How should we meet the challenges of access to Ocracoke?

Approach One: Current Road and Ferry System

This approach will continue the current management strategies of NC-Highway 12 on Ocracoke Island and the ferry routes that have been in place. NC-DOT to do its best to repair the roadway in a timely manner when the road is deemed impassable.

1A: NCDOT continues managing and repairing NC-Highway 12 as needed.	Repairing NC-12 is contingent on several factors: the ferry must be operational to allow NC-DOT personnel onto the island, funding must be available for repairs, road closure may be lengthy if repairs are delayed or time-consuming, and the frequency of needed repairs must be considered.
1B: Maintain and improve ferry routes and schedules.	South Dock is heavily impacted by erosion and flooding. If the terminal undergoes repairs, it could result in possible closures and higher costs. Adding additional ferry routes and time slots is dependent on funding and weather/ocean conditions.

Approach Two: Beach and Dune Management

This approach involves occasional beach nourishment along the oceanside, as the beach width erodes. This approach also involves maintaining the sandbags and improving dune structure near the road.

2A: Dunes will be repaired and built-up when needed.	Dune management could be costly if repairs/construction is needed multiple times a year or after major storms/flood events. Preventing overwash events makes the road and island interior lower and more vulnerable to storms and soundside flooding
2B: Beach Nourishment will be performed on the island every 3-5 years.	Storm frequency and coastal erosion could require beach nourishment more often which can result in higher costs. Reductions in overwash sediment makes the road and island interior lower and more vulnerable to storms and soundside flooding.

Approach Three: Roadway Alternatives

This approach involves no longer maintaining NC-Highway 12 from Ocracoke Village to South Dock. Alternatives could include additional ferry service to the Village, a causeway or a bridge.

3A: No longer maintain NC-Highway 12 from the Pony Pens to South Dock and allow the roadway corridor to undergo natural processes without human interference.	No longer maintaining the road would require alternative means for getting to/from the island. The island would migrate at a faster rate in locations where the highway recently was, but would likely stay above sea level for longer, compared to the other two approaches.
3B: Build a bridge from Hatteras to South Dock or a suspended roadway from South Dock to Ocracoke Village.	Building an expansive jug-handle bridge or a new elevated roadway would be costly and require a high degree of engineering and funding. Bridges also experience closures during high winds and major storms which would impact traffic and transportation.

Conclusions from Simulations

Approach One: Current Road and Ferry System

Model runs resulted in:

- **Narrowing of the island** over time. This occurs due to bayside inundation and shoreline erosion.
- The frequency of **flooding and overwash will increase** steadily.
- **Within 51-75 years**, the entire length of the road will likely be continuously **submerged.**

Approach Two: Beach and Dune Management

Model runs resulted in:

- **Narrowing of the island** over time. This occurs due to inundation of the island on the bayside while the ocean shoreline remains stable as long as nourishment keeps up with erosion.
- The frequency of **flooding and overwash will increase** steadily.
- **Within 51-75 years**, much of NC Hwy 12 will likely be continuously **submerged**.

Approach Three: Roadway Alternatives

Model runs resulted in:

- **Less island narrowing** than the other approaches and landward island migration.
- The **bayside shoreline remains more stable** or grows landward, while the **ocean shoreline erodes.**
- **Within 51-75 years**, the roadway between Ocracoke Village and the Pony Pens becomes continuously **submerged**.

Dialogue Goals & Format

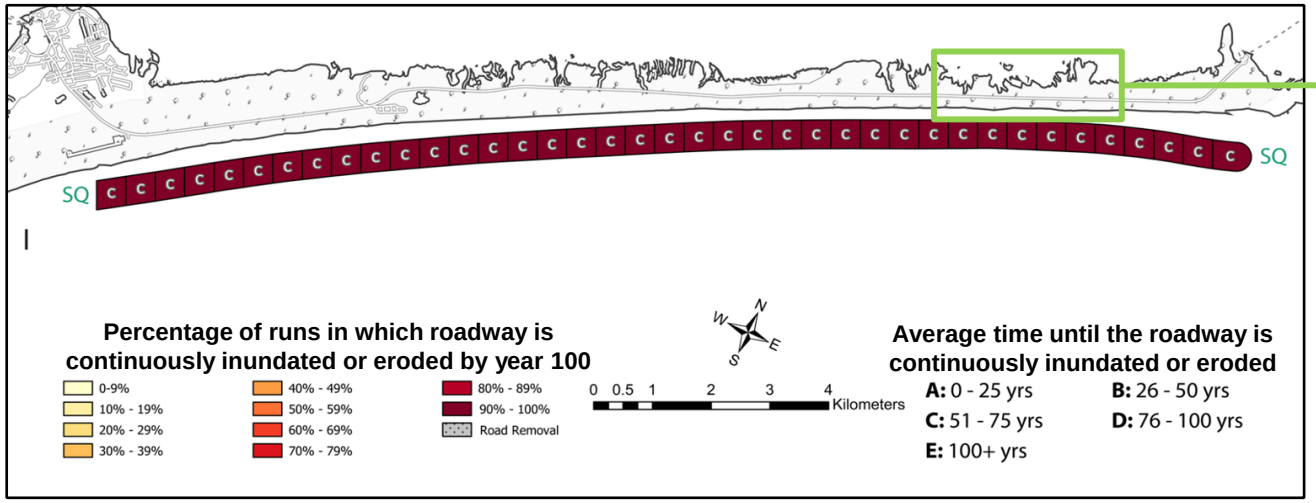
The goal of this "deliberative dialogue" event is to share information with and seek the opinions of Ocracoke residents, regarding possible management approaches for NC-12, affecting access to Ocracoke Village.

1. **Welcome (about 10 min)**
2. **Deliberations in small groups (about 65 minutes)**
3. **Expert Panel (about 10 min)**
4. **Conclusion & Participant questionnaire (about 5 min)**

[Image Credit: NPS]

Notes

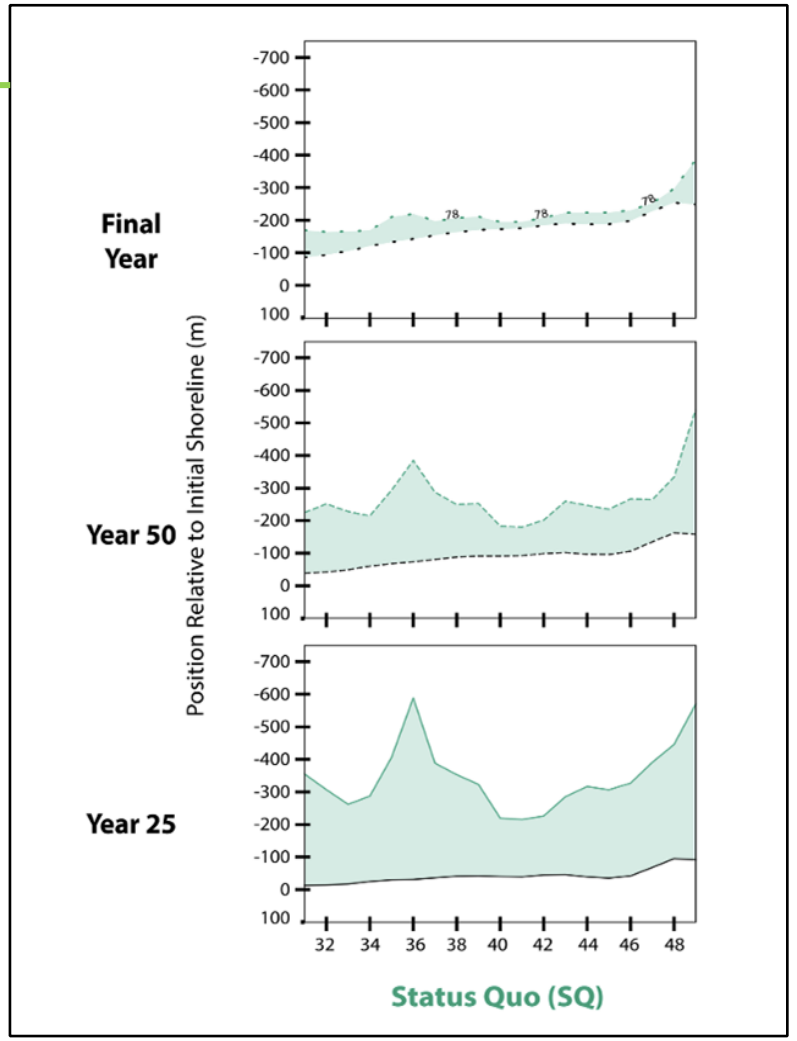
Approach One: Current Road and Ferry System



The diagram above shows a top-down view of the entire island. In this scenario, the road is likely to be continuously submerged along all domains within 51-75 years.

The diagram on the right is a top-down view of the island from model domains 32-48 (known as the 'erosion hot spot') at 25 years, 50 years, and 78 years. The shaded green area shows all land above sea level (at still water), with 0 indicating the current ocean shoreline.

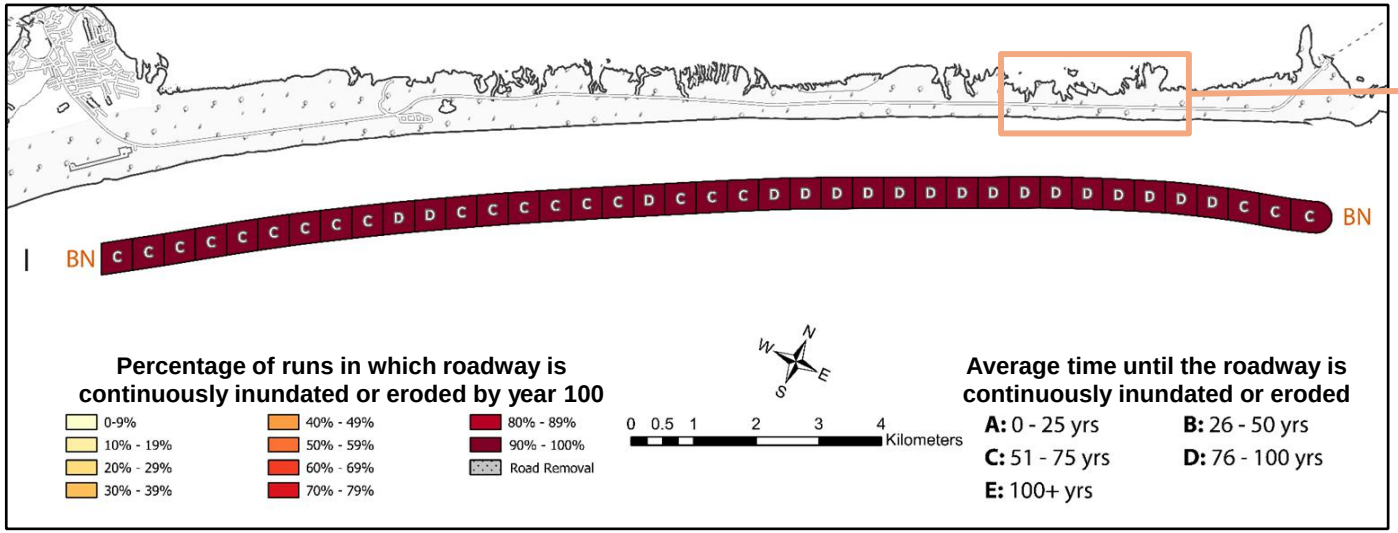
In this scenario, management reduces sediment transport to the island's interior, leading to island narrowing from a combination of bayside inundation and ocean shoreline erosion in years 0 -77. On average, this area drowns at model-year 78.



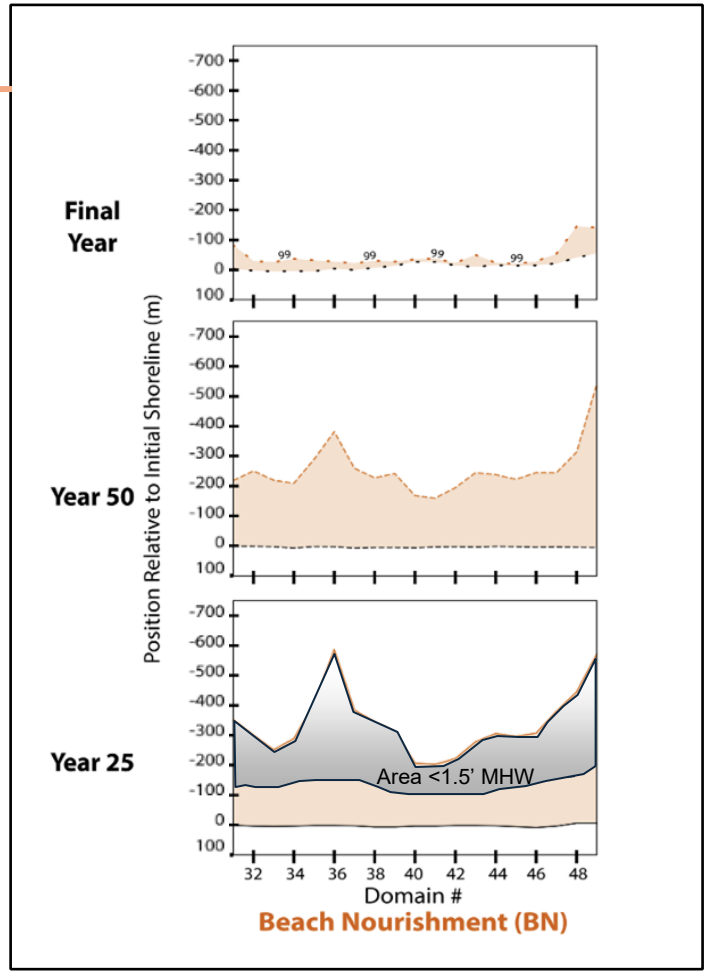
Franklin et al., in preparation for submission *to Earth's Future*

Model results indicate: Narrowing of the island over time due to bayside inundation and shoreline erosion. Flooding and overwash frequency will increase over time. The entire length of NC-Hwy 12 will be continuously submerged by ~51-75 years.

Approach Two: Beach and Dune Management



The diagram above shows a top-down view of the entire island. In this scenario, the road is likely continuously submerged within 51-75 years along the southern and central portions of the island and near the inlet. Continuous inundation is likely delayed to within 76-100 years near the Pony Pens and in the erosion hotspot.



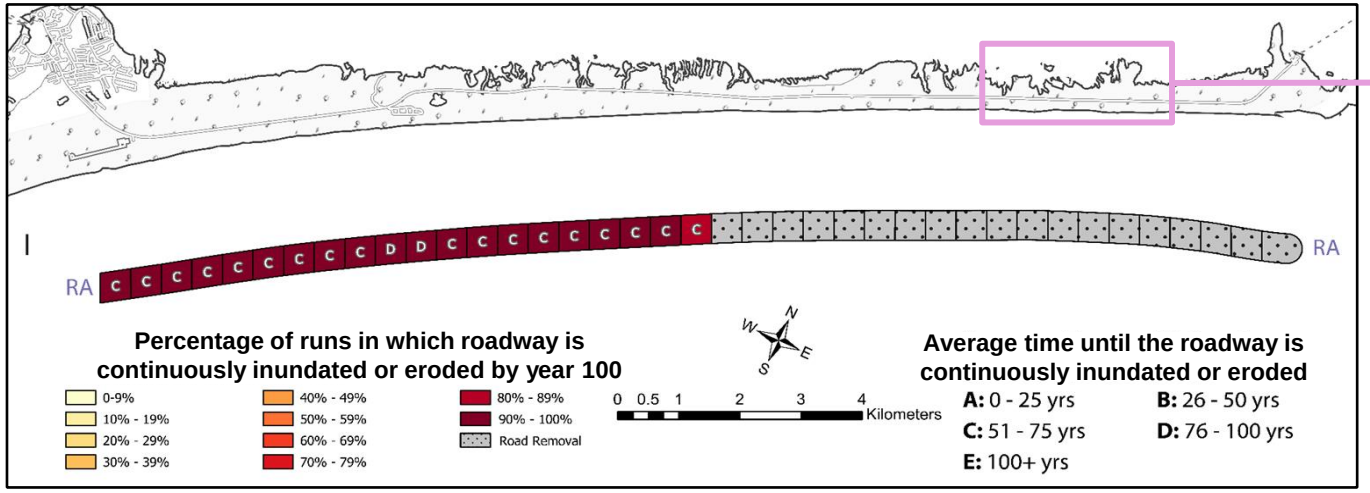
The diagram to the right shows a top-down view of the island from domains 32-48 (known as the 'erosion hot spot') at 25 years, 50 years, and 99 years. The shaded orange area shows all land above sea level (at still water), with 0 indicating the current ocean shoreline.

In this scenario, on average, the island drowns at year 99. If nourishment occurs frequently enough, it mitigates ocean shoreline erosion. This, along with dune construction, reduces sediment transport to the island interior leading to island narrowing from bayside inundation.

Franklin et al., in preparation for submission *to Earth's Future*

Model results indicate: Narrowing of the island over time due to inundation on the bayside while the ocean shoreline remains stable (as long as nourishment is frequent enough). The frequency of flooding and overwash will increase over time. Much of NC-Hwy 12 will be continuously submerged within ~51-75 years, with the remaining roadway submerged by ~76-100 years.

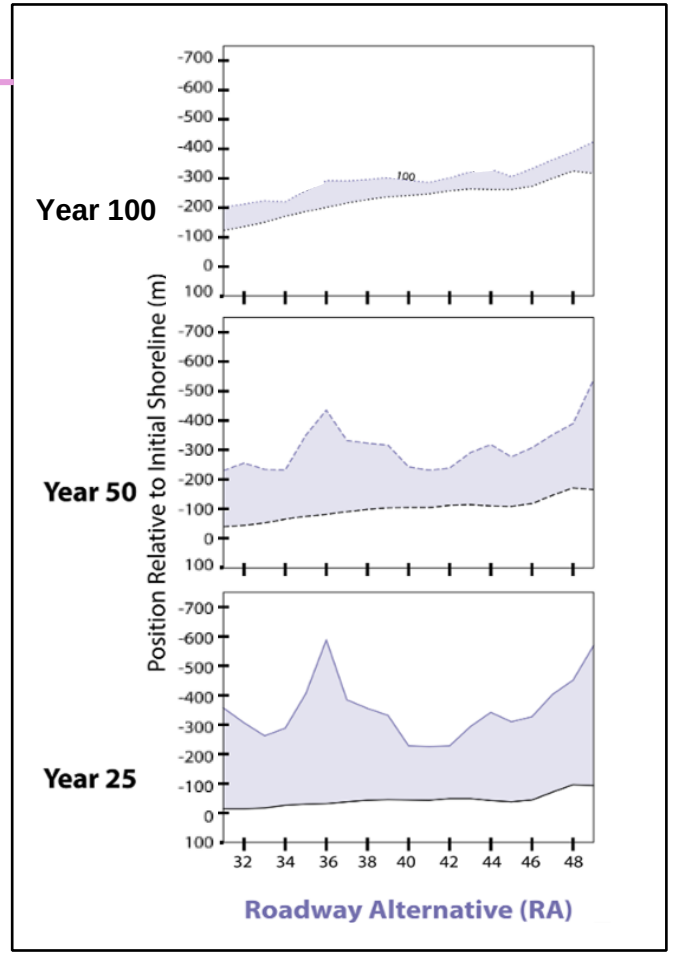
Approach Three: Roadway Alternatives



The diagram above shows a top-down view of the entire island. In this scenario, like the others, the road is likely continuously submerged within 51-75 years along the stretch from the Pony Pens to the Village.
[Note: Because the roadway isn't managed where the gray boxes are shown, there are no roadway results to report for the northern portion of the island.]

The diagram to the right shows a top-down view of the island from domains 32-48 (known as the 'erosion hot spot') at 25 years, 50 years, and 100 years. The shaded purple area shows shows all land above sea level (at still water), with 0 indicating the current ocean shoreline.

In this scenario, the island moves landward instead of drowning. As it moves, the island becomes narrower due to ocean shoreline erosion and minor bayside inundation. There is greater sediment transport to the island interior compared to approaches 1 and 2, leading to less bayside inundation and a lack of drowning.



Franklin et al., in preparation for submission *to Earth's Future*

Model results indicate: Less island narrowing than the other approaches and landward island migration. The bayside shoreline is maintained by overwash as the ocean shoreline erodes. Flooding of the roadway from the Pony Pens to Ocracoke will increase over time. The road from the Ocracoke Village to the pony Pens will be continuously submerged within 51-75 years.