

# Restoration and Protection of the Barrier Island Dunes on the Outer Banks

*Safeguarding Nature's First Line of Defense*



Outer Banks, North Carolina



# Forward

This pamphlet was created by the Outer Banks Coastal Conservation (OBCC), a nonprofit organization whose mission is to foster environmental stewardship and a deeper connection to the Outer Banks of North Carolina through outreach, education, and conservation efforts.

We believe that small stories can spark big change. That is why we have made this book available as a free resource for parents, teachers, and community members.

All materials in this pamphlet may be freely downloaded, shared, printed and used for educational or nonprofit purposes.

To learn more, access additional resources at: [www.theobcc.org](http://www.theobcc.org).





# Introduction: The Dynamic Nature of Barrier Islands

Stretching like a slender ribbon between the Atlantic Ocean and the Pamlico Sound, North Carolina's Outer Banks are ever-changing barrier islands shaped by wind, waves, and tides. The dunes that line these islands are not just piles of sand — they are *living systems* that protect communities, roads, and wildlife from coastal storms and rising seas.

Yet, these dunes face constant threats from erosion, storms, trampling, and development. Understanding how to restore and protect them is essential for maintaining the health of both the natural and human environments.



# The Role of Dunes in Coastal Protection

Dunes are nature's protective walls. When storms strike, they:

- Absorb wave energy, reducing flooding and erosion.
- Store sand that helps rebuild beaches after storms.
- Provide habitat for dune grasses, ghost crabs, piping plovers, and other coastal wildlife.
- Serve as buffers between the ocean and human development.

Without dunes, storm surge can rush inland unimpeded, damaging roads, homes, and ecosystems.

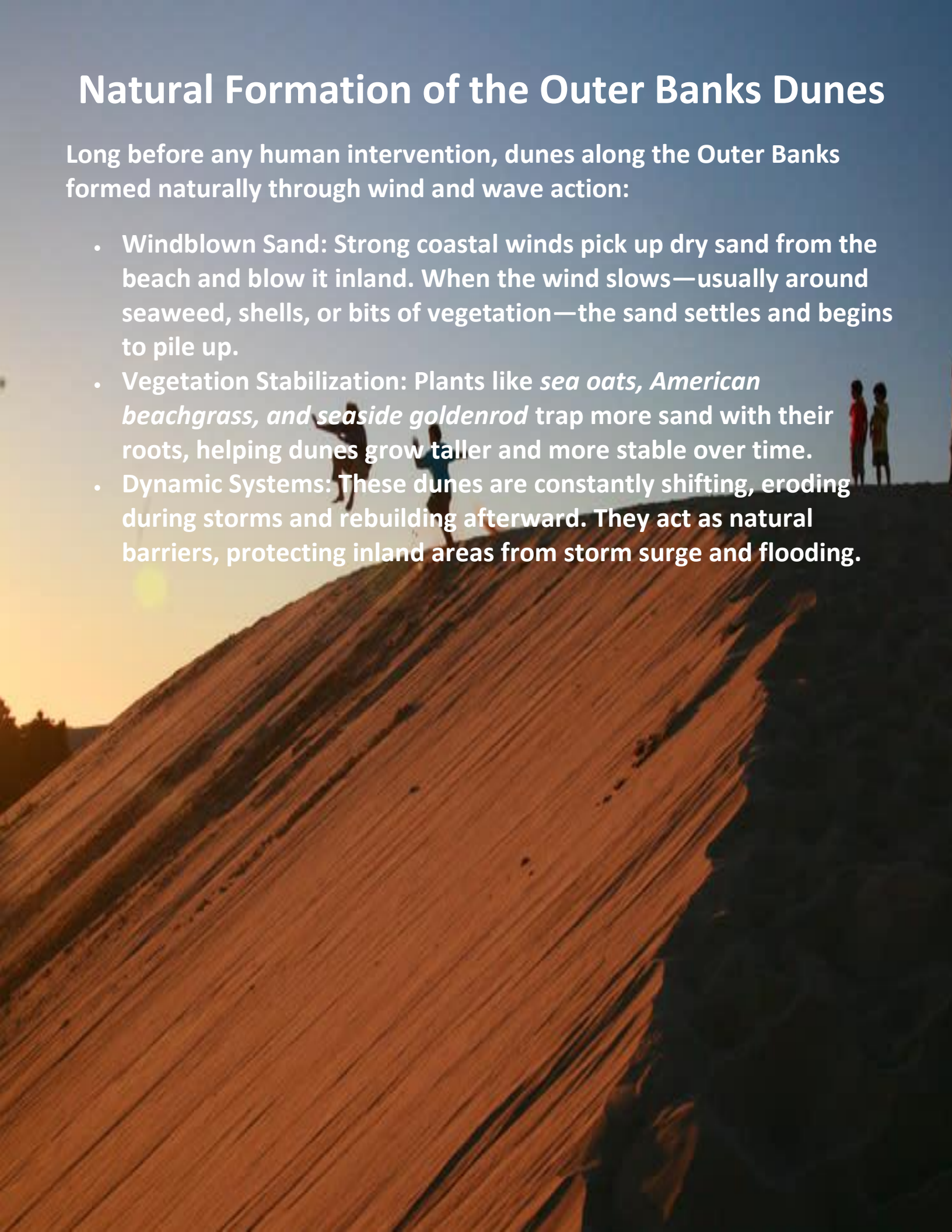




# Natural Formation of the Outer Banks Dunes

Long before any human intervention, dunes along the Outer Banks formed naturally through wind and wave action:

- **Windblown Sand:** Strong coastal winds pick up dry sand from the beach and blow it inland. When the wind slows—usually around seaweed, shells, or bits of vegetation—the sand settles and begins to pile up.
- **Vegetation Stabilization:** Plants like *sea oats*, *American beachgrass*, and *seaside goldenrod* trap more sand with their roots, helping dunes grow taller and more stable over time.
- **Dynamic Systems:** These dunes are constantly shifting, eroding during storms and rebuilding afterward. They act as natural barriers, protecting inland areas from storm surge and flooding.





# Human-Made Dunes: The CCC Era

Many of the tall, continuous dune lines seen today along the Outer Banks were *built or reinforced by humans*, especially during the 1930s.

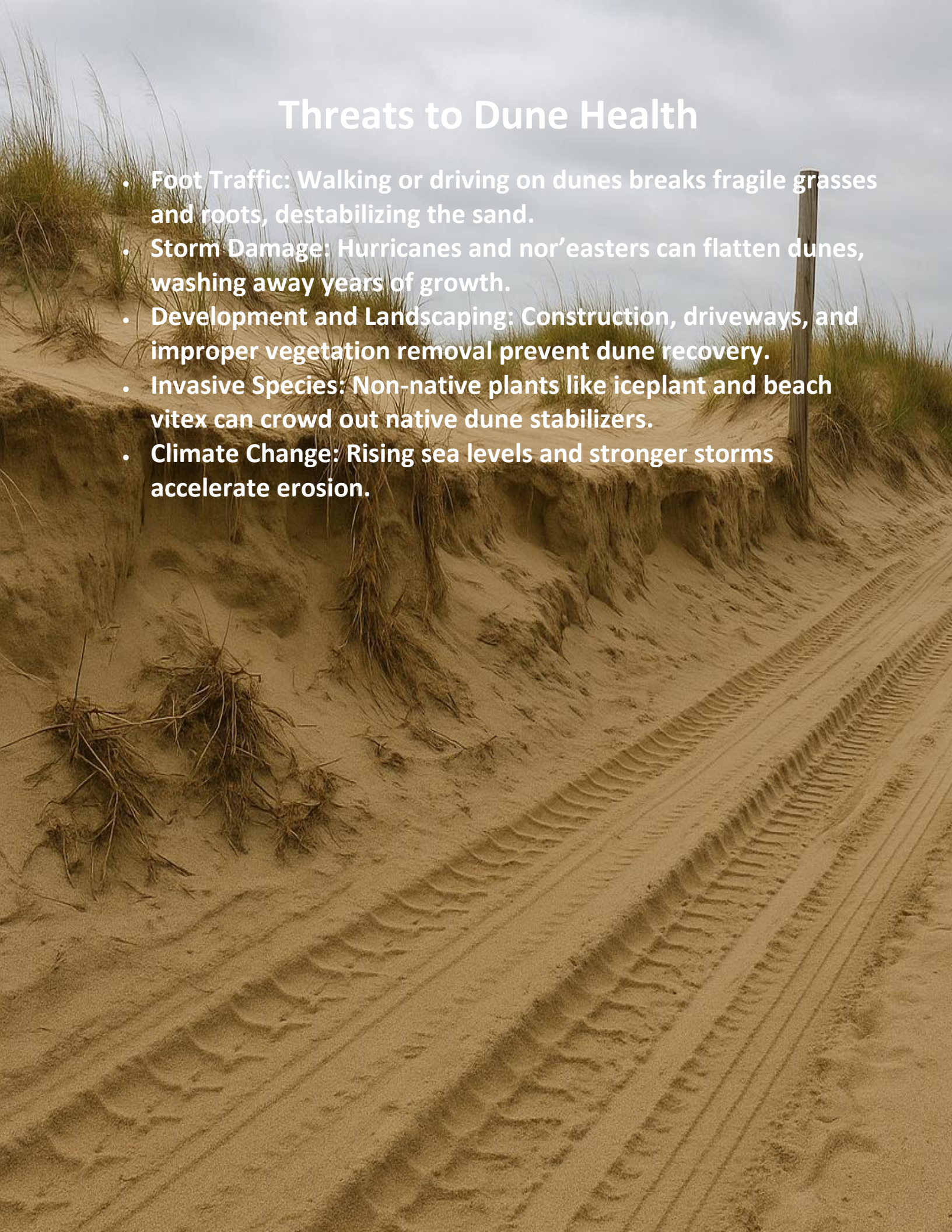
- During the Great Depression, President Franklin D. Roosevelt's Civilian Conservation Corps (CCC) played a huge role in coastal management.
- In the 1930s and 1940s, CCC crews worked along much of North Carolina's coast — especially Cape Hatteras, Bodie Island, and Ocracoke — to:
  - Build artificial dunes by bulldozing and shaping sand ridges parallel to the shoreline.
  - Install sand fencing and plant sea oats and beachgrass to hold the dunes in place.
  - Prevent sand from blowing onto the new NC Highway 12 and protect property from overwash.

These CCC-built dunes are sometimes called “*engineered dunes*.” They created the tall, linear dune systems we still see along much of the Outer Banks today — particularly near developed or highway areas — though they've since been reshaped by storms and natural processes.



# Threats to Dune Health

- **Foot Traffic:** Walking or driving on dunes breaks fragile grasses and roots, destabilizing the sand.
- **Storm Damage:** Hurricanes and nor'easters can flatten dunes, washing away years of growth.
- **Development and Landscaping:** Construction, driveways, and improper vegetation removal prevent dune recovery.
- **Invasive Species:** Non-native plants like iceplant and beach vitex can crowd out native dune stabilizers.
- **Climate Change:** Rising sea levels and stronger storms accelerate erosion.





# Restoration Strategies

## 1. Planting Native Dune Vegetation

Replanting native species is one of the most effective restoration methods:

- *American Beachgrass* – Excellent sand trapper; planted in winter or early spring.
- *Sea Oats* – Deep roots help stabilize high dunes.
- *Bitter Panicgrass* – Thrives in hot, dry sand; provides cover for wildlife.
- *Seaside Goldenrod* – Adds biodiversity and attracts pollinators.

Spacing and density matter: typically 12–18 inches apart in staggered rows.

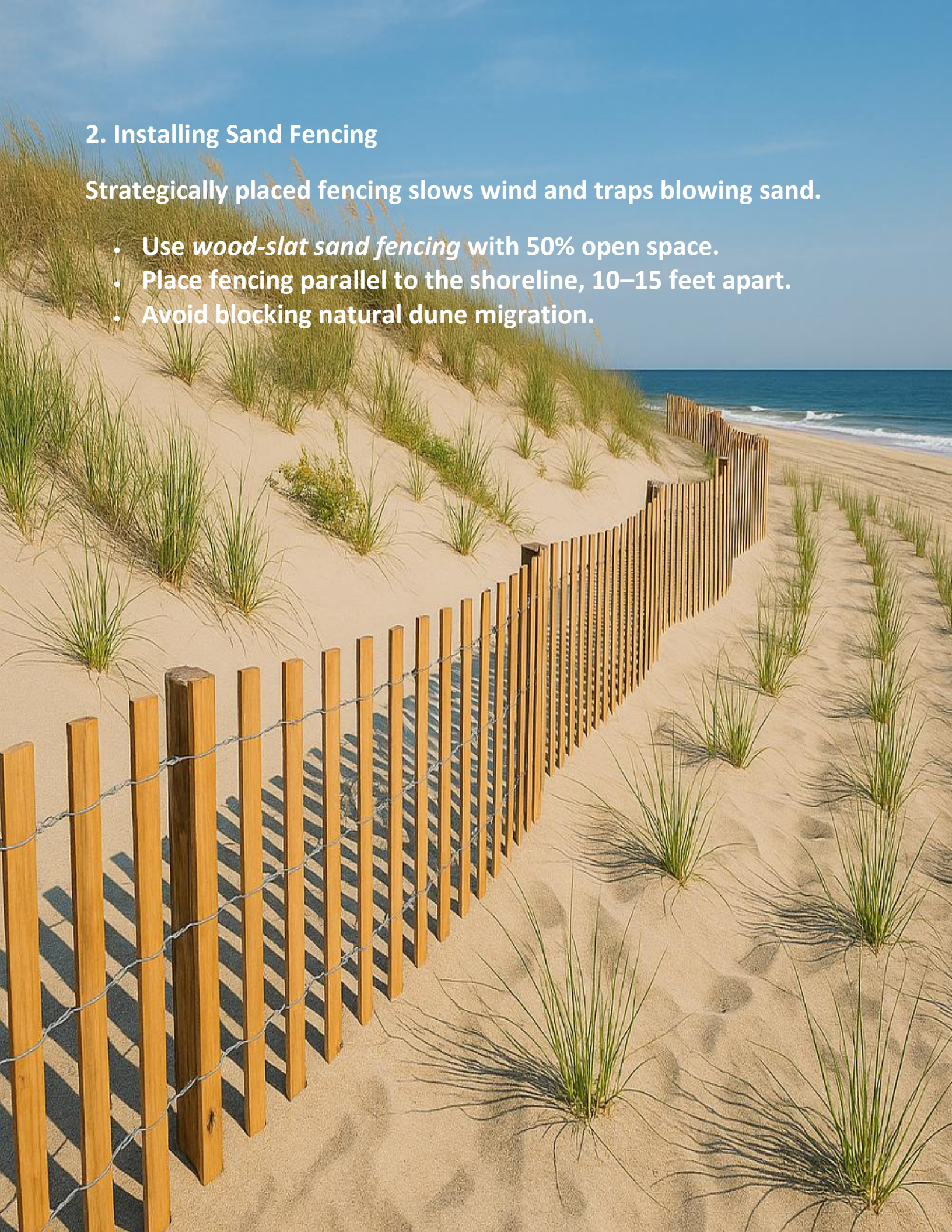




## 2. Installing Sand Fencing

Strategically placed fencing slows wind and traps blowing sand.

- Use *wood-slat sand fencing* with 50% open space.
- Place fencing parallel to the shoreline, 10–15 feet apart.
- Avoid blocking natural dune migration.





### 3. Limiting Access with Walkovers and Signs

- Build *boardwalks or designated paths* over dunes.
- Post “*Stay Off the Dunes*” and “*Use Designated Access*” signage.
- Encourage stewardship through education and local partnerships.





#### 4. Using Natural Debris and Wrack

Allowing *seaweed, shells, and driftwood* to remain along the high-tide line adds organic material and traps sand — an important early step in dune formation.



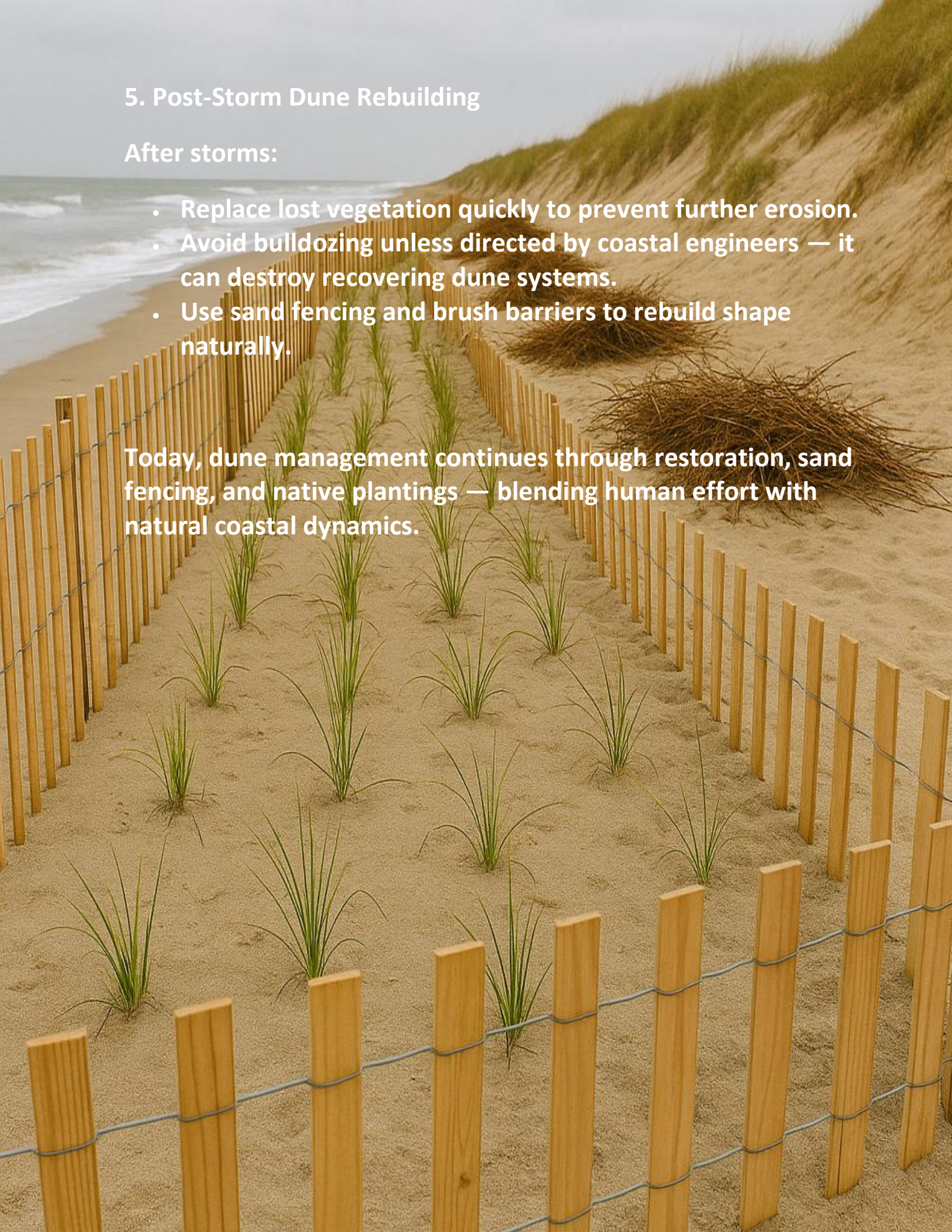


## 5. Post-Storm Dune Rebuilding

After storms:

- Replace lost vegetation quickly to prevent further erosion.
- Avoid bulldozing unless directed by coastal engineers — it can destroy recovering dune systems.
- Use sand fencing and brush barriers to rebuild shape naturally.

Today, dune management continues through restoration, sand fencing, and native plantings — blending human effort with natural coastal dynamics.





# What You Can Do

- Stay off dunes — use marked beach access paths.
- Support dune-friendly landscaping on private property using native plants.
- Volunteer in local dune restoration events.
- Reduce runoff and remove invasive species near the coast.
- Spread awareness — teach visitors and renters why dunes matter.

## Why It Matters

Healthy dunes are essential for:

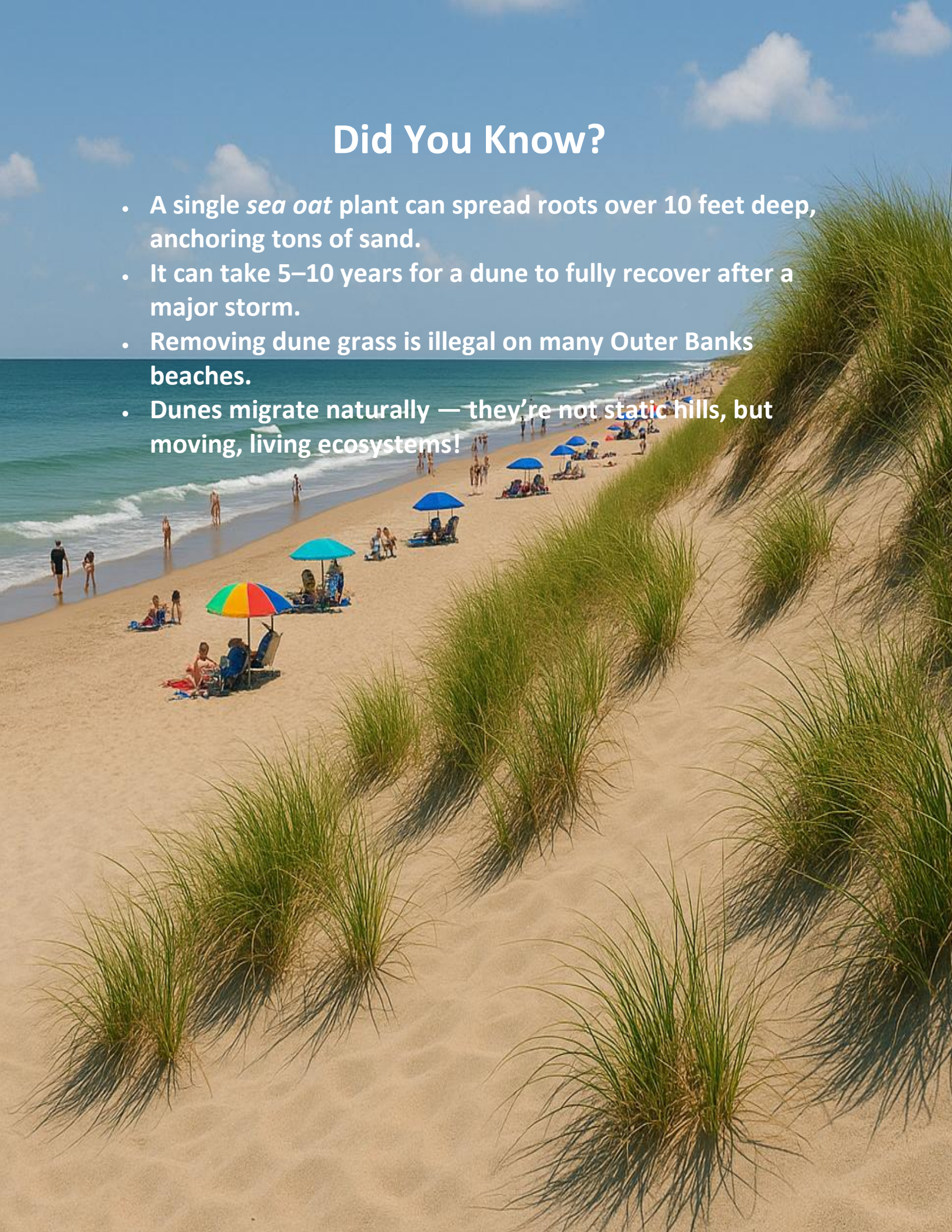
- Protecting roads and homes from storm surge.
- Preserving wildlife habitat for nesting birds and sea turtles.
- Maintaining the natural beauty and resilience of the Outer Banks.

Every blade of dune grass and every handful of sand plays a role in the island's defense.



# Did You Know?

- A single *sea oat* plant can spread roots over 10 feet deep, anchoring tons of sand.
- It can take 5–10 years for a dune to fully recover after a major storm.
- Removing dune grass is illegal on many Outer Banks beaches.
- Dunes migrate naturally — they're not static hills, but moving, living ecosystems!





# References

National Oceanic and Atmospheric Administration (NOAA), Office for Coastal Management. (2022). *Coastal dune dynamics and restoration techniques*. U.S. Department of Commerce.

<https://coast.noaa.gov/>

National Park Service. (2023). *Cape Hatteras National Seashore dune restoration projects*. U.S. Department of the Interior.

<https://www.nps.gov/caha/learn/nature/dunes.htm>

North Carolina Coastal Federation. (2024). *Living with the coast: Dune management in the Outer Banks*.

<https://www.nccoast.org/>

U.S. Fish and Wildlife Service. (2023). *Barrier island ecology and resilience in coastal North Carolina*. U.S. Department of the Interior.

<https://www.fws.gov/>

