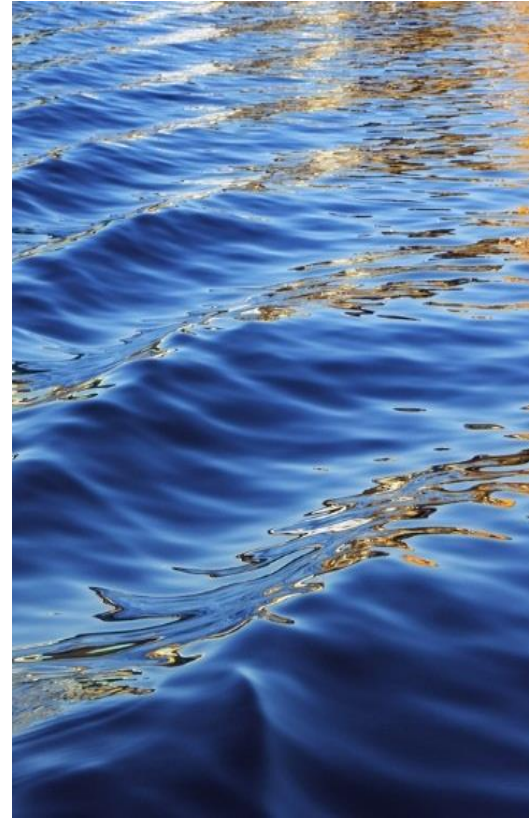




Block Island – Land surrounded by Ocean

Tom Boving
Hydrogeologist
University of Rhode Island

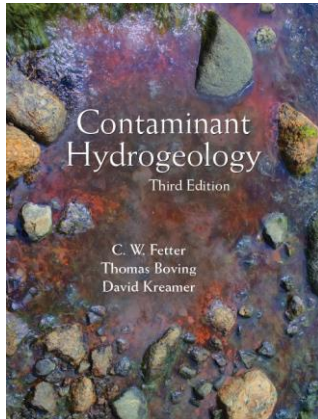


Introduction



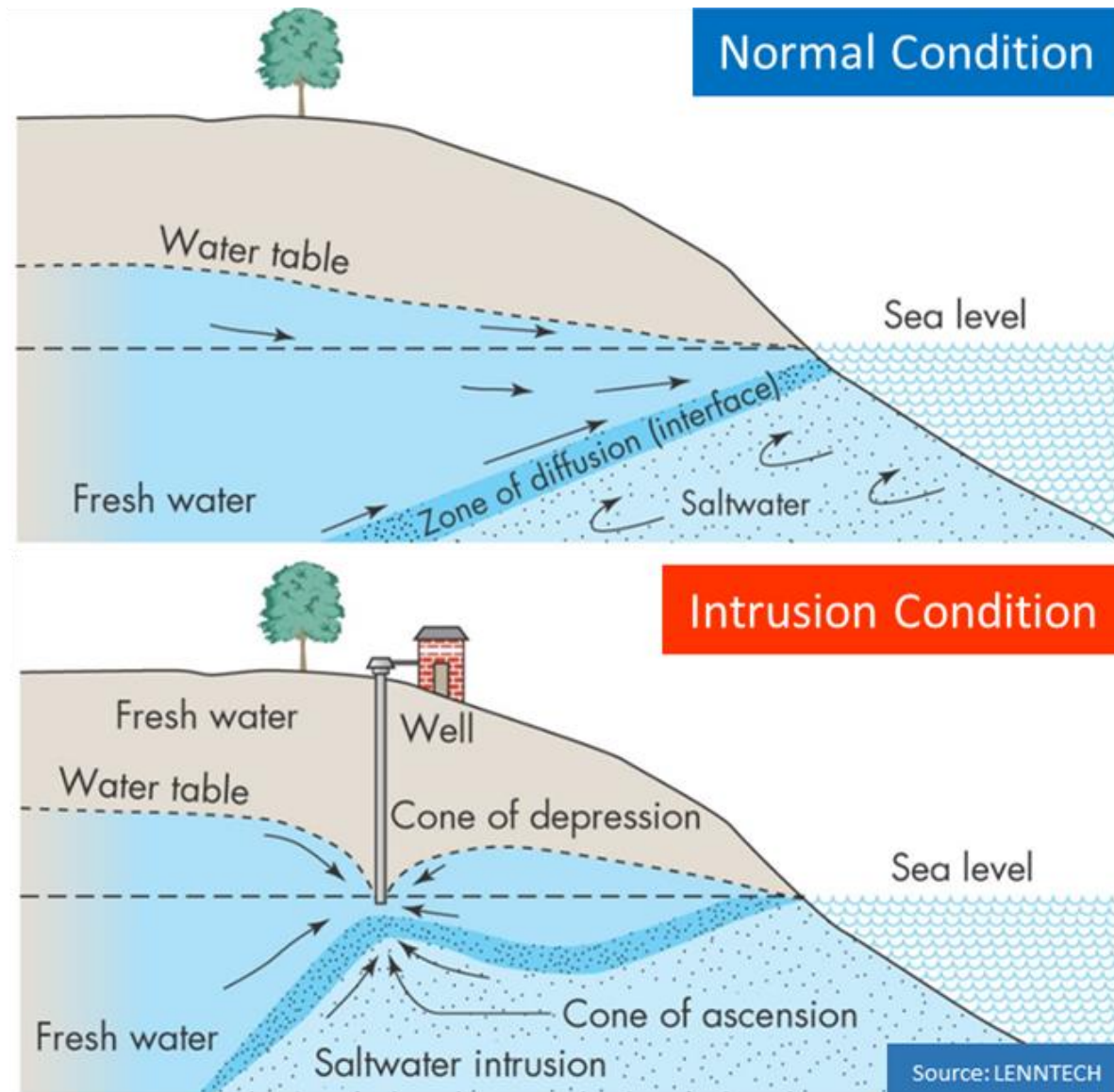
Dr.
Boving

- Professor - Environmental Hydrogeology at the University of Rhode Island
 - Dept. Geosciences
 - Dept. Civil and Environmental Engineering

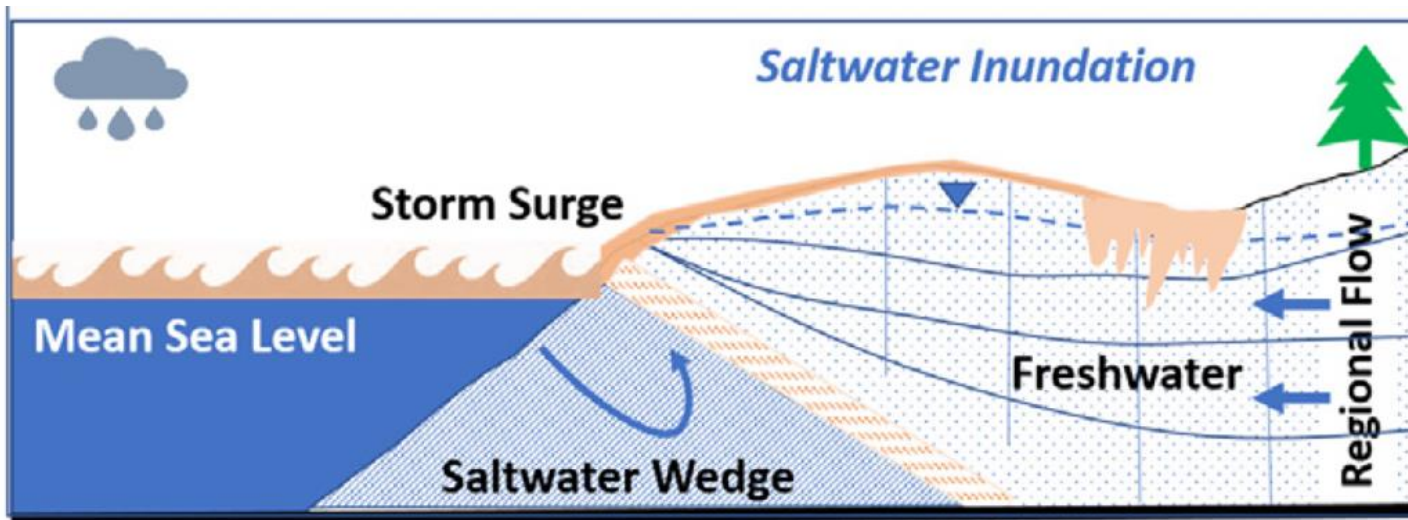
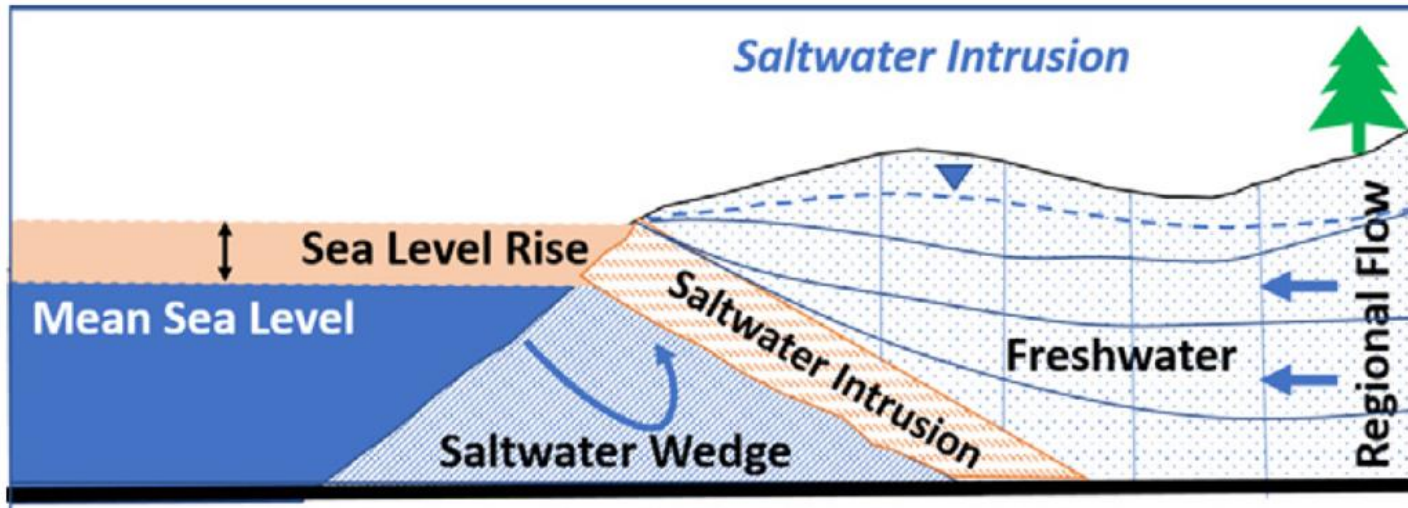


- Ph.D. in Hydrology and Water Resources from the University of Arizona
- Co-authored the leading textbook in Contaminant Hydrogeology

Saltwater Intrusion into Coastal Aquifers

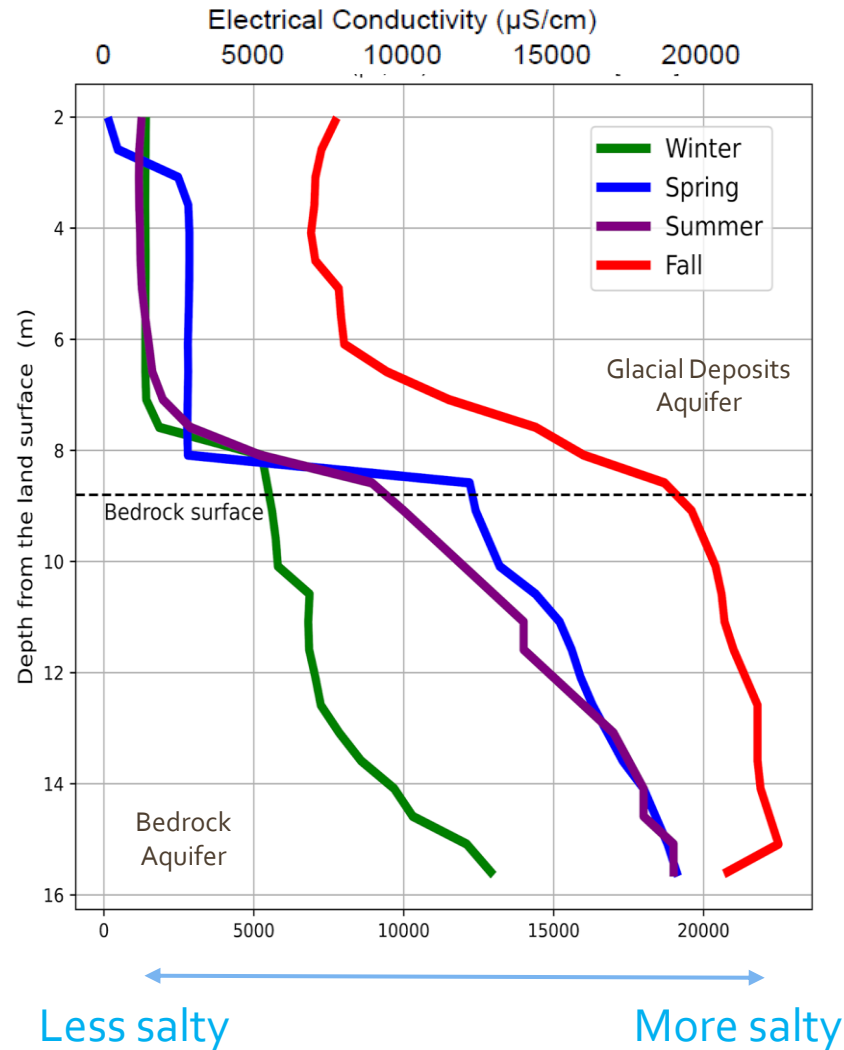


Intrusion versus Inundation



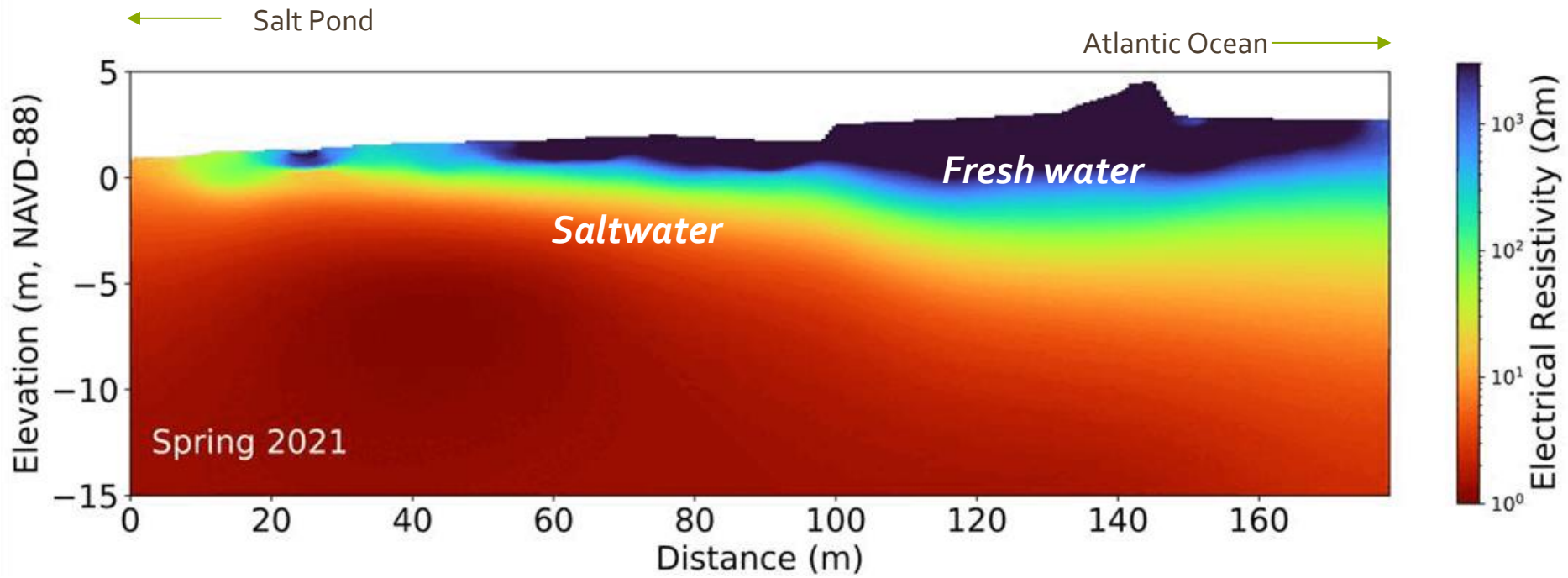
Saltwater Intrusion into Coastal Aquifers

Blue Shutters Beach, RI



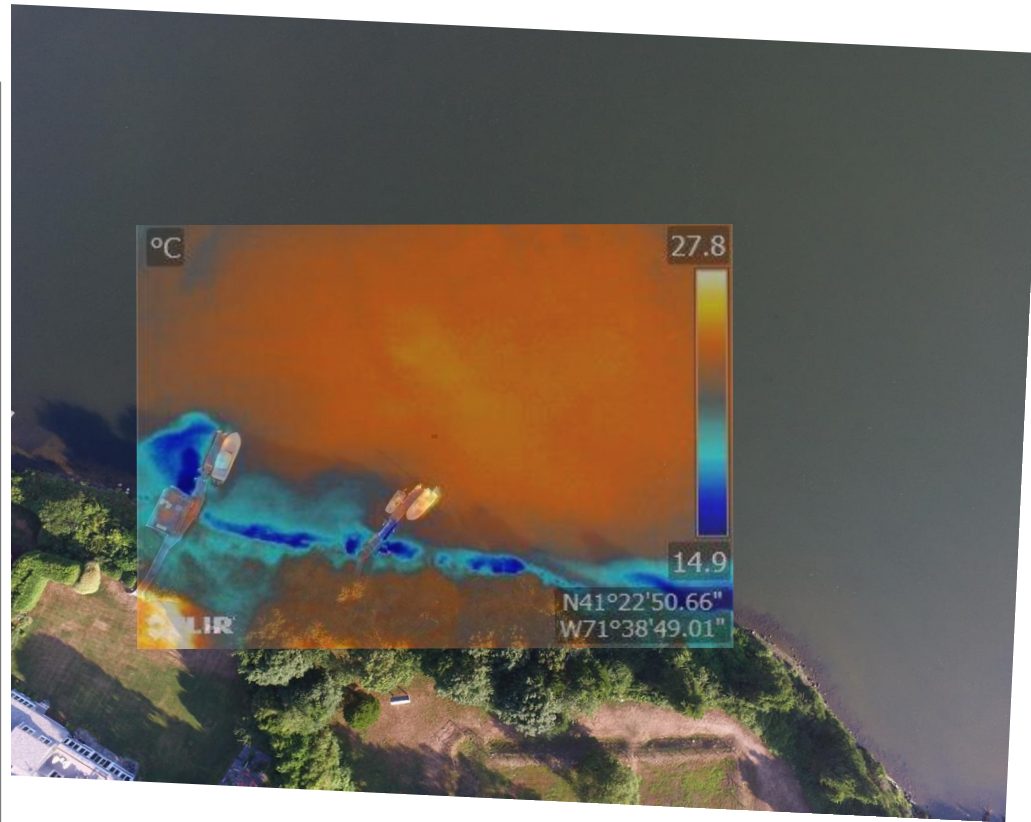
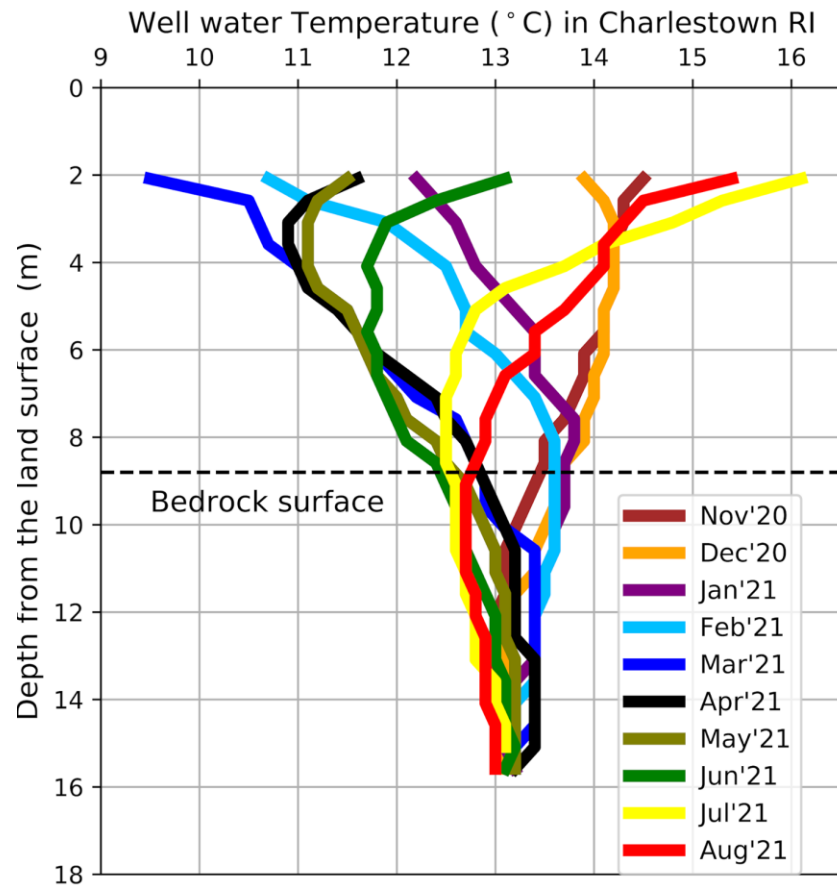
Time-lapse Electrical Resistivity

East Beach, RI



Panthi
2022

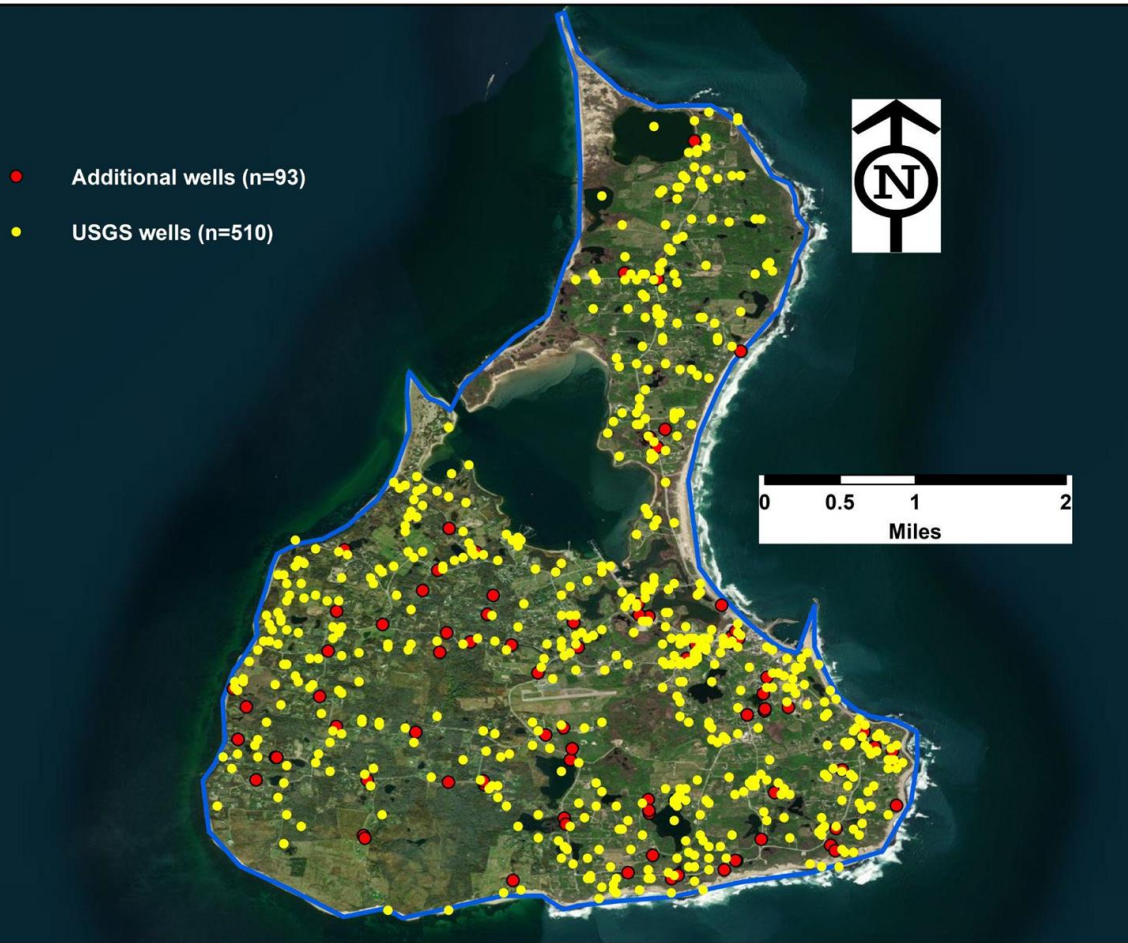
Submarine Groundwater Discharge



Panthi
2022

K.
Young

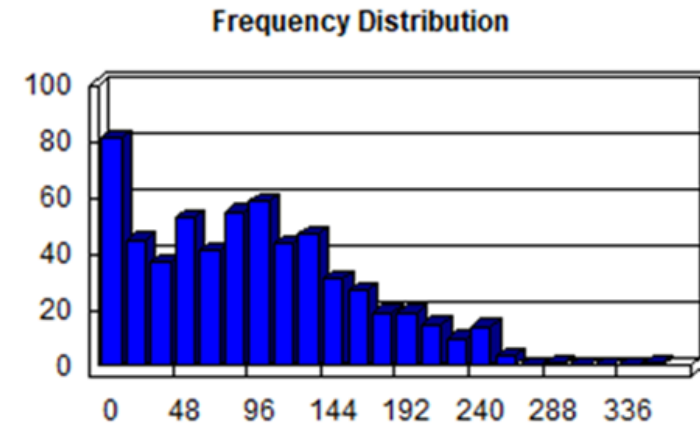
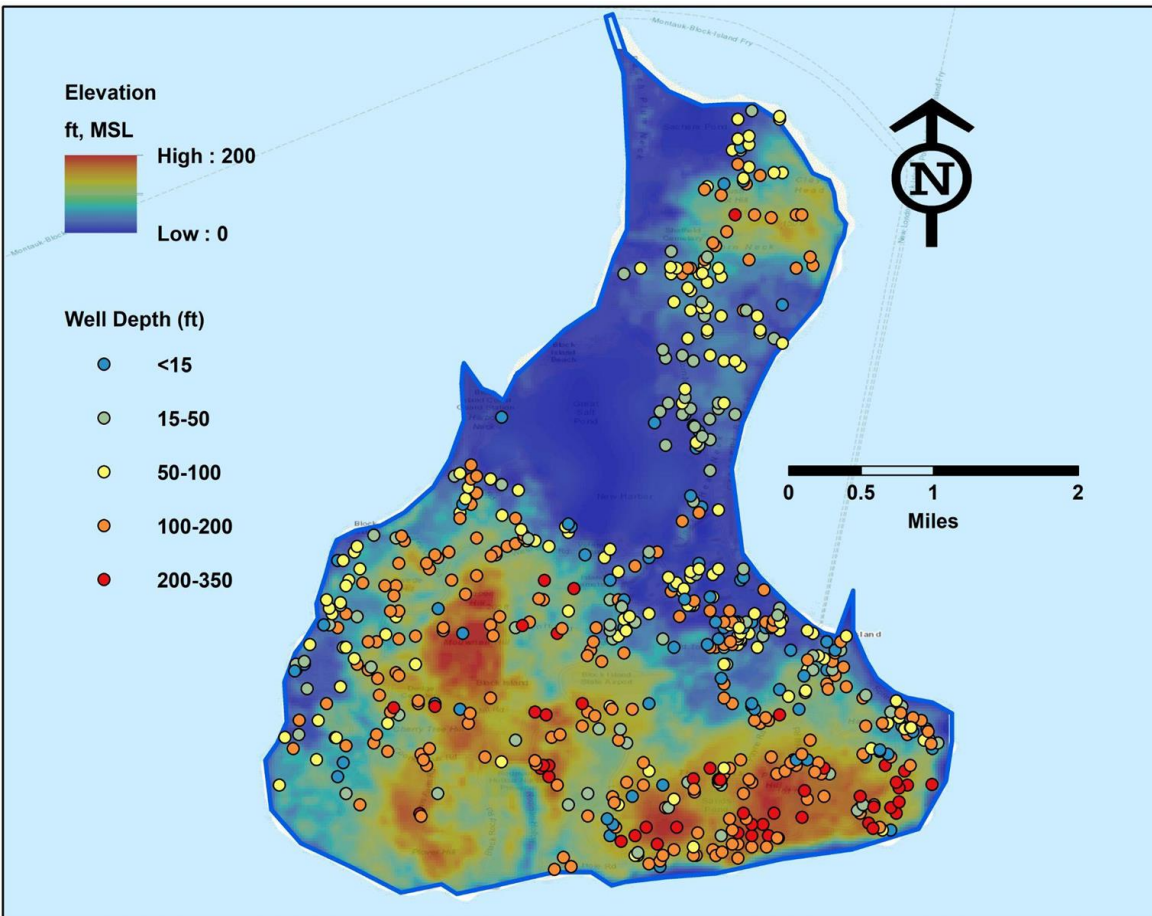
BI Well logs



603 well on record.

- Mainly private wells.

Land surface topography vs Well depth



Well_depth

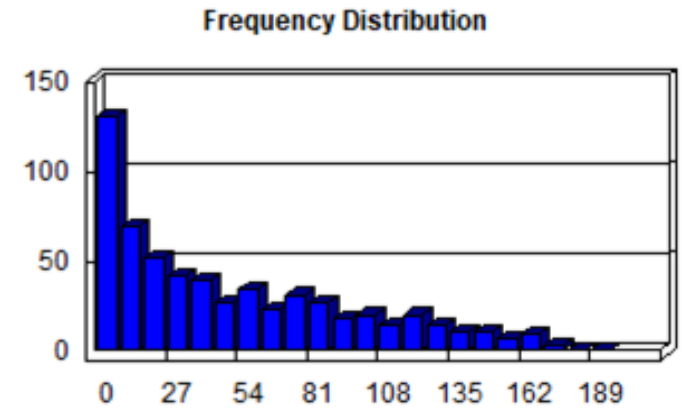
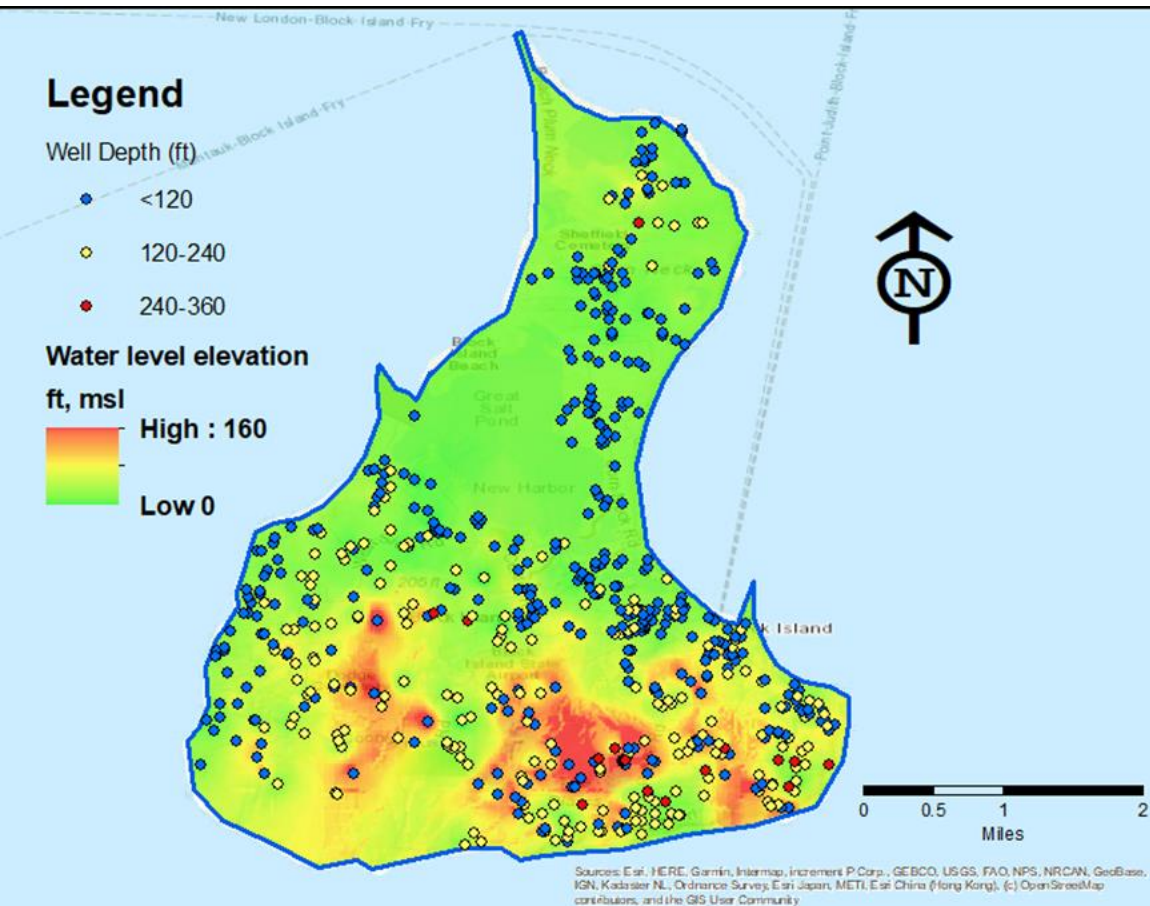
Statistics:

Count: 603

Minimum: 0

Maximum: 360

Groundwater level vs well depth



Field

Wat_tbl_de

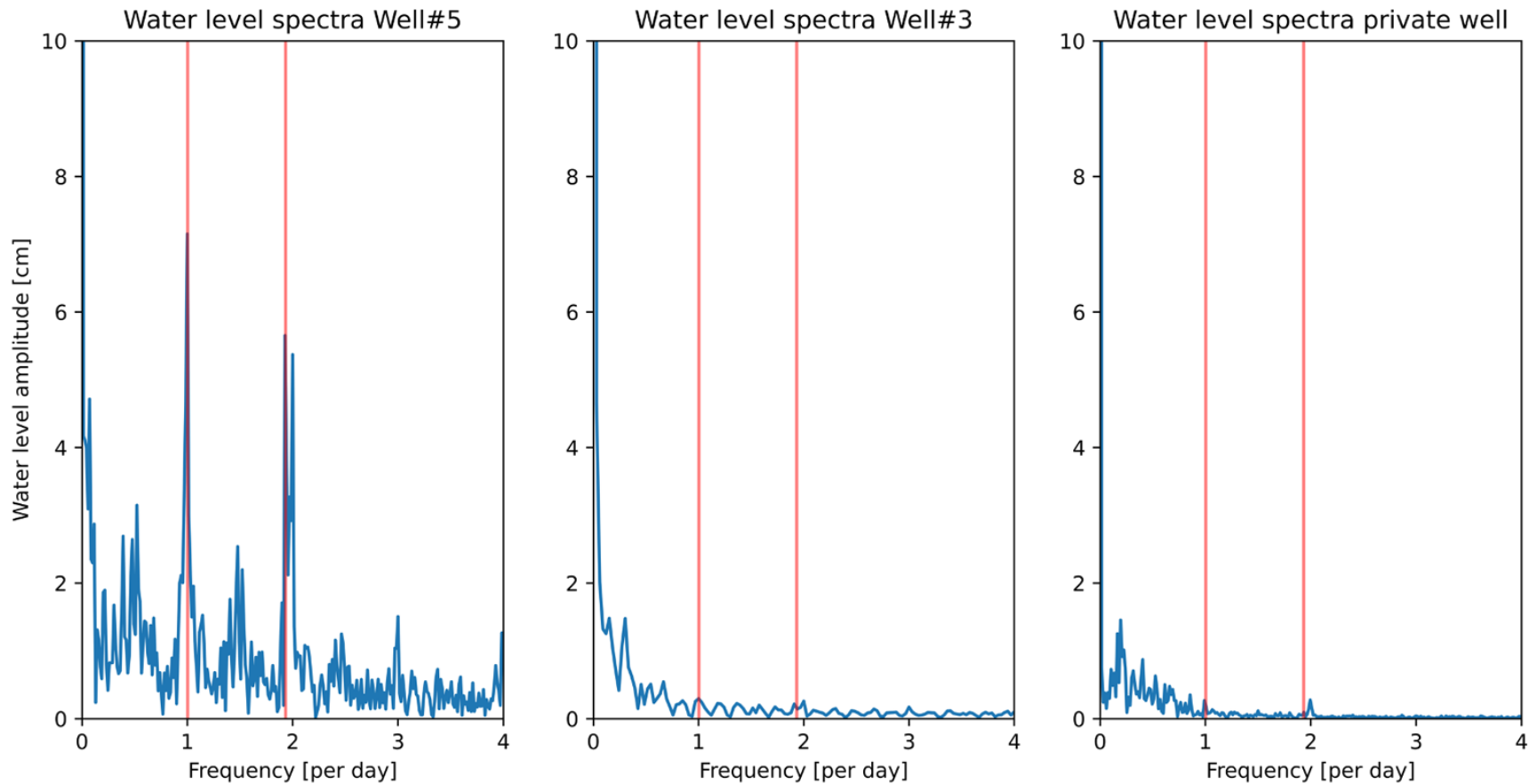
Statistics:

Count: 603

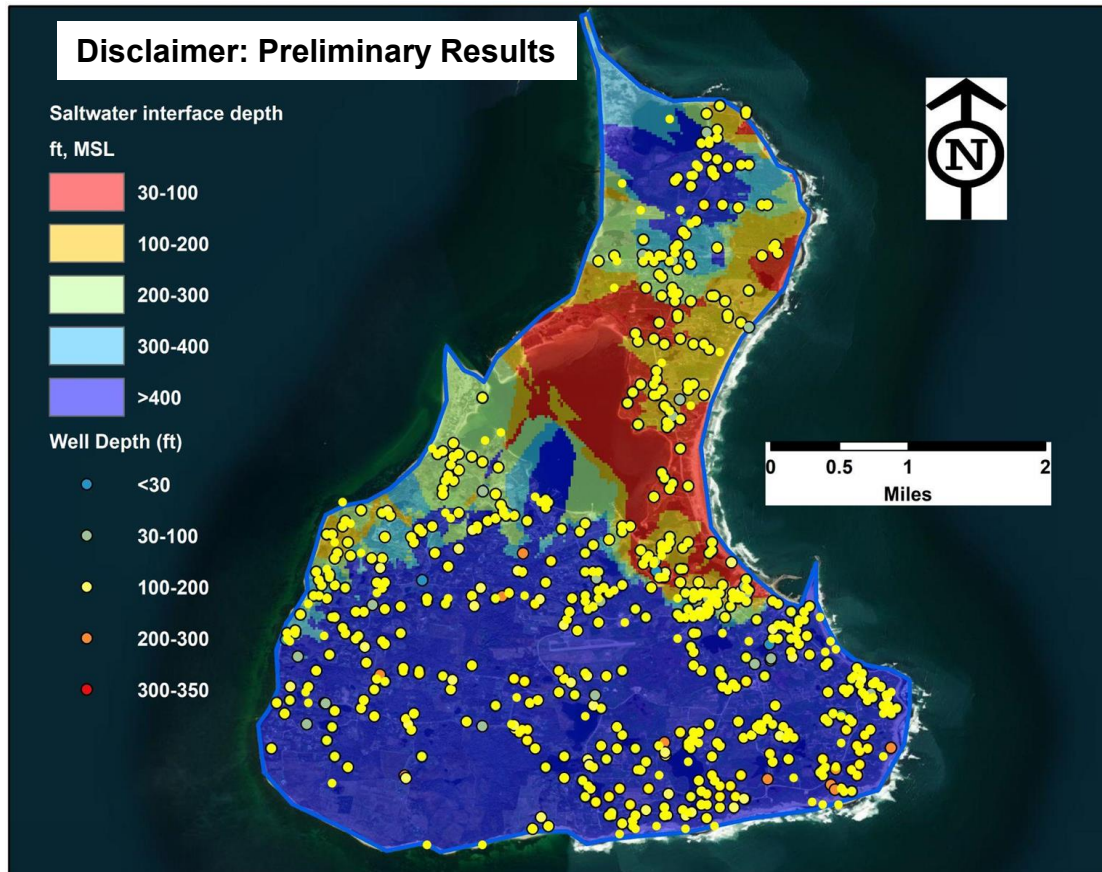
Minimum: 0

Maximum: 195

Multiple Aquifers on BI

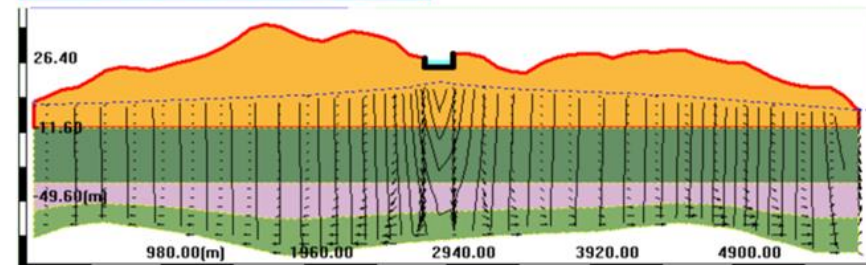
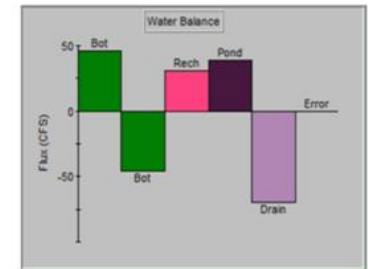
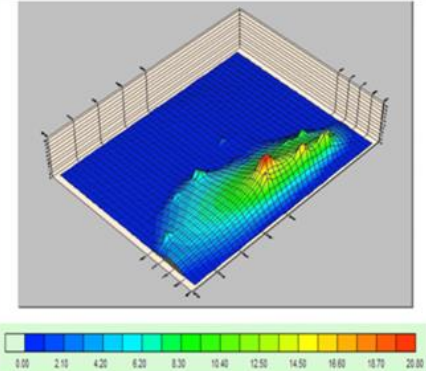
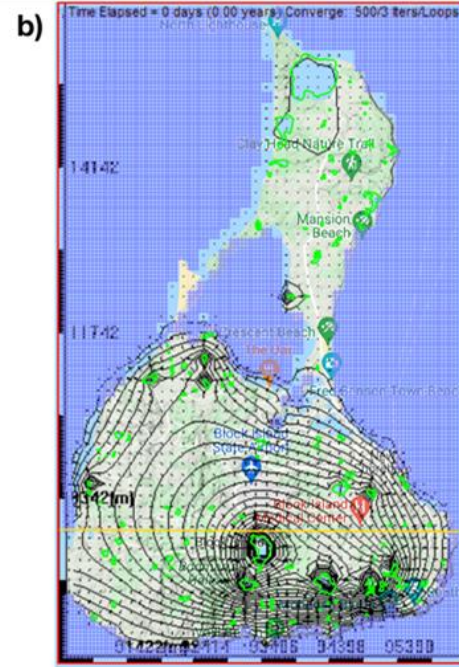
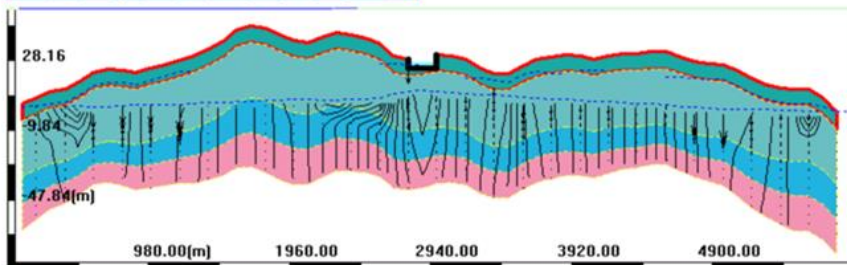
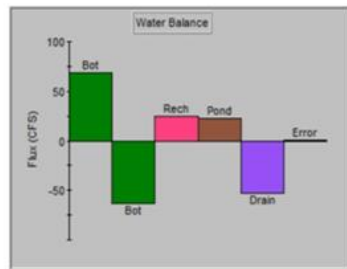
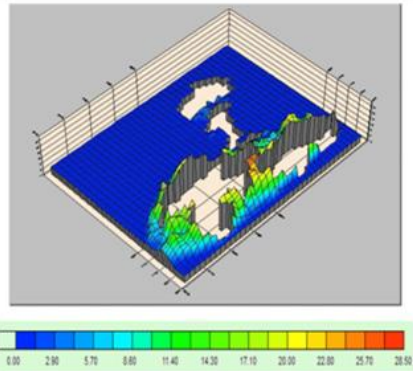
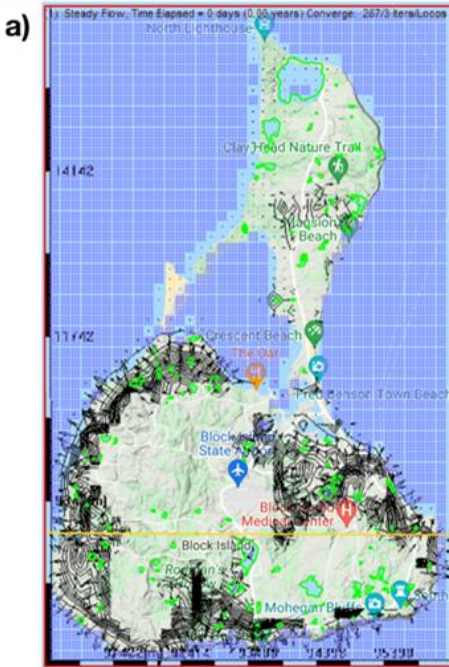


Areas vulnerable to saltwater intrusion



- Yellow wells in red areas are susceptible to saltwater.
- BIWC is in safe location, but higher pumping may lead saltwater up-coning.
- Needs further refinement, particularly at the land/ocean interface.

We need robust modeling



Tourism, Climate Crisis Tax Block Island's Drinking Water

November 22, 2021

New study to examine popular island's freshwater supply

By CAITLIN FAULDS/ecoRI News staff

NEW SHOREHAM, R.I. — In hydrology, every water system has its intricacies. But Block Island may pose some of the heftiest water management challenges around.

Limited surface fresh water.
Salt-heavy aquifers requiring reverse osmosis treatment.
Wildly fluctuating seasonal



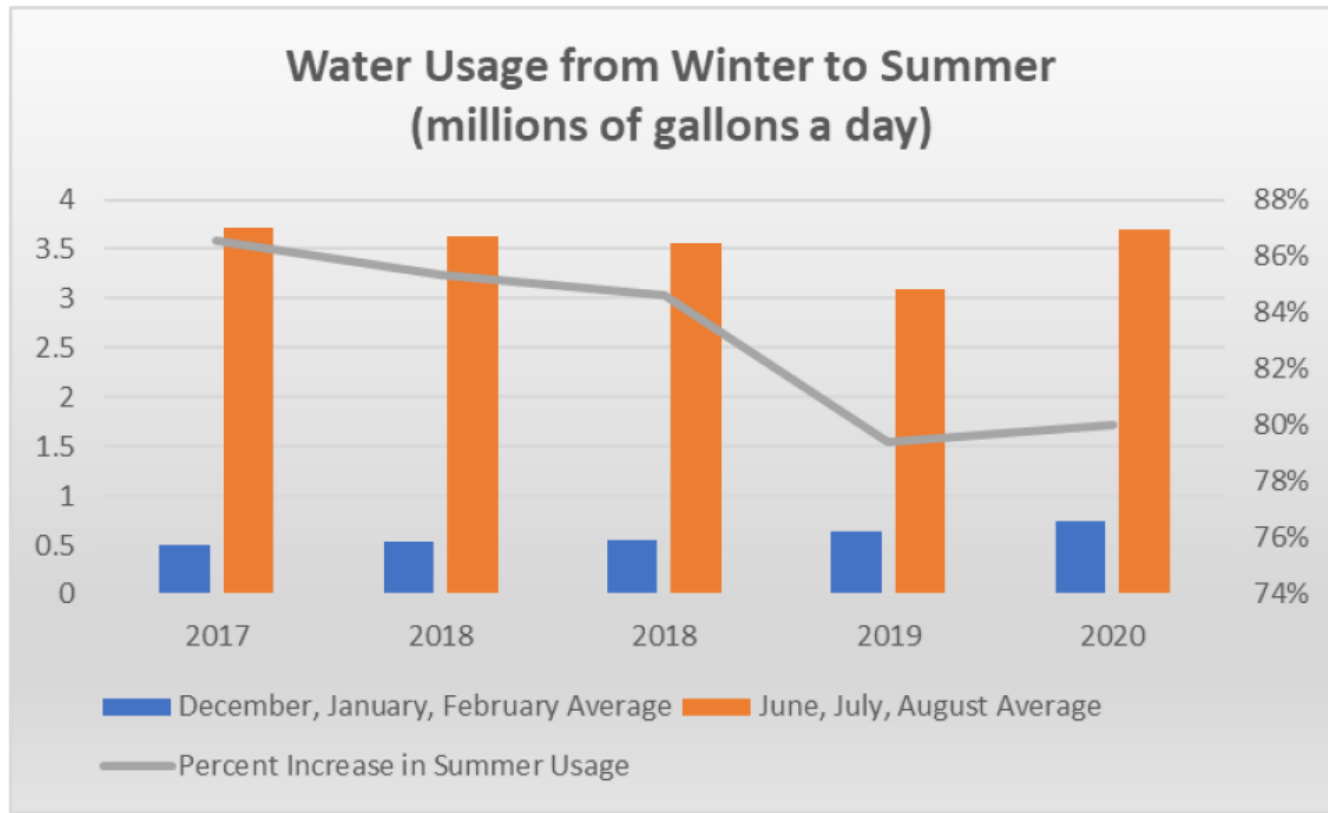


Figure 8. Average water usage in winter and summer months with percent increase from 2017-2021.

Similar to energy, the winter month average of water consumption is significantly lower than the summer month average. The percent increase in summer usage ranged from 79% to 87% during the 2017-2020 timeframe.

Indicator: Total amount of water consumed

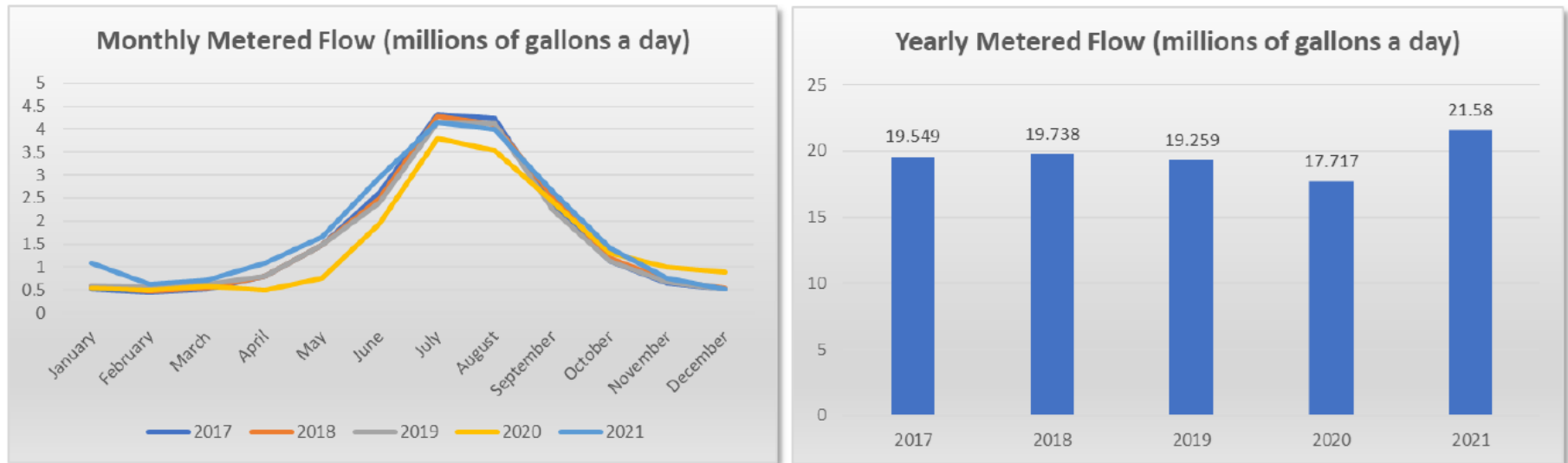


Figure 7. Left: Monthly water hour usage from 2017-2021. Right: Yearly total of water usage from 2017-2021.

Like many other resources on Block Island, water consumption increases in the summer months, displaying considerable seasonality. It is notable that there has not been significant growth in yearly total water usage over time. This is likely because BIWC has reached its capacity limit and cannot provide more water to facilitate growth.

A local islander consumes about 25% to 30% the amount of water a seasonal tourist does.

Source: Wargo et al. 2022

Average Amount of Water Consumed per Commercial Customer (thousands of gallons)



Key Water Issues

Key Issues	• Capacity to process, store, and deliver water • Managing high seasonality • Approving new water allocation requests
Knowns	• Current limits to processing and storage • Monthly and yearly totals for water usage • High seasonality in consumption • Water usage breakdown by user type • Hotels with restaurants are by far the highest commercial consumer of water • Vacation rental homes use more water than year-round residents per month
Unknowns	• Maximum capacity based on limits of water source • If sea level rise will affect water source, and a projected timeline

Concluding Remarks

- Coastal aquifers are the main drinking water source in southern RI and Block Island
- Coastal communities faces saltwater intrusion and inundation events because of:
 - Sea level rise
 - Increasing intensity and frequency of storm events
 - Growing (seasonal) demand for fresh water.
- How much can we manage coastal aquifers in the future?

References

Wargo N., Epler Wood M., Burns O., 2022. *Block Island and the Invisible Burden of Tourism - Sustainable Tourism Report*. Created for Block Island Tourism Council by the EplerWood International and Harvard T.H. Chan School of Public Health.



Thank you!

Tom Boving

tboving@uri.edu

