

The Future of Native Plant Conservation in South Florida: History and Adaptation in the Age of Rapid Change

Naples Chapter of the Florida Native Plant Society
Naples Botanical Garden
March 26, 2019



International Policy Lead

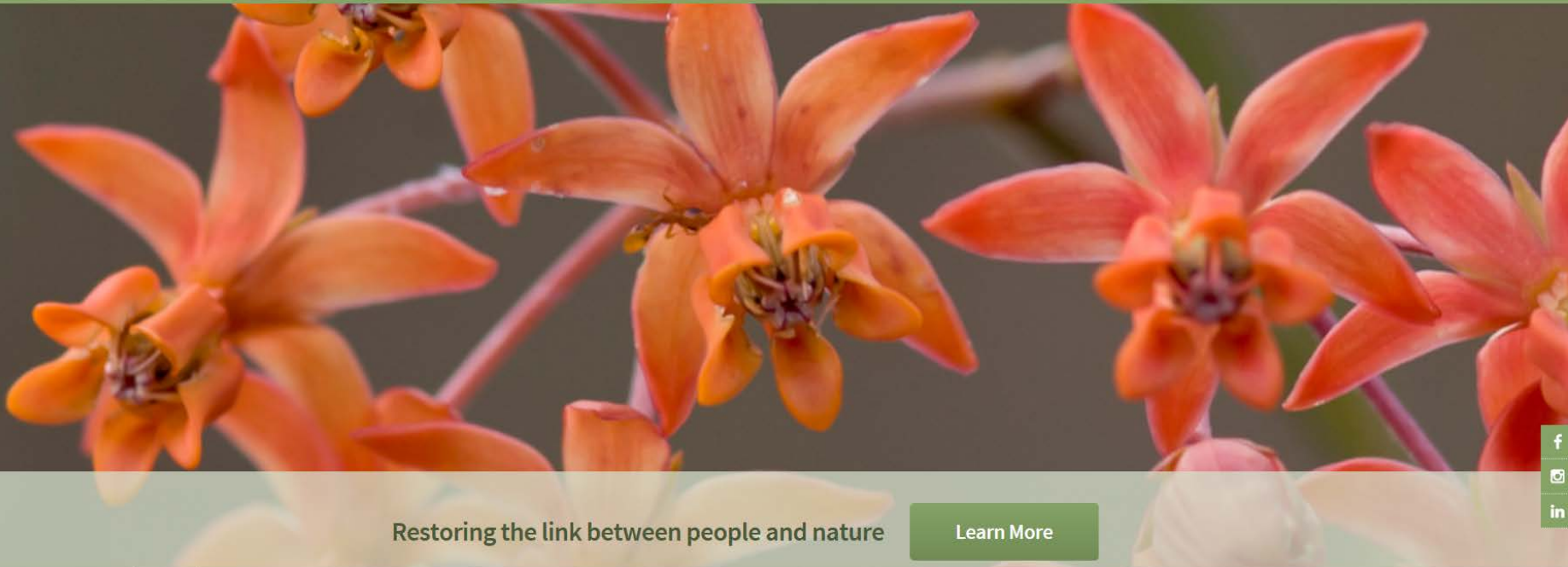
George D. Gann

www.regionalconservation.org

www.ser.org



Chief Conservation Strategist



Restoring the link between people and nature

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Rather than focusing on charismatic animals or plants with narrow global ranges, IRC seeks to protect, restore and manage all biodiversity on a regional basis, and to **prevent regional extinctions of rare plants, animals and ecosystems**. All conservation is ultimately local. **2019 is our 35th Anniversary Year!**



Ecological Restoration: The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.



SER AWARDS FUNDING TO BRAZILIAN RESTORATION PROGRAM

SER and the Sociedade Brasileira de Restauração Ecológica, awarded

Restoration Resource Center
a primer on the new global restoration database

May 24, 2018
1:00PM ET

MAY WEBINAR

Join SER's Levi Wickwire for a tour of the RRC, including an overview of its history as well as a tutorial of how to

30
YEARS

SETTING
GLOBAL
STANDARDS

OVER
2,700
MEMBERS

FIVE
BOLD
STEPS

30TH BIRTHDAY

For the past 30 years, SER has harnessed the knowledge and dedication of practitioners and scientists to restore our

Restoration Ecology

THE JOURNAL OF THE SOCIETY FOR ECOLOGICAL RESTORATION

Volume 26, Number 21, April 2018

SPECIAL ISSUE: INVOLVING SOCIETY IN RESTORATION AND CONSERVATION
GUEST EDITORS: JAC. A.A. SWART, JORIEN ZEVENBERG AND PETER HO



SER advances the science, practice and policy of ecological restoration to **sustain biodiversity, improve resilience in a changing climate**, and re-establish an ecologically healthy relationship between nature and culture. All conservation is also global.

My Objective is to accomplish 3 things

- **Review** what we know about plant conservation and extinctions in South Florida.
- **Explore** the potential direct and indirect effects of future change, and what that means for the ecological and botanical resources in Collier County.
- Have a **conversation** about things we can do to move forward in a positive and meaningful way.



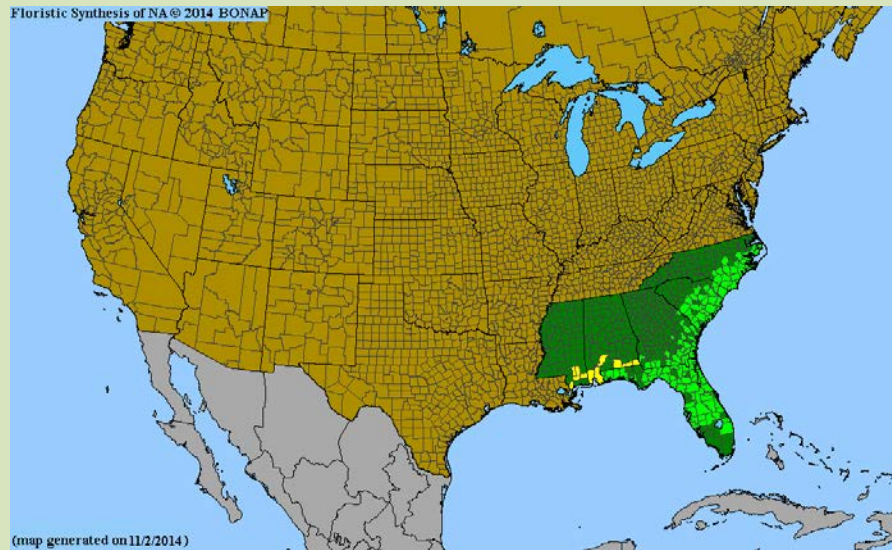
Acknowledgements

- **Andrea Naccarato, Daniel Cox and the Naples FNPS Board of Directors**, for the invitation and financial support of Natives For Your Neighborhood.
- **Chad Washburn** for his contributions on the most pressing native plant conservation concerns in Collier County.
- **All the IRC folks**, past and present, and all our **conservation partners**.
- **Photographers**, including Roger Hammer, Keith Bradley, Shirley Denton, James Johnson and many others.



Context

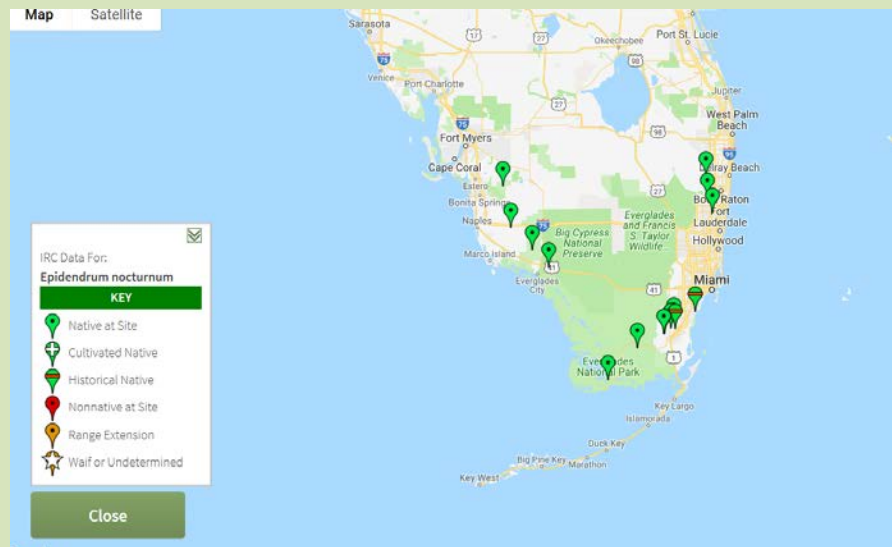
South & North Range Limits in South Florida



Gordonia lasianthus (BONAP.org)



K. Bradley

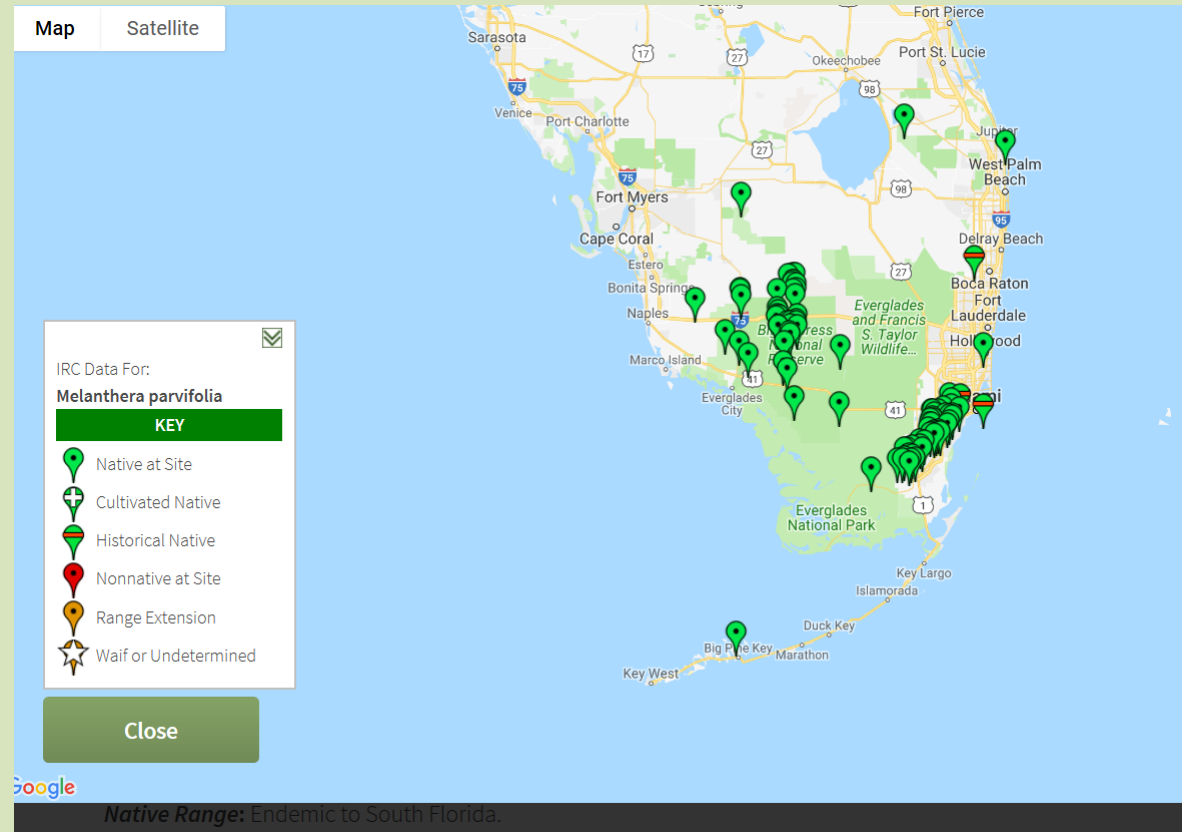


Epidendrum nocturnum (IRC)



R. Hammer

Melanthera parvifolia
Pineland blackanthers



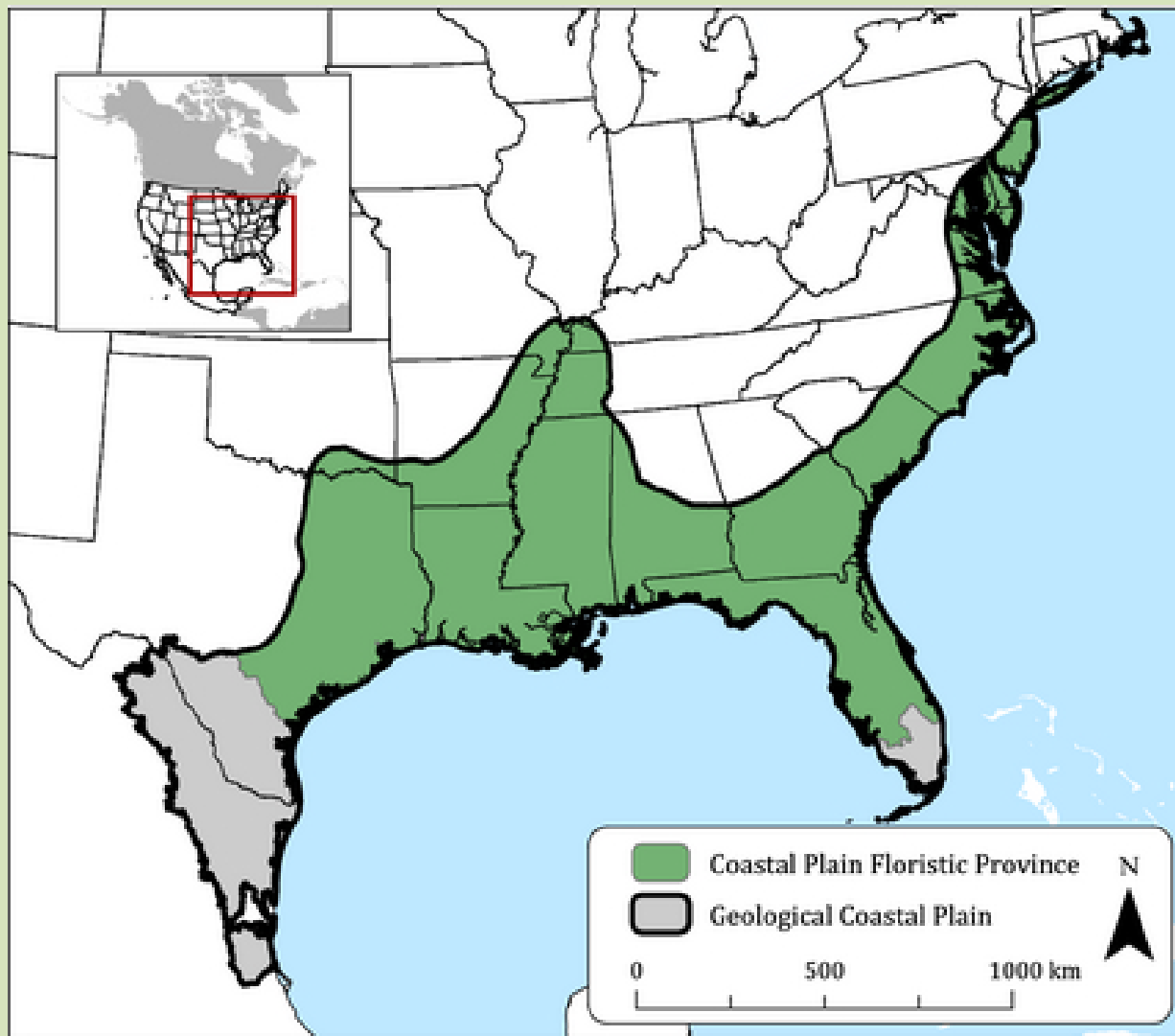
South Florida and Florida Endemics,
>110 taxa in South Florida, of which >30
have been recorded in Collier County.

Only one taxon is known to be endemic to
Collier County – *Lechea lakelae*, now
presumed extinct.

Conservation Geography of South Florida

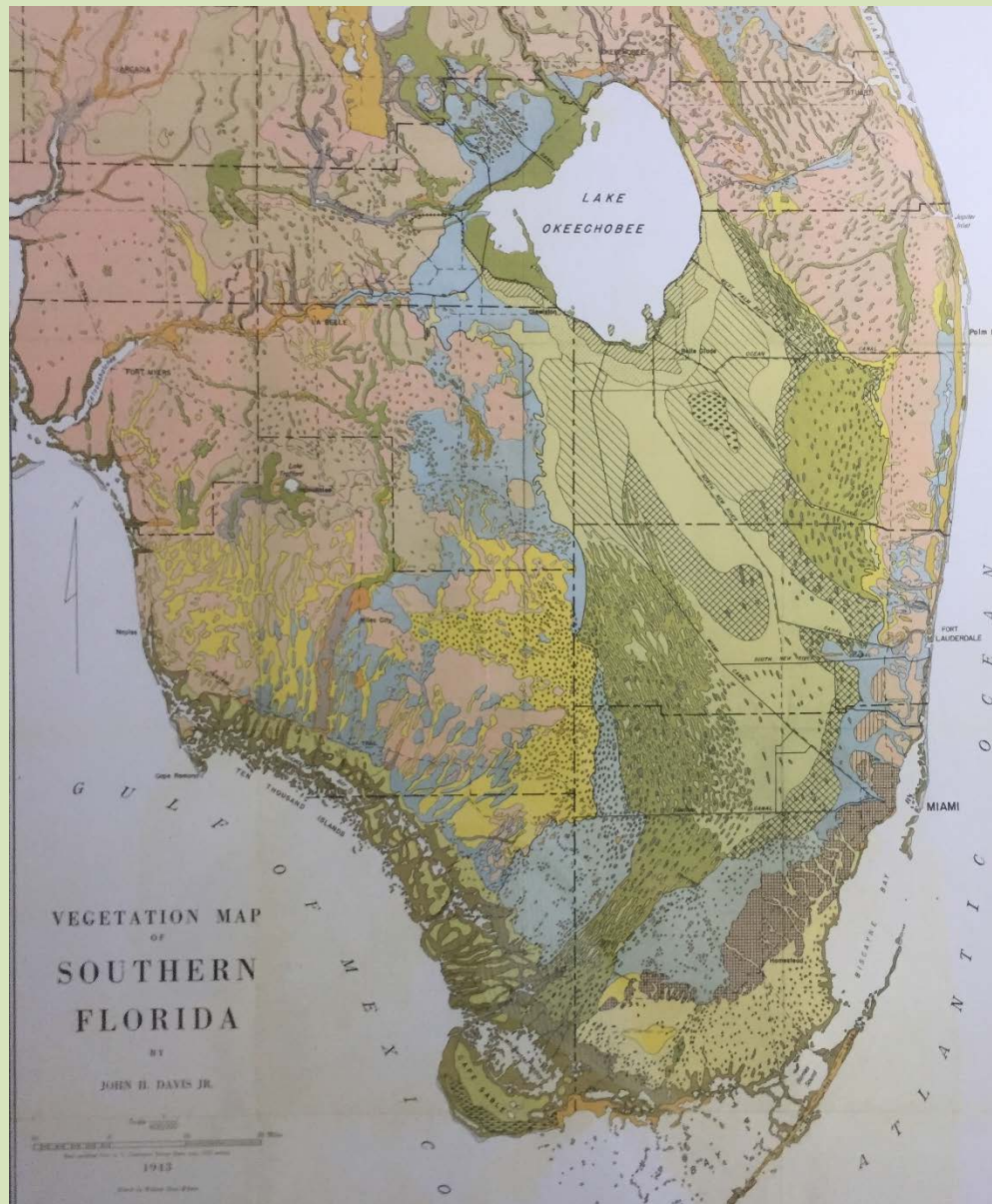


From: Myers et al. 2000. Biodiversity Hotspots for Conservation Priorities. *Nature*. 44% of plants and 35% of vertebrate animals in 25 hotspots covering 1.4% of global land area.

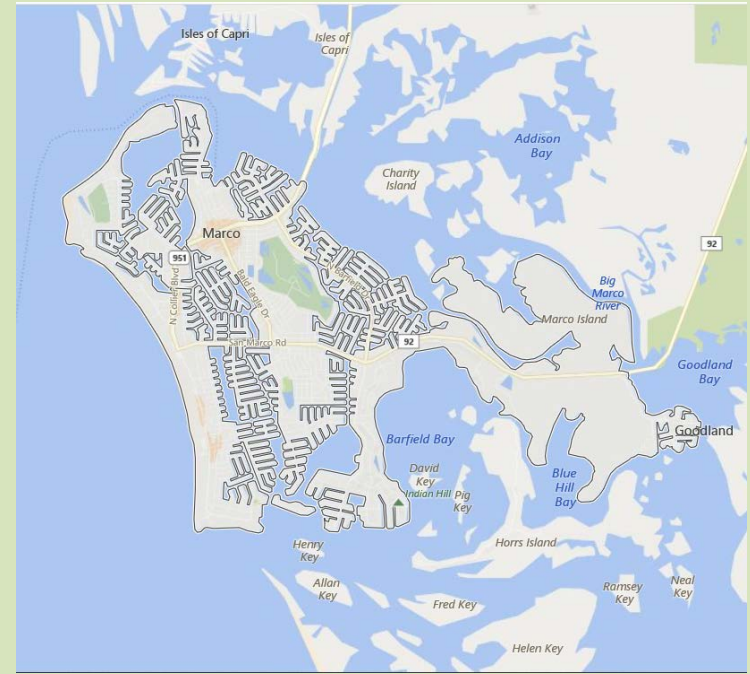
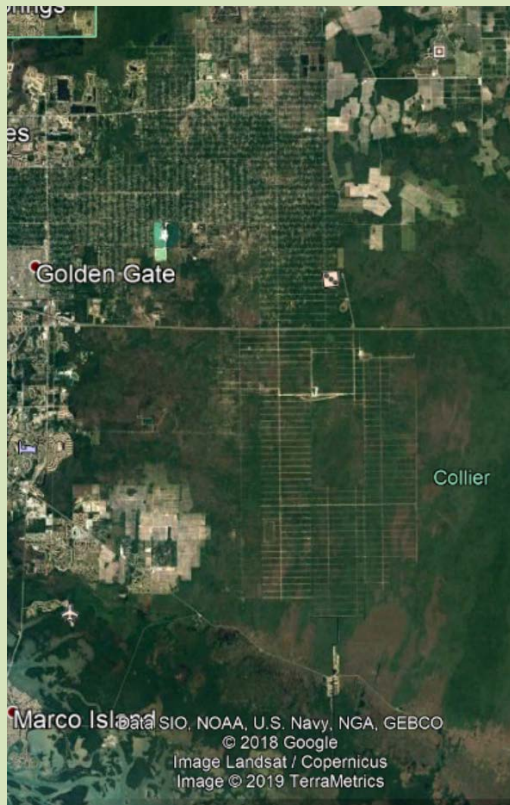


North American Coastal Plain Global Hotspot

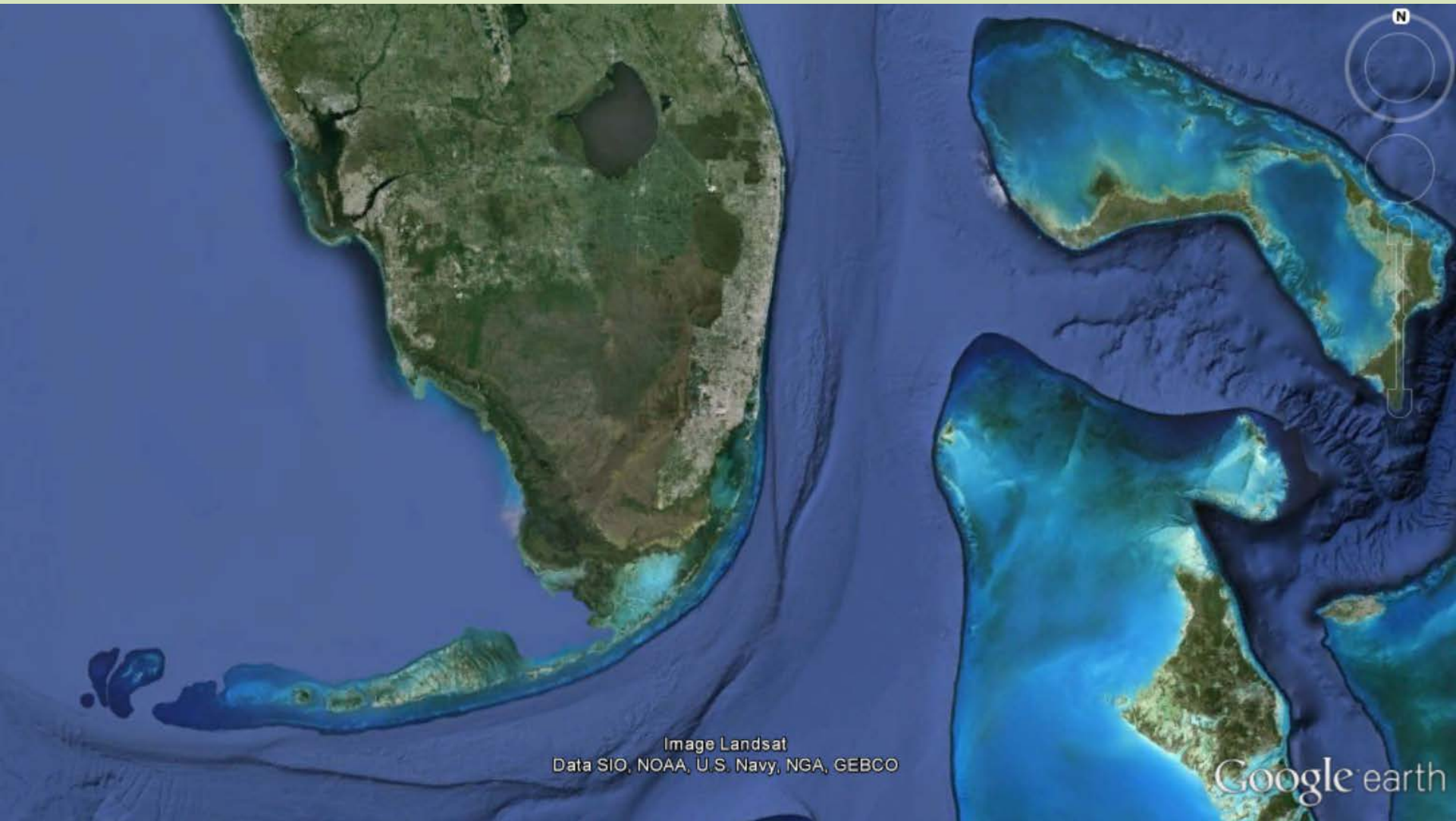
Noss et al. 2014



Davis, 1943



- Hydrological transformation
- Coastal development & erosion
- Destruction of critical upland habitat in the interior



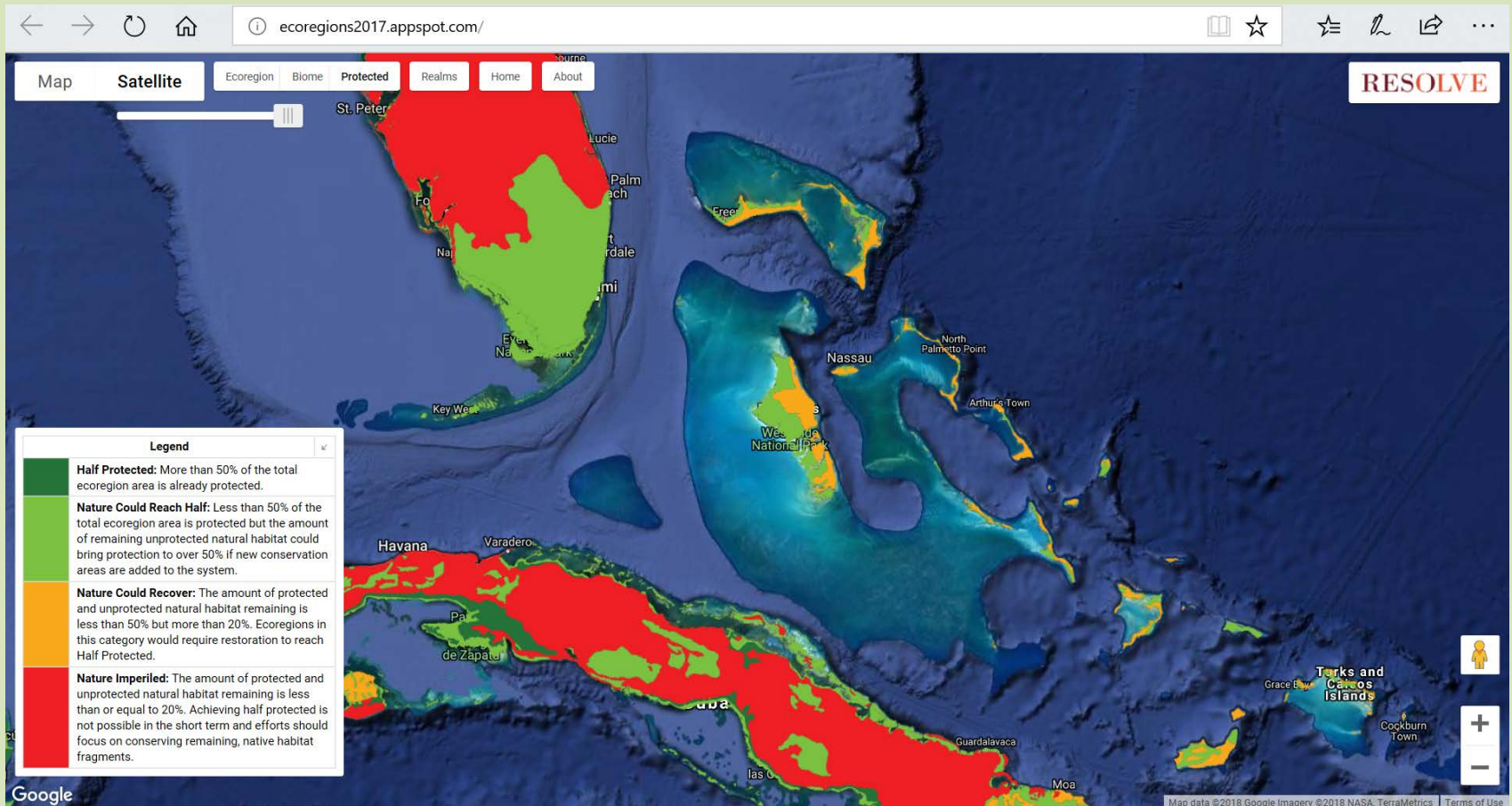
What we have to work with

>50% of region in conservation; United Nations Convention on Biological Diversity (CBD) 2020 Protected Areas Target = 17%. So everything should be great – but its not.



Nature Needs Half

846 Ecoregions, Protect 50% by 2050



The Floristic Inventory of South Florida

The Floristic Inventory of South Florida 1995 – present

The Institute for Regional Conservation
Floristic Inventory of South Florida Database Online

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Plants of South Florida - Plants by Conservation Area - Plants by County - Plants by Habitat
Quick Search - Advanced Search


Cyrtopodium punctatum (L.) Lindl.
Cowhorn orchid, Cigar orchid

Family: Orchidaceae
Group: Monocot
Substrate: Epiphyte
Habit: Herb
Arrestation: Perennial

Native Range: South Florida, Greater Antilles (not Jamaica), Central America and South America.
Native/Genus Global Status: **Secure**
State of Florida Status: **Endangered**

Florida Natural Areas Inventory State Status: **Critically Imperiled**
JAC SOUTH FLORIDA State: **Critically Imperiled**
SOUTH FLORIDA Occurrence: **Present**
SOUTH FLORIDA Native Status: **Native**
SOUTH FLORIDA Cultivated Status: **Cultivated**

Comments: This was ranked as imperiled in Rare Plants of South Florida (Gentry et al. 2002), but was re-ranked in 2013 based on a reassessment of the number of plants and occurrence confirmed as present (see vascular plant occurrence management concerns in Conservation National Park, Gentry et al. 2014). It was then ranked as presumed extirpated in the Monroe County State, but has recently been rediscovered there at John Pennekamp Coral Reef State Park. See visit our Natives for Your Neighborhood website for more information.



Copyright by: Keith A. Bradley

NEW LINKS TO FLORISTIC WEBSITES

Floristic Inventory of the Florida Keys
Florida Institute of Conservation
Puerto Rico
Florida of the West Indies
Ecology of the Woodlands of the West Indies
TROPICOS.ORG
GRF.org

Other data on *Cyrtopodium punctatum* available from:

Cyrtopodium punctatum has been found in the following 14 conservation areas:

Conservation Area	Occurrence	Native Status
A.D. Crook Service Park	Presumed Extirpated	Native
Big Cypress National Preserve	Present	Presumed Extirpated
Big Cypress State Park	Presumed Extirpated	Presumed Extirpated
Cayo Chaco State Park	Present	Native, Cultivated Only
Castell Hammock Park	Presumed Extirpated	Presumed Extirpated
Castro-Gonzalez State Park	Present	Native
Chokoloskee Island	Present	Native
Chokoloskee State Park	Present	Presumably Extirpated
Chrysler Park	Present	Presumably Extirpated
Deering Estate at Cutler	Present	Presumably Extirpated
Everglades National Park	Present	Native
Fakahatchee Strand Preserve State Park	Present	Native
John Pennekamp Coral Reef State Park	Present	Native
Lignumvitae Key Botanical State Park	Reported	Native
Palmetto Bluff State Park	Present	Native


Cyrtopodium punctatum has been found in the following 5 counties:

County	Occurrence	Native Status
Collier County	Native	Native
Lee County	Native	Native
Miami-Dade County	Native	Native
Monroe County (West)	Native	Native
Monroe County (West/Central)	Native	Native

Cyrtopodium punctatum has been found in the following 7 habitats:

Coastal Scrub
Herbaceous
Herb
Riparian
Shrubland
Tropical Swamps
Tidal Swamps

All Images:



Castell Hammock Park

County: Miami-Dade County
Size: 114.79 acres
Latitude: 25.59772° Longitude: -80.45528°
Section: 17 Township: 56 Range: 39
Notes: Historically spelled as Costello Hammock or Costello's Hammock. For a map and more information click [here](#).
Managing Agency: Miami-Dade County Department of Parks and Recreation

There are 379 taxa reported for Castell Hammock Park

Group By Family: [Show Results](#)

Scientific Name:	Occurrence:	Native Status:	Introduced Status:	Invasive Status:	Cultivated Status:	Reference:	Voucher:
Acanthaceae							
Barleria cristata	Present	Not Native, Naturalized	Introduced	Potentially Invasive		2272	2272
Ruellia blechum	Present	Not Native, Naturalized	Introduced	Ruderal		14757	
Ruellia simplex	Present	Not Native, Naturalized	Introduced	Potentially Invasive		14757	
Ruellia succulenta	Present	Native	Not Introduced	Native		14757	
Amaranthaceae							
Achyranthes aspera var. aspera	Present	Not Native, Naturalized	Introduced	Ruderal		14757	
Amaranthus spinosus	Present	Not Native, Naturalized	Introduced	Ruderal		14757	
Anacardiaceae							
Mangifera indica	Present	Not Native, Naturalized	Introduced	Invasive		14757	
Metopium toxiferum	Present	Native	Not Introduced	Native		14757	
Rhus copallinum	Present	Native	Not Introduced	Native		14757	
Schinus molle	Present	Not Native, Naturalized	Introduced	Invasive		14757	
Toxicodendron radicans	Present	Native	Not Introduced	Native		14757	
Anemiaceae							
Anemia adiantifolia	Present	Native	Not Introduced	Native		14757	
Annonaceae							
Annona glabra	Present	Native	Not Introduced	Native		14757	
Apiaceae							
Cyclopemum leptophyllum	Present	Not Native, Naturalized	Introduced	Ruderal		14757	
Apocynaceae							
Anagallis berteri	Present	Native	Not Introduced	Native		14761	
Asclepias curassavica	Present	Not Native, Naturalized	Introduced	Invasive		14757	
Asclepias verticillata	Present	Native	Not Introduced	Native		14761	
Catharanthus roseus	Present	Not Native, Naturalized	Introduced	Ruderal		14756	
Echites umbellatus	Present	Native	Not Introduced	Native		14757	
Metastelma scoparium	Present	Native	Not Introduced	Native		14757	
Aquifoliaceae							
Ilex cassine	Present	Native	Not Introduced	Native		14757	
Ilex krugiana	Present	Native	Not Introduced	Native		14757	
Araceae							
Epipremnum pinnatum	Present	Not Native, Cultivated Only	Not Introduced				
Epipremnum pinnatum cv. Aureum	Present	Not Native, Naturalized	Introduced	Invasive		14757	
Monstera deliciosa	Present	Not Native, Cultivated Only	Not Introduced	Cultivated Only	Cultivated	14756	

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?

Plants of South Florida · Plants by Conservation Area · Plants by County · Plants by Habitat
Quick Search · Advanced Search

Please scroll to the bottom for more images.

Eryngium aromaticum Baldwin
Fragrant eryngium, Fragrant Eryngo

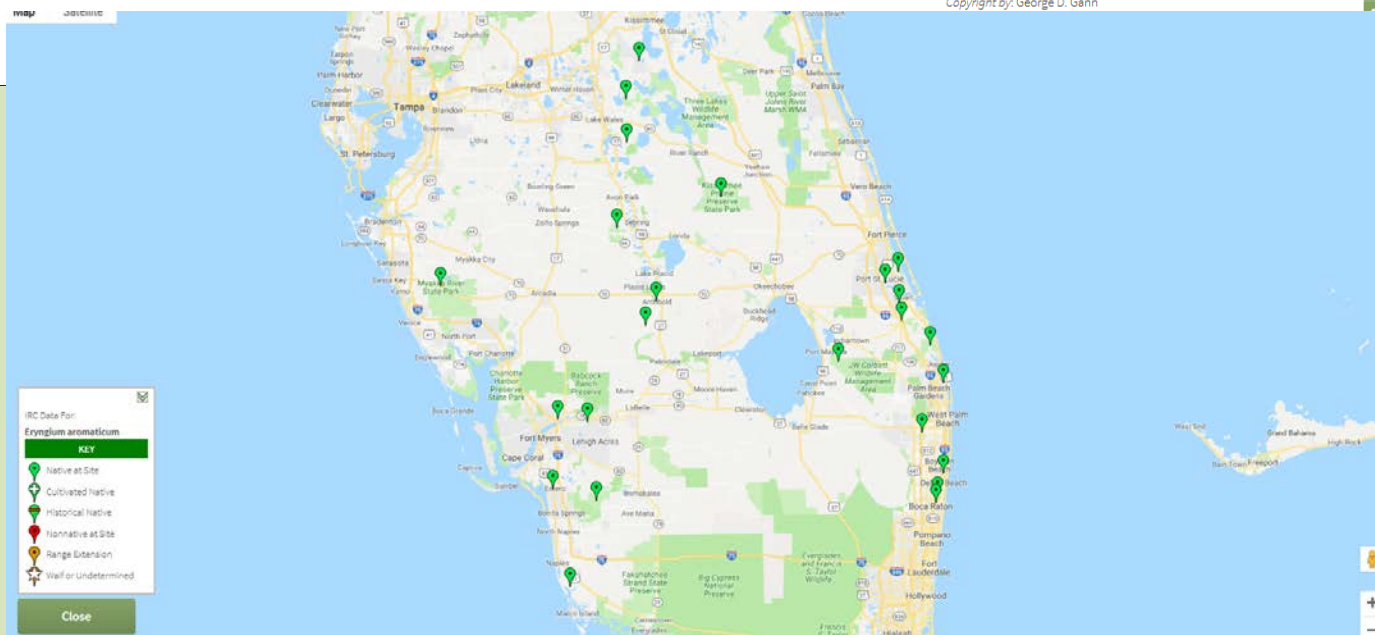
Family: Apiaceae
Group: Dicot
Substrate: Terrestrial
Habit: Herb
Perennation: Perennial
Native Range: Southeastern United States.
[Map of select IRC data for peninsular Florida](#)
IRC SOUTH FLORIDA Status: Rare
SOUTH FLORIDA Occurrence: Present
SOUTH FLORIDA Native Status: Native
SOUTH FLORIDA Cultivated Status: Cultivated

Comments: Visit our [Natives For Your Neighborhood](#) website for more information and images.

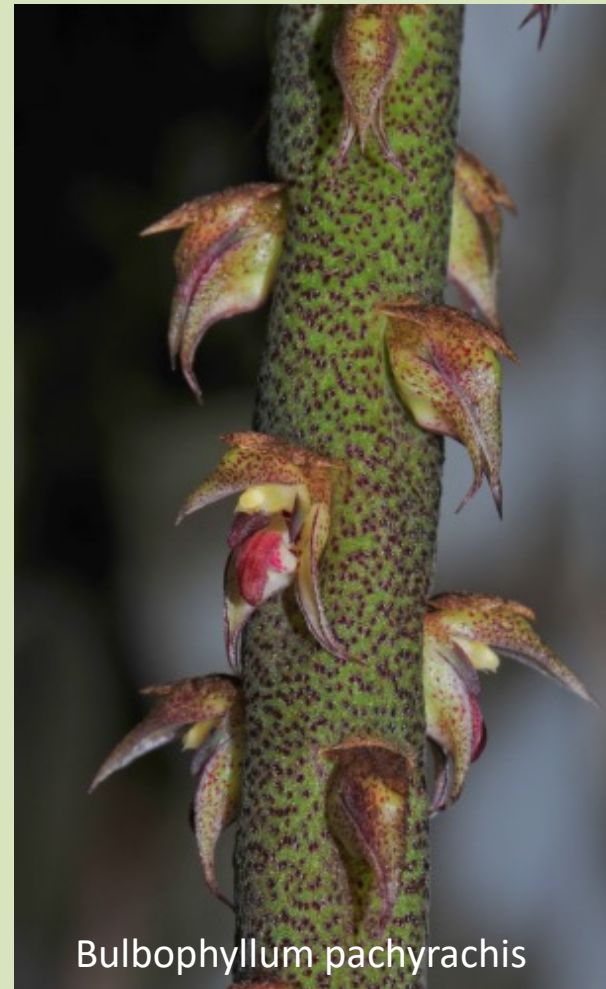
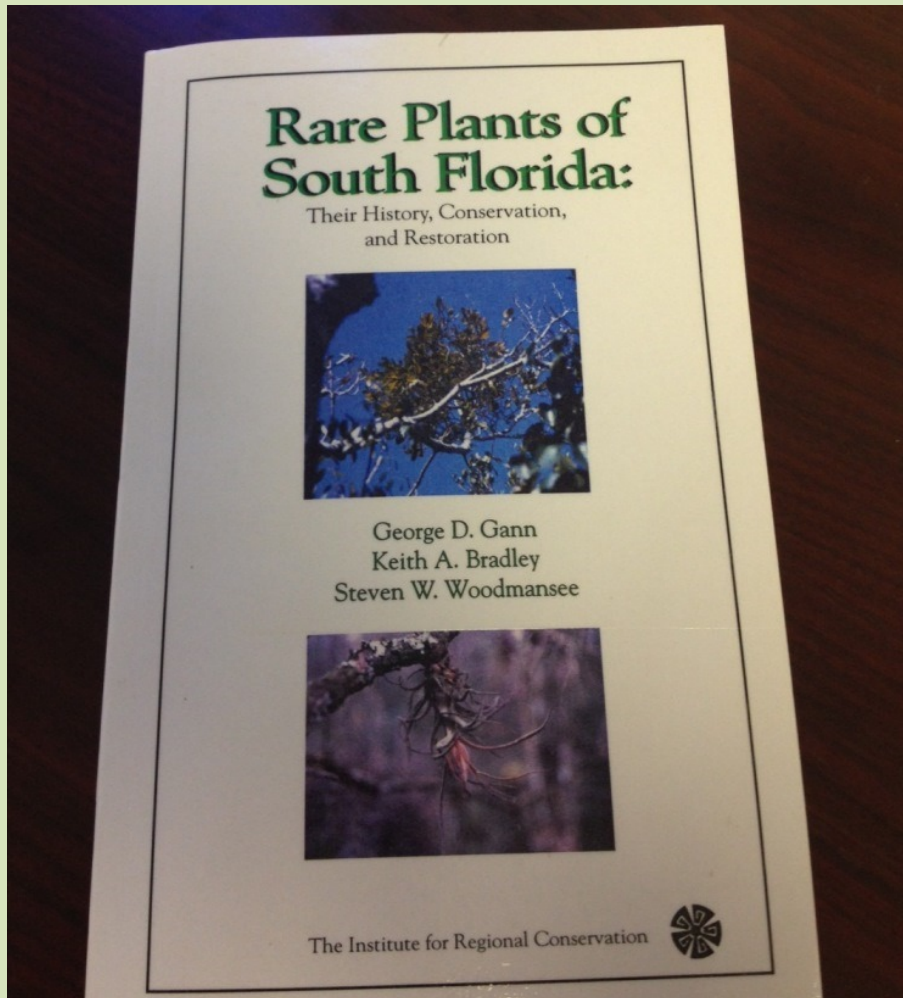


Copyright by: George D. Gann

Online since 2001
>400 Conservation Areas
>2500 Species



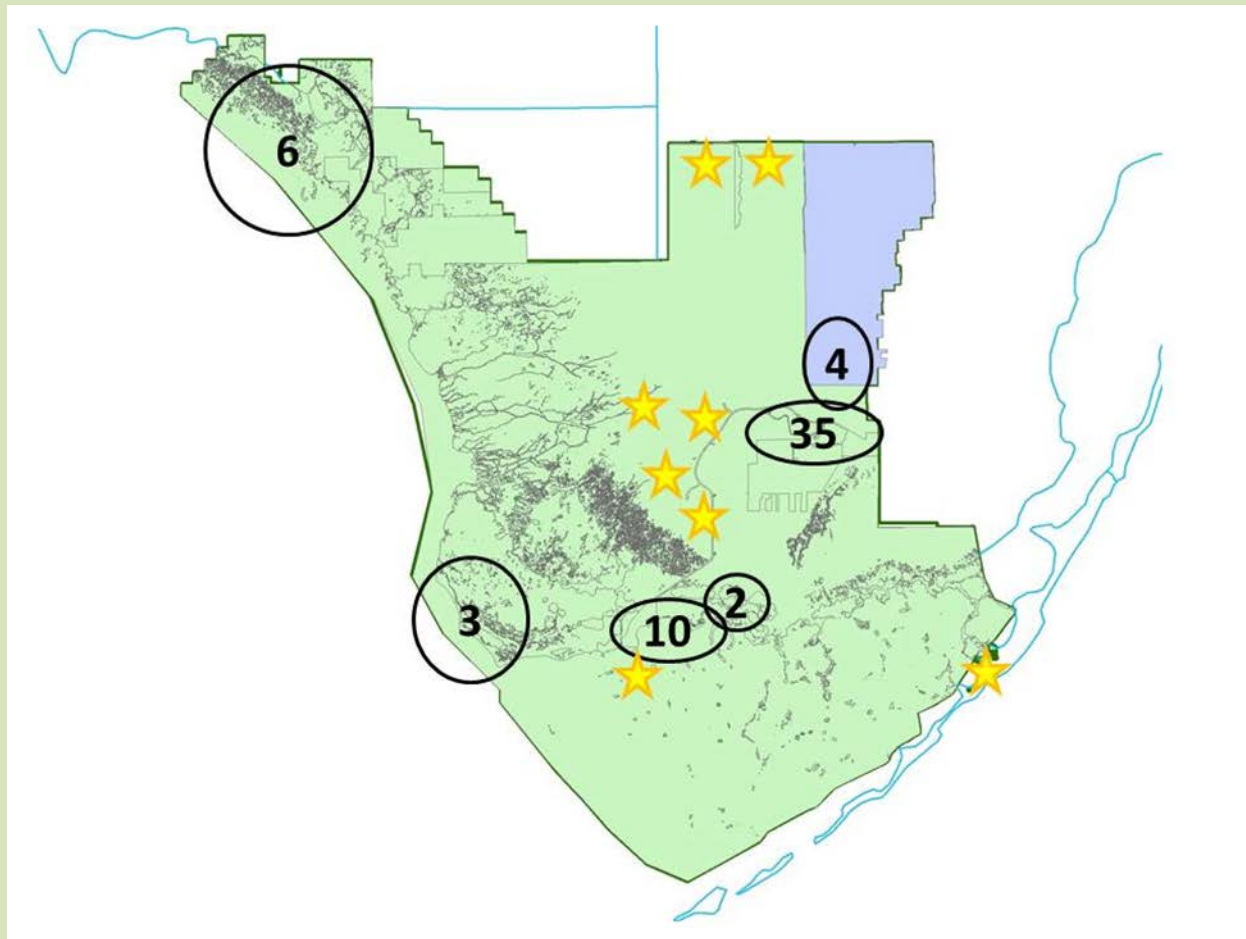
2002



Bulbophyllum pachyrachis

1 in 4 native plant species were critically imperiled or possibly extirpated.
About 8% were reported as possibly extirpated.

Confirmed or hypothesized locations of SOMCs in Everglades National Park



About 2/3 of SOMCs are found only in the interior of the park.

Only 10% of SOMCs are found exclusively in wetlands.



Local Biodiversity Matters



56% of SOMC's occur in hardwood hammocks.

Habitat Destruction, Fragmentation and Extinctions



Habitat destruction causes most extinctions, especially in the early stage of habitat fragmentation and degradation.

Here are two examples of pine rockland extinctions in South Florida, one regional, one global.

Tephrosia angustissima var. *angustissima* [Fabaceae (Engler) / Fabaceae (APGIII)]

FLAS 28310 [sheet (fruiting)]



Image by: Kathy M. Davis

Stable Image URL: <https://www.floridamuseum.ufl.edu/herbarium/cat/imageserver.asp?image=28310a1>

Image JPG: <http://cdn.flmnh.ufl.edu/herbarium/jpg/020/28310a1.jpg> -- (use governed by the [FLMNH / UF Herbarium Image Contract](#))

Imaged on Friday, February 25, 2011

Image rendered via [Zoomify](#) conversion. XML and Java script

es may not show the latest specimen annotation(s). Choose the accession number link at the top right for the most up-to-date specimen data.

Fragmentation leads to inexorable loss

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'

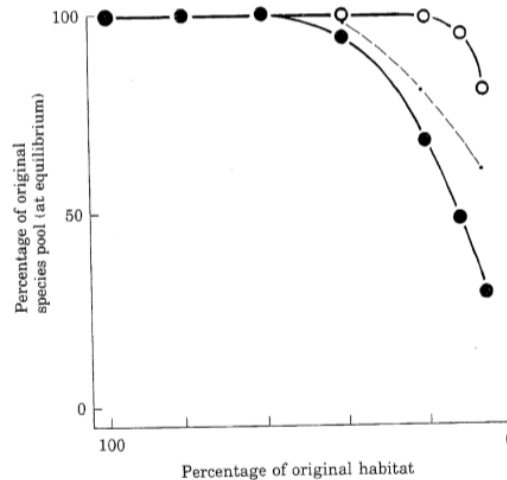


FIGURE 4. The number of species remaining in each species pool as fragmentation proceeds. Closed circles show the pool of species with large area requirements and low vagility. Open circles show the species with less stringent area requirements. The small dots connected by the dashed line depict the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

Extinction Debt

refers to the time delay between the impact of environmental changes and the time species go extinct.

(from Tilman et al. 1994)

**Following Habitat
Destruction The Debt
Must be Paid**

Some species and groups go faster.



© Holly L. Salvato



© Holly L. Salvato



© Holly L. Salvato



© Holly L. Salvato



© Shirley Denton



Some go slower.



Flora of Broward County

(today's numbers)

731 native taxa

10-20% are likely extirpated already

Working list of 150+ taxa in need of review

Extirpations in South Florida

(2002-present)

6%, slight increase expected

Extirpations in Florida Keys

(2007-present)

13%, likely to go up



Bidens laevis



Pleopeltis astrolepis



Calopogon multiflorus



Carya floridana

Dark Diversity

refers to the missing portion of a species pool for a given habitat in a given region.

(from Pärtel et al. 2011)

**Following Extinction
The Debt Paid Should
be Measured**

An example of Dark Diversity in Collier County



[Print](#)

[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
- Vouchered

Species Links

- [Biota of North America Program \(BONAP\)](#)
- [EDD MapS](#)
- [Flora of North America](#)
- [NatureServe Explorer](#)
- [Tropicos \(MO herbarium\)](#)
- [USDA PLANTS](#)

Consortia links

- [Alabama](#), [Bryophyte](#), [GBIE](#), [iDigBio](#), [JSTOR](#), [SERNEC](#)

Herbaria links

- [A/GH](#), [FLAS](#), [FSU](#), [G](#), [K](#), [NY](#), [P](#), [S](#), [US](#), [W](#)

Image searches

- [Google Images](#), [Yahoo!](#)

Major Causes of Local Species Extinctions in South Florida

Historically

Habitat destruction

Poaching

Drainage

Now

Invasive species

Fire suppression

Changes in water quantity and quality

Fragmentation effects

(e.g., loss of pollinators, inbreeding depression,
stochasticity)

Sea level rise

Near Future

“Now” + Climate change effects



Sericocarpus tortifolius

Climate Change and Sea Level Rise



Climatic Change

February 1999, Volume 41, Issue 2, pp 213–248 | [Cite as](#)

Predicted Effects of Climatic Change on Distribution of Ecologically Important Native Tree and Shrub Species in Florida

Authors [Authors and affiliations](#)

Elgene O. Box, David W. Crumpacker, E. Dennis Hardin

Article

1	318	39
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Abstract

A previously developed plant species-climatic envelope model was evaluated further to predict effects of hypothesized climatic change on the potential distribution of 124

Early(er) Climate Change Models 2001-2002

Conservation Biology

Implications of Climatic Warming for Conservation of Native Trees and Shrubs in Florida

Implicaciones del Calentamiento Global en la Conservación de Árboles y Arbustos Nativos de Florida

David W. Crumpacker, Elgene O. Box, E. Dennis Hardin

First published: 21 March 2002 | <https://doi.org/10.1046/j.1523-1739.2001.0150041008.x> | Cited by: 25

[Read the full text >](#)

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Abstract

EN ES

Abstract: Ecological process models and empirical envelope models have been used to relate climatic-change predictions to effects on plant species and vegetation. Climatic-envelope models are useful for simultaneous investigation of many plant species whose range-limiting mechanisms are poorly known. They are most effectively applied in regions with strong temperature and moisture gradients and low relief. Their required databases are often relatively easy to obtain. We provide an example involving the effect of six annual warming scenarios, ranging from +1° C to +2° C and from +10% to -20% annual precipitation (some have greater warming in winter than in summer), on 117 native woody species in Florida (U.S.A.). Tree species at their southern range boundaries in central and southern Florida are likely to be negatively affected by as little as 1°C warming.

Climate Envelope Model to Predict Effects of Warming and Drying Scenarios on Florida Ecosystems

Coauthors:

D. Wilson Crumpacker, Dept. Environmental, Population and Organismic Biology, University of Colorado

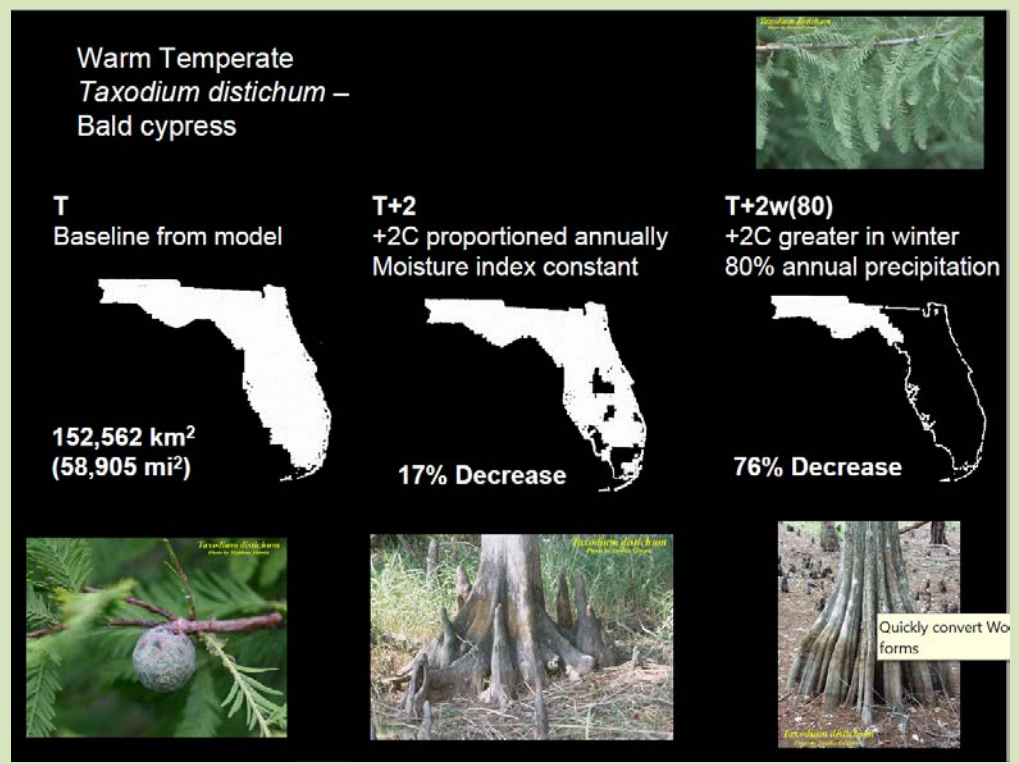
Elgene O. Box, Dept. of Geography and Institute of Ecology, University of Georgia

E. Dennis Hardin, FL Dept. Agriculture & Consumer Services, Division of Forestry

THE FLORIDA PLANT SPECIES - CLIMATIC ENVELOPE MODEL (from Crumpacker et al.)

Winter and summer temperatures, overall moisture balance and dry-season precipitation have important direct and/or indirect effects on the natural distribution of many important native, woody plant species in Florida.

A climate-envelope is the climatic space corresponding to the geographical range of a species (community, type, etc.). The basic assumption is that a species will not grow at a place if the local value of any climatic variable exceeds that used to define its envelope.



So what will fill this space and functional role?

...and tropical species march north

Subtropical *Bursera simaruba* – gumbo limbo

T
Baseline from model



39,701 km²
(15,329 mi²)

T+2
+2C proportioned annually
Moisture index constant



84% increase

T+2w(80)
+2C greater in winter
80% annual precipitation



109% increase



not
Gumbo-limbo!



Find on page

Enter text to search

No results



Options v

Potential Future Forest Type Changes

The links below allow comparison of maps of potential forest-type changes according to the various GCM scenarios.

IMPORTANT: Make sure you read the help file before interpreting the changes.

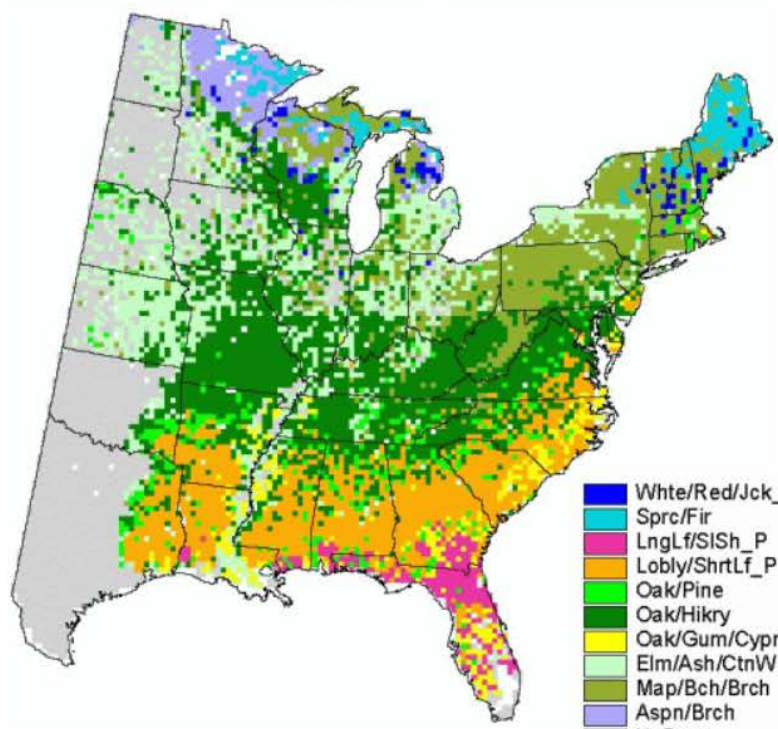


[View Summary of Changes](#)

Climate Scenario Menu

Choose Forest Type from Menu

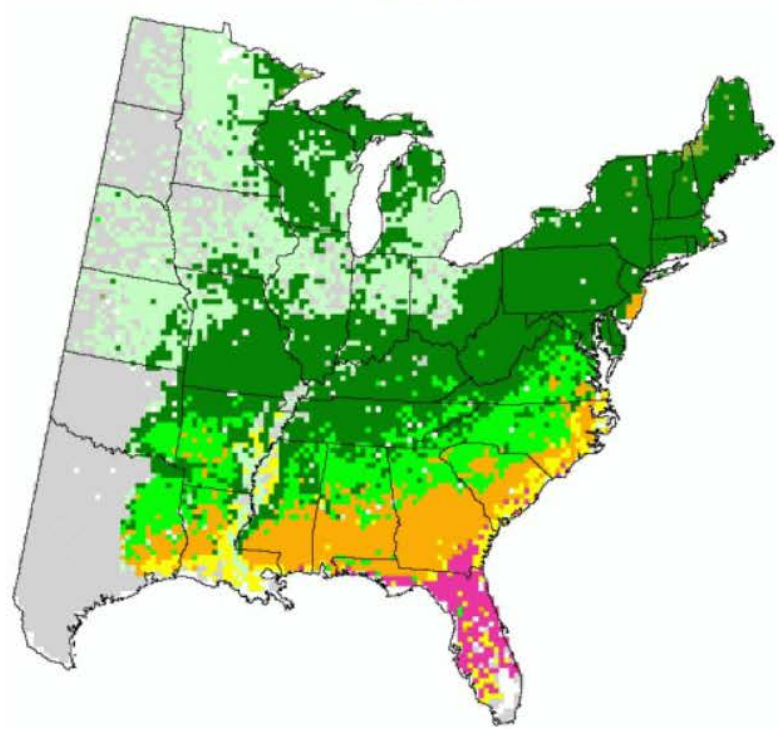
Current FIA



Climate Scenario Menu

Choose Forest Type from Menu

Hadley - High



What to Expect

(from Dennis Hardin 2007)

Predict northward movement of species with warming

- contraction of southern boundaries of temperate species
- expansion of northern boundaries of subtropical species
- no changes for some species (e.g., saw palmetto)?

Natural movement of species may be slow, less than 200 km/century at most, perhaps more in the range of 20-50 km/century.

Movement of species will be complicated or prevented by

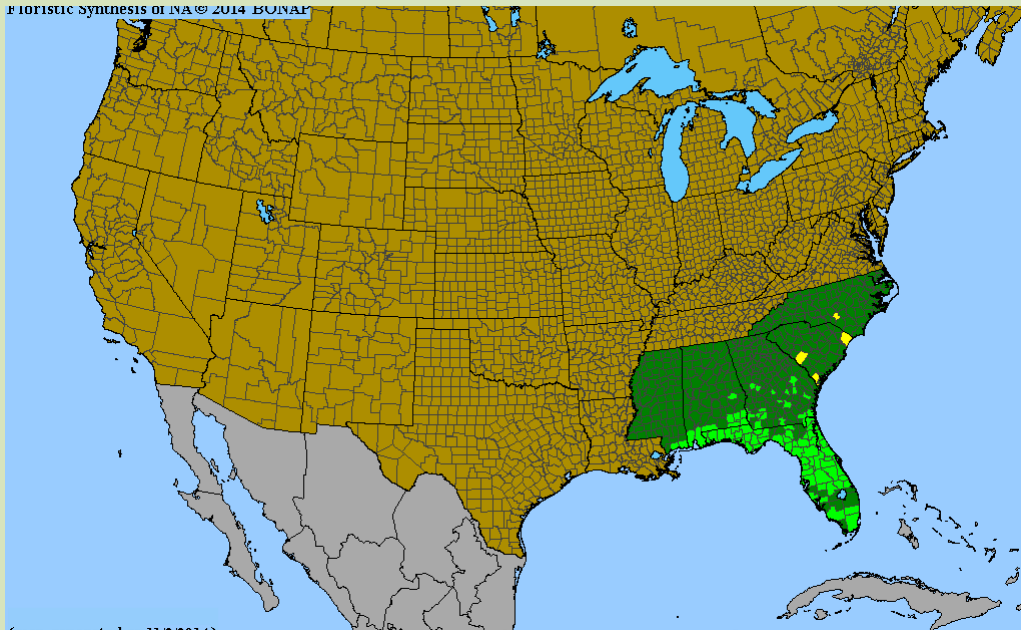
- Fragmentation due to development
- Competition from non-native invasive exotics
- Competition from native invasive species (weeds)
- Diseases and insects, both native and exotic
- Filtration and inertia of existing stands
- Ecotypic/genetic variation
- Changes in fire frequency and intensity
- Soil variation

Predict changes in plant community composition, structure and function.

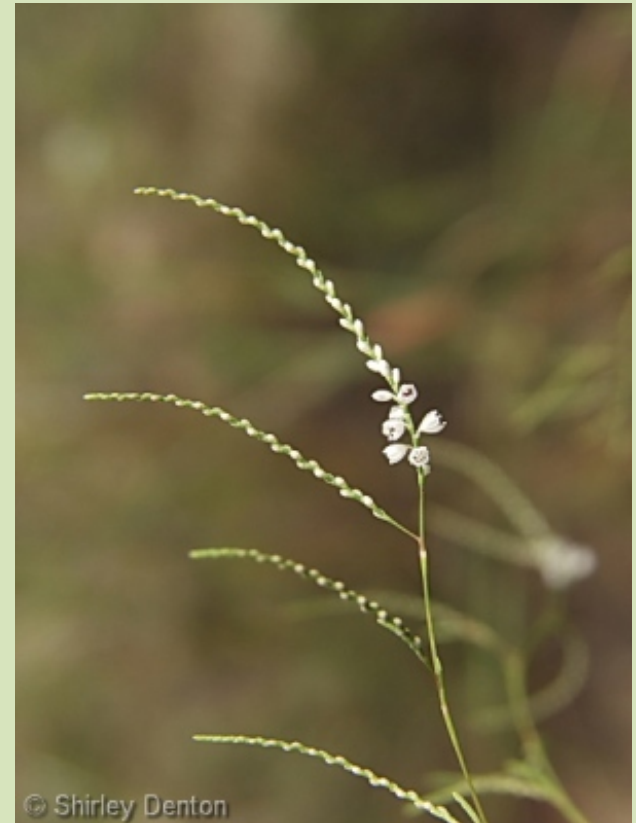
Predict losses of biodiversity and resulting ecological and economic impacts.

In **Rare Plants of South Florida (2002)**, we annotated many species with this message:

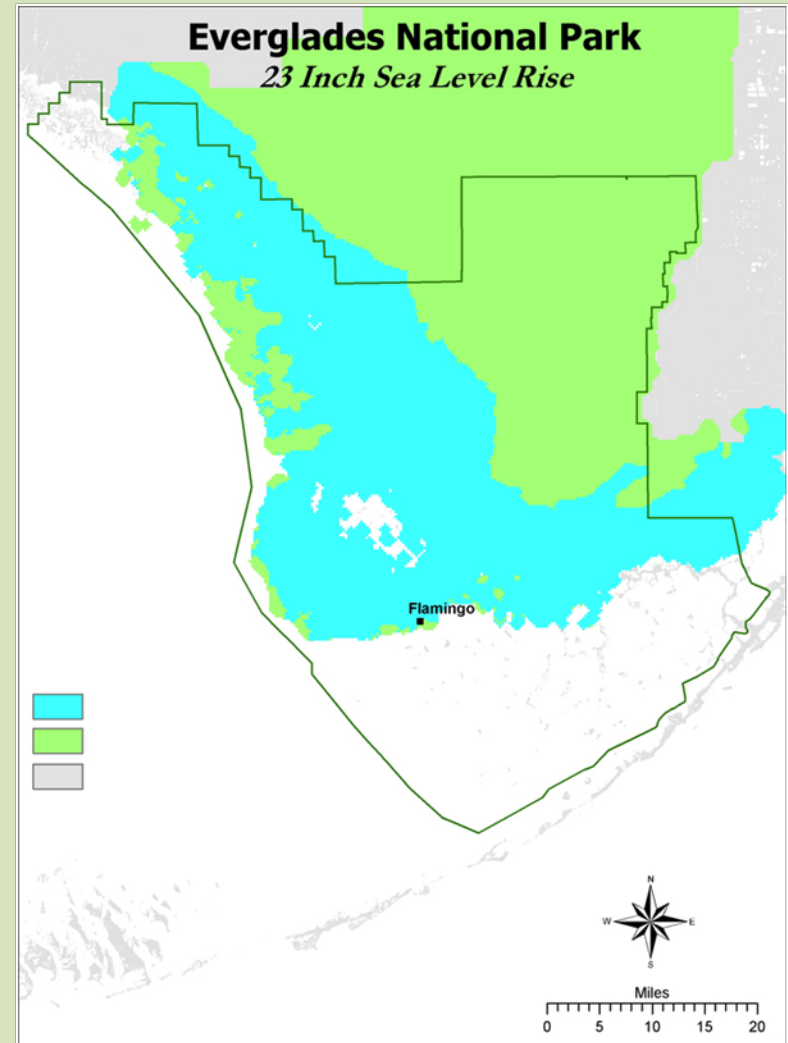
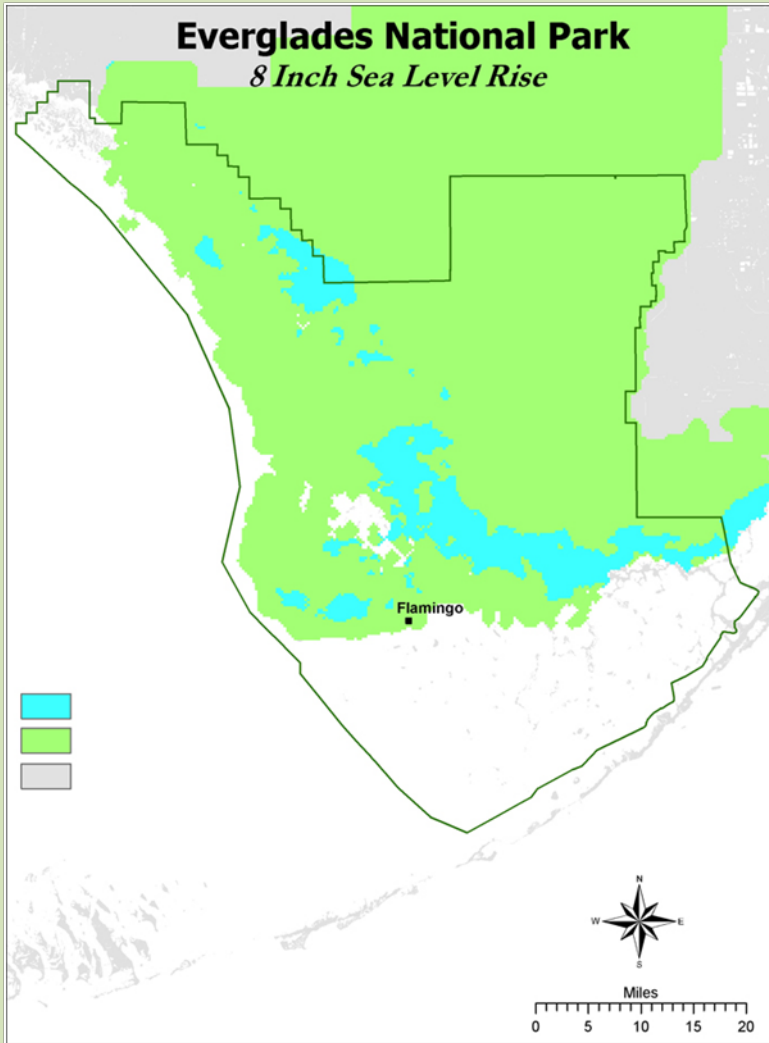
“This is a temperate species at the southern end of its range, and may have always been rare in South Florida.” And if just one of two localities were known, we were modest in our recommendations for active restoration.



Polygonella pinicola
(*P. gracilis*)

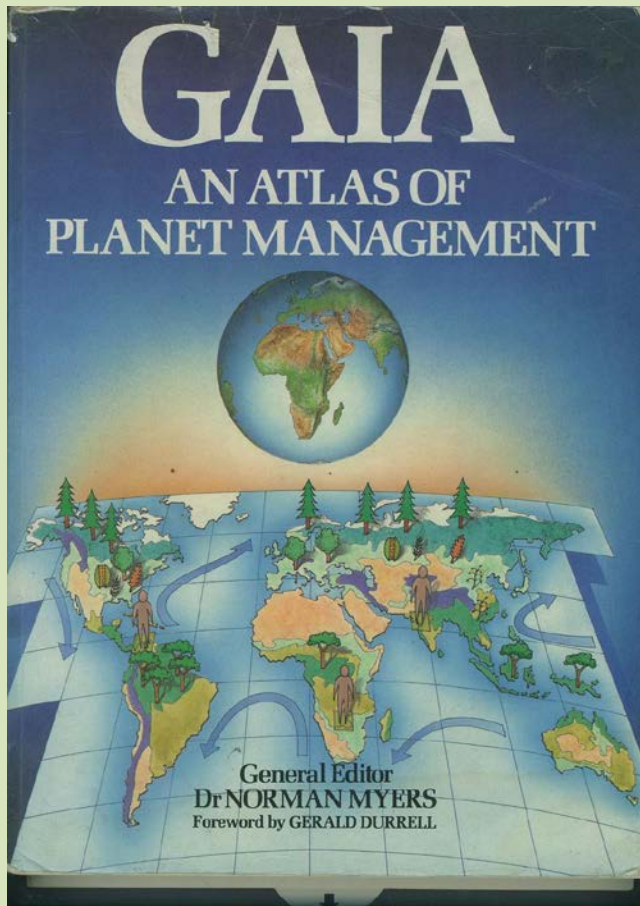


Sea Level Rise

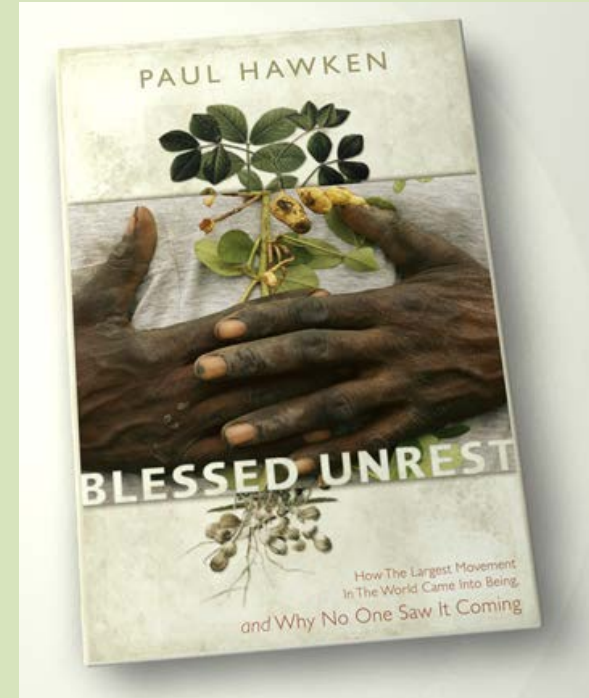


Everglades National Park scenarios by end of this century from 2007 IPCC projections.

Ecological Restoration – The Key to Our Future



In 1984 **Norman Myers** estimated that there were 12,130 international non-profit groups (INGOS) worldwide, mostly dealing with environmental and social issues.



Paul Hawken 2007: estimated that there were more than 1,000,000 non-profit groups and community organizations dedicated to the “environmental and social justice movement”.



Native plant garden & nursery of
J. Carlos Trejo-Torres, Merida, Mexico





2011

The Challenge

A global effort

The Bonn Challenge is a global effort to bring 150 million hectares of the world's deforested and degraded land into restoration by 2020, and 350 million hectares by 2030.

It was launched in 2011 by the Government of Germany and IUCN, and later endorsed and extended by the New York Declaration on Forests at the 2014 UN Climate Summit.

Underlying the Bonn Challenge is the [forest landscape restoration \(FLR\) approach](#), which aims to restore ecological integrity at the same time as improving human well-being through multifunctional landscapes.

The [restoration](#) of 150 million hectares of degraded and deforested lands in biomes around the world – in line with the FLR approach – will create approximately USD 84 billion per year in net benefits that could bring direct additional income opportunities for rural communities. About 90 per cent of this value is potentially tradable, meaning that it encompasses market-related benefits. Achieving the 350 million hectare goal will generate about USD170 billion per year in net benefits from watershed protection, improved crop yields and forest products, and could sequester up to 1.7 gigatonnes of carbon dioxide equivalent annually.

[The history of the Challenge](#)

[The GPFLR](#)

[Champions and initiatives](#)

[Learning programs on restoration](#)

370 million acres by 2020
865 million acres by 2030



INTERNATIONAL STANDARDS FOR THE PRACTICE OF
ECOLOGICAL RESTORATION – INCLUDING PRINCIPLES
AND KEY CONCEPTS

FIRST EDITION: December 2016

Tein McDonald, George D. Gann, Justin Jonson,
Kingsley W. Dixon



“...adopting a reference ecosystem should not be viewed as an attempt to immobilize an ecological community at some point in time, or to ‘turn back the clock’. Rather [it] is to optimize the potential for local species and communities to recover through well-targeted restoration actions and continue to reassemble and evolve in the face of change.”



UN **BIODIVERSITY**
CONFERENCE
COP13-COPMOP8-COPMOP2
CANCUN, MEXICO 2016

MAINSTREAMING BIODIVERSITY FOR WELL-BEING



The International Standards is a Living Document

First revision due out by mid 2019

Among other items, we are:

Considering **provenance issues** – note that this pertains within species (‘assisted migration’ is largely not accepted).

From Nany Shaw, USFS: “**Trailing edges** of a distribution relative to climate change are most vulnerable to loss of a species. Longevity, dispersal, breeding system etc., determine ability to adapt/migrate. When sourcing, consider material from currently adapted sources plus sources adapted to projected near future conditions to hopefully provide current adaptation plus ability to adapt.”

In other words, for South Florida projects local propagules + propagules from the south are better than propagules from the north.

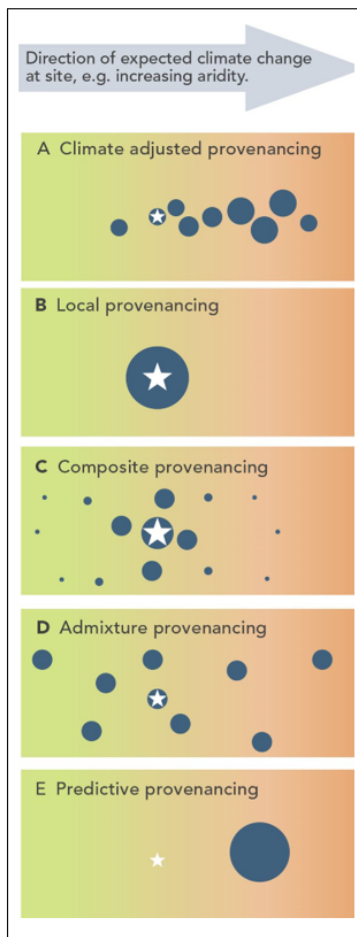


Figure 5. Provenancing strategies for revegetation, (Reproduced here from Prober et al 2015) The star indicates the site to be revegetated, and the circles represent native populations used as germplasm sources. The size of the circles indicates the relative quantities of germplasm included from each population for use at the revegetation site. In the case of the climate-adjusted provenancing the relative quantities of the germplasm from the various populations will depend upon factors such as genetic risks, and the rate and reliability of climate change projections. For simplicity this represents the major direction of climate change in a single dimension (e.g., aridity, to combine influences of increasing temperature and decreasing rainfall), but multiple dimensions could be considered as required.

Two Slides from

Don Falk

University of Arizona, USA

SER2018 Restoration in the
EUROPE Era of Climate Change



It's the end of a very full week...



"Mr. Osborne, may I be excused? My brain is full."

So here are ~~seven~~ ~~five~~
three* principles for
restoring the future.


* plus one extra

And on Ecological Resilience

To predict future responses to climate change, we need to understand the mechanisms of resilience, which is an **emergent phenomenon**

- **persistence** (individual survives)
- **recovery** (population survives, community persists)
- **reorganization** (community- and biome-level change)

Most ecologists would put the banner “resilience” over the first two
What about the third?

A vertical green bar on the left side of the page containing icons for Facebook, Twitter, LinkedIn, and Email.

Home / News and Stories / Press release

01 MAR 2019 | PRESS RELEASE | ECOSYSTEMS

New UN Decade on Ecosystem Restoration offers unparalleled opportunity for job creation, food security and addressing climate change

A photograph showing several people working in a field, likely engaged in ecosystem restoration. They are surrounded by trees and vegetation. The scene is set in a rural, agricultural area with a mix of greenery and brown soil.

©FAO Giulio Napolitano

“The UN Decade on Ecosystem Restoration is both urgently needed and globally appreciated,” said George Gann, SER International Policy Lead. “Achieving the goals of this new UN Decade will require continued enthusiasm and funding for this work, as well as a common understanding of how to design and implement successful restoration projects that proactively and collaboratively engage local communities.” SER Media Release, www.ser.org

Native Plant Conservation in Collier County

Flora of Collier County

1000+ native taxa

5-10% are likely extirpated in the County

Working list of taxa in need of review,
but needs to be expanded

About 13% of Collier County species are
Critically Imperiled or Possibly Extirpated
throughout South Florida

Extirpations in South Florida
(2002-present)

6%, slight increase expected

Extirpations in Broward County
(in progress)

10-20% expected



Ruellia succulenta



Lechea lakelae



Guzmania monostachya



Celtis iguanaea

Review of first 100 native taxa on our list

78 in Big Cypress National Preserve

81 in BICY + Fakahatchee Strand Preserve State Park

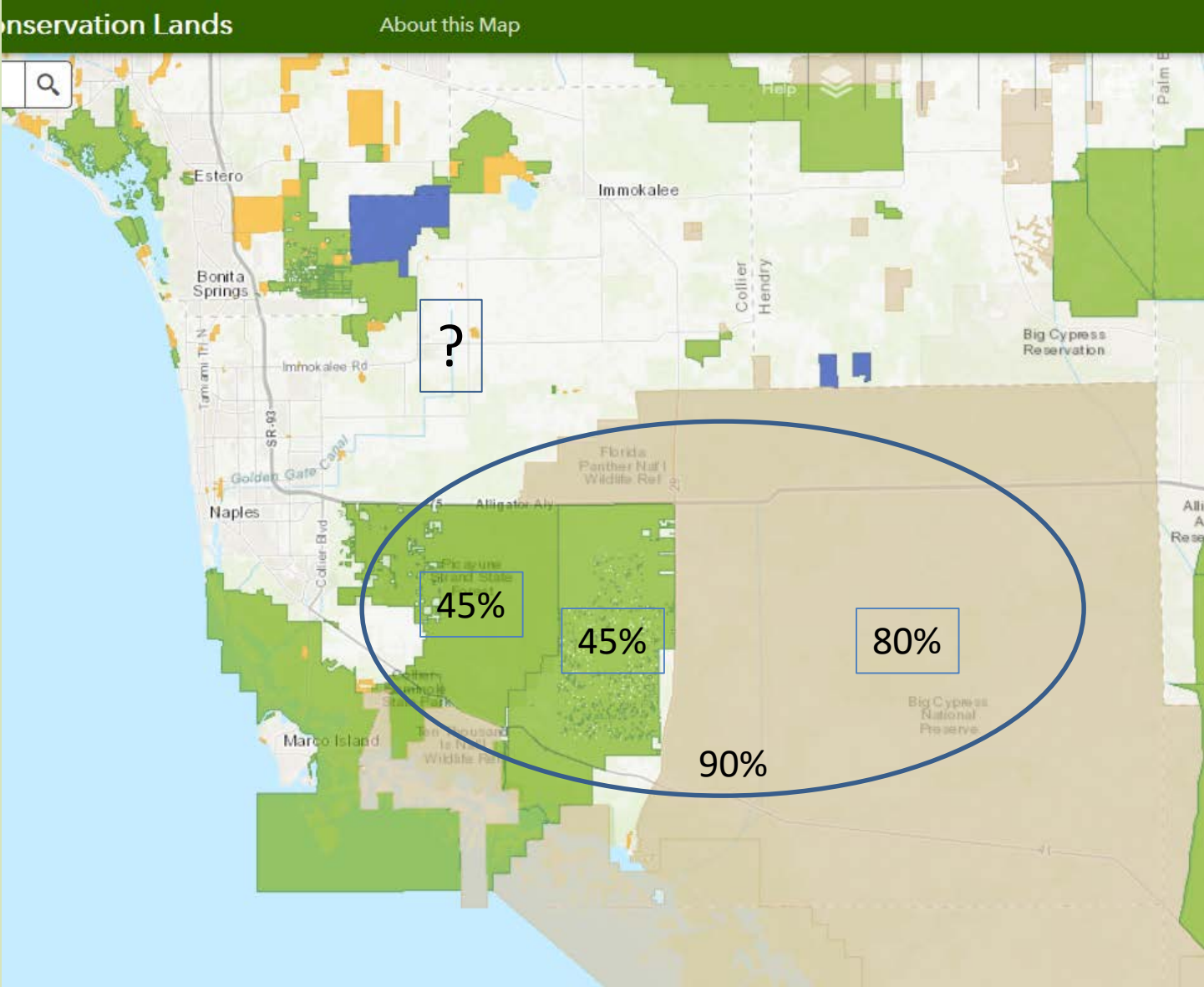
19 not in BICY or Fakahatchee

Of these, 7 are extant and 12 possibly extirpated

Important historical localities include Marco Island, Immokalee area, scrub islands

<u>Agalinis fasciculata</u>		Native
<u>Agalinis filifolia</u>	Historical	Historical
<u>Agalinis linifolia</u>		Native
<u>Agalinis maritima</u>		Native
<u>Agalinis obtusifolia</u>	Historical	Historical
<u>Agave decipiens</u>		Native
<u>Ageratina jucunda</u>		Native
<u>Aletris lutea</u>		Native
<u>Alternanthera flavescens</u>		Native
<u>Alternanthera maritima</u>	Historical	Historical
<u>Amaranthus australis</u>		Native

Collier County Regions and Proportions of the Native “Local Diversity”



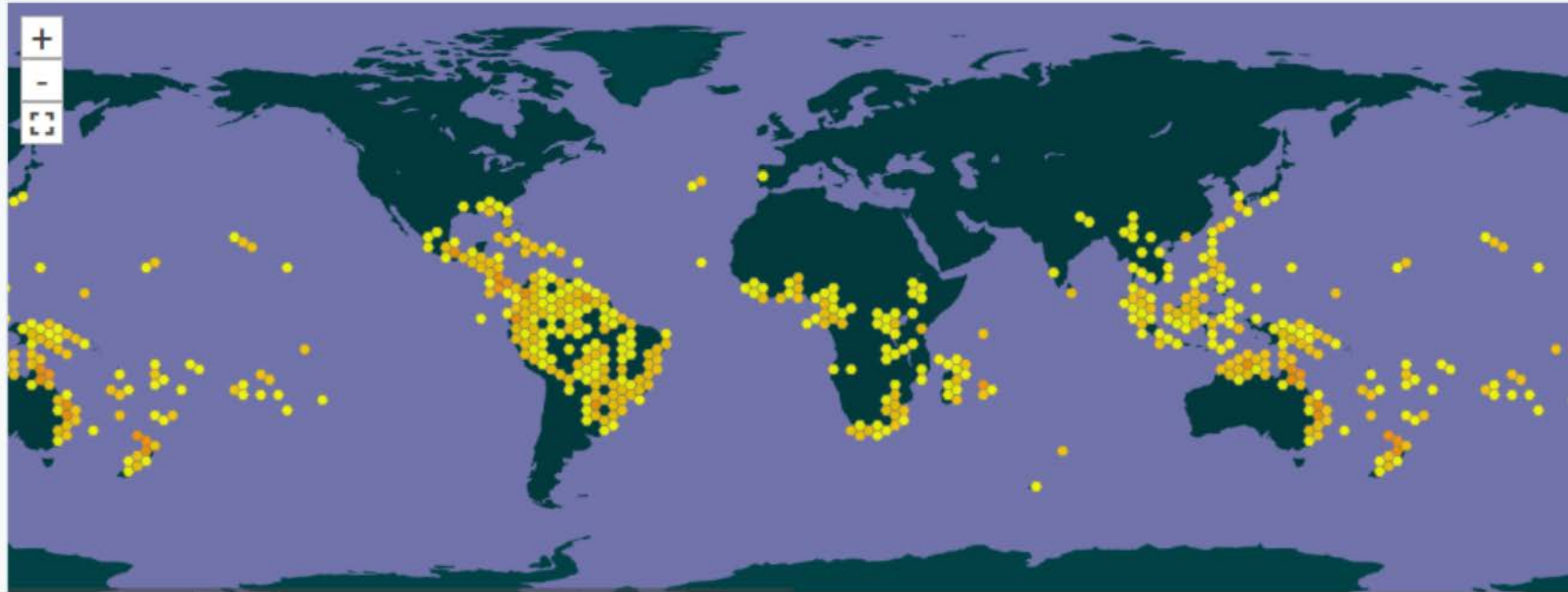
Tropical and Widespread Species Are Not Immune From Local Extinction

3,863 OCCURRENCES WITH IMAGES

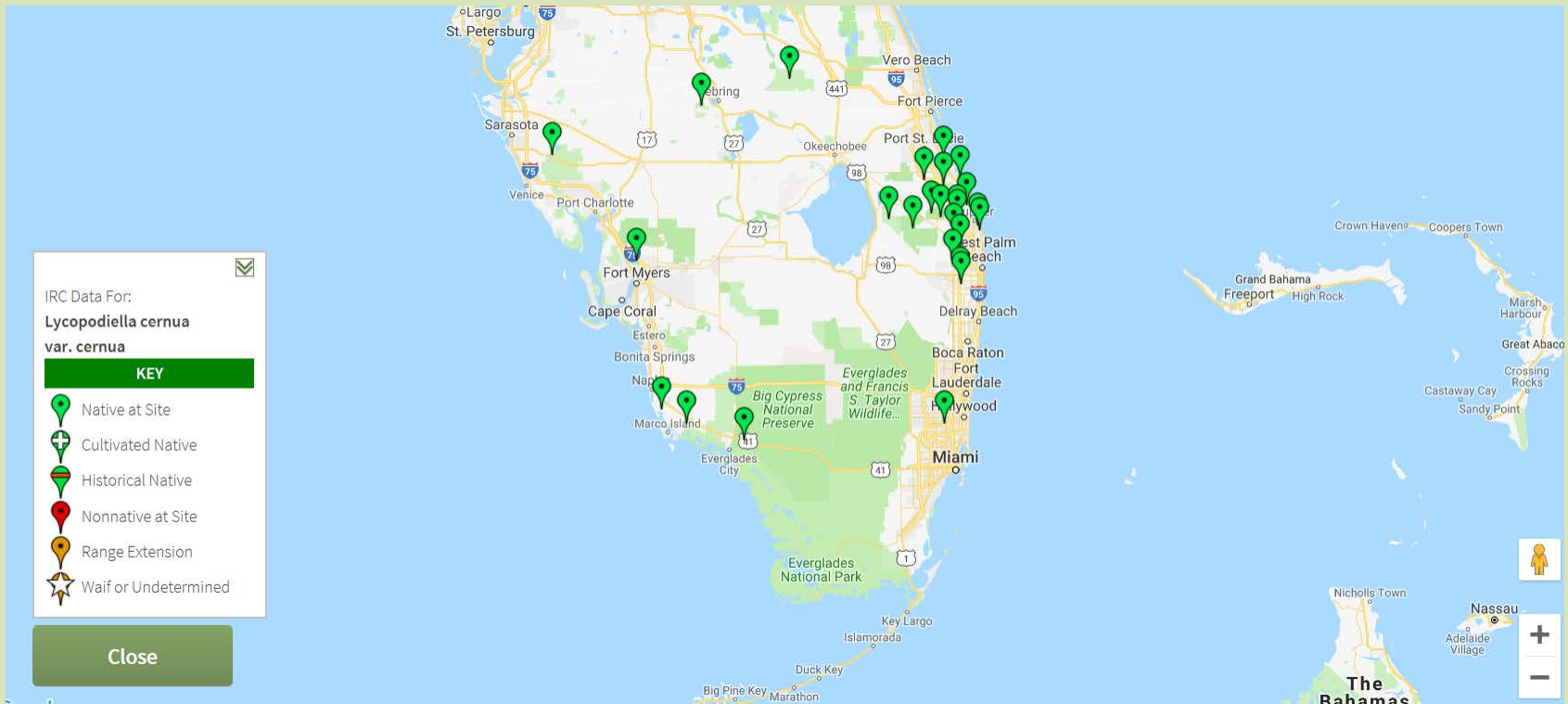


SEE GALLERY

4,698 GEOREFERENCED RECORDS



Lycopodiella cernua (L.) Pic. Serm. var. *cernua*
Nodding club-moss



But Temperate Species Are Really at Risk

Almost 40% of Collier species are temperate species at the southern ends of their ranges, or peninsular Florida endemics.

These species have already been hard hit by development and degradation, before the effects of climate change are really felt.



Asclepias lanceolata



Arisaema triphyllum

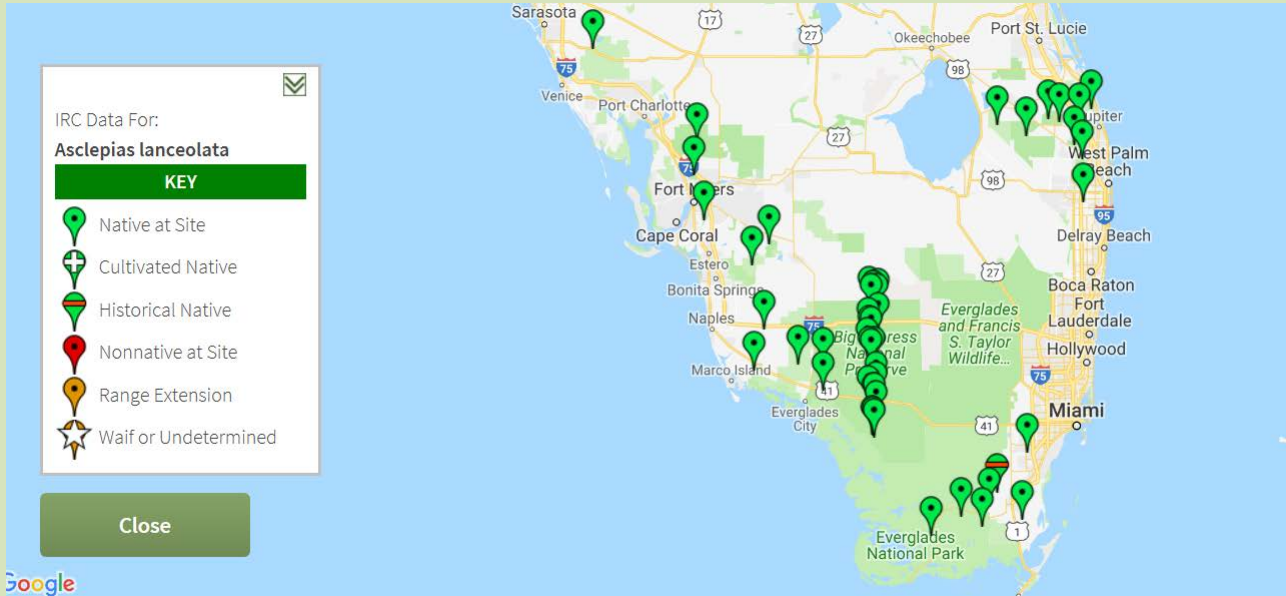


Calopogon multiflorus



Eryngium aromaticum

Asclepias lanceolata



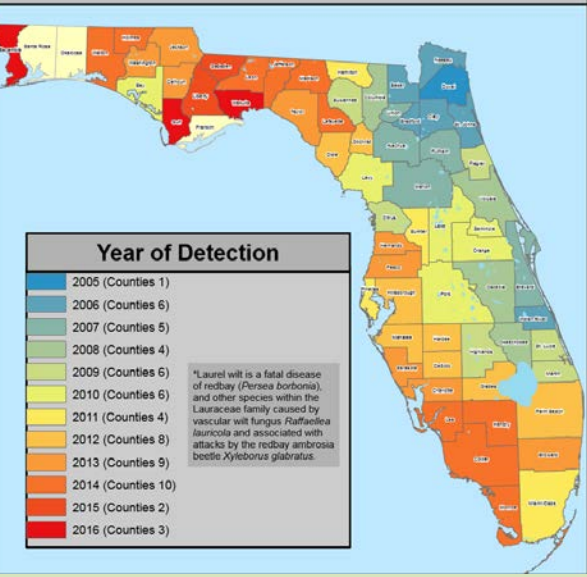
Itea virginica



Other Threats We Must Contend With Population Growth

Year ▼	Population	Growth	Growth Rate
2017	372,880	6,785	1.85%
2016	366,095	8,901	2.49%
2015	357,194	8,978	2.58%
2014	348,216	8,733	2.57%
2013	339,483	6,927	2.08%
2012	332,556	4,889	1.49%
2011	327,667	5,066	1.57%
2010	322,601	170,502	112.10%
1990	152,099	66,128	76.92%
1980	85,971	47,931	126.00%
1970	38,040	22,287	141.48%
1960	15,753	9,265	142.80%
1950	6,488	1,386	27.17%
1940	5,102	2,219	76.97%
1930	2,883		0.00%

Distribution of Counties with Laurel Wilt Disease* by Year of Initial Detection (Florida)



Invading Pests and Diseases

Bromeliad Weevils in Florida



Photo by J.L. Castner/UF

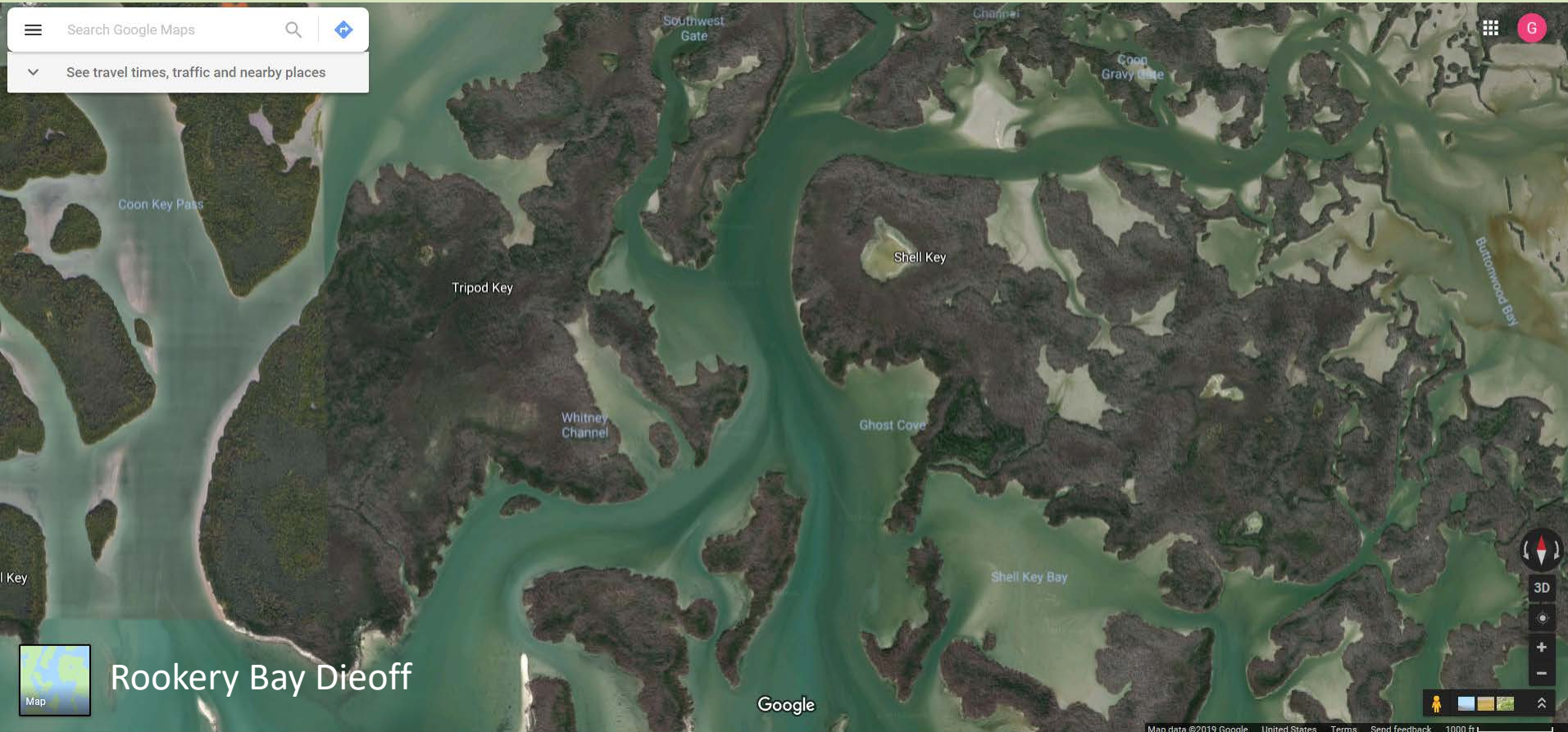
Emerald Ash Borer Information Network



This Website is part of a multinational effort to bring you the latest information about emerald ash borer.

Esri, USGS | Esri, HERE, Garmin, NGA, USGS

Extreme Storms, Pulse Events, and Ecosystem Reassembly



ENVIRONMENT

Could more powerful hurricanes threaten South Florida's disappearing forests?

BY JENNY STALETOVICH

MARCH 25, 2019 06:00 AM, UPDATED 7 HOURS 44 MINUTES AGO



Some Assets

NEW COMBINATIONS, RANK CHANGES,
AND NOMENCLATURAL AND TAXONOMIC COMMENTS
IN THE VASCULAR FLORA OF THE SOUTHEASTERN UNITED STATES. II

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ABSTRACT

As part of ongoing efforts to understand and document the flora of the southeastern United States, a number of taxonomic changes at generic, specific, and infraspecific rank are made. We also discuss and clarify the recommended taxonomy for other taxa (not requiring nomenclatural acts) and present a point of view about the practical and phylogenetic basis for making taxonomic changes in an alliance.

Cryptic Species Descriptions

Edwin Bridges Florida Flora and Ecosystematics
August 10, 2016

Xyris calcicola (Xyridaceae) - a peninsular Florida endemic species, on the edges of a wet ditch along a shell-fill road in northern Highlands County, along with other common roadside ditch and roadside calciphiles (*Scleria verticillata*, *Rhynchospora colorata*, as examples) - August 10, 2016 - with Brian Lutz and Alex Griffel

I still am seeing very few records of this species other than those I find. — with Alex Griffel and Brian Lutz.

The Internet and Citizen Science

Home About Collaborators

Orchid Conservation Center

Go Orchids: A Guide to Identifying Orchids

Go Orchids Guide

ed or threatened somewhere in their native range. The North American Orchid Conservation Center Botanic Garden to assure the survival of all native orchids in the U.S. and Canada.

zai fungi, developing protocols to propagate and restore all native orchid species and developing everything that is known about our native orchids. This website will be an ever-changing window

Ambitious Projects

The Most Important Things To Do

(from IRC staff meeting)

- **Educate** – the public doesn't know what is at stake.
- **Advocate** and raise awareness about native plants, animals and ecosystems.
- **Collaborate** and link plant work with animal work – that is where the money is.
- Tap into high-end **landscape architecture** industry.
- Increase **prescribed burning** – without fire we are lost.
- **Restore** fragmented and degraded habitats, and recover degraded populations.

Some Closing Thoughts

Collaborate, Collaborate, Collaborate!



Florida Native Plant Society

Donate Join or Renew

Who We Are ▾ What We Do ▾ Native Plants ▾ Resources ▾ Events ▾ Chapters ▾ Join / Support ▾



Renewal!

Register Now

May 17-20
Miami, FL

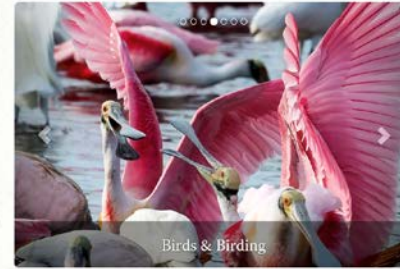
Join

Donate



Tropical Audubon Society
South Florida's Voice of Conservation

Home ▾ Birds ▾ Conservation ▾ Programs ▾ Our Story ▾ Media Coverage ▾ Get Involved ▾ Archives



Birds & Birding

Mission

To conserve and restore South Florida ecosystems, focusing on birds, other wildlife and

Support Our Mission

Keep South Florida's Voice of Conservation clear and strong. Join, Give and Volunteer! You'll be helping TAS champion the environment and grow our Mission.

Join Give Volunteer

Upcoming Events

- Apr 29** Members Migration: Potluck Picnic & Skit Auction @ TAS
- May 05** Key Largo Hummocks State Biological Site: Birds, Butterflies and Native Plants
- May 05** Guided Tours of Historic Doc Thomas House
- May 10** Bird & Wildlife Weekend at Fairchild

**Pine Rockland &
Tropical Botany
Conference 2018**

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Conference Map

Connect to Protect
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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!

RESTORATIVE CONTINUUM



Photo credits: (from left): 1. Used under license from Shutterstock.com; 2. ©S. Triggs; Inglis Rural; 3. ©Marcel Huijser; 4 and 6. ©T. McDonald; 5. ©J. Jonson

Figure 3. Restorative continuum. Ecological restoration and restorative management can be seen to be aligned along a 'restorative continuum' where a broad range of activities undertaken by society to repair damage to the broader environment, complement ecological restoration and provide improved conditions for broad scale recovery.

All restorative activities matter, no matter how small. But some activities may not be restorative at all (e.g., some mitigation, afforestation of native savanna).

Identify Opportunities



Use Available Tools (and make them better!)



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Gumbo-limbo

Bursera simaruba

Burseraceae

General Landscape Uses: An excellent accent or specimen tree in moist to dry soils. It can be used as a street tree and in commercial and residential landscapes. A good shade tree in the hot summer months.

Ecological Restoration Notes: One of the most common and important canopy trees in tropical hammocks.

Availability: Widely cultivated. Available in Lake Worth at [Indian Trails Native Nursery](#) (561-641-9488) and at [Amelia's SmartyPlants](#) (561-540-6296).

Description: Medium to large tree with a rounded and usually broad spreading crown, moderately dense to open. Trunk thick, sometimes short, 1-3 feet in diameter. Bark thick and resinous; almost always with a thin, red peeling outer layer which varies in color from tree to tree. Leaves compound, 6-8 inches long; leaflets thin, smooth, becoming mottled with age. Semi-



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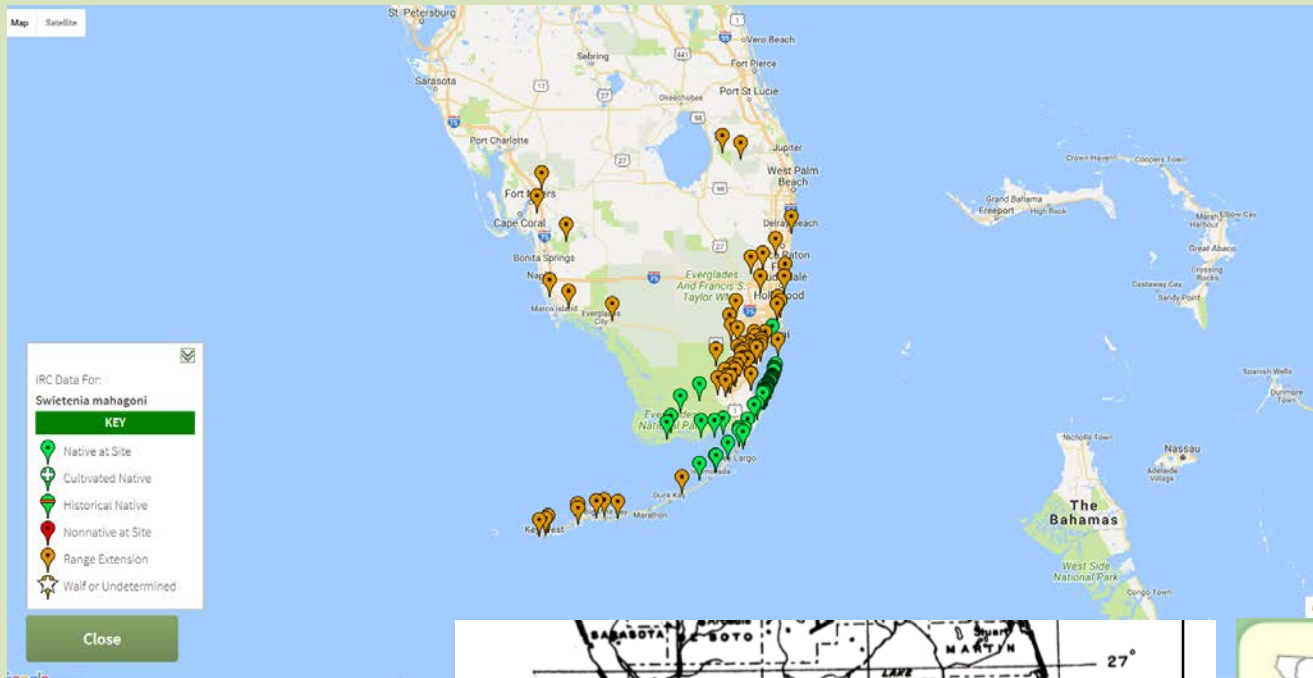
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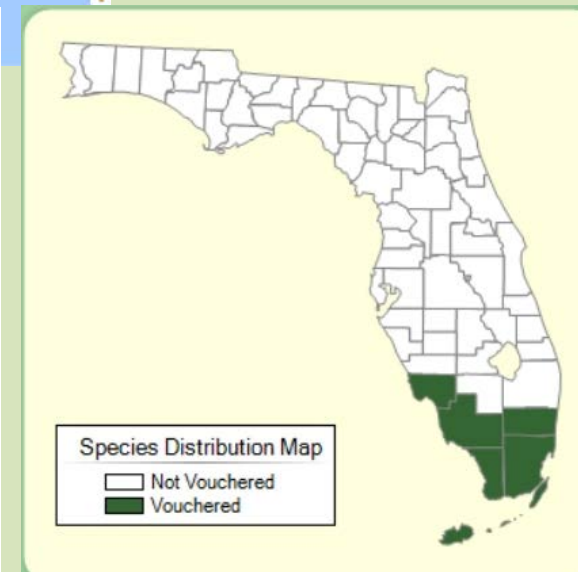
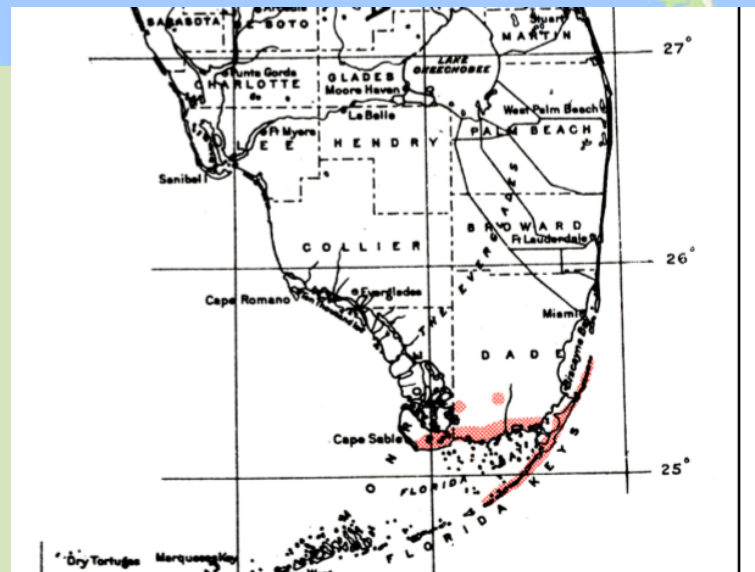
How Does It Work?

- County Lists – Ecological generalist with broad ranges (95% rule)
- ZIP Code Lists – Ecological generalists + generalists within local habitats
- Habitat Lists – Generalists + habitat specialists within historical range within ZIP Code

And Be Thoughtful



West Indian Mahogany
Swietenia mahagoni



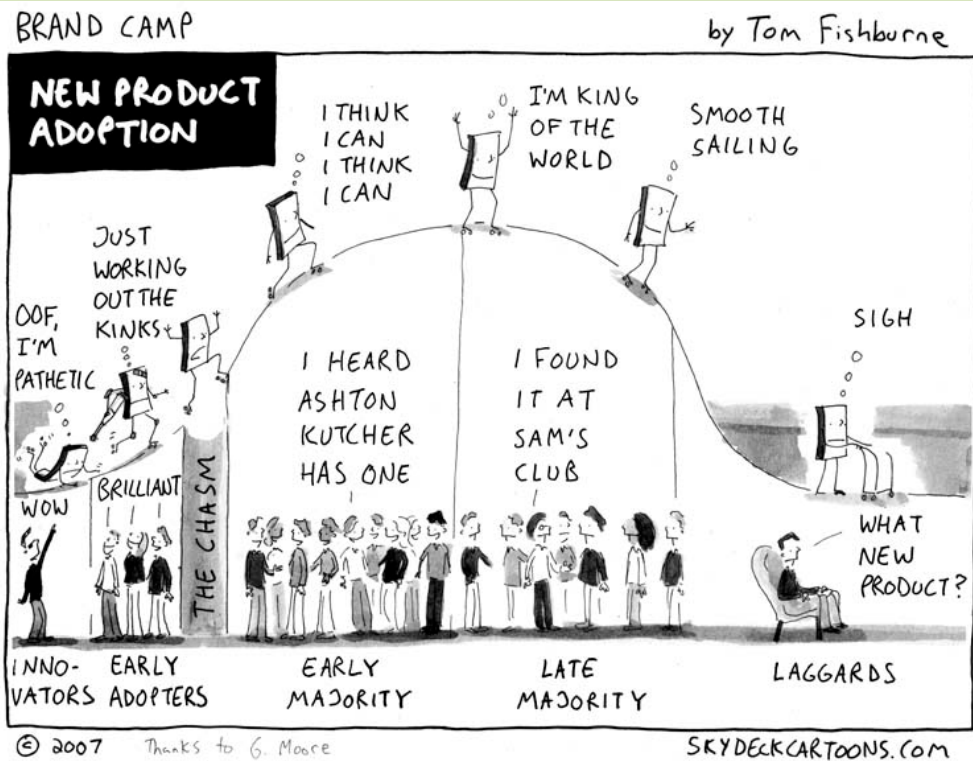
Celebrate Success!



Delray Beach c. 1980,
Delray Beach 2016



Play the Long Game



Thanks!



Vote
Our
Planet

Defend Our Air, Our Water, Our Soil

74%
of U.S. adults said
"the country should
do whatever it takes
to protect the
environment."

73%
of registered voters
believe that climate
change is happening.