become so in the future. Such a provision can help prevent a species from reaching the higher level of endangerment typically necessary for protection under the ESA.

The Florida Department of Agriculture and Consumer Services (DACS) administers the PNFFS. The DACS is authorized to adopt rules relating to the "listing, delisting, and changing from one category to another category any plant on the Regulated Plant Index." The Regulated Plant Index is the list of plant species that are designated as endangered, threatened, or commercially exploited by the DACS. The

138. It should be noted that transplanting rare plants is difficult and many species cannot be successfully transplanted. One pair of authors notes that "[s]ince many species of rare plants are confined to specialized habitats, these species are particularly difficult to cultivate in the absence of delicately balanced natural conditions." AYENSU & DEFILIPPS, supra note 27, at 49-50.

139. FLA. STAT. ch. 581.185(2) (2002).
140. Id. ch. 581.185(2)(b). This definition also includes "all species determined to be endangered or threatened pursuant to the federal Endangered Species Act of 1973, as amended." Id. It is generally regarded as beneficial for state plant protection laws to incorporate federally designated species. See, e.g., McMahan, supra note 3, at 562.
141. FLA. STAT. ch. 581.185(2)(h) (2002). This definition does not make any explicit reference to threatened species under the ESA. Compare FLA. STAT. ch. 581.185(2)(b) with FLA. STAT. ch. 581.185(2)(h). However, federally threatened species are included in the state's list of protected plants. See FLA. ADMIN. CODE ANN. 5B-40.0055 (2002).
143. Id. ch. 581.185(4).
144. Id. ch. 581.185(2)(f). This list of protected plant species can be found at FLA. ADMIN. CODE ANN. 5B-40.0055. As of 2002, there were 421 plant species listed as endangered, 113 listed as threatened, and eight listed as commercially exploited. Id. Forty-five of those plant species listed as endangered in Florida are federally listed as endangered. See id. Ten of the
Division of Plant Industry within DACS also administers the Conservation Grants Program created by the PNFFS.\textsuperscript{145}

The Endangered Plant Advisory Council, a committee created by the EPACS, consists of seven members.\textsuperscript{146} The specified duties of the Council include advising the DACS about proposals for revising the two statutes, reviewing the species on the Regulated Plant Index, and considering native plants proposed for inclusion.\textsuperscript{147} The Council meets twice annually,\textsuperscript{148} and its agenda typically includes determining whether particular plant species should be added or removed from the list or transferred from one category to another.\textsuperscript{149}

Under the PNFFS, the prohibitions and permit requirements of harvesting activities vary with each level of protection. It is unlawful for any person to willfully destroy or harvest any plant listed as endangered on the Regulated Plant Index that is growing on private or public land without first obtaining the written permission of the landowner or legal representative of the landowner\textsuperscript{150} and a permit from DACS.\textsuperscript{151} Much

\begin{thebibliography}{99}
\bibitem{1} See id. For further explanation and descriptions of the biology of Florida’s listed plants, see generally NANCY COILE, FLA. DEP’T OF AGRIC. & CONSUMER SERV., NOTES ON FLORIDA’S ENDANGERED AND THREATENED PLANTS (2000).
\bibitem{145} The PNFFS established the Endangered or Threatened Native Flora Conservation Grants Program. This program authorizes the Division of Plant Industry of DACS to contract with “qualified corporations” in the private sector for the purpose of “providing recognition of those flora native to the state that are endangered or threatened; and, to encourage, within a controlled program, the protection, curation, propagation, reintroduction and monitoring of native flora that are identified as endangered or threatened.” FLA. STAT. ch. 581.185(11)(a). For more information on the application and selection procedures of the Endangered or Threatened Native Flora Conservation Grants Program, see FLA. ADMIN. CODE ANN. 5B-40.010 (2002).
\bibitem{146} These seven members include the following: one representative of the Florida Federation of Garden Clubs, Inc.; one representative of the Florida Nurserymen and Growers Association, Inc.; one representative of the Committee for Rare and Endangered Plants and Animals; one representative of the Florida Forestry Association; one representative of the Florida Native Plant Society; and two botanists, each of whom shall be a staff or faculty member at a state university. FLA. STAT. ch. 581.186(1)(a). All members of the council shall be appointed for terms of four years. Id. ch. 586.186(1)(b).
\bibitem{147} FLA. STAT. ch. 581.186(3).
\bibitem{148} Telephone Interview with Nancy Coile, Botanist, Florida Dep’t of Agric. & Consumer Serv. (Mar. 29, 2002). The Council is required to meet at least once a year. FLA. ADMIN. CODE ANN. 5B-40.0056(2) (2002).
\bibitem{149} See Procedures for Amending the Regulated Plant Index, FLA. ADMIN. CODE ANN. 5B-40.0056(2). The Department of Agricultural and Consumer Services shall consider the recommendations of the general public and the Endangered Plant Advisory Council in the listing or de-listing of plant species. Id.
\bibitem{150} Florida is the only state that requires permission to harvest on state lands as well as privately owned lands. Rachlinksi, supra note 98, at 13.
\end{thebibliography}
like the ESA, the PNFFS does not prevent a landowner from destroying endangered plants on his or her own property.\textsuperscript{152} Threatened species under the PNFFS are afforded less protection than endangered species because no permit is required to harvest them.\textsuperscript{153} In the case of plants designated as commercially exploited, permission from the landowner is required to harvest any plant, but a permit is only required if three or more plants are harvested.\textsuperscript{154} Thus, the protections available for commercially exploited plants are stronger than those for threatened plants.

The PNFFS limits the transport and sale of protected plants, even by private landowners, but these limitations do not apply to threatened species.\textsuperscript{155} The fact that landowners must have a permit to sell endangered or commercially exploited plants from their land offers more legal protection than that afforded to plants under the ESA. It also reflects the emphasis of the PNFFS on limiting commercial exploitation of rare plants.\textsuperscript{156}

As is the case with the ESA, land development activities are exempt from the provisions of the PNFFS. The PNFFS specifically states that the Regulated Plant Index is “not to be used to regulate construction or other land alteration activities on any property.”\textsuperscript{157} The clearing or other disturbances of land for agricultural, silvicultural, mining assessment, or fire control purposes are also exempt from the statute.\textsuperscript{158} Unlike the ESA, which prohibits federal actions affecting protected species, the PNFFS exempts the clearing of land by a public agency or a publicly or privately owned public utility when acting in the performance of its obligation to provide service to the public.\textsuperscript{159} Thus, the statute provides no protection from many activities that destroy habitat and individual rare plants.

\textsuperscript{151} FLA. STAT. ch. 581.185(3)(a). However, permits issued for federally listed species must be consistent with federal standards. \textit{id.}

\textsuperscript{152} Although it does prohibit the landowner from harvesting plants on his or her property for sale without the appropriate permit. \textit{See id.} ch. 581.185(3)(d).

\textsuperscript{153} It is unlawful to willfully destroy or harvest any threatened plant growing on public or private land without first obtaining the written permission of the landowner or legal representative, but no permit is required. \textit{Id.} ch. 581.185(3)(b).

\textsuperscript{154} \textit{Id.} ch. 581.185(3)(c).

\textsuperscript{155} See \textit{id.} ch. 581.185(3)(d).

\textsuperscript{156} Such protection is more effective in the case of rare plants that are threatened by harvesting or collecting as opposed to other forms of destruction. See discussion \textit{supra} Part II.B.

\textsuperscript{157} FLA. STAT. ch. 581.185(12).

\textsuperscript{158} \textit{Id.} ch. 581.185(8).

\textsuperscript{159} \textit{Id.} ch. 581.185(8)(c).
Perhaps the greatest limitation of Florida's rare plant protection statutes is the fact that they are only designed to regulate the harvesting and commercial exploitation of rare plants, as opposed to providing comprehensive protection for rare plant species. The protected status afforded to plants listed on the Regulated Plant Index can only be used for regulating the harvesting of plants. The EPACS states:

The Regulated Plant Index must be used solely for the purposes specified in s. 581.185 and may not be used for regulatory purposes by other agencies. However, this section does not preclude another agency authorized to protect endangered plants from including one or more species listed on the Regulated Plant Index on a list developed by that agency under its own regulatory authority.\textsuperscript{160}

This language severely limits the use of the Regulated Plant Index for conservation purposes by other agencies. Florida agencies typically involved with conservation programs, such as the Department of Environmental Protection or the Fish and Wildlife Conservation Commission, do not have authority to list plant species. Thus, these agencies cannot use the Regulated Plant Index as a basis for decision making or conservation programs.

Although the EPACS provides for cooperation between relevant state agencies and the Endangered Plant Advisory Council, the extent of this cooperation has been limited.\textsuperscript{161} However, one provision of the statute imposes a specific duty on the Florida Department of Transportation to notify DACS and the Endangered Plant Advisory Council of proposed highway construction.\textsuperscript{162} The Florida Department of Transportation complies with this provision.\textsuperscript{163}

\textsuperscript{160} \textit{Id.} ch. 581.186(3) (emphasis added).
\textsuperscript{161} \textit{Id.} ch. 581.186(4). “The Division of Plant Industry, the Department of Environmental Protection, the Department of Transportation, and the Fish and Wildlife Conservation Commission shall cooperate with the council whenever necessary to aid it in carrying out its duties under this section.” \textit{Id.}
\textsuperscript{162} \textit{Id.} ch. 581.185(10).

The Department of Transportation shall notify the Department of Agriculture and Consumer Services and the Endangered Plant Advisory Council ... of advertised bids for highway construction at the time those bids are first advertised, describing the project, the location of the project, and the representative of the Department of Transportation who can answer questions regarding the project and the plant life immediately affected by the construction.

\textit{Id.}

\textsuperscript{163} E-mail from Terry Zinn, Fla. Dep't of Transportation, Counsel for District 2 (Mar. 22, 2002) (on file with author). It has been noted that the Florida Department of
The Division of Plant Industry’s nursery inspection program is involved in the enforcement of the PNFFS by assuring that nurseries selling native plant species comply with the permitting program. In practice, however, enforcement actions regarding illegally harvested plants are rare. This lack of enforcement could reflect the difficulty of identification of rare plant species and the fact that the primary purpose of nursery inspections by DACS is to inspect for contamination with insect pests and disease.

While Florida’s legislation provides some additional protection for rare plant species that are not listed under the ESA, the extent of this protection is limited to regulating harvesting and commercial exploitation. Unlike the ESA, the PNFFS does not designate critical habitat or require an agency to develop recovery plans for listed species. The DACS is limited in its ability to monitor harvesting, and there is currently no data available on whether the permitting program under this statute has contributed to the survival of Florida’s rare plants. Thus, there is still a need for comprehensive state legislation to protect rare plants in Florida from other threats such as habitat destruction and forms of taking not covered by the existing legislation.

Transportation has been proactive with regard to rare plant conservation and has helped provide funding for rare plant conservation efforts. Telephone Interview with Nancy Coile, supra note 148. For example, one guide to rare plants was funded in part by the Florida Department of Transportation. Id.

164. Telephone Interview with Joe Beckwith, Dep’t of Agric. & Consumer Servs., Div. of Plant Industry (Mar. 15, 2002).

165. Inspectors are required to have a four-year degree in biological sciences and receive additional training from the regional offices of the Division of Plant Industry in Apopka, Winter Haven, Jacksonville, and Gainesville. This training includes familiarization with species of endangered, threatened, and commercially exploited plants. Id.

166. A number of permit applicants are scientists who want to collect samples for herbaria or other research purposes. Id.

After the application is received [by the Division of Plant Industry], it is forwarded to an inspector in the area who will visit the property and either approve or disapprove the request based on how many plants are to be collected and whether or not the population will be seriously impacted by the collection process. FLA. DEP’T OF AGRIC. & CONSUMER SERV., PLANT INSPECTION, at http://doacs.state.fl.us/onestop/plt/plantinsp.html (last visited Apr. 11, 2004). The application is then returned to the office of the Division of Plant Industry in Gainesville, Florida, reviewed by a botanist, and approved or disapproved. If the proposed harvesting activity is approved, a permit is issued. Id.

167. Telephone Interview with Joe Beckwith, supra note 164. The DACS Division of Plant Industry typically receives approximately 30 permit applications each year. Id. Most applicants are granted permits, although sometimes conditions are imposed in these permits, such as limiting the number of individuals harvested and the timing of harvesting. Id.
D. Local Regulation and Other Laws That Provide Indirect Protection for Rare Plants

This article focuses on the federal and state laws that provide direct legal protection for rare plants in Florida. However, it is important to note that a variety of regulations exist at the local government level and may provide direct protection for native vegetation generally and rare plants in particular. Other mechanisms for plant preservation are found in a number of federal, state, and local regulations that provide indirect protection for rare plants. Such laws may be especially useful for protecting the habitats of rare plant species.

In Florida, local governments have a good deal of authority to protect rare plants and their habitats through their home rule powers and the Growth Management Act. A number of counties and municipalities have developed local ordinances protecting wetlands, uplands, and coastal resources. It is arguable that in many cases such ordinances "offer the only substantive protection to uplands and upland-dependent endangered species." For example, Monroe County, which contains a number of unique plant communities associated with the Florida Keys, "has adopted a policy whereby the buildable portion of a previously undeveloped lot is determined by the character and condition of the existing vegetation." A smaller area of land may be developed when rare native vegetation communities are intact. This is not true when exotic plants are a prominent component of the vegetation. In addition, these regulations require that native vegetation on the undeveloped portions of the lot be maintained. These types of local land use regulations, which are capable of supplementing existing federal and state protections, may play an increasingly important role in rare plant conservation efforts in Florida and throughout the United States.

Similarly, a number of federal, state, and local laws provide indirect protection for rare plants. At the federal level, the Clean Water Act and other environmental laws protect wetlands and uplands. At the state level, Florida's Local Government Comprehensive Planning and Land Development Regulation Act, which is often referred to as the "Growth Management Act," requires each local government in Florida to adopt a comprehensive land use plan for lands within its jurisdiction. Local governments may only approve or authorize development and enact land development regulations in conformity with the adopted comprehensive plan.

168. FLA. STAT. ch. 163.3161–3217. Florida's Local Government Comprehensive Planning and Land Development Regulation Act, which is often referred to as the "Growth Management Act," requires each local government in Florida to adopt a comprehensive land use plan for lands within its jurisdiction. Id. ch. 163.3167(b). Local governments may only approve or authorize development and enact land development regulations in conformity with the adopted comprehensive plan. Id. ch. 163.3167(c).


170. Id.

171. ACTION PLAN, supra note 2, pt. III(C)(3).

172. Id.

173. Id.
Act’s wetlands protection provisions under section 404 can help preserve habitat for rare plant species. Many states and local government entities have additional wetland regulations that can further guide the protection and management of such areas. These types of laws provide important protection for rare plant habitats. While such habitat protection provides secondary protection for rare plants, it is an important part of a comprehensive approach to protecting rare plants.

E. Non-Regulatory Approaches to Rare Plant Conservation

Despite the significant limitations of legal protection for rare plants in Florida, there are currently a variety of conservation programs for rare plant species underway in the state. Non-regulatory programs, which also play an important role in plant conservation throughout the United States, reflect the efforts of federal, state, and local governments, as well as non-governmental organizations. This section gives an overview of some of the non-regulatory approaches to rare plant protection that are being used in Florida, as well as other parts of the country.

The Florida Natural Areas Inventory is a notable non-governmental program that has been involved in the identification of rare plant species and the designation of habitats. This organization attempts to provide standardized designations for levels of endangerment of species, including plants, and maintains a database that can be used by management and land use decision makers. The Florida Natural Areas Inventory has succeeded in convincing plant scientists to contribute to and use its Element Occurrence database, which includes an extensive list of rare plants that are declining. It is notable that Florida’s Regulated Plant Index fails to list a number of species identified as needing protection by the Florida Natural Areas Inventory.

174. See 33 U.S.C. § 1344 (2000) (regulating the discharge of dredge and fill material into “waters of the United States” and establishing a permit program to ensure that such activities comply with environmental criteria). The U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency administer this program.

175. For example, Florida has a comprehensive water law system that, among other things, regulates certain activities in surface waters and wetlands. Management and Storage of Surface Waters, FLA. STAT. ch. 373.413–416 (2003). In many cases, an individual must obtain an environmental resource permit before engaging in these activities. Id. ch. 373.411 (requiring a permit and compliance with conditions to assure that certain activities will not be harmful to the water resources of the area).

176. See further discussion infra Part III.F.


178. Id.

179. Telephone Interview with Nancy Coile, supra note 148.
Another organization that has been active with rare plant protection in Florida and throughout the United States is the Center for Plant Conservation (CPC). The CPC is a national coalition of botanical institutions, including 29 of the nation's leading botanical gardens and arboreta, dedicated to preventing the extinction of America's native flora.\textsuperscript{180} Participating Florida institutions include Bok Tower Gardens in Lake Wales and Fairchild Tropical Garden in Miami. These institutions represent important sources of ex situ conservation.\textsuperscript{181} The CPC has been involved in one statewide and two regional task forces, composed of plant biologists and ecologists, that have disseminated opinions about rare plant endangerment status.\textsuperscript{182}

Habitat protection is an important part of rare plant conservation. The extent of public and private land acquisition for conservation purposes in Florida is significant. Florida has been described as having "the largest environmentally sensitive land acquisition programs in the U[nite]d S[ates]."\textsuperscript{183} Although some areas such as Everglades National Park are federally owned and managed, a significant number of land acquisition efforts are sponsored by the state.\textsuperscript{184} Land managed by private organizations includes some of the "best-preserved examples of rare native habitat in Florida."\textsuperscript{185} For example, "the Nature Conservancy is the largest private owner of Conservation Areas, managing 42 sites totaling over 15,000 [hectares]."\textsuperscript{186} The National Audubon Society owns and manages the 11,000-acre Corkscrew Swamp Sanctuary, which includes one of the largest

\textsuperscript{180} For a summary of some of the current conservation activities of the CPC's participating institutions, see THE CENTER FOR PLANT CONSERVATION, AMERICA'S VANISHING FLORA: STORIES OF ENDANGERED PLANTS FROM THE FIFTY STATES & EFFORTS TO SAVE THEM 54 (2000).

\textsuperscript{181} "Protection of genetic reserves in botanical gardens and in seed banks is generally referred to as 'ex situ' conservation. Although such facilities can serve as repositories for plant genes, most authorities consider them less desirable as a long-term preservation method than 'in situ' conservation areas as nature reserves." Coggins & Harris, supra note 3, at 266 n.124.

\textsuperscript{182} ACTION PLAN, supra note 2, pt. III(C)(1).

\textsuperscript{183} Id. III(C)(3).

\textsuperscript{184} Id. Three of the largest state programs are (1) Preservation-2000, (2) Conservation and Recreation Lands (CARL), and (3) Land Acquisition Trust Fund. Id. In recent years the Division of State Lands in the Department of Environmental Protection has allocated approximately $300 million annually for land purchases. Id.

\textsuperscript{185} Id. at III(C)(5)(b).

\textsuperscript{186} Id. The three largest Nature Conservancy sites in Florida are (1) Apalachicola Bluffs and Ravines (2600 ha.), which is notable for the presence of several of Florida's rarest species; (2) Tiger Creek (1900 ha.), which contains many endangered Lake Wales Ridge scrub species; and (3) the Disney Wilderness Preserve (4500 ha.). Id.
remnants of virgin bald cypress forest in the United States.187 Private biological stations, including Archbold Biological Station188 and Tall Timbers Experiment Station,189 own and manage significant portions of rare plant habitat. The resource management objectives of these conservation areas vary. Archbold Biological Station is engaged in pure habitat preservation, while Tall Timbers Experiment Station's objectives include wildlife habitat, timber, and agricultural production.190

F. The Need for a More Comprehensive Approach to Rare Plant Protection

There are three main strategies to conserve rare plant species: (1) protect individual plant species, (2) protect plant habitat, and (3) establish gene banks and botanical gardens.191 “In the United States, legislative efforts at the state, national and international level have been directed chiefly toward the protection of individual species,” while the goal of habitat preservation is often incidental to other purposes.192 Because of the biological characteristics of rare plants and the limitations of scientific knowledge about them, there is a need for protection efforts that maintain a dual focus of protecting both habitat and individual species. This section discusses the need for a comprehensive legal approach to rare plant protection and recent federal conservation efforts in Florida that may reflect such an approach.

It is possible, for purposes of discussion, to subdivide the universe of rare plant species into three categories reflecting the level of knowledge regarding the particular species.193 The first category includes the rare plant species for which there is sufficient scientific information to characterize the species as being in danger of extinction.194 The second


188. “Archbold Biological Station, established by eco-philanthropist Richard Archbold, and funded by an Archbold Expeditions endowment, is a 2,000 ha property on the Lake Wales Ridge consisting of pine flatwoods, sandhills, and scrub.” ACTION PLAN, supra note 2, pt. III(C)(5)(b).

189. Tall Timbers Experiment Station manages a 1600 ha. property north of Tallahassee composed mostly of sandhill vegetation. Id.

190. Id.

191. See supra note 181.

192. Coggins & Harris, supra note 3, at 266.

193. These distinctions are theoretical and merely designed to aid discussion.

194. This “danger” represents a continuum of endangerment, regardless of which terms, such as “endangered” or “threatened,” are used to characterize the immediacy of the endangerment.
category includes rare plants for which there is sufficient scientific information to characterize the plant species as not being in danger of extinction. The third category includes rare plants that are in actual danger of extinction but for which there is not sufficient scientific information to demonstrate this danger.\footnote{For example, a plant may not have been discovered by scientists.}

In order to minimize the decline of rare plant species, each of these three categories of rare plants should be given some type of protection. The rare plants in the first category are known to be in danger of becoming extinct; thus, they are in need of protection to ensure their survival. While the rare plants in the second category are not currently believed to be in danger of extinction, such a judgment is often subject to scientific uncertainties and epistemological factors.\footnote{See supra note 70. For example, a rare plant that has a large or brightly colored flower may be more likely to be observed by biologists than one that has less noticeable flowers. Thus, to an extent, scientific knowledge about rare plants reflects human aesthetics and values.} Furthermore, even if such a plant species is not currently in danger of extinction, the rarity of the species increases its susceptibility to future threats.\footnote{Consider this explanation:
[R]are species do need to be monitored as a part of any study of endangerment because their very low population levels provide little latitude should environmental circumstances change and their numbers begin to decrease; they are the “canaries” whose disappearance signals the onset of new adverse factors of potential significance to other plant species and to man. WARD, supra note 33, at xiv.}

Thus, it is sound conservation policy to offer protection for this second category of rare plants. The third category also requires protection because, although science is not currently aware of the danger of extinction of a rare plant, that plant is nonetheless in danger of extinction.

While each category is in need of protection, effective protection depends on the particular plant species and the level of scientific information available. For example, for the first category of rare plants, one for which there is clear data indicating endangerment, a species-specific approach to legal protection is possible.\footnote{However, even in the case of protecting a single species, some form of habitat protection is necessary. The ESA currently recognizes this need through the requirement that critical habitat be designated for listed species under section 4. 16 U.S.C. § 1533(b) (2000). See discussion of the ESA, supra Part III.B.} Such an approach may be especially useful in the case of plants that are threatened by taking for collection or commercial purposes without major disruption of habitats. However, such a species-specific approach is less workable for the other...
two categories of rare plants and for cases in which habitat loss is the major cause of decline. With regard to the second category, a rare plant that is not believed to be sufficiently in danger to merit legal protection, habitat protection may be the best available means to prevent the plant’s status from declining. In the case of a species in the third category, a species that is unknown to science, it is impossible to engage in single-species protection efforts. For these species, more general habitat conservation may represent the only available means of protection.

This analysis indicates that a comprehensive approach to rare plant protection requires both habitat protection and species-specific protection. These two approaches are complementary conservation tools, the application of which should be determined by situational circumstances such as the type of rare plant or habitat involved, the level of scientific information available, and the nature of the threat to the species. Existing legal protection of rare plant species can be evaluated with reference to this model of rare plant protection.

One of the best examples of the application of a comprehensive approach to rare plant protection in Florida, and perhaps nationally, is the recently developed South Florida Multi-Species Recovery Plan (SFMSRP). The SFMSRP, developed by the FWS pursuant to the ESA, is one of the first recovery plans designed to aid multiple species by attempting to restore ecological communities over a large geographical area. Encompassing an area that includes the 19 southernmost counties in Florida, including the Everglades, the SFMSRP was designed to identify the recovery needs of 68 endangered and threatened animal and plant species and 23 natural communities.

The SFMSRP is designed to achieve its stated conservation goals in three ways: First, it contains all the available information on the distribution, abundance, biology, and ecology of threatened and endangered species and natural communities in South Florida in a single...
document. Second, the information is presented in a format that allows it to be easily imported into documents like biological opinions and environmental impact statements. Third, the plan presents recovery and restoration actions that focus on land management activities to benefit imperiled species and their habitats.202

The SFMSRP addresses the recovery of 35 federally endangered or threatened plant species that occur in South Florida. The "plants" section contains accounts of each federal protected plant species. These accounts characterize the biology, ecology, status and trends, and management for each of these species.203 Each of these species' accounts is followed by a description of the recovery needs of the species outlining the recovery objective, criteria that will be used to determine when the recovery objective is met (called recovery criteria), and the tasks that will be necessary to achieve the objective (called recovery actions).204

One notable characteristic of the SFMSPR is that recovery tasks are divided into two parts: (1) species-level recovery actions that address species-specific conservation and biology and (2) habitat-level recovery actions that address habitat management, conservation, and restoration needs for the species.205 This structure reflects an understanding of the fact that single-species preservation and habitat conservation are complementary plant conservation tools.

The habitat-level recovery actions form the basis for multi-species and community-level restoration actions that are provided in the community accounts sections. The species with distributions outside of South Florida are assigned two types of recovery objectives: first, the recovery objective throughout its range and second, how South Florida will contribute to the species' recovery throughout its range.206

It is too soon to assess whether the more comprehensive approach of the SFMSRP has contributed to enhanced conservation efforts for rare plants in Florida. Nevertheless, the plan reflects at least a symbolic commitment to a more comprehensive approach to rare plant conservation at the federal level. Such an approach has the potential to increase the effectiveness of rare plant conservation efforts.

202. Id.
203. See id. at 4-787.
204. Id.
205. For example, the SFMSRP's entries for the key tree-cactus (Pilosocereus robinii) has both species-specific and habitat-specific recovery goals. See RECOVERY PLAN, supra note 200, at 4-111.
206. Id.
IV. SUGGESTIONS FOR IMPROVING RARE PLANT PROTECTION

An examination of rare plant protection in Florida suggests five general recommendations for improving the protection of rare plants both in the state and throughout the country: (1) encourage interdisciplinary communication and cooperation, (2) increase funding for rare plant research and conservation efforts (3) strengthen existing legal protection and enforcement mechanisms (4) maintain a dual focus of habitat protection and single-species approaches to conservation, and (5) increase awareness of rare plant issues and encourage voluntary cooperation with conservation efforts.

A. Encourage Interdisciplinary Communication and Cooperation

As is suggested by the discussion of the terminology and the science of rare plants in Florida, science and law have somewhat different perspectives on rare plant protection. Management agencies are typically faced with the difficult task of preventing the decline of rare plants in light of scientific uncertainty and relatively weak legal protection. Some scientists have noted that "[l]imited understanding and inadequate communication within the research and the applied aspects of plant conservation have contributed to the superficiality of some Recovery Plans now being produced."²⁰⁷ Biologists may feel frustrated by laws and management plans that make seemingly arbitrary distinctions.²⁰⁸ Meanwhile, those involved with the legal and management aspects may feel frustrated by biologists' failure to recognize the legal and political factors that complicate rare plant protection.²⁰⁹ Recognition that such differences in perspective exist is the first step toward encouraging interdisciplinary communication and cooperation. Similarly, it is necessary for individuals involved with conservation efforts to recognize that terminology can vary among different disciplines.

At the state level, forums such as Florida's Endangered Plant Advisory Council reflect movement toward a forum representative of both governmental and non-governmental interests. However, a more

²⁰⁷. ACTION PLAN, supra note 2, pt. IV (citing D. Schemske et al., Evaluating Approaches to the Conservation of Rare and Endangered Plants, 75 ECOLOGY 584 (1994)).  
²⁰⁸. For example, from a biological standpoint there is little distinction between the ecological value of plants and animals. Thus, biologists may be frustrated with laws such as the ESA that draw a distinction between plants and animals.  
²⁰⁹. As discussed supra Part III.A, there is a long legal history of the distinction between plants and animals at common law. Similarly, there is significant political and legal controversy regarding regulations that may limit individuals' use of their property.
comprehensive listing system, whereby other state agencies could rely on listed plants for broader conservation purposes, would help protect rare plants from threats other than harvesting and commercial exploitation. A 1995 study and action plan by the Southeast Environmental Research Program and the Center for Plant Conservation expresses the need for "a single group within the plant conservation community that brings a non-partisan, expert, plant advocacy voice" to rare plant protection efforts.\textsuperscript{210} The action plan emphasizes that such a forum should consider the following issues: land acquisition priorities, plant collection and reintroduction protocols, impact of potential legislation on native plants, park management policies, and the structure and content of environmental education efforts.\textsuperscript{211} In the case of Florida, the study recommends the formation of the Florida Native Plant Council as a mechanism to provide direction on such issues.\textsuperscript{212} Such a broad entity has not yet been created in the state.

\section*{B. Increase Funding for Rare Plant Research and Conservation Efforts}

There is a strong need for further research to acquire data that can be used in the implementation of rare plant protection. The 1995 study explains that, "[w]hile a significant body of information is now available on the abundance, distribution, and taxonomic characteristics of Florida's rare plants, much less is known about the specific factors that are causing their decline or limiting their expansion, or what might improve their condition."\textsuperscript{213} The study further notes that, "[w]ithout fundamental ecological knowledge of the plants, efforts to rehabilitate failing species rely on guesswork or on restoration models developed for different species or conditions."\textsuperscript{214}

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{210} \textit{ACTION PLAN, supra} note 2, pt. IV(5).
\item \textsuperscript{211} \textit{id.}
\item \textsuperscript{212} \textit{id.} The Center for Plant Conservation suggests that the proposed Florida Native Plant Council should consist of 20 to 30 members, including native plant researchers, managers, and advocates representing a broad range of institutions, disciplines, and geographic regions. \textit{id.} The Center recommends that the institutions and groups invited to participate should include the following: the National Park Service, the FWS, the U.S. Forest Service, the Florida Department of Environmental Protection, the Florida Division of Forestry, the DACS, the Florida Division of Plant Industry, the Florida Fish and Wildlife Commission, state water management districts, county governments, the Florida Natural Areas Inventory, the Nature Conservancy, the Florida Native Plant Society, the Exotic Pest Plant Council, the Endangered Plant Advisory Council, and CPC Florida participating institutions. \textit{id.}
\item \textsuperscript{213} \textit{id.}, pt. IV(1).
\item \textsuperscript{214} \textit{id.}
\end{enumerate}
\end{footnotesize}
In addition, the limited availability of financial support prevents scientists from addressing complex problems that require multi-year observations. The fact that Florida's rare plant protection statutes establish a grant program demonstrates the state's recognition of the need for further research and conservation efforts. However, increased funding is necessary both in Florida and throughout the United States in order to gather necessary data and implement more comprehensive and long-term conservation strategies.

C. Strengthen Existing Legal Protection and Enforcement Mechanisms

At least one author has noted that the greatest single weakness in the ESA and many state laws is the absence of a prohibition against taking protected plants. A major obstacle to enacting take prohibitions is the political concern that such governmental restrictions would create severe limitations on private land use, potentially resulting in a regulatory taking. Nevertheless, some authors have argued that this expansion of protection is a necessary step for plant conservation.

Seven states prohibit private landowners from killing or adversely modifying the habitat of any protected plant. In these jurisdictions, the presence of a listed plant imposes the same restrictions as the presence of a listed animal. One 1998 study, which used FWS data to compare the effects of different state plant protection schemes on rare plants, indicates that such restrictions on private landowners benefit protected species. It is not clear how politically feasible such restrictions would be in Florida or other states.

The study by the Southeast Environmental Research Program and the Center for Plant Conservation makes four main

215. Id. pt. III(C)(1).
216. McMahan, supra note 3, at 562.
217. In the context of regulatory taking, "taking" is used in a different sense than under the ESA. It refers to a "taking" of property when government action directly interferes with or substantially disturbs the owner's use and enjoyment of the property. See Rachlinski, supra note 98, at 1-3; McMahan, supra note 3, at 530-33. Such takings implicate the constitutional protections of the Fifth Amendment, requiring payment or just compensation. See U.S. CONST. amend. V.
218. See generally Rolston, supra note 8. Rolston makes an interesting argument: the ownership of an entire species, which can occur when someone owns land with the last remaining populations or individuals of a plant species, has never been a part of the traditional bundle of property rights. Id. at 48. "The question as to who owns a species has remained tacit with wildlife, due to the fact that landowners do not own individual animals, but the question comes into sharper focus in the case of plants." Id.
219. Rachlinski, supra note 98, at 12 n.62. These seven states are Hawaii, Iowa, Massachusetts, Michigan, Minnesota, South Dakota, and Vermont. Id.
220. Id. at 33.
recommendations to improve Florida's existing rare plant legislation\textsuperscript{221} that are also applicable to other states. First, state agencies should be required to formulate statewide plans and policies to enhance the survival of plants that are currently listed.\textsuperscript{222} Second, state agencies should be required to produce listed-species impact statements prior to implementation of projects and to provide for mitigation.\textsuperscript{223} In addition, state agencies should use a significant proportion of native plants in their landscaping projects.\textsuperscript{224} Third, all state agencies should directly or indirectly work to conserve state-listed species and use their authorities to further the well-being of native plants and their habitats.\textsuperscript{225} Fourth, exotic plant species listed as invasive should be prohibited from use on public lands and in commercial trade or transport.\textsuperscript{226} These suggestions would greatly expand the legal protection available for rare plant species and facilitate more comprehensive conservation efforts.

D. Maintain a Dual Focus of Habitat Protection and Single-Species Conservation

Although there has been increasing recognition of the need for habitat conservation approaches to rare plant protection,\textsuperscript{227} it is also important to recognize that single-species preservation has an important role in plant conservation. Humans have very different attitudes toward plants than animals. While many people are adamantly opposed to keeping wild animals in captivity, few individuals think twice about keeping plants in gardens or collections. As a result, it is necessary to regulate human activities that directly impact rare plant species, particularly those plants that are susceptible to pressures from collection. Rare plants often possess special adaptations that allow them to occupy very specific ecological niches.\textsuperscript{228} In many cases, it is the unique features of a particular rare plant, as well as its rarity, that increases the appeal of

\begin{itemize}
\item \textsuperscript{221} See \textit{ACTION PLAN}, supra note 2, pt. IV(3).
\item \textsuperscript{222} Id.
\item \textsuperscript{223} Id.; \textit{See generally} Gann & Gerson, supra note 43 (discussing the effectiveness of rare plant mitigation in Florida).
\item \textsuperscript{224} \textit{ACTION PLAN}, supra note 2, pt. IV(3).
\item \textsuperscript{225} This suggestion is analogous to the requirements imposed on federal agencies under section 7 of the ESA. \textit{See} 16 U.S.C. § 1536 (2000). \textit{See also} supra Part III.B.
\item \textsuperscript{226} \textit{ACTION PLAN}, supra note 2, pt. IV(3).
\item \textsuperscript{227} For example, "[t]he most serious problem of federal plant protection law is its emphasis on saving single species faced with extinction to the relative exclusion of a broader protective focus." Coggins & Harris, supra note 3, at 307.
\item \textsuperscript{228} Rolston explains that "[t]he rare flower is a botanical achievement, a bit of brilliance, a problem resolved, a niche filled." Rolston, supra note 8, at 56.
\end{itemize}
the plant for collectors. Laws such as the Preservation of Native Flora of Florida (PNFF) statute that attempt to limit collecting and commercial exploitation are essential for protecting some of the most vulnerable species.

At the same time, protecting habitat is an essential part of the long-term conservation of rare plant species. Unlike mobile animals that require expansive habitats, many rare plants require a relatively small amount of habitat. In some cases, protection for a population of rare plants can be accomplished by relatively minor adjustments to development plans or other land use activities. The South Florida Multi-Species Recovery Plan (SFMSRP) exemplifies an increasing recognition on the part of management agencies that a comprehensive approach to plant protection requires both habitat and single-species protection.

E. Increase Awareness of Rare Plant Issues and Encourage Voluntary Cooperation

In light of the fact that many people take plants for granted, it is necessary to educate the public about the general importance of plants.

229. For example, in Florida many orchids and bromeliads are coveted for their unique appearance and have been subjected to enormous collecting pressure. Perhaps the Fuzzy wuzzy air-plant (Tillandsia pruinosa) exemplifies this problem. This plant has been described as resembling a "furry, many-legged tarantula." WARD, supra note 33, at 117. Ward further notes, "the enthusiasm for horticultural specimens has considerably depleted some of its more easily reached localities." Id. The plant is now listed as endangered on Florida's Regulated Plant Index.

230. However, such laws do not prevent private owners from destroying rare plants. Chapman's rhododendron (Rhododendron chapmanii) is an example of a very rare plant that is threatened by commercial exploitation. See McMahan, supra note 3, at 520 n.25. This plant is native to Florida's pinelands and presently known to exist in only three locations: the Florida National Guard owns one, while a paper company owns the other two locations. Id. Another population of the species was totally decimated when collectors discovered its location. Id.

231. One example was the San Felasco spleenwort (Asplenium monanthes), which only grew in one particular ravine but is now believed to be extinct. See supra note 35.

232. Hypothetically, if a landowner had wanted to build a house on property containing a rare plant species such as the San Felasco spleenwort (Asplenium monanthes), relatively minor adjustments to development plans could help ensure protection of the species. This scenario illustrates the importance of strengthening the regulations governing destruction of rare plants by owners on private property or, at the very least, encouraging the voluntary cooperation of landowners in protecting rare plants on their property.

233. One suggestion for increasing awareness about rare plants is to display color illustrations in public places, in publications, and on postage stamps. AYENSU & DEFILIPPS, supra note 27, at 45-47. Such efforts have been implemented in other countries including Australia, Holland, France, and Great Britain. Id.
Many people who are sympathetic to the decline of animal species are unaware of the decline of plant species and the fact that there is currently relatively little legal protection for rare plant species. By increasing the public awareness of discrepancies in levels of protection for plants and animals that exist under laws such as the ESA, it may be possible to gain political support for more expansive legal protections.

It is necessary to encourage the appreciation of rare plants in their natural habitats. The extent of the problems with illegal collecting and harvesting suggests that there is a great deal of interest in rare plant species. Educating plant enthusiasts and landowners about the biological complexity and vulnerability of rare plant species may help deter irresponsible collecting and other forms of intentional and unintentional destruction. Such efforts may help instill a sense of stewardship and increase the voluntary cooperation of landowners with conservation needs. "Indeed, the only landowners who really possess and enjoy their land, in a deeper philosophical sense, are those who respect the life that is native there." 

V. CONCLUSION

This article has provided an introduction to the issues associated with the decline of rare plant species and illustrated some of the scientific and legal obstacles to protecting rare plant species in Florida and throughout the country. The lack of attention devoted to issues concerning rare plants, especially among the legal community, is unfortunate. The increasing prevalence of conflicts between developers and existing legal protections for protected species may change this trend. As the legal mechanisms that attempt to protect ecosystems evolve, an increased recognition of the importance of plant species and the need to protect them will be necessary.

Analysis of existing protection for rare plant species illustrates that there are still many species for which there is no legal protection. A

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234. In regard to the market for rare plants collected from the wild, efforts should be made to end "the fad for rarity" that is encouraged by dealers who advertise the rarity of their offerings. Id. The market emphasis should be shifted to species grown from seed or cuttings. Id. Similarly, the public should be encouraged to leave endangered flowers undisturbed or to photograph them instead of collecting them. Id.

235. Rolston, supra note 8, at 58.

236. For example, in Florida there have been increasing conflicts regarding development projects that may impact Johnson's seagrass (Halophila johnsonii). See, e.g., Flynn v. Dep't of Env'tl Protection, 775 So. 2d 293 (Fla. Dist. Ct. App. 2001) (affirming the Department of Environmental Protection's final order denying a permit to dredge in order to construct a dock and mooring for a large private vessel in seagrass habitat).
leading scholar aptly notes that "[n]either federal nor state protection for rare plants is as strong, comprehensive, or effective as it could and should be." 237 Plants and animals are both integral parts of ecosystems and rely on each other for survival. A legal recognition of the value of plant species in the form of strengthened legislation would enhance existing efforts to preserve overall ecological integrity.

237. McMahan, supra note 3, at 569.