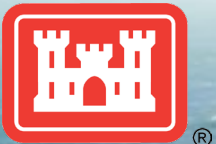# THINK SANDY THOUGHTS – THE TRIALS AND TRIUMPHS OF SEARCHING FOR OFFSHORE SAND SOURCES FOR SAJ'S BEACH NOURISHMENT PROJECTS

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USACE Jacksonville District
Engineering Division –
Geosystems Branch**

6 February 2025

OUTLINE

❑ Background
❑ Current Sand Searches
    ❑ St. John County (Expand existing sand sources)
    ❑ Broward County – Kennedy Space Center/NASA (Develop new borrow area)
    ❑ Sarasota County - Venice Beach (Find new source)
❑ Conclusion

BLUF

SIMILAR METHODOLOGIES IN DIFFERENT REGIONS CAN PRODUCE DRAMATICALLY DIFFERENT OUTCOMES BETWEEN PROJECTS

FUTURE SAND SEARCHES WILL BECOME INCREASINGLY DIFFICULT AS SAND RESOURCES BECOME DEPLETED

SAND SEARCHES ARE RARE
WHY AND WHEN WE GO LOOKING FOR SAND SOURCES

❑ Sand is a finite resource

❑ A majority Florida has low sand inputs

❑ 50-year lifespan of Federal Projects - must identify adequate volumes

    ❑ Periodic Scheduled Nourishments

    ❑ Emergency Post-Storm Nourishment (FCCE)

❑ Sand searches are conducted when

    ❑ A beach nourishment project is new and needs a borrow area (NASA SPP).

    ❑ Beach nourishment projects expand their extent and require more sand (St. John's County Projects)

    ❑ Expending sand sources faster that planned (Venice Beach).

THINK SANDY THOUGHTS
SEARCHING FOR SAND SOURCES FOR FLORIDA BEACH NOURISHMENT PROJECTS

❑ Material in Sand Source must adhere to is the "Sand Rule," (Florida Administration Code **62B-41.007(2)(j)** or 62B-41.007(2)(k))

❑ Shall Not Contain

　❑ Greater than **5 percent**, by weight, **silt, clay or colloids** passing the #230 sieve (4.0φ)

　❑ Greater than **5 percent**, by weight, **fine gravel** retained on the #4 sieve (-2.25φ)

　❑ Coarse gravel, cobbles or material **retained on the 3/4 inch** sieve in a percentage or size greater than found on the native beach

　❑ Construction debris, toxic material or other foreign matter

　❑ **Shall not result in cementation of the beach**

❑ Beach compatible fill is material that maintains the general character and functionality... Such material shall...similar material with a particle size distribution ranging between 0.062mm (4.0φ) and 4.76mm (-2.25φ)...shall **be similar in color** and grain size distribution...to the material in the existing coastal system

THE SAND SEARCH
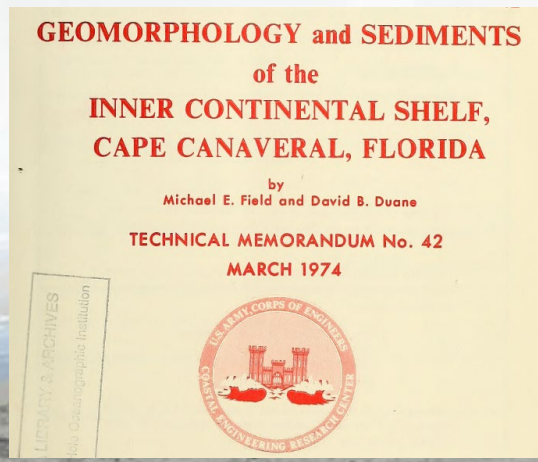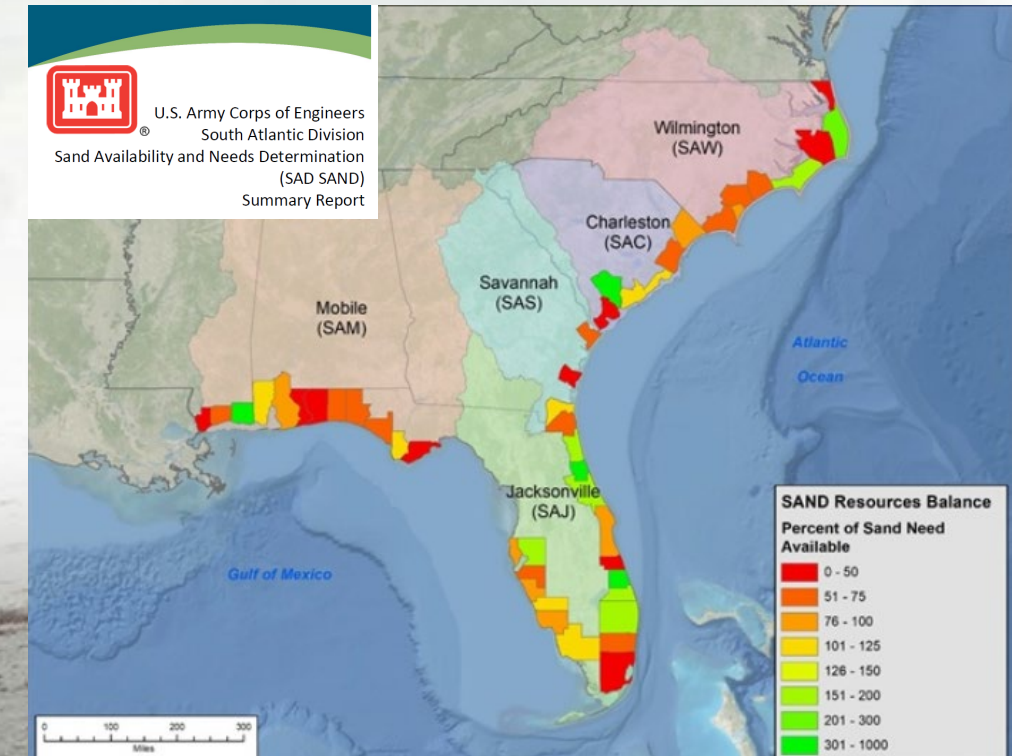## IDENTIFYING POTENTIAL SAND SOURCES USING ALL AVAILABLE DATA

- ❏ Existing Data
  - ❏ Maps, Historical Borings, Drill Plans, Bathymetry
  - ❏ Databases (ROSSI,BOEM)
  - ❏ Studies (SAD SAND Study, Local Studies)
- ❏ Existing Permits (FDEP and BOEM)
- ❏ Coordinating with EPA and other agencies
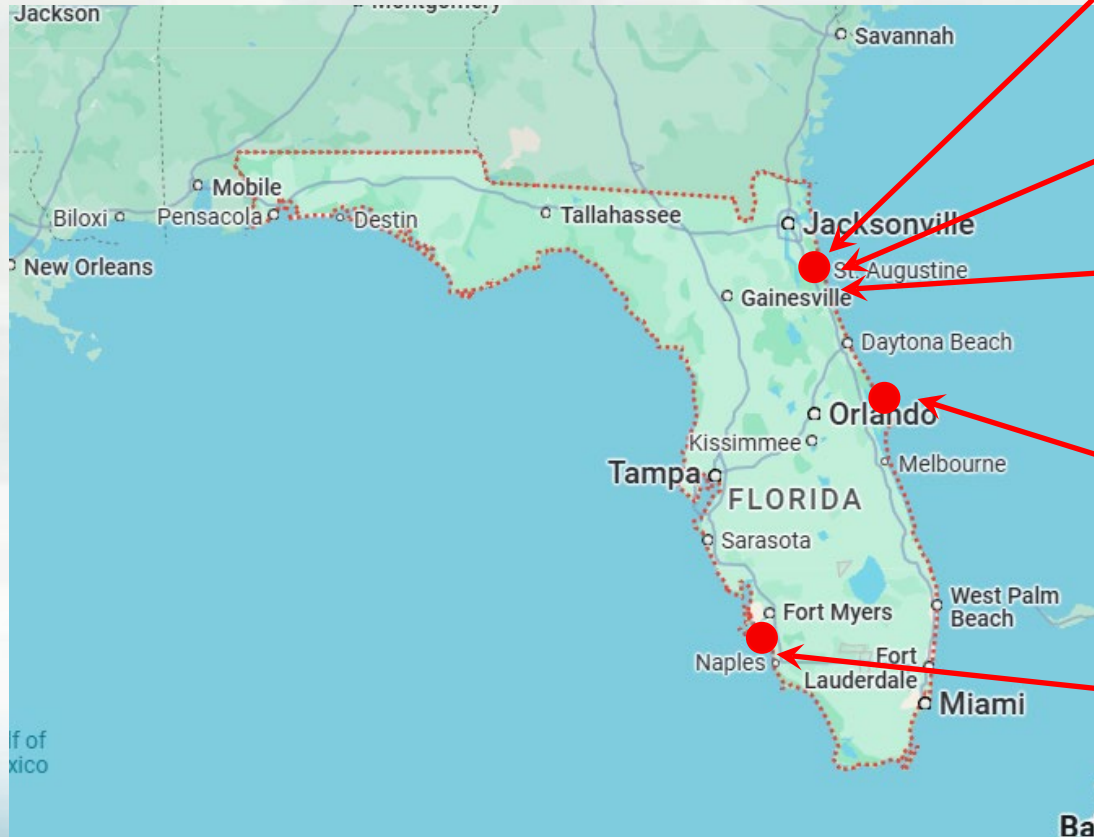- ❏ Two Phases – Recon. & Design

RECENT SAND SEARCH EXAMPLES
JACKSONVILLE DISTRICT

❑ South Ponte Vedra Coastal Storm Risk Management Project

❑ Vilano Beach Coastal Storm Risk Management Project

❑ St. Johns County Shore Protection Project - St. Augustine

❑ Kennedy Space Center Shore Protection Project, Brevard County

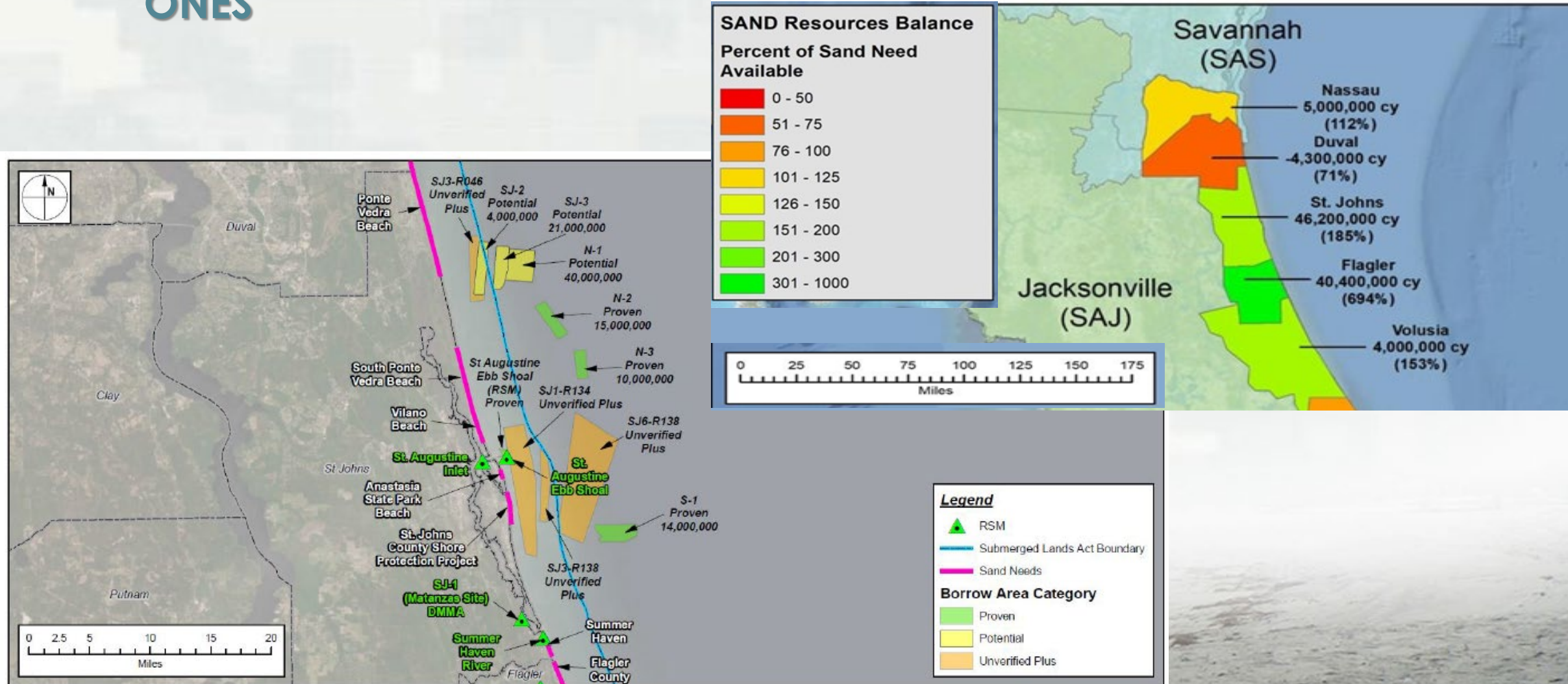❑ Hurricane Storm Damage Reduction Project, Venice Beach Nourishment, Sarasota County

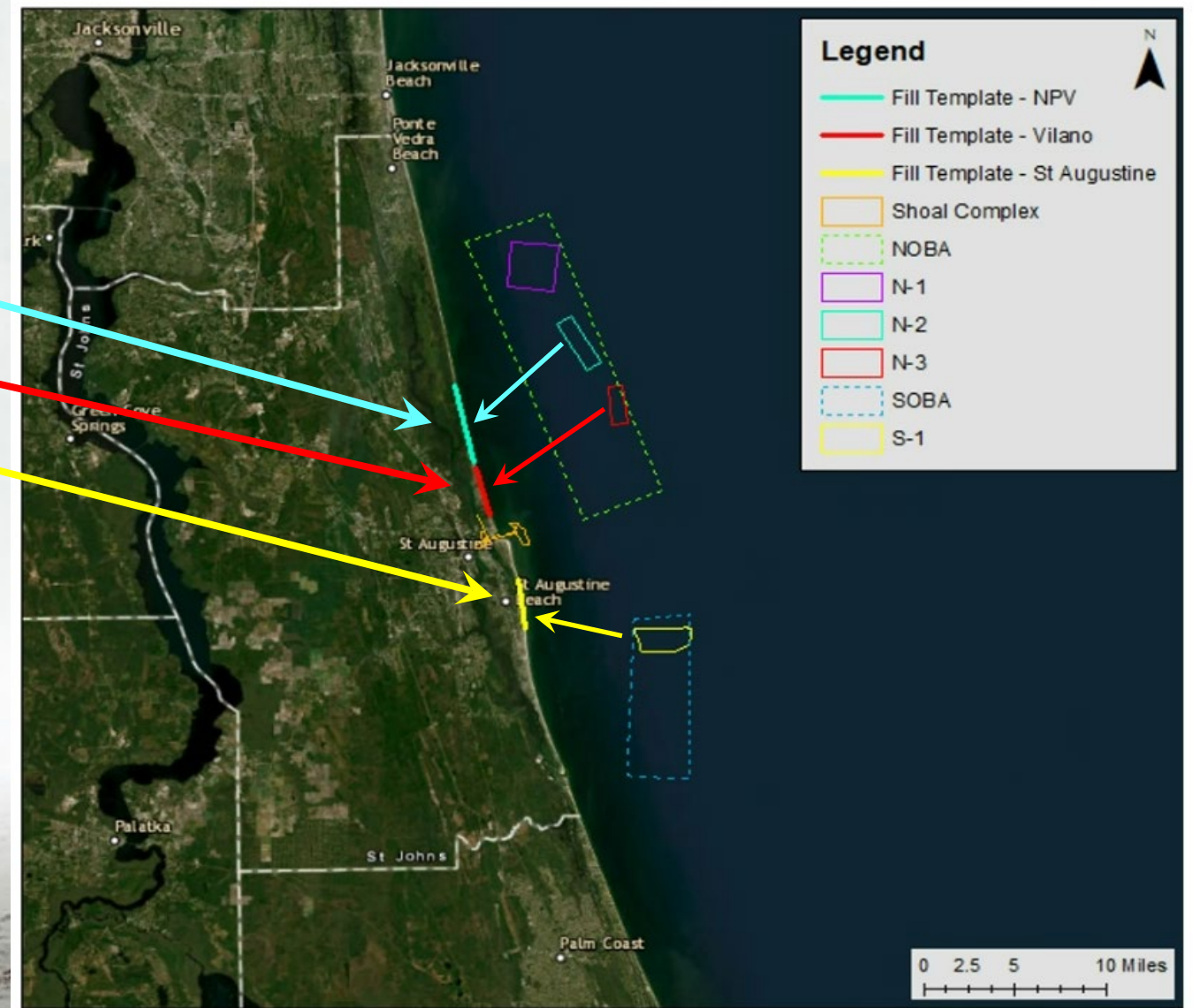Figure 6.5 St Johns County Sand Needs and Sources

ST. JOHNS COUNTY SAND SEARCH
EXPANDING CURRENT SAND SOURCES AND FINDING NEW ONES

- ☐ Ponte Vedra - CRSM (N-2)
- ☐ Vilano Beach - CRSM (N-3)
- ☐ St. Augustine Beach - SPP (S-1)

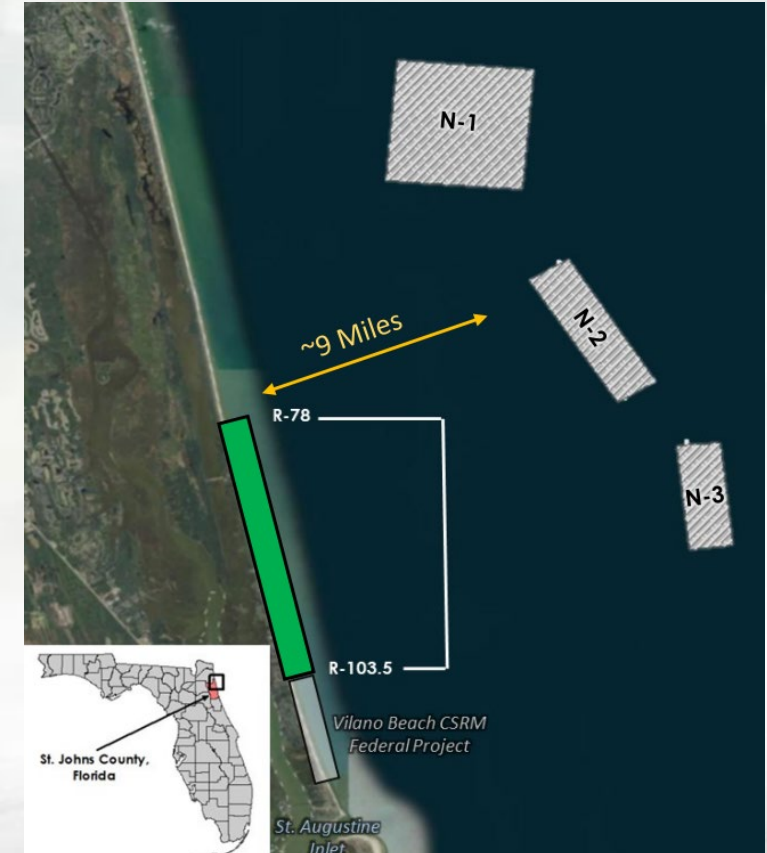- ☐ Several County Projects in surrounding areas (N-1)

ST. JOHNS COUNTY SAND SEARCH
EXPANDING CURRENT SAND SOURCES AND FINDING NEW ONES

Ponte Vedra Beach

- ❑ ~5 miles of Federal projects (R-78 to R-103.5)
- ❑ 10-year nourishment interval
- ❑ 2.1 million cubic yards (approx.) initial fill
- ❑ 650,000 cubic yards per nourishment

ST. JOHNS COUNTY SAND SEARCH
EXPANDING CURRENT SAND SOURCES AND FINDING NEW ONES

Vilano Beach

❑ ~3 miles of Federal projects (R-102.5 to R-117.5)

❑ 12-year nourishment interval (3 total over 50-year life)

❑ 900k cubic yards (approx. per event)

❑ Period Beneficial Placement of IWW in vicinity of St. Augustine Inlet shoaled material

During Construction

Post Construction
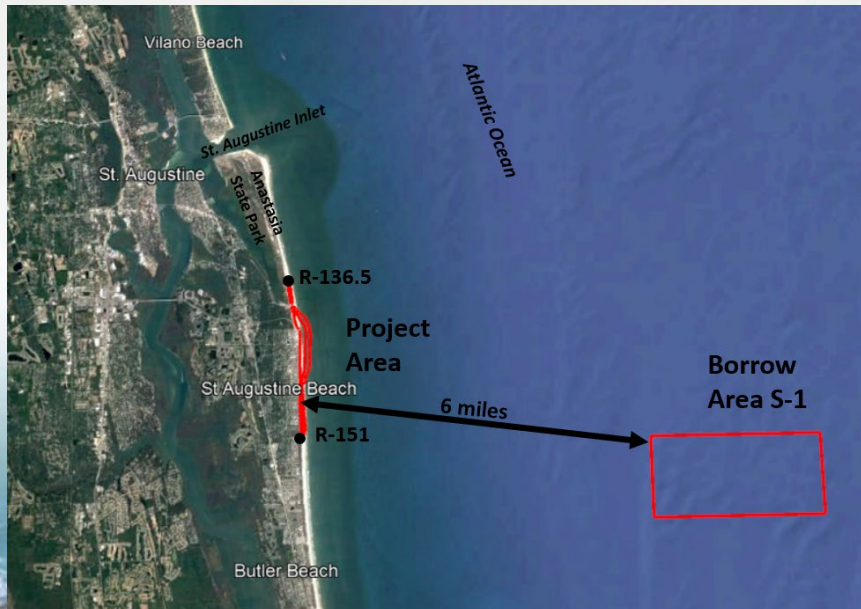
ST. JOHNS COUNTY SAND SEARCH
EXPANDING CURRENT SAND SOURCES AND FINDING NEW ONES

St. Augustine Beach

- ❑ ~ 2 miles of Federal projects (R-137 to R-151)
- ❑ 5-year nourishment interval
- ❑ 2.4 million cubic yards (2024 nourishment – S-1)
- ❑ Ebb Shoal Southern Lobe Material Historical placement

Project Area — Borrow Area S-1 — 6 miles

During Construction

Post Construction

ST. JOHNS COUNTY SAND SEARCH
EXPANDING CURRENT SAND SOURCES AND FINDING NEW ONES

- ❑ Proven sources have been developed
- ❑ St. Augustine Ebb Shoal, N-2, N-3, and S-1
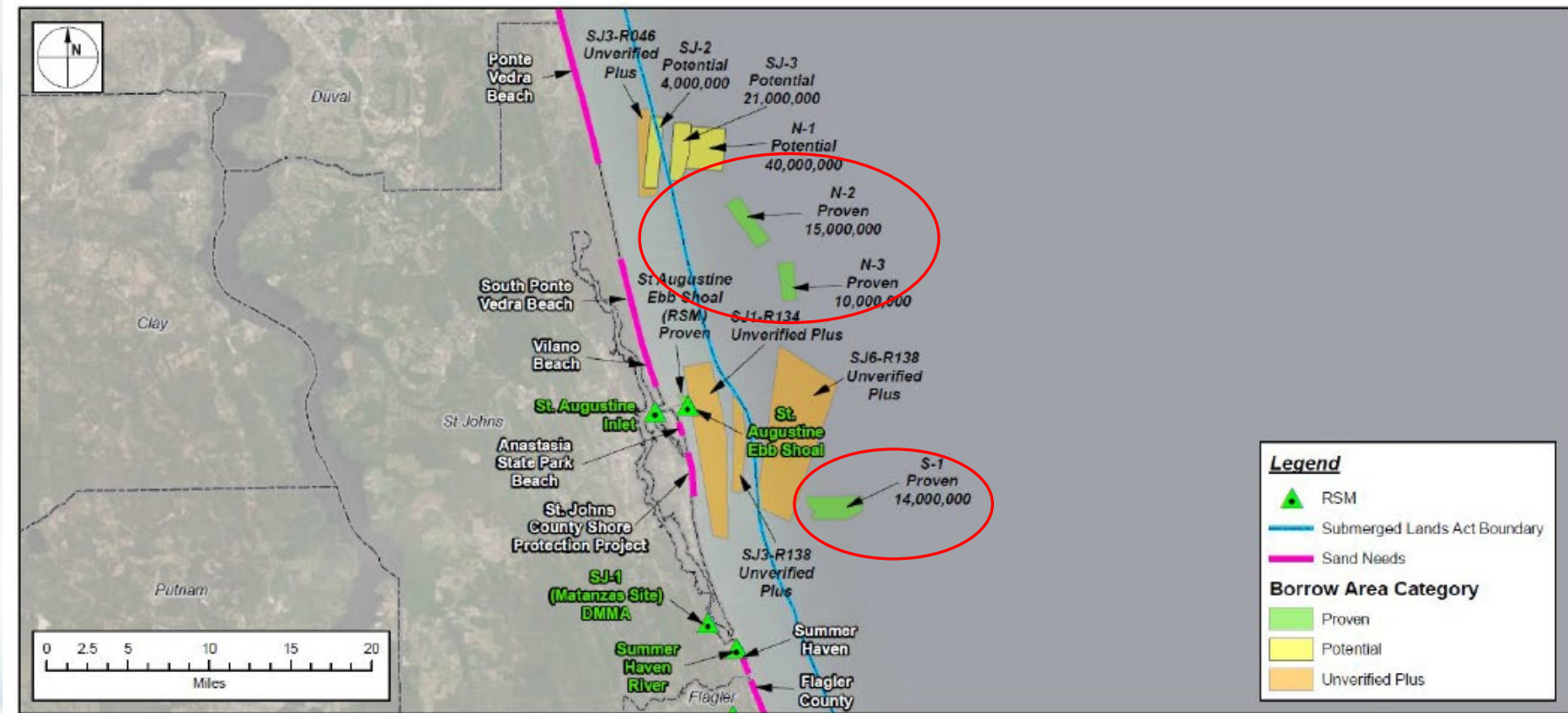- ❑ Potential sources still exist

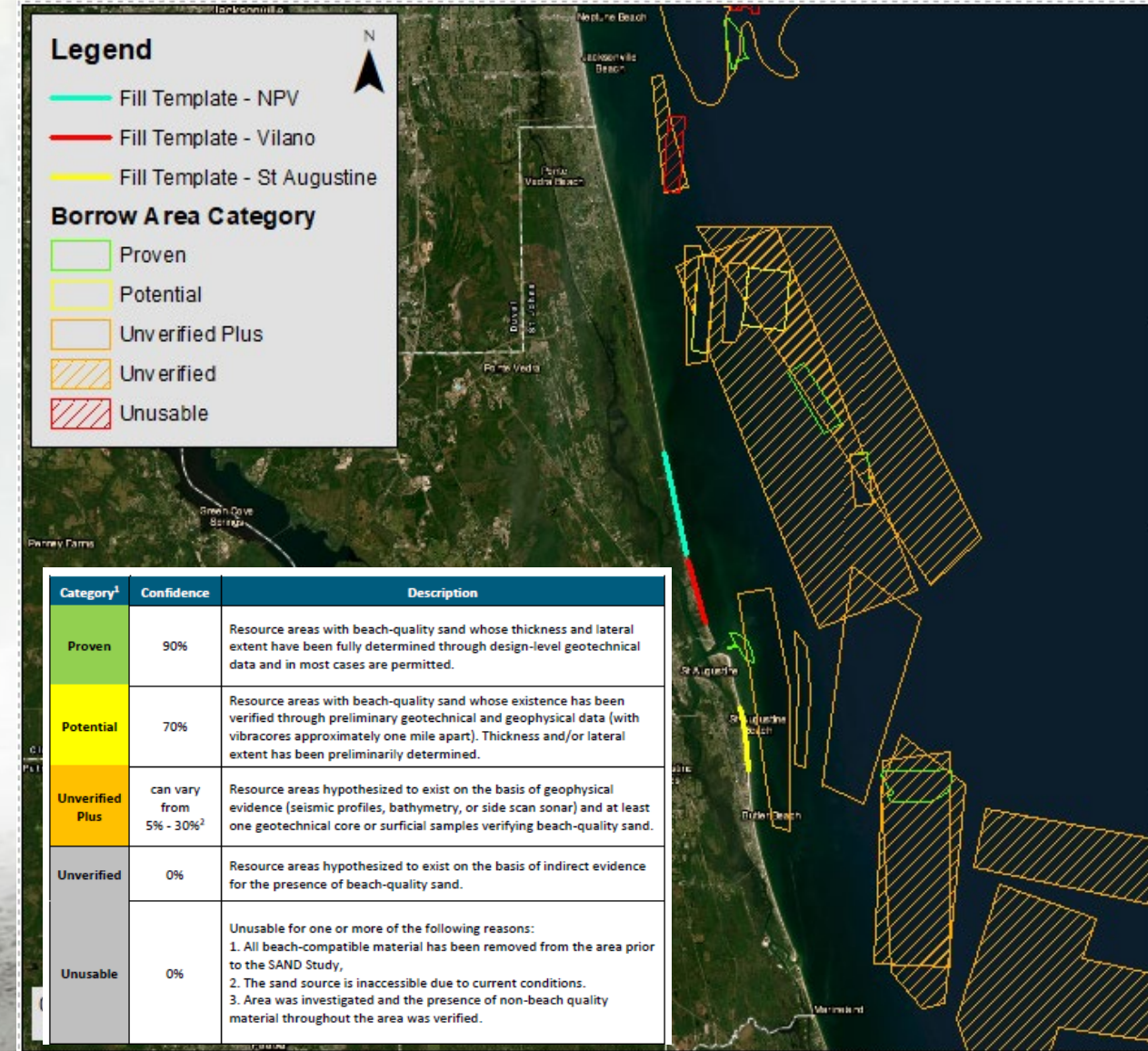**Figure 6.5** St Johns County Sand Needs and Sources
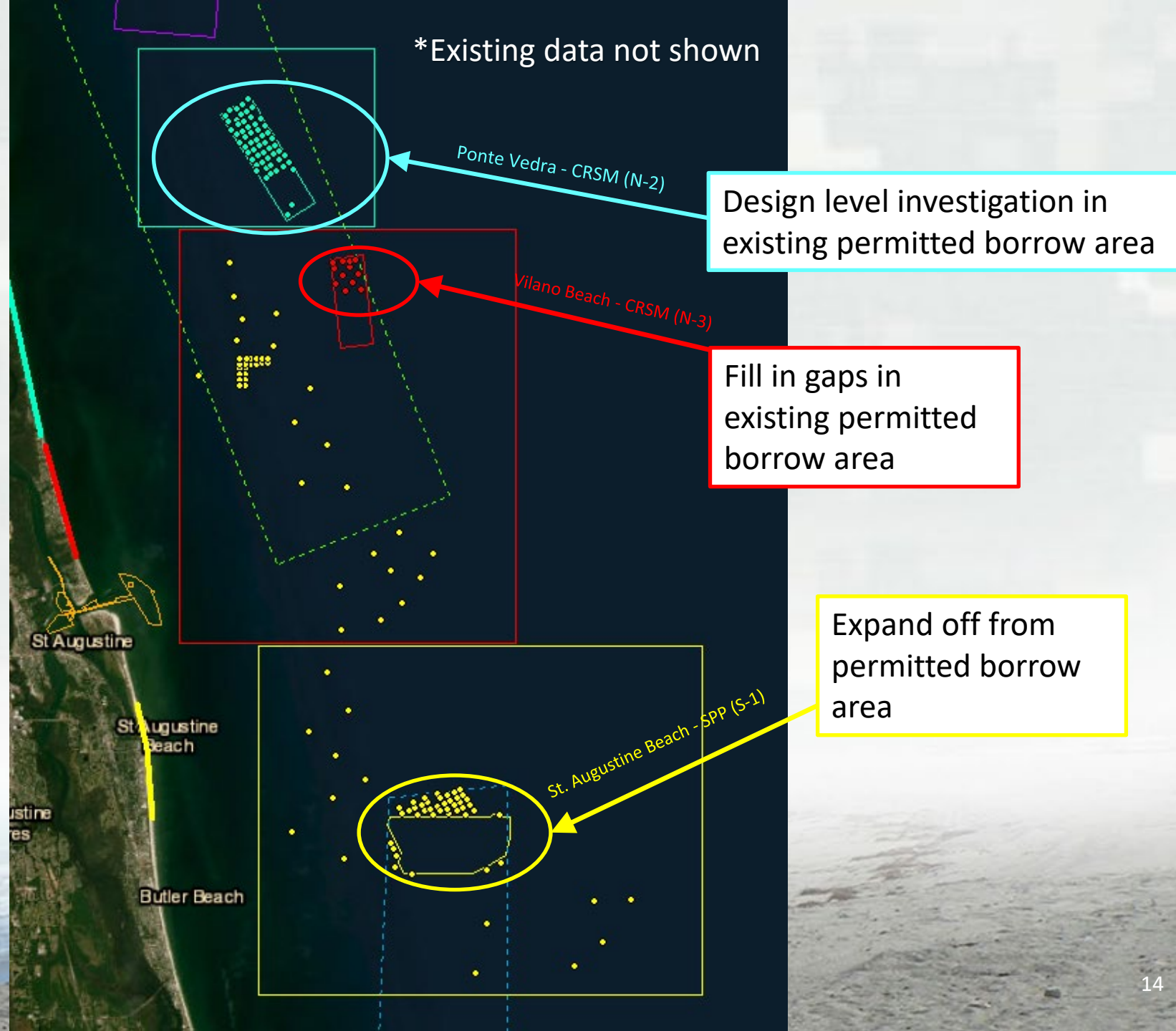
ST. JOHNS COUNTY SAND SEARCH
EXPANDING CURRENT SAND SOURCES AND FINDING NEW ONES

- Larger unverified plus and unverified areas exist (SAD SAND study).
- Expand data around existing borrow area
- Expand knowledge of larger unverified areas between existing borrow areas
- Sand Search Based on
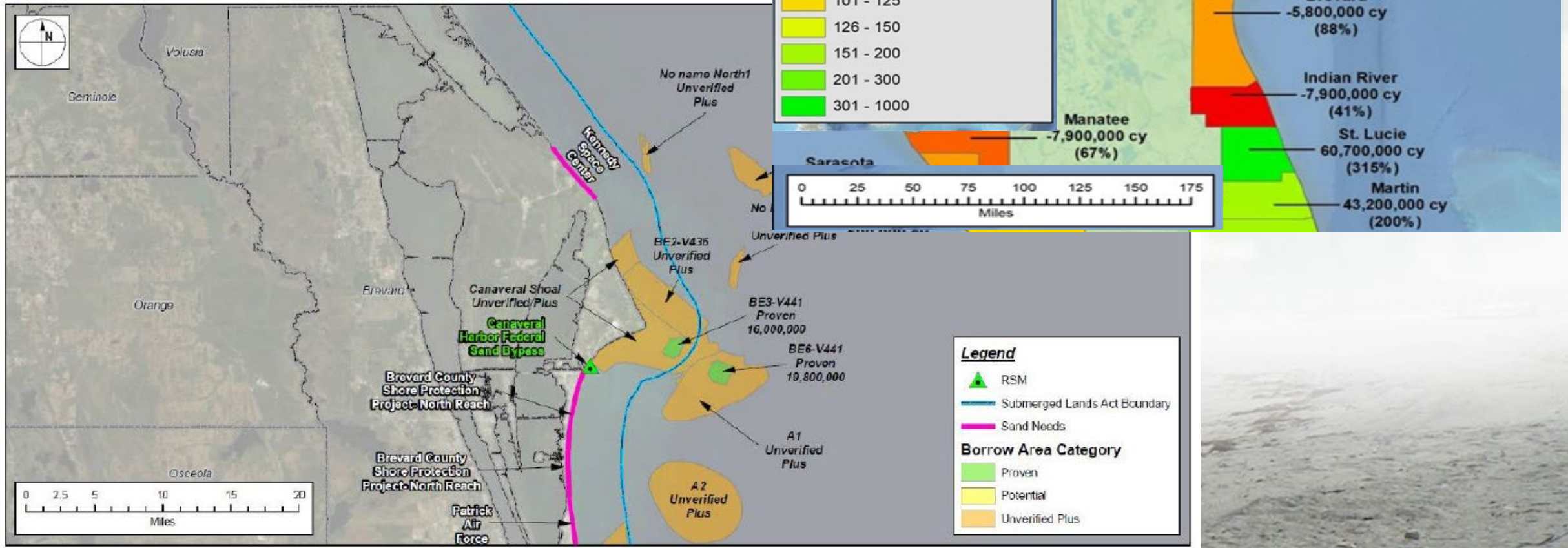 - Existing Data from projects
  - SAD SAND Study
  - NOAA Bathymetry

Legend

- Fill Template - NPV
- Fill Template - Vilano
- Fill Template - St Augustine

Borrow Area Category

- Proven
- Potential
- Unverified Plus
- Unverified
- Unusable

Category[1]	Confidence	Description
Proven	90%	Resource areas with beach-quality sand whose thickness and lateral extent have been fully determined through design-level geotechnical data and in most cases are permitted.
Potential	70%	Resource areas with beach-quality sand whose existence has been verified through preliminary geotechnical and geophysical data (with vibracores approximately one mile apart). Thickness and/or lateral extent has been preliminarily determined.
Unverified Plus	can vary from 5% - 30%[2]	Resource areas hypothesized to exist on the basis of geophysical evidence (seismic profiles, bathymetry, or side scan sonar) and at least one geotechnical core or surficial samples verifying beach-quality sand.
Unverified	0%	Resource areas hypothesized to exist on the basis of indirect evidence for the presence of beach-quality sand.
Unusable	0%	Unusable for one or more of the following reasons: 1. All beach-compatible material has been removed from the area prior to the SAND Study, 2. The sand source is inaccessible due to current conditions. 3. Area was investigated and the presence of non-beach quality material throughout the area was verified.

- 2025 investigation
- 158 vibracore investigation

*Existing data not shown

Ponte Vedra - CRSM (N-2)

Design level investigation in existing permitted borrow area

Vilano Beach - CRSM (N-3)

Fill in gaps in existing permitted borrow area

St. Augustine Beach - SPP (S-1)

Expand off from permitted borrow area

St Augustine

St Augustine Beach

Butler Beach

14

- 2025 investigation
- 158 vibracore investigation

*Existing data not shown

Ponte Vedra - CRSM (N-2)

Design level investigation in existing permitted borrow area

Vilano Beach - CRSM (N-3)

Fill in gaps in existing permitted borrow area

Recon level investigation to characterize material

Expand off from permitted borrow area

St. Augustine Beach - SPP (S-1)

St Augustine

St Augustine Beach

Butler Beach

15

KENNEDY SPACE CENTER, BREVARD COUNTY
FINDING AND DEVELOPING NEW SAND SOURCES FOR NEW SHORE PROTECTION PROJECT

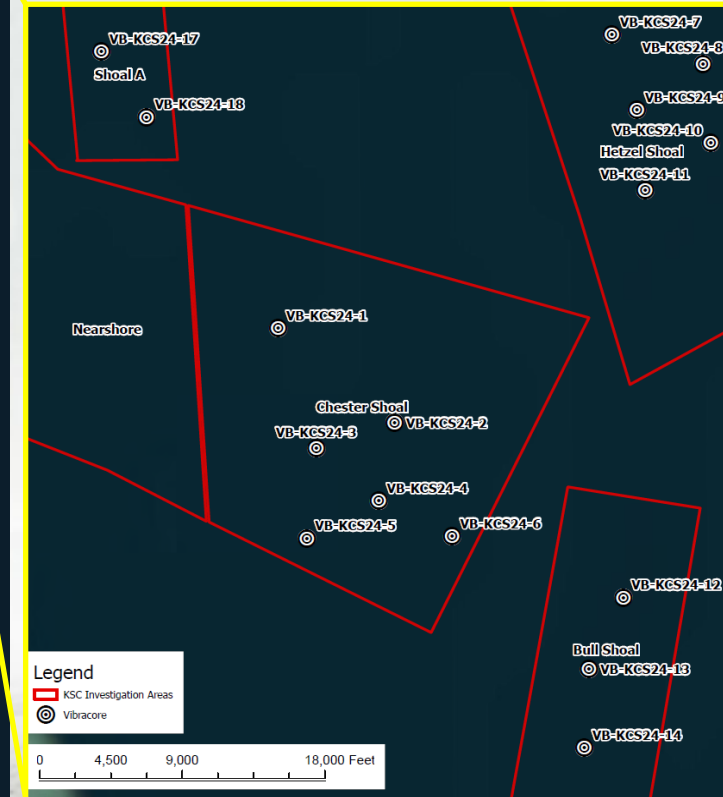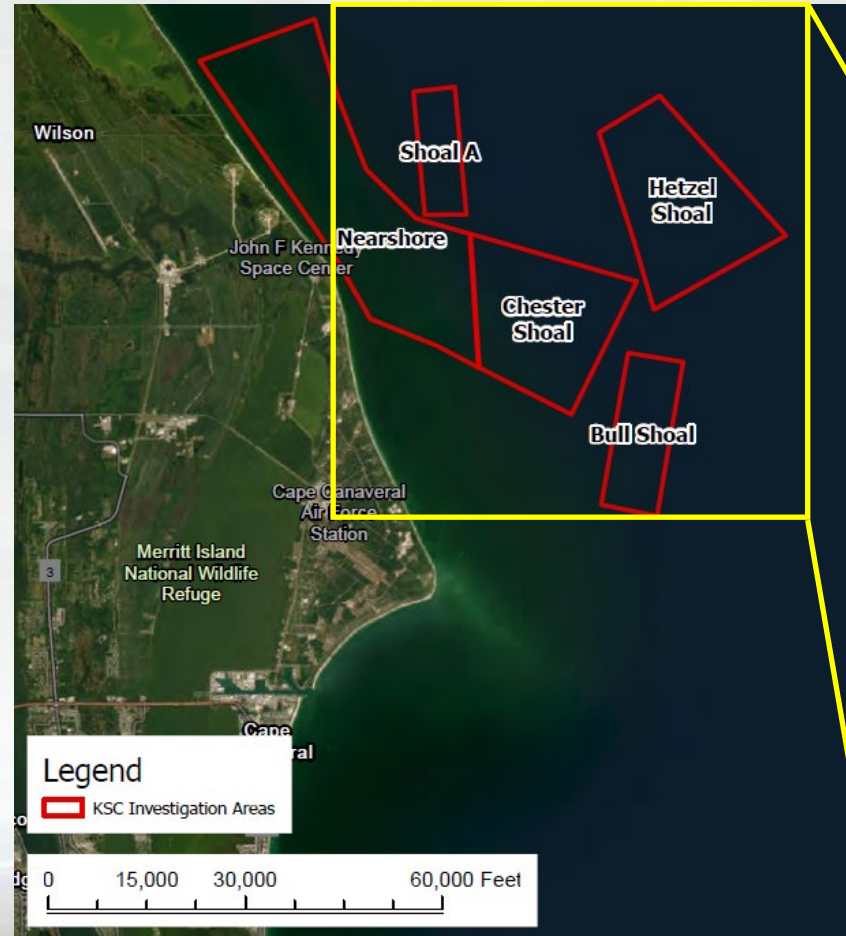# KENNEDY SPACE CENTER, BREVARD COUNTY
FINDING AND DEVELOPING NEW SAND SOURCES FOR NEW SHORE PROTECTION PROJECT

- ❑ ~ 6 miles of critically eroded shoreline
- ❑ Dunes constructed and planted to protect critical NASA infrastructure
- ❑ This is an Interagency & Intergovernmental Support (IIS) Project
  - ❑ NASA authority and appropriations
- ❑ Currently in design phase
- ❑ Restore beach to 260 foot berm width

Approximately 1.4 MCY needed every 15 years

KENNEDY SPACE CENTER, BREVARD COUNTY
FINDING AND DEVELOPING NEW SAND SOURCES FOR NEW SHORE PROTECTION PROJECT

- Sand Search Data sets
  - Coastal Sustainability Study
  - Historical Documents
  - SAD SAND Study
  - NOAA Bathymetry Data & GIS
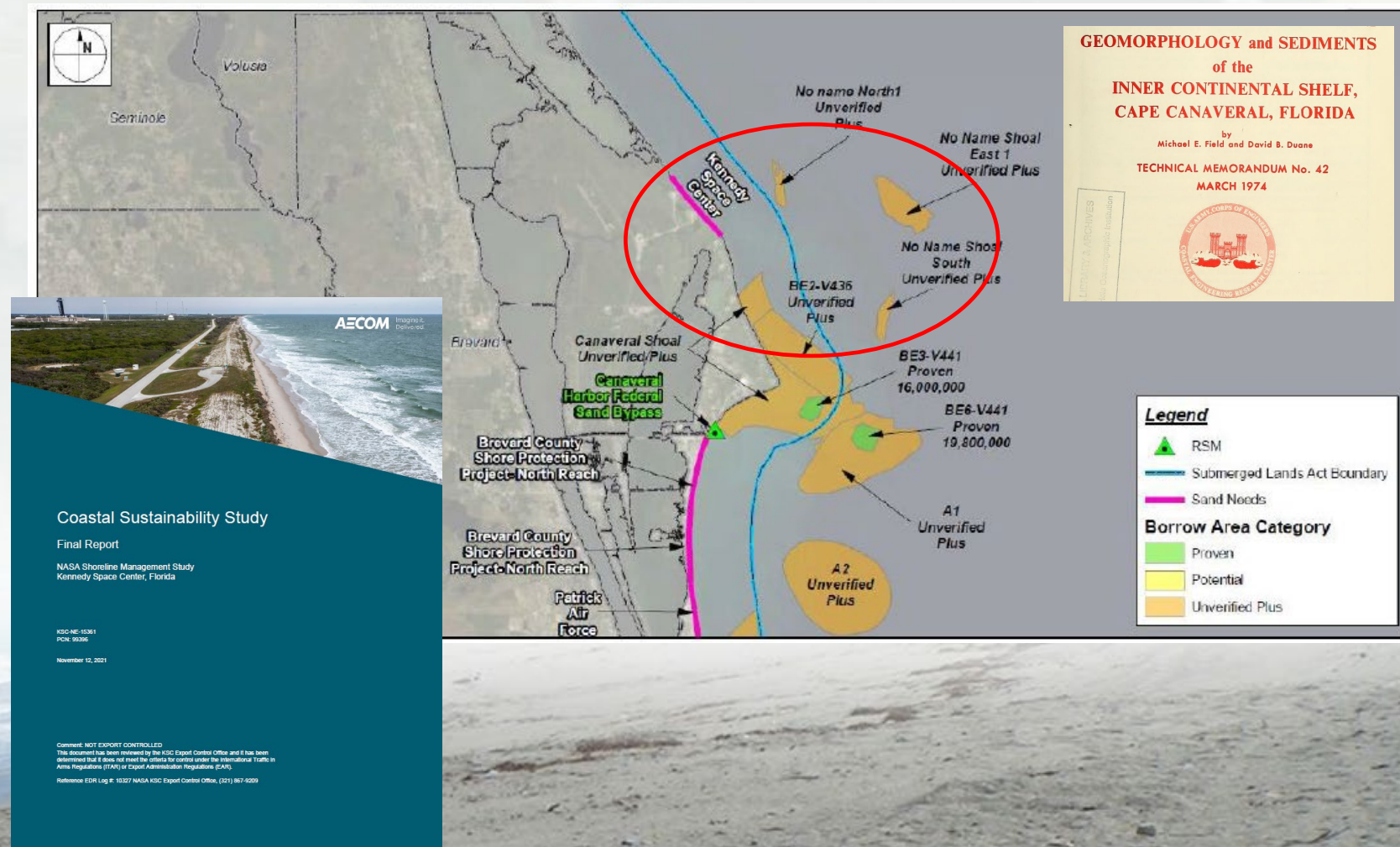
KENNEDY SPACE CENTER, BREVARD COUNTY
FINDING AND DEVELOPING NEW SAND SOURCES FOR NEW SHORE PROTECTION PROJECT

- ❑ 2-Phase Investigation
- ❑ Phase 1 - Reconnaissance (20 Cores)
- ❑ Determine which shoal will be project Borrow area
- ❑ Phase 2 – Design Level (50 Cores)
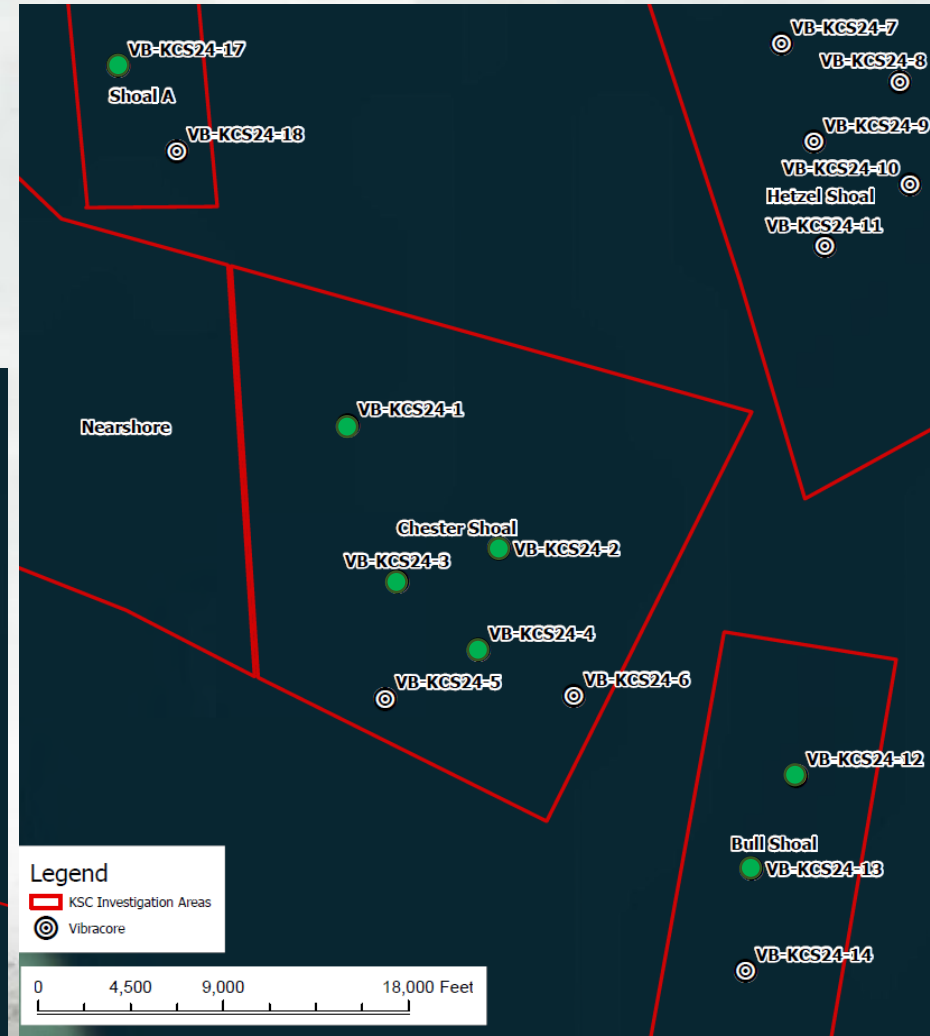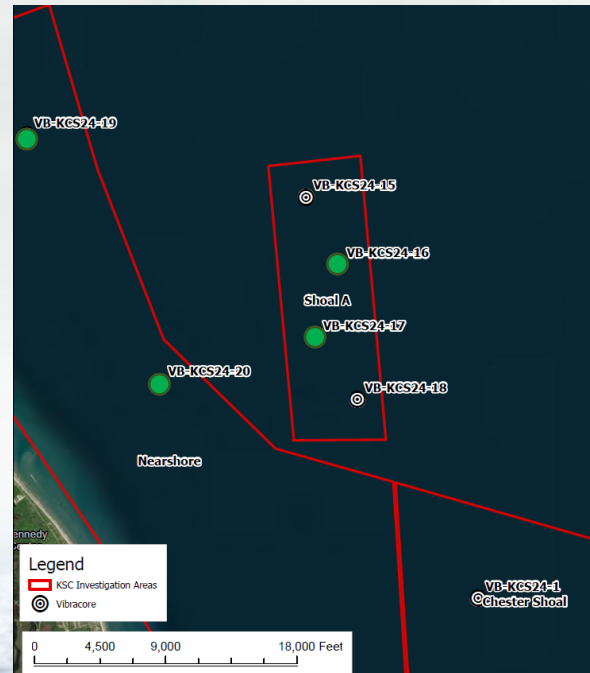
VENICE BEACH NOURISHMENT, SARASOTA COUNTY BEC

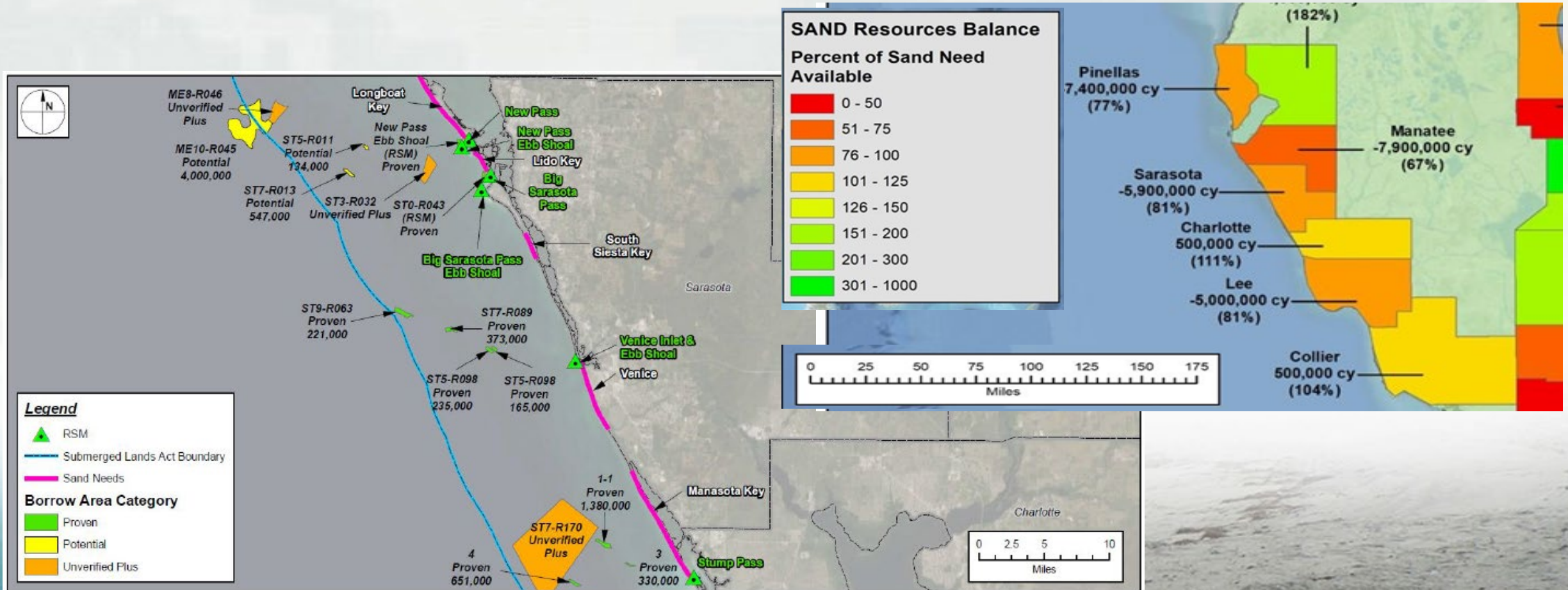## THE DIFFICULTIES OF SEARCHING FOR SAND IN SAND STARVED REGIONS

Figure 6.24 Sarasota County Sand Needs and Sources

VENICE BEACH NOURISHMENT, SARASOTA COUNTY

Venice Beach

☐ ~3 miles of Federal project (R-116 to R-133)

☐ 1 million cubic yards (approx.)

☐ Previous borrow areas - nearly exhausted

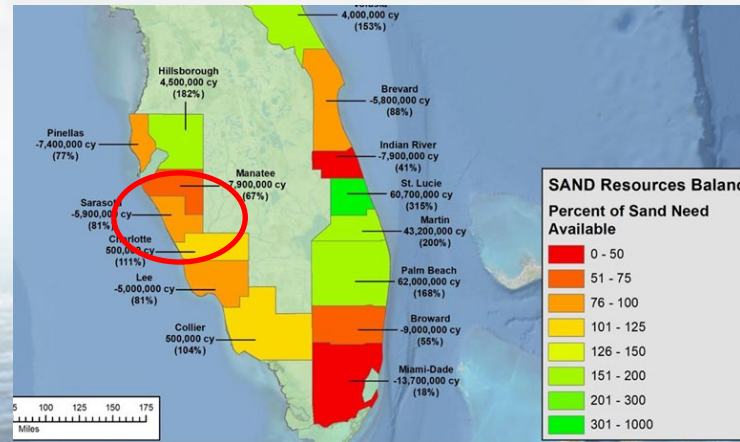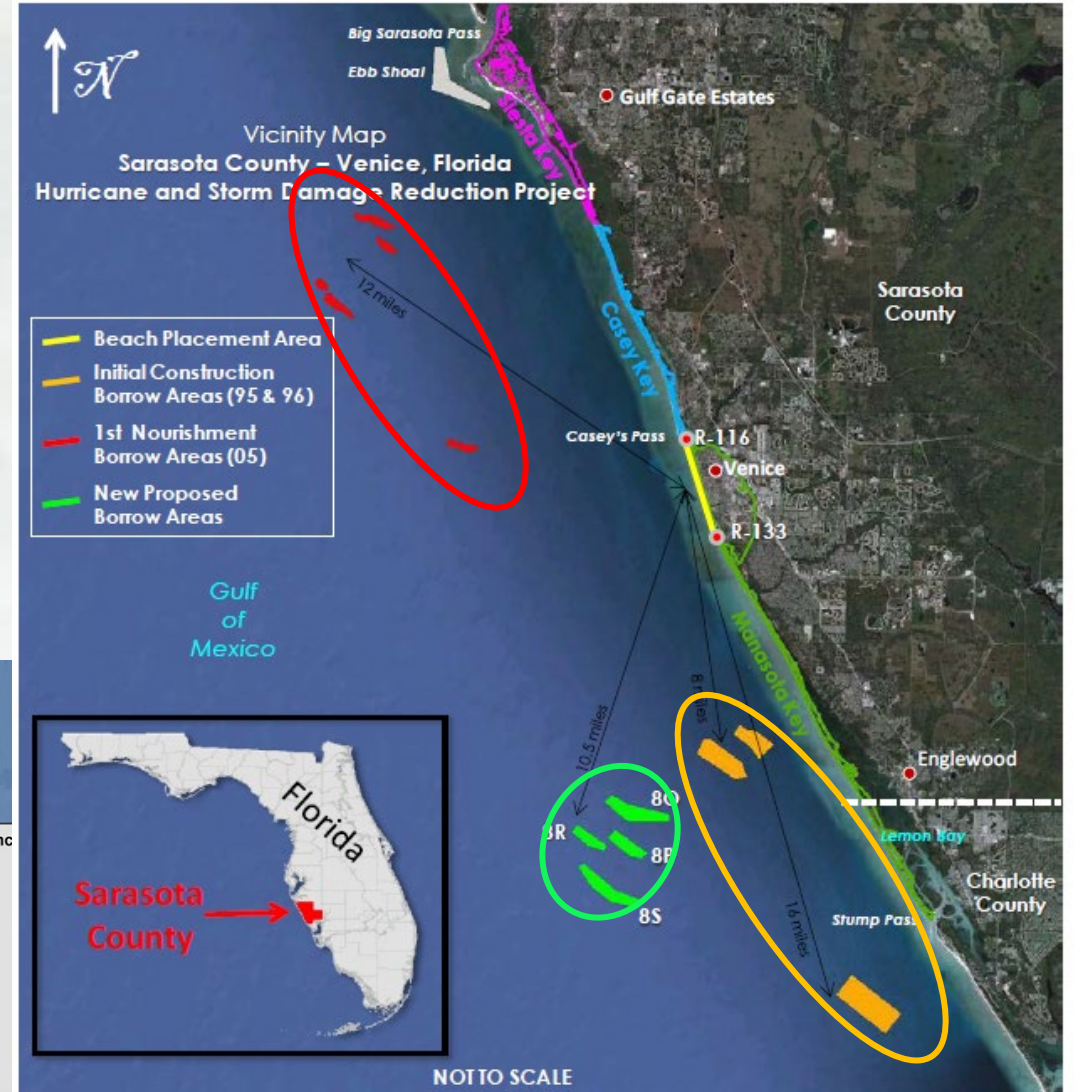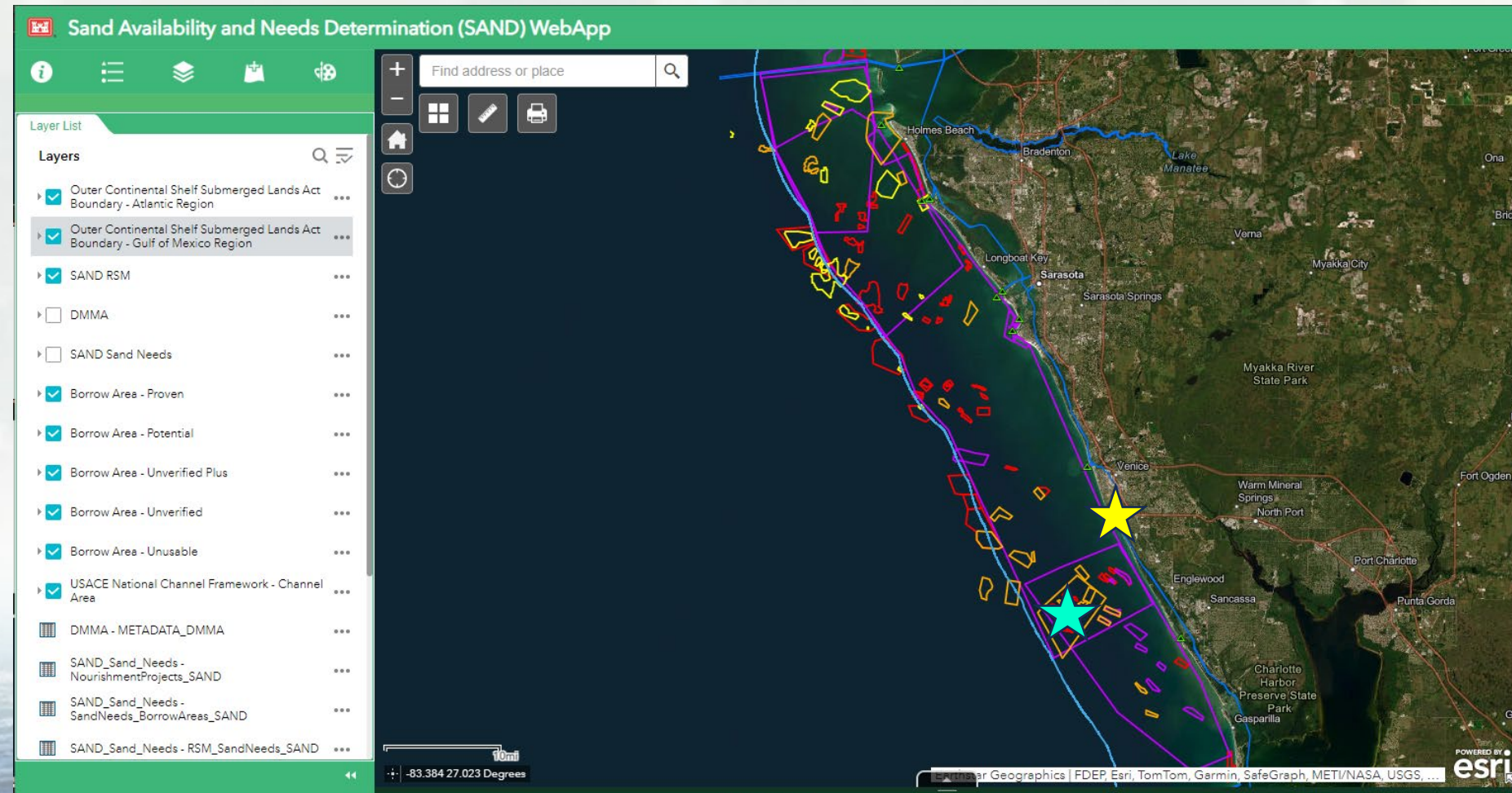☐ Sand needed for remaining 50-year life of project

☐ Sand starved region

Figure 6.2 SAND Balance Volume and Percent of Sand Need Available

VENICE BEACH NOURISHMENT, SARASOTA COUNTY

THE DIFFICULTIES OF SEARCHING FOR SAND IN SAND STARVED REGIONS

- ❑ Sand Search Data sets
  - ❑ Regional Studies
  - ❑ ROSSI Database
  - ❑ SAD SAND Study
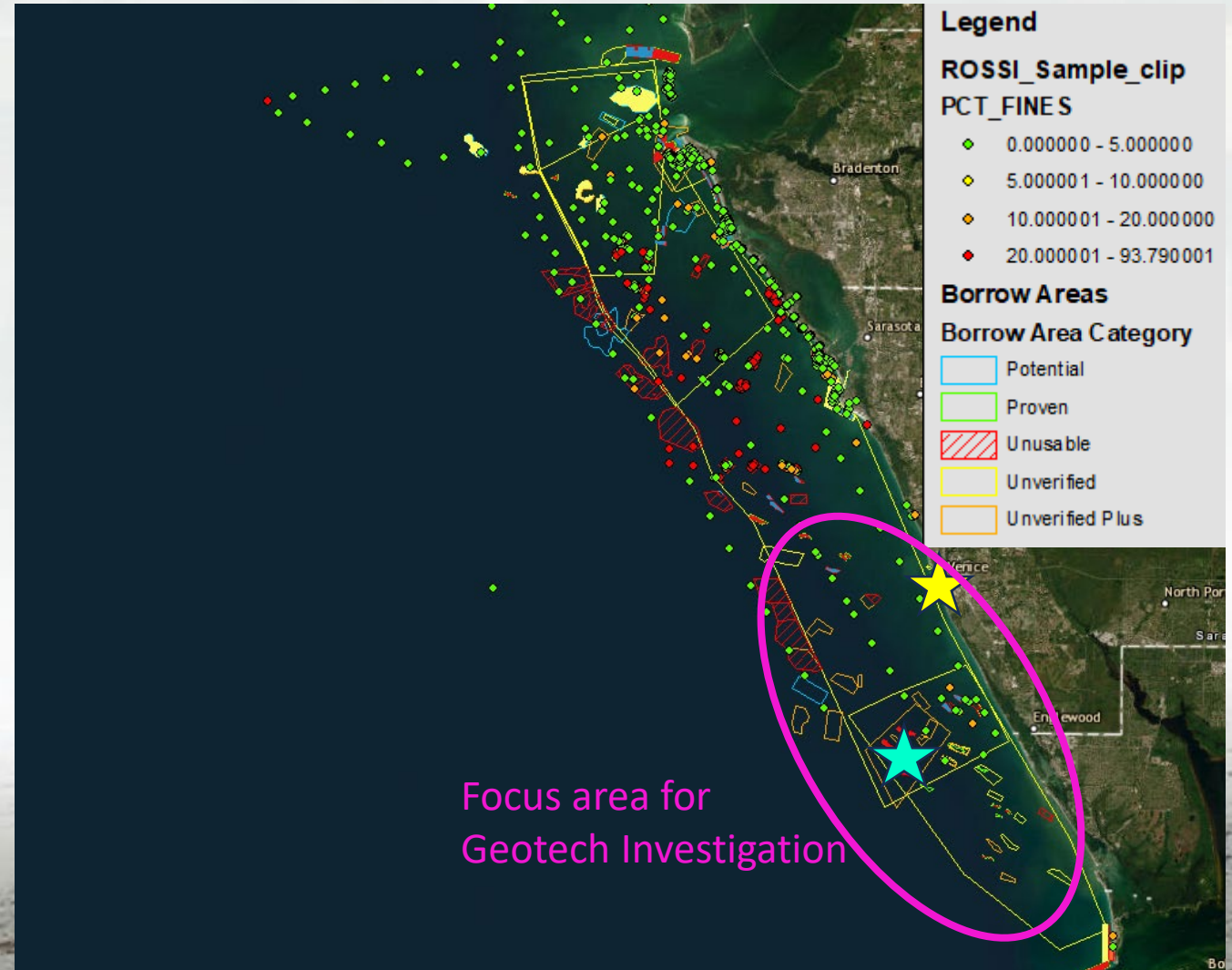 - ❑ NOAA Bathymetry Data & GIS

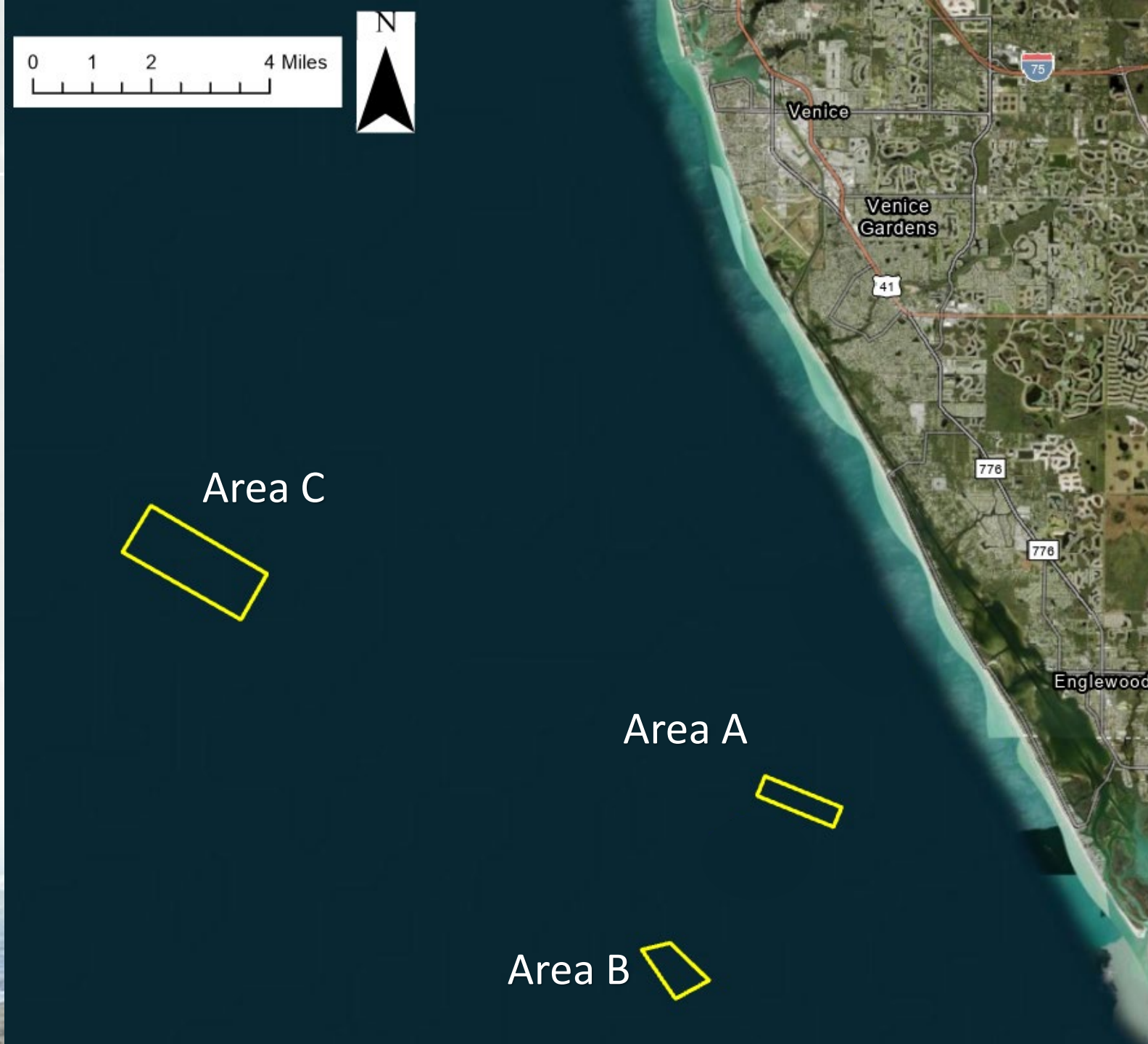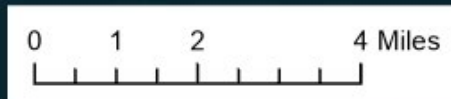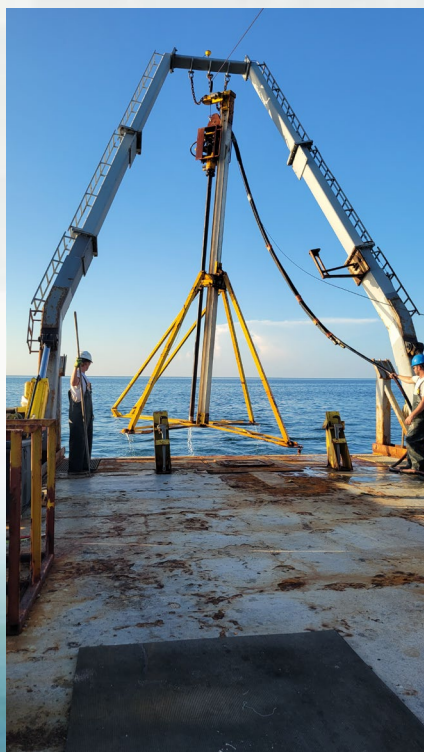# VENICE BEACH NOURISHMENT, SARASOTA COUNTY

THE DIFFICULTIES OF SEARCHING FOR SAND IN SAND STARVED REGIONS

- ❑ Sand Search Data sets
  - ❑ Regional Studies
  - ❑ ROSSI Database
  - ❑ SAD SAND Study
  - ❑ NOAA Bathymetry Data & GIS

Legend

ROSSI_Sample_clip
PCT_FINES
- 🟢 0.000000 – 5.000000
- 🟡 5.000001 – 10.000000
- 🟠 10.000001 – 20.000000
- 🔴 20.000001 – 93.790001

Borrow Areas
Borrow Area Category
- Potential
- Proven
- Unusable
- Unverified
- Unverified Plus

Focus area for Geotech Investigation

- 50 vibracores
- 3 target areas to investigate
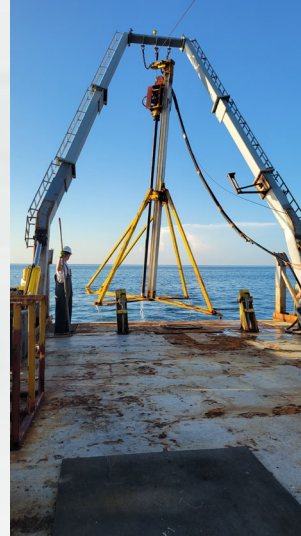
Area C

Area A

Area B

VENICE BEACH NOURISHMENT, SARASOTA COUNTY

THE DIFFICULTIES OF SEARCHING FOR SAND IN SAND STARVED REGIONS

❑ Areas A & B – Only thin layer of beach compatible sand present over noncompliant silt, clay and limestone

❑ Area C – Entirely silt, clay, and limestone

VENICE BEACH NOURISHMENT, SARASOTA COUNTY

THE DIFFICULTIES OF SEARCHING FOR SAND IN SAND STARVED REGIONS

❑ Areas A & B – Only thin layer of beach compatible sand present over noncompliant silt, clay and limestone
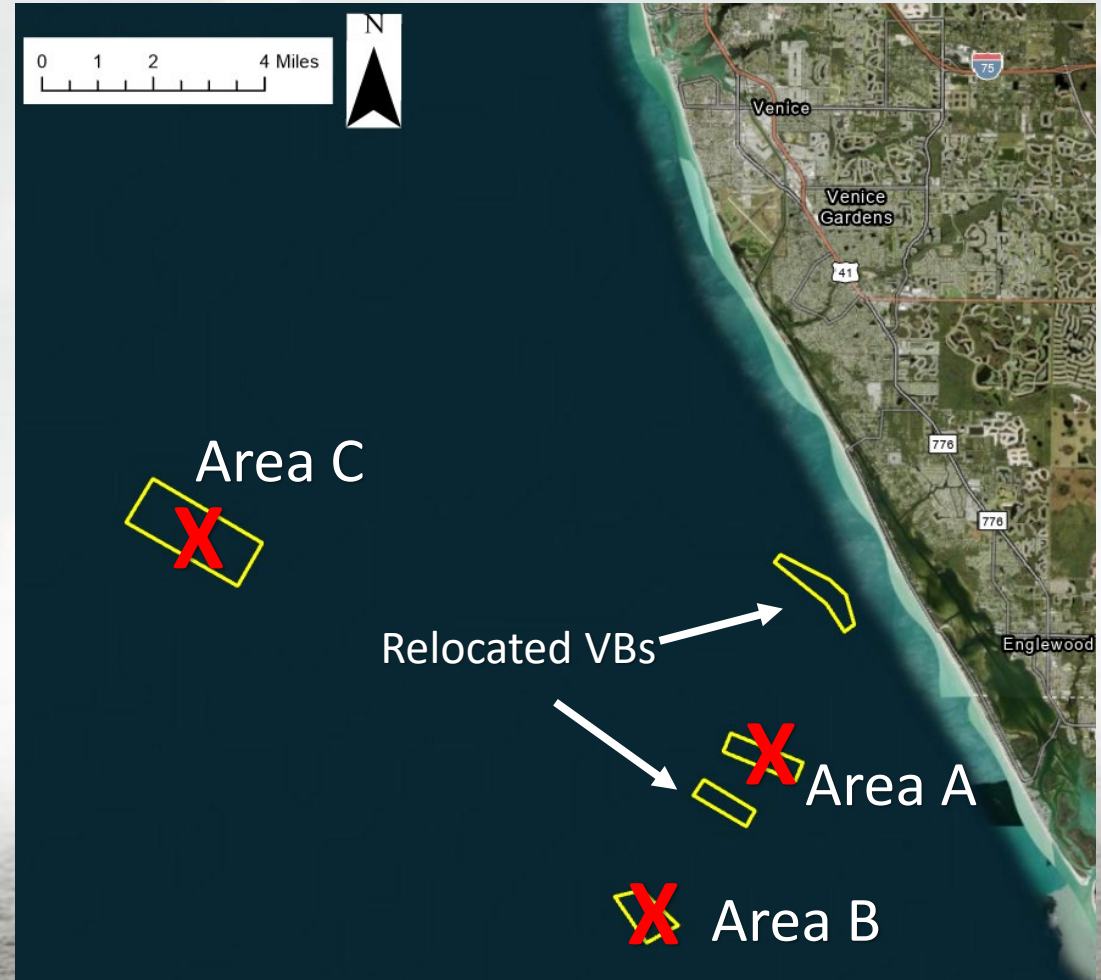
❑ Area C – Entirely silt, clay, and limestone

❑ Relocated Areas – Some sand, but additional investigations would be needed

   ❑ Reconnaissance level drilling identified thin discontinuous layers of sand

CONCLUSIONS

❑ Geology, geomorphology, and sediment pathways influence availability of offshore sand.

❑ Similar methodologies produce dramatically different outcomes between projects in different regions and sediment type.

❑ Sand searches are data and cost intensive efforts that may not always result in sufficient volumes of beach compatible sand for projects.

❑ Future sand searches will become increasingly difficult as sand resources become depleted.

St. Augustine SPP – Nov 2024

SAND SEARCH RESULTS DIFFER BY REGION

QUESTIONS?

https://www.saj.usace.army.mil/StJohnsVilanoCSRM/

https://www.saj.usace.army.mil/StAugustineBeach/

https://www.saj.usace.army.mil/PonteVedra/

https://www.nasa.gov/kennedy/

https://www.saj.usace.army.mil/About/Congressional-Fact-Sheets-2024/Sarasota-County-FL-BEC-C/

- ❑ Nicholas McCarroll, PhD – Nicholas.mccarroll@usace.army.mil
- ❑ Jennifer Coor, PhD, PG – Jennifer.L.Coor@usace.army.mil

SIMILAR METHODOLOGIES IN DIFFERENT REGIONS CAN PRODUCE DRAMATICALLY DIFFERENT OUTCOMES BETWEEN PROJECTS

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