The Pine Rockland Initiative Program

ARRA Cooperative Agreement ARRA-R4FD-RJ012
Final Report

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Submitted by
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Introduction

This report details the completion of 29 months of work conducted under the American Recovery and Reinvestment Act (ARRA) agreement ARRA-R4FD-RJ012 by The Institute for Regional Conservation (IRC). The purpose of the project has been to treat invasive pest plants on 500 acres of pine rockland habitat in Miami-Dade County, Florida. Keith Bradley served as the lead on the project and Sarah Martin as the Program Coordinator.

Pine Rockland is a globally imperiled ecosystem. It occurs only in south Florida and the Bahamas and is important habitat for six federally listed plant taxa and eight federal candidate plant taxa (Table 1), as well as other species of rare plants. There are a number of rare animals that also live in pine rockland habitat, including the Bartram's hairstreak (*Strymon acis bartrami*), Florida leafwing (*Anaea floridalis*), and rim rock crowned snake (*Tantilla oolitica*). In Florida, pine rocklands are primarily limited to Miami-Dade and Monroe counties. Pine rocklands are habitat for a diversity of Caribbean plant species that are at the northern ends of their ranges, temperate plant species at the southern ends of their ranges, and endemic species with small ranges in southern Florida. Pine rocklands contain dozens of plant and animal species found nowhere else in the United States. The forest canopy is dominated by a single species, south Florida slash pine (*Pinus elliottii* var. *densa*), the subcanopy is dominated by palms and tropical hardwoods, and the ground cover is dominated by a rich diversity of herbs and grasses.

In Miami-Dade County, pine rocklands occur along the Miami Rock Ridge, a Pleistocene deposit of oolitic limestone. The southern quarter of the Miami Rock Ridge is protected in Everglades National Park and the northern three quarters extends from the Park boundary some 45 miles northward into the vicinity of the City of Miami. The 45 miles of Miami Rock Ridge outside of Everglades National Park has been almost completely developed. Only small isolated fragments of pine Rockland remain, representing less than 2% of the original pine rockland in this area (Figure 1). Over 2.5 million people live in Miami-Dade County, and pine rocklands are found only as small, isolated patches of habitat surrounded by homes, agricultural lands, and industrial parks. Based on data collected in 2004 by IRC there are only 680 acres of pine rockland in private ownership in 114 fragments. With an additional 2,267 acres on public lands, less than 2% of the historical pine rockland habitat remains in this area. Most of the larger sites are subdivided into multiple parcels, with several to many landowners. Significant declines in acreage of pine rockland habitat are the result of the combined effects of habitat destruction, exotic plant invasions, fire suppression, and overall lack of management. Human population growth and development pressures in Miami-Dade County continue to cause clearing and degradation of the remaining privately owned pine rockland fragments.

The habitat degradation detailed above has resulted in many plant and animal species becoming very rare, as documented by IRC throughout its existence. Three of the six federally listed plant taxa found in the area are endemic and are not found or protected in Everglades National Park. In addition, there are eight plant species that are candidates for federal listing in the project area (Bradley and Gann 1999). Many of the 74 state-listed plant species that occur in Miami-Dade's pine rocklands were first brought to attention when Bradley and IRC Executive

Director George Gann presented data to the State of Florida in 1996, and were subsequently listed as Threatened or Endangered for the first time (Gann and Bradley 1996). IRC also called attention on rare pine rockland plant species in the book Rare Plants of South Florida (Gann et al. 2002), which contained detailed accounts of conservation recommendations for many pine rockland species IRC considered Critically Imperiled or possibly extirpated, and describing the importance of private lands. Contributions of IRC to the USFWS South Florida Multi Species Recovery Plan (1999), including the Pine Rockland account and accounts for listed species, detailed needs of restoration of the fragmented mosaic of pine rocklands.

One regulatory mechanism is in effect that provides very limited protection to private pine Rockland fragments: Miami-Dade County's Natural Forest Community (NFC) ordinance. This ordinance, enacted in 1984, limits development in pine rocklands and other upland plant communities, yet does not provide a mechanism for their management or sustainability. Since most NFCs are already very small, any substantial clearing, legal or illegal, can effectively destroy the ecological integrity of the site due to loss of area, cause species extirpations, and increase degradation due to edge effects. Given the highly fragmented status of these sites and the lack of resources for management, the implementation of this program is critical to recovering this globally imperiled ecosystem and the species that are dependent on this habitat.

Much of the publicly owned pine rockland in Miami-Dade County is being managed by Miami-Dade County, which manages the majority of parcels in County ownership. This network of managed County lands provides for a mosaic of larger high quality habitats across the County. Unfortunately there are many other publicly owned lands, including some County lands, as well as many privately owned fragments, which are not managed at all.

IRC performed a comprehensive assessment of pine rockland fragments in 2003 and 2004 when mapping and conducting floristic inventories of all remaining fragments. The contrast between County-managed and non-managed fragments was striking, with dramatic differences in habitat structure, quality, and biodiversity. Also overwhelmingly apparent were the needs of so many private landowners who wanted to be better stewards of their forests, but lacked the knowledge, physical ability, or financial resources to do so. It was recognized that the proper management of these neglected parcels would contribute greatly to the overall conservation of pine rockland habitat by not only increasing the value of the fragments themselves, but by increasing connectivity between fragments allowing for pollinator movement and germplasm dispersal.

In 2005 IRC applied for a USFWS Private Stewardship Grant and was provided funding to start the Pine Rockland Initiative. This new Initiative focused on private lands that had not yet received any significant management, with the goal of restoring pine rockland habitat and endangered species populations. Due to the success of this first grant, IRC later received additional funding to continue the program through the USFWS Partners Program and from the private Ross Foundation. Because of the sheer magnitude of the forest fragment complex, the USFWS and IRC collaborated on the current project, funded through ARRA. The receipt of ARRA

funding has allowed for a major expansion of the program to additional private lands and for the first time public lands. The goal under the agreement has been to remove exotic pest plant populations on 200 acres of private lands and 300 acres of public lands.

Accomplishments

Pine Rockland Management

Since the beginning of the project 582 acres of pine rockland have received initial management (338 public, 244 private) on 37 enrolled sites (29 private, 8 public). This represents exotic plant control on approximately 20% of the pine rockland habitat in the project area. These sites are distributed across nearly the entire remaining range of pine rockland in urban Miami-Dade County. Full details of management activities are included in the attached site reports.

Overall, management focused on pine rockland habitat with undisturbed soils. To minimize reinfestations and to improve management access (e.g. clearing firebreaks) we often treated around the perimeters of sites as well. Exotic species we encountered on every one of the 37 sites were Burmareed (*Neyraudia reynaudiana*), Brazilian-pepper (*Schinus terebinthifolius*), and woman's tongue (*Albizia lebbeck*). The other most commonly treated species were Gold Coast jasmine (*Jasminum dichotomum*), natal grass (*Melinis repens*), shoebutton ardisia (*Ardisia elliptica*), leadtree (*Leucaena leucocephala*), Queensland umbrella tree (*Schefflera actinophylla*), and shrubverbena (*Lantana camara*). Overall, we recorded treatments on 48 invasive exotic plant species and on occasion undesirable native species were treated as well.

Our management activities have resulted in restoration of habitat where populations of four endangered plant species occur, as well as four candidate plant species and three candidate animal species. We have also restored potential habitat for one additional candidate plant species (Table 2).

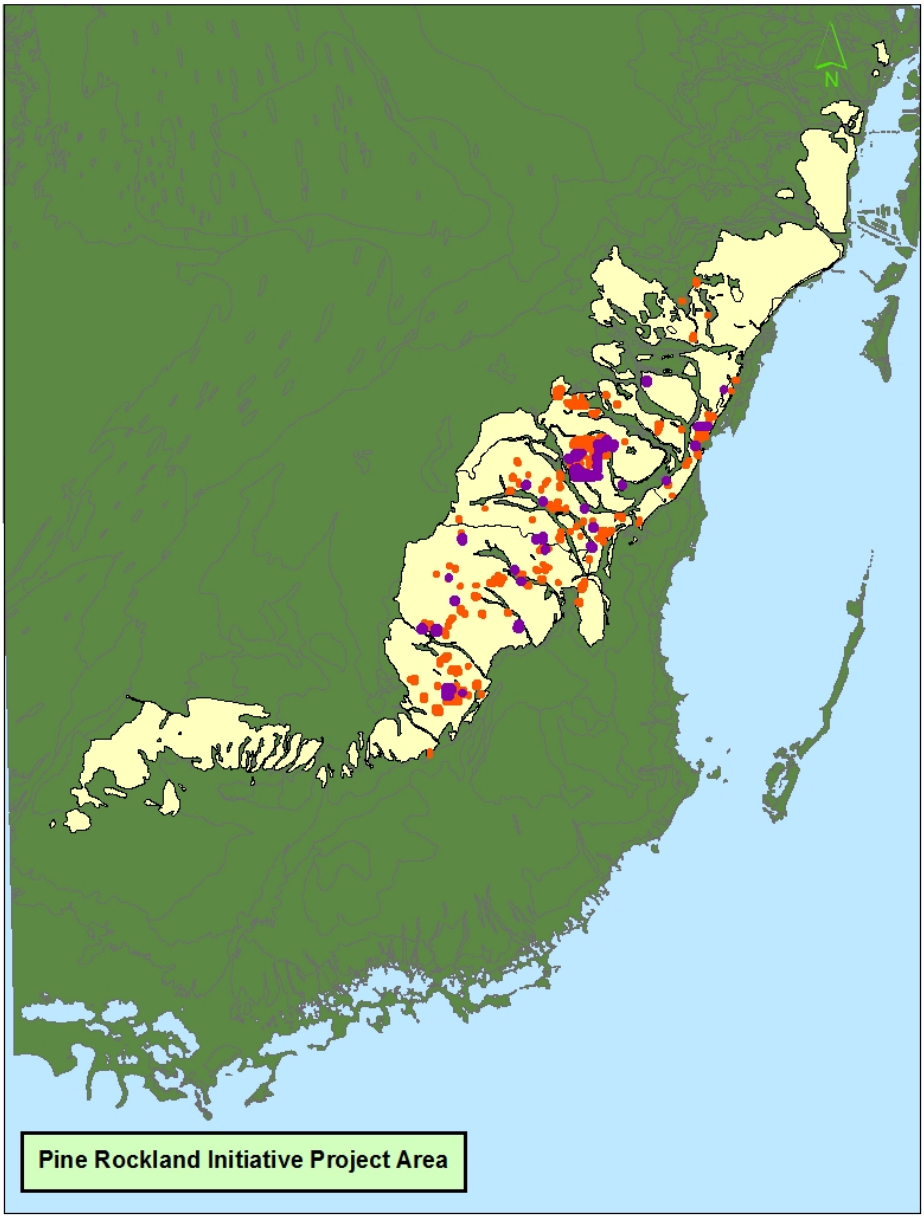

Figure 1: The 37 pine rockland project sites that have received treatment through the Pine Rockland Initiative are projected in purple and cover 582 acres. The properties in red are the remaining pine rockland fragments occurring along the Miami Rock Ridge (yellow) outside Everglades National Park in Miami-Dade County (green) which have not received treatment through the IRC Pine Rockland Initiative. Pine rockland was not treated in Everglades National Park (the far southwest end of the ridge).

Table 1:

FLEPPC Category I & II Species Treated Through the Pine Rockland Initiative	
Scientific Name	**Common Name**
Abrus precatorius	Rosary pea
Acacia auriculiformis	Earleaf acacia

FLEPPC Category I & II Species Treated Through the Pine Rockland Initiative	
Agave sisalana	Sisal hemp
Albizia lebbeck	Woman's tongue
Ardisia elliptica	Shoebutton ardisia
Asparagus aethiopicus	Asparagus-fern
Bischofia javanica	Bishopwood
Casuarina equisetifolia	Australian-pine
Casuarina glauca	Suckering Australian-pine
Crotalaria spectabilis	Showy rattlebox
Dalbergia sissoo	Indian rosewood, sissoo
Dioscorea bulbifera	Air-potato
Eugenia uniflora	Surinam cherry
Flacourtia indica	Governor's plum
Hyparrhenia rufa	Jaragua
Jasminum dichotomum	Gold Coast jasmine
Jasminum fluminense	Brazilian jasmine
Kalanchoe xhoughtonii	Life plant
Lantana camara	Lantana, shrub verbena
Leucaena leucocephala	Lead tree
Lysiloma sabicu	Horseflesh mahogany
Manilkara zapota	Sapodilla
Melinis minutiflora	Molassesgrass
Melinis repens	Natal grass
Merremia dissecta	Noyau vine
Mucuna pruriens	Cow itch
Nephrolepis brownii	Asian sword fern
Nephrolepis cordifolia	Sword fern
Neyraudia reynaudiana	Burma reed, cane grass
Paederia cruddasiana	Sewer vine, onion vine
Panicum maximum	Guinea grass
Pennisetum purpureum	Napier grass
Psidium cattleianum	Strawberry guava
Psidium guajava	Guava
Pteris vittata	Chinese brake fern
Pueraria montana var. lobata	Kudzu
Ricinus communis	Castor bean
Rottboellia cochinchinensis	Itch grass
Sansevieria hyacinthoides	Bowstring hemp
Schefflera actinophylla	Queensland umbrella tree
Schinus terebinthifolius	Brazilian-pepper
Solanum umbellatum	Nightshade

FLEPPC Category I & II Species Treated Through the Pine Rockland Initiative	
Stenotaphrum secundatum	St. Augustine grass
Syzygium cumini	Java-plum
Tabebuia heterophylla	White-cedar
Tradescantia spathacea	Oyster plant
Turnera ulmifolia	Yellow alder
Zamia furfuracea	Cardboard palm

Table 2: Rare Species in the Pine Rockland Initiative Project Area

Scientific Name	Common Name	Listing Status	On Sites vs. Habitat Restored
Anaea floridalis	*Florida leafwing butterfly*	*Candidate*	*On sites*
Argythamnia blodgettii	*Blodgett's wild mercury*	*Candidate*	*On sites*
Brickellia mosieri	*Mosier's false boneset*	*Candidate*	*On sites*
Chamaesyce deltoidea ssp. adhaerens	*Goulds wedge sandmat*	*Endangered*	*On sites*
Chamaesyce deltoidea ssp. deltoidea	*Wedge sandmat*	*Endangered*	*On sites*
Chamaesyce deltoidea ssp. pinetorum	*Pineland wedge sandmat*	*Candidate*	*On sites*
Dalea carthagenensis var. floridana	*Florida prairieclover*	*Candidate*	*Habitat*
Galactia smallii	*Small's milkpea*	*Endangered*	*On sites*
Linum arenicola	*Sand flax*	*Candidate*	*On sites*
Polygala smallii	*Tiny polygala*	*Endangered*	*On sites*
Strymon acis bartrami	*Bartram's hairstreak*	*Candidate*	*On sites*
Tantilla oolitica	*Rim rock crowned snake*	*Candidate*	*On sites*

Photos:

Sarah Martin, IRC Pine Rockland Initiative Program Coordinator discussing exotic plants and pine rockland habitat at the SE Forest Stewardship Tour.

IRC staff working with Partner, the Tropical Audubon Society, and volunteer on a “Together Green” pine rockland cleanup at the Porter Russell Pine Rockland.

Community Involvement

In May 2010 IRC hosted a Landowner Management Workshop. The purpose of the workshop was to educate owners of pine rocklands on how to manage their property. The workshop was led by IRC staff, but importantly also utilized many of our partners, including the U.S. Fish & Wildlife Service Partners Program, the U.S.D.A. Wildlife Habitat Incentives Program, and the State of Florida. The participants of the workshop were given demonstrations and presentations covering how to kill exotic plants, the use of herbicides, plant identification, the importance of fire, and permitting issues.

Due to communication with new landowners and managers about the Pine Rockland Initiative, we added numerous new pine rocklands to the program. In addition, we participated in the planning of a multi-agency pine rockland stewardship workshop and tour as well as the bi-annual Pine Rockland Conference planned for June 2012. Several students from Miami-Dade College, the Boy Scouts of America, the Tropical Audubon Society, and other organizations volunteered their time to the program that proved to be a great help in the field, and served as an opportunity to educate the students about pine rocklands and ecological restoration.

Hiring / Job Creation

ARRA funding allowed for the creation of numerous jobs for the duration of the 29 months of the project. We maintained the positions of Program Coordinator and Crew Leader and a staff of up to four crew members. Additional support from IRC staff came from IRC's Assistant Director, Executive Director, and Office Manager, as well as occasionally from other IRC employees as needed.

Because this project allowed us to hire and train a new exotic plant removal team we have been able to pursue other restoration projects with the team. Thus, the ARRA grant has opened up new opportunities, allowing us to create a longer-term of employment for our entire team. The team completed work with the National Park Service and has also completed two small restoration projects for a local landowner. We have also received grant funding from the USFWS Coastal Program and additionally the Partners Program to conduct follow up treatments of the 582 acres that have been treated under the Stimulus. We hope that ultimately the ARRA grant has served as a starting point for a restoration team that is sustained in the long-term by other funding sources.

Acknowledgments

We would like to thank the dozens of people who have contributed their time and expertise to the Pine Rockland Initiative for the duration of this ARRA grant. The success of the Pine Rockland Initiative is truly the result of our partners and the pine rockland owners. In particular we would like to thank Debbie Devore, Craig Aubrey, and Erin Myers with the U.S. Fish and Wildlife Service and the USFWS Coastal Program and Partners for Fish and Wildlife Program; Joe Maguire, Rodell Collins, Eduardo Salcedo, Sonya Thompson, Jose Prieto, and Dallas Hazelton with the Miami-Dade County Parks Department; Tim Joyner and Joy Klein with the Miami-Dade County Permitting; Environment, and Regulatory Affairs, Christine Coffin with the U.S. Department of Agriculture NRCS; Laura Reynolds, Lewis Milledge, and Stephanie Cornejo with Tropical Audubon Society; Dr. Joyce Maschinski and Jennifer Possley with Fairchild Tropical Botanic Garden; Dr. Mary Lamberts and the folks at University of Florida Miami-Dade IFAS Extension; Keith Wright with the United States Coast Guard Station in Miami; Dr. Bruce Schaffer with the University of Florida Tropical Research and Education Center; the late Dr. Robert Heath of the USDA Subtropical Horticulture Research Center at Chapman Field; Dr. Patrick Griffith with the Montgomery Botanical Center; all the volunteers from Miami Dade College; and, Florida Division of Forestry, Florida International University, Hands on Miami, National Park Service, Ross Foundation, and the University of Miami. Certain landowners went above and beyond all expectations to help make this program a success, including Gerald and Janet Case, Girl Scout Council of Tropical Florida, Terry and Barbara Glancy of Pine Ridge Sanctuary, Don and Barbara Powell, John and Kristen Whelan, Arlene Samalion and Betsy Sharp with the Assurant Group, Inc. We would also like to thank the IRC Executive Director and restoration expert George Gann, IRC Pine Rockland Initiative Team Leader Rasheed Bradley, IRC Project Greensweep Coordinator Cody Miller, Jim Duquesnel (IRC Pine Rockland Initiative Program

Coordinator, 2009-2010) the IRC Board of Directors and all of the crew members and volunteers who have participated on the IRC team.

Citations

Bradley, K.A., and G.D. Gann. 1999. Status summary of 12 rockland plant taxa in southern Florida. Report prepared for the U.S. Fish and Wildlife Service by The Institute for Regional Conservation.

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Gann, G.D., K.A. Bradley, and S.W. Woodmansee. 2002. Rare Plants of South Florida: Their History, Conservation, and Restoration. Institute for Regional Conservation. Miami, Florida.

U.S. Fish and Wildlife Service. 1999. South Florida Multi-Species Recovery Plan. G.D. Gann and K.A. Bradley, contributors.

Site Reports

Arlene Samalion Pine Rockland

Owner: Arlene Samalion
16375 SW 256 St., Homestead, FL 33031

Site Map: Arlene Samalion Pine Rockland is located in the Redland agricultural area of Miami-Dade County.

Species Benefited: Fifteen state listed plants are present on the site. It is habitat for one Federally listed plant (*Chamaesyce deltoidea* subsp. *adhaerens*), for two Federal candidate plants (*Argythamnia blodgettii* and *Linum arenicola*), and for three federal candidate animals (Florida leafwing butterfly, Bartram's hairstreak, and rim rock crowned snake).

Acres Treated Under ARRA: 3.8

Site Description: The Arlene Samalion Pine Rockland is located on an 8.9- acre residential property surrounded mainly by agricultural lands. It is adjacent to a privately owned, unmanaged, and degraded pine rockland fragment. This site experienced an intense wildfire in 2000. Several hardwood species, including live oak, running oak, and wax myrtle dominate the understory and there is a slightly dense immature slash pine canopy planted by the owner after hurricane Andrew eliminated the original stand. There are populations of native pineland shrubs, grasses, herbs, and vines growing actively throughout the pineland. Common exotic plants invading the site are Burmareed (*Neyraudia reynaudiana*), napier grass (*Pennisetum purpureum*), natal grass (*Melinis repens*), jaragua (*Hyparrhenia rufa*), jasmine (*Jasminum dichotomum* and *J. fluminense*), Brazilian-pepper (*Schinus terebinthifolius*), woman's tongue (*Albizia lebbeck*), bishopwood, (*Bischofia javanica*), Indian rosewood (*Dalbergia sissoo*), and Queensland umbrella-tree (*Schefflera actinophylla*).

Pre-ARRA Management: The landowner, a retired nurse, has been and continues to be very active in management of this property and conducted treatments of some exotic pest plants, although the extent of the infestations was far too severe for her to overcome. She also planted numerous slash pine tubelings throughout the site. IRC began management of this site in 2009 with USFWS funds, starting treatments of exotic pest plants. Because of the size of the site and densities of exotic plant species, maintenance condition was not reached prior to the ARRA project.

ARRA Management Activities: This site was treated at the beginning of the project for infestations of FLEPPC Category I and II species (See table below). The site was re-visited several times during the duration of the ARRA project for follow-up treatments. These follow-up treatments have greatly reduced the exotic seed bank. Now the site is in a management phase feasible for the landowner. Arlene Samalion has become very active in managing her pine rockland. She has also become a very supportive and active participant in IRC led pine rockland workshops, volunteer days, and participated in our landowner management workshop.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar and Cut Stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Jasmine	*Jasminum dichotomum* and *J. fluminense*	Cut Stump	Garlon 4 20%
Bishopwood	*Bischofia javanica*	Cut Stump, Hand-pull	Garlon 4 20%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Queensland Umbrella	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Indian rosewood	*Dalbergia sissoo*	Cut Stump, Hand-pull	Garlon 4 20%
Napier grass	*Pennisetum purpureum*	Foliar	Glyphosate 3%
Natal grass	*Melinis repens*	Foliar	Glyphosate 3%
Jaragua	*Hyparrhenia rufa*	Foliar	Glyphosate 3%

Photos:

The IRC restoration team treated FLEPPC Category I and II species at the Arlene Samalion Pine Rockland, including Indian Rosewood (*Dalbergia sissoo*).

FLEPPC Category I and II species such as Queensland umbrella-tree (*Schefflera actinophylla*) were scattered amongst the native vegetation and competing for resources.

Scattered infestations of the persisting Burmareed seed bank were treated in follow-up visits.

The wildfire in 2000 at the Arlene Samalion Pine Rockland allowed for an open grass and herb layer to thrive in the center of the pineland.

Assurant Pine Rockland

Owner: Assurant
11222 Quail Roost Drive Miami, FL 33157-6596

Site Map: The Assurant Pine Rockland is located adjacent to the Florida Turnpike and is on the grounds of the company Assurant Solutions. There is potential for this pine rockland to have a future educational component for students who attend the on-site school.

Species Benefitted: Several state-listed plants are present on the site. It is also habitat for the federal-candidate plants *Brickellia mosieri* and *Argythamnia blodgettii*, and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 2.8

Site Description: The Assurant Pine Rockland contains approximately 3 acres of pine rockland habitat. The Florida Turnpike runs adjacent to the eastern border of the pineland. Though suffering from neglect and fire suppression, the site still contains a core of pine rockland with margins heavily invaded by invasive exotic plants. The edges of the pineland are dominated by Brazilian-pepper, woman's tongue and Burmareed. The interior of the pineland is in better condition and contains open pockets where native grasses and herbs persist; including abundant populations of native pineland croton (*Croton linearis*), coontie (*Zamia pumila*), and prickly pear (*Opuntia humifusa*). There are several south Florida slash pine (*Pinus elliottii* var. *densa*) on the site, and at the northeast end of the pineland there is a large amount of fuel build-up from cabbage palm (*Sabal palmetto*), muscadine grape-vine (*Vitis rotundifolia*) and greenbrier (*Smilax* spp.).

Pre-ARRA Management: Limited management was conducted on this site, except for a prescribed fire, which was done approximately twelve years ago.

ARRA Management Activities: The IRC restoration team treated infestations of FLEPPC Category I and II species (see table 1 below). While we were working in the interior of the site Assurant arranged for their grounds maintenance company to remove denser stands of exotics from the perimeter, using a bucket truck and chipper to help with the project. In June 2010 IRC organized and carried out a volunteer workday at the Assurant Pine Rockland. IRC staff met onsite with Assurant and Florida Department of Forestry and coordinated an effort to organize a prescribed burn for the Assurant Pine Rockland.

Invasive Treated	**Scientific Name**	**Treatment Method**	**Herbicide Used**
Burmareed	*Neyraudia reynaudiana*	Foliar and Cut Stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Rosary pea	*Abrus precatorius*	Cut Stump, Hand-pull	Garlon 4 20%
Queensland umbrella-tree	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Asian Sword Fern	*Nephrolepis cordifolia*	Foliar	Glyphosate 3%
Lantana	*Lantana camara*	Cut-Stump	Garlon 4 20%

Photos:

Aerial photo from a bucket truck demonstrates the concentration of heavier fuels at the north end of the pineland and more open areas with grasses and herbs persisting on the south end, as well as the Florida Turnpike situated to the east.

Dense coverage by palms and vines located on the northeast end of the Assurant Pine Rockland, as well as a moderate infestation of woman's tongue and Brazilian-pepper.

IRC Restoration team cutting out Brazilian-pepper and woman's tongue with chainsaws from the Assurant Pine Rockland.

IRC organized and carried out a large volunteer workday at the Assurant Pine Rockland in June 2010.

Barbara Hampson-Keller Pine Rockland

Owner / Land Manager: Barbara Hampson-Keller
20255 SW 304th St., Homestead FL 33030

Site Map: The Barbara Hampson-Keller Pine Rockland is located in the far southwest of the Redland agricultural area of Miami-Dade County.

Species Benefited: This site is habitat for the federally-listed *Galactia smallii,* for the federal-candidate plants: *Brickellia mosieri, Argythamnia blodgettii,* and *Chamaesyce deltoidea* subsp. *pinetorum*; and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 26.4

Site Description: This Barbara Hampson-Keller Pine Rockland is part of a 37.9 acre privately owned residential and agricultural property. A cleared utility easement and unimproved road runs south to north dividing the undeveloped portion (approximately 28 acres) with one third to the west and two thirds to the east of the easement. Two concrete power (transmission) poles have been installed by Florida Power & Light and are currently in use, with plans to expand their capacity. Agricultural uses are adjacent on the west and north boundaries. The County-owned preserves Fuchs Hammock, Meissner Hammock, and Fuch's Hammock Addition are immediately east of the site. The landowner also uses half the property to the east agriculturally (avocado grove and some vegetables) and has approximately a dozen European honeybee hive boxes lining the boundary between grove and pine Rockland. The perimeter of the property is lined with broadleaf canopy trees and Burmareed. Primary FLEPPC Category I and II species invading the site are Brazilian-pepper (*Schinus terebinthifolius*), Burmareed (*Neyraudia reynaudiana*) and woman's tongue (*Albizia lebbeck*).

Pre-ARRA Management: With the assistance of the Florida Division of Forestry, prescribed fire has been used to manage this site and wildfires have also occurred The last burn was conducted in 2004, according to the landowner. There was little management for invasive species conducted on this site prior to ARRA management activities.

ARRA Management Activities: The site received initial treatment for FLEPPC Category I and II species (See table below) by the IRC habitat restoration team in July 2010 and was revisited for follow-up treatment several times to treat the existing exotic seed bank. Additional negotiation with the landowner in March 2011 allowed for permission to eradicate a wall of Burmareed that was functioning as a privacy screen for the home along 304th street.

Invasive Treated	**Scientific Name**	**Treatment Method**	**Herbicide Used**
Burmareed	*Neyraudia reynaudiana*	Foliar and Cut Stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Strawberry Guava	*Psidium cattleianum*	Cut Stump, Hand-pull	Garlon 4 20%
Queensland Umbrella	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Sisal hemp	*Agave sisalana*	Cut-Stump	Garlon 4 20%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Lantana	*Lantana camara*	Cut-Stump	Garlon 4 20%

Photos:

The IRC habitat restoration team brush-cut the large infestation of Burmareed at the Barbara Hampson-Keller Pine Rockland.

The IRC habitat restoration team brush-cut large expanses of Burmareed from the open interior of the Barbara Hampson-Keller Pine Rockland and returned to foliar treat the new growth.

Sisal hemp (*Agave sisalana*) was scattered throughout the Barbara Hampson-Keller Pine Rockland.

Frequent prescribed fires in the pine rockland promote habitat for native shrubs, grasses and herbs, such as rockland shrubverbena (*Lantana depressa* var. *depressa*), which is endemic to Miami-Dade County.

Barry Massin Pine Rockland

Owner: Formerly Barry Massin, now bank owned
Miami, FL 33170

Site Map: The Barry Massin Pine Rockland is in the Redland agricultural area.

Species Benefited: The federally listed plant *Chamaesyce deltoidea* subsp. *adhaerens* as well as 20 state listed plants are present on the site. It is habitat for two Federal candidate plants (*Argythamnia blodgettii* and *Linum arenicola*), and for three federal candidate animals (Florida leafwing butterfly, Bartram's hairstreak, and rim rock crowned snake).

Acres Treated Under ARRA: 5.4

Site Description: The Barry Massin Pine Rockland is part of a 7.5-acre is residential property. There is a residential home with an outdoor workspace and a quarry situated on the southwest section of the site. The edge between of the pineland adjacent to the southwest section of the property has disturbed soils where invasive species are most concentrated. This site was scarified a long time ago, so the soil substrate is gravelly and has no saw palmetto (*Serenoa repens*); nevertheless the site is still dominated by pine rockland plant species. A fairly dense hardwood sub canopy is present throughout the pineland, but open grassy areas are present, especially along old trails and roads. There are young pines present that are beginning to cone.

Pre-ARRA Management: Management was conducted in a collaborative effort between IRC and the landowner prior to the ARRA project. Funding was utilized from the USDA's Wildlife Habitat Improvement Program (WHIP) funding until February 2010, and with USFWS funds (Private Stewardship Grant Program and Partners for Fish and Wildlife Program) since 2004. The landowner has also been active in creation of fire breaks, exotic control, and planting of slash pine tubelings and saw palmetto. IRCs Management activities included exotic plant control in and immediately adjacent to the pineland and thinning of native hardwoods. These activities have resulted in the site being in maintenance condition for invasive exotic grasses, requiring only periodic treatments of newly recruiting exotics. Woody plants in the pineland are near maintenance levels but not quite there yet. The landowner has created ample space around the pineland to serve as a firebreak with little or no additional clearing required.

ARRA Management Activities: The IRC habitat restoration team treated FLEPPC Category I and II species (See table below) at the Barry Massin Pine Rockland initially in March and April of 2010 and with follow-up treatments in July and August 2010. Unfortunately, this property is currently owned by a bank.

Invasive Treated	**Scientific Name**	**Treatment Method**	**Herbicide Used**
Burmareed	*Neyraudia reynaudiana*	Foliar and Cut Stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Rosary pea	*Abrus precatorius*	Cut Stump, Hand-pull	Garlon 4 20%
Queensland umbrella	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Napier grass	*Pennisetum purpureum*	Cut Stump, Hand-pull	Garlon 4 30%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Natal grass	*Melinis repens*	Foliar	Glyphosate 3%
Lantana	*Lantana camara*	Cut-Stump	Garlon 4 20%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Oyster plant	*Tradescantia spathacea*	Hand-pull	N/A

Photos:

Barry Massin escorts IRC Assistant Director Keith Bradley to the pine rockland to conduct a site assessment.

The edges of the Barry Massin Pine Rockland are heavily invaded by Brazilian-pepper and have some dumping.

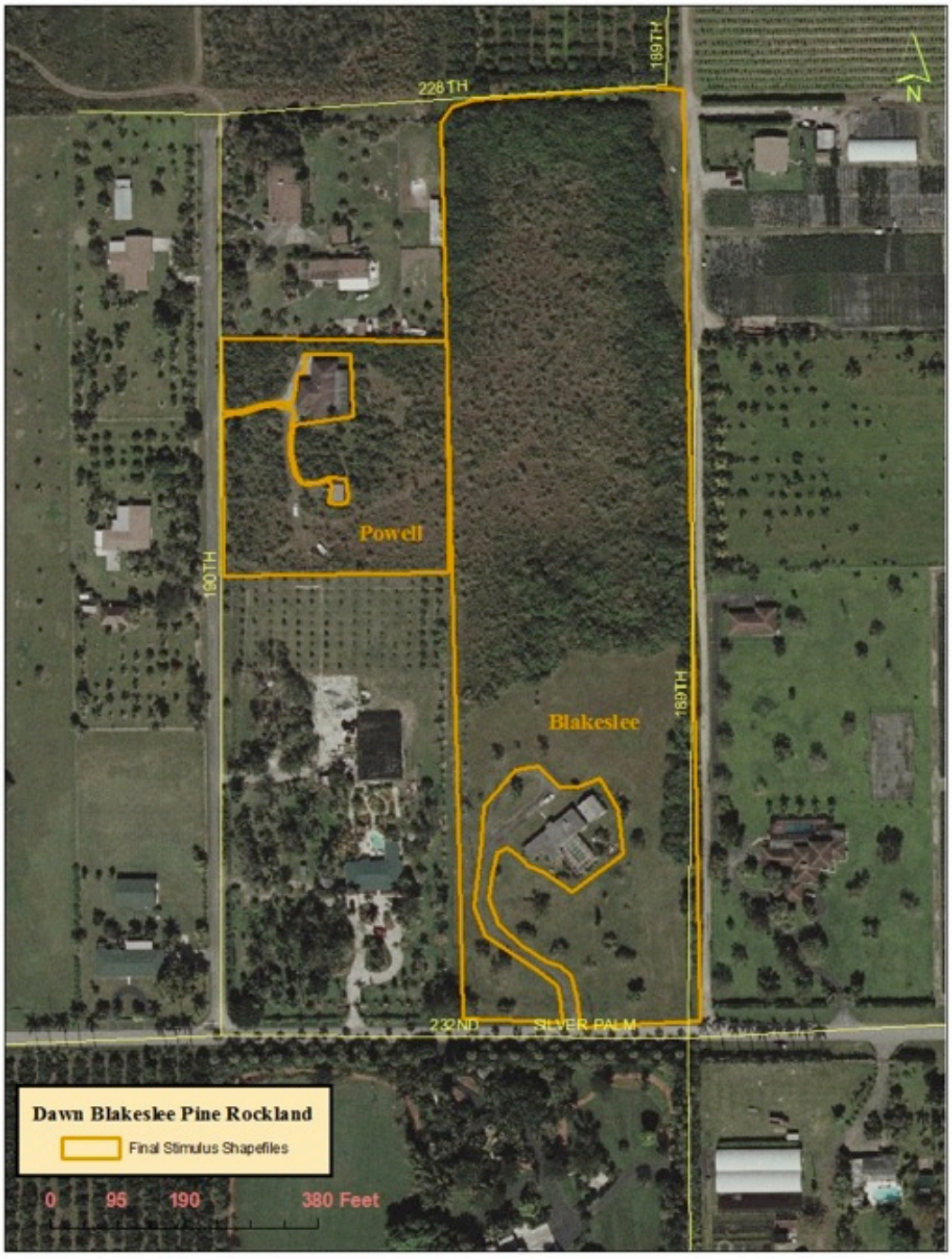
Located in the Redland Agricultural Area of Miami, the Barry Massin Pine Rockland has an agricultural component, which includes European honey bee hives maintained by the landowner.

The IRC habitat restoration team brush-cut the scattered infestation of Burmareed (*Neyraudia reynaudiana*).

The Barry Massin Pine Rockland has a dense shrub layer and would benefit greatly from a prescribed fire to allow for more open spaces for grasses and herbs.

Dawn Blakeslee Pine Rockland

Owner: Dawn Blakeslee
18901 SW 232 St., Miami, FL 33170



Site Map: The Blakeslee Pine Rockland is connected to neighboring pine rockland fragments to the north (Shields pineland) and west (Powell pineland) located in the Redland Agricultural Area of Miami-Dade County.

Species Benefited: There are at least 15 state listed species present on this site as well as the federally endangered Small's Milkpea, *Galactia smallii,* and is habitat for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 9.6

Site Description: The Blakeslee property entered the Pine Rockland Initiative Program during the last quarter of the project, and the bulk of the initial treatment for exotic plants occurred in that quarter. IRC approached the property owner in July 2011, Ms. Dawn Blakeslee, whose family has owned the property for generations. Ms. Blakeslee recalls how drastically the pineland has changed in the past generation due to Hurricane Andrew, invasion of non-native species and encroachment of excessive hardwood species. The site is surrounded primarily by agricultural lands, but there are also two adjacent pine rockland sites, to the west and north. The pine rockland is surrounded by a dense perimeter of Brazilian-pepper (*Schinus terebinthifolius*) and other hardwoods on three sides. On the remaining side (west) a firebreak was dominated by a dense stand of Burmareed (*Neyraudia reynaudiana*). The interior of the pine rockland is relatively open, with a sparse cover of native understory shrubs and palms due to a wildfire. Native grasses and herbs are common. This interior, however, has been invaded by exotics, most abundantly Burmareed.

Pre-ARRA Management: As with the adjacent Powell and Shields pine rocklands, the Blakeslee pine rockland has been largely degraded since Hurricane Andrew. After the hurricane, most of the pines were removed from the property because of bark beetle infestations, and the pineland became invaded by non-native species and hardwoods. The pineland has experienced some wildfire events, which have maintained habitat for many rare pineland species in spite of degrading factors. The healthier portions of habitat are being taken over by invasive plants such as Burmareed (*Neyraudia reynaudiana*), Brazilian-pepper (*Schinus terebinthifolius*), woman's tongue and Gold Coast jasmine (*Jasminum dichotomum*). MS. Blakeslee has not done any management on the property.

ARRA Management Activities: The IRC habitat restoration team initially treated FLEPPC Category I and II species on the adjacent Don and Barbara Powell Pine Rockland in August 2011, and then returned to the 190th Avenue neighborhood to start treatment of adjacent Dawn Blakeslee Pine Rockland. At first glance, it appeared the entire pineland had been taken over by exotic plants. Once the team began brush-cutting Burmareed (*Neyraudia reynaudiana*), however, it became evident the pineland still retained a plethora of native and rare species. After treatment, the Blakeslee pineland underwent a complete transformation and the visual reconnection of this stretch of pine rockland habitat across the two properties was drastic. With the combined management of the adjacent Don and Barbara Powell pine rockland the two sites combine to result in 11.9 acres of managed pine rockland.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar	Glyphosate 3%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Lantana	*Lantana camara*	Cut Stump, Hand-pull	Garlon 4 20%
Natal Grass	*Melinis repens*	Foliar	Glyphosate 3%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Common Guava	*Psidium cattleianum*	Cut Stump	Garlon 4 20%

Photos:

The IRC habitat restoration team had their work cut out for them on day-one of exotic removal.

The team attacked the large and ubiquitous infestation of Burmareed with brush-cutters.

As the Burmareed was cut away from the pineland, the adjacent Powell pine rockland became visible to the west

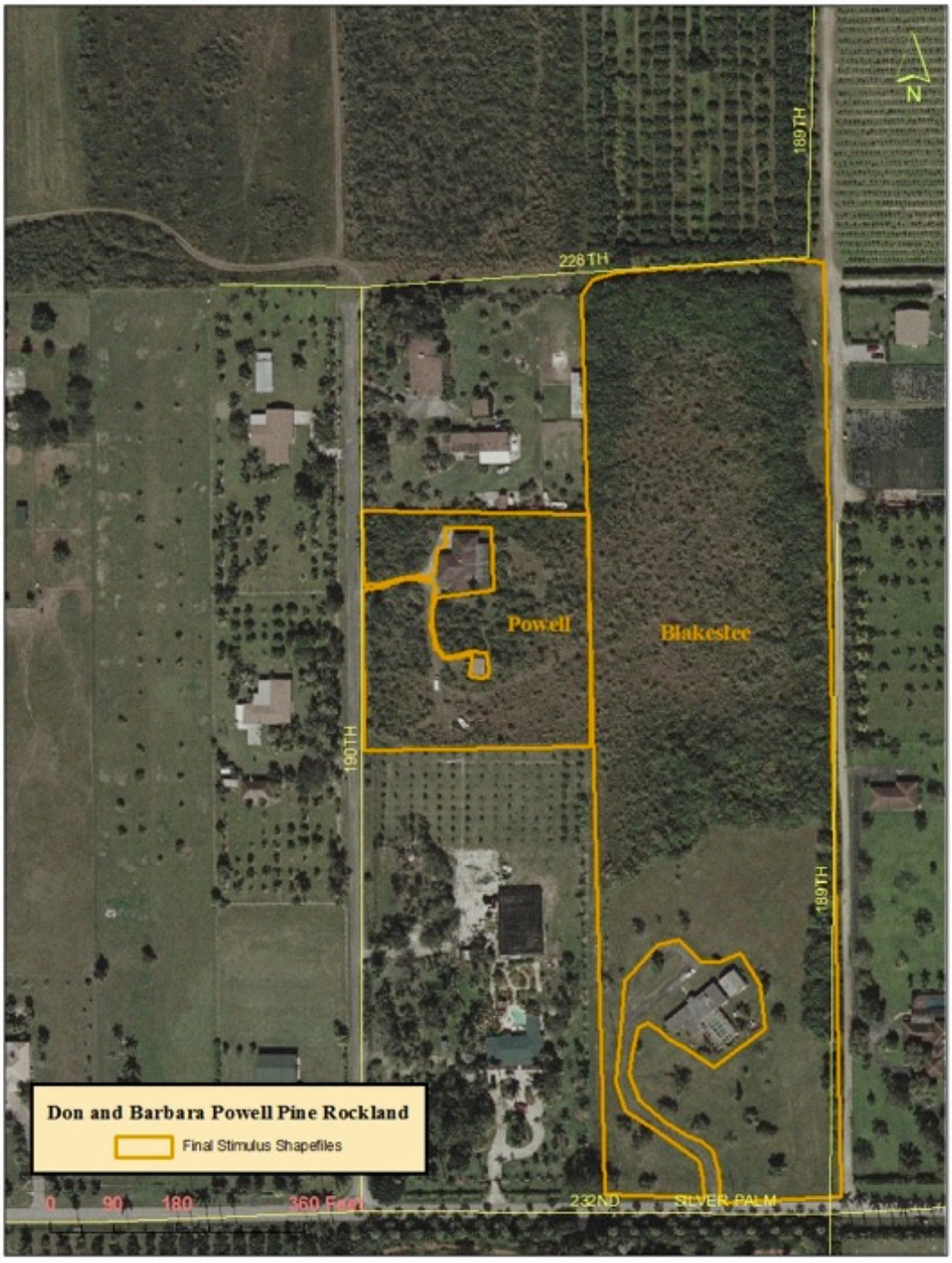
IRC restoration team chainsaw-cutting into Brazilian-pepper infestation.

After a few days of brush-cutting the Burmareed was cut out of the pineland**.**

IRC restoration team member cutting exotic hardwood saplings from the pineland.

Don and Barbara Powell Pine Rockland

Owner: Donald and Barbara Powell
22951 SW 190 Ave., Goulds, FL 33170



Site Map: The Powell Pine Rockland is located adjacent to two other privately owned pine rockland properties treated through the IRC Pine Rockland Initiative program in the Redland agricultural area (Blakeslee to the west and Shields to the north).

Species Benefited: Fifteen state-listed plants and the federally endangered Small's milkpea, *Galactia smallii*, have been documented on the Powell pine rockland. It is habitat for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 2.3

Site Description: This property is a 2.6-acre site with approximately 2.3 acres of pine rockland habitat. There are no remaining pine trees in the pineland post Hurricane Andrew; according to Don and Barbara Powell 500 pine trees were cut and hauled off the pineland during hurricane clean up. There have been several fires in the pine rockland since Hurricane Andrew and as a result there is a rich understory of shrubs, grasses and herbs that before IRC treatment were at high risk of rapidly disappearing as a result of a large, unchecked Burmareed infestation that was arguably brought onto the site on an uncontaminated dozer during a wildfire.

Pre-ARRA Management: Prior to IRC management, many years ago the Powell's took pride in tending to their pine rockland. Due to illness, however, the Powell's have no longer been able to work in their pineland the way they used to and as a result, exotic species began taking over the pine rockland. The Powell's have lived in the Redland their entire life and know and love their pineland. They have been very grateful for all the assistance brought to them through the Pine Rockland Initiative program and wish to be anchors in their community supporting healthy pine rockland management.

ARRA Management Activities: Before exotic removal, IRC biologists visited the Powell pine rockland and established a management plan. There have been both prescribed and wild fires on this site since Hurricane Andrew. All *Pinus elliottii* var. *densa* were cut down and hauled off site by the Florida Department of Forestry post hurricane because of bark beetle infestations. Because of the lack of a pine canopy the Powell Pine Rockland contains several open pockets of pinnacle rock where a diverse population of native grasses and herbs persist, including many rare and endemic species. Prior to restoration efforts these pockets were being encroached upon by the invasive species listed in the chart below. The dominant infestation in the pine rockland was of Burmareed. Large infestations of Burmareed were cut with hand-held brush-cutters and then received a foliar treatment two weeks after with 3% glyphosate. The main management concern was that the cut biomass of the treated exotic species would create a blanket of organic material over the sensitive herbaceous layer. Thus, the IRC restoration team hauled all the cut exotic species off site. Removing the biomass of the exotic plants from the pine rockland proved worth the effort. The site was revisited for follow-up treatment 3 months after the initial treatment, and the herbaceous layer had expanded into the areas where the cut biomasses of the exotic species were removed (See table below). IRC has also managed an adjacent site, the Dawn Blakeslee Pine Rockland, under this ARRA grant. The combination resulted in the restoration of 11.9 acres of contiguous pine rockland.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar and Cut Stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Queensland Umbrella	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Natal grass	*Melinis repens*	Foliar	Glyphosate 3%
Lantana	*Lantana camara*	Cut-Stump	Garlon 4 20%

Photos:

The Powell pineland was heavily infested by Burmareed after Hurricane Andrew and when the IRC restoration team arrived they had their work cut out for them.

The IRC restoration team got straight to work and began brush-cutting Burmareed.

As the team cut away the Burmareed they began uncovering the understory of the pine rockland.

The team uncovered many good native plants but also other invaders such as Brazilian-pepper.

The fresh cut stumps of Burmareed were left for one month for the new, vigorous growth to sprout; foliar treatment with glyphosate followed.

The team also cut out invasive hardwoods such as Brazilian-pepper, woman's tongue and umbrella tree with machetes and chainsaws and hauled out the biomass for disposal.

Donald and Barbara Powell wanted to help out with the exotic removal and worked along side the crew each day from start to finish.

The Powells loaded their truck with the cut biomass of invasive plants, mostly Burmareed, and hauled it to their front curb for the county to pick up.

Within the pineland there are many open areas where pine rockland grasses and herbs flourish.

Hauling out the cut biomass of the invasive plants was well worth the effort in this pineland.

The Powells and the IRC restoration team were very happy with the curbside pile of invasive plants to be hauled off site and the healthy pine rockland they uncovered.

Elly Trout Pine Rockland

Owner: Elly Trout
23750 SW 125 Ave., Princeton, Florida 33032

Site Map: The Elly Trout Pine Rockland is situated among four other privately owned pine rockland fragments (two of which receive treatment through the ARRA) in the Princeton area of southwest Miami-Dade County.

Species Benefited: This site contains habitat for the federally-listed plant *Chamaesyce deltoidea* subsp. *adhaerens* which occurs just across the street, the federal-candidate plants *Argythamnia blodgettii, Brickellia mosieri, Linum arenicola,* and *Linum carteri* var. *carteri.* There are 16 state-listed plants on the site. It is habitat for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 2.3

Site Description: This 2.5-acre site private residence entered the Pine Rockland Initiative Program during Quarter 7 of the project. Restoration of this site along with two other privately owned tracts of pine rockland is crucial because it is connected with IRC's George Avery pine rockland, which is well managed and provides habitat to many listed and rare species. Habitat will be improved and connected by restoring all of these privately owned adjacent parcels of pine rockland. Though the perimeter of the Elly Trout Pine Rockland is weedy, the infestation of invasive species in the interior of the pineland is relatively low.

Pre-ARRA Management: Prior to IRC's management, the interior of the Elly Trout Pineland has been managed for most exotic plants by the landowner, except for Burmareed (*Neyraudia reynaudiana*), which the landowner preferred to keep on her property. The landowner has spread mulch on some of the pine rockland in an effort to suppress weeds and encourage pines to grow. After discussing the negative effects of allowing Burmareed to spread and of introducing organic matter to the pineland, the landowner has agreed to remove most Burmareed and other invasive exotic plants from her property and to discontinue spreading mulch on the pineland. In addition to improving the Elly Trout Pine Rockland, management of this site minimizes a seed source, minimizing re-colonization on IRCs adjacent pine rockland preserve.

ARRA Management Activities: The Elly Trout Pine Rockland received initial treatment FLEPPC Category I and II species in April 2011 by the IRC habitat restoration team. After initial treatment, the landowner Elly Trout has become very active in managing her pine rockland. In fact, she has slowly but surely removed the perimeter of Burmareed she kept as a privacy screen and replaced it with solid fencing.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar	Glyphosate 3%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Natal grass	*Melinis repens*	Foliar	Glyphosate 3%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Queensland umbrella- tree	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump	Garlon 4 20%

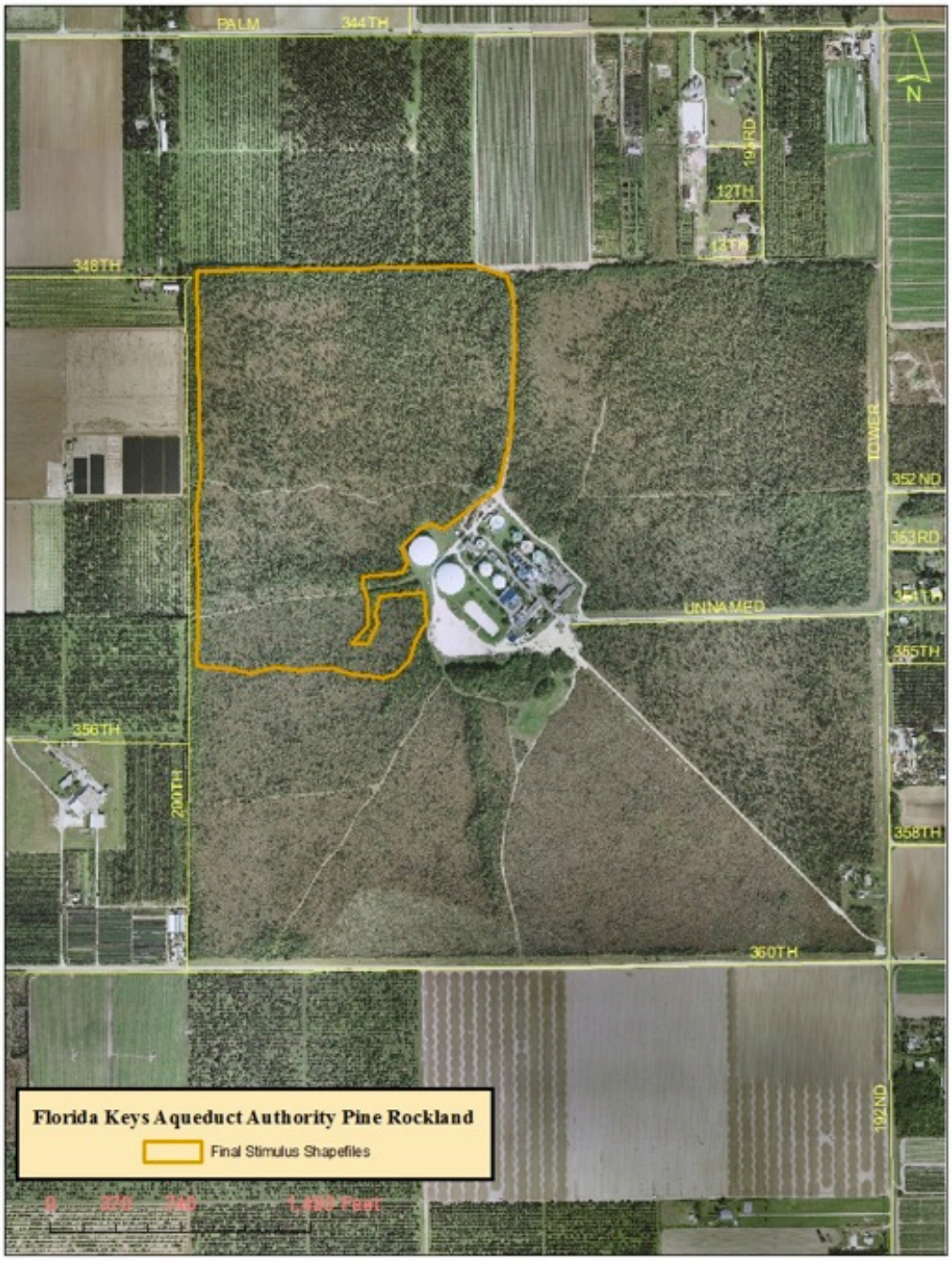
Photos:

The exterior of Elly Trout Pineland was surrounded by a wall of Burmareed (*Neyraudia reynaudiana*), which is now removed.

The Elly Trout Pineland was treated for Burmareed (*Neyraudia reynaudiana*) as well as other invasive plants such as Queensland umbrella-tree (*Schefflera actinophylla*).

Florida Keys Aqueduct Authority Pine Rockland

Owner: The Florida Keys Aqueduct Authority
PO BOX 1239, Key West, FL 33040



Site Map: The Florida Keys Aqueduct Authority Pine Rockland is part of the Navy Wells pine rocklands, which are located in Florida City, just east of Everglades National Park. The southern and western fragments connected to the Florid Keys Aqueduct Authority Pine Rockland are owned and managed by Miami-Dade County.

Species Benefited: At least forty three state-listed plants are present on the site as well as the federally endangered plant *Galactia smallii*, the candidate plants *Chamaesyce deltoidea* subsp*. Pinetorum, Brickellia mosieri,* and *Sideroxylon reclinatum* subsp. *austrofloridense,* and the candidate animal the Bartram's hairstreak butterfly. It is habitat for two federal-candidate animals, the Florida leafwing butterfly which was formerly known from the site, and rimrock crowned snake.

Acres Treated Under ARRA: 80.4

Site Description: This pine rockland is part of a 102-acre property owned by the Florida Keys Aqueduct Authority. It is one of the last remaining large rockland fragments of pine rockland occurring just east of Everglades National Park along the Miami Rock Ridge, an is connected to 271 acres of intact pine rockland owned and managed by Miami-Dade County as the Navy Wells Pineland. The Florida Keys Aqueduct Authority Pine Rockland is in overall very good condition, with the primary exotic invader being Brazilian-pepper (*Schinus terebinthifolius*). The substrate is intact throughout the site, although the north, west, and southeast borders of the pineland are dominated by thick infestations of Brazilian-pepper; there is also disturbance surrounding buildings and old ditches. The understory is very diverse throughout the site where there have been some small wildfires, and there are many small solution holes throughout the landscape that contain additional rare species.

Pre-ARRA Management: Prior to IRC management the Florida Keys Aqueduct Authority Pine Rockland have been largely untouched except by occasional wildfire. Herbicides cannot be used on this site because it is the well field which provides all the drinking water to the Florida Keys.

ARRA Management Activities: In September 2011 the IRC habitat restoration team provided initial treatment to the Florida Keys Aqueduct Authority Pine Rockland. The team swept through the pineland in line formations, cutting down invasive hardwoods such as Brazilian-pepper, woman's tongue and leadtree to the base. The cut-biomass of the trees were piled around the base of the cut-stumps and left in place to dry-out and hopefully increase the chances of root smoldering and mortality of the invasive trees in the next prescribed or wild fire event. Without the use of herbicides, these invasive hardwoods will regrow. Cutting them back will control their growth and spread but will not eradicate them. In addition, the large border of Brazilian-pepper surrounding the perimeter of most of the pineland must be addressed, or it will continue to act as a major seed source. The Florida Keys Aqueduct Authority environmental managers are very interested in conducting a prescribed fire in the pine rockland in the near future.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	N/A
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	N/A
Woman's tongue	*Albizia lebbeck*	Cut Stump	N/A
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	N/A

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Natal Grass	*Melinis repens*	Hand-pulled and bagged	N/A

Photos:

Brazilian-pepper was cut to the base with machetes and chainsaws.

The cut-biomass of Brazilian-pepper, woman's tongue and leadtree were piled around the cut-stumps of the plants to smolder roots in next fire event, hopefully resulting in mortality of the exotic species.

Chapman's wild sensitive plant, *Senna mexicana* var. *chapmani* and other plants endemic to pine rocklands are prevalent in the open areas of the Florida Keys Aqueduct Authority Pine Rockland.

State endangered shrub eupatorium (*Koanophyllon villosum)* was in bloom at the Florida Keys Aqueduct Authority Pine Rockland in September 2011, attracting several species of native pollinator species.

Blazing star (*Liatris tenuifolia*), amidst Florida silver palm (*Coccothrinax argentata)* poisonwood (*Metopium toxiferum)* and other pine rockland species on pinnacle rock.

Florida Keys Aqueduct Authority Pine Rockland has large, diverse, open stretches of native grasses and herbs where small wildfires have occurred.

Florida Power and Light Ludlum Pine Rockland

Owner: Florida Power & Light & Co.
P.O. Box 14000
Juno Beach, FL 33408

Site Map: The Florida Power and Light Ludlum Pine Rockland is geographically connected to the 9-acre Miami-Dade County owned and managed Ludlum Pine Rockland.

Species Benefited: There are at least 21 state listed species present on this site as well as the federally endangered tiny polygala (*Polygala smallii*) and wedge sandmat (*Chamaesyce deltoidea* subsp. *deltoidea*), and is habitat for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 20.2

Pre-ARRA Management: The Florida Power and Light Ludlum Pine Rockland has not been managed for invasive species prior to ARRA management for many years. There have been several small wildfires which have been have promoted habitat for a diverse variety of native grasses and herbs to thrive. FPL crews routinely prune the tops of taller south Florida slash pine (*Pinus elliotti* var. *densa*) to protect the powerlines that run through the entire length of the property.

Management Activities Completed: During the last quarter of the project, IRC's habitat restoration team treated the Florida Power and Light Ludlum Pine Rockland for FLEPPC Category I and II species (See table below). This 26-acre property contains approximately 21 acres of pine rockland habitat with power-lines running through the entire length of it. The pineland is adjacent to the Miami-Dade County owned and managed Ludlam Pineland. The Ludlam Pineland is in excellent condition due to frequent fires and exotic plant control, but the Florida Power and Light Ludlum Pine Rockland is not managed for invasive species and they are threatening the diverse assemblage of native species present on this site. The northeast edge of Florida Power and Light Pine Rockland has a dense infestation of Burmareed (*Neyraudia reynaudiana*) occurring along the firebreak and continues to provide an invasive seed source to the relatively well-managed and invasive-free Miami-Dade County Ludlum Pine Rockland, due to its geographic proximity.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar	Glyphosate 3%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Lantana	*Lantana camara*	Cut Stump, Hand-pull	Garlon 4 20%
Natal Grass	*Melinis repens*	Foliar	Glyphosate 3%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Suckering Australian-pine	*Casuarina glauca*	Cut Stump	Garlon 4 20%

Photos:

Power-lines run through the Florida Power and Light Pine Rockland, so FPL crews routinely prune the tops of taller south Florida slash pine (*Pinus elliotti* var. *densa*).

Exotic plants such as Brazilian-pepper (*Schinus terebinthifolius*) internmingled with native plants around the borders of the Florida Power and Light Pine Rockland were treated by the IRC habitat restoration team.

The FPL Ludlum pine rockland had a medium-sized infestation of suckering Australian-pine (*Casuarina glauca*), which the restoration team cut-stump treated and hauled out the cut debris.

Burmareed heavily invaded the northwest border of the FPL Ludlum pine rockland, which the IRC restoration team brush-cut.

With the help of Miami-Dade College student volunteers, the IRC restoration team loaded and hauled out the cut-biomass of the Burmareed and Australian pines to encourage a more rapind return of native plants on the forest floor.

The state-listed and rare pineland clustervine (*Jacquemontia curtisii*), endemic to south Florida, was prevalent in the interior of the pineland.

Removal of invasive plants by the IRC habitat restoration team under the ARRA, combined some recent wildfire events has drastically improved the FPL Ludlum pine rockland habitat for rare and endemic pineland species to thrive.

Liatris chapmanii

Endangered *Chamaesyce deltoidea*

subsp. *deltoidea*

Along with finding lots of great native plant species in the FPL pineland, the team also came across several burrows of the federally-listed gopher tortoise (*Gopherus polyphemus)* which has been found in pine rockland fragments located in the northern range of the Miami Rock Ridge.

With continued management, the Florida Power and Light Ludlum Pine Rockland has the potential to persist as healthy pine rockland habitat and home for a plethora of rare and native species.

Gerald Case Pine Rockland

Owner: Gerald Case
14925 SW 232nd St., Miami, FL 33170

Site Map: The Gerald Case Pine Rockland is located within the Redlands agricultural area of Miami-Dade County and is connected to two other privately owned residential pine rocklands.

Species Benefited: There are at least 15 state listed species present on this site. It is habitat for the candidate plant *Argythamnia blodgettii* and three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acreage Treated Under ARRA: 4.6

Site Description: The Gerald Case Pine Rockland is located within the Redlands Agricultural Area of Miami-Dade County and is connected to two other privately owned residential pine rocklands. The fragment connected directly to the northern border is owned by his daughter, Janet Case, and the fragments to the northwest and southwest are owned by his brother-in-law and sister, Larry and Gloria Dunagan; both of whose pine rocklands have received treatment for invasive species under this ARRA grant. Gerald Case wishes to preserve the family's pinelands for future generations, and is enthusiastic about restoring this pineland through the IRC Pine Rockland Initiative program. Directly northeast of the Case and Dunagan pine rockland fragments is a 10-acre rockland hammock owned and managed by Miami-Dade County.

Pre-ARRA Management: Prior to IRC's management, some efforts have been made to eradicate invasive air potato *(Dioscorea bulbifera),* which was encroaching from the pineland onto the Case family's adjacent fruit crops growing to the east. After Hurricane Andrew the Case and Dunagan pine rockland fragments lost all south Florida slash pine (*Pinus elliottii* var. *densa*), which did not regenerate. Loss of habitat for pine rockland species on this fragment is due mainly to fire suppression and hard wood succession. Together the Case and Dunagan fragments make up 24.6 acres of pine rockland habitat.

ARRA Management Activities: The Gerald Case Pine Rockland received initial treatment for FLEPPC Category I and II species in June 2011 and has been re-visited multiple times for follow-up treatment.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Bishopwood	*Bischofia javanica*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Sapodilla	*Manilkara zapota*	Cut Stump	Garlon 4 20%
Oyster plant	*Tradescantia spathacea*	Hand-pull	N/A

Photos:

A large infestation of Brazilian-pepper (*Schinus terebinthifolius*) and Gold Coast jasmine (*Jasminum dichotomum*) was treated at the southern end of the Gerald Case Pine Rockland.

Girl Scouts Camp Choee Pine Rockland

Owner: Girl Scout Council of Tropical Florida, Inc.
11347 SW 160th St., Miami, FL 33157

Site Map: The Girl Scouts Camp Choee Pine Rockland is located adjacent to the Florida Turnpike, which runs along its western border; and surrounded by private residences to the north, south, and east.

Species Benefited: The federal-candidate plant *Brickellia mosieri* and sixteen state-listed plants are present on the site. The federally-listed plant *Chamaesyce deltoidea* subsp. *deltoidea* formerly occurred on the site. It is habitat for one federally-listed plant (*Polygala smallii*), and two federal-candidate plants (*Argythamnia blodgettii* and *Linum arenicola*), and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 13.7

Site Description: This Girl Scouts Camp Choee Pine Rockland is part of a 19.8 acre property owned and operated by the Girl Scout Council of Tropical Florida, Inc. Much of the site is developed as a facility for Girl Scout programs and activities. The property is bordered on three sides by dense residential housing and on the west by the Florida Turnpike. Other than some trail development, the pine rockland that remains is more or less left alone. Due to the high chain link fence, abundant adult supervision, and security of the site maintained for the safety of the Girl Scout Council's program participants, this pine rockland is unusually free of litter, illegal dumping, and other problems commonly encountered at other parks and preserves. The highest quality habitat is located in at the north end and northeast corner of the property. The site has an overly dense slash pine canopy and suffers from fire suppression, which has created a dense layer of pine duff and other organic material, which has drastically reduced habitat for native grasses and herbs.

Pre-ARRA Management: Management was conducted by IRC at Camp Choee prior to the ARRA project with USFWS funding from the Partners for Fish and Wildlife Program and from the Private Stewardship Grants Program, and during numerous volunteer workdays. Management activities included exotic plant control and construction of fire breaks (by the Florida Division of Forestry). Because of the size of the site and density of exotics the site was not yet in maintenance condition.

ARRA Management Activities: The Girl Scouts Camp Choee Pine Rockland was treated initially under the ARRA for FLEPPC Category I and II species by the IRC habitat restoration team in March 2010 (See table below). Several follow-up treatments have been conducted in 2010 and 2011 that have drastically reduced the exotic seed bank. This site would benefit greatly from a prescribed fire.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar and Cut Stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Air potato	*Dioscorea bulbifera*	Hand-pull/bagged	N/A
Rosary pea	*Abrus precatorius*	Cut Stump, Hand-pull	Garlon 4 20%
Queensland Umbrella	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Napier grass	*Pennisetum purpureum*	Foliar	Glyphosate 3%
Lantana	*Lantana camara*	Cut-Stump	Garlon 4 20%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Oyster plant	*Tradescantia spathacea*	Hand-pull	N/A
Bishopwood	*Bischofia javanica*	Cut-Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut-Stump	Garlon 4 20%
Indian Rosewood	*Dalbergia sissoo*	Cut-Stump	Garlon 4 20%
Earleaf acacia	*Acacia auriculiformis*	Cut-Stump	Garlon 4 30%
Bowstring hemp	*Sansevieria hyacinthoides*	Cut-Stump	Garlon 4 20%

Photos:

In the shade of dense pines, Burmareed (*Neyraudia reynaudiana*) reaches heights of 14 feet or more throughout the Girl Scouts Camp Choee Pine Rockland.

Prior to ARRA management the infestation of Burmareed and Brazilian-pepper along the western border was extremely dense.

Air potato (*Dioscorea bulbifera*) was hand-pulled and the potatoes bagged and properly disposed of.

IRC George Avery Pine Rockland

Owner: The Institute for Regional Conservation
22601 SW 152 Ave., Miami, FL 33170

Site Map: The IRC George Avery Pine Rockland is located in the Princeton region of southwest Miami-Dade County and is adjacent to four other privately owned pine rockland fragments.

Species Benefited: The federally-listed plant *Chamaesyce deltoidea* subsp. *adhaerens* as well as 20 state-listed plants are present on the site. The federal-candidate plant *Linum arenicola* formerly occurred on the site and still occurs on the adjacent canal bank. The site is habitat for the federal-candidate plants *Argythamnia blodgettii* and *Brickellia mosieri*, and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake). IRC has conducted a trial outplanting of *A. blodgettii* on the site under a different grant.

Acres Treated Under ARRA: 2.5

Site Description: The IRC George Avery Pine Rockland is approximately 2.5 acres. It is bordered by homes on the east and south, and is contiguous with a privately-owned pine Rockland to the north. Another pine rockland exists across the street to the west. Additional privately-owned pine rockland exists to the west across SW 125 Ave. An FPL right-of-way cuts through the property diagonally. A firebreak was installed by Florida DOF on three sides of the property.

The eastern edge of the site was previously infested with dense populations of Brazilian-pepper (*Schinus terebinthifolius*), Burmareed (*Neyraudia reynaudiana*), and smaller patches of woman's tongue (*Albizia lebbeck*). After initial treatments conducted by IRC staff, only small patches of Burmareed and Brazilian-pepper remain in the interior. Additional colonies of Burmareed and Brazilian-pepper exist along the edges of the fire breaks on the east and south boundaries, but at only a fraction of their previous densities due to treatments by IRC and construction of fire breaks.

Pre-ARRA Management: Management was conducted prior to the ARRA project with private and USFWS funding from 2004 until February 2010 under the Partners for Fish and Wildlife Program and the Private Stewardship Grants Program, a grant from the South Florida Ecological Services office, and funding from the Ross Foundation. Some assistance was also received from the USDA Wildlife Habitat Incentives Program. Management activities included extensive exotic plant control, including the elimination of a dense perimeter of Brazilian-pepper, construction of fire breaks, control of exotic species within the pine rockland, removal of illegal dumping debris and conducting a prescribed fire. The site is now in maintenance condition, requiring only periodic treatments of newly recruiting exotics.

ARRA Management Activities Completed: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species at this site under the ARRA in January 2010 and has received several follow up treatments in 2010 and 2011 (see table below). A gate was constructed along the northern firebreak to allow vehicle access during prescribed burns or wildfires and to prevent people from illegally dumping on the pine rockland, which is a common occurrence in this neighborhood. This site was prescribe-burned in 2009 and has a very diverse herbaceous layer. The pine rockland extends onto another private property which is slightly maintained for exotic plant control by the landowner, who has put his pine rockland up for sale.

The IRC George Avery Pine Rockland has undergone a complete transformation and is at a very feasible management phase. The main challenge will continue to coordinate prescribed fires at this site.

Invasive Treated	**Scientific Name**	**Treatment Method**	**Herbicide Used**
Burmareed	*Neyraudia reynaudiana*	Foliar and Cut Stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Jasmine	*Jasminum fluminense* and *J. dichotomum*	Cut Stump/Hand-pull	Garlon 4 20%
Bishopwood	*Bischofia javanica*	Cut Stump, Hand-pull	Garlon 4 20%
Queensland Umbrella	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Bowstring hemp	*Sansevieria hyacinthoides*	Cut-Stump	Garlon 4 20%
Lantana	*Lantana camara*	Cut-Stump	Garlon 4 20%
Natalgrass	*Melinis repens*	Foliar	Glyphosate 3%
Rosary pea	*Abrus precatorius*	Cut stump, hand pull	Garlon 4 20%
Mother of millions	*Kalanchoe xhoughtonii*	Hand-pull/bagged	N/A
Itch grass	*Rottboellia cochinchinensis*	Foliar	Glyphosate 3%
Molasses grass	*Melinis minutiflora*	Foliar	Glyphosate 3%
Castor bean	*Ricinus communis*	Cut Stump	Garlon 4 20%
Surinam cherry	*Eugenia uniflora*	Cut Stump	Garlon 4 20%
Napier grass	*Pennisetum purpureum*	Foliar	Glyphosate 3%

Photos:

Much of the site is characterized by open, rocky areas such as this. Occasional Burmareed clumps are found on the site and are treated before they go to seed.

An overview of the site with characteristic understory of open, grassy areas and low saw palmettos.

John Kunkel Small Pineland

Owner: The Institute for Regional Conservation
22601 SW 152 Ave., Miami, FL 33170

Site Map: The IRC John Kunkel Small Pine Rockland is a small fragment located in a residential neighborhood in the far southwest region of the Redland agricultural area in the proximity of Navy Wells pine rocklands.

Species Benefited: The federally-listed plant *Galactia smallii,* the federal-candidate plant *Chamaesyce deltoidea* subsp. *pinetorum*, as well as 21 state-listed plants are present on the site. It is habitat for two federally-listed plants (*Argythamnia blodgettii* and *Linum arenicola*), and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake). Bartram's hairstreak occurs immediately to the west at Navy Wells Pineland, and the Florida leafwing formerly occurred on that site.

Acres Treated Under the ARRA: 0.9

Site Description: The IRC John Kunkel Small Pine Rockland is a pine rockland fragment owned and managed by The Institute for Regional Conservation. It is bordered by privately-owned land to the west, and an undeveloped county road right-of-way to the north. It is contiguous with 1.4 acres of additional pine rockland on private land and public rights-of-way to the north and west. A firebreak forms the north and west boundaries. County roads form the south (SW 353 Street) and east (SW 190 Avenue) boundaries. When acquired by The Institute for Regional Conservation (IRC), the southern perimeter contained a dense colony of *Schinus* and additional exotic hardwoods extending 15 m inwards. Approximately 2/3 of this was cleared in January 2008, leaving only a bare rock substrate. A dense colony of *Schinus* on disturbed soil still exists in the southwest corner, along with some *Albizia lebbeck*, one sausage tree (*Kigelia pinnata*), and small patches of *Nephrolepis cordifolia*, *Neyraudia reynaudiana*, and *Pennisetum purpureum*. The interior of the pine rockland has sparse colonies of *N. reynaudiana*, *S. terebinthifolius*, and *A. lebbeck*.

Pre-ARRA Management: Management was conducted prior to the ARRA project with private and USFWS funding from the Partners for Fish and Wildlife Program, a grant from the South Florida Ecological Services office, and the Ross Foundation from 2008 until February 2010. Management activities included exotic plant control, including the elimination of one third of a dense perimeter of *S. terebinthifolius* on the southern edge, construction of fire breaks by the Florida Division of Forestry, control of exotic species within the pine rockland, and conducting a prescribed fire. Prior to ARRA the pine Rockland was close to maintenance condition, except for dense *S. terebinthifolius* and other exotics along part of the southern edge, and sparse exotics in the interior.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species in the first quarter of the ARRA project and carried out several follow-up treatments (See table below). Treatment for exotic species combined with the effects of prescribed fire have brought this pine rockland to a feasible management phase. IRC plans to conduct retreatments under a USFWS Coastal grant to eliminate the existing exotic seed bank.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Natal grass	*Melinis repens*	Foliar	Glyphosate 3%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Rattlebox	*Crotalaria spectabilis*	Hand pull, bag	N/A
Jaragua	*Hyparrhenia rufa*	Foliar Hand-pull/bag	Glyphosate 3%
Asian sword fern	*Nephrolepis cordifolia*	Foliar	3% Glyphosate
Jasmine	*Jasminum fluminense* and *J. dichotomum*	Hand Pull, Cut Stump	Garlon 4 20%
Queensland umbrella tree	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Oyster plant	*Tradescantia spathacea*	Hand-pull, bagged	N/A

Photos:

This May 2010 photo was taken just a week prior to the second day of initial treatment. The Burmareed (*Neyraudia reynaudiana*) in the foreground shows the effects of a recent foliar treatment.

Many sensitive tropical species lost foliage to the effects of record cold in January 2010.

During the fifth quarter a wall of Brazilian-pepper (*Schinus terebinthifolius*) encroaching on the pineland was removed.

Lots of bare limestone and *Serenoa* trunks (“gator-backs”) staying horizontal; both are signs of healthy pine rockland. Undisturbed portions of the IRC John Kunkel Pine Rockland appear to in good condition and harbor a population of the federally-endangered plant *Galactia smallii*

John Kunkel Small Pine Rockland post-invasive exotic plant treatment is now in a feasible management phase.

Janet Case Pine Rockland

Owner: Janet Case
14910 SW 228 St., Miami, FL 33170

Site Map: The Janet Case Pine Rockland is located within the Redlands agricultural area of Miami-Dade County and is connected to two other privately owned residential pine rocklands.

Species Benefited: Fifteen state-listed plants are present on the site. It is habitat for the federal candidate plant (Argythamnia blodgettii), and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acreage Treated Under ARRA: 4.8

Site Description: The Janet Case Pine Rockland is located within the Redlands agricultural area of Miami-Dade County and is connected to two other privately owned residential pine rocklands. The fragment connected directly to the southern border is owned by her father, Gerald Case, and the fragments to the southeast are owned by her relatives, Larry and Gloria Dunagan; both of whose pine rocklands have received treatment for invasive species under this ARRA grant. Gerald Case, Janet Case and the Dunagans wish to preserve their family's pinelands for future generations, and are very enthused about restoring this pine rockland fragment through the IRC Pine Rockland Initiative program. Directly northeast of the Case and Dunagan pine rockland fragments is a 10-acre rockland hammock owned and managed by Miami-Dade County, Silver Palm Hammock Preserve.

Pre-ARRA Management: Prior to IRC's management, some efforts have been made to eradicate invasive air potato *(Dioscorea bulbifera),* which was encroaching from the pineland onto the Case family's adjacent fruit crops growing to the east. After Hurricane Andrew the Case and Dunagan pine rockland fragments lost all south Florida slash pine (*Pinus elliottii* var. *densa*), which did not regenerate. Loss of habitat for pine rockland species on this fragment is due mainly to fire suppression and hard wood succession. Together the Case and Dunagan fragments make up 24.6 acres of pine rockland habitat.

ARRA Management Activities: The Janet Case Pine Rockland received initial treatment for FLEPPC Category I and II species in June 2011 and has been re-visited multiple times for follow-up treatment.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Bishopwood	*Bischofia javanica*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Sapodilla	*Manilkara zapota*	Cut Stump	Garlon 4 20%
Oyster plant	*Tradescantia spathacea*	Hand-pull	N/A

The Janet Case Pine Rockland is succeeding to hammock; the canopy is now dominated by wild tamarind (*Lysiloma latisiliquum*) and with a rich understory of mixed pineland and hammock species.

Jeremy and Elena Sweet Pine Rockland

Owners: Jeremy and Elena Sweet
26055 SW 197 Ave., Miami, FL 33031

Site Map: The Jeremy and Elena Sweet Pine Rockland is located in the Redland Agricultural Area and is surrounded by private residences and agriculture.

Species Benefited: Twelve state listed plants are present on the site. It is habitat for one federally listed plant (*Chamaesyce deltoidea* subsp. *adhaerens*), three Federal candidate plants (*Argythamnia blodgettii*, *Brickellia mosieri,* and *Linum arenicola*), and for three federal candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 1.0

Site Description: The 4.6-acre property contains approximately 1.0 acre of pine rockland habitat that is dominated in many areas by a diversity of native herb species and is shrubless and grassy. Shrub and palm density is low because of former mechanical disturbance (decades old). In some areas there is a developing canopy of the native tree wild tamarind (*Lysiloma latisiliquum*) that is starting to shade the understory to an excessive degree. The remainder of the property is dominated by a mowed and irrigated field. While about some of the site was in good relatively good condition, 0.3 acres of it was densely infested with exotic species such as Brazilian-pepper (*Schinus terebinthifolius*) and gold coast jasmine (*Jasminum dichotomum*). That acreage is managed under a USDA Wildlife Habitat Incentives Program grant by the landowner. Natal grass (*Melinis repens*) and seedlings of woody invasive species (especially *Flacourtia* and *Jasminum*) were present in patches throughout the site. Wedelia (*Sphagneticola trilobata*) noted in prior visits was had been contained to the outside margins of the site. Seedlings of woody species such as woman's tongue (*Albizia lebbeck*), Brazilian-pepper (*Schinus terebinthifolius*), and wild tamarind (*Lysiloma latisiliquum*) were intermittently present throughout. Umbrella tree (*Schefflera actinophylla*) was not found during the initial assessment, although previously found on the site. Burmareed was almost eliminated from the site, and only small, isolated patches remained. Along the perimeter small, scattered itchgrass (*Rottboellia cochinchinensis*) was also found.

Pre-ARRA Management: IRC began management of this property under a USFWS Partners Program grant in May 2009. We did not do enough work under that grant to reach maintenance status prior to the start of the ARRA grant. Management activities focused on control of exotic pest plant species, particularly Burmareed (*Neyraudia reynaudiana*), Brazilian-pepper (*Schinus terebinthifolius*), woman's tongue (*Albizia lebbeck*), and *Jasminum* species.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species at this site in March 2010 and provided follow up treatments in 2010 and 2011 (see table below). The landowner continues to work on his property, and this pineland has entered a feasible management phase.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar and Cut Stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Jasmine	*Jasminum fluminense* and *J. dichotomum*	Cut Stump/Hand-pull	Garlon 4 20%
Bishopwood	*Bischofia javanica*	Cut Stump, Hand-pull	Garlon 4 20%
Queensland Umbrella	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Governor's plum	*Flacourtia indica*	Cut Stump	Garlon 4 20%
Earleaf acacia	*Acacia auriculiformis*	Cut Stump	Garlon 4 20%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Bowstring hemp	*Sansevieria hyacinthoides*	Cut-Stump	Garlon 4 20%
Lantana	*Lantana camara*	Cut-Stump	Garlon 4 20%
Natalgrass	*Melinis repens*	Foliar	Glyphosate 3%
Rosary pea	*Abrus precatorius*	Cut stump, hand pull	Garlon 4 20%
Air potato	*Dioscorea bulbifera*	Hand-pull/bagged	N/A
Itch grass	***Rottboellia cochinchinensis***	Foliar	Glyphosate 3%
Molasses grass	*Melinis minutiflora*	Foliar	Glyphosate 3%
Castor bean	*Ricinus communis*	Cut Stump	Garlon 4 20%
Sisal hemp	*Agave sisalana*	Cut Stump	Garlon 4 20%
Java-plum	*Syzygium cumini*	Cut Stump	Garlon 4 20%
Napier grass	*Pennisetum purpureum*	Foliar	Glyphosate 3%

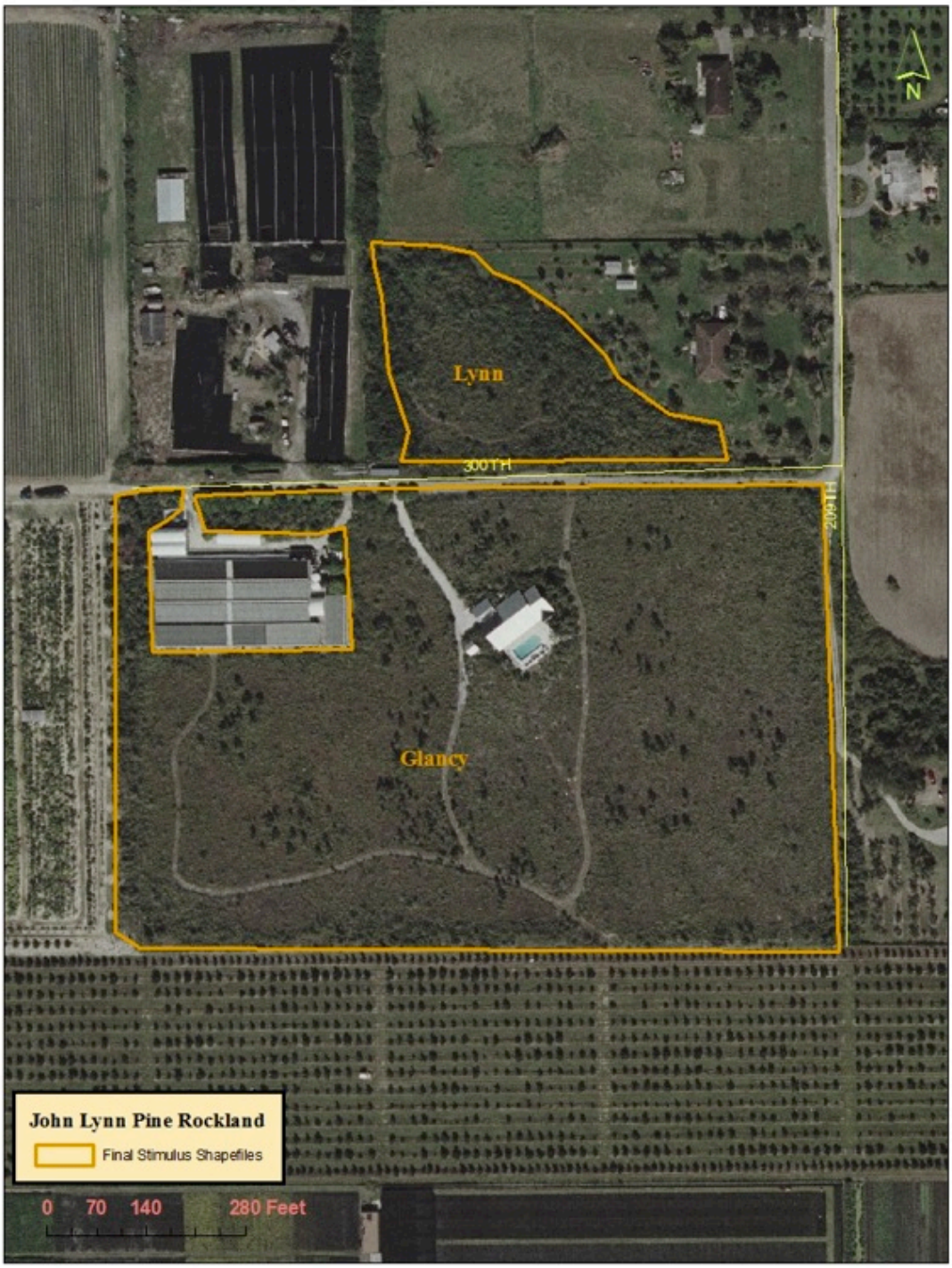
Photos:

Small, isolated patches of Natal grass were hand- pulled, bagged, and removed from the site.

This site consists mostly of low, open grassy areas and few palms. Small pine seedlings were planted throughout by the landowner.

John Lynn Pine Rockland

Owner: John Lynn
29950 SW 209 Ave., Homestead, FL 33030



Site Map: The John Lynn Pine Rockland is located in the southwest region of the Redland Agricultural Area and is across the street from the Pine Ridge Sanctuary owned by Terry and Barbara Glancy.

Species Benefited: The federally-listed Small's milkpea (*Galactia smallii*) is present at this site as well as the federal-candidate *Sideroxylon reclinatum* subsp. *austrofloridense*. It is habitat for the federal-candidate plants *Brickellia mosieri* and *Argythamnia blodgettii*, and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 2.1

Site Description: This is a 4.5-acre privately owned residential home a small pine rockland fragment remaining at the southwest end. The perimeter of the pine rockland is dominated by a border of Brazilian-pepper (*Schinus terebinthifolius*), woman's tongue (*Albizia lebbeck*) and Burmareed (*Neyraudia reynaudiana*) which is encroaching on the more open center where native species persist. The best habitat is toward the center of the pineland, and especially near the south end, where conditions are more open and a fair amount of rocky substrate exposed.

Pre-ARRA Treatment: Exotics in this site have been treated through IRC's Pine Rockland Initiative since 2005, with funding from the USFWS Partners and Private Stewardship Grants Programs. These ongoing efforts have more or less stabilized the remaining pine rockland.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species under the ARRA in March 2010 (See table below). Because of the extremely dense exotics around the perimeter of the site the focus was placed on treating the interior of the pine rockland here. Treatment of the remaining exotics will require the use of heavy machinery, something that was not feasible under the ARRA grant.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar and Cut Stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Jasmine	*Jasminum fluminense* and *J. dichotomum*	Cut Stump/Hand-pull	Garlon 4 20%
Bishopwood	*Bischofia javanica*	Cut Stump, Hand-pull	Garlon 4 20%
Queensland Umbrella	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Governor's plum	*Flacourtia indica*	Cut Stump	Garlon 4 20%
Earleaf acacia	*Acacia auriculiformis*	Cut Stump	Garlon 4 20%
Lantana	*Lantana camara*	Cut-Stump	Garlon 4 20%
Natalgrass	*Melinis repens*	Foliar	Glyphosate 3%
Rosary pea	*Abrus precatorius*	Cut stump, hand pull	Garlon 4 20%
Napier grass	*Pennisetum purpureum*	Foliar	Glyphosate 3%

Photos:

Some of the better quality pine rockland at Lynn's site was found in the center of the pineland.

IRC habitat restoration crew cut Burmareed (*Neyraudia reynaudiana*) with brush-cutters**.**

John and Kris Whelan Pine Rockland

Owners: John and Kris Whelan
22601 SW 152 Ave., Miami, FL 33170

Site Map: The John and Kris Whelan Pine Rockland is located along Silver Palm Drive in the Redland Agricultural Area of Miami-Dade County.

Species Benefited: Seventeen state listed plants are present on the site. It is habitat for two Federal candidate plants (*Argythamnia blodgettii* and *Linum arenicola*), and for three federal candidate animals (Florida leafwing butterfly, Bartram's hairstreak, and rim rock crowned snake).

Acres Treated Under ARRA: 4.5

Site Description: The John and Kris Whelan Pine Rockland is located on a privately owned residential property in the heart of the Redland Agricultural Area of Miami Dade County. A house lies in the center of the lot, surrounded by pine rockland. It is bordered by an avocado orchard to the east, a gravel road to the west, a nursery to the north, and private residences across a county road to the south. Prior to the initiation of management by the current owner, the site contained a very dense overstory and understory of native hardwoods; but now the site now has a much more open canopy in most areas. Much leaf litter and woody debris remain on the ground, covering the limestone substrate. The diversity of native grasses and herbs is relatively low because of a layer or organic material.

Pre-ARRA Management: The owner has thinned out native hardwoods, treated exotic pest plants, and maintained firebreaks on the property. The owner has also planted slash pines throughout the site in an attempt to re-establish a pine canopy. In addition, IRC began management with USFWS funding from the Partners for Fish and Wildlife Program in April 2009, conducting exotic plant control on a portion of the property.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species under the ARRA in March 2010 and has carried out several follow-up treatments (See table below). The landowner has been active in trying to coordinate a prescribed fire at the site through the Division of Forestry but one has not been carried out. The landowners are very active working in to maintain their pine rockland, and they have been very active in IRC pine rockland landowner workshops and events. Once this site undergoes a prescribed fire it will be in a much more feasible management phase.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut-stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut-stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut-stump	Garlon 4 30%
Jasmine	*Jasminum fluminense* and *J. dichotomum*	Cut-stump	Garlon 4 20%
Bishopwood	*Bischofia javanica*	Cut-stump	Garlon 4 20%
Queensland Umbrella	*Schefflera actinophylla*	Cut-stump	Garlon 4 20%
Leadtree	*Leucaena leucocephala*	Cut-stump	Garlon 4 30%
Bowstring hemp	*Sansevieria hyacinthoides*	Hand-pulled and bagged	Garlon 4 20%
Lantana	*Lantana camara*	Cut-stump	Garlon 4 20%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Natalgrass	*Melinis repens*	Foliar spray	Glyphosate 3%
Rosary pea	*Abrus precatorius*	Cut Stump, Hand-pull	Garlon 4 20%
Mother of millions	*Kalanchoe xhoughtonii*	Hand-pull	N/A
Itch grass	***Rottboellia cochinchinensis***	Foliar spray	Glyphosate 3%
Molasses grass	*Melinis minutiflora*	Foliar spray	Glyphosate 3%
Castor bean	*Ricinus communis*	Cut-stump	Garlon 4 20%
Surinam cherry	*Eugenia uniflora*	Cut-stump	Garlon 4 20%
Australian pine	*Casuarina equisetifolia*	Cut-stump	Garlon 4 20%
Red sandalwood	*Asparagus aethiopicus*	Cut-stump	Garlon 4 20%
Shoebutton Ardisia	*Ardisia elliptica*	Cut-stump	Garlon 4 20%
Governor's plum	*Flacourtia indica*	Cut-stump	Garlon 4 20%
Sisal hemp	*Agave sisalana*	Cut-stump	Garlon 4 20%
Oyster plant	*Tradescantia spathacea*	Cut-stump	Garlon 4 20%
Earleaf acacia	*Acacia auriculiformis*	Cut-stump	Garlon 4 20%
Guinea grass	*Panicum maximum*	Foliar spray	Glyphosate 3%
Air potato	*Dioscorea bulbifera*	Hand pull	N/A
Napier grass	*Pennisetum purpureum*	Foliar spray	Glyphosate 3%

Photos:

The landowner (John Whelan, center) show's representatives of IRC and USFWS the results of habitat restoration work in his pineland. A young *Neyraudia* plant occupies the center of the

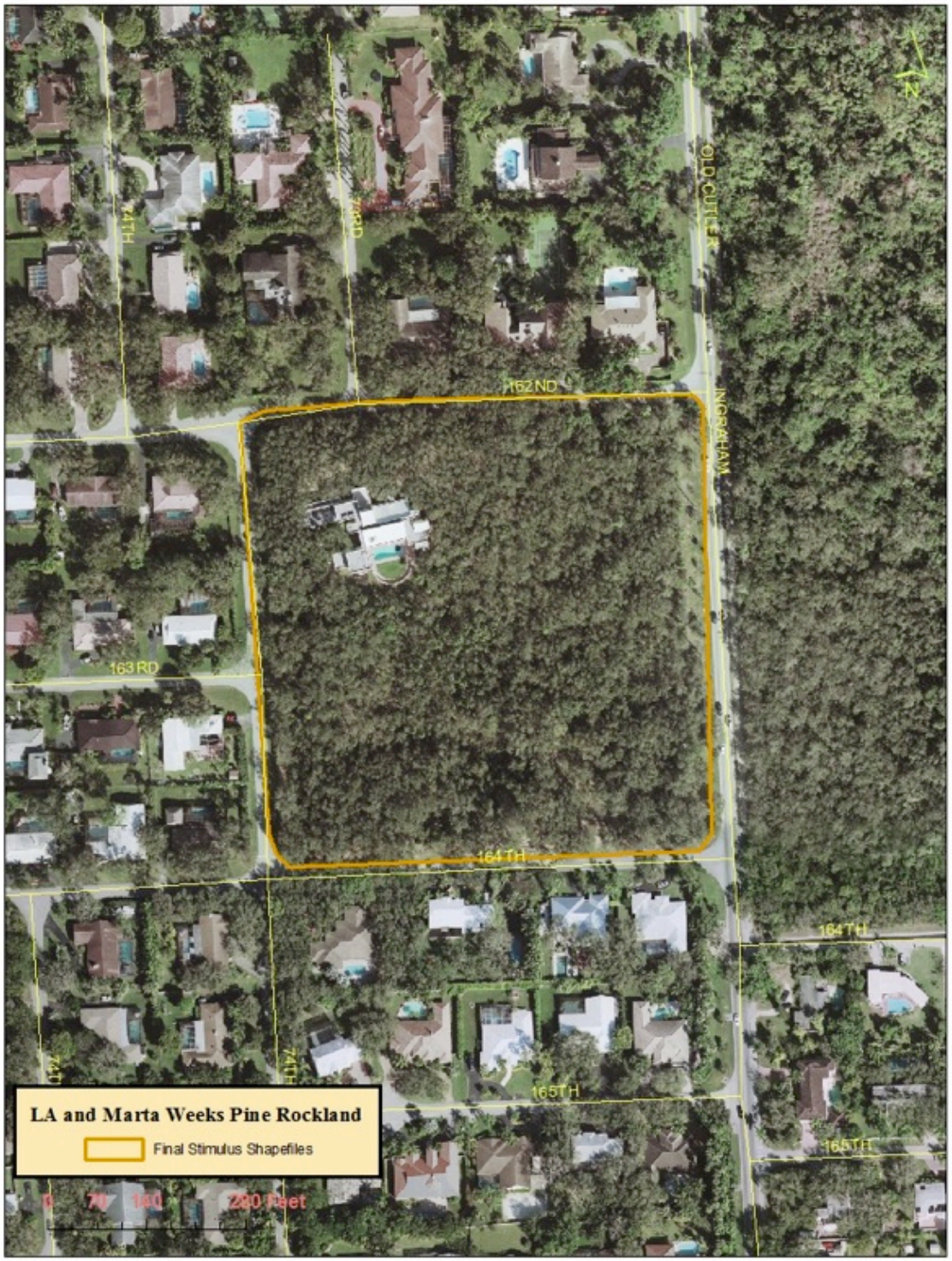
clearing they are looking at, but dozens of flowering or fruiting *Neyraudia* stems would have been visible in this scene just a year earlier.

This large native *Ficus aurea* (as well as several other hammock species) was killed to reduce shade and production of organic soil in the pine rockland.

While showing off young pines he has planted, landowner John Whelan inquired about a few seedlings showing symptoms that resemble chlorosis (yellowing needles).

LA and Marta Weeks Pine Rockland

Owner: LA and Marta Weeks
7350 SW 162 St., Miami, FL 33157



Site Map: The Weeks pine rockland is located across the street from the Deering Estate's pine rocklands and rockland hammocks that are well managed by a full-time stewardship team.

Species Benefited: Fourteen state-listed plants are present on the site. It is habitat for two federal candidate plants (*Linum arenicola* and *Linum carteri*), and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 9.6

Site Description: The Weeks pine rockland is directly across the street from the Miami-Dade County park site The Charles Deering Estate. The site is succeeding to hardwood hammock because of many years of fire suppression and seed rain from the rockland hammock across the street. The canopy is dominated by live oaks, with some pre and post-Hurricane Andrew South Florida slash pine (*Pinus elliottii* var. *densa*) and other hardwoods such as *Bursera simaruba* (gumbo limbo), *Lysiloma latisiliquum* (wild tamarind), and swamp bay (*Persea palustris*). There are some scattered, open, sandy areas within the pineland that have patches of *Opuntia humifusa* and *Rhynchospora grayi*, as well as other pineland herbs and grasses. There are small invasions of exotic plants such as *Schinus terebinthifolius, Leucaena leucocephala, Neyraudia reynaudiana,* and *Nephrolepis* spp.

Pre-ARRA Management: Prior to IRC management, the Weeks pine rockland had some previous exotic removal efforts. Evidence of cut, but non-chemically treated leadtree is evident throughout the site where plants have been cut but re-sprouted. In addition, the Weeks have been active in picking up trash illegally dumped on their pineland.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species under the ARRA in August 2011 and has conducted one follow up treatment (see table below). The Weeks Pine Rockland is now largely in a feasible management phase but will most likely transition to hammock with lack of fire.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Asian Sword Fern	*Nephrolepis multiflora*	Foliar	Glyphosate 3%
Oyster plant	*Tradescantia spathacea*	Hand-pull	N/A
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Guinea grass	*Panicum maximum*	Foliar	Glyphosate 3%
St. Augustine grass	*Stenotaphrum secundatum*	Foliar	Glyphosate 3%

Photos:

Marta Weeks met with IRC restoration crew members before they got started in the pineland.

La Ultima Cosecha Pine Rockland

(Historic 1958 Coral Rock Chapel Pine Rockland)

Owner: Centro Christiano Internacional

12425 SW 224th Street, Goulds, FL 33170

Site Map: Site Map: La Ultima Cosecha Pine Rockland is connected to the Tropical Audubon Society's Porter Russell Pine Rockland, located in a residential neighborhood in Goulds, just west of US Highway 1.

Species Benefited: This site shares a 335 foot-long boundary Tropical Audubon Society's Porter Russell Pine Rockland. Nothing but a chain link separates this site from Porter Russell's populations of the federal candidate plant *Brickellia mosieri* and 14 state-listed plants. Also, like Porter-Russell Pine Rockland, this site is the correct habitat for three federally-listed plants (*Argythamnia blodgettii*, *Chamaesyce deltoidea* subsp. *adhaerens*, and *Linum arenicola*), and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake). *Chamaesyce deltoidea* subsp. *adhaerens* used to occur at the Porter-Russell Preserve and suitable habitat exists for it on this property.

Acres Treated Under ARRA: 0.8

Site Description: Most of this property is managed for the church, its parish and related activities. However, pine rockland habitat remains along the north margin, retaining many pine rockland species and is contiguous with the much larger Tropical Audubon Society's Porter-Russell Pine Rockland. This site was formerly cleared, and except for a very narrow band along the north side, it is still mostly devoid of native shrubs. However, it still has pines and a rich understory of native grasses and herbs. The church itself is a center for community activities: meetings, picnics, and Sunday School classes. This creates an opportunity for environmental education and outreach that, combined with potentially good habitat for rare plants and the site's role as a buffer for the Porter-Russell Pine Rockland, weighed strongly in favor of inclusion in the Pine Rockland Initiative program. Piles of fill with some trash line the fence, especially near the northwest corner of the site. But approximately one-half acre retain natural value and its location, adjacent to a much larger preserve, make management of invasive species here that much more important. Large woman's tongue (*Albizia lebbeck*) are scattered across the site, with scores of seedlings hidden in shrubby areas. Small coppices of native and exotic hardwoods and scattered invasions of Brazilian-pepper (*Schinus terebinthifolius*), shoebutton ardisia (*Ardisia elliptica*), bowstring hemp (*Sansevieria hyacinthoides*), oyster plant (*Tradescantia spathacea*), leadtree (Leucaena leucocephala), Gold Coast jasmine (*Jasminum dichotomum*), napier grass (*Pennisetum purpureum)* Guinea grass (*Panicum maximum*), lantana (*Lantana camara*), sisal-hemp (*Agave sisalana*), cowitch (*Mucuna pruriens*), jaragua (*Hyparrhenia rufa*) and natal grass (*Melinis repens*) are prevalent.

Pre ARRA Treatment: This site received little or no management as a natural area. In fact, dumped piles of waste and fill along the fence line indicate the previous landowners had little regard for the site as a natural habitat. Representatives of the new ownership (since 2006), the Pastors seemed excited to learn that there was something special about the site. Also, the County Archeologist has an informal interest in the site, and expressed concerns about our activities until he was assured that no excavation would be required to control the targeted invasive species.

Management Activities Completed: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species in the second quarter of the ARRA project and carried out several follow-up treatments (See table below). Treatment for exotic species

combined pine rockland fragment to a feasible management phase. IRC plans to conduct retreatment under a USFWS Coastal grant to eliminate the existing exotic seed bank.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar Cut stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Lantana	*Lantana camara*	Cut Stump, Hand-pull	Garlon 4 20%
Natal grass	*Melinis repens*	Foliar, hand-pull/bag	Glyphosate 3%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Cowitch	*Mucuna pruriens*	Foliar	Glyphosate 3%
Jaragua	*Hyparrhenia rufa*	Foliar, Hand pull/bag	Glyphosate 3%
Napier grass	*Pennisetum purpureum*	Foliar Cut Stump	Glyphosate 3% Garlon 4 20%
Bowstring hemp	*Sansevieria hyacinthoides*	Cut Stump	Garlon 4 20%
Oyster plant	*Tradescantia spathacea*	Hand-pull/bag	N/A
Queensland umbrella tree	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%

Photos:

Shoebutton ardisia (*Ardisia elliptica*), was growing profusely along the border between La Ultima Cosecha Pine Rockland and the TAS Porter Russell Pine Rockland until the IRC habitat restoration team treated it.

Several sisal hemp plants (*Agave sisalana)* were treated along the border of the two pine rockland fragments.

Larry and Gloria Dunagan Rockland

Owner: Larry and Gloria Dunagan
14975 SW 232 ST Miami, FL 3310

Site Map: The Larry and Gloria Dunagan Pine Rockland is geographically connected to two other privately owned residential pine rockland fragments located in the Redland Agricultural Area of Miami-Dade County.

Species Benefited: There are at least 15 state listed species present on this site. It is habitat for the candidate plant *Argythamnia blodgettii* and three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 3.5

Site Description: The Dunagan family owns several properties in the Redland Agricultural Area and has been a part of the local agricultural community for generations. They are well known locally as the last pole bean farmers in Miami-Dade County. The Dunagan and Case properties located on Silver Palm Drive are connected geographically, and their families are related also. Both parties have a strong interest in preserving their pinelands for future generations. After Hurricane Andrew the Dunagan and Case pine rockland fragments lost all south Florida slash pine (*Pinus elliottii* var. *densa*), which did not regenerate. Loss of habitat for pine rockland species on this fragment is due mainly to fire suppression and hard wood succession. Together the Case and Dunagan fragments make up 24.6 acres of pine rockland habitat.

Pre-ARRA Management: Prior to IRC involvement, the Dunagan pine rocklands have not been actively managed for invasive species. There have not been any recorded occurrences of prescribed or wild fires on this pine rockland.

ARRA Management Activities: During the last quarter, IRC's habitat restoration team returned to the Silver Palm Drive pine rocklands to start treatment of the first Dunagan pine rockland fragment (We treated the Case pine rocklands in a previous quarter. Primary exotic plant control included the treatment of invasive hardwoods such as Brazilian-pepper and vines such as Gold Coast jasmine.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar	Glyphosate 3%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Air potato	*Dioscorea bulbifera*	Hand-pulled/potatoes bagged	N/A

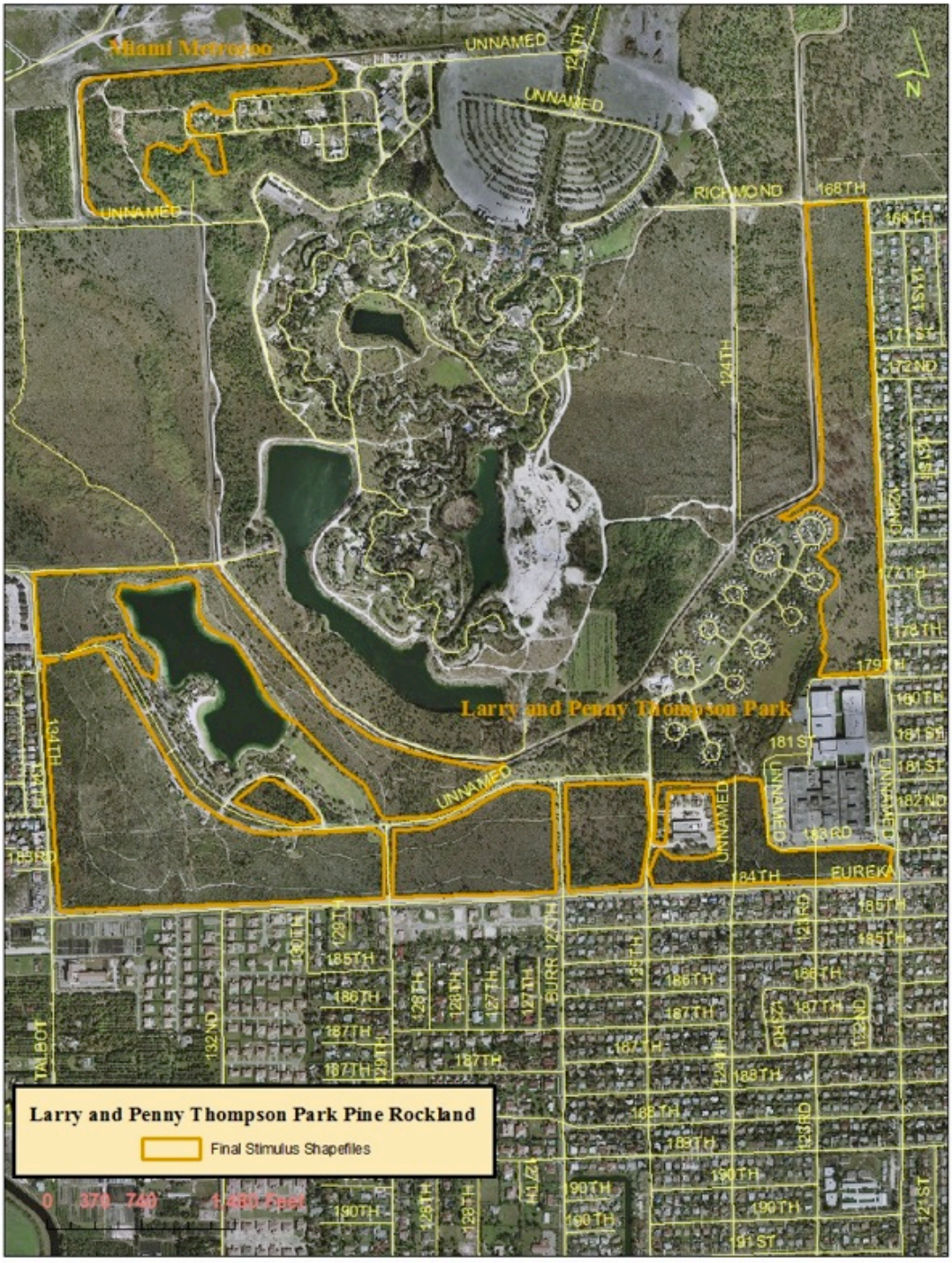
Photos:

The Dunagan pineland is succeeding to rockland hammock; Gumbo limbo (*Bursera simaruba*), wild tamarind (*Lysiloma latisiliquum*) and Florida silver palm (*Coccothrinax argentata*) are abundant at this site.

State endangered and rare Mexican Alvaradoa (*Alvaradoa amorphoides*) is present on this site.

Larry and Penny Thompson Park Pine Rockland

Owner: Miami-Dade County
Managed by Miami-Dade Parks and Recreation Department



Site Map: The Larry and Penny Thompson Park Pine Rockland is located along Eureka Drive in southwest Miami-Dade County and is part of the Richmond Complex Pine Rocklands.

Species Benefited: At least forty-seven state-listed plants are present on the site as well as the federally endangered plant *Chamaesyce deltoidea* subsp. *deltoidea* and, the candidate plant *Brickellia mosieri.* It is habitat for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake), the latter two of which have been found at the adjacent Miami Metrozoo.

Acres Treated Under ARRA: 188.5

Site Description: The Larry and Penny Thompson Park Pine Rockland is owned and managed by Miami-Dade County. The pineland is located on a large park property that is open to the public for recreation and camping. It is part of the largest contiguous pine rockland fragments remaining outside of Everglades National Park, the Richmond Pine Rocklands. Like many pine rocklands, this site lost most of its pine canopy during Hurricane Andrew. Tubelings of south Florida slash pine (*Pinus elliotti* var. densa) were planted and the downed trees were removed from the site to prevent beetle bark infestations. There are semi-frequent prescribed fires carried out by the Florida Division of Forestry and frequent wildfires. In addition to exotic plant invasions, there is a big problem with feral cats at this site. Since it is a public park, a common issue is people feeding the feral cats, which has resulted in a large feral cat colony. This site is in overall excellent condition with sparse infestations of Burmareed, Brazilian-pepper, woman's tongue, jaragua (*Hyparrhenia rufa*), leadtree, rosary pea (*Abrus precatorius*), Queensland umbrella tree (*Schefflera actinophylla*), earleaf acacia (*Acacia auriculiformis*), showy rattlebox (*Crotalaria spectabilis*), air-potato (*Dioscorea bulbifera)*, and lantana (*Lantana camara*).

Pre-ARRA Management: Prior to IRC management the Larry and Penny Thompson pine rocklands received management for exotic species. After hurricane Andrew this pineland was replanted with *Pinus elliottii* var. *densa* and has experienced both prescribed and wildfires. This pineland is in good condition and requires treatment of sparsely but evenly distributed exotics.

ARRA Management Activities: In December 2011 the IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species at the Larry and Penny Thompson Park Pine Rockland (See table below). This site is primarily in a feasible management phase. We have also treated several adjacent properties in the Richmond Pine Rocklands during the ARRA grant including the US Coast Guard, Miami Metrozoo, and NOAA. Together we have performed management on 310 acres of this critically important pine rockland complex

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut-stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut-stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut -stump	Garlon 4 30%
Leadtree	*Leucaena leucocephala*	Cut-stump, Hand-pulled	Garlon 4 30%
Jaragua	*Hyparrhenia rufa*	Hand-pulled and bagged	N/A
Rosary-pea	*Abrus precatorius*	Hand-pulled and bagged; also cut-stumped	Garlon 4 20%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Umbrella Tree	*Schefflera actinophylla*	Cut-stump	Garlon 4 20%
Rattlebox	*Crotalaria spectabilis*	Hand-pulled and bagged, Cut Stump	Garlon 4 20%
Air Potato	*Dioscorea bulbifera*	Cut-stump, Hand-pulled and bagged	Garlon 4 20%
Itch grass	*Rottboellia cochinchinensis*	Foliar	Glyphosate 3%
Guinea grass	*Panicum maximum*	Foliar	Glyphosate 3%
Napier grass	*Pennisetum purpureum*	Cut stump	Garlon 4 20%
Lantana	*Lantana camara*	Cut-stump	Garlon 4 20%
Scaevola	*Scaevola taccada*	Hand-pulled and bagged	N/A
Giant Reed	*Arundo donax*	Cut-stump	Garlon 4 20%
Earleaf Acacia	*Acacia auriculiformis*	Cut-stump	Garlon 4 20%

Photos:

The IRC habitatat restoration team bagged and properly disposed of jaragua (*Hyparrhenia rufa)* and rosary pea (*Abrus precatorius*).

Sparse infestations of Burmareed and Brazilian-pepper were scouted and treated by the IRC habitat restoration team throughout the Larry and Penny Thompson Pine Rockland

Med South Pine Rockland

Owner: Miami-Dade County
Managed by Miami-Dade Department of Parks and Recreation,
Division of Natural Areas Management, 22200 SW 137th Ave., Miami, FL 33170

Site Map: The Med South Pine Rockland is a small pine rockland fragment surrounded by private residences in southwest Miami-Dade County.

Species Benefited: Twelve state listed plants are present on the site. It is habitat for the Federal candidate plants *Brickellia mosieri* and *Argythamnia blodgettii*, and for three federal candidate animals (Florida leafwing butterfly, Bartram's hairstreak, and rim rock crowned snake).

Acres Treated Under ARRA: 4.5

Site Description: The 4.5 acres site is owned and managed by the Miami-Dade County Parks and Recreation Department. It contains pine rockland with varying widths and depths of fill forming a perimeter. At the north end, several very large strangler figs (*Ficus aurea*) replace the thin pine canopy and cast much heavier shade. Med South Park is in a residential area and separated from residential communities on the south, east and west sides by county roads. On the north side is a large, undeveloped property owned by the Miami-Dade County School Board containing heavy infestations of Napier grass (*Pennisetum purpureum*) and other exotics species. The interior of the site accounts for a third to half of the total area, and is in better condition. A dense layer of saw palmettos (*Serenoa repens*) has filled in under the sparse south Florida slash pines (*Pinus elliottii* var. *densa*). Many more pines were once present, as evidenced by the scores of tall snags killed by Hurricane Andrew. Several large strangler figs (*Ficus aurea*) dominate the northeast corner, putting heavier shade on approximately 5% of the park. Some native species have benefited from the absence of fire, to the detriment of pine rockland endemics. The nuisance natives include common vines such as grape (*Vitis* spp.), Virginia creeper (*Parthenocissus quinquefolia*), and green brier (*Smilax* spp.). Running oak (*Quercus pumila*) and winged sumac (*Rhus copallinum*) are also abundant. The large weedy sub-woody herb jack-in-the-bush (*Chromolaena odorata*) is also common in the pine rockland.

Pre-ARRA Management: Prior to 2007 the site was dominated by a dense margin of Brazilian-pepper, which was also invading into the interior of the pine rockland. Miami-Dade County Department of Parks and Recreation began initial management of this site by mechanically cutting and mulching large woody exotics, but no recent management of invasives has occurred. Currently, the margins of this site are in very poor condition, with disturbed substrate (often under fairly deep fill), dumped construction debris, and other waste.

ARRA Management Activities: The Med South Pine Rockland received initial treatment of FLEPPC Category I and II species under the ARRA by the IRC habitat restoration team in April 2010 and has received several follow-up treatments (See table below).

Invasive Treated	**Scientific Name**	**Treatment Method**	**Herbicide Used**
Burmareed	*Neyraudia reynaudiana*	Foliar and Cut Stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Jasmine	*Jasminum fluminense* and *J. dichotomum*	Cut Stump/Hand-pull	Garlon 4 20%
Bishopwood	*Bischofia javanica*	Cut Stump, Hand-pull	Garlon 4 20%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Queensland Umbrella	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Earleaf acacia	*Acacia auriculiformis*	Cut Stump	Garlon 4 20%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Bowstring hemp	*Sansevieria hyacinthoides*	Cut-Stump	Garlon 4 20%
Lantana	*Lantana camara*	Cut-Stump	Garlon 4 20%
Natalgrass	*Melinis repens*	Foliar	Glyphosate 3%
Rosary pea	*Abrus precatorius*	Cut stump, hand pull	Garlon 4 20%
Air potato	*Dioscorea bulbifera*	Hand-pull/bagged	N/A
Itch grass	***Rottboellia cochinchinensis***	Foliar	Glyphosate 3%
Molasses grass	*Melinis minutiflora*	Foliar	Glyphosate 3%
Castor bean	*Ricinus communis*	Cut Stump	Garlon 4 20%
Napier grass	*Pennisetum purpureum*	Foliar	Glyphosate 3%

Photos:

Napier grass (*Pennisetum purpureum*) and Burmareed *(Neyraudia reynaudiana*) infestation at north end of the Med South Pine Rockland was brush-cut and foliar treated. Infestation in this area was 100% coverage and reached from the fence line to about 50 feet inward.

Natal grass (*Melinis repens*) has infested fill around the perimeter.

Miami Metrozoo Pine Rockland

Owner: Miami-Dade County
Managed by Miami-Dade Parks and Recreation Department

Site Map: The Miami Metrozoo Pine Rockland is part of the historic Richmond Pine Rockland complex in Miami-Dade County.

Species Benefited: The federally listed plants *Chamaesyce deltoidea* subsp. *deltoidea* and *Polygala smallii*, the federal candidate *Brickellia mosieri*, as well as 31 state listed plants are present on the site. The Federal candidate animals the Bartram's hairstreak and Rim Rock crowned snake have also been found on the site. It is also habitat for two federal candidate plants (*Argythamnia blodgettii* and *Linum arenicola*), and for the candidate Florida leafwing butterfly.

Acres Treated Under ARRA: 25.4

Site Description: The Miami Metrozoo property contains a large pine rockland fragment that is part of the historic Richmond Pine Rockland complex. Additional portions of the property are managed by the Miami-Dade County Department of Parks and Recreation, but the County had no funding for a portion of the site. The property is generally closed to the public and is separated from an adjacent federal prison by a moat and chain link fence. Unfortunately, the federal prison does not manage their pine rockland and has no future plan or intent to do so.

Pre-ARRA Management: There has been no management at this site since 2002, when Miami-Dade County conducted exotic plant control.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species under the ARRA in August 2010 and has provided several follow up treatments (See table below). Gaining access to this pine rockland is challenging, because zookeepers have strict rules about people and equipment around animal cages. We have also treated several adjacent properties in the Richmond Pine Rocklands during the ARRA grant including the US Coast Guard, Larry & Penny Thompson Park, and NOAA. Together we have performed management on 310 acres of this critically important pine rockland complex

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Air potato	*Dioscorea bulbifera*	Hand-pull and bag	N/A
Oyster plant	*Tradescantia spathacea*	Hand-pull and bag	N/A
Leadtree	*Leucaena leucocephala*	Cut Stump	Garlon 4 30%
Guinea grass	*Panicum maximum*	Foliar	Glyphosate 3%
St. Augustine grass	*Stenotaphrum secundatum*	Foliar	Glyphosate 3%

Photos:

Much of the Burmareed grass infestation has been treated, with occasional regrowth shown above.

The Montgomery Botanical Center Pine Rockland

Owner: The Montgomery Foundation, Inc.
11901 Old Cutler Road, Miami, FL 33156

Site Map: The Montgomery Botanical Center Pine Rockland is owned by a private botanical garden in the Cutler Bay section of Miami Dade County.

Species Benefited: The federal candidate plant *Linum carteri* var. *carteri,* and it is habitat for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 1.4

Site Description: The Montgomery Botanical Center's 4.1 acres of pine rocklands are made up of three separate fragments of this natural forest community: one fragment on Montgomery Drive (1.4 acres) and two within the botanical center's landscape off of Old Cutler Road (0.9 and 1.8 acres). The pine rockland fragment off of Montgomery Drive has a population of the federal candidate species *Linum carteri* var. *carteri,* and thus restoration activities took precedent on this site. All three fragments have populations of large, pre-Hurricane Andrew south Florida slash pine (*Pinus elliottii* var*. densa*)*,* a rich understory, and a somewhat diverse herbaceous layer in places. Fire suppression and invasion by exotic plants such as Burmareed (*Neyraudia reynaudiana*) and Sewer vine (*Paederia foetida*) are the main identifiable threats to these pine rockland fragments.

Pre-ARRA Management: Prior to IRC management, the Montgomery Botanical Center's pine rocklands experienced little to no previous exotic removal efforts by maintenance crews. The primary management activities carried out by the maintenance crew is picking up litter and mowing of the fire breaks. Previously attempts to coordinate a prescribed fire with the Florida Division of Forestry were made but were unsuccessful in implementation.

ARRA Management Activities: In August 2010 the IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species under the ARRA grant at the Montgomery Botanical Center's Montgomery Drive pine rockland fragment and have provided two follow up treatments (See table below). The team brush-cut the dense infestation of Burmareed (*Neyraudia reynaudiana*), cut-stump treated hardwood invaders such as Brazilian-pepper (*Schinus terebinthifolius*), woman's tongue (*Albizia lebbeck*), and horseflesh mahogany (*Lysiloma sabicu*), and poodle-cut a large infestation of sewer vine (*Paederia foetida*). They returned in September 2010 to foliar-treat the new growth of the sewer vine infestation and hand-pulled an infestation of Noyau vine (*Merremia dissecta*) encroaching on a population of the federal candidate species, *Linum carteri* var. *carteri*.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Sewer vine	*Paederia cruddasiana*	Poodle Cut and Foliar	Glyphosate 3%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Asian sword fern	*Nephrolepis multiflora*	Foliar	Glyphosate 3%
Oyster plant	*Tradescantia spathacea*	Hand-pull and bag	N/A

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Natal Grass	*Melinis repens*	Hand-pull and bag	N/A
Umbrella tree	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Horseflesh mahogany	*Lysiloma sabicu*	Cut Stump	Garlon 4 20%
Noyau vine	*Merremia dissecta*	Hand-pull	N/A

Photos:

Sewer vine (*Paederia cruddasiana*) infestation was poodle-cut by IRC restoration team; the living lower portion of the plant was foliar-treated.

IRC habitat restoration team brush-cut Burmareed (*Neyraudia reynaudiana*)

Montgomery Botanical Center's south Florida slash pine canopy, *Pinus elliottii* var. *densa* was mostly undisturbed by Hurricane Andrew

Federal candidate species *Linum carteri* var. *carteri,* which is endemic to Miami-Dade County, grows at Montgomery Botanical Center's Montgomery Drive pine rockland.

NOAA at Richmond Pine Rockland

Owner: National Oceanographic and Atmospheric Administration
13601 SW 176th St., Miami, FL 33170

Site Map: The NOAA at Richmond Pine Rockland is located on a historic NOAA radar site in the Richmond Pine Rockland complex in Miami-Dade County.

Species Benefited: The federally-listed plant *Chamaesyce deltoidea* subsp. *deltoidea* is present on the site. This site also contains habitat for the federal-candidate plants *Brickellia mosieri* and *Argythamnia blodgettii*, and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake), the latter two having been found adjacent to the site at Miami Metrozoo.

Acres Treated Under ARRA: 9.1

Site Description: The NOAA Radar site houses a large radar dome in a fence compound within a larger fenced compound. Within the inner fence the site is scarified and covered with limestone rock for ease of maintenance. Between the two fences there is approximately 9 acres of undeveloped pine rockland habitat connected geographically to 136 acres of pine rockland and other natural habitat owned and managed by Miami Dade County at their Martinez Pineland. The property is closed to the public and is separated by a chain link fence and canal from an adjacent federal prison pine rockland that was mechanically destroyed by the prison in the 1990's. The NOAA at Richmond Pine Rockland is in good condition due to occasional fires. The hardwood understory is sparse and the site has a diversity of native grasses and herbs. Generally, the pineland appears to be in very good condition, though seedlings and saplings of *Acacia*, *Albizia, Schinus*, and *Schefflera* are scattered throughout the site. More conspicuous are the mature *Neyraudia* scattered throughout even the site's best habitat.

Pre-ARRA Management: The National Park Service had previously conducted some exotic plant control on this property.

ARRA Management Activity: The NOAA at Richmond Pine Rockland received initial treatment for FLEPPC Category I and II species by the IRC habitat restoration team under the ARRA in September 2010 and has received several follow up treatments (see table below). This pine rockland is mainly in a feasible management phase requiring retreatment of the invasive seed bank. We have also treated several adjacent properties in the Richmond Pine Rocklands during the ARRA grant including the US Coast Guard, Miami Metrozoo, and Larry & Penny Thompson Park. Together we have performed management on 310 acres of this critically important pine rockland complex.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Natal Grass	*Melinis repens*	Hand-pull and bag	N/A
Umbrella tree	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Rosary pea	*Abrus precatorius*	Cut Stump	Garlon 4 20%

The NOAA at Richmond Pine Rockland has a rich diversity of shrubs, grasses, and herbs and is located adjacent to a NOAA radar station.

The NOAA at Richmond Pine Rockland is adjacent to a federal prison; which mechanically destroyed a pine rockland fragment that was situated directly on the other side of the above fence in the 1990's.

The NOAA at Richmond Pine Rockland perimeter along SW 137th Avenue is disturbed and has a higher persistence of invasive species reoccurring such as woman's tongue (*Albizia lebbeck*) and lantana (*Lantana camara*) shown here.

Paul and Judith Radice Pineland

Owner: Paul and Judith Radice
16375 SW 256 ST Homestead, FL 33031

Site Map: The Paul and Judith Radice Pine Rockland is located in the Redland Agricultural Area of Miami Dade County and is surrounded by agriculture, aquaculture, and private residences.

Species Benefited: Fourteen state-listed plants are present on the site. It is habitat for the federally listed plant *Chamaesyce deltoidea* subsp*. adhaerens*, and the candidate plants *Brickellia mosieri, Linum carteri* var. *carteri*, and *Linum arenicola.* It is also habitat for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 1.9

Site Description: The Paul and Judith Radice Pine Rockland is located on a 4.9-acre privately owned residence with an on-site aquaculture business in the Redland agricultural area of Miami Dade County. All of the original south Florida slash pine (*Pinus elliotti* var. *densa*) were killed in Hurricane Andrew except for one original adult. Over 200 pine tubelings have been planted in the pine rockland since Hurricane Andrew by the owner. The pine rockland has a rich understory dominated by woody shrubs such as saw palmetto (*Serenoa repens*), Florida silver palm (*Coccothrinax argentata*), West Indian-lilac (*Tetrazygia bicolor*), beautyberry (*Callicarpa americana*), buttonsage (*Lantana involucrata*), white indigoberry (*Randia aculeata*), locust berry (*Byrsonima lucida*) and winged sumac (*Rhus copallinum*). Native hardwoods such as oak (*Quercus* spp.) and poisonwood (*Metopium toxiferum*) and exotics have been thinned out by the Radices. This pine rockland is fire suppressed and the Radices are opposed to coordinating a prescribed fire.

Pre-ARRA Management: Prior to IRC's management, the Radice's have been very proactive in maintaining their pine rockland. They have a deep affection for their pine rockland and wish to maintain it as a healthy and diverse habitat. Their efforts have included removing invasive plants and thinning out encroaching hardwoods, as well as planting tubelings of south Florida slash pine (*Pinus elliotti* var. *densa*).

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species under the ARRA in May 2011 and have provided two follow up treatments (See table below). This pine rockland is in a feasible management phase for the actively involved pine rockland owners.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Natal grass	*Melinis repens*	Foliar	Glyphosate 3%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Tuberous sword fern	*Nephrolepis cordifolia*	Foliar	Glyphosate 3%

Photos:

The Paul and Judith Radice Pine Rockland is dominated by native shrubs and has a moderately dense pine canopy.

With no recent fire activity, this pineland has a thick layer of organic material overlaying the forest floor.

The forest floor of the Paul and Judith Radice Pine Rockland has a thick layer of pine litter which suppresses potential habitat for native grasses and herbs to grow.

Pine Ridge Sanctuary

Owner: Terry and Barbara Glancy
21100 SW 300th Street, Homestead, FL 33030

Site Map: The Pine Ridge Sanctuary is located in the southwest end of the Redlands agricultural area.

Species Benefited: The federally-listed *Galactia smallii* occurs here, as does the federal-candidate plant species *Chamaesyce deltoidea* subsp*. pinetorum* and *Sideroxylon reclinatum* subsp*. austrofloridense.* There are also 26 state-listed plants present on the site. It is habitat for the federal-candidate plants *Brickellia mosieri* and *Argythamnia blodgettii*, and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 14.0

Site Description: This site is in excellent condition due to the landowners' efforts since 1976 to restore the habitat to its natural condition. Limestone is exposed throughout the site, and leaf litter is conspicuous only by its absence, results of the frequent use of prescribed fire. Low saw palmetto (*Serenoa repens*) is the dominant understory; most of it is below knee-height. Also conspicuous is the abundance of silver palm (*Coccothrinax argentata*). Small solution holes are scattered across the site, often marked by a small thicket of slightly taller shrubs benefiting from a little extra moisture and soil.

Pre-ARRA Treatment: The landowners were among the very first in Miami-Dade County to incorporate prescribed fire into a habitat restoration plan for a privately owned site, working closely with the Florida Division of Forestry, the County's Department of Environmental Resource Management, and The Nature Conservancy to learn and to share their own knowledge. They have received assistance managing this site from various federal, state, and private partners. Of course, the State Division of Forestry is very involved when they conduct their burns (12 prescribed fires since 1976, the most recent in November 2011).

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment for FLEPPC Category I and II species in June 2010 and has received follow-up treatments in 2010 and 2011 (See table below). Population densities of exotic species treated were very low, and since the site has been well maintained by the landowners, most plants IRC treated were immature seedlings, except for mature infestations of cardboard palm (*Zamia furfuracea*), a thicket of Governor's plum (*Flacourtia indica)* and two species of jasmine (*Jasminum fluminense* and *J. dichotomum*) occurring on the southeast corner of the pineland. There have been frequent prescribed fires conducted on this site by the Florida Division of Forestry. At the end of the last quarter the Glancy's were awarded the 2011 Florida Land Steward award by the University of Florida for their 35 years of dedicated management of their pine rockland. IRC and several partnering agencies worked with the Glancy's to put on a stewardship tour of their pine rockland for pine rockland owners and land managers to attend and learn more about pine rockland habitat management. Approximately 50 people attended and listened to presentations put on by IRC, Florida Division of Forestry, USDA NRCS, Florida Fish and Wildlife Conservation Commission and Miami-Dade County Department of Environmental Resource Management.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar and Cut Stump	Glyphosate 3% Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Rosary pea	*Abrus precatorius*	Cut Stump, Hand-pull	Garlon 4 20%
Queensland Umbrella	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Natal grass	*Melinis repens*	Foliar	Glyphosate 3%
Cardboard palm	*Zamia furfuracea*	Cut-Stump	Garlon 4 20%
Jasmine	*Jasminum fluminense* and *dichotomum*	Cut-Stump	Garlon 4 20%
Governor's plum	*Flacourtia indica*	Cut-Stump	Garlon 4 20%

Photos:

This site was unquestionably in better condition than any other pine rockland the team has visited, the result of active stewardship since 1976 by very dedicated landowners.

Man-in-the-ground (*Ipomoea microdactyla*), a rare, state-listed endangered species.


To minimize soil disturbance caused by uprooting exotics, and to prevent non-target damage that can occur due to over-spray or volatilization of some herbicides, the preferred control method for many plants is to cut the stem and immediately apply a solution of herbicide to the cut surface.

Common nighthawks were found nesting at Pine Ridge Sanctuary


The IRC Pine Rockland Initiative Program Coordinator, Sarah Martin giving a presentation to land owners and land managers about pine rockland management, invasive species and treatment methods at the Southeast Florida Land Stewardship Tour Pine Ridge Sanctuary.

Landowners and managers listen to presentations at Southeast Florida Stewardship Tour at Pine Ridge Sanctuary by IRC and partnering agencies including Miami-Dade County Department of Ernvironmental Resource Management, Florida Division of Forestry, USDA's NRCS and Florida Fish and Wildlife Conservation Commission.

Ricardo and Yania Paez Pine Rockland

Owner: Ricardo and Yania Paez
15755 SW 188 ST Miami, FL 33187

Site Map: The Ricardo and Yania Paez Pine Rockland is connected to neighboring pine rockland fragments to the west (Shields), north and west (Kern pineland) in the Redland Agricultural Area of Miami Dade County.

Species Benefited: There are at least five state listed species present on this site. It is habitat for the listed *Chamaesyce deltoidea* subsp. *adhaerens,* as well as the candidate plant species *Linum arenicola* and *Brickellia mosieri,* and is habitat for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: **1.6**

Site Description: The Ricardo and Yania Paez Pine Rockland is on a privately owned residential property that entered the Pine Rockland Initiative program during the last quarter of the ARRA project. The bulk of the initial treatment for exotic plants occurred in that quarter. IRC approached the property owner in July 2011, Mr. Ricardo Paez, whose family has only recently moved there. Mr. Paez is just beginning to learn about the pineland. He is a school teacher and he and his wife have small children; they hope to maintain the pineland as a healthy forest for theirs and future generations. The pineland is invaded primarily by exotic plants such as Brazilian-pepper (*Schinus terebinthifolius),* Burmareed (*Neyraudia reynaudiana*), Queensland umbrella tree (*Schefflera actinophylla*) and woman's-tongue (*Albizia lebbeck*); but is also being overgrown by native hardwoods and vines such as oak (*Quercus* spp.) and muscadine grapevine (*Vitis rotundifolia*) primarily occurring around the perimeter of the pine rockland. These weedy borders are shared with neighboring properties to the north and west, and the hope is that eventually the owners of the neighboring properties will remove their exotic borders to eliminate the exotic seed source. In the interior of the pine rockland there are open sandy pockets where native shrubs, grasses and herbs are present. The pine rockland is in need of a prescribed fire to maintain the openness occurring in the interior of the pineland.

Pre-ARRA Management: Prior to IRC involvement the Paez pineland has not been actively managed. The pineland has experienced wildfire events in the past but not recently.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species in September 2011 and provided one follow up treatment. IRC plans to provide more follow up treatment of the exotic seed bank through a USFWS Coastal Partners grant in 2012. IRC has also treated the neighboring Winston Shields Pine Rockland (who owns three other pine rockland fragments in the area totaling 25 acres that IRC hopes to be able to treat in the future) under the ARRA grant, the two combined totaling 2.2 acres of restored pine rockland.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar	Glyphosate 3%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Lantana	*Lantana camara*	Cut Stump, Hand-pull	Garlon 4 20%
Natal Grass	*Melinis repens*	Foliar	Glyphosate 3%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%

Photos:

The Paez pine rockland has many natives, but is being crowded out by Brazilian-pepper (*Schinus terebinthifolius*).

The Paez pine rockland being invaded by native (*Quercus* spp.) and exotic (*Schinus terebinthifolius, Albizia lebbeck*) hardwoods and native muscadine grape vine (*Vitis rotundifolia*) as well as scattered Burmareed (*Neyraudia reynaudiana*).

Robert Parsons Pine Rockland

Owner: Robert Parsons
9960 SW 37 St., Miami, FL 33165

Site Map: The Robert Parsons Pine Rockland is located in the Princeton section of southwest Miami Dade County in a primarily low-density residential neighborhood mixed with agriculture.

Species Benefited: There are at least 16 state listed species present on this site, including the very rare orchid *Eltroplectris calcarata.* It is habitat for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 2.1

Site Description: This pine rockland entered the Pine Rockland Initiative Program during Quarter 8 of the project. The site is quite overgrown throughout, and is being invaded heavily by *Schinus terebinthifolius*. Diversity in the herb layer is not very high in most areas. Disturbance of the substrate is evident mostly around the edges, as well as an old trail running east-west trough center of site. The west edge has heavy exotic cover and was not mapped, although restoration activities in such areas should be carefully laid out due to the presence of state endangered *Eltroplectris calcarata* in *Schinus* dominated areas on this site. In addition to exotic plant invasions, this site has suffered greatly from illegal dumping and homeless camping, primarily along the perimeter. There are 16 state listed species so introduction of management activities is critical. It is adjacent to four other privately owned pine rockland fragments, the Elly Trout Pine Rockland and IRC George Avery Pine Rockland. The lot is connected geographically and ecologically to a 2.25-acre parcel of pine rockland to the south, which is owned and also left unmanaged by a church. IRC plans to remove exotic vegetation and introduce management activities to Mr. Parsons as well as the churches' pine rocklands because they are adjacent to IRC's George Avery Pine Rockland Preserve as well as two well-managed privately owned pine rocklands. Treating the entire natural forest community in this neighborhood would expand the ecological corridor and drastically reduce the seed source for exotic plant invasions within the healthier pine rocklands. This site, in addition to having a severe invasion by exotic species and problem with constant illegal dumping, is extremely fire suppressed and in need of a regular prescribed fire regime.

Pre-ARRA Management: Prior to IRC's restoration activities this site has no known management history. It has been owned by Mr. Parsons since 1973 and it has remained an unmanaged lot. Mr. Parsons visits the site every Monday and picks up trash.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species under the ARRA in September 2011 and have provided several follow up treatments (See table below). This pine rockland is not at a feasible management phase. IRC plans to continue treating the site under a USFWS Coastal and Partners program grants.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar	Glyphosate 3%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Lantana	*Lantana camara*	Cut Stump, Hand-pull	Garlon 4 20%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Guinea grass	*Panicum maximum*	Foliar	Glyphosate 3%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%

Photos:

Illegal dumping is a severe problem along the perimeter of the Robert Parsons Pine Rockland.

Homeless camps have contributed to the degradation of the Robert Parsons Pine Rockland.

Ron Ehmann Park Pine Rockland

Owner: Miami-Dade County
Managed by Miami-Dade Parks and Recreation Department

Site Map: Ron Ehmann Park is located in the Killian area of Miami-Dade County. It is surrounded by dense residential housing and a school.

Species Benefited: The federally listed plant *Chamaesyce deltoidea* subsp. *deltoidea*, the federal candidate *Brickellia mosieri*, as well as 14 state listed plants are present on the site. It is habitat for one federally listed plant (*Polygala smallii*), and two federal candidate plants (*Argythamnia blodgettii* and *Linum arenicola*), and for three federal candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rim rock crowned snake).

Acres Treated Under ARRA: 7.8

Site Description: This 20-acre site is managed by the Miami-Dade County Parks and Recreation Department. It contains 8 acres of pine Rockland. Much of the site is developed as turf sports fields and paved courts for tennis and basketball. The property is in a residential area and is separated from residential communities on three sides by county roads, and to its north is parking for Miami Killian Senior High School. Pine rockland habitat quality is variable on the site. The largest pine rockland area, the southern unit, is in good condition, although in the past several years hardwoods and palms are becoming too dense, although good populations of native grasses and herbs remain. The northern blocks are more fire suppressed and have overly dense pine canopies, with reduced understory diversity. The interior of the property has sparse populations of *Neyraudia* with somewhat denser populations of *Neyraudia* toward the margins of the park. Another exotic grass, jaragua (*Hyparrhenia rufa*), is also establishing along margins at the south side of the park. Generally the pineland appears to be in good condition, though closer examination reveals patches of the saw palmetto (*Serenoa repens*) understory have been invaded by two exotic sword ferns (*Nephrolepis brownii* and *N. cordifolia*). Outliers of *Acacia*, *Albizia, Schinus*, and *Schefflera* are scattered throughout the park and a number of other listed invasive species are present though less abundant. Worth noting, natal grass (*Melinis repens*) is common along margins and trails, though it appears to have a less significant impact on native species and ecosystem processes than the species mentioned earlier. There was a wildfire at the Ron Ehmann Park Pine Rockland in June 2011 that proved very beneficial to the pine rockland habitat by eliminating heavy fuel loads.

Pre-ARRA Management: In the past Miami-Dade County crews have treated exotic pest plants and native hardwoods, but this has not occurred in recent years.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species in the first quarter of the ARRA project and carried out several follow-up treatments (See table below). Treatment for exotic species combined with the effects of a wildfire in June 2011 have brought this pine rockland to a feasible management phase. IRC plans to conduct retreatment under a USFWS Coastal Grant to eliminate the existing exotic seed bank.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Natal grass	*Melinis repens*	Foliar	Glyphosate 3%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Rattlebox	*Crotalaria spectabilis*	Hand pull, bag	N/A
Yellow alder	*Turnera ulmifolia*	Cut stump	Garlon 4 20%
Jaragua	*Hyparrhenia rufa*	Foliar Hand-pull/bag	Glyphosate 3%
Oyster plant	*Tradescantia spathacea*	Hand-pull, bagged	N/A

Photos:

Shrub layer dominated by saw palmetto (*Serenoa repens*) before the wildfire in June 2011.

The Ron Ehmann Park Pine Rockland at Ronald Ehmann Park has interpretive signage for the public who visit.

Seminole Wayside Park Pine Rockland

Owner: Miami-Dade County
22200 SW 137th Avenue, Miami FL 33170

Site Map: The Seminole Wayside Park Pine Rockland is located in southwest Miami Dade County just east of US Highway 1 surrounded primarily by a residential neighborhood.

Species Benefited: The federally listed plant *Galactia smallii,* the federal candidate plants *Brickellia mosieri* and *Chamaesyce deltoidea* subsp. *adhaerens,* as well as 28 state listed plants are present on the site. It is habitat for three federal candidate plants (*Argythamnia blodgettii, Brickellia mosieri,* and *Linum arenicola*), and for three federal candidate animals (Florida leafwing butterfly, Bartram's hairstreak, and rim rock crowned snake).

Acres Treated Under ARRA: 14.7

Site Description: The site contains 24.4 acres, a majority of it classified as pine rockland. It is bordered by residential communities to the east and south, and commercial development and the US 1 right-of-way to the west and north. The pine rockland on the site is quite variable due to differences in fire history and human disturbance. Large areas, particularly in the south, contain good quality pine rockland due to frequent fires. They have low palm and hardwood cover, and high diversity of native grasses and herbs. It is in these areas where listed species such as *Galactia smallii* are most common. Other areas have not had frequent fires, and hardwood and palm cover has increased, resulting in a decrease in native grass and herb diversity and cover. Other areas were mechanically disturbed decades ago. They were colonies by native hardwood species, especially *Lysiloma latisiliquum*, resulting in a dense canopy of hardwoods and poor habitat for listed plant species. Much of the perimeter of the natural area contains dense colonies of exotic plants on disturbed soils. On the west side of the park, the natural area encircles an open and mowed park. The boundary with this clearing is heavily infested with Brazilian-pepper (*Schinus terebinthifolius*), Burmareed (*Neyraudia reynaudiana*), and jasmine vines (*Jasminum dichotomum* and *J. fluminense*). Woman's tongue (*Albizia lebbeck*), earleaf acacia (*Acacia auriculiformis*) and Queensland-umbrella tree (*Schefflera actinophylla*) are also common here. All of these species are also dispersed throughout the pine rockland along with smaller numbers of white-cedar (*Tabebuia heterophylla*).

Pre-ARRA Management: Management was conducted prior to the ARRA project by Miami-Dade Recreation and Parks Division of Natural Areas Management, and included control of invasive species as well as the thinning of some native hardwoods. No exotic plant control was conducted in the year preceding this project.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species in the first quarter of the ARRA project and carried out several follow-up treatments (See table below). Treatment for exotic species combined with the effects of frequent wildfire have brought this pine rockland close to a feasible management phase. IRC plans to conduct retreatment under a USFWS Coastal grant to eliminate the existing exotic seed bank.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Natal grass	*Melinis repens*	Foliar	Glyphosate 3%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Queensland umbrella tree	*Schefflera actinophylla*	Cut stump	Garlon 4 20%
White-cedar	*Tabebuia heterophylla*	Cut stump	Garlon 4 20%
Jaragua	*Hyparrhenia rufa*	Foliar Hand-pull/bag	Glyphosate 3%
Jasmine	*Jasminum fluminense* and *J. dichotomum*	Cut stump Hand-pull, bagged	Garlon 4 20% N/A

Photos:

Some of the interior of Seminole Wayside Park's pineland is relatively free of exotic infestations, though margins are heavily infested.

The Seminole Wayside Park Pine Rockland is frequently inhabited by homeless who leave behind litter, damage vegetation and accidentally set fires.

Todd and Diane Lary Pine Rockland

Owner: Todd and Diane Lary
14870 SW 238 St., Homestead, FL 33032

Site Map: The Lary Pine Rockland is connected with several other small, privately owned residential pine rockland fragments in the Redland Agricultural Area of Miami Dade County.

Species Benefited: There are at least 19 state listed species present on this site as well as the federally endangered Small's Milkpea, *Galactia smallii,* and is habitat for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 4.4

Site Description: The Todd and Diane Lary Pine Rockland is on a small, privately owned residential property in the Redland Agricultural Area. IRC approached the owners of this site in July 2011 and after talking with them it was evident that restoring the entire neighborhood's pine rocklands together would be possible due to the strong sense of community within the neighborhood. Treating the entire natural forest community in this neighborhood would expand the ecological corridor and greatly reduce the seed source for exotic plant invasions within the healthier pine rocklands. The pine rockland is in fairly good condition and is dominated by a diverse native shrub layer. The north end of the pine rockland is succeeding to hammock, while the south end is dominated by pine rockland species. There are two large solution holes at this site. The Larys have cleared trails around and through the pine rockland for accessibility. They have planted pine tubelings throughout the pine rockland as well. There are moderate infestations of exotic species throughout the property, which the Larys actively try to maintain.

Pre-ARRA Management: The Larys have been active in trying to maintain their pine rockland and as a result infestations of exotic species are only moderate. They have tried to coordinate a prescribed fire through Florida Division of Forestry, but one has not been implemented.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species in the first quarter of the ARRA project and carried out several follow-up treatments (See table below). One particularly important species was treated, *Solanum umbellatum*. This exotic species was only discovered in Florida in the last decade and I could become a problematic invader. The landowners alerted us to it's present. Because this was the third known infestation in the State, we made treating it a priority. IRC plans to conduct retreatment of the site under a USFWS Coastal grant to eliminate the existing exotic seed bank. During Quarter 8 IRC's Program Coordinator organized a neighborhood workshop for all the pine rockland owners in the neighborhood. The Lary's hosted this workshop at their home. The Program Coordinator was able to address the entire neighborhood in regards to habitat restoration and management goals, take the attendees on a tour of the Lary pine rockland to identify key native and exotic species and management concerns, as well as add six new pine rockland properties to the PRI program. At the workshop Arlene Samalion and John Whelan, whose pinelands have been treated under the ARRA talked with the group about the success on their properties.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar	Glyphosate 3%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Lantana	*Lantana camara*	Cut Stump, Hand-pull	Garlon 4 20%
Natal Grass	*Melinis repens*	Foliar	Glyphosate 3%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Potato tree relative	*Solanum umbellatum*	Cut Stump	Garlon 4 20%

Photos:

Several Miami-Dade College students came out and volunteered their time tackling invasive species with the IRC restoration team.

Miami-Dade student volunteers pull Gold coast jasmine vines, *Jasminum dichotomum,* from the Todd and Diane Lary Pine Rockland.

A newly discovered exotic, *Solanum umbellatum,* found only in two other locations in North America growing in the wild by IRC Assistant Director Keith Bradley, was also found seeding into the Lary Pine Rockland.

Tropical Audubon Society's Porter Russell Pineland

Owner: Tropical Audubon Society
5530 Sunset Drive Miami, FL 33143

Site Map: The TAS (Tropical Audubon Society) Porter Russell Pine Rockland is located in southwest Miami-Dade County in a highly residential neighborhood just west of US Highway 1.

Species Benefited: The federal candidate plant *Brickellia mosieri* and 13 state-listed plants are present on the site. It is habitat for three federally-listed plants (*Argythamnia blodgettii*, *Chamaesyce deltoidea* subsp. *adhaerens*, and *Linum arenicola*), and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake). *Chamaesyce deltoidea* subsp. *adhaerens* used to occur here, but disappeared before management activities were initiated.

Acres Treated Under ARRA: 7.8

Site Description: The TAS Porter Russell Pine Rockland is a nature preserve owned by Florida's Tropical Audubon Society. The property is in a residential area and is bordered by several homes. To the south is a church with disturbed pine rockland habitat (La Ultima Cosecha Pine Rockland). The quality of pine rockland habitat varies on the site. Good quality habitat exists in the western portions of the property, with somewhat low shrub densities and abundant grasses and herbs. In other portions of the site, particularly towards the east, pine densities and hardwoods (especially live oak) are much higher. In these denser areas there is almost no cover of native grasses and herbs, and higher cover of exotic species. Invasive infestation occurs at the perimeter with relatively fewer exotic species present in the interior portions pine rockland. Despite the fact that this pine rockland is fenced and locked illegal dumping is common on the site.

Pre-ARRA Management: Management was conducted prior to the ARRA project with private and USFWS funding staring in 2004. Management activities included exotic plant control, construction of fire breaks, and manual hardwood reduction. Because of the size of the site and density of exotics the site was not yet in maintenance condition.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species under the ARRA grant in March 2010 and many retreatments of the exotic seed bank in 2010 and 2011. IRC has worked closely with the Tropical Audubon Society in coordinating and carrying out volunteer workdays with community members, students and school groups. Volunteer work days primarily focus on firebreak maintenance, hauling out illegally dumped materials, and hand-pulling of appropriate exotic species. This site is not yet in a completely feasible maintenance phase. It continues to be invaded by exotic species growing on neighboring properties, is very fire suppressed and in need of hardwood thinning, and continues to be illegally dumped on and vandalized. There is a great need for local community outreach at this pine rockland site.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Foliar	Glyphosate 3%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Lantana	*Lantana camara*	Cut Stump, Hand-pull	Garlon 4 20%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Natal Grass	*Melinis repens*	Foliar, hand-pull/bag	Glyphosate 3%
Leadtree	*Leucaena leucocephala*	Cut Stump, Hand-pull	Garlon 4 30%
Cowitch	*Mucuna pruriens*	Foliar	Glyphosate 3%
Jaragua	*Hyparrhenia rufa*	Foliar, Hand pull/bag	Glyphosate 3%
Napier grass	*Pennisetum purpureum*	Foliar Cut Stump	Glyphosate 3% Garlon 4 20%
Rosary pea	*Abrus precatorius*	Cut Stump, bag seeds	Garlon 4 20%

Photos:

A large cowitch (*Mucuna pruriens*) and jaragua (*Hyparrhenia rufa*) infestation continues to invade the firebreak at the TAS Porter Russell Pine Rockland due to a persisting seed bank on site and on neighboring properties.

Jaragua (*Hyparrhenia rufa*) infestation in the fire break. This infestation has moved into interior pine rockland areas and although less severe, is very conspicuous on the site.

Volunteer work day at TAS Porter Russell Pine Rockland, with a Miami school group, Pine Rockland Initiative Program Coordinator Sarah Martin (bottom, left) and Tropical Audubon Society's Lewis Milledge (far right). Note the industrial sized dumpster in the background filled with illegally dumped material picked up by volunteers from the pineland to be hauled off to the dump.

IRC habitat restoration team crew leader Rasheed Bradley showing volunteers where to hand pull and bag natal grass (*Melinis repens*) growing in the firebreak of the TAS Porter Russell Pine Rockland.

University of Florida TREC Pine Rockland

Owner: University of Florida Tropical Research and Education Center
3900 Commonwealth Blvd., Tallahassee, FL 32399

Site Map: The University of Florida TREC Pine Rockland is located in the far southwest region of the Redland Agricultural Area of Miami Dade County and is surrounded by agriculture and private residences.

Species Benefited: The federal-candidate plant *Brickellia mosieri* is present on the site. It is habitat for the Federally Listed plant *Chamaesyce deltoidea* subsp. *adhaerens,* numerous state-listed pant species, for three federal candidate plants (*Argythamnia blodgettii, Linum arenicola,* and *Linum carteri* var. *carteri*), and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 8.8

Site Description: The University of Florida TREC Pine Rockland is in the middle of an agricultural research station, and the property is surrounded mainly by agricultural lands. The north section of the pineland is succeeding to hammock and is dominated by a wild tamarind (*Lysiloma latisiliquum*). The southeast section and interior has the best pine rockland habitat but is being invaded severely by jaragua (*Hyparrhenia rufa*). There are a variety of other exotic species prevalent at this site, especially on the southern and western borders. This site contains one of the only populations of kudzu (*Pueraria montana* var. *lobata*) in southern Florida.

Pre-ARRA Management: Prior to IRC's management, TREC's pine rockland has been largely neglected in terms of exotic removal and has been invaded by non-native grasses and woody species. Through the efforts of their on-site biologist, one prescribed fire was implemented in 2009 through the Florida Division of Forestry.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species in the seventh quarter of the ARRA project and carried out several follow-up treatments (See table below). Treatment for exotic species combined with the effects of a prescribed fire in 2009 have brought this pine rockland closer to a feasible management phase. IRC plans to conduct retreatment under a USFWS Coastal Grant to eliminate the existing exotic seed bank

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Jaragua	*Hyparrhenia rufa*	Foliar	Glyphosate 3%
Burmareed	*Neyraudia reynaudiana*	Foliar	Glyphosate 3%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Natal grass	*Melinis repens*	Foliar	Glyphosate 3%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump	Garlon 4 20%
Kudzu	*Pueraria montana* var. lobata	Foliar	Glyphosate 3%
Gold Coast jasmine	*Jasminum dichotomum*	Cut Stump	Garlon 4 20%
Governor's plum	*Flacourtia indica*	Cut Stump	Garlon 4 20%

Photos:

An extremely abundant infestation of jaragua (*Hyparrhenia rufa*) was growing throughout the open interior of the pine rockland mixed in with desirable native grasses and herbaceous species.

The IRC habitat restoration team brush-cut jaragua (*Hyparrhenia rufa)* in the interior of the pineland and removed the cut debris off site to limit impacts to native vegetation.

United States Coast Guard Communication and Engineering Station

Owner / Land Manager: United States Coast Guard
15608 SW 117 Ave., Miami, FL 33177

Site Map: The US Coast Guard Station Pine Rocklands is located in the historic Richmond Pine Rockland complex.

Species Benefited: There are at least 21 state-listed plant species on this site. It contains populations of the federally-listed *Polygala smallii* and *Chamaesyce deltoidea* subsp. *deltoidea.* It is also habitat for the Federal candidate *Brickellia mosieri* and *Argythamnia blodgettii* and for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake), the latter two having been found adjacent to the site at Miami Metrozoo.

Acres Treated Under the ARRA: 87.0

Site Description: Bordered by Miami Metrozoo and University of Miami pine Rocklands, this large 221-acre site consists of approximately 100 acres of pine rockland habitat. The site is divided into sections by security fences and paths, creating well maintained fire breaks throughout. The pine rockland is variable, some areas characterized by no pine canopy with a diverse herb and grass layer, while some areas have dense stands of slash pine and tall saw palmettos with a depauperate herb and grass layer. Native grasses are present, but compete for space with the many palms. Healthy populations of Small's milkwort (*Polygala smallii*), deltoid spurge (*Chamaesyce deltoidea* subsp. *deltoidea*) and other pine rockland species are present in places where pines are not too dense. Fire suppression has contributed to the dense coverage (up to 100% in some areas) of slash pine, saw palmetto, and poisonwood, creating dense leaf litter and making access difficult in some areas. The site is maintained by the Coast Guard who has worked at reducing and preventing invasion of invasive hardwood species in the past, including removal of Brazilian-pepper (*Schinus terebinthifolius*), earleaf acacia (*Acacia auriculiformis*), and umbrella tree (*Schefflera actinophylla*), thus reducing the number of these species on much of the site. Burmareed (*Neyraudia reynaudiana*) is moderately thin in open areas and extremely thick (up to 100% coverage) in disturbed areas and areas of fire suppression. Thick stands of slash pine prevent easy access to scattered but dense stands of Burmareed. Diligence by the property manager has prevented introduction of many invasive plants through prevention of dumping and careful monitoring of the site for new occurrences of invasive plants.

Pre-ARRA Management: Management was performed by the property owner which included some removal of invasive hardwoods. Fire breaks around the property are well maintained by the property manager. The site had been burned prior to the current property manager's term, but it is has been at least 13 years (if not more) since the site was last burned.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species in the first quarter of the ARRA project and carried out several follow-up treatments (See table below). IRC plans to conduct retreatment under a USFWS Coastal grant to eliminate the existing exotic seed bank.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Earleaf acacia	*Acacia auriculiformis*	Cut Stump	Garlon 4 20%

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Lantana	*Lantana camara*	Cut Stump, Hand-pull	Garlon 4 20%
Queensland umbrella tree	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%

Photos:

Polygala smallii (federally listed endangered species) is found in the sandy open pockets of the US Coast Guard Station Pine Rockland. This species would benefit greatly from an implemented prescribed fire.

The IRC habitat restoration team foliar treated the new growth of the dense infestations of Burmareed (*Neyraudia reynaudiana*) they brush cut in the prior weeks.

Due to lack of burning, very dense stands of south Florida slash pine (*Pinus elliotti* var*. densa*) have created a closed canopy over the majority of the pine rockland and thick buildup of organic matter on the forest floor.

IRC habitat restoration team field supervisor takes note of locust berry (*Byrsonima lucida*) growing in the recently treated area.

Cut Burmareed grass just chemically treated in the interior of the pineland.

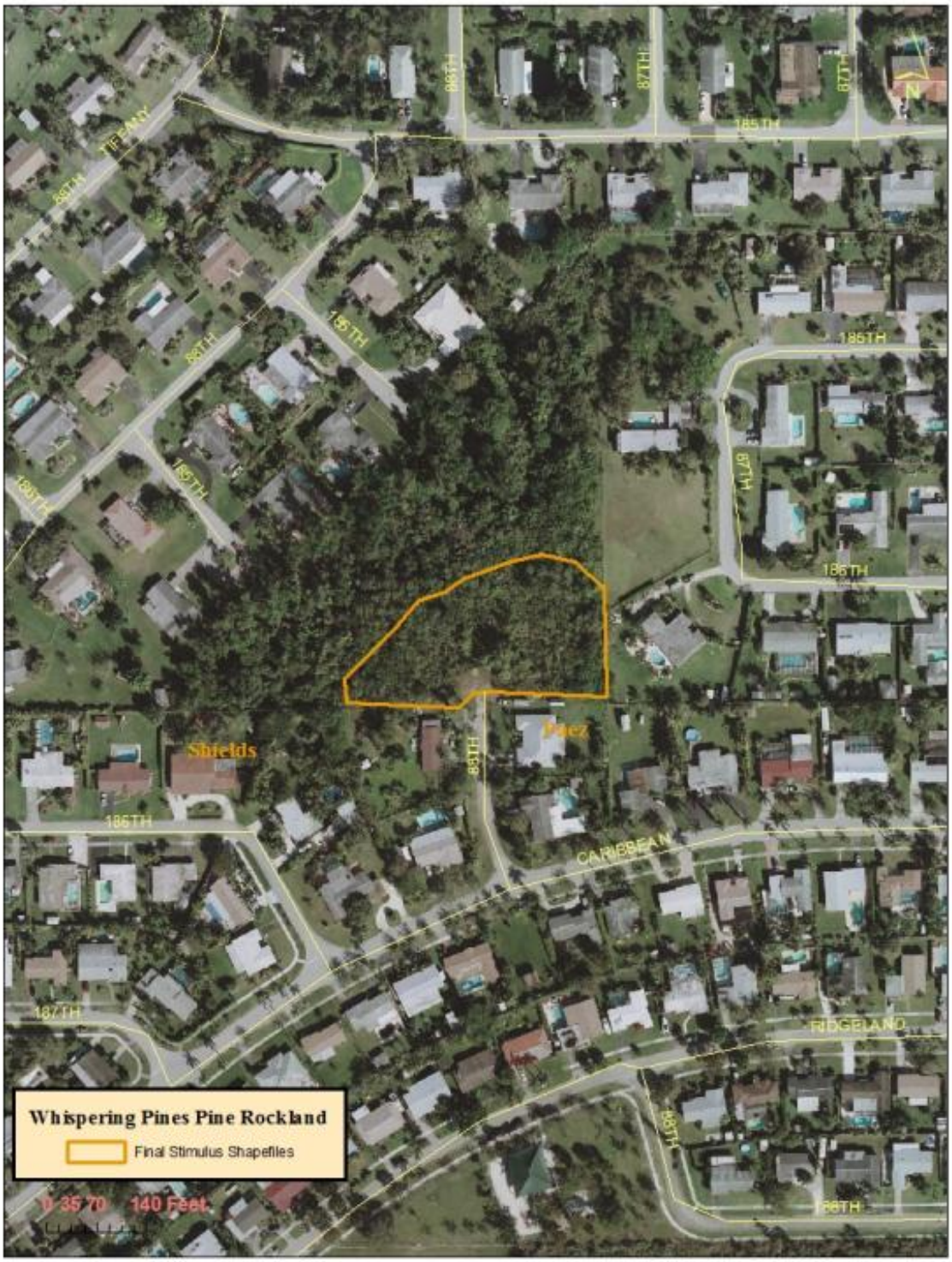
A 20-acre parcel months after receiving treatment

Pineland lantana **(***Lantana depressa* var. *depressa*) growing in a treated section of the USCGS pine rockland.

Note the open area in the foreground where pines were mechanically removed adjacent to very dense slash pine in background.

Whispering Pines Pine Rockland

Owner: Miami-Dade County
Division of Natural Areas Management, 22200 SW 137th Avenue, Miami FL 33170



Site Map: The Whispering Pines Pine Rockland is located in southwest Miami Dade County in a dense residential neighborhood.

Species Benefited: There are four state-listed plant species on the site, and it is habitat for one federally listed species (*Chamaesyce deltoidea* subsp*. deltoidea*), four Federal candidate plants (*Argythamnia blodgettii Brickellia mosieri*, *Dalea carthagenensis* var. *floridana*, and *Linum arenicola*), and for three federal candidate animals (Florida leafwing butterfly, Bartram's hairstreak, and rim rock crowned snake). Because there is a mix of pine rockland and rockland hammock on the site, and because it is in a neighborhood where the species has been found previously, there is a high likelihood that rim rock crowned snake occurs here.

Acres Treated Under ARRA: 1.3

Site Description: This site contains pine rockland and rockland hammock, and is one of the few sites in urban Miami-Dade County where an undisturbed ecotone between these habitats exists. The park is bounded on all sides by residential development. The pine rockland is isolated from similar habitat; there is tall hammock to the north and west, and extensive residential development the south and east. The southeast corner of the property is an intersection of four properties, and at least one of the residential neighbors apparently throws landscape debris (including live propagules of invasive species) over the fence and into the park. The pine rockland continues across property lines, and the unmanaged acreage provides an abundant exotic invasive seed source to the managed Whispering Pines Pine Rockland. Future efforts must be made to treat the unmanaged acreage, so to create an exotic-free buffer. This small parcel of pineland is rapidly succeeding into hardwood hammock due to fire suppression. Prescribed fire will be necessary in order for this zone to be maintained as a pine rockland.

Pre-ARRA Management: There has been no recent management at this site. In the past, Miami-Dade County Natural Areas Management crews have treated exotics and native hardwoods.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species in the first quarter of the ARRA project and carried out several follow-up treatments (See table below). Treatment for exotic species combined with the effects of a wildfire in June 2011 have brought this pine rockland to a feasible management phase. IRC plans to conduct retreatment under a USFWS Coastal grant to eliminate the existing exotic seed bank.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Natal grass	*Melinis repens*	Foliar	Glyphosate 3%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Rattlebox	*Crotalaria spectabilis*	Hand pull, bag	N/A
Oyster plant	*Tradescantia spathacea*	Hand pull, bag	N/A
Queensland umbrella tree	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%

Photos:

The dense understory and fuel load at Whispering Pines Pine Rockland indicate the need for prescribed fire to maintain this habitat.

In the absence of fire, Whispering Pines pine Rockland is rapidly losing ground to the encroachment of wood shrubs and succession to hammock.

Winston Shields Pine Rockland

Owner: Winston Shields
22951 SW 190 Ave., Goulds, FL 33170

Site Map: The Shields Pine Rockland is adjacent to the Ricardo and Yania Paez Pine Rockland, also treated under this ARRA grant.

Species Benefited: At least five state-listed plants are documented on the Shields Pine Rockland. It is habitat for three federal-candidate animals (Florida leafwing butterfly, Bartram's hairstreak butterfly, and rimrock crowned snake).

Acres Treated Under ARRA: 0.6

Site Description: There are only small fragments (about 0.96 acres) of pine rockland habitat remaining on the property. These fragments are low in diversity and surrounded by dense stands of Burmareed (*Neyraudia reynaudiana*), Brazilian-pepper, (*Schinus terebinthifolius*) and dense cabbage palm (*Sabal palmetto*).

Pre-ARRA Management: Prior to IRC management, there is no management history for the Winston Shields Pine Rockland.

ARRA Management Activities: The IRC habitat restoration team conducted initial treatment of FLEPPC Category I and II species in the eighth quarter of the ARRA project and carried out one follow-up treatment (See table below). Further treatment of exotic species and implementation of a prescribed fire regime are necessary before this site is at a feasible management phase. IRC plans to conduct retreatment under a USFWS Coastal grant to eliminate the existing exotic seed bank.

Invasive Treated	Scientific Name	Treatment Method	Herbicide Used
Burmareed	*Neyraudia reynaudiana*	Cut Stump	Garlon 4 20%
Brazilian-pepper	*Schinus terebinthifolius*	Cut Stump	Garlon 4 20%
Natal grass	*Melinis repens*	Foliar	Glyphosate 3%
Woman's tongue	*Albizia lebbeck*	Cut Stump	Garlon 4 30%
Shoebutton ardisia	*Ardisia elliptica*	Cut Stump, Hand-pull	Garlon 4 20%
Rattlebox	*Crotalaria spectabilis*	Hand pull, bag	N/A
Queensland umbrella tree	*Schefflera actinophylla*	Cut Stump	Garlon 4 20%
Lantana	*Lantana camara*	Cut-Stump	Garlon 4 20%
Napier grass	*Pennisetum purpureum*	Foliar	Glyphosate 3%

Photos:

The entrance on SW 188th St. demonstrates how dense the fuel load is at Winston Shields Pine Rockland.

The Winston Shields Pine Rockland has abundant cabbage palm (*Sabal palmetto*), saw palmetto (*Serenoa repens*), and large invasions of Burmareed (*Neyraudia reynaudiana*) and Brazilian-pepper (*Schinus terebinthifolius*). There are several coconut palms (*Cocos nucifera*) the owner asked us not to treat.

The IRC habitat restoration crew cut and foliar treated the large infestation of Burmareed (*Neyraudia reynaudiana*), napier grass (*Pennisetum purpureum*), lantana (*Lantana camara*), Queensland umbrella tree (*Schefflera actinophylla*), and Brazilian-pepper (*Schinus terebinthifolius*) from the Winston Shields Pine Rockland.