

Driving Mechanisms and Timescales of Saltwater Intrusion near Dover, DE

Mary Hingst¹

Rachel McQuiggan², Chelsea Peters¹, A. Scott Andres², Holly Michael¹

¹ University of Delaware, ²Delaware Geological Survey



WA

MT

ND

MN

NE

OR

ID

SD

WI

MI

ME

WY

NE

IA

IL

IN

OH

NY

NH

MA

NV

UT

United States

CO

KS

MO

IN

PA

MD

DE

CA

NV

UT

CO

KS

MO

IL

IN

OH

PA

MD

DE

VA

CA

NV

UT

CO

KS

MO

IL

IN

OH

PA

MD

DE

VA

AZ

NM

OK

AR

TN

NC

CA

NV

AZ

NM

TX

LA

MS

AL

GA

SC

CA

NV

AZ

NM

TX

LA

AL

GA

FL

Mexico

Gulf of Mexico

NYC

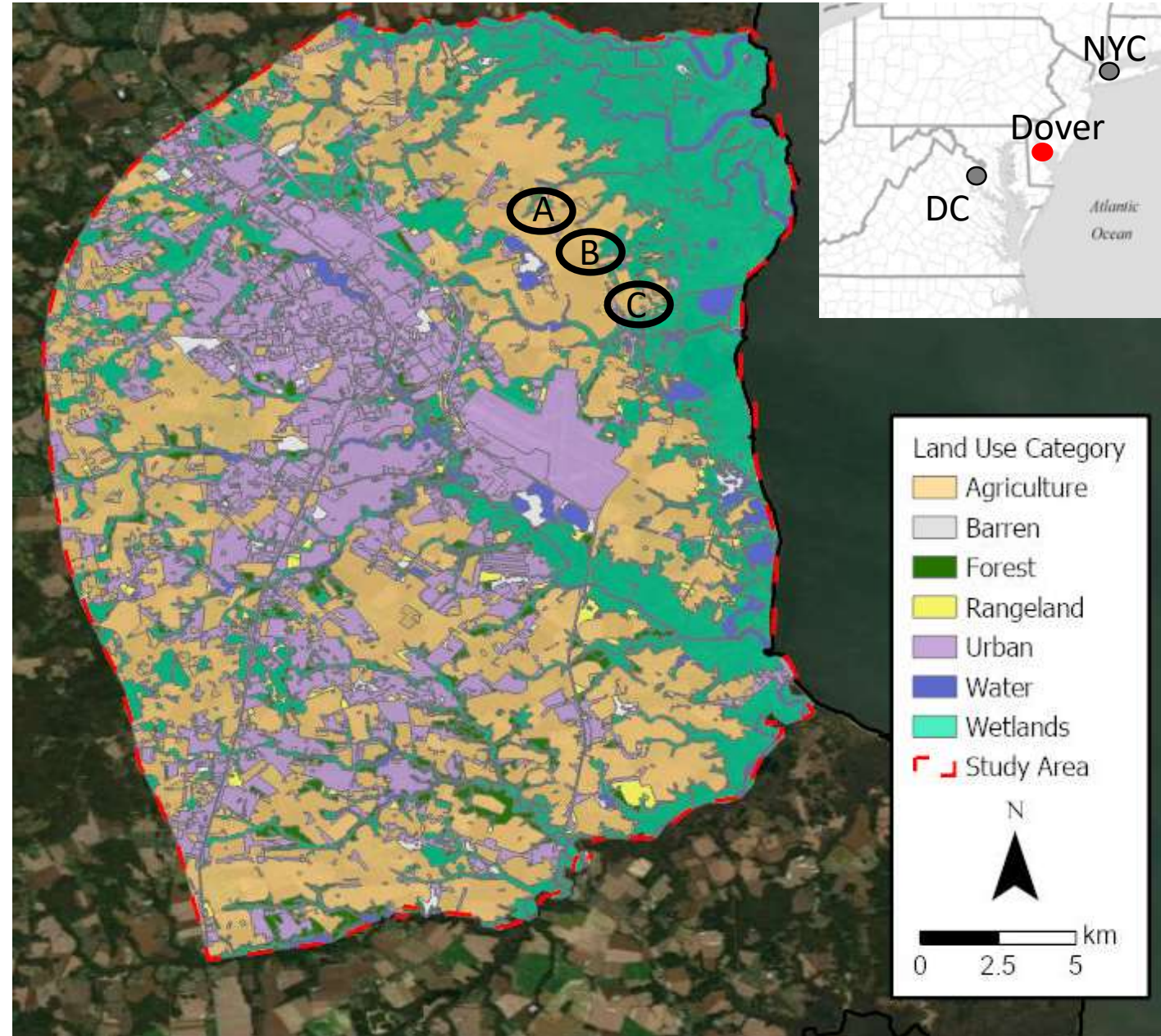
Dover

DC

Atlantic Ocean

Study Area

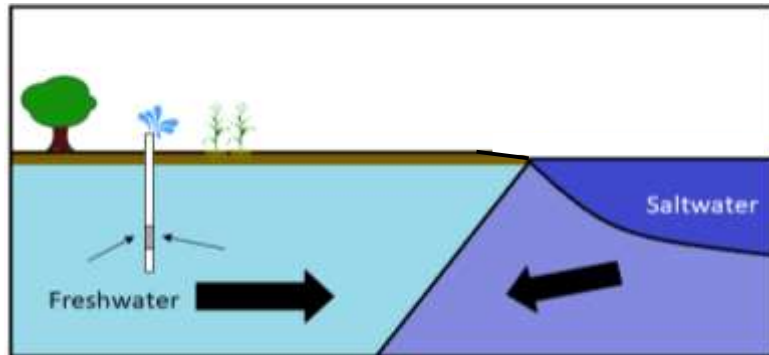
- DE is lowest lying state
- Highest rates of SLR due to isostatic adjustment and subsidence
- City (purple) surrounded by ag land (orange) which is adjacent to tidal wetlands (green)
- Groundwater main source for municipal and agricultural uses



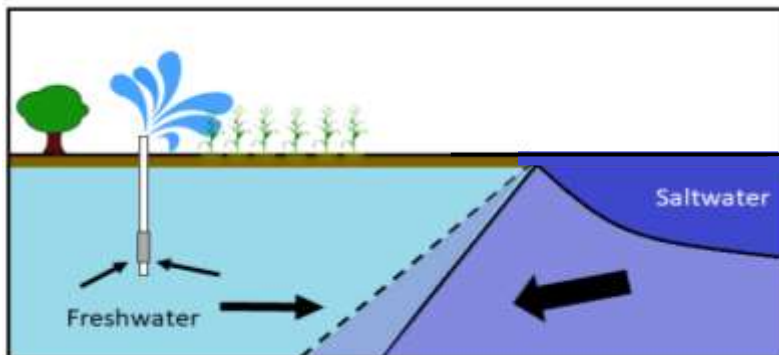
Saltwater Intrusion Mechanisms

Subsurface Intrusion

Sustainable pumping, no SLR

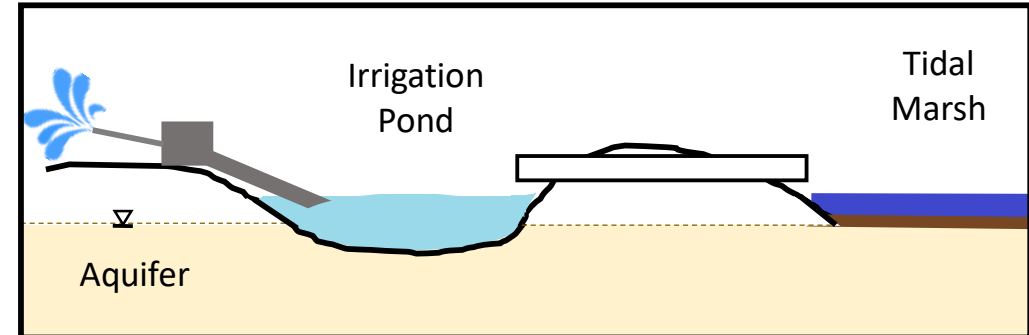


SLR, increased pumping

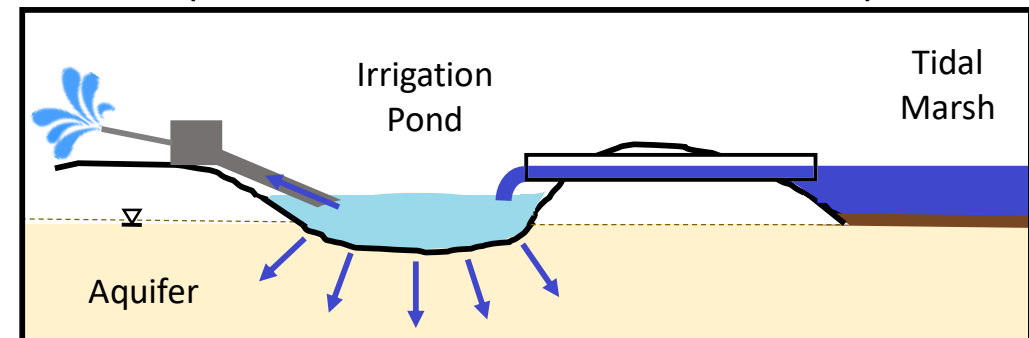


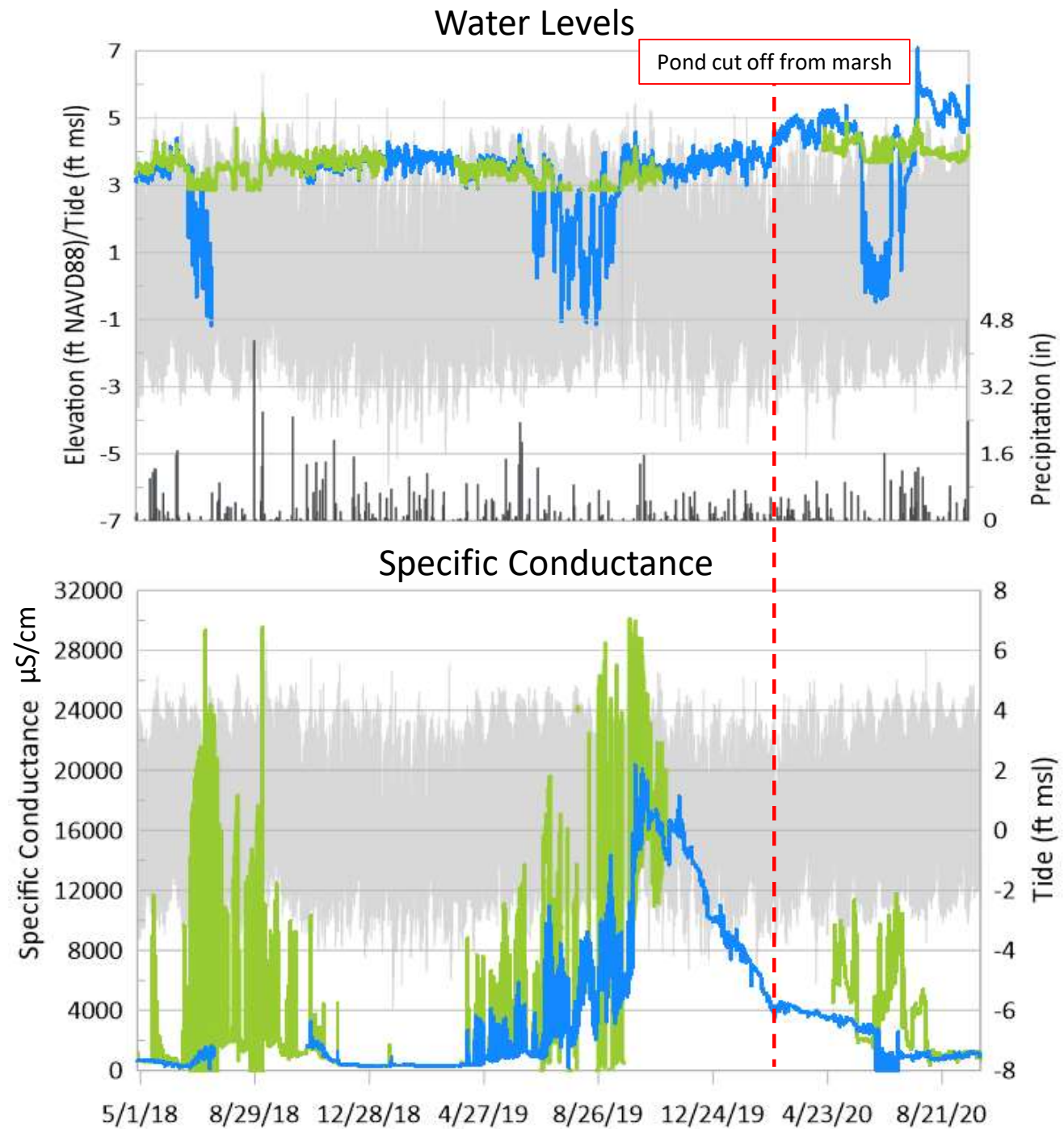
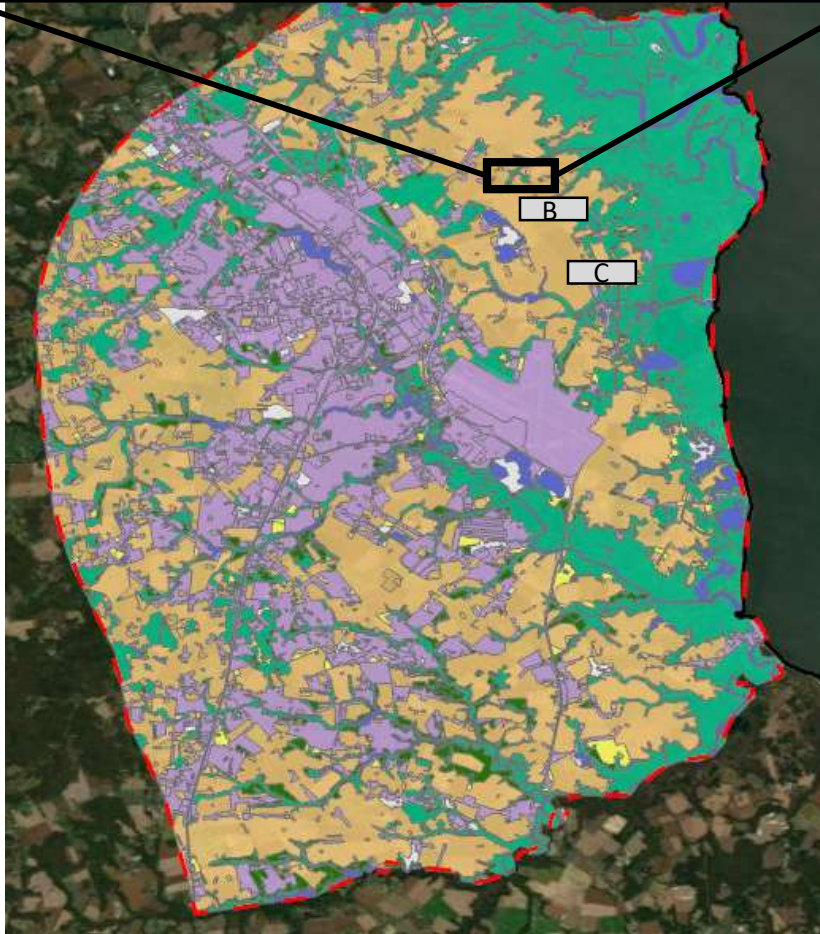
Surface Inundation

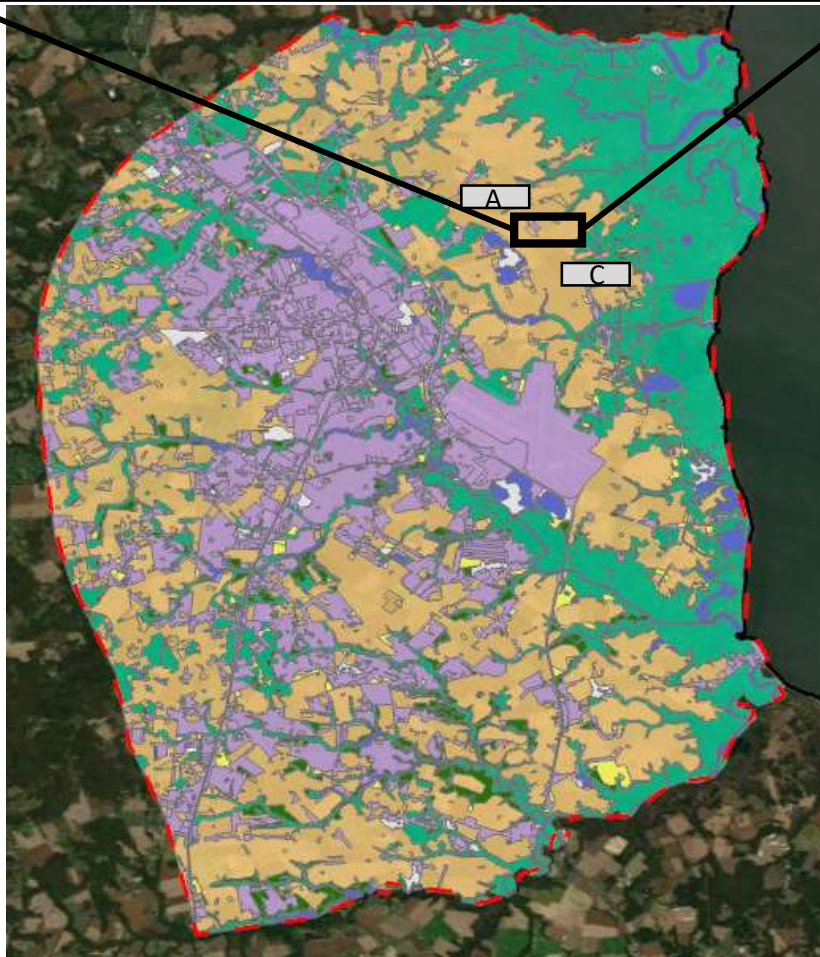
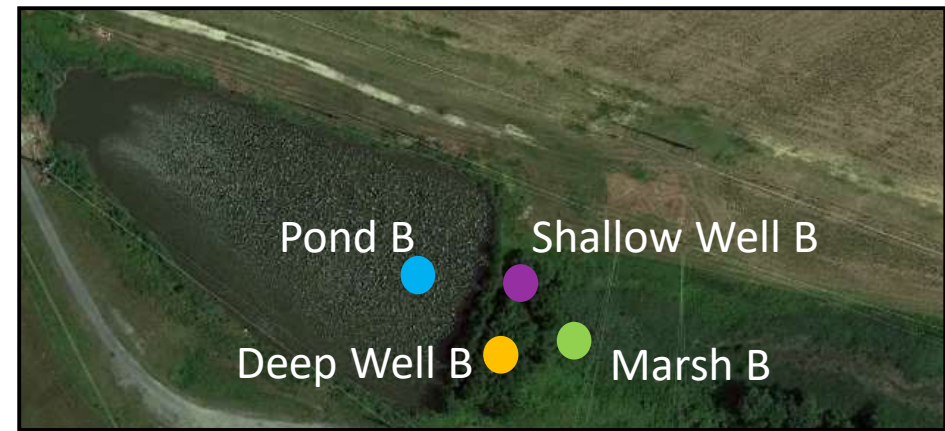
“Normal” conditions, low tide



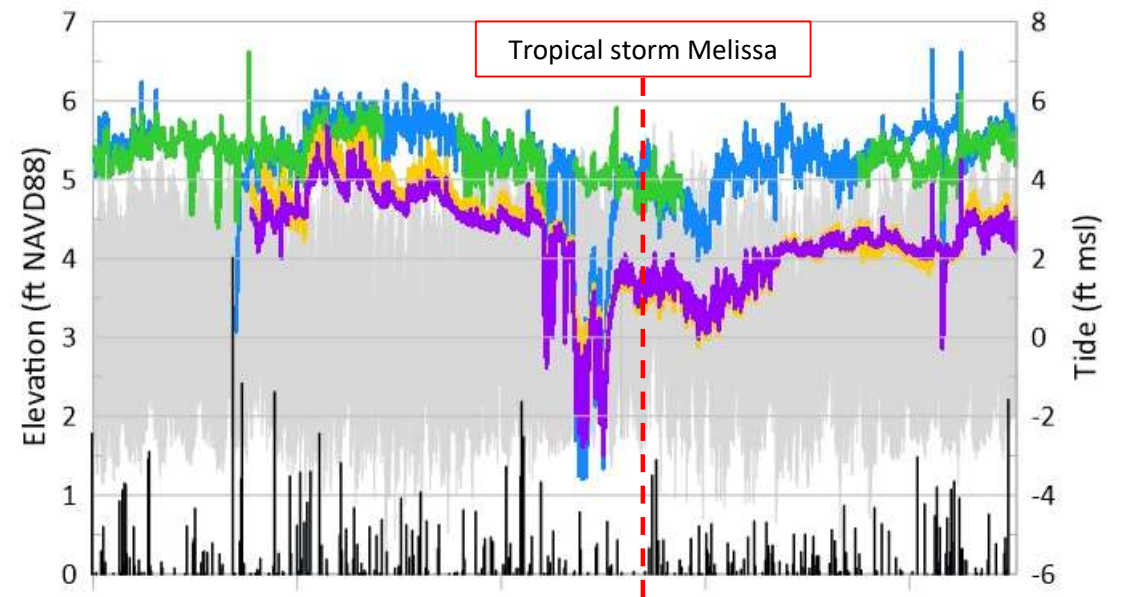
High tide, SLR, storm inundation
(can lead to subsurface salinization)



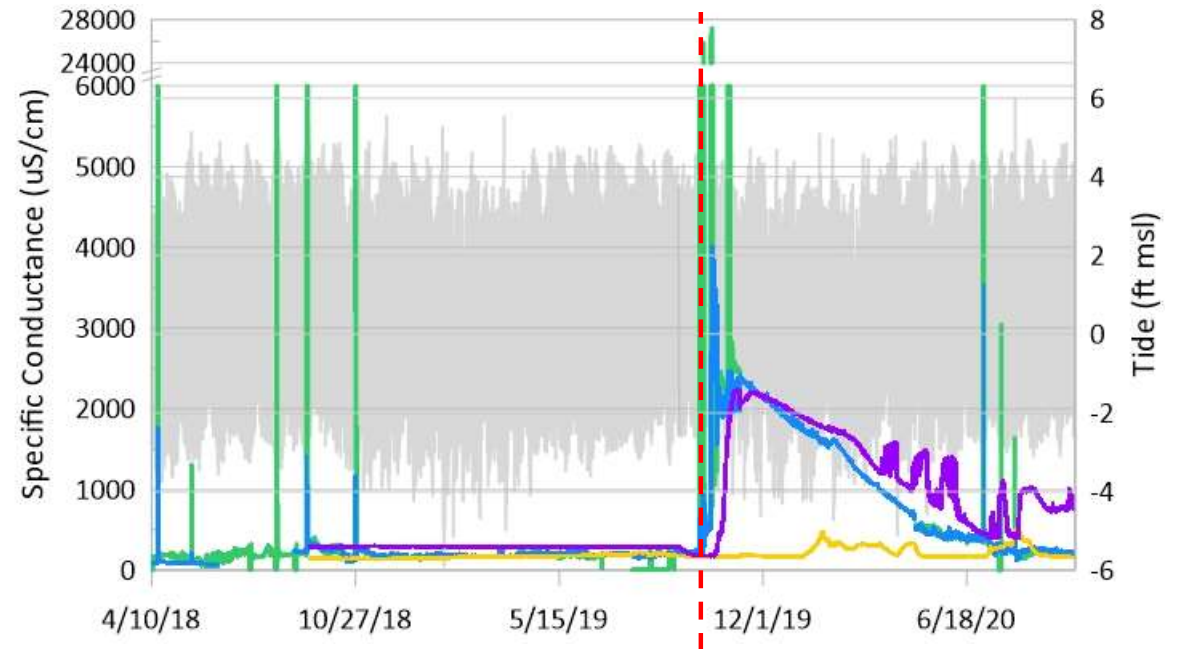


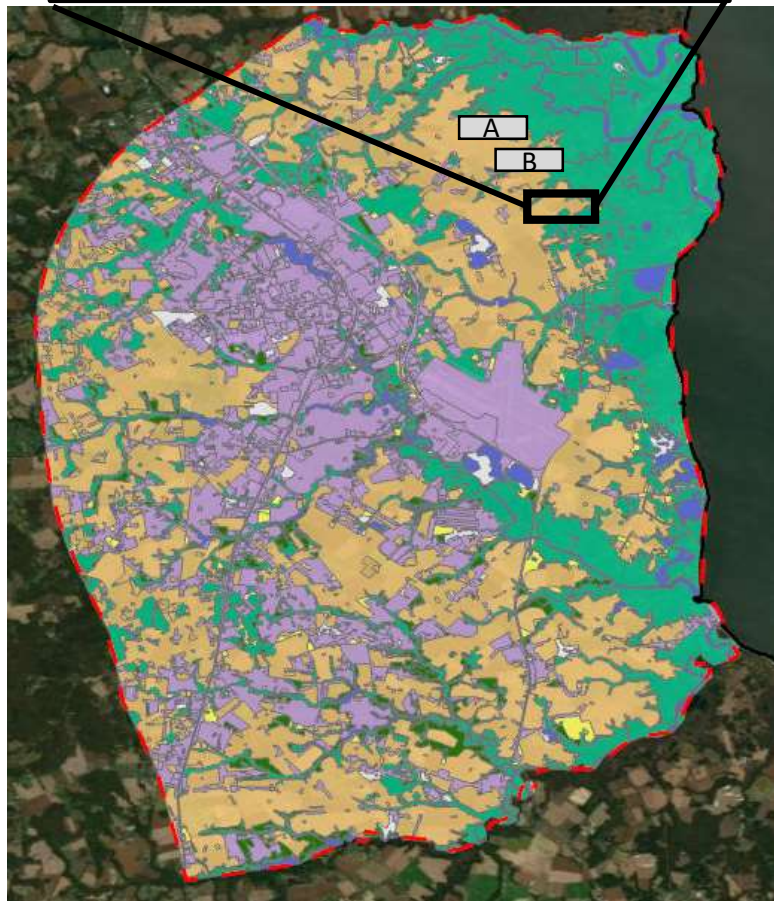
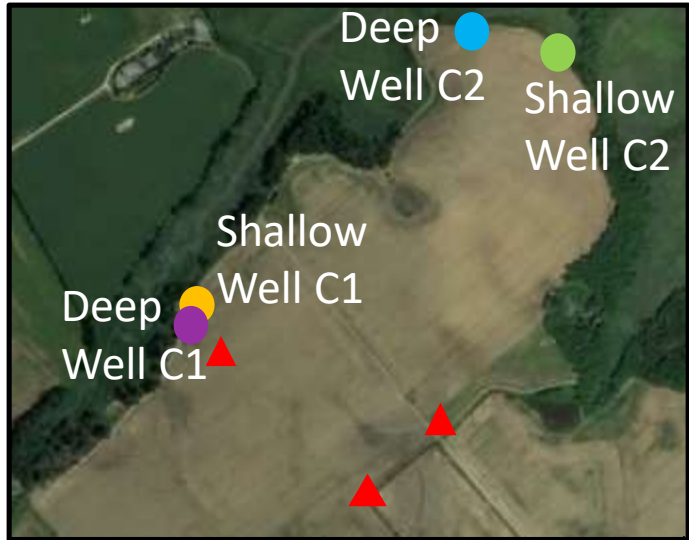


Water Levels

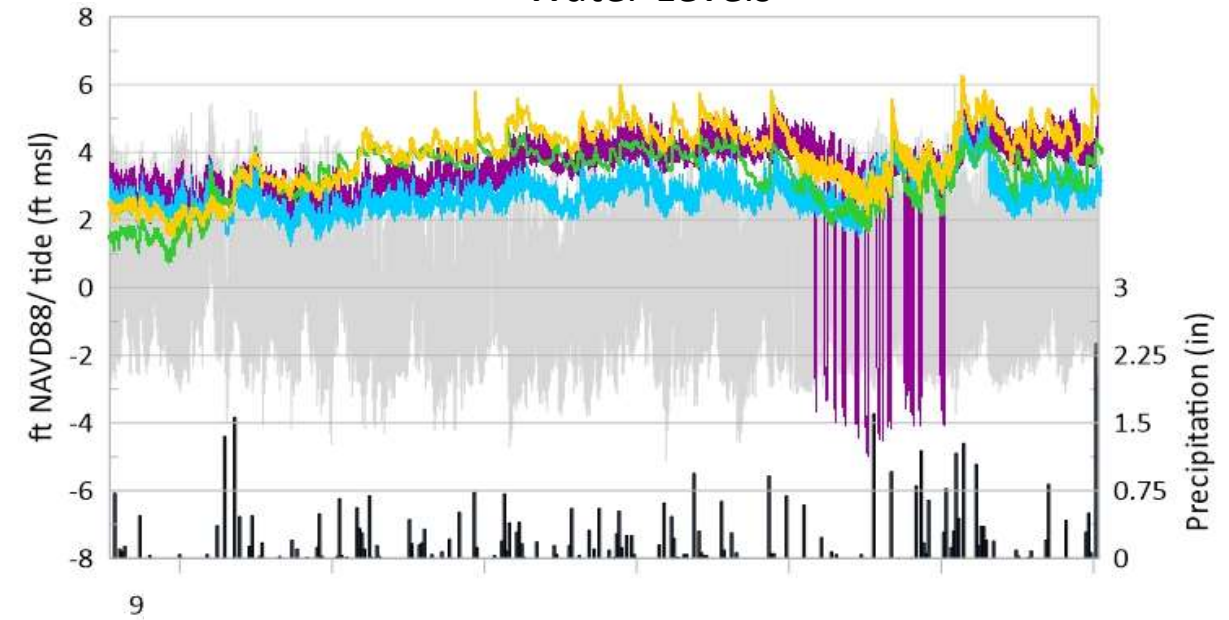


Specific Conductance

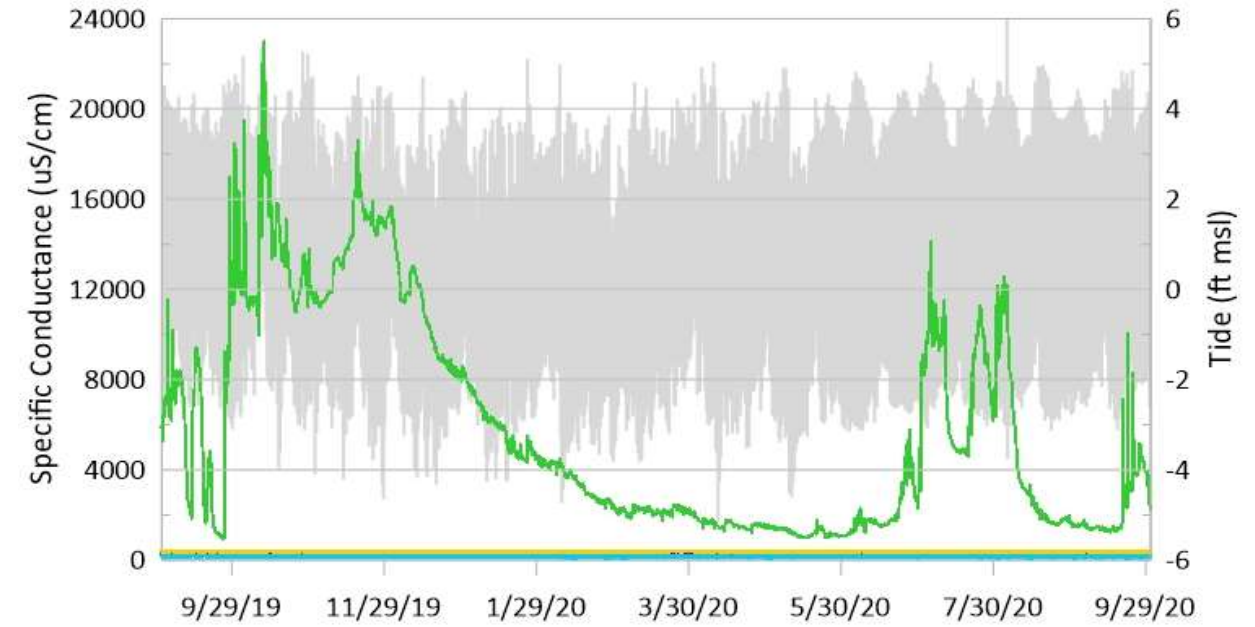


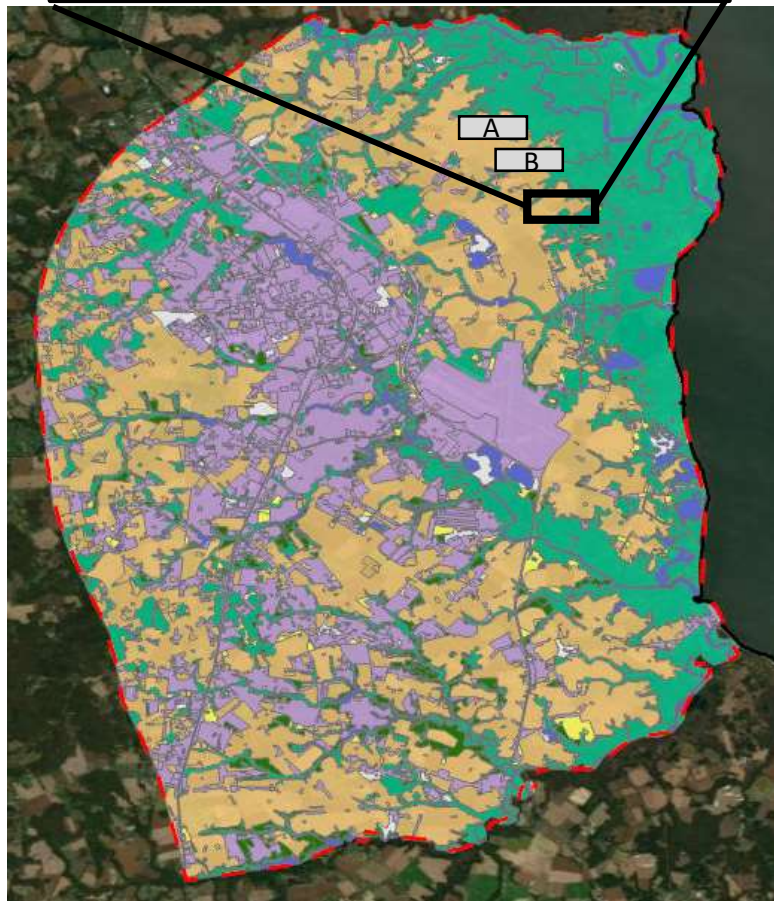
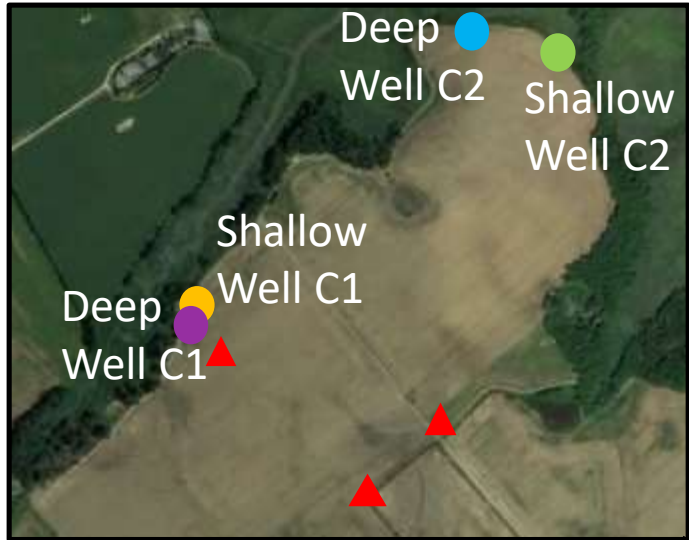


Water Levels

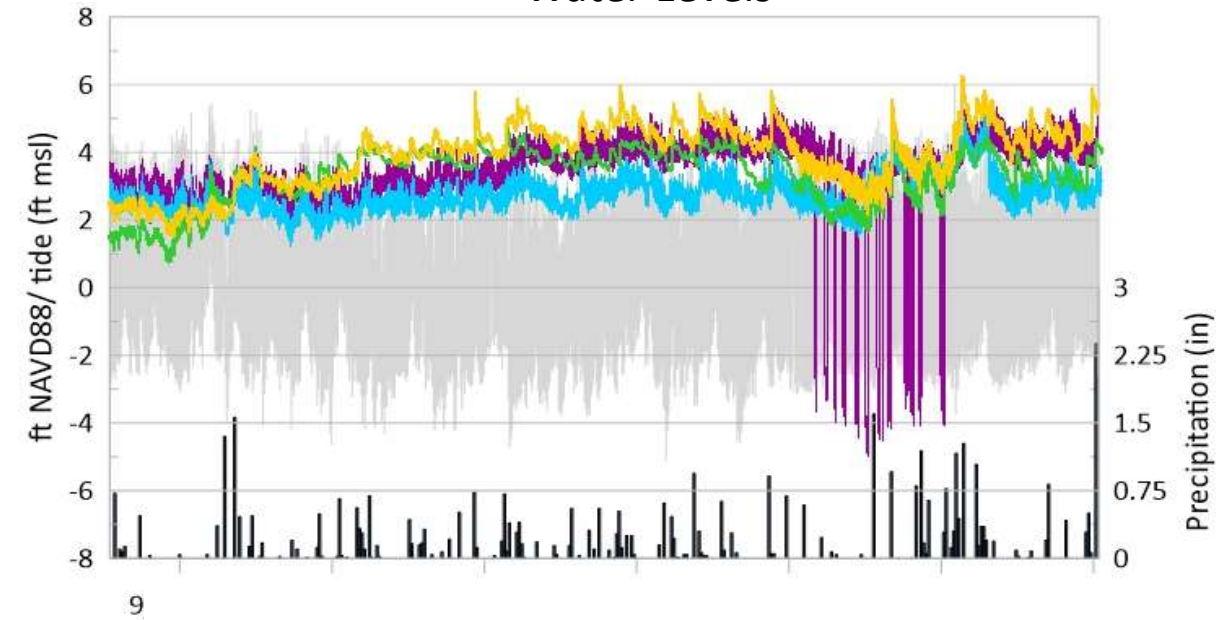


Specific Conductance

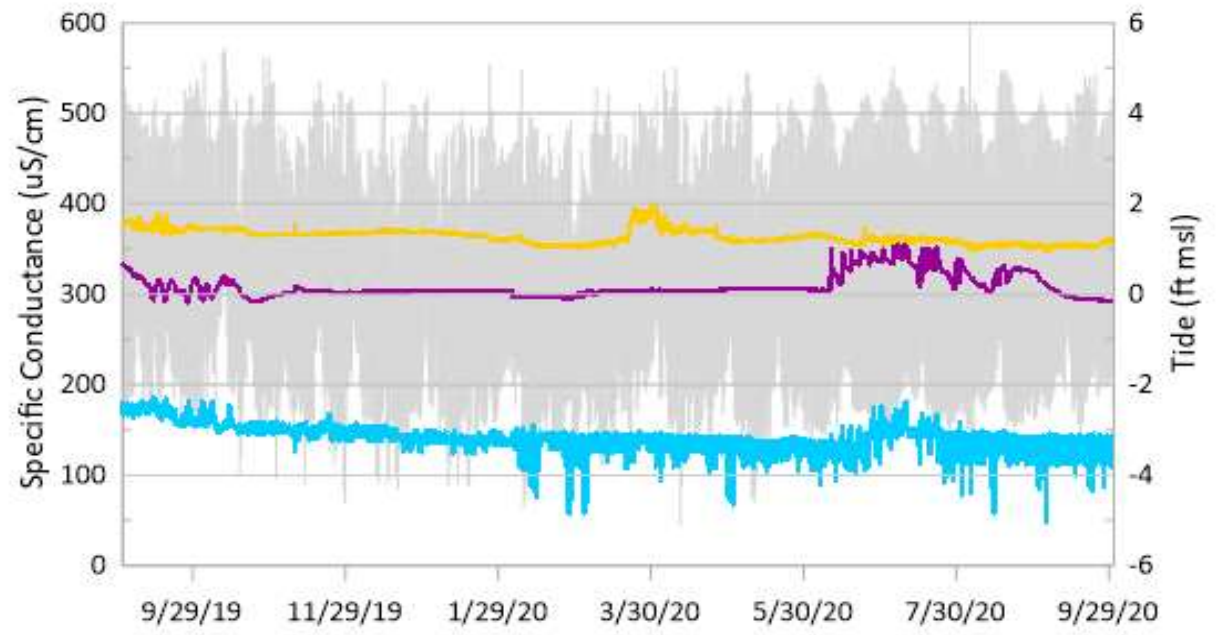




Water Levels



Specific Conductance



Conclusions and Next Steps

- Sea level rise will push tides and marshes further in land
- Storm frequency and intensity are expected to increase, potentially increasing residence time of saltwater in irrigation ponds
- Surface water bodies which penetrate the shallowest aquifer could act as direct paths of contamination for SWI (almost instant contamination, long recovery)
- Calibrating 3-D SEAWAT model to assess risk level and timescale of subsurface migration

Questions?

ACKNOWLEDGEMENTS

This work was supported by funding from Delaware EPSCoR Project WiCCED and DNREC.



PROJECT
WiCCED
WATER *in the*
CHANGING COASTAL ENVIRONMENT
of DELAWARE

