Restoring the Gold Coast
Biodiversity Restoration and Community Engagement in Southeastern Florida

George D. Gann
Chief Conservation Strategist, The Institute for Regional Conservation
International Policy Lead, Society for Ecological Restoration

with Cara Abbott
Education and Outreach Coordinator, The Institute for Regional Conservation

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Building a Coalition Since 2018
Outline

- Background on me, IRC and our mission.
- Conservation context in South Florida.
- Restoring the Gold Coast Program, its relevance, progress to date, and our future plans.
- 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 coastal upland restoration and research

- Early 1980s – *Casuarina* removal on Cape Sable, ENP
- Late 1980s – 7.5 miles of beach dune and coastal strand restoration on Miami Beach; 5 miles of beach dune restoration on Captiva island
- 1989 to mid 2000s – Consultant to Town of Palm Beach concerning seagrave trimming at Sloan’s Curve and other coastal issues.
- 1990s – Consultant to American Littoral Society for restoration of Cape Florida following Hurricane Andrew.
- 1995 to 2007 – Consultant to and then Director of Gemini Botanical Garden in Manalapan.
- Mid 1990s-present – Rare plants, floristics management plans, restoration through IRC.
IRC Background and Mission
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, 13 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
Ecological Restoration and Community Outreach
International Policy Work on Ecological Restoration, Conservation, and Sustainability
South Florida 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
Agave decipiens
False sisal

Florida Endemics, >110 taxa in South Florida
South Florida Endemics (probably >50)

Jacquemontia reclinata
Beach clustervine
Schoenus nigricans
Black bogrush
Local Biodiversity Matters

Species of Management Concern in Everglades National Park, hardwood hammocks.
Plant Biodiversity is Key to Animal Biodiversity

Images by Mary Trulio Fesmire
>50% of region in conservation; United Nations Convention on Biological Diversity (CBD) 2020 Protected Areas Target = 17%. So everything should be great.
Conservation lands along the Atlantic Coastal Strip are few and scattered, or need to be designated.
Density and growth
Change since 2010 top 11 states

1. New Jersey 1.3%
2. Rhode Island 0.5%
3. Massachusetts 5.4%
4. Connecticut -0.04%
5. Maryland 4.7%
6. Delaware 7.7%
7. New York 0.8%
8. Florida 13.7%
9. Pennsylvania 0.8%
10. Ohio 1.3%
11. California 6.2%
24. Washington 12.1%
26. Texas 14.1%

Martin County: 2010-2019 (est.) – 10.0%; Palm Beach County 2010-2019 (est.) – 13.4%
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' extinctions.

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.)
Some species and groups go faster.
Some go slower.
Documenting extinctions and rarity since 1996
The Floristic Inventory of South Florida

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

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?
Methods of the FISF

- Comprehensive (looks at all species in region)
- Collates all available data on conservation areas (published and unpublished, FNAI data, herbarium specimens, field notebooks, personal communications)
- Uses NatureServe assessment methods at a regional scale
- Filters for rarest species (SF1, SFH, SFX)
- Intensifies work on rarest species and conservation areas with little or no data

Botanist George Avery, c. 1970s
Courtesy Sally Channon
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.
Restoring the Gold Coast Background
Beach/Dune Goals:
• A continuous, functional dune system complements every beach from Key Biscayne to Jupiter Inlet.
• Invasive exotic vegetation covers less than 5% of total vegetated area of the region’s dunes.
"Our beaches are one of Florida’s most valuable resources, serving as critical habitat for species of plants and animals, attracting visitors and new residents to the state, as well as providing a line of defense during major storm events," Florida Senator Debbie Mayfield, Melbourne. *Florida Today*, January 30, 2019
But No One Is Monitoring Biodiversity
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.
East Coast lantana
*Lantana depressa var. floridana*
- Miami-Dade to St. Johns County along the east coast (endemic), but nearly extinct due to hybridization with the exotic weedy *Lantana camara*.
- Recorded for Atlantic Dunes Park (1993) but presumed extirpated there. Possibly present in Boca Raton but otherwise gone from South Palm Beach County.

Red mulberry
*Morus rubra*
- Widespread in south Florida in both inland and coastal locations, but very rare in South Palm Beach County.
- Previously recorded for Atlantic Dune Park (1991) but apparently extirpated there. Present in Boca Raton in maritime hammocks.

Partridge pea
*Chamaecrista fasciculata*
- Widespread in south Florida in both inland and coastal locations, but perhaps extinct on South Palm Beach County barrier islands.
- Provides food for birds. Larval host plant for cesarua blue (*Hemaris cesarua*), cloudless sulphur (*Phoebis philea*), little yellow (*Eurybia leucota*), and gray hairstreak (*Strymon melinus*) butterflies.

Spurred butterfly pea
*Convolvulus virginianus*
- Widespread in south Florida in both inland and coastal locations, but very rare in South Palm Beach County.
- Previously documented at Atlantic Dune Park (1991) but apparently extirpated.

Forked bluecurls
*Trichostema dichotoma*
- Widespread in south Florida in both inland and coastal locations, but very rare in coastal South Palm Beach County.

Marshhay cordgrass
*Spartina patens*
- Widespread in South Florida along the coast and sometimes planted in dune revegetation projects.
- Previously documented at Atlantic Dune Park (1991) but apparently extirpated there; present at Delray Municipal Beach.
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 Clockvine
Jasminum subfuscatum
- 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
Crotalaria punctata
- Scattered and rare in southeastern Florida. Not common on re-nourished beaches.
- Present at Atlantic Dunes Park and Delray Municipal Beach. Plants added in 1995.

Pineland Croton
Crotalaria 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 (1993) but introduction failed.

Bartram’s Scrub-hairstreak
Strymon nichollsii
- Federally endangered. Monroe and Miami-Dade counties, extant in Broward and Palm Beach counties.
- Larvae feed only on Pineland croton.

Florida prairie-clover
Dalea carthaginensis var. floridana
- Federally endangered. Southern mainland north to Palm Beach and Collier counties. Extant in Palm Beach County.
- Collected in the Palm Beach area only in 1893 and 1918.
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
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
Freshwater Wetlands Have All Been Destroyed
(some species have been planted or could be restored in retention areas)
Restoration Success Stories For Grassy Dunes

Miami Beach

Delray Beach
The Delray dune is loaded with rare plants.
But Limited Diversity is the Norm
Encroachment by seagrapes and invasive species is common; and human pressure on the foredune can be severe.
Coastal strand is being overwhelmed or destroyed
Perception Weighted Toward Forests

Fig. 2. Present plant associations on the Biscayne National Park with the major cultural features added. Based on 1943 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/24320068
Trees in the Wrong Place Destroy Native Biodiversity
Restoring the Gold Coast
Section 2: Eight Principles that Underpin Ecological Restoration

1. Engages Stakeholders
2. Draws on Many Types of Knowledge
3. Is Informed by Native Reference Ecosystems, While Considering Environmental Change
4. Supports Ecosystem Recovery Processes
5. Is Assessed Against Clear Goals and Objectives Using Measurable Indicators
6. Seeks the Highest Level of Recovery Possible
7. Gains Cumulative Value When Applied at Large Scales
8. Is Part of a Continuum of Restorative Activities

[Diagram showing the eight principles]
Biodiversity Restoration at Atlantic Dunes Park Restoration, 2016-present

Previous work completed under our “Green Delray” program

Special thanks to our sponsors:
• New York Life Foundation
• Pugliese Public Relations
• Keep Palm Beach County Beautiful
• Solid Waste Authority
February 2019 Newsletter

Diversity is Healthy
A diverse beach is a healthy beach! We have done well in southeastern Florida to re-nourish our beaches and restore sea turtle populations. Yet we have a long way to go to restore all of the native plant and animal diversity lost from our barrier islands in Dade, Broward and Palm Beach counties. The fact is that diverse dunes are more resilient to sea level rise and climate change. That's why it's critical they are restored based on native ecosystems able to support hundreds of species of native plants and animals, including rare and endemic species! Bringing together all of the stakeholders - landowners, community members, politicians, students - to support a regional conservation vision for the dunes of southeastern Florida is the goal of our new Restoring the Gold Coast program. Stay tuned to this newsletter for more updates!

Monthly Conservation Notes

Join us for our new monthly Conservation Notes, where we discuss topics important to our work. If you have ideas about topics you would like to see covered, please send us a note!
A diverse dune is a healthy dune, and our first line of defense against sea level rise
Palm Beach County

Impact100

The Power of Women Giving as One

Pay to the Order of The Institute for Regional Conservation

$100,000.00

One Hundred Thousand and 00/100 Dollars

for 2019 Grand Awards

Impact100 PBC

Date April 17, 2019
What is the Restoring the Gold Coast Program?

Restoring the Gold Coast is a collaborative initiative to restore the incredible diversity of native plants and animals native to coastal beaches and dunes in southeastern Florida, along the historic Gold Coast from Miami-Dade to Palm Beach County. This two-pronged project mobilizes partnerships within the community to teach children and adults about environmental advocacy as they also learn about the importance of protecting our coastal dunes and work toward restoring damage done. Participants will be provided with rich opportunities to learn how biodiversity keeps our Earth healthy and ultimately keeps us healthy too. In its first phase, participants will enjoy hands-on restoration activities as we help restore native coastal ecosystems in southern Palm Beach County from Boca Raton to Lake Worth.
Goals in Southern Palm Beach County

Conduct outreach to municipalities and community groups

Assess coastal plant diversity

Conduct hands-on restoration & education events and workshops

Increase depleted populations of native plants

Engage public officials and other influencers
June 2019 Rapid Assessment
Town of Ocean Ridge

George Gann, Kimberlee Duke Pompeo,
Commissioner Phil Besler, Lieutenant Scott McClure
Building on Healthy Biodiversity
Opportunities
Areas of Outside of Scope

Areas with Poor Engineering

Areas of Active Erosion
Events and Community Engagement
Overview

• Our aim is to build and foster a community that cares about and advocates for coastal biodiversity and its restoration.

• We are working with K-12 students, college students, and adults, including thought leaders and other influencers.

• A variety of methods are employed including stakeholder meetings, presentations, and hands-on field trips and restoration events.
School Presentations

- AICE Environmental Management class at Boca Community High
- Science National Honors Society at Atlantic Community High
- Guest lectures in all Earth Science classes at Atlantic Community High
- After school presentation to Milagro Center High Schoolers
- Presentation to Kindness Matters Club at Banyan Creek Elementary
Presentations for Adults and Outreach to Influencers

- Presentation to Ocean Ridge Commission and Workshop at Ocean Ridge Town Hall
- Humana Senior Center Presentation
- Delray Beach Chamber Nonprofit Lunch and Learn
- Estates of Silverlakes Presentation
- Included in presentations at Florida Native Plant Society chapter meetings
- Held webinars of RGC and Biodiversity Starter Plant Kits in May
- Meetings with Delray Beach Commissioners about biodiversity, seagrape trimming, and invasive species
- Collaborations with City of Boca Raton at Red Reef Park and South Beach Park
School Field Trips

• South Inlet Park with Boca Community High
  – Planted maritime hammock species
  – Students brainstormed ways to improve our dunes in the future
  – Special thanks to Rachel Wellman
School Field Trips

• Multiple field trips with Atlantic Community High School to Delray municipal beach
  – Students planted coastal strand species, hand-removed invasive plants, and picked up trash
  – Special thanks to Chelsea Cantwell
Community Organization Events

• Sea Turtle Adventures iCare Program at Gulf Stream Park
  – We led roughly 20 special needs participants from the iCare program and roughly 20 high school “buddies” from St. Vincent High School
  – Planted a variety of coastal strand species
Public Events

• RGC Kick-Off Event in Delray municipal beach
  – Participants helped us create a “biodiversity hotspot” in the municipal beach inbetween Anchor Park and Sandoway Park
Public Events

- International Coastal Cleanup at Atlantic Dunes Park
  - Built on the biodiversity hotspot we have been creating over the last several years at ADP
  - Also removed invasive plants and picked up trash
Resources for Private Dune Owners

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 5-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/donationrc.html
As part of our **Restoring the Gold Coast** program, IRC is offering native Biodiversity Starter Plant Kits for coastal gardens 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.
Coastal Strand and Shrubland Starter Plant Kits

Each coastal strand starter kit contains 5 plants native to the beaches and dunes of southern Palm Beach County. Our Spring 2020 Kits contain: (1) Silver saw palmetto, (1) Horizontal coco-plum, (1) Beach-creeper, (1) Seaside joyweed or Yellow joyweed, and (1) rare plant surprise. Each kit contains (2) 10” containers, (1) 6” container, and (2) 3-4” containers. These kits are perfect for back dunes and areas protected from direct wind and salt spray. These species can also be used in sunny locations in any coastal garden. The price for each kit is $85.00.
Four Larval Hosts – 10 Coastal Butterflies

- Cassius Blue
- Large Orange Sulphur
- Martial Scrub-Hairstreak
- Common Buckeye
- Gray Hairstreak
- Phaon Crescent
- White Peacock
- Gulf Fritillary
- Julia Heliconian
- Zebra Heliconian
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:

- 33435
- Find

If you would like to learn more about native plants and the importance of conserving them, or how to use this website, see the topics at right.

Map

Originally designed for South Florida (counties from Lake Okeechobee southward), NFYN is now moving north with the aspiration of serving all of the state of Florida by 2020. When complete, a list of the cultivated native plants that commonly occur throughout that each county will be provided.
Shrubs and Woody Groundcovers

- Bahama nightshade
- Baycedar
- Beach-creeper, Golden-creeper, Coughbush
- Beach-elder, Seacoast marshelder
- Coco-plum
- Common snowberry, Milkberry
- Coralbean, Cherokee bean

- Solanum bahamense
- Suriana maritima
- Ernodea littoralis
- Iva imbricata
- Chrysobalanus icaco
- Chiococca alba
- Erythrina herbacea
2020 Events Affected by COVID-19

• Presentation to 5 to 9-year-olds at Hagen Ranch Library
• Outdoor Youth Adventures guest presentation and field trips at Homeschool Fridays and summer camp
• Lake Worth Board of Education presentation
• Save Our Seas Workshop at Ocean Ridge
• Public planting in Boynton Beach at Oceanfront Park
• Public planting in Boca Raton
• Additional planting events at Atlantic Dunes Park and Delray Municipal Beach
• Save Our Seas event in Ocean Ridge
• Springfest in Boca Raton
• Lake Worth Festival of Trees
• Earth Day Celebration at Palm Beach Atlantic University
New Public Events

- IRC worked with surf campers from Outdoor Youth Adventures to do a coastal planting in Delray Beach
New Public Events

• The Palm Beach County Chapter of the Surfrider Foundation and New York Life sponsored a coastal dune planting at Oceanfront Park in Boynton Beach
New Public Events

• Erin Deady Law, Central Park Taekwondo, and New York Life co-sponsored a restoration event at Atlantic Dunes Park in Delray Beach
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.
Professional Restoration Crew

• We are continuing our restoration work at Atlantic Dunes Park and are collaborating with WGI and the City of Delray Beach on work at the municipal beach.
Impact and Future Plans
Restoring the Gold Coast Project Sites
2019 to present
Excellent Opportunities for Connectivity

Delray Beach, Florida
Restoration design. Bringing coastal strand east by using cues from natural recruitment.
Invasive Species Control
42 species planted

Seeds and plants collected
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 burned under seagrasses, vines, and invasive species. It emerged in 2020.

On Friday, I was able to go back to ADP with four ecological restoration practitioners 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 seagrass. 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

*Nyctanthes paperacea*, 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 *Lobaria pulmonaria*, or tropical sage, in South Florida. Every spring the red flowers barely poke out from the protecting shrubs of the coastal strand.

We recorded *Pongassu nitidus*, snap, or pitted suppressor, for the first time on coastal dunes in Palm Beach County in 2019. This species is normally found growing in pine forests.
Moving Forward

- Dune Assessments
- Workshops
- Restoration Activities
- Educational and Policy Tools
- Geographic Expansion
Global Change and Closing Thoughts
Early(er) Climate Change Models 2001-2002

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

Abstract

A previously developed plant species-climatic envelope model was evaluated further to predict effects of elevated atmospheric CO₂ on the potential distribution of native woody plants in Florida, USA. The model was run for the years 2000 and 2050 relative to the climatic conditions of the years 1970 and 2000, respectively. The model predicted that the potential distribution of native woody plants would expand northward and westward, with some species showing significant changes in their potential distribution. The results suggest that climate change will have significant impacts on the distribution of native woody plants in Florida, which could have implications for conservation and management efforts.

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

Coauthors:
D. Wilson Crumppacker, 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

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
Hurricane Dorian "near miss"
Play the Long Game
We Need Your Support!

www.regionalconservation.org
gann@regionalconservation.org