

# **PINE RIDGE SANCTUARY THE GLANCY'S PINE ROCKLAND RESTORATION PROCESS**

**CAROLINA BERGET  
DIANA LOPEZ  
WAYNE WORTHLEY**

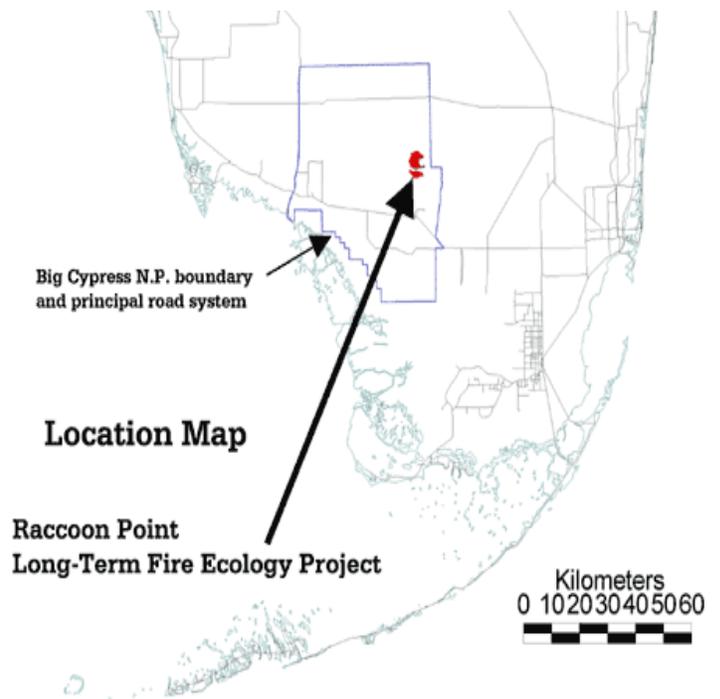
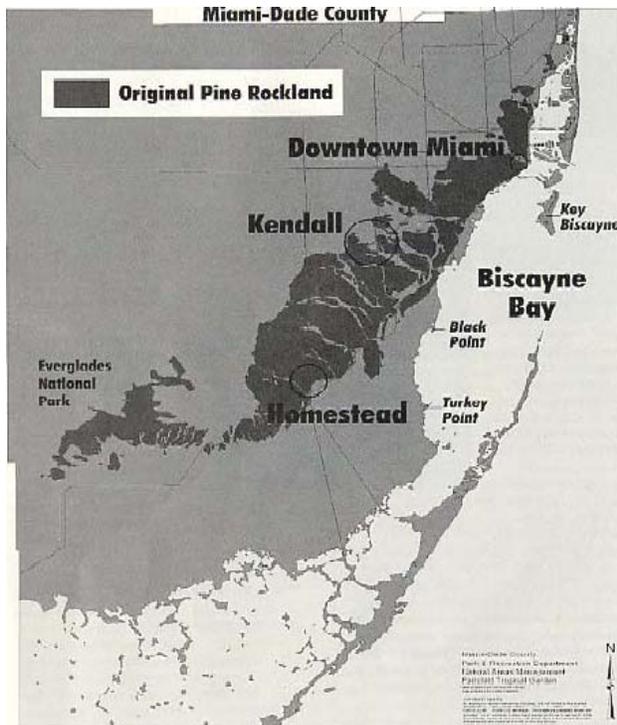
## **Introduction**

The focus of this paper is a 20 acre property in deep southwest Miami-Dade County known as Pine Ridge Sanctuary owned by Barbara and Terry Glancy since 1976, also the proprietors of Pine Ridge Orchids. The twenty acre property includes a very rare South Florida Pine Rockland habitat on 15 of the acres, along with their residence and a large greenhouse complex and related infrastructure for growing their orchids. Adjacent to this 15 acre parcel, they have more recently acquired an additional 5 acres that they use as an in-ground palm and bamboo nursery, together comprising the 20 acres known as Pine Ridge Sanctuary. This is a story of true 'pioneering' at its best. However, instead of utilizing this land for production purposes, the Glancy's goal was, and continues to be, to preserve their highly endangered Pine Rockland habitat. The Glancy's have spent the better part of the past 33 years attempting to understand this very fragile and severely fragmented ecosystem, learning to properly manage the property to ensure its preservation, and in soliciting technical assistance and funding, at several bureaucratic levels, to assist them in these goals and management tasks. Therefore, this paper will concentrate on those three areas: the **biological diversity and physical properties** that make this such a unique ecosystem, the **different management strategies, including prescribed burning**, that the Glancy's practice, and the forms of **assistance and funding** from

different levels that they have utilized to further their goal and mission which is to preserve this habitat and the native species that reside therein. It is our hope that this paper may serve as a motivator for others to perhaps consider doing the same, or at least to realize that the goal of environmental or ecological preservation, at least a small 'piece' of it, may be realized with clear goals, education, initiative, endurance, and assistance when needed and where appropriate.

### **Biotic and Abiotic factors of the Pine Ridge Sanctuary**

Pine Rocklands are an extremely endangered and unique ecosystem. They are found in relatively flat areas, and they are characteristic of having moderately to well-drained terrains. The surface is composed of hard and thick limestone bedrock where soils are mainly found as sand, marl and organic material in depressions and crevices within the rocky surface. The porosity of the limestone determines the drainage patterns (USFWS 2007). The only areas in the world that possess the mentioned qualities for the development of a Pine Rockland ecosystem are in South Florida, the Bahamas, and Cuba. In South Florida, the limestone substrate was originally found in the Miami Rock Ridge, the Florida Keys, and Big Cypress Swamp.



These Pine Rockland habitats are dominated by a single canopy tree, the South Florida Slash Pine (*Pinus elliotti* var. *densa*) which ranges from about 20 to 24 m in height when mature. The heavy rain periods in South Florida occur most often between the months of June and September leaving an average annual rainfall of 122 to 143 cm (USFWS 2007). Its germination phase occurs during the months of October, November, and December (McMinn 1970) after the rainy season, and its initial growth phase is of ten months somewhere between February until November (Langdon 1963). The lower subcanopy is composed of a variety of palms and hardwood vegetation, and the herbaceous layer is a mixture of perennial grasses, ferns, sedges, and forbs. Most of the herbaceous taxa are originally from tropical and temperate regions (USFWS 2007). This mixture of vegetation provides critical foraging, cover, and nesting sites for a wide variety of wildlife species. Snyder et al. (1990) describe that most vertebrate species are from temperate origins with the exception of birds and bats. The “Peninsular Effect” describes

how Florida contains lower diversity and abundance of wildlife than similar habitats to the north, but still many remarkable species are residents of the endangered habitats found in Florida (USFWS 2007). For example, the once rare cycad 'coontie' needs the hardwood hammock or Pine Rockland habitat to establish viable populations. Since only 2% of the original pine forests are left in Miami Dade County outside Everglades National Park, the suitable habitat for this plant and many more has been extremely reduced. As a consequence, the butterfly, Florida Atala, which uses coontie as its refuge to grow, was considered extinct, but it has made a comeback to the wild since its host plant is widely grown in gardens and nurseries (USFWS 2007).

The Pine Rocklands of South Florida have been disturbed for a long time due to the rapid development of the land. Agricultural fields and urban development are the two greater causes for the decline of pine forests, which have left us with only 2% of the original distribution of these remarkable habitats (USFWS 2007). Furthermore, the few fragments left are permanently threatened by the occurrence of exotic plants and animal invasions. A possible viable solution to maintain the fragments of Pine Rockland intact would be to manage them privately or at the state level, but not many people would be willing to invest or simply have the time and money to keep a habitat out of the danger of invasions and development. In fact, only one family has put a great amount of effort to recover a 15 acre Pine Rockland. For 33 years, the Glancy family has restored the property from a degraded invaded area to a highly diverse authentic pine forest. Their efforts have been awarded not only by state agencies but most importantly by the many wildlife residents that have found a home, a suitable nesting site or even a foraging ground within their property as a refuge from the highly developed Dade County. Their Pine Rockland has become habitat for hundreds of plant and animal species including endemic, threatened, and endangered species.

The following table summarizes the many plant species found in the preserve that are considered very important for their unique status as endemic, threatened or endangered, as well as some of the exotics that have to be constantly managed and removed (Pine Ridge Orchids

| <b>Endemic to Florida</b>       | <b>State Endangered</b>       | <b>State Threatened</b>      | <b>Non-native</b>           |
|---------------------------------|-------------------------------|------------------------------|-----------------------------|
| Pineland twinflower             | Shrub throughway's            | Silver palm                  | Brazilian pepper            |
| Wild petunia                    | Bahama sachsia                | Northern wild pine           | Strangler daisy             |
| Green eyes                      | Cardial airplant              | Bahama senna                 | Little ironweed             |
| Fivepetelated leafflower        | Man in the ground             | West indian lilac            | <i>Ipomoea triloba</i>      |
| Queen's delight                 | Rockland morning glory        | Florida tripsacum            | Wild balsam apple           |
| Everglades key false buttonweed | Pineland acacia               | Bahama ladder brake          | Mendez's sandmat            |
| Florida coastal indigo          | Havana skullcap               |                              | Mascarene island leafflower |
| Florida bully                   | Locustberry                   |                              | Woman's tongue              |
| Splitbeard bluestem             |                               |                              | Zarabacoa comun             |
| <b>Pineland jacquemontia</b>    |                               | <b>Pineland jacquemontia</b> | Dixie ticktrefoil           |
| <b>Mosier's false boneset</b>   | <b>Mosier's false boneset</b> |                              | Threeflower ticktrefoil     |
| <b>Narrow leaf milkpea</b>      | <b>Narrow leaf milkpea</b>    |                              | Shrub verbena               |
| <b>Small's milkpea</b>          | <b>Small's milkpea</b>        |                              | Shrubby false buttonweed    |
| <b>Small's flax</b>             | <b>Small's flax</b>           |                              | Mexican clover              |
| <b>Rockland lantana</b>         | <b>Rockland lantana</b>       |                              | Trailing indigo             |
| <b>Blodgett's silverbush</b>    | <b>Blodgett's silverbush</b>  |                              | Pitted beardgrass           |
| <b>Pineland sandmat</b>         | <b>Pineland sandmat</b>       |                              | Gophertail lovegrass        |
| <b>Rockland pointsettia</b>     | <b>Rockland pointsettia</b>   |                              | Vaseygrass                  |
| <b>Rockland nose-burn</b>       |                               | <b>Rockland nose-burn</b>    | Rose natal grass            |
|                                 |                               |                              | Paragrass                   |

website).

The impact that invasive species put on the native populations is highly detrimental. It has been demonstrated that high densities of flowering invasive plants may disrupt pollination dynamics of native species resulting in lower native seed production (Bjerkens et al. 2007), so that it is of high priority to try to eradicate exotic appearances within the forest. The Glancys use a variety of techniques to eliminate and control the exotic plants within their property. For example, they use herbicides (Roundup Pro or Finale), hand pulling, and a pick axe to remove exotic grasses, Schinus, Albizia, grape vine, jasmine vine and other exotic vines. They make sure to use the right concentrations of herbicides to avoid excess run-off of chemicals.

The great amount of work that they have invested in restoring the sanctuary has paid off

well for the enormous amount of species that use it. Around 75 species of birds, over 20 amphibians, and about 15 mammals have been documented using the habitat to forage or even to nest, including endangered and threatened species like the Florida panther and the bald eagle respectively (Glancy’s interview). The animal diversity of the area is planned to be improved by the installation of several watering holes around the 15 acre pineland. They have already dug about three of the future watering holes, but some more technicalities are needed to finalize the project. By having water holes in the area, many more mammals would be attracted to use this piece of land as a permanent or transient refuge (Glancy’s interview). The construction of artificial bird and bat houses is another ongoing project that will aid to enhance the diversity of species taking advantage of the Glancy’s sanctuary. The following list shows some of the groups of birds that have been reported nesting in the sanctuary, and the many others seen foraging or just using the area as a temporary refuge (Pine Ridge Orchids website).

|                               | # seen nesting | total # seeing in the sanctuary |
|-------------------------------|----------------|---------------------------------|
| Blackbirds and Allies         | 3 species      | 4 species                       |
| Doves and Pigeons             | 4 species      | 4 species                       |
| Falcons, Hawks, and Vultures  | 3 species      | 13 species                      |
| Finches and Sparrows          | 5 species      | 5 species                       |
| Flycatchers                   | 1 species      | 2 species                       |
| Goatsuckers                   | 3 species      | 3 species                       |
| Hummingbirds                  | 1 species      | 2 species                       |
| Shorebirds, Gulls, and Allies | 2 species      | 3 species                       |
| Swallows                      | 1 species      | 2 species                       |
| Warblers                      | 1 species      | 8 species                       |

Some of the bat houses created by the Glancys have been used in the past by a number of species. Unfortunately the rain has damaged some of them by rusting the pulley that allows the structure to be positioned at the desired height for the bats to feel comfortable in it and repairs are in progress to replace the mechanics with stainless steel pulleys and cable. There are 13 bat species considered permanent residents of Florida, but they, as many other, species are having

trouble finding suitable habitats for nesting and spawning. They are often seen using the roofs of houses and human-built structures as refuges mainly because they are losing the suitable habitat needed to reproduce and rest. Land development has displaced a huge number of species so that they have been forced to use non-natural structures as their homes. The creation of artificial bird and bat houses is a great method to improve the diversity of species found in the sanctuary, and more importantly to recover the populations of species that might be in risk of becoming endangered due to the lack of suitable habitat. For example, the Florida mouse (*Podomys floridanus*) is another permanent resident of Florida that is on the list of endangered species because land development and feral house cat populations has decreased the amount of suitable habitat for this species to maintain a viable population (Mushinsky et al 2005).

The fact that the Glancy's Pine Rockland is greatly out of risk of being disturbed by plant or animal invasions as well as agricultural or urban development does not mean that it is invulnerable to other types of risks. Natural disasters, pest outbreaks, and unpredicted wild fires are some of the threats that could jeopardize the healthiness of the ecosystem. In the year 1992, hurricane Andrew left a path of destruction of 25 miles wide and 60 miles long (Gore 1993), and within its path the Glancy's backyard Rockland habitat was severely affected. The hurricane destroyed about 90% of the old pines in the sanctuary. Some of these old stands were about 125 years old, and the few that survived the extremely strong force of the high speed winds were eventually killed by an outbreak of *Ips* beetles (Glancy's interview). These insects take advantage of weakened, dying, or recently felled trees to start their attack. The beetle's first colonizer is a male followed by several females. When they start reproducing, they construct several egg galleries where their offspring will hatch and continue the tree colonization. The beetles carry in their guts numerous fungal spores, that when they get released with the beetles'

feces, they germinate and grow fungal colonies. As a result, the fungal colonies stop the upward flow of water, which slowly kills the pine (Wood et al. 1968). Although the devastating effects of hurricane Andrew left behind a huge toll of pine mortality in the Pine Ridge Sanctuary, it also opened up the area for a wider variety of grasses, ferns, and smaller plants to colonize the area and create the healthy plant communities found today (Glancy's interview).

### **Prescribed Burns as a Management Tool**

Barbara Glancy remembered from a high school biology class that pines needed to be burned to keep the hardwoods from taking over. In order to restore this ecosystem, the Glancys also knew from up north that pines burned, therefore they believed that the introduction of fire to this ecosystem would probably have positive effects on the Pine Rockland (Glancy's interview).

Originally the Glancys consulted foresters from different parts of the country for advice on how to restore this ecosystem. The foresters, as the Glancy's had thought, told them to burn the pineland, and since the foresters were the professionals in the matter, the Glancys did what they said (Glancy's interview).

The prescribed burning as a restoration mechanism for this Pine Rockland ecosystem was a great training exercise for the Florida Division of Forestry (DOF) and it was also a great opportunity for foresters from different states to come down here to have the first prescribed burn on this piece of land in 1979. This was the first time this Pine Rockland had been burned in over 50 years. The resulting smoke could be seen all the way down to Marathon in the Keys and throughout Miami. This burn clearly showed the Glancys that there is no alternative to prescribed burning to maintain a fire climax plant community like this one (Pine Ridge Orchids website).

By 1979 there was no prescribed burning on private land in South Florida. The Glancy's property was one of the first private sites to incorporate the use of prescribed burning in Miami-

Dade County for restoration. They have depended until now on the Florida Division of Forestry (DOF) for the burns, and they have never been charged for this service. The only time that another institution has been in charge of a burn on this site was in the 4th prescribed burn on 7/26/1990 and 8/23/1990, conducted by The Nature Conservancy. Also for their 3<sup>rd</sup> prescribed burn they hired an independent contractor that charged them \$55 per acre for the controlled burn (Pine Ridge Orchids website).

A prescribed fire is one of the most versatile and cost effective tools land managers use. In a general sense, prescribed fire is used to reduce hazardous fuel buildups, thus providing increased protection to people, their homes and the forest. Other uses include disease control in young pines, improving habitat for wildlife, range management, preservation of endangered plant and animal species and the maintenance of fire dependent ecosystems (DOF 2009). In ecologic terms, fire is required for the maintenance of the Pine Rockland community. It influences vertical structure and species composition, controls the invasion and growth of hardwood species, allows light to reach understory and herbaceous plants, and allows for pine regeneration (USFWS 2007).

Given the high incidence of fire in this environment, it is not surprising that most species, including the dominants, show an ability to resist or recover from fires. As mentioned before, the pineland overstory species is south Florida slash pine, *Pinus elliottii* var. 'densa'. A very fire-tolerant and fire-adapted species, south Florida slash pine is the southernmost native and the only subtropical pine in the United States (Snyder & Belles 2000). Pine Rockland fires are surface fires that have minimal effects on the pine canopy. The primary source of natural fire in Pine Rockland systems is lightning. The majority of lightning-caused fires occur between May and September, with larger fires in the early part of the wet season (USFWS 2007). Virtually all of

the South Florida endemic plant species are fire adapted. In particular, the South Florida slash pine forest, comprised of *Pinus ellioti* var. 'densa', has historically been maintained by fire. But because of the adaptation to burns, fires normally do not kill overstory pine trees (Taylor & Herndon 1981). The south Florida variety of *Pinus elliotii* var.' densa', is more fire resistant than the typical variety because seedlings and saplings have thicker bark. The estimated natural fire frequency of south Florida slash pine communities is 25 fires per century. Crown fires are rare because frequent fires reduce fuel build-up, trees self-prune well, and stands are open. In addition to adaptations of the typical slash pine variety, the south Florida variety is fire resistant in the seedling grass stage. A dense tuft of needles protects the terminal bud. If top-killed by fire, the grass-stage seedling may sprout from the root collar (Smithsonian Marine Station at Fort Piece 2009).

Many species of tropical hardwood hammocks are present in the pine forest understory. These understory shrubs have the potential of becoming trees in the absence of fire, and will shade the understory herbs within 15-25 years forest. Height of the understory depends largely upon recent fire history (Taylor & Herndon 1981). If fire is not introduced into the ecosystem, the pine overstory would be replaced with a dense hardwood hammock dominated by broadleaf tropical tree species and most of the biodiversity of the Pine Rockland would be lost (Pine Ridge Orchids website). The herbaceous pine understory is composed of many species and several of those are endemic to South Florida. When fire is excluded these endemic species will disappear due to shading by the developing hardwood stand. Pineland fires remove the ground cover vegetation and prune back the hardwood understory leaving bare limestone. Recovery after fire is marked by an outburst of bloom of the herbaceous plants, and stands of tall broom grass on one-year-old burns (Taylor & Herndon 1981).

Conservation of this unique habitat type through the manipulation of fire will be the main tool used to continue to meet the primary objectives of preservation of biological integrity and aesthetic enhancement. Burns have typically alternated between winter and summer seasons on a three year burn rotation. Historically, winter burns had been preferred by the Division of Forestry (DOF), but more recent research suggests that naturally occurring summer burns are more advantageous (Pine Ridge Orchids website).

The 9<sup>th</sup> prescribed burn on 10/17/2008 was the most recent one on this Pine Rockland ecosystem and the next one is expected to be done in 2011 or 2012. The regular burn schedule for this type of ecosystem should be every ten years, but the accumulation of fuel loads in a period of ten years would be too high. According to the literature, the shortest fire interval could be 2 to 3 years, the longest interval 10 to 15 years with most researchers in agreement that Pine Rocklands typically burn twice per decade. According to the literature a proper fire frequency should be between 3 to 7 years, although it has been suggested that a fire interval of 3 to 7 years may be too frequent for young pines to attain a large enough size to survive a fire (USFWS 2007). Therefore the prescribed burns in the Glancy's property are done every 3 to 4 years. Described here is the complete prescribed burning schedule for the Glancy's property since they began restoring this ecosystem:

| <b>Prescribed Burn Number</b> | <b>Date</b>      | <b>Performer</b>                                                                                                     |
|-------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------|
| 1 <sup>st</sup>               | 2/1979           | DOF as training exercise                                                                                             |
| 2 <sup>nd</sup>               | 8/1982           | DOF as training exercise                                                                                             |
| 3 <sup>rd</sup>               | 12/1987          | Independent contractor – Forest Resources Mgmt, Inc. Charged \$55/acre                                               |
| 4 <sup>th</sup>               | 7/1990<br>8/1990 | Nature Conservancy. Due to heavy rain the burn on the first day had to be stopped, and continued on the second date. |
| 5 <sup>th</sup>               | 2/1993           | DOF. First burn after hurricane Andrew.                                                                              |
| 6 <sup>th</sup>               | 10/1997          | DOF.                                                                                                                 |
| Wildfire                      | 12/2000          | Wildfire started by neighbor.                                                                                        |

|                 |                   |                                                                                                                                     |
|-----------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| 7 <sup>th</sup> | 8/2005<br>12/2005 | DOF. One section of the property was burned on the first date and the other section burned on the second date (weather conditions). |
| 8 <sup>th</sup> | 10/2008           | DOF.                                                                                                                                |

During these past 30 years of restoration, only one wildfire has occurred. It was started by a neighbor being careless. In order to control this wildfire, the firefighters were called. They came but it took them a long time to get there. Miami Dade Firefighters know about controlling fire in structures but they are not well trained on controlling fires in an ecosystem. This wildfire happened during the dry season and it smoldered for about two months afterwards. Whereas in a prescribed burn, the smoke lasts for two days at most (Glancy’s interview).

The Glancys have been doing prescribed burning in their property for over 32 years, with the objective of restoring this unique and priceless Florida ecosystem. Although the Glancys would like to experiment, and create some pine islands, and burn just some of these islands, to be able to compare what happens to pine islands that are burnt, and pine island that are not, this is not cost-effective for the Florida Division of Forestry. This is the reason why the prescribed burn is done in the whole forest, and not in individual parcels. The fire is not propagated to neighboring properties due to the fact that in the Glancy’s property as well as in the adjacent properties, there are fire breaks that prevent the fire from propagating. The Glancys have been certified to burn, but they have never done a burn on their own, because as mentioned before, they have always relied on the Florida Division of Forestry to do the burns (Glancy’s interview).

On burn day, various important factors are measured before the fire is started. If it is a rainy day the burn will not take place. Also, three important factors are measured in a test burn that is done before the real prescribed burn takes place. These factors are fuel moisture, rate of spread and smoke dispersal. If these three factors fall between the established parameters, then

the prescribed burn will take place. If they don't, the DOF will return next day and evaluate the climatic and soil conditions again. If appropriate, the fire will be started in the morning, and in the afternoon the fire will be extinguished (Glancy's interview).

Overall, the burns have been successful in not allowing the hardwood hammocks to become established in this Pine Rockland ecosystem. Also this ecosystem has benefited from the burns allowing native herbaceous plants to become established in the understory. The perpetuation of prescribed burns on this property will be necessary to maintain this Pine Rockland ecosystem.

### **Technical Assistance and Financial Support or Incentives**

The Glancy's were able to take advantage of several forms of technical assistance and financial incentives in order to assist in their goals of preserving their Pine Rockland habitat. These will be separated and discussed in two groups: those agencies and institutions that provide technical assistance will be covered first, followed by those that provide financial incentives.

The Florida Division of Forestry (DOF), as discussed previously, has been the agency that has provided the most critical technical support by conducting the prescribed burns. Without the fire component in the management plan, all other activities would be for naught, as fire is the primary natural element required for sustainability of Pine Rockland ecosystems. The Glancy's did have to pay somewhere in the range of \$700 - \$2500 for one prescribed burn when DOF was not available, however, DOF has not charged them for conducting prescribed burns within their sanctuary (Glancy's interview).

Following Hurricane Andrew and the 100% mortality of the slash pine (90% mortality following the storm and the remaining 10% due to the Ips beetle) the Glancy's needed to find a reliable seed source of *Pinus elliotti* var. 'densa' in order to reestablish the pine stand within the

sanctuary. Following failed efforts of planting seedlings from various nurseries, the Glancy's went to the source of the seedlings within the largest remaining stand of sub-tropical Pine Rockland in the United States – Everglades National Park (ENP). With the assistance of personnel from the Miami-Dade Department of Environmental Resource Management (DERM) and Fairchild Tropical Garden (FTG), *Pinus elliotti* var 'densa' seeds were collected from inside the ENP boundary and were germinated in small 'tubes'. After germination, the seedlings were planted in cluster-groups inside Glancy's sanctuary. The tubling stage offered some degree of protection and stability for the young fragile seedling and several small groups of slash pine, with some trees achieving a height of 20' or more, have been reestablished on the property in only 15 years time (Glancy's interview). Obtaining the viable seed source from ENP, with the assistance of DERM and FTG, appears to have been critical to reintroducing the pine species to the habitat. The Glancys also wanted to preserve the same specific genotype as historically occurs in the nearby Everglades National Park.

The Glancy's are also recipients of technical assistance from the Forest Stewardship Program (FSP). Forest landowners with 20 acres or more (the Glancys were accepted into the program with only 15 acres due to the endangered status of their sanctuary) and a desire to manage their forest according to stewardship principles are eligible for the following benefits at no cost to the landowner (table from FDACSDOF):

- A meeting on their property with a team of resource professionals that will contribute to the development of the plan.
- A customized management plan that is based on the landowner's objectives. The plan will include forest stand characteristics, property maps, management recommendations, and a five-year time line for future planning.
- A loose-leaf binder organized to be the landowner's one source of information for managing their property.

- Documentation of active management on the property that may help reduce tax liability.
- An opportunity for future public recognition as a certified "Forest Steward".
- A quarterly Stewardship newsletter developed and distributed by the University of Florida, IFAS Cooperative Extension Service.
- The peace of mind in knowing that their property is being managed in a sustainable manner.

The FSP designated the Glancys as being stewards of the most important, biologically and aesthetically, pineland habitat in the state of Florida and the only one south of Lake Okeechobee (Glancy's interview & 2008 FSP recertification Management Plan) and this certification, one of 6 awards that they received from the FSP, generated a detailed and informative story of their conservation efforts on Pine Ridge Sanctuary that was printed in the Miami Herald on December 21, of 2008 (Tasker, 2008).

The Glancys are also members in the Pine Rockland Working Group (PRWG) which is a group of scientists and land managers (US Geological Survey, National Park Service – US Department of the Interior, The Nature Conservancy, Fairchild Tropical Garden, Miami-Dade Department of Resource Management (DERM), and The Institute for Regional Conservation (IRC) dedicated to maintaining and restoring “the Pine Rockland natural community, it's associated species, and the natural processes, most notably fire, upon which they all depend.” (PRWG website).

The Miami-Dade Chapter of the Florida Native Plant Society (FNPS) and the Native Plant Workshop, whose members were involved in the taxonomy of the Pine Rockland plant community, were instrumental in the Glancys knowledge basis on their ecosystem.

The Glancys also worked with Conservation Specialists from Bat Conservation International and The Maberry Centre on the bat houses attached to the artificial “tree” stands the Glancys designed.

In addition to these agencies providing technical assistance, other agencies, through programs associated with their functions, have provided the Glancys with financial support in the form of property tax incentives (savings), cost-sharing, and providing labor at no expense for some of their management practices. The Glancy’s have been enrolled in the Environmentally Endangered Lands (EEL) program, of Miami-Dade County, for nearly 30 years. This conservation easement is known as Chapter 25-B in Miami-Dade County and provides property tax reductions in exchange for a 10 year covenant consisting of a conservation easement on the property that would prohibit development or the disruption of the natural Pine Rockland habitat (Glancy’s interview). The Glancy’s paid less than \$5000 in local property taxes on their 20 acre property in 2008 with an assessed value of 1.2 million (Miami-Dade County Property Appraiser). This would indicate a substantial property tax savings, probably in the range of \$10,000 per year for being designated as an EEL. It is important to mention that the EEL program in Miami-Dade uses the Glancy’s property as an ‘indicator’ or ‘model’ for accepting other lands into the program. Currently, Miami-Dade County either has acquired or assisted in managing over 21,000 acres of lands enrolled in the EEL program (Miami-Dade.gov Environmental Resources).

The Glancy’s have taken advantage of two federal programs managed through the United States Department of Agriculture’s (USDA) Natural Resources and Conservation Service (NRCS). These include the Environmental Quality Incentives Program (EQIP) and the Wildlife Habitat Incentives Program (WHIP). EQIP provides payments to the landowner up to 75% of

the incurred costs or foregone income for certain conservation practices and activities (NRCS, EQIP). The Glancy's have used this cost-sharing incentive to supply the labor for various management tasks including installing drip irrigation (including the trenching) and assisting with herbicide applications to control exotic as well as invasive plant species (Glancy's interview).

The WHIP also provides up to a 75% cost-share benefit, however, the focus is on wildlife habitat improvement and generally requires a five to 10 year agreement with the landowner (NRCS, WHIP). Bird roosting platforms and bat houses have been installed on Pine Ridge Sanctuary utilizing these funds as well as helping to offset the cost of the pine tubes and labor required for planting the pine seedlings (Glancy's interview). Other institutions providing the Glancy's with labor have been Panther Research Project, Partners For Fish and Wildlife Program / Branch of Habitat Service , US Fish and Wildlife Service , the US Department of the Interior, and the Institute for Regional Conservation. However, most of the labor has been generated by the Glancys themselves.

## **Conclusion**

There are several factors that may have contributed to the success that the Glancys have realized on their way to reaching their goal - preservation of their Pine Rockland habitat. First of all, the Glancy's are highly educated and appeared to us to be quite knowledgeable in the area of conservation, horticulture, native vs. exotic species, local government, endangered species, and forest management. Because they are enthusiastic and motivated, they continue to learn and stay abreast of information as it becomes available. It is not easy to navigate through the bureaucracy at the local, state, and federal levels of government, but the Glancys have been able to locate several resources in the form of technical support and financial incentives within all three of those levels of government. None of this would have been possible without perseverance,

determination, and diligence, especially when following setbacks (Hurricane Andrew, the wildfire, opposition from neighbors to burning, etc...). This is truly a remarkable story of how a young couple in their twenties (Terry 27 and Barbara 22 at the time) moved from Detroit to a Pine Rockland forest in deep southwest Florida and spent the next 33 years of their lives laboring to preserve one of our most fragile ecosystems.

### Bibliography

Bjerkens, A. L., O. Totland, S. J. Hegland, and A. Nielsen. (2007). Do alien plant invasions really affect pollination success in native plant species? *Biological Conservation* 138: 1-12.

Florida Department of Agriculture and Consumer Services Division of Forestry (FDACSDOF) (n.d.). *Forest Stewardship Program*. Retrieved April 15, 2009, from [http://www.fldof.com/forest\\_management/cfa\\_steward\\_index.html](http://www.fldof.com/forest_management/cfa_steward_index.html)

Florida Division of Forestry. 2009. <[http://www.fl-dof.com/wildfire/rx\\_index.html](http://www.fl-dof.com/wildfire/rx_index.html)>.

Glancy Family. "Pine ridge sanctuary animal list." *Pine Ridge Orchids - Home Page*. 15 Apr. 2009 <<http://www.pineridgeorchids.com>>.

Glancy's Family. <<http://www.pineridgeorchids.com>>. 2009.

"Glancy's Pine Ridge Sanctuary." Personal interview. 28 Mar. 2009.

Gore, R. 1993. Andrew aftermath: *National Geographic*, v. 183, no. 4, p. 2-37.

Langdon, O. G. 1963. Growth patterns of *Pinus elliotti var. densa*. *Ecology* 44: 825-827.

McMinn, J. W. 1970. Optimum depth and season for direct seeding slash pine in South Florida. U.S. Forest Service Note SE -117.

Miami-Dade County Property Appraiser. *Property tax search for Glancy, Terry and Barbara*. Retrieved April 15, 2009, from <<http://gisims2.co.miami-dade.fl.us/MyHome/propmap.asp>>.

Miami-Dade.gov Environmental Resources. *Environmentally Endangered Lands (EEL) Program*. Retrieved April 15, 2009, from [http://www.miamidade.gov/derm/program\\_EEL.asp](http://www.miamidade.gov/derm/program_EEL.asp)

Mushinsky, H., E. McCoy, and I. Lukanik. 2005. Do *Podomys floridanus* exist in metapopulations and do habitat measures have a deterministic effect on their demography?. *Integrative and Comparative Biology* 45: 1170

Natural Resources Conservation Service. *Environmental Quality Incentives Program*. Retrieved April 15, 2009, from <<http://www.nrcs.usda.gov/PROGRAMS/EQIP/>>.

Natural Resources Conservation Service, *Wildlife Habitat Incentives Program*. Retrieved April 15, 2009, from <<http://www.nrcs.usda.gov/programs/whip/>>.

Smithsonian Marine Station at Fort Pierce. Available from <[http://www.sms.si.edu/irlspec/Pinus\\_elliott.htm](http://www.sms.si.edu/irlspec/Pinus_elliott.htm)>. 2009.

Snyder, J. R., A. Herndon, and W. B. Robertson, Jr. 1990. South Florida Rocklands in R. L. Myers and J. J. Ewel, eds. *Ecosystems of Florida*. University of Central Florida Press; Orlando, Florida.

Snyder, J. R., and Belles H.A. Long-term Study of Fire Season and Frequency in Pine Forest and Associated Cypress Wetlands, Big Cypress National Preserve: Project Description and Preliminary Data. U. S. Geological Survey Biological Resources Division, Florida Caribbean Science Center Big Cypress National Preserve Field Station, Ochopee, Florida. 2000.

Tasker, G. (2008, December 21). Keepers of the pines: For three decades, Terry and Barbara Glancy have nurtured one of South Florida's rarest ecosystems. *Miami Herald*. Retrieved April 15, 2009, from <<http://www.miamiherald.com/business/real-estate/story/818123.html>>.

Taylor, D. and Herndon, A. Impact of 22 years of fire on understory hardwood shrubs in slash pine communities within Everglades National Park (Electronic Resource). Homestead, Florida: National Park Service, South Florida Research Center, Everglades National Park. 1981. <<http://purl.fcla.edu/fcla/tc/feol/FI06403149.pdf>>

U.S. Fish and Wildlife Service. USFWS Endangered Species / Pine Rocklands Multi-Species Recovery Plan for South Florida. Rep. Vero Beach, 2007.

Wood, D. D., Stark, R. W. 1968. The life history of *Ips calligraphus* (Coleoptera; Scolytidae) with notes on its biology in California. *Can. Entomol.* 100: 145-151