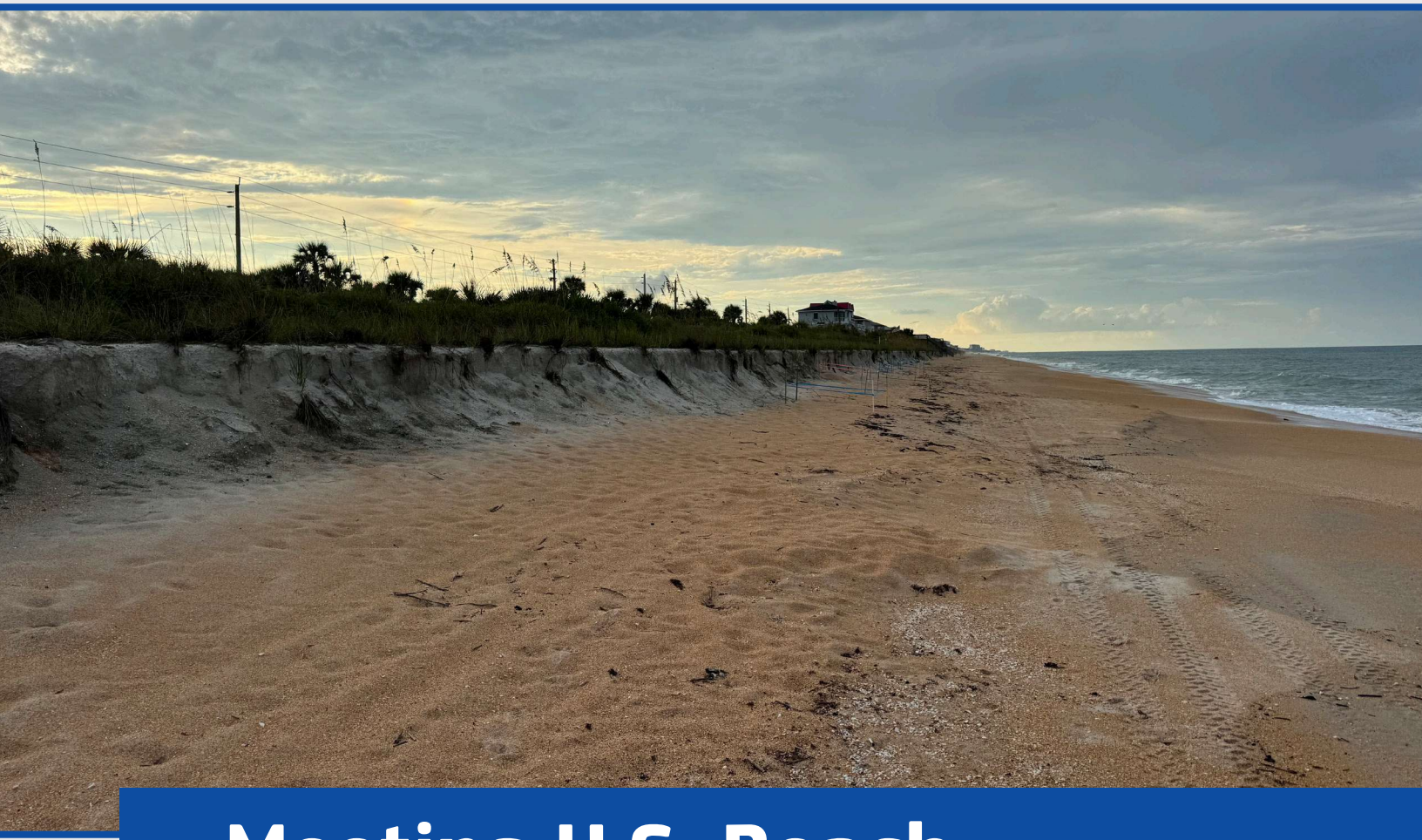

Meeting U.S. Beach Nourishment Needs Now and in the Future

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December 2025

Image: Beverly Beach, Florida, with eroded dunes and protective markers for turtle nests
Credit: Robert Young

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Meeting U.S. Beach Nourishment Needs Now and in the Future

Robert S. Young, PhD, PG
December 2025

Executive Summary

Coastal erosion, increasingly severe storms, and rising sea level are driving unprecedented demand for beach nourishment in the United States. As many coastal states prohibit seawalls and other hardened structures, beach nourishment has become the primary strategy to protect coastal infrastructure, sustain tourism economies, and preserve natural habitats. However, current U.S. dredging capacity, particularly for large ocean-going hopper dredges, is insufficient to meet both present and future needs. As a result, project costs are escalating, timelines are lengthening, and communities are increasingly unable to secure the sand needed to maintain resilient shorelines.

The U.S. dredging market is constrained by the Foreign Dredge Act of 1906, which prevents foreign-built and foreign-owned dredges from operating in American waters. While originally intended to foster domestic capability, the Act has instead left the U.S. reliant on a small, aging, and expensive fleet that lags well behind European peers in scale, efficiency, and technological sophistication. Federal reports and industry analyses consistently show that United States' dredging capacity does not meet national coastal protection needs and that costs are rising rapidly as a result.

European firms, operating in open global markets, have developed advanced, high-capacity fleets capable of delivering beach nourishment faster and at a significantly lower cost. Independent bid comparisons indicate that European dredging companies could complete U.S. projects at 40–60% of current U.S. contract values, even when employing American mariners. Increased competition would not only alleviate capacity constraints, but also lower costs for coastal communities and taxpayers, shorten project timelines, accelerate post-storm recovery, and improve long-term coastal resilience—particularly as federal funding becomes more limited.

The environmental benefits are equally significant. Greater offshore dredging capacity would reduce pressure to mine sand from nearshore and ecologically sensitive areas, help maintain best practices such as avoiding sea turtle nesting seasons, and introduce advanced environmental monitoring and sediment-control technologies already standard in Europe. Expanding access to global dredging capacity would therefore support both economic and ecological resilience.

This report concludes that maintaining the current approach to dredging in the United States is unsustainable given the accelerating pace of coastal change. Carefully crafted policy reforms, such as targeted exemptions to the Foreign Dredge Act for beach nourishment projects conducted by European dredgers using ships built in the EU or allied shipyards, would strengthen U.S. coastal security, reduce taxpayer burden, and ensure communities have timely access to the sand needed to protect shorelines and critical infrastructure in the decades ahead.

Introduction

As coastal erosion intensifies and storms grow more frequent, the United States is increasingly reliant on beach nourishment as a frontline defense for its shoreline communities. Yet, mounting evidence suggests that the nation's current dredging capacity—particularly for large, ocean-going hopper dredges—is insufficient to meet this growing demand.

For many communities, beach nourishment remains the most viable option to preserve their coastlines. There are only two other alternatives: build massive seawalls or retreat.

Beach nourishment is a coastal management strategy that has become increasingly important as shorelines across the globe face the growing threats of rising sea level, stronger storms, and resulting beach erosion and infrastructure damage. Rather than relying on hard structures like seawalls or groins, beach nourishment takes a softer, more natural approach. It involves adding large volumes of sand to eroding beaches to rebuild their width, elevation, and protective capacity. Many states ban the construction of oceanfront seawalls, leaving beach nourishment as the primary option for shorelines stabilization. Even in states where seawalls are still constructed to protect property, beach nourishment will be required to maintain a sandy beach in front of the wall.

The nourishment process begins with identifying a compatible sand source, typically from an offshore borrow area. Engineers must carefully match the new sand to the beach's natural composition to ensure it behaves similarly under wave and wind forces. Once a source is approved, specialized dredging equipment is used to excavate and transport the sand, usually through long pipelines, directly to the beach. Bulldozers then spread and shape the sand creating a protective berm, and in some cases, rebuilding dunes as well.

The expressed goals of beach nourishment are both practical and ecological. A wider beach provides a buffer that absorbs wave energy and reduces storm damage to coastal infrastructure. It also preserves public access and recreational space, which are vital for tourism-based economies. Coastal tourism generates $240 billion in direct spending (Houston, 2024). Additionally, nourished beaches can support important wildlife habitats, particularly as nesting grounds for sea turtles.

Beach nourishment is not a permanent fix. The added sand continues to erode, just as the original beach did, and projects must be repeated every two to ten years. The frequency of renourishment varies with the coastal setting, wave climate and storm activity. Rising sea level is shortening this interval and will accelerate the need for more frequent beach nourishment.

The process is expensive, costing tens to hundreds of millions of dollars per project, and funding is typically shared between federal, state, and local governments. Moreover, nourishment can pose environmental concerns: dredging disturbs marine habitats, and if poorly matched, the new sand can alter local ecosystems or bury existing biological communities. Given the massive scale of U.S. beach nourishment (described below), even small improvements in mitigating the impacts of dredging will have big ecological benefits.

It is currently not possible for the U.S. Army Corps of Engineers and the domestic dredging industry to meet all dredging needs and provide the coastal protection with beach nourishment at a price that communities can afford.

Still, for many communities, beach nourishment remains the most viable option to preserve their coastlines. There are only two other alternatives: build massive seawalls or retreat. In places like Florida, New Jersey, and North Carolina, beach nourishment has become a routine part of long-term shoreline management. After major storms like Hurricane Sandy, the federal government has invested heavily in

nourishment projects as a means of coastal recovery.

The geographical extent and scale of U.S. beach nourishment projects is stunning. We are almost literally trying to maintain a beach from southern Maine down the coast to Padre Island, Texas (Figure 1). The need on the U.S. west coast is growing as well. The Program for the Study of Developed Shorelines (PSDS) has been tracking beach nourishment projects in the United States since the mid-1980s. Figures 2-3 show a clear and significant upward trend since 2000. The number of projects, the volume of sand moved, and the cost has increased dramatically. This trend will only accelerate over the next few decades as coastal erosion continues and accelerates in response to sea level rise. It is currently not possible for the U.S. Army Corps of Engineers (USACE) and the domestic dredging industry to meet all dredging needs and provide the coastal protection with beach nourishment at a price that communities can afford (Figure 4). Coastal communities need a more efficient and cost-effective approach to the nation's beach nourishment programs to ensure economic prosperity, community resilience, and environmental protection today and tomorrow.

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Figure 1. Map of beach nourishment sites in the United States., color-coded by state.

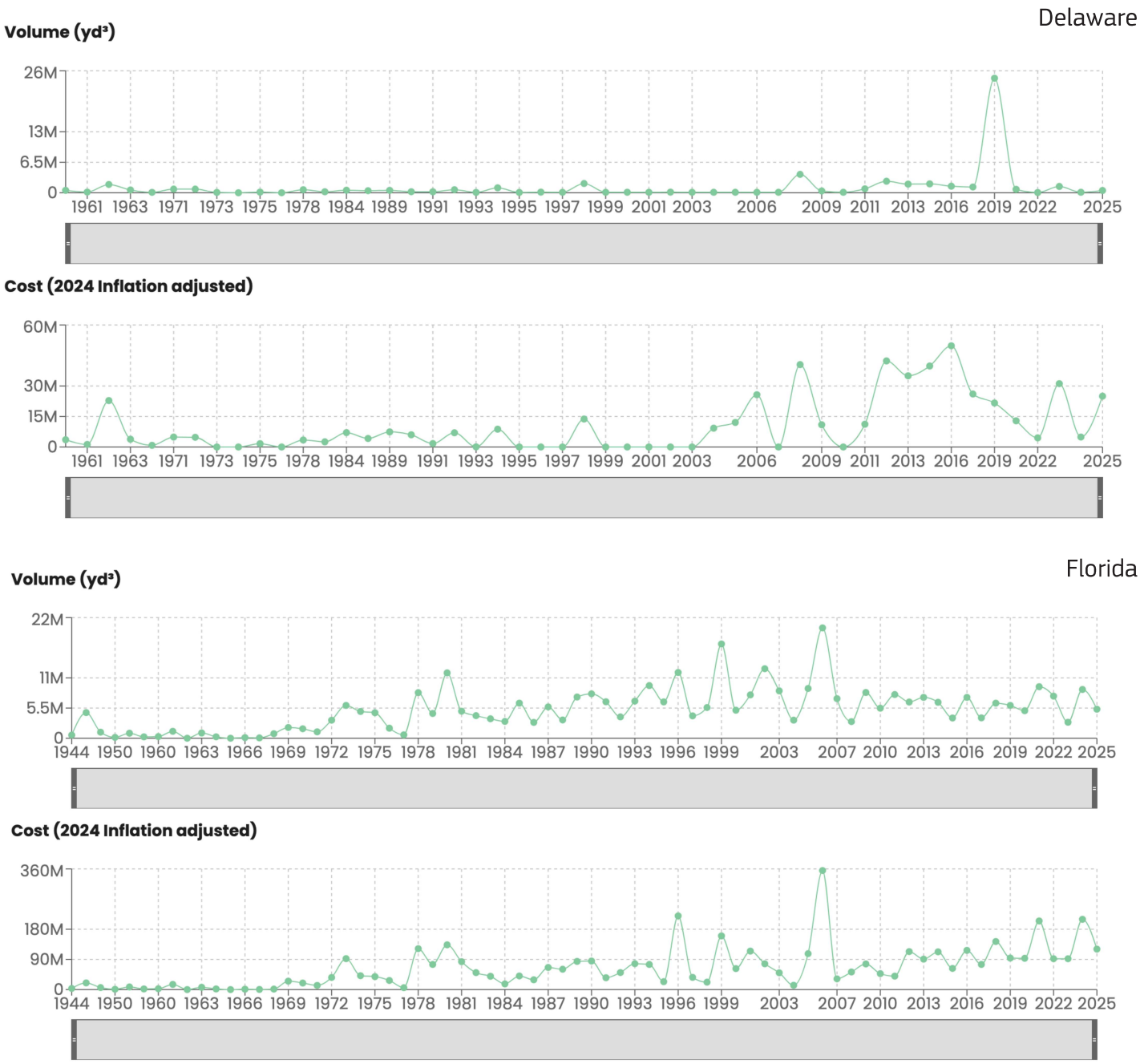

Figure 2. Beach nourishment totals by volume and cost for Delaware (top) and Florida (bottom). Data from PSDS Beach Nourishment Viewer (https://beachno.wcu.edu/).

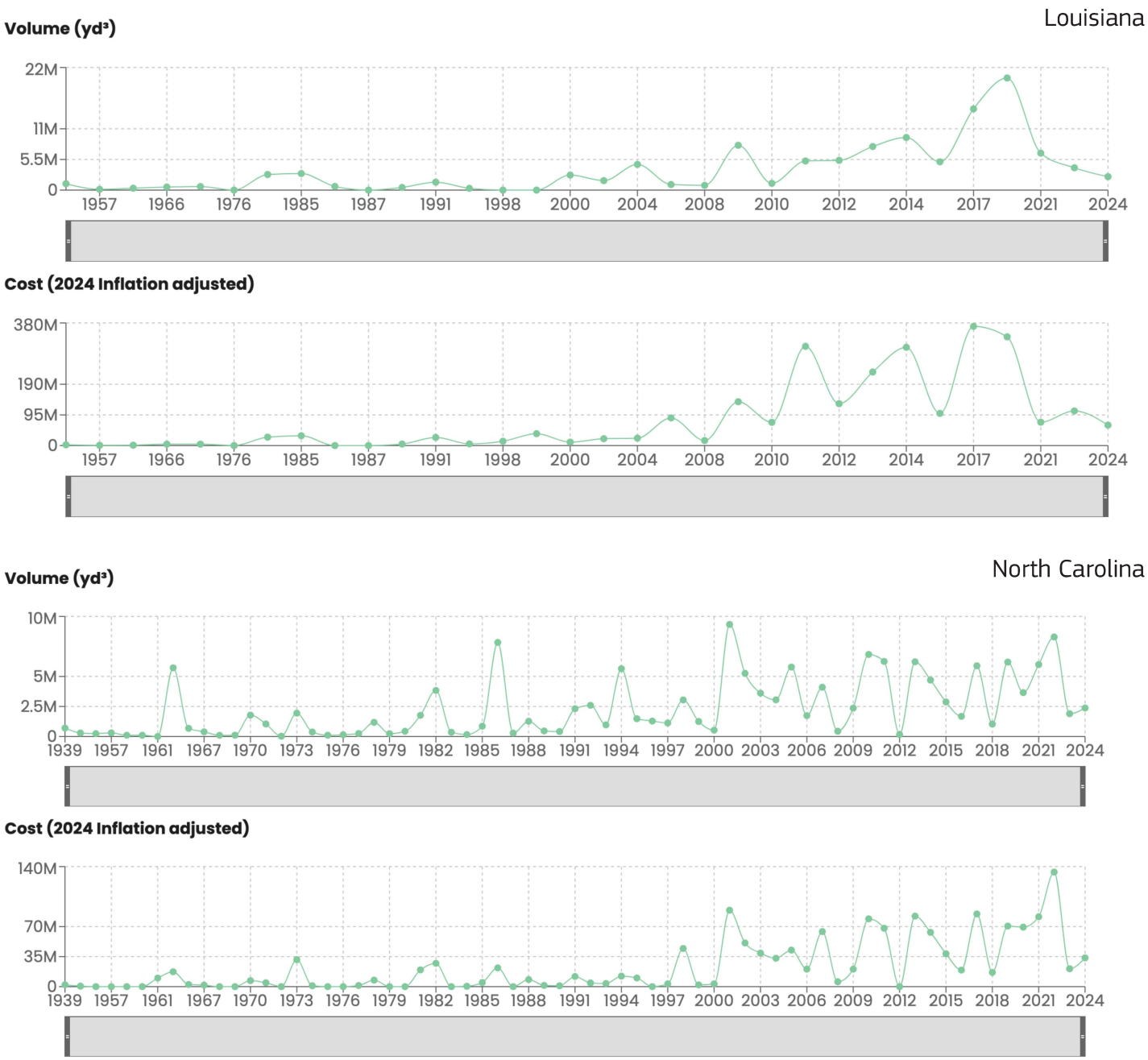

Figure 3. Beach nourishment totals by volume and cost for Louisiana (top) and North Carolina (bottom). Data from PSDS Beach Nourishment Viewer (https://beachno.wcu.edu/).

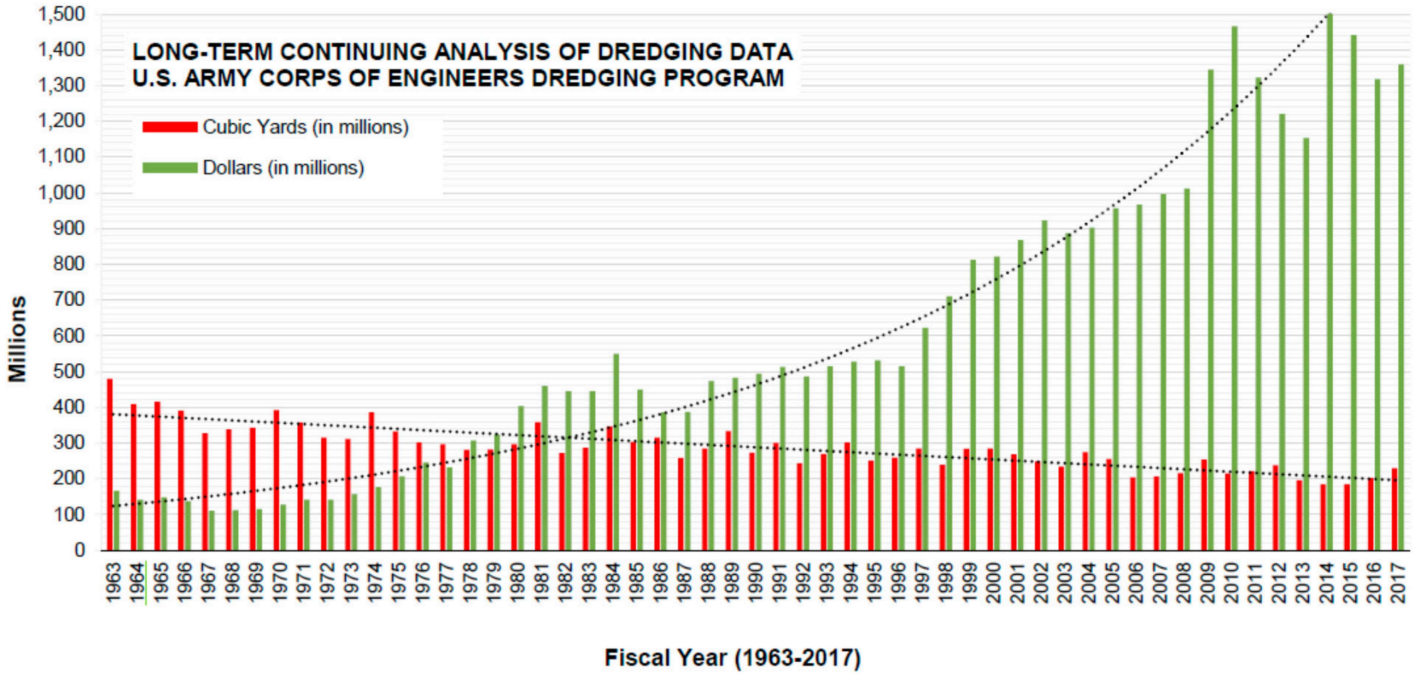

Figure 4. Nationally, dredging costs are accelerating making all dredging projects less and less cost effective. (USACE, 2018)

Limitation of the Current U.S. Fleet

Historically, the USACE has managed a small fleet of government-owned dredges and relied on contracts with a limited number of private U.S. firms. But the nation's reliance on a domestic dredging industry protected from foreign competition has resulted in a fleet that is relatively small, aging, and expensive to operate. According to a 2023 report by the National Taxpayers Union, many U.S. hopper dredges have been in service for over two decades, and the U.S. fleet trails the European fleet in capacity by a significant margin (Wilford, 2023).

A 2014 report by the Government Accountability Office (USGAO) highlighted structural weaknesses in the USACE's ability to track and manage hopper dredging capacity. It noted that limited data, no-bid contracting practices, and poor cost estimation methods prevented an accurate assessment of whether the fleet could meet national needs (USGAO 2014).

A 2019 Report to Congress by its in-house research arm, the Congressional Research Service, also found that the USACE is unable at times to schedule as much dredging as desired due to a lack of dredges. Compared to the fleets of the four European dredging firms considered world leaders, the U.S. fleet of hopper vessels is smaller and older. Each of the four European firms has a hopper fleet whose capacity is three to four times that of the entire U.S. fleet (CRS, 2019).

Meanwhile, demand for dredging has surged. In Fiscal Year 2023, federal dredging contract awards exceeded $2.1 billion, up 39% from the previous year—driven by both navigation maintenance and beach nourishment needs (Dredging Contractors of America, 2023). However, the limited number of qualified dredging vessels means projects are often delayed, downsized, or forced to compete for access to the same small pool of assets.

In response, U.S. dredging companies assert that they are continuing to invest in the fleet. Yet, the scale of need appears to be outpacing this growth. A 2018 presentation prepared for the Bay Planning Coalition by the USACE itself warned that "the nation is at a point where the demand for dredging... may exceed industry capacity" (USACE, 2018). The backlog continues to grow, especially after major hurricanes

when immediate dredging is needed to protect vulnerable infrastructure and rebuild eroded beaches. Transportation Policy Analyst Jay Derr writes: "Low domestic capacity and a captive market drive dredging costs up for this country in times of crisis" (Derr, 2024).

Are project delays and inflated costs sustainable in an era of increasing coastal erosion and storm activity? In short, while investment in fleet modernization may be underway, America's current dredging capacity is not keeping up with the escalating demands of beach nourishment and coastal protection. The gap between need and capacity is likely to widen as the demand for coastal restoration projects grows.

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Why Foreign Dredgers are Excluded from Bidding on Beach Nourishment Projects in the United States

In the early 20th century, as the United States began asserting greater control over its coastal and inland waterways, dredging became an increasingly regulated activity. The Rivers and Harbors Act of 1899, one of the nation's earliest environmental and navigational protection laws, required that anyone seeking to dredge or alter a navigable waterway first obtain a federal permit from the USACE. This law made no specific mention of foreign ships, and in its original form, it did not prohibit foreign-flagged vessels from engaging in dredging in the United States.

That changed with the Foreign Dredge Act of 1906, a lesser-known but highly consequential piece of maritime legislation that continues to shape the economics of coastal engineering in the United States. Its central provision is simple, yet far-reaching: it prohibits foreign-built and foreign-owned dredging vessels from operating in U.S. waters. The Foreign Dredge Act is rooted in early 20th-century protectionist thinking—designed to bolster the domestic shipbuilding industry and preserve American maritime labor.

The law was originally enacted as part of a series of federal efforts to ensure that critical infrastructure projects, such as dredging navigable waterways and maintaining harbors, would be carried out only by vessels fully under U.S. control. Today, this restriction is codified in 46 U.S. Code § 55109 and enforced by U.S. Customs and Border Protection, in coordination with the USACE, which oversees dredging permits.

In practical terms, the Act means that only dredges that are built in the United States, owned by U.S. companies, and flagged under the U.S. registry can lawfully perform dredging within American territorial waters. As a result, foreign dredging companies, even those with larger, more efficient fleets, are barred from bidding on beach nourishment, harbor maintenance, and other marine construction projects unless they obtain a rare federal waiver. It is important to note that U.S. dredgers do not face similar restrictions in Europe and most other countries. In short, these federal policies drive up the cost of beach nourishment for coastal communities and often make the wait for a new beach unbearably long.

Solutions Exist: The Case for the European Dredging Fleet

European dredging companies operate at the forefront of a highly competitive and technologically advanced global industry. Firms such as Boskalis and Van Oord from the Netherlands, along with Belgium's Jan De Nul and DEME, consistently lead the market in capacity, innovation, and cost-efficiency. Their dominance is no accident; it is the result of strategic advantages that have been cultivated through open-market access, sustained investment, and an emphasis on global maritime leadership.

One of the most fundamental advantages European dredging firms enjoy is their access to a global marketplace. Unlike U.S. dredging companies, who chose to focus almost exclusively on domestic operations, European firms freely bid on projects around the world. This open access allows them to take on a greater volume and variety of work, spread operational costs across a larger portfolio, and achieve the kind of economies of scale that lead to lower costs and higher efficiency.

Technologically, European fleets are significantly more advanced. Many of their vessels are larger, newer, and more capable than those operating under U.S. flags. Ships like Jan De Nul's Cristóbal Colón, one of the world's largest trailing suction hopper dredges, can move immense volumes of sediment quickly and with precision. An examination of S&P Global's International Dredging Directory, updated by an examination of company websites, indicates that 47 of the top 50 hopper dredges, measured by capacity, are EU dredges.

Operationally, European firms are more agile. With global experience and extensive logistics networks, they can mobilize vessels more quickly—a critical advantage when responding to time-sensitive projects such as post-hurricane beach nourishment or emergency port deepening. Their logistical flexibility allows them to deploy specialized equipment, personnel, and support services with far fewer delays than U.S. firms bound by domestic availability and restricted fleet options.

In short, European dredging companies benefit from a combination of competitive pressure, technological edge, and global mobility that the U.S. industry currently lacks. While American companies are shielded by the Foreign Dredge Act, they also operate within a constrained system that limits fleet expansion, inflates costs, and delays critical coastal projects. As the United States faces escalating challenges from sea level rise and storm-driven erosion, the contrast between the two dredging models has become increasingly stark—and increasingly relevant.

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Increased Competition will Lower the Cost of Beach Nourishment for Coastal Communities

Meeting the cost of beach nourishment has become the number one priority for many coastal communities. Some must finance the costs themselves (e.g. Hilton Head, SC; Dare County, NC; Sagaponack, NY), while others must meet a cost share (typically 35%) with the federal government covering most of the cost (e.g. Virginia Beach, VA; Carolina Beach, NC; New Jersey beaches). Currently, 2025 federal funding for many beach nourishment projects has disappeared and 2026 funding is likely to be at greatly reduced rates.

As the price and frequency of beach projects accelerates, so does the burden on local government and local taxpayers. Many communities are delaying projects beyond the demonstrated need to meet the cost demands. In addition, the large number of scheduled projects has municipalities standing in line waiting for an available dredge. This is particularly

true after a major storm event when rebuilding a storm-impacted beach may be critical to protecting local infrastructure and returning a recreational beach to visiting tourists.

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The strain placed on the coastal economy by the Dredge Act has long been recognized by numerous entities within the United States. The CATO Institute has been one of the most prominent voices in opposition. Policy analyst Colin Grabow has repeatedly argued that the Foreign Dredge Act is "a relic of a bygone era" that blocks some of the world's most efficient dredging companies from bidding on U.S. projects (Grabow 2021). He notes that while ports like Baltimore face costly delays and shallow harbors, massive European dredging firms with state-of-the-art equipment are kept out of the market purely due to the 1906 law. The same rationale applies to beach nourishment projects and meeting community needs for coastal resilience and infrastructure protection.

Similar concerns have been raised by the Heritage Foundation. In a 2019 commentary, Nicolas Loris warned that the Act "prevents some of the world's largest dredging companies" from operating in the United States, which leads to higher costs and longer timelines for critical dredging and nourishment projects. He pointed specifically to challenges at the Port of Houston, where capacity limitations and sediment buildup have made it difficult to accommodate large vessels—undermining both economic growth and maritime safety (Loris, 2019).

Others, like commentator Zvi Mowshowitz, have taken an even stronger stance, calling for the complete repeal of the Act. Writing on Substack, Mowshowitz describes it as a "bad law that stops foreign dredges from even fixing water access in America" and warns that it actively impedes basic infrastructure repairs needed for safety and commerce (Mowshowitz, 2023).

The National Taxpayers Union has also weighed in, highlighting how the Act limits supply and drives up federal spending. In a 2023 brief, the organization warned that "continued inaction on U.S. dredging policy stifles competition and burdens taxpayers," pointing to recent cases where U.S. communities had to postpone critical beach nourishment projects due to a lack of available domestic dredges (Wilford).

Responding to these pressures, lawmakers from both houses of Congress have introduced reform legislation aimed at opening the U.S. dredging market, at least partially, to foreign competition. The SHIP IT Act and the DEEP Act, both introduced in recent Congresses, would allow dredging vessels from NATO-member countries to operate in the U.S. under certain conditions. Supporters argue that this would increase dredging capacity, reduce project delays, and bring down costs without compromising national security (U.S. Congress, 2023).

The cost savings of greater competition would be significant. As a part of the research for this study, USACE bid documents for two ongoing beach nourishment projects in North Carolina were provided to one of the leading European dredging companies. The project was awarded in 2025 to a U.S. dredging company with a winning bid of $23.52 million. Upon reviewing all documents, the European company estimated that it would have submitted a bid of $12.99 million to complete the same work, using American workers. This estimate, which includes mobilization from Europe, is approximately 60% lower than the awarded U.S. bid. Note that this company is already legally working in the United States on offshore wind monopile installation and is fully conversant with the U.S. workforce, wages and safety requirements. A second EU company reviewed all documents for a larger project in New Jersey that was awarded in 2024 to the winning bidder at a cost of $118 million and states that it would have bid $57 million with a project completion timeline of only 10 weeks.

Comparisons of coastal restoration projects performed in the United States and abroad, lend credence to claims that costs are much lower outside the United States. The 2018 restoration of Whiskey Island, Louisiana's biggest beach rebuild project to date, cost $118 million and used 15.8 million cubic yards of dredged sand. In contrast, the well-regarded

Sand Motor project in the Netherlands cost about $81 million to move 28 million cubic yards of sand from 6-9 miles offshore— less cost and much more sand. Louisiana's Camina Headland project provides an even starker contrast. That project moved 8.8 million cubic yards of sand at a cost of $218 million.

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One could attempt to quibble with these numbers, and the author could continue to provide detailed comparisons. These kinds of comparative analyses show that increased competition and improved equipment can reduce costs. For those seeking to evaluate the claim that European dredging firms could execute most U.S. beach nourishment projects at approximately 45–50% of current costs, two options exist. Coastal communities and their consultants may get valuable new perspectives on cost savings and alternative approaches, by sharing bid documentation and discussing project parameters with the organizations listed at the end of this report. Another way to test the cost savings assertion is to create a small carve out in the Dredge Act for beach nourishment projects and let the market decide.

In sum, the growing chorus of criticism reflects a bipartisan recognition that the Foreign Dredge Act no longer aligns with the scale and urgency of modern coastal needs. With America facing mounting coastal erosion, maintaining strict restrictions on foreign dredgers comes at a cost the nation can no longer afford. Imagine if you are a coastal community in New Jersey and you just lost your 65% cost match from the federal government, but increased competition drives down the cost to the degree that your 35% local match could get you all the sand and much faster as well!

The growing chorus of criticism reflects a bipartisan recognition that the Foreign Dredge Act no longer aligns with the scale and urgency of modern coastal needs. With America facing mounting coastal erosion, maintaining strict restrictions on foreign dredgers comes at a cost the nation can no longer afford.

Environmental Benefits of Increased Capacity and Lower Costs

European dredging companies have emerged as global leaders in environmentally responsible marine construction, owing to a combination of stringent environmental regulations, technological innovation, and a philosophical shift toward nature-based solutions. A key driver of Europe's environmental leadership in dredging is its robust regulatory framework. European companies must comply with continent-wide laws such as the EU Water Framework Directive and the Marine Strategy Framework Directive, which demand rigorous environmental assessments and minimal ecological disruption for all marine and coastal projects. These legal standards have prompted EU firms to develop comprehensive environmental management systems that go beyond compliance.

Technological innovation is another major differentiator. These vessels also feature advanced sediment containment systems that limit turbidity and sediment plumes—key concerns in ecologically sensitive areas. Moreover, European dredging firms tend to bring a higher level of environmental monitoring to their projects. It's not uncommon for European sites to include continuous, real-time data collection on water quality, noise, and species presence, with automated shutdowns if thresholds are exceeded. These systems help avoid harm to

sensitive ecosystems and ensure accountability throughout the project life cycle.

Reducing the cost of dredging and accessing offshore sources with greater efficiency will reduce the pressure to mine sand from nearshore borrow areas, thus delivering notable benefits for the environment and securing longer term coastal community resilience.

As costs have risen, some American beach communities have sought access to sand sources that are inshore (and cheaper to access), rather than offshore. This is resulting in breaking many "norms" of project implementation that have guided beach nourishment for decades. Applicants are seeking to take sand from inlet shoals, from back-barrier settings, and from the nearby intertidal zone to truck sand down the beach. Communities are increasingly seeking access to sand located within the Coastal Barrier Resource System (CBRS), which is typically off limits to projects with federal funding. The growing efforts to access the CBRS demonstrate how challenging the funding situation has become for coastal communities.

From a scientific perspective, removing sand from nearshore areas is far more likely to negatively impact coastal wetlands and other critical habitat. Manipulating nearshore sand bodies is also more likely to negatively impact shoreline dynamics by increasing erosion and storm impacts in nearby areas. There is a strong case for using sand from offshore – rather than inshore – as it can limit environmental impacts and lessen the likelihood of unexpected changes to storm dynamics that may threaten infrastructure. Consequently, reducing the cost of dredging and accessing offshore sources with greater efficiency will reduce the pressure to mine sand from nearshore borrow areas, thus delivering notable benefits for the environment and securing longer term coastal community resilience.

Finally, the increasing demand for beach nourishment is also putting pressure on the timing of projects. In the past, communities have generally avoided conducting nourishment activities during turtle nesting season (in areas where nesting occurs). With the current capacity, it is difficult to fit all the work in to the "turtle windows" when nesting is not occurring. Projects are now stretching into nesting season or ignoring the windows altogether. While true that those carrying out the nourishment profess to pay careful attention to turtle impacts, this is certainly not best practice. Increased capacity will allow more projects to be constructed at times when environmental impacts are less likely.

Conclusion

As rising seas and intensifying storms accelerate erosion, the United States must reevaluate its approach to coastal protection. Without expanded dredging capacity and increased competition, communities will continue to face escalating costs, delayed projects, and heightened vulnerability. Opening the market to competition—while maintaining environmental safeguards and supporting U.S. coastal labor—offers a practical, urgent path forward. Ensuring access to affordable, efficient nourishment today is essential to securing resilient coastlines, thriving coastal economies, and sustainable shorefront communities in the decades ahead.

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For more information on European dredging companies:

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