Beach Preservation Ad Hoc Committee
11:00 a.m., Tuesday, August 12, 2025
City Hall Council Chambers
1207 Palm Boulevard, Isle of Palms, SC 29451

Agenda

1. Call to order and acknowledgement that the press and the public have been duly notified of this meeting in accordance with the Freedom of Information Act
2. Presentation- Tara Marden, Coastal Protection Engineering report
3. Review progress on Beach Preservation Ad Hoc Committee's recommendations
4. Next steps- forthcoming second opinion from Foth Olsen expected late August
5. Adjournment

Erosion Assessment of the South End of Isle of Palms

Prepared For
Paul Jorgensen

Prepared By
COASTAL PROTECTION ENGINEERING, LLC

May 2025

Executive Summary

Isle of Palms Erosion Analysis – Southern End near Breach Inlet

The southern shoreline of Isle of Palms, SC, near Breach Inlet, is experiencing accelerated beach erosion over the past few years. Between 2019 and 2024, the high-water line retreated between 40 to 70 meters, resulting in the complete loss of the frontal dune system and exposing homes and infrastructure to direct storm damage. This segment of shoreline, unlike the more frequently managed northeastern end of the island, has historically been left unmanaged, without large-scale coastal stabilization or beach nourishment. A group of local homeowners concerned with regional erosion trends funded this independent study to assess the causes of erosion and identify practical long-term solutions to mitigate for the erosion trend observed.

This report presents the findings of a preliminary, qualitative assessment conducted by Coastal Protection Engineering of North Carolina, Inc. (CPE), in partnership with Dr. Duncan FitzGerald of Boston University. The evaluation included a comprehensive literature review, site-specific field observations, a GIS analysis of historical shoreline positions from the 1700s to the present, as well as a morphologic evaluation of Breach Inlet using historical and recent aerial imagery. This effort was designed to characterize the beach and inlet behavior over time, assess sediment transport processes, and understand the natural forces shaping the beach at the project area.

Findings confirm that the chronic erosion is largely driven by the dynamic behavior of Breach Inlet, including shifting inlet channels, shoal welding, and sediment bypassing events. These processes are further compounded by longshore sediment transport from north to south towards breach inlet, and sea level rise. The absence of beach management program in this area leaves it particularly vulnerable to these stressors.

While this portion of the island has seen minimal historical intervention, a recent U.S. Army Corps of Engineers beneficial use project placed dredged sand along the outer beach profile between 2nd and 10th Avenues. However, the sand was not placed to a designed berm width or elevation, and it remains uncertain, given the highly dynamic inlet conditions, whether this material will migrate landward to meaningfully benefit the recreational beach or dune system.

Given the site's high vulnerability to shoreline change, dynamic inlet-adjacent beach setting, and the absence of past beach management efforts, CPE recommends conducting a comprehensive Alternatives Analysis to evaluate a full range of shoreline protection strategies to protect the southern end of the Isle of Palms from erosion and storm damage. This analysis should include a "No Action" scenario to illustrate potential erosion risks, soft engineering options like beach nourishment and dune restoration, hybrid approaches that combine limited structures with sand and vegetation, and hard structures such as a permeable terminal groin near Breach Inlet. Each alternative should be assessed for effectiveness, permitting feasibility, cost, environmental impact, potential downdrift effects, and long-term resilience under sea level rise scenarios.

The terminal groin option appears promising and warrants further consideration; therefore, a more detailed description of this alternative is provided in this report. This structure could hypothetically capture a portion of the southwestward longshore sediment transport, creating a wider beach fillet on the updrift side to buffer against erosion, while allowing excess sand to bypass the structure and continue feeding the inlet system, thereby minimizing potential downdrift impacts on Sullivan's Island and the adjacent inlet shoreline. The benefits and potential impacts of this approach should, however, be thoroughly analyzed using established coastal engineering practices, sediment budget development, and numerical modeling of coastal morphology utilizing state-of-the-art models such as Delft3D.

Because any proposed beach management work, including nourishment and/or structural interventions such as the terminal groin, would occur on City- or State-owned property, private property owners do not have the legal authority to implement the project independently. A viable path forward would be for either the City or a group of private property owners to sponsor the feasibility study to develop and assess shoreline protection alternatives and identify a preferred alternative. This study would document the project's public benefits and potential impacts, providing the City with the technical basis needed to support decision-making. If the City is supportive of the project but lacks the financial capacity to act as the sponsor following the feasibility phase, private owners could consider working with the City to contribute funding for design and construction. While this approach has been successfully implemented in other communities, it would require substantial financial commitment from participating property owners. Regardless of the path chosen, early collaboration with the City will be essential to securing project support and ensuring alignment with regulatory requirements.

Protecting this stretch of the Isle of Palms from beach erosion and storm impacts will require a deliberate solution grounded in the latest science and engineering, one that balances near-term protection with the long-term sustainability of the Breach Inlet system and the southern end of Isle of Palms.

TABLE OF CONTENTS

LIST OF FIGURES

1. Isle of Palms Erosion Analysis Introduction

Coastal Protection Engineering is pleased to submit this technical report summarizing the results of our evaluation of the shoreline erosion along the southern end of Isle of Palms, near Breach Inlet in South Carolina. This work was conducted to characterize the coastal processes that influence the shoreline erosion observed over the past two years in the project area (southern end of Isle of Palms), and to provide recommendations for future beach management strategies, including potential alternatives for beach stabilization.

The study was structured around four main tasks:

- **Task 1**: Literature Review and Data Collection
- **Task 2**: Site Visits and Field Documentation
- **Task 3**: Shoreline Change and Inlet Morphology Analysis
- **Task 4**: Recommendations for Future Actions

2. Summary of Tasks and Findings

2.1. Task 1 – Literature Review and Data Collection

Coastal Protection Engineering (CPE) conducted a review of scientific papers about the dynamics of beaches adjacent to non-stabilized inlets, similar to the southern end of Isle of Palms. We focused on the work conducted by Dr. Duncan Fitzgerald, one of the team members who participated in this project, as well as other authors. We also conducted a comprehensive review of publicly available studies, engineering reports, agency data, and academic literature relevant to the Isle of Palms shoreline and Breach Inlet. This effort focused on synthesizing information to understand long-term and recent coastal processes influencing erosion in the project area. Key sources reviewed include:

Inlet Dynamics and Shoreline Variability

Natural tidal inlets are among the most dynamic coastal features, exerting significant influence on adjacent shorelines through complex interactions of tidal currents, sediment transport, and shoal morphology. Numerous studies conducted by Dr. FitzGerald, have highlighted the occurrence of large fluctuations in erosion and accretion patterns of beaches adjacent to inlets, particularly as a result of ebb-tidal channel migration and shoal reconfiguration.

Research by FitzGerald (1984) documented the pronounced influence of channel migration on shoreline stability, with alternating patterns of erosion and accretion depending on the channel's proximity and sediment bypassing mechanisms. These fluctuations are especially evident in systems such as Price Inlet, SC, where landward or lateral shifts of the main ebb channel led to measurable shoreline retreat on one flank of the inlet while promoting sediment accretion on the other.

FitzGerald and collaborators have identified three principal sediment bypassing mechanisms that drive inlet-associated shoreline changes: (1) inlet migration and spit breaching, (2) swash bar welding across stable inlet throats, and (3) ebb-shoal breaching with subsequent bar attachment along the downdrift shore (FitzGerald, 1988). These processes redistribute sediment in episodic pulses rather than continuous drift, resulting in non-linear and often abrupt changes in shoreline morphology.

FitzGerald (1982) also emphasized the role of asymmetric tidal flows, particularly in ebb-dominated inlets, where stronger seaward-directed currents promote the seaward migration and growth of ebb-tidal deltas. These deltaic features in turn modulate nearshore wave energy distributions, indirectly impacting sediment budgets and shoreline alignment downdrift of the inlet. The presence of dynamic shoal systems further complicates shoreline response. As shoals detach, migrate, and eventually weld onto the coast, rapid localized accretion events may occur. Conversely, erosion may ensue when shoals bypass the shoreline or when the inlet channel redirects flow paths away from sediment-deprived areas.

Additional research by Oertel (1975) and Dean and Walton (1973) supports FitzGerald's findings, confirming that inlet channel migration and ebb-shoal reworking can redistribute large volumes of sediment and cause significant, often unpredictable, changes in adjacent beaches. These studies collectively reinforce the observation that the south end of the Isle of Palms is behaving in a manner consistent with well documented beaches adjacent to non-stabilized inlets, particularly in response to the dynamic behavior of Breach Inlet and its associated shoals.

Due to the processes described above, shorelines adjacent to non-stabilized inlets, such as the south end of the Isle of Palms, are naturally subject to wild fluctuations of erosion and accretion. At this location, the shifting orientation of Breach Inlet's channel and the development of flood and ebb shoals, as well as flood channels have historically driven cycles of extreme shoreline retreat followed by episodic recovery. Historical shoreline analyses later described in greater detail in this report, for example, indicate that the shoreline at the southern end of Isle of Palms was located significantly landward of its present position during the 1920s and, conversely, significantly seaward of its current location during the 1990s. These fluctuations are characteristic of beaches adjacent to non-stabilized inlets where channel and shoal morphology evolve continuously in response to both storm events and longer-term tidal inlet dynamics.

Site-Specific Studies

Key publicly available studies, engineering reports, agency data, and academic literature relevant to the Isle of Palms shoreline and Breach Inlet reviewed include:

- Coastal Science & Engineering (CSE) 2024 Annual Monitoring Report, summarizing shoreline change trends, inlet dynamics, and sediment transport patterns.

- **NOAA and USGS coastal vulnerability data**, including updated regional sea level rise (SLR) projections and flood risk scenarios for the Charleston region.
- **Historic aerial imagery and shoreline mapping** (1776, 1919, 1943, 1958, 1968, 1994, 2019–2024) illustrating long-term barrier island migration, backbarrier infilling and beach progradation and retreat patterns.
- **U.S. Army Corps of Engineers (USACE) 2024–2025 beneficial use dredging project** information and construction updates.
- **Wind and wave climatology** based on a 16-year record from Charleston, characterizing dominant storm-driven sediment transport directions toward Breach Inlet.

Emphasis was placed on understanding past beach management practices at Isle of Palms. It was observed that nearly all major coastal protection projects (seawalls, groins, nourishment projects, and shoal management) from the 1970s to 2018 were concentrated east of 41st Avenue, near Wild Dunes and Dewees Inlet. No large-scale nourishment or stabilization efforts historically targeted the southern Isle of Palms or the Breach Inlet to 6th Avenue segment. As a result, this western portion of the island is influenced by natural tidal inlet dynamics and its effects are left unmitigated.

Key findings from the literature review include:

- **Erosion Patterns (CSE, 2024)**: The Breach Inlet to 6th Avenue area experienced long-term accretion through the 1980s but shifted to a net erosional trend around 2009. Between 2023 and 2024, the reach lost approximately 27,000 cubic yards of sand (~-6.1 cy/ft), although this rate of erosion was lower than during the 2021–2023 period.
- **Inlet Morphology (CSE, 2024)**: Historical bathymetric surveys documented a shoal bypass event at Breach Inlet between 2020 and 2022, where a large bar welded onto Sullivan's Island. The primary inlet channel has since migrated toward Sullivan's Island, altering sediment dynamics and reducing natural sediment supply to the Isle of Palms southern shoreline.
- **Sea Level Rise and Coastal Flooding Risks (NOAA, 2022)**: Charleston Harbor, located a few miles to the west of the project area, is experiencing sea level rise at approximately +3.34 mm/year (~13 inches per century). Projections suggest 2 feet of rise by 2060 and 4 feet by 2100 under an Intermediate SLR scenario. Even with moderate SLR, "nuisance" flooding of back-barrier marshes, low roads, and infrastructure (e.g., Waterway Boulevard at Isle of Palms) will become increasingly frequent. Open oceanfront areas are projected to remain less impacted in early stages, but long-term vulnerability will likely rise as storm surge elevations increase.
- **USACE Beneficial Use Project (2024–2025)**: The U.S. Army Corps of Engineers is placing ~500,000 cubic yards of dredged material along the Isle of Palms shoreline between 2nd and 10th Avenues. Sediment is pumped from spoil banks along the AIWW behind Breach

Inlet, consisting of fine-grained sand with some silt content. Placement is intentionally occurring below mean high water (MHW) to allow natural landward migration through tidal reworking.

- **Wave and Wind Climate (Charleston Data)**: Long-term meteorological data shows that northeast winds dominate during major storm events, generating northeast-originating waves that drive southerly longshore sediment transport along Isle of Palms toward Breach Inlet.

Literature Review Summary:

The Breach Inlet to 6th Avenue beach segment has historically been subjected to large fluctuations in shoreline position due to natural inlet-driven processes, without the benefit of large-scale engineered interventions. Over the past two decades, erosion has been exacerbated by inlet shoal dynamics, storms, and limited sediment replenishment. Projections of accelerating sea level rise and coastal flooding risks underscore the need for proactive, site-specific management strategies tailored to this highly dynamic environment.

This literature review provided the foundational understanding needed to inform field evaluations, shoreline change analysis, and the recommendation of preliminary management alternatives to build and maintain a healthy beach at the southern end of Isle of Palms.

2.2. Task 2 – Site Visits and Field Observations

As part of this evaluation, Ms. Tara Marden of Coastal Protection Engineering (CPE) and Dr. Duncan FitzGerald of Boston University conducted multiple site visits to the Isle of Palms beachfront near Breach Inlet between January and April 2025. These inspections were essential for directly assessing current beach and dune conditions, collecting georeferenced photographs, and observing and documenting active coastal processes influencing beach behavior.

Conditions Observed at the Site Include:

- Extremely narrow and flat recreational beach at high tide, offering almost no dry sandy area for public or private use.
- Minimal or absent dune system seaward of private properties, resulting in direct exposure of structures to storm impacts.
- Fine sand grain size, susceptible to aeolian (wind-driven) transport, significant aeolian activity, with visible windblown sand moving inland due to lack of vegetation or dune traps to capture and retain it.
- Sandbags deployed extensively across numerous properties as emergency stabilization measures.
- Wrack lines (high tide debris lines) consistently located near or at the base of private decks, walkways, and other infrastructure, illustrating minimal buffer against tides.

- Intertidal bedforms of varying shapes, sizes, and orientations were prevalent, indicating the highly energetic and complex nature of the nearshore tidal and wave environment.
- Tidal channels and shoals actively shift, compounding sediment mobility and shoreline instability.
- Field inspections during USACE beneficial use dredging operations noted that newly placed dredged sand was deposited well offshore of the mean high water (MHW) line, intended to gradually migrate landward over time through natural tidal and wave action.

The combined effect of limited beach width, lack of dune protection, visible signs of threatened homes and infrastructure, dynamic bedforms, and offshore sediment placement highlights the vulnerability of this stretch of the Isle of Palms. Immediate action strategies will be needed to avoid continued land loss and storm damage.

Figure 1. Photographs from recent site visit showing the high tide wrack line at the toe of the artificial dune (top photo) and a wide flat beach lacking a dune (bottom photo).

2.3. Task 3 – Shoreline Change and Inlet Morphology Analysis

Introduction

As previously described in this technical report, beaches adjacent to non-stabilized tidal inlets, such as Breach Inlet between Isle of Palms and Sullivan's Island, experience significant fluctuations in erosion and accretion driven by dynamic inlet processes. These fluctuations result from changes in inlet channel orientation, the formation of secondary flood channels, and the shifting size and position of ebb-tidal shoals—all influenced by storms and longer-term coastal processes. Historical analysis of the southern end of Isle of Palms reveals extreme shoreline variability, with periods of severe erosion extending landward of current property lines to periods of accretion resulting in wide beach berms. This type of variability is typical of shorelines adjacent to active, non-stabilized inlets and illustrates the dynamic nature of the shoreline.

The inlet's tidal prism, wave climate, and longshore sediment transport govern local morphodynamics, often leading to the migration of sandbars and shifts in primary and secondary channels that either starve or supply sand to adjacent beaches. For example, when Breach Inlet's main channel migrates southwest toward Sullivan's Island without a deep secondary flood channel wrapping around Isle of Palms, the adjacent shoreline in the southern end of Isle of Palms tends to experience accretion. However, these same configurations often correspond with increased erosion on the northeastern end of Sullivan's Island, highlighting the interconnected sediment dynamics of the system.

One member of the project team, Dr. FitzGerald, a leading expert in inlet morphology, has extensively documented these processes, noting that tidal inlets are inherently dynamic systems where sand bypassing and ebb-tidal delta evolution strongly influence adjacent shorelines (FitzGerald, 1988; FitzGerald et al., 2013). Without intervention, such variability is expected to persist as Breach Inlet continues to respond to fluctuating hydrodynamic conditions.

The Breach Inlet shoreline is naturally dynamic, undergoing cycles of erosion and accretion strongly influenced by tidal inlet processes, longshore sediment transport, and wave energy. This task involved evaluating both historical and recent shoreline changes near Breach Inlet to better understand the causes of ongoing erosion at the southern end of Isle of Palms.

Inlet Morphology and Sediment Transport Evaluation

Understanding the behavior of Breach Inlet was a critical component of this evaluation. Using a series of historical aerial photographs, CPE analyzed changes in inlet morphology over the past decades. Key features such as the orientation of the main channel, the formation and welding of shoals, and shoreline positions were mapped and assessed. This analysis clarified how channel migration, sediment deposition, and shoal evolution have contributed to periods of both erosion and accretion along the adjacent Isle of Palms beaches.

Beaches near non-stabilized tidal inlets are typically the most dynamic sections of barrier islands due to the complex interactions between tidal and wave-generated currents, as well as the effects of channel switching and landward migration of offshore bars. These areas are commonly characterized by cyclic erosional and depositional patterns driven by inlet hydrodynamics and sediment transport processes. The southwestern end of Isle of Palms directly abuts Breach Inlet, which migrated steadily southward before stabilizing near its present-day location by the early 1900s. Since that time, the inlet has scoured into semi-consolidated mud layers, anchoring the main channel and preventing further large-scale migration. In addition, groins and riprap revetments placed along the downdrift shoreline of Sullivan's Island have helped stabilize the inlet's location and limit further erosion of the northern-facing shoreline of Sullivan's Island (see Figures 2 and 3).

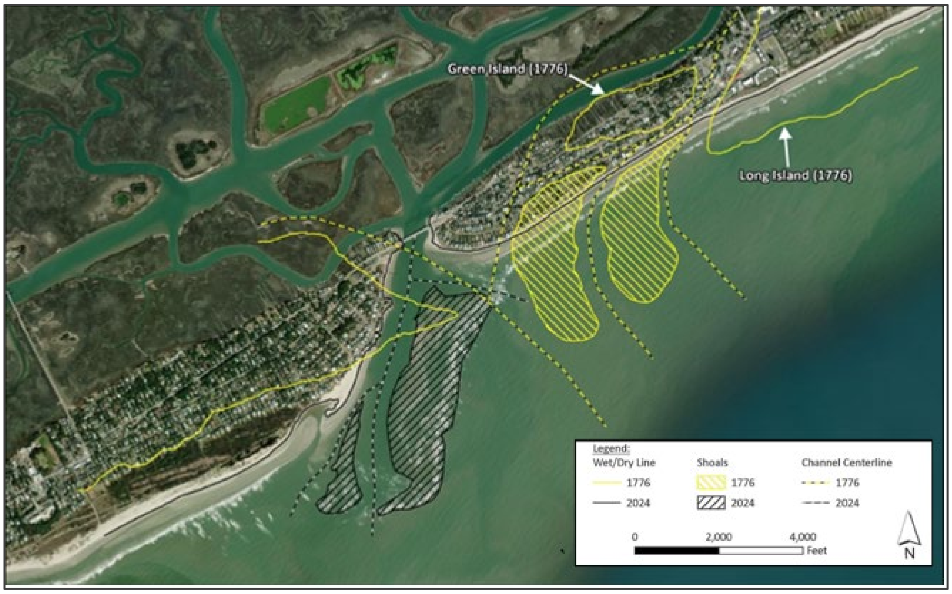


Figure 2. Historical 1776 and 2024 shorelines of Breach Inlet and Isle of Palms. Note that Breach Inlet has migrated 1.5 miles during the past circa 250 years.

Figure 3. Recent (03/2025) aerial photo of Breach Inlet and the northwest end of Sullivan's Island. The structures identified in the image have served to stabilize the inlet's location and reduce erosion.

Historical Shoreline Changes

Understanding historical shoreline changes along the southwestern end of Isle of Palms is critical for interpreting recent coastal changes in context. Figure 4 shows the position of the high-water shoreline in 1919, 1943, and 2025, illustrating a gradual southwestward migration of the island and substantial seaward progradation of the beach over the past century. The expansion of the beach and dune system during this period was primarily driven by sediment moving southward along the barrier island chain from Bull Island.

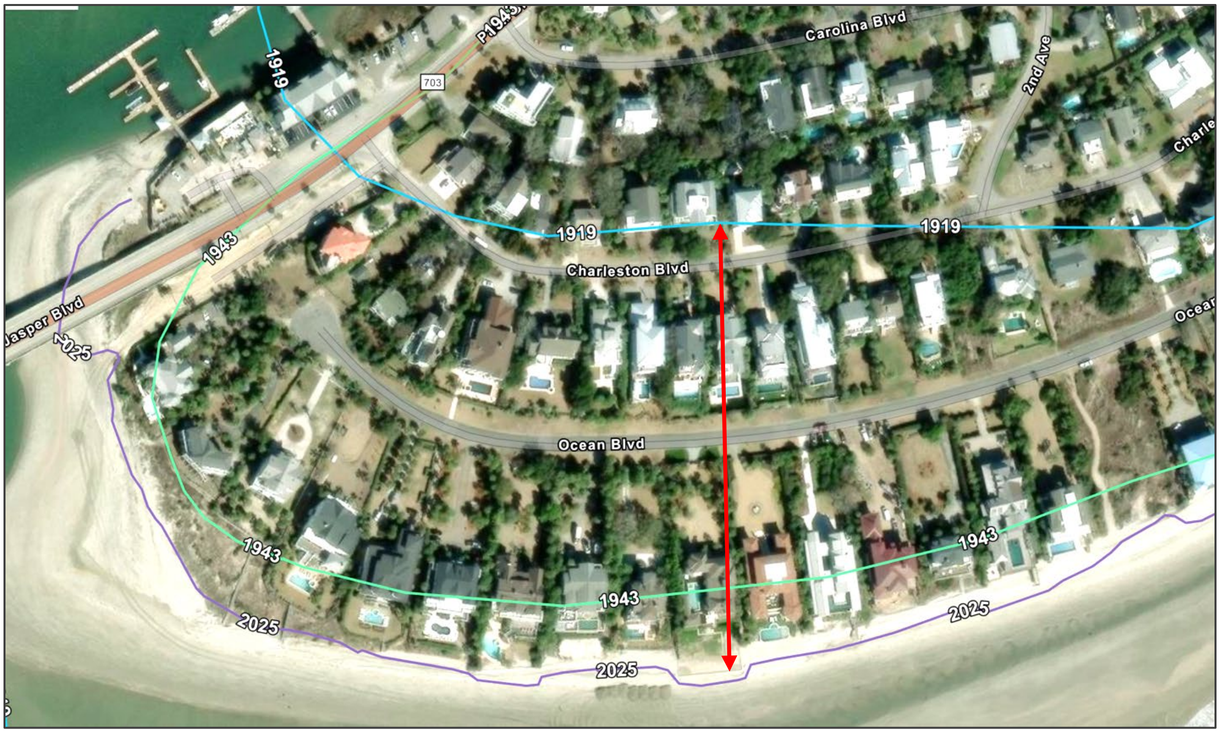


Figure 4. Aerial photo of the southwestern end of Isle of Palms showing the position of the highwater shoreline in 1919, 1943, & 2025. During this +100-yr period the ocean shoreline built seaward by almost 200 m (see red arrow).

At the same time, sediment gradually filled the marshes and open-water areas behind the barrier (the backbarrier). This infilling reduced the tidal prism — the volume of water exchanged between the ocean and the backbarrier during each tidal cycle — leading to the contraction of tidal inlets and their shoal systems. As the tidal prism diminished, wave action transported more sand onshore, further contributing to the growth of the island's beaches and dunes. Although today the tidal prisms of nearby inlets have largely stabilized, future changes are likely as sea level rise accelerates.

Recent Shoreline Retreat (2019–2024)

A more recent history of the beach is presented in Figure 5, showing shoreline positions in 2019, 2021, 2023, and 2024. Although some local variability exists, the overall trend is a consistent pattern of beach erosion and shoreline retreat. Between 2019 and 2024, the high-water shoreline migrated landward by approximately 40 to over 70 meters.

Figure 5. Shoreline changes near Breach Inlet. A. 2019 and 2021, B. 2021 and 2023, C. 2023 and 2024. Note the gradual retreat of the shoreline from 2019 to 2024.

This period of accelerated erosion resulted in the complete loss of the primary dune system, along with damage or destruction of swimming pools, infrastructure, and other private amenities. The loss of the dune system is particularly concerning, as dunes provide essential natural protection against storm surge, wave runup, and coastal flooding. Without this critical first line of defense, inland properties are now significantly more vulnerable to both daily tidal inundation and major storm events.

The following sections of this report further describe the coastal processes operating along this portion of the beach and analyze the recent trends in beach retreat and associated property impacts.

Coastal Processes

The Isle of Palms is largely sheltered from northeasterly waves with approach angles less than approximately 60 degrees due to its shoreline orientation. The prevailing wave energy impacting this coast originates from the east and southeast. Figure 6 presents a wave rose for the 44-year period from January 1980 to January 2024, illustrating the offshore wave climate near Isle of Palms (WIS Station 63347). Given the shoreline's northeast-to-southwest alignment, waves approaching from the east and southeast, particularly those with angles less than 135 degrees, drive longshore currents and sediment transport to the south, toward Breach Inlet. This represents the predominant sediment transport direction in the project area. In recent years, this net sediment transport trend has been exacerbated. Figure 7 shows a wave rose generated from the same WIS hindcast station for the period January 2022 to January 2024, illustrating a relative increase in wave energy reaching this coast from easterly, NE and southeast directions (>135) when compared to the historical average. This phenomenon has led to an increase in sediment transport toward the south along the project area.

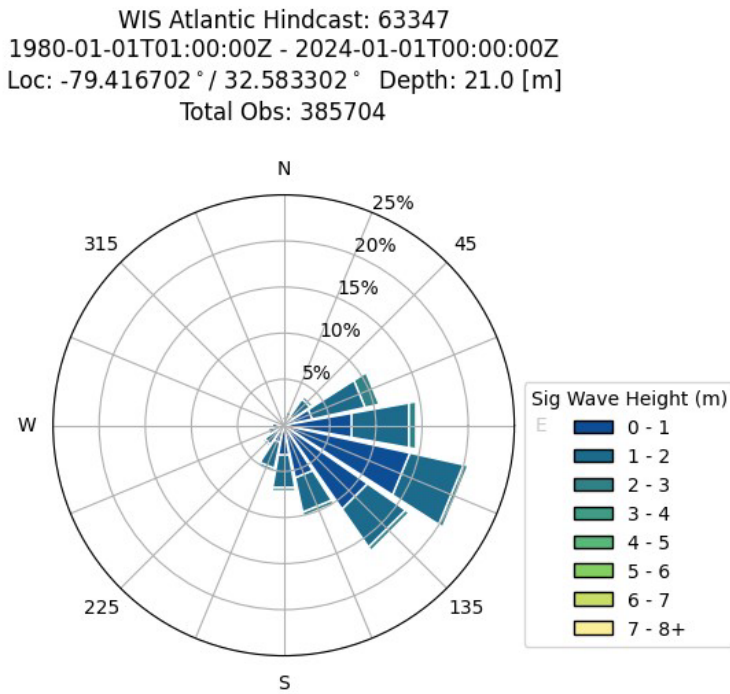


Figure 6. Wave rose offshore Isle of Palms displaying hourly hindcasted wave data from January 1st, 1980 to January 1st, 2024.

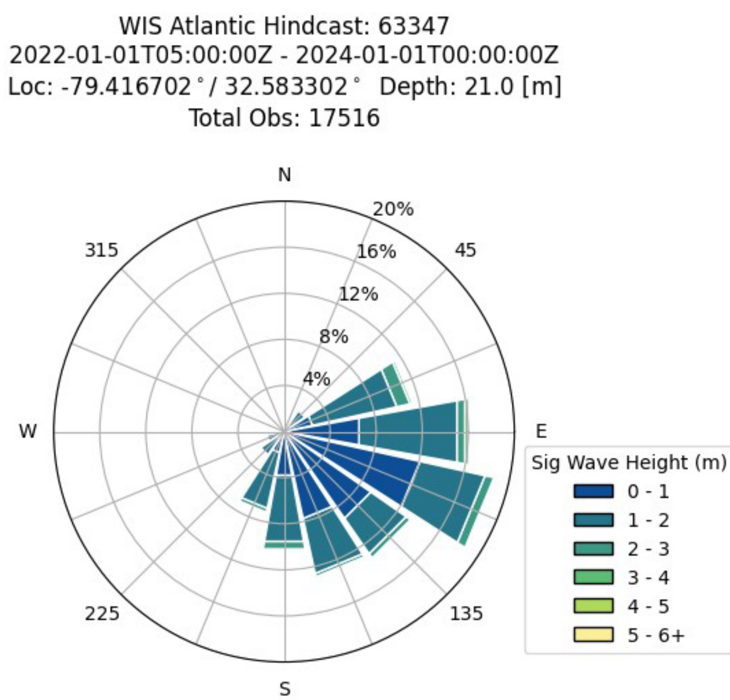


Figure 7. Wave rose offshore Isle of Palms displaying hourly hindcasted wave data from January 1st, 2022 to January 1st, 2024.

Sand is transported along the beach primarily by two processes: wave-generated longshore currents within the surf and breaker zones that flow parallel to the shoreline, and suspension of sand by shoaling and breaking waves. Along most of Isle of Palms, wave-driven currents dominate sediment transport; however, near Breach Inlet, these currents interact with tidal flows. During flood tides, incoming tidal currents augment the wave-generated longshore currents, increasing the rate of southerly sand transport south, towards the inlet. Flood-tidal currents are most effective when a shallow marginal channel (<0.5 m deep) forms just offshore, linking the nearshore zone to the inlet.

The photograph in Figure 8, taken in early spring 2025, shows a well-developed marginal flood channel that enhances flood-driven sand transport. As illustrated schematically in Figure 9, this sediment movement has led to the formation of a subtidal spit advancing into the inlet channel and a supratidal spit encroaching into the marina landward of the bridge. Most recently, sand discharged along southern Isle of Palms continues to be driven southward by longshore currents, building a prominent spit that extends into Breach Inlet (Figure 10).

Figure 8. Recent photograph (03/2025) of the nearshore zone at the southern end of the Isle of Palms, showing a well-developed marginal flood channel. The channel enhances wave-driven sediment transport toward Breach Inlet.

Figure 9. Aerial photo from 04/2024 showing angular wave approach generating southerly longshore currents, which are further enhanced by flood-tidal currents entering Breach Inlet.

Figure 10. Recent aerial photograph (03/2025) showing the dredging operation and the formation of a sand spit driven by longshore sediment transport.

Ebb-Tidal Delta Cycles

Like many tidal inlets, Breach Inlet's ebb-tidal delta and adjacent nearshore areas along the Isle of Palms exhibit cyclical morphologic changes, alternating between periods dominated by marginal flood channels and those characterized by the development of an ebb-spillover lobe. An ebb-spillover lobe forms when sand transported seaward by ebb-tidal currents is deposited beyond the inlet mouth, creating a broad, shallow bar feature across the outer delta platform.

By 2022, a new tidal channel had incised the distal portion of the ebb-tidal delta, while a large ebb-spillover lobe had developed across the location of the former main inlet channel (Figure 11). This lobe represented a temporary storage of sand offshore, interrupting the direct connection between tidal flows and adjacent shorelines. Simultaneously, a marginal flood channel began to form along the Isle of Palms shoreline, enhancing flood-directed sediment transport. By 2024, the ebb-spillover lobe had welded onto Sullivan's Island, reshaping sediment pathways and amplifying the influence of the marginal flood channel along the Isle of Palms. These evolving features have played a major role in modifying sediment transport patterns and altering the adjacent shoreline configuration over time.

Figure 11. Photographs of the ebb-tidal delta from 2022 and 2024, showing the formation of a new channel across the distal delta in 2022, which facilitated sand bypassing Breach Inlet and led to a bar welding onto Sullivan's Island.

Eventually, due to changes in flow within Breach Inlet, the marginal flood channel along the Isle of Palms transitions into an ebb-dominant channel. During the falling tide, strong ebb currents flow through this channel, transporting sand seaward. These channels are referred to as “ebb spillover lobes” and are commonly found along the updrift (northern) side of the ebb-tidal delta at Breach Inlet. As seen in the photograph in Figure 12A, several ebb spillover lobes were present in 2020, including one channel located close to the beach.

Detailed observations of the channel floor at low tide reveal an extensive system of bedforms — configurations of the sandy bottom formed by flowing water — providing a visible record of sediment movement. These bedforms are asymmetric, with a gentler slope on the upstream side and a steeper face on the downstream (seaward) side, indicating net seaward sediment transport (Figure 12B). The resulting seaward movement of sand, shown in Figure 12C, allows sediment to travel along the nearshore zone in a direction opposite the prevailing southerly wave-driven longshore transport system. Breaking and shoaling waves then move this seaward-transported sand back onshore, helping to rebuild parts of the beach.

An inspection of historical shoreline changes (see Figure 4 above) shows that the presence of a strong ebb-spillover lobe in 2020 coincided with a period of relatively slower shoreline recession, compared to more recent years when the spillover lobe was absent.

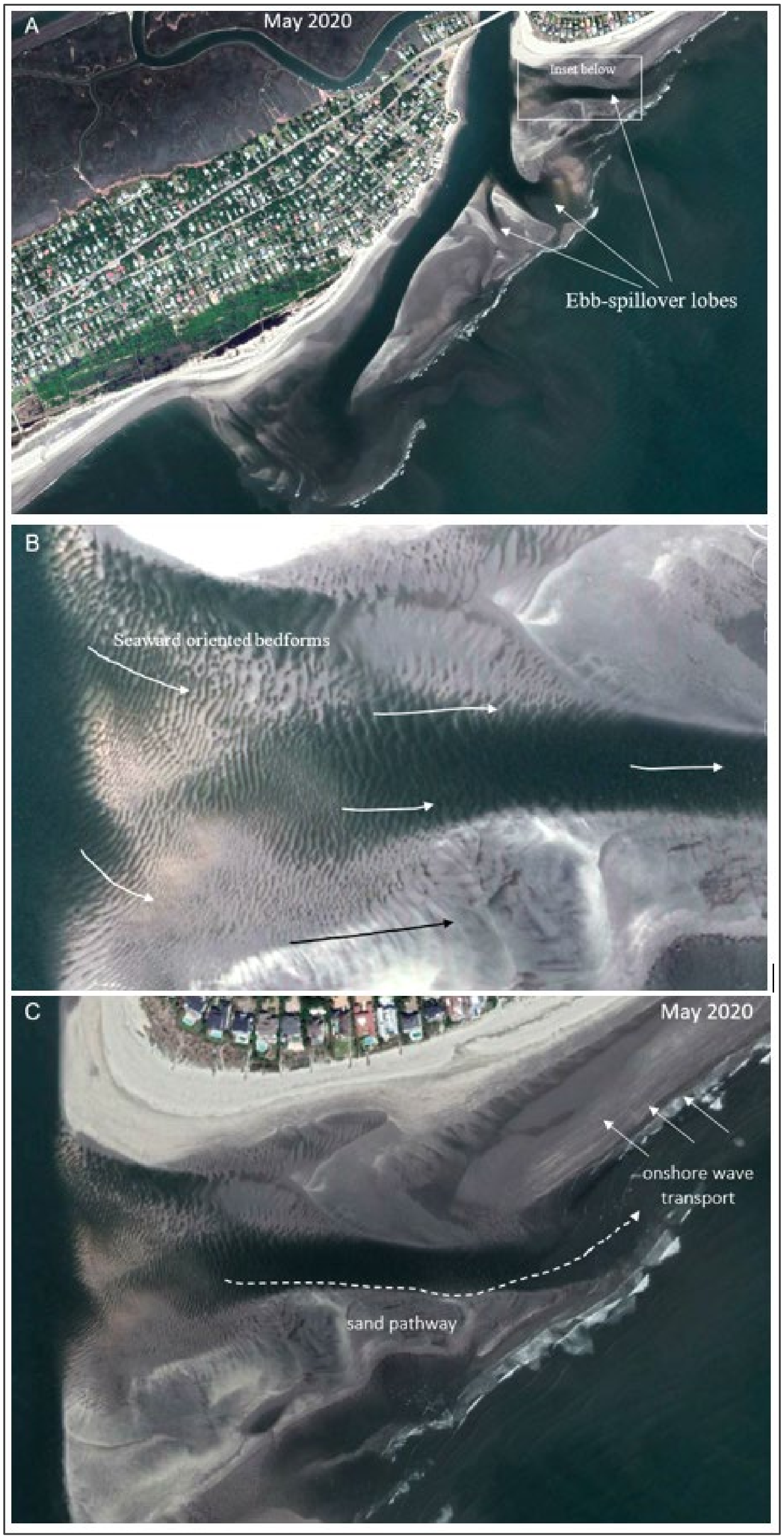


Figure 12. Sand transport seaward through ebb-spillover lobe. A: Inset identifying ebb lobe close to beach. B: Inset showing ebb-oriented bedforms indicating seaward transport to the east. C: Image demonstrating that seaward transport of sand moves onshore by wave action.

History of Ebb-Spillover Lobes

Historical photo analysis of Breach Inlet and southern Isle of Palms indicates that ebb-spillover lobe channels like the 2020 configuration also existed in 2007 and 2014. As shown in Figure 13, the general pathway of the channel and its extension along the southern Isle of Palms were nearly identical to those documented in 2020. Although the tide was higher in the 2007 and 2014 photographs, ebb-oriented bedforms are still visible, indicating ongoing seaward sand transport. Both sets of images also reveal the presence of sand bars forming ridge and runnel systems along the beach landward of the spillover channel. These ridges, fronted by a steep slipface and separated by runnels, are diagnostic of bars migrating onshore and adding sand to the beach.

Figure 13. Ebb-spillover lobes at Breach Inlet in 2007 (A) and 2014 (B), showing sand transport pathways and the formation of ridge and runnel systems along the beach.

Further historical analysis suggests that spillover lobes are not static features but gradually migrate seaward over time along the updrift shoal of the ebb-tidal delta. As illustrated in Figure 14, the spillover lobe observed in 2020 gradually migrated offshore between May 2020 and April 2024, eventually merging with the seaward extent of the main ebb channel.

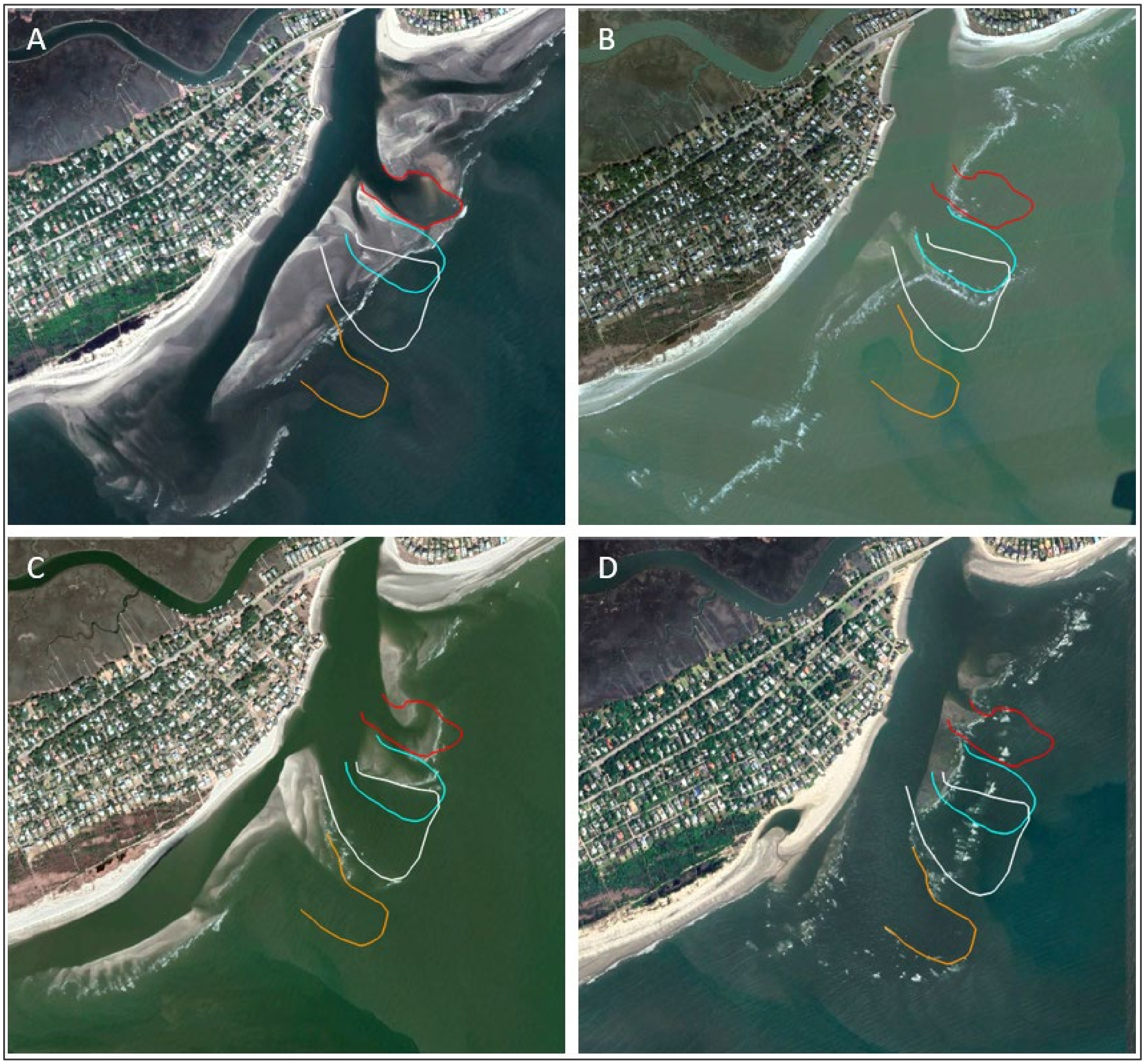


Figure 14. Gradual seaward migration of ebb-spillover lobe documented across four timestamps: May 2020 (A), January 2021 (B), February 2022 (C), and April 2024 (D). Eventually the feature becomes indistinguishable from the main ebb channel.

3. Task 4 - Summary, Recommendations and Final Considerations

3.1 Summary

This report presents the results of a comprehensive evaluation of shoreline erosion and coastal processes affecting the southern end of Isle of Palms, near Breach Inlet. The study was undertaken to better understand the causes of accelerated erosion observed over the past several years and to identify management options to enhance the resilience of this highly dynamic shoreline.

The evaluation was structured around four main tasks: (1) Literature Review and Data Collection, (2) Site Visits and Field Documentation, (3) Shoreline Change and Inlet Morphology Analysis, and (4) Development of Management Recommendations.

The literature review confirmed that the Breach Inlet to 6th Avenue segment of Isle of Palms has historically been left largely unmanaged compared to central and eastern portions of the island, which have benefited from multiple nourishment projects and stabilization efforts. Past monitoring reports, particularly the 2024 CSE Annual Monitoring Report, show that while this reach experienced net accretion until the late 1980s, it has transitioned to a pattern of chronic erosion since approximately 2009. Factors influencing this erosion include shoal bypass events at Breach Inlet, channel migration, storms, increased wave energy from easterly quadrants over the recent years, and a limited natural sediment supply relative to wave energy.

Sea level rise projections, based on NOAA and IPCC data, indicate that even under moderate emissions scenarios, sea levels in the Charleston region are expected to rise by 2 feet by 2060 and 4 feet by 2100. This will exacerbate flooding risks along the back-barrier and increase storm vulnerability along the open coast.

Field site visits conducted by CPE and Dr. FitzGerald documented critical vulnerabilities along the southern Isle of Palms shoreline. Observations revealed a severely narrowed recreational beach at high tide, extensive sandbag defenses deployed by property owners, an almost complete absence of natural dune systems, fine sand highly susceptible to wind-driven transport, and dynamic bedforms across the intertidal zone reflecting complex tidal and wave interactions. Notably, the active U.S. Army Corps of Engineers beneficial use dredging project was observed, with sand placed offshore of mean high water, intended to naturally migrate landward over time.

Historical shoreline change analysis showed that from 1919 through the mid-20th century, the Isle of Palms shoreline near Breach Inlet migrated gradually southwestward, building seaward by almost 200 meters. However, recent analysis from 2019 to 2024 revealed a consistent and alarming pattern of rapid shoreline retreat, with the high-water mark migrating landward by 40 to 70 meters. This erosion has resulted in the destruction of frontal dunes, infrastructure loss, and direct exposure of residential properties to storm events.

The coastal process evaluation identified the combined influence of wave-driven longshore sediment transport, flood- and ebb-tidal currents, inlet morphology changes, and ebb-spillover lobe dynamics as the primary mechanisms affecting shoreline change in the project area. During periods when ebb-spillover lobes are present and active near Isle of Palms, sand is redistributed offshore but can be returned onshore by wave action, temporarily stabilizing the shoreline. However, when such features are absent or migrate away from the beach, erosion rates sharply increase.

Inlet dynamics were further confirmed through analysis of historical aerial imagery, documenting the cyclical formation and migration of ebb-spillover lobes over the past two decades. The absence of a stable spillover lobe during the past two years correlates with the period of severe shoreline retreat documented at the site.

In summary, the southern Isle of Palms shoreline near Breach Inlet is highly vulnerable to large fluctuations in shoreline position and beach erosion due to natural inlet processes, a net southerly sediment transport regime exposed to storm events, and rising sea levels. Without proactive beach management, continued beach erosion and damage to coastal infrastructure from storm events will likely become a more frequent occurrence.

3.2 Recommendations for Beach Management at the South End of Isle of Palms

Given the site's high vulnerability to shoreline change, dynamic inlet-adjacent beach setting, and the absence of past beach management efforts, CPE recommends conducting a comprehensive Alternatives Analysis to evaluate a full range of shoreline protection strategies to protect the southern end of the Isle of Palms from erosion and storm damage. This analysis should include a "No Action" scenario to illustrate potential erosion risks, soft engineering options like beach nourishment and dune restoration, hybrid approaches that combine limited structures with sand and vegetation, and hard structures such as a permeable terminal groin near Breach Inlet. Each alternative should be assessed for effectiveness, permitting feasibility, cost, environmental impact, potential downdrift effects, and long-term resilience under sea level rise scenarios.

The terminal groin option appears promising and warrants further consideration; therefore, a more detailed description of this alternative is provided here. To establish a more stable, permanent beach berm width along the southern end of the Isle of Palms, an evaluation of the feasibility of a terminal groin should be conducted. To illustrate this concept, a conceptual sketch of a potential structure is shown in Figure 15. This structure could hypothetically capture a portion of the southwestward longshore sediment transport, creating a wider beach fillet on the updrift side to buffer against erosion, while allowing excess sand to bypass the structure and continue feeding the inlet system, thereby minimizing potential downdrift impacts on Sullivan's Island and the adjacent inlet shoreline. The benefits and potential impacts of this approach should be thoroughly analyzed using established coastal engineering practices, sediment budget development, and numerical modeling of coastal morphology.

Figure 15. Concept sketch of a terminal groin and associated beach fillet illustrating this concept for the southern end of Isle of Palms adjacent to Breach Inlet.

A similar permeable terminal groin at Ocean Isle Beach, North Carolina, designed by CPE, has proven effective in maintaining a stable beach with minimal downdrift erosion, demonstrating the viability of this approach (Figures 16 and 17). Another example is the terminal groin at Bald Head Island (Figure 16), also in North Carolina. Additional alternatives such as altering inlet channels (e.g., constructing a dike to relocate the flood channel) could also be evaluated in the feasibility study, however, these management practices are more ephemeral when compared to the terminal groin, and may have adverse impacts on the north end of Sullivan's Island.

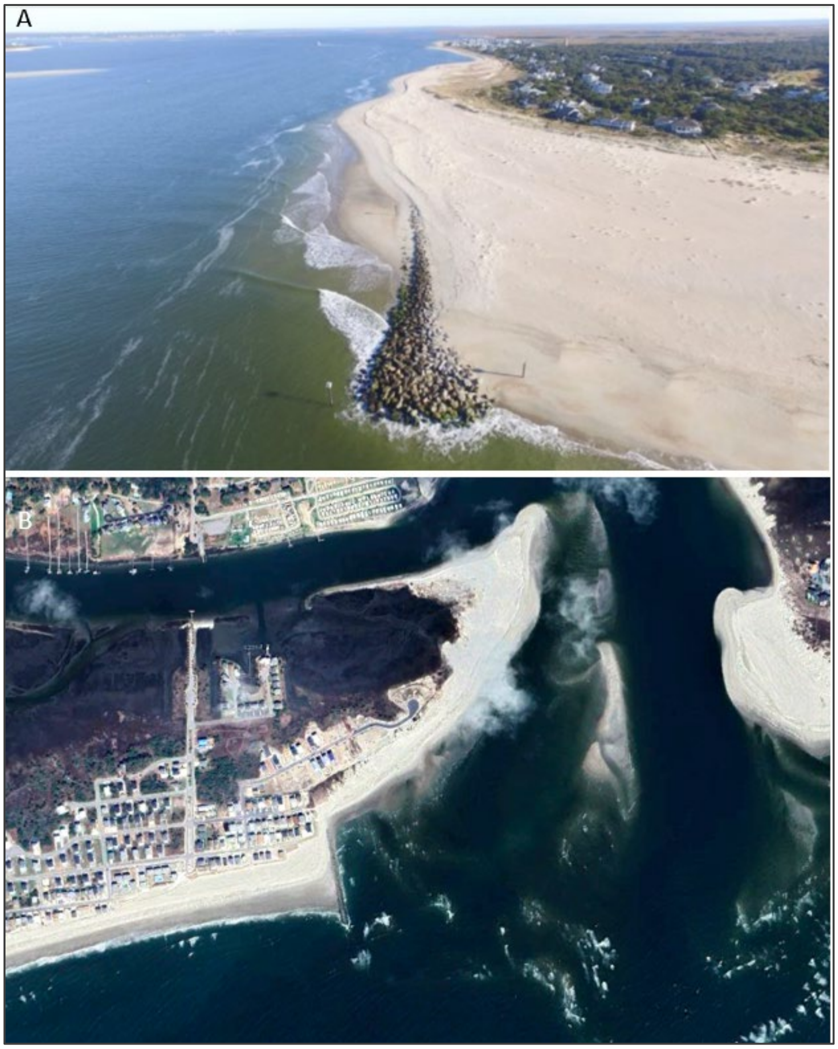


Figure 16. Terminal groins at Ocean Isle Beach (bottom) and Bald Head Island (top), Brunswick County, NC.

Figure 17. Before/after photos of the terminal groin at Ocean Isle Beach, Brunswick County, NC.

For any engineering alternative to be pursued, early engagement with permitting agencies will be essential given the sensitive regulatory environment surrounding inlet-adjacent shorelines. Recommended outreach should include the following agencies:

- South Carolina Department of Health and Environmental Control - Office of Ocean and Coastal Resource Management (SCDHEC-OCRM) for critical area permitting.
- U.S. Army Corps of Engineers Charleston District (USACE) for potential Section 10/404 approvals related to structures and fill within navigable waters.
- NOAA National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) for endangered species and habitat impact reviews.

Additionally, coordination with the Town of Sullivan's Island and local property owners will be critical to demonstrate that any project will protect inlet health, maintain sediment pathways, and minimize the risk of downdrift impacts. Building broad stakeholder support early can help streamline the permitting process and reduce project delays. Transparent communication about project goals, environmental protections, and expected benefits will help minimize opposition and streamline the permitting process.

3.3 Final Considerations

The southern shoreline segment of Isle of Palms, particularly in the Breach Inlet vicinity, is subject to dynamic and complex coastal processes. This evaluation, completed by the team from Coastal Protection Engineering of North Carolina, Inc. (CPE) in collaboration with Dr. Duncan FitzGerald of Boston University, confirms that historic and ongoing shoreline erosion trends are the result of a complex combination of natural inlet dynamics, sediment transport variability, inlet morphology changes, and long-term vulnerabilities associated with sea level rise.

The recent beach erosion trends, loss of beach width and protective dunes, and reliance on temporary sandbag defenses, underscore the need for strategically engineered solutions. Immediate and proactive actions—supported by a detailed alternatives analysis, robust numerical modeling, and collaborative stakeholder engagement—are needed to prevent continued land loss and to protect critical infrastructure and private property.

Given the specific site conditions and regional sediment dynamics, CPE recommends proceeding with an evaluation of alternatives to establish a wider, more stable beach at the southern end of the Isle of Palms. A carefully engineered terminal groin combined with targeted beach nourishment, for example, may offer an effective solution to the chronic erosion near Breach Inlet. However, this approach must be evaluated alongside other potential alternatives using established engineering practices, sediment budget analysis, and numerical modeling of coastal morphology with coupled wave-current-sediment transport models such as Delft3D.

Early regulatory coordination and stakeholder outreach will be essential to ensure that the selected solution is both effective and permittable. Engagement with agencies such as SCDHEC-

OCRM, USACE Charleston District, and adjacent communities will be critical to demonstrating the project's benefits and addressing environmental and regulatory considerations and constraints.

CPE is committed to supporting the client through the next phases of this effort, including the feasibility study to evaluate project alternatives, design of the preferred alternative, permitting, and eventual project execution. However, because the proposed work would occur on City- or State-owned property, private property owners do not have the legal authority to implement the project independently. A viable path forward would be for either the City or a group of private property owners to sponsor the feasibility study to develop and assess shoreline protection alternatives and identify a preferred alternative. This study would document the project's public benefits and potential impacts, providing the City with the technical basis needed to support decision-making. If the City is supportive of the project but lacks the financial capacity to act as the sponsor following the feasibility phase, private owners could consider working with the City to contribute funding for design and construction. While this approach has been successfully implemented in other communities, it would require substantial financial commitment from participating property owners. Regardless of the path chosen, early collaboration with the City will be essential to securing project support and ensuring alignment with regulatory requirements.

Protecting this stretch of the Isle of Palms from beach erosion and storm impacts will require a deliberate solution grounded in the latest science and engineering, one that balances near-term protection with the long-term sustainability of the Breach Inlet system and the southern end of Isle of Palms.

4. References

Beck, T.M. & Wang, P. 2019. "Hydrodynamics and sediment transport at natural and engineered tidal inlets." *Coastal Engineering Journal*, 61(2): 125–145.

City of Isle of Palms. 2025. *Beach Nourishment and Dune Restoration Updates.* https://www.iop.net/news

Coastal Science & Engineering (CSE). 2024. *2024 Annual Monitoring Report: Isle of Palms, SC.* Prepared for the City of Isle of Palms. https://www.iop.net/sites/default/files/uploads/2618_monitoring_report_y6-2024_final_draft.pdf

Dean, R.G., and Walton, T.L. 1973. "Sediment transport processes in the vicinity of inlets with special reference to sand trapping." In: *Proceedings of the 3rd Coastal Engineering Conference*, ASCE, pp. 1293–1310.

FitzGerald, D.M. 1982. "Sediment bypassing at mixed energy tidal inlets." In: *Proceedings of the 18th Coastal Engineering Conference*, ASCE, pp. 1094–1118.

FitzGerald, D.M. 1984. "Interactions between the ebb-tidal delta and landward shoreline: Price Inlet, South Carolina." *Marine Geology*, 60(1–4), 281–308.

FitzGerald, D.M. 1988. "Shoreline erosional–depositional processes associated with tidal inlets." *Journal of Coastal Research*, Special Issue 3, 69–78.

FitzGerald, D.M., Fenster, M.S., Argow, B.A., & Buynevich, I.V. 2013. "Coastal impacts due to sea-level rise." *Annual Review of Earth and Planetary Sciences*, 36: 601–647.

FitzGerald, D.M., Penland, S., & Nummedal, D. 1984. "Tidal inlet variability along a barrier coastline." *Marine Geology*, 60(1–4), 281–309.

Intergovernmental Panel on Climate Change (IPCC). 2021. *Sixth Assessment Report: Summary for Policymakers.* https://www.ipcc.ch/report/ar6/syr/

Marsooli, R., Lin, N., Emanuel, K., & Feng, K. 2019. "Climate change exacerbates hurricane flood hazards along US Atlantic and Gulf Coasts in spatially varying patterns." *Nature Communications*, 10(1), 3784.

National Oceanic and Atmospheric Administration (NOAA). 2022. *2022 Sea Level Rise Technical Report.* NOAA Technical Report NOS 01. https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report.html

NOAA National Centers for Environmental Information. *Tides & Currents Data for Charleston, SC – Station ID 8665530.* https://tidesandcurrents.noaa.gov/

NOAA Office for Coastal Management. 2024. *Sea Level Rise Viewer.* https://coast.noaa.gov/digitalcoast/tools/slr.html

Oertel, G.F. 1975. "Ebb-tidal deltas of the U.S. Atlantic coast: morphology and morphologic changes." In: *Estuarine Research, Volume II: Geology and Engineering*, edited by L.E. Cronin, Academic Press, New York, pp. 267–276.

Sweet, W.V., et al. 2022. *Global and Regional Sea Level Rise Scenarios for the United States.* NOAA Technical Report NOS 01. https://www.noaa.gov/media-release/noaa-report-sea-level-to-rise-up-to-a-foot-by-2050

U.S. Army Corps of Engineers (USACE), Charleston District. 2024–2025. *AIWW Beneficial Use Dredging Project Updates.* City of Isle of Palms News Archive. https://www.iop.net/news

Appendices attached – Inlet Morphology Comparisons

Notes:
1) 1776 datasets are based on a Revolutionary War Map from June 28, 1776 by Lieutenant Colonel Thomas James. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.
2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
1776	1776	1776
2024	2024	2024

0 2,000 4,000 Feet

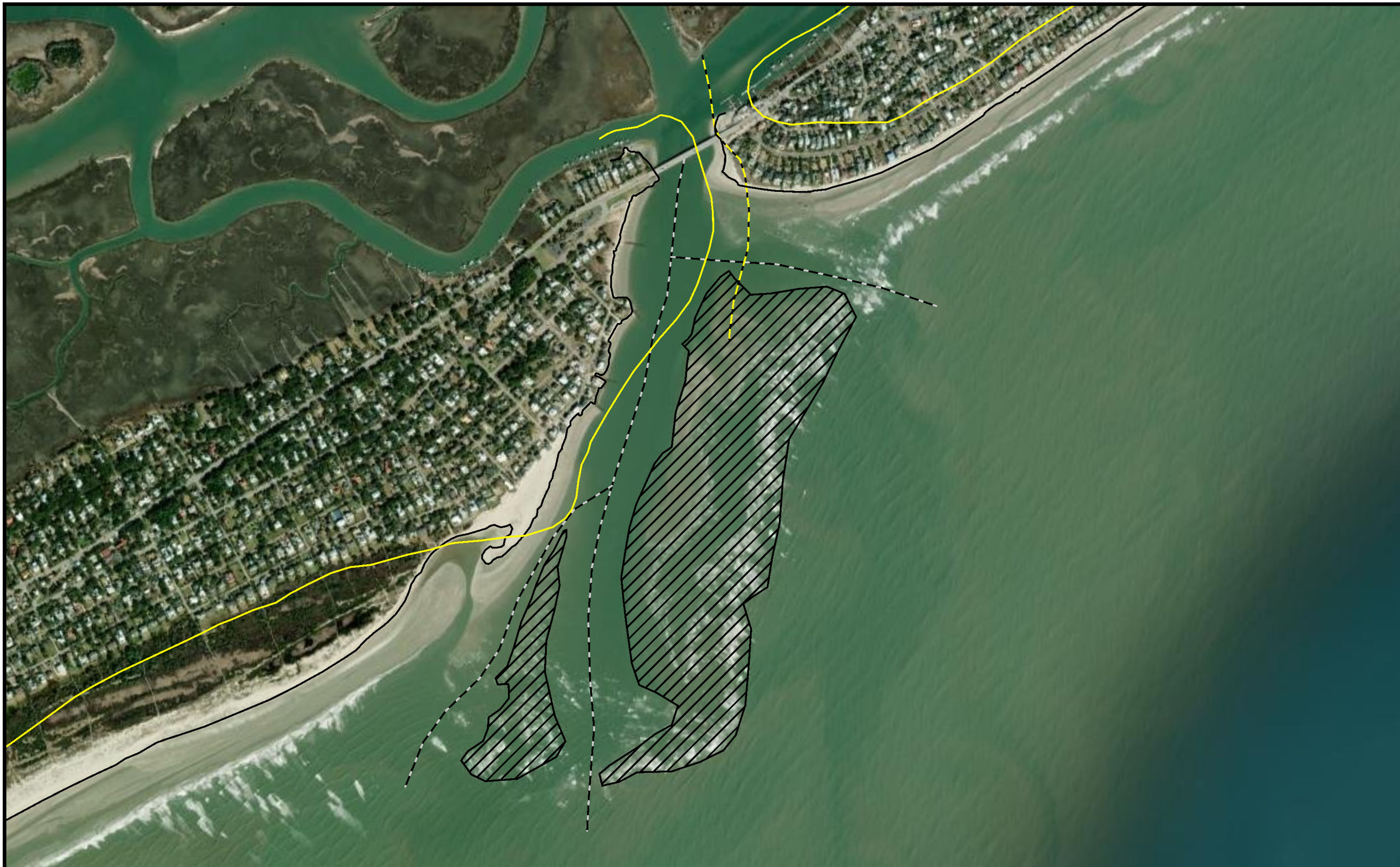
N

Inlet Morphology Comparison 1776 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

E:\Projects\USA\SC\Charleston\2025XXX_IslePalmErosionAssessment\aprx\2025 Isle of Palm Erosion Assessment.aprx



E:\Projects\USA\SC\Charleston\2025XXX_IslePalmErosionAssessment\aprx\2025 Isle of Palm Erosion Assessment.aprx

Notes:
1) 1919 datasets are based on a USGS Topographic Map from 1919. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.
2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
1919	1919 (None)	1919
2024	2024	2024

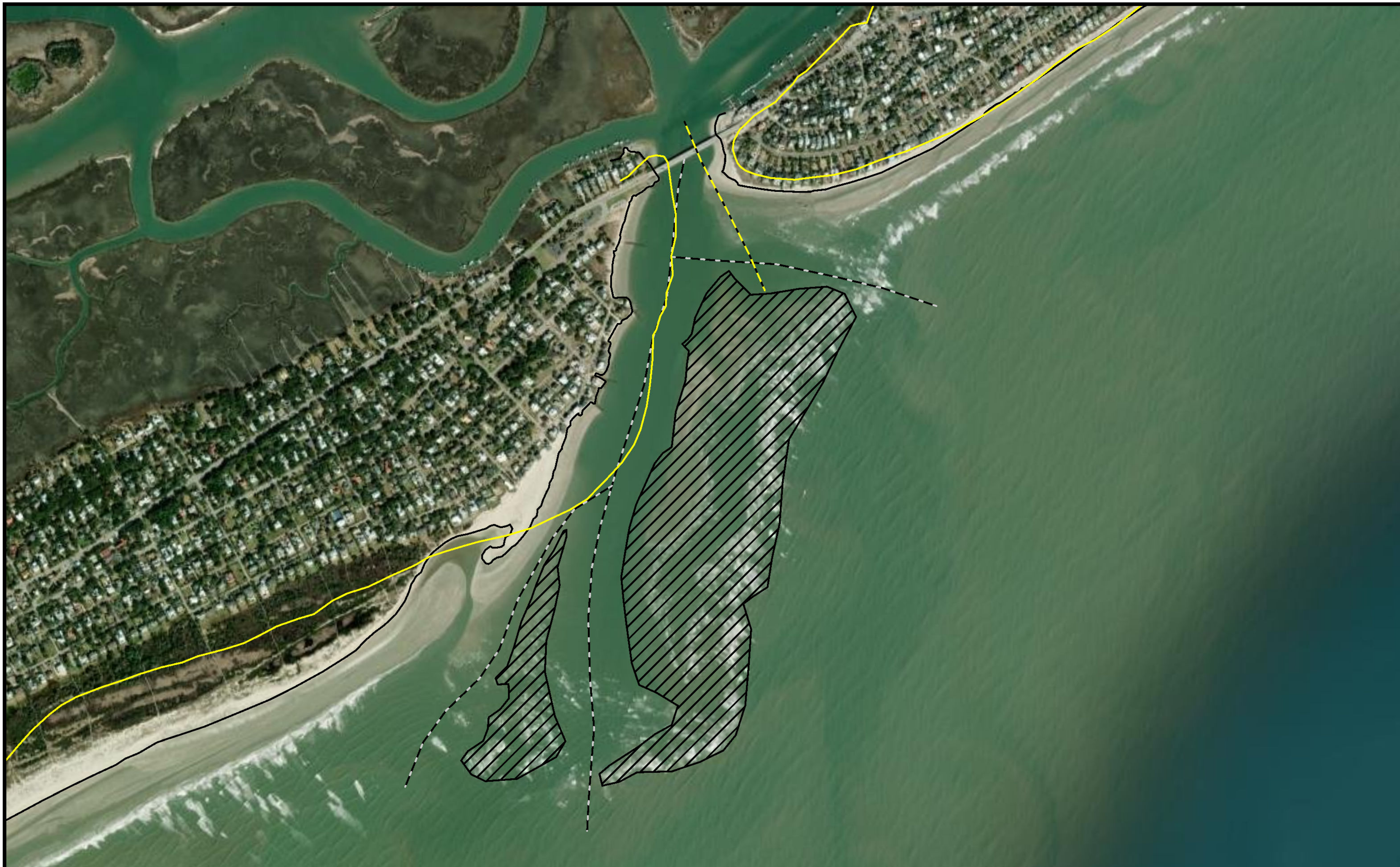
0 2,000 4,000 Feet

N

Inlet Morphology Comparison 1919 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409



Notes:
1) 1943 datasets are based on a USGS Topographic Map from 1943. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.
2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line
- 1943
- 2024

Shoals
- 1943 (None)
- 2024

Channel Centerline
- 1943
- 2024

0 2,000 4,000 Feet

N

Inlet Morphology Comparison 1943 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

Notes:

1) 1958 datasets are based on a USGS Aerial Imagery from 1958. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.

2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
1958	1958	1958
2024	2024	2024

0 2,000 4,000 Feet

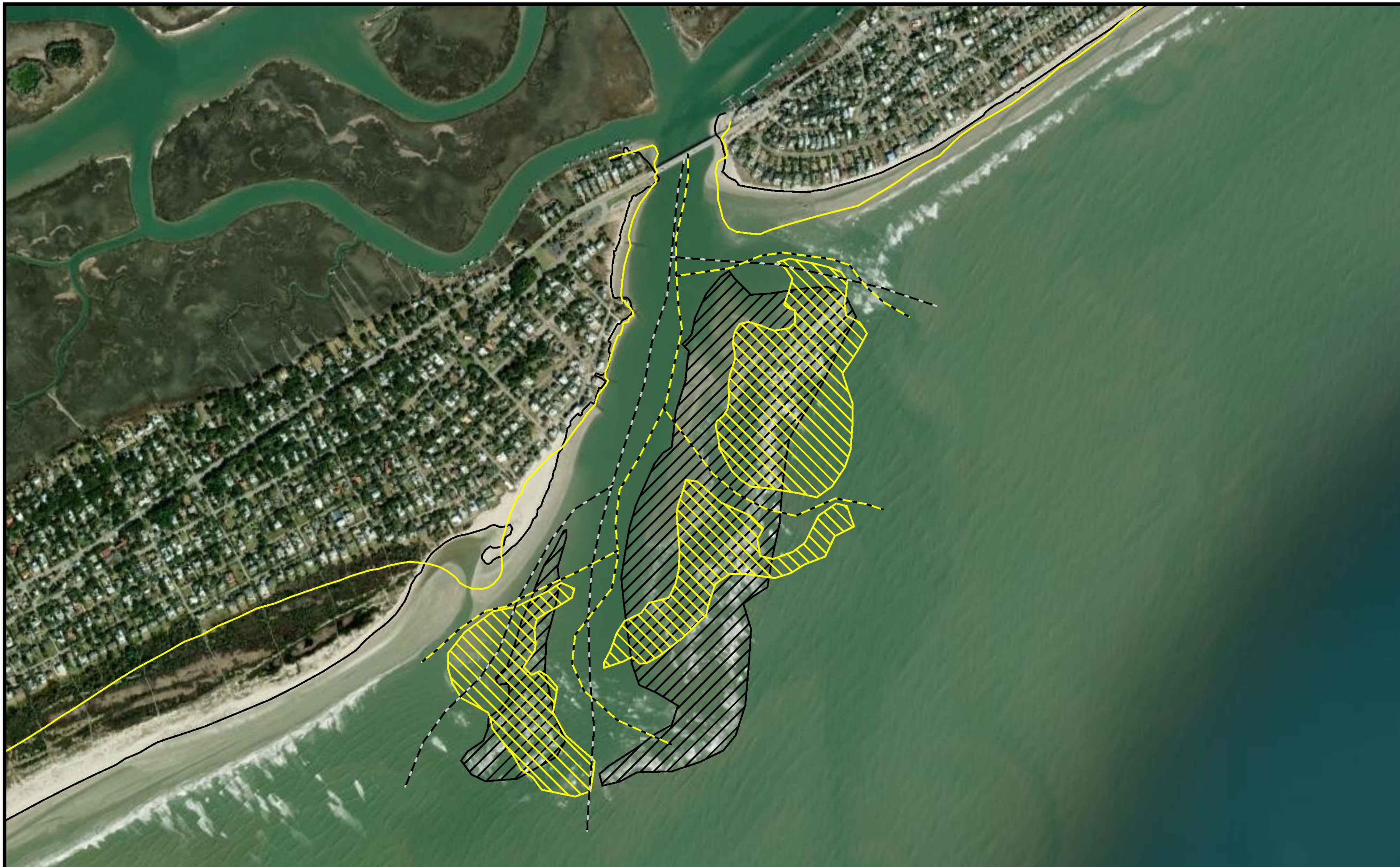
N

Inlet Morphology Comparison 1958 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

E:\Projects\USA\SC\Charleston\2025XXX_IslePalmErosionAssessment\aprx\2025 Isle of Palm Erosion Assessment.aprx



Notes:

1) 1968 datasets are based on a USGS Aerial Imagery from 1968. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.

2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
1968	1968	1968
2024	2024	2024

0 2,000 4,000 Feet

N

Inlet Morphology Comparison 1968 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

E:\Projects\USA\SC\Charleston\2025XXX_IslePalmErosionAssessment\aprx\2025 Isle of Palm Erosion Assessment.aprx

Notes:
1) 1977 datasets are based on NOAA Color Infrared Imagery from 1977. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.
2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
1977	1977	1977
2024	2024	2024

0 2,000 4,000 Feet

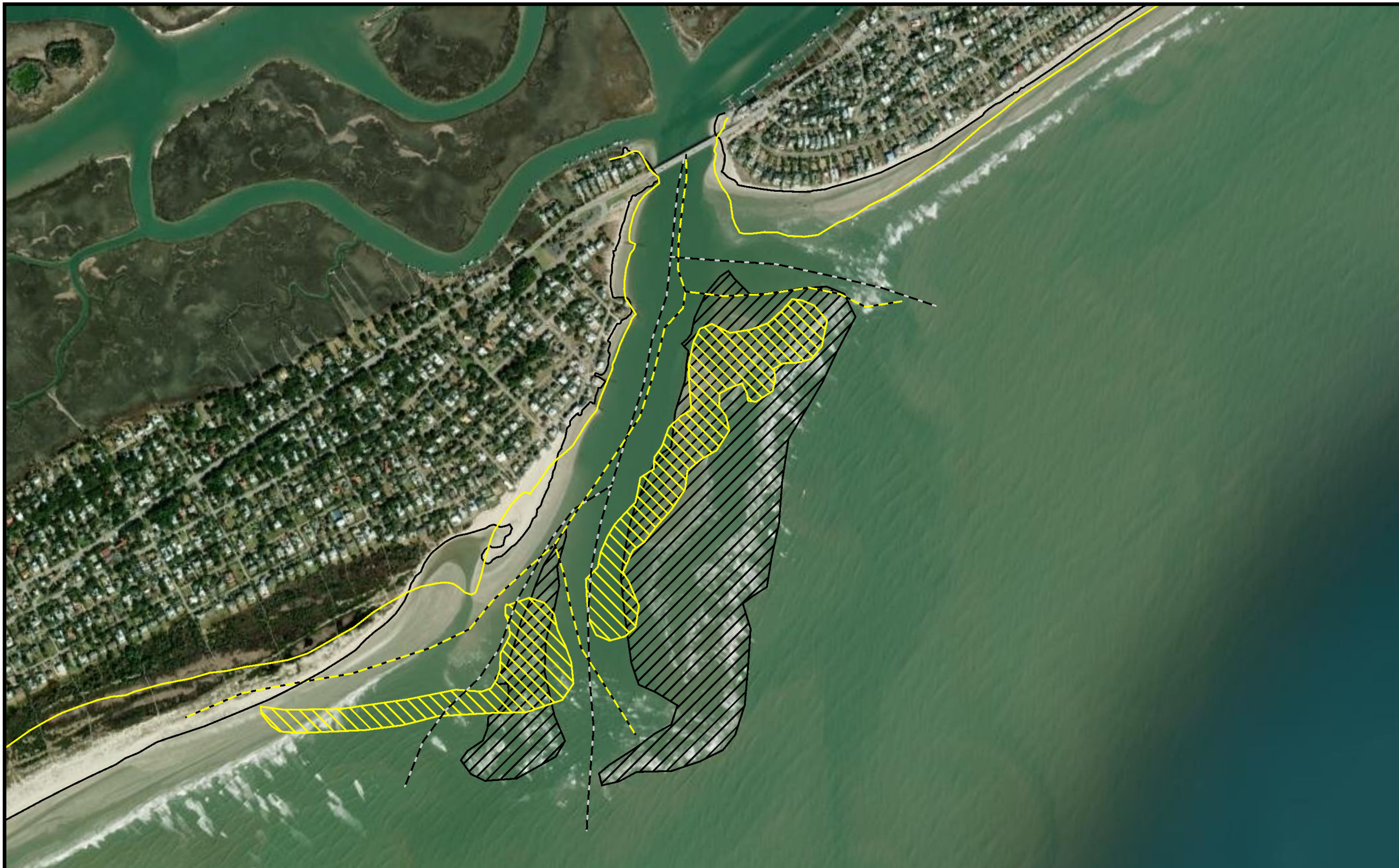
N

Inlet Morphology Comparison 1977 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

E:\Projects\USA\SC\Charleston\2025XXX_IslePalmErosionAssessment\aprx\2025 Isle of Palm Erosion Assessment.aprx



Notes:

1) 1989 datasets are based on a USGS Digital Orthophoto Quadrangle from 1989. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.

2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
1989	1989	1989
2024	2024	2024

0 2,000 4,000 Feet

N

Inlet Morphology Comparison 1989 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

E:\Projects\USA\SC\Charleston\2025XXX_IslePalmErosionAssessment\aprx\2025 Isle of Palm Erosion Assessment.aprx

Notes:
1) 1994 datasets are based on a USGS Digital Orthophoto Quadrangle from 1994. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.
2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
1994	1994	1994
2024	2024	2024

0 2,000 4,000 Feet

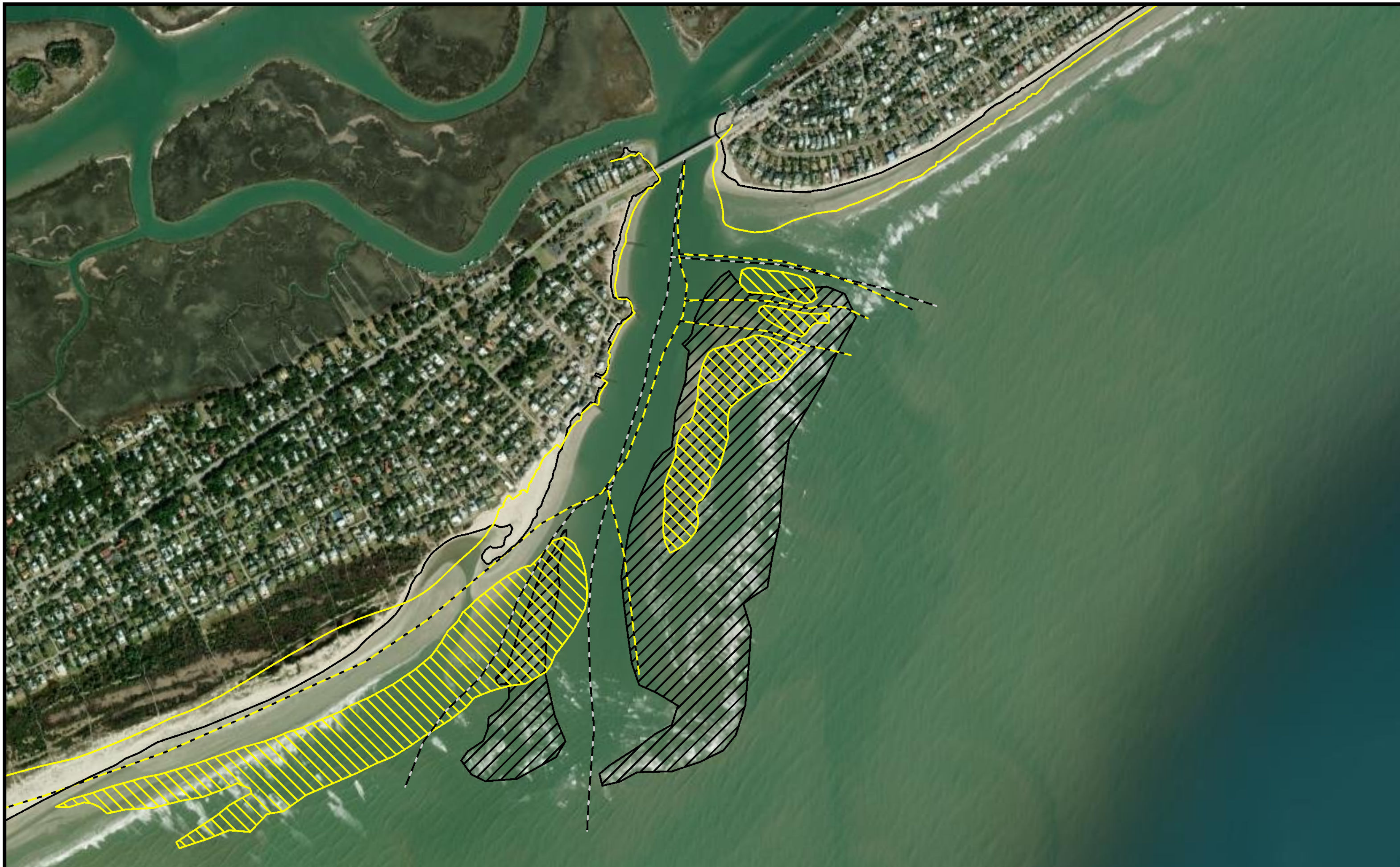
N

Inlet Morphology Comparison 1994 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

E:\Projects\USA\SC\Charleston\2025XXX_IslePalmErosionAssessment\aprx\2025 Isle of Palm Erosion Assessment.aprx



Notes:

1) 2004 datasets are based on a USGS High Resolution Orthoimagery from 2004. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.

2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
2004	2004	2004
2024	2024	2024

0 2,000 4,000 Feet

N

Inlet Morphology Comparison 2004 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

Notes:
1) 2011 datasets are based on a NOAA Aerial Imagery from 2011. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.
2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
2011	2011	2011
2024	2024	2024

0 2,000 4,000 Feet

N

Inlet Morphology Comparison 2011 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

Notes:

1) 2016-2017 datasets are based on a NOAA Aerial Imagery from 2016-2017. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.

2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
2016-2017	2016-2017	2016-2017
2024	2024	2024

0 2,000 4,000 Feet

N

Inlet Morphology Comparison 2016-2017 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

Notes:

1) 2019 datasets are based on Charleston County Aerial Imagery from 2019. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.

2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
2019	2019	2019
2024	2024	2024

0 2,000 4,000 Feet

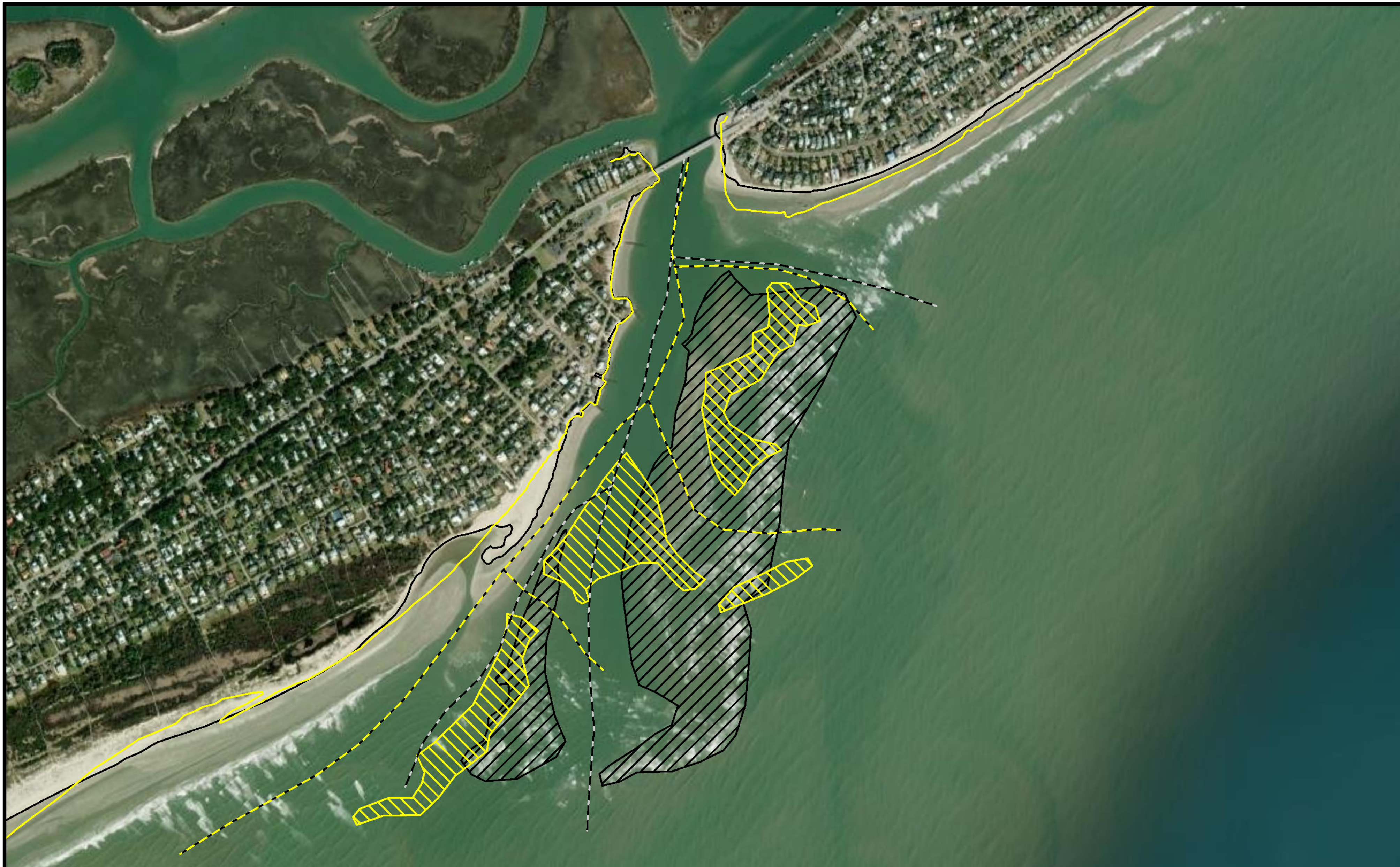
N

Inlet Morphology Comparison 2019 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

E:\Projects\USA\SC\Charleston\2025XXX_IslePalmErosionAssessment\aprx\2025 Isle of Palm Erosion Assessment.aprx



Notes:

1) 2021 datasets are based on USDA NAIP 4-Band Imagery from 2021. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.

2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
2021	2021	2021
2024	2024	2024

0 2,000 4,000 Feet

N

Inlet Morphology Comparison 2021 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

Notes:

1) 2023 datasets are based on Charleston County Aerial Imagery from 2023. 2024 datasets are based on aerial imagery collected on February 21, 2024 by ESRI Basemap Services.

2) Background imagery collected on February 21, 2024 and provides by ESRI Basemap Services

Legend:

Wet/Dry Line	Shoals	Channel Centerline
2023	2023	2023
2024	2024	2024

0 2,000 4,000 Feet

N

Inlet Morphology Comparison 2023 and 2024

Breach Inlet, SC

Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

E:\Projects\USA\SC\Charleston\2025XXX_IslePalmErosionAssessment\aprx\2025 Isle of Palm Erosion Assessment.aprx

Beach Preservation Ad Hoc Committee Recommendations - Next Steps- Updated 8/8/25

1) Beach Restoration Policies

Recommendation	Next Step
Establish a minimum healthy beach volume profile per Figure 5 (approx. 600 cy per foot within the unstabilized inlet zones and 380 cy per foot elsewhere on the beach)	included with second opinion- expected response Aug. 2025
Establish triggers, as stated in the January 2025 Beach Ad Hoc Report, for when Council should consider authorizing construction of mid-scale and large-scale projects	included with second opinion- expected response Aug. 2025
Consider becoming a US Army Corps of Engineers (USACE) managed beach	no action necessary now - letter of intent submitted for feasibility study
Repeal ordinance prohibiting hard erosion control structures 250' of mean high water	included with second opinion- expected response Aug. 2025
Modify ordinance prohibiting hard erosion control structures 250' of mean high water	included with second opinion- expected response Aug. 2025
City performs emergency work (sand scraping, trucking in sand and/or placement of sandbags)	need Council direction
Establish property owner's responsibilities for maintaining dune system within private property (Folly Beach model)	need Council direction- should be done after decisions made about hard erosion control structures
Prohibit construction of new pools seaward of the maximum building line	done
Consider seeking second opinion on emergency protective actions, future beach nourishment program and other beach protection options (groins, sandbag installation and review of emergency protective actions taken during the last 2 years)	underway now with Foth Olson

2) Proactive Response to Beach Erosion

Recommendation	Next Step
Accelerate and increase frequency of large-scale dredging beach nourishment projects from every 10 years to every 8 years	included with second opinion- expected response Aug. 2025

Initiate permitting for large scale nourishment projects two years after completion of a large-scale nourishment project	no action necessary now - permit applications expected to be submitted Aug. 2025
Coordinate construction of large scale nourishment projects on both unstabilized inlet zones to occur at the same time	no action necessary now - permit applications for both ends expected to be submitted Aug. 2025
Hire full time employee tasked with overseeing resilience efforts, including beach management	included in draft FY26 budget- next step is job description to be considered by Council and begin hiring process
Establish an ongoing Beach Preservation Committee made up of 5 Residents and 2 Council members	no action necessary now - it was agreed to keep the existing ad hoc committee engaged until the completion of the 2nd opinion and then establish membership of the new permanent committee, which is advertised now
Increase the frequency of beach monitoring surveying from annual to semi annual	done

3) New and Consistent Funding Mechanisms for Future Needs and Projects

Recommendation	Next Step
Establish separate accounts for 1) emergency beach restoration work, and 2) large-scale beach nourishment projects and 3) other beach related projects	done
Consider raising revenue to cover the proposed proactive beach nourishment schedule (See funding sheet)	need Council direction
Engage state and federal lobbyists/legislators to secure funding for beach nourishment	no action necessary State lobbyists have given direction and Federal lobbyist have been authorized to begin work
Engage state lobbyists/legislators to amend state law to allow beach nourishment to be added to Municipal Improvements Act (MID) to allow City to establish special purpose tax district	need Council direction
Engage state lobbyists/legislators to amend state law to provide coastal communities ability/flexibility to raise revenue for beach nourishment (i.e. real estate transfer fees or additional ATAX)	need Council direction
Establish a cost-sharing plan with Wild Dunes for projects along areas that do not meet public access requirements based on WD contributions to the Beach Preservation Fund	plans can be made but current Council and WDCA board will not be able to bind future Councils and WDCA boards. Both City staff and Wild Dunes staff has indicated an ability to continue to participate, but expressed concerns about their abilities to continue in outyear major renourishment projects