



Mitigating Military Munitions Risks on Coastal Resiliency Projects

Ryan Steigerwalt, PG
Weston Solutions, Inc.

June 26, 2024

Trust
Performance
People



Trust. Performance. People.

It's the Weston Solutions way. The guiding principle behind every choice and every challenge since 1957.



About Weston

- Weston Solutions, Inc. is a mid-size, **100% employee-owned national environmental and infrastructure support services firm** serving government, industrial, and commercial clients.
- For **65 years**, we have solved our clients' most complex challenges with a passion to make a difference for a better tomorrow.
- Our team is committed to providing ultimate safety and value for our clients and driven to be the most effective, efficient service provider in our target markets.

Our Legacy

- Long before “sustainable development” became a buzzword, Roy F. Weston had a vision for a new environmental engineering firm that would support sustainable outcomes. He founded Roy F. Weston, Inc. in 1957, which quickly became recognized as a pioneer environmental engineering firm—a legacy we're proud to continue today as one of the top 50 environmental firms in the country (Engineering News Record, 2021).
- With roots as a family-run organization, our caring spirit has evolved into an incredible team culture of employee-owners who continue to uphold our traditions and embody our unique culture every day.

Purpose

- Importance of beach preservation
- Scope, requirements of beach nourishment
- Historical issues with munitions releases
- Preventative measures

Coastal Resilience

Beaches – Environmental Importance

- Crucial role in the ecosystem
- Coastal protection
- Recreation



Coastal Resilience

Beaches – Economic Importance

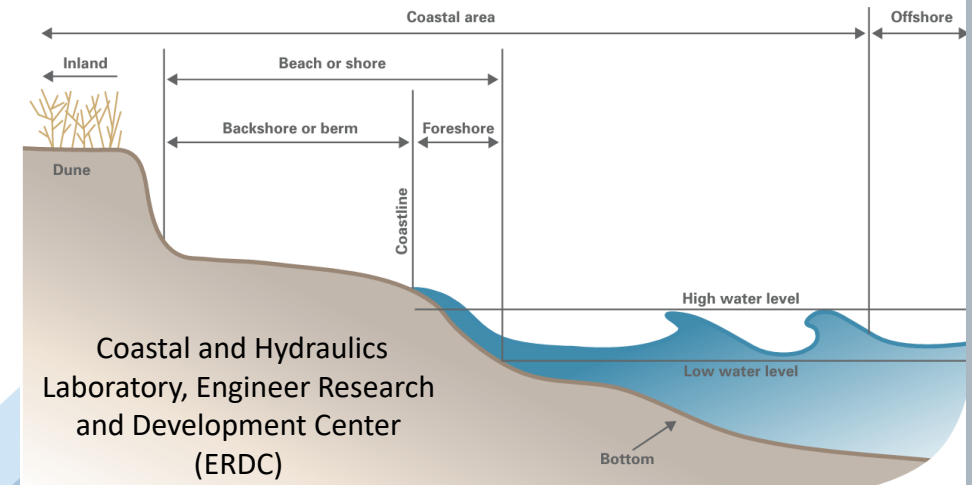
- Tourism
- Employment
- Property contributions
- Commercial fishing vitality



Coastal Resilience

Functional Beach System

- Absorbs wave energy
- Mitigates erosion
- Encourages vegetation growth to help stabilize tidal flats
- Expands habitat for plants and wildlife, including rare, threatened, and endangered species
- Protects upland areas from flooding and destructive waves
- Increases land value of nearby properties
- Grows economy through tourism and recreation

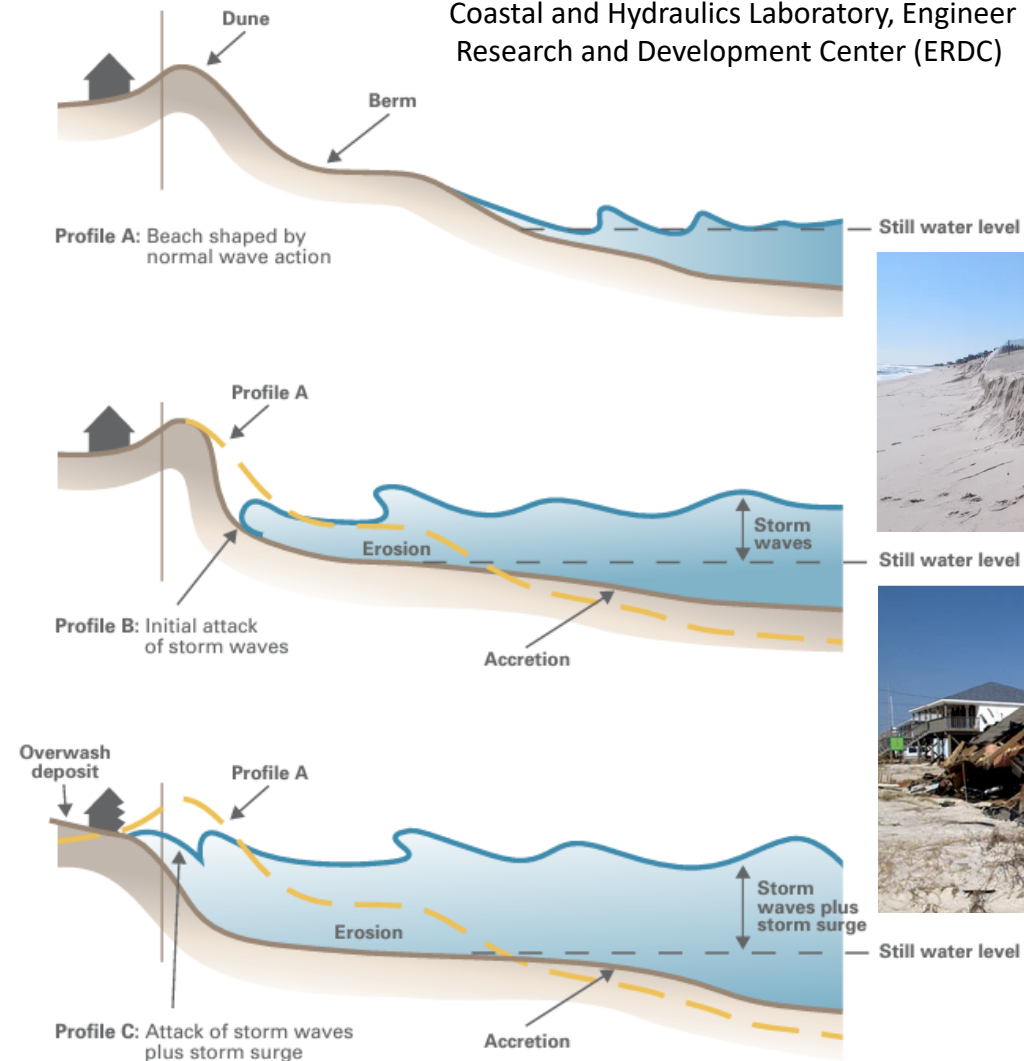


Coastal Resilience

Coastal Erosion

- Dynamic environments gradually remove sand from the shoreline
- Intensified by factors such as sea level rise, storm surges, and human activities like coastal development
- Threatens coastal infrastructure
- Increased risk of property damage and loss
- Degradation of habitats such as dunes, wetlands, and estuaries
- Diminishes recreational opportunities

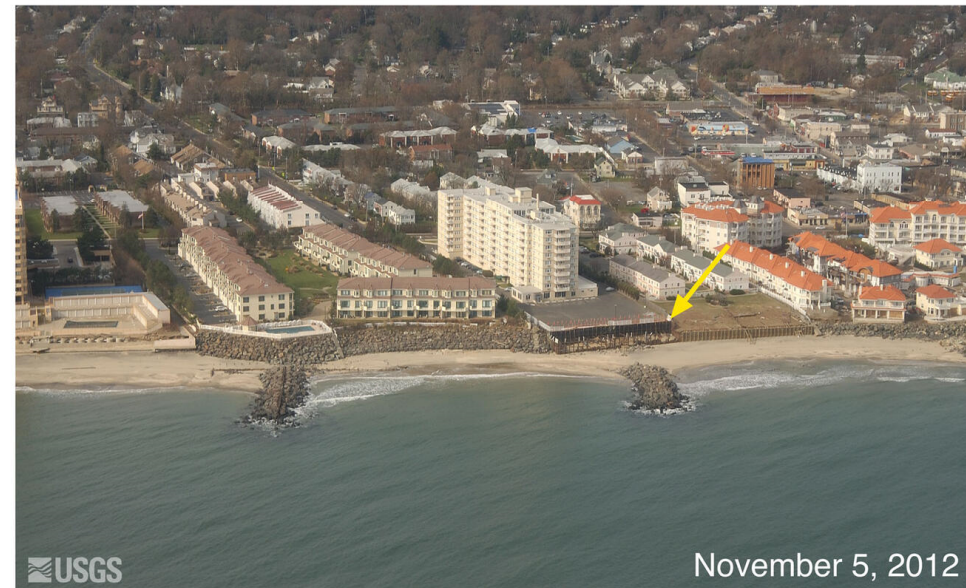
Coastal and Hydraulics Laboratory, Engineer Research and Development Center (ERDC)



Coastal Resilience

Coastal Erosion

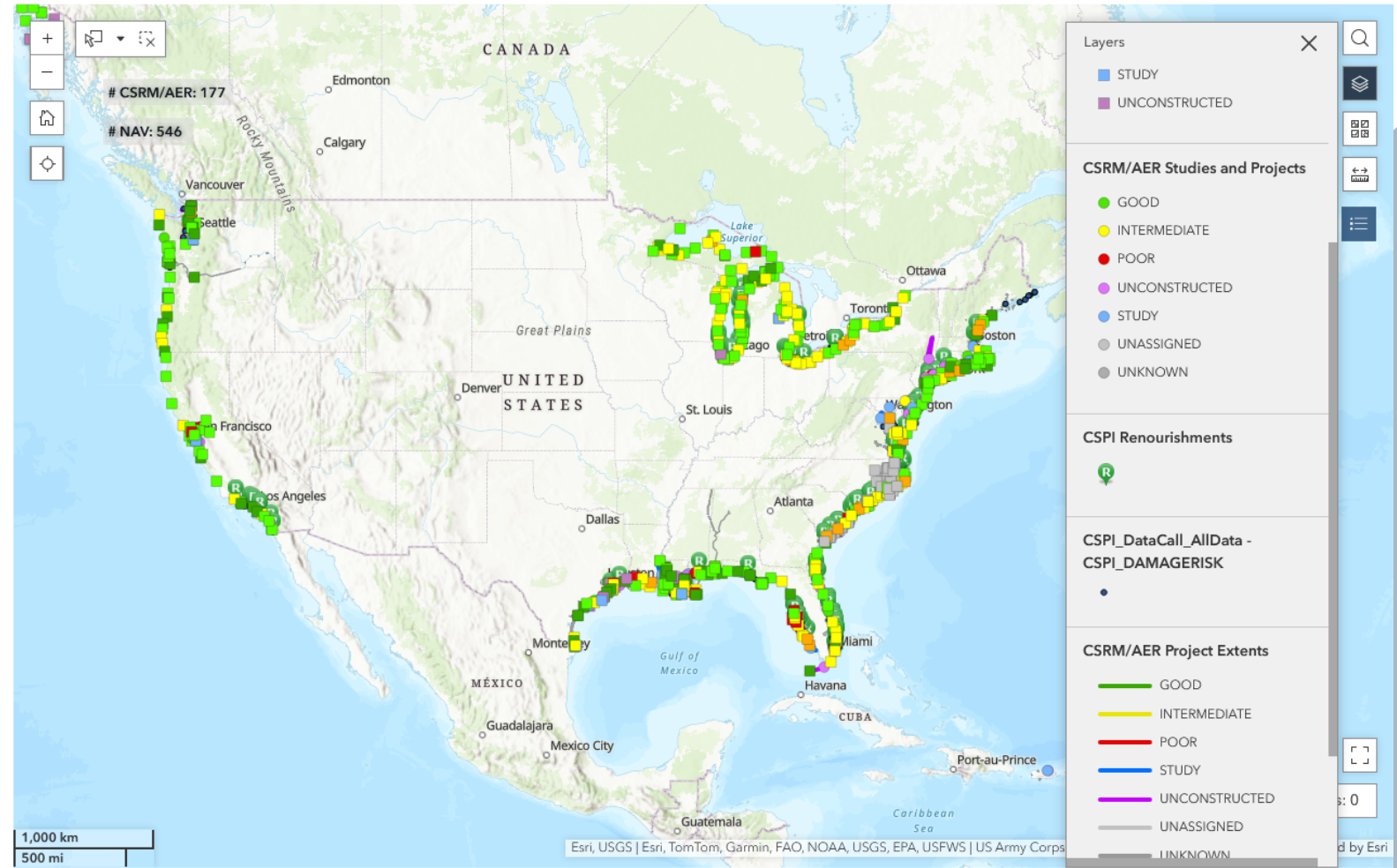
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Building Resilience

Coastal Systems Portfolio Initiative (CSPI)/ Coastal Storm Risk Management (CSRM)

- Continual need to address the impacts of shoreline erosion on existing public infrastructure in coastal communities
- Authorized in the 1936 Flood Control Act and modified in subsequent Flood Control, Rivers and Harbors, and Water Resource Development Acts over the years
- Reduce coastal erosion damages resulting from hurricanes and coastal storms

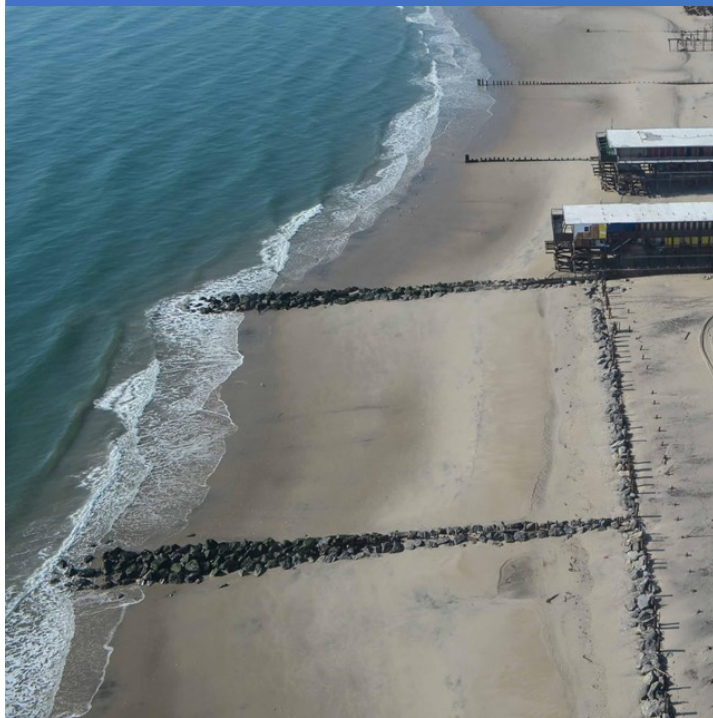


CSPI Database contains hundreds of Coastal Storm Risk Management (CSRM), Navigation (NAV) and Aquatic Ecosystem Restoration (AER) Studies and Projects

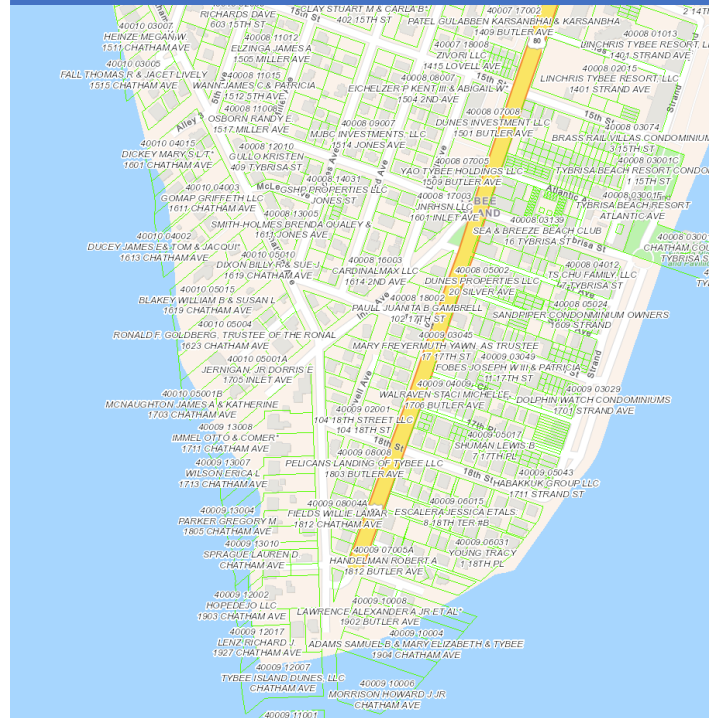
Building Resilience

Shoreline Protection

Hard Coastal Structures



Non-Structural Solutions



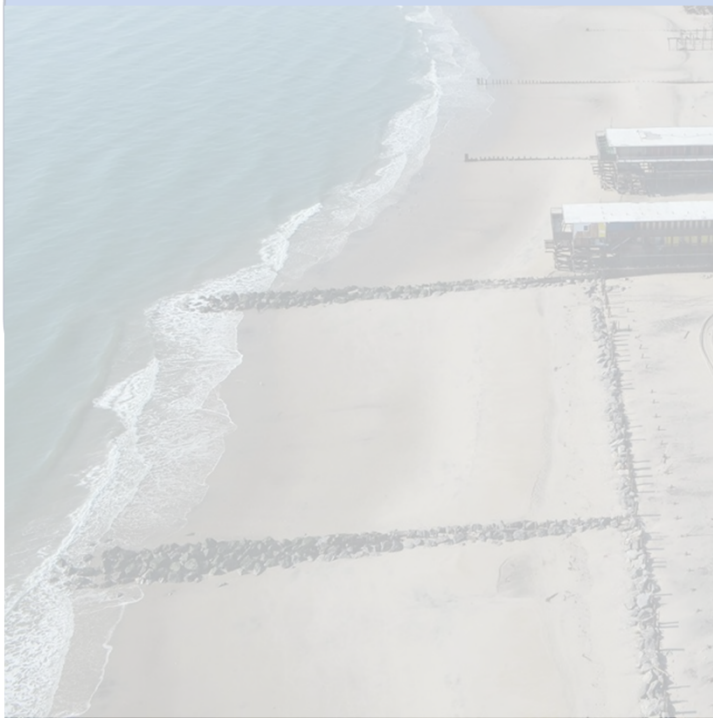
Soft Measures



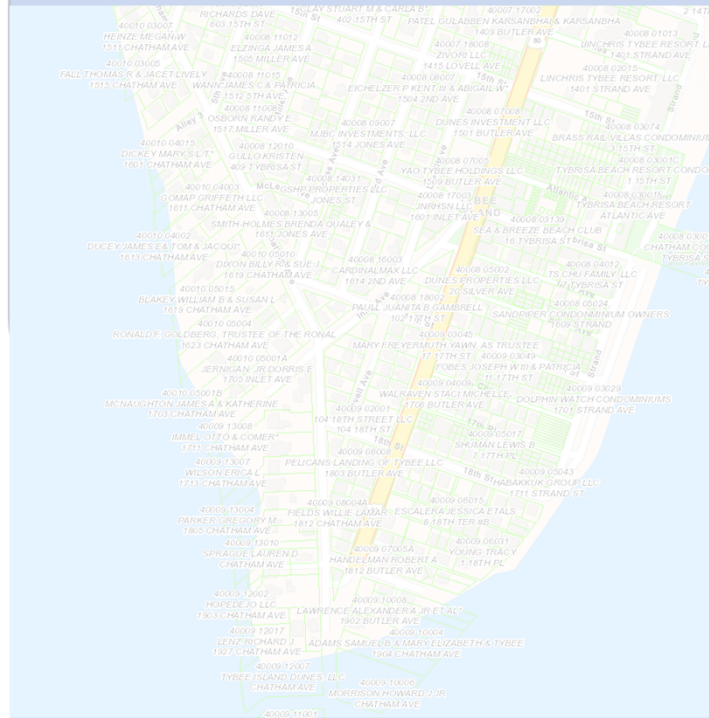
Building Resilience

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Hard Coastal Structures



Non-Structural Solutions



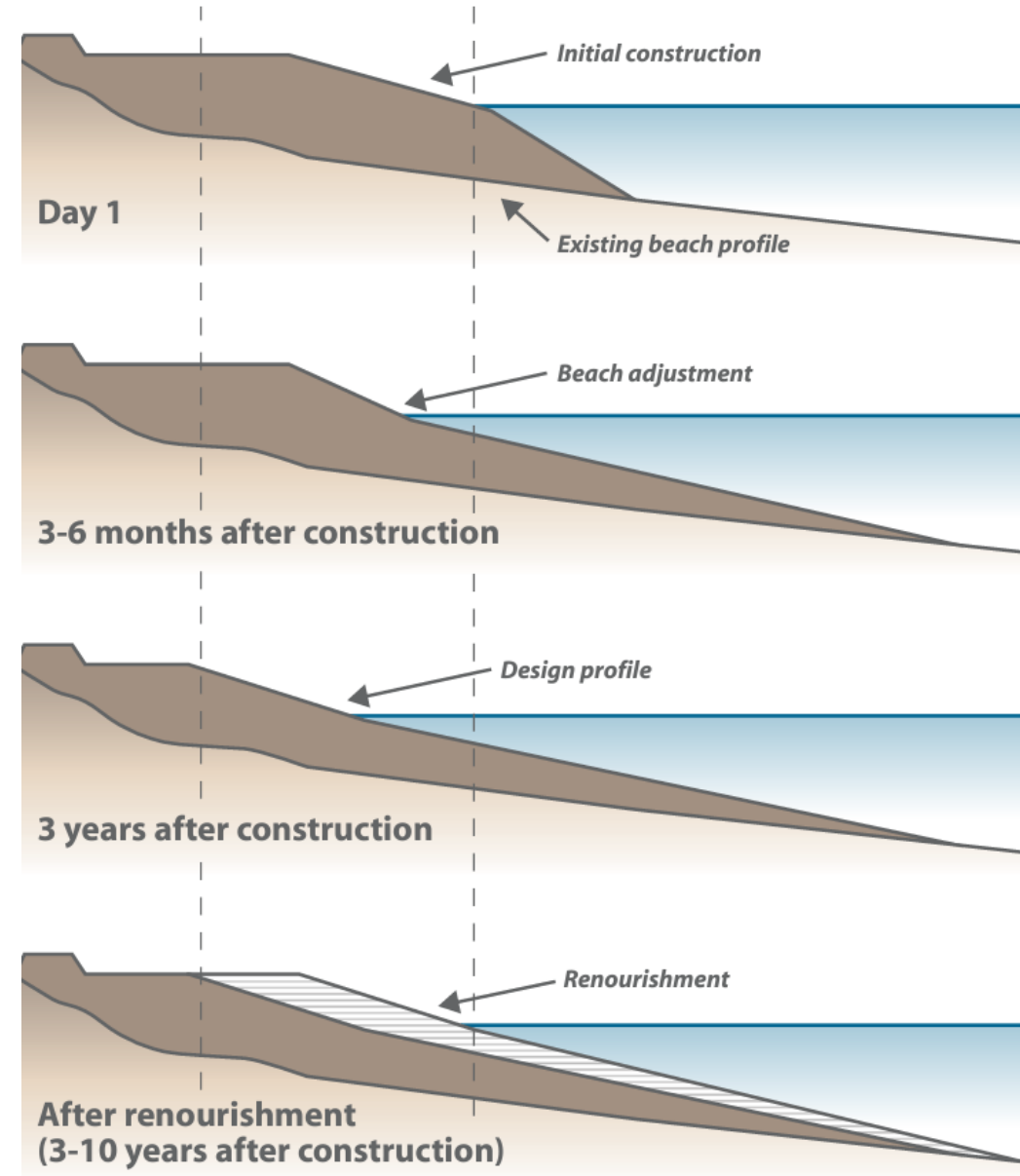
Soft Measures



Building Resilience

Beach Nourishment

- Beach renourishment, beach replenishment, beach fill or sand replenishment
- Adds sand to beachfront areas and/or dunes with material dredged from another location
- Restores eroding beach or creates a new one
- Engineered to work like natural beaches
- Allows sand to shift in response to natural variations in waves and water levels
- Renourishment needed periodically



Coastal and Hydraulics Laboratory,
Engineer Research and Development Center (ERDC)

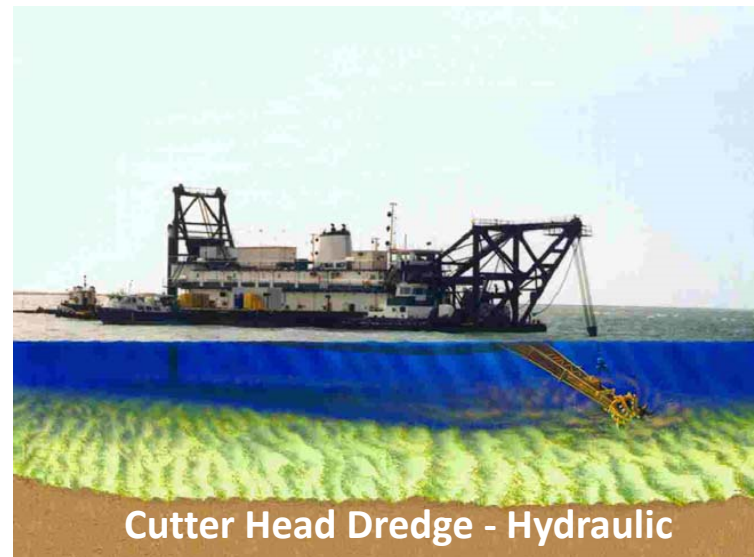
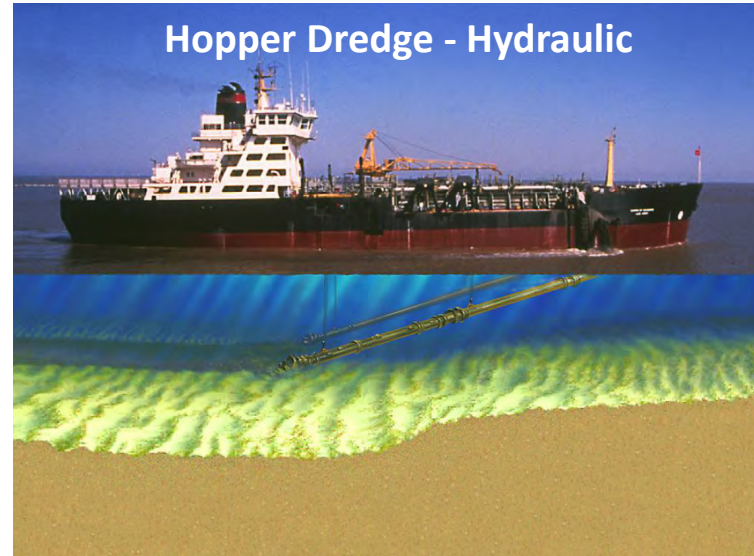
Dredge Types

Mechanical

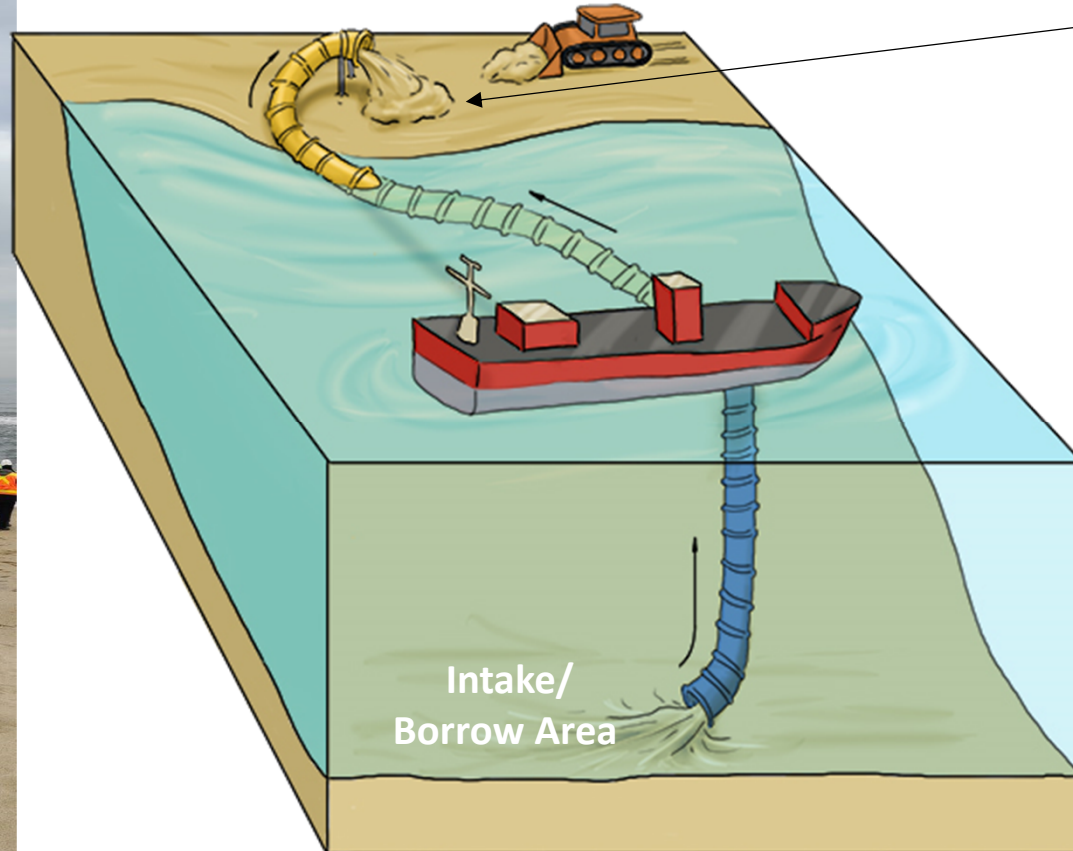
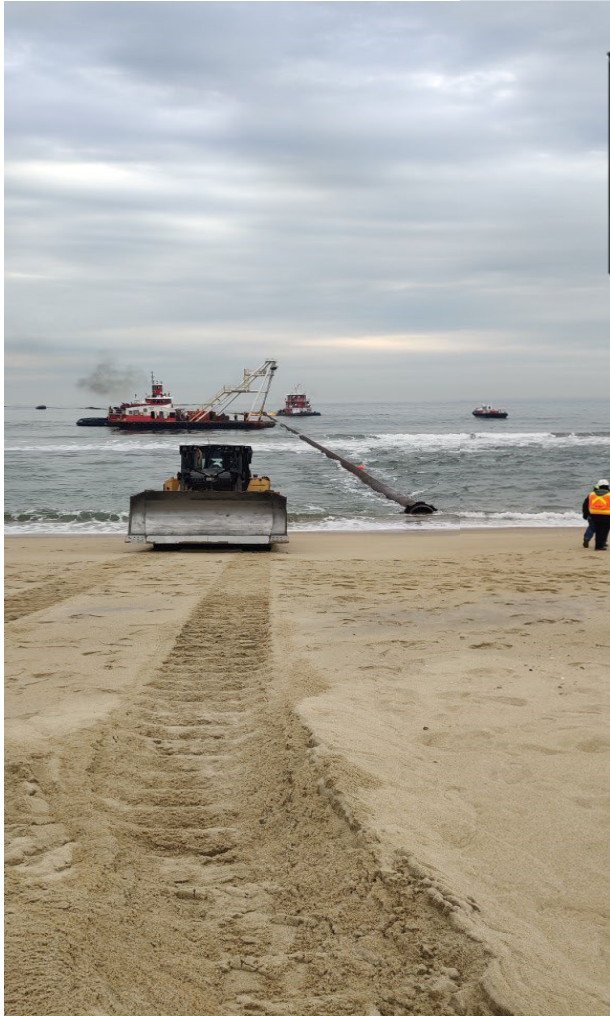
- Use heavy equipment to dig up the bottom of a water source and move it
- Can be used in larger and deeper water bodies
- Better suited for heavier sediment (rocks and clay)

Hydraulic

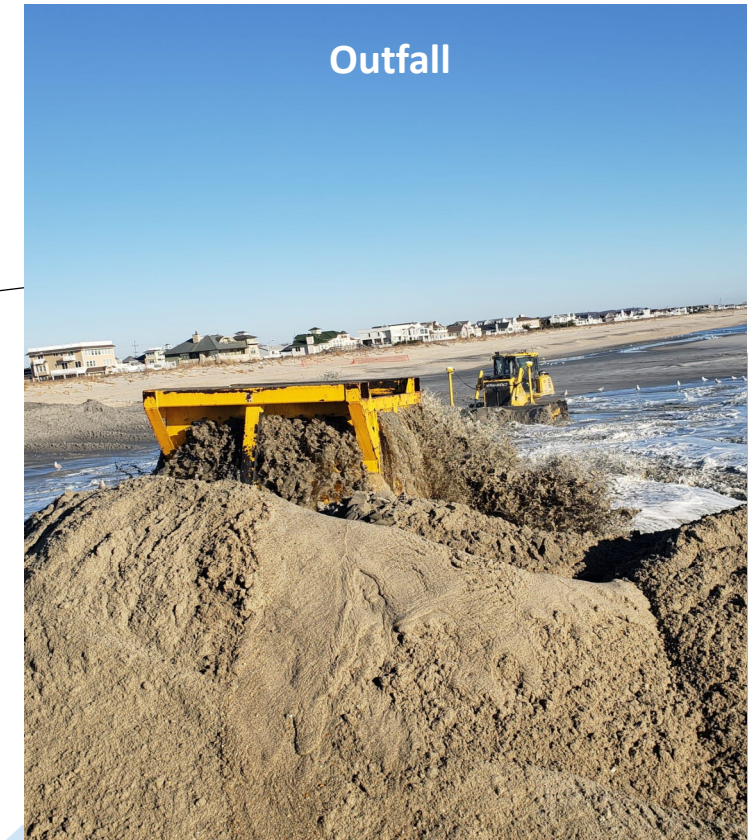
- Act as a giant underwater vacuum cleaner to clean and remove sediments
- Cleaner than mechanical dredgers and safer for the environment
- More consistent dredging outcome
- Excellent for moving loose soils, sands, silt, gravel, and rocks



Dredging Approach



<https://mammothmemory.net/>



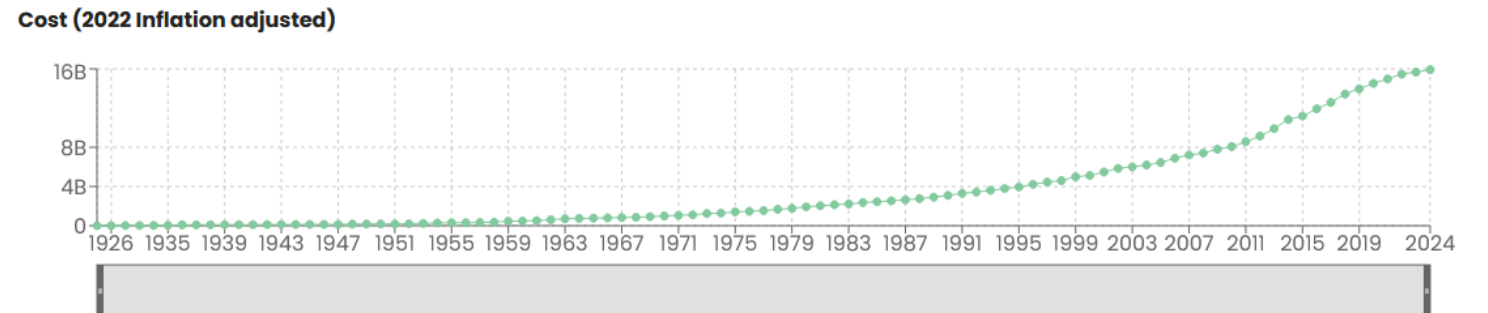
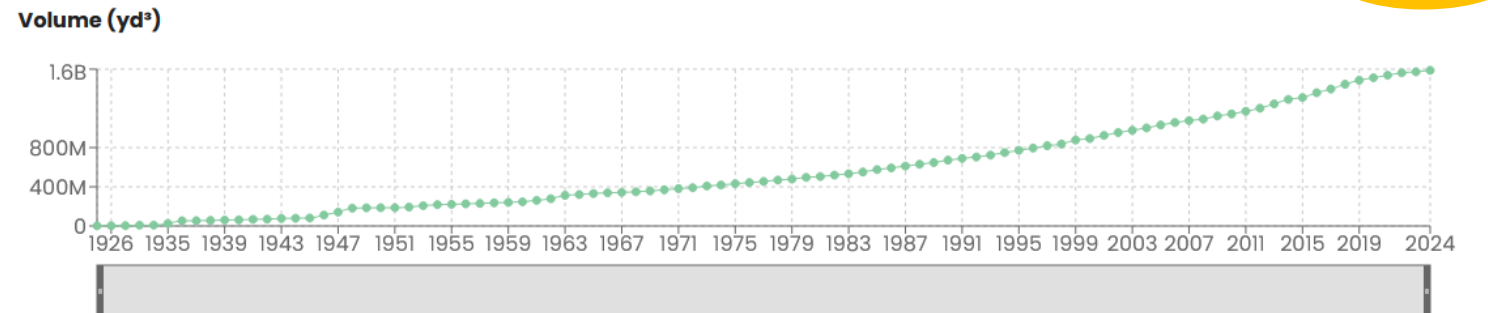
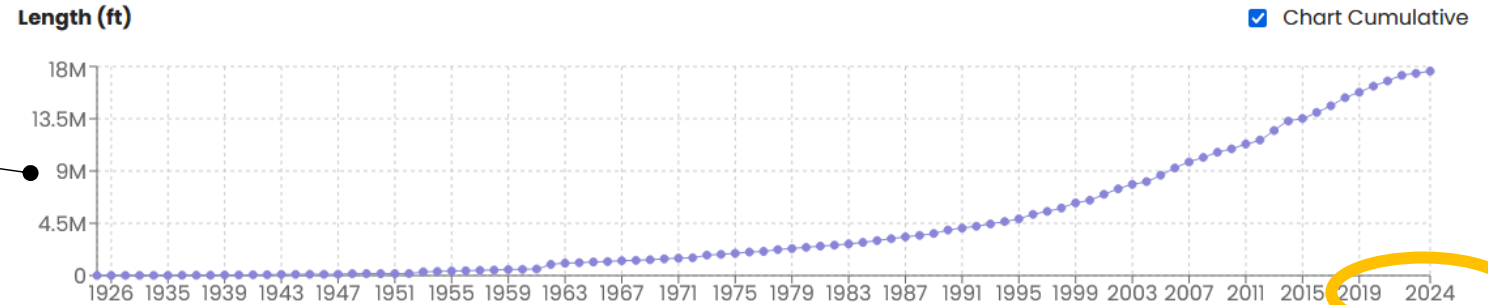
Outfall

Beach Nourishment

Beach Nourishment Statistics (2,509 Episodes) Western Carolina University

1926 to Present Day

→ 17,601,176 ft



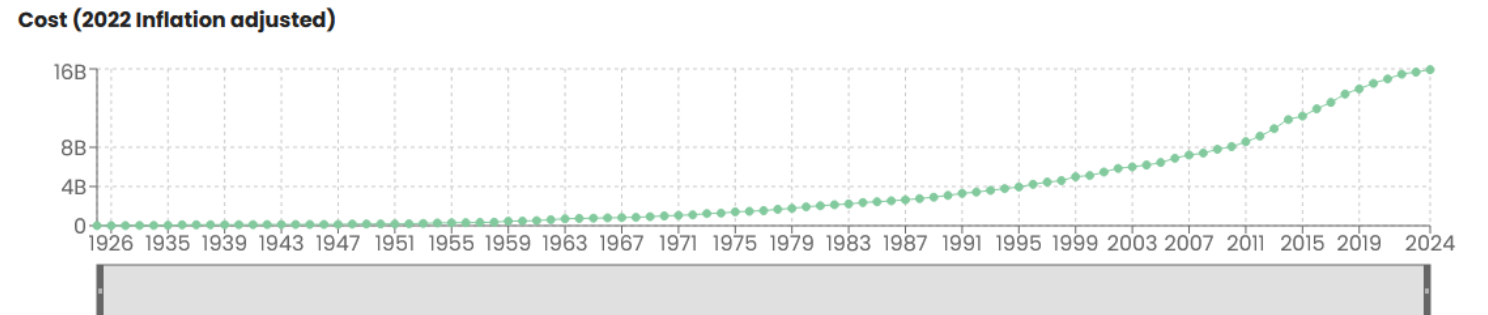
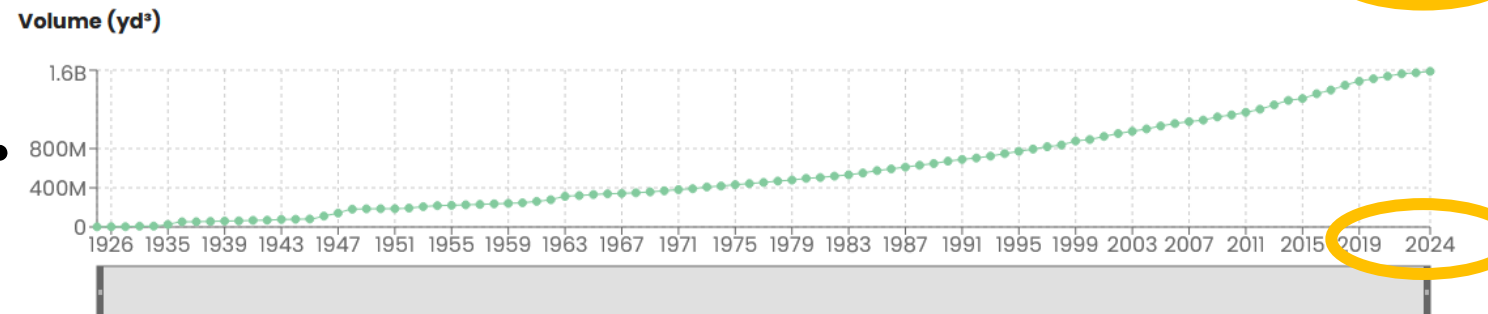
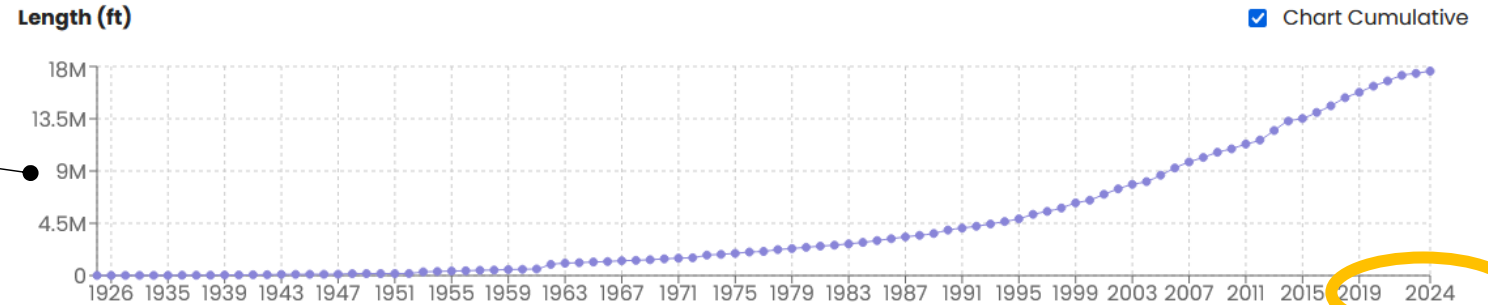
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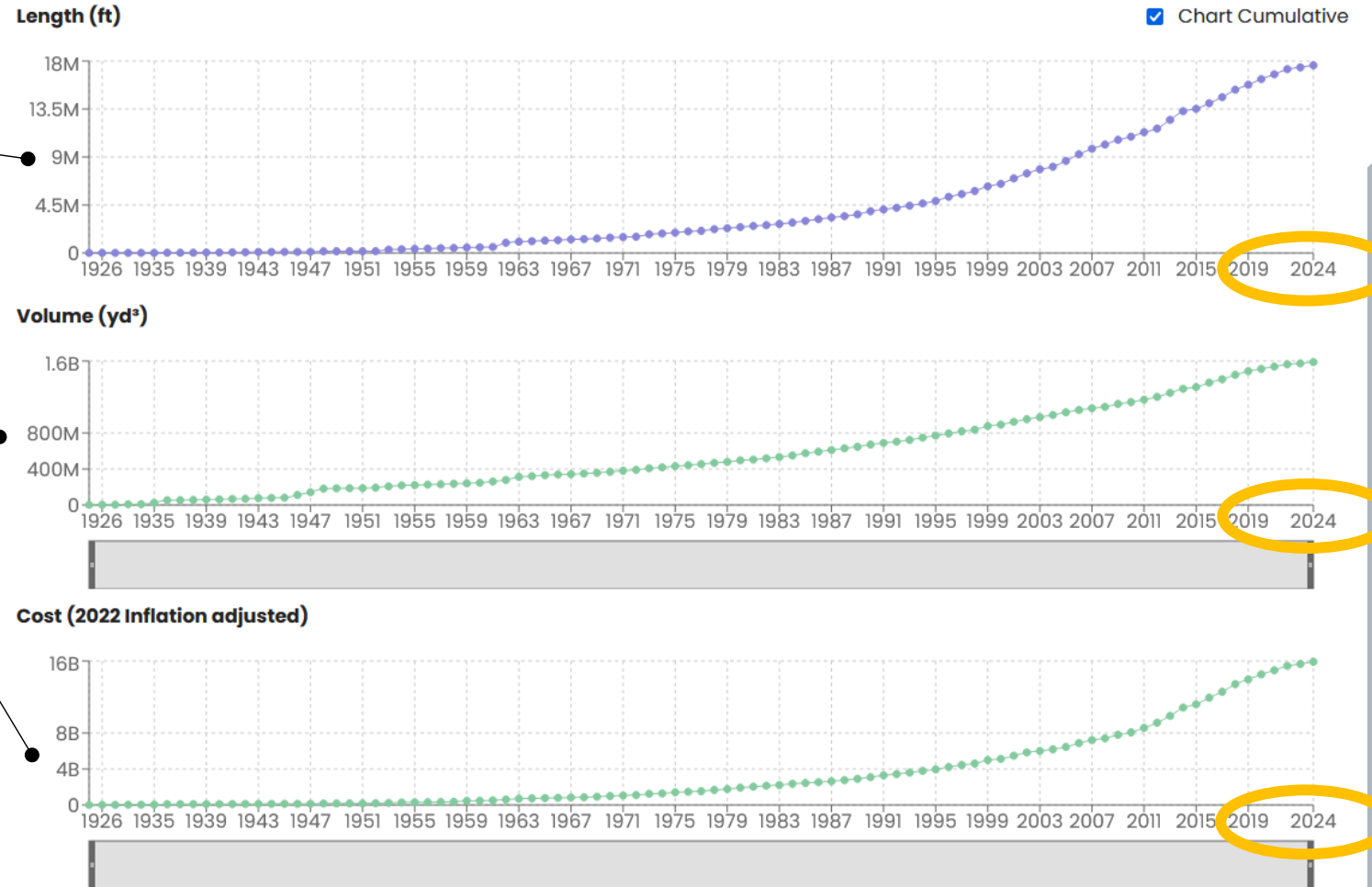


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- 1,587,927,804 cubic yards
- \$15,917,955,366.74

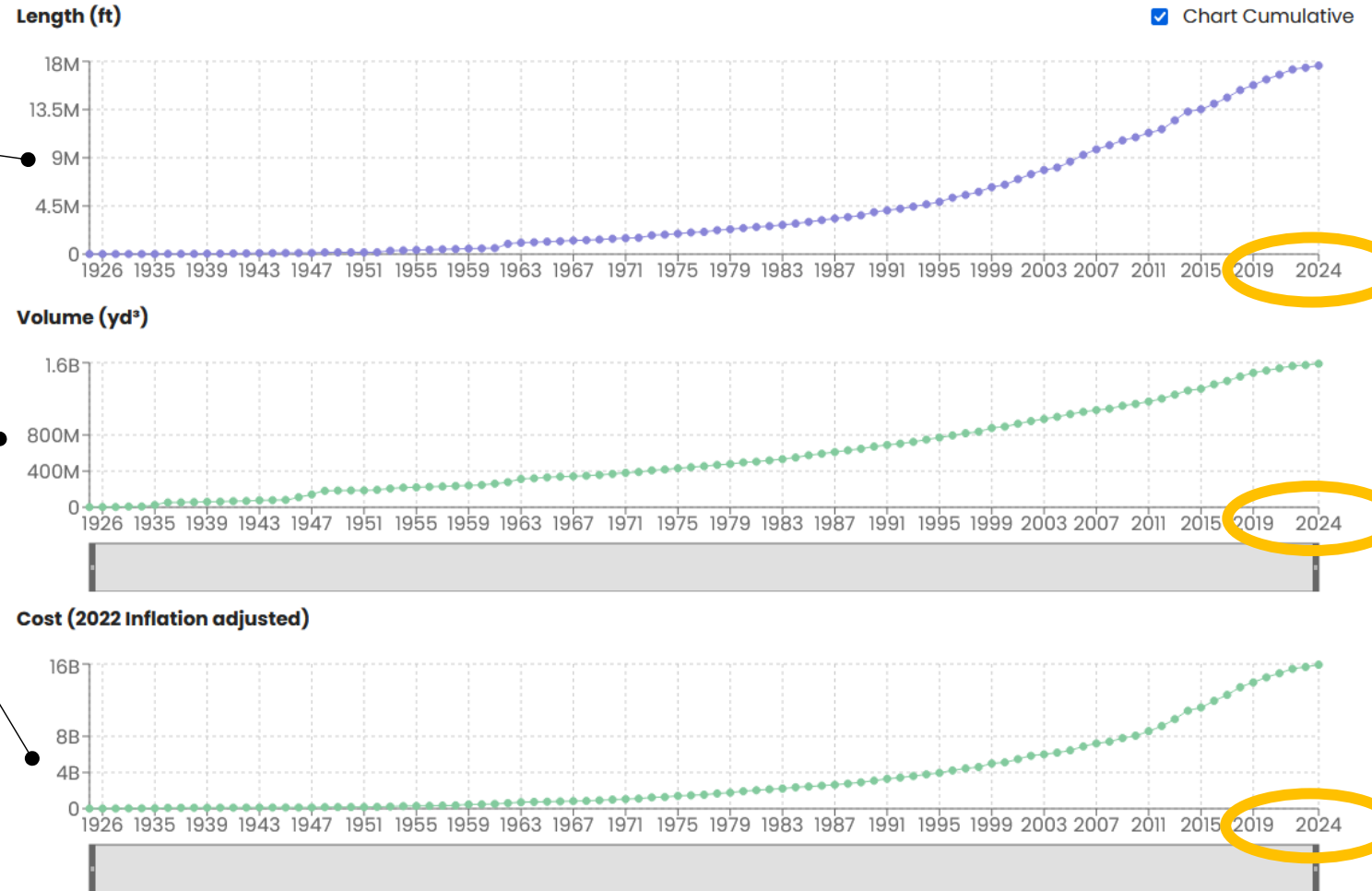


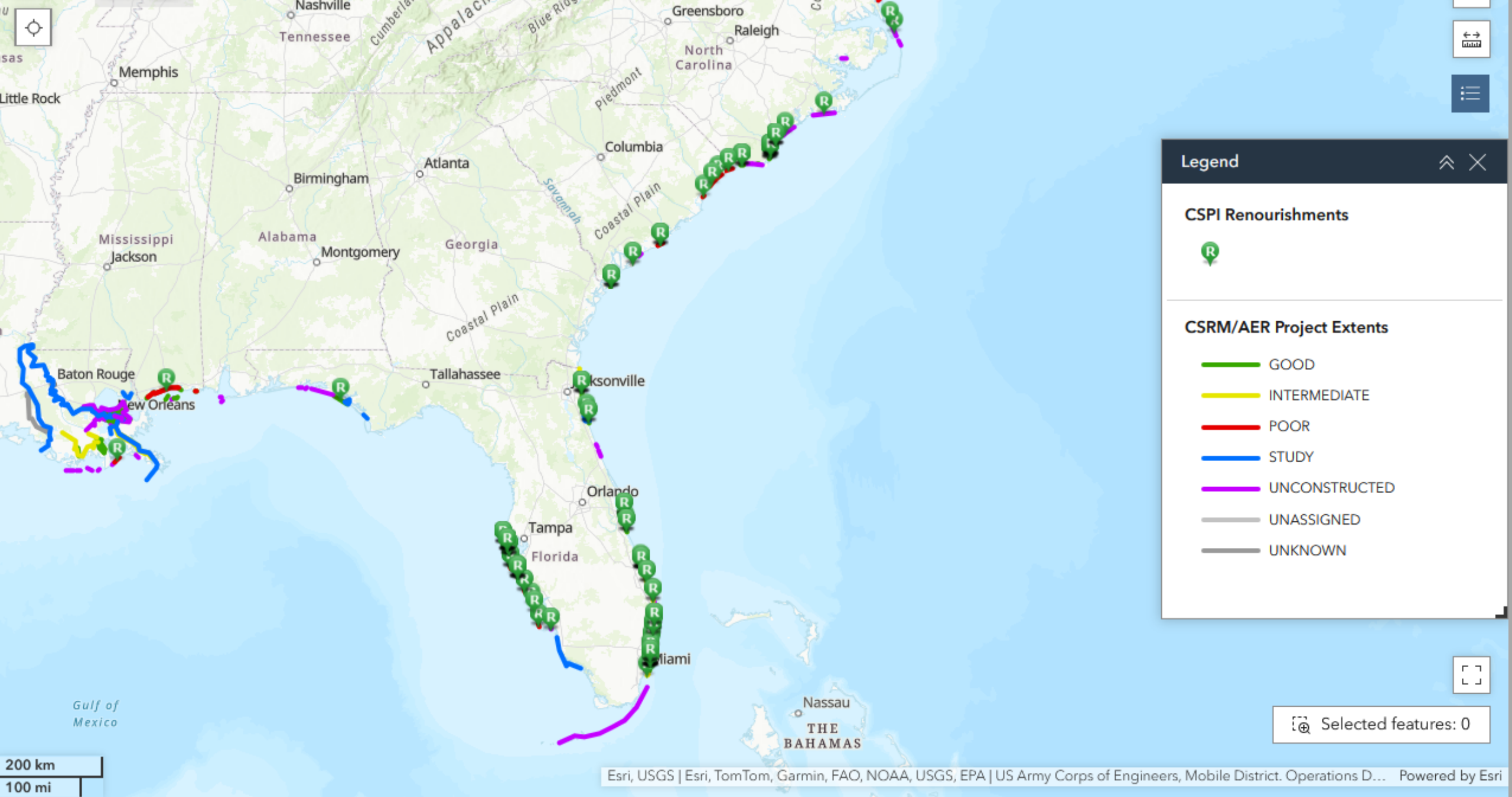
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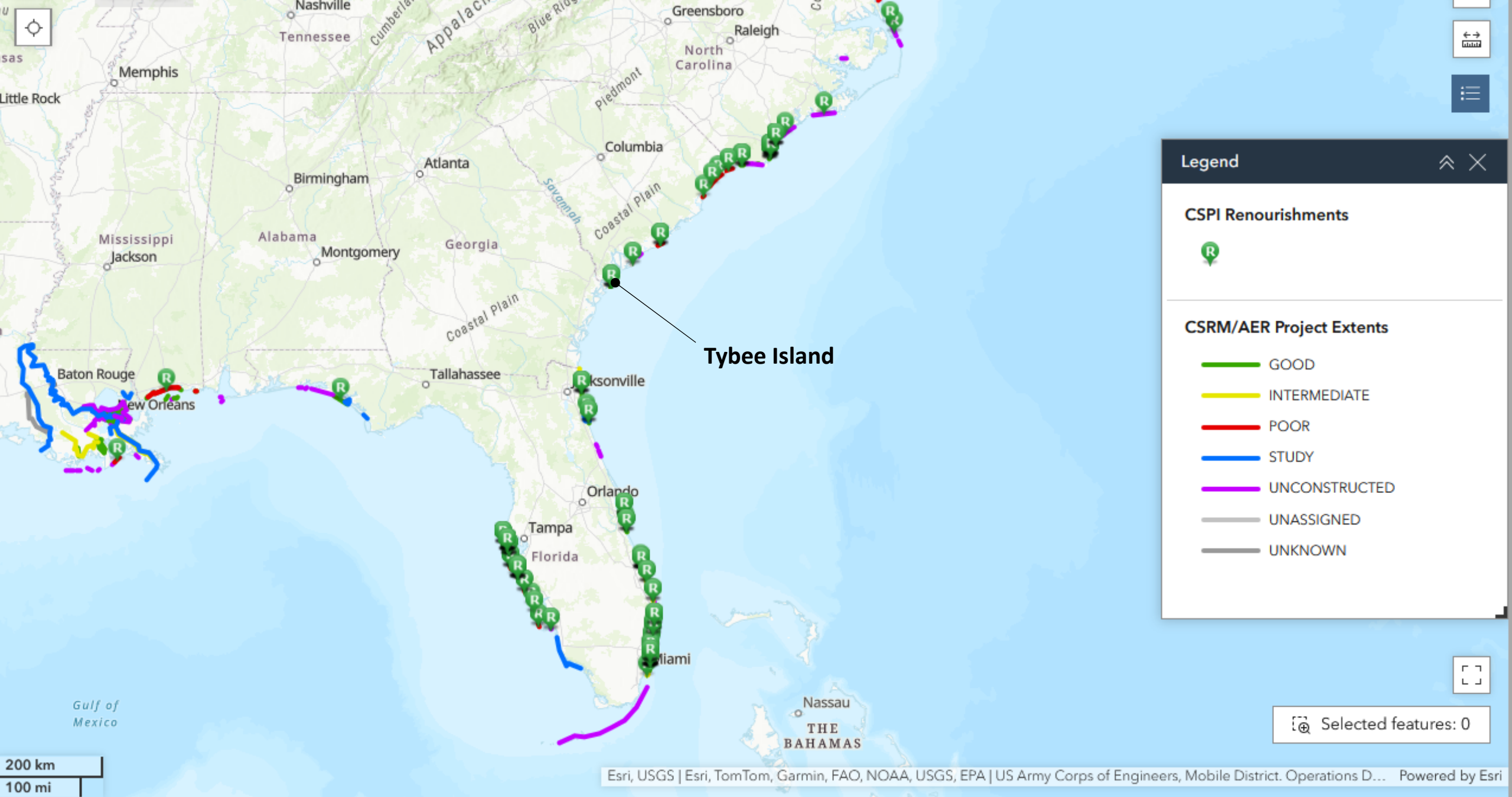
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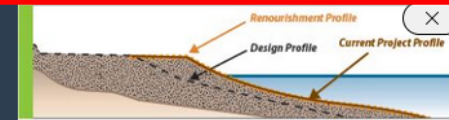
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- 1,587,927,804 cubic yards
- \$15,917,955,366.74







ACTIVE Project



LOCATION

Alignment Length: 3.31 mi

Notes:

The federal footprint begins at the north terminal groin, extends 13,200 linear feet to the south terminal groin and is referred to as Tybee Front Beach. From the south terminal groin to the mouth of Tybee Creek and 1800' along Back River beach was added to the authorized project in 1998 and is referred to as Back River Beach.

BASICS

Project Details Last Reviewed: 12/16/2020

ALTERNATIVE TYPES

Natural & Nature Based Features (NNBF): **YES**

PROJECT CLASSIFICATIONS

Notes:

Select Beach

Select a Georgia beach

Select State

Select a state

Download

[Download Georgia's Data](#)

Beach Totals

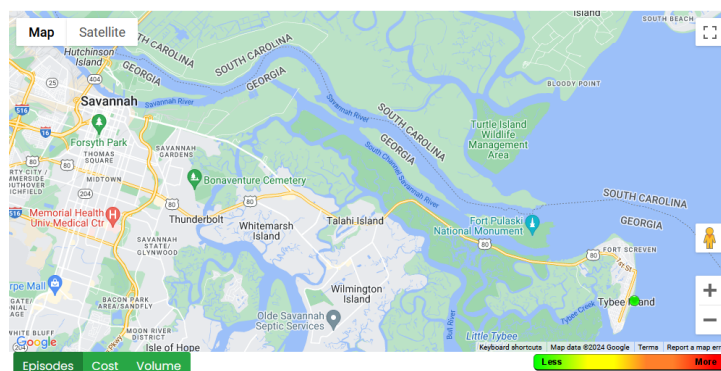
Nourishment Episodes:

Volume: 10,429,818 yd³

Length: 71,542 ft

Total Cost: \$ 60,600,000

Adjusted Cost (2022): \$ 101,155,525



Division, Spatial Data Bran... Powered by Esri

Gulf of Mexico

200 km
100 mi

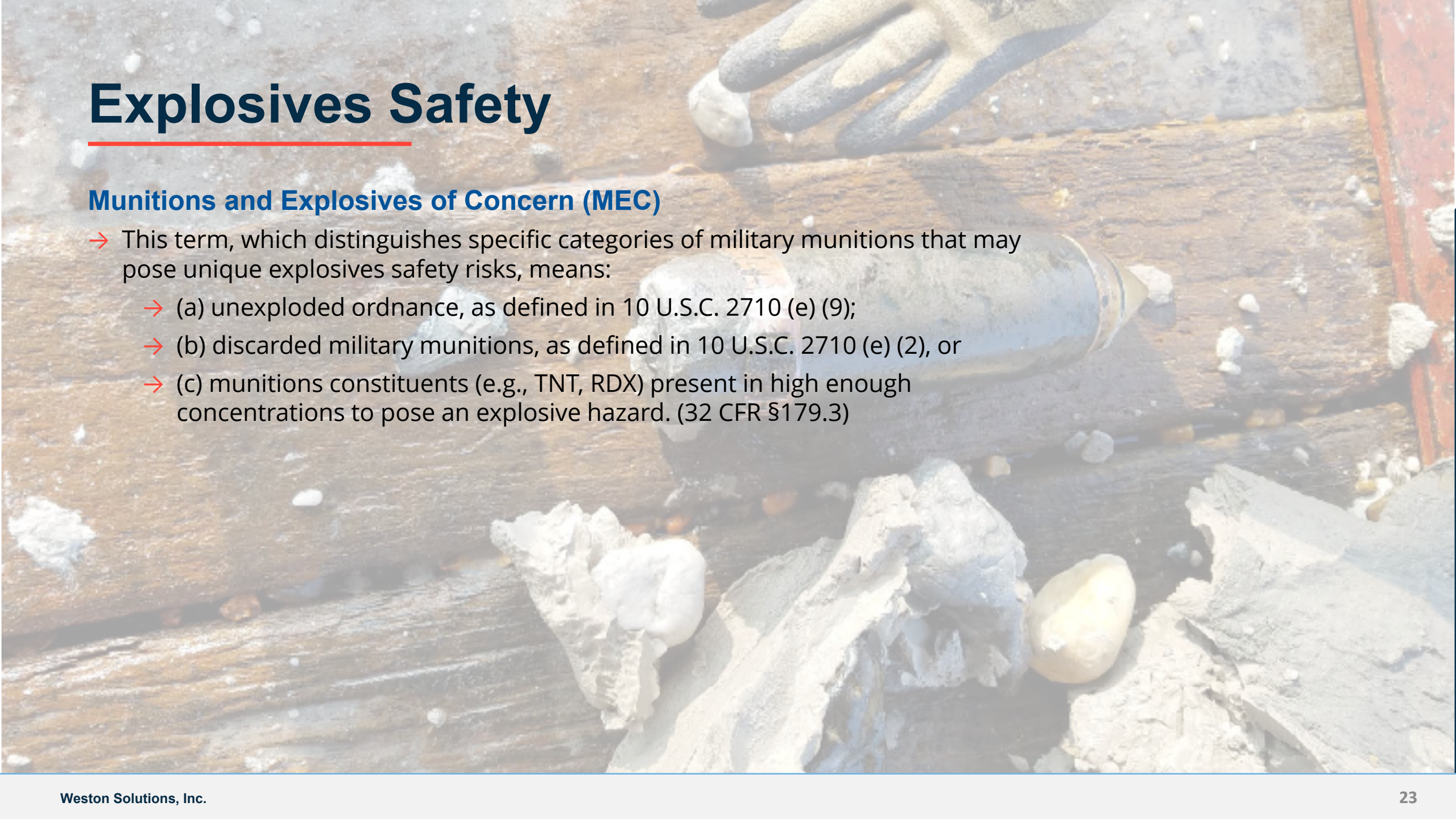
Esri, USGS | Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA | US Army Corps of Engineers, Mobile District. Operations D... Powered by Esri

UNKNOWN

Selected features: 0



Explosives Safety



Munitions and Explosives of Concern (MEC)

- This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means:
 - (a) unexploded ordnance, as defined in 10 U.S.C. 2710 (e) (9);
 - (b) discarded military munitions, as defined in 10 U.S.C. 2710 (e) (2), or
 - (c) munitions constituents (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard. (32 CFR §179.3)

Sources of MEC

Underwater MEC sites may exist in ponds, lakes, marshes, streams, rivers, estuaries, harbors, canals, seas, and oceans

- Wartime preparation, combat, coastal defenses
- Active training
- Former training
- Disposal at sea



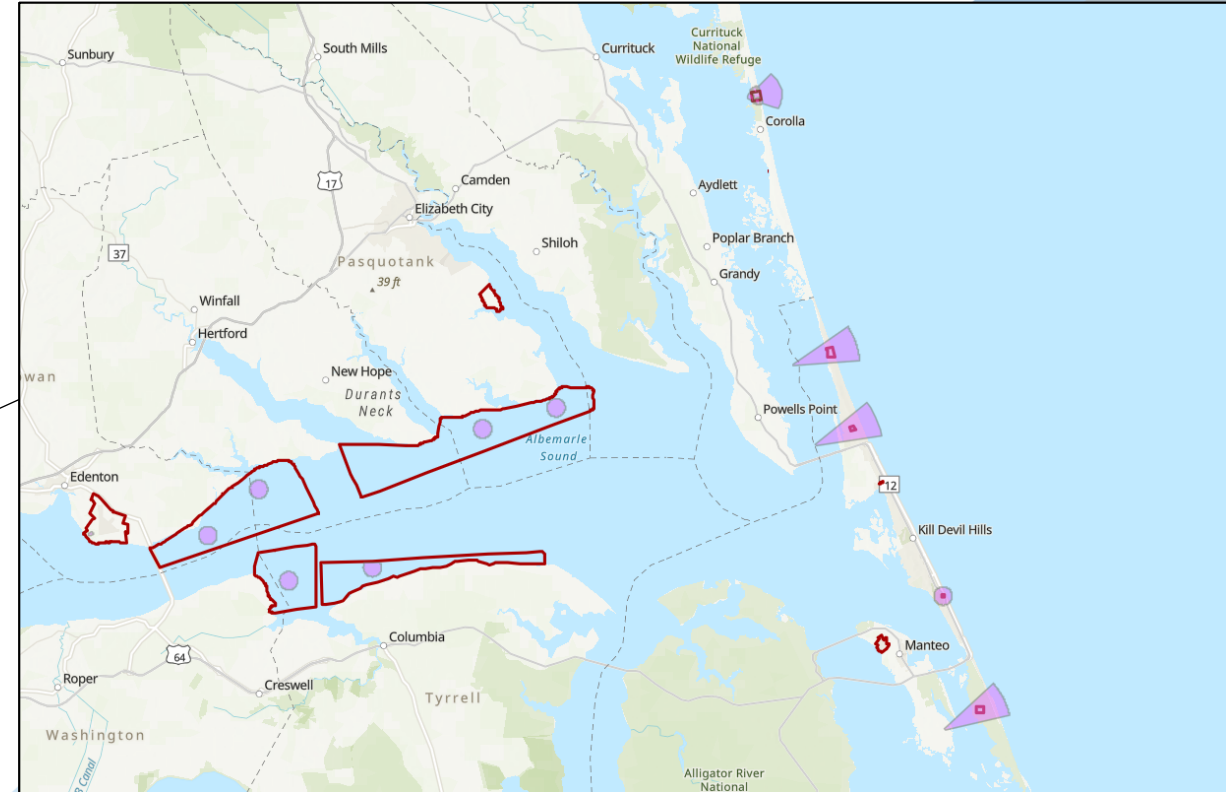
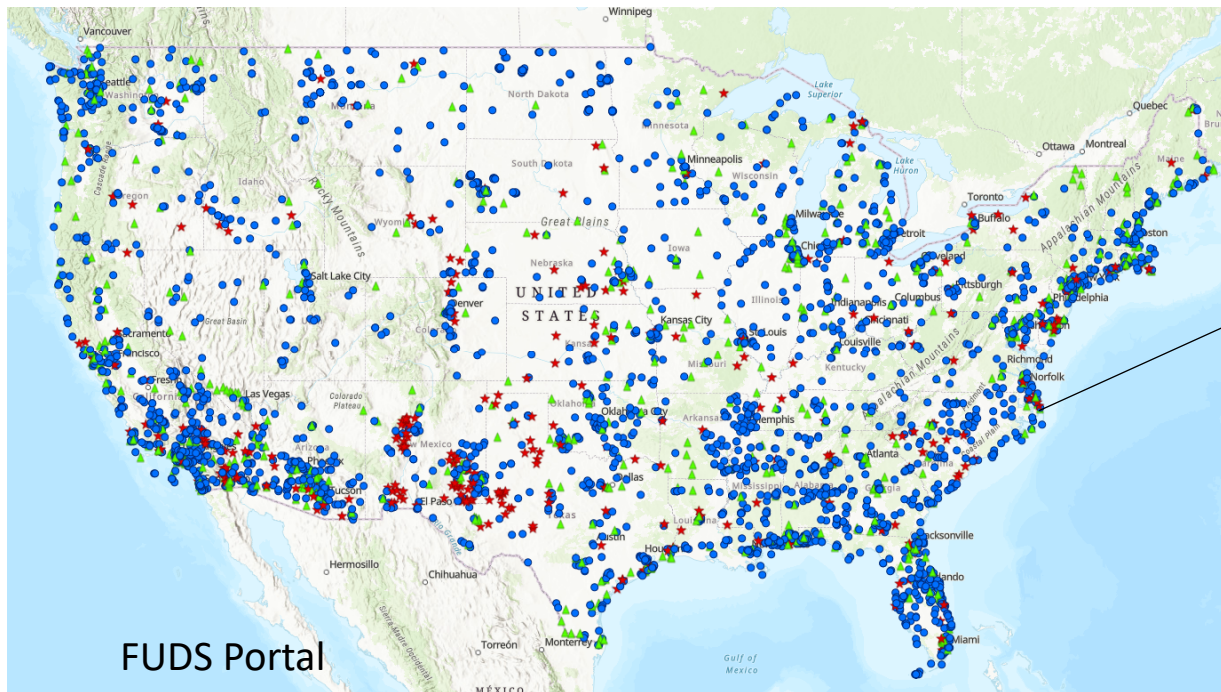
Fort Pierce
Formerly Used Defense Site,
Florida



Sources of MEC

Formerly Used Defense Sites

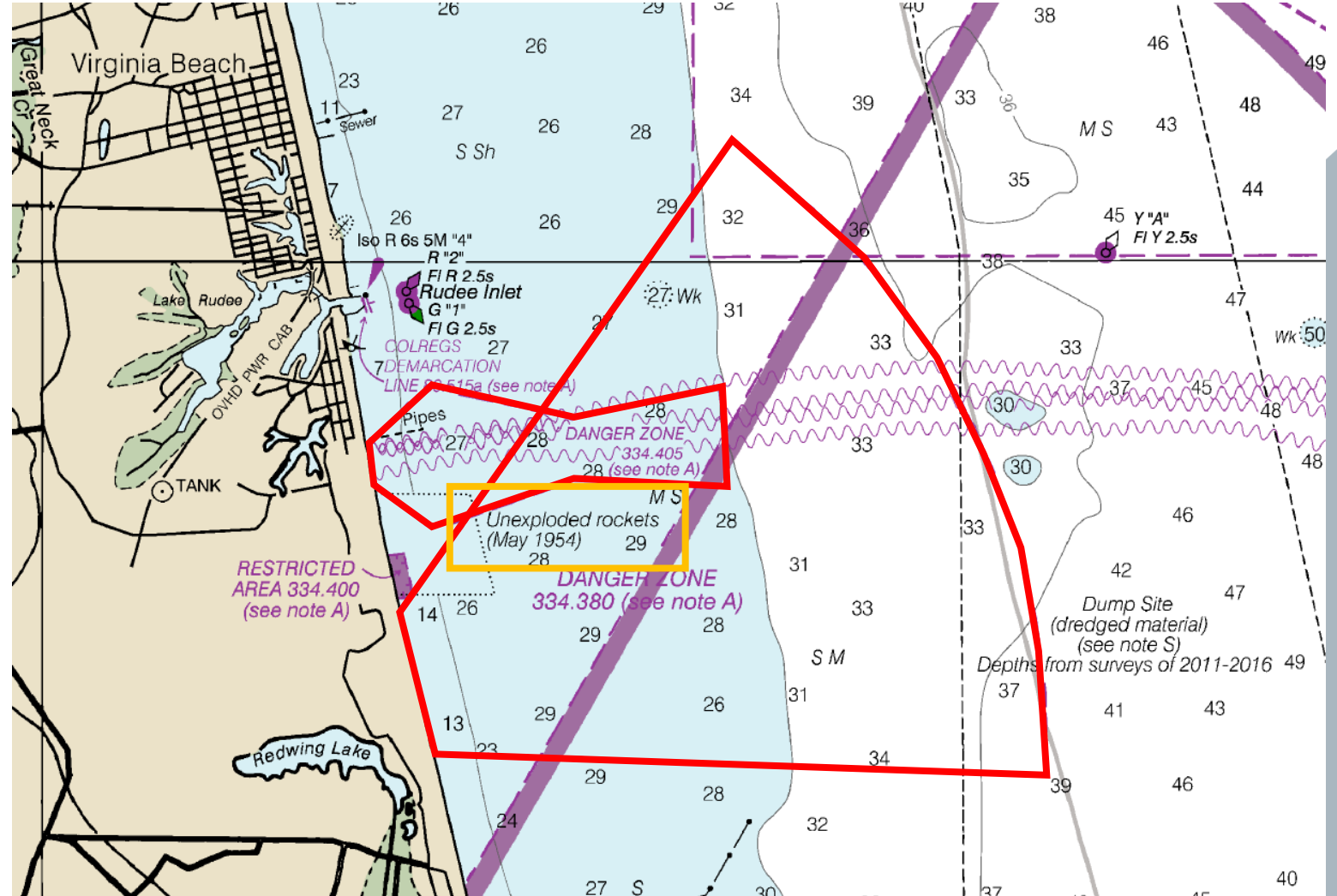
- A FUDS is defined as real property that was owned by, leased to, or otherwise possessed by the United States and under the jurisdiction of the Secretary that was transferred from DoD control prior to 17 October 1986 (SARA Section 211 as codified in 10 USC § 2701(c)(1)(B))
- >12,000 sites



Sources of MEC

Active Training

- Range fans
- Often identified on nautical charts
- Danger Zones and Restricted Areas
- May not correspond to FUDS or other sites



NOAA

Sources of MEC

Sea Dumping

- 1905 – earliest known sea disposal
- Policy to dispose of excess, obsolete and unserviceable munitions
- Hundreds of thousands conventional and chemical munitions disposed
- 1972 – Marine Protection, Research and Sanctuaries Act restricts sea disposal activities
Carton, 2009

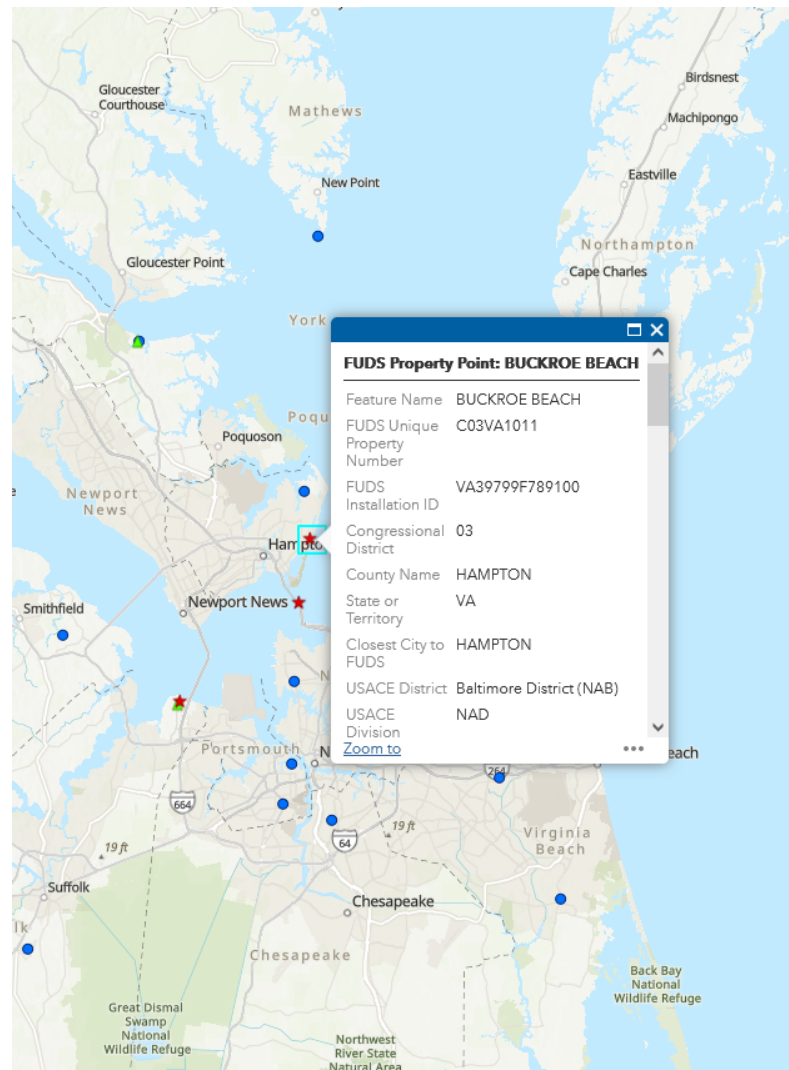


National Archives

MEC Releases

Buckroe Beach, Virginia

- Beach replenishment in 1990 and 1996
- Borrow area contained MEC and emplaced on beach
- Required several time critical removal actions through 2003
- Recovered numerous 75mm and 76mm's



Ryan Steigerwalt of Weston Solutions Company demonstrates the device Thursday afternoon that is being used to detect metal objects under the sand at Buckroe Beach.

Buckroe Beach scoured for WWI, WWII ordnance

By Justin George
Daily Press

HAMPTON

As 6-year-old Dylan Daniels sifted through sand and romped on Buckroe Beach, a contractor for the Army Corps of Engineers stood several hundred yards away showing off a recently discovered rusted 76-mm anti-aircraft shell.

The contractor, Rick Aiken, said more artillery shells could be found in the sand this fall as the Army corps finishes a \$1.2 million sweep of the beach. The sweep is targeting World War I and World War II artillery shells inadvertently dumped on Buckroe in 1990, when the beach was replenished with offshore sand.

But Aiken doesn't expect to find much. A search after Hurricane Isabel, which unearthed

old rounds elsewhere in Hampton Roads, proved fruitless.

"We believe that the majority of the ordnance, if not all of it, is gone," he said, but they will search from now until at least Christmas to make sure.

The shells originated from training sessions and could have been fired from land or ship. The cleanup effort, which began in 1994, includes nearly 40 searches.

More than 80 old military rounds have been found in the sand at Buckroe since 1990, including a few lifeless shells discovered in the spring, officials said.

The final phase of the cleanup includes dragging along the beach a geophysical sensor that looks like an orange lawn fertilizer spreader. The sensor can

find shells 20 to 30 inches underground.

"We'll try to minimize the impact to residents," said Adriane James, Army Corps project manager. "We don't take the whole beach at a time."

James said residents should not be worried by the search — though bans on using metal detectors and digging on the beach are still in effect — but they should be aware of the workers.

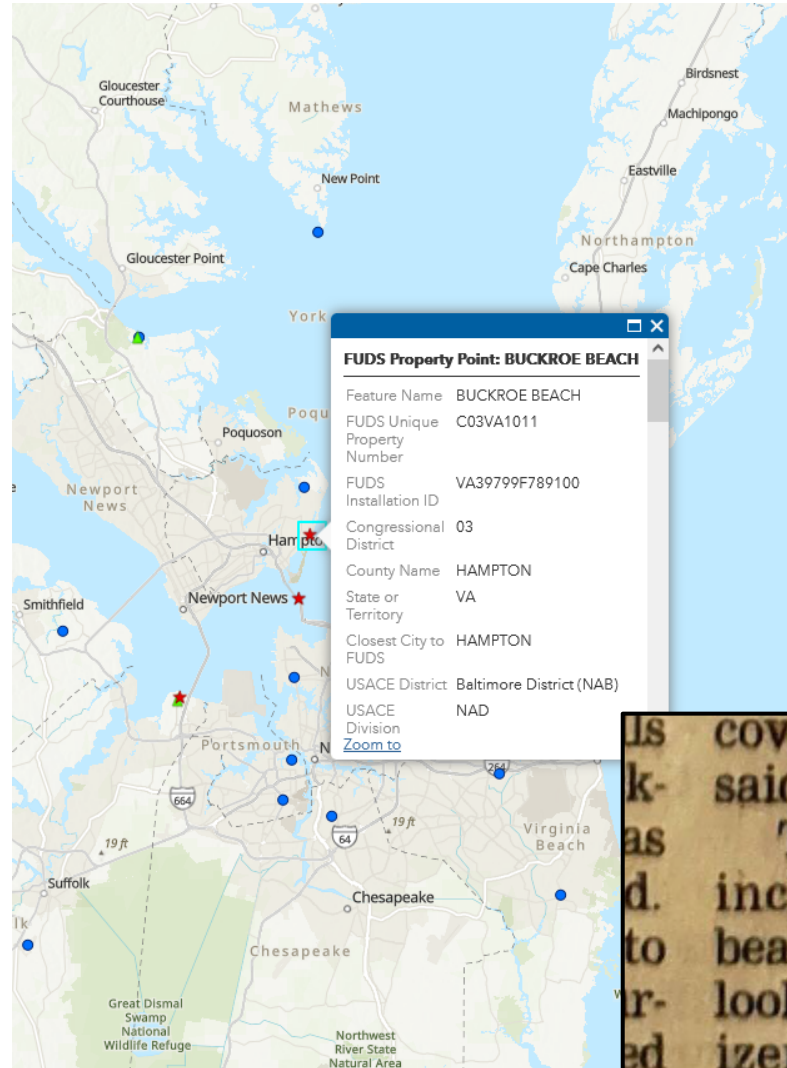
Dylan's mother, Ticia, said she's not scared as she lifted her eyes from a book to watch her son chase waves into the Chesapeake Bay. "I wouldn't be worried, honestly."

Justin George can be reached at 247-4793 or by e-mail at jgeorge@dailypress.com

MEC Releases

Buckroe Beach, Virginia

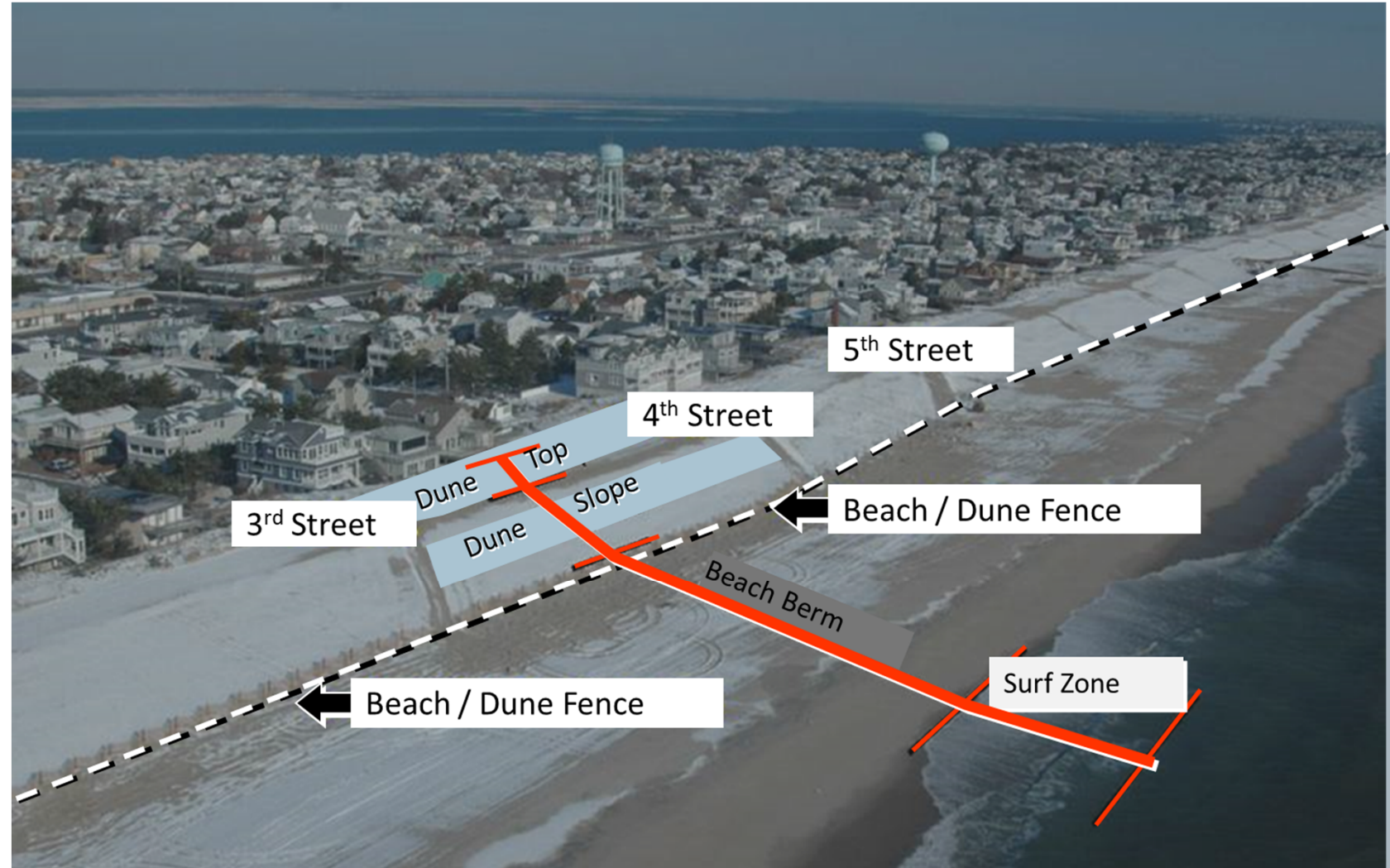
- Beach replenishment in 1990 and 1996
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MEC Releases

Surf City, New Jersey

- 2007, Coastal Storm Damage Mitigation, beach fill project consisting of an estimated 11,000,000 cubic yards (cy)
- 1.6 miles of beach
- Completed borrow area feasibility study
- Hopper dredge, hydraulic transport



MEC Releases

Surf City, New Jersey

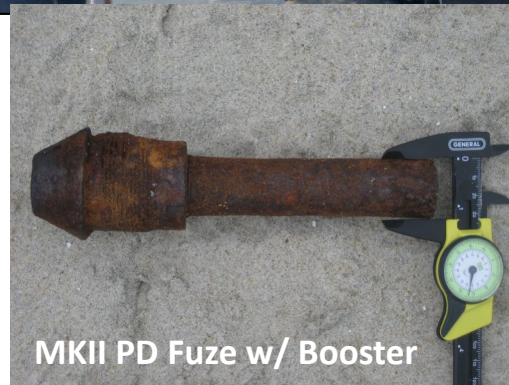
- MEC encountered 2 days after completion
- Time critical removal action to remove MEC to 2 ft
- 2nd removal action to sift 400,000 cy of sand
- Recovered 3,000 DMM
- Significant cost



MKI Fuze



Base Detonating Fuze
Model 1906



MKII PD Fuze w/ Booster



MKIII Booster



37-mm Projectile

MEC Interdiction/Prevention

Engineering Controls

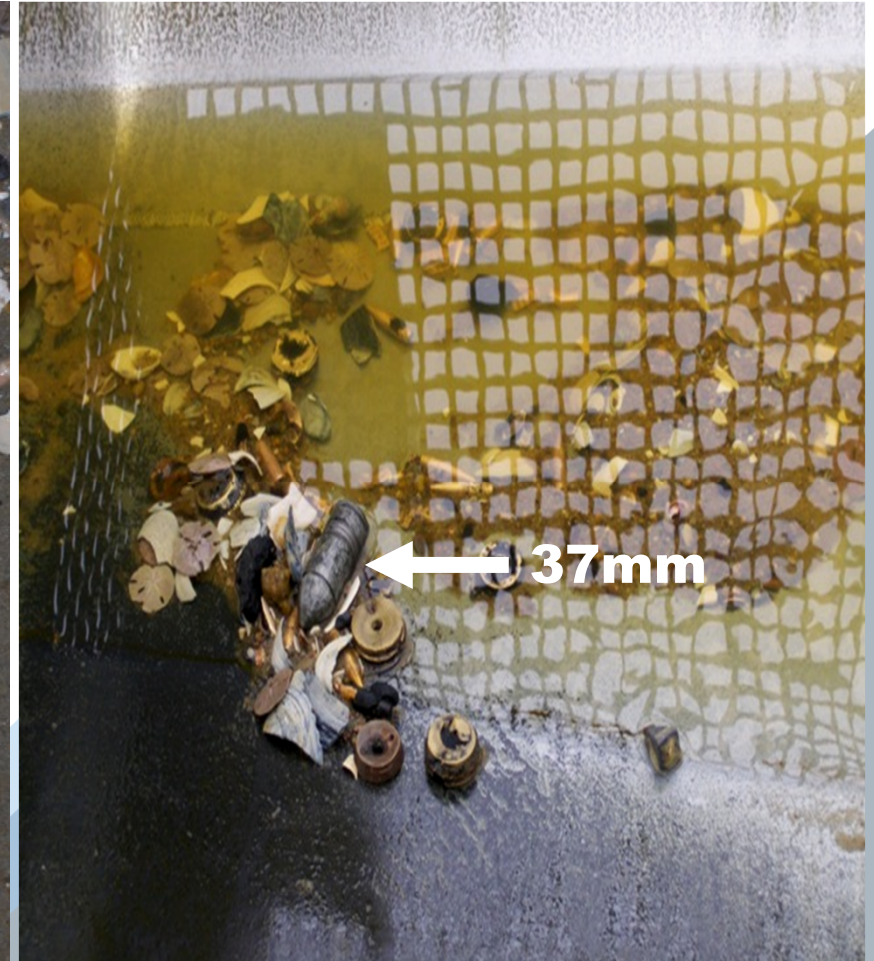
- Intake screens to prevent entraining MEC
- Outfall screens to prevent release onto beach
- Case study – Bethany Beach, Delaware
 - 3.2M cu yds of sand
 - 2.75 miles
 - 37mm projectile smallest MEC expected in borrow area
 - 1.25 in screens



MEC Interdiction/Prevention

Engineering Controls

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- Case study – Bethany Beach, Delaware
 - 3.2M cu yds of sand
 - 2.75 miles
 - 37mm projectile smallest MEC expected in borrow area
 - 1.25 in screens
 - 12 MEC recovered, no release



MEC Interdiction/Prevention

Site Staffing

- Construction support activities
 - Onboard dredge and/or at outfall
- UXO Personnel engagement
 - UXO Technician III
 - UXO Technician II
- On-call, on-site support
- 24/7 operations
- Screen inspections
- Quality control testing of screened material
- Coordination with local authorities and EOD



MEC Interdiction/Prevention

Other Considerations

- Velocity and quantity of material running through screens
- Consider all types of MEC – ferrous and non-ferrous components
- 3R's



- when you may have encountered a munition and that munitions are dangerous.
- do not approach, touch, move or disturb it, but carefully leave the area.
- call 911 and advise the police of what you saw and where you saw it.

Questions?



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Contact

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Munitions Response and Range Services



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