



CLIMATE CHANGE AND POPULATION DYNAMICS OF THE COASTAL STRAND

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- A photograph of a sandy beach with sparse vegetation and a distant building on a dune under a blue sky.
- I'll be talking about
 - THE NATURAL CHARACTER OF THE STRAND
 - CONTROLS WITHIN THE CLIMATIC ENVELOPE
 - HUMAN INFLUENCES AND ECOSYSTEM RESPONSE
 - CASE STUDIES AND ILLUSTRATIONS
 - MANAGEMENT METHODS
 - THE COST OF FAILURE

A photograph of a coastal dune landscape. The foreground is covered in white sand with sparse, dry, brownish vegetation. In the middle ground, there are rolling dunes with more dense, dark vegetation. In the far distance, a small building or structure is visible on a hill under a clear blue sky. The text is overlaid on the lower half of the image.

The Coastal Strand ecosystem is all but wiped out in Florida, due mostly to development, but the few remaining patches are under increasing human generated threat. What was Strand like and how can we preserve what is left?

UNDEVELOPED BOCA RATON IN THE TWENTIES..
palmetto dominated strand..no trees



EARLY COASTAL PALM BCH. COUNTY
BEACHFRONT HOMESTEAD..no trees.



DELRAY BEACH CLUB SITE
CA 1950



NO TREES
Scrub species and palmetto



1951

Delray Beach Shores 11-16-1951

Foundation for John B White Res.
11-16-51 Reef Winds

Seagate Oceanfront 1951

11-16-51 1951

DELRAY BEACH
1951

Ocean to river was palmetto strand in natural condition, from Daytona south. Historical photos and conserved remnants yield the character of the wild dune as a model for protection and restoration.



EXISTING COASTAL STRAND IN NATURAL CONDITION

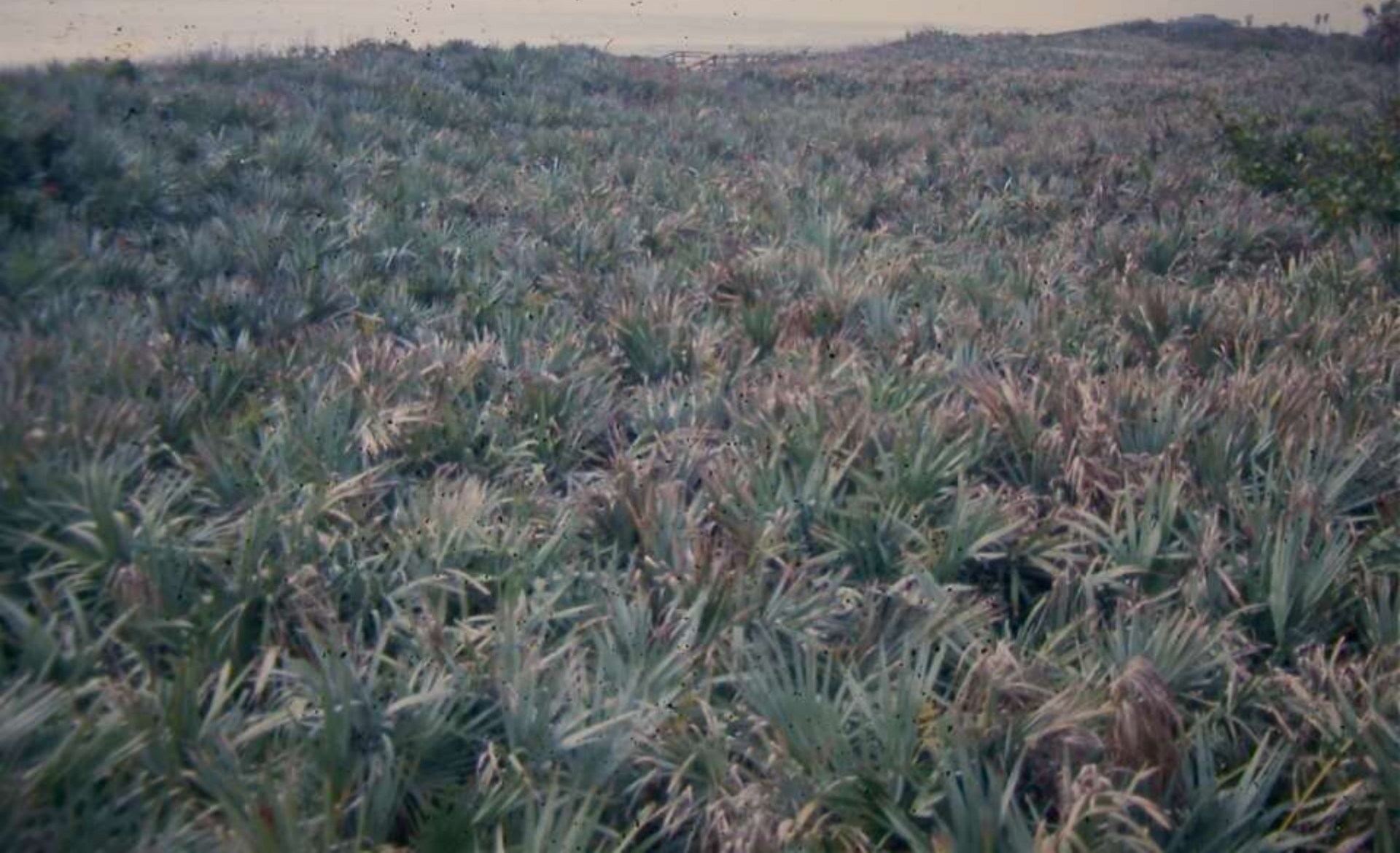




CLIFTON S. PERRY
BEACH

OPERATED BY THE MARTIN COUNTY
BOARD OF COUNTY COMMISSIONERS

Spessard Holland Beach, Brevard County 1987



CANAVERAL NATIONAL SEASHORE..1988



WHAT SHAPED THIS SYSTEM SO
UNIFORMLY THROUGHOUT THE
SOUTHEAST COAST OF FLORIDA?

Canaveral today..not much change.



HURRICANES ?..catastrophic but local,
since most storms are cross shore

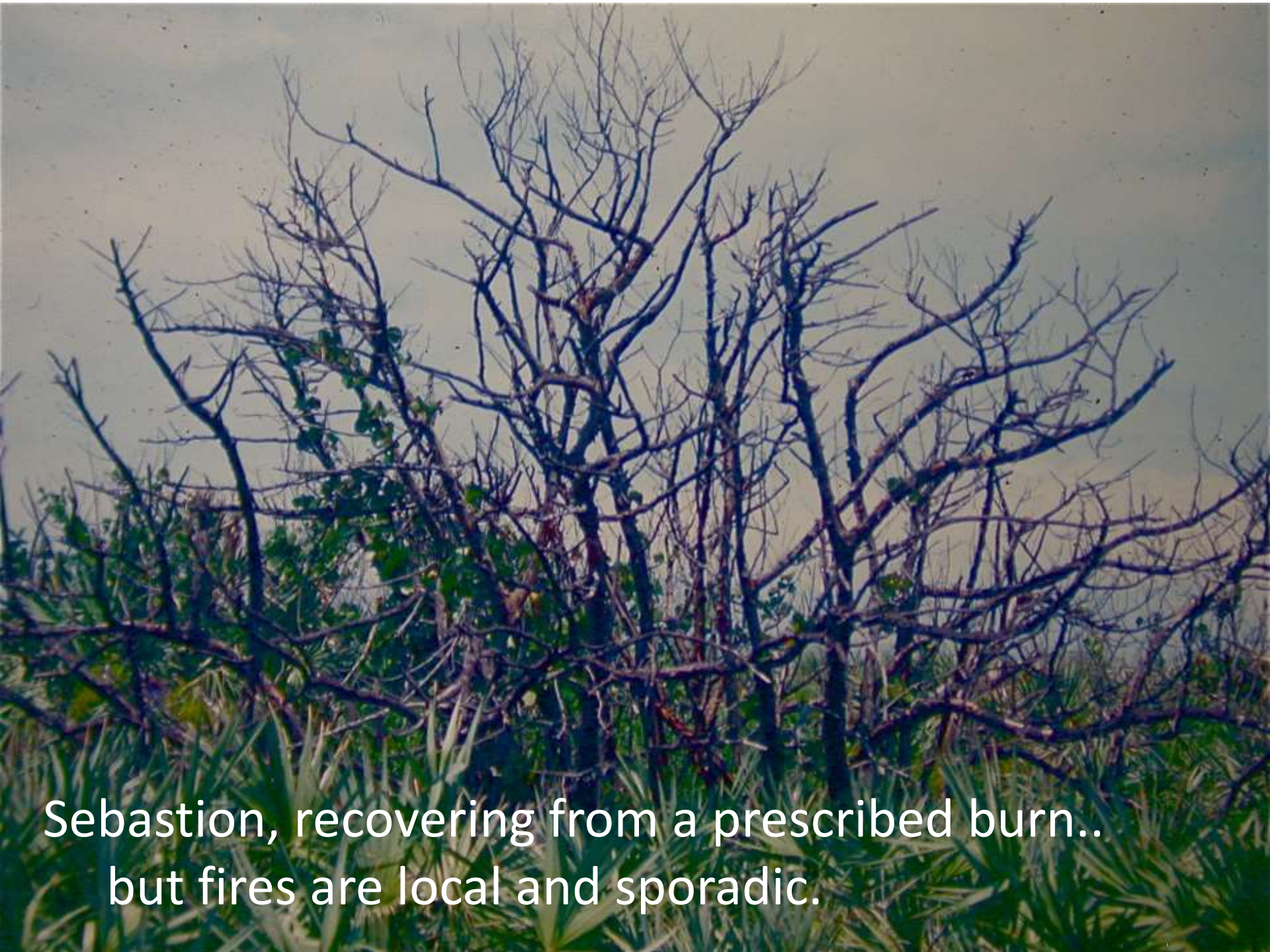


WILDFIRE.. effective controller of
woody species, fast growing herbs

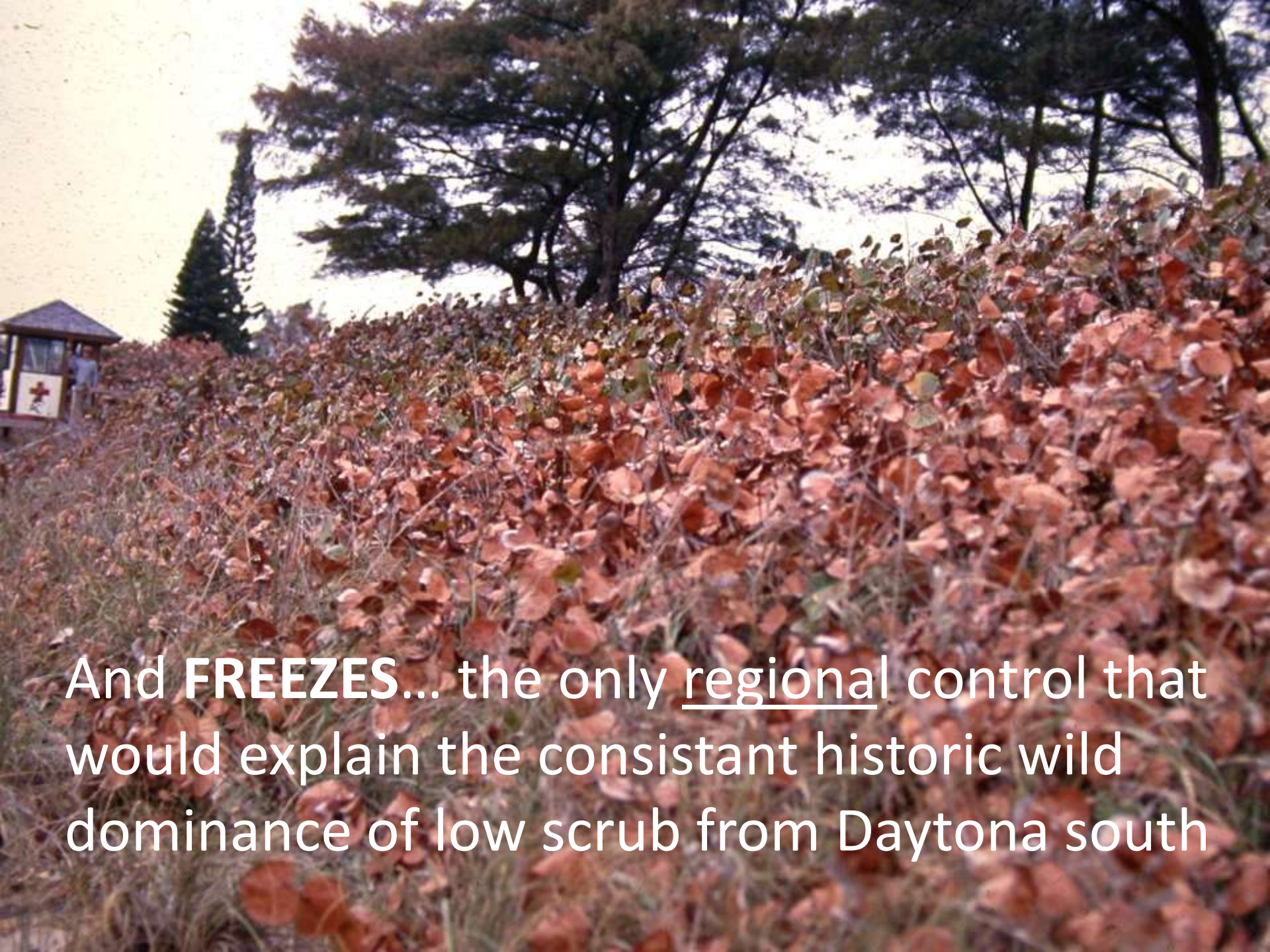


Selects out seagrapes and taller shrubs,
promoting fire resistant palmettos





Sebastion, recovering from a prescribed burn..
but fires are local and sporadic.



And **FREEZES**... the only regional control that would explain the consistent historic wild dominance of low scrub from Daytona south

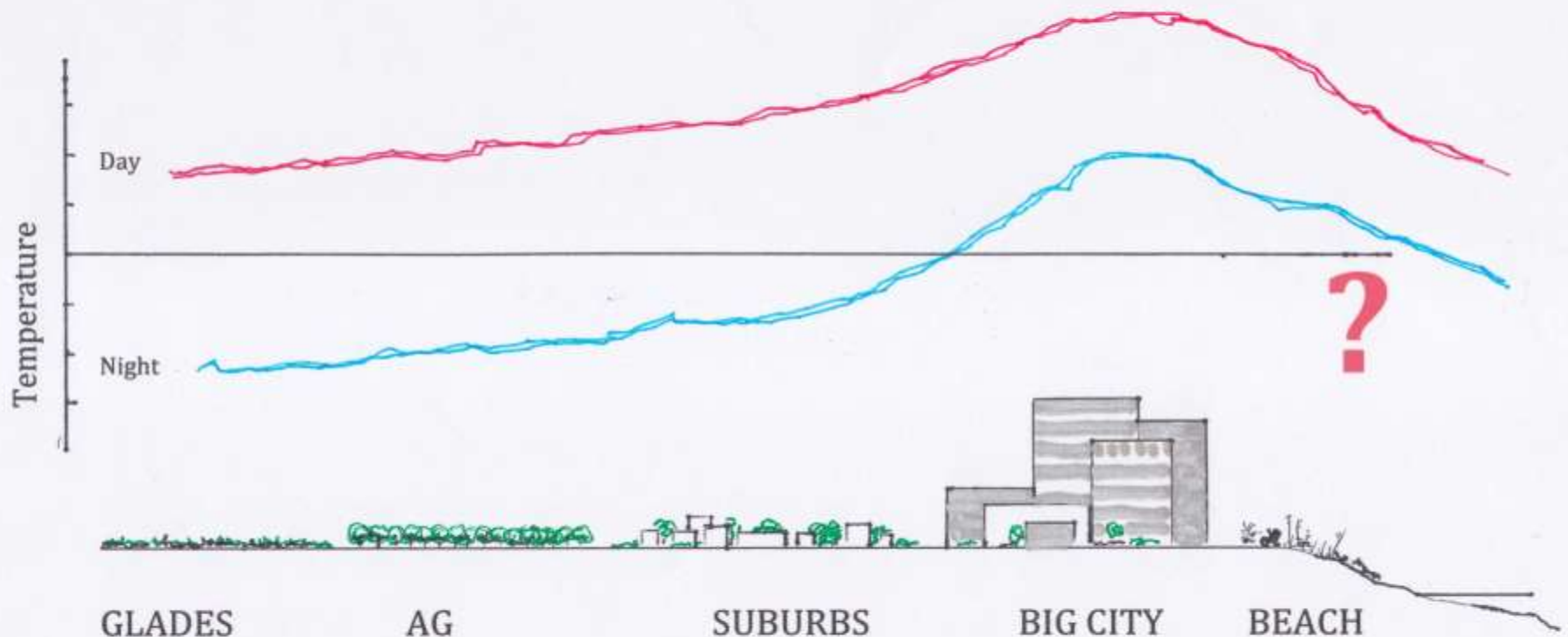
1990 FREEZE, DELRAY BEACH

Saw palmetto, yucca,
inkberry, pioneer
species not impacted..
Seagrape and cocoplum
frozen to the root crown.

2010 NOAA Data Center correspondence...

“the frequency of freezing temperatures along the coast (and all of SE Florida) has decreased since 1940, compared to the 1890 to 1940 period. **The time period between freezes has approximately doubled**”

URBAN HEAT ISLAND EFFECT



"...air temperature of a city of one million or more can be 1-3°C higher than its surroundings. In the evening, the difference can be as high as 12°C." (U.S. E.P.A.)

Buildings and pavement capture heat during the day and release it at night. Even a one degree change can mean **no freeze this time.**

A photograph of a sandy beach with sparse vegetation and a building in the distance. The foreground is filled with white sand and clumps of dry, brown grass. In the middle ground, there are more clumps of grass and some low-lying green plants. In the background, a dark, silhouetted building is visible on a dune under a clear blue sky.

RESULTS OF HUMAN INFLUENCE

- Invasive plant behavior
- Accelerated succession
- Degredation and loss of strand

Dalbergia ecastophyllum,
coinvine” ..single 3 year old
plant with 36 leads to 30
feet long



If not controlled while small, this invasive native species
can overwhelm large areas of healthy dune in just a
few seasons..but provides little stabilizing rootmass.



Offshore hurricane winds from Frances, Jeannie, and Wilma resulted in spike of floating seed distribution.

OCEAN VILLAGE, FT. PIERCE



Three years after first observed during annual sea oat seed collection..35 coin vine clusters as big as 500 square yards.

Vine species respond to warmth and increased CO₂ better than slow growing woody species.



Rapid stem elongation speeds up overshadowing.



Hand cutting and removal required 24 man days labor and filled seven 20 yard dumpsters



Massive vine clusters lead back to central tap rooted lead. No rooting below the vines.



2 plants..3 years..500 sq.yds. \$2,500 fix.
TOTAL REPAIR PROJECT COST..**\$7K**



Hollywood Beach coin vine infestation

\$4,000.00 to remove and dispose
\$7,200.00 to replant..\$11K cost



ANNA MARIA. County park bayside shore half covered with invasive monoculture

ANNA MARIA ISLAND, BAYFRONT PARK



Most other native species have been overshadowed and killed.

Coin vine devouring recent seagrape
planting at Patrick AFB



MIAMI BEACH

A photograph of a coastal area. In the foreground, there is a dense field of green vegetation, possibly a dune area. To the right, a wooden walkway or boardwalk runs along the edge of the vegetation. In the background, a sandy beach is visible with several people walking. The sky is blue with some light clouds. The overall scene suggests a coastal management or conservation project.

CAUGHT IN TIME..Dune Management
Plan will include inspections and
seedling control.. HUGE SAVINGS


DELRAY BEACH



Several years of neglect result in exotic removal costs above \$40K, not counting replanting cost.

Replanting will cost minimum of
\$4/square yard.



A large, dense, green bush of Coin vine engulfing a twenty-foot-tall seagrape tree at a Palm Beach County Park. The vine is thick and covers the entire tree, with many small, round, green leaves. The background is a clear blue sky with some white clouds. The ground in the foreground is dry and sandy.

Coin vine engulfing twenty foot tall seagrape trees at a
Palm Beach County Park... maybe we should call it

BEACH KUDZU

PALM BEACH MID-TOWN, CLARKE AVE.



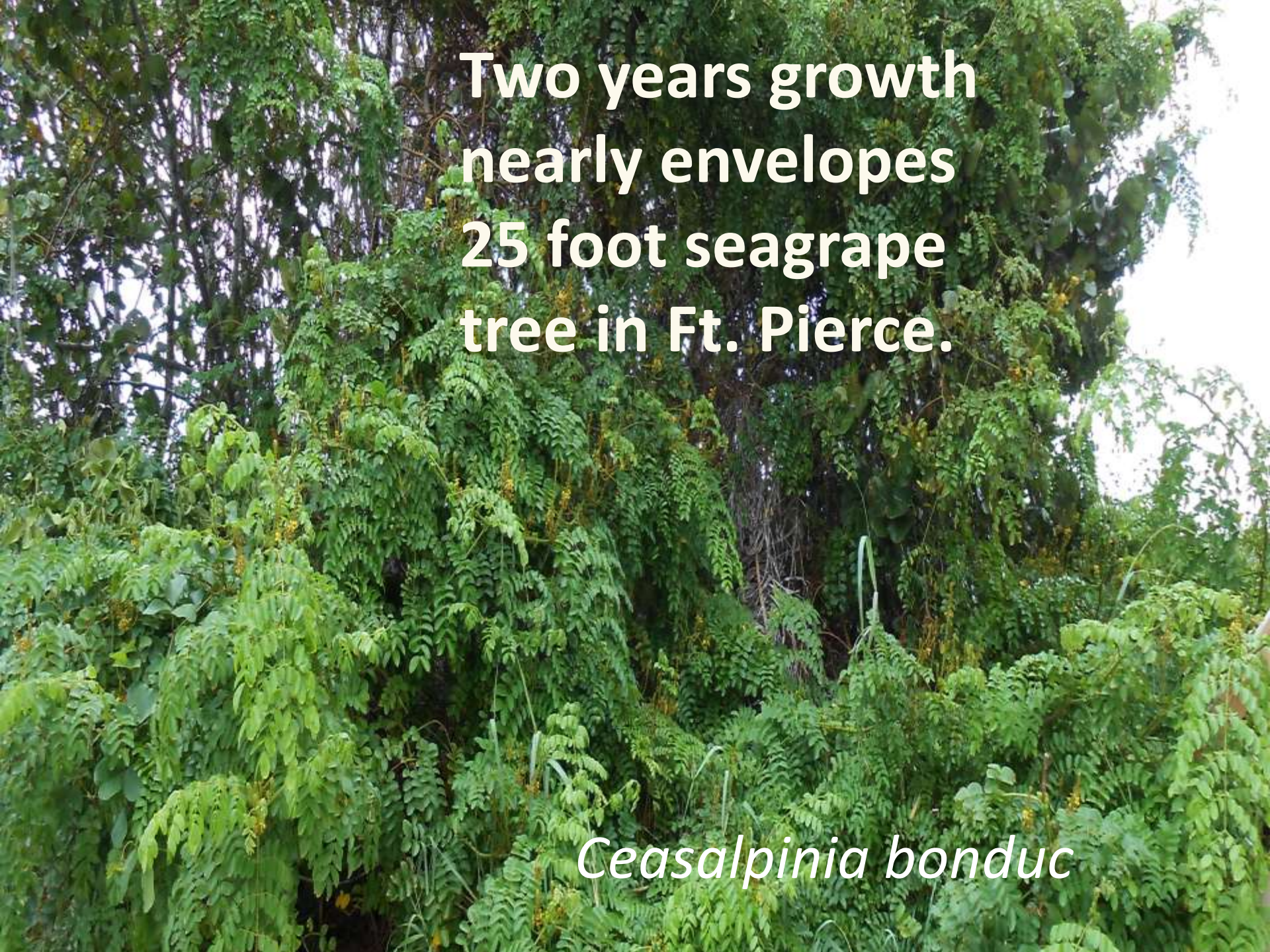
\$2,450 to remove and dispose, \$5,000 TO replant

since then.. Ignore/neglect,etc..next KA'JING SCHEDULED?

Cost of annual prevention program?..less than 1 truckload of sand.

Grey nickerbean. Invasive
native shades out and kills
other valuable strand zone
species.



A photograph showing a large tree trunk and branches almost completely obscured by a thick, dense growth of green vines. The vines hang in long, cascading strands, creating a lush, textured appearance. The leaves of the vines are small and pinnate. The background shows more of the tree's structure and some sky visible through the canopy.

Two years growth
nearly envelopes
25 foot seagrape
tree in Ft. Pierce.

Ceasalpinia bonduc



Nickerbean engulfing and killing seagrape at
Sebastion Inlet State Park

HOW DO WE MANAGE THE PROBLEM, SHORT TERM AND LONG TERM ?



SEMI-ANNUAL INSPECTIONS. Worker on foot with shovel, 1 mile/day.
Cost to remove a seedling by hand.. Maybe \$1.50. No need for
costly replanting or biomass removal.

But if not controlled as seedlings..



MECHANIZED REMOVAL?, SELECTIVE HERBICIDE?

Cost to remove 400 square yards after 3 years neglect..\$400-\$700. Does not include replanting cost of \$4/square yard.

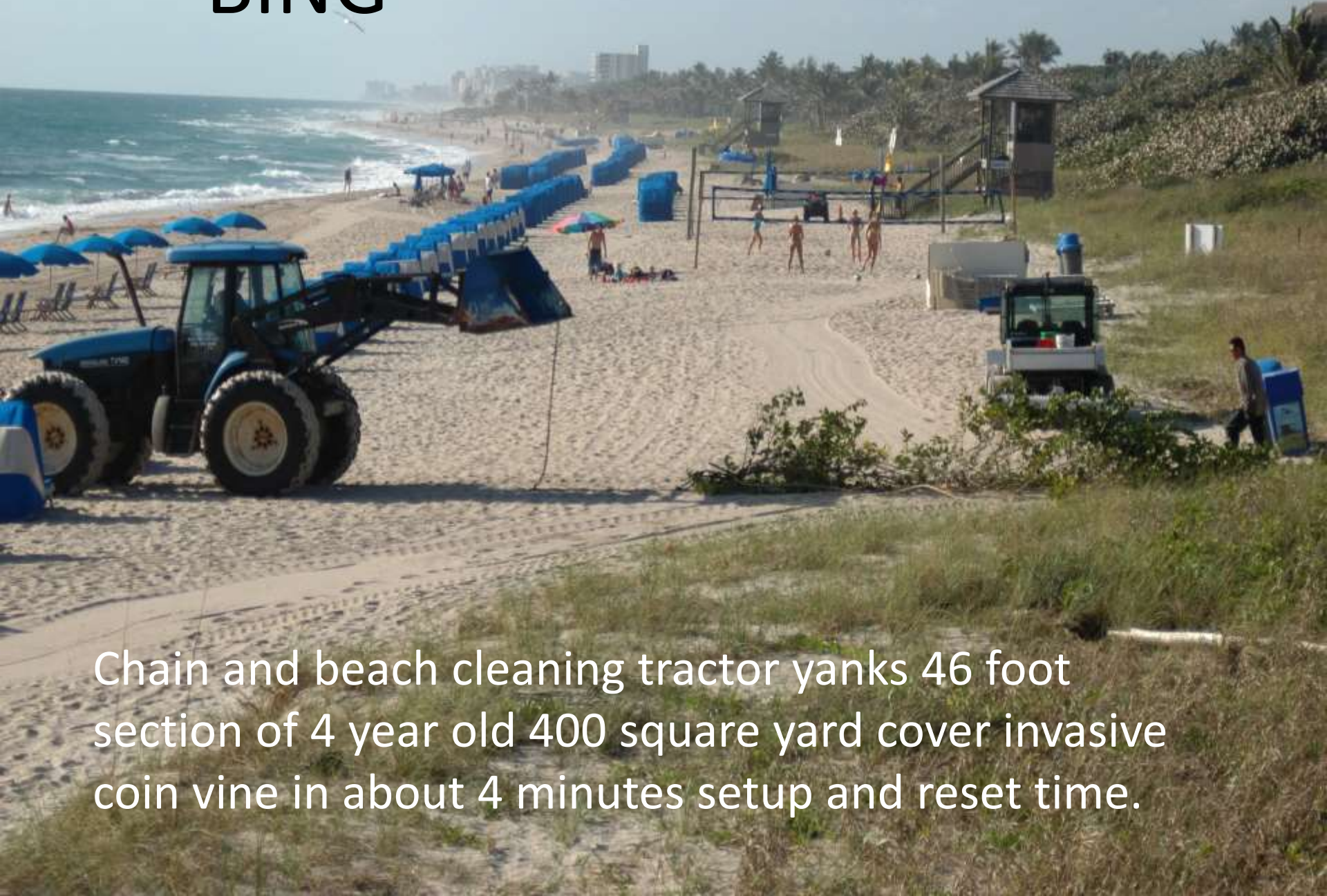
Invasive plant removal tool

Patent pending..... OK maybe not.....go ahead, make your own.

Bada..



-BING



Chain and beach cleaning tractor yanks 46 foot section of 4 year old 400 square yard cover invasive coin vine in about 4 minutes setup and reset time.



COSTS OF FAILURE TO MANAGE THE SYSTEM ?

- Loss of habitat function.
- Loss of genetic and species diversity
- Reduced erosion resistance.
- Increased maintenance burden.
- **LOSS OF THE NATURAL HERITAGE OF
OUR WILD SHORELINE**

“CLIMAXOPHILIA”

Which of
these is
more
Important
?

biased management of habitat for the benefit
of apex species, at the expense of the overall
ecosystem.



Beachfront parks have been actively managed for the benefit of seagrapes and turtles. Most of the strand species are lost in a single management generation.

PLANT LIST, ATLANTIC DUNES PARK



These recommendations should be evaluated at the time of the staged restoration of each area to determine if adjustments should be made for growth existing at that time.

ATLANTIC DUNES PARK
NATIVE PLANT RESTORATION PLAN
CITY OF DELRAY BEACH
PARKS AND RECREATION DEPARTMENT

designed by
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PLANTING PLAN

1991..58 wild native species found.. Today at least 15 lost.



Exotic infestation and accelerated succession has cost much of the biodiversity..listed species gone.



Shading by seagrape has killed most of the native strand species which occupied this park only 20 years ago. Rare and listed plant species are lost. This was a choice!

What remains is a near sterile monoculture.



Invasive native species can be more of a problem than exotics.



Absent natural controls, seagrass spreads to monoculture, even if pruned to shrub height.
These planted masses started as 30' by 30'



We know that it is possible to repair and conserve the coastal strand with focused commitment.

A photograph of a coastal dune landscape. The foreground is filled with white sand and sparse, dry-looking vegetation. In the background, there are more dunes and a small building or structure visible on the horizon under a clear blue sky.

So.. The point of this presentation is..

We must !

Manage the the coastal ecosystem
actively and wisely or we lose what
remains within the next fifteen or
twenty years.



THANKS TO:

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

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