

THE BIG CYPRESS NATIONAL PRESERVE

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TABLE 5.4. Big Cypress plants that have become scarce due to man's activities.

Species	Factor(s) Responsible for the Decline				
	Extermination	Logging	Fire	Drainage	Collecting
Royal palm					X
Wild cotton	X				
Ionopsis			X		X
Ghost orchid		X	X	X	X
Night-blooming epidendrum		X	X	X	X
Clamshell orchid		X	X		X
Oblong-leaved vanilla		X	X		X
Dollar orchid			X		X
Mule ear orchid			X		X
Guzmania		X	X	X	X
Bird's nest fern				X	X
Hand fern			X	X	X
Cowhorn orchid		X	X		X
Strap ferns			X	X	X

TABLE 5.5. The importance of the Big Cypress National Preserve to rare, endangered, and threatened plants.

Species	Status in BCNP
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1) The BCNP has suitable habitat for these species, which grow here, but are of limited distribution elsewhere in Florida. The BCNP is therefore very important to survival of these plants in Florida. Species indicated by an asterisk are not widespread outside the state and might face extinction if eliminated from the Big Cypress Swamp.

*Hand fern, <i>Ophioglossum palmatum</i>	Rare
*Climbing fern, <i>Microgramma heterophylla</i>	Present
*Wild Boston fern, <i>Nephrolepis exaltata</i>	Common
*Leather fern, <i>Acrostichum danaeaeifolium</i>	Common
*Bird's Nest fern, <i>Asplenium serratum</i>	Rare
*Auricled Spleenwort, <i>Asplenium auritum</i>	Rare
*Banded wild pine, <i>Tillandsia flexuosa</i>	Present
Fuzzy-wuzzy airplant, <i>Tillandsia pruinosa</i>	Rare
Small catopsis, <i>Catopsis nutans</i>	Rare
*Many-flowered catopsis, <i>Catopsis floribunda</i>	Rare
*Yellow catopsis, <i>Catopsis berteroniana</i>	Rare
*Oblong-leaved Vanilla, <i>Vanilla phaeantha</i>	Rare
*Ghost orchid, <i>Polyrrhiza lindenii</i>	Present
* <i>Polystachya flavescens</i>	Present
*Rigid epidendrum, <i>Epidendrum rigidum</i>	Present
*Umbelled epidendrum, <i>Epidendrum difforme</i>	Present
Brown epidendrum, <i>Epidendrum anceps</i>	Present
Night-blooming epidendrum, <i>Epidendrum nocturnum</i>	Present
Pleurothallis, <i>Pleurothallis gelida</i>	Rare
* <i>Schizachyrium rhizomatum</i> ^c	Common
Lepanthopsis, <i>Lepanthopsis melanantha</i>	Rare
Clamshell orchid, <i>Encyclia cochleata</i>	Present
Cowhorn orchid, <i>Cyrtopodium punctatum</i>	Present
Ionopsis, <i>Ionopsis utricularioides</i>	Rare
Florida oncidium, <i>Oncidium floridanum</i>	Rare

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TABLE 5.5. (Continued)

Species	Status in BCNP
Reddish peperomia, <i>Peperomia humilis</i>	Probable
Florida peperomia, <i>Peperomia obtusifolia</i>	Rare
Cypress peperomia, <i>Peperomia glabella</i>	Rare
Pale green peperomia, <i>Peperomia simplex</i>	Rare
Pond apple, <i>Annona glabra</i>	Common
Krug's holly, <i>Ilex krugiana</i>	Present
Wild cotton, <i>Gossypium hirsutum</i>	Probable
Simpson's stopper, <i>Myrcianthes fragrans</i> var. <i>simpsonii</i>	Present
Satinleaf, <i>Chrysophyllum oliviforme</i>	Present
2) The BCNP has suitable habitat for these species, which are widespread in Florida. The BCNP is not critical to the survival of these plants at the present time, but might become so in the future.	
Whisk fern, <i>Psilotum nudum</i>	Present
Quillwort, <i>Isoetes flaccida</i>	?
Shoestring fern, <i>Vittaria lineata</i>	Common
Resurrection fern, <i>Polypodium polypodioides</i>	Common
Golden polypody, <i>Phlebodium aureum</i>	Common
Boston fern, <i>Nephrolepis biserrata</i>	Common
Swamp fern, <i>Blechnum serrulatum</i>	Common
Chain fern, <i>Woodwardia virginica</i>	Common
<i>Thelypteris kunthii</i>	Present
<i>Thelypteris totta</i>	Common
Mosquito fern, <i>Azolla caroliniana</i>	Common
Water fern, <i>Salvinia rotundifolia</i> ^b	Common
Cabbage palm, <i>Sabal palmetto</i>	Common
Needle-leaved airplant, <i>Tillandsia setacea</i>	Present
Giant wild pine, <i>Tillandsia utriculata</i>	Present
Soft-leaved wild pine, <i>Tillandsia valenzuelana</i>	Probable
Reddish wild pine, <i>Tillandsia polystachia</i>	Present
Stiff-leaved wild pine, <i>Tillandsia fasciculata</i>	Common
Reflexed wild pine, <i>Tillandsia balbistana</i>	Present
Twisted airplant, <i>Tillandsia circinata</i>	Probable
Catesby lily, <i>Lilium catesbaei</i>	Probable
Rain lily, <i>Zephyranthes simpsonii</i>	Rare
<i>Habenaria odontopetala</i>	Present
<i>Habenaria quinqueseta</i>	Probable
Water spider orchid, <i>Habenaria repens</i>	Probable
Snowy orchid, <i>Platanthera nivea</i>	Probable
Shadow witch, <i>Ponthieva racemosa</i>	?
Pale grass pink, <i>Calopogon pallidus</i>	Probable
Many-flowered grass pink, <i>Calopogon multiflorus</i>	Probable
Grass pink, <i>Calopogon tuberosus</i>	Probable
Florida malaxis, <i>Malaxis spicata</i>	Probable
<i>Spiranthes cranichoides</i>	Probable
<i>Spiranthes lanceolata</i>	Probable
Fragrant lady's tresses, <i>Spiranthes cernua</i>	Probable
Florida lady's tresses, <i>Spiranthes breviflora</i>	Probable
Long-lip lady's tresses, <i>Spiranthes longilabris</i>	Probable
Lace-lip lady's tresses, <i>Spiranthes lactiniata</i>	Probable
Giant lady's tresses, <i>Spiranthes praecox</i>	Probable
Spring lady's tresses, <i>Spiranthes vernalis</i>	Probable
Wild coco, <i>Eulophia alta</i>	Present
Harrisella, <i>Harrisella porrecta</i>	Rare
Butterfly orchid, <i>Encyclia tampensis</i>	Common
Jamaica dogwood, <i>Piscidia piscipula</i>	Rare
<i>Stillingia sylvatica</i> ^a	Probable
Dahoon holly, <i>Ilex cassine</i>	Common
Ground cherry, <i>Physalis viscosa</i> ^c	Common

- 3) The BCNP apparently has suitable habitat for these species, but few, if any, of them grow there now, although they are found in nearby areas. It might be appropriate, after careful study, to establish populations in the BCNP.

TABLE 5.5. (Continued)

Species	Status in BCNP
Club moss, <i>Lycopodium carolinianum</i>	?
Club moss, <i>Lycopodium dichotomum</i>	?
Polypody fern, <i>Polypodium ptilonum</i>	Probable
Polypody fern, <i>Polypodium plumula</i>	Rare
Parsley fern, <i>Sphenomeris clavata</i>	?
<i>Ctenitis submarginalis</i>	?
<i>Ctenitis sloanei</i>	?
<i>Thelypteris palustris</i>	?
<i>Thelypteris augescens</i>	?
Cypress fern, <i>Thelypteris reticulata</i>	Rare
<i>Gymnopogon floridanus</i>	?
Royal Palm, <i>Roystonea elata</i>	Rare, planted around homesites
<i>Guzmania</i> , <i>Guzmania monostachia</i>	? also planted at Day-hoffs' and Orchid Isles
Fakahatchee burmannia, <i>Burmannia flava</i>	?
<i>Habenaria distans</i>	?
<i>Erythroxylum querceticola</i>	?
Tall liparis, <i>Liparis elata</i>	?
<i>Restrepia ophioccephala</i>	?
Pine Pink, <i>Bletia purpurea</i>	Present
<i>Campylocentrum pachyrrhizum</i>	?
<i>Epidendrum strobiliferum</i>	?
<i>Epidendrum acunae</i>	?
Dwarf epidendrum, <i>Encyclia pygmaea</i>	Rare
Dollar orchid, <i>Encyclia boothiana</i>	?
Bulbophyllum, <i>Bulbophyllum pachyrachis</i>	?
Mule ear orchid, <i>Oncidium luridum</i>	?
<i>Leochilus labiatus</i>	?
Maxillaria, <i>Maxillaria crassifolia</i>	?
<i>Polygala boykinii</i> ^c	Present
<i>Tetrazygia</i> , <i>Tetrazygia bicolor</i>	?
Wild sapodilla, <i>Manilkara bahamensis</i>	Rare
Florida privet, <i>Forestiera segregata</i> ^a	Present
<i>Tournefortia hirsutissima</i>	?
False foxglove, <i>Agalinis purpurea</i> ^a	Rare
<i>Elytraria caroliniensis</i>	Probable
4) The BCNP has little, if any, proper habitat for these species. They may be present in limited areas of the preserve, or even common in appropriate habitats, but the BCNP is not pivotal in their survival in Florida.	
Golden Leather Fern, <i>Acrostichum aureum</i>	Rare ?
Coontie, <i>Zamia pumila</i>	Present
Paurotis palm, <i>Acoelorrhaphe wrightii</i>	?
Worm vine, <i>Vanilla barbellata</i>	Present
Red mangrove, <i>Rhizophora mangle</i>	Common

^aMyers (1975) lists *Stillingia sylvatica* from his Jetport area dwarf cypress plot, but Austin (pers. comm.) believes it was probably *S. aquatica*, since *S. sylvatica* is generally a pineland species.

^bHas been changed to *Salvinia minima*.

^cSubspecies is on Smithsonian list. Taxonomic expertise may be required to determine whether or not the listed variety is in the BCNP.

is a geologically young area with a dynamic flora, characterized by relatively new and probably rapidly evolving plant populations, and it may therefore be difficult to determine whether a rare species is actually a native plant or an exotic brought in by man. No plant species, regardless of its rarity and beauty, should be encouraged to grow in the BCNP unless it can be reasonably considered a natural component of the Big Cypress ecosystem.

Before attempts to increase populations are made, it is also imperative to assess the potential consequences of the plant's interactions with other organisms. Once a species is deemed an appropriate part of the preserve's flora, it should be, to the degree possible, ascertained that any genetic manipulation involved will not adversely affect the wild populations. Because plants from populations outside the preserve (or in a different part of

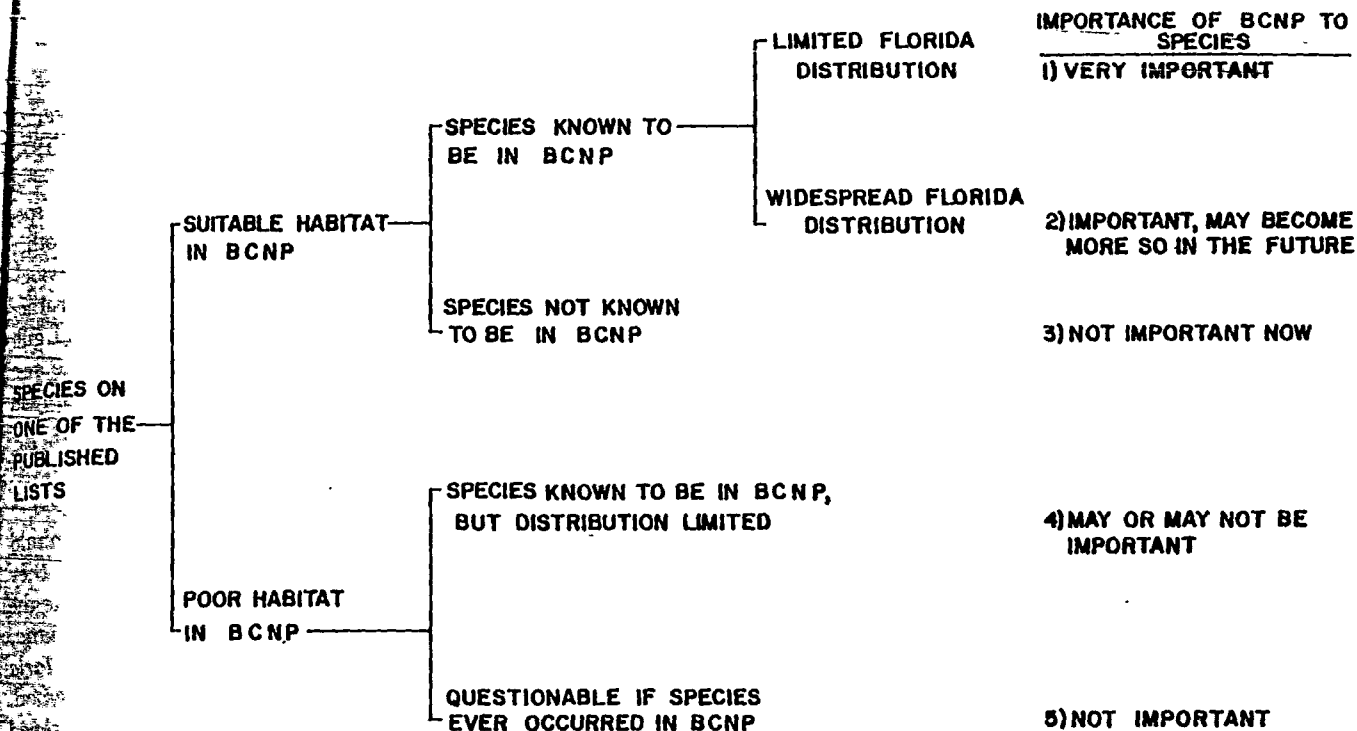


FIGURE 5.28. Procedure for evaluating the importance of the Big Cypress National Preserve to rare, endangered, and threatened plants.

it) may have evolved in response to subtly different habitat conditions, there is the hazard of degrading the native stock, and, of course, there is the threat of introducing diseases or pests. These problems might be minimized by using meristem culture or clone division to propagate local plants.

Major groups of rare and endangered plants are discussed below. Some species of particular concern in terms of preserve management are treated individually.

We have included only very general descriptions of the locations of the plants because publishing more specific information would be inviting collectors to raid the colonies. Actually, we were not able to find out much about where these plants are. There are people who know, but experience has taught them to keep their knowledge to themselves. Even scientists, conservationists, and NPS personnel with impeccable credentials cannot always be trusted to safeguard such information. This presents a dilemma: how to protect rare plants from fire and public intrusion when you don't know where they are. Perhaps the NPS can work out some sort of data security or management plan review system to deal with this problem, but we have not suggested a solution because we are not sure there is one.

Palms

The state regards all palms (except saw palmetto, *Serenoa repens*) to be threatened or endangered.

We feel that the cabbage palm should not be regarded as such in the BCNP. Although cabbage palms are collected for landscaping and building materials and are killed by removal of the buds for cooking as "swamp cabbage," they are plentiful in the preserve as well as throughout Florida. Cabbage palm is favored by fire and appears actually to be becoming more abundant due to frequent burning.

Royal Palm, ROYSTONEA ELATA

The royal palm grows in mixed swamp forests and damp hammocks. The species' range extended into north Florida in the mid-1700s (Bartram, 1791), but between 1835 and 1860 freezes eliminated the royal palms from all but the southernmost parts of Florida (Beard, 1938). It is now most abundant in the Fakahatchee, but a few grow wild in Deep Lake Strand (Dayhoff, pers. comm.), and it is cultivated at campsites throughout the BCNP.

Transplanting for landscaping has been the most seri-

ous man-related threat to this species. Although most of the royal palms seen in South Florida gardens are *R. regia* imported from Cuba, a great many *R. elata* have been taken from the wild. It may be difficult to positively identify the royal palms planted around camps, since *R. oleracea* from South America and *R. borinquena* from Puerto Rico are also cultivated in Florida. *R. elata* is not easily distinguished from the other three species, and hybridization is a possibility (Stevenson, 1974).

Royal palms could probably be successfully established in swamp forest habitats throughout the Big Cypress. The seeds germinate readily within two months without special treatment and grow rapidly so long as they have ample moisture (McCurrach, 1960). Royal palm regeneration in the Fakahatchee Strand is already quite impressive; there are many 10-20 m (30-65 ft) tall trees on the old tramways only 30 years after logging. The advisability of spreading royal palms throughout the BCNP might be questioned, however, since it is doubtful that the species was ever common within the preserve.

Paurotis Palm, ACOELORRAPHE WRIGHTII

The paurotis palm, *A. wrightii* (formerly *Paurotis*), is a wetland species most often seen in coastal prairies and low, back-mangrove hammocks. Some authorities regard it as a brackish water species (Stevenson, 1974), but we have observed it in an undoubtedly freshwater swamp forest in the Fakahatchee Strand. Little (1976) describes it as a "wet savanna" species and includes a photo showing paurotis growing in scrub cypress habitat.

Paurotis palms are cultivated around camps and homes in the BCNP, but it is questionable whether they ever grew wild within the preserve. The coastal habitats where paurotis is found in the Everglades are unlike those in the BCNP (Dayhoff, pers. comm.). It is quite abundant in many Caribbean coastal areas.

Although they were probably never very common in South Florida, paurotis palms have declined in numbers because of transplanting for landscaping. They grow in attractive clumps and are quite popular as ornamentals, but are so slow growing that few nurseries find it economical to propagate them.

Slow growth might not be so serious an obstacle to establishing paurotis in the Big Cypress, if such was deemed desirable. The plants grow much more rapidly in wet situations (McCurrach, 1960), although they may become chlorotic on limestone soils (Stevenson, 1974). The seedlings germinate readily within two months, and the young plants are easy to grow if the soil is kept moist enough.

Tropical Hammock Trees

Little (1976) lists canella, *Canella winterana*, gulf graytwig, *Schoepfia chrysophylloides*, and wild tamarind, *Lysiloma latisiliqua*, as rare species, and the 1978 state list classifies satinleaf, Jamaica dogwood, and Simpson's stopper as threatened. We feel that these species are not especially rare in relation to many other tropical hammock plants, and it is the hammock association which should be considered threatened rather than these particular species. Wild tamarind and gulf graytwig are actually quite abundant in the Pinecrest area, and most of the hammock plants are widespread tropical species common in areas south of Florida.

Host Trees

We feel that certain relatively abundant trees should be regarded as species of special concern because they serve as sites for rare epiphytes. These trees include the oaks *Quercus nigra*, *Q. laurifolia*, and *Q. virginiana*, the mangroves *Rhizophora mangle* and *Laguncularia racemosa*, pop ash, pond apple, satinleaf, buttonwood, and cypress. Pond apple, which is listed as threatened by the state, is probably the most important species in this category. Its coarse-textured bark and near-horizontal spreading branches make it an ideal epiphyte tree, but it grows only in the deepest and wettest sloughs and is therefore particularly vulnerable to drainage. FCREPA considers the mangroves doubly eligible for special concern status because they are subject to habitat loss due to coastal development.

Orchids

Orchidaceae is a family with an unusually large number of rare species. There are both intrinsic and man-related reasons for this. Orchids are thought to be an explosively evolving plant group which is rapidly diversifying into a huge variety of very specialized species (Garay, 1960 in Withner, 1977). This results in varieties with very limited distribution and/or extremely precise habitat requirements. Thus orchids often require specific pollinators, symbiotic fungi, particular substrates, or very exact temperature or humidity conditions. Unfortunately, the orchid family's variety also makes it valuable to collectors, who are attracted by strangeness and rarity as well as by beauty, creating a situation where an inherently vulnerable plant group is being subjected to unusually heavy collecting pressures. The result is endangered species.

Fire, logging, drainage, and natural hazards also take their toll. Fires kill most orchids; logging destroys the trees they grow on; and drainage not only increases fire

incidence, but often alters microclimates so that temperature and humidity conditions are no longer suitable for sensitive plants. Orchids are also susceptible to natural hazards: deer, rodents, and insects (especially lubber grasshoppers, *Romalea microptera*) chew on them, particularly during the dry season, and, like other epiphytes, they are vulnerable to storms. Hurricane winds (and, along the coast, waves) tear many of the plants out of the trees and those remaining often die of dehydration when the forest canopy is defoliated.

The epiphytic orchids of the Big Cypress region fall into several general categories. The ubiquitous butterfly orchid and the endangered cowhorn orchid are both well-adapted integral parts of the ecosystem. They can tolerate a light frost, a mild scorching, or a severe drought. The butterfly orchid is found only in Florida and the Bahamas, and, although the cowhorn orchid is widely distributed throughout tropical America, it is an epiphyte only in Florida (Luer, 1964). These are plants that unquestionably belong here.

The second group of orchids is made up of species which are generally widespread further south, but which have adjusted to the Florida environment and established themselves as part of our flora. These species may suffer from freezes or droughts, yet are not likely to be eliminated from the ecosystem by natural stresses. In this group are clamshell orchid, night-blooming epidendrum, ionopsis, dollar orchid, brown epidendrum, umbrella epidendrum, mule ear orchid, oblong-leaved vanilla, and worm vine. The ghost orchid is not so widely distributed outside the United States, but since it is rather cold-sensitive it probably belongs in this category.

Most of the remaining orchids could be considered "accidentals," tropical species which have been recorded in Florida very few times (some of them only once or twice), generally in quite sheltered locations in either Fakahatchee pond apple sloughs or Everglades hammocks. A few of these species may, with protection, eventually become more widespread, but most of them are probably ill suited to the Big Cypress and destined to at best remain very localized.

It may be impossible to confirm that an orchid which is extremely localized and rare in Florida but commonly grown by hobbyists is actually a natural introduction. It is not too farfetched to visualize some self-appointed Johnny Orchidseed scattering his favorite species about for later "discovery." Luer (1972) says it has happened before and Austin (pers. comm.) reports that there is a group of Fort Lauderdale orchid collectors dedicated to spreading species in Fakahatchee. Under questionable circumstances, it may be difficult to

decide whether to protect the plant as an endangered species or persecute it as an exotic.

South Florida's terrestrial orchids are, for the most part, species derived from northern stock and widely distributed in the southeastern United States. They are therefore much less vulnerable to extirpation than are the tropical epiphytes.

Cowhorn Orchid, *CYRTOPODIUM PUNCTATUM*

The cowhorn, or cigar orchid, named for its elongated pseudobulbs, grows in more or less sunny spots in cypress or mangrove swamps and occasionally in hammocks. Craighead (1963) describes it as most abundant on dead buttonwoods. In Florida, cowhorn orchids normally grow as epiphytes, but *Cyrtopodium* is an otherwise terrestrial genus, and even *C. punctatum* is a terrestrial in other parts of its range. The plants were once quite common in the Big Cypress and grew in huge aggregations weighing in excess of 34 kg (75 lbs) (Craighead, 1963; Luer, 1972) but were hauled out by the wagonload by orchid collectors (Luer, 1972). The species has consequently become rare in Florida, although it is still prominent in the Caribbean and in Central and South America.

Orchid collectors attracted by the cowhorn's showy yellow and brown flowers have certainly been chiefly responsible for the orchid's decline, but it has probably suffered from several other negative influences. Before the plants became popular as collector's items, the Indians and early settlers harvested the pseudobulbs and used them to make glue (Craighead, 1963; Luer, 1972). Mammals also eat them during drought periods (Craighead, 1963). Because the plants grow into such ponderous clumps, they are particularly vulnerable to storm winds and are often blown out of trees. While logging may have, in opening the canopy, improved conditions for those cowhorn orchids growing on rejected trees, it surely hurt the species as a whole by destroying many plants and decreasing the amount of available habitat.

If the collecting problem can be controlled, the cowhorn orchid will probably eventually become abundant in the Big Cypress again. This may take many years, however, since the mature plants grow very slowly. It would not be too difficult to accelerate the process. Cowhorn orchids are easily propagated from seed and can grow 5-15 cm (2-6 in) tall by the second season (Craighead, 1963).

Ghost Orchid, *POLYRRHIZA LINDENII*

The ghost orchid is a leafless epiphyte found in deep

swamp habitats. Its greyish green roots are seldom noticed without its spectacular flower, which Correll (Craighead, 1963), described as like "a snow-white frog suspended in mid-air." Craighead (1963) states that ghost orchids are most often found on pop ash trees, but also grow on pond apple and cypress. Dayhoff (pers. comm.) says he has found more on pond apple. Luer (1972) says they do just as well on oak or royal palm, but Buswell (1945) did not find them on palms.

The ghost orchid is not as widely distributed outside Florida as many of our other orchids are. Its range includes only South Florida, Cuba, and the Bahamas. Since the ghost orchid habitat in the Bahamas is limited and the conservation situation in Cuba is uncertain, it is especially important to maintain this species in the BCNP.

Ghost orchids are found further north in the Bahamas than they are in Florida, but the species is quite sensitive to cold. The freeze of 1977 killed a great many of them in the Fakahatchee (Austin, pers. comm.).

The ghost orchid's inconspicuousness out of flowering season has probably prevented overcollecting. The plants are so hard to find that it would be practically impossible for a collector to remove all of them from an area.

Luer (1972) believes the ghost orchid may be pollinated by the nocturnal hawk moth, *Cocytius antaeus*, whose larvae feed on pond apple. Austin (pers. comm.) feels several other hawk moths may also be involved. Successful fertilization is apparently infrequent, since fruiting plants are seldom seen (Luer, 1972).

A ghost orchid propagation program would be complicated by the difficulty of transplanting this species. Successful transplants have been accomplished by people who know exactly the right techniques, but most ghost orchids die when moved (Austin, pers. comm.).

Ionopsis, *IONOPSIS* *UTRICULARIODES*

Ionopsis, a pretty little epiphytic orchid with 2 cm (3/4 in) violet like lavender blossoms is apparently locally abundant (Craighead, 1963; Luer, 1972) but found in relatively few localities. This would suggest that it has very specialized habitat requirements, yet the literature gives no indication that this is the case. Luer (1972) says it is found in damp hammocks or forests; Hawkes (1947) calls it a swamp species; and Craighead (1963) states that it grows in sunny spots on the small outer branches of trees at the edges of cypress domes and hammocks. He says that it is particularly abundant on hardwoods along the interior rivers in Everglades National Park. Dayhoff (pers. comm.) reports that it usually grows on pop ash, willow, or cypress. We have

not seen *ionopsis* in the BCNP, but Dayhoff (pers. comm.) says that it grows in open spots in Roberts Lakes and Deep Lake strands. Elsewhere, it is extraordinarily widespread, growing throughout tropical America.

Since *ionopsis* often grows on slender branchlets or "crawls" off its branch altogether and grows dangling by its roots, it seems logical that storms would rip many plants from the trees and thus be especially damaging to this species. For that matter, any plant with a tendency to thrive in only a few scattered locations is particularly vulnerable to natural (or unnatural) disasters.

Clamshell Orchid, *ENCYCLIA* *COCHLEATA*

Clamshell orchids are relatively widespread in South Florida, but we could find little information on their habitat requirements. Craighead (1963) says only that they prefer moist, shaded spots; Luer (1972) says they come from "damp forests"; and Hawkes (1947) merely relegates them to "jungles." Dayhoff (pers. comm.) says they grow around ponds and in very damp hardwood stands. There are healthy-looking clamshell orchids growing in almost full sun high in pond apple trees along the edge of an open "lettuce lake" at Corkscrew Swamp Sanctuary.

Although *E. cochleata* is found throughout the Caribbean, some authorities regard the Florida population as an endemic variety, var. *triandra*. An albino form with all yellow petals has also been found in the Fakahatchee (Luer, 1972).

Since the clamshell orchid has relatively showy maroon and yellow flowers, it is probably more subject to collection by casually interested tourists than are the less colorful species.

Night-blooming Epidendrum, *EPIDENDRUM* *NOCTURNUM*

The night-blooming epidendrum, which has blossoms that stay open all day but are most strongly scented at night, is an epiphytic orchid growing in a variety of habitats throughout South Florida, the Caribbean, Central America, and northern South America. We have encountered it most often in pond apple or pop ash sloughs, and our impression is that it does not do well in full sun, but there is little in the literature on its habitat requirements. Hawkes (1947) does mention that it is found in warm, moist cypress strands. We have observed cultivated specimens which survived temperatures as low as -2°C (28°F) with no detectable damage, so it is apparently not an extremely cold-sensitive species. It does seem to require a humid site. Collecting and logging are probably the greatest threats to this species.

Anyone who plans to propagate night-blooming epidendrums should be aware that they are thought to be self-fertilizing, and it is normal for many of the flowers to fail to open, but nevertheless to produce seed (Luer, 1972).

Mule Ear Orchid, *ONCIDIUM LURIDUM*

The mule ear orchid, named after its large heavy leaves, bears panicles of brown and gold speckled flowers. The species ranges through most of tropical America, but the flowers are larger and more brightly colored in Florida. There may or may not be mule ear orchids in the BCNP. They apparently prefer coastal habitats, but Craighead (1963) reports them growing in Collier County cypress strands, and Luer (1972) states that they have been found in the Fakahatchee. According to Craighead (1963), mule ear orchid's preferred host trees are buttonwood, pond apple, and cypress. The plants were quite plentiful prior to the ravages of Hurricane Donna and of the orchid collectors but are now extremely rare. Craighead (1963), however, regards this as a "tenacious" species and believes it could again become abundant if protected from overcollecting. The plant's ability to reproduce is affected during some years by a beetle which bores into and destroys many of the flower stalks (Craighead, 1963).

Bromeliads

Florida's bromeliads are, as a rule, not as sensitive and habitat-specific as are the orchids, but they are subject to similar collecting pressures. It may be easier for people to rationalize collecting bromeliads, since they "die" after flowering anyway. This is really no justification; the plants produce offsets and, of course, seed after flowering. (The downy seed are wind-distributed.)

Bromeliads serve as important mini-habitats for amphibious organisms (Neill, 1951b). Mosquitoes breed in their water-filled cups, and frogs hide there. Birds and mammals drink from the plants after dry season showers. This tank function brings nutrients to the bromeliad, but animals often tear the plants apart searching for food or water. Raccoons and squirrels also nibble on the buds (Austin, pers. comm. and Craighead, 1963).

Small Catopsis, *CATOPSIS NUTANS*

The small catopsis is a shade-loving little bromeliad with bright green leaves and orange yellow flowers. It is widespread south of Florida, but has apparently always been rather scarce here. Austin (pers. comm.) says it grows on cypress and pond apple in Fakahatchee.

Yellow Catopsis, *CATOPSIS BETERONIANA*

The yellow catopsis is a large bromeliad with yellowish green leaves. It sends up an impressively tall flower stalk which produces disappointing little white flowers. This species is found in many parts of tropical America and, according to Craighead (1963), is locally abundant in hammocks, pinelands, and mangroves in South Florida. Austin (pers. comm.) says he has found it only in swamps, however. It is most often found on exposed branches in nearly full sun (Craighead, 1963).

Banded Wild Pine, *TILLANDSIA FLEXUOSA*

Banded wild pine is a medium-sized, pink-flowered bromeliad which has leaves with a vague pattern of alternating splotchy grey-green and dull dark green bands. The leaves are arranged so as to give the impression that someone had grasped the top of the plant and twisted it. Craighead (1963) says this species is widely distributed but never very abundant and prefers to grow in sunny situations near the tops of trees. We found banded wild pines to be quite numerous in certain relatively open, mangrove-dominated islands in the BCNP's coastal marshes, but Austin (pers. comm.) reports that he has most often found them in the fringes of cypress domes.

Fuzzy-wuzzy Airplant, *TILLANDSIA FRUINOSA*

The fuzzy-wuzzy airplant is a small (7-13 cm [3-5 in] tall) bromeliad with pink and purple flowers and dull green leaves covered with silvery fuzz. Craighead (1963) reports only that it is "found rather sparingly in Collier County"; Austin (pers. comm.) says it grows on cypress; and Dayhoff (pers. comm.) reports that it grows in Deep Lake Strand and several other locations north of US 41.

Guzmania, *GUZMANIA MONOSTACHIA*

Guzmania is a very attractive bromeliad with strap-like, bright green leaves. The flower spike is white at the base and shades to bright salmon orange at the tip. This candlelike effect makes a colony of blooming guzmanias quite spectacular.

This tropical species has never been widespread in Florida and may not presently occur within the BCNP, but since it tends to be very abundant locally in both Fakahatchee pond apple sloughs and Miami area hammocks, we feel it might be well suited to the Big Cypress. It may be a species relatively new to the Florida flora which simply did not have time to become widespread before collecting reversed the trend.

Peperomias

Peperomias are another group of troubled epiphytes. Their reproductive strategy, however, is somewhat different; instead of relying on wind for seed dispersal, they produce sticky seeds that are spread by animals walking along rotten logs (Craighead, 1963).

Cypress Peperomia, PEPEROMIA GLABELLA

Cypress peperomia, which can be either epiphytic or terrestrial, has succulent climbing stems, glossy oval leaves, and greenish white spikes. Craighead (1963) reports that it has been found growing on logs in cypress strands in east-central Collier County.

Florida Peperomia, PEPEROMIA OBTUSIFOLIA

Florida peperomia is a rather shrubby creeping plant with dark shiny oval leaves. It is the most common of the peperomias and grows both as an epiphyte on dead logs, oaks, mangroves, and cypress, and as a terrestrial in organic soils in moist shady places.

Reddish Peperomia, PEPEROMIA HUMILIS

The reddish peperomia is a branching plant with attractive pinkish red pubescent stems, oval leaves, and greenish yellow flower spikes. It is most often found growing in the litter accumulated in the hollows or crotches of old buttonwood trees (Craighead, 1963), but also grows on logs and pond apples and has been reported as a terrestrial on marl flats.

Pale Green Peperomia, PEPEROMIA SIMPLEX

Pale green peperomia is a sturdy, erect species with greenish white flower spikes and stems and elliptical to ovate leaves. It has been found growing on stumps and logs in swamp habitats.

Ferns

The state considers all ferns except the *Osmunda* species (the common cinnamon and royal ferns) and *Pteridium aquilinum* (bracken) to be threatened or endangered. Described below are those FCREPA regards as troubled species.

Hand Fern, OPHIOGLOSSUM PALMATUM

The hand fern is a drooping, staghornlike fern which grows in the dead leaf bases (boots) of cabbage palms. Although it was once much more widespread and is still common in parts of tropical America, in Florida hand fern now survives only in very moist, shady hammocks

and swamp forests that have somehow managed to escape fire. The plants are very sensitive to fire, and in 1938 Small wrote that increased fire incidence had already begun to eliminate hand fern from localities where it was formerly common. Since then, drainage and attendant increased fire frequency have accelerated the species' destruction. Hand fern may require a rather precise regional fire regime since its host tree is favored by fire. Collectors have removed most of the hand ferns from hammocks that have avoided burning, and the species is now in serious danger of extirpation.

Unfortunately, hand fern is difficult to grow (Mesler, 1974), and the plants usually die when transplanted. It might be possible, however, to propagate the ferns from collected spores and carefully transplant them into the wild. If an attempt to reestablish hand fern is made, it would probably be unwise to choose the same areas where fox squirrels are to be encouraged because squirrels have been known to feed heavily on hand fern roots in dry weather (Craighead, 1963).

Auricled Spleenwort, ASPLENIUM AURITUM

The auricled spleenwort is a resurrection-type fern with an erect rootstock and several once-compound leaves. It grows almost exclusively on the inclined trunks of large trees, usually live oaks (FCREPA, 1976) or pond apples (Austin, pers. comm.). The species is widespread in tropical hammocks of the Caribbean and South America but has only been found in a few scattered locations in Florida and may now be restricted to Fakahatchee and Deep Lake strands (FCREPA, 1976).

Birds's Nest Fern, ASPLENIUM SERRATUM

The bird's nest fern has an upright rootstock with a vase-shaped rosette of undivided leaves up to 70-80 cm (28-32 in) long. It grows on logs, stumps, and tree bases in swamps and in dark, moist hammocks. High humidity seems to be important, and this plant does poorly in drained areas (Dayhoff, pers. comm.). Although it is widespread in the West Indies and in Central and South America, the bird's nest fern has never been abundant in Florida. It is still found in Deep Lake Strand, in hammocks near the L-28 canal, and in several other locations in the BCNP, but has seriously declined due to collecting for horticultural purposes, and Ward feels it will be extirpated from Collier County if collecting is not brought under control (FCREPA, 1976).

Narrow Strap Fern, CAMPYLONEURUM ANGUSTIFOLIUM

The narrow strap fern forms a rosette of linear leaves up to 40 cm (16 in) long. It usually grows on live oaks in

shady hammocks. The species ranges through the West Indies into northern South America but has been found in only a few Florida locations. It does occur in Deep Lake Strand (Dayhoff, pers. comm.). This fern has probably suffered more from collection than from habitat loss (FCREPA, 1976). It is easily propagated from root cuttings (Dayhoff, pers. comm.).

Narrow Strap Fern, *CAMPYLONEURUM COSTATUM*

This narrow strap fern has elliptic entire leaves. It is epiphytic on cypress knees and logs in swamp forests and low hammocks. This is primarily a Caribbean species, but it is known to occur in the BCNP (Dayhoff, pers. comm.).

Cypress Fern, *THELYPTERIS RETICULATA*

Cypress fern is a large (1-3 m [3-10 ft] tall) pinnate-leaved fern with a fleshy rootstock. It is an epiphyte found on cypress knees and logs in swamp forests. The species is widespread in tropical America but rare in Florida. There are no official cypress fern records from southwest Florida, but it does grow in Roberts Lakes Strand. This species can be grown from leaf buds.

Cycads

Coontie, *ZAMIA PUMILA*

Coontie, a fernlike cycad, is primarily a plant of shady, relatively dry, palm-dominated hammocks. In parts of its range, which extends from north Florida into the West Indies, it was once common enough that the Indians used a starch extracted from the cooked roots as a staple food, but it has apparently never been abundant in the Big Cypress. Although habitat loss is the primary threat to this species outside the preserve (and lack of suitable habitat is the reason it was never plentiful within it), collecting is also a significant problem. Many coonties are dug from the wild and transplanted to gardens, but even more are probably killed when would-be transplanters accidentally cut into their huge roots. We have also seen coontie plants from north Florida completely defoliated by caterpillars.

EXOTIC PLANTS

When man introduces a foreign plant into a native flora which has evolved in an environment with a limited complement of species, a variety of things can happen. The new species may compete with and restrict the sites available to a native species, perhaps even leading to its extinction, thus affecting populations of animals dependent upon the native vegetation as food or habitat. Or, the new plant may be utilized by certain wildlife

species, giving them a competitive advantage over other animals. These changes may be so subtle and gradual that they go unnoticed, or at least unstudied. Sometimes, however, an exotic plant multiplies so rapidly that it grossly disrupts plant communities. Several species have done this in South Florida, and exotic plants have therefore become a major management concern here.

Generally dramatic invasions involve plants called weeds, colonizers, supertramps, or "r" selected species that are normally opportunistic in terms of habitat or site requirements. They rely on rapid growth, precocious reproduction, and the production of large numbers of small, readily dispersed propagules. They usually utilize wind or animals that travel long distances (such as birds or humans) as vectors to quickly spread their seed to underutilized sites. These plants are not very good competitors in complex plant communities, however, and are usually eliminated from a site as succession proceeds.

For several reasons, Florida has been particularly susceptible to the introduction and successful establishment of exotic plants and animals (Crowder, 1974a and 1974b). As discussed in the Geology and Evolution of Plant Communities sections, the region is geologically young, and the native plant communities have had less than 5,000 years to develop (Long, 1974b). The processes of natural species dispersal and evolutionary adaptation simply have not had much time to operate here. Biogeographical isolation compounds the effects of geological youth. Florida is physically isolated by water on three sides and climatically isolated by a colder climate at the landward end of the peninsula. Therefore, South Florida is ecologically very much like an island and, as is typical of such environments (MacArthur and Wilson, 1967; Simpson, 1964), is not species saturated. The fact that our climax hardwood hammocks are made up of species which are typically second-growth colonizers in tropical America attests to the immaturity of our flora.

Since there are no similar bioclimatic regions anywhere nearby to act as a source of preadapted colonizers, both temperate and tropical species occupy sites in Florida to which neither are particularly well adapted. Temperate species (such as cypress and maple) tend to be programmed to lose their leaves in winter, which may not be the most efficient season for dormancy in South Florida, since it requires new foliage production during the stressful spring drought period. The tropical colonizers must contend with a totally new stress: frost. Consequently, it appears that Florida's native species are not all utilizing the environment optimally, and an invader can simply tap unused or underutilized resources.