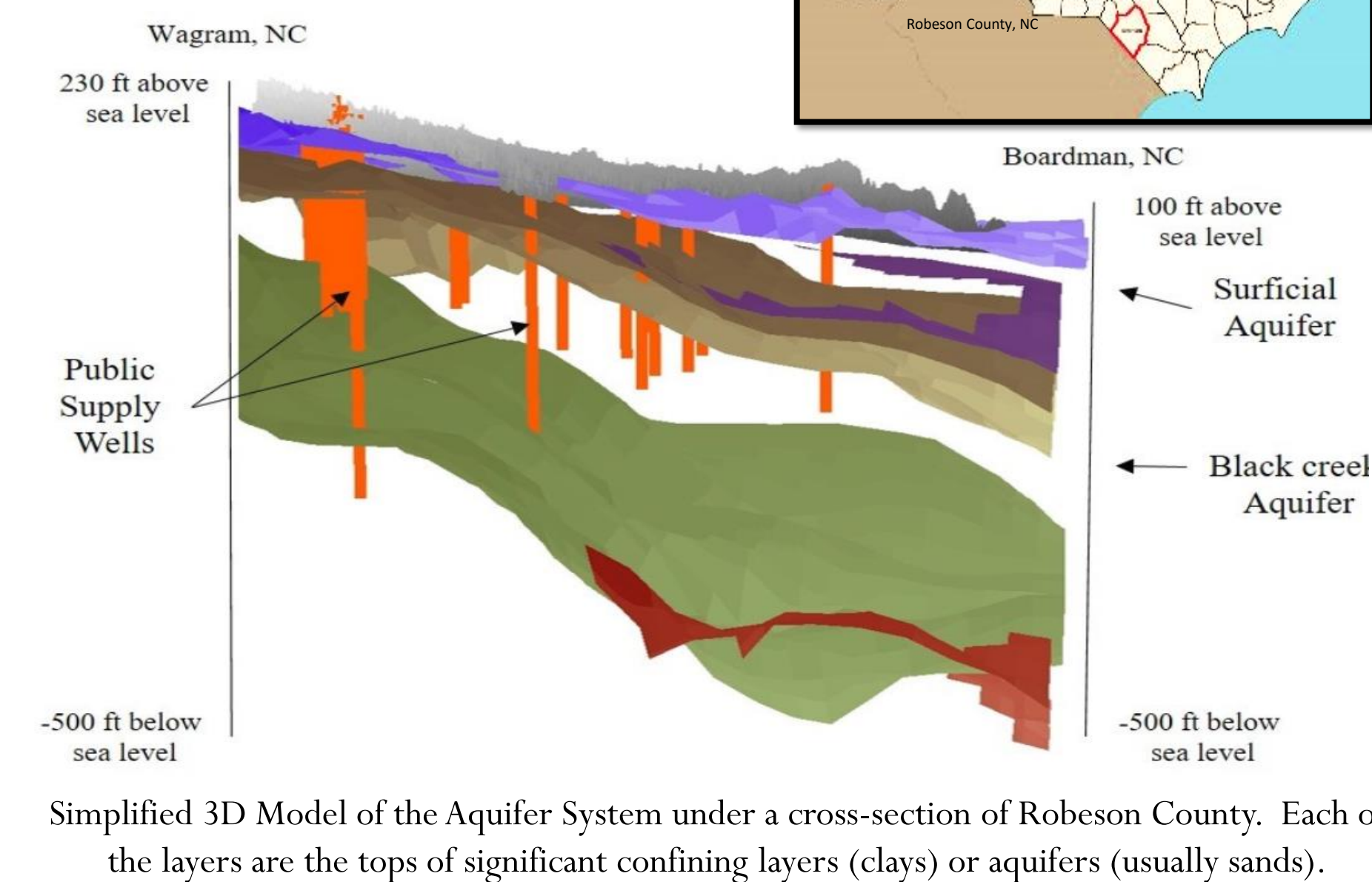


INTRODUCTION

The Southeastern North Carolina Groundwater Monitoring Network is a series of monitoring wells in Robeson County, North Carolina that are overseen by faculty and students from the University of North Carolina at Pembroke and funded by Robeson County. The Black Creek aquifer is a confined aquifer that is the primary source for drinking water within the region. Pressure transducers within monitoring wells across the county monitor the groundwater use in the Black Creek Aquifer and this data is publicly accessible to water users in the region. The network of transducers were placed in 2018 prior to two large hurricanes that severely impacted the region, hurricanes Florence and Michael. Both storms caused significant flooding in the region where over 8 trillion gallons of water were dropped on the Carolinas in a short time. Our transducers obtained a very high-resolution record of these events and how the potentiometric surface in the region responded to the storms. The data from the wells are interpreted to show the heterogeneity within the aquifer, how the aquifer responds to these large changes of barometric pressure, and that the confined aquifer is more interconnected to surficial aquifers than originally thought. As we continue to study the data from the network, we are hoping that can have a better understanding of how large storm events impact aquifers and how we should manage this resource in the region.



MONITORING WELLS

The Black Creek Aquifer is a primary ground water resource for five different counties in Southeast North Carolina and is the focus of this study. Undergraduate interns worked with their faculty mentor, county officials, and a local well driller to site 13 monitoring wells and 1 pumping well across the region. Each of the 14 wells in the network are monitored using pressure transducers and the data is collected and downloaded each month to a publicly accessible database by the interns.

Interns working with faculty to collect data from campus well.



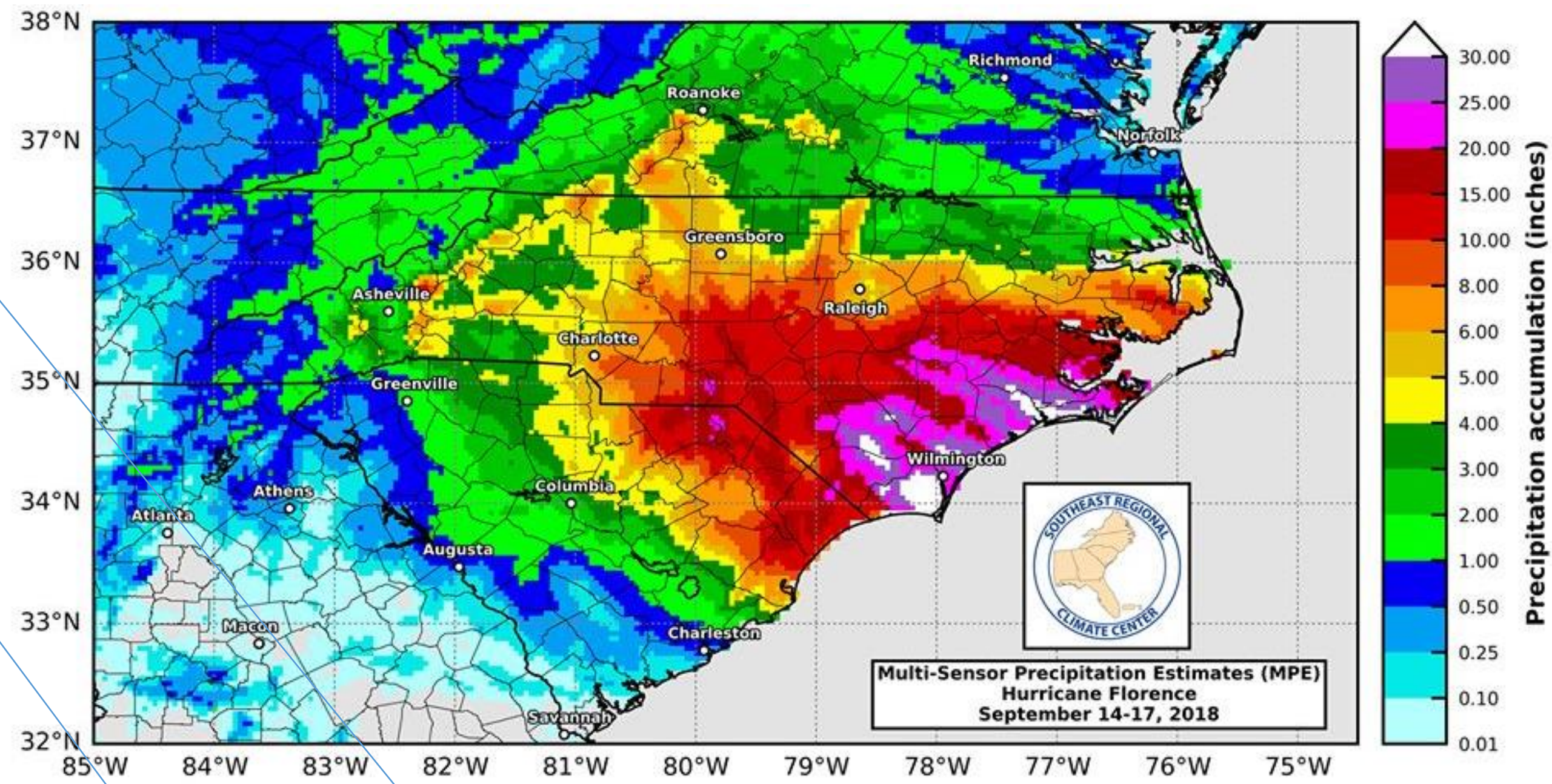
Manual collection of water levels at pumping wells

UNCP campus monitoring well.

DATA FROM SOUTHEASTERN NORTH CAROLINA GROUNDWATER DATABASE

Hurricane Florence dropped over 10 trillion gallons of water in the Carolinas and flooded communities for the second time in 3 yrs. following the massive flooding caused by Hurricane Matthew in 2016.

The Monitoring Network for the Southeastern North Carolina Groundwater Database recorded a high-resolution response of water levels in the region. Based on the response seen in the hydrographs we can tell that the aquifer is more heterogeneous than originally thought

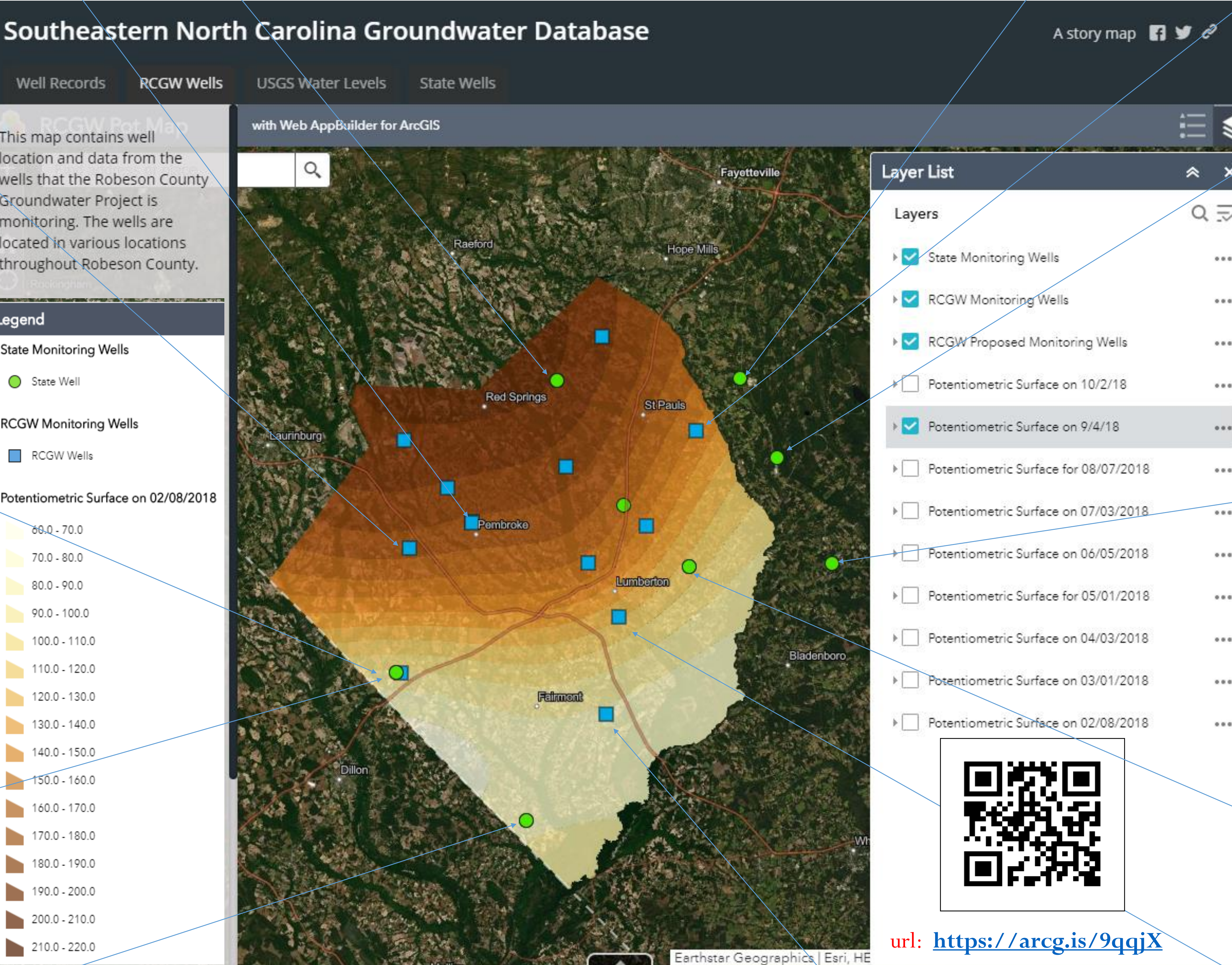
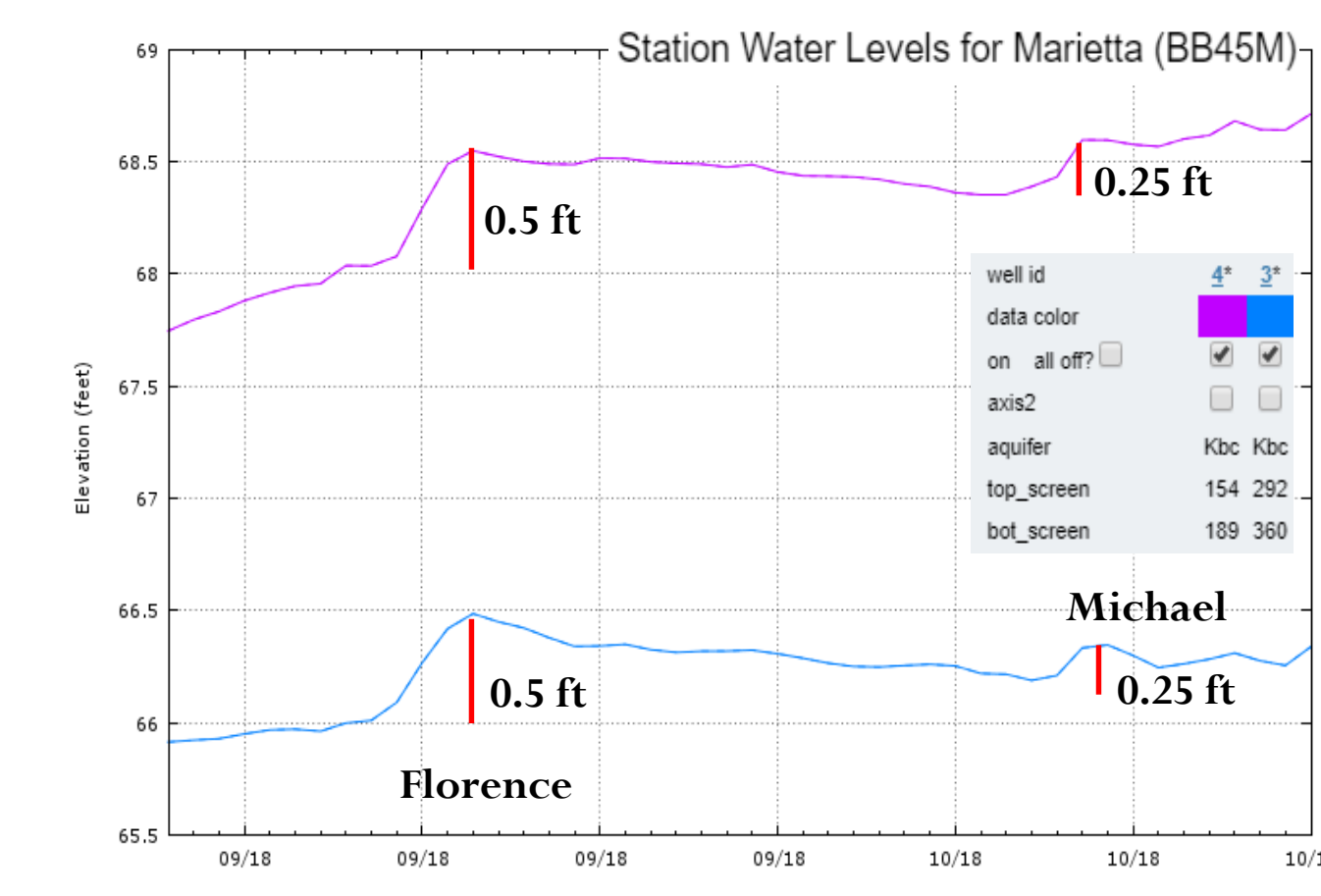
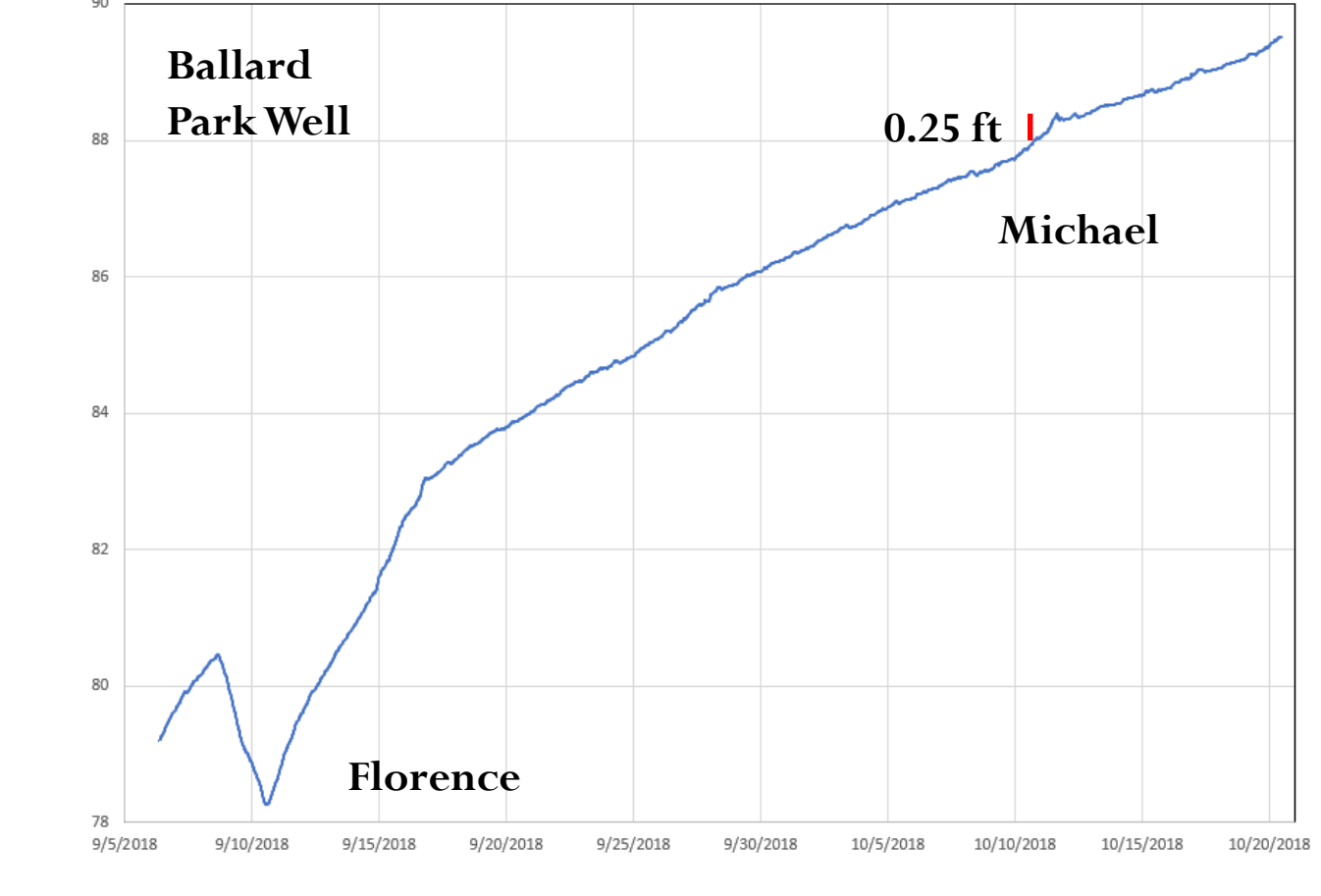
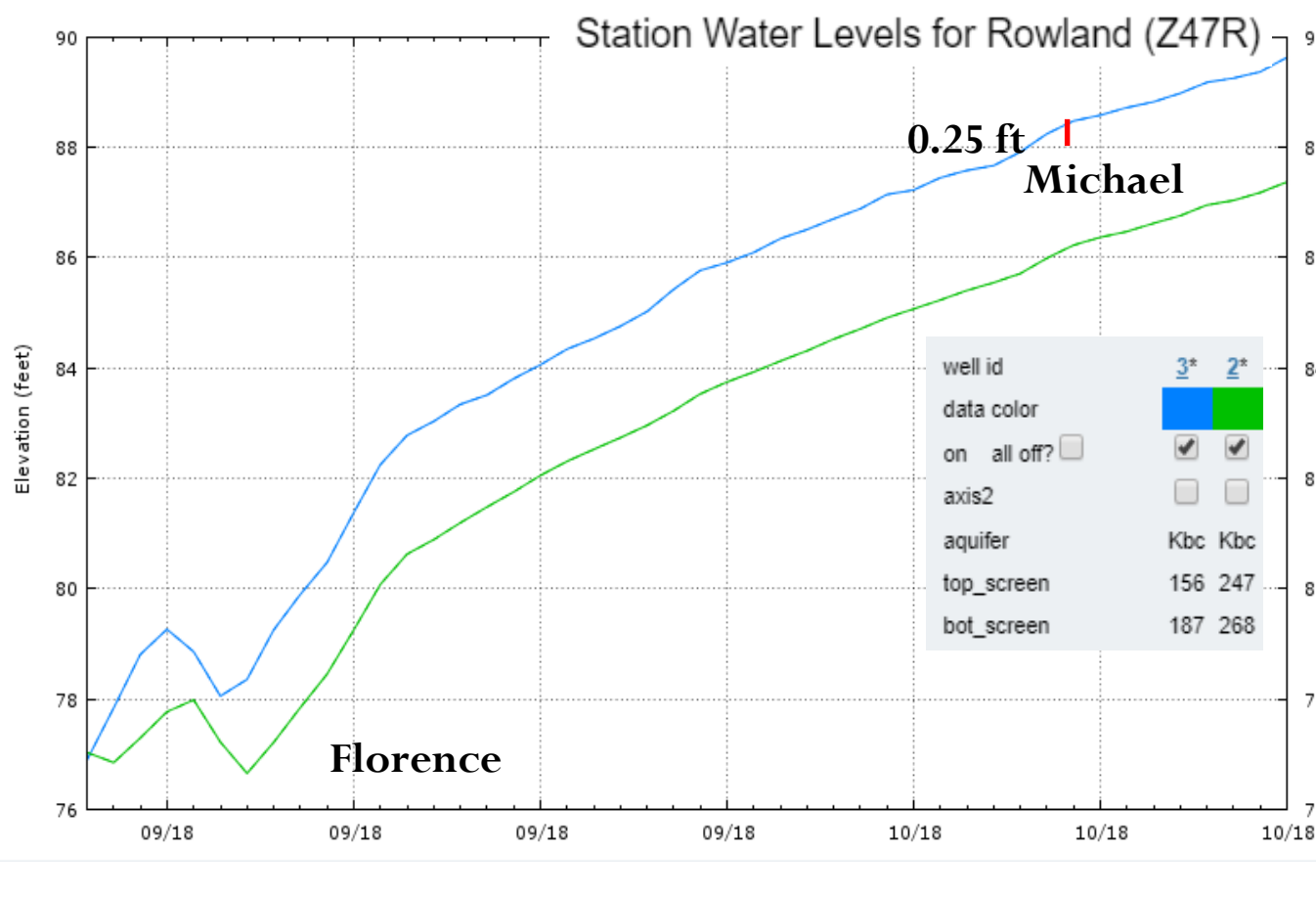
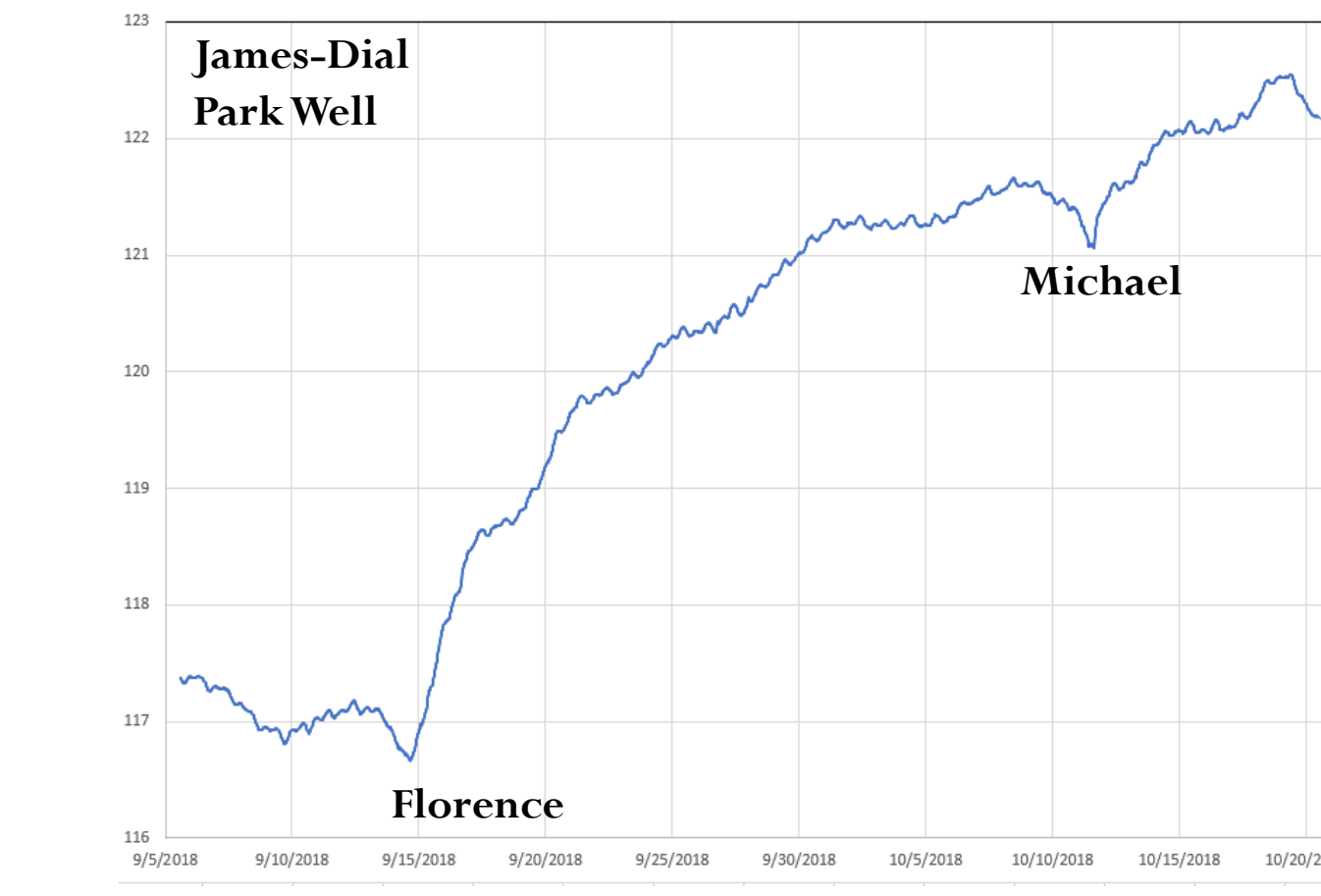
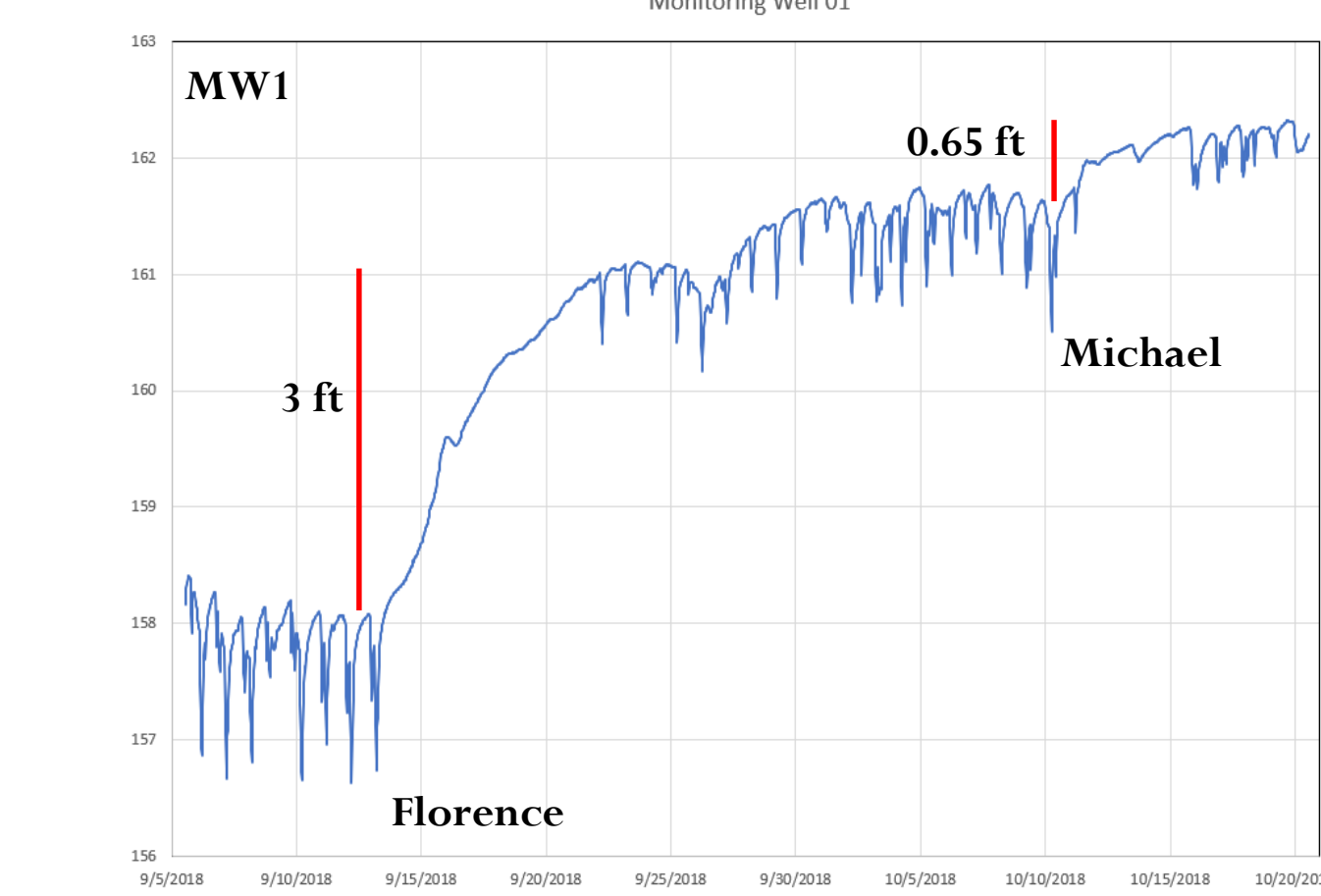
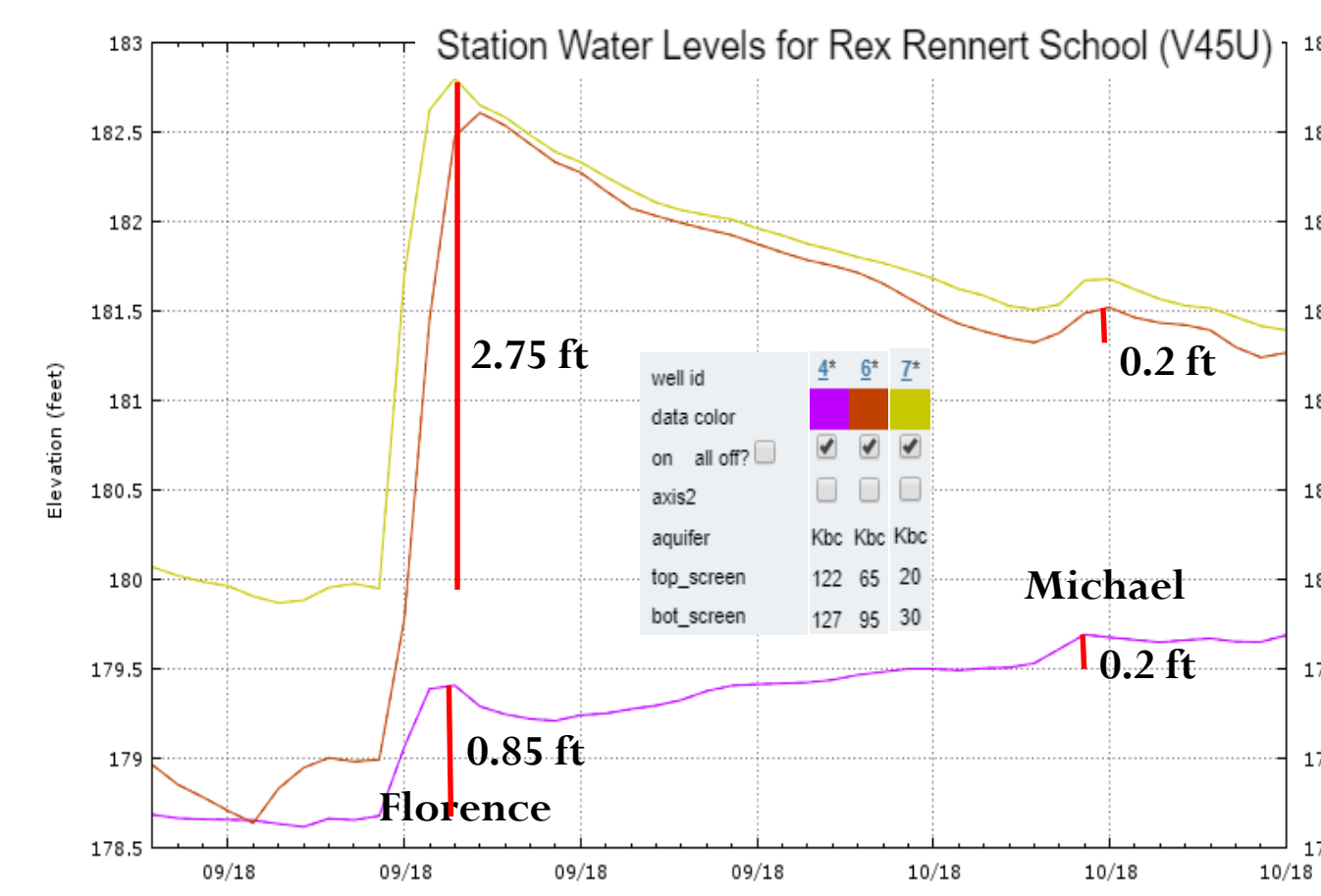


The wells near the major rivers tend to have significant responses in water level.

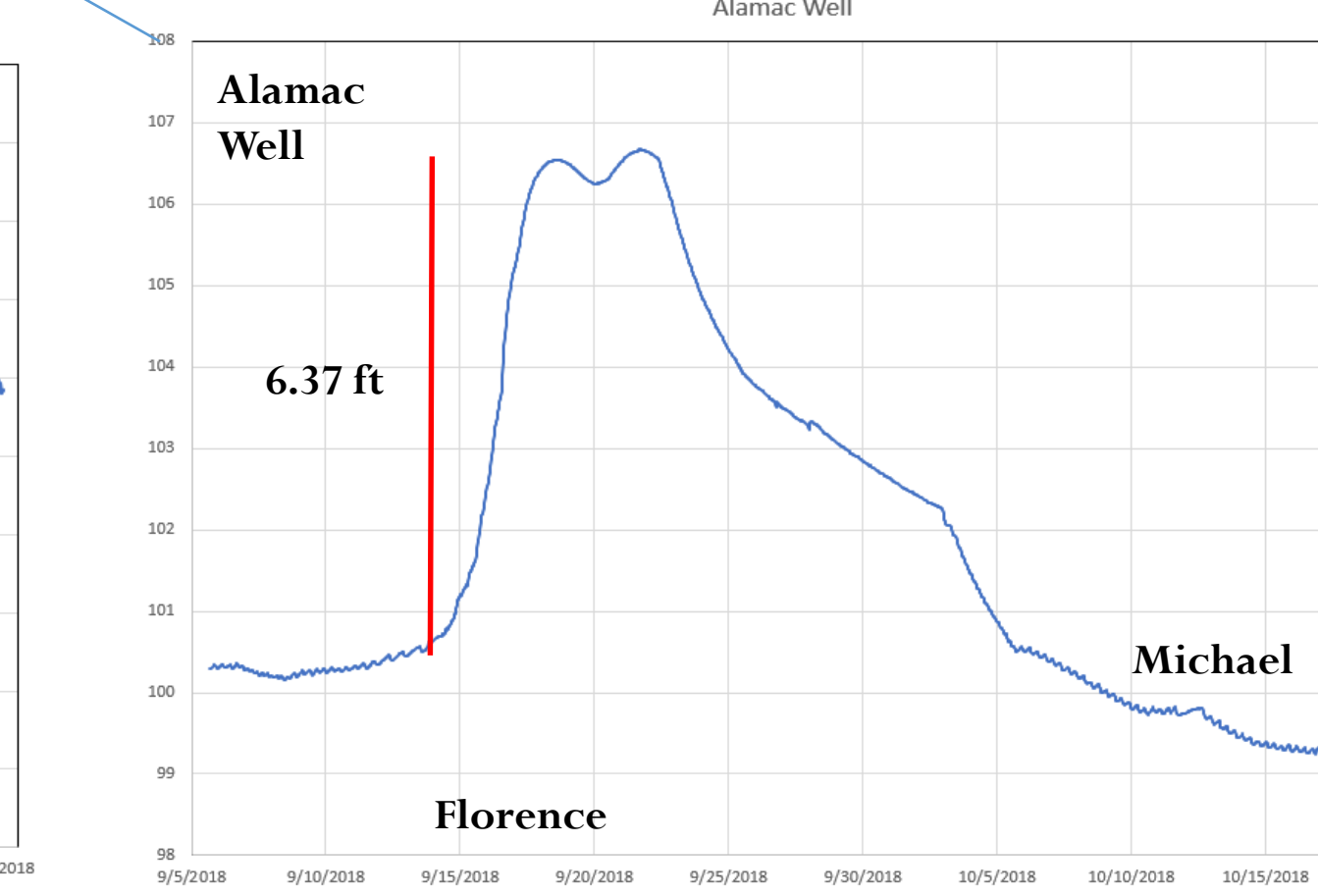
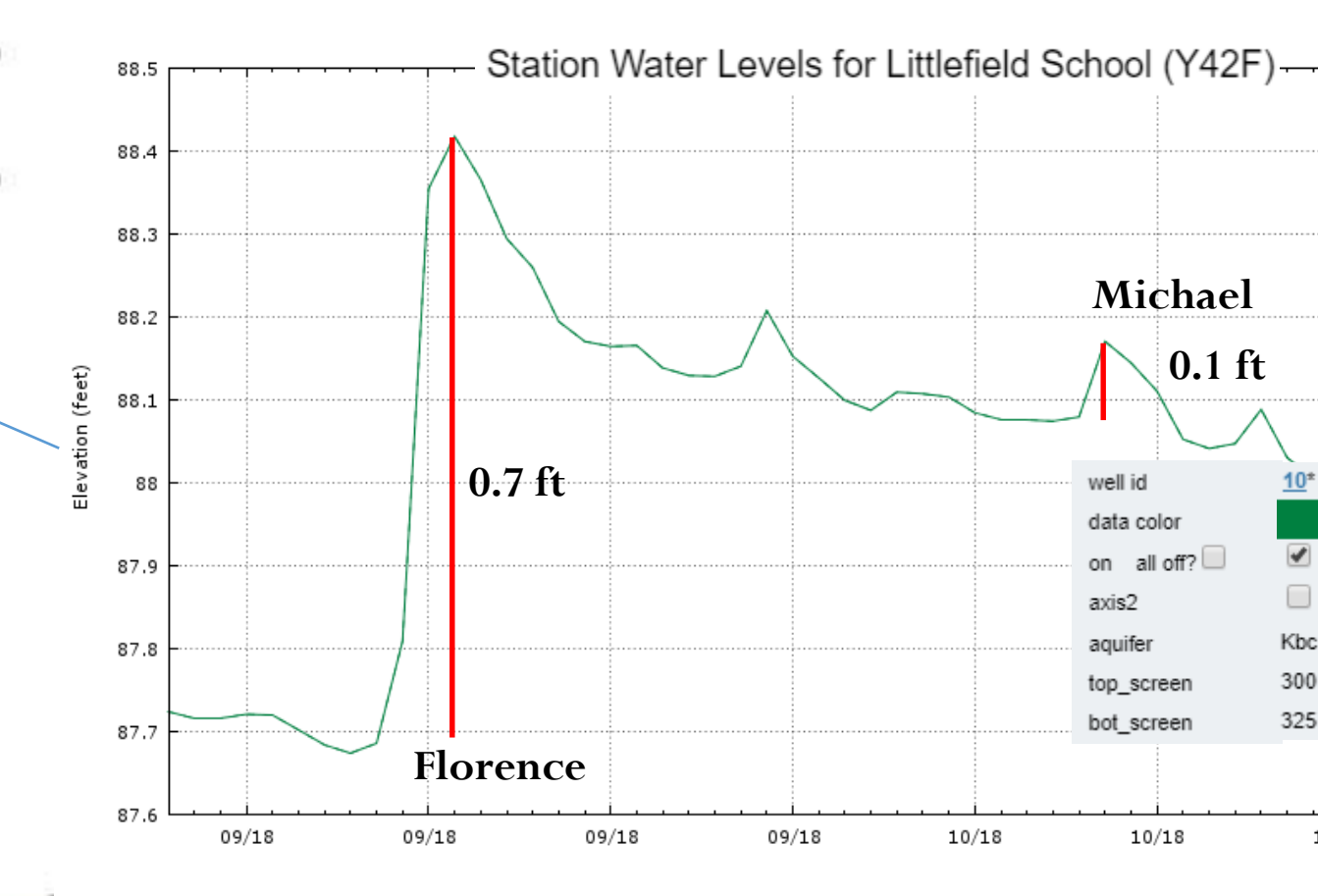
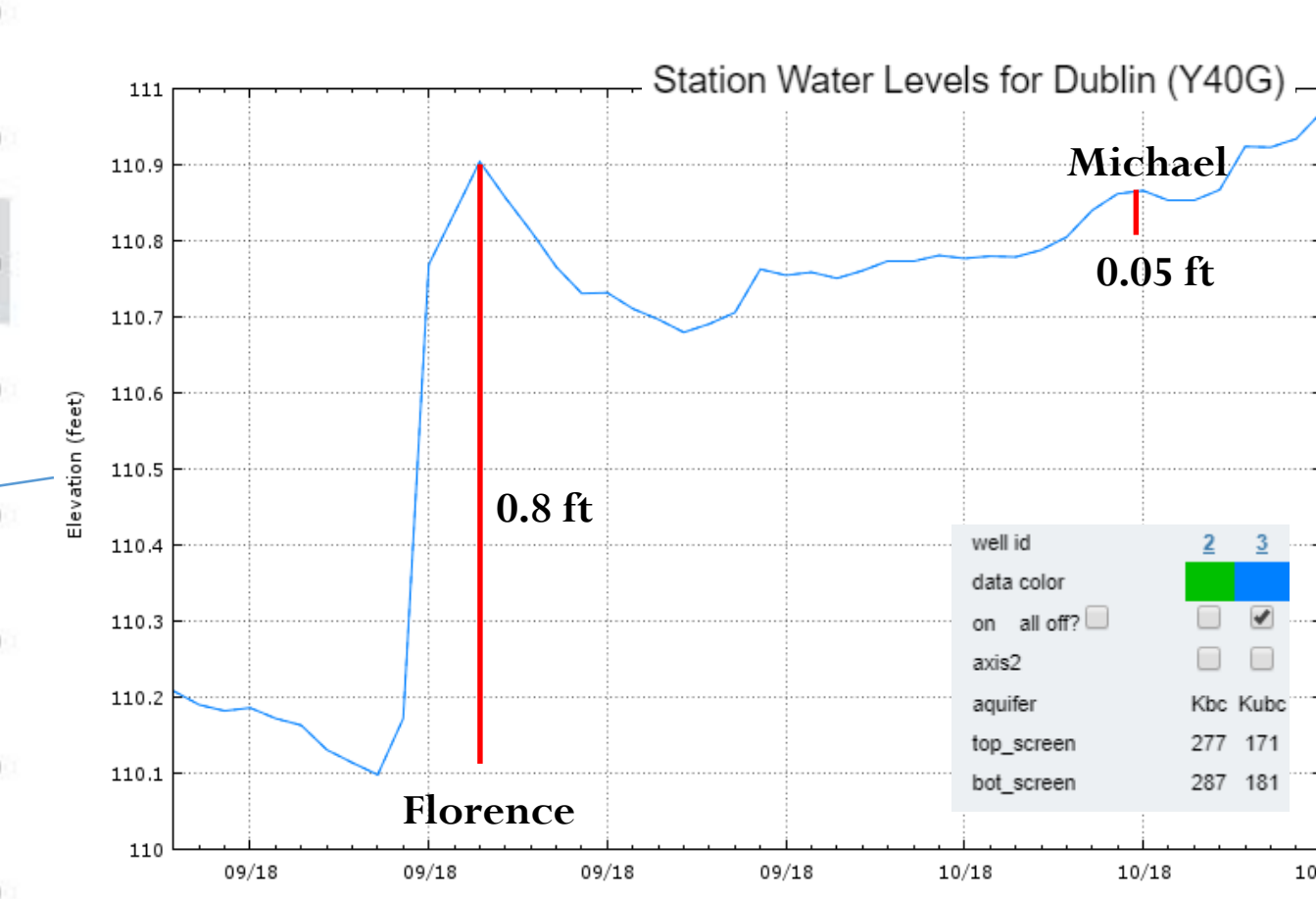
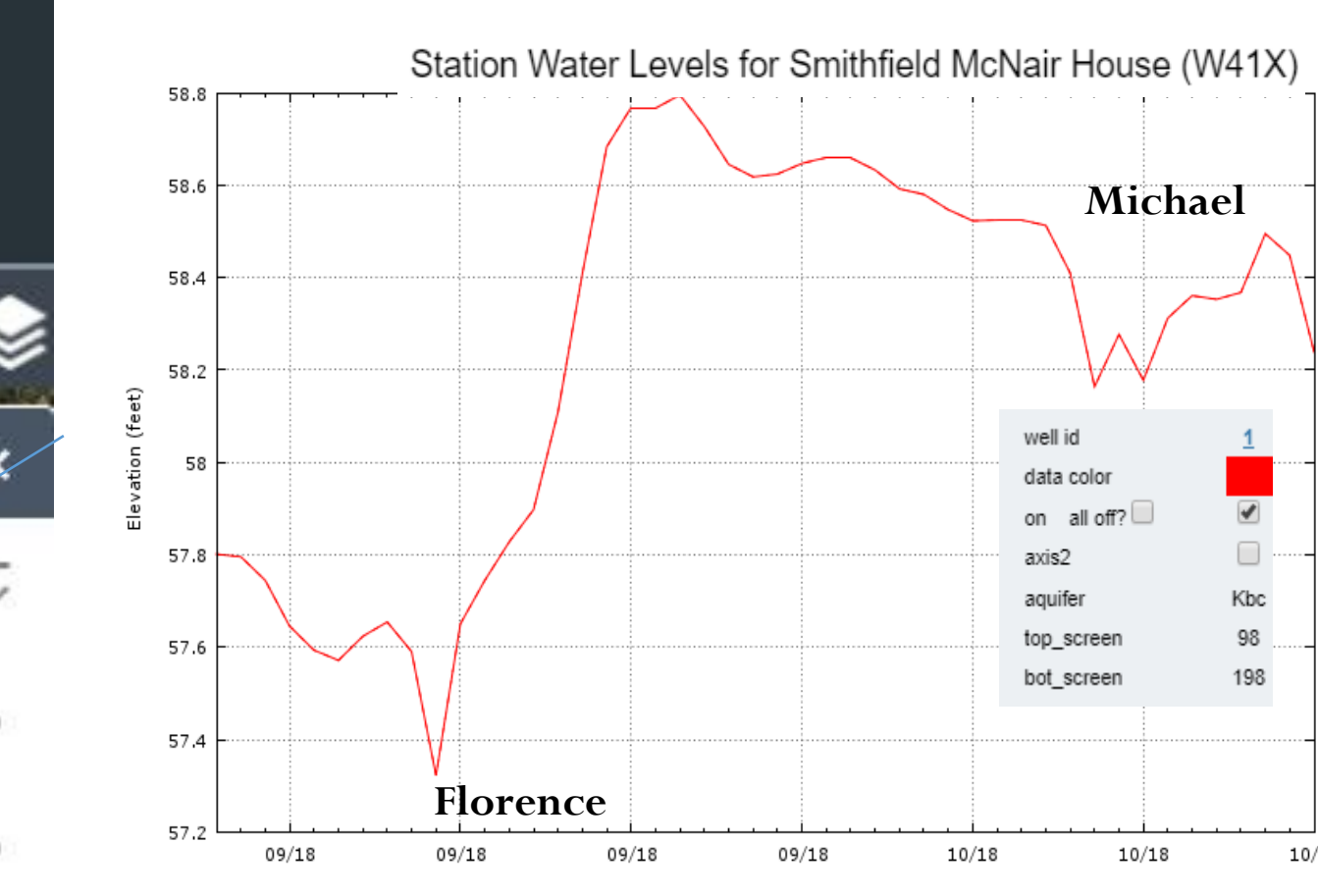
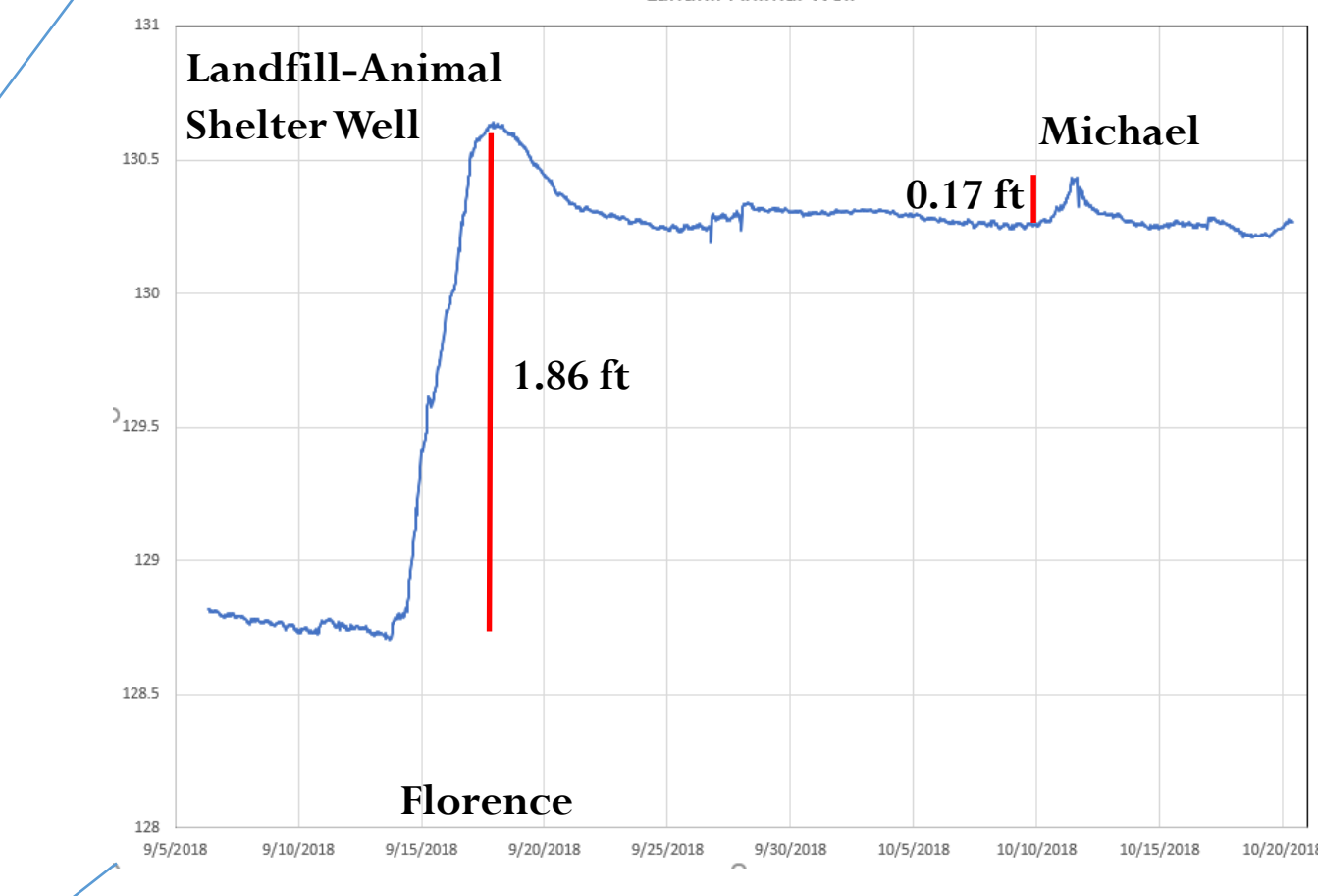
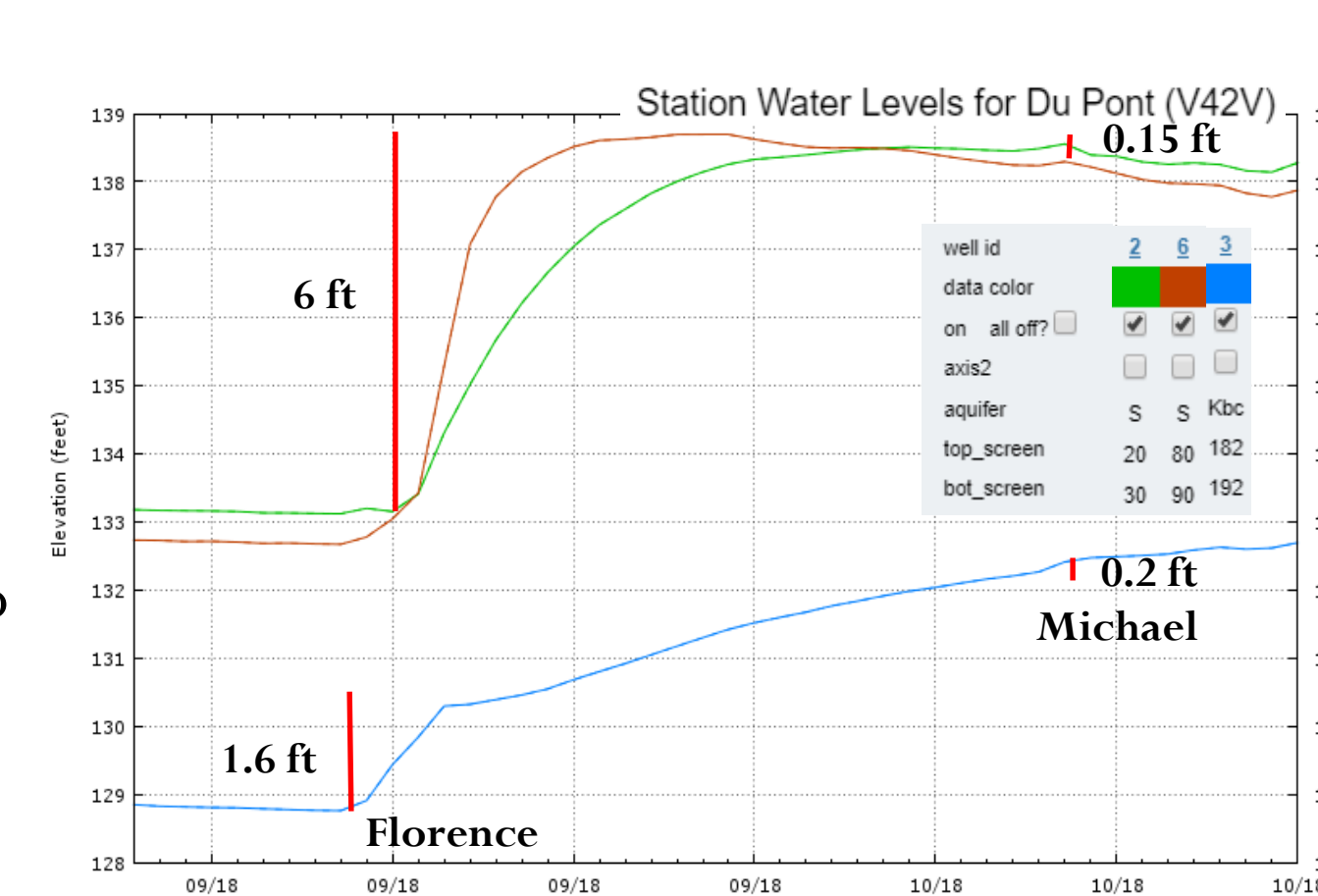
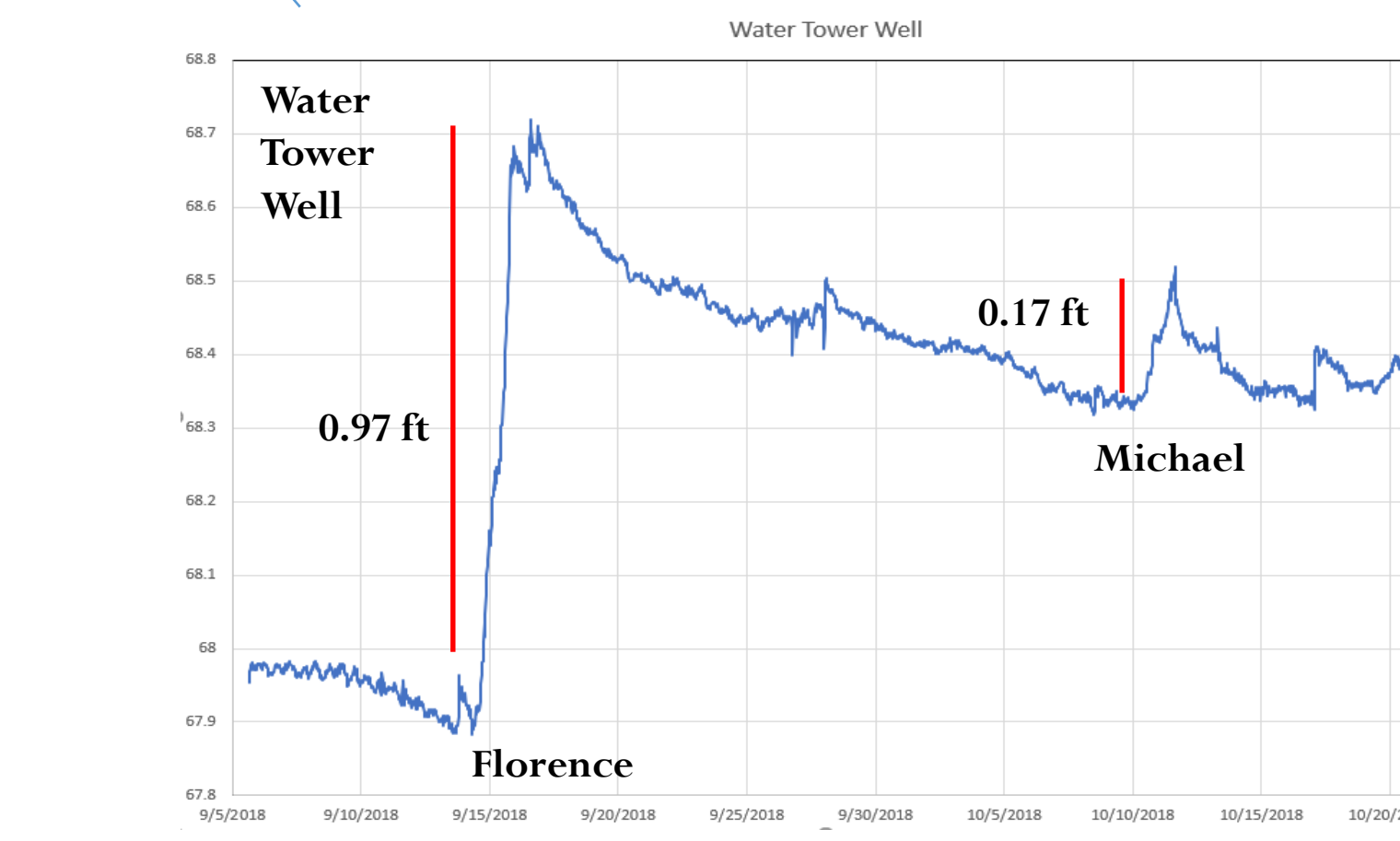
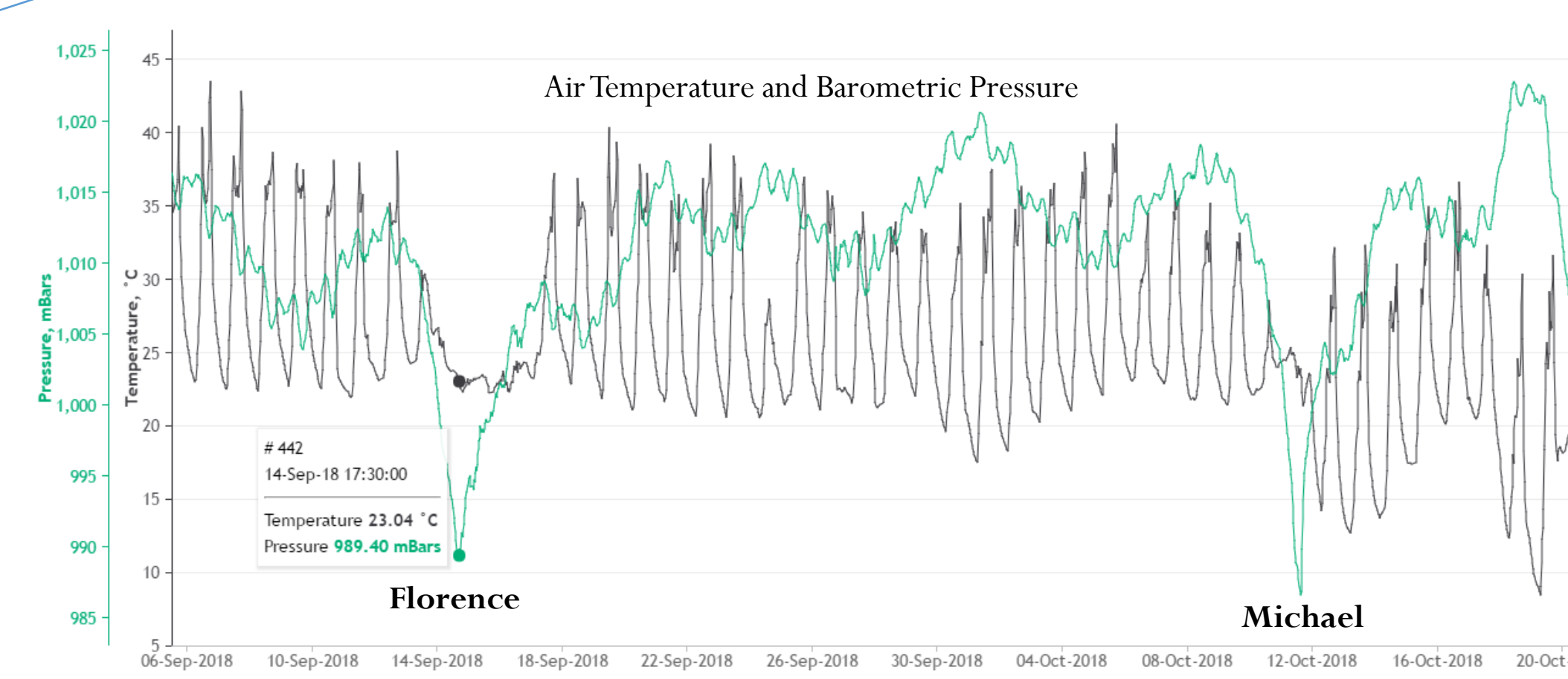
Wells that have a less pronounced response that shallow wells.

Deeper wells tend to have more of a response lag than other wells.

Based on the variance in the data it is hypothesized that the aquifer is very heterogeneous but also may be semi-confined.



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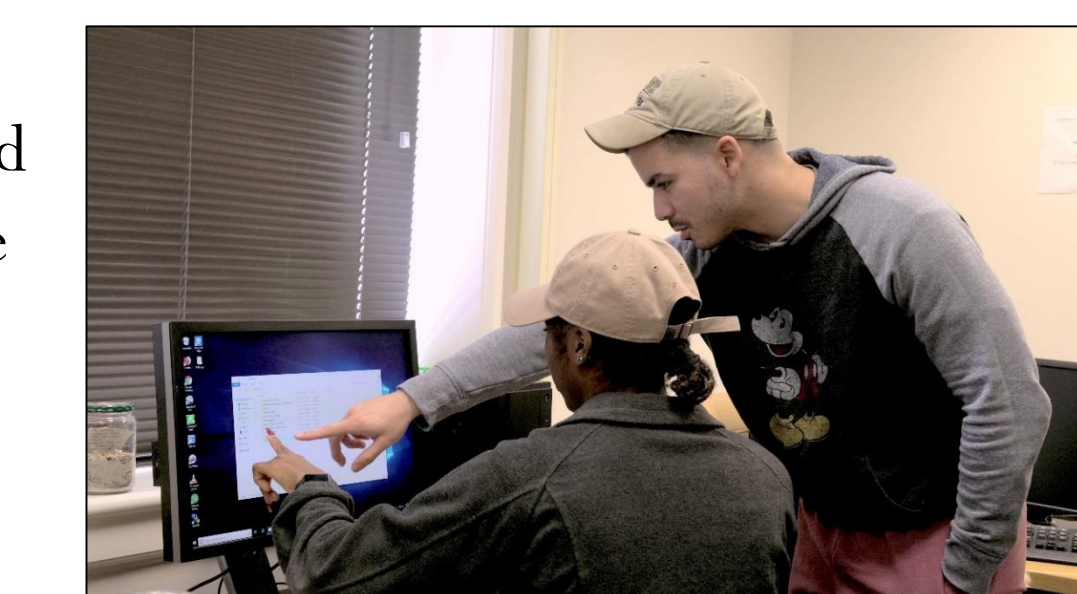


UNDERGRADUATE TRAINING

The interns collect well records from local drillers and the Water Resources Division of the North Carolina Department of Environmental Quality (DEQ) to be digitally linked to an online GIS database. All of the data obtained is synthesized in order to simplify the records for the public. The students create well construction and formation diagrams for each of the wells in the database..

The project has been able to provide 12 students in our program with a paid internship that can be used toward their current degrees and provide on the job training that has helped them further their career. The students have also found success in applying for employment and getting jobs, thanks to the experience and knowledge the project has provided them.

Thanks to the internship, students that have applied to graduate programs have been accepted in places such as the Eastern Carolina University, the University of North Carolina at Charlotte and the North Carolina State University.



FUTURE WORK

In order to gain an accurate assessment of how increased development is impacting the groundwater, analysis of the potentiometric surface over a longer period is required. The students and faculty mentors will continue to collect archived groundwater data from surrounding counties in North and South Carolina that will be compiled and analyzed to produce stratigraphic columns, well diagrams, hydrographs, and maps of the region, as well as continue to collect water level information from local monitoring wells to provide potentiometric surface maps for the region.

Further analysis will also be required to see how the potentiometric surfaces change over time and to help the county ensure that capacity limit restrictions are not applied to the region. In addition, additional wells are being proposed to be drilled in the future.

ACKNOWLEDGEMENTS

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We also want to thank all the interns who have worked on the groundwater project: Alexis Kussman, Edgar Lopez, Jillian Robson, Tori Saunders, Jason Free, Rebecca Hunter, Wren Varga, and Joseph Leary.



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