The Quarterly Journal of the Florida Native Plant Society

Scrub Hickory: A Florida Endemic • The Evil Weevil And The No-Name Fly • Obtaining Research And Collecting Permits
Growing Partnerships: Preserving Florida’s Environment from Backyards to Backwoods.

Don Spence, Conference Chair

The Pawpaw and Lyonia Chapters are well on their way to organizing an excellent conference. Speakers are set, dinners and lunches organized, entertainment scheduled, and field trips coordinated. All we need is you!

Our theme is Growing Partnerships: Preserving Florida’s Environment from Backyards to Backwoods. Conference speakers will represent the Florida Natural Areas Inventory, Florida Department of Environmental Protection, Volusia County School District, Save the Loop Campaign, Volusia County Environmental Management, Trust for Public Land, Department of Agriculture, Halifax River Audubon Society, University of Florida Schools of Horticulture and Urban Forestry, Florida State University, University of South Florida, University of Central Florida, and Stetson University.

Our keynote speakers are Gary Knight, Director of the Florida Natural Areas Inventory (FNAl) and Richard Louv, of the San Diego Union-Tribune. Gary will discuss FNAl accomplishments in acquiring land for preservation and the importance of local community involvement. FNAl is a non-profit organization administered by Florida State University, dedicated to gathering, interpreting, and disseminating information critical to the conservation of Florida’s biological diversity. FNAl also maintains a comprehensive database of the biological resources of Florida, which now includes more than 28,000 element occurrences of rare plants, rare animals, and high-quality natural communities.

Richard Louv is the author of Last Child in the Woods which highlights the importance of nature experiences in childhood development. Rich’s book relates how society has become so structured that kids are almost forced to stay inside due to no-trespassing signs, ordinances limiting the construction of tree houses, traffic, and a fear of bugs and predators. Rich will also point out that there is good news; many communities and school districts are working on programs that take students back to nature.

Life, liberty and the pursuit of native plants – our conference topics will include butterfly gardening, landscaping, pest damage, and how to maintain your trees and shrubs in a healthy manner. Five speakers will introduce successful environmental programs and land preservation initiatives that have taken place in Volusia County. Two plant identification workshops, one for beginners and one for those interested in the advanced taxonomy of the Asteraceae will provide challenging learning experiences. A panel discussion on plant genetics and the biological ramifications of hybrids, cultivars, and the movement of native plants outside of their naturally occurring range will offer plenty of food for thought.

This year FNPS programs will provide CEUs (Continuing Education Units) for landscape architects & designers, nurserymen, herbicide spray technicians, and arborists. If you hold a certification in one of these fields there is an extra incentive to come to the conference. If you know someone who is a municipal worker, nursery owner, urban planner, on a landscape maintenance crew, or otherwise involved with plants let them know about this incentive.

The spectacular Shores Resort and Spa (www.shoresresort.com), is the location for our activities. With its beautiful location on the Atlantic Ocean, rooms will either have a Halifax River or ocean view. The conference rate is $115 before taxes. It is unlikely that you will find a cheaper room locally so I hope you will stay with us at the Shores. Your occupancy also helps FNPS pay for rooms for our keynote speakers and offsets overall conference costs. The Shores has just over 200 rooms, which guarantees us full run of house with no conflicts, but you need to reserve your room today. We hope to see you at the conference in May!
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Scrub Hickory: A Florida Endemic

Scrub hickory (Carya floridana Sargent), also known as Florida hickory, is one of Florida’s more conspicuous endemic plant species. It occurs on the Atlantic coastal dunes from Volusia County south to Palm Beach County and in xeric upland sites in the south-central and west-central regions of the peninsula from Marion County on the north to Charlotte County on the south.

C. S. Sargent (1922) stated that the species also occurred “on the shores of Pensa cola Bay” in the Florida panhandle, but he was presumably referring to the sand or pale hickory (C. pallida). The scrub hickory was described by Sargent in 1913 as Hicoria floridana and later assigned to the genus Carya by J. K. Small (1933). The type specimen was collected by B. K. McCarty in 1911 in St. Lucie County about 5 miles (8 kilometers) south of Ft. Pierce. McCarty wrote to Sargent that he had found no ripe fruit and, as a result, a fruit collected by R. T. Morris at the same locality was used for the type in the species’ description (Murrill 1946). Although they recognized the species, H. Kurz and R. K. Godfrey (1962) questioned its validity on the basis of the occurrence of specimens intermediate in size and other characters between scrub hickory and pignut hickory (C. glabra) in transition zones between scrub and sandy hammock vegetation.

Scrub hickory is particularly characteristic of the xeric sand pine scrub association of the Lake Wales Ridge. In fact, Small was so impressed with its abundance near the southern end of the ridge that in 1914 he prevailed upon the Atlantic Coastline Railroad to change the name of a railroad stop in Highlands County south of the town of Lake Placid from “Red Hills” to “Hicoria” (Wilson 1995). The local post office was also given the same name. In 1923, Hicoria was the center of the naval stores and turpentine operations of the Consolidated Naval Stores company and in 1928 was the site of a logging operation of the Sherman Lumber Company with its associated residential buildings and commissary (DeVane 1978). Today, the only trace of this long-abandoned operation are the concrete supports of the former buildings now hidden in the dense scrub vegetation.

Scrub hickory is typically a shrub or small tree 3-5 meters high but has been reported to reach a height of 25 meters (Small 1933). However, a Highlands County specimen listed by American Forests (2004) in its National Register of Big Trees had a height of only 47 feet (14.3 meters) and a diameter of 19.7 inches (50.7 centimeters), based on the circumference of 62 inches. Sargent (1922) noted that in the interior of the peninsula the species occurs typically as a shrub. The maximum height of scrub hickories we sampled in natural habitats in Highlands County was 7.6 meters. However, considerably larger specimens are found in suburban and urban areas in the region where growing conditions are presumably more favorable. For example, an individual in a vacant lot in the town of Lake Placid had a height (estimated with a clinometer) of 13.4 meters and a diameter of 120.9 centimeters before dividing into several trunks. Unfortunately, this tree along with many other large scrub hickories in residential areas in the Lake Placid area were casualties of Hurricane Jeanne.

Scrub hickory has a clonal growth pattern, with the separate stems (ramets) often forming distinct clusters termed a “multi-trunk” condition by Grauke (2002). Larger tree-sized clones may have a dozen or more separate, diverging trunks. The yellowish-green compound leaves usually have 3 to 5, and more rarely 7, leaflets with a rusty pubescence on the lower surface when young. The mature leaves retain a rusty tinge on the lower surface. The outer bud scales overlap and are covered with small rusty-colored scales. The bark is typically grayish and relatively
smooth, with prominent interconnecting, longitudinal fissures that tend to be parallel; and the trunk and larger branches usually bear conspicuous patches of lichens. [Fig. 1] The bark on the lower trunk of old trees in shady, long-unburned habitats is almost black and deeply furrowed, and the larger branches may be heavily encrusted with foliose lichens. [Fig. 2]

The species is monoecious, with flowers appearing in the spring along with the new leaves. The staminate flowers consist of 3-branched catkins, and the 2-10 tiny pistillate flowers occur as tightly-crowded clusters at the ends of the twigs. [Fig. 3] Scrub hickory has been determined to be a tetraploid with 64 chromosomes, and, although it has a relatively large stomatal area characteristic of tetraploid species, its pollen is the smallest of any tetraploid member of the genus (Stone 1963). Despite the multiple flowers, typically only a single nut matures. For example, in one study site in Highlands County single nuts occurred in 93 percent of the cases and two nuts in only 7 percent. There was a suggestion in this sample that twin nuts tended to be more frequent on certain trees, perhaps reflecting a genetic effect. Double nuts may occur on individuals as small as 1 meter in height as well as on larger trees.

The nut is enclosed in semi-woody husks that are relatively thin, persistent, and separate irregularly. [Fig. 4] The surface of the hull varies from smooth to roughened with many tiny projections. The shape of the fruit varies from narrowly pear-shaped and elongate to globular, with fruits on the same plant having the same general shape. [Fig. 5] Small (1933) attributed the great variation in shape and size of the fruits to the species' occurrence in very late and unstable physiographic areas. The nut itself is thick-shelled with a ridged surface and often with a stalk-like base. [Fig. 6] Compared with other hickory species, the nut of scrub hickory is relatively small, with a diameter of 2.0-2.5 centimeters and an average mass of 3.4 grams (Abrahamson and Abrahamson 1989). The nut is “sweet,” reflecting a relatively low tannin concentration, and has considerably higher nutritional and energy content than the acorns of the five species of oaks and fruits of the two species of palmettos occurring in the same habitats.

Scrub hickory is closely related to pignut hickory (C. glabra) and black hickory (C. texana), as indicated by such shared characteristics as the rusty pubescence of young leaves and number of leaflets and similarity in the composition of the nut oils (Stone et al. 1969). In fact, the resemblance between scrub hickory and black hickory is so strong that identification of herbarium specimens of the two species requires knowledge of their geographic origin. Pignut hickory is widespread in relatively mesic habitats from southwestern New Hampshire to eastern Illinois and south to Louisiana and central peninsular Florida. Black hickory occurs in dry upland sites mainly west of the Mississippi River from Iowa and Illinois south to eastern Texas and western Louisiana.

Based on the study by Stone et al. (1969) of the composition of the nut oils of hickories, the sand hickory (C. pallida) is also related to the scrub, black, and pignut hickories. This species occurs on sandy well-drained soils from Virginia to Tennessee and south to Louisiana and the Florida panhandle, with isolated populations as far north as Delaware and New Jersey. In Florida it is found sporadically from Santa Rosa to Leon counties, primarily in longleaf pine-oak woodlands. Intergrades between scrub, black, sand, and pignut hickories occur in areas where their ranges overlap. In Florida, pignut hickory and scrub hickory often occur in the same area, with the former in moist habitats and the latter in xeric uplands. Other Florida examples of a pair of closely related plants that occur in the same geographic region with one member occupying more mesic environments and the other xeric uplands include red bay (Persea borbonia) and silk bay (P. humilis), live oak (Quercus virginiana) and sand live oak (Q. geminata), and American holly (Ilex opaca) and scrub holly (I. opaca var. arenicola).

The close relationship of scrub hickory and black hickory with widely separated ranges at the present time reflects an evolutionary
history similar to that of a number of animal species, such as the gopher tortoise, indigo snake, crested caracara, scrub jay, pocket gopher, and Florida mouse, with nearest relatives in Florida and western North America or Central America.

According to our hypothesis the evolution of the scrub hickory involved the isolation of the ancestral stock on the small island (presently represented by “Red Hill” on the Archbold Biological Station) that existed in the region of the southern end of the present Lake Wales Ridge during the high stand of sea level in the upper Miocene period or, alternatively, at a later time on the more extensive insular land mass corresponding to the present-day Lake Wales Ridge that existed during a high stand of sea level in the mid-Pliocene period. (Alt and Brooks 1965) which led to its adaptation to xeric, deep sandy soils of marine origin. The subsequent retreat of sea level far below the present level during the maximum Wisconsin glacial advance in the following mid-Pleistocene period resulted in a near-doubling of the size of the Florida peninsula and a lowering of the water table by 26-31 meters, creating conditions allowing the expansion of the xeric vegetation association designated as “sand-dune scrub” by the plant geographers H. R. and P. A. Delcourt (1984). As a result, scrub hickory was presumably able to expand its range well beyond the present limits. A study by W. A. Watts and B. C. Hansen (1988) of pollen in cores of sediments from Lake Annie, a deep sink-hole lake near the southern end of the Lake Wales Ridge, documented the presence in the region of an arid vegetation association with hickory, presumably scrub hickory, as one of its components from about 50,000 years (the beginning of the record) to 9,800 years BP (before the present), with the appearance of pollen of more mesic-adapted species following that period. This trend in the pollen record correlates with the progressive rise in sea level and the related rise in the water table of peninsular Florida following the end of the Wisconsin glacial period about 13,500 BP, which resulted in a reduction in the area of the peninsula and extensive replacement of xeric habitats by more mesic vegetation associations such as pine flatwoods, hardwood hammocks, cypress swamps, bayheads, and peatlands. As a result, by 5,000 BP the xeric habitats occupied by scrub hickory had become restricted to well-drained sands of the central peninsular uplands and coastal dune systems.

On the Archbold Biological Station near Lake Placid in south-central peninsular Florida where we have studied the scrub hickory for many years, the species occurs in three major xeric upright vegetation associations, namely, southern ridge sandhill, sand pine scrub, and scrubby flatwoods (Abrahamson et al. 1984). The southern ridge sandhill association has an open canopy of south Florida slash pines (Pinus elliottii var. densa) and sand pines (Pinus clausa) and an understory of small trees and shrubs comprised mainly of myrtle oak (Quercus myrtifolia), Chapman’s oak (Q. chapmanii), sand live oak (Q. guminata), turkey oak (Q. laevis), scrub hickory, and palmettos (saw palmetto, Serenoa repens, and scrub palmetto, Sabal etonia). The understory is generally dense, but interrupted with open areas with thin litter or exposed sand. Ground cover includes stems of the shrub layer species in areas of shrub cover and herbaceous plants, lichens (Cladonia spp.), and spike moss (Selaginella arenicola) in the open areas. The presence of scrub hickory is one of the features, in addition to the replacement of longleaf pine by South Florida slash pine, distinguishing southern ridge sandhill vegetation from its more northerly counterpart in Florida. In fact, one phase of the sandhill vegetation type in the southern ridge area is characterized by having scrub hickory rather than turkey oak as the dominant hardwood species. The sand pine scrub association has a nearly closed canopy of sand pines, and a small tree-shrub understory of most of the same species as in sandhill. Ground cover consists mainly of sprouts of the shrub layer components, with few herbaceous species. The litter layer is generally well-developed with fewer openings with sparse litter or bare sand than the sandhill site. Scrubby flatwoods has a widely open tree layer consisting of slash pines and sand pines; a generally dense shrub layer; with interspersed openings with herbaceous species and lichens.

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Fig. 5 A fruit of scrub hickory with a narrow, obovate shape that differs from the usually more globular form. All fruits on the same tree have a similar shape.

Fig. 6 Mature nuts of scrub hickory.
The endemic Archbold oak (Q. inopina) is a characteristic component of the shrub layer of scrubby flatwoods.

Scrub hickory is generally distributed in the southern ridge sandhill and sand pine scrub vegetation types but has a more restricted distribution in scrubby flatwoods, where it is often lacking or occurs only as isolated individuals probably resulting from occasional nut dispersal by birds from sites with higher numbers of the species.

**Historically, the vegetation associations inhabited by scrub hickory were subject to periodic lightning-ignited fires that maintained an open tree canopy, a sparse shrub layer, and extensive open areas with herbaceous vegetation or bare sand.**

Historically, the vegetation associations inhabited by scrub hickory were subject to periodic lightning-ignited fires that maintained an open tree canopy, a sparse shrub layer, and extensive open areas with herbaceous vegetation or bare sand. Under the natural fire regime, sandhill and scrubby flatwoods were subject to relatively frequent burns, while scrub experienced less frequent but high intensity fires. Scrub hickory is well-adapted to fire and following a burn quickly regenerates through production of new ramets rather than through germination of nuts in the soil bank. Most other perennial plants in these associations also regenerate by vegetative means rather than from seeds following fire (Abrahamson 1984).

In a study we conducted on the effects of a prescribed fire in a long-unburned sandhill association, new scrub hickory ramets produced a few nuts within a year following the burn, but full recovery of nut production by larger ramets required more than 5 years (Layne and Abrahamson 2004). In contrast to scrub hickory, the larger oaks on the burned plot, particularly species of the white oak group, tended to have higher production than on the unburned control plot during the 5 years following burning. The density of scrub hickory ramets also increases with time since fire. For example, R. L. Myers and D. L. White (1987) documented a 393 percent increase in the number of stems less than 5 centimeters in diameter in a sandhill association over a span of 52 years beginning 5 years after a major fire.

The phenology of scrub hickory in the southern Lake Wales Ridge region involves the appearance of new leaves in late January or early February, with considerable individual, site, and year-to-year variation in the timing of leaf development. Leaf development continues through March and by early April leaves are fully developed on some trees. Flowering occurs from about late January to mid-April coincident with the emergence of leaves and during the time of year with greatest air movement, which presumably maximizes pollination efficiency. In some years, many trees have well-developed nuts by late May and nearly full-size but still green nuts are present by early July. Some nuts have ripened and begun to fall by late August but most are shed from September to November.

By late August the leaves of many trees have acquired a bronzy tinge, and leaves begin turning color from early October through early December, depending on the year. The leaves are bright yellow when first turned, providing a sharp contrast to the green canopy of the evergreen oaks, and later turn brown. There is much individual as well as year-to-year difference in the timing of these color changes. Even late in the season some trees retain leaves that may still be partly green, bright yellow, or brown, with most leaves having been shed by the end of January. A hard freeze tends to synchronize color change and leaf drop, with the shed leaves often forming a thick carpet on the ground beneath the tree.

The number of nuts produced by scrub hickory is strongly correlated with the size of the ramet; and the average number of nuts per ramet for combined size classes over a 23-year period on our study sites was 11.8 in sandhill, 5.8 in sand pine scrub, and 12.3 in scrubby flatwoods (Layne and Abrahamson 2004). The highest number of nuts recorded on a single tree was 350. The low average number of nuts per ramet produced by scrub hickory in the sand pine scrub association was similar to our observations on acorn production by the four oak species of that association (Abrahamson and Layne 2003) and presumably reflects the lower light-level in the nearly closed-canopy of the mature scrub. Based on the mean number of nuts for different size classes and the densities of the respective size classes as determined by periodic vegetation surveys, we estimated that the average annual nut production by scrub hickory in the three vegetation associations studied was 348 per hectare in sandhill, 464 per hectare in scrub, and 47 per hectare in scrubby flatwoods (Layne and Abrahamson 2004).

There was considerable year-to-year variation in the nut crop in each vegetation association, with the proportion of ramets bearing nuts having a greater effect on the size of the crop than the average number of nuts per ramet. Annual crops ranged from 22 to 775 nuts per hectare in sandhill, 11 to 1635 nuts per hectare in sand pine scrub, and 1 to 280 nuts per hectare in scrubby flatwoods. Average intervals between higher annual crops in the three vegetation types ranged from 2.6 to 3.2 years, periodicities that are generally comparable to those reported for nut production by other hickory species in various localities and habitats in the United States. Statistical analysis indicated that about 42 to 62 percent of the variation in yearly nut production in different vegetation types was explained by temperature and rainfall conditions, with average maximum winter temperature, average minimum spring temperature, and winter rainfall having the greatest effects.

The high nutrient and energy content of the scrub hickory nut makes it a potentially important wildlife food species, and at least 14 species of vertebrates are known or presumed to feed on the nuts in our study areas. [Fig. 7] The gray squirrel and southern flying squirrel are probably the principal mammalian consumers and dispersers of the nuts. Scrub hickory nuts comprised 85 percent of the food items found in nest boxes occupied by these species. In contrast, based on our annual censuses of mast crops in the different vegetation types, scrub hickory nuts accounted for only 0.5 to 16.7 percent of the combined hickory nut and acorn production. Thus the high frequency of scrub hickory nuts in nest boxes suggests that the squirrels were selectively collecting them. Studies elsewhere in the United States have indicated a similar greater preference by squirrels for hickory nuts than acorns. Aside from their possible attractiveness to squirrels because of their high energy content, the higher frequency of scrub hickory nuts than acorns in nest boxes may also reflect a greater tendency of squirrels to
The Evil Weevil and the No-Name Fly

A new “weevil-killing fly” has the potential to combat larval infestations of *Metamasius callizona*, an exotic weevil that threatens Florida’s *Tillandsia* species.

by Heidi Rhoades

Just before sitting down at my desk to write this article, I received a phone call from Dennis Giardina of Panther Refuge (Naples) and the designated tree climber for the panther capture team in Big Cypress. His usually upbeat tone was muted with concern, so I braced myself. “Well, Heidi,” he began slowly, “I found a Tillandsia utriculata with several cocoons and they’re callizonas.” “Ugh,” I moaned and wagged my head in disbelief. In an instant, I imagined the cypress dome he stood in plundered of its airplants in a matter of a few years. Dennis empathized with my reaction and we shared a brief mourning. I hung up the phone, put my chin in my hands, and sat quietly in grief.

I have been monitoring *Metamasius callizona* since 2002. My first “weevil gig,” as I casually refer to my work, was with the South Florida Water Management District during the fall and winter of 2002 and 2003. Most of my work was done to the east, west, and north of Lake Okeechobee. I found weevils at Fisheating Creek in Palmdale; at Dupuis, and in the Pal Mar natural area in Martin County. The damage in these areas was extensive. Finding my first cocoon and beholding the destruction unleashed by these invasive pests is an experience that has, unfortunately, lost its novelty, but not its emotional impact. To look into a seemingly infinite cypress and pop ash canopy brimming with prehistoric looking bromeliads, and then to look into your hand cupping a cocoon and feel

Our “weevil-killing fly” and potential hero is a new species, in a new genus, previously unknown to science. A formal description of the fly has just been submitted by Monty Wood and Ron Cave to *Florida Entomologist*.

The fly belongs to the family Tachinidae. It is being temporarially described as “tachinid fly cf. *Admontia*” – “cf.” is the abbreviation for the Latin word confer (meaning compare with) and *Admontia* is a genus of tachinid flies to which this new genus is closely related. It was first discovered in Honduras, and has also been found in Guatemala.

The fly larvae preys on weevil larvae, and there is evidence it prefers *Metamasius callizona*, a weevil species causing severe damage to *Tillandsia* populations in Florida.
its gentle larval movement, is an experience that is terribly difficult to wrap one’s mind around. To know what the weevil is capable of doing is to know an ensuing and inevitably slow death for the Tillandsias and ultimately the ecosystem of which they are part.

In 2003, I was hired by the University of Florida to survey natural areas and collect seed. My region consisted of federal, state, and county natural areas from Kissimmee State Park to Rookery Bay, Bullcreek Wildlife Management Area to Collier Seminole State Park, and many hammocks and domes in between. Within this swath, I have found weevils at Rookery Bay, Panther Refuge, and Lake June Scrub.

Ray Creel last contributed to The Palmetto in September 2002 (V21:4), dropping a bomb when he discovered the evil weevil inhabiting bromeliads in Fakahatchee. This discovery compelled the University of Florida team to focus our efforts largely on monitoring and seed collecting within Fakahatchee. Thankfully, neither Mike Owen, the park biologist, nor I have found any weevil damage since Creel’s last report. Owen, whose legendary passion for the park precedes him, continues to keep his eyes peeled for any signs of infestation. Adjacent land areas in the Panther Refuge and Big Cypress, however, have been sites of weevil damage.

My monitoring work continues today due to a federal grant we received; thus, my focus is monitoring in Everglades National Park and Big Cypress. In early February 2005, I monitored “Christian Point,” a buttonwood and mangrove forest not far from Flamingo. Nearly a quarter of the Tillandsia utriculata appeared to have observable damage (centers falling out easily, a banana yellow hue), and with enough prodding of plants, we found a larva. Since the weevil has not been found in Miami-Dade since 1992 (Hurricane Andrew), I felt it important that this larva receive special care, so I brought it to the Indian River Research and Education Center in Fort Pierce for rearing. Dr. Cave has shared that he believes that the weevil is Metamasius mosieri, and we could not be more pleased with this finding.

The biological control agent against the “evil weevil” comes to us in the form of a parasitic fly. Currently the fly (possible genus Lixophaga) is being studied by Alonso Suazo (in conjunction with Drs. Howard Frank and Ron Cave, University of Florida) at the School of Agriculture in Honduras. Studies have confirmed that the fly will readily parasitize Metamasius callizona and Metamasius mosieri with evidence suggesting that it prefers Metamasius callizona. The fly is found in Honduras and Guatemala where it resides in high elevation cloud forests and has been very difficult to colonize. The fly was recently received at the Indian River Research and Education Center quarantine center however, all of the individuals have expired.

In the meantime, there is plenty of work that can be done, including more monitoring and seed collection. Native plant enthusiasts can contribute to this effort in several ways: volunteering with local county, state, and federal parks to monitor bromeliad populations and, if necessary, collect seed. We can also monitor exotic bromeliads sold in local stores and garden centers for pests. There are over 19 exotic weevils that can do the same type of damage as Metamasius callizona. With little more than 8% of all incoming cargo inspected, it is vital that we keep our senses alert for any pests that have gained entry into this country. Please, poke around exotics wherever they are found. Though quirky, I have educated a lot of people about the weevil because they observed my snooping with curiosity. Let this be an ice-breaker to begin a dialogue — many people are completely unaware of natives, exotics, and even what “bromahlads” are. I have found that people generally love learning new things and this is an opportunity to share some beneficial trivia. Which brings me to my final pursuit of action: talk it up! Write letters to your representatives, post a bromeliad weevil fact sheet in your supermarket or library, host a workshop, or write an article for the paper. In March 2004, while in Washington, D.C., I lobbied Congressional Representative Alcee Hastings; I am quite sure that even with all of the items he hears daily, the weevil remains on his mind!

Florida would be incomplete and unrecognizable without our armored and shapely air plants. Not only would our forests and swamps suffer aesthetically, but the ecological impact of losing our native bromeliads would be enormous.

To learn more about weevils and bromeliads, visit http://savebromeliads.ifas.ufl.edu/

For any field questions or other concerns you may have, please contact Heidi Rhoades at fscrubj@earthlink.net, Dr. Ron Cave at rdcave@mail.ifas.ufl.edu or Dr. Howard Frank at jhf@ifas.ufl.edu.
Montgomery Botanical Center (MBC) is a 122-acre, private, nonprofit, botanical garden located in Miami, Florida. MBC’s mission is to develop wild-collected, population-based, scientifically valuable collections of tropical plants – primarily palms and cycads – for research, education, and conservation purposes. Although we have an extensive collection of cycads and palms from around the world at MBC, we are lacking representative population samples of the only cycad and many of the palm species native to the U.S. My goal is to visit, document, and collect seeds and herbarium specimens from as many native coontie (Zamia pumila) populations as possible. MBC’s Palm Biologist, Dr. Larry Noblick, will be focusing on palms. The result of our collective efforts will be the only population-based ex-situ germplasm collection of Florida native cycads and palms in the world.

As the Cycad Biologist at MBC, a significant part of my job involves planning, permitting, and conducting expeditions to various countries around the world for the purpose of increasing the quantity and quality of MBC’s Cycad Collection. While employed at MBC, I have mounted highly successful expeditions to Honduras and Panama. With the experience gained in obtaining permits to collect and export seeds and herbarium specimens from these two Central American countries, I certainly didn’t think obtaining permits to collect in Florida would be any more difficult…but was I ever wrong!

I quickly discovered that the Florida Department of Agriculture and Consumer Services, Division of Plant Industry (DPI), Bureau of Plant and Apiary Inspection in Gainesville oversees the issuance of permits to collect and conduct research on protected native plant species. I also learned that Chapter 05B-40 of the Florida State Statutes includes 1) definitions applicable to protected plant species in Florida, 2) instructions on how to obtain a permit to harvest plants or plant parts of protected species, and 3) a regulated plant index that lists all protected plant species in the state. According to this index, there are currently 553 protected plant species in Florida. They are divided into three categories: 431 species are considered “Endangered,” 114 species are considered “Threatened,” and 8 species are considered “Commercially Exploited.” Of these 553 state-protected species, 45 species are also federally endangered and 10 more are federally threatened; these latter 55 species are protected under the Endangered Species Act of 1973 (as amended) and require additional permits not covered here.

As I delved deeper into the various regulations pertaining to the collection of protected native plants, I realized that the agency responsible for maintaining each of the numerous sites or locations in which I want to collect varies depending on the ownership of the property. For example, the Florida Department of Environmental Protection (DEP) oversees and maintains the state parks in Florida, the National Park Service oversees the national parks, and individual county parks are controlled by the respective “Parks and Recreation” departments in each county. As I then learned, each of the controlling agencies also requires permits for collecting or conducting research on protected native plants within their respective parks and natural areas.

This article provides the information that I have compiled to date pertaining to research and collecting permits for protected native plants in Florida. The specific requirements for obtaining permits and the applicable contact information for each different type of property are listed in the following section.

Be aware that even though you obtain a specific permit from the appropriate agency that oversees a particular park or property, you must also obtain an additional permit from the Division of Plant Industry (DPI) for each and every location in which you wish to collect or conduct research – regardless of whether it is privately or publicly owned. For large-scale projects that include numerous locations, the specific permits should be obtained first and then sent to the DPI, which will then issue a single blanket permit for all of the public and private sites covered by the specific permits.

Disclaimer: The information provided herein was accurate at the time of writing this article (June 2005). Although personnel may change, I believe the various agencies that issue research and collecting permits will remain fairly constant over time.
 Permit Requirements & Contact Information

**Private property:** Written permission from landowner must be sent with a completed “Request for Permit to Harvest Endangered or Commercially Exploited Plant(s) or Plant Part(s)” (Form DACS-008051), to:

Tyson Emery, Environmental Specialist III
Division of Plant Industry, Florida Department of Agriculture & Consumer Services
Phone: (352) 372-3505 ext 155
FAX: (352) 334-3816
E-Mail: EmeryT@doacs.state.fl.us

- DPI permit application is available from Mr. Emery at the above address or e-mail.
- DPI must receive written permission/application at least two weeks prior to collecting to issue a permit.
- See state regulations and permit guidelines regarding native endangered, threatened, and commercially exploited plant species online at: www.doacs.state.fl.us/pi/images/rule05B.pdf. Download the pdf and select the “Chapter 5B-40” bookmark along the left side of the screen.

**State parks (all but Broward & Miami-Dade counties):** Submit research proposal and completed “Florida Department of Environmental Protection, Division of Recreation and Parks (DRP), Application for Research/Collection Permit” (Form FPS-R0009) to:

Donna Watkins, Special Projects Coordinator
Bureau of Natural & Cultural Resources
Mail Station 530
3900 Commonwealth Blvd.
Tallahassee, FL 32399-3000
Phone: (850) 245-3104
FAX: (850) 245-3114
E-Mail: donna.watkins@dep.state.fl.us

- DEP permit application is available from Ms. Watkins at the above address or e-mail.
- DEP will allow you to collect or conduct research in any state park except those in Broward and Miami-Dade counties, which require separate, special permits (see below).
- DPI permit must also be obtained; see the “Private property” section.

**State parks (Broward & Miami-Dade counties):** Submit a research proposal and a completed “Florida Department of Environmental Protection, Division of Recreation and Parks (DRP), Application for Research/Collection Permit” (Form FPS-R0009) to:

Ernest M. Cowan, Environmental Specialist III
Bureau of Parks District 5, Florida Park Service
13798 S.E. Federal Highway
Hobe Sound, FL 33455
Phone: (772) 546-0900
FAX: (772) 223-2591
Cell phone: (772) 263-3752
E-Mail: Ernest.Cowan@dep.state.fl.us

- You can use the same DEP permit application as for the other state parks.
- DPI permit must also be obtained; see the “Private property” section.

**Broward County Parks & Natural Areas:** Submit a research proposal and a completed Broward Parks & Recreation “Application for Collecting Permit” to:

Patricia L. Howell, Natural Areas Specialist
950 NW, 38 St.
Oakland Park, FL 33309
Phone: (954) 357-8137
FAX: (954) 537-2865
E-Mail: PHOWELL@broward.org

- Collecting permit application can be obtained from Ms. Howell at the above address or e-mail.
- DPI permit must also be obtained; see the “Private property” section.

**Miami-Dade Parks & Natural Areas:** Submit a research proposal and a completed “Miami-Dade Parks Natural Areas Research Permit Application” to:

Research Review Committee, c/o Sonya Thompson
Miami-Dade Parks Natural Areas Management
22200 SW 137 Ave.
Miami, FL 33170
Phone: (305) 257-0933
FAX: (305) 257-1086
E-Mail: parks@miamidade.gov

- Collecting permit application form is available online at: www.miamidade.gov/parks/library/2005-Research_Permit_App.pdf
- DPI permit must also be obtained; see the “Private property” section.

**Ocala National Forest:** Submit a research proposal and a completed U.S. Forest Service “Forest Product Free Use Permit, Personal Use Only (Not For Resale)” (Permit FS-2400-B, OMB No. 0596-0085) application to:

Bob Wuestenhagen, USDA Forest Service
Lake George Ranger District
17147 East Highway 40
Silver Springs, FL 34488-5849
Phone: (352) 625-2520
FAX: (352) 625-7556

- Note: DPI permit must also be obtained; see the “Private property” section.

**Lower Suwannee & Cedar Keys National Wildlife Refuges:** Submit a brief research proposal to the Refuge Manager; if approved, you will be issued a U.S. Department of Interior Fish & Wildlife Service Special Use Permit.

Kathy Whaley, Refuge Manager
Lower Suwannee and Cedar Keys NWRs

16450 NW 31st Place
Chiefland, FL 32626
Phone: (352) 493-0238 ext. 11
FAX: (352) 493-1935
E-mail: Kathy_Whaley@fws.gov

- DPI permit must also be obtained; see the “Private property” section.

**National Park Service:** Complete a “Scientific Research & Collecting Permit” application online via the National Park Service (NPS) Research Permit and Reporting System (RPRS):
http://science.nature.nps.gov/research/ac/researchindex

- Each park has its own contact person. Search for individual parks at the NPS Web site and then contact them to determine if your species of interest occur there. Do this prior to submitting the online permit application because, during the application process, the online service will ask you if you would like to submit the application to any additional national parks. Specify all parks where you wish to collect or conduct research and avoid having to go through the entire process for each park separately.
- DPI permit must also be obtained; see the “Private property” section.

Jody Haynes is the Cycad Biologist at the Montgomery Botanical Center in Miami, Florida. He has an extensive background and expertise in cycad botany and taxonomy, particularly among the cycads of the Americas. Contact Jody at jhay@montgomerybotanical.org, 305.667.3800, Montgomery Botanical Center, 11901 Old Cutler Rd, Miami 33156-4242.

Protected Native Palms & Cycads in Florida
(According to Florida State Statute Rule 05B-40)

**Endangered Species**
- Pseudophoenix sargentii
- Roystonea elata
- Thrinax morrisii
- Thrinax radiata

**Threatened Species**
- Acoelorrhaphe wrightii
- Coccothrinax argentata

**Commercially Exploited Species**
- Rhapidophyllum hystrix
- Zamia spp.
Florida Ethnobotany
by Daniel F. Austin, CRC Press

It may seem strange for a linguist to review a book on botany, but those who leaf through the pages of this volume will soon discover that Florida Ethnobotany is part dictionary, part thesaurus, and a part encyclopedia. They will also find that its author, Daniel Austin, is someone who loves word histories as much as plants.

Florida Ethnobotany is a 909-page book with a hard, glossy cover listing some 900 plant species native to Florida. It has line drawings on almost every page and 64 color plates to assist in identification. The first 50 pages (“People and Plants”) treat the conventions used, the history of various peoples in Florida, and several extensive tables. The main portion – some 700 pages – is an alphabetical listing of genera (from Abutilon to Zornia). The work concludes with a list of references and an unusually extensive index to genera and common names in English and other languages.

A typical entry in the main section consists of: a) the genus name and its meaning; b) an alphabetical list of common names and their etymologies in English, the native languages of the South, and scattered other European and indigenous languages; and, c) an essay on the history of the genus’s classification and uses. These draw in part on contributions Austin has previously made to The Palmetto. The information has been compiled from the journals of early explorers, dictionaries, and works by anthropologists, linguists, botanists, and others. Wherever possible, the author has sought to match common and older terms with their modern botanical equivalents. This is, in fact, the main contribution of the work: to sort through previous studies, identify probable referents in the plant world, and then to compile these by their currently accepted botanical names. He has also done quite a bit of sleuthing to determine what names mean in a broad range of languages, since names can provide clues as to uses.

The term ethnobotany means different things to different people. For some, the term refers to the study of how people use plants. For others, it includes the study of how people view and categorize the world around them. Because of its organization by genus, this study answers questions of the first type. Those who wish to understand how the practices of a specific group (such as the Seminoles) fit within a larger belief system should consult work by anthropologists (see for example, Sturtevant 1955, Snow and Stans 2001).

Some of the etymologies in this book would benefit from further study. It is also a disappointment that sources are rarely given for words in indigenous languages. Every visitor to the American South has used a different spelling for transcribing plant names in native languages: unless the source of a word is identified, it is impossible to judge the accuracy of the transcription or even the proper pronunciation. It is also difficult to separate mistakes on the part of the original source from mistakes introduced in the current volume.

Florida Ethnobotany will be a useful reference for those interested in deepening their knowledge of Florida’s native plants and their appreciation of the ingenuity shown by local inhabitants in making use of all the resources around them.

About the reviewer: Jack B. Martin is Robert E and Sarah M. Boyd Associate Professor of English at the College of William and Mary and a linguist specializing in the native languages of the South.

REFERENCES


transport hickory nuts to nest boxes for opening to reduce their exposure to predators, as C. C. Smith and D. Follmer (1972) in a study in Missouri found that gray squirrels took an average of 184 seconds to remove the husk and open the shell of shagbark hickory nuts compared with 15-28 seconds for opening the shell of acorns. Besides squirrels, other mammals known or suspected to utilize scrubb hickory nuts include black bears, raccoons, foxes, several species of native mice, and feral hogs. The leaves of scrub hickory are also utilized by squirrels to construct outside leaf nests and are superior for this purpose to those of the oak (except turkey oak) and other available shrub and tree species.

Birds recorded to feed on scrub hickory nuts include the Florida scrub jay, blue jay, red-bellied woodpecker, and red-headed woodpecker. [Fig. 8] In an intensive study of caching behavior of blue jays at the Archbold Biological Station, C. A. Adkisson of Virginia Polytechnic University has repeatedly observed blue jays transporting acorns for long distances but has never recorded long-distance transport of scrub hickory nuts by the jays. Presumably the size of the nut, approximately 38 percent heavier than the largest acorn (turkey oak), precludes long distance transport by birds or small mammals. This may account in part for the restricted geographic range of scrub hickory as compared with that of the oak characteristic of the scrub association in Florida. Scrub hickory sap also appears to be attractive to yellow-bellied sap suckers during the winter months based on the number of larger trunks with closely-spaced scars from sap sucker drill holes.

The only invertebrate animals known to feed on scrub hickory nuts are the larvae of curculionid beetles (weevils), which may infest 23 to 53 percent of the nut crop in some years. The stomach of a black bear killed on a highway near our study area contained remains of scrub hickory nuts along with numerous weevil larvae from the nuts, suggesting that beetle infestation does not necessarily reduce the palatability of the nut to consumers and in fact may actually enhance its nutritive value.

The scrub hickory is clearly a noteworthy member of the Florida flora. In addition to its biological significance as one of the state’s more conspicuous endemic species, a characteristic member of the sand pine scrub and other xeric ecosystems of the central peninsula region, and an important wildlife food source, its attractive appearance gives it potential economic value as a landscape plant. In fact, because of its adaptation for dry conditions, the scrub hickory would appear to be a particularly good candidate for use in xeriscaping to promote water conservation.

Fig. 8 The Florida scrub jay (Aphelocoma coerulescens) is one of several birds known to feed on scrub hickory nuts when available.

ABOUT THE AUTHORS
Dr. James N. Layne has conducted extensive research on the ecology and behavior of mammals and other vertebrate animals in Florida and is a Senior Research Biologist Emeritus at Archbold Biological Station, PO Box 2057, Lake Placid, FL 33852.

Dr. Warren G. Abrahamson, an evolutionary ecologist whose research interests include plant-insect interactions as well as Florida vegetation, is a Research Associate of the Archbold Biological Station and the David Burpee Professor of Plant Genetics in the Department of Biology, Bucknell University, Lewisburg, PA 17837.


## Statement of Functional Expenses

<table>
<thead>
<tr>
<th>For the Year Ended December 31, 2003</th>
<th>Total</th>
<th>Membership &amp; Chapter Support</th>
<th>The Palmetto</th>
<th>Government Policy</th>
<th>General &amp; Management</th>
<th>Fund Raising</th>
<th>Conservation &amp; Research</th>
<th>Education</th>
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<td><strong>Total</strong></td>
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## Statement of Financial Position

<table>
<thead>
<tr>
<th>December 31, 2004 and 2003</th>
<th>2004</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASSETS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Assets</td>
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<td>Cash and Cash Equivalents</td>
<td>$171,263</td>
<td>$159,870</td>
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<tr>
<td>Accounts Receivable (Net of Allowance for Doubtful Accounts of $0)</td>
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<td>277</td>
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<td>Prepaid Expenses</td>
<td>3,347</td>
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<td><strong>Total Current Assets</strong></td>
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<td><strong>Other Assets</strong></td>
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<td>Endowment Fund</td>
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<td>Cash and Cash Equivalents</td>
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<td>4,956</td>
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<td>Marketable Securities</td>
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<td>50,688</td>
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<td>Total Endowment Fund</td>
<td>59,928</td>
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<td>Illustrations by Wes Jurgens</td>
<td>5,475</td>
<td>5,475</td>
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<td><strong>Total Other Assets</strong></td>
<td>64,409</td>
<td>61,117</td>
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<td><strong>Office Equipment and Software</strong></td>
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<td><strong>Total Assets</strong></td>
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<td>$222,451</td>
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<td><strong>Liabilities and Net Assets</strong></td>
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<td>Current Liabilities</td>
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<td>Unrestricted Net Assets</td>
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<td>Permanently Restricted Net Assets</td>
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<tr>
<td><strong>Total Liabilities and Net Assets</strong></td>
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<td>$222,451</td>
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## Statement of Cash Flows

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<thead>
<tr>
<th>For the Year ended December 31, 2004 and 2003</th>
<th>2004</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cash Flows from Operating Activities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in Net Assets</td>
<td>$17,744</td>
<td>$7,968</td>
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<tr>
<td>Adjustments to Reconcile Change in Net Assets</td>
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<td></td>
</tr>
<tr>
<td>to Net Cash Provided by Operations</td>
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<td></td>
</tr>
<tr>
<td>Depreciation and Amortization</td>
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<tr>
<td>(Increase) Decrease in Accounts Receivable</td>
<td>(141)</td>
<td>17,893</td>
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<tr>
<td>(Increase) Decrease in Inventories</td>
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<tr>
<td>(Increase) Decrease in Prepaid Expenses</td>
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<td>(1,265)</td>
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<tr>
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<td>(6,034)</td>
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<tr>
<td>Increase (Decrease) in Chapter Support Payable</td>
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<tr>
<td>Increase (Decrease) in Accrued Liabilities</td>
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<tr>
<td><strong>Total Adjustments</strong></td>
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<tr>
<td>Net Cash Provided (Used by) Operations</td>
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<td><strong>Cash Flows from Investment Activities</strong></td>
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<tr>
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<td>(1,363)</td>
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<td>Held in General Fund</td>
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<tr>
<td>Redemption of Endowment Certificates or Prepayment</td>
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<td><strong>Net Cash Provided (Used) by Investment Activities</strong></td>
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<td><strong>Cash Flows from Financing Activities</strong></td>
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<tr>
<td>Proceeds from Contributions Restricted for Investment</td>
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<td><strong>Net Cash Provided (Used) by Financing Activities</strong></td>
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<td>Increase (Decrease) in Cash and Cash Equivalents</td>
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<td>Cash and Cash Equivalents at Beginning of Year</td>
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<td><strong>Cash and Cash Equivalents at End of Year</strong></td>
<td>$171,263</td>
<td>$159,870</td>
</tr>
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</table>

## Independent Accountant's Report

I have audited the accompanying statements of financial position of Florida Native Plant Society (a non-profit organization) as of December 31, 2004 and 2003, and the related statements of activities, cash flows, and functional expenses for the years then ended. These financial statements are the responsibility of the Organization’s management. My responsibility is to express an opinion on these financial statements based on my audit.

I conducted my audit in accordance with auditing standards generally accepted in the United States of America. Those standards require that I plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatements. An audit includes examining, on a test basis, evidence supporting the amounts and disclosure in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. I believe that my audit provides a reasonable basis for my opinion.

In my opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Florida Native Plant Society as of December 31, 2004 and 2003, and the results of its activities, cash flows, and functional expenses for the years then ended in conformity with accounting principles generally accepted in the United States of America.

Ellis W. Boll, CPA, P.A.
Certified Public Accountant
Winter Park, Florida
Statement of Activities
For the Year ended December 31, 2003

<table>
<thead>
<tr>
<th>Unrestricted</th>
<th>Temporarily Restricted</th>
<th>Permanently Restricted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues, Gains and Other Support: Membership Dues</td>
<td>$602,261</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Conference Income</td>
<td>38,209</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Palmetto Income</td>
<td>1,442</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Contributions</td>
<td>10,019</td>
<td>0</td>
<td>3,336</td>
</tr>
<tr>
<td>Interest and Dividend Income</td>
<td>1,241</td>
<td>1,487</td>
<td>0</td>
</tr>
<tr>
<td>Investment Gains</td>
<td>0</td>
<td>2,862</td>
<td>0</td>
</tr>
<tr>
<td>Other Income</td>
<td>1,317</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Revenues, Gains &amp; Other Support</td>
<td>114,489</td>
<td>4,349</td>
<td>3,336</td>
</tr>
</tbody>
</table>

Expenses and Losses:
- Membership Dues 26,567 0 0 26,567
- Conference Expenses 30,947 0 0 30,947
- Government Policy Expense 1,790 0 0 1,790
- Palmetto Expenses 10,312 0 0 10,312
- General and Management Expenses 14,171 0 0 14,171
- Fund Raising 3,246 0 0 3,246
- Research and Conservation Expenses 1,000 0 0 1,000
- Landscape Awards 996 0 0 996
- Education 2,196 0 0 2,196
- Grants for Research 0 4,561 0 4,561
- Expenditures for Designated Donation Purposes 0 752 0 752
- Conservation Awards and Displays 17,668 0 0 17,668
| Total Expenses and Losses | 108,893 | 5,313 | 0 | 114,206 |

Change in Net Assets 5,596 (964) 3,336 7,966

Net Assets at Beginning of Year 150,511 3,485 52,366 206,332

Net Assets at End of Year $156,107 $2,521 $55,642 $214,270

For the Year ended December 31, 2004

<table>
<thead>
<tr>
<th>Unrestricted</th>
<th>Temporarily Restricted</th>
<th>Permanently Restricted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues, Gains and Other Support: Membership Dues</td>
<td>$63,931</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Conference Income</td>
<td>49,623</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Palmetto Income</td>
<td>2,064</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Contributions</td>
<td>10,512</td>
<td>0</td>
<td>3,386</td>
</tr>
<tr>
<td>Interest and Dividend Income</td>
<td>1,370</td>
<td>1,973</td>
<td>0</td>
</tr>
<tr>
<td>Investment Gains</td>
<td>0</td>
<td>1,370</td>
<td>0</td>
</tr>
<tr>
<td>Other Income</td>
<td>15,524</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Revenues, Gains &amp; Other Support</td>
<td>136,162</td>
<td>3,343</td>
<td>3,386</td>
</tr>
</tbody>
</table>

Expenses and Losses:
- Membership Dues 34,245 0 0 34,245
- Conference Expenses 47,812 0 0 47,812
- Government Policy Expense 300 0 0 300
- Palmetto Expenses 15,742 0 0 15,742
- General and Management Expenses 19,668 0 0 19,668
- Fund Raising 945 0 0 945
- Research and Conservation Expenses 1,000 0 0 1,000
- Landscape Awards 632 0 0 632
- Education 0 0 0 0
- Grants for Research 0 2,999 0 2,999
- Expenditures for Designated Donation Purposes 0 1,490 0 1,490
- Temporary Restriction by Board of Directors 4,139 (4,139) 0 0
- Conservation Awards and Displays 197 0 0 197
| Total Expenses and Losses | 124,998 | 350 | 0 | 125,648 |

Change in Net Assets 11,465 2,993 3,286 17,744

Net Assets at Beginning of Year 156,107 2,521 55,842 214,270

Net Assets at End of Year $167,572 $5,514 $58,928 $232,014

FNPS Chapters & Representatives
For chapter contact information, please visit http://www.fnps.org/pages/chapters/countymap.php

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26. Suncoast – George Kish .................................................. gkisha@tampabay.com
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Larger branches of scrub hickories growing in old-growth vegetation associations often support dense growths of foliaceous lichens. Photo by Dr. James N. Layne.