

# Where Will the Salt Go?

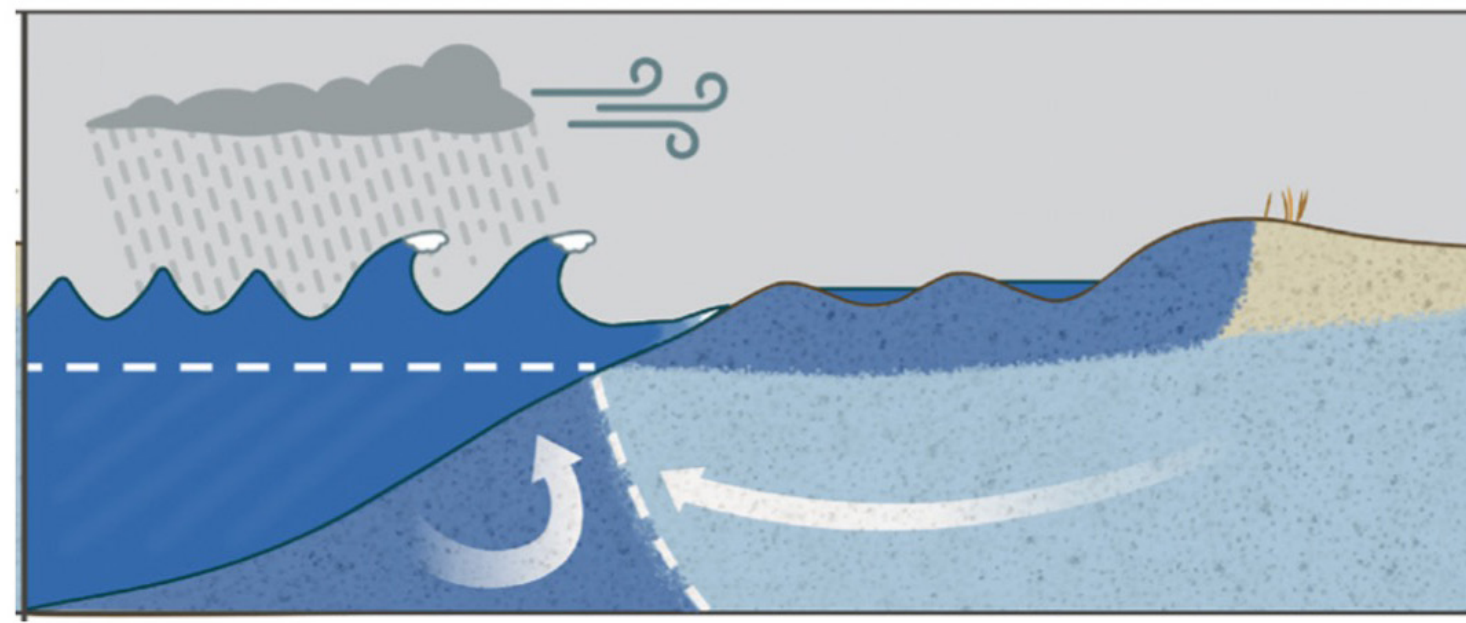
Hanne Borstlap, Lawrence E. Band, Qingguang Zhu, Patricia Wiberg, Department of Environmental Sciences, University of Virginia

## 1. Background

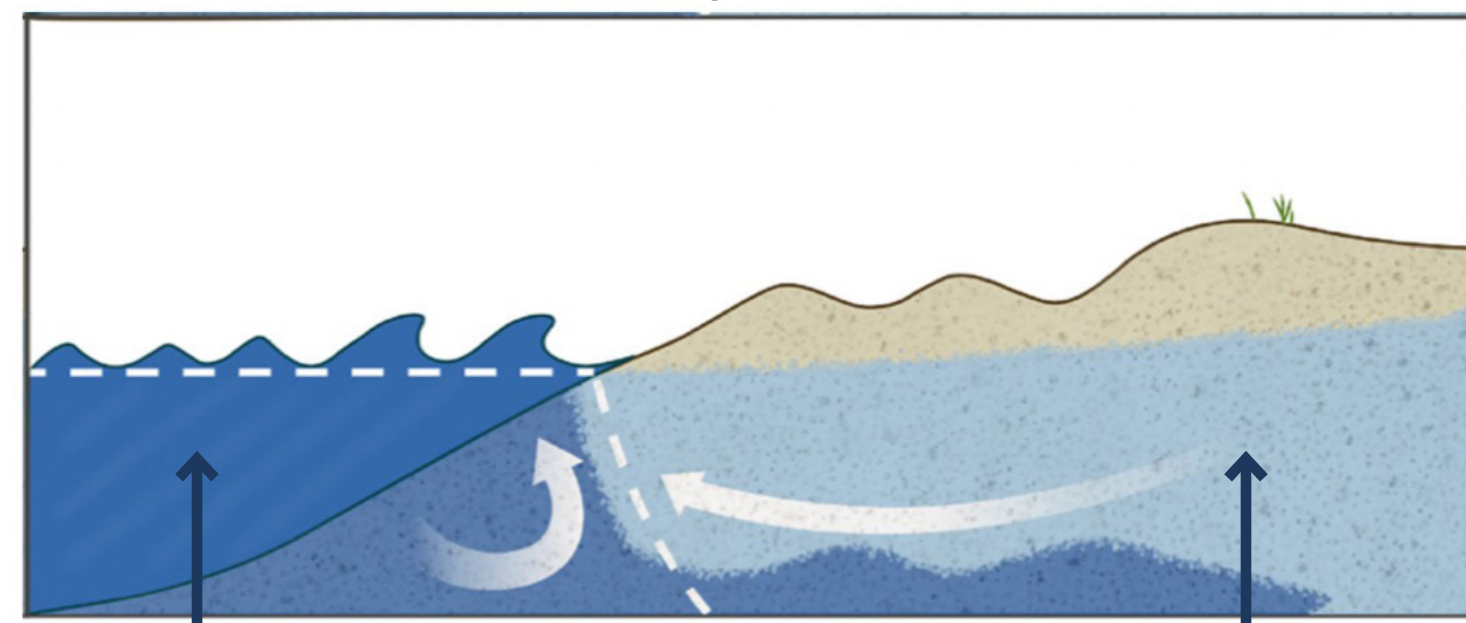
When big coastal storms or very high tides (also referred to as king tides) push seawater onto the land, that salty water can soak into the ground. This can make drinking water wells salty and harm crops. How bad this gets depends not just on how strong the storm is, but also on how dry the land is—drier land lets more seawater seep in. Sometimes, things like drainage ditches or berms can even make the problem worse by allowing seawater to flow in more easily.

### Processes Driving Saltwater Infiltration (SWI)

- 1 Storm surges create large waves that can cause saltwater to flow over the land and mix with freshwater sources.



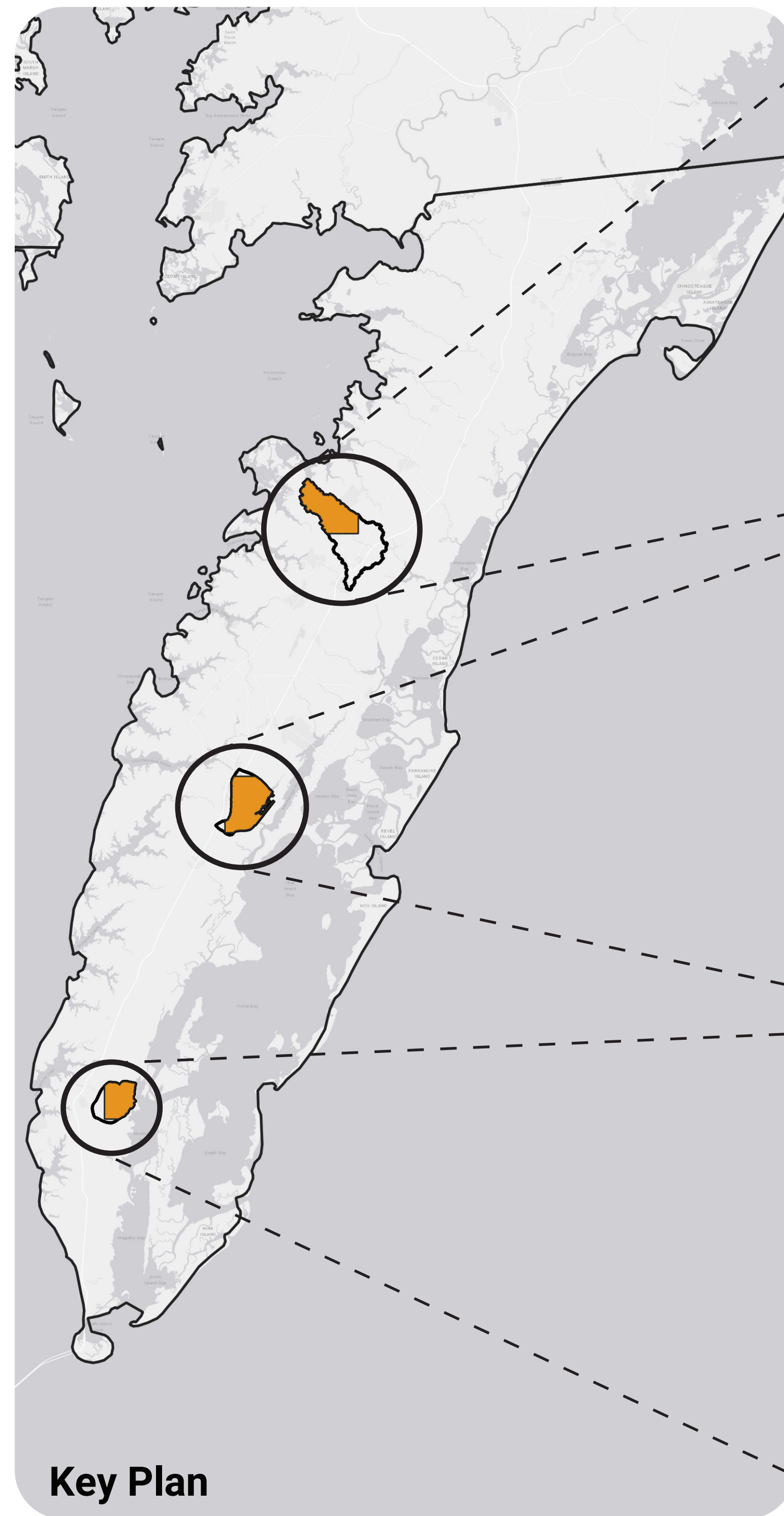
- 2 The land recovers from the salt overflow when fresh groundwater sources flow back out toward the sea and push the salt with it.



dark blue = seawater      light blue = fresh groundwater

Cantelon, Julia A., et al. 2022. "Vertical saltwater intrusion in coastal aquifers driven by episodic flooding: a review." *Water Resources Research* 58.11: e2022WR032614.

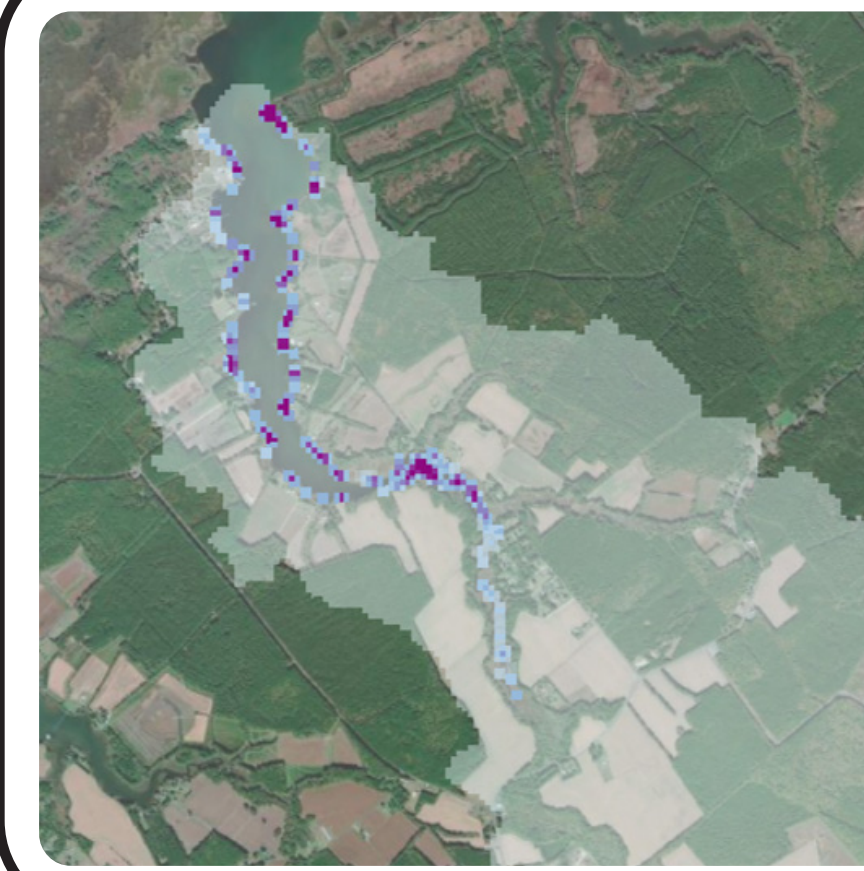
## 2. Study Area



## 3. Saltwater in the Ground

### Bayside

Saltwater will seep into the ground where tidal streams meet drier upland areas, where there's room in the soil for it to soak in, like shown here for the Bayside area around Deep Creek. This can harm or kill trees and crops growing in those areas.



### Willis Wharf

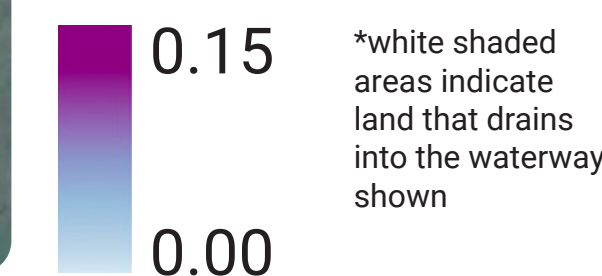
Low-lying areas, such as those around the town Willis Wharf, are always at risk of saltwater seeping in after storms. Especially in these spots, ditches can make the problem worse by allowing seawater to flow even further onto the land.



### Oyster

Cobb Mill Creek in Oyster demonstrates the issue of creeks and ditches allowing the salt water to reach farther inland.

Depth (ft) of salt-water in the ground



## 4. Conclusions

Saltwater will soak into the ground where tidal streams meet drier upland areas. In general, low-lying coastal areas are always at risk, especially if the land is dry before a storm, which allows more saltwater to seep in. Salt that reaches deeper is more likely to harm the roots of plants.

### Willis Wharf



Depth of Ditch (ft)  
0.15  
0.00

Ditches increase the likelihood of salt entering the land and groundwater sources by letting seawater flow farther onto the land and by drying out the landscape before a storm, making it easier for the saltwater to infiltrate.

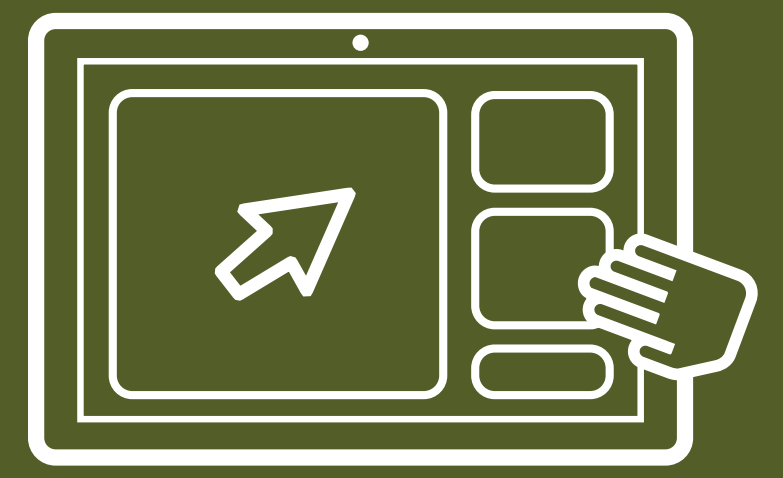
However, with careful planning of ditch networks and the use of berms, we can help reduce the problems caused by saltwater intrusion.

### Key takeaway

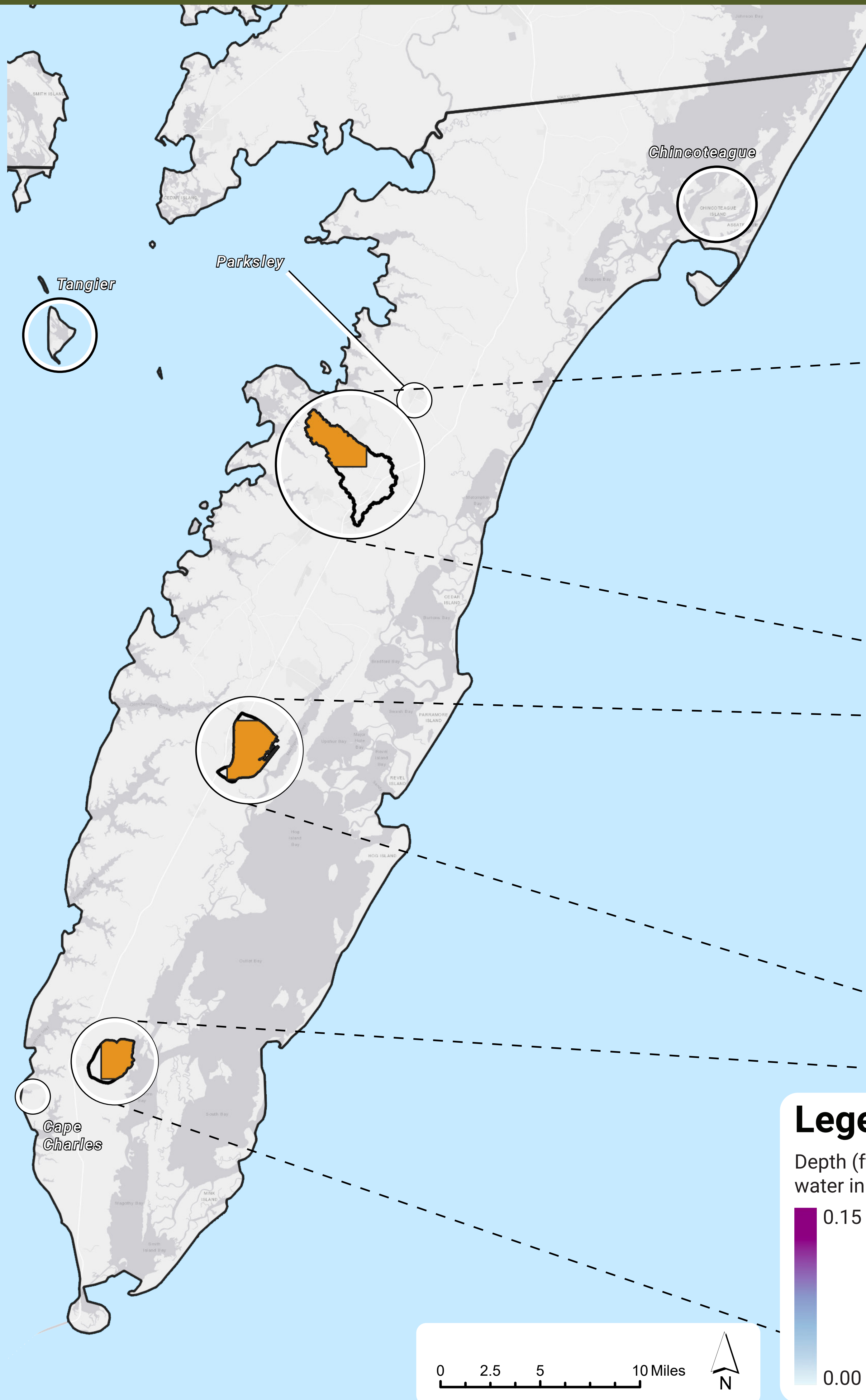
Careful ditch and berm planning can help prevent saltwater from entering into land and groundwater sources during storms



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Livability Tool Data Preview

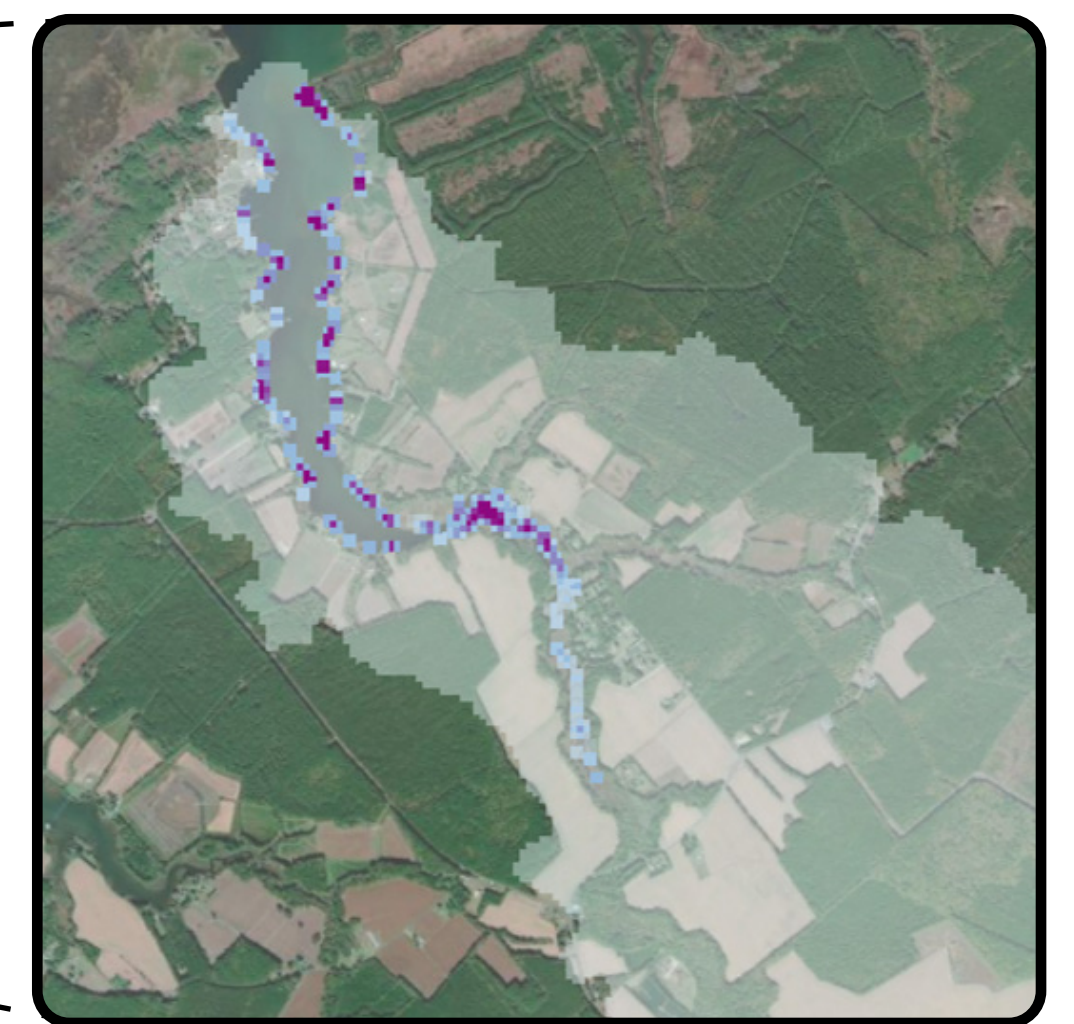


## About

Storms and high tides can drive seawater onto the land, causing salt to enter the land and enter groundwater resources.

## A closer look

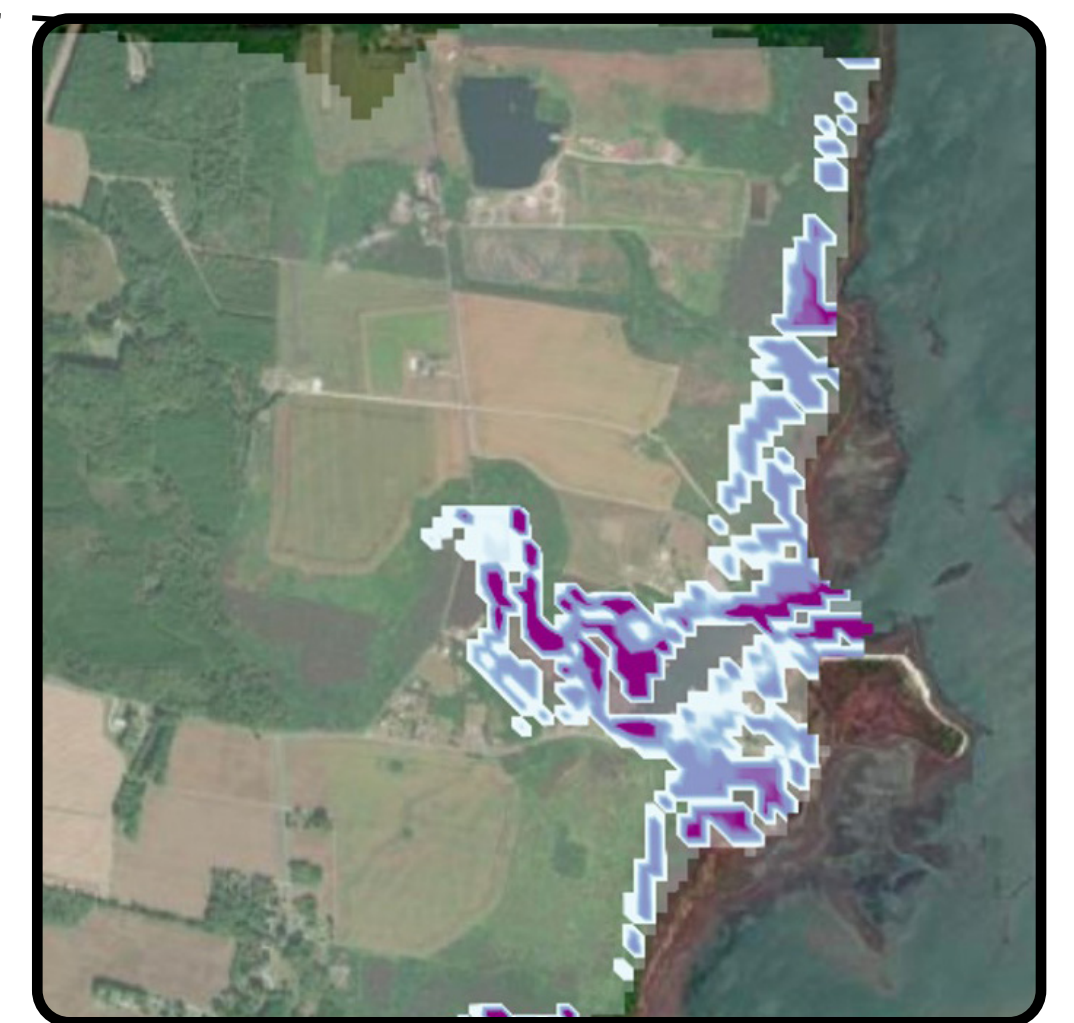
Bayside



Willis Wharf



Oyster



## Legend

Depth (ft) of salt-water in the ground

0.15 (Deeper)

0.00 (Shallower)

## Key takeaway

Areas near tidal creeks and the coast are particularly vulnerable to salt entering the ground; ditches can make this worse but proper management can help reduce these effects

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2025. Department of Environmental Sciences, University of Virginia,

