

WATER OVER THE BRIDGE:

Innovation, Technology, and Partnerships for Port Community Resilience

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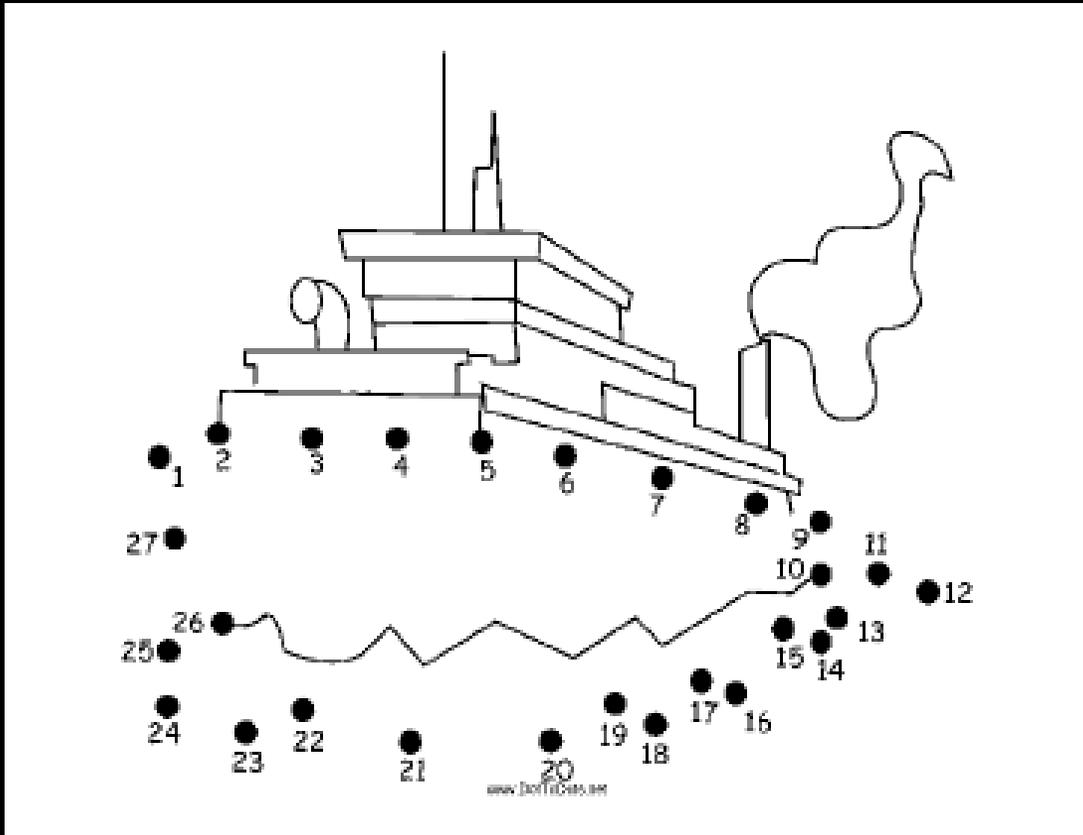
University of North Carolina, Chapel Hill

2018 Carolinas Climate Resilience Conference

Session 6A Policy Innovations for Climate Adaptation

Columbia, SC

WOB: by the numbers



- + 5 quick slides -intro – meaning of WOB!
- + 10 things about ports and global freight
- + 3 climate change & freight transportations
- + 5 things to worry about
- + 3 policy warnings: WOB
- + 1 reminder to take action!
- = 27 points in 30 slides
in less than 20 minutes

WATER OVER THE BRIDGE – a new idiom



- Water *under* the bridge –
- Likely not going to happen again
- Can safely ignore

- Water *over* the bridge
- Likely going to happen more frequently with greater consequences.

- **CANNOT IGNORE – must take action NOW!!!**

WATER OVER THE BRIDGE = WOBB



Charleston, SC

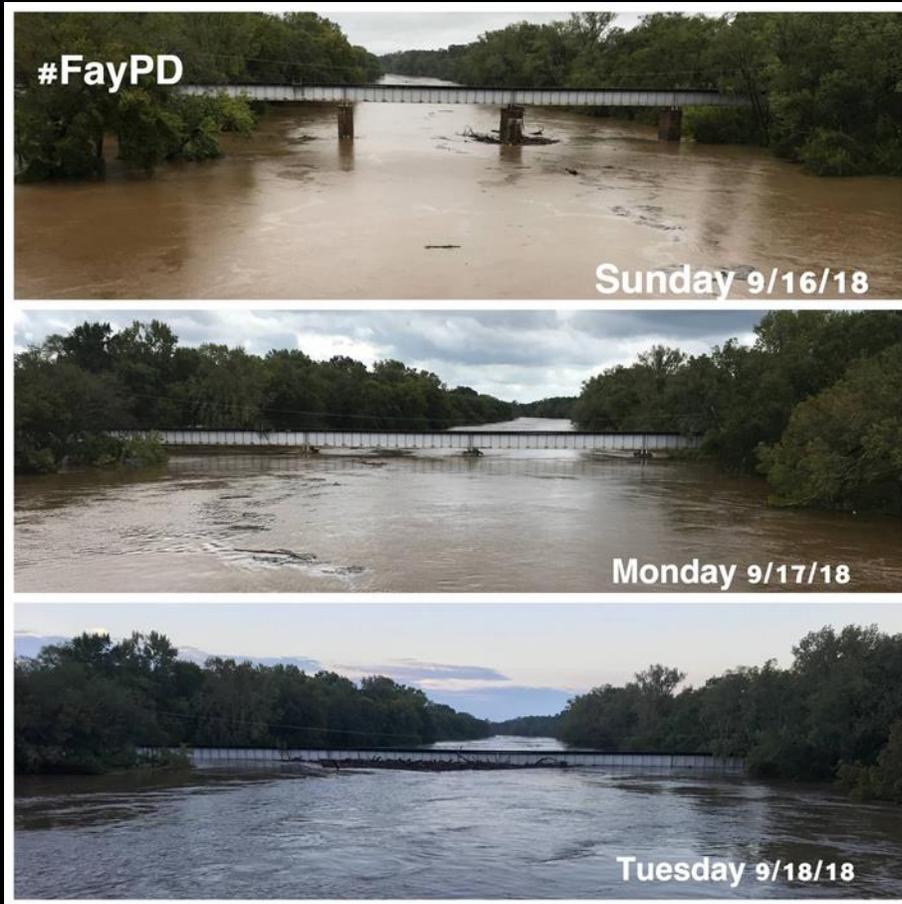
CLEARANCE FOR SHIPS

- freight
- national defense
- Between water surface and bottom of bridge
- Between bottom of ship and channel depth

ACCESS TO PORTS

- people & freight
- Roads, railroads, airports

TIDES, SEVERE WEATHER & CLIMATE CHANGE

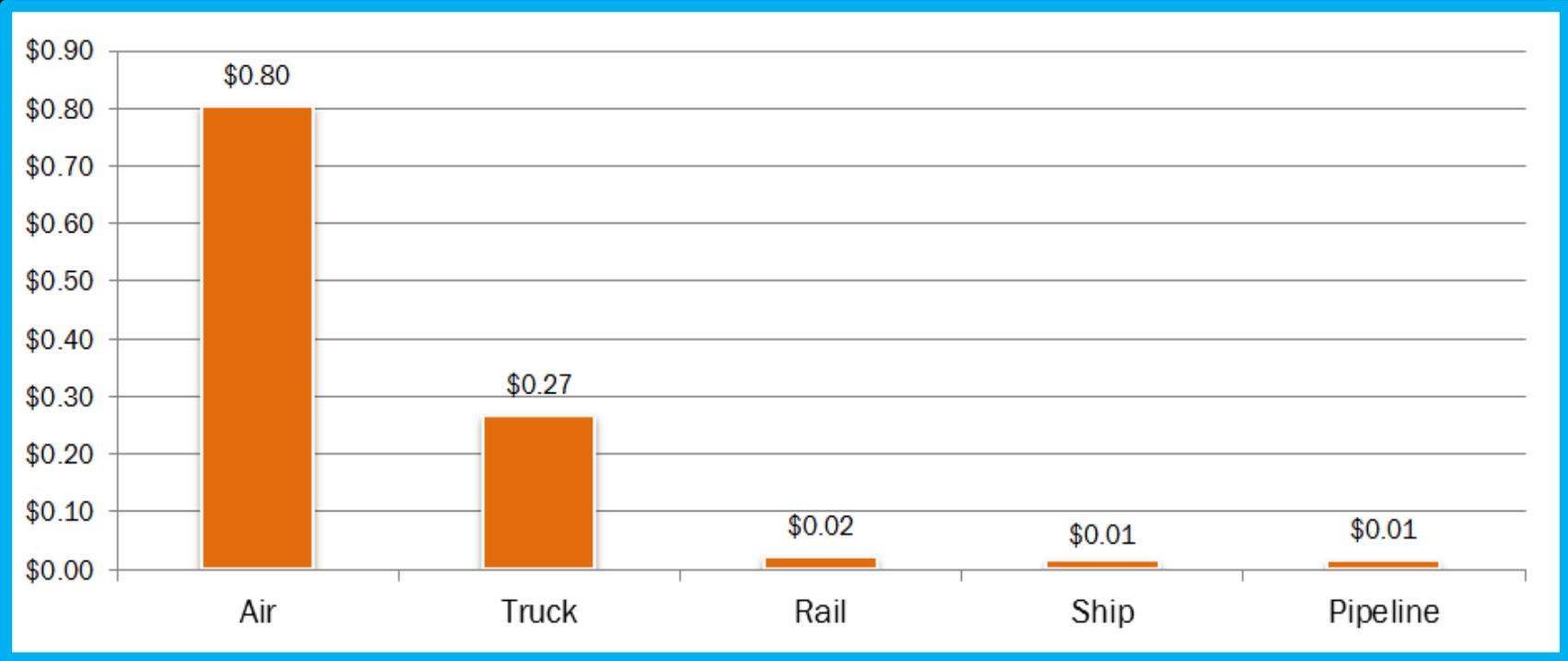


- TIDES ALREADY MATTER
- 9-11 EXAMPLE
- SEVERE WEATHER MATTERS
- PORT CLOSURES FOR HURRICANES AND FLOODS
- Clearance for surface traffic access to port for people, for freight – including emergency supplies!
- CLIMATE CHANGE MATTERS
- SEA LEVEL RISE, INCREASE IN SEVERE WEATHER (STORMS, DROUGHTS, AND HURRICANES)
- WOB = urgent call for innovative global policy to meet the water challenges of CC for port communities.

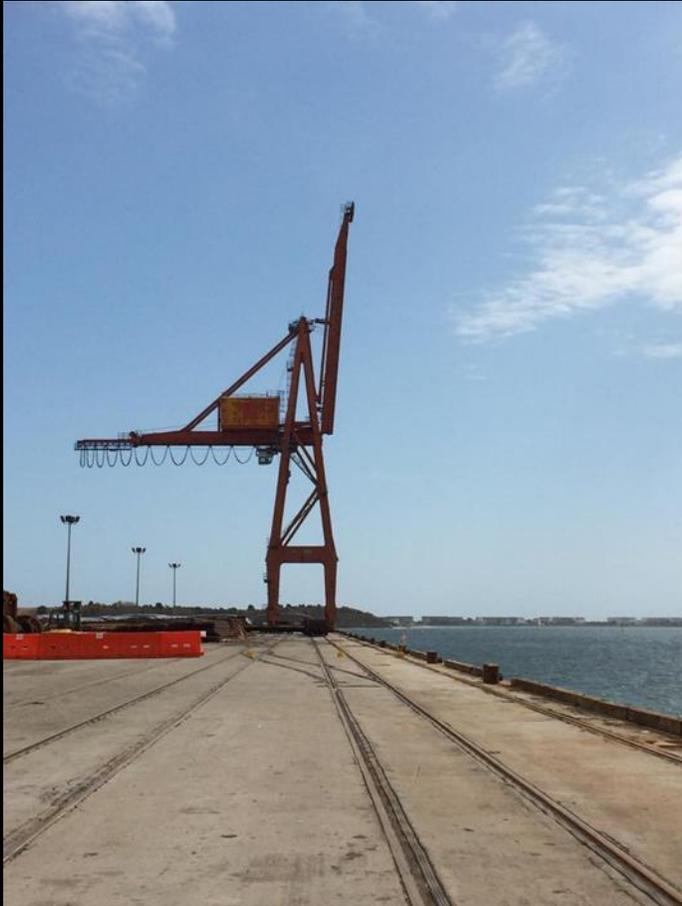
TEN THINGS
YOU NEED TO KNOW ABOUT
SHIPPING AND PORTS



#1 What is the most *energy efficient* way to move freight?

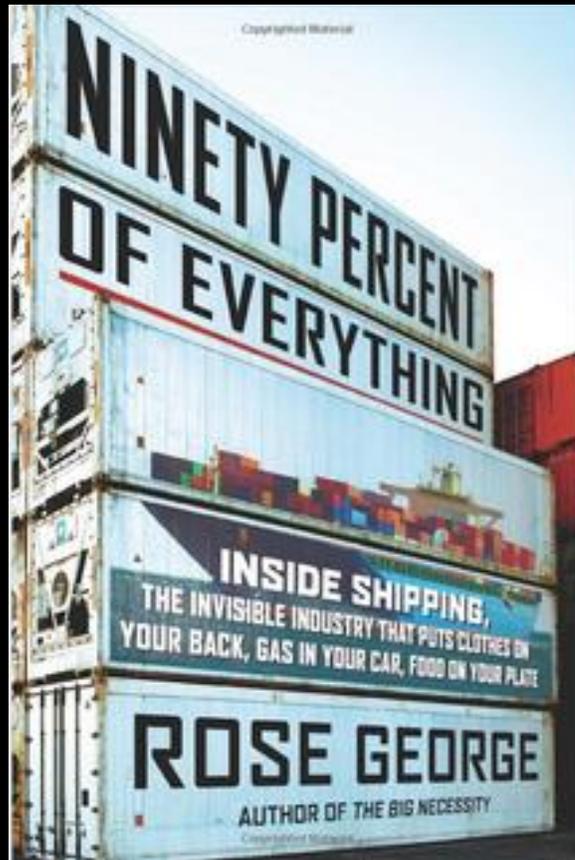


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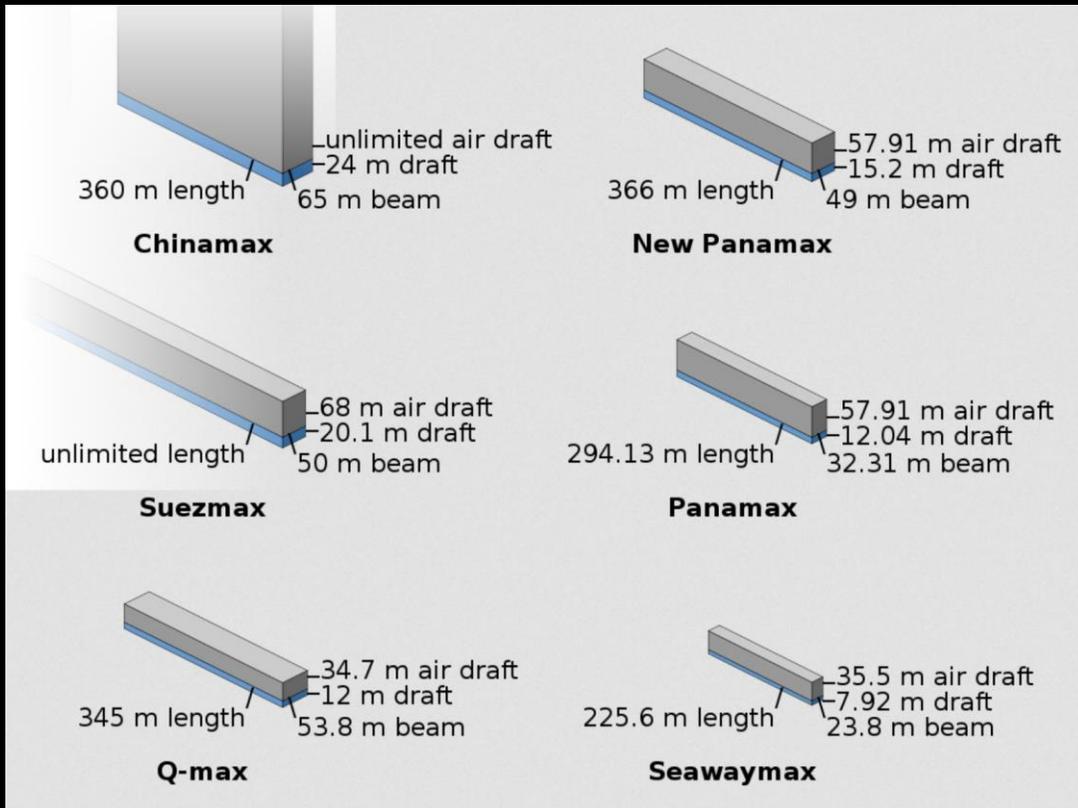
- AIR-TRUCK-RAIL-PIPELINE-WATER to move a ton of freight one mile
- Least expensive way to move things is to maximize distance on the WATER and then PIPELINE or RAIL to and from marine ports.
- Port of Morehead City, NC
- Minimize trucks, really minimize air freight
- Remember: PROXY FOR CARBON EMISSIONS

90 % OF EVERYTHING



- TRAVELS PART OF ITS JOURNEY BY WATER
- RAW MATERIALS, INTERMEDIATE PRODUCTS, FINISHED GOODS, FOOD AND FUEL!
- CRITICAL ROLE OF WATER CORRIDORS AND PORTS

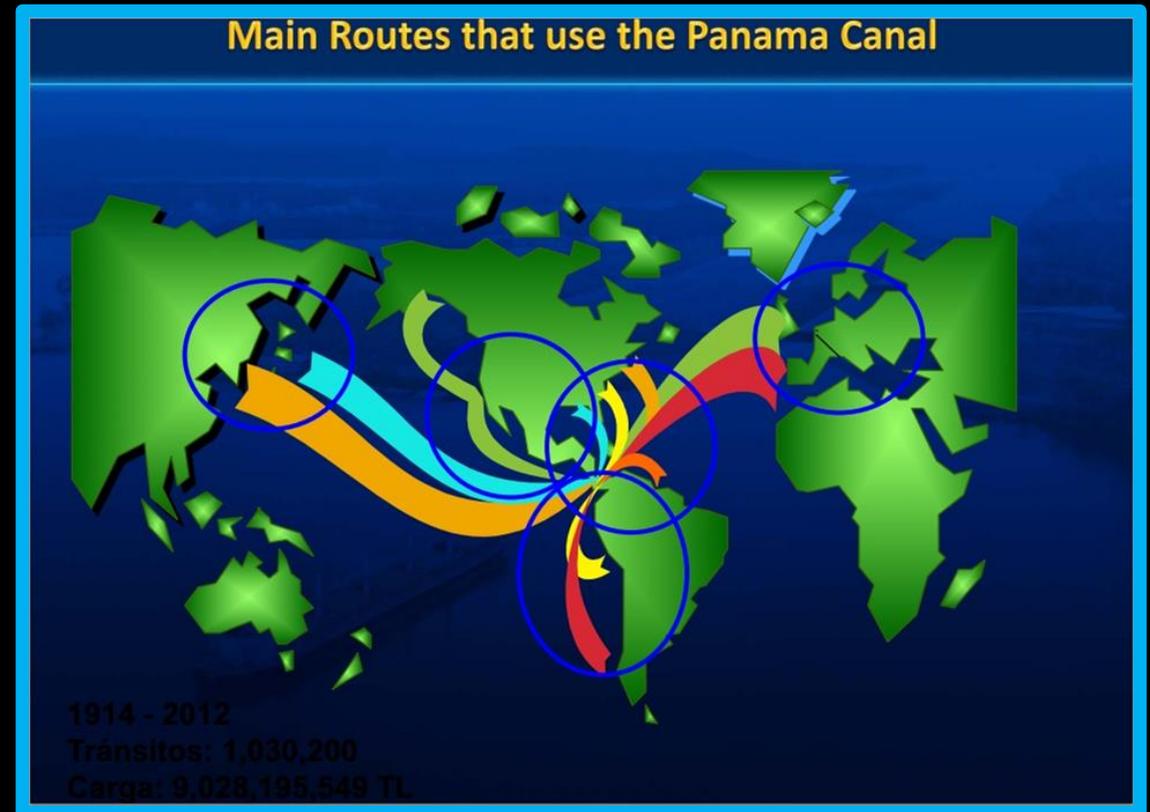
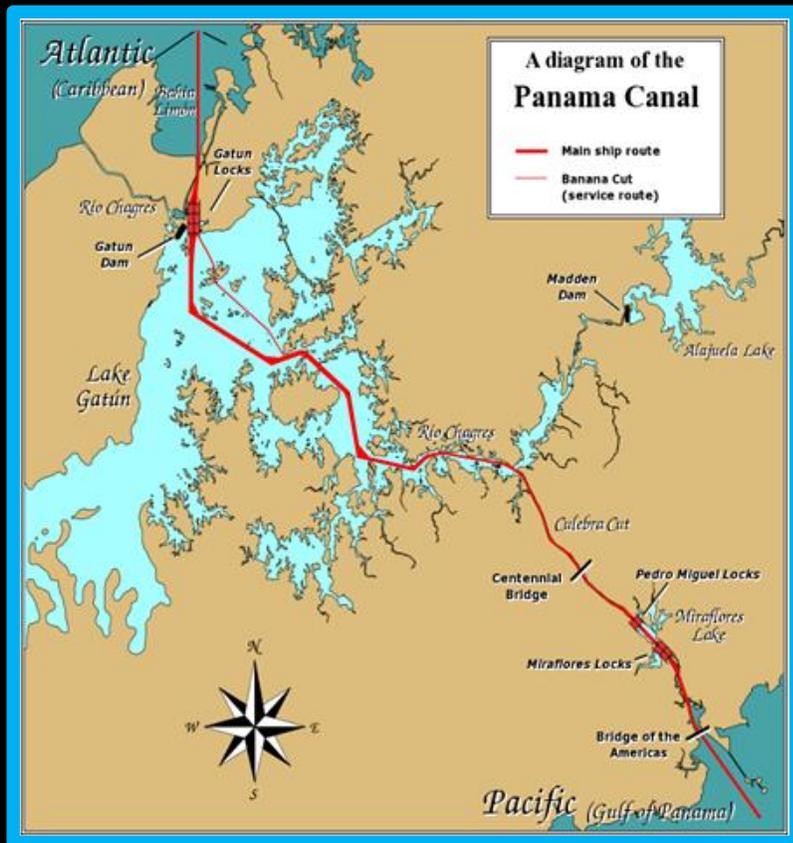
SHIPPING VESSEL SIZE MATTERS TO COSTS



- Maritime shipping is highly sensitive (elastic) to bunker fuel costs as they represent between 45 and 50% of operating costs with limited opportunities to mitigate outside slow steaming. Still, from a comparative perspective maritime shipping has less fuel price sensitivity than trucking and rail, implying that higher energy prices are likely to trigger the consideration of routing options that have a port call the closest possible to the destination of the shipments.
- A standard Panamax containership has operational costs of about \$9 million per year. The most significant expenses are related to fuel (46%) and port charges (21%), which are variable costs. This is transcribed in annual operating costs of about \$2,314 per TEU. Not shown here are the significant amortization costs related to the ship purchase (principal and interest). The incentive to use larger containerships is quite clear from the perspective of maritime shippers, which led to a new generation of 10,000 TEUs containerships being introduced in 2007. In this case, fuel and port charges account respectively for 50% and 21% of their annual operating costs, while manning costs remains constant. However, annual operating costs per TEU drop by more than one half to \$1,449.
- The principle of economies of scale is thus a strong factor in containerized maritime shipping.

Water shortcuts MATTER!

Panama Canal Expansion and Post- PANAMAX Ships



- Expand size and capacity of 100-year old water shortcut through the Americas
- Save 10x Panama Canal Toll (average toll \$300k) versus passage around South America
- Global warming is providing another no toll shortcut – the NORTHERN SEA ROUTE – and use is accelerating warming.

New Demands for Port Infrastructure

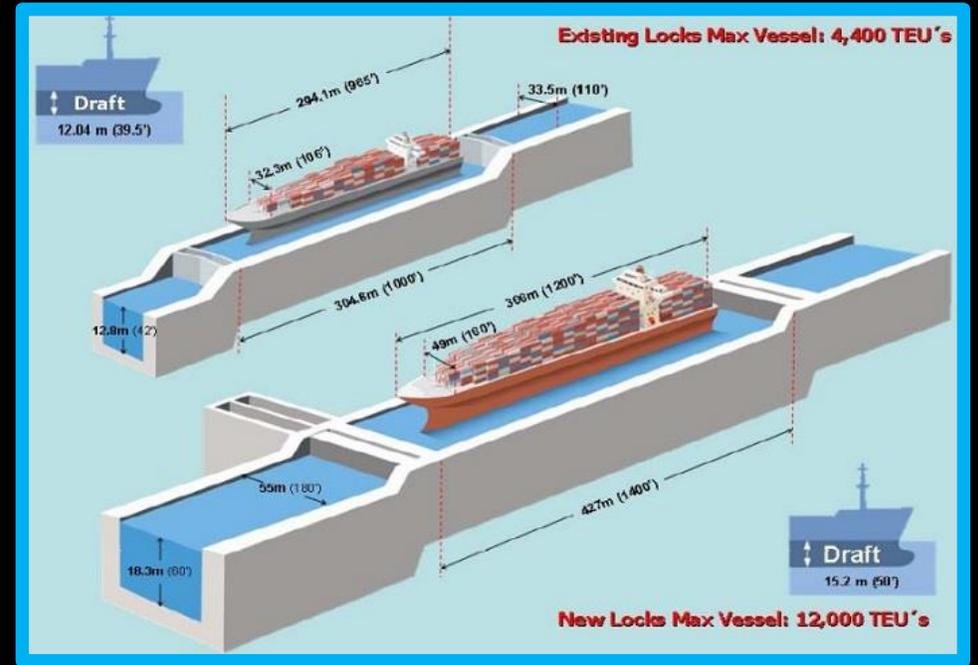


Wider

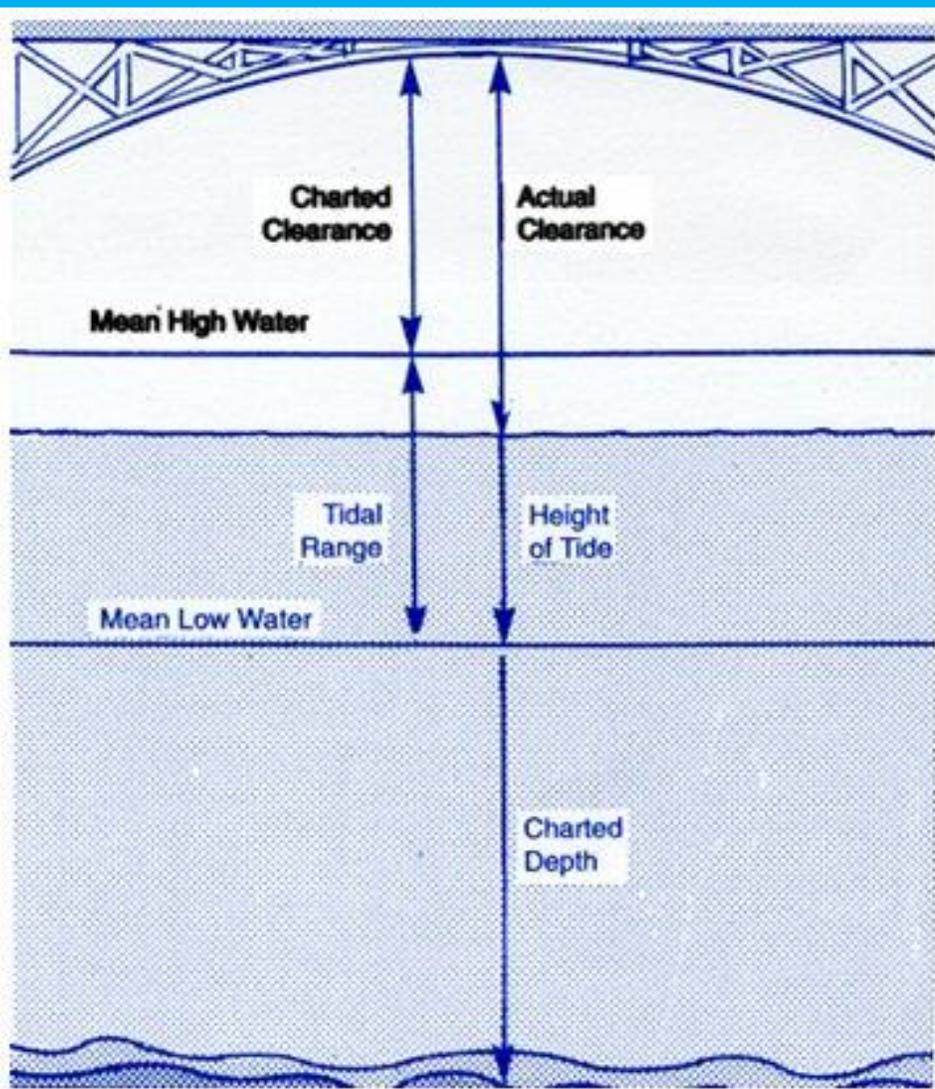
Deeper

Longer

Taller



Bridge Clearance

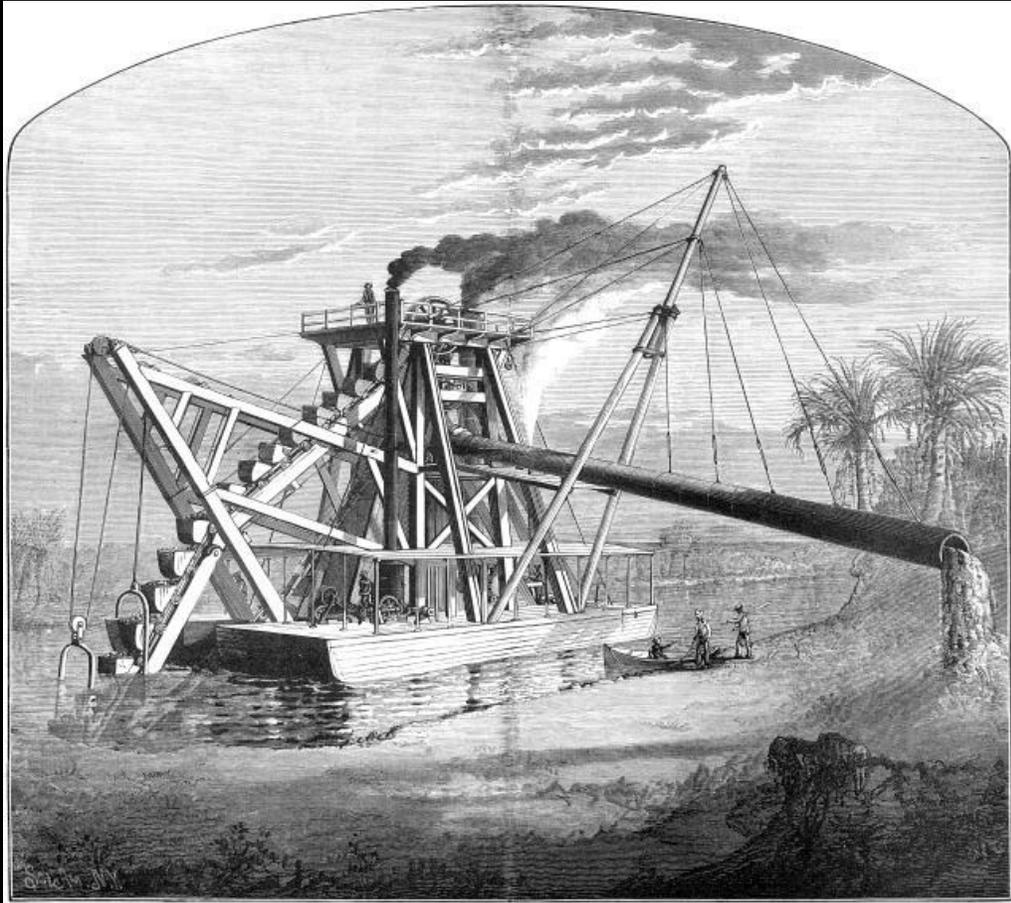


Water Over the Bridge (Sweden and Denmark)



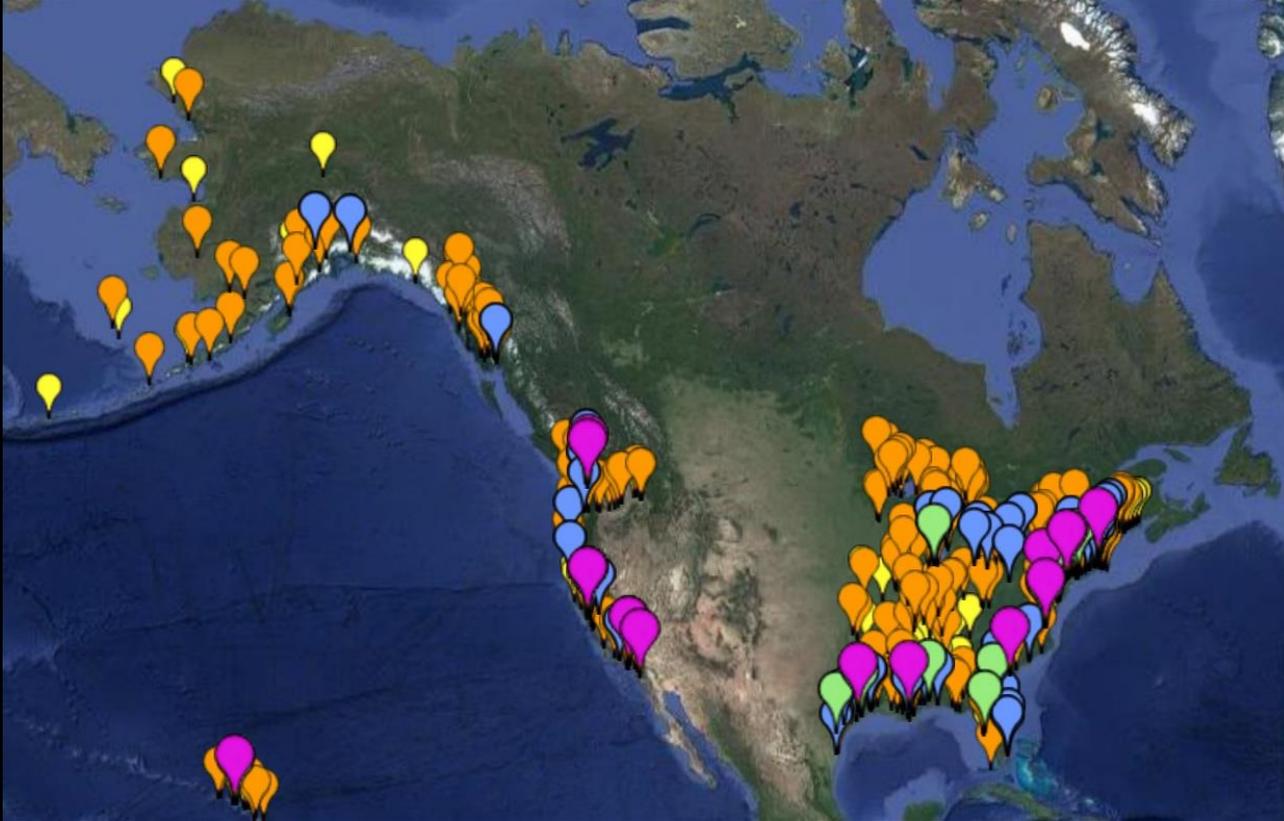
Water Under the Bridge (Charleston) ¹³

DREDGING



- Good for navigational channels
- Bad for marine life
- Can be a disaster for salt water intrusion into drinking water supplies.

PORT OWNERSHIP IN THE US



Port ownership and incentives in the US are very diverse and complex.

- Baltimore part of Maryland Transportation
- Los Angeles and Long Beach adjacent,
- Charleston and Savannah competing,
- Morehead City and Wilmington different users.

PORT INFRASTRUCTURE INVESTMENT

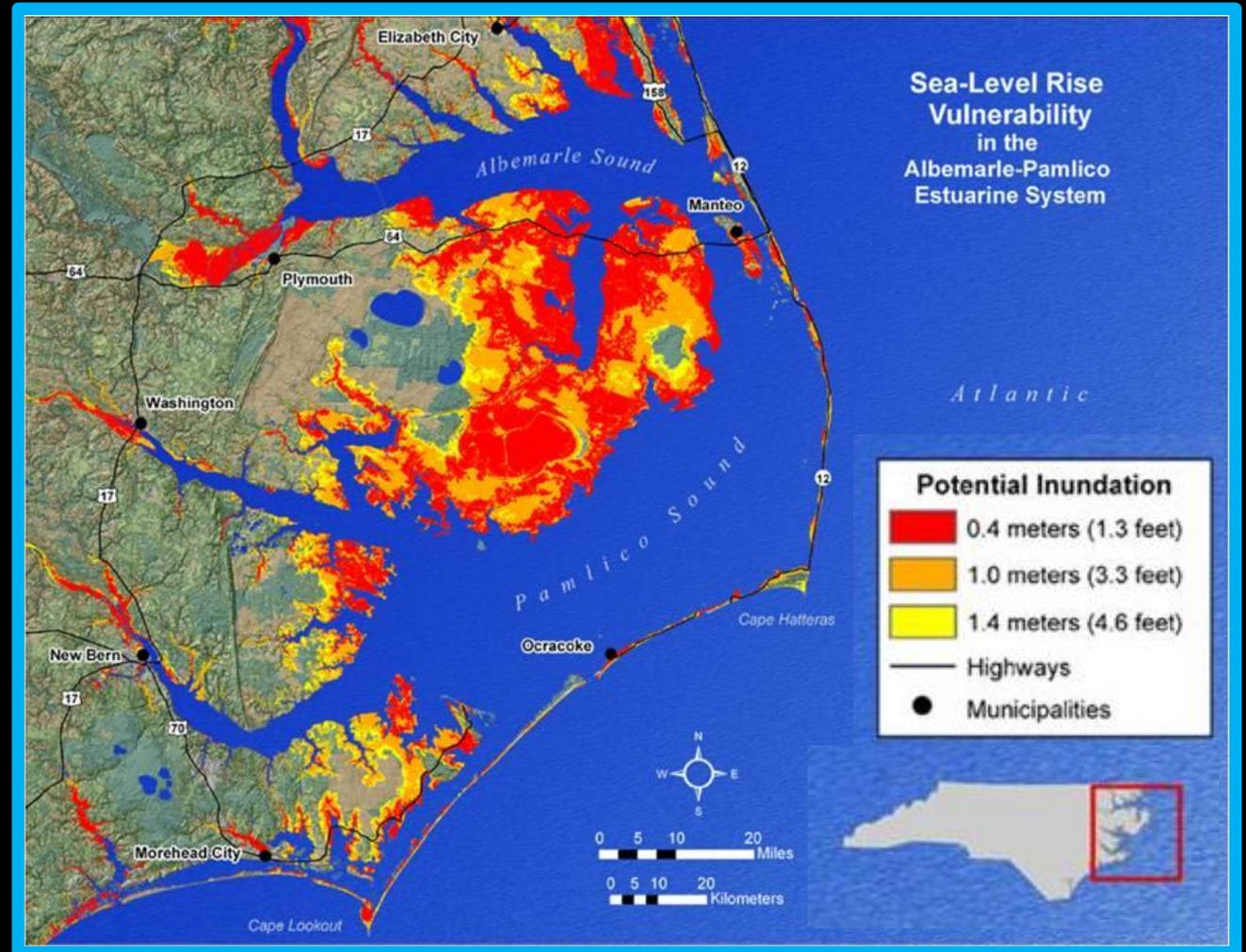


- VERY EXPENSIVE
- VERY RESOURCE INTENSIVE
- LONG LASTING

3 THINGS YOU NEED TO KNOW ABOUT
CLIMATE CHANGE
AND
FREIGHT TRANSPORTATION

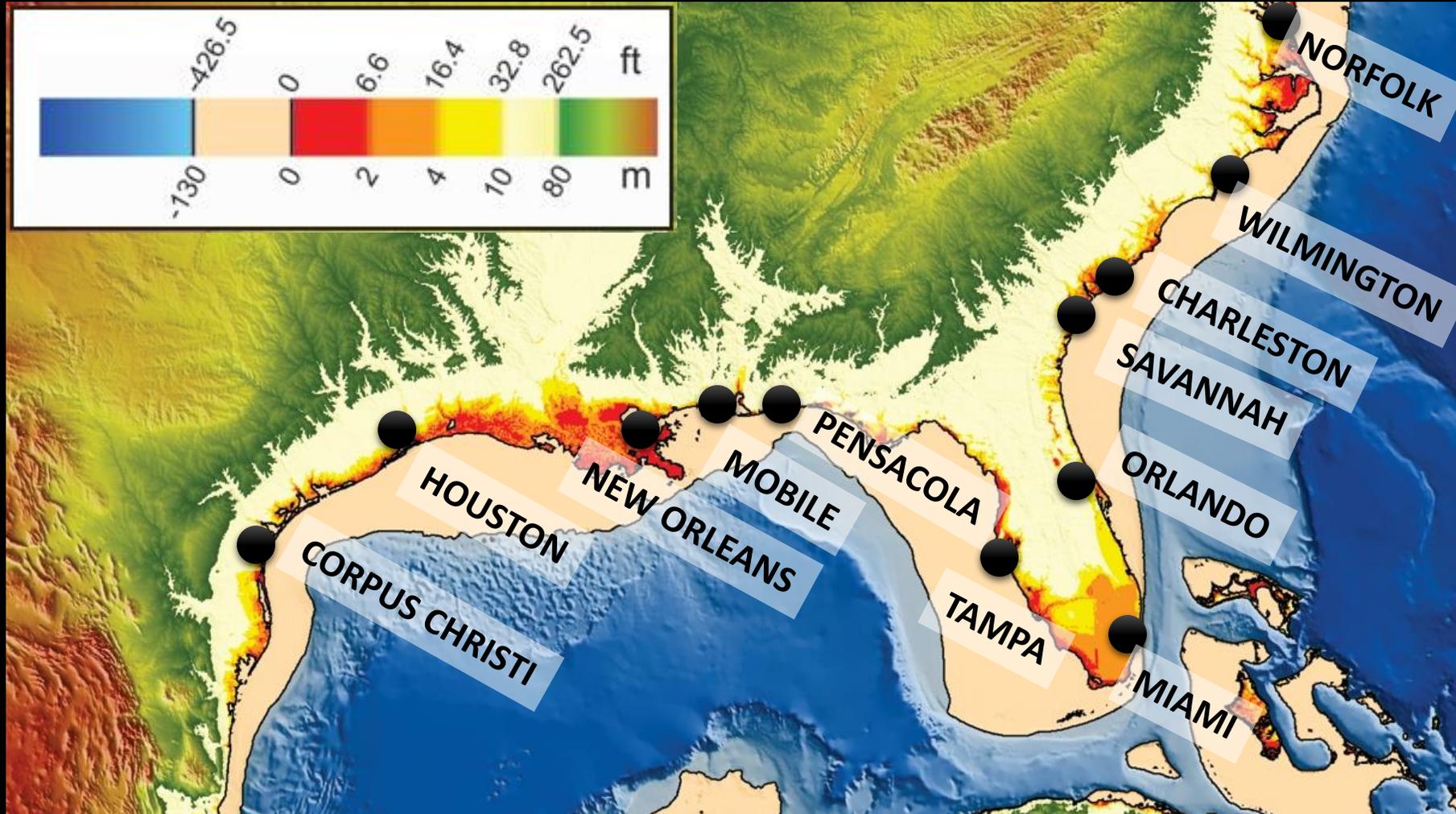
Intergovernmental Panel on Climate Change Findings

- Melting glaciers and ice sheets
- Higher temperatures mean more thermal expansion
- Rising sea levels
- In many port/coastal communities, land subsidence increases flooding.
- More droughts and more monsoons impact freight movement



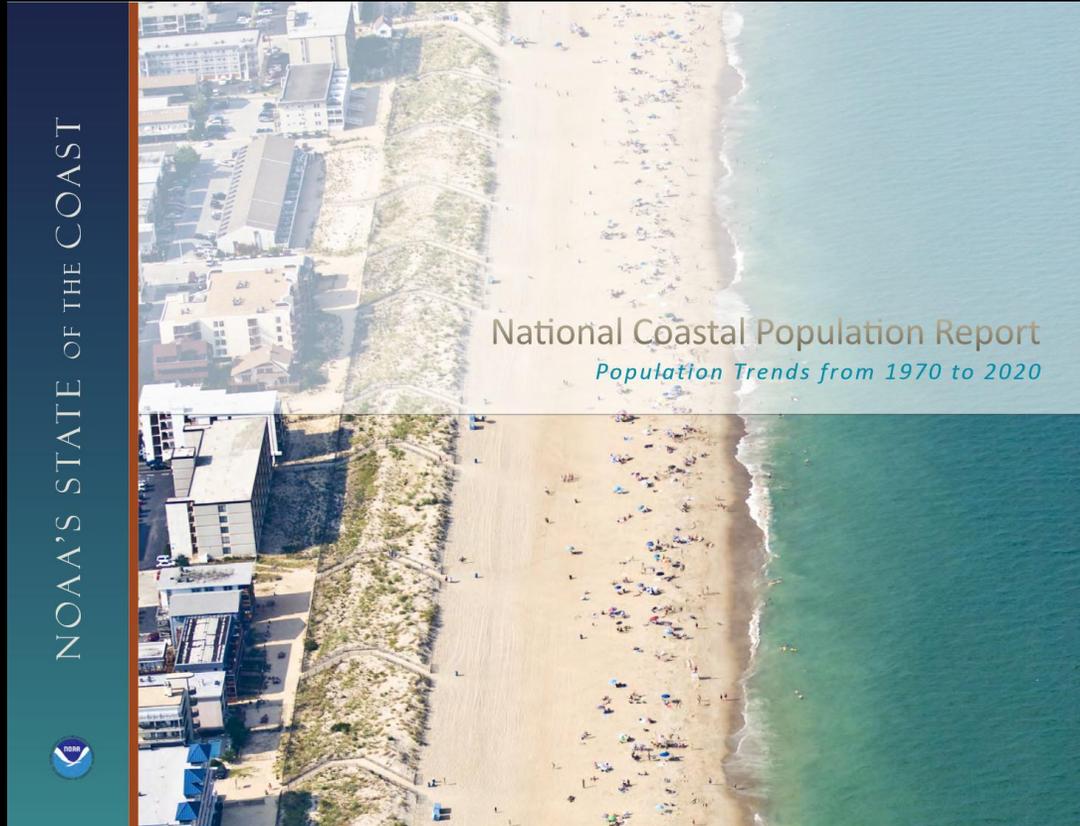
Sea-Level Rise Vulnerability for northeastern North Carolina

Major Port Cities Affected by Sea Level Rise in the Southeastern United States



5 THINGS
YOU NEED TO REALLY WORRY ABOUT
WITH RESPECT TO CLIMATE CHANGE
AND PORT COMMUNITIES

US & WORLD POPULATION MOVING TO VULNERABLE COASTS



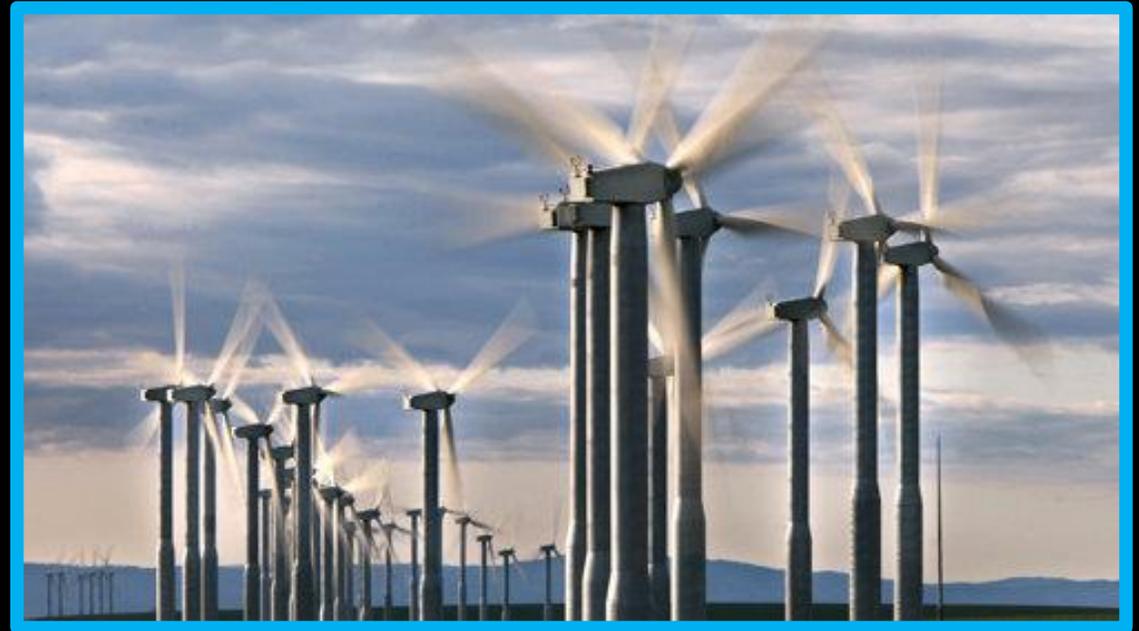
- Nearly 2.4 billion people live within 100 km (60 miles) of the coast. (40 per cent of the world's population and INCREASING!)
- More than 600 million people (around 10 per cent of the world's population) live in coastal areas that are less than 10 meters above sea level.
- INCREASES AS SEA LEVEL RISES!

PORTS and SHIPPERS COMPETE FOR BUSINESS



- Must regulate on global scale
- Fuel choices
- Port power options
- Corridors
- Impacts on water and food choices

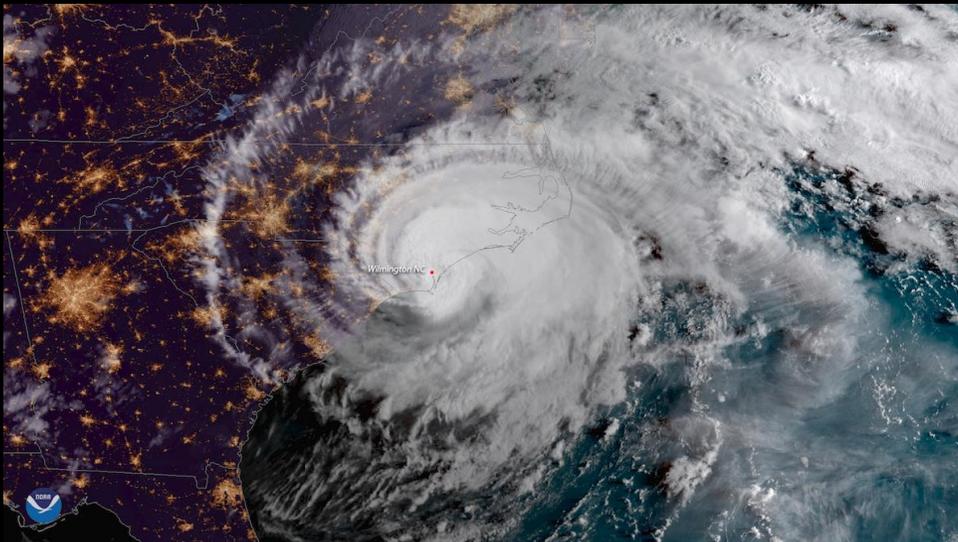
Force use of renewable energy and environmental protections in ports and shipping on a global scale



PORT PROTECTION FOR WATER CHALLENGES



- Very expensive
- Can't be engineered in all places – especially coast of the Carolinas – where barrier islands want to move.



- We don't have enough global resources to move them all inland nor build sufficient barriers.

HARD CHOICES AHEAD



- Purpose of shipping is movement of goods and materials.
- Requires shipping channels and ports where there are global needs and opportunities.
- Prioritize ports for climate change to allocate resources!

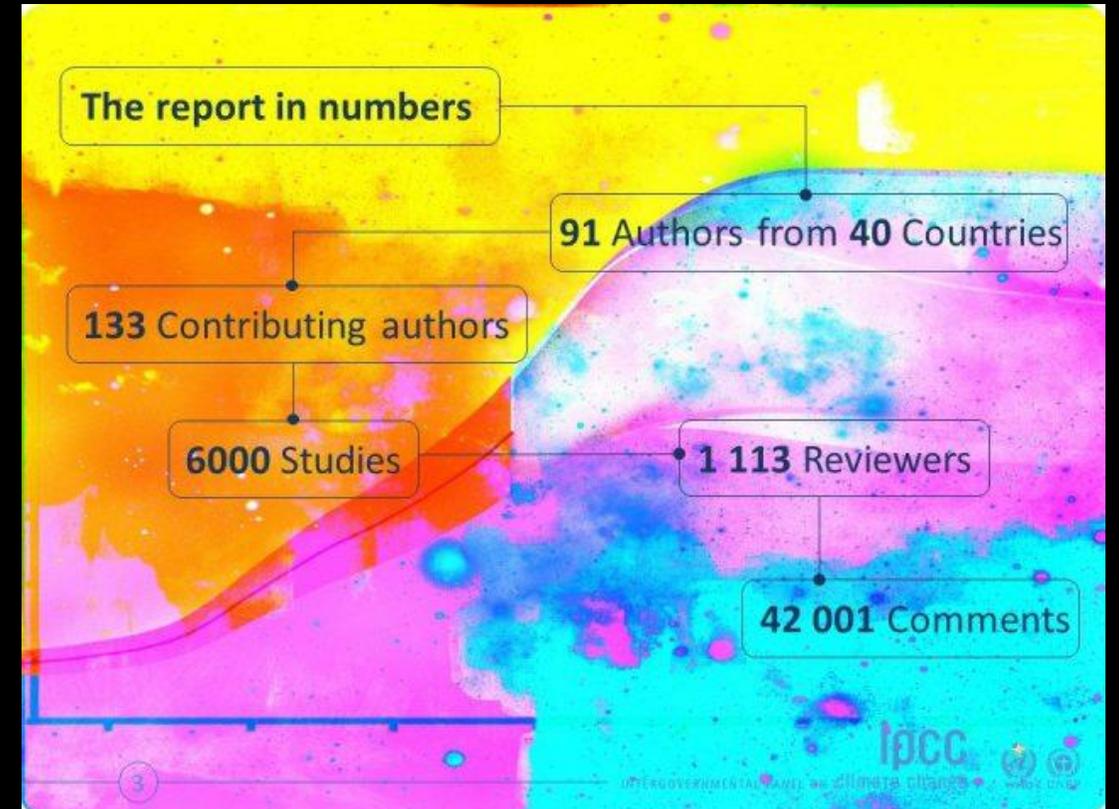
3 policy warnings
on ports communities
and climate change

OCT. 2018: UN REPORT - ACT NOW

- We have 12 years to limit climate change catastrophe, warns UN to get temp. increase down below 1.5 degree.
- Urgent changes needed to cut risk of extreme heat, drought, floods and poverty, says IPCC

We have to plan and act now:

- **port communities,**
- **half the world's population,**
- **and all of our needs.**



WOB- ACT HOW



- Multi-jurisdictional collaboration
 - Local property owners
 - Local communities
 - Regional
 - Multi-modal
 - National
 - International

WOB= ACT POW

leaders in innovative global Partnerships on water!

- We have to go beyond the Dutch ethos of “fighting the water” as both a national defense and economic development strategy; we have to be a leader in global partnerships that enforce new rules of global trade that are good for the environment.
- We have to fight for prioritizing and allocating resources in a coordinated global strategy that enables port city resilience and global collaboration through trade.
- It is WWIII.
- We have less than a decade to win it.
- We are all in the same boat, let’s keep in afloat!