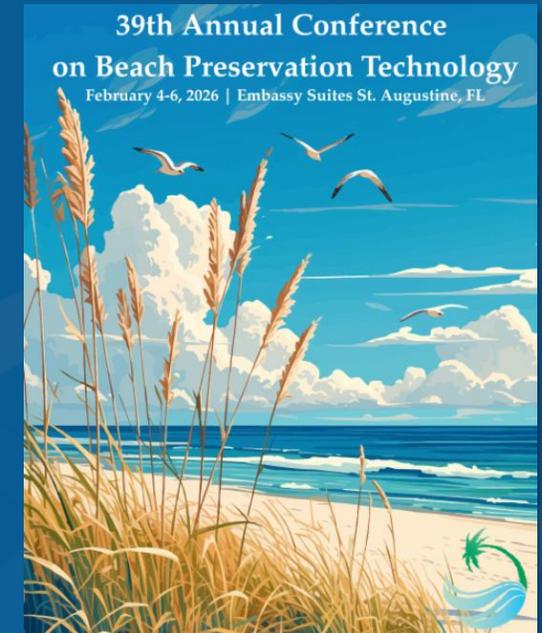


BEACH NOURISHMENT IMPACTS ON SURFING: MYTHS AND FACTS

Lindino Benedet, Ph.D, Principal Coastal Scientist
Coastal Protection Engineering

Co-Author:

Thomas Pierro, PE, BC.CE, Principal Engineer
Coastal Protection Engineering



FSBPA 39th Annual National Conference on Beach Preservation Technology
February 2026, St. Augustine, Florida

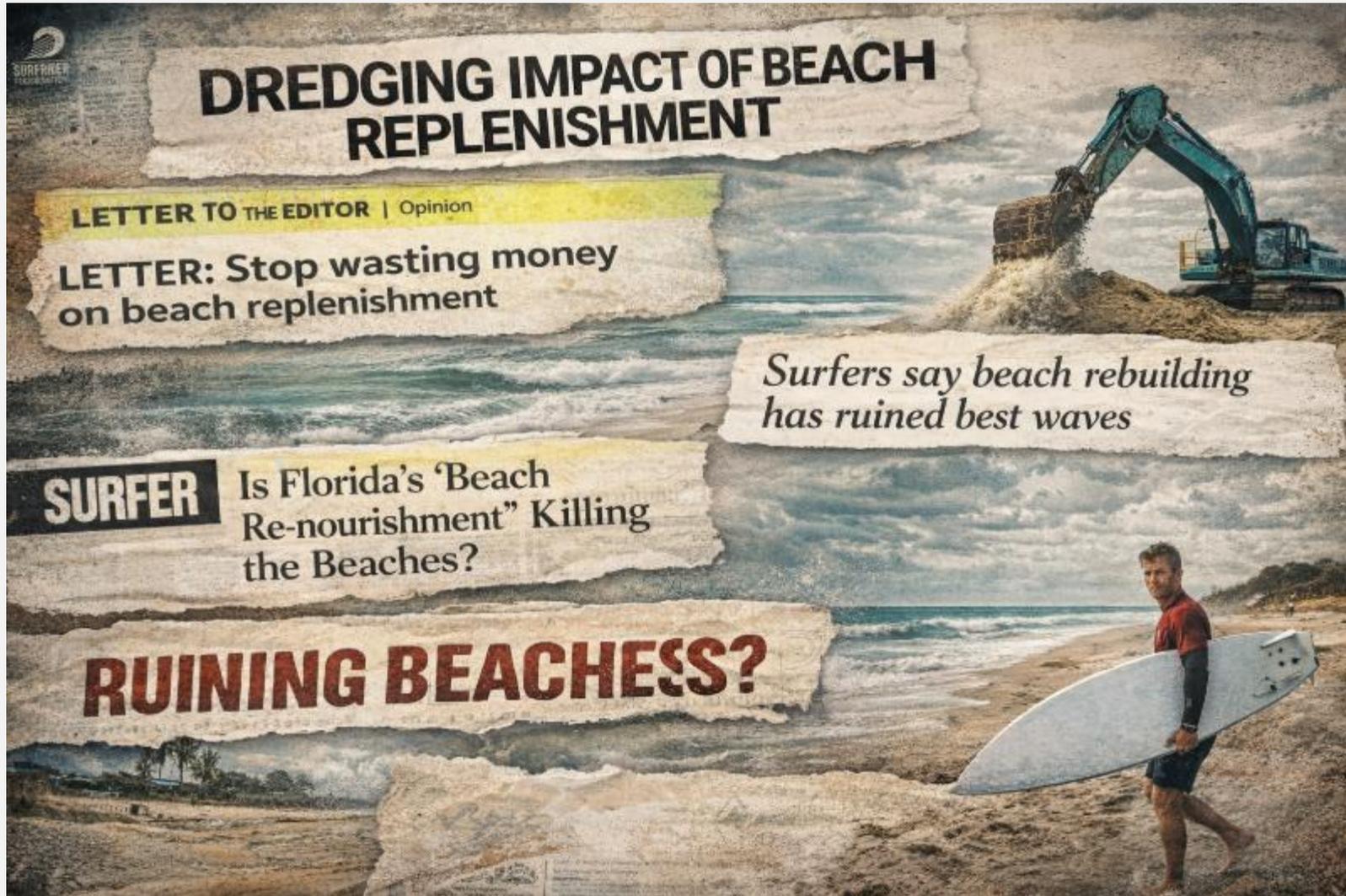
Myth: Beach nourishment is always bad for surfing.

Fact: Beach nourishment can affect surfing.

- It can **degrade** surfing wave quality.
- It can **improve** surfing wave quality.
- It can have no measurable effect

Outcomes depend on multiple factors, further explored in this presentation.

BEACH NOURISHMENT & SURFING



- Between 2010-2020 surfer's perception of beach nourishment was largely negative.
- There was an active campaign (and lawsuits) to halt beach nourishment projects.

BEACH NOURISHMENT & SURFING



But we've come a long way!

- In 2026 we're focused on building real support for beaches at the local, state and national level.
- Beaches protect communities, support local economies, and define coastal life. But erosion is outpacing the way we currently respond. One-off projects and emergency fixes are not a plan.



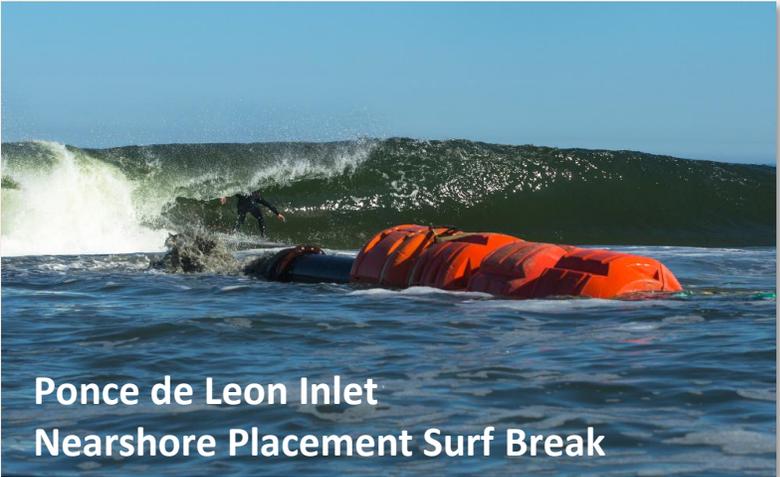
Atlantic Beach, NJ – end of the pipe break



- Our position is simple, investments in our beaches have to scale, especially at the national level.
- We intent to make 2026 the year it becomes normal to treat beaches like the assets they are

<https://www.bringbackourbeaches.com/>

Founder: Jeff Berg, Surflife Chairman



Ponce de Leon Inlet
Nearshore Placement Surf Break

BEACH NOURISHMENT & SURFING

“...epic surf at South Beach, Miami. Pre-nourishment, this wasn't even a wave.”

“Beaches are the overlooked engine of the American economy.”



surfline ✓ ...

Surfline

4,663 posts 2.5M followers 2,692 following

Product/service

The world's largest network of live surf cams and forecasts
Surfline app to know before you go. Link below... more

linktr.ee/surfline @surfline



surfline ✓ @marley_puglielli pulls in during a window of epic surf at South Beach, Miami. Pre-nourishment, this wasn't even a wave. Photo: David Hernandez

The case of Miami Beach is legendary. When the beach was nearly gone in the mid-70s, tourism sank.

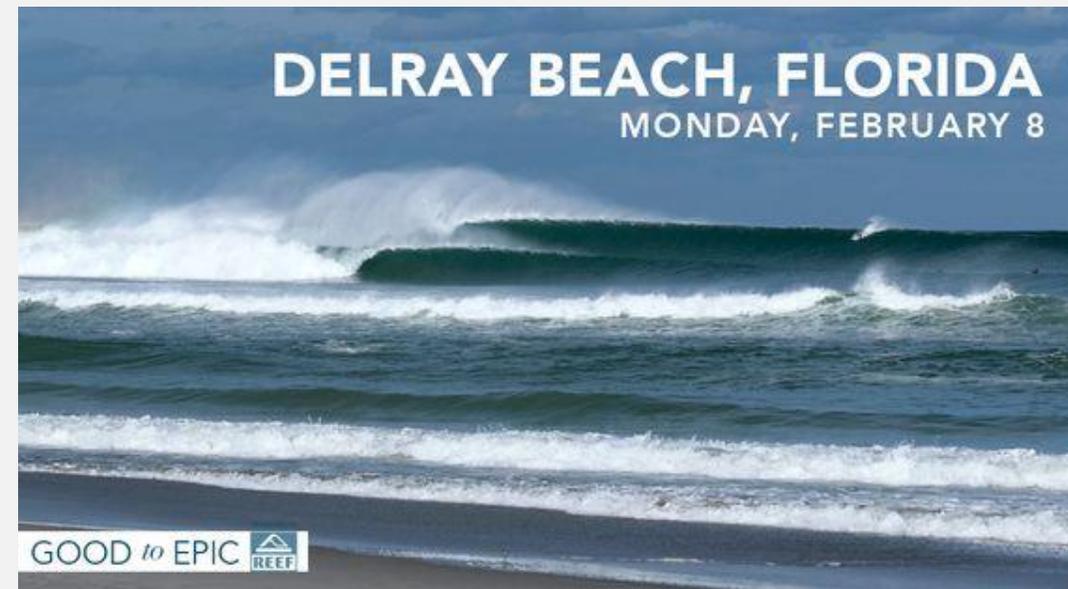
But thanks to coastal-engineering, dune restoration and one serious beach nourishment push between 1978-83, visitor spending jumped by \$290 million in just its first year.

The federal government saw a 4,000-to-1 return on investment. Miami remembered that lesson but Washington hasn't.

Beaches are the overlooked engine of the American economy. And it's time we bring them back.

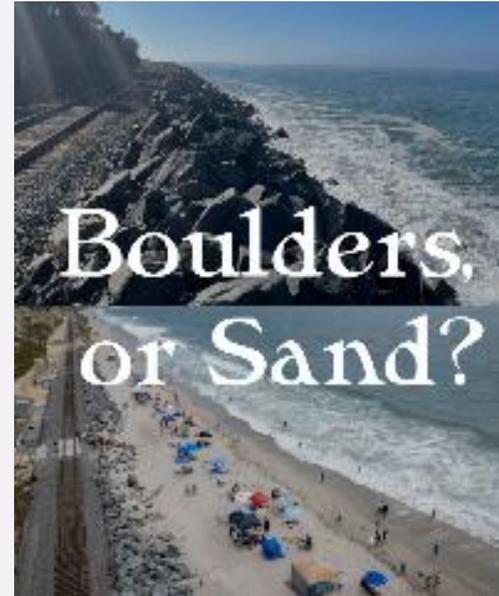
Which factors create quality surfing on a beach break?

- ✓ Waves need to vary in size along the beach - bathymetric anomalies, bar morphology, obstacles.
- ✓ Non-uniform bar morphology often produce the best surfing on beach breaks.
- ✓ Uniform wave heights alongshore and uniform bathymetry with shore-parallel contours = Closeout, poor surf.
- ✓ The best beach breaks are often linked to offshore or features that focus wave energy at a spot (canyon, shoal, dredge pit, headland, reef platform), or an obstacle in the surf zone (pier, groins, reef).

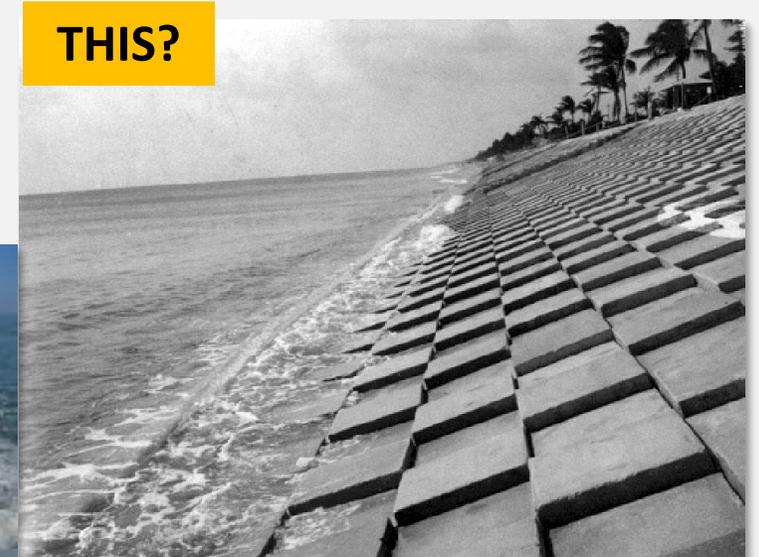


HOW CAN A NOURISHMENT AFFECT SURFING?

- ❑ **First: No Sand, No Beach = Poor Surf.**
- ❑ **Beach Nourishment May Affect Surfing by:**
 - Burying obstacles/features in the surf zone such as coastal structures or reef features.
 - Changing offshore bathymetry through dredging.
 - Changing beach grain size and beach type - bar morphology and beach slope.
 - Temporary Steepness Change due to construction (cross-shore adjustment).

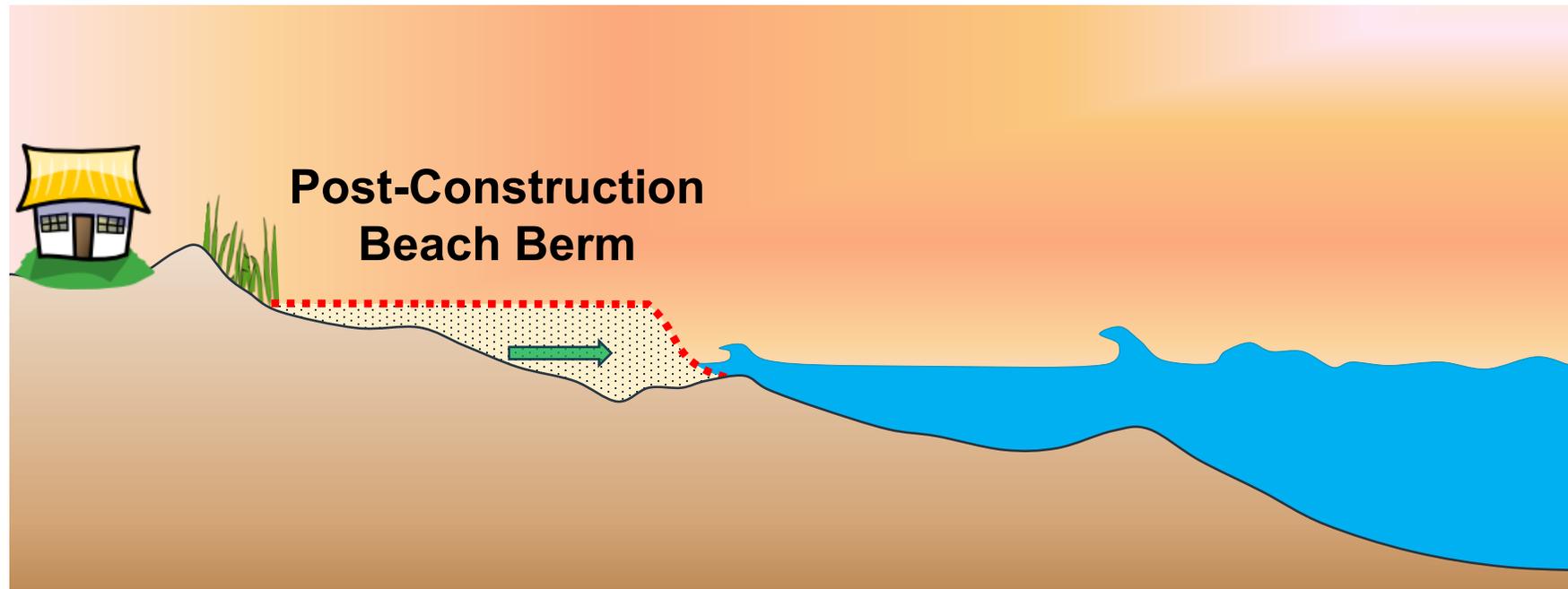


Bringbackourbeaches.org



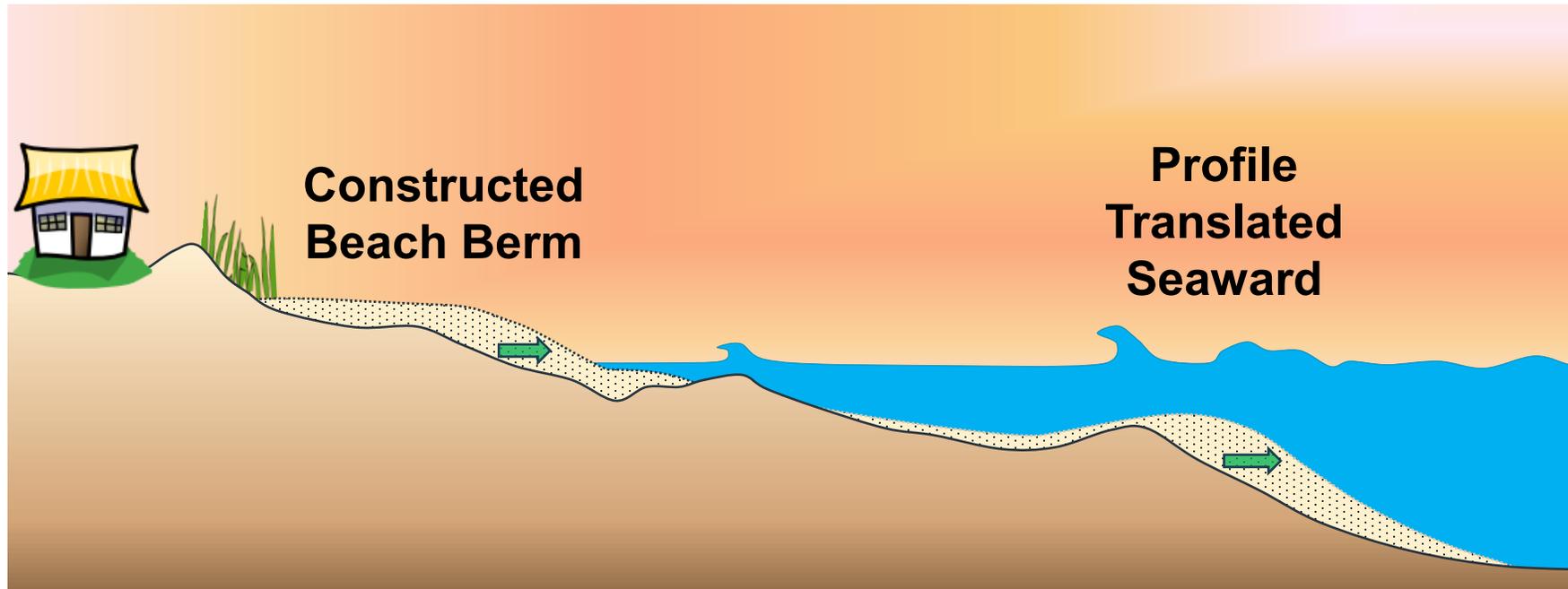
EFFECT #1 – SLOPE CHANGE DUE TO CONSTRUCTION

- Immediate Post-Project Conditions



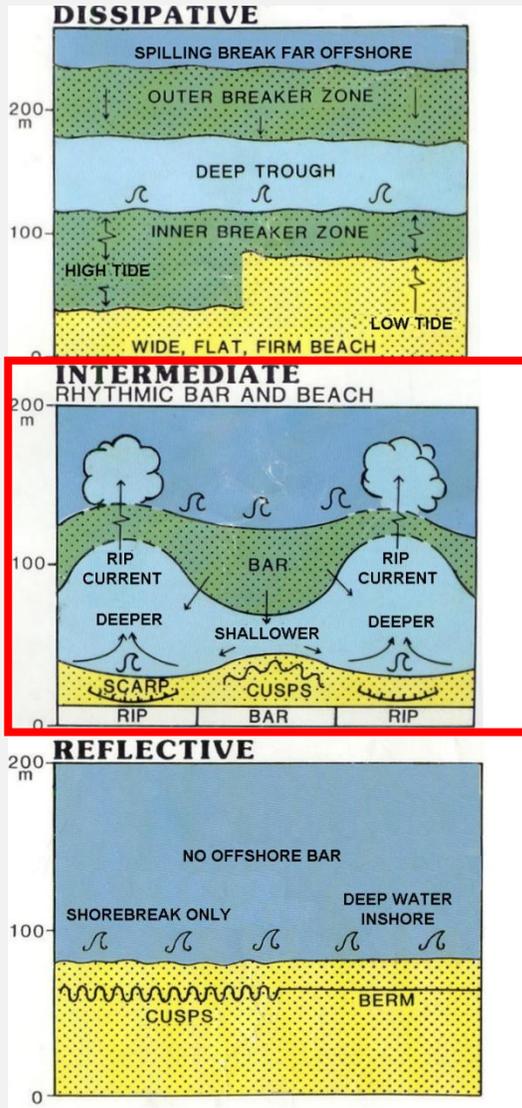
EFFECT #1 – SLOPE CHANGE DUE TO CONSTRUCTION

- After Profile Equilibration (few months)



- Morphology after equilibration largely $f(x)$ of grain size

EFFECT #2 – CHANGE IN BEACH GRAIN SIZE



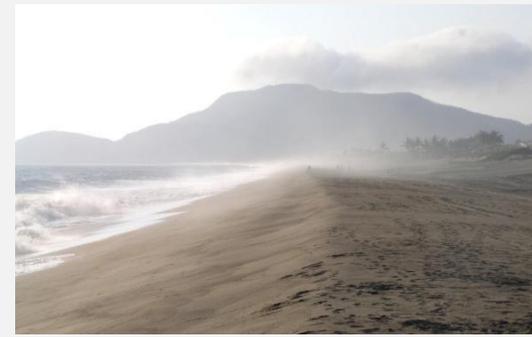
Daytona



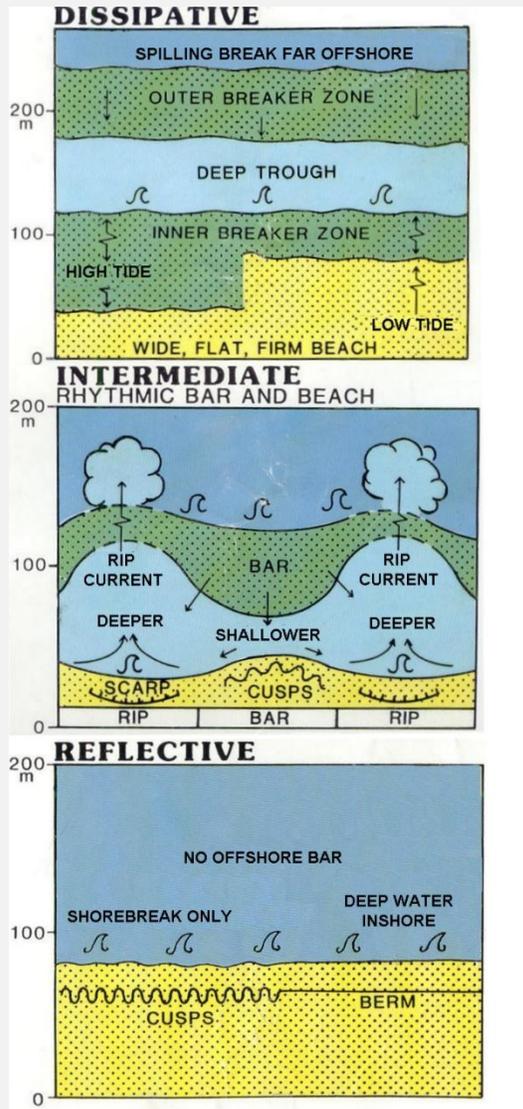
Sebastian
Delray
Miami
PCB



Not in FL



EFFECT #2 – CHANGE IN BEACH GRAIN SIZE



Dissipative
 $\Omega > 6$

Intermediate
 $1 < \Omega < 6$

Reflective
 $\Omega < 1$

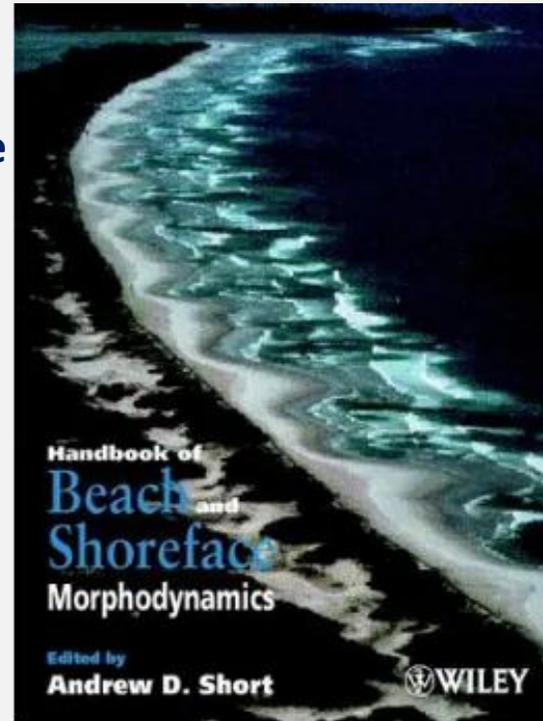
$$\Omega = H_b / T W_s$$

where:

H_b - breaking wave height

T - wave period

W_s - sediment fall velocity

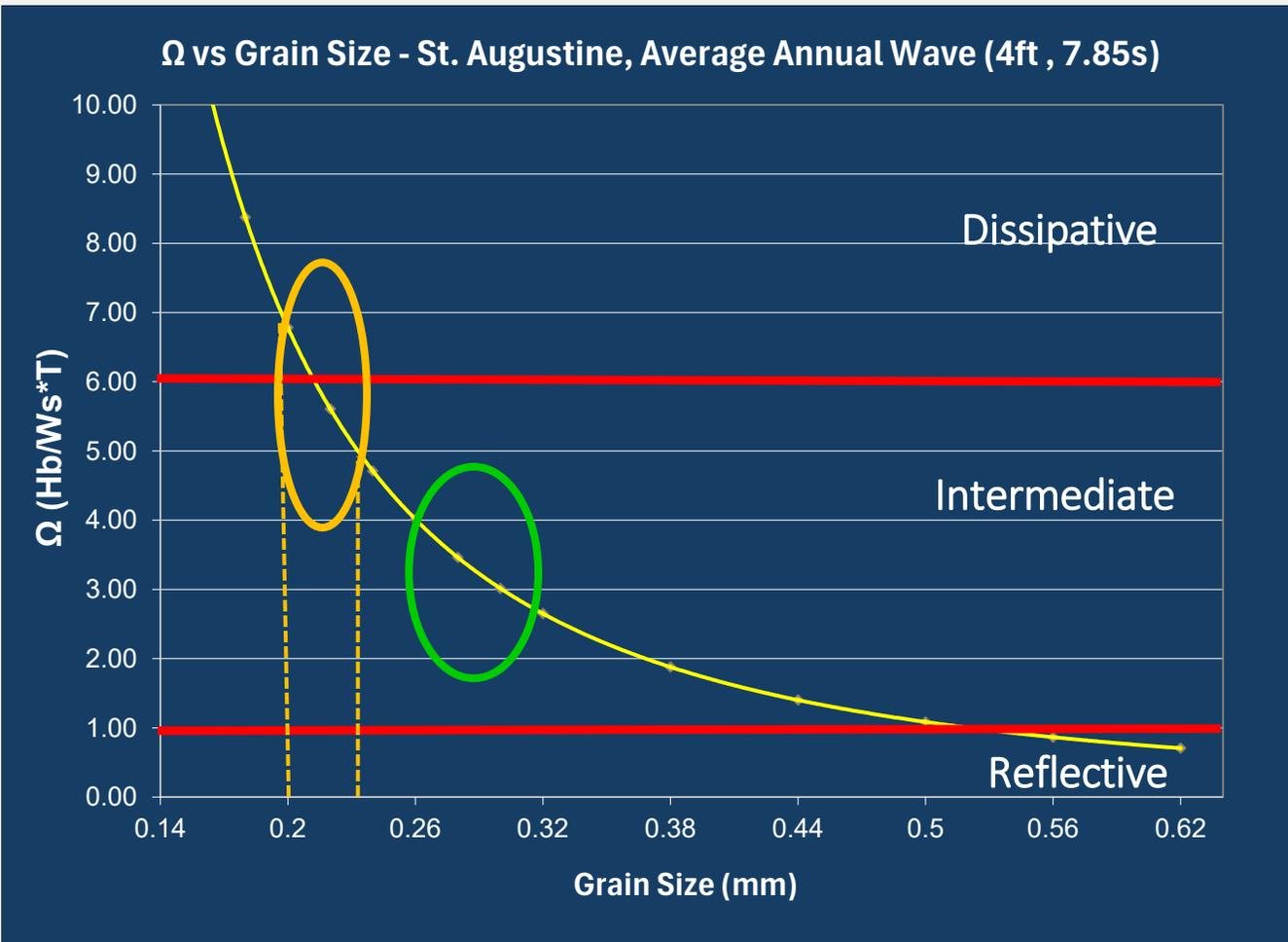


Dean Number, 'Dimensional Fall Velocity', used by (Wright and Short, 1984) to classify beach morphology

- A Beach nourishment project can affect W_s (grain size - sediment fall velocity)
- Nourishment with coarser sand: beach will get steeper, waves punchier, shorter.
- Nourishment with finer sand: beach will get flatter, waves mushier, possible longer rides.
- Nourishment with similar sand: No effect after equilibration.
- Nourishment Volume considerations

- Can you kill the surf? YES!
- Can you make it better? YES!

EFFECT #2 – CHANGE IN BEACH GRAIN SIZE – ST. AUGUSTINE HYPOTHETICAL EXAMPLE



- St. Augustine: intermediate to dissipative beach domain.
- Need large volumes of sand >0.55mm to turn it to reflective with plunging breaks.
- Finer than 0.18 mm turns it into dissipative flatter beach, wider surf-zone and mushier waves.
- Coarser sand will add some punch. Sweet spot for high performance surf is in the 0.25mm-0.3mm

Methodology from Benedet et. al., 2004.

GRAIN SIZE CHANGE GONE WRONG



Copacabana, built in early 1970s. Large volume of coarse sand (~5M cy, 400cy/ft). Turned beach into a reflective beach with plunging collapsing breaker closing out.

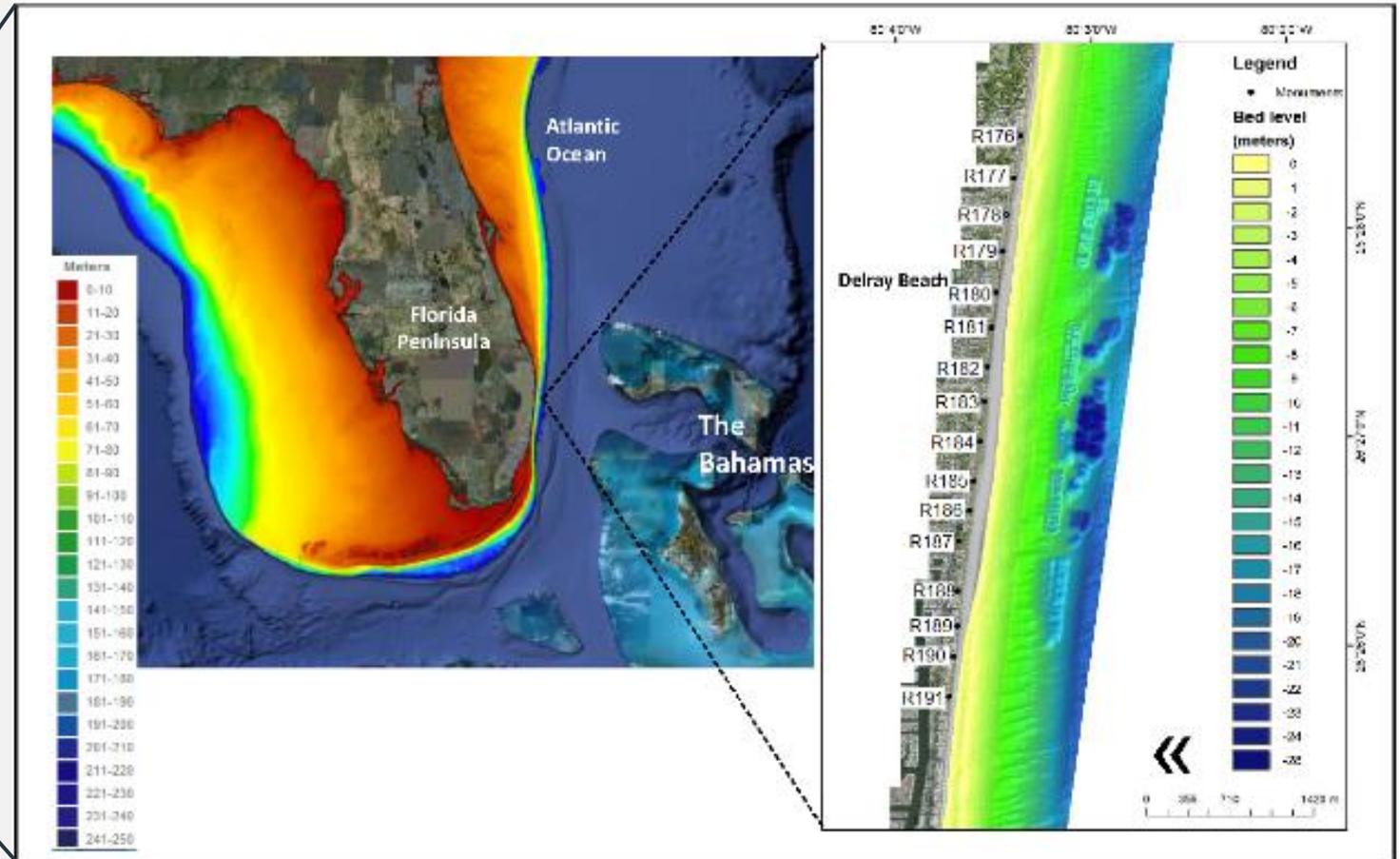
CHANGE IN GRAIN SIZE MODIFYING A BREAK

BALNEÁRIO CAMBORIÚ, BRAZIL



- Large volume on a pocket beach, coarser than native (0.3mm range vs 0.2mm native).
- Turned beach from almost dissipative to mid-intermediate states.
- Punchier waves, shorter.
- Longboarders hated it, high performance surfers liked it.
- Jetty on north end constructed with the nourishment created a new left point break (Mitigation?)

EFFECT #3 – CHANGES IN OFFSHORE BATHYMETRY THROUGH DREDGING



DELRAY BEACH, FL



- Beach gone in the '60s
- A series of nourishments and vegetation planting since then created the beautiful 'natural' beach we see today.
- About 100,000 cy/yr since the 1970s.
- Nourishment maintenance events every 5-10 years.
- Similar grain size, but slightly finer

SURFING IN DELRAY WITH A NE SWELL



H. Irma



H. Dorian



Cold front

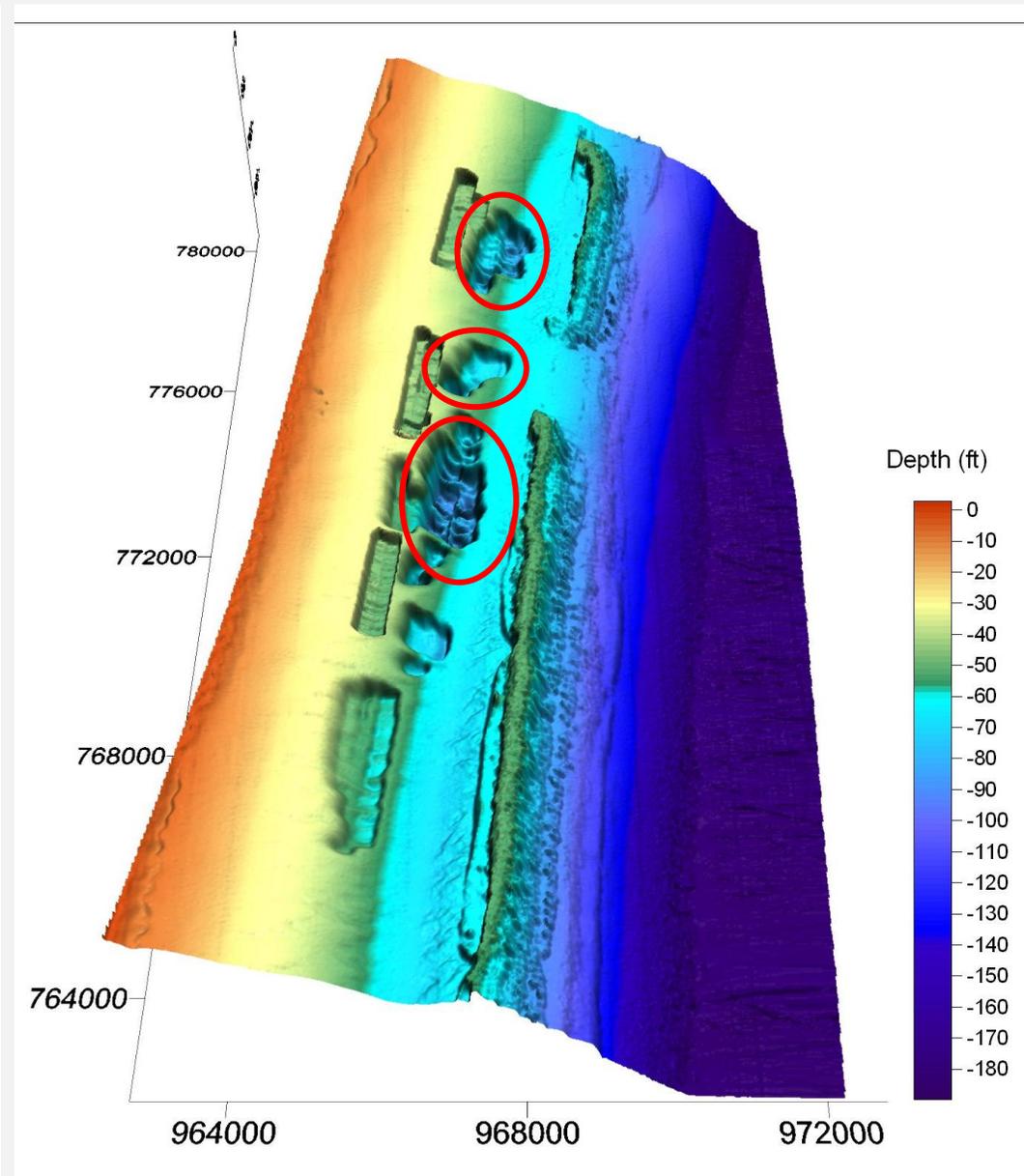
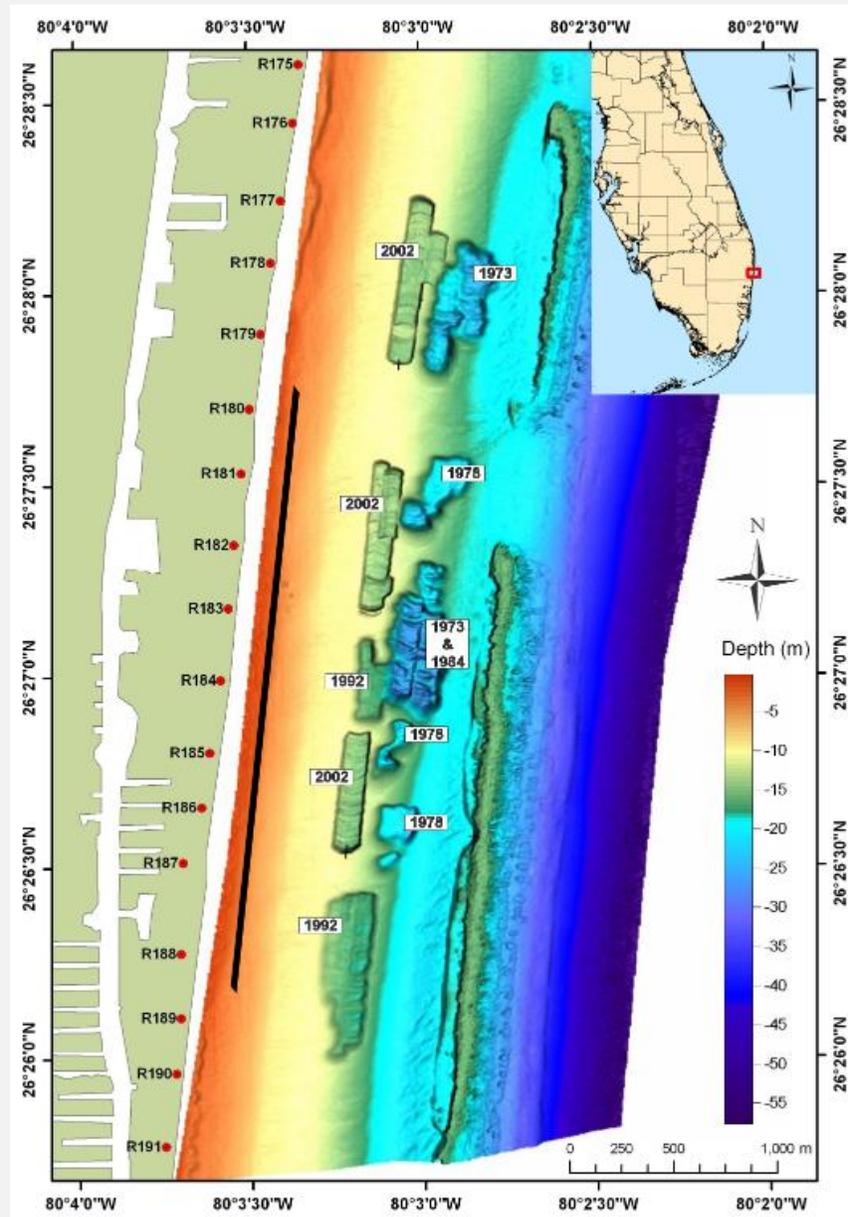


DELRAY BEACH, FLORIDA
MONDAY, FEBRUARY 8

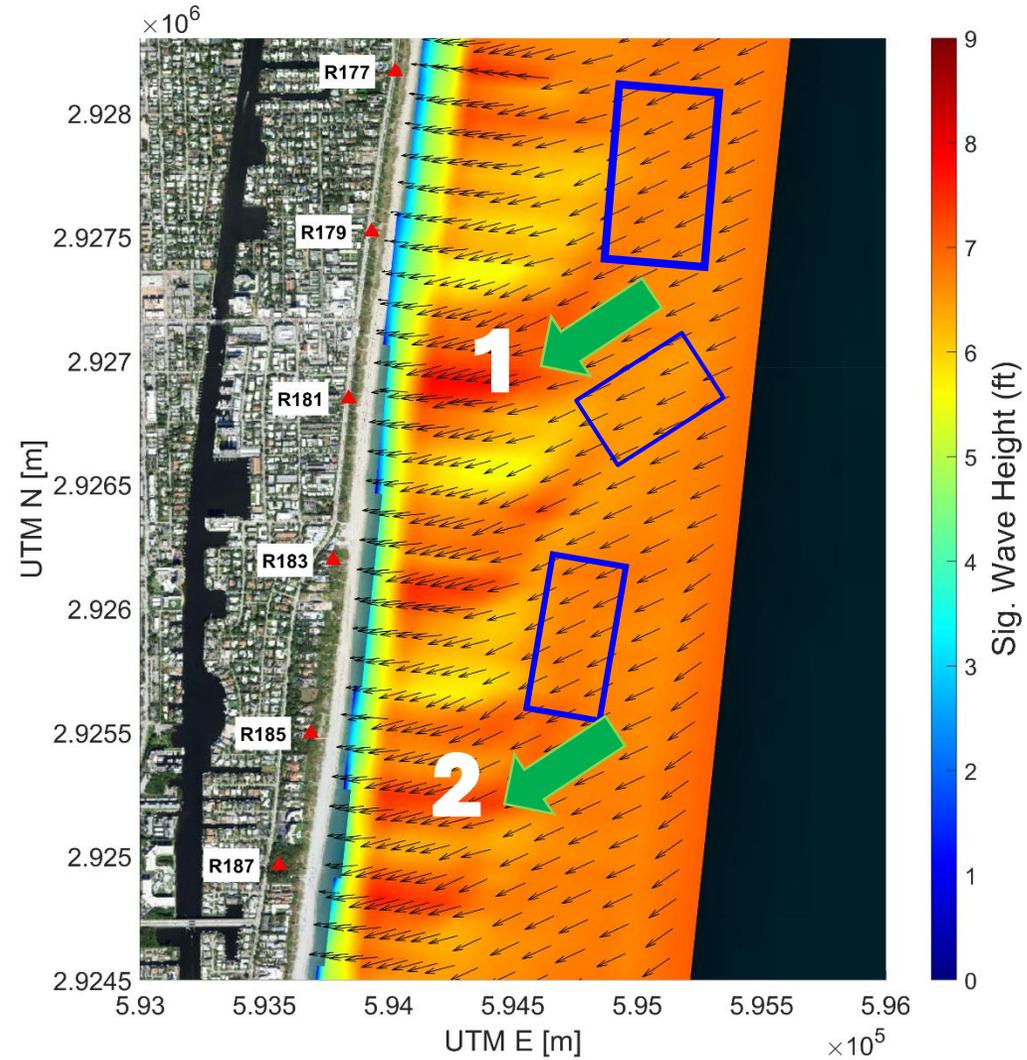


Offshore Morphology

- Borrow areas dredged for the nourishment lie directly offshore
- Older dredge cuts were very deep (30ft - 50ft cut depths)
- Deep cuts affect wave progradation and cause large wave height gradients along the beach



HURRICANE DORIAN SIMULATION



- Borrow areas create variability in wave heights alongshore.
- Bar morphology responds to it.
- Similar effect to an offshore canyon, at smaller scale.
- Created a classic 'point break' in an area dominated by underwhelming beach breaks.



Jacksonville Beach Pier



Flagler Beach Pier



New Smyrna Inlet



Delray Beach



Cocoa Beach Pier



Sebastian Inlet



Ft. Pierce Inlet



Satellite Beach



Juno Pier



Lake Worth Pier



South Beach Miami



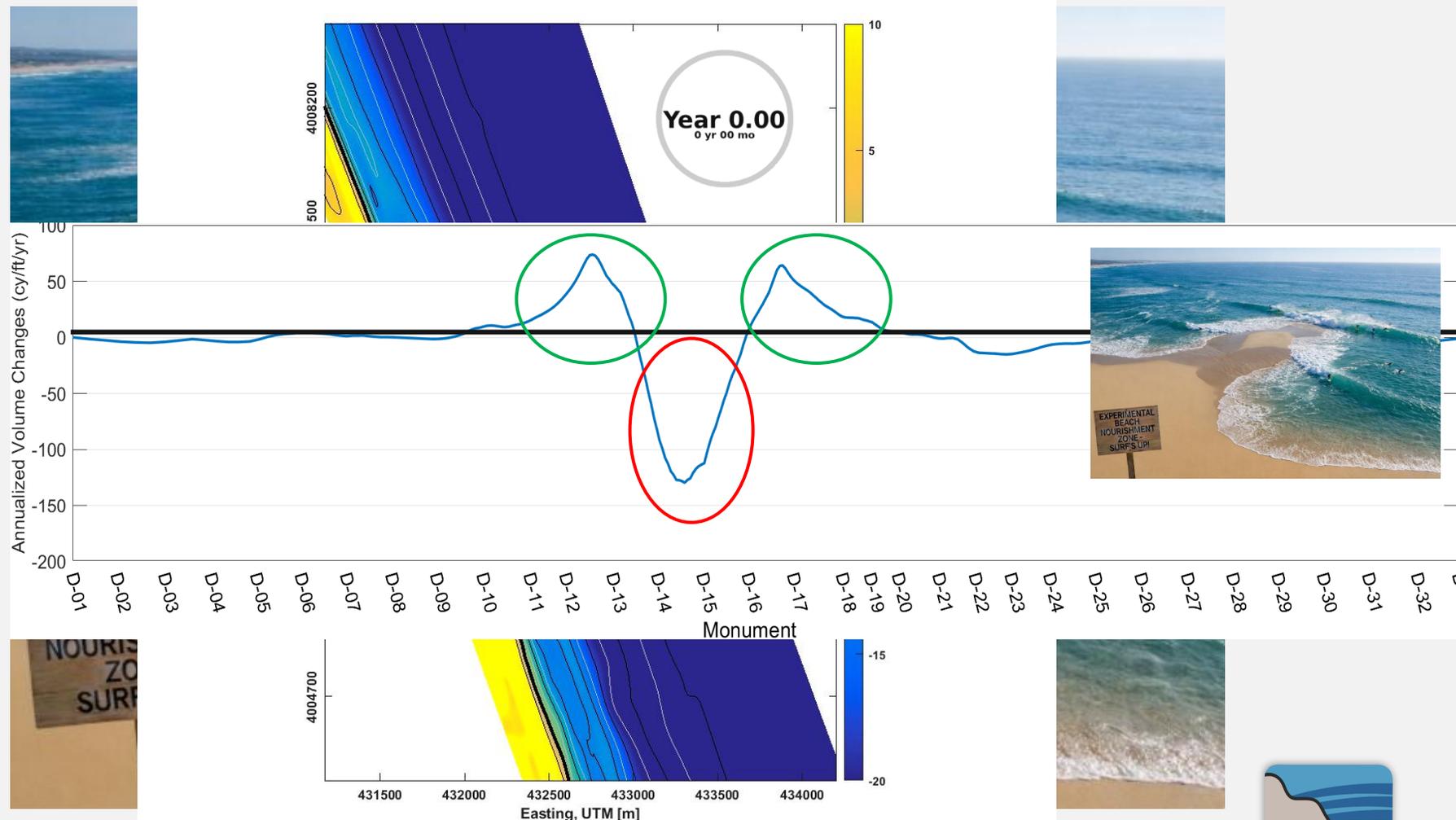
TOPB Reef Road

Pretty Much Every Well-Known Surf Spot in Florida is a Nourished Beach!

BEACH NOURISHMENT DESIGN TO IMPROVE SURFING

CONCEPTUAL IDEA

- Large cross shore fill to serve as a ‘feeder beach’.
- It can potentially create ephemeral point break like waves on both sides of the hump (site specific).
- Hypothetical Example:
Placing 680k cy over about 1,000 ft, very high fill density (600-1200 cy/ft).



FINAL CONSIDERATIONS

- A beach is better than no beach at all.
- **Fact:** Beach Nourishment can affect surfing quality. **It can worsen it, improve it, or have no effect.**
- The impact of a beach nourishment on surfing is **primarily grain-size dependent.**
- **Coarser sand** favor steeper, hollower waves. **Finer sand** favors flatter, mushier waves (longboard friendly).
Sand similar to native sand = no change.
- **Nourishments can be designed to enhance surfing** through cross-shore fill features (feeder beach concepts) or targeted dredging that creates alongshore wave-height gradients.
Performance trade-offs must be considered.
- When coastal structures are required, surfing amenity should be considered in the design process.

THANK YOU!

DELRAY BEACH, FLORIDA
MONDAY, FEBRUARY 20, 2012



Lindino Benedet, Ph.D
Principal Coastal Scientist
Coastal Protection Engineering
Mobile: 561-609-9144
lbenedet@coastalprotectioneng.com

BEACH NOURISHMENT & SURFING



bringbackourbeaches ...
Bring Back Our Beaches
206 posts 5,706 followers 218 following

San Clemente is in crisis: the sand is disappearing
Become a member and help restore our beaches
linktr.ee/bringbackourbeaches

Followed by wsl, surfline,

