

SALTWATER INTRUSION on the Eastern Shore

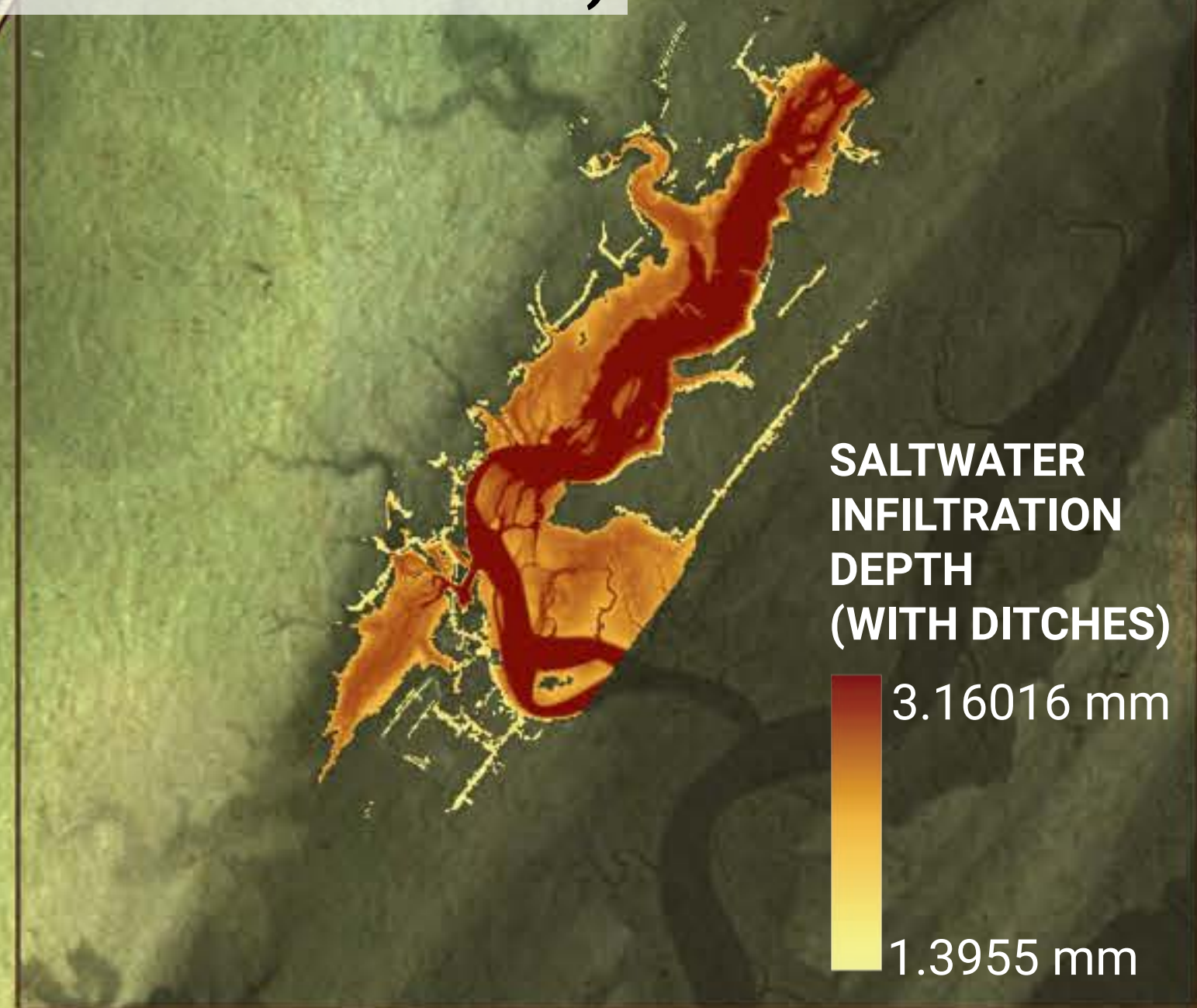
What is happening and why?

When sea water gets into the ground, it leaves behind salt that can get into drinking water wells and kill trees and crops. On the Eastern Shore, salt can get into the drinking water and soil in two ways: coastal flooding, especially of tidal creeks, and overpumping deep aquifers.

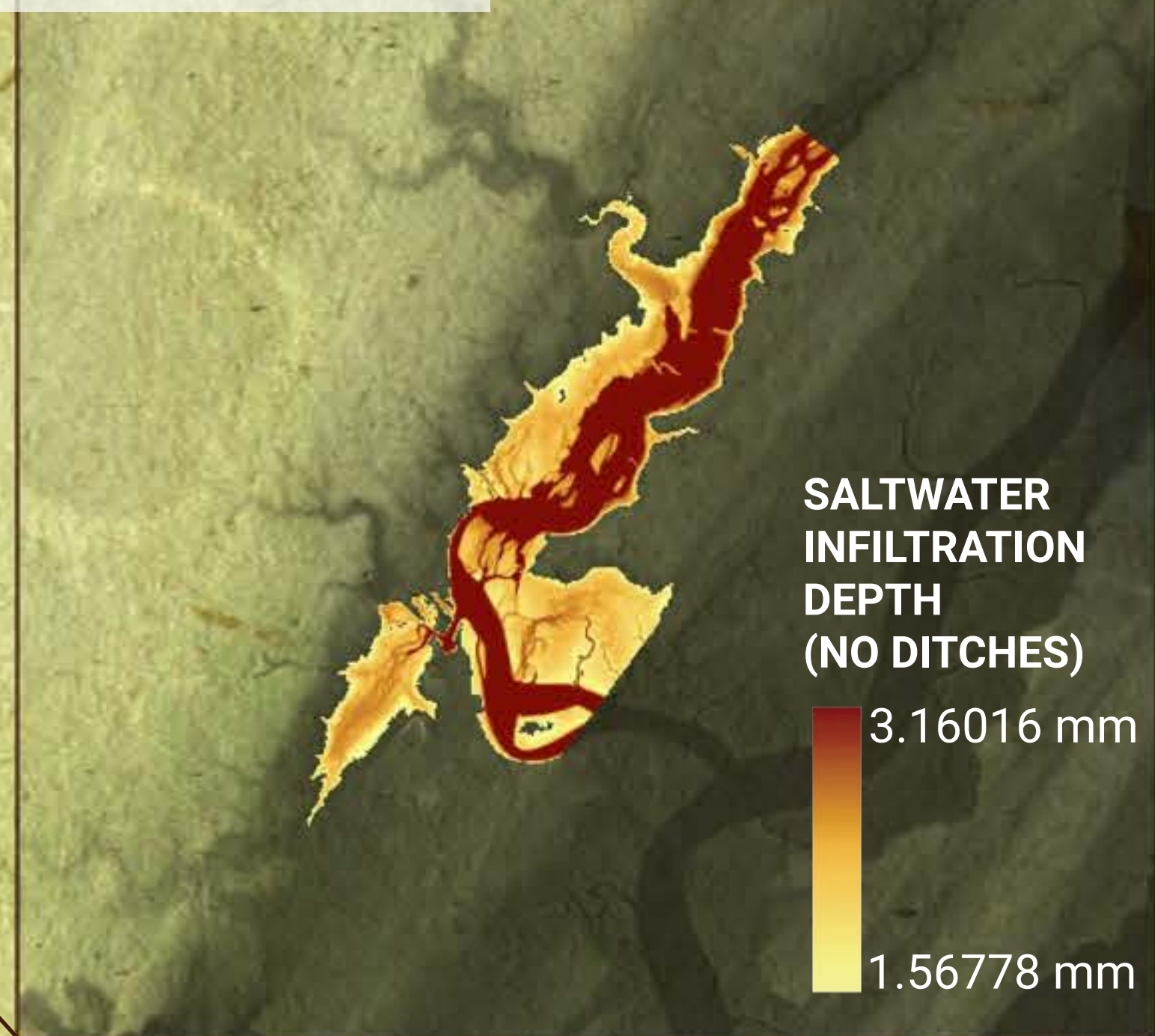
How bad this gets depends not just on how strong a storm is, but also on how dry the land is—drier land lets more seawater seep in.

Ditches (both roadside and agricultural) help drain fields and make the landscape drier, providing more 'space' in the soil for saltwater to infiltrate. They also increase connectivity throughout the landscape and allow seawater to push further inland.

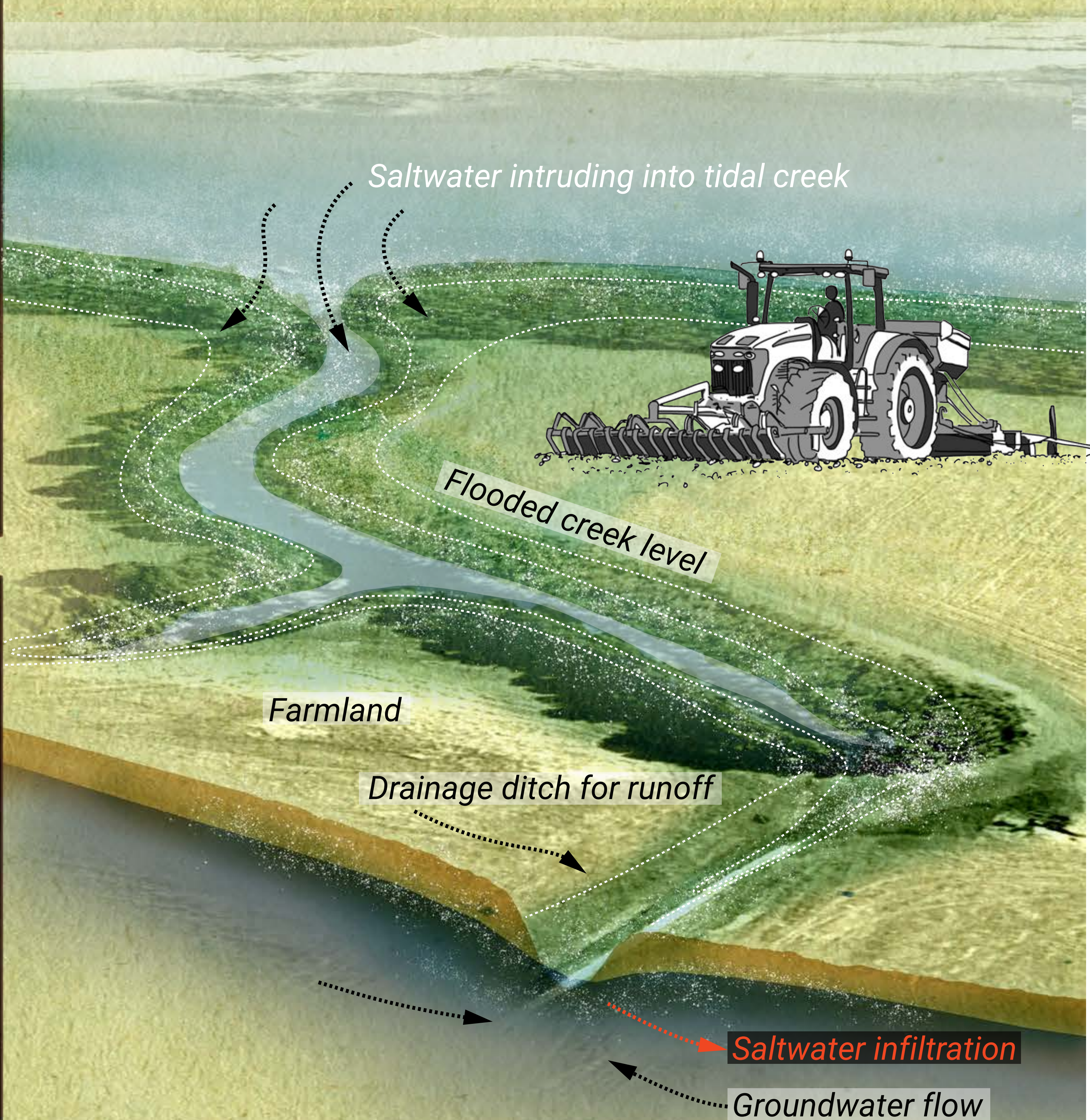
Saltwater coming in through ditches (Hurricane Isabel 2003)



No ditches scenario



The top image shows how existing agricultural ditches allowed the saltwater to travel further and deeper into the soil during Hurricane Isabel. The bottom image shows a scenario without ditches. Seawater can't travel as far up onto land without these low spots, so less salt reaches into inland groundwater.



Saltwater is coming in FROM ABOVE from flooding and storm surge

Saltwater coming in to aquifers FROM BELOW from overpumping

Saltwater also can infiltrate into freshwater aquifers from below. If a well pumps too much freshwater, the suction creates a vacuum that sucks seawater into the ground. Crops that use well irrigation may be damaged if too much salt gets into the aquifer.

What does this mean?

Agriculture in Virginia is a \$70 billion dollar industry, and the Eastern Shore grows 36% of Virginia's high-value vegetable crops. **Salt that seeps into the root zone of the soil is more likely to damage trees and crops growing in those areas, risking economic loss from crop failure.**

Loss of potable drinking water is also a serious issue, causing health problems and financial burden for individuals and towns.

Adaptation strategies

DITCH PLANNING

Ditches near coasts can dry out soil and let seawater spread inland, increasing saltwater infiltration. However, with careful placement, ditches can help reroute water away from wells and farmland.

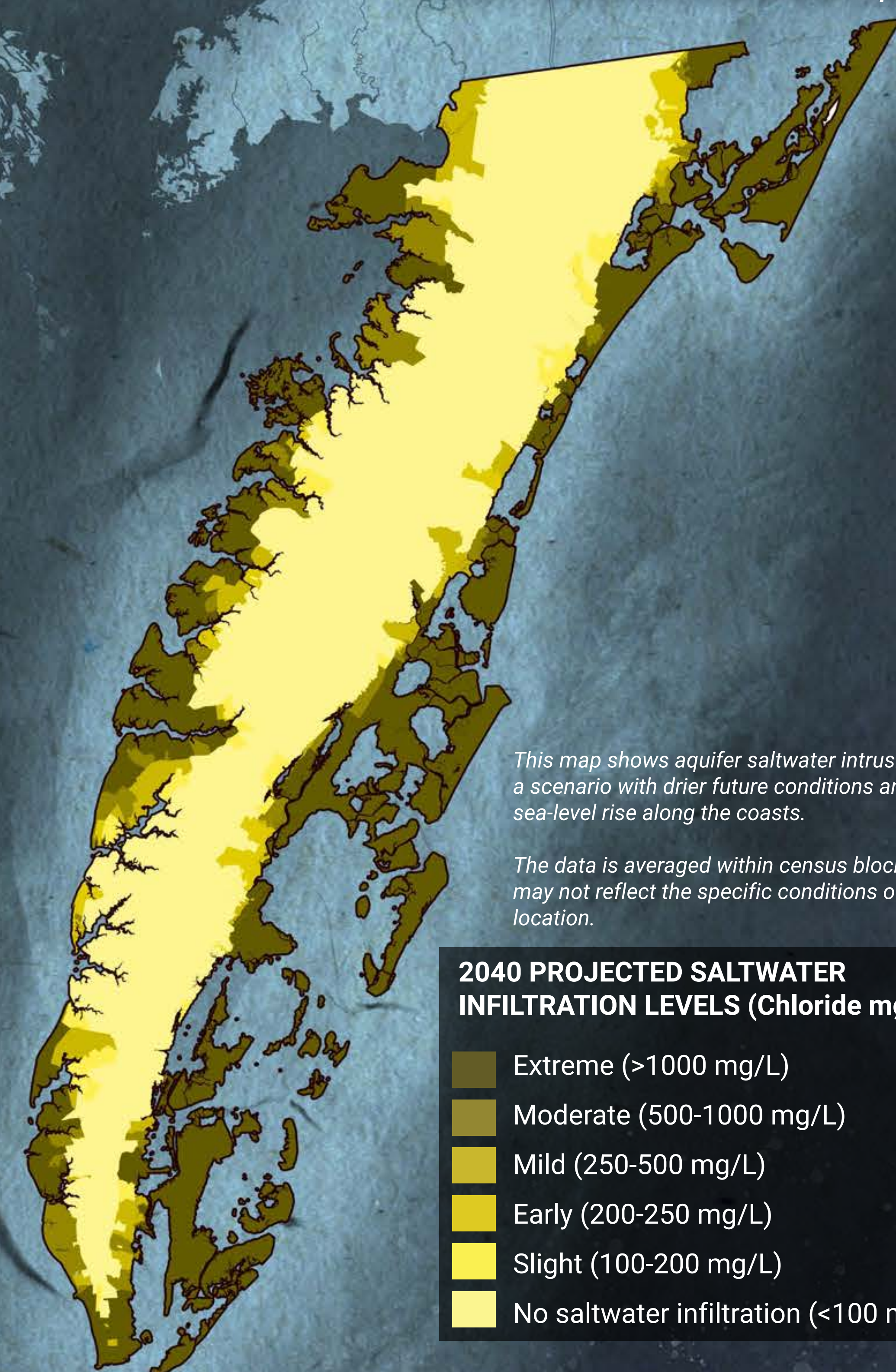
SALT-TOLERANT CROPS

These species can survive and produce food even when saltwater seeps into the soil, helping farmers maintain yields and reducing crop loss in areas where saltwater infiltration is increasing.

SHORELINE RESTORATION

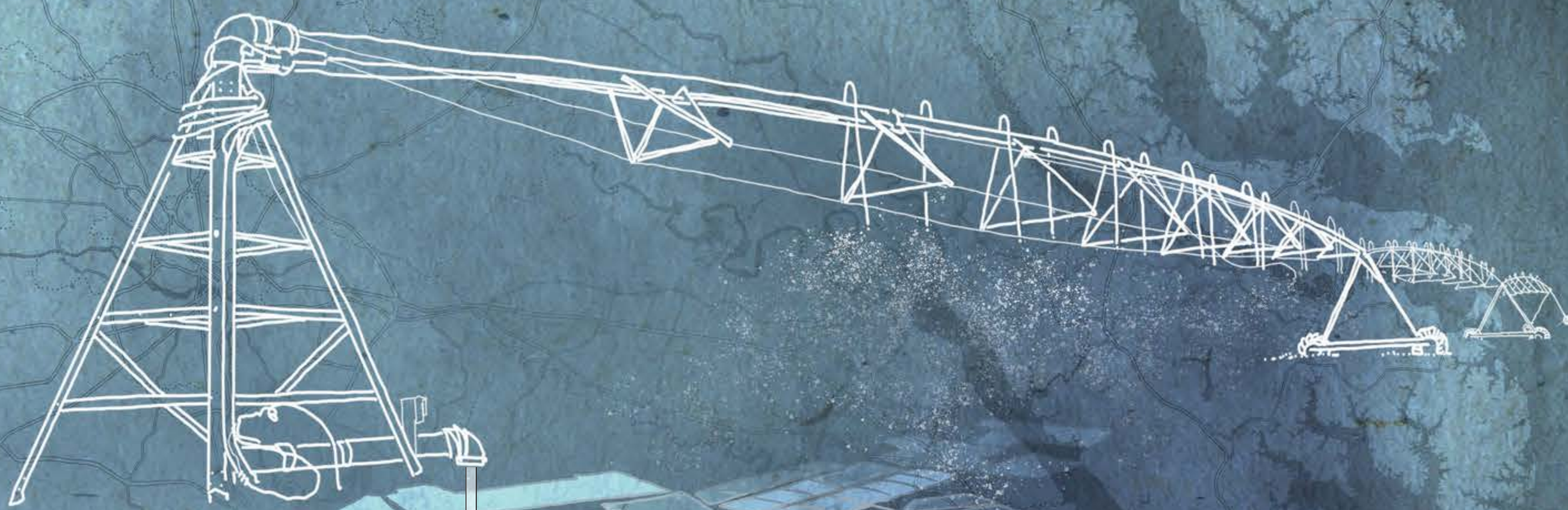
Natural barriers like wetlands, dunes, and vegetation can provide a buffer to absorb wave energy. This limits erosion and how far saltwater can infiltrate the soil.

2040 Projections of Saltiness in the Lower Yorktown-Eastover Aquifer



This map shows aquifer saltwater intrusion in a scenario with drier future conditions and sea-level rise along the coasts.

The data is averaged within census blocks and may not reflect the specific conditions of a location.



Saltwater intrusion from overland flooding

Saltwater intrusion from overpumping the aquifer

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Cantelon, Julia A., et al. 2022. "Vertical saltwater intrusion in coastal aquifers driven by episodic flooding: a review." *Water Resources Research* 58.11. e2022WR032614.
USDA National Agricultural Statistics Service, 2017 Census of Agriculture. Complete data available at www.nass.usda.gov/AgCensus.