

**Kevin Bodge, PE PhD**

**Krista Egan, EI**  
olsen associates, inc.  
and

**Mike McGarry**  
Brevard County  
Natural Resources Mgt. Dept.

# Changes in Beach Profile and Grain Size after Beach Renourishment



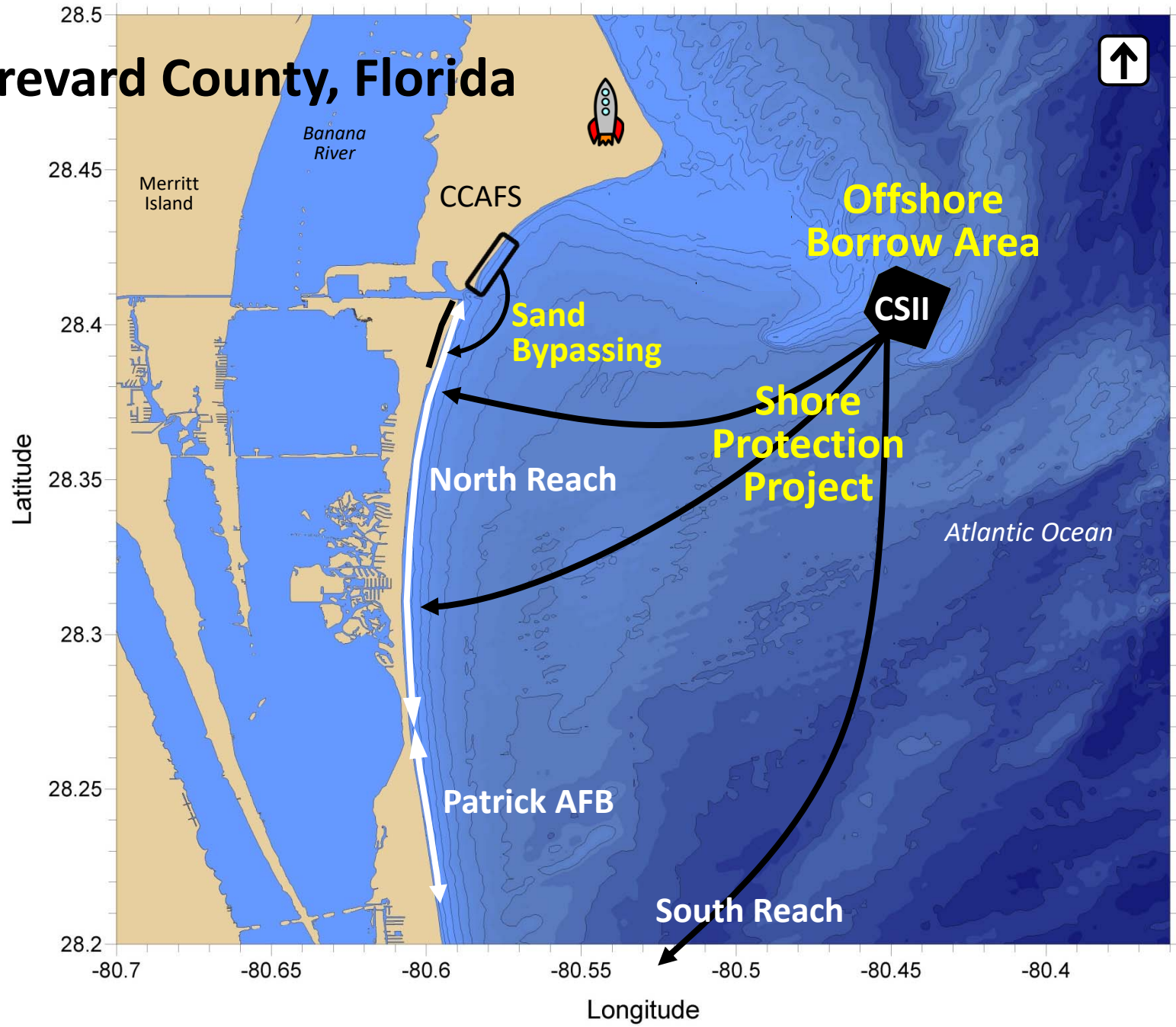
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- **How does beach profile shape change after a beach renourishment event?**
- **How does sand grain size change across the profile after a beach renourishment event?**
- **We'll contrast Pre- and Post-Project Conditions.....and first 2 years after a renourishment.**



# Brevard County, Florida



Merritt Island

Banana River

CCAFS

Offshore Borrow Area

CSII

Sand Bypassing

Shore Protection Project

North Reach

Atlantic Ocean

Latitude

28.35

28.3

28.25

28.2

Patrick AFB

South Reach

-80.7

-80.65

-80.6

-80.55

-80.5

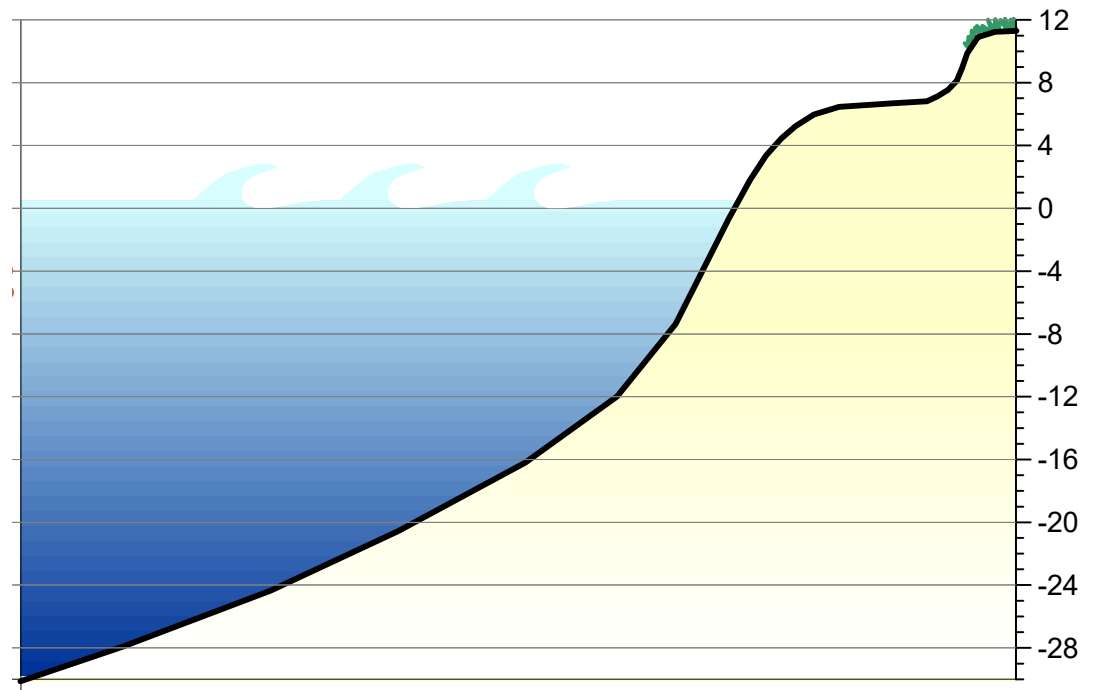
-80.45

-80.4

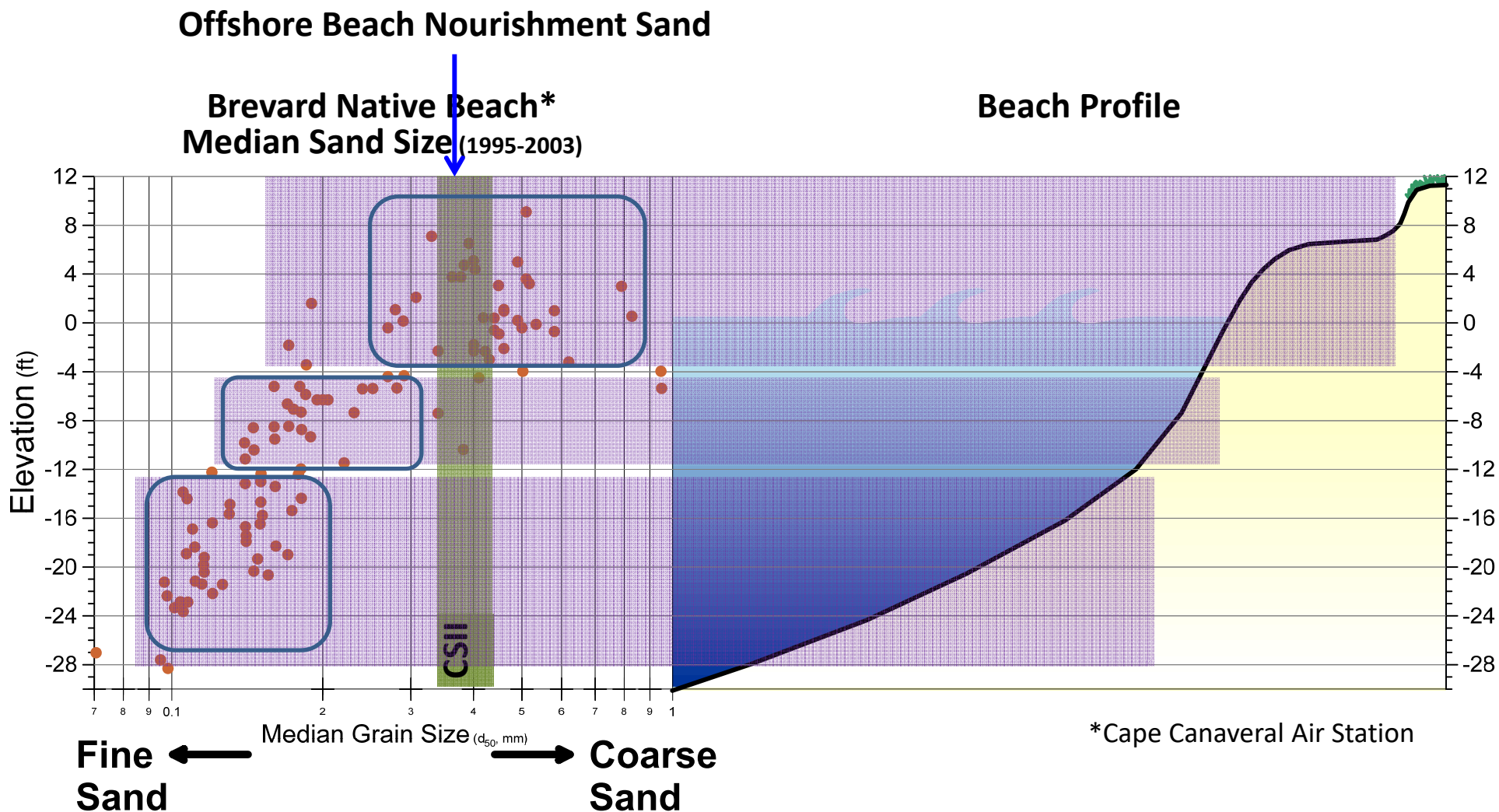
Longitude

# Sand Grain Size varies across the Natural Beach

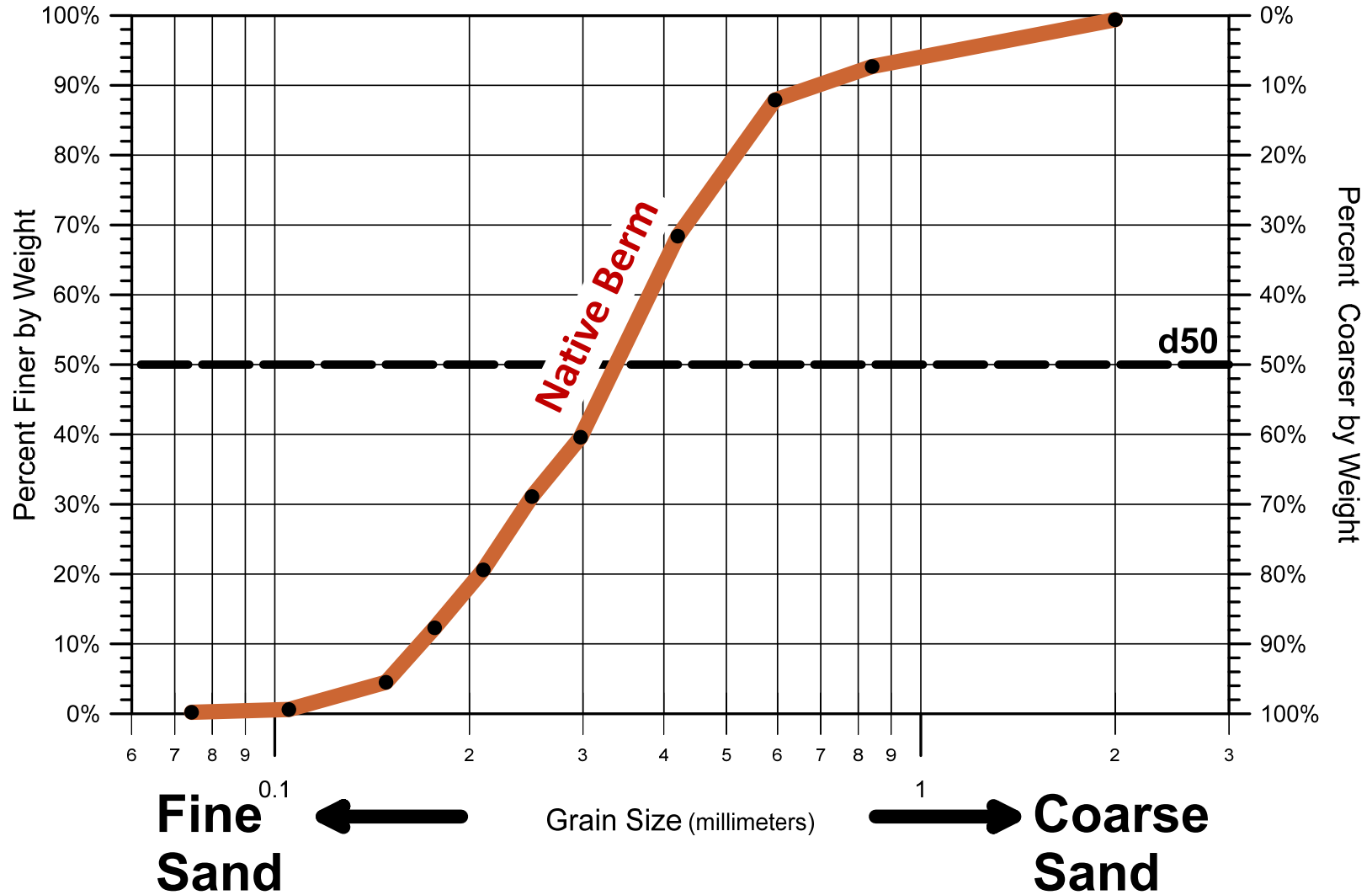
Beach Profile

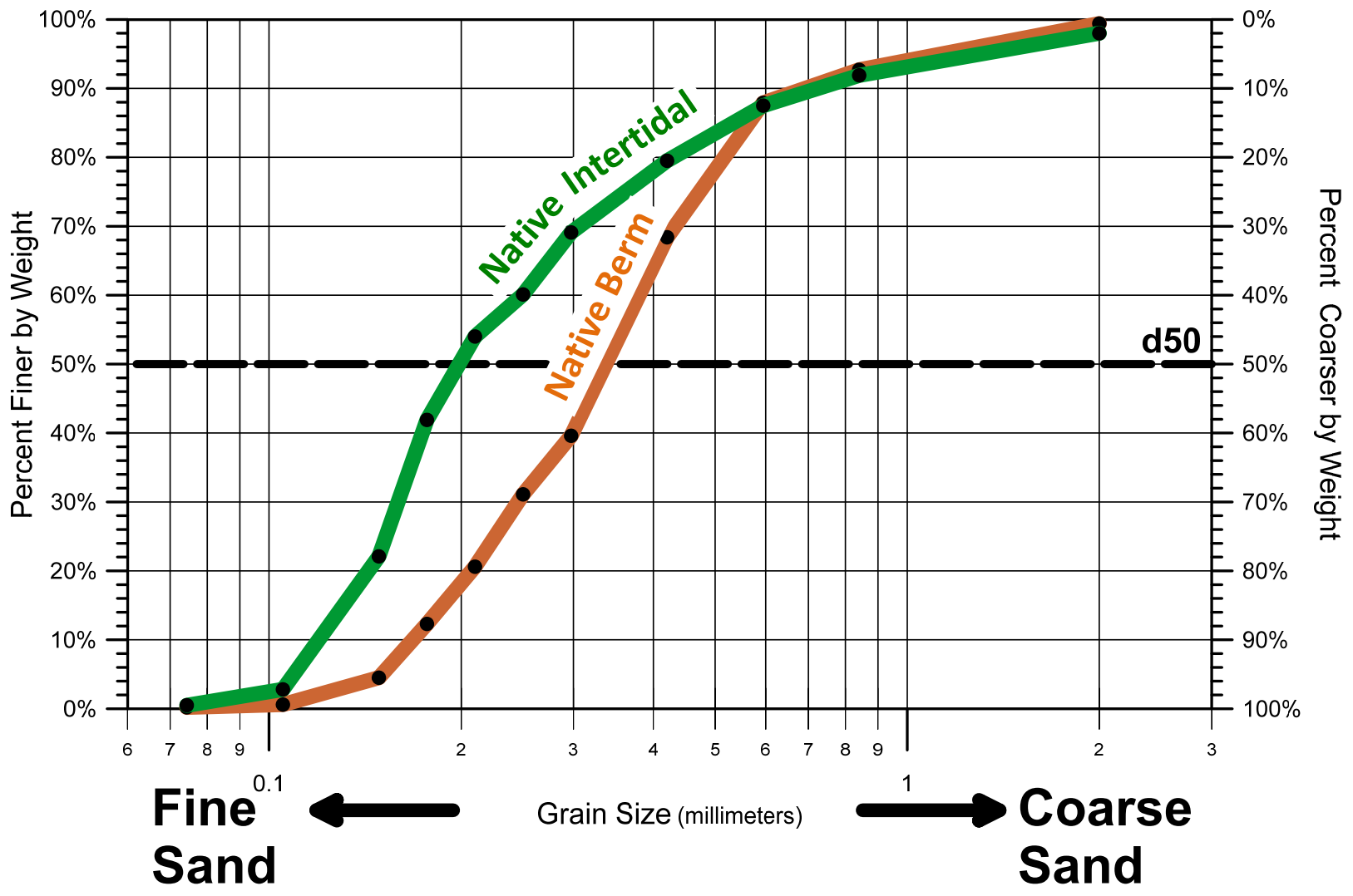


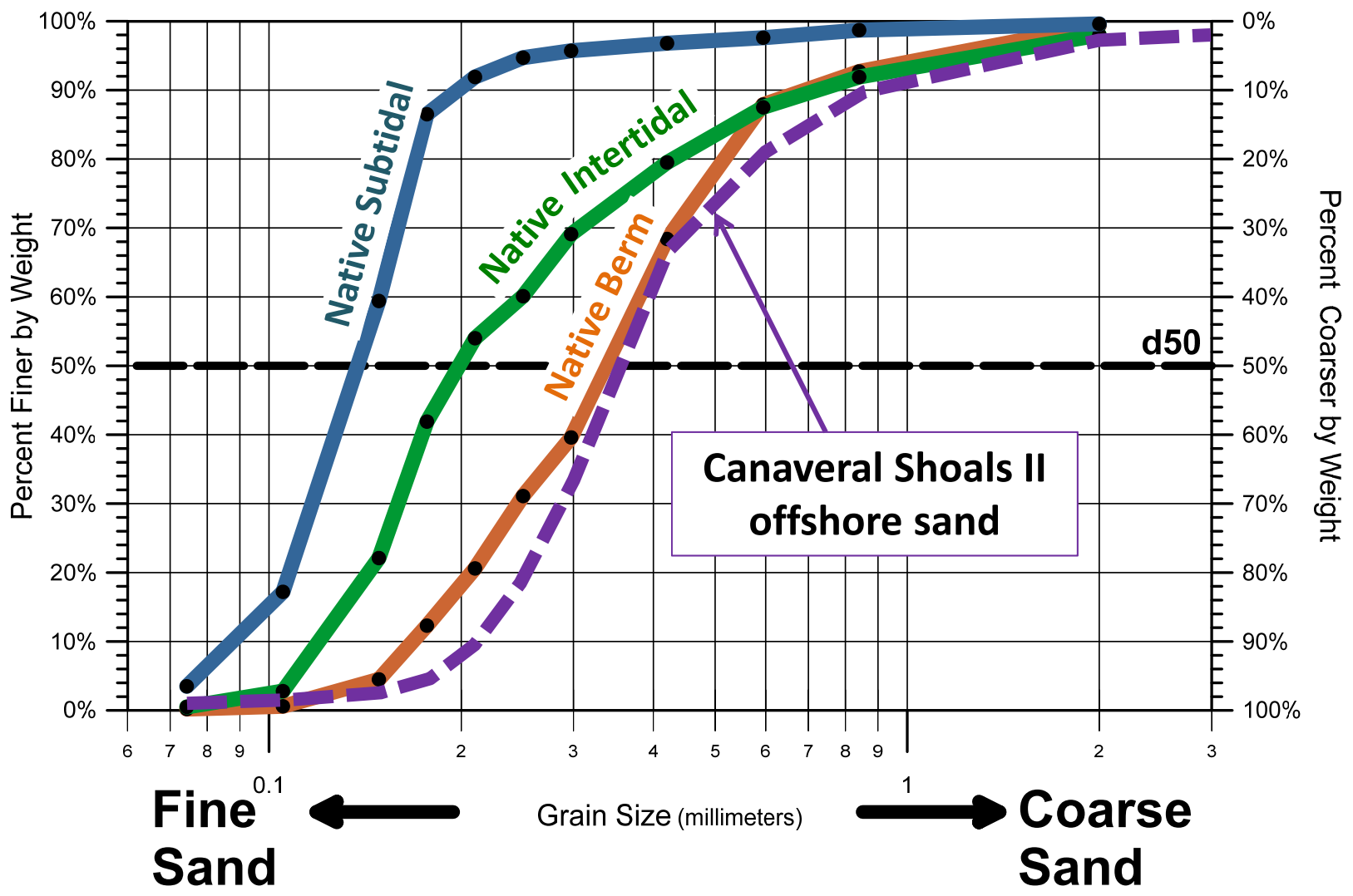
# Sand Grain Size varies across the Natural Beach



# Sand Grain Size Distribution

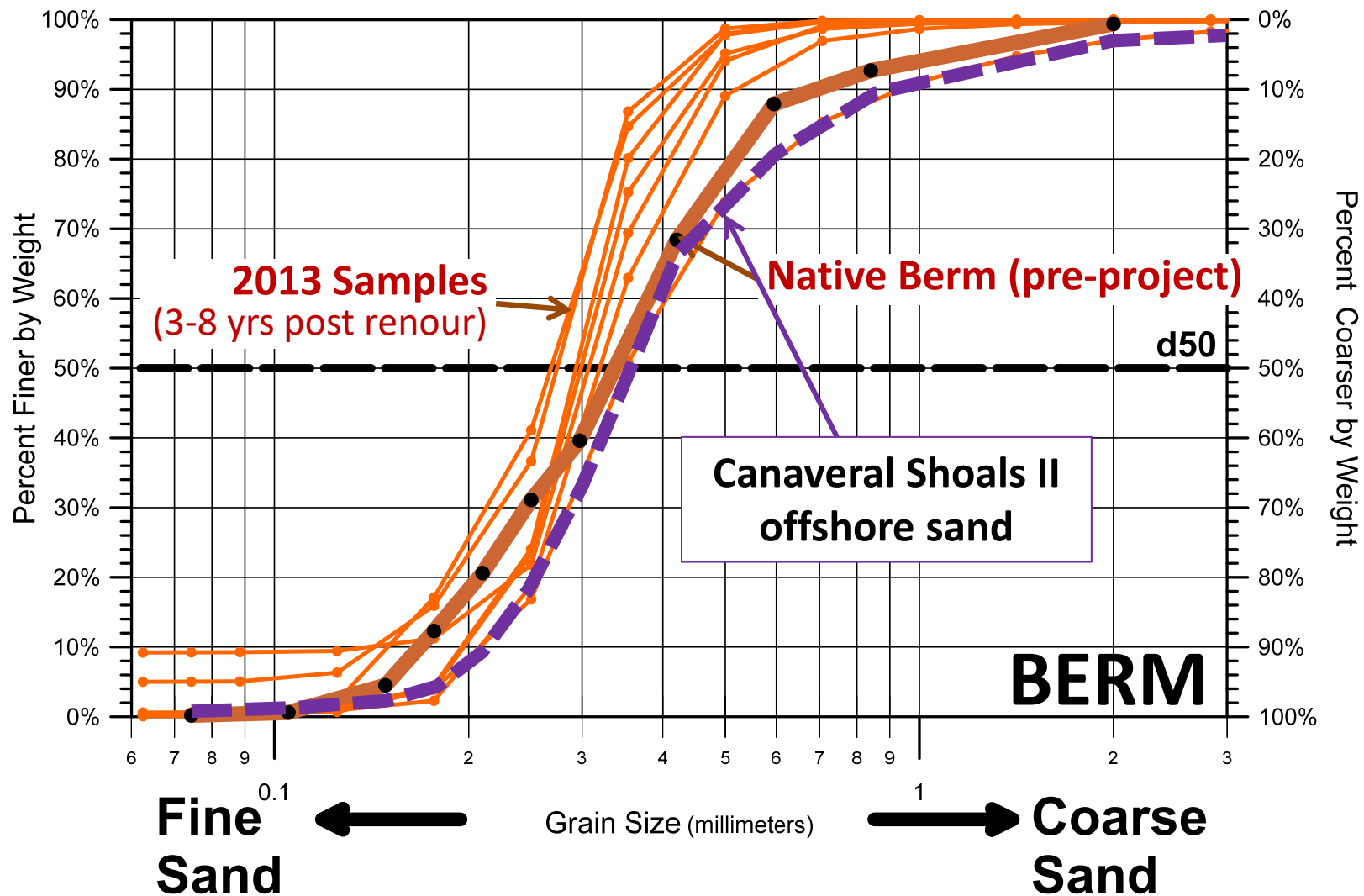




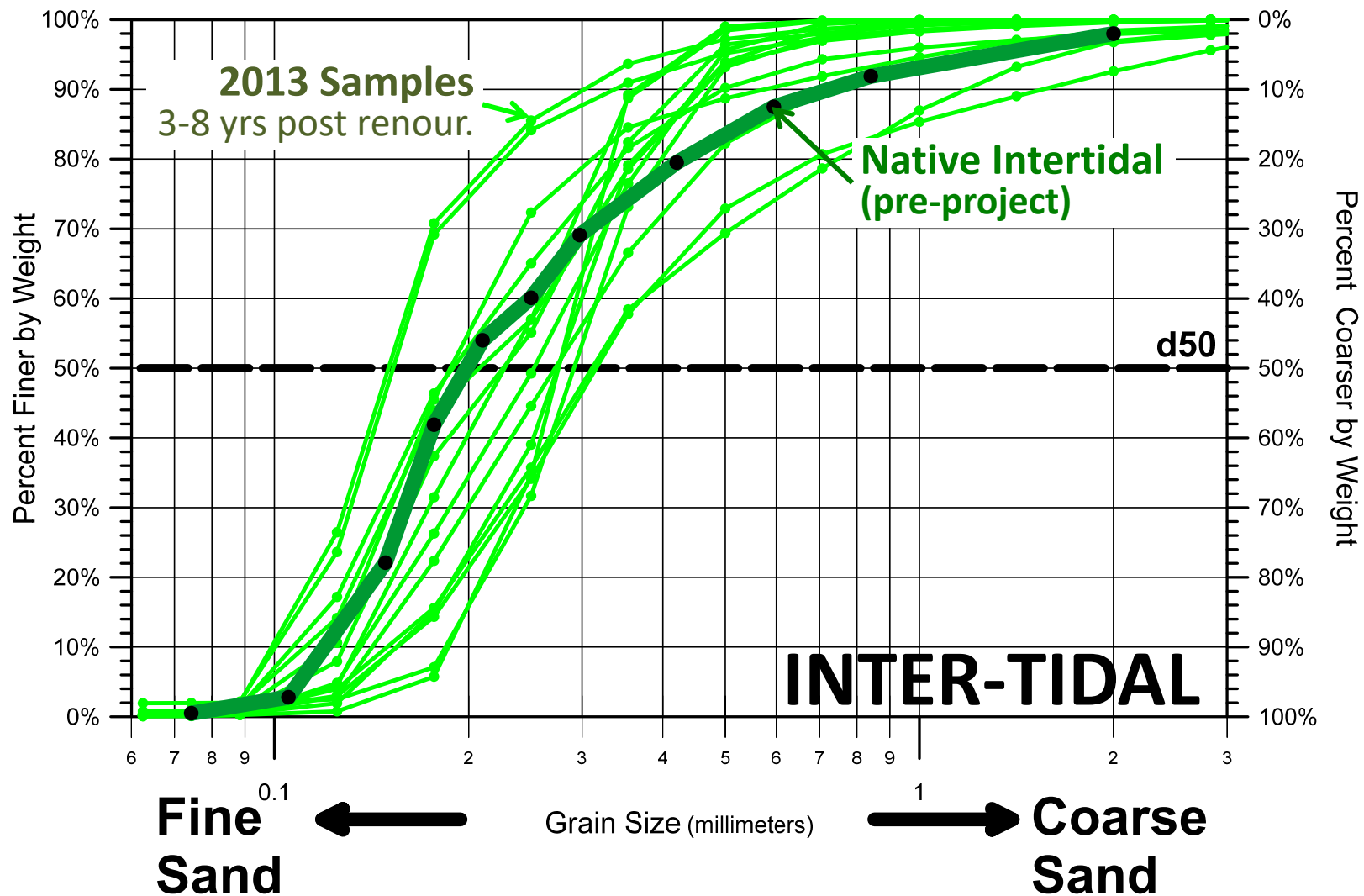




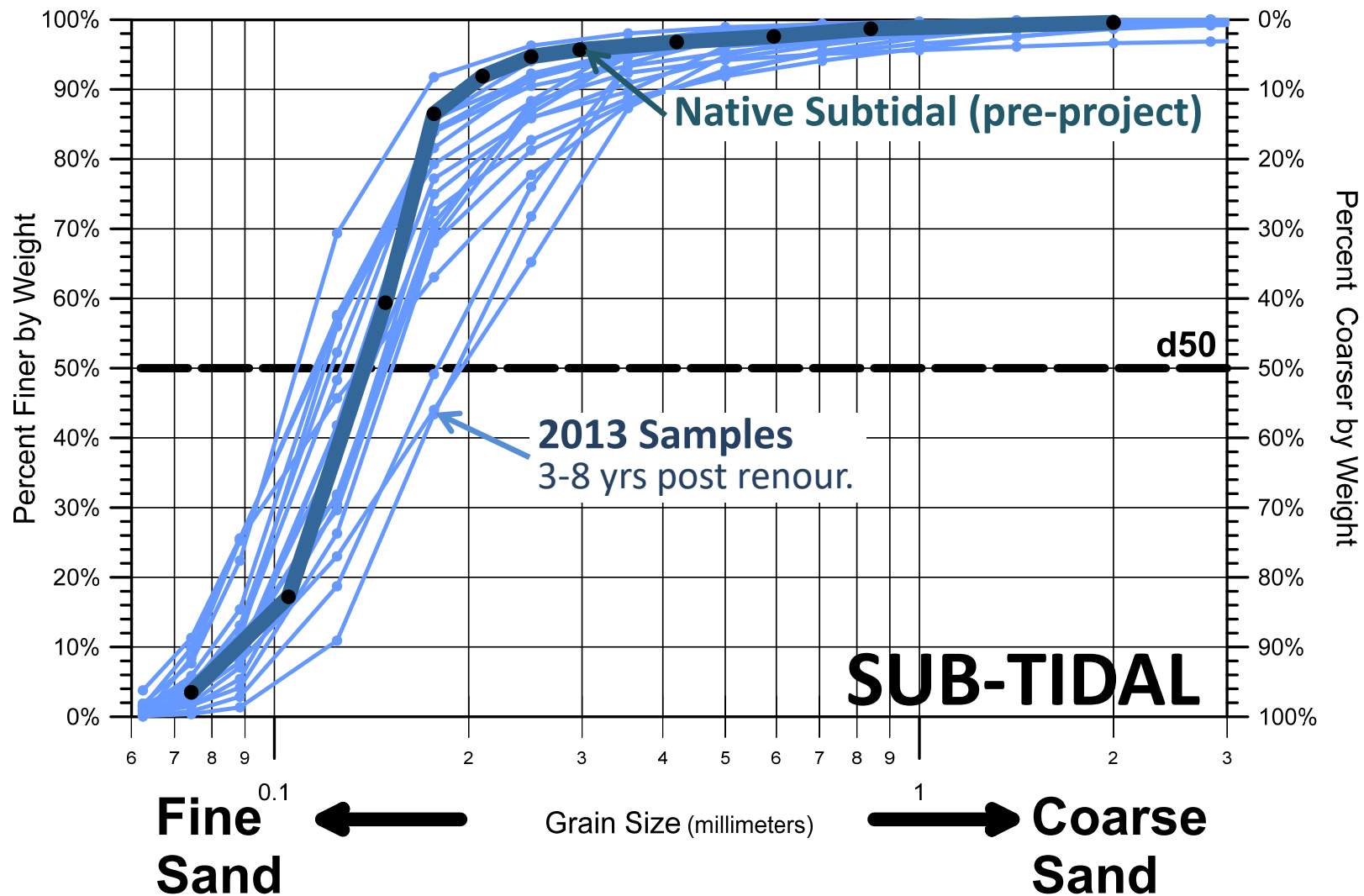
# The existing post-project sand matches the pre-project sand by depth zone



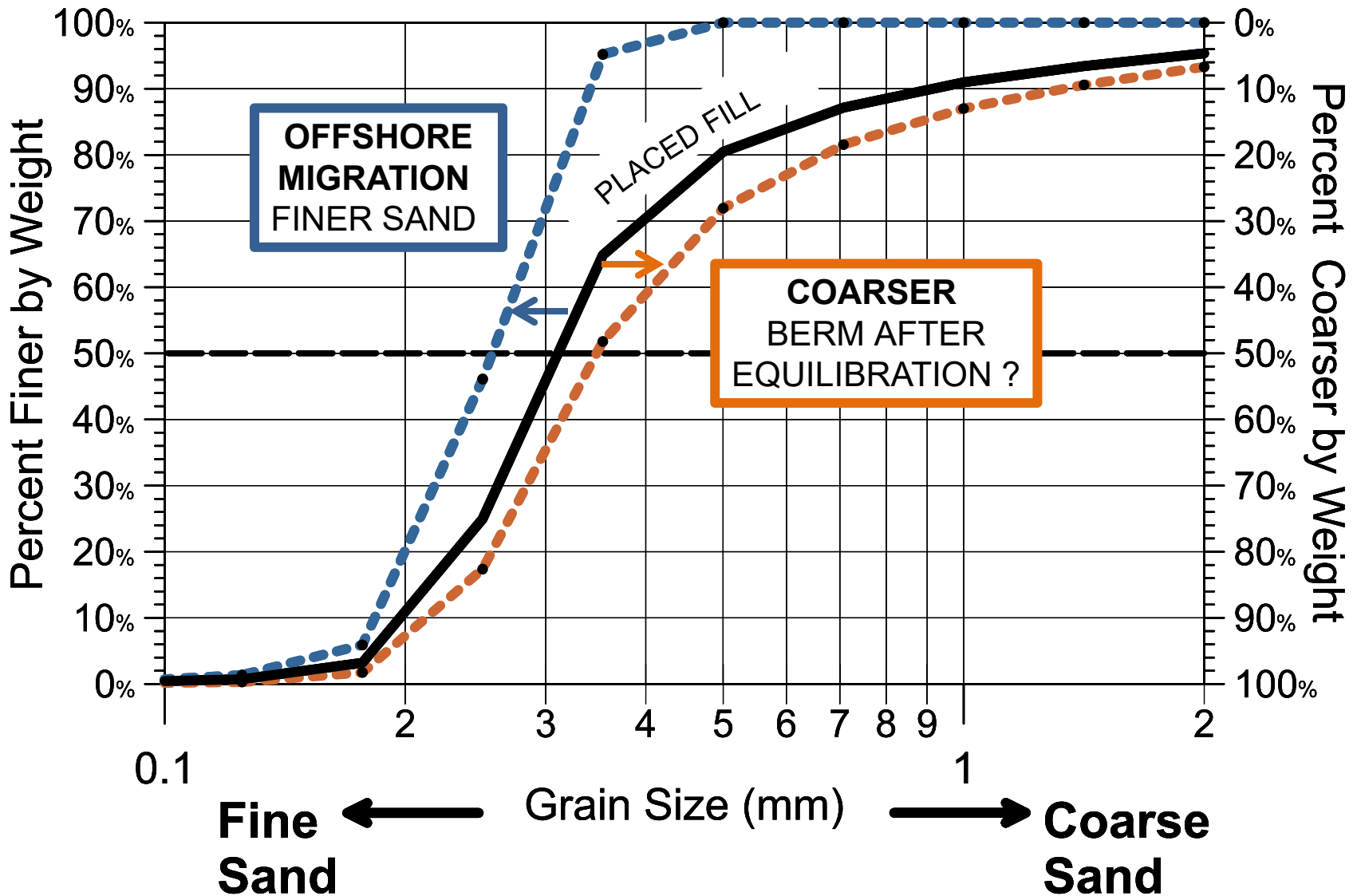
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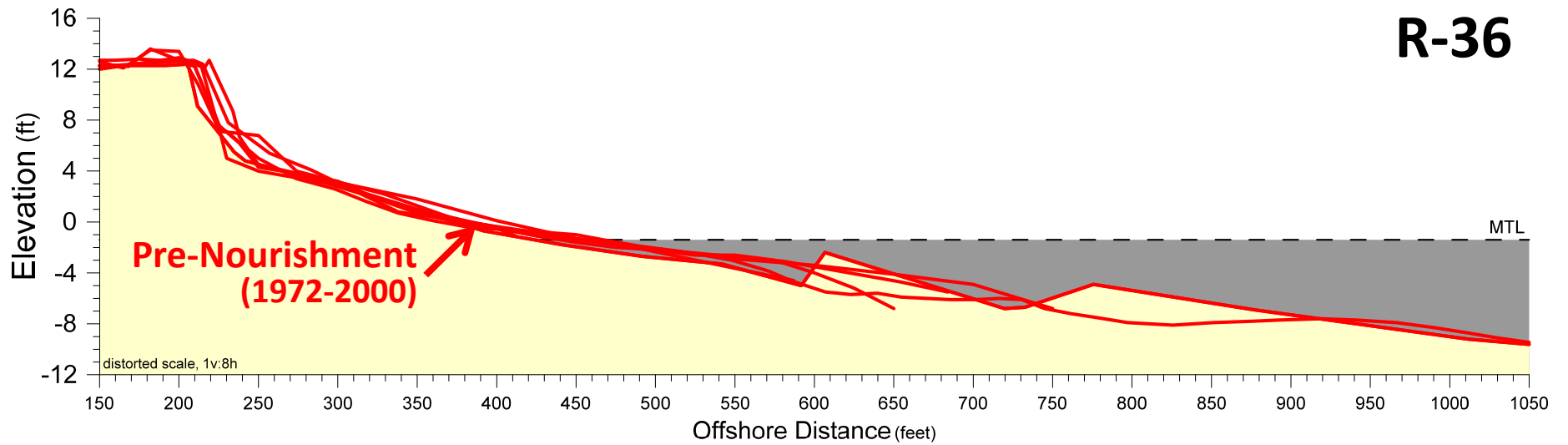


# EXPECTED CHANGE IN SAND SIZE ?



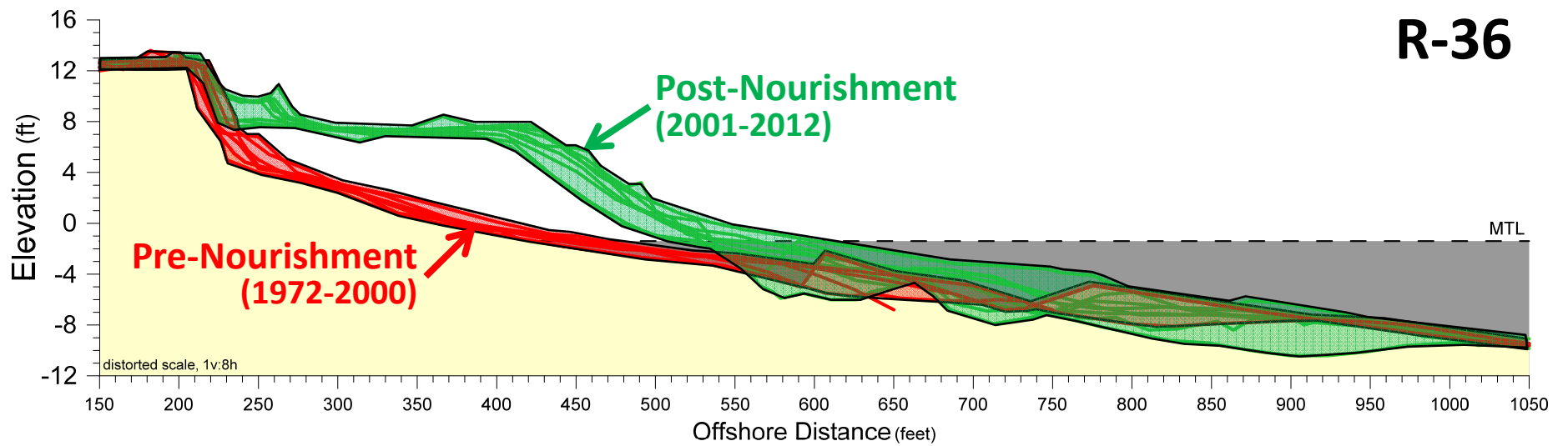
# Beach Profiles

Cocoa Beach  
R-36



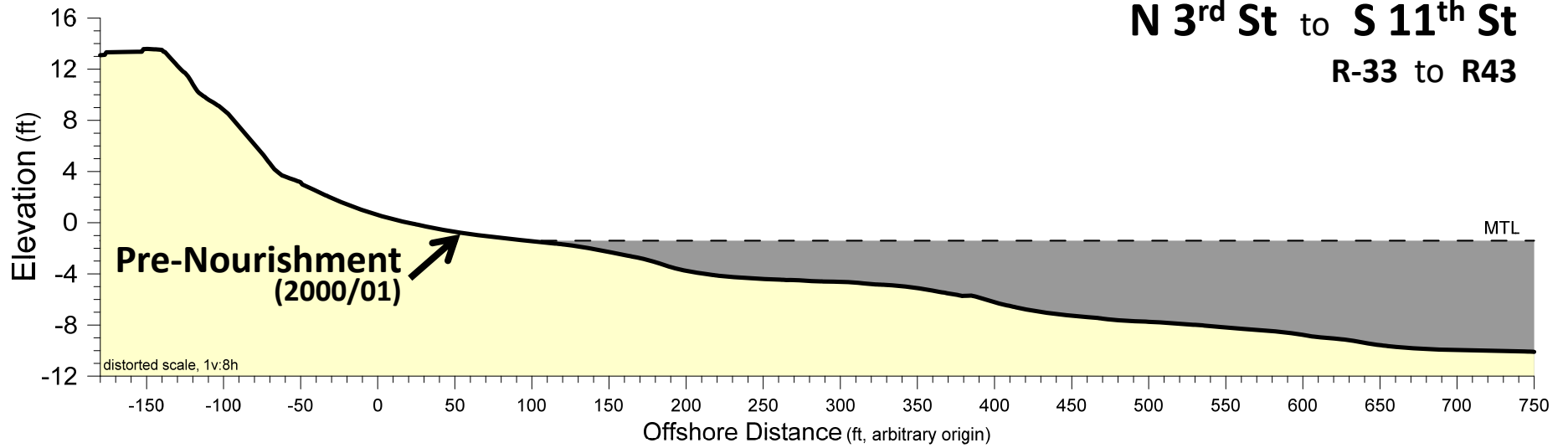
# Beach Profiles

Cocoa Beach  
R-36



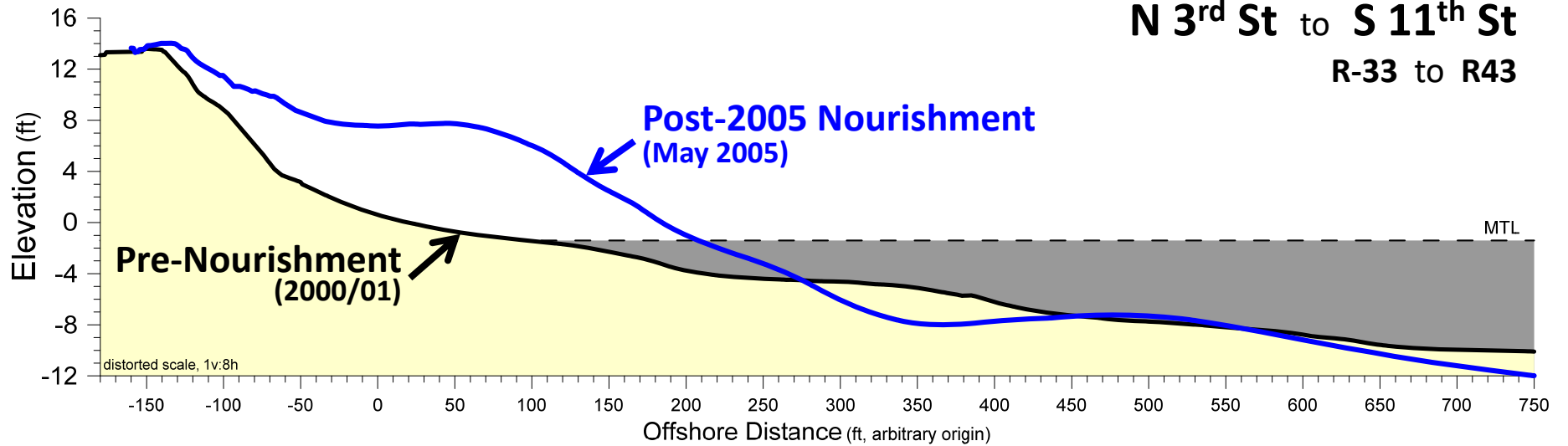
# Beach Profiles

**Composite Profiles**  
**N 3<sup>rd</sup> St to S 11<sup>th</sup> St**  
**R-33 to R43**



# Beach Profiles

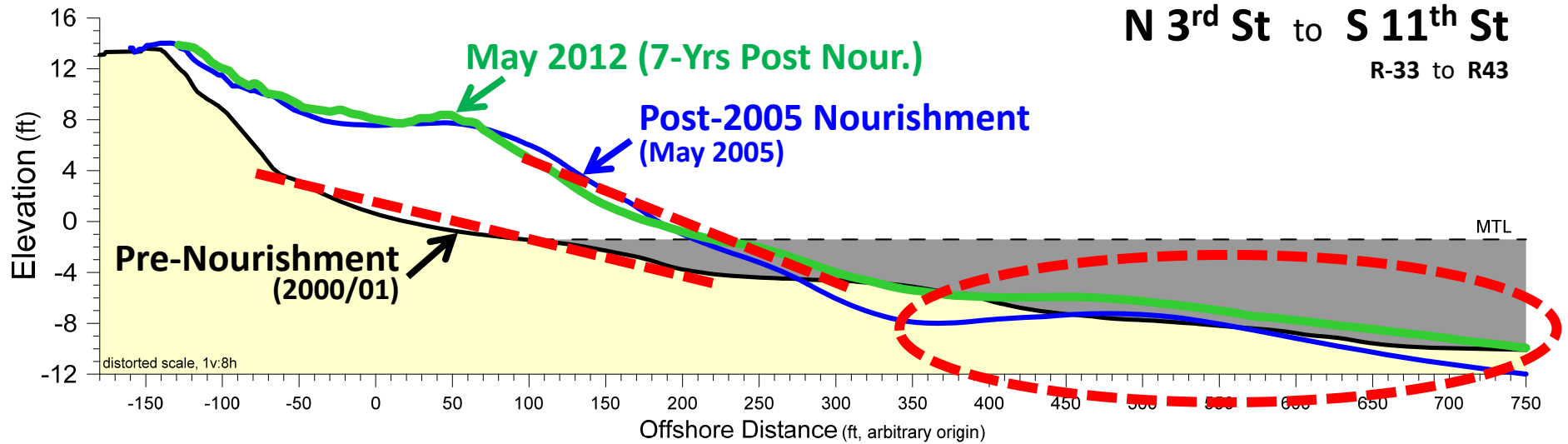
Composite Profiles  
N 3<sup>rd</sup> St to S 11<sup>th</sup> St  
R-33 to R43





# Beach Profiles

Composite Profiles  
N 3<sup>rd</sup> St to S 11<sup>th</sup> St  
R-33 to R43



# What happens immediately after beach renourishment construction?

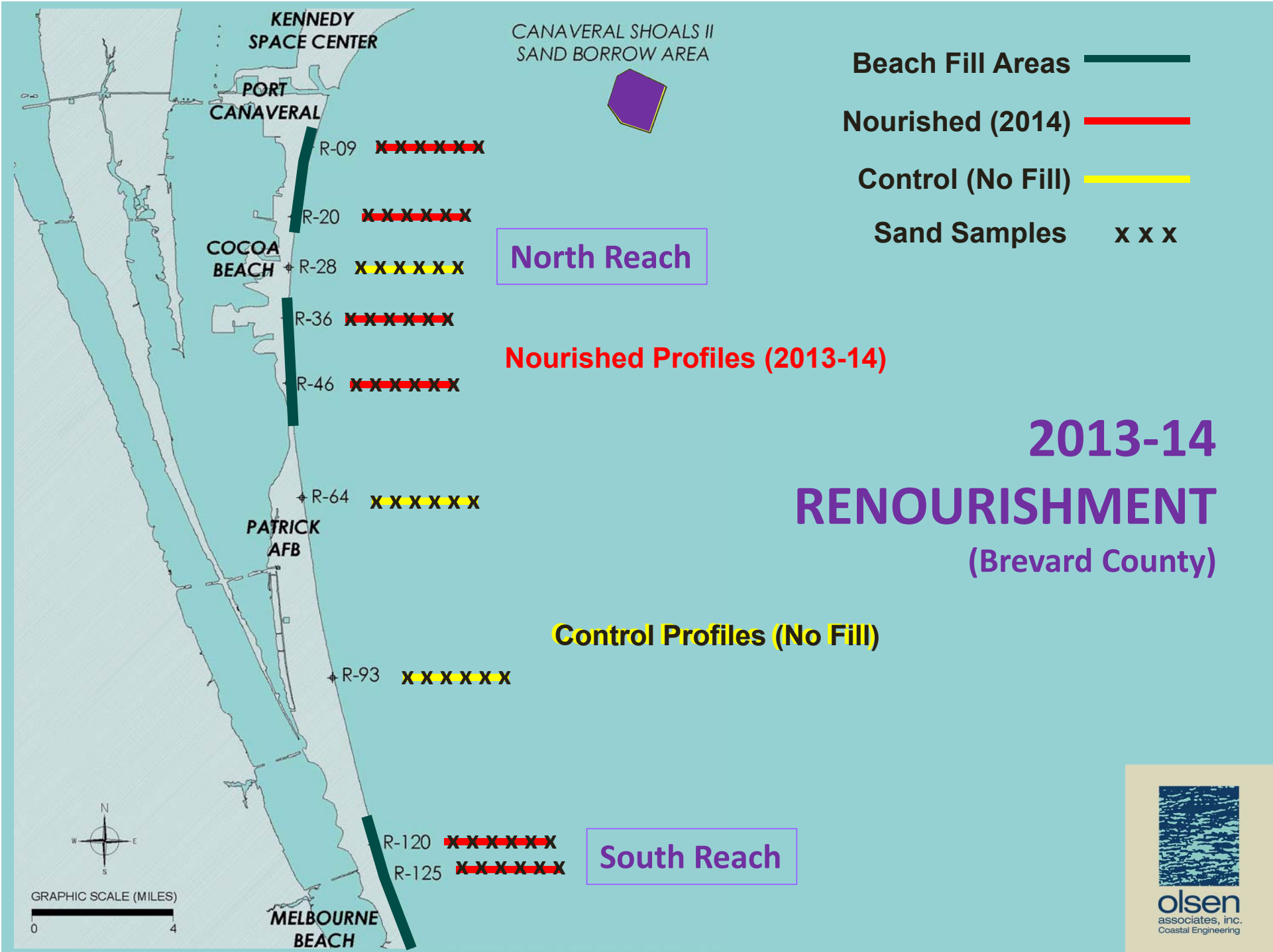


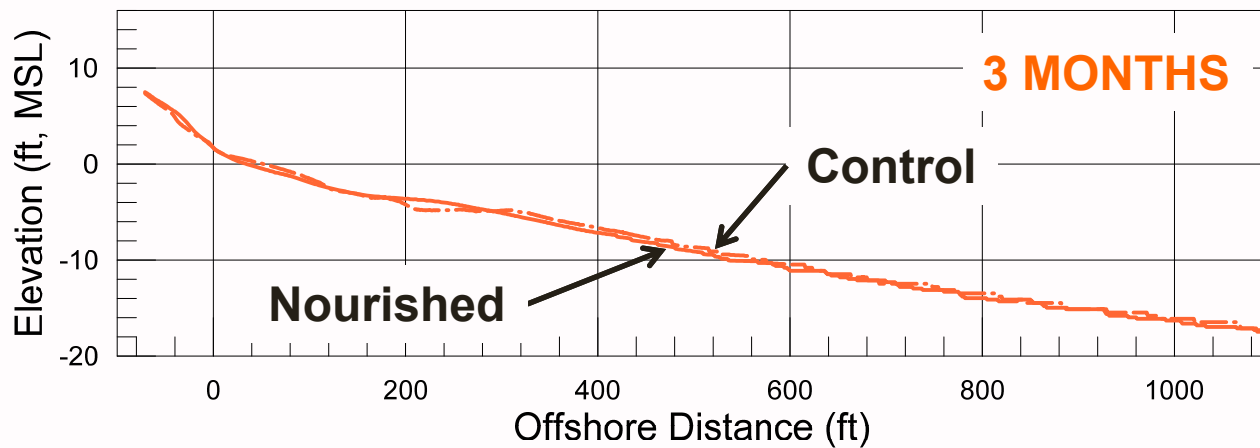
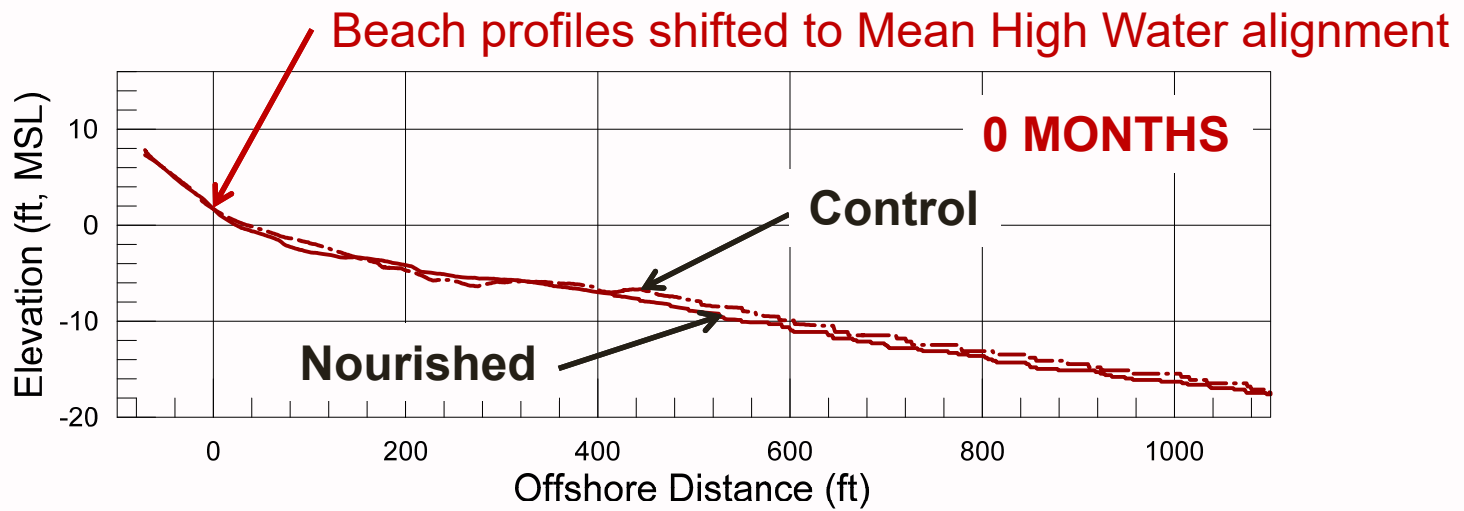
## We examined:

- Beach profiles: 6 nourished and 3 non-nourished ....
- Sand grain size at 6 depths along each profile...  
...at...
- pre-construction and
- 0-, 3-, 6- 12-, and 24-months post-construction.
  - *54 beach profile surveys, and*
  - *324 sand samples*



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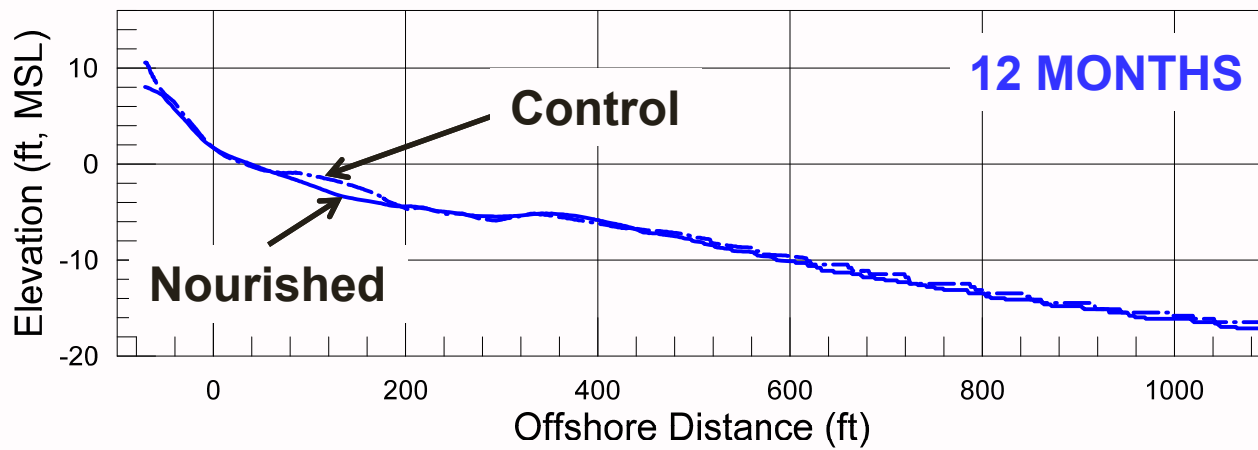
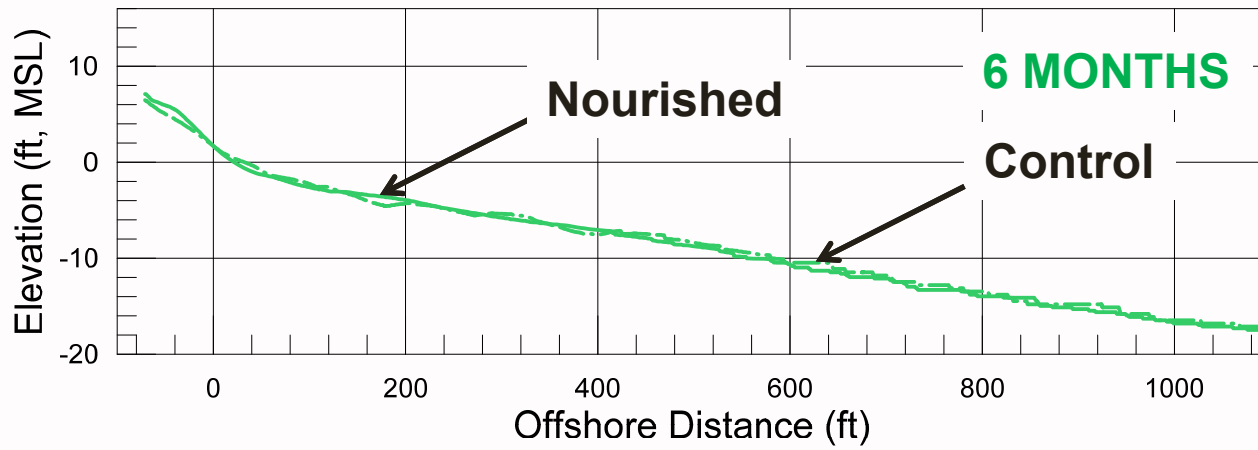




# COMPOSITE PROFILES



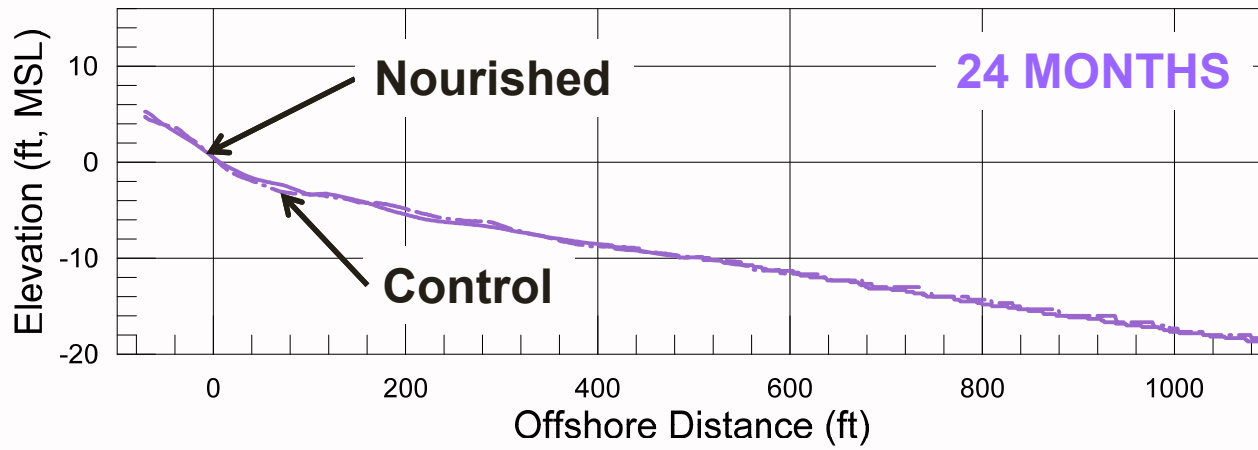
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# COMPOSITE PROFILES



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# COMPOSITE PROFILES



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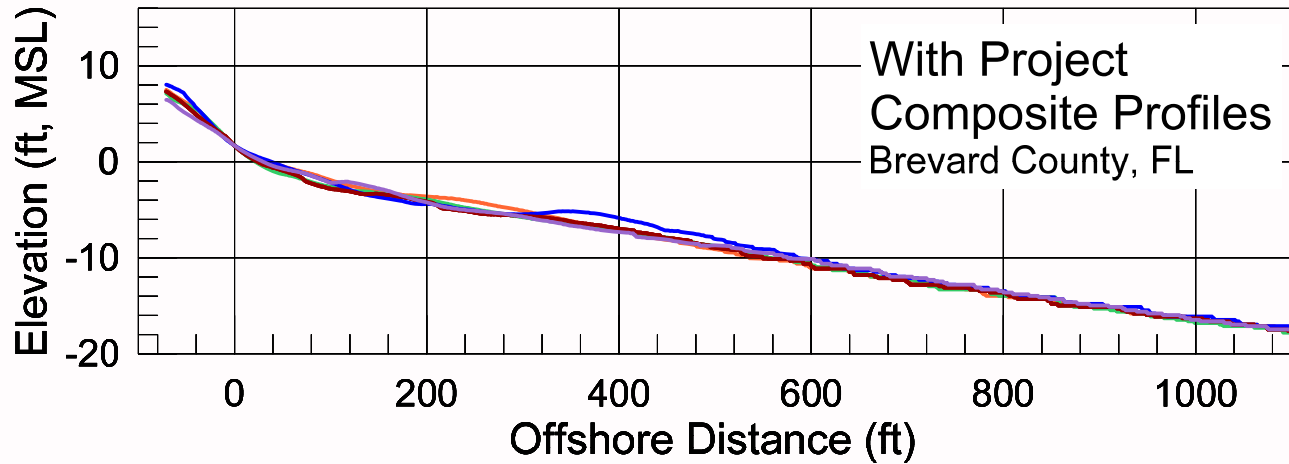
**0 MONTHS**

**3 MONTHS**

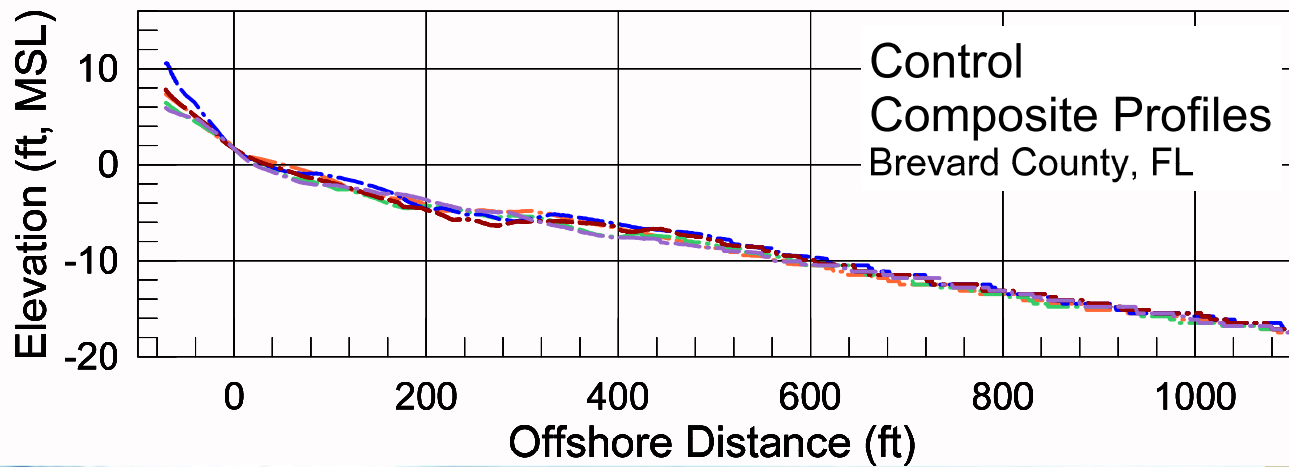
**6 MONTHS**

**12 MONTHS**

**24 MONTHS**



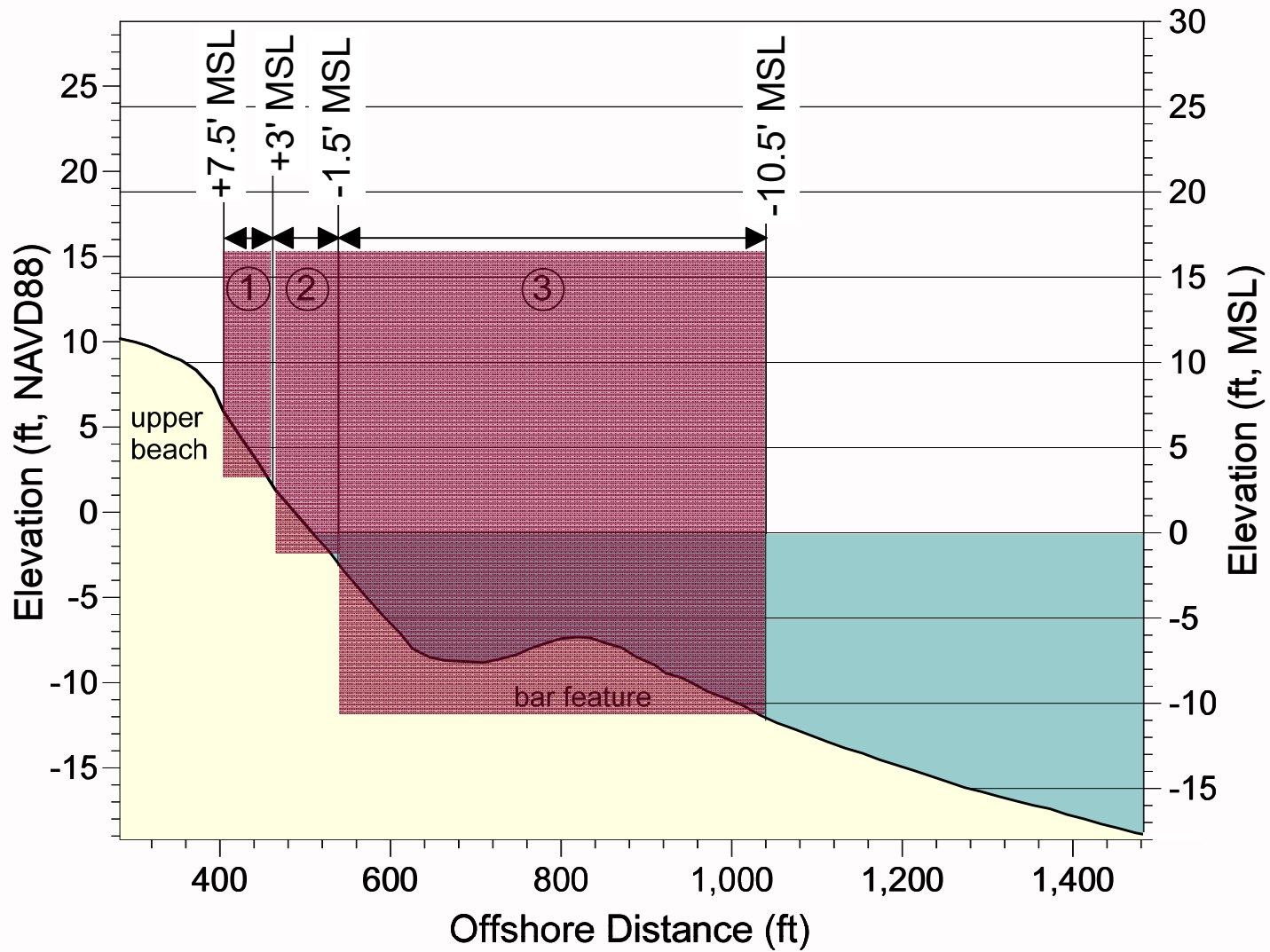
**NOURISHED**



**CONTROL**

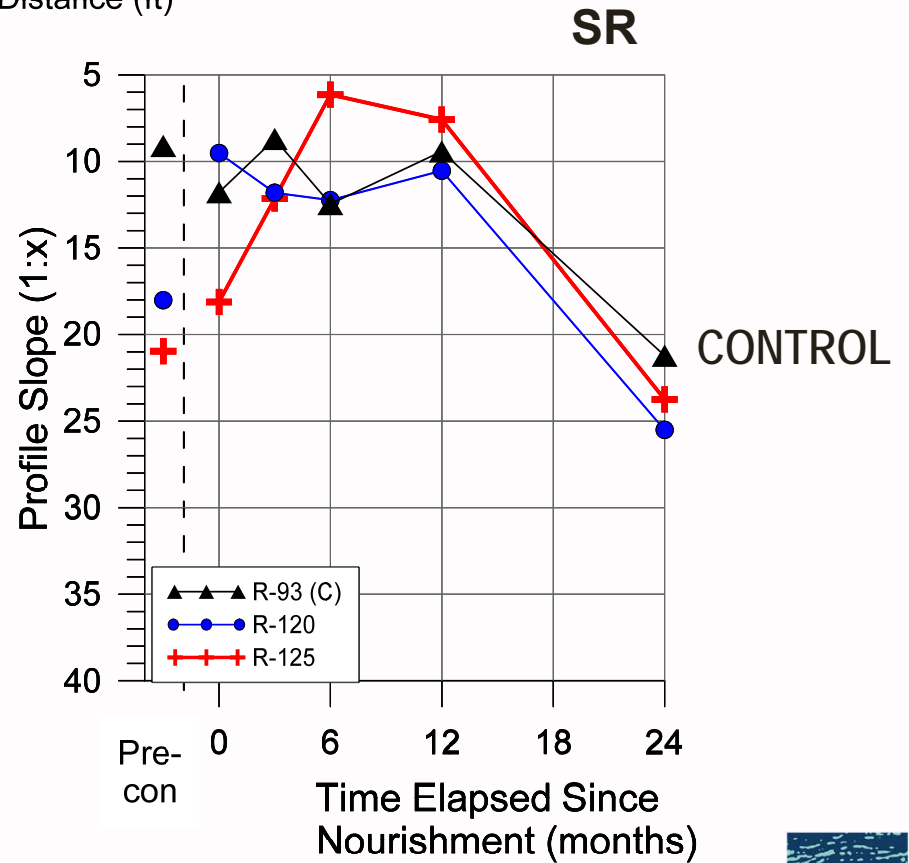
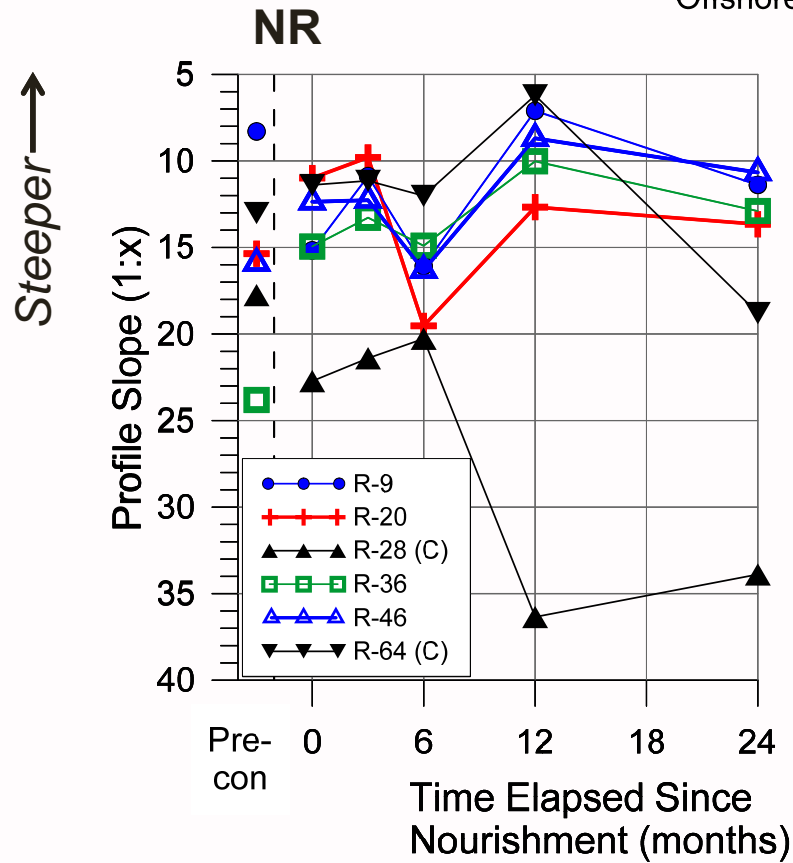
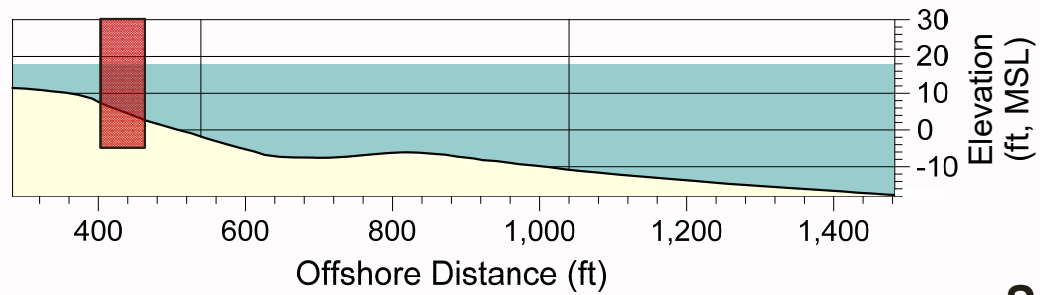


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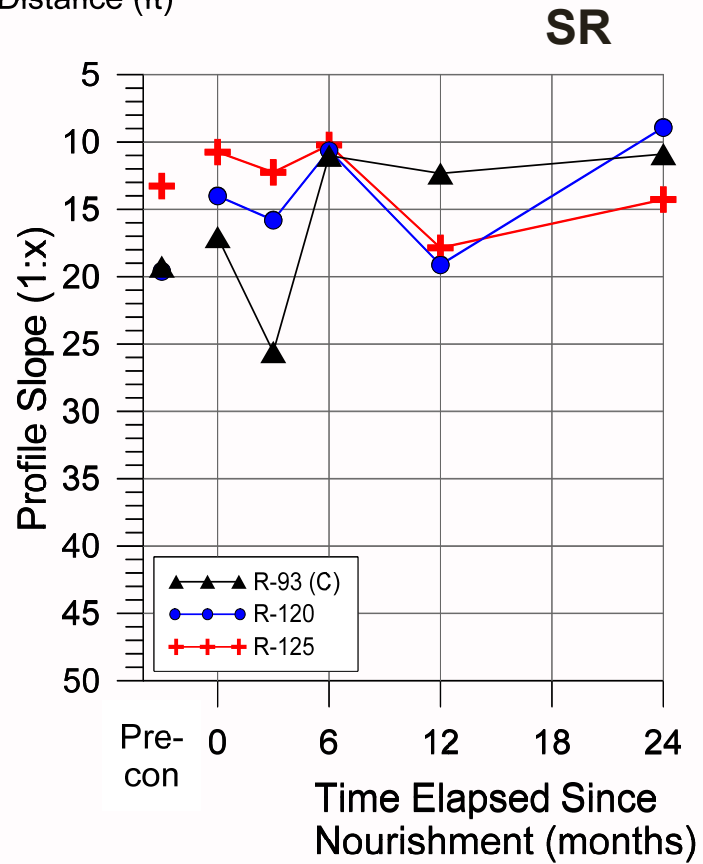
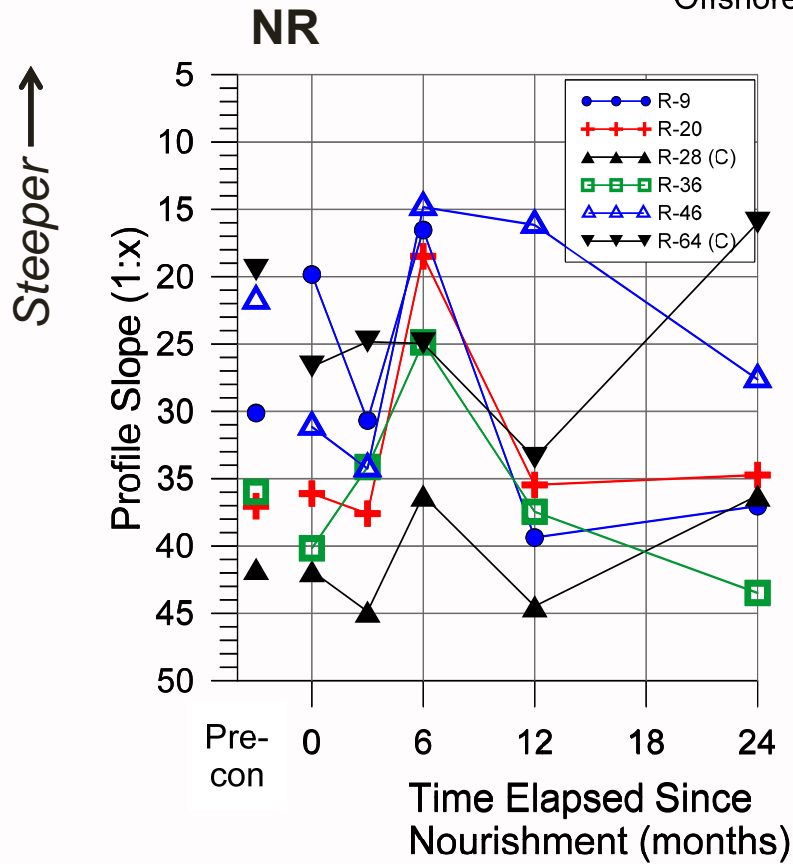
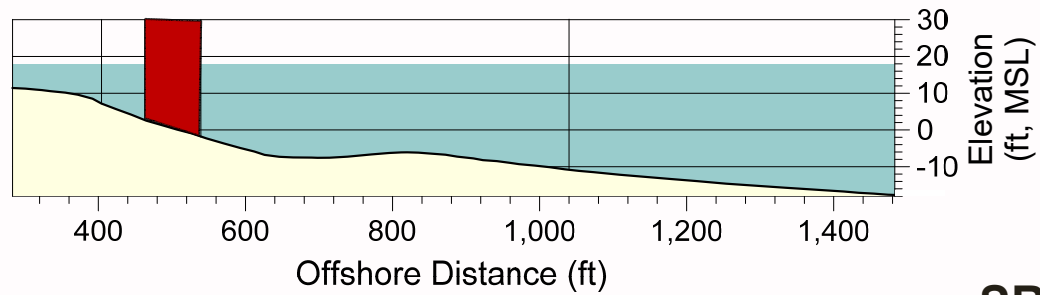


# BEACH SLOPE ANALYSIS ZONES

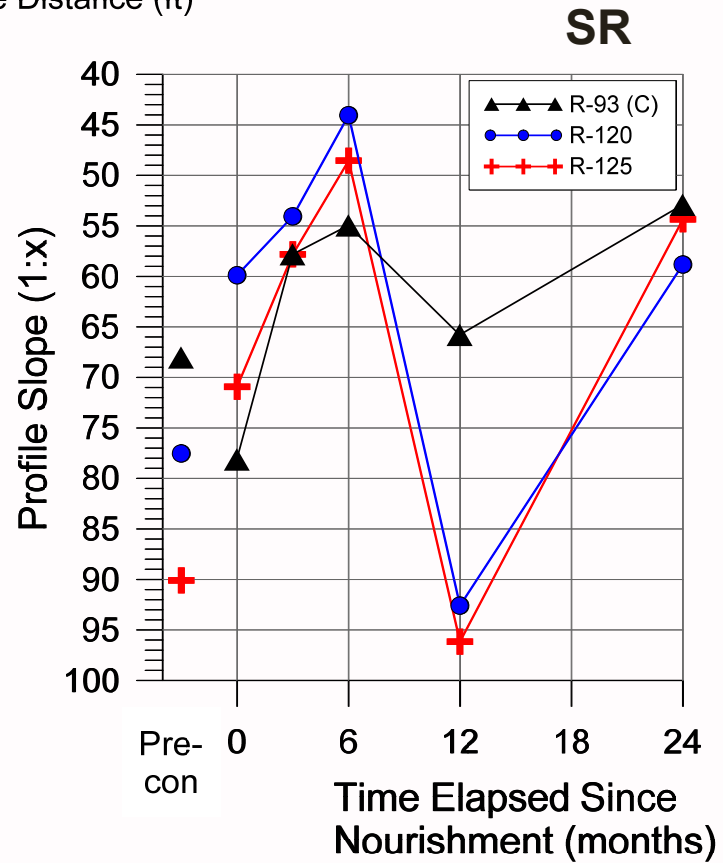
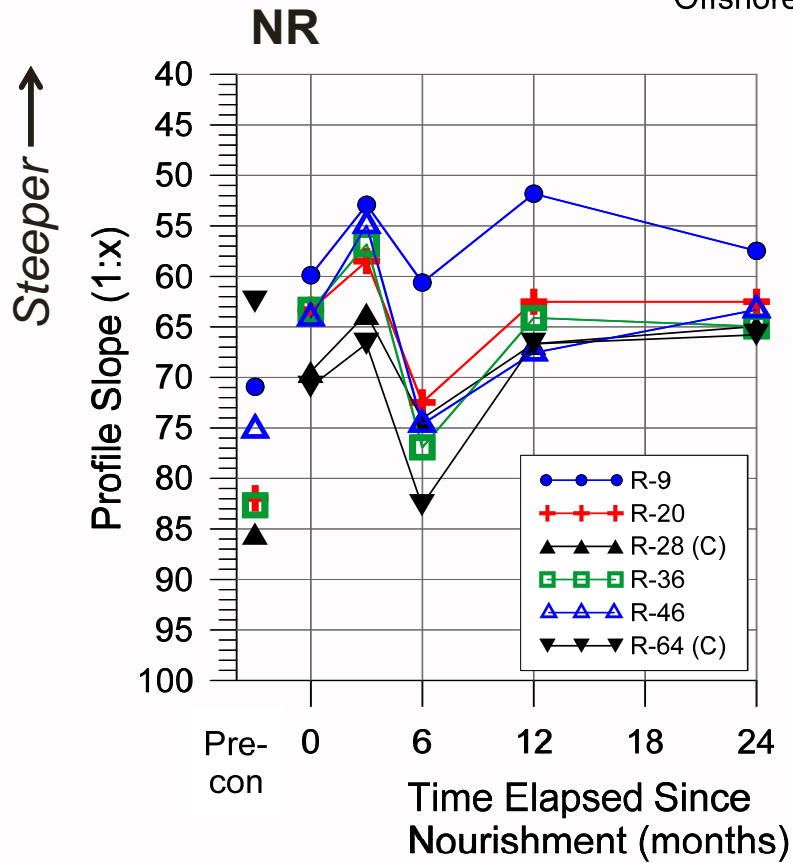
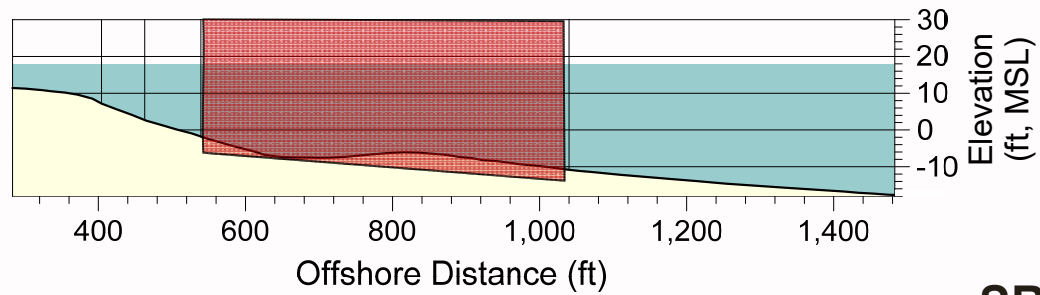




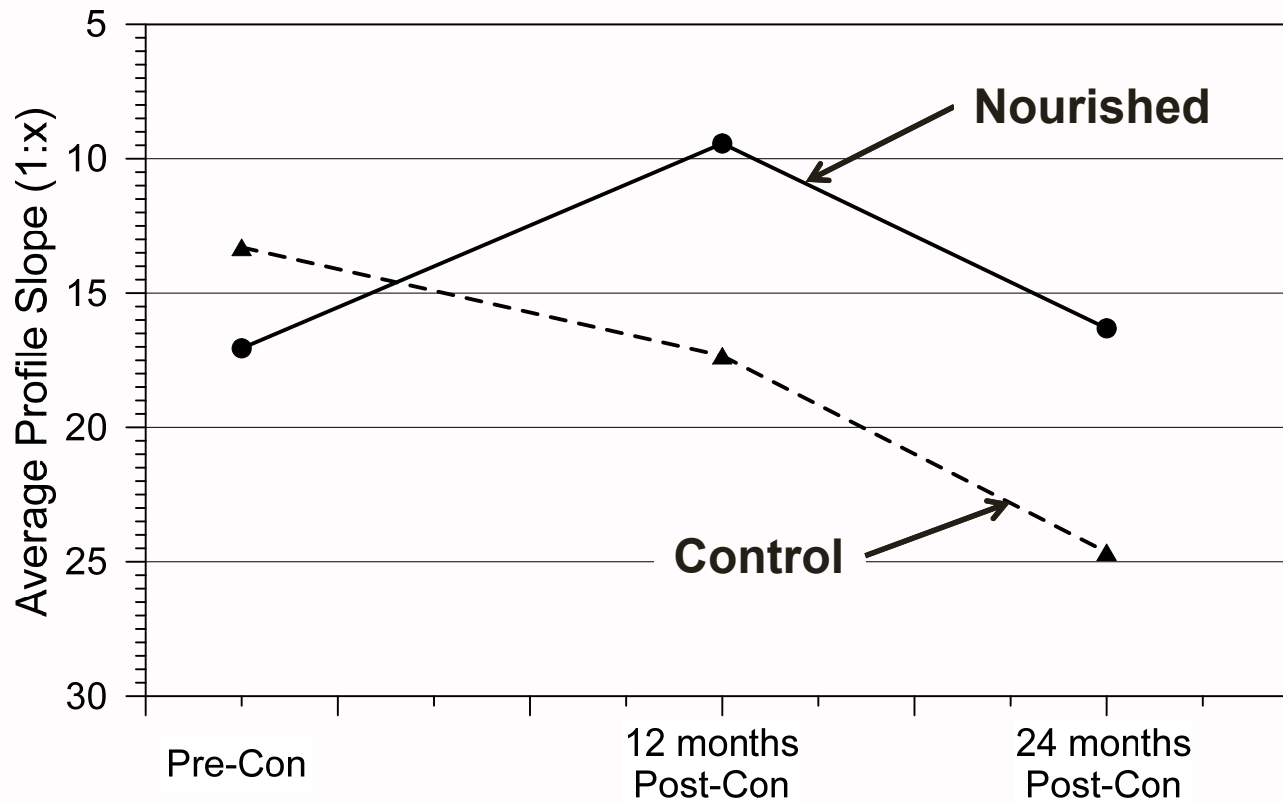
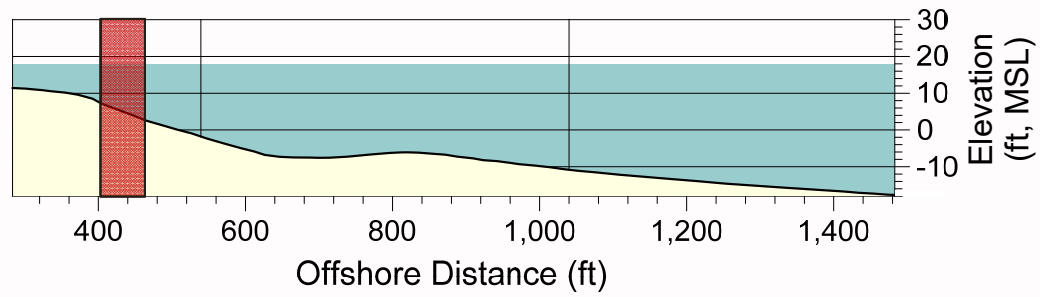
# SLOPE ANALYSIS: BERM



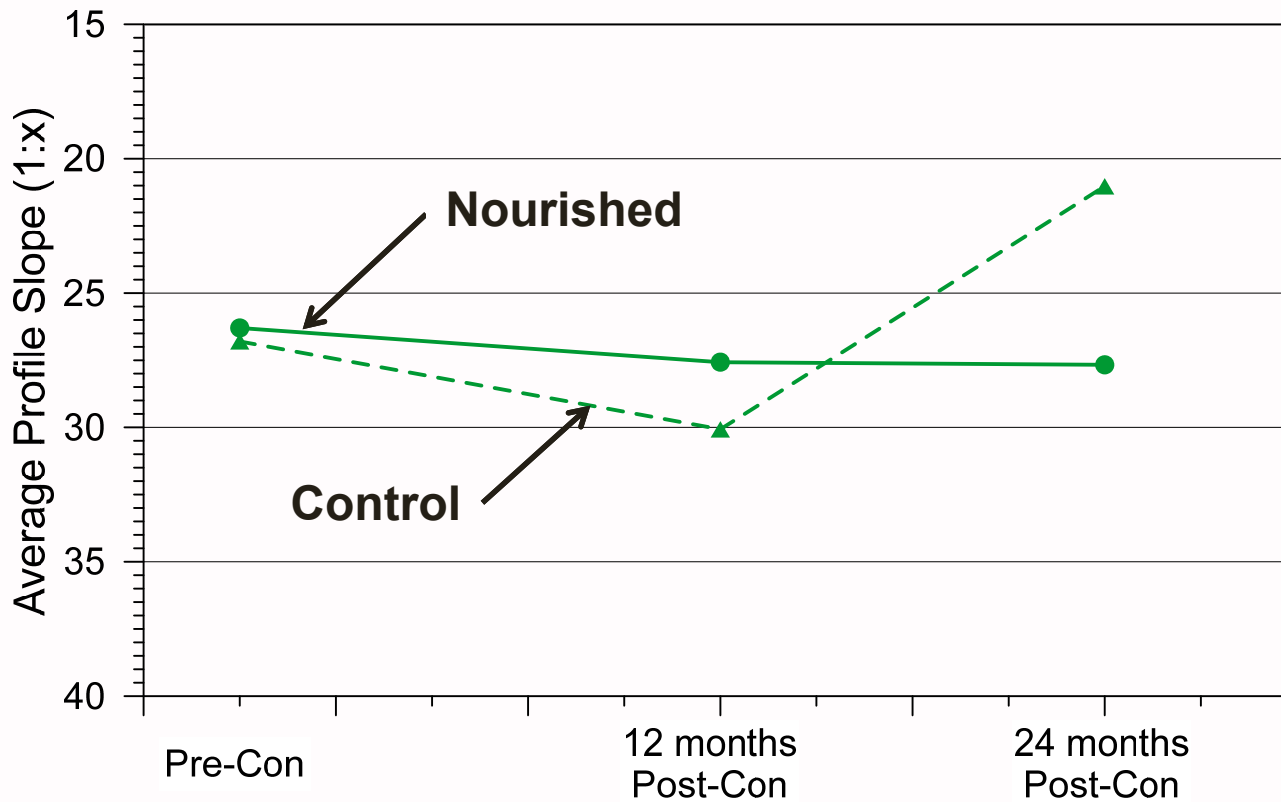
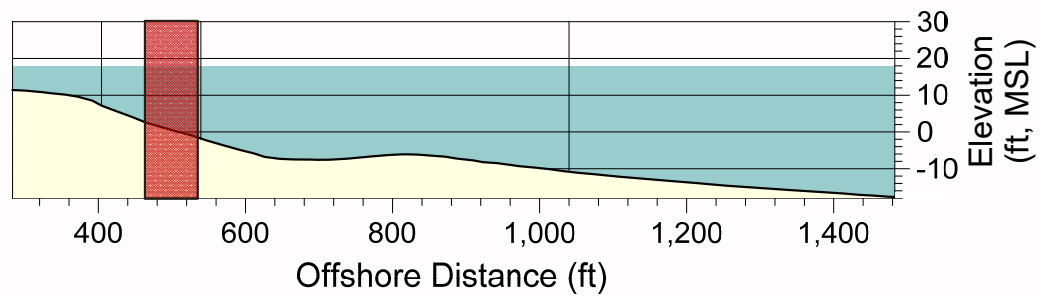
# SLOPE ANALYSIS: INTERTIDAL



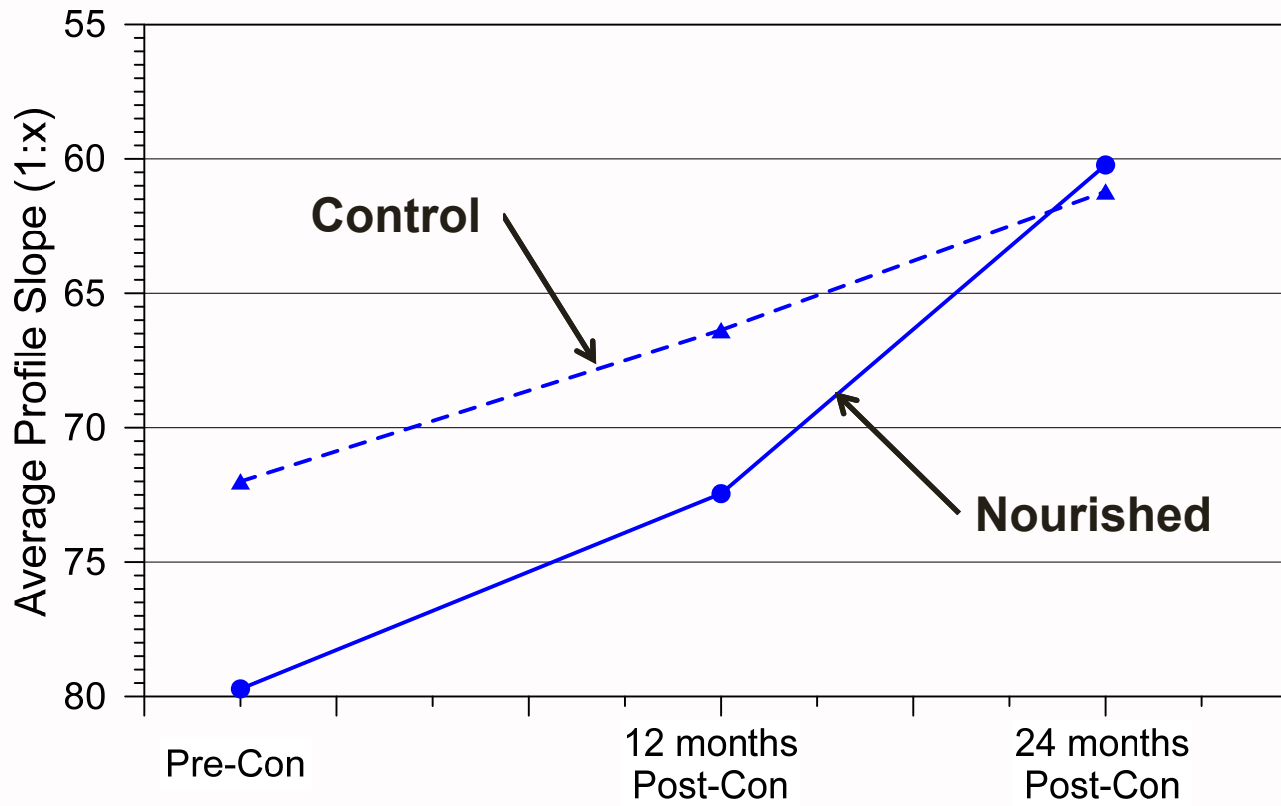
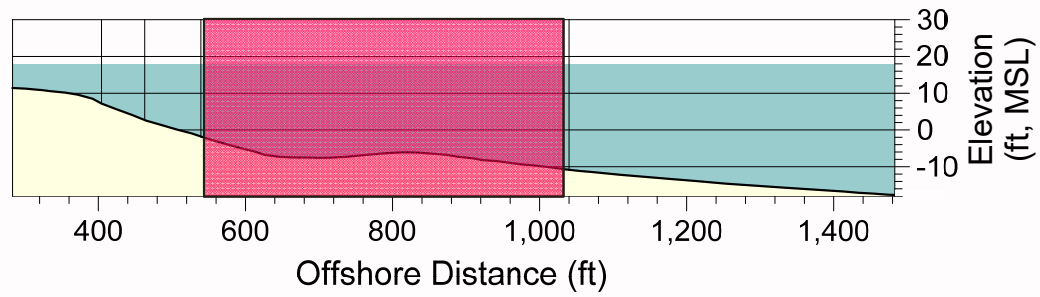
# SLOPE ANALYSIS: SUBTIDAL



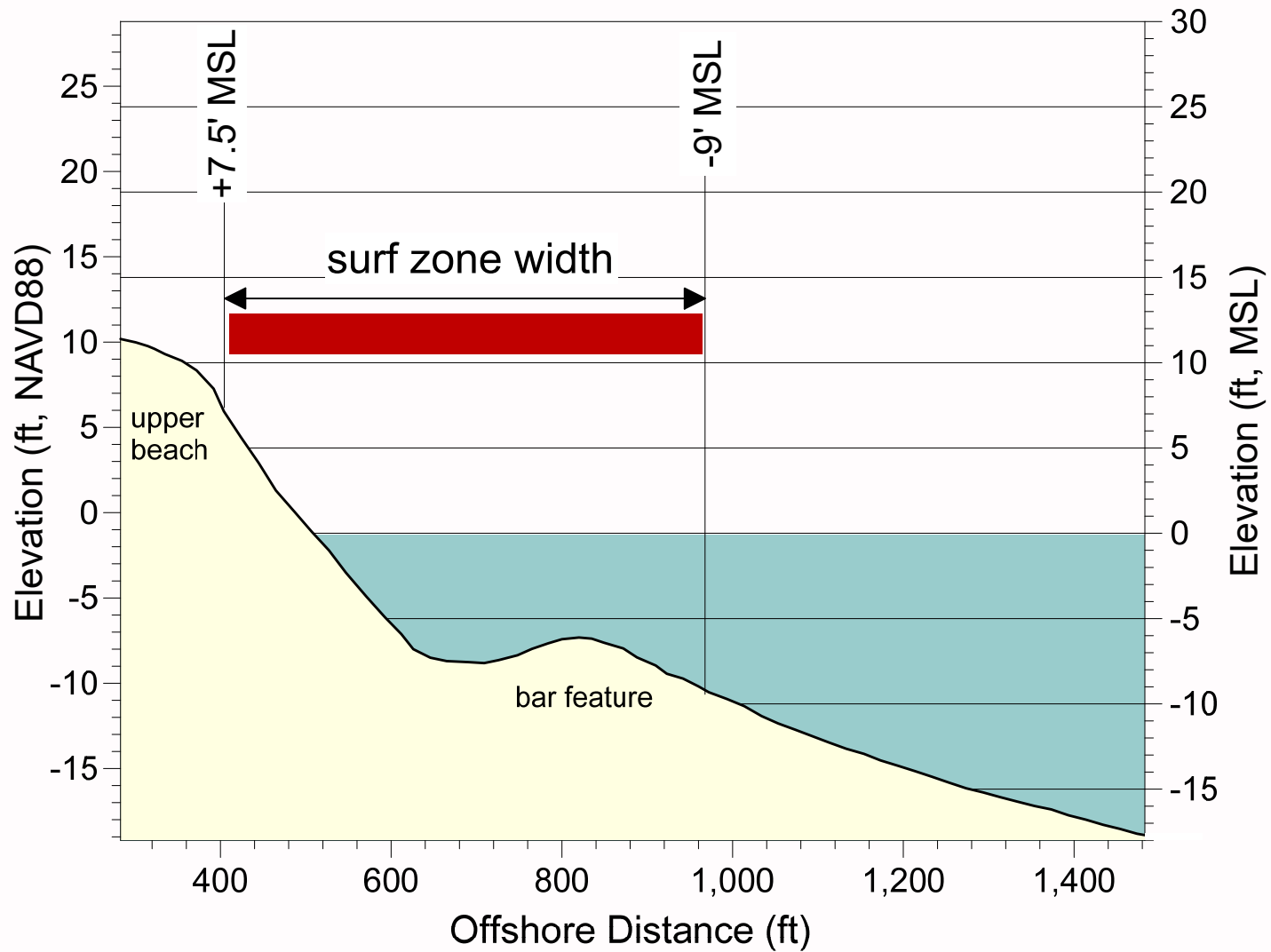
# SLOPE ANALYSIS: BERM



# SLOPE ANALYSIS: INTERTIDAL



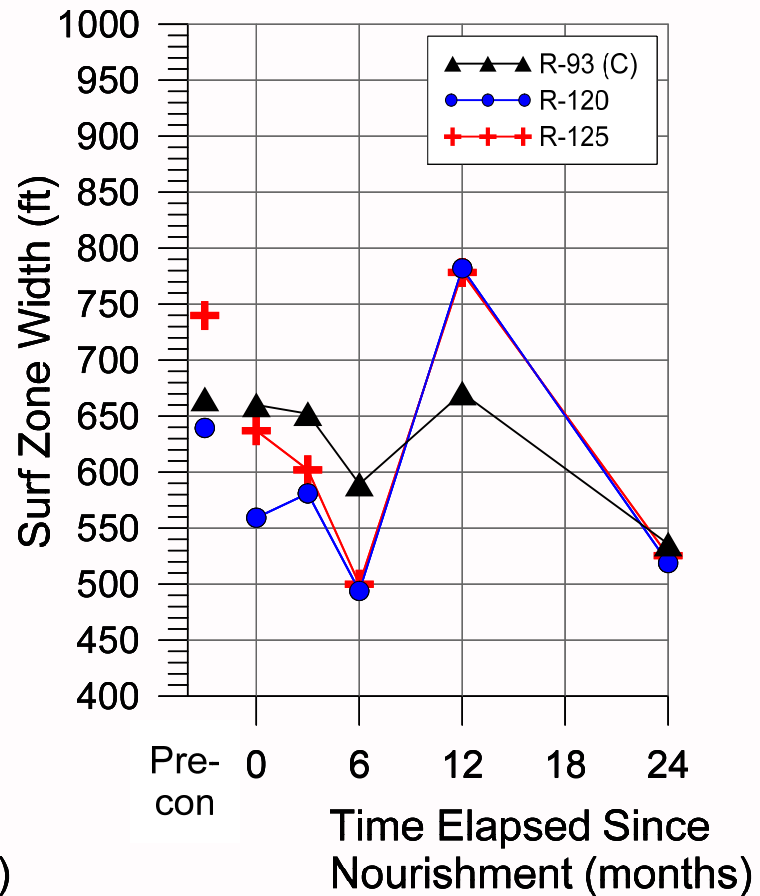
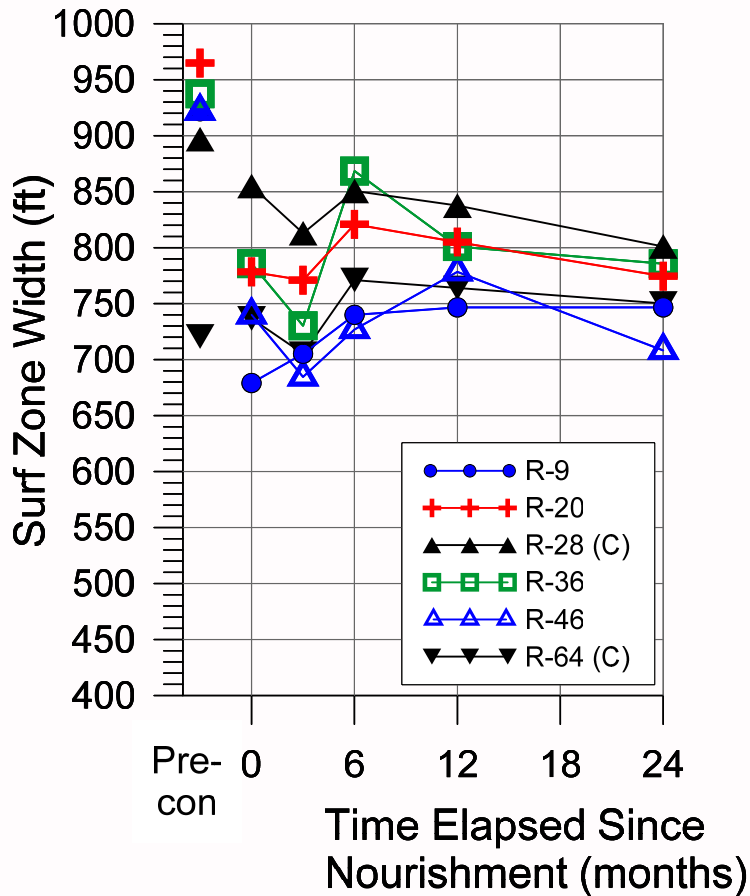
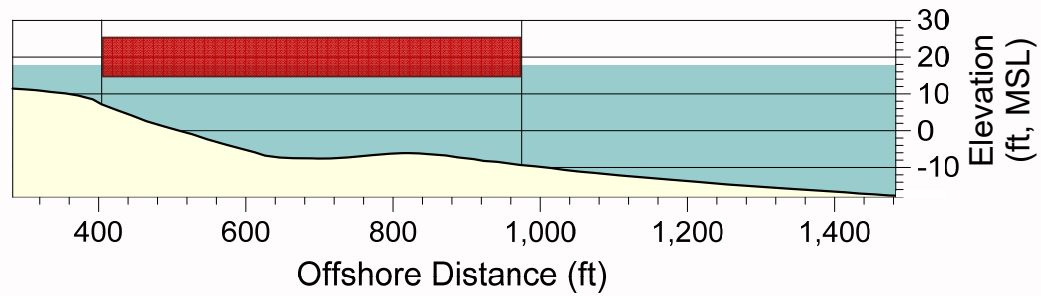
# SLOPE ANALYSIS: SUBTIDAL



# SURF ZONE WIDTH

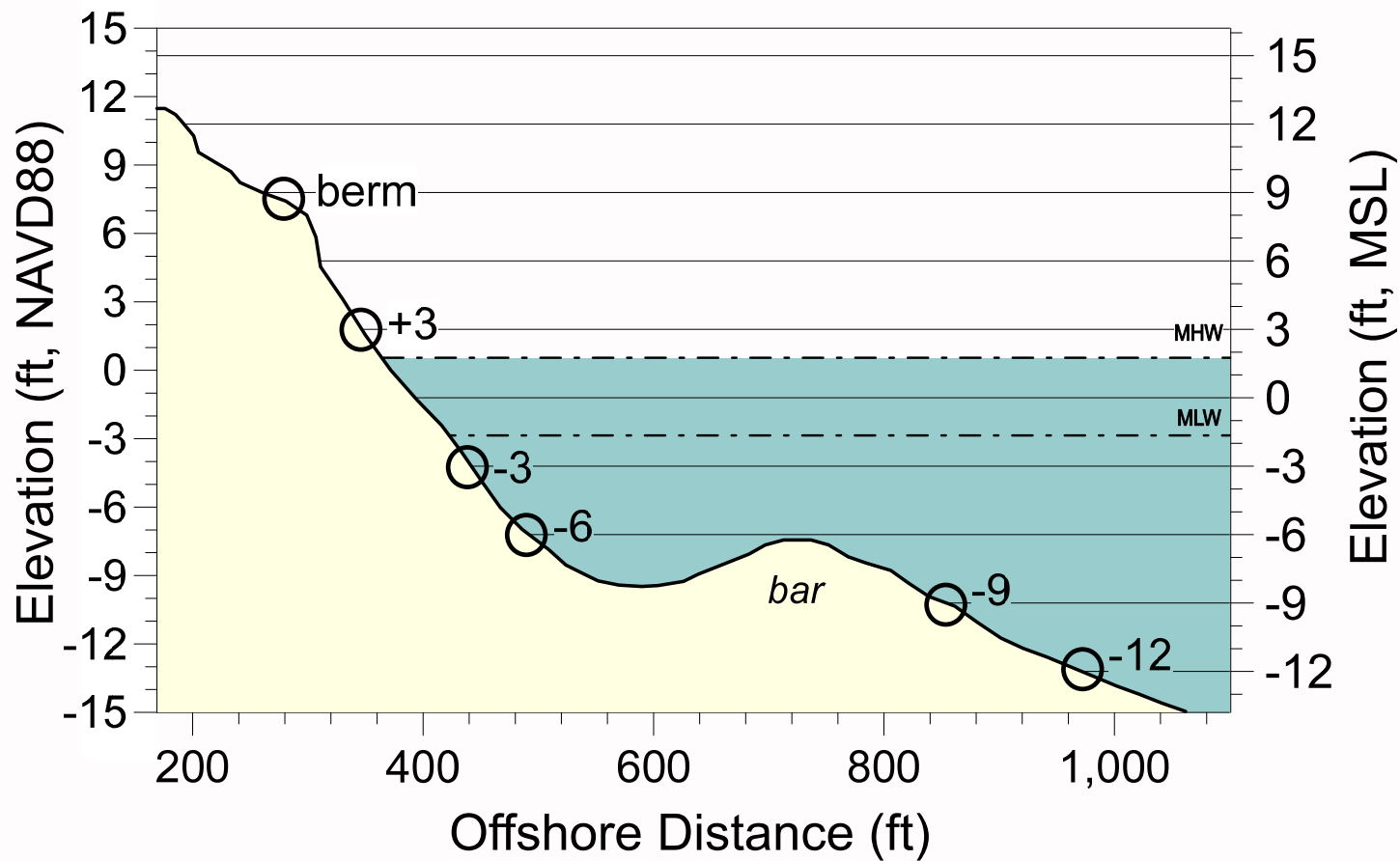


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# SURF ZONE WIDTH





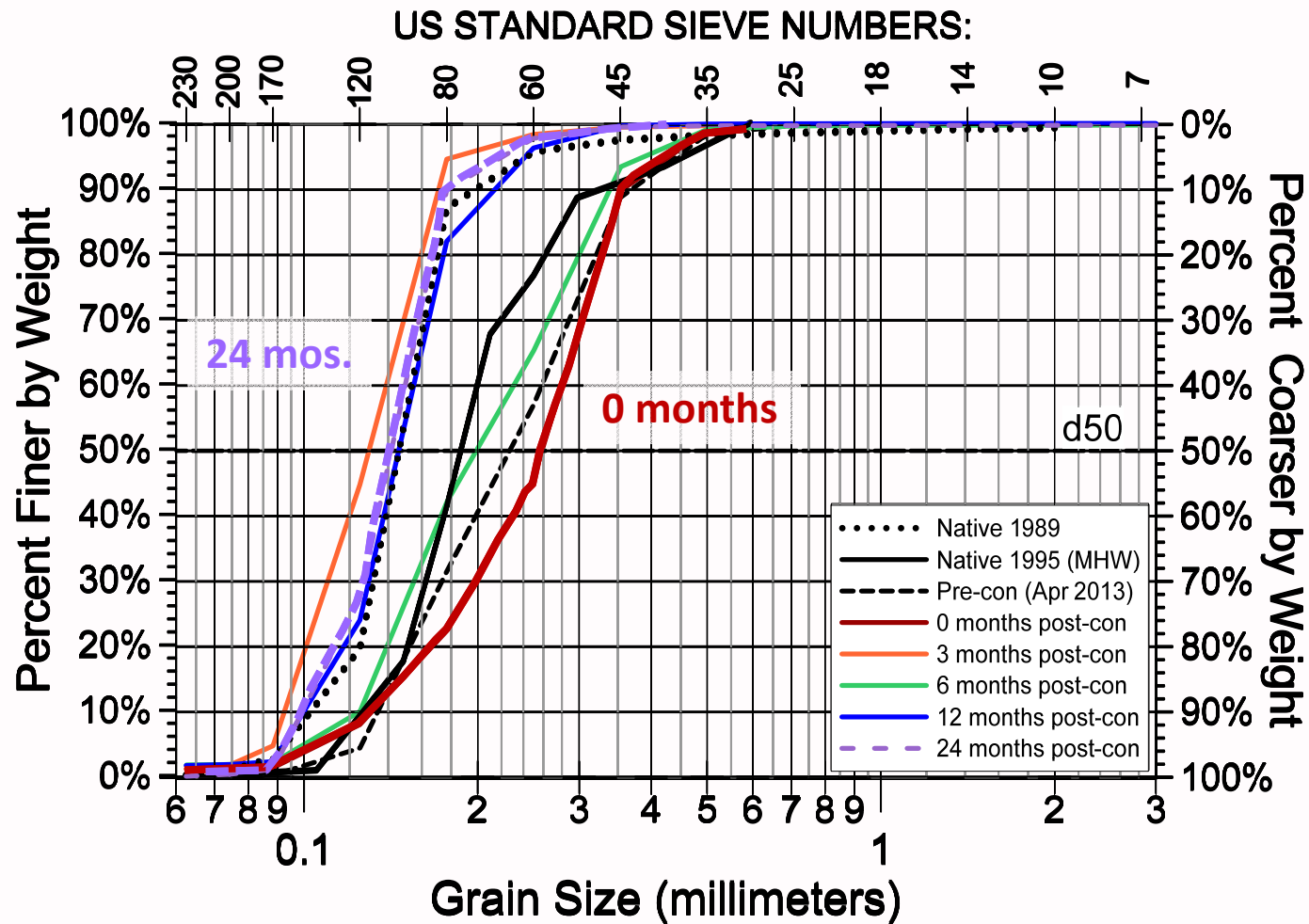
# SEABED SAND SAMPLES



R-36

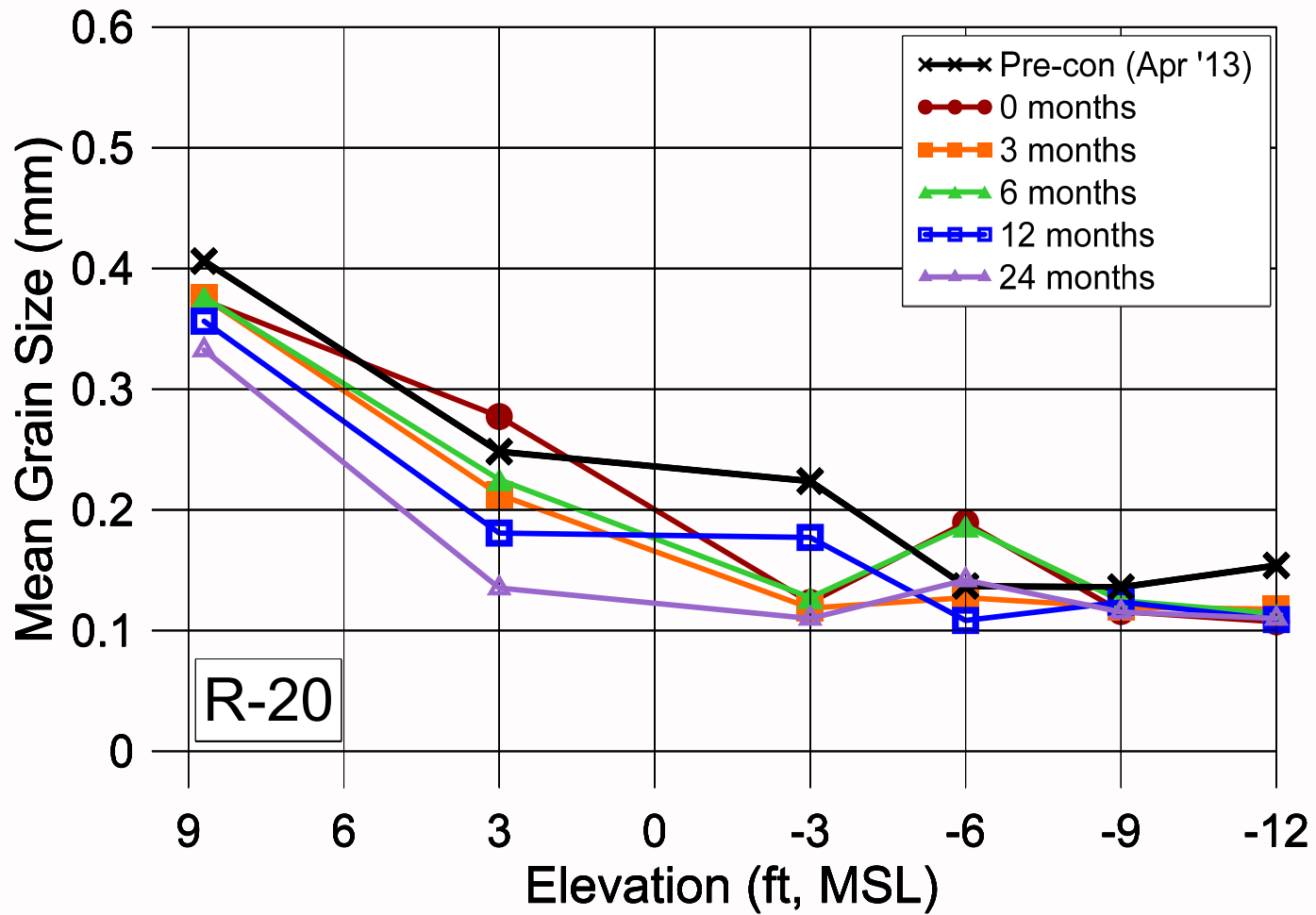
Beach Fill Profile

+3 MSL



# GRAIN SIZE DISTRIBUTION

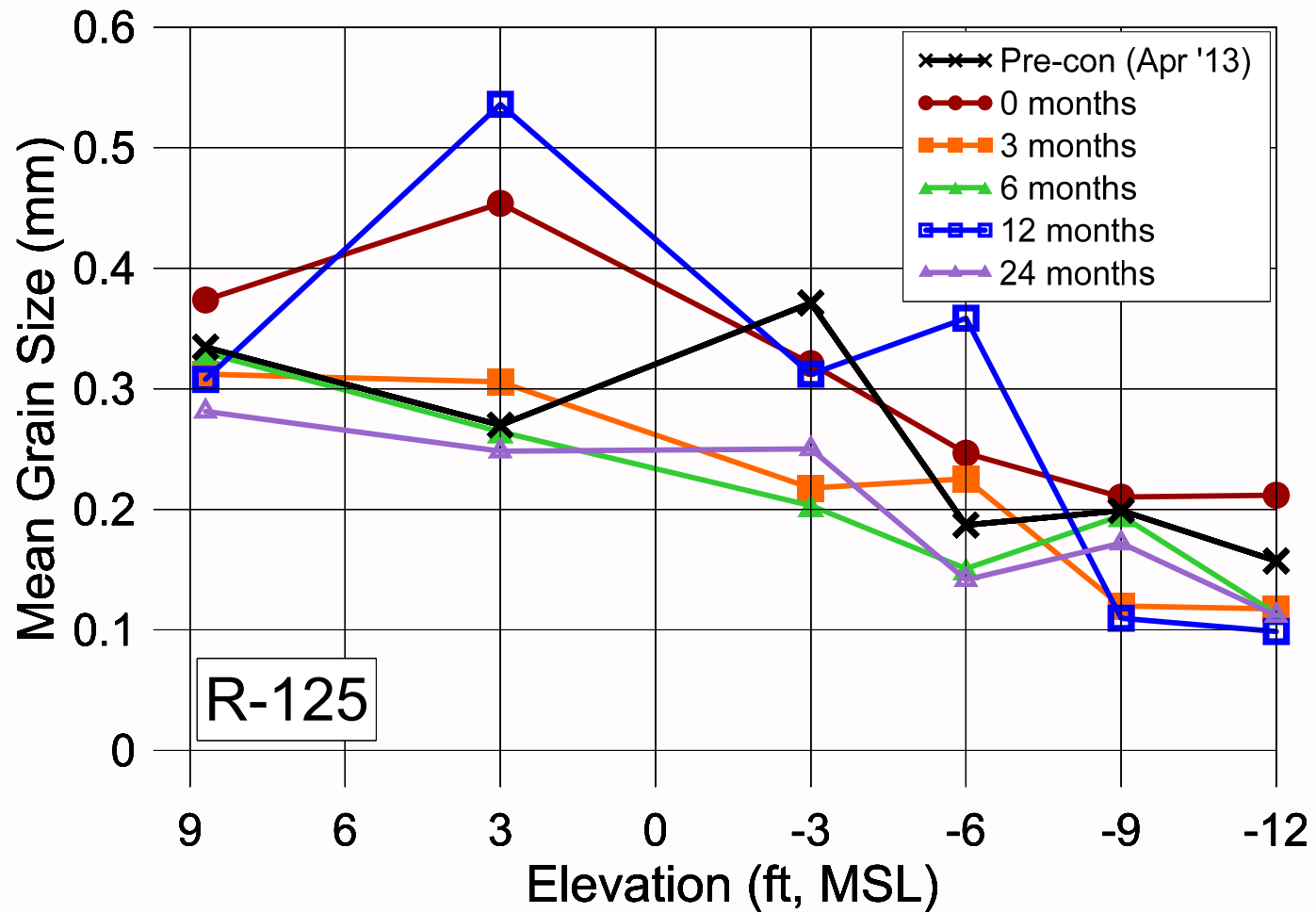
## Beach Fill Profile



# GRAIN SIZE VS. ELEVATION



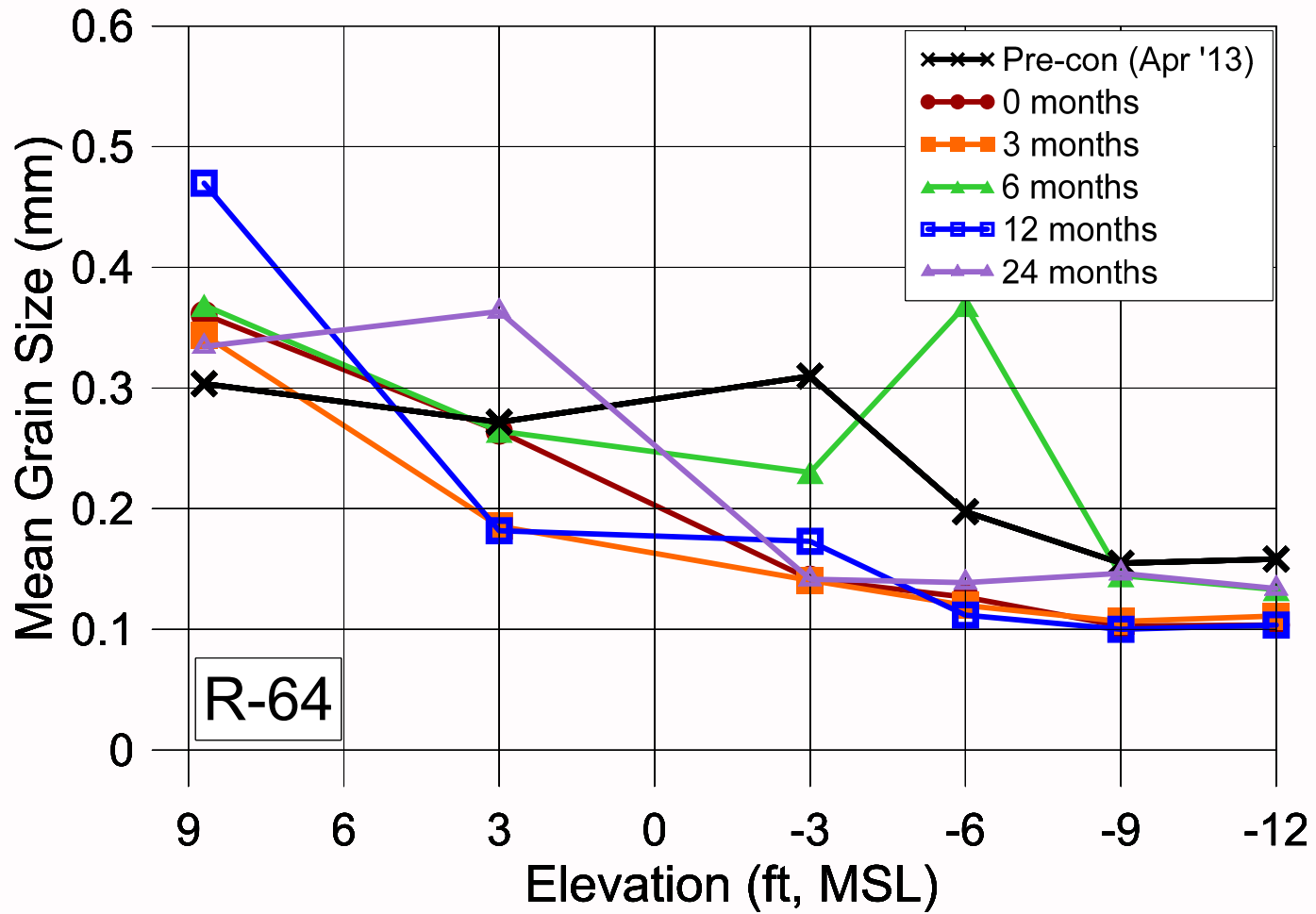
## Beach Fill Profile



# GRAIN SIZE VS. ELEVATION



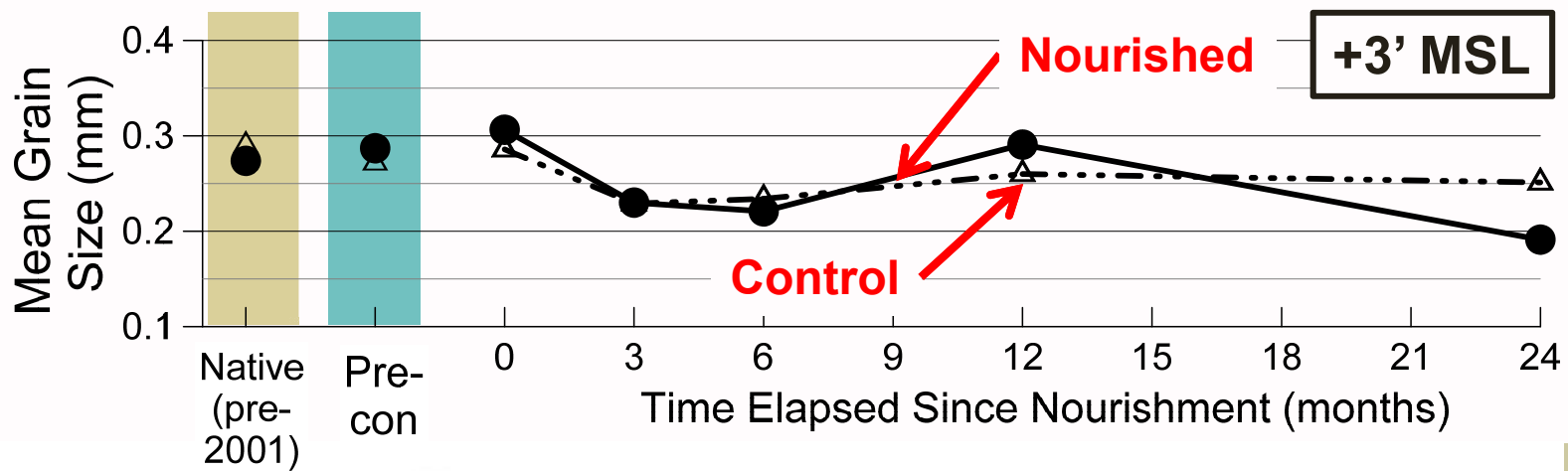
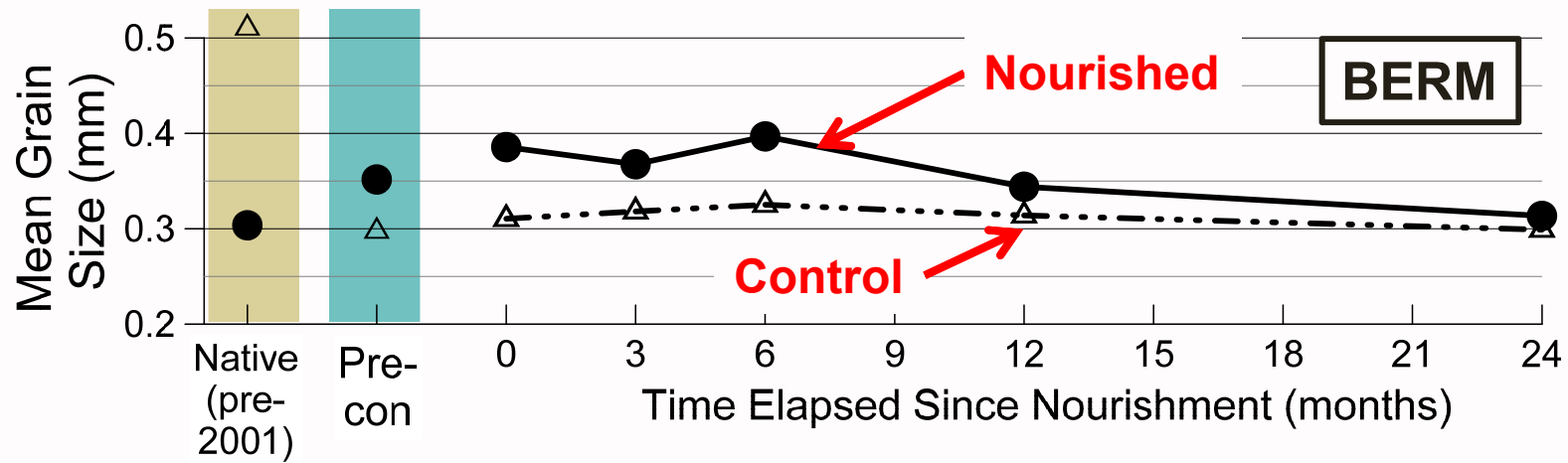
## Control Profile



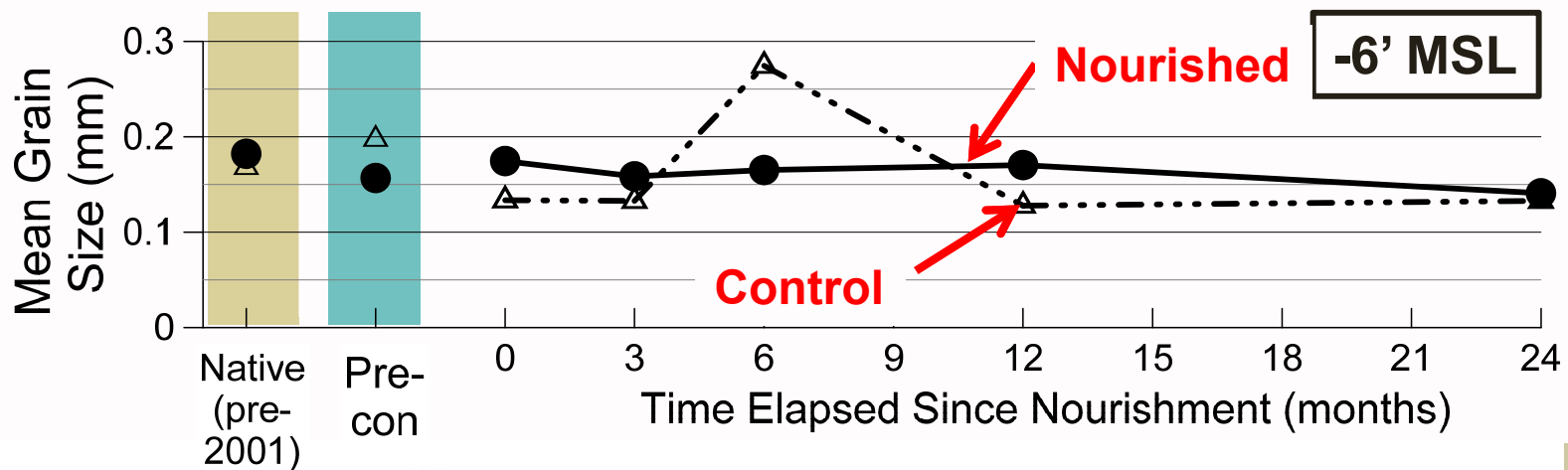
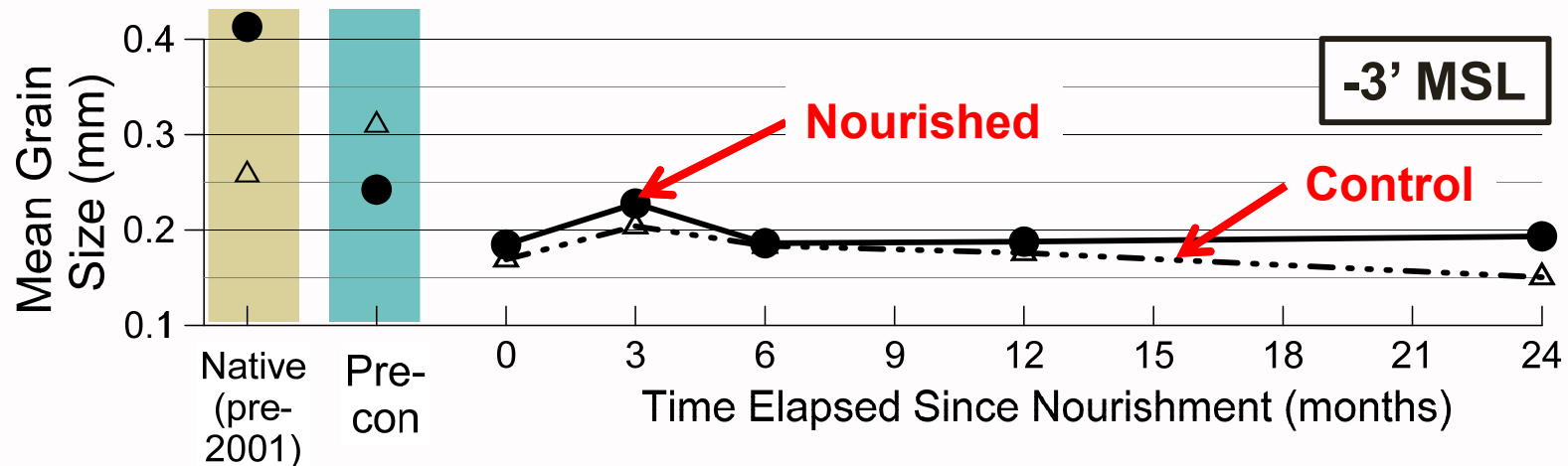
# GRAIN SIZE VS. ELEVATION



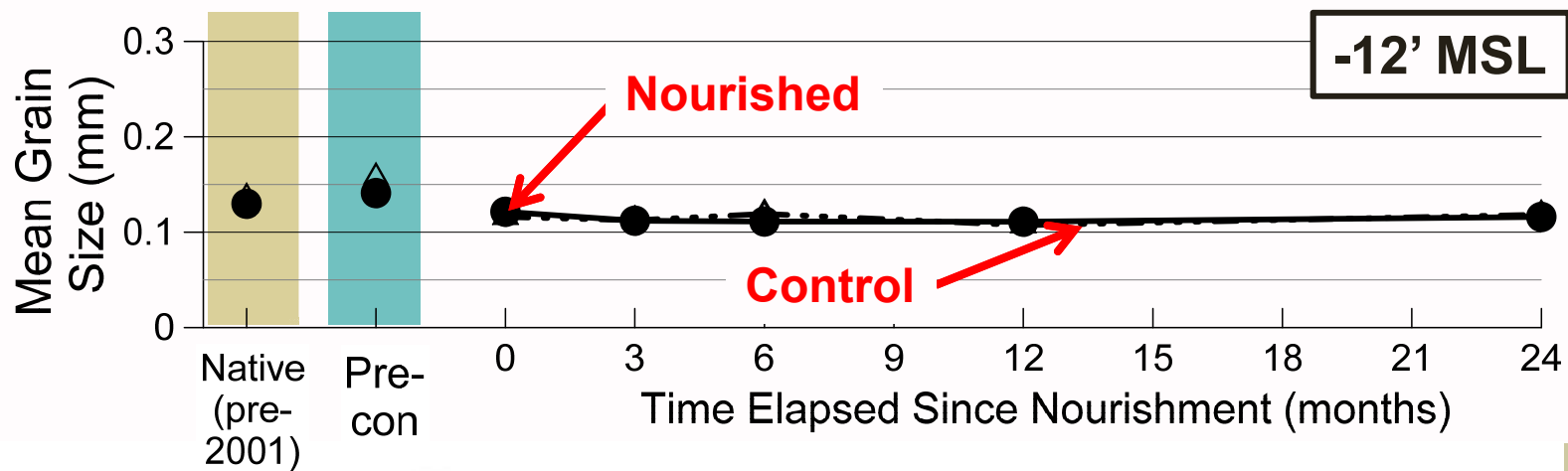
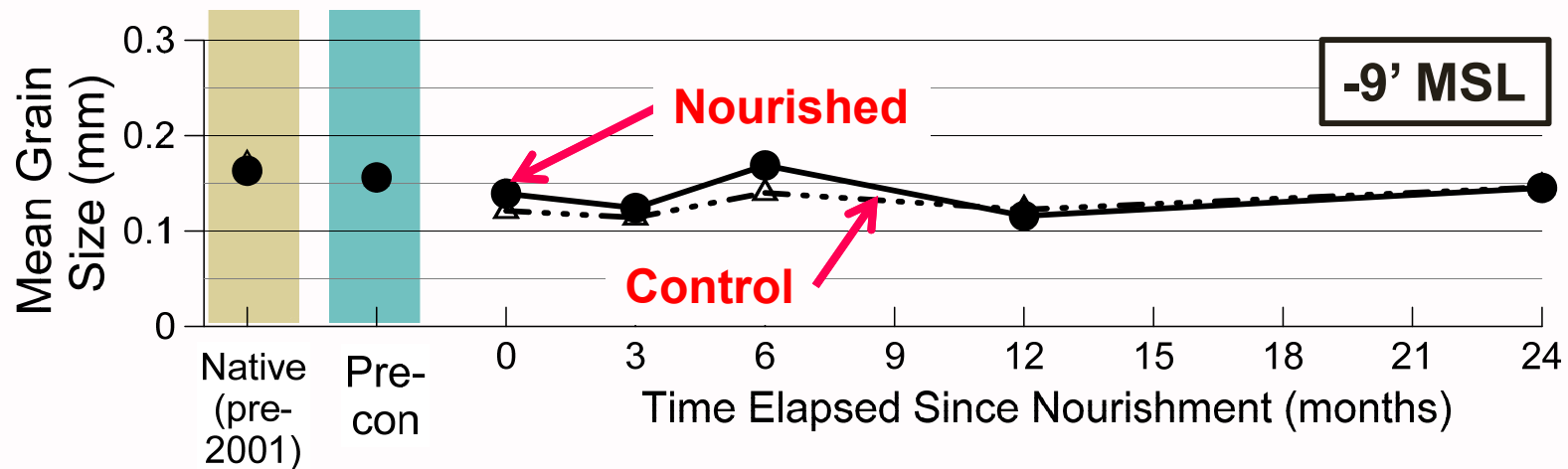
# MEAN GRAIN SIZE



# MEAN GRAIN SIZE



# MEAN GRAIN SIZE





# Summary – Profiles

- **Post-project beach profile conforms to native pre-project profile, except for steeper beachface slope (as expected from restoration of eroded beach).**
- **Negligible difference in average beach profile shape between nourished and non-nourished, at 0- to 24- months.**
- **Change in nourished beach slopes similar to or lesser than non-nourished profiles from pre- to 12- to 24-months.**
- **Temporal changes in profile slope and surf zone width similar between nourished and non-nourished profiles.**
- **Surf zone widths increasingly converged at 12- to 24-months.**



# Summary - Sand

- Existing post-project sand matches native sand, by depth.
- Grain size at nourished berm slightly increased at 0-6 months, returned to pre-renourishment within 12-24 months.
- Little net change in grain size at/below MHW.....changes were less than non-nourished profiles.
- Negligible changes below -9 ft MSL anywhere.
- Temporal variations in grain size are significant -- mostly greater at non-nourished profiles, and obscure trends.....  
though there is limited indication of increasing coherence at 12- and 24-months post-construction.



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