



# Spoil Island Restoration in Biscayne National Park

AMANDA BOURQUE

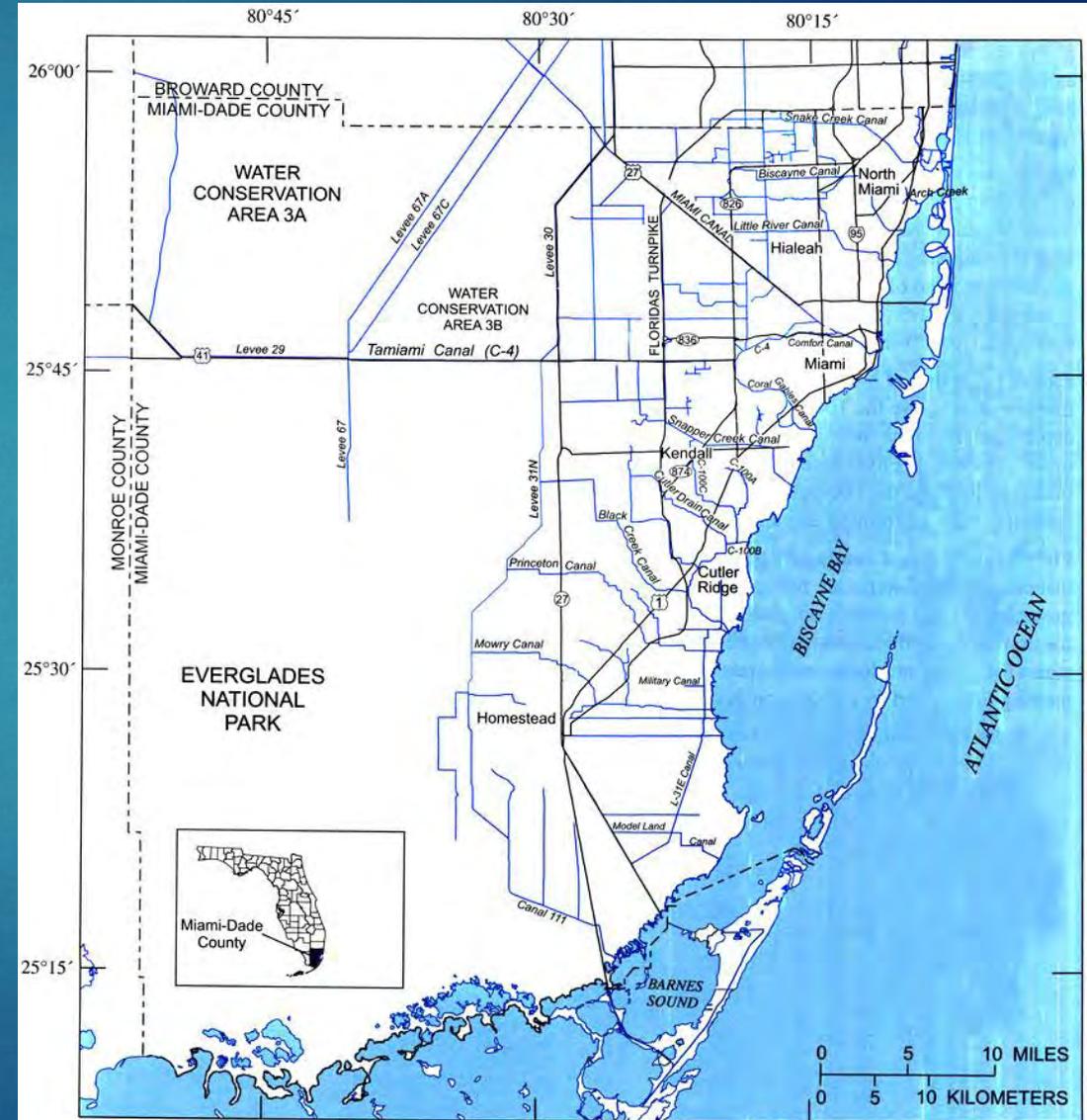
HABITAT RESTORATION PROGRAM, BISCAYNE NATIONAL PARK

18 NOVEMBER 2015

BISCAYNE BAY REGIONAL RESTORATION COORDINATION TEAM MEETING, MIAMI FL

# Once upon a time, canals were dredged...

- ▶ And then there were spoil islands
- ▶ Spoil: waste material brought up during the course of an excavation or a dredging or mining operation.
- ▶ Invaded by exotic plant species
  - ▶ Brazilian pepper, Australian pine, latherleaf, mahoe, and others.
- ▶ Eroding shorelines
  - ▶ Shallow-rooted vegetative communities
  - ▶ Steep slopes
  - ▶ Increased risk from sea level rise
- ▶ Water clarity issues in shallow waters
  - ▶ Suboptimal conditions for adjacent seagrasses
- ▶ Accumulation of marine debris



# What can be done?

- ▶ Enhancement for conservation, passive or active recreation, education

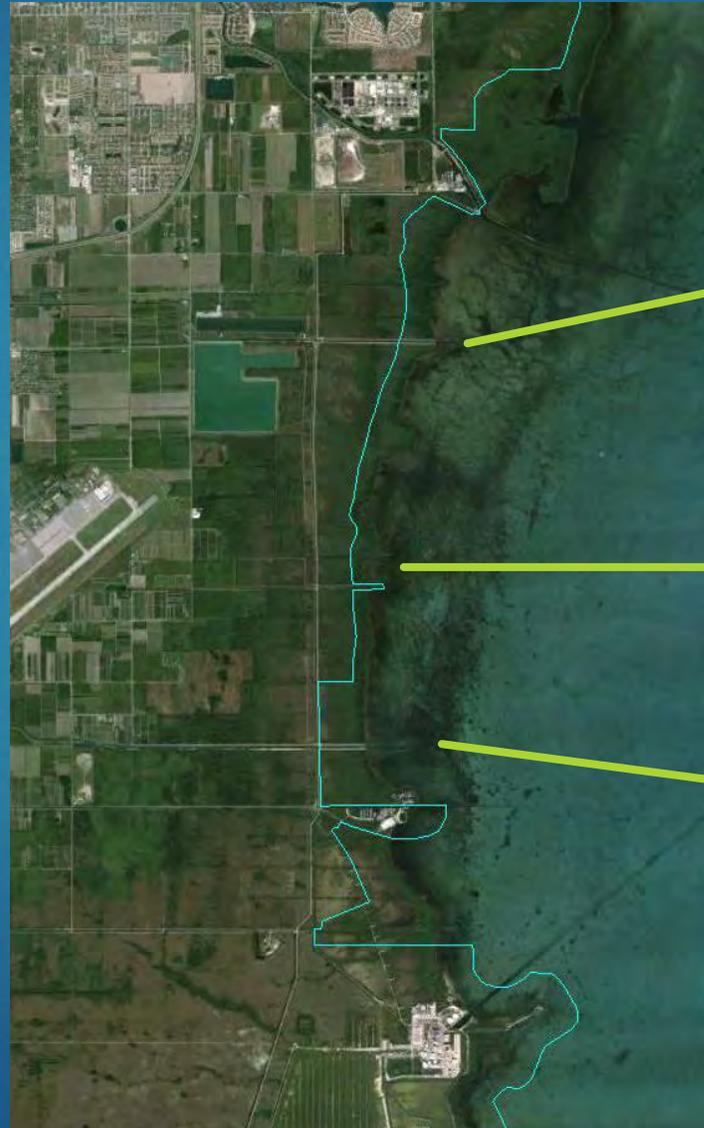
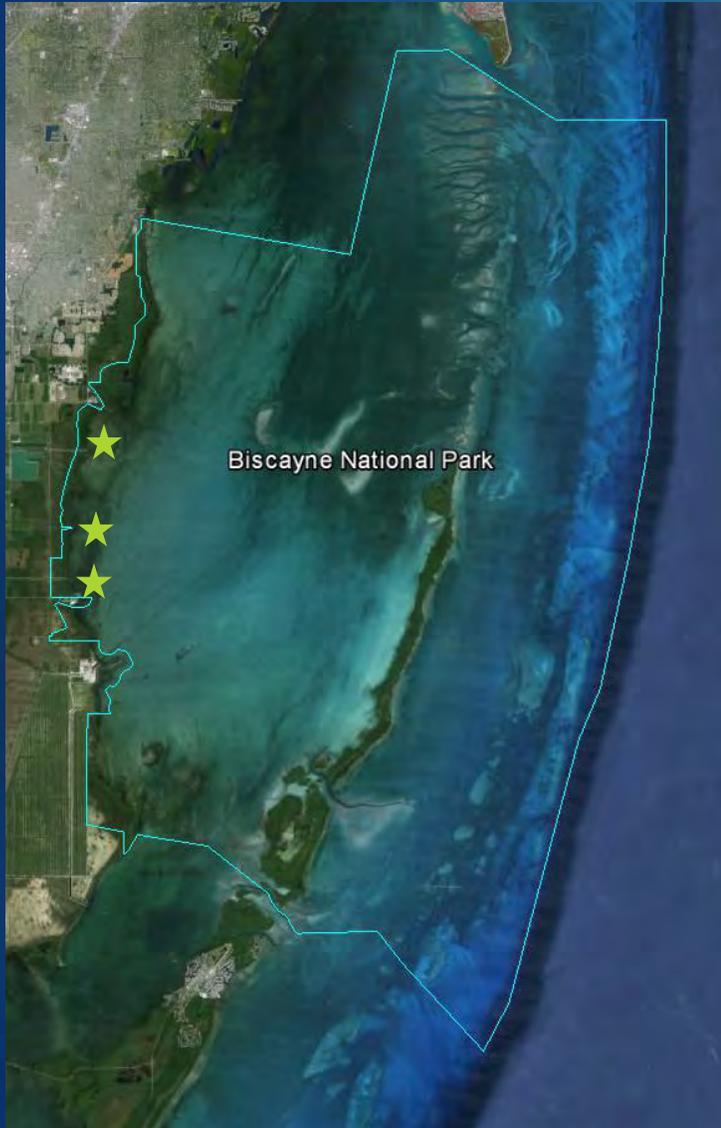


# Lots of good work already done

- ▶ Standing on the shoulders of giants
- ▶ Milano, G.R. 2000. Island restoration and enhancement in Biscayne Bay, Florida, 1-17. In P.J. Cannizarro (ed.) Proceedings of the 26th Annual Conference on Ecosystem Restoration and Creation. Hillsborough Community College, Tampa, FL
- ▶ The last remnants are in Biscayne National Park!

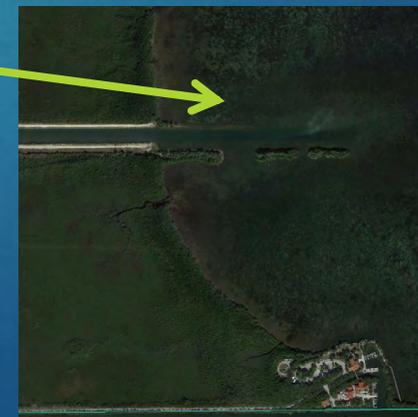


# Where exactly in BISC?



C-102  
(Princeton Canal)

Military Canal



C-103  
(Mowry Canal)

# How did we get here?

- ▶ A few years back, our neighbor to the south decided to expand a transmission line.
- ▶ Unfortunately they squashed a bunch of dwarf red mangrove habitat on park lands **January 2012**
- ▶ Park System Resource Protection Act case settlement **August 2012**
  - ▶ Primary restoration (~\$7k)
    - ▶ restore on-site impacts
  - ▶ Compensatory restoration (~\$83k)
    - ▶ restore mangrove habitat elsewhere in the park



# “But what to do?”

- ▶ Reached out to local experts
  - ▶ Gary Milano, Miami-Dade County DERM (retired)
  - ▶ Josh Mahoney, Miami-Dade County DERM
  - ▶ Steve Blair, Miami-Dade County DERM (retired)
  - ▶ John Ricisak, Miami-Dade County DERM
  - ▶ Craig Grossenbacher, Miami-Dade County DERM
  - ▶ Tony Pernas, NPS FLCEPMT
  - ▶ Kevin Whelan, NPS SFCN



# What areas “could use some work?”

- ▶ Spoil islands and peninsulas off Princeton (C-102) and Mowry (C-103) Canals
- ▶ Elliott Key Keyhole
- ▶ Goulds Canal
- ▶ FL City Canal mitigation site
- ▶ FL City Canal culverts
- ▶ Western boundary area near old Burger King Building
- ▶ Budget, logistics, environmental sensitivity, ecological benefit
- ▶ **January 2013**

# Spoil islands it is! The path:

- ▶ Project steps
  - ▶ Topographic and vegetation surveys
  - ▶ Restoration design
  - ▶ NEPA compliance and other NPS planning activities
  - ▶ Permitting
  - ▶ Contracting
  - ▶ Implementation
  - ▶ Monitoring
  - ▶ Maintenance

# Need surveys!

- ▶ Salman Elrubai, Cartographer/Surveyor, NPS Naples Lands Office
- ▶ Topographic surveys of Princeton and Mowry Canal spoil islands
  - ▶ Four islands
  - ▶ **June-July 2013**
- ▶ Locate local benchmarks
  - ▶ Transfer elevations to islands
  - ▶ Shoot spot elevations in grid pattern
  - ▶ Shoot “high value” vegetation (thanks Gary and Josh)
  - ▶ Shoot seagrass line, water line



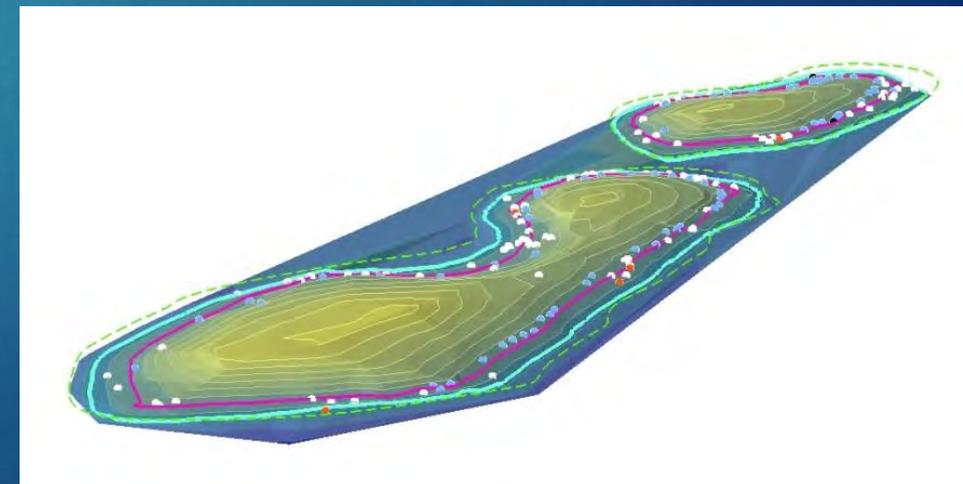
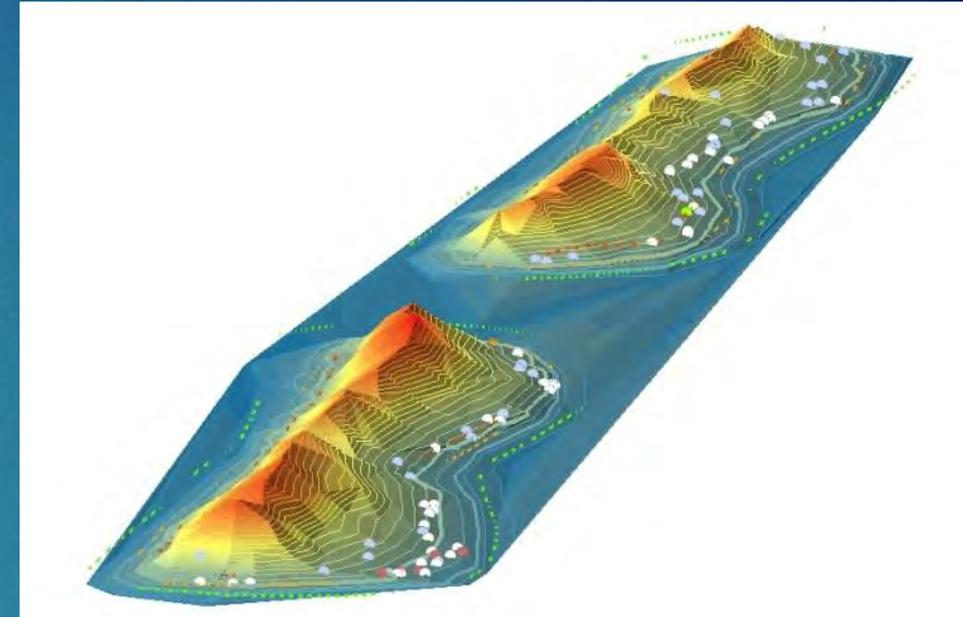
# Surveys - let the fun begin!

- ▶ The Sal-Monster + BISC HRP
  - ▶ Hot as heck, we all lost a few pounds
  - ▶ Got pretty good with the machete
- ▶ Produced signed and sealed topographic surveys
- ▶ Finalize restoration designs
- ▶ Create final plans for permit apps and contract package



# Restoration design and planning

- ▶ Review surveys
- ▶ Establish restoration goals
  - ▶ Stabilize shoreline and slopes
  - ▶ Provide higher quality coastal habitat
- ▶ Restoration actions to achieve goals
  - ▶ Selective clearing of exotic vegetation
  - ▶ Regrade upland topography, create stable zones favorable for native plant communities
  - ▶ Plant salt-tolerant native vegetation



# Restoration design

- ▶ Target elevations for desired native plant communities
- ▶ Create mangrove zones on leeward sides
  - ▶ Excavate to just below appropriate elevation
  - ▶ Install filter fabric and augment soil with muck layer
- ▶ Create coastal transitional and hammock zones on upward slopes
- ▶ Use boulders from site to establish berms to protect mangrove plantings



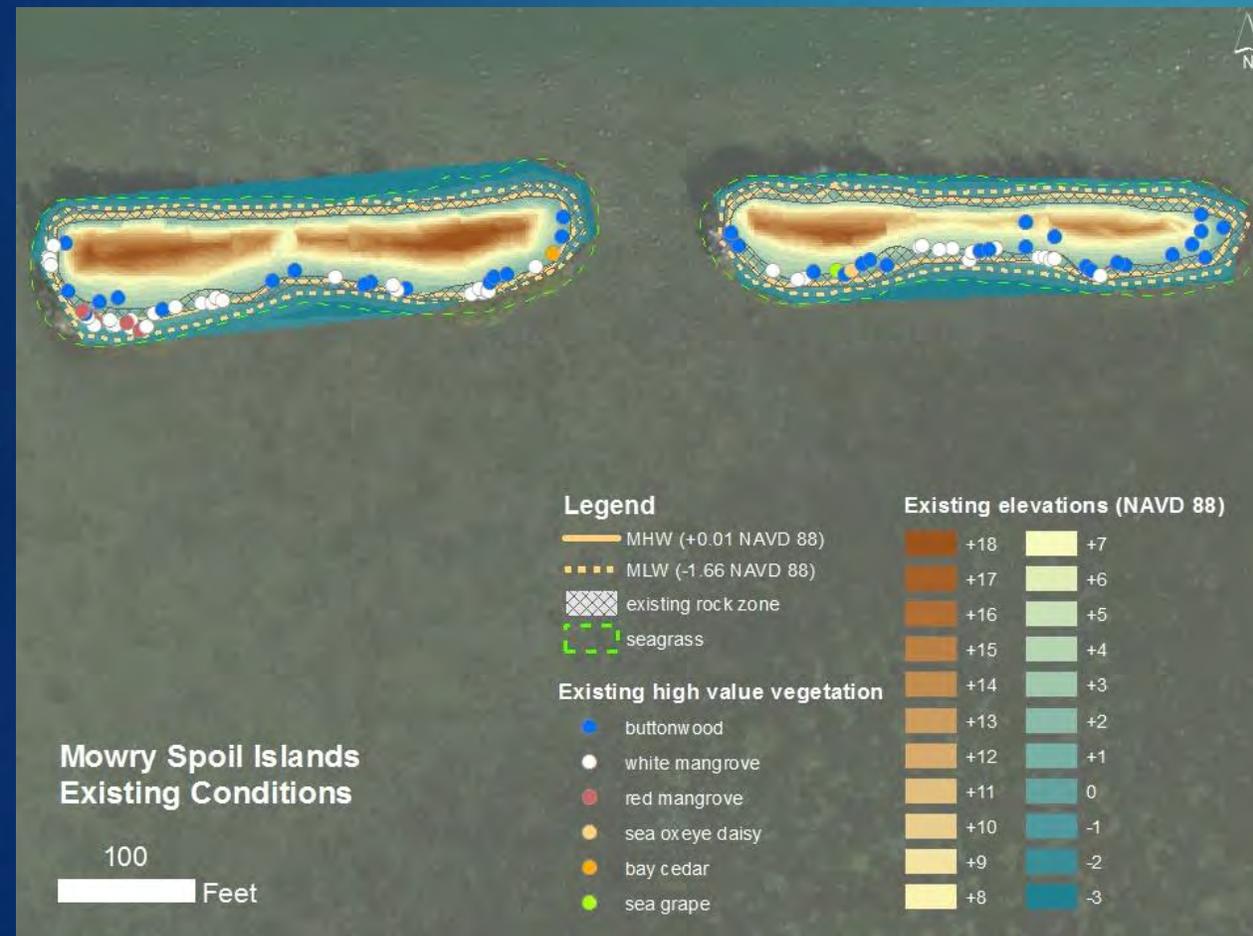
# Restoration design: C-102 islands

► 0.86 acres



# Restoration Design: C-103 islands

▶ 0.84 acres



# Cost Estimating

- ▶ Estimate restoration quantities
  - ▶ Plot desired elevations and slopes
  - ▶ Cut and fill calculations
    - ▶ Spoil excavation volumes for redistribution and/or removal
    - ▶ Volume of muck layer for mangrove restoration zones
  - ▶ Plant quantities
- ▶ Construction logistics
  - ▶ Staging
  - ▶ Routes to site
  - ▶ Site access
  - ▶ Loading/offloading equipment & personnel
- ▶ Marine construction is expensive!!!

# Princeton (C-102) Canal Spoil Islands

- ▶ Start with the smallest
- ▶ **November 2013**



# NEPA Compliance and Planning

- ▶ NPS Internal restoration planning **JANUARY 2014**
- ▶ National Environmental Policy Act (NEPA) compliance
  - ▶ Section 106 Compliance (National Historic Preservation Act)
  - ▶ Section 7 Consultation re. Protected Species
    - ▶ US Fish and Wildlife Service (Eastern indigo snake, wood stork, nesting sea turtles, Schaus swallowtail butterfly, semaphore cactus, American crocodile)
  - ▶ Categorical Exclusion **MAY 2014**
    - ▶ “Removal of non-historic materials and structures in order to restore natural conditions.”
    - ▶ “Restoration of noncontroversial native species into suitable habitats within their historic range and elimination of exotic species.”

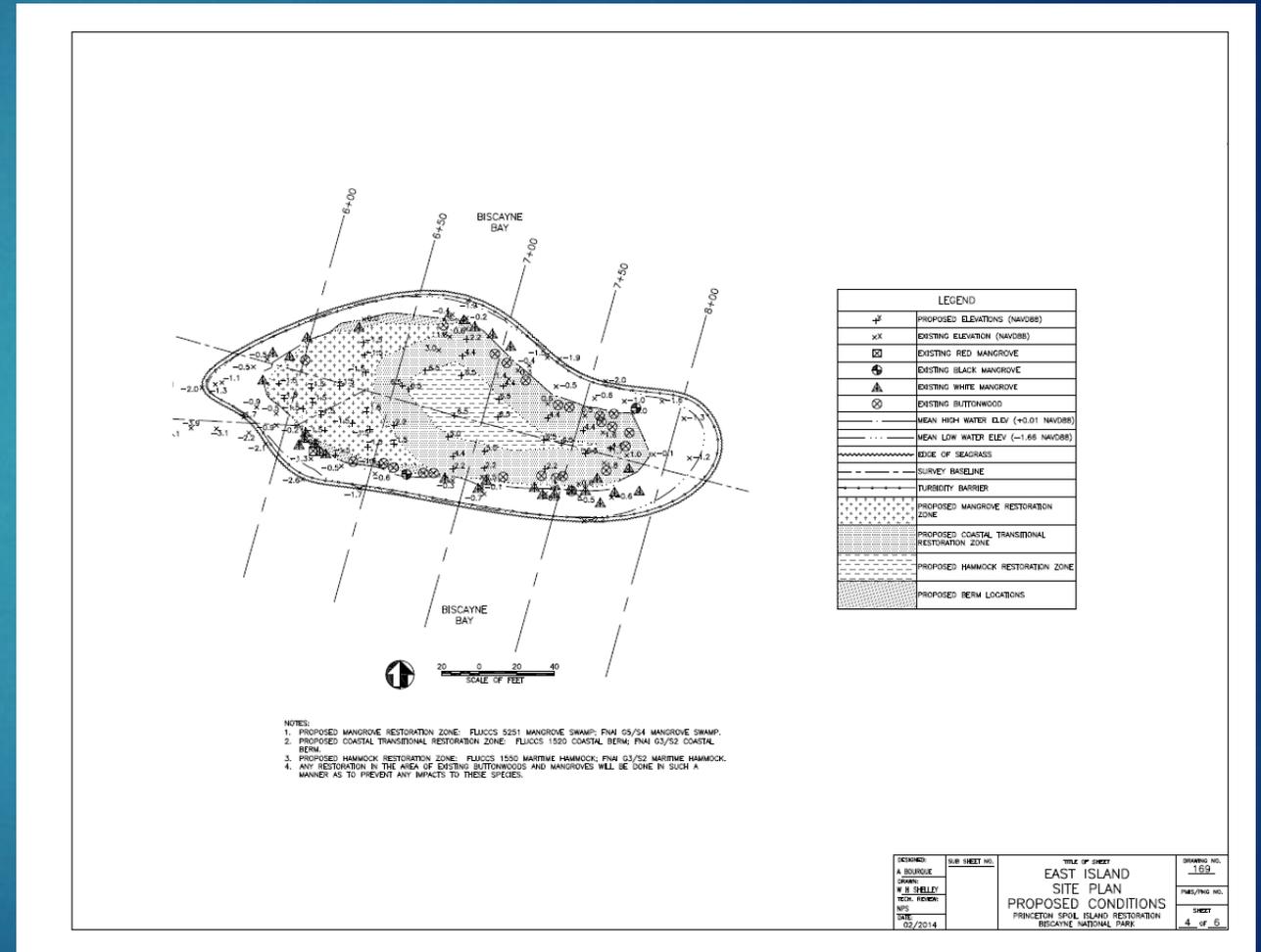
# Permitting

- ▶ Bill Shelley, Civil Engineer (NPS EVER)
  - ▶ Worked with me to develop CAD drawings for permits
- ▶ South Florida Water Management District (SFWMD)
  - ▶ Right of Way Access Permit **AUGUST 2014**
- ▶ SFWMD
  - ▶ Environmental Resource Permit **JUNE 2014**
- ▶ US Army Corps of Engineers
  - ▶ Department of the Army Permit **SEPTEMBER 2014**
- ▶ Miami-Dade County Class I Coastal Construction Permit **OCTOBER 2014**



# Permit Conditions

- ▶ Erosion control
- ▶ Turbidity control
- ▶ Turbidity monitoring
- ▶ Protected species conditions
- ▶ Fueling restrictions
- ▶ Island access restrictions
- ▶ Vessel draft restrictions



# Pre-restoration Monitoring



- ▶ Document site conditions
- ▶ NPS SFCN and NPS FLCEPMT
  - ▶ Efficacy monitoring
  - ▶ Rapid assessment, before and after management activities
  - ▶ Species composition and species specific canopy cover
- ▶ NPS FLCEPMT **January 2015**
- ▶ Permanent monitoring plots
  - ▶ 3 sites on east island (restoration site)
  - ▶ 3 sites on west island (reference site)

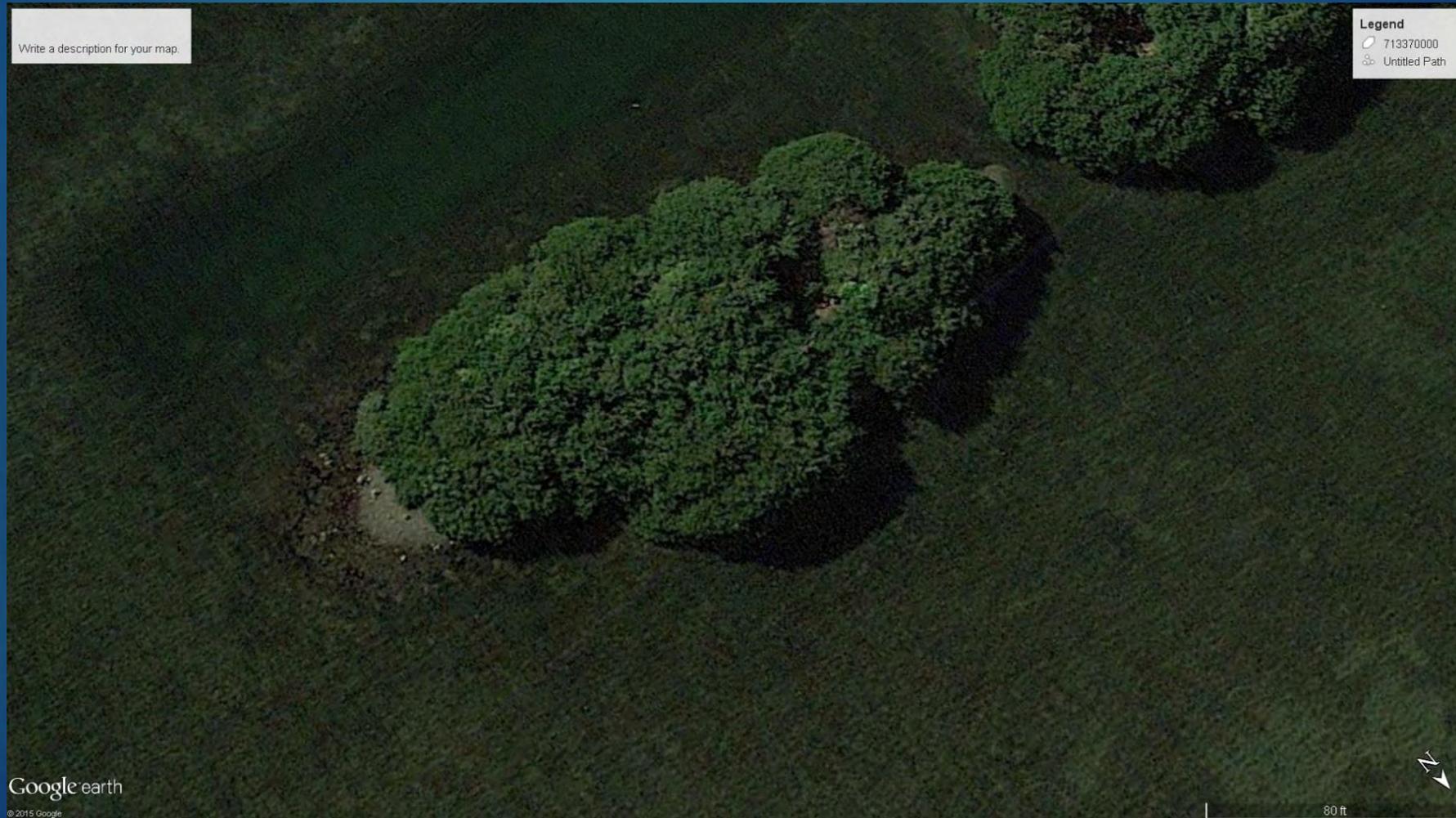


# Contracting

- ▶ Solicitation and award (\$100k) **July 2014**
- ▶ Award cancelled **January 2015**
- ▶ PLAN B: Modify project approach
  - ▶ ~~Selective clearing of exotic vegetation~~—KEEP THE PROJECT MOVING - DO IT OURSELVES!
    - ▶ NPS FLCEPMT
    - ▶ Solicit bids for new contract - earthworks only
- ▶ **February 2015:**



# Boots on the Ground: **April 2015**



# Exotics Removal

- ▶ NPS FLCEPMT + BISC HRP + BISC Maint
- ▶ Rent a chipper
- ▶ Get 4-wheeler and chipper onto Munson
- ▶ Offload onto island
- ▶ Gentlemen, start your engines!



# Exotics Removal, Just Kidding!

- ▶ North American black vulture chicks on site!
  - ▶ *Coragyps atratus atratus*
- ▶ Protected species under Migratory Bird Treaty Act
- ▶ Ground nesting species
- ▶ Must wait until fledged
- ▶ Take a breather



# Exotics Removal, Part Deux

- ▶ 5 days **May 2015**
- ▶ NPS FLCEPMT + BISC HRP



# Exotics Removal, Part Deux



# All Clear!



# What about the logs?

- ▶ Loaded onto Munson into Bagsters
- ▶ Offloaded with crane; forklift to stakebed
- ▶ Driven to landfill for disposal



# Back to Contracting

- ▶ PLAN B: Second solicitation w/modified scope **July 2015**
  - ▶ Solicit bids for new contract - earthworks only
  - ▶ Bids ranged from \$150k - \$225k
  - ▶ No award!
- ▶ Plan C
  - ▶ No contract. No earthworks.
  - ▶ Exotics removal – DONE!
  - ▶ Move straight to planting phase.
    - ▶ Save bulk of \$\$\$ for another mangrove project
  - ▶ Do it quick! Its already late **August 2015...**



# Planting

- ▶ Scheduled for September 30 – October 5, 2015
- ▶ Recruit volunteers
  - ▶ BISC and SFNPT mailing lists, FIU Biology and Env. Ed Depts.
- ▶ Procure supplies and tools
  - ▶ DERM Natural Areas Management
- ▶ Develop plant list
  - ▶ Josh Mahoney (DERM) and Gary Milano
- ▶ Source plants from local nurseries
- ▶ Coordinate vessels, equipment, logistics



# Site Preparation

- ▶ Last 2 weeks of September
- ▶ Move boulders out of planting areas
- ▶ Auger holes for larger pot sizes
  - ▶ Square peg, round hole etc.
  - ▶ Augered ~250 holes
  - ▶ BISC HRP
- ▶ Invasive grasses becoming established
  - ▶ Pull the weeds



# The Plant List

- ▶ Plants delivered to BISC on 29 Sept
- ▶ 1,360 plants, 23 species, 4 nurseries
- ▶ 2" liners to 15 gallon pot sizes



- ▶ Black mangrove
- ▶ White mangrove
- ▶ Buttonwood
- ▶ Sea purslane
- ▶ Sea oxeye daisy
- ▶ Necklace pod
- ▶ Cordgrass
- ▶ Blackbead
- ▶ Indigo berry
- ▶ Joint grass
- ▶ Torchwood
- ▶ Jamaican caper
- ▶ Wild lime
- ▶ Spanish stopper
- ▶ White stopper
- ▶ Jamaican dogwood
- ▶ Sea grape
- ▶ Florida privet
- ▶ Blolly
- ▶ Gumbo limbo
- ▶ Pigeon plum
- ▶ Strangler fig

# Let's Plant!

- ▶ First load delivered to the island on 30 September.
- ▶ Planting with volunteers on **31 Sept, 1-2-5 October**



# Let's Plant!



A beautiful site is a beautiful sight!



From the air...



# Maintenance and Monitoring

- ▶ Watering from Day 1 through Nov 2015
  - ▶ Once or twice a week
  - ▶ 6000+ gallons to date
  - ▶ Our watering machine is a fussy beast
- ▶ Site monitoring
  - ▶ Survival counts for most species
    - ▶ 0% mortality to date
  - ▶ Community development
    - ▶ Efficacy monitoring plots
    - ▶ Fixed transects
- ▶ Retreat exotics and remove marine debris as needed



# Volunteer Participation

- ▶ 37 volunteers
- ▶ 250+ hours over 6 days



# A new name...Dragonfly Island



# Accounting

- ▶ \$128,000 in funding sources
  - ▶ \$82,000 FPL settlement
  - ▶ \$20,000 DOI-NRDAR interest
  - ▶ \$26,000 South Florida National Parks Trust grant for planting phase
- ▶ \$51,000 spent to date
  - ▶ Topographic surveys – 4 islands (1.7 acres)
  - ▶ Exotics removal and planting – 1 island
  - ▶ Template permit sketches, applications, planting designs
- ▶ \$77,000 available for future work

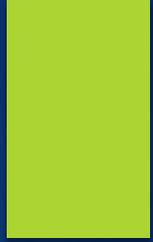


# And the moral of the story is...

- ▶ Be creative
- ▶ Be flexible
- ▶ Be persistent
- ▶ Be resourceful
  - ▶ Surveys, permitting, exotics removal
- ▶ Don't be shy – phone a friend!
- ▶ Adversity.....BRING IT!
- ▶ Simple is good!
  - ▶ “...focus and simplicity. Simple can be harder than complex: You have to work hard to get your thinking clean to make it simple. But it's worth it in the end because once you get there, you can move mountains.” ---Steve Jobs



# The Incredible Journey



# Appreciate the cool extra stuff...

- ▶ Puss caterpillars
- ▶ Velvet ants
- ▶ Great horned owls
- ▶ Nearshore feeding frenzies
- ▶ Manatees and babies
- ▶ Baby black vultures
- ▶ Dragonflies
- ▶ Bird poop in the rain guage



# With gratitude:

## ▶ NPS BISC

- ▶ Michelle Tongue
- ▶ Dan Crossett
- ▶ Emily McGrath
- ▶ Josh Marano
- ▶ Shelby Moneysmith
- ▶ Megan Davenport
- ▶ Mike Hoffman
- ▶ Charles Lawson
- ▶ Steve Newman
- ▶ Vicente Martinez
- ▶ Julius Keaton
- ▶ Shane Harrington
- ▶ Pedro Lopez
- ▶ Jonathan Campos

## ▶ NPS EVER

- ▶ Bill Shelley
- ▶ Mava Vasquez

## ▶ NPS Naples Lands Office

- ▶ Sal Elrubai

## ▶ NPS FLCEPMT

- ▶ Tony Pernas
- ▶ Shane McKinley
- ▶ Chris Muina
- ▶ Joe Ingram

## ▶ NPS SFCN

- ▶ Kevin Whelan, NPS SFCN
- ▶ Robert Muxo
- ▶ Judd Patterson
- ▶ Raul Urgelles

## ▶ DERM

- ▶ Gary Milano, free agent (retired)
- ▶ Josh Mahoney
- ▶ Steve Blair
- ▶ John Ricisak
- ▶ Rodell Collins

## ▶ South Florida Water Management District

- ▶ Dan Boyar

## ▶ SOUTH FLORIDA NATIONAL PARKS TRUST

- ▶ Don Finefrock

# Training wheels off! Next steps...

▶ C-102 (Princeton Canal)



▶ Military Canal



▶ C-103 (Mowry Canal)



# Peninsulas?



# Thank you!



National Park Service  
Biscayne National Park  
[www.nps.gov/bisc](http://www.nps.gov/bisc)