

ACCELERATING DUNE HABITAT SUCCESSION

I'll talk about..

- South Hutchinson dune projects, since Frances, Jeannie
- New International standards for habitat restoration.
- Applying these to complex successional restorations.

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OK, so one month after H Frances, Jeannie, 2004 Ocean Village Community

Most vegetation and about
12,000 cy sand deposited
upland onto roads and parking
lots.



Sand bulldozed back to
reprofile dune berm in
December



The frontal dune planting was completed by mid March, the back dune by the end of April.



This dune was fully established by the next hurricane season, producing seed, and captured a foot of sand from H. Wilma with no damage.



Same location fourteen years later. The seaward limit of the dune is now 80 feet to the east with four to five vertical feet of accretion.



Second season recovery




Owners had observed that established saw palmettos survived the storms with little erosion or damage. Annual dune enhancement adds these to backdune areas.





Planted at 24 inch size with temporary drip irrigation..



**Scattered with other strand shrubs
on backdune slope**

**Won't show up for about
two years**

They grow about one foot per year to reach mature height and spread in five to six years.





ST. LUCIE COUNTY DUNE 5 MILES, 2006

Planting began in early June and was substantially completed the first week of August with the installation of over 183,000 plants on the new dune from Normandy Beach South to the County line. Dolman Park was added in October, and Blind Creek was completed in November, with an additional 70,000 plants.

Fort Pierce City Projects:

30 foot wide X 1.2 mile pioneer dune.

followed by

2000 plant successional strand planting.

20 species palmettos and shrubs.



Southern half has doubled in width and captured 3 to 4 verticle feet sand.





**Sand capture and spread
have buried 42 inch post
and rope barriers.**

Strand species are well established but at risk since new management not concerned with overshadowing species.





MARTIN COUNTY
Sailfish Point/Bathtub Beach 2016.
1.2 miles pioneer vegetation 30 to
50 feet shore normal.

10.08.2016 08:34

ENDURING AND EXPANDING THROUGH STORMS SINCE CONSTRUCTION



ELEMENTS OF A COMPREHENSIVE DUNE MAINTENANCE PLAN

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All projects we have permitted through FDEP and carried out in Florida have been designed with these five common elements, including Cities of Miami Beach, Delray Beach, Flagler Beach, Martin and St. Lucie Counties, and hundreds of private works.

ELEMENTS OF A COMPREHENSIVE DUNE MAINTENANCE PLAN

- 1. LIGHTING CONTROL**
 - 2. EXOTIC SPECIES ERADICATION**
 - 3. GRASSY FOREDUNE HUSBANDRY**
 - 4. STRAND ZONE PRUNING**
 - 5. STRAND ZONE ENHANCEMENT**
- 



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



These projects generally follow recently published world restoration guidelines.

Strong focus of SER document is to model restorations after remnant intact local ecosystems. Hard to find these sometimes.



CANAVERAL NATIONAL SEASHORE

One of the few remaining complete natural barrier island ecosystems..
26 miles with minimal human impact.





Remember , we're trying to model this restoration after existing remnant systems, like..

Spessard Holland, Brevard, 2016

Or historic evidence from 80 or 90 years ago.



Plate 5.—East Coast dunes of Jupiter and Crescent Beach.

Nine months ago, here at this hotel..



HUTCHINSON SHORES HOTEL/MARTIN COUNTY PROPERTY
Exotic removal , seagrape pruning, and restoration with pioneer
and strand species.



Current progress viewed from Hotel pool deck. Seagrape trees recovered as shrubs, pioneer species providing green cover. Hard to see the strand species that will succeed within a couple of years.



But all are alive and established and will emerge to dominate...ACCELERATING SUCCESSION.

Hard seagrape pruning remains controversial,
on social media, but science is solid.

Remedial crown reduction pruning..coppicing.. of 25' tall
seagrape trees at Delray Beach. Two weeks after Wilma.



SLOAN'S CURVE, PALM BEACH



**Pruned continuously since 1990 to
hip high with no harm**

Section 17 Seagrape expansion since 1985

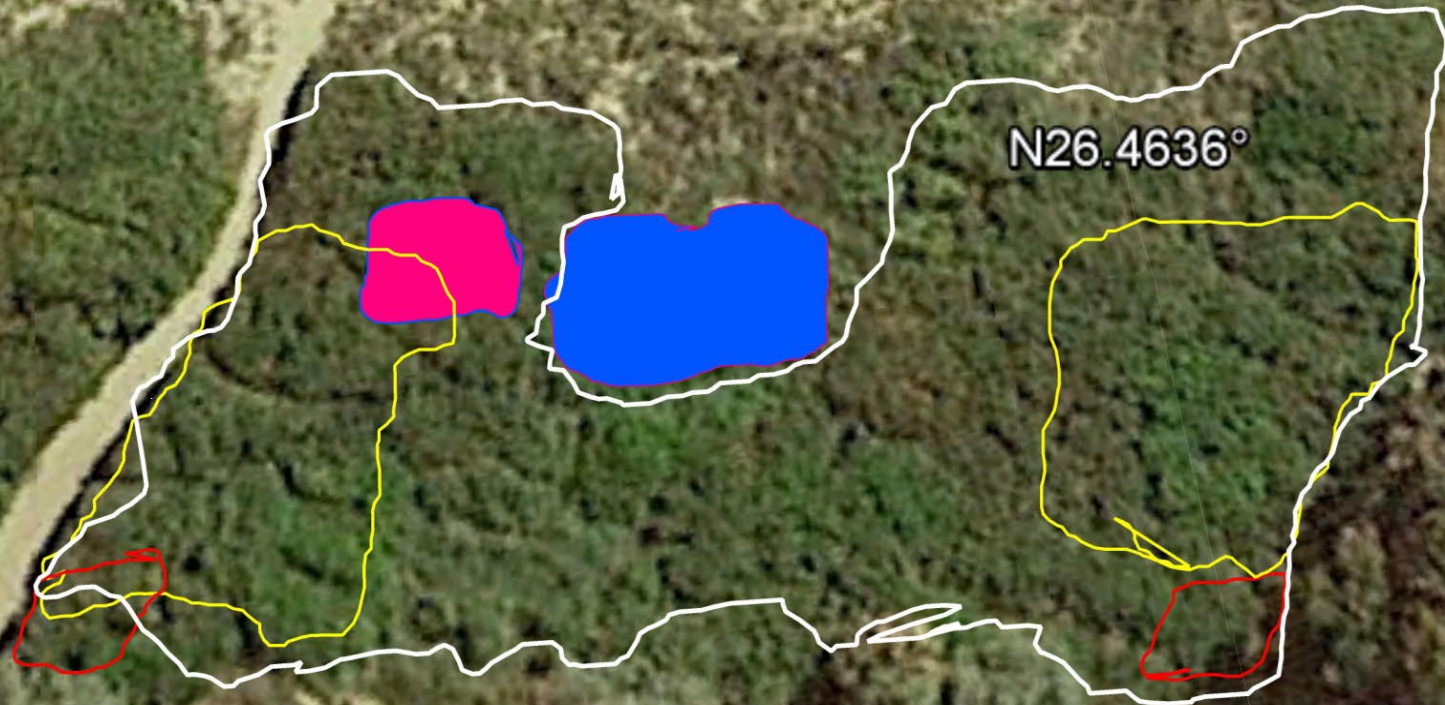
Red line is approximate footprint of seagrape clusters as installed to trap sand at access points 1982; about 300 sq ft.

Yellow is footprint at time of 2001 FDEP pruning permit; about 4,500 sq ft.

White line is seagrape footprint at 2015 FDEP exotic removal permit; about 10,500 sq ft.

35X increase since planting, 2.3X increase since pruning began. 7%/year, expansion since pruning began.

INVASIVE CHARACTER OF *COCCOLOBA UVIFERA*, MAPPED AT DELRAY BEACH FOR FDEP DUNE MANAGEMENT PERMITS



FPL DUNE HARDENING PROJECT.

Including removal of exotic plant species, pruning native species to restore strand growth habit, and enhancement planting with FDEP approved coastal native species per attached FPL St. Lucie Power Plant Dune Hardening Project Description.

Approximately 4650 feet shore parallel from about FDEP monument SCR-085 at the North, to SCR-079 to the South, and from the high water line on the East to the upland base of the dune berm on the West.

**PRIMARY ENGINEERING OBJECTIVE:
Improve storm protection to intake
and outfall infrastructure.**

Google Earth

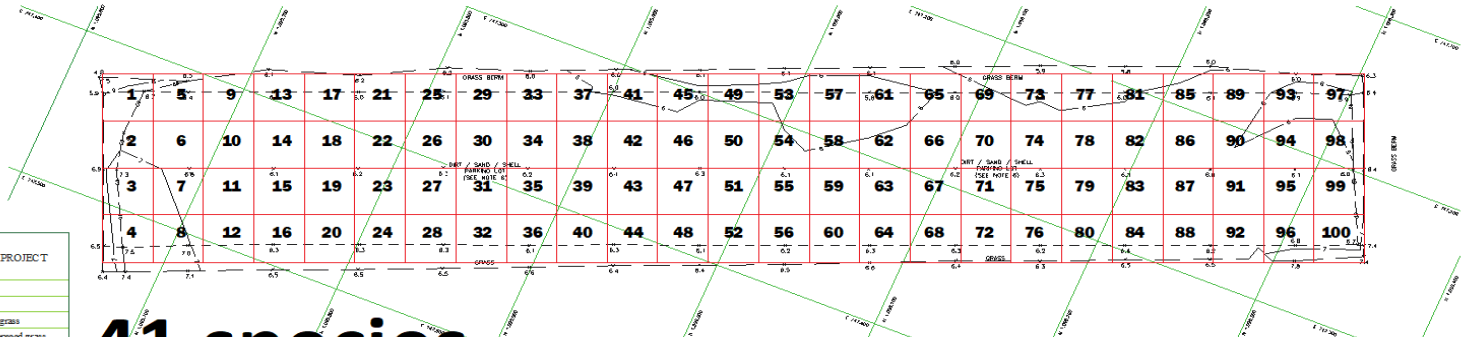
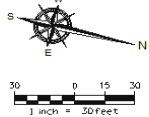
1000 ft



PROOF OF CONCEPT PROJECT, 2010,



FLORIDA POWER & LIGHT DUNE RENOVATION PROJECT



FL. POWER PLANT, HUTCHINSON ISLAND DUNE RENOVATION PROJECT

a	<i>Urochloa paniculata</i>	Sea oats
b	<i>Sporobolus vaginatus</i>	Cordgrass
c	<i>Panicum anserinum</i>	Dune panic grass
d	<i>Sporobolus virginicus</i>	Virginia dropseed grass
e	<i>Paspalum vaginatum</i>	Shore paspalum
f	<i>Heliopsis scabra</i>	Dune sunflower
g	<i>Distichlis spicata</i>	Saltgrass
h	<i>Ipomoea pes-caprae</i>	Railroad vine
i	<i>Cassia maritima</i>	Beach bean
j	<i>Asterionia maritima</i>	chaff flower
k	<i>Taraxacum officinale</i>	Beach taraxacum
l	<i>Borreria frutescens</i>	Sea purslane
m	<i>Ambrosia ligulata</i>	Beach ragweed
n	<i>Sarcocornia quinqueflora</i>	Sesuvium
o	<i>Chrysobalanus icaco</i>	Coconut
p	<i>Ruellia caroliniana</i>	White indigo
q	<i>Coccoloba trifida</i>	Sage
r	<i>Croton tiliaceus</i>	Butterwood
s	<i>Phacelia imrayana</i>	Blackhead
t	<i>Lantana camara</i>	Wild sage
u	<i>Sida acuta</i>	Bay Cedar
v	<i>Rapanea hederifolia</i>	Myrtle
w	<i>Baccharis halimifolia</i>	Saltbush
x	<i>Avicennia nitida</i>	Beach elder
y	<i>Erinodes pectinatus</i>	Golden aster
z	<i>Arctostaphylos uva-ursi</i>	Matferry
A	<i>Zanthoxylum herculis-claris</i>	Hercules club
B	<i>Zanthoxylum fagara</i>	Wild lime
C	<i>Eragrostis ciliaris</i>	Spanish stopper
D	<i>Argemone mexicana</i>	Sea lavender
E	<i>Coccoloba trifida</i>	Silver Palm
F	<i>Yucca aloifolia</i>	Spanish bayonet
G	<i>Agave decurrens</i>	Native coastal agave
H	<i>Trichostema aegyptiacum</i>	Blue curls
I	<i>Jacquemontia mollis</i>	Beach cluster
K	<i>Portulaca oleracea</i>	Florida portulaca
L	<i>Sagittaria arifolia</i>	needlepod
M	<i>Mimulus aurantiacus</i>	yellowtop
N	<i>Hymenocallis borealis</i>	keylily
O	<i>Eragrostis ciliaris</i>	white stopper
P	<i>Flourensia coccinea</i>	yellowtop

41 species, 6 listed

DUNE RENOVATION PROJECT



LEGEND

- 0.0 = AS-BUILT SPOT ELEVATION
- E = EASTING
- LB = LICENSED BUSINESS
- N = NORTHING
- = EDGE OF PARKING LOT
- = GRADE BREAK
- = CONTOUR
- = PAINTED LIMITS (SEE NOTE 4)

Species Location

1	b, c, e, g, n, r, u, y	21	b, c, e, i, l, n, g, r, u, z, E, M	41	a, b, c, i, l, m, n, p, q, r, y	61	a, b, c, i, k, n, q, r, s, u, y, z, F, G	81	C, e, l, n, o, q, r, B, C
2	b, c, d, e, g, G	22	a, d, c, e, i	42	a, b, c, d, e, h, i, k, m, n, y	62	a, c, d, e, i	82	a, b, c, e
3	b, c, d, e, g	23	b, c, d, e, g	43	b, c, d, e, g	63	b, c, d, e, i	83	a, b, c, d, e, i
4	b, c, d, e, g	24	a, b, c, d, e, g	44	b, c, d, e, g	64	a, b, c, d, e, i	84	a, b, c, d, e, i
5	b, c, e, i, n, g, r, s, t, v, y, A, B, F, N, M	25	b, c, i, j, n, g, r, s	45	b, c, h, l, n, q, r, s, y, C, F, K, L, P	65	b, c, l, n, q, r, s, u, v, y, z, M	85	c, e, h, i, n, o, q, r
6	b, c, d, e, g	26	a, c, d, e	46	a, c, i, m, n, u	66	a, b, c, d, e, i	86	a, c, d, e, h, l, n, o, q, K, L
7	b, c, d, e, g	27	b, c, d, e, g	47	a, b, c, d, e, g	67	a, b, c, d, e, i	87	a, b, c, d, e, l
8	a, b, c, d, e, g	28	b, c, d, e, g	48	a, b, c, d, e, g	68	a, b, c, d, e, i	88	a, b, c, d, e, l
9	b, c, e, i, o, q, r, s, v, y, z, C, D, K, N	29	a, b, c, e, i, l, n, q, r, v	49	b, c, h, l, n, r, q, s, y, C, F, K, L, P	69	a, b, c, e, n, C, M, O	89	c, d, g, l, q, r, v
10	b, c, e, g	30	a, b, c, e, g, n	50	a, c, i	70	a, b, c, d, e	90	a, d, c, d, e, q, r
11	b, c, d, e, i	31	a, d, c, d, e, g	51	a, b, c, i, h	71	a, c, d, e, i	91	a, b, c, d, e, l
12	a, b, c, d, e, g	32	b, c, d, e, g	52	a, c, d, e, g, h	72	a, b, c, d, e, i, m	92	a, b, c, d, e, l
13	c, e, i, j, k, l, n, o, p, q, r, s, v, y	33	a, b, c, i, l, n, q, r, v, F, G	53	a, b, c, d, e, g, h, i, n, p, q, r, s, y, N	73	b, c, e, i, j, n, q, r, K, M, N	93	c, d, g, i, q, r, v
14	a, c, d, e, g, i, N	34	a, b, c, e, i, n, y	54	a, c, i	74	a, b, c, d, e, i	94	d, e, g, l, q, r, v
15	b, c, d, e, g	35	b, c, d, e, g	55	a, b, c, i, h	75	a, b, c, d, e, m	95	c, d, e, g, l, n, q
16	b, c, d, e, g	36	b, c, d, e, g	56	a, c, d, e, g, h	76	a, b, c, d, e, i	96	b, c, d, e, n, q
17	b, c, d, e, i, l, n, r, s, v, y, k	37	a, b, c, e, i, l, n, q, r, v, A, M	57	b, c, l, p, r, v, y, z, F, G, M	77	b, c, e, i, n, o, r, u, y, A	97	d, e, g, q, r, v
18	a, c, d, e, g	38	a, b, c, d, e, g, n, y	58	a, b, c, d, e, g, h, i, n, y	78	a, b, c, e, h, n, u, y	98	c, d, q
19	b, c, d, e, g	39	b, c, d, e, g	59	a, c, d, g	79	a, b, c, d, e, i	99	c, d, q
20	b, c, d, e, g	40	b, c, d, e, g	60	a, b, c, d, e, i	80	a, b, c, d, e, l	100	b, c, d, e, n, q, r

* These species randomly seeded from local genetic stock

CURRENT PROJECT: 38,440 plants, 68 species



PIONEER ZONE HUSBANDRY..install sea oats and other fast growing species to capture and hold moving sand.

STRAND ZONE PRUNING

to control competitive spread and replace with more appropriate species.



38,440 plants, 61 species..

but 1/3 of total project cost
in palmettos.



Since this is the model



Juno Dunes



Natural Area

In five years or so, this will be transformed



RESTORATIVE CONTINUUM



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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.



Initial restorative activities such as single-species revegetation projects can be transformed over time into diverse 4-star to 5-star restoration projects. Left, Bethany Beach, Delaware, USA, ©ER&M/Biohabitats. Right, Delray Beach, Florida, USA ©George D. Gann.

LONG TERM GOAL IS FULL SYSTEM FUNCTION

This project included a research component to test propagation protocols for a number of native species previously unavailable in nursery trade. There were some notable but informative failures. And some successes.



We tried out several experimental small scale micropropagation techniques on rare and “who cares” species.



\$50 aeroponics rooting chamber. Producing
Ambrosia Hispida

New slow release fertilizer added to our planting spec allows contract compliance managers to confirm correct application rate up to one year after planting.



So, what are we holding onto here that you and your kids would not likely see if not for these efforts?


Maybe 50 plant species nearly lost to habitat destruction, including..Wild allamanda, *Urechites Lutea*



Jacquemontia reclinata
Listed Endangered U.S

COST TO CREATE A NEW POPULATION
IS \$40K FOR 100 NEW PLANTS, UNDER
FEDERAL PLAN

OUR KIDS CAN DO IT
FOR LESS THAN
\$300.



Listed coastal plants have no inherent weakness..but are suffering from habitat loss. Preserving them for future generations simply requires finding safe places to plant them. Private projects are the best.

Beach verbena grows well in semi-sheltered backdune areas. Threatened species in FL.

Partridge Pea



BEACH RAGWEED, *Ambrosia hispida*



Seaside Gentian,
Eustoma exaltata



Burrowing four o'clock
Okenia hypogaea

(Endangered—Florida)





Sea Oxeye Daisy, *Borichia frutescens*




TROPHY



TROPHY

**THANKS FOR LISTENING...and please
practice redundant contraception.**

A wide-angle photograph of a crowded beach. In the foreground, several large, dark, fringed beach umbrellas are visible. A lifeguard stand with a white flag that says "SWIM" is prominent. The beach is filled with people in swimwear, some sitting on towels or chairs, others standing. In the background, the ocean is visible under a clear blue sky, with a few sailboats on the water. The overall scene is a busy, sunny day at a popular beach destination.

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