

Restoration of Native Plant Communities From Theory to Practice



Why restore coastal dunes?

George D. Gann

Chief Conservation Strategist, The Institute for Regional Conservation
International Policy Lead, Society for Ecological Restoration

February 22, 2021

Acknowledgements

- Mark Kateli and the Cuplet Chapter of FNPS.
- All the IRC folks, past and present, and all our funders and conservation partners.
- Photographers, including Roger Hammer, Beryn Harty, Erin Backus, Keith Bradley, Shirley Denton, James Johnson, and many others.
- Pine Rockland Initiative, Restoring the Gold Coast, and Natives For Your Neighborhood program staff, sponsors, and collaborators.



Outline

- **Background on me, IRC** and our mission.
- **Native plant conservation** context.
- **Restoration theory** and policy.
- **Restoration practice**, some examples.
- **Conversation!**



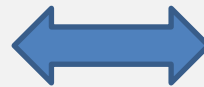
My Neighborhood

Global and Local Policy



World Conference on Ecological Restoration
Cape Town, South Africa 2019

International Policy Lead



Restoration site, No Name Key
National Key Deer Refuge, FL, USA

Chief Conservation Strategist

40-years of experience in ecological restoration practice, policy, and science

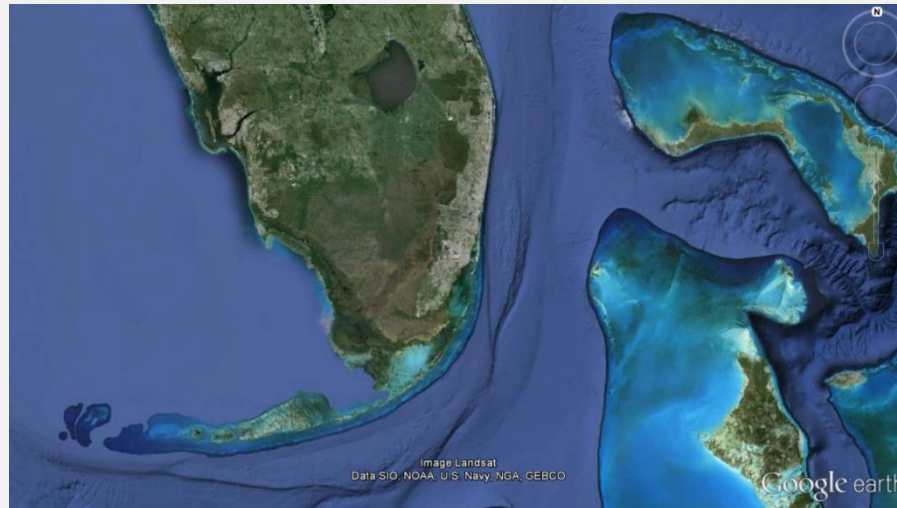


Miami Beach, 1987

- 1970s – invasive plant removal in Gann Hammock; nursery production of native plants at Gann’s Native Tropical Greenery.
- Early 1980s – *Casuarina* removal on Cape Sable, ENP; prescribe fire on Long Pine Key.
- Late 1980s – 7.5 miles of beach dune and coastal strand restoration on Miami Beach; 5 miles of beach dune restoration on Captiva island.
- 1990s – Post Hurricane Andrew restoration at Cape Florida, tropical hammocks in Miami-Dade County.
- Mid-2000s to present – Pine Rockland Initiative in Miami-Dade and Monroe counties.
- Mid-2010s to present – Coastal biodiversity restoration and launch of Restoring the Gold Coast.
- Since 1989 – Engagement with Society for Ecological Restoration including global policy initiatives. Board of Directors 17 years.
- Since mid-1990s - Rare plants, floristics, management plans, restoration through IRC.

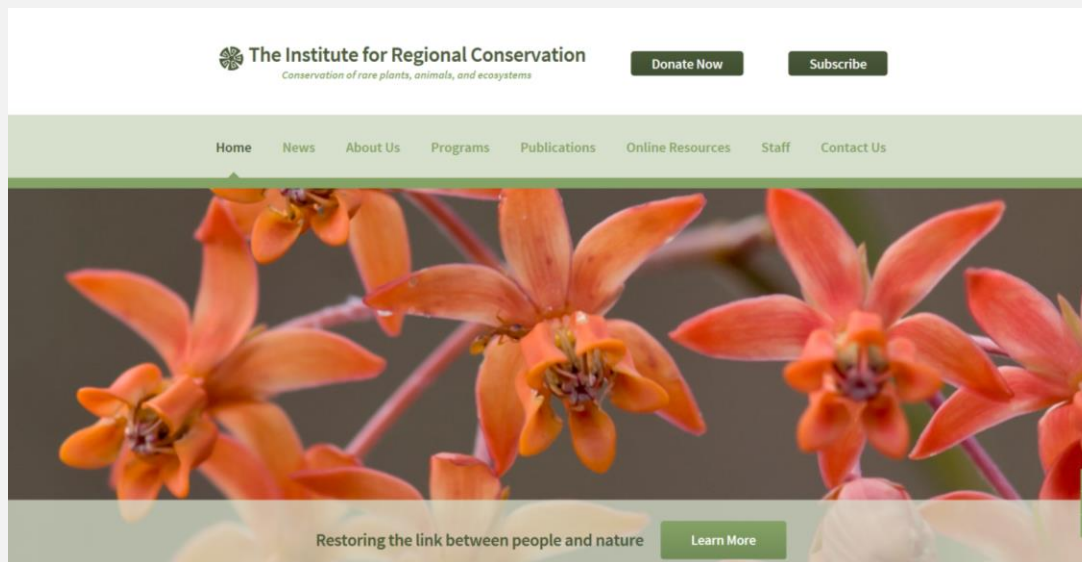
Everglades Restoration and Rare Plants - Including a Critical Element of Biodiversity

John C. Gifford Arboretum, University of Miami
October 12, 2016



George D. Gann
Chief Conservation Strategist
The Institute for Regional Conservation
www.regionalconservation.org





IRC aims to protect, restore and manage all biodiversity on a regional basis, and to **prevent local extinctions of native plants, animals and ecosystems**. All conservation is ultimately local. **2019 was our 35th Anniversary Year**. Staff of 7, 12 Associates and 7 Board Members.

Floristic and faunistic inventories

Rare species research

Ecological restoration design and implementation

Educational training and workshops

Online tools and resources

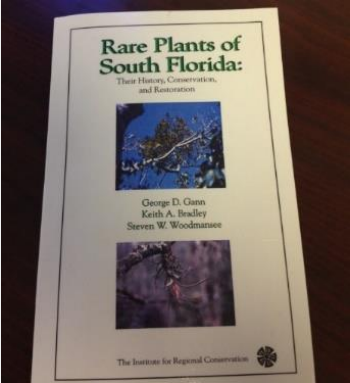
International policy

Some IRC Resources



Natives For Your Neighborhood
Conservation of rare plants, animals, and ecosystems

[Donate Now](#) [Subscribe](#)

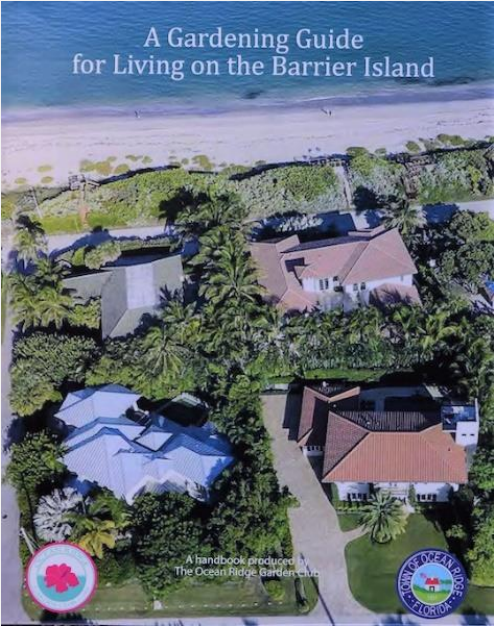


The Floristic Inventory of South Florida
Conservation of rare plants, animals, and ecosystems



Plantas de la Isla de Puerto Rico
Plants of the Island of Puerto Rico
Un servicio para la conservación de flora / A conservation service for the flora

The Institute for Regional Conservation



Amigos de Plantas de Puerto Rico / Friends of Plants of Puerto Rico

George Gann
Edit Profile

FAVORITES
News Feed
Messages
Events
Save Groups

PACKS
The Institute for Re...
Pages Feed
Like Pages
Create Ad
Create Page

GROUPS
Amigos de Planta...
Florida Flora and...
PLANTY - Plantas...
Urban Paradise G...

RECENT ACTIVITY

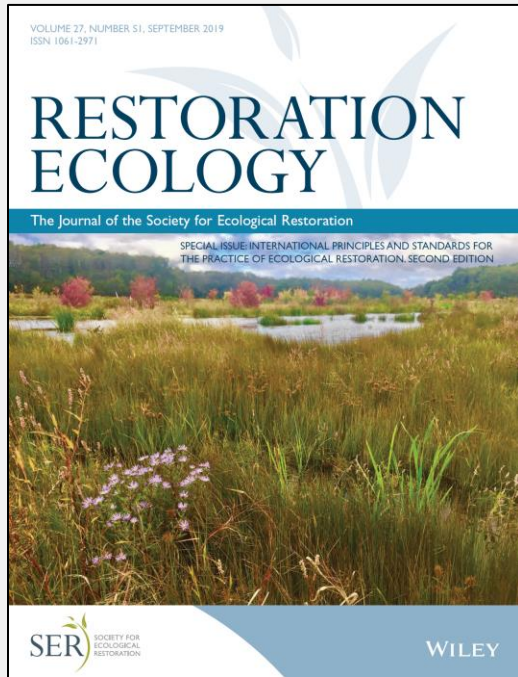
Josy Gonzalez
April 15 at 10:28pm
Buenas noches. ¿acaso de comprar esta planta alguien sabe cual es y como la puedo cultivar. Mi gracias anticipadas 🙏

115 Members (10 new)

DESCRIPTION
¡BIENVENIDO a Amigos de Plantas de Puerto Rico! Friends of Plant... See More

Ecological Restoration and Community Outreach





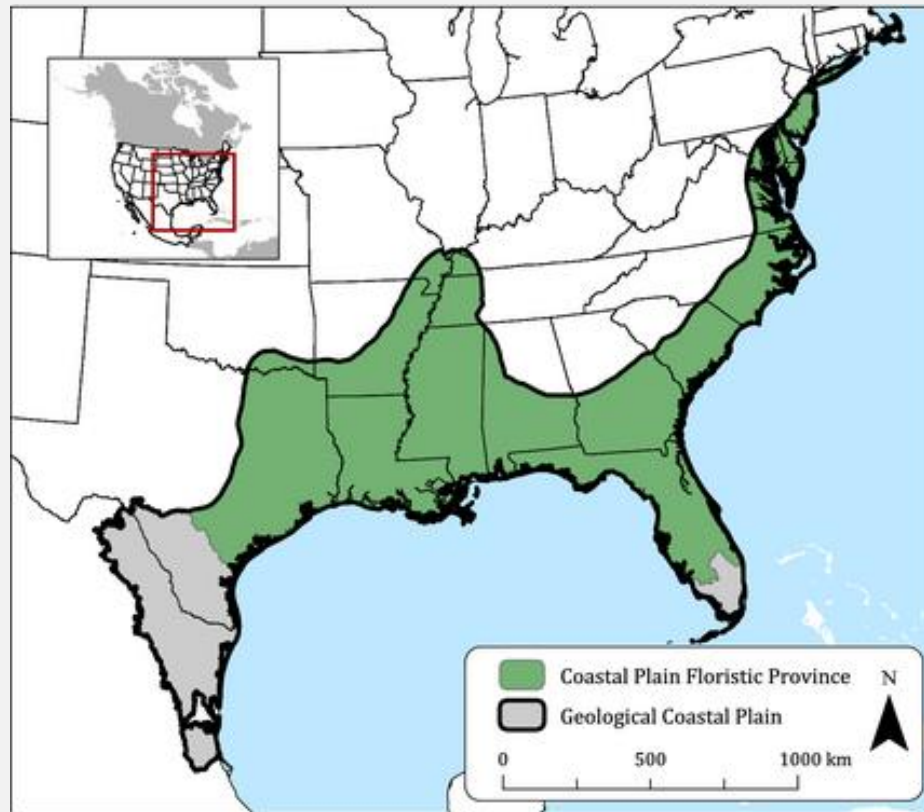
International Policy Work on Ecological Restoration, Conservation, and Sustainability



www.ser.org/Standards

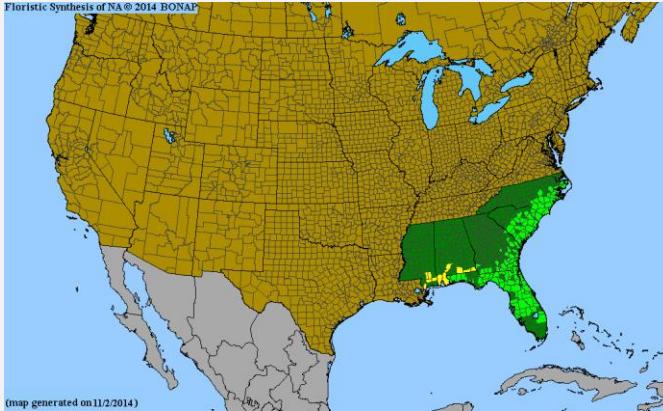


Native Plant Conservation Context

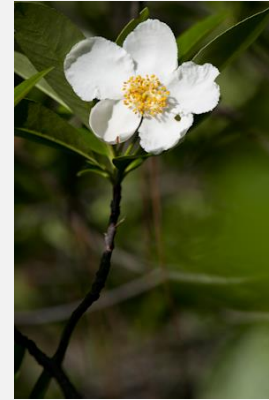


North American Coastal Plain Global Hotspot
Noss et al. 2014

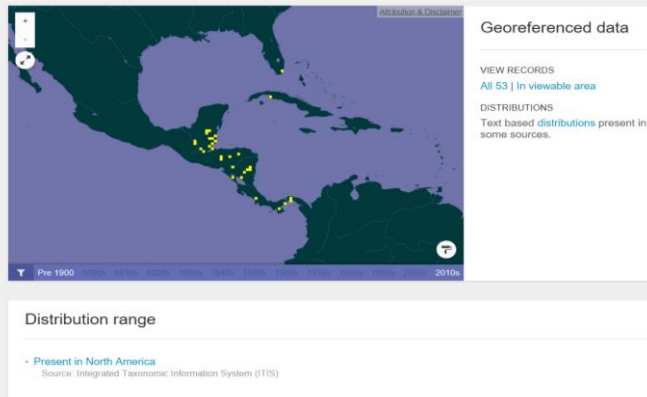
South & North Range Limits in South Florida



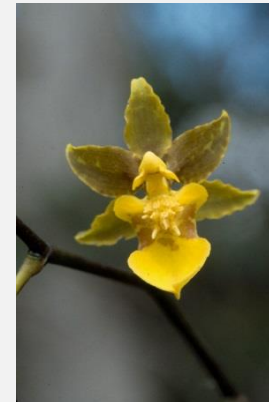
Gordonia lasianthus (BONAP.org)



K. Bradley



Oncidium ensatum (GBIF.org)



C. McCartney

Example from Orange/Seminole area: *Ulmus alata*; *Eulophia alta*

Asplenium serratum L.

Bird's-nest fern, wild birdnest fern

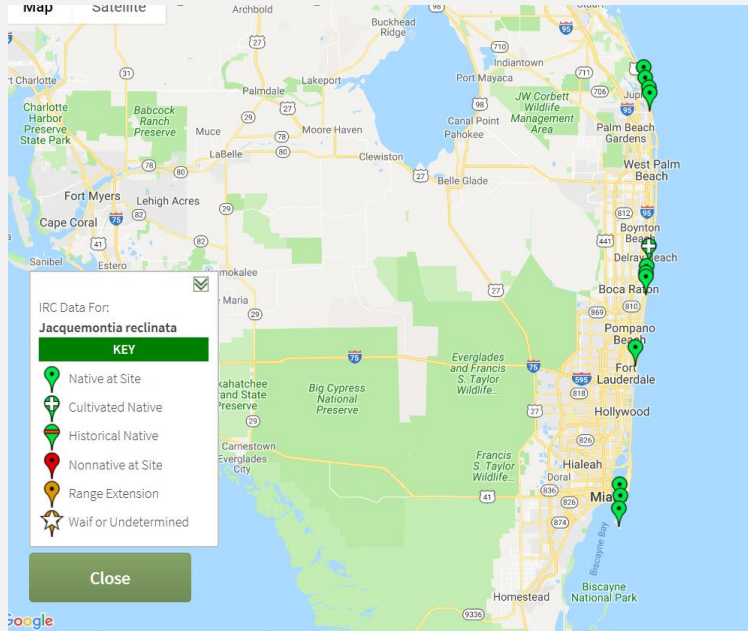


Iguassu Falls, Brazil



Fakahatchee Strand, Florida

South Florida Endemics (probably >50)



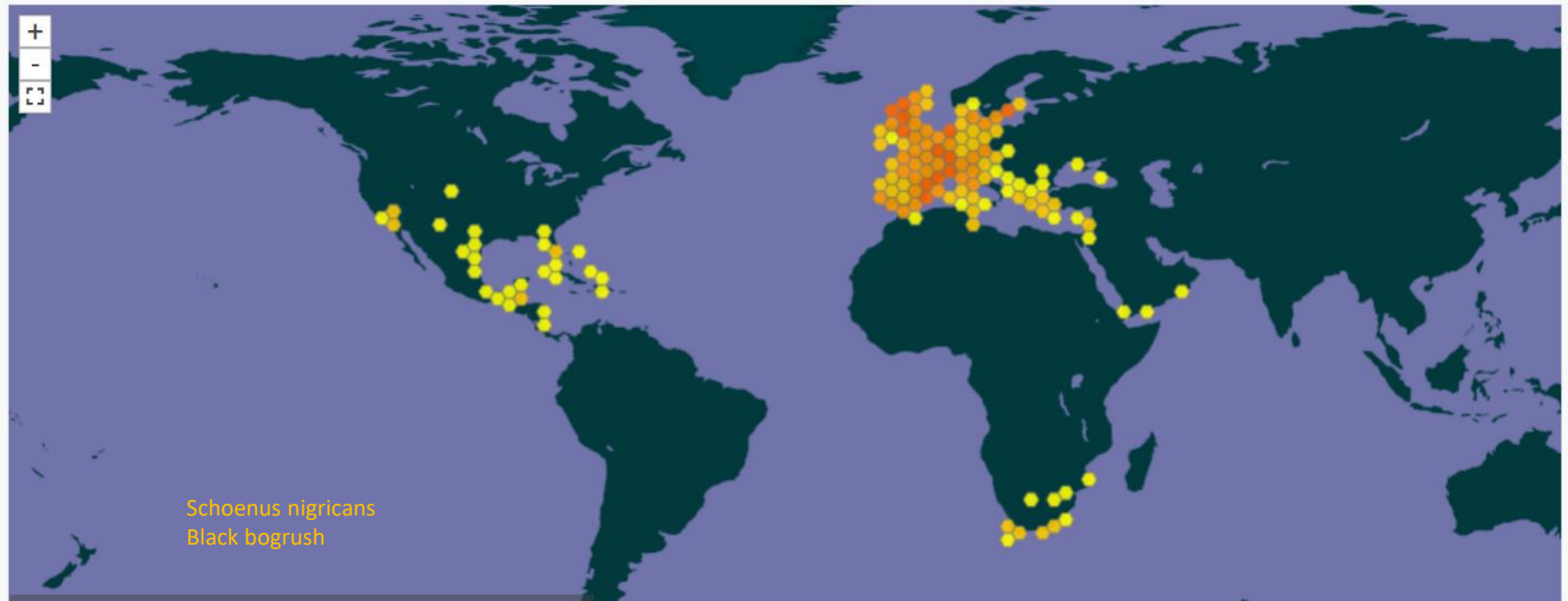
Jacquemontia reclinata
Beach clustervine

Globally Widespread Species

1,311 OCCURRENCE RECORDS WITH IMAGES



22,294 GEOREFERENCED RECORDS



Local Biodiversity Matters!



Plant Biodiversity is Key to Animal Biodiversity



Cicada

Images by Mary Trulio Fesmire

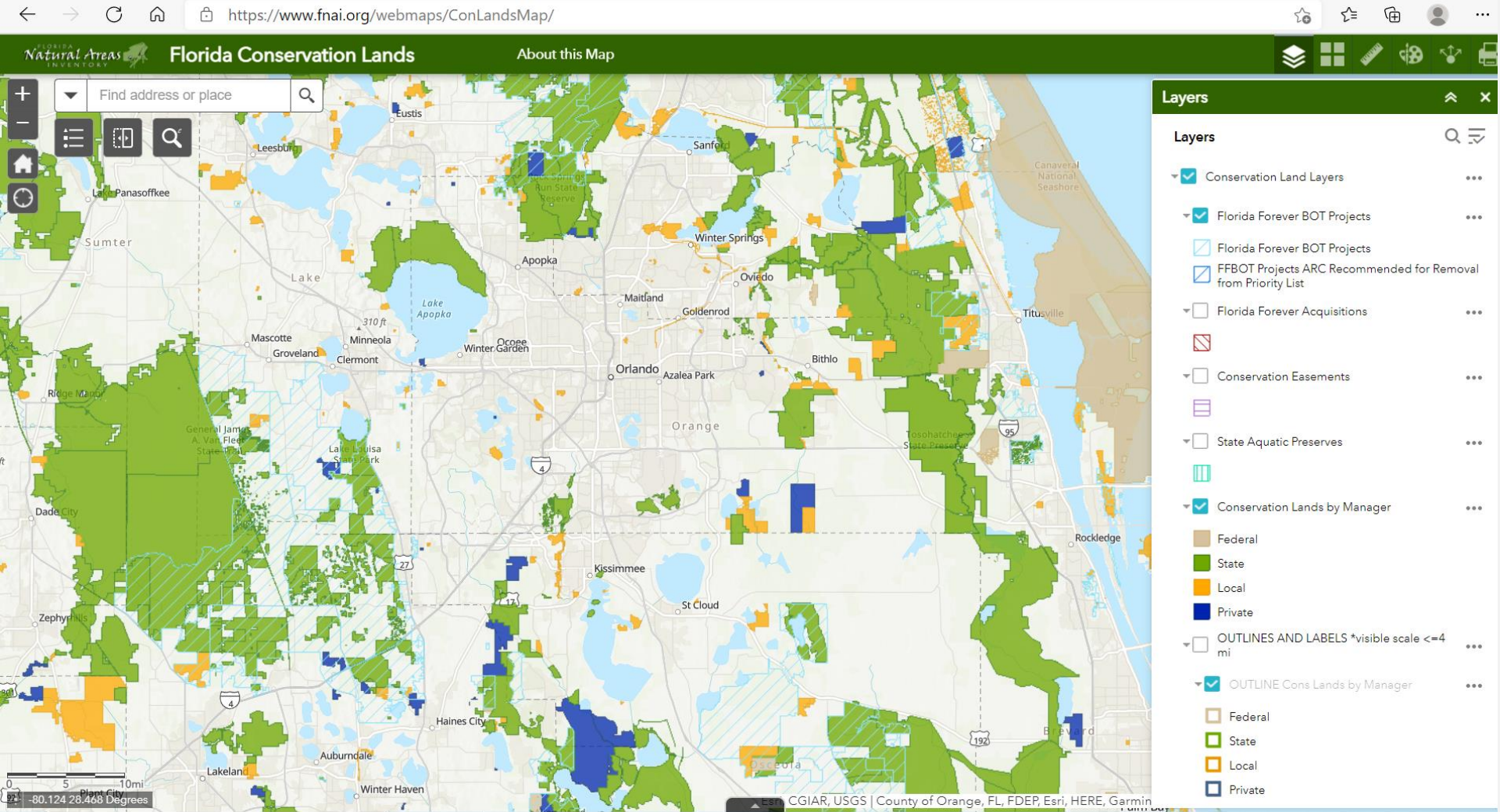


Ceraunus Blue

>50% of South Florida in conservation; United Nations Convention on Biological Diversity (CBD) 2020 Protected Areas Target = 17%. So, everything should be great. But it is not.



Central Florida Conservation Areas



Fragmentation leads to local extinction

no species are lost from either pool. As fragmentation proceeds we eventually reach some critical level of reduction and fragmentation where species begin to die out. The susceptible pool loses species earlier and loses more species in total than does the resistant pool. When the resistant pool begins to lose species, it loses them very rapidly, because by this time the fragments are small and there is little habitat left.

Insularization causes extinctions over and above those expected through reduction in the total area of habitat. More species persist at equilibrium if the remaining habitat is concentrated into a single large patch rather than distributed over many small fragments (Figure 4). We stress that the results in Figure 4 are equilibrium patterns; depending on the relative time scales of habitat destruction and species'

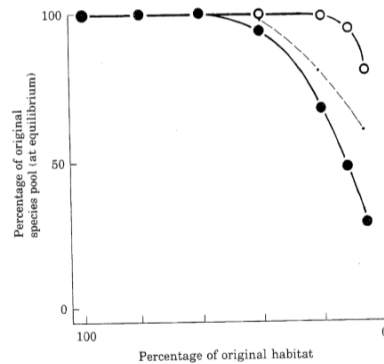


FIGURE 4. The number of species remaining in each species pool as fragmentation proceeds. Closed circles show the pool of species with large area requirements and low vagility. Open circles show the species with less stringent area requirements. The small dots connected by the dashed line depict the proportion of the first pool that would be present when the habitat is minimally fragmented. (From McLellan et al., 1986.)

Wilcove 1986

Some species and groups go faster.





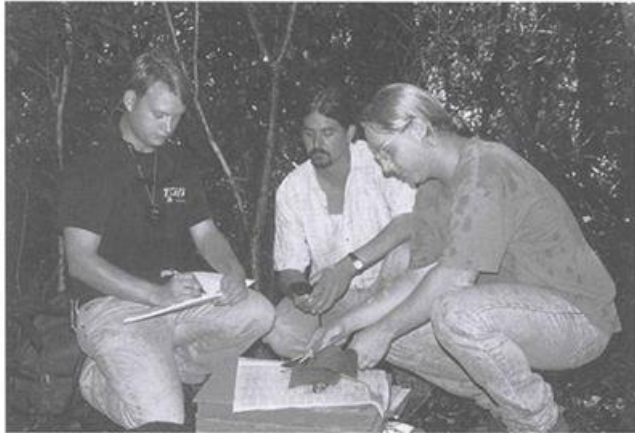
Some go slower.



Documenting extinctions and rarity since 1996

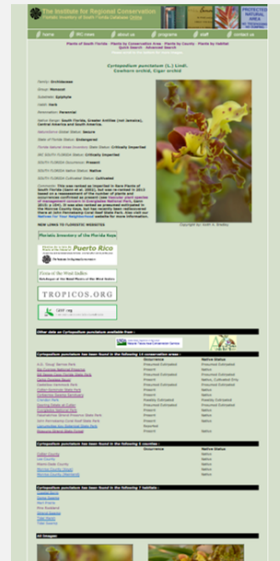
The Floristic Inventory of South Florida

Afield celebrates...
Origins



80 Species To Be Added to Florida's
Endangered Species List

The Floristic Inventory of South Florida 1995 – present, Online since 2001



County: **Harris County**
Site: **Castello Hammock Park**
Date: **11/11/2001**
Section: **1.7 Hammock**
Notes: **Historically listed as Castello Hammock or Castello's Hammock. For a map and more information click [here](#).**
Herbarium: **None**
Inventory Agency: **Harris County Department of Parks and Recreation**
There are **279** taxa reported for **Castello Hammock Park**

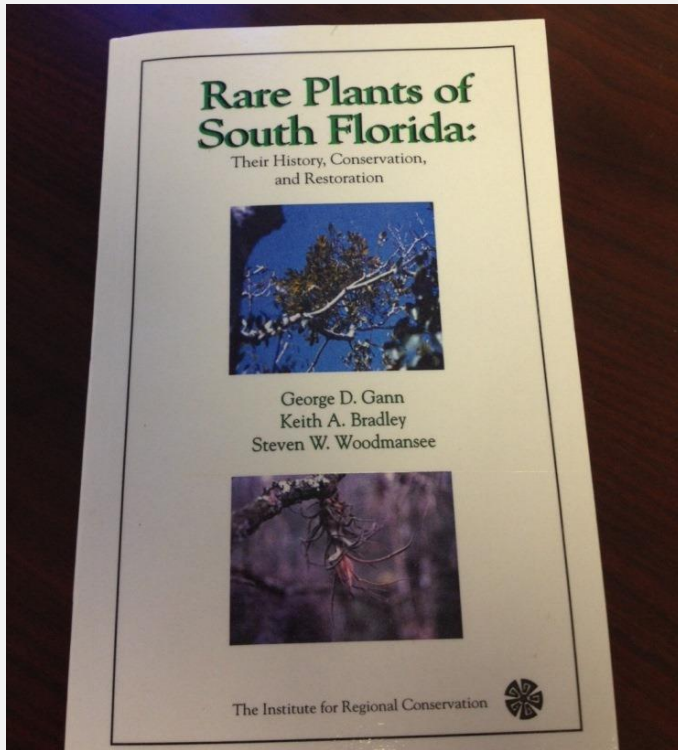
Group By Family:

Scientific Name	Occurrence	Native Status	Introduced Status	Invasive Status	Cultivated Status	Reference	Year(s)
Acanthaceae							
<i>Salvia leucostachya</i>	Present	Not Native, Naturalized	Introduced	Probably Invasive			2001, 2002
<i>Salvia rosmarinifolia</i>	Present	Not Native, Naturalized	Introduced	Ruderal			2001
<i>Salvia triloba</i>	Present	Not Native, Naturalized	Introduced	Probably Invasive			2002
<i>Salvia verticillata</i>	Present	Native	Not Introduced	Native			2001
Amaranthaceae							
<i>Amaranthus albus</i>	Present	Not Native, Naturalized	Introduced	Ruderal			2002
<i>Amaranthus spinosus</i>	Present	Not Native, Naturalized	Introduced	Ruderal			2002
Anacardiaceae							
<i>Quercus laevis</i>	Present	Not Native, Naturalized	Introduced	Invasive			2002
<i>Quercus muhlenbergii</i>	Present	Native	Not Introduced	Native			2001
<i>Quercus prinus</i>	Present	Not Native, Naturalized	Not Introduced	Native			2001
<i>Quercus rubra</i>	Present	Not Native, Naturalized	Introduced	Invasive			2001
Anemniaceae							
<i>Asplenium platyneuron</i>	Present	Native	Not Introduced	Native			2002
Ammonaceae							
<i>Ammonia</i>	Present	Native	Not Introduced	Native			2002
Apiaceae							
<i>Apocynum androsaemifolium</i>	Present	Not Native, Naturalized	Introduced	Ruderal			2002
Apocynaceae							
<i>Apocynum androsaemifolium</i>	Present	Native	Not Introduced	Native			2001
<i>Apocynum cannabinum</i>	Present	Not Native, Naturalized	Not Introduced	Invasive			2001
<i>Apocynum digitale</i>	Present	Native	Not Introduced	Native			2001
<i>Apocynum spicatum</i>	Present	Not Native, Naturalized	Not Introduced	Native			2001
<i>Apocynum venetum</i>	Present	Native	Not Introduced	Native			2002
Agrostaceae							
<i>Agrostis</i>	Present	Native	Not Introduced	Native			2002
<i>Agrostis alba</i>	Present	Native	Not Introduced	Native			2002
Araceae							
<i>Araceae</i>	Present	Not Native, Cultivated Only	Not Introduced	Invasive	Cultivated		2002
<i>Araceae</i>	Present	Not Native, Naturalized	Introduced				2001
<i>Araceae</i>	Present	Not Native, Cultivated Only	Not Introduced		Cultivated		2001

SOME QUESTIONS

- Are very small, fragmented conservation areas important?
- How well does the current conservation system protect rare vascular plants?
- Have there been regional extirpations/extinctions?

2002



Bulbophyllum pachyrachis


1 in 4 native plant species were critically imperiled or extirpated.

About 8% were reported as presumed or possibly extirpated or extinct (now 6%).

Four South Florida endemic taxa reported as extinct in Knapp et al. (2020) were documented by IRC in 2002.

Amaranthus floridanus

Last Collected in South Florida in 1985, in Florida in 1989



Scientific Name Search

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Atlas of Florida Plants » Species Page

Amaranthus floridanus

Jump to a section: [Classification](#) | [Citation](#) | [Source](#) | [Synonyms](#) | [Specimens](#) Print

Family:	AMARANTHACEAE
Species:	<i>Amaranthus floridanus</i> (S.Watson)J.D.Sauer
Common Name:	FLORIDA AMARANTH
Status:	Native, Endemic, OBL (DEP) , OBL (NWPL)
Specimen:	View details of USF Herbarium specimens

** Not applicable or data not available.

Classification

Order [CARYOPHYLLALES](#)
Family [AMARANTHACEAE](#)
Genus [Amaranthus](#)
Species [Amaranthus floridanus](#) (S.Watson)J.D.Sauer - FLORIDA AMARANTH

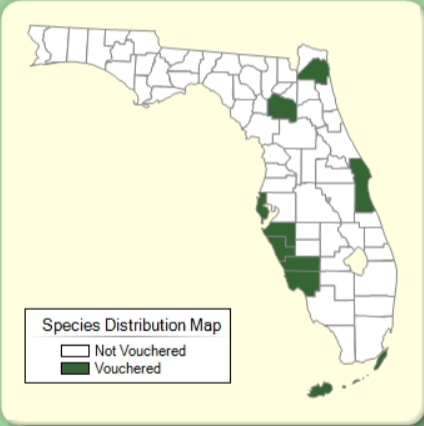
Citation

Citation	AMARANTHUS FLORIDANUS (S. Watson) J. D. Sauer, Madroño 13: 25. 1955.
Basionym:	Acnida floridana S. Watson 1882.
Type:	FLORIDA: Monroe Co.: Key West, s.d., Blodgett s.n. (lectotype: GH). Lectotypified by J. D. Sauer, Madrono 13: 25. 1955.

** Not applicable or data not available.

Map | No Photos Available

Distribution Map: Based on **vouchered** plant specimens from **wild** populations. **Cultivated** occurrences are not mapped. View county names by placing the cursor over the map.



Species Distribution Map

- Not Vouchered
- Vouchered

Species Links

- [Biota of North America Program \(BONAP\)](#)
- [EDD MapS](#)
- [Flora of North America](#)
- [iNaturalist](#)
- [NatureServe Explorer](#)
- [Plants of the World](#)

Treated as G3, N3, S3 in NatureServe (1993)
Not tracked by Florida Natural Areas Inventory
Not listed by State of Florida or FWS
Not on CPC National list

Restoration Theory and Policy

United National Decade on Ecosystem Restoration 2021-2030
“There has never been a more urgent need to restore damaged ecosystems than now”



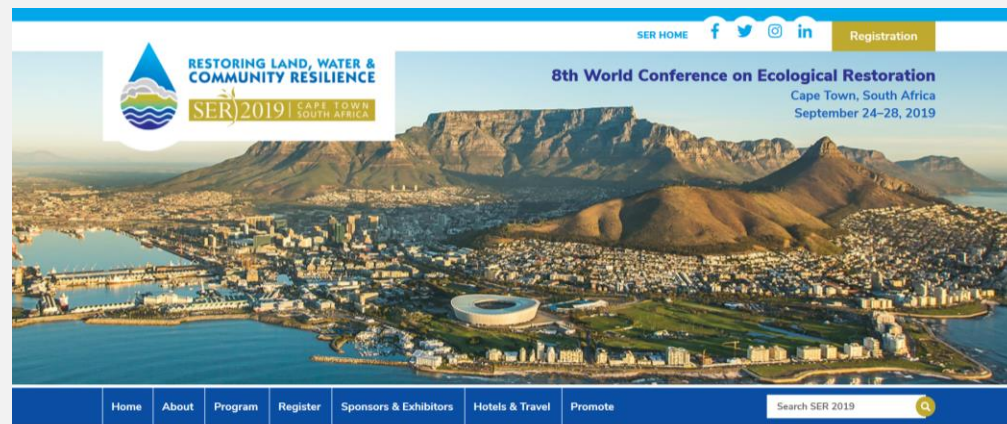


© AMBERLY BOGRESTEIN, USA, PHOTO: J. VAN WESDAN



INTERNATIONAL PRINCIPLES AND STANDARDS FOR THE PRACTICE OF ECOLOGICAL RESTORATION

- Launched at SER2019 in South Africa, simultaneously in *Restoration Ecology* and by SER.



ORGANIZERS



PARTICIPATING INSTITUTIONS



16 authors
7 countries
5 continents

Core writing team of
George Gann, Tein
McDonald, and
Bethanie Walder

Jim Hallet steered
publication in RE in
coordination with
Valter Amaral

George D. Gann, Tein McDonald, Bethanie Walder, James Aronson, Cara R. Nelson, Justin Jonson, James G. Hallett, Cristina Eisenberg, Manuel R. Guariguata, Junguo Liu, Fangyuan Hua, Cristian Echeverría, Emily Gonzales, Nancy Shaw, Kris Decler, and Kingsley W. Dixon

Decades of discussion regarding:

- ***Which target?***
- ***What degree of recovery?***
- ***Direct or indirect activity?***

Camp 1:

'Inclusive at all costs'

Concerned the movement will lose relevance if all related efforts are not encouraged

Camp 2:

'Raise the bar at all costs'

Concerned full inclusion will devalue the term "ecological restoration"



Section 2: Eight Principles that Underpin Ecological Restoration





Climate Change and Insurmountable Environmental Change

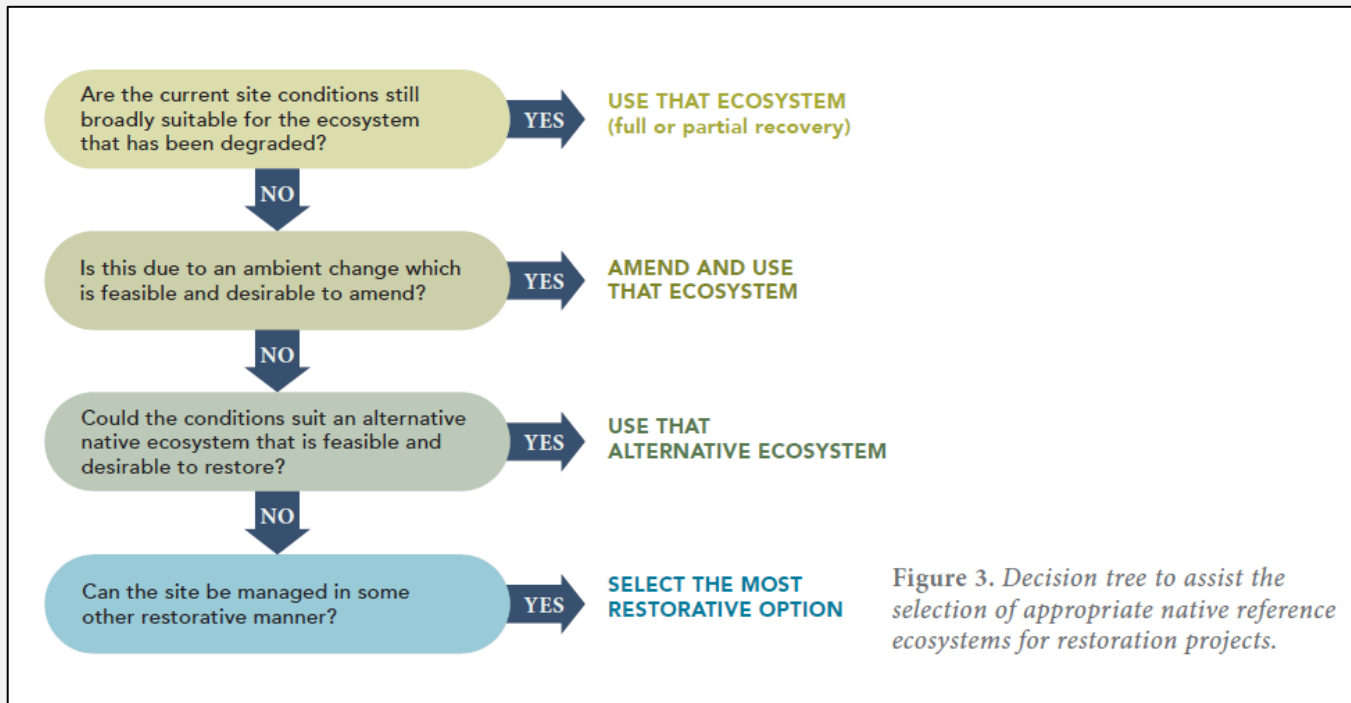


Figure 3. Decision tree to assist the selection of appropriate native reference ecosystems for restoration projects.





Wastewater Treatment Area at Green Cay Wetland,
Palm Beach County, Florida

Key Ecosystem Attributes

Table 2.

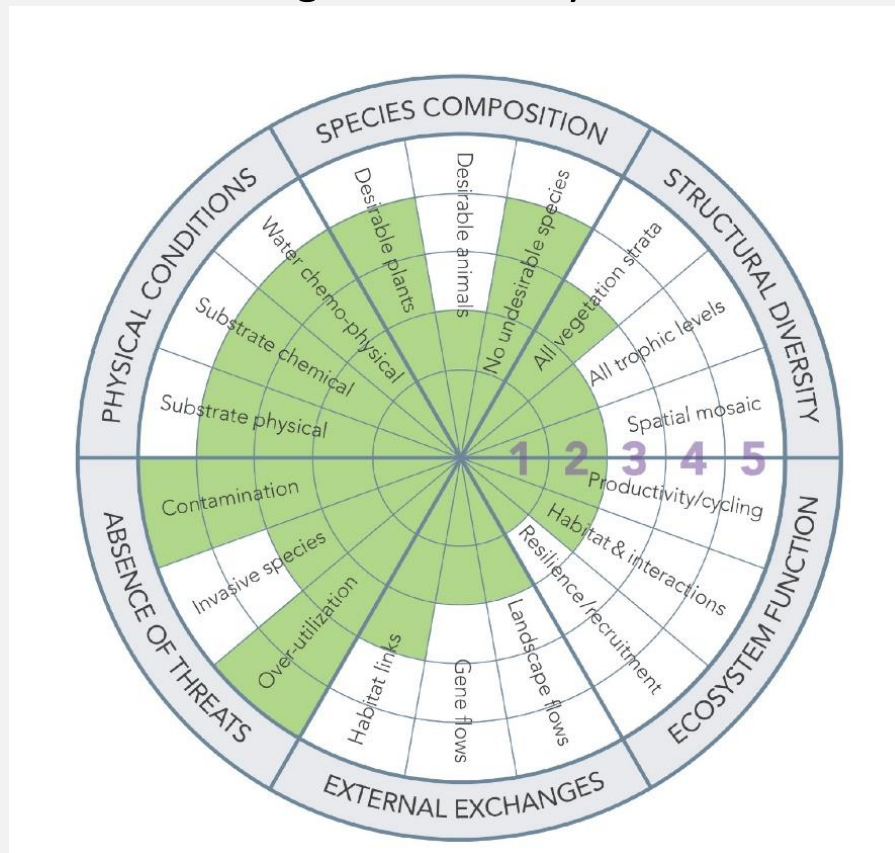
Description of the key ecosystem attributes used to characterize the reference ecosystem, as well as to evaluate baseline condition, set project goals, and monitor degree of recovery at a restoration site. These attributes are suited to monitoring in Principle 5 and the Five-star System discussed in Principle 6.

ATTRIBUTE	DESCRIPTION
Absence of threats	Direct threats to the ecosystem such as overutilization, contamination, or invasive species are absent.
Physical conditions	Environmental conditions (including the physical and chemical conditions of soil and water, and topography) required to sustain the target ecosystem are present.
Species composition	Native species characteristic of the appropriate reference ecosystem are present, whereas undesirable species are absent.
Structural diversity	Appropriate diversity of key structural components, including demographic stages, trophic levels, vegetation strata and spatial habitat diversity are present.
Ecosystem function	Appropriate levels of growth and productivity, nutrient cycling, decomposition, species interactions, and rates of disturbance.
External exchanges	The ecosystem is appropriately integrated into its larger landscape or aquatic context through abiotic and biotic flows and exchanges.



Principle 6

Ecological Recovery Wheel





Delray Beach, Florida



Principle 8

THE RESTORATIVE CONTINUUM

Improving biodiversity, ecological health, and ecosystem services



**REDUCING
SOCIAL
IMPACTS**

**IMPROVING
ECOSYSTEM
MANAGEMENT**

**REPAIRING
ECOSYSTEM
FUNCTION**

**INITIATING
NATIVE
RECOVERY**

**PARTIALLY
RECOVERING
NATIVE
ECOSYSTEMS**

**FULLY
RECOVERING
NATIVE
ECOSYSTEMS**

REDUCED IMPACTS

REMEDICATION

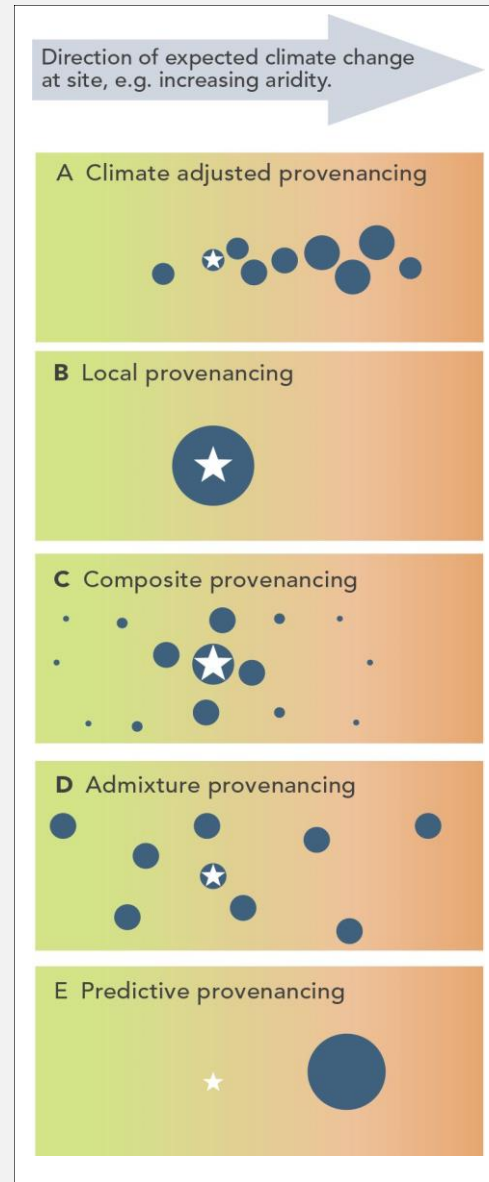
REHABILITATION

ECOLOGICAL RESTORATION



Provenancing strategies for revegetation (reprinted from Prober et al. 2015). The star indicates the site to be revegetated and the circles represent native populations used as germplasm sources. The circle size indicates the relative quantities of germplasm included from each population at the revegetation site.

These strategies can also be applied to animals and soil biota.



Pine Rockland Initiative



The Institute for Regional Conservation

Pine Rockland Initiative



The Pine Rockland Initiative is a key program of the Institute for Regional Conservation (IRC) in Miami-Dade and Monroe counties, Florida. The goal of the IRC Pine Rockland Initiative program is to help protect, restore, and manage the remaining pine rockland fragments and the species that occur within them. We also advocate for "Expanding the Footprint", to increase the total pine rockland area. The program is especially designed to assist landowners and land managers through applied conservation science and research, education and outreach, volunteer opportunities, and on-the-ground activities such as invasive plant control, hardwood reduction, and the protection and recovery of rare species. This is a collaborative program with significant funding from the U.S. Fish and Wildlife Service, and in partnership with Miami-Dade County, Fairchild Tropical Botanic Garden, and many others.

What is a Pine Rockland?

Pine Rocklands are a globally imperiled ecosystem that exists only in southern Florida and parts of the Bahamas. They are home to many rare plant and animal species, including more than a dozen Federally endangered plants and animals. A typical pine rockland is characterized by limestone outcroppings, a canopy of Florida Slash Pine, and a diverse, shrub and herbaceous understory. In South Florida, pine rocklands have all but disappeared outside of Everglades National Park.

Perhaps 2% of the original pine rocklands within Miami-Dade County's urban corridor and in the lower Florida Keys remain. Existing fragments are threatened by habitat destruction, invasive species, fire suppression, and sea level rise.

Pine Rockland Initiative Activities:



Reintroduction of the Natural Fire Cycle



Removal of Invasive Species



Planting of Native Species



The Institute for Regional Conservation

Pine Rockland Initiative

Why Get Involved?

You can help conserve and restore a critically imperiled ecosystem unique to South Florida and the Bahamas that is home to many rare and endangered species.



How Can I Get Involved?

Private landowners, public land managers, students, educators, scientists, nature enthusiasts, and other conservation stewards can get involved in a variety of ways. Contact us for more information about conservation and restoration activities, workshops, and volunteer opportunities.

305-247-6547

pri@regionalconservation.org

www.regionalconservation.org/PRI.asp

Can I Donate to the Pine Rockland Initiative?

Tax deductible donations can be made specifically to the Pine Rockland Initiative on the IRC website at: www.regionalconservation.org or mailed to:

100 E. Linton Blvd. Suite 302B, Delray Beach, FL 33483.

IRC is a 501(c)3 non-profit organization.

We Thank You For Your Support!



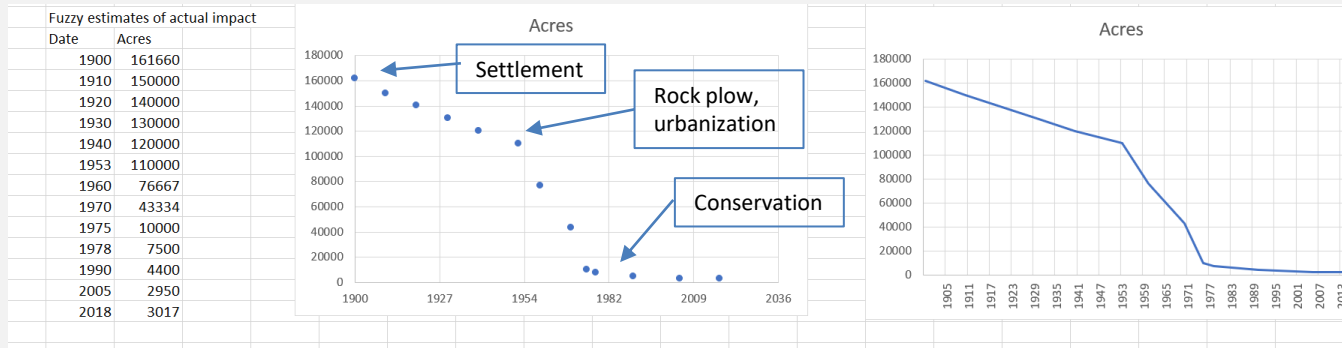
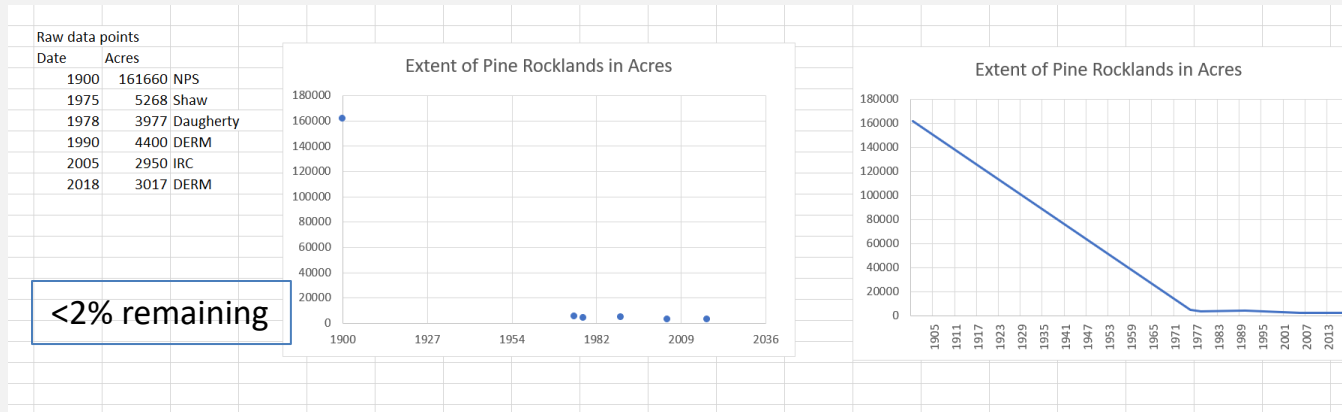
Initiated in 2005, to provide management support for private owners of pine rocklands, specifically invasive species control.

Expanded over the years to include restoration and management of any pine rockland, as well as supporting activities, such as rare species surveys, mapping, ecological restoration design, and outreach.

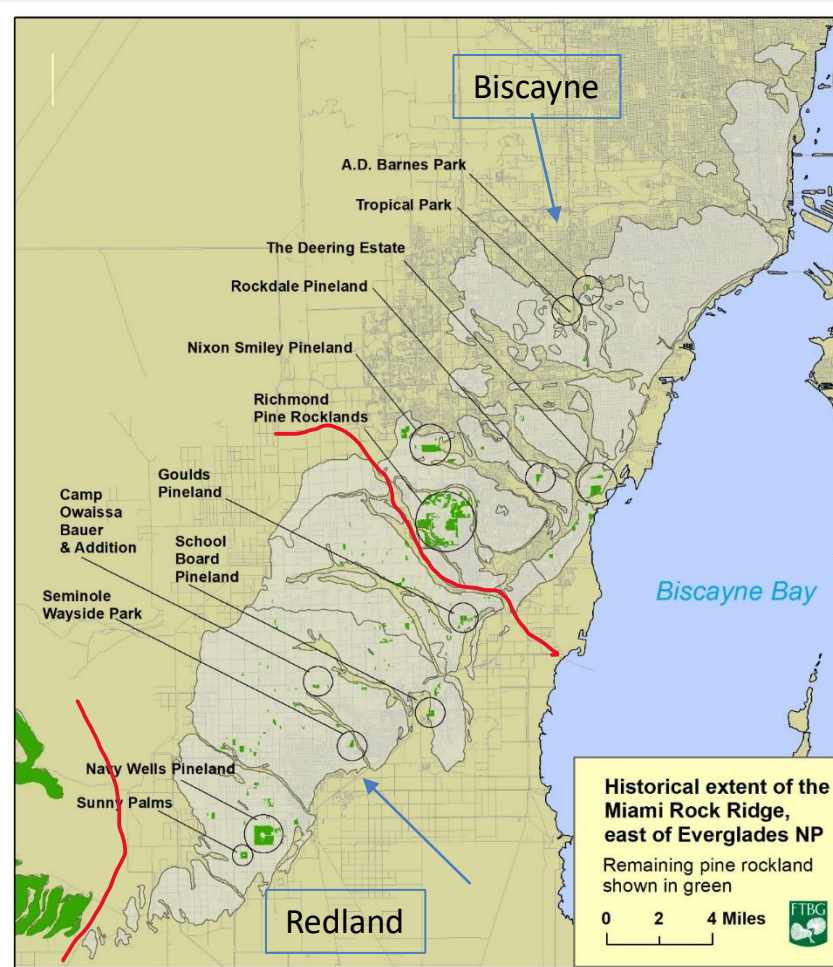
Primary funding has come from US Fish and Wildlife Service, Coastal and Partners Programs.

Collaborators include Miami-Dade County, Fairchild Tropical Botanic Garden and others.

Extent of Pine Rocklands outside of Everglades National Park From Loope et al. (1979; NPS) and subsequent

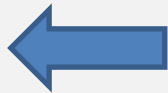


Network of Public and Private Conservation Areas



Adapted from FTBG

Long Pine Key



Miami Rock Ridge Pinelands

(Gann 2018 unpublished)

Vascular Plants

Estimated native taxa – 420

Unique Taxa

Long Pine Key – 4

Redland and Biscayne - 119

Redland – 5

Biscayne – 52

S FL Endemics*

In Pine Rocklands – 28

On MRR only – 11

Outside LPK only - 7

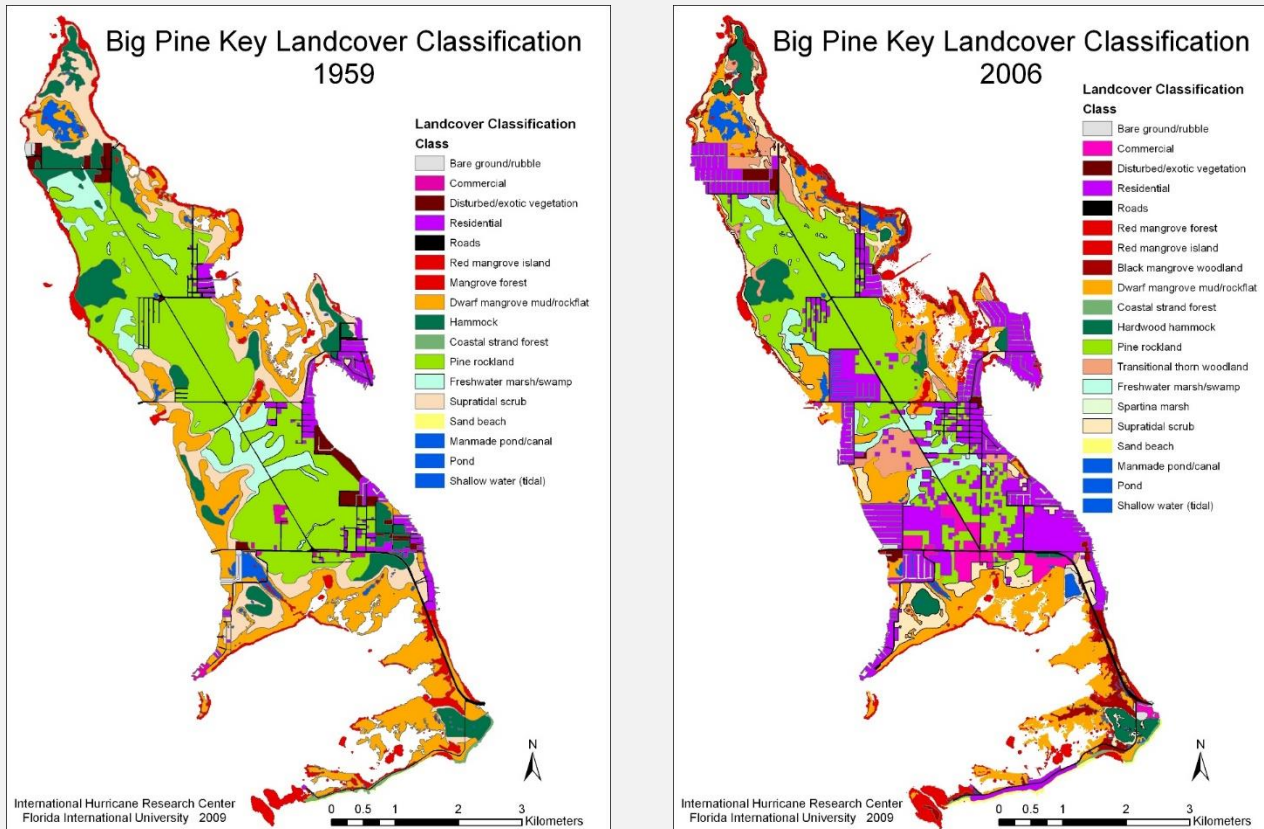
Redland only – 2

Biscayne only – 2

Drivers of Degradation



Losses on Big Pine Key



From Zhang K, Ross M, Ogurcak D, Houle P. 2010. Lower Florida Keys Digital Terrain Model and Vegetation Analysis for The National Key Deer Refuge. U.S. Fish and Wildlife Service National Key Deer Refuge, Big Pine Key, FL.

Conference Home

- Registration
- Abstracts
- Schedule
- Photo Gallery
- Info for Presenters
- Meals/Transport/Lod...
- Organizers
- Conference Map
- Connect to Protect Network



2018 PINE ROCKLAND WORKING GROUP CONFERENCE:
EXPANDING THE FOOTPRINT
FEATURING FIU'S TROPICAL BOTANY SYMPOSIUM
& FAIRCHILD'S CONNECT TO PROTECT NETWORK
October 30 - November 4, 2018
Meeting at Fairchild Tropical Botanic Garden

We Must Aspire to More!

You're Invited!
Pine Rockland Business Plan Team Meeting and Workshop
Thursday October 17th, 2019 from 10 AM- 3 PM
The Florida Room at Zoo Miami
12400SW 152nd St, Miami, FL 33177
*Light snacks and refreshments will be provided. Lunch will be available for purchase at nearby Zoo Miami restaurants.
Be sure to bring a reusable water bottle.*



A Pine Rockland Business Plan is being created for conservation of the pine rockland ecosystem in Miami-Dade County and the Florida Keys. This plan will augment and support existing conservation plans and strategies in a way that quantifies and prioritizes the conservation actions that need to be taken, and the costs to improve pine rockland extent and condition throughout its range.

We'll need some help from folks like you from the greater pine rockland community to develop this plan. Some topics to be covered at this initial meeting will include business planning goals, approach, timeline, and opportunities for collaboration on data needs and acquisition, as well as site-by-site condition scoring.

We hope you can join us as we begin this endeavor!

Please Contact Sarah Martin at sarah.martin@tnc.org or call 561-744-6668 ext. 102 For More Information on Attending



1) Re-Think what is a Pine Rockland



2) Protect All Intact and Restorable Pine Rocklands



Miami-Dade County restored overgrown pine rockland at Larry and Penny Thompson Park. Patrick Farrell - Miami Herald Staff

OP-ED

Miami-Dade Commission should not betray our environmental legacy by destroying pine rocklands



BY JASON CLAYBORN
jclay010@fiu.edu



3) Don't Fragment, Defragment



ENVIRONMENT

Miami Wilds water park lease gets green light from Miami-Dade county commissioners

Parking Lot at Future Miami Wilds

“From a policy perspective, we cannot assume it’s ‘already gone’,” said Botanist George Gann, who has worked on projects to restore pine rockland habitats and serves as president and chair of the Board of The Institute for Regional Conservation. **“I look at it as pine rockland with asphalt over it.”** Miami Herald, 2020

4) Burn Wherever and Whenever Possible



Pine Ridge Sanctuary
Redland, Florida

5) Support both Public and Private Conservation Efforts



IRC's Pine Rockland Initiative
Private Pine Rockland Owners' Summit, October 2018

6) Document Potential for Natural Recovery



Figure 91. Bruce Holst of Manis Selby Botanical Gardens and EVER Botanist Jani Sadle showing length of *Sporobolus clandestinus* inflorescence near Otsean Hammock in EVER, 2012.

153

Long Pine Key, Everglades National Park



Former Scraped Site, SOCSOUTH

7) Identify All Restoration Opportunities

Restoration Opportunities

refers to the restoration of both **the extent** (e.g. expanding the footprint) and **the quality** (e.g., integrity) of pine rocklands, including degraded or “transitional” pinelands not currently measured.

What do we really have?

What do we really want?

CHANGING THE CONVERSATION

Is this Destroyed or a Restoration Opportunity?



Florida City, 2018



8) Support Restoration in the Urban Zone

FTBG FAIRCHILD TROPICAL BOTANIC GARDEN
Exploring, Explaining and Conserving the World of Tropical Plants

Share & Connect

CONNECT TO PROTECT NETWORK

Fairchild's Connect to Protect Network enlists South Florida residents (Miami & The Keys) to plant native plants in order to connect the few remaining isolated fragments of pine rockland - a globally critically imperiled plant community. Planted areas can include private yards, rights-of-way, and public lands such as schools or community parks. Installing native pine rockland plants increases the probability that bees, butterflies and birds can find and transport seeds and pollen across developed areas that separate pine

Related links
Fairchild Research Publications
Fairchild's Conservation Team
Connect to Protect on Facebook



Natives For Your Neighborhood
Conservation of Florida plants, animals, and ecosystems

Home | NFYN Home | Citation | About NFYN | Map | Online Resources

A Resource to Help Change a Backyard Hobby for a Few into a Powerful Conservation Tool for Many.

Here you can learn how to turn simple gardening into habitat restoration by using plants that are native to your specific area. This website will provide you with the information you need to do that. By planting native plants and recreating natural habitats that are unique to your area, you will make a valuable contribution to the conservation and restoration of South Florida's natural heritage!

Find out About the Unique Plants, Habitats, and Wildlife in Your Area.
Choose what you would like to search:

Florida Zip Code By County Plant Animal








Search By Florida Zip Code

Start by entering a 5-digit South Florida ZIP Code here:

<https://www.flawildflowers.org/>

Pine Rockland Restoration Guidance

Natives For Your Neighborhood Pine Rockland Plants for ZIP Code 33170

	<u>Brownhair snoutbean</u>	<u>Rhynchosia cinerea</u>
	<u>Butterflyweed, Butterfly milkweed</u> ▲	<u>Asclepias tuberosa</u>
	<u>Candyweed, Showy milkwort</u>	<u>Polygala violacea</u>
	<u>Chapman's goldenrod</u> ▲	<u>Solidago odora var. chapmanii</u>
	<u>Clasping aster, Scaleleaf aster</u> ▲	<u>Symphotrichum adnatum</u>
	<u>Coastal plain hawkweed</u>	<u>Hieracium megacephalon</u>
	<u>Coontie, Florida arrowroot</u> ■	<u>Zamia integrifolia</u>



GUIDELINES FOR PLANTING A PINE ROCKLAND IN MIAMI-DADE COUNTY, FLORIDA

George D. Gann, Jennifer Possley,
Steven W. Woodmansee



Version 2.0
October 2020

Why plant a pine rockland? Pine rockland is a critically imperiled ecosystem that has been heavily impacted by urban development and agriculture. Found only in South Florida and the Bahama Archipelago, less than 2% of the original pine rocklands remain in Miami-Dade County outside of Everglades National Park. Pine rocklands of the lower Florida Keys have also been heavily impacted by development, sea level rise, and flooding from hurricanes and tropical storms. Creating a pine rockland is not easy or simple, but it can be extremely rewarding. Pine rocklands provide wonderful habitats for native plants and wildlife, including many species of very rare plants, butterflies, bees and other pollinators, and songbirds. If well-planned and managed they can also be aesthetically pleasing.



9) Don't be Afraid to Trial New Tools and Techniques



Skid Steer with Forestry Mulcher



Billy Goat Brush Cutter



Galactia smallii, *Linum arenicola*, *Croton linearis* ~6 weeks after conservation mowing



Saw palmetto reduction at Pine Shore Pineland Preserve

Direct Seeding Trials + Modified Applied Nucleation Concepts SOC SOUTH



Spring 2019



Spring 2020



10) Develop Measurable Targets and Document Success!



1. BASELINE FOR PINE ROCKLAND RECOVERY - MIAMI DADE PINE ROCKLANDS OUTSIDE OF EVERGLADES NATIONAL PARK (DRAFT)

2. ADEQ 5009, George Ivers, et al.

3. SITE: All Pine Rocklands combined

4. DATE: 2002-7-20

ATTRIBUTE CATEGORY	BASELINE	RECOVERY TARGET (e.g., INDICATORS)	EVIDENCE FOR RECOVERY LEVEL
ATTRIBUTE 1: Absence of threats			
Over-utilization	0 5	Cessation of habitat destruction	
Invasive species (external)	0 4	Reduction of seed rain, invasion	
Contamination	1 4	Reduced contamination (e.g., dumping, insect spraying)	
ATTRIBUTE 2: Physical conditions			
Substrate physical	2 5	No dumped material; see Indicators table	
Substrate chemical	4 5	No soil contamination	
Water (theme physical)	1 4	No saltwater intrusion where possible; no chemical pollutants affecting root zone	
ATTRIBUTE 3: Species composition			
Desirable plants	2 5	see Indicators table	
Desirable animals	2 5	Diversity of fauna; carnivores, pollinators	
No undesirable species	0 4	No exotic, invasive or noxious plants or animals; see also Indicators table	
ATTRIBUTE 4: Structural diversity			
All strata present	2 5	See Indicators table	
All trophic levels	2 4	Herbivory, predation	
Spatial mosaic	2 5	Presence of SPINE, palm, hardwood, open habitats	
ATTRIBUTE 5: Ecosystem function			
Productivity, cycling etc (flora)	2 5	Flora every 2-7 years	
Habitat & interactions	3 4	Presence of key foundation plants for pollinators	
Resilience, recruitment etc	2 5	Pine, rare species recruitment	
ATTRIBUTE 6: External exchanges			
Landscape flows	1 3	Presence of native pine, native carnivores/birds	
Gene flows	1 3	Presence of native pine, native carnivores/birds	
Habitat links	1 3	Ecotones with well-functioning hammocks	

31. See also: Givner et al. 2019 Tables 3 and 4.

Update recovery sheet

Template Source: Ryan S. McDonald, T. Walter, R. et al. (2013) Invertebrate principles and standards for the protection of biological resources, Second edition, Restoration Ecology #1511-1514, doi: 10.1111/ra.12015.
 Article: Little Gordo Mtns. Excel file maintained by Simone Pedini.

SOCSSOUTH



7-2018



1-2019



7-2019



1-2021

Restoring the Gold Coast

Where Did the Native Biodiversity Go?



Southern Palm Beach County, circa 1970

What We Have Done Well



move sand



plant sea-oats and a few other species



recover sea turtles

A diverse dune is a healthy dune, and our first line of defense against sea level rise





The Delray dune is loaded with rare plants.





2015 Survey and Assessment of Delray Beach

101 native dune species
were recorded, but 7
previously recorded are
were possibly missing

An additional 75 species
within native range were
identified as missing and
could be restored in area.

Our current list includes 235
native dune species in
southern Palm Beach
County.





Focal Gold Coast Species

Beach ragweed

Ambrosia hispida

- Florida Keys north to Brevard County, but nearly extinct along Florida east coast.
- Introduced at Atlantic Dunes Park (2016) and Delray Municipal Beach (1993; still present).



Beach Clustervine

Jacquemontia reclinata

- Federally endangered. Miami-Dade to Martin County (endemic).
- Reintroduced to Atlantic Dune Park (2016) and introduced to Delray Municipal Beach (2002-2006; still present).



Beach-tea

Croton punctatus

- Scattered and rare in southeastern Florida. Not common on renourished beaches.
- Present at Atlantic Dunes Park and Delray Municipal Beach. Plants added in 1995.



Pineland Croton

Croton linearis

- Florida Keys to St. Lucie County. Nearly extinct north of Miami-Dade County. Sole larval host for two federally endangered and endemic butterflies.
- Planted at Delray Municipal Beach (1995) but introduction failed.



Bartram's Scrub-hairstreak

Strymon acis bartramii

- Federally endangered. Monroe and Miami-Dade counties; extinct in Broward and Palm Beach counties.
- Larvae feed only on Pineland croton.



Florida prairieclover

Dalea carthagenensis var. *floridana*

- Federally endangered. Southern mainland north to Palm Beach and Collier counties. Extinct in Palm Beach County.
- Collected in the Palm Beach area only in 1895 and 1918.

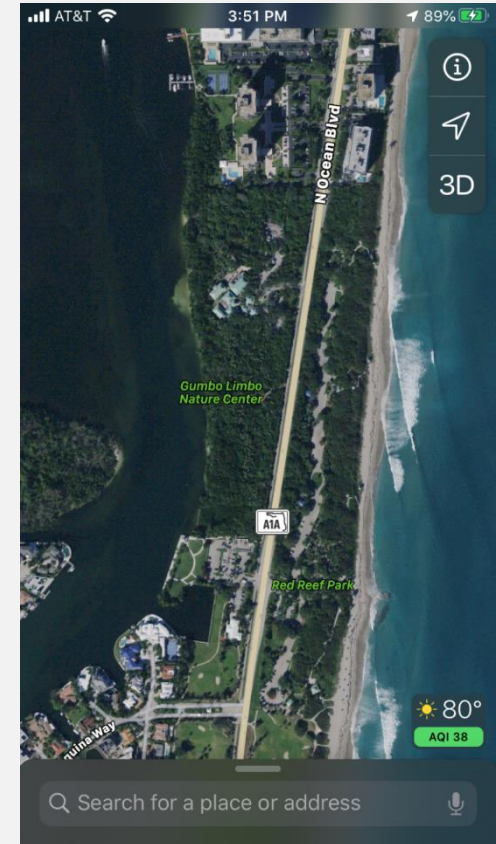


June 2019 Rapid Assessment Town of Ocean Ridge

George Gann, Kimberlee Duke Pompeo,
Commissioner Phil Besler, Lieutenant Scott McClure



Some Key Areas Coastal Forests Protected



And Some Grassy Areas Intersect Those Forests



But Coastal Strand (Shrub Zone) Heavily Impacted



Lighthouse Point Park, Volusia County



Ocean Ridge, Palm Beach County

Coastal strand is being overwhelmed or destroyed



Perception Weighted Toward Forests

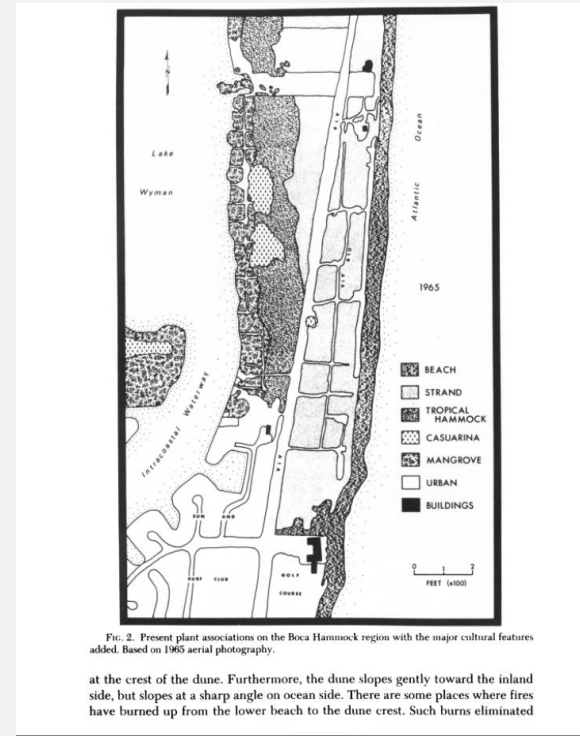


FIG. 2. Present plant associations on the Boca Hammock region with the major cultural features added. Based on 1965 aerial photography.

at the crest of the dune. Furthermore, the dune slopes gently toward the inland side, but slopes at a sharp angle on ocean side. There are some places where fires have burned up from the lower beach to the dune crest. Such burns eliminated

<https://www.jstor.org/stable/2432006>

Seagrapes and Biodiversity



A workshop contributing to understanding the issues behind seagrape trimming, ecological restoration, and coastal conservation





Seagrasses are native to this ecosystem, but not dominant, or event abundant.

Building a Coalition Since 2018

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Opportunities



Areas of Outside of Scope



Areas with Poor Engineering



Areas of Active Erosion

RGC Events



Professional Restoration Crew

In collaboration with Fairchild Tropical Botanic Garden, we are restoring beach clustervine habitat at South Beach Park and Red Reef Park in Boca Raton.



2014



Before



After

50 species planted



Seeds and plants collected

Resources for Private Dune Owners

Ad Images

Biodiversity Starter Kits



The Institute for Regional Conservation
Written by Morgan Murphy (7) · May 4 at 4:06 PM

Enhance your coastal garden or beach dune landscape with a starter plant kit from the IRC. Each kit comes with hand-selected native plants that will help restore biodiversity in your backyard. For residents of south Palm Beach County.



REGIONALCONSERVATION.ORG

View The Plant Kits

Including butterfly kits!

Shop Now



The Institute for Regional Conservation

BIODIVERSITY STARTER KITS



As part of our Restoring the Gold Coast Program, IRC is offering native biodiversity starter kits for gardens on barrier islands in southern Palm Beach County.

Each kit comes with hand-selected native plants perfect for enhancing your native beach dune system or coastal garden. This service helps make the restoration of native habitats on barrier islands cost effective and time efficient.

What Each Starter Kit Contains

A single kit contains five native plants in 4" to 3-gal. containers, including at least one rare species not readily available on the open market. A double contains 10 native plants. Prices start at \$60 for DIY kits.

Kits Are Available For:

- Beach dunes and coastal grasslands
- Coastal strand and shrublands (back dune)
- Tropical hammock forests and coastal gardens
- Butterfly attracting kits for a wide variety of coastal habitats

How You Can Get Your Kit

We will be offering a monthly pickup service of these kits. Delivery and planting can be arranged for an additional fee. If you're interested in purchasing an IRC Biodiversity Kit, please visit our website at: regionalconservation.org/donationrgc.html

Thanks to Modsnap Design & Marketing

Four Larval Hosts – 10 Coastal Butterflies

Zebra Heliconian



Cassius Blue



Large Orange Sulphur



Martial Scrub-Hairstreak



Common Buckeye



Gray Hairstreak



Phaon Crescent



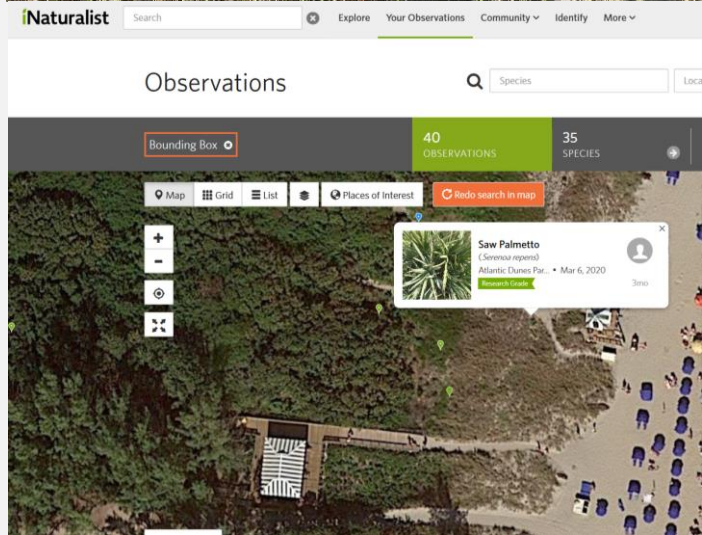
White Peacock



Gulf Fritillary



Julia Heliconian



Restoration design. Bringing coastal strand east by using cues from natural recruitment.

Discoveries and Recovery

Monthly Conservation Notes

Biodiversity Explosion in Delray Beach

Since 2016 we have been working with dozens of volunteers and collaborators to reduce invasive species and restore native biodiversity at Atlantic Dunes Park (ADP) in Delray Beach. Starting as part of our Green Delray program, Atlantic Dunes Park is now one of the biodiversity hot spots in our Restoring the Gold Coast program. See a list of plant species at the park [here](#).

Work has been slow but steady, but over the last two years native plants have been showing up that have not been recorded there before, or which have not been seen at the park in decades, or which are recruiting and spreading into new areas. It is a remarkable example of the power of natural recovery in response to sound ecological restoration practice - in this case the restoration of coastal strand, the most impacted upland ecosystem in coastal Palm Beach County.



Commelina erecta, or whitemouth dayflower, has recruited en masse in the back dune just east of the seagrape line.



Solanum bahamense, or Bahama nightshade, had been buried under seagrapes, vines, and invasive species. It emerged in 2020.

On Friday, I was able to go back to ADP with four ecological restoration practitioner colleagues to follow up on some work that was delayed due to the shutdown. We are not yet ready to hold volunteer events, but we are moving the restoration forward with a professional crew in cooperation with the City of Delray Beach. Once again we found native plants that had not been recorded before, emerging from under what had been a smothering canopy of Brazilian-pepper and seagrape. In celebration of getting back outside and enjoying springtime, I am posting pictures of some of the cool native plants celebrating the restoration at Atlantic Dunes Park. Enjoy!

George Gann

Founder and Executive Director



We recorded *Piriqeta cistoides* subsp. *caroliniana*, or pitted stripeseed, for the first time on coastal dunes in Palm Beach County in 2019. This species is normally found growing in pine forests.



Neptunia pubescens, or tropical puff, is a very rare element of coastal dunes in southern Palm Beach County. We first recorded this at Atlantic Dunes Park on Friday.

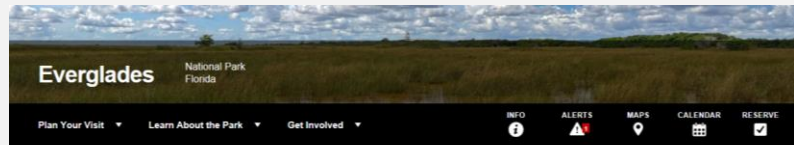


This is one of the very few authentic historical populations of *Salvia coccinea*, or tropical sage, in South Florida. Every spring the red flowers barely poke out from the protecting shrubs of the coastal strand.

Natives For Your Neighborhood



We Must Restore
Degraded Ecosystems, Small and
Large, Fragmented and Connected



[NPS.gov](#) / [Park Home](#) / [Learn About the Park](#) / [Science & Research](#) / [Research Programs](#) / [Comprehensive Everglades Restoration Plan \(CERP\)](#)

Comprehensive Everglades Restoration Plan (CERP)

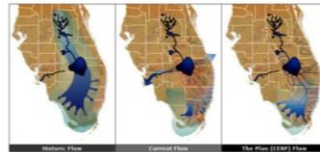


Image Courtesy of EvergladesPlan.org

The CERP was authorized by Congress in 2000 as a plan to "restore, preserve, and protect the south Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection." At a cost of more than \$10.5 billion and with a 35+ year time-line, this is the largest hydrologic restoration project ever undertaken in the United States.



Native Plant and Wildlife Data

Florida Native Plant Society

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Native Plants

Learn about native plants!

Click on the links to learn more.

- Native Plants for Your Area
 - Get a list of species appropriate for landscaping in your area. You can explore the entire list, identify species that thrive in specific conditions (soil tolerance, water use, etc.) that provide habitat for butterflies and wildlife, and that are native to your particular area. Descriptors and photographs are provided.
 - Native Plants for Landscaping and Restoration: Plants
 - Attracting butterflies and native pollinators: [Butterflies and Pollinators](#)
 - Attracting Wildlife: [Wildlife](#)
 - Native Plant Communities
- Native plants exist naturally in specific habitats. This page provides general information and photographs of the major natural communities that support plants in Florida.
- Gardens with Native Plants

Find public gardens near your community that have native plants. Most also have non-natives.

FANN
Native Nurseries

Growing, planting and promoting Florida native plants for sustainable landscapes.

Plants | Plant Communities | Professionals | About Us | News | Learn More | Membership

Florida Professionals

- Wholesale Growers
- Landscape Professionals
- Environmental Professionals
- Nursery and Landscape Products
- Commercial Services
- Retail Nurseries

Florida Landscapes

Starting a design? Consider what grows naturally, then find the plants.

Select Your County

or Enter your Zip

Know Your Natives: Navigating the Hamelia Mess

Native Plant Name List
Butterfly Magnet
Attracting Native Plants

In Florida, our native plant stock often performs poorly. Ask your grower about plant/seed origin and check Florida native nurseries for use in Florida. Growers now manage at least two native nurseries in Florida, one which grows most perennials, with flowers that are typically bright orange, and another which grows in excessively well-drained sandhills and swales, with flowers that exhibit more color variation from yellow-orange to orange-red. The products returned may be easier to use in most typical landscape settings.

Find a specific plant

Enter the first few letters of the common or botanical name, then select a plant from the list.

Looking for...

Or choose a plant type below:

or select plant type

Find a nursery or grower

Find a nursery that grows...

See All

Atlas of Florida Plants
Institute for Systematic Botany

Home | Browse By | Search | Specimen Search | ISB | Links | About | References

Liquidambar styraciflua Jump to a section: Classification | Citation | Source | Synonyms | Print

Family: **ALTINGIACEAE**

Species: *Liquidambar styraciflua* L.

Common Name: SWEETGUM

Status: Native, FACW (DEP), FAC (NWP), I (WAP)

Specimens: [View details of USF Herbarium specimens](#)

Classification

Order: SAXIFRAGALES
Family: ALTINGIACEAE
Genus: *Liquidambar*
Species: *Liquidambar styraciflua* L. - SWEETGUM

Citation

Liquidambar styraciflua Linnaeus, Sp. Pl. 999. 1753.

Basionym: **

Type: VIRGINIA: Without data, Kalm s.n. (lectotype: LINN 1134.1). Lectorevised by Winans, Bot. Compositae

Map | Photo Gallery | Browse Photos

Distribution Map: Based on vouchered plant specimens from wild populations, cultivated occurrences are not mapped. View county names by placing the cursor over the map.

Species Distribution Map

Not Vouchered (white)
Vouchered (green)

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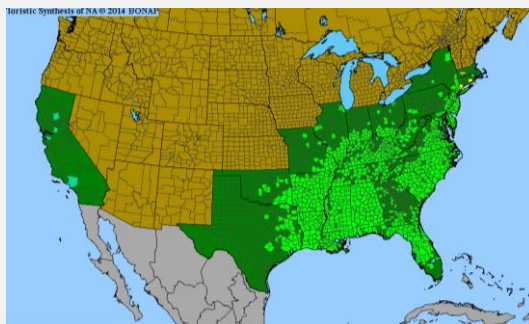
Announcements

Olga Leigh shared an event

Admission: April 28 at 11:17 PM

CUPLET GARDEN

Garden Chat with Mark



Tropical Audubon Bird Board

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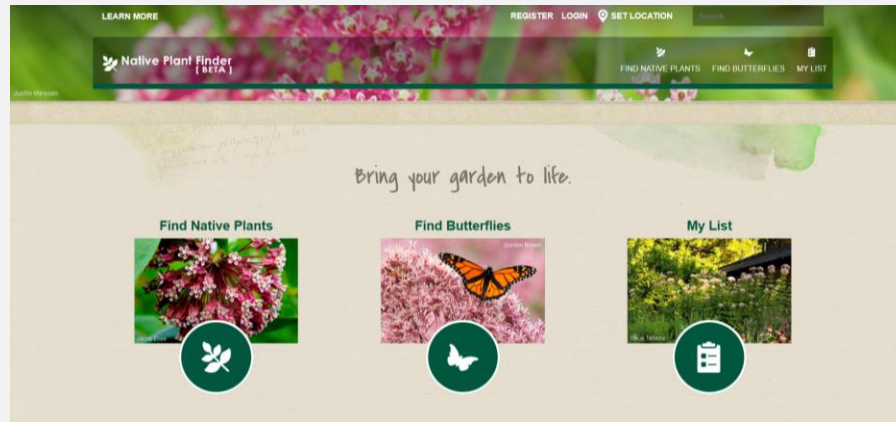
Announcements

Write something...

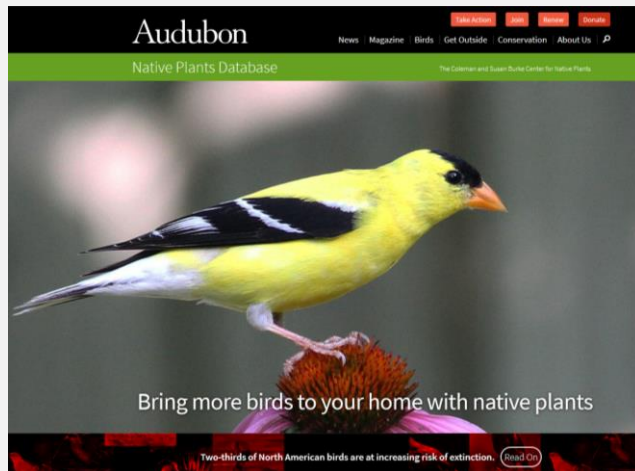
Tropical Audubon Society

1,187 likes

How can we better link national and local resources for native landscaping and restoration?



National Wildlife Federation



National Audubon Society



Plant Agents



Natives For Your Neighborhood

Conservation of rare plants, animals, and ecosystems

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Map

Online Resources

A Resource to Help Change a Hobby for a Few into a Powerful Conservation Tool of Many.

Here you can learn how to turn simple gardening into habitat restoration by using plants that are native to your specific area. This website will provide you with the information you need to do that. By planting native plants and recreating natural habitats that are unique to your area, you will make a valuable contribution to the conservation and restoration of South Florida's natural heritage!

Find out About the Unique Plants, Habitats, and Wildlife in Your Area.

Choose what you would like to search:

Florida Zip Code

By County

Plant

Animal

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Start by entering a 5-digit Florida ZIP Code here:

33444 ×

Find

[Find Native Plants!](#)

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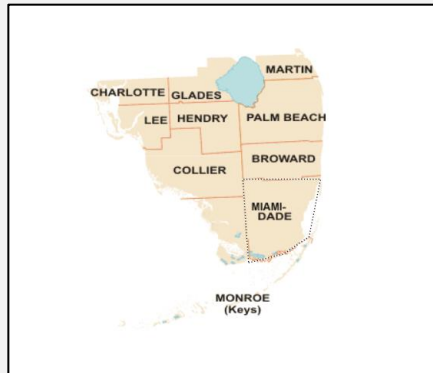


Precise Data Encouraging the Use of Native Species Within Their Native Ranges

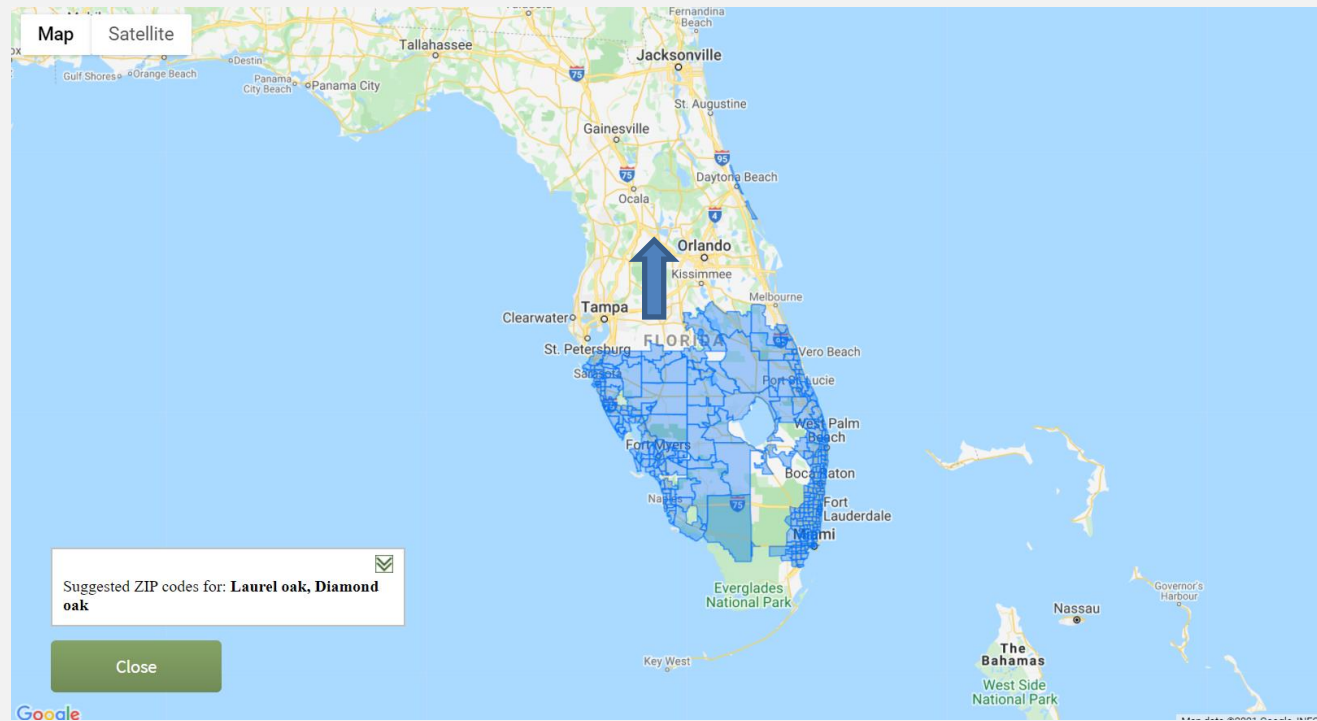
(2020: >76,000 users, >750,000 page views)

Mapping Zip Codes to North

Original Scope



Laurel Oak – Quercus laurifolia



Coming Soon – Floristic Inventory of Central Florida?

Please scroll to the bottom for more images.

Coastalplain staggerbush

Lyonia fruticosa

Ericaceae

General Landscape Uses: Accent shrub.

Availability: Grown by one or two native plant nurseries in central Florida.

Description: Medium erect shrub. Leaves about 1-2 inches long, covered with brown hairs when young.

Dimensions: About 4-6 feet in height. Usually taller than broad.

Growth Rate: Moderate.

Range: South Carolina and Georgia south to Miami-Dade and Collier counties.

 [Map of select IRC data from peninsular Florida.](#)

 [Map of suggested ZIP codes north to Indian River and Manatee counties.](#)

 [Map of ZIP codes with habitat recommendations north to Martin and Charlotte counties.](#)

Habitats: Pinelands and hammocks.

Soils: Moist to dry, well-drained sandy or limestone soils, with or without humusy top layer, acid pH.

Nutritional Requirements: Low to moderate; it can grow in nutrient poor soils or soils with some organic content.

Salt Water Tolerance: Low; does not tolerate flooding by salt or brackish water.

Salt Wind Tolerance: Low; salt wind may burn the leaves.

Drought Tolerance: Moderate to high; plants growing in extremely dry soils may die during extended periods of drought.

Light Requirements: Full sun.

Flower Color: White or pink.

Flower Characteristics: Showy.

Flowering Season: Spring-summer.

Fruit: Inconspicuous capsule.

Wildlife and Ecology: Provides some food and moderate amounts of cover for wildlife. Attracts bee pollinators.



Copyright by: James Johnson, 2014

In habitat, Blazingstar Preserve, Palm Beach County, Florida

[Enlarge](#)



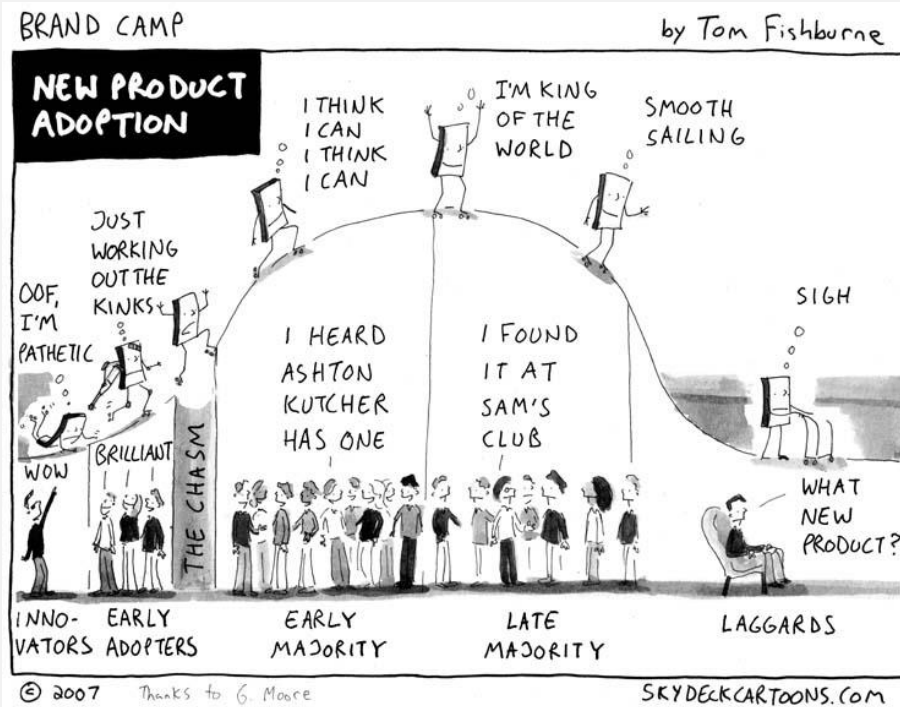
Copyright by: James Johnson, 2014
In habitat, Blazingstar Preserve, Palm Beach County, Florida
[Enlarge](#)



Copyright by: Keith A. Bradley



Play the Long Game



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gann@regionalconservation.org