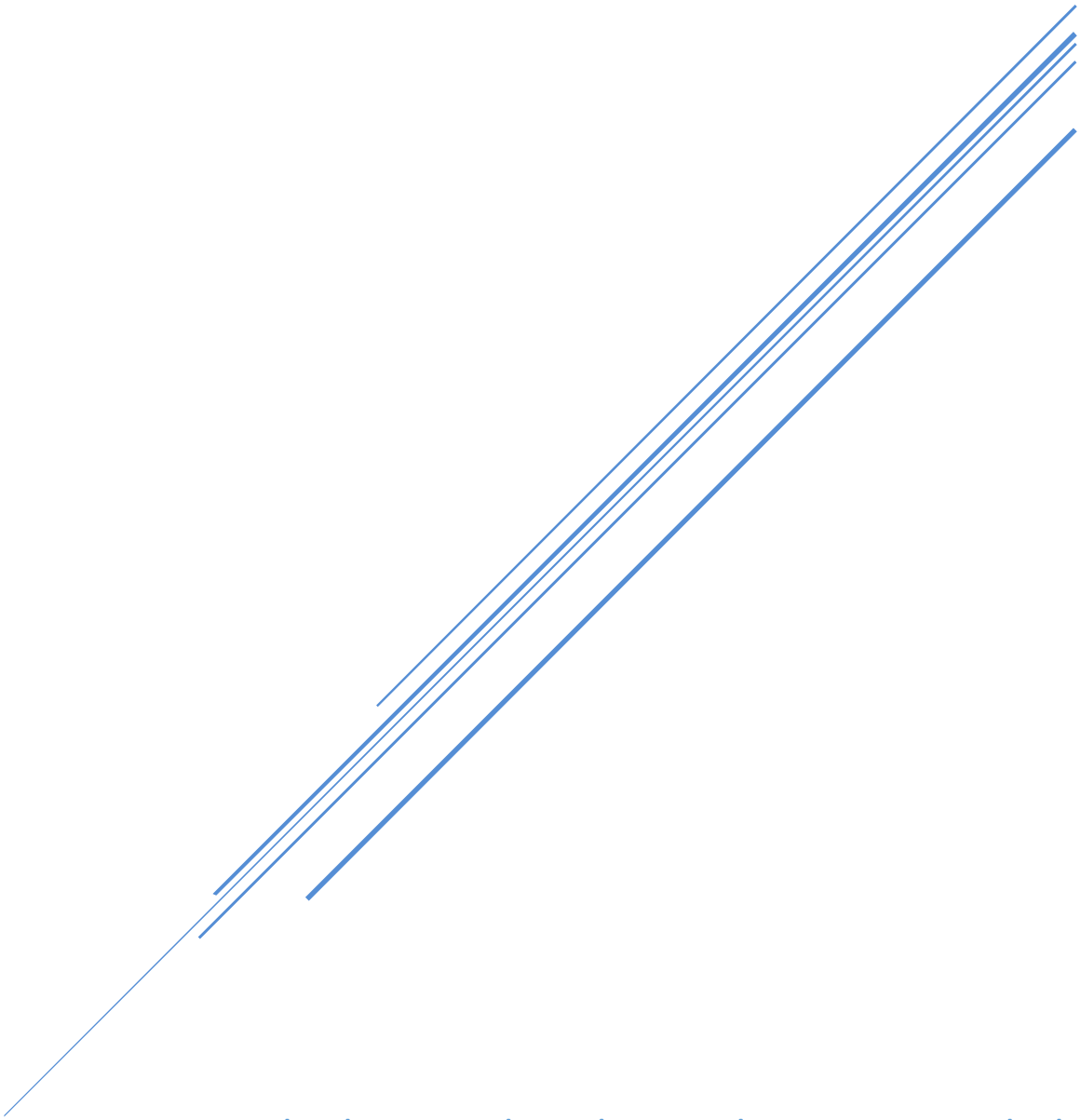
APPENDIX 4A

1st Quarter Data Download



Lower Charlotte Harbor Flatwoods Strategic Hydrologic Restoration Plan

Lower Charlotte Harbor Flatwoods Strategic Hydrologic Restoration Plan

4A – 1st Quarter Data Download

PREPARED FOR:

1050 Loveland Boulevard
Port Charlotte, Florida 33980

PREPARED BY:

IN CONJUNCTION WITH:

Lower Charlotte Harbor Flatwoods Hydrologic Modeling/Planning Project

Technical Memorandum – Task 4 Data Collection: Flow Rating Curves, Station Maintenance, and Data Downloading

To: Jennifer Hecker, Nicole Iadevaia
From: Roger Copp and Kirk Martin, P.G., Water Science Associates
Date September 15, 2020
Re: 1st Quarter Data Download

BACKGROUND

Water Science Associates was contracted by the Coastal and Heartland National Estuary Partnership (CHNEP) to develop a hydrologic restoration plan for the Lower Charlotte Harbor Flatwoods that will promote sheet flow enhancement and restore wetland hydroperiods in Babcock Webb and Yucca Pens Wildlife Management Area (WMA) and improve the timing and magnitude of flows to tidal creeks west of Yucca Pens WMA.
Project tasks include:

1. Compilation of existing hydrologic data,
2. Installation and of new surface and groundwater monitoring stations and rain gages,
3. Evaluation of vegetation indicators of wetland health,
4. Maintenance of the monitoring stations and downloading measured data,
5. Development of an existing conditions hydrologic model of the study area,
6. Evaluation of alternative management scenarios, and
7. Development of a Lower Charlotte Harbor Flatwoods Strategic Hydrological Restoration Planning Tool and Report.

The Task 1 - Data Discovery Memorandum and the Task 2 deliverables including the groundwater monitoring plan, the flow monitoring plan, and the monitoring equipment acquisition and installation memoranda have been submitted to CHNEP. Task 3 is ecologic monitoring to determine average wet season water depths at more than 50 locations in Babcock Webb and Yucca Pens and Historical Hydroperiod Mapping. Dry season field work was completed in April and May, 2020, and a draft memorandum for Task 3a was submitted to CHNEP on August 10. Wet season field work will be completed in September, 2020 to measure water depths at the locations inventoried in the 2020 dry season.

Task 4 activities include maintenance of the monitoring stations and downloading on a quarterly basis for six quarters. This memorandum summarizes the completion of the 1st Quarter of Task 4.1 as described below.

DESCRIPTION OF DELIVERABLE REQUIREMENTS

The requirement for Task 4.1 is to provide monitoring well, flow gage, and rainfall metadata outputs for the 1st quarter after installation of monitoring stations and programming of data loggers. The station installation and programming was completed in May, 2020, therefore August 2020 was the first quarterly monitoring event. Data provided includes the 24 new monitoring wells all equipped with recording data loggers, 8 new data loggers at existing Babcock Webb staff gages, 3 new rain gages, and 8 new flow monitoring gages. Data outputs are differentiated per their location within either the SFWMD or the SWFWMD.

DOCUMENTATION

New Groundwater Monitoring Stations and Existing Staff Gages

New groundwater monitoring wells were installed at 24 locations and In-Situ Troll 100 water level data loggers were installed in each monitoring well shown below in **Figure 1**. Water elevations are recorded every four hours in feet NAVD. The monitoring well installation methodology was described in the Groundwater Monitoring Plan (Water Science Associates, 2020). Data loggers that were installed at 8 existing Babcock Webb staff gages are also presented in **Figure 1**. Flow monitoring station locations are shown in **Figure 2** and rain gage locations are presented in **Figure 3**. Recorded data from the monitoring stations was downloaded in August 2020 for the first quarter and will be uploaded to the CHNEP Water Atlas after being subjected to a quality assurance/quality control (QA/QC) review

Graphs of compiled data for the groundwater monitoring stations and datalogger data for existing Babcock Webb staff gages categorized by location are provided in **Appendix 1**. Compiled data from the rain gages installed in Babcock Webb and Yucca Pens are provided in **Appendix 2**. Data for monitoring stations SP-4 and SR-2 are not available for this quarter, as described below:

- Upon arrival to station SP-4 to download data it was found that the data logger was no longer there, however the cap for the data logger was still there indicating that someone intentionally unscrewed the data logger from the cap. Water Science is planning to replace this logger and build a more secure area for the monitoring station.
- The data logger for station SR-2 was unable to be downloaded and was sent to the manufacturer to have the data extracted, and data that can be retrieved from the data logger for quarter 1 will be included in the quarter 2 report.

Flow Monitoring Stations

The Flow Monitoring Plan provided a description of the proposed monitoring stations and flow monitoring activities. The stations were all installed in May 2020 and were operational as of May 15, 2020. Recorded water levels at the flow monitoring stations and flow measurements are presented in **Appendix 3**. **Table 1 (provided in Appendix 3)** provides a summary of the flow measurements at all stations except the tidal Yucca Pens station. **Table 2 (also provided in Appendix 3)** provides a summary of flow measurements at the Yucca Pens tidal station as well as recorded rainfall amounts at the rain gage located at the Yucca Pens tidal flow monitoring station.

Data from the Yucca Pens tidal flow monitoring station are available on-line on a real-time basis at http://data.locherenv.com/vdv/

The login is: **yuccapens**, and the password is: **yp051820.**

Data files for all stations listed above have been provided to CHNEP.

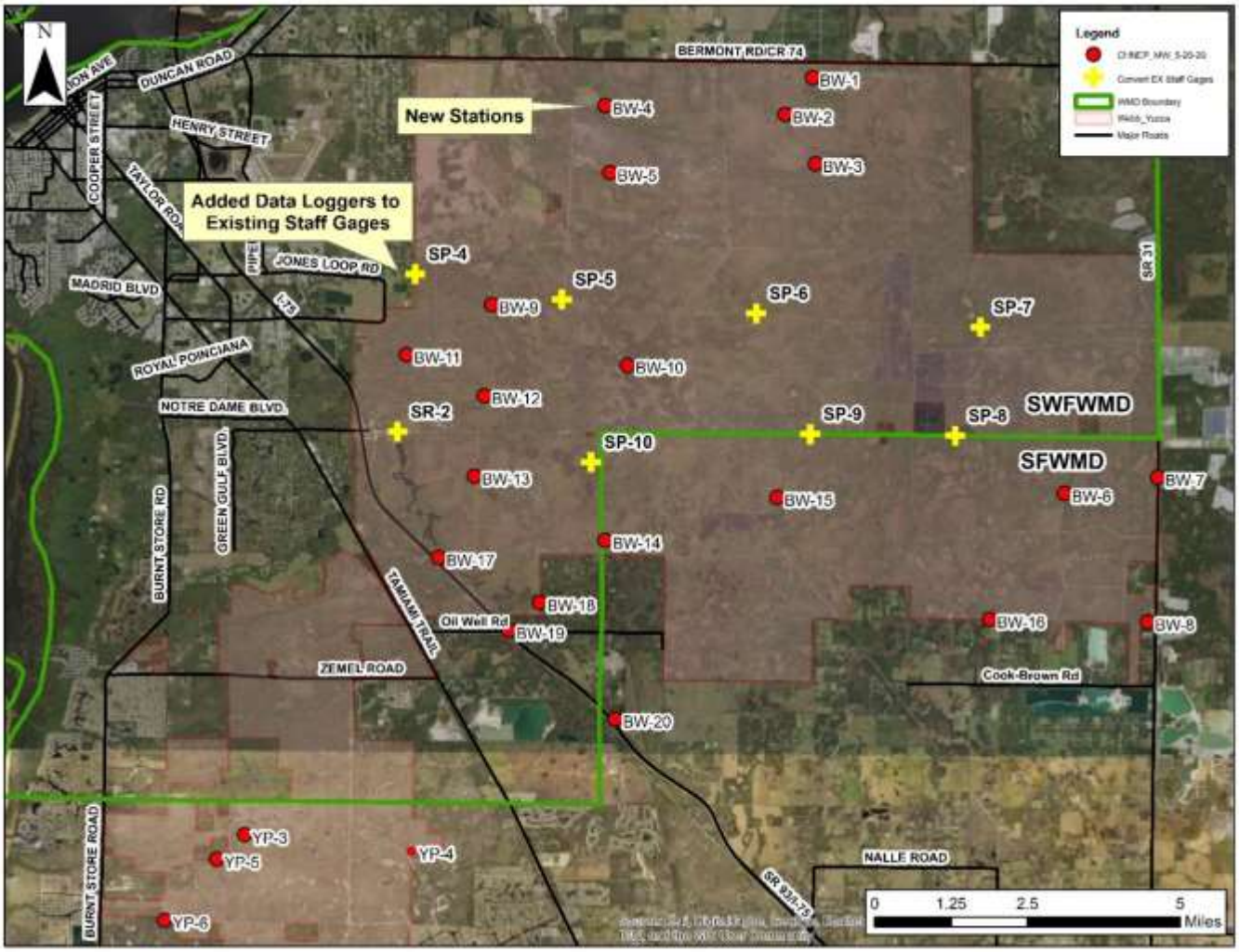


Figure 1 – Map of Surveyed New Groundwater Monitoring Stations and Existing Staff Gaging Station Upgrades

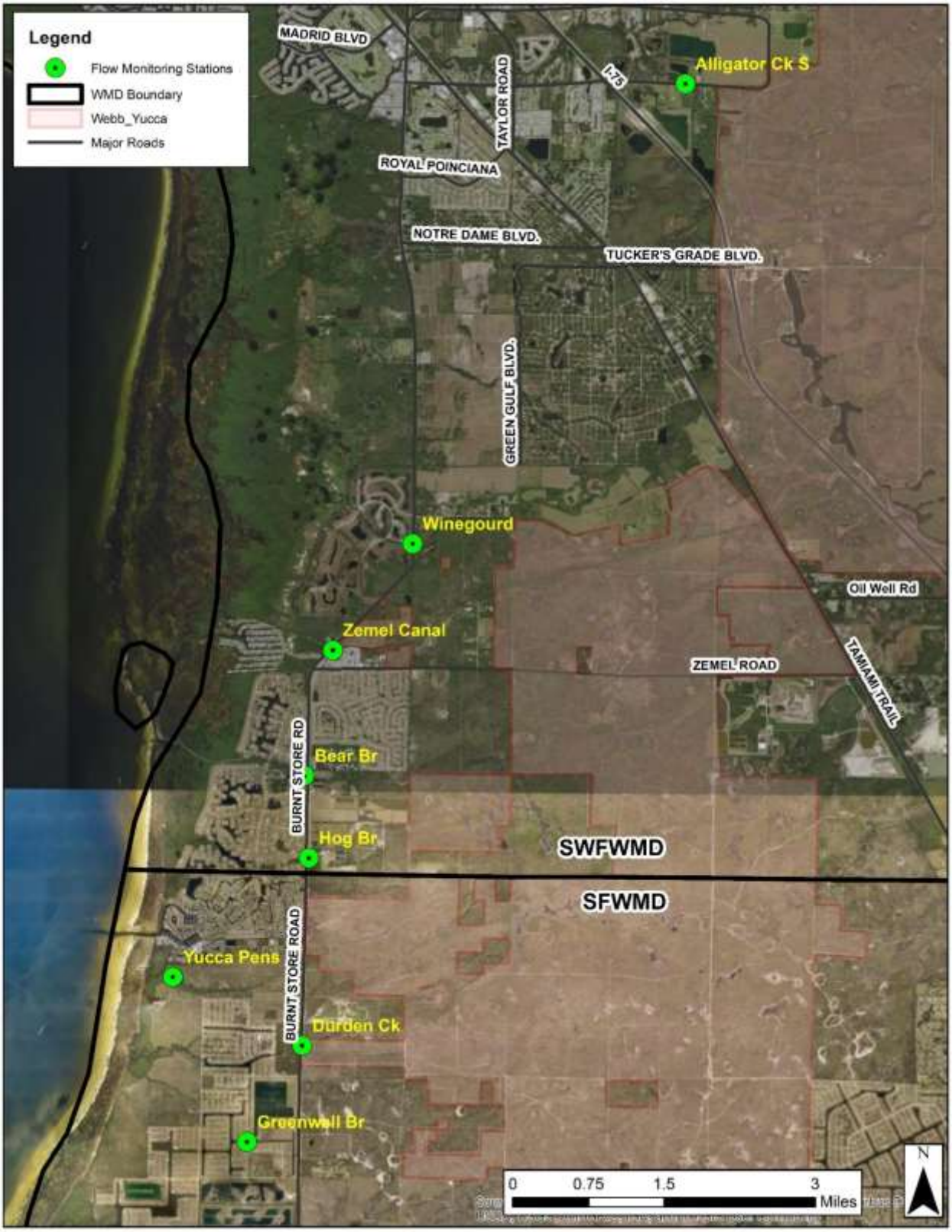


Figure 2 – Map of Newly Installed Flow Monitoring Stations

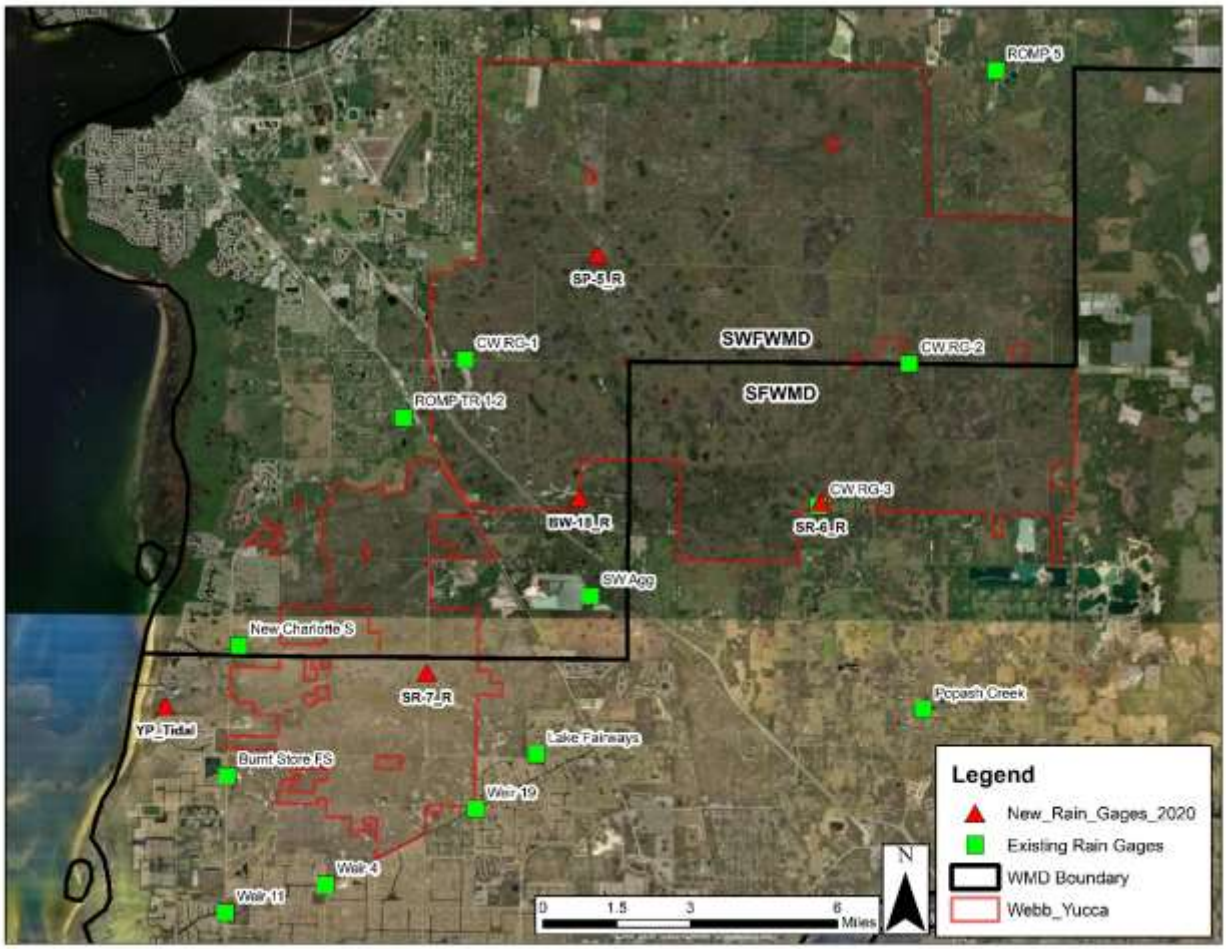


Figure 3 – Map of Newly Installed Rain Gages

REFERENCES

Water Science Associates. 2020. Lower Charlotte Harbor Flatwoods Hydrologic Modeling & Restoration – Groundwater Monitoring Plan. Prepared for Coastal and Heartlands National Estuary Partnership.

Water Science Associates. 2020. Lower Charlotte Harbor Flatwoods Hydrologic Modeling & Restoration – Flow Monitoring Plan. Prepared for Coastal and Heartlands National Estuary Partnership.

Appendix 1 – 1st Quarter Groundwater Monitoring Station Data

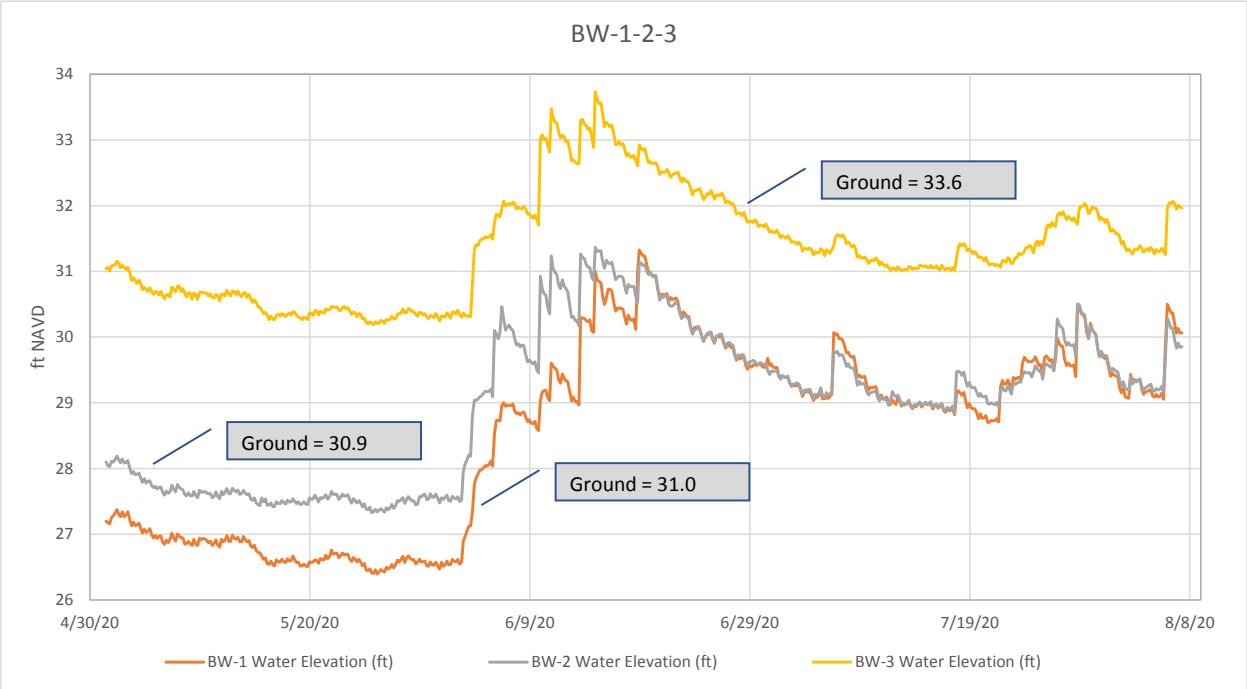


Figure 4- Groundwater elevations for stations BW-1, BW-2, BW-3 measured in ft NAVD

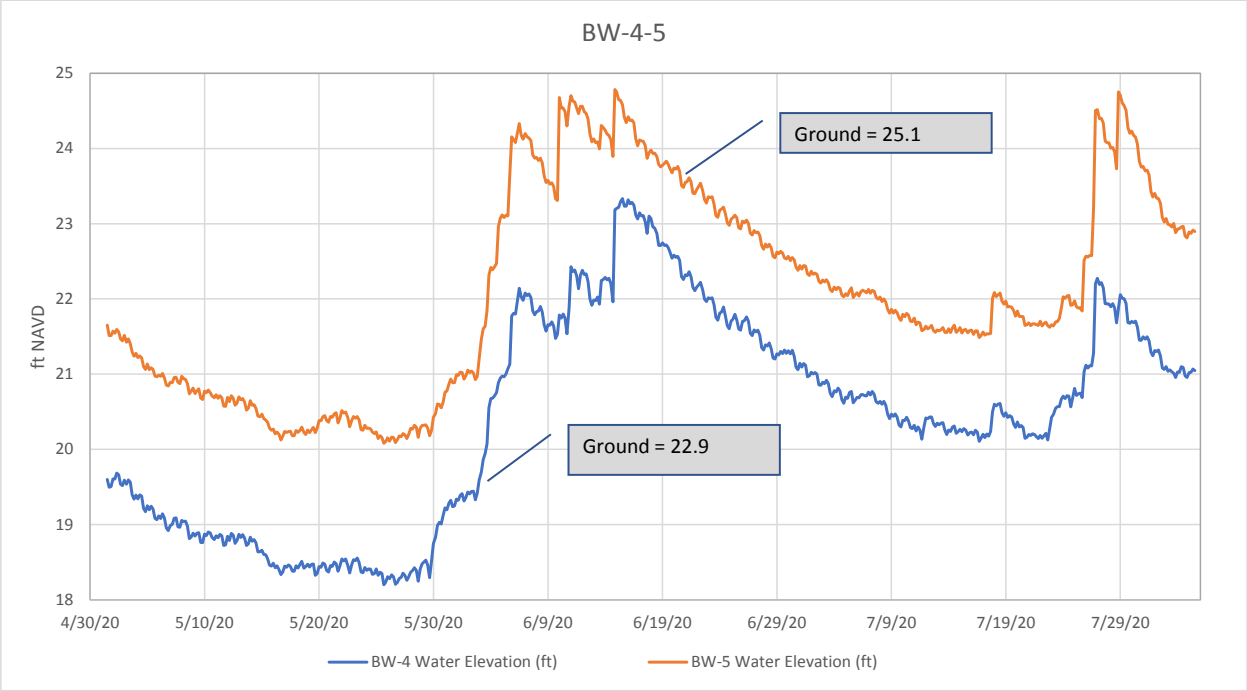


Figure 5- Groundwater elevations for stations BW-4 and BW-5 measured in ft NAVD

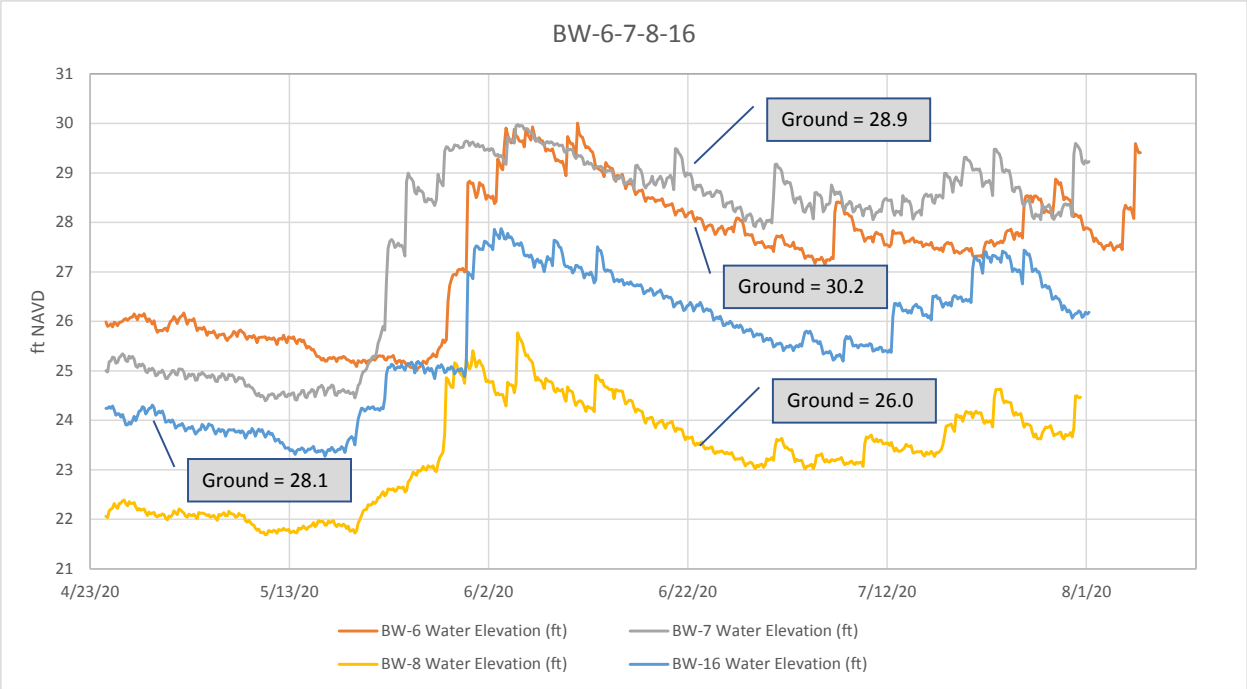


Figure 6- Groundwater elevations for stations BW-6, BW-7, BW-8, and BW-16 measured in ft NAVD

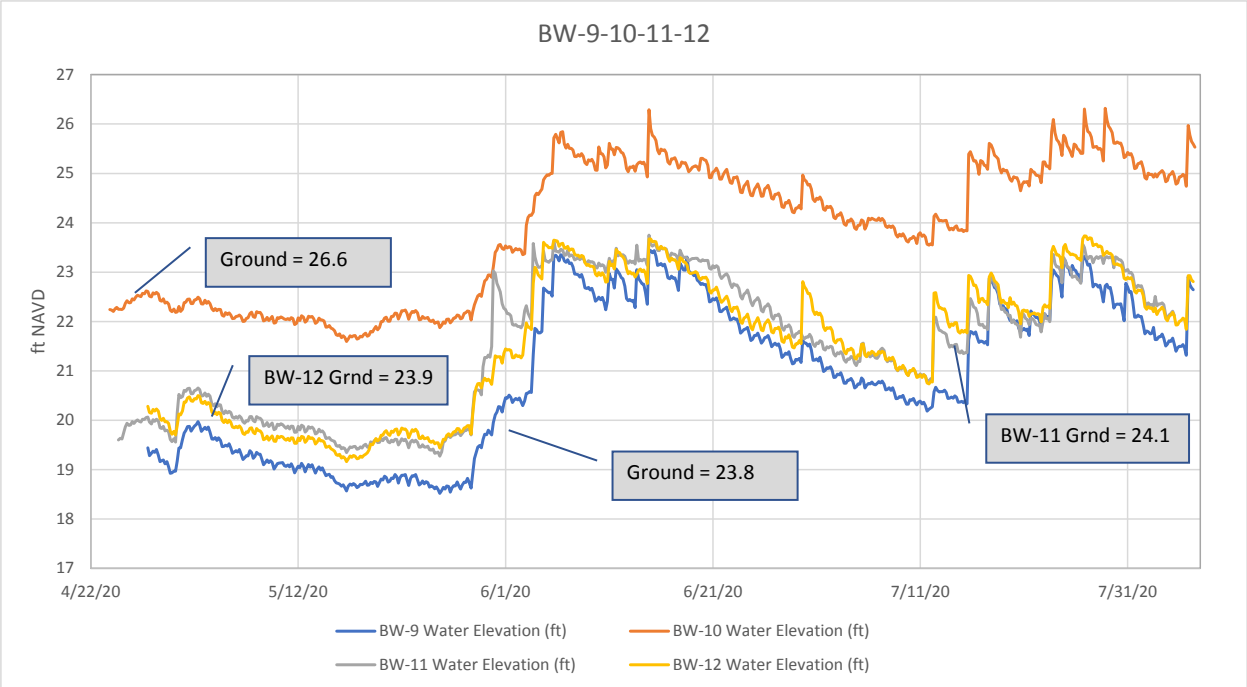


Figure 7- Groundwater elevations for stations BW-9, BW-10, BW-11, and BW-12 measured in ft NAVD

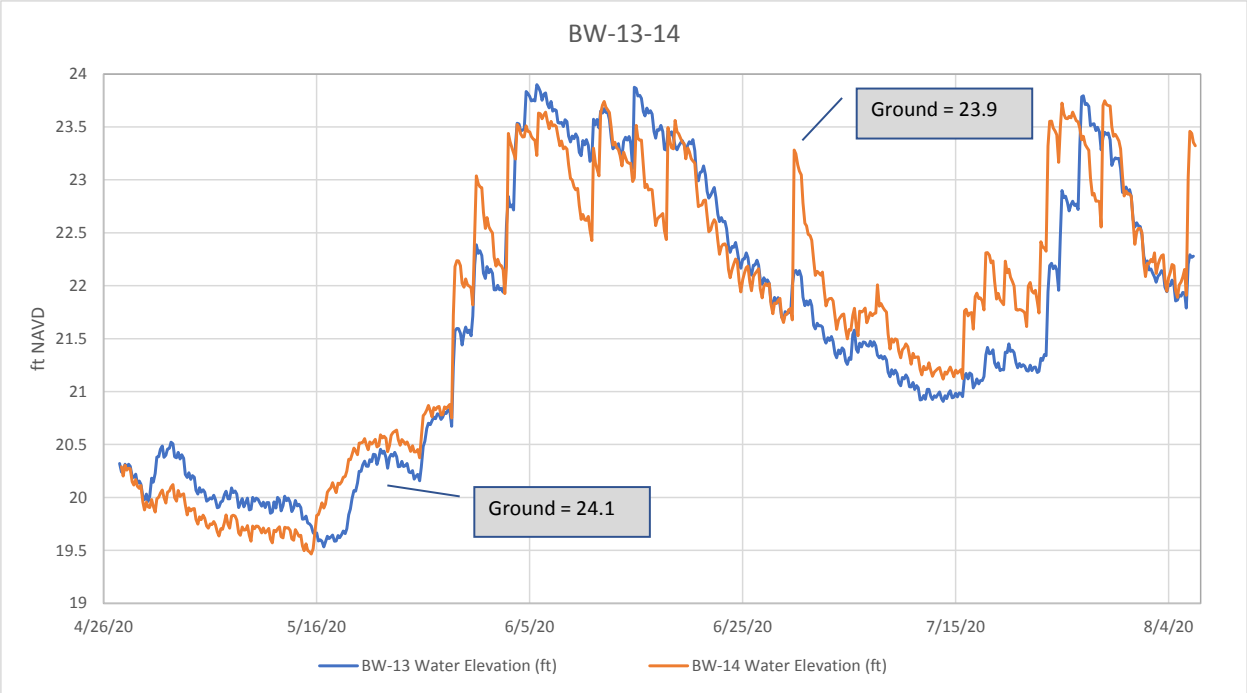


Figure 8- Groundwater elevations for stations BW-13 and BW-14 measured in ft NAVD

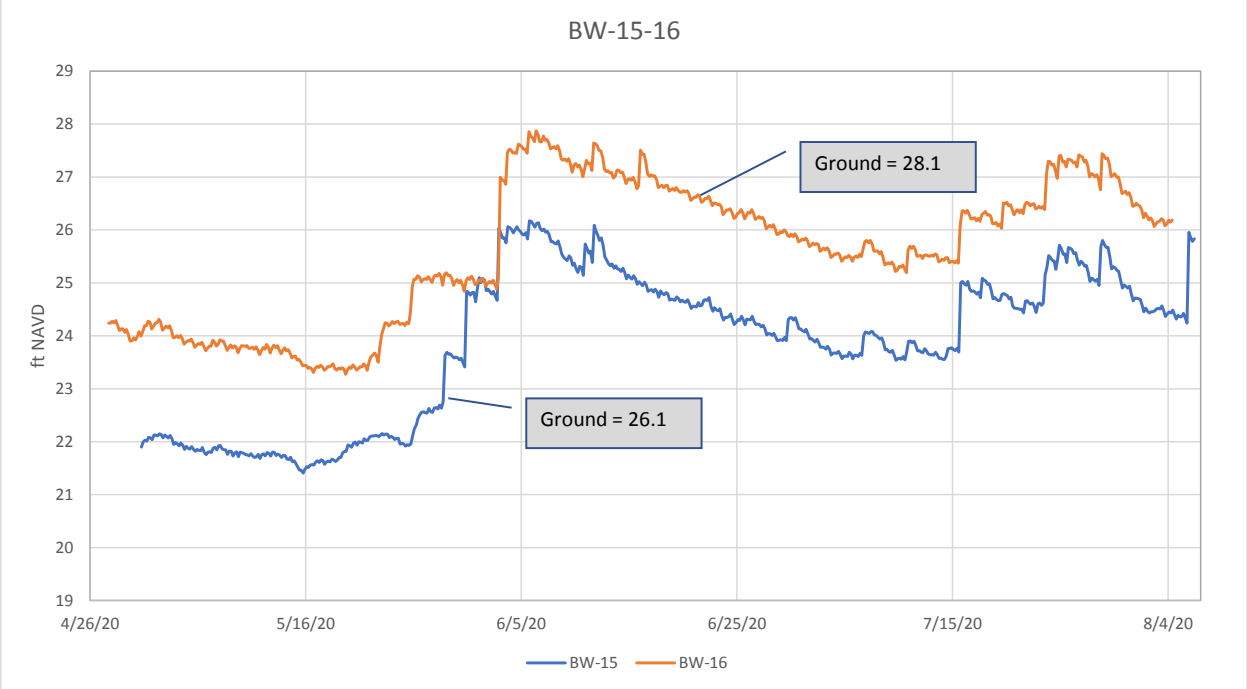


Figure 9- Groundwater elevations for stations BW-15 and BW-16 measured in ft NAVD

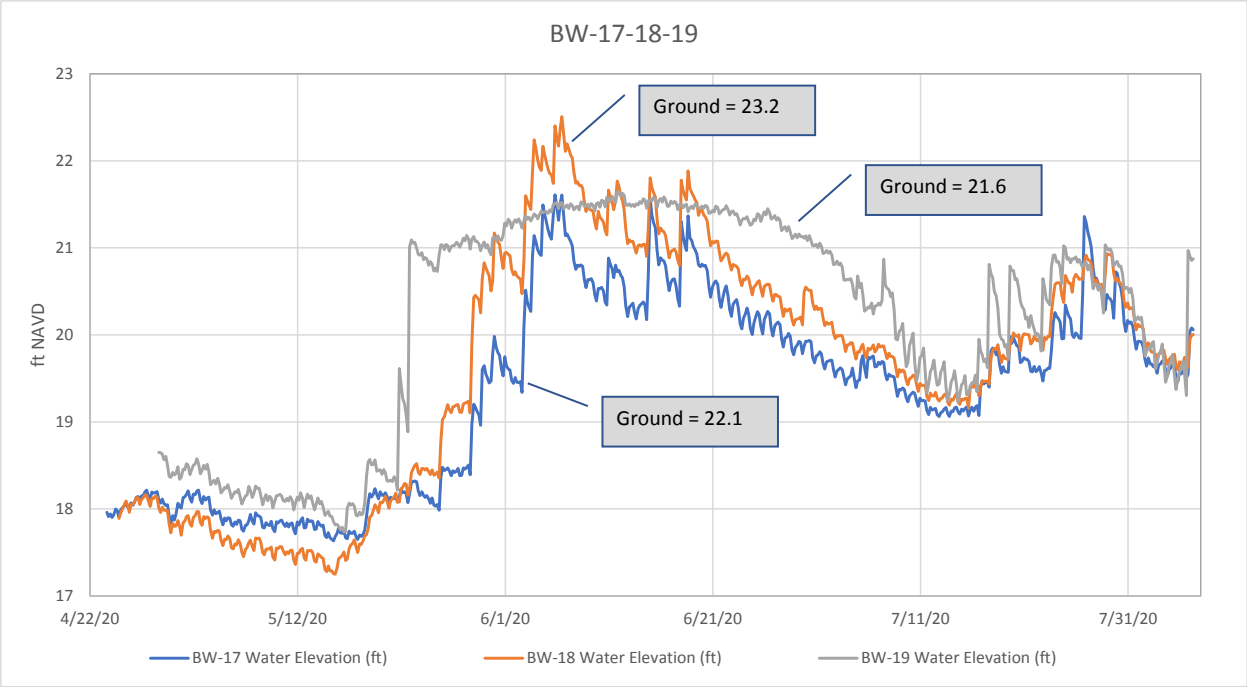


Figure 10- Groundwater elevations for stations BW-17, BW-18, and BW-19 measured in ft NAVD

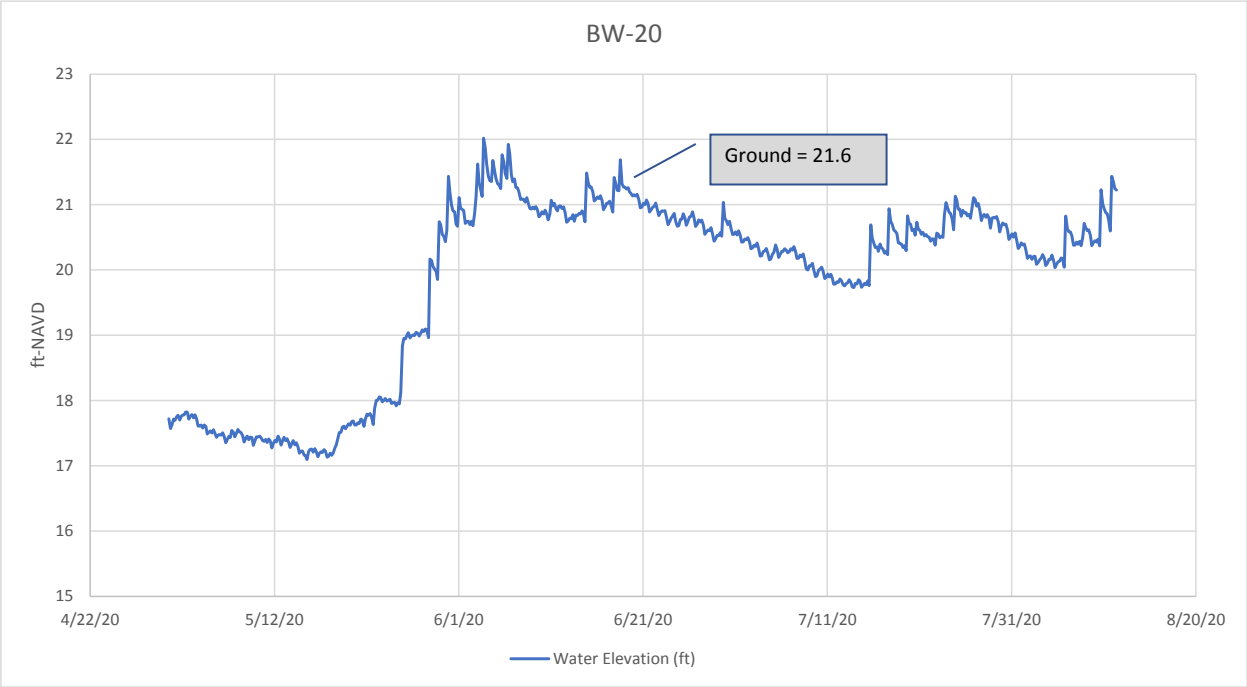


Figure 11- Groundwater elevation for station BW-20 relative to ground elevation measured in ft NAVD

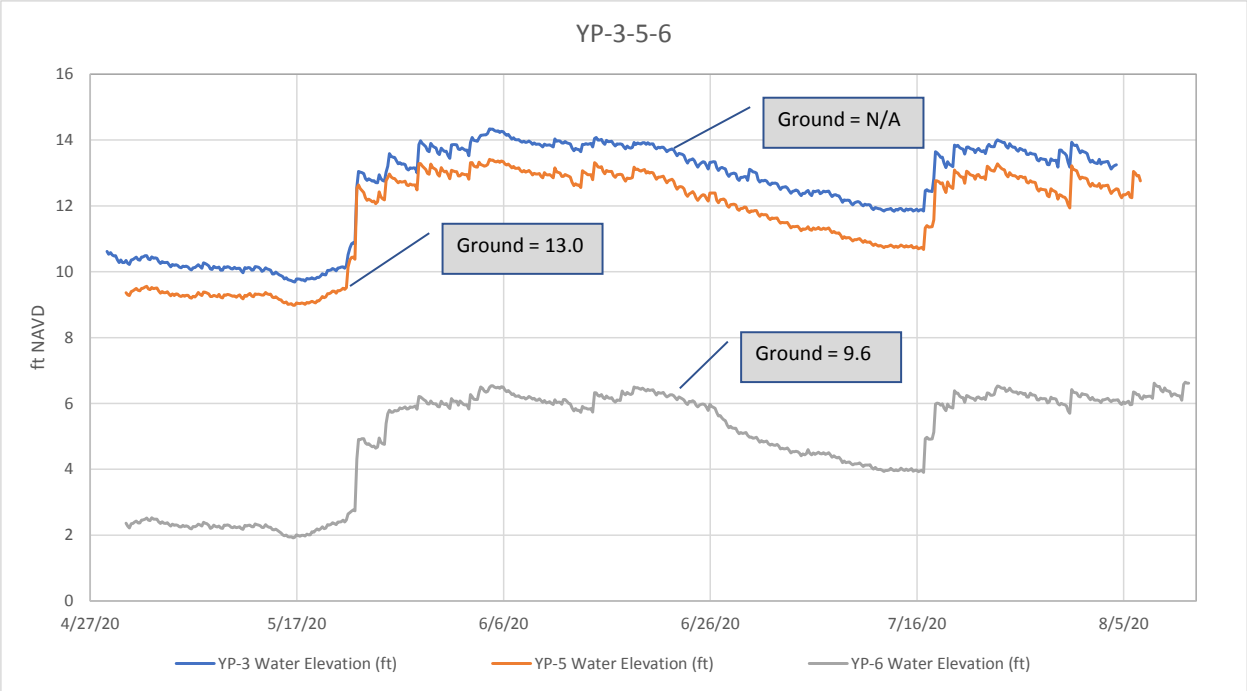


Figure 12- Groundwater elevations for stations YP-3, YP-5, and YP-6 measured in ft NAVD

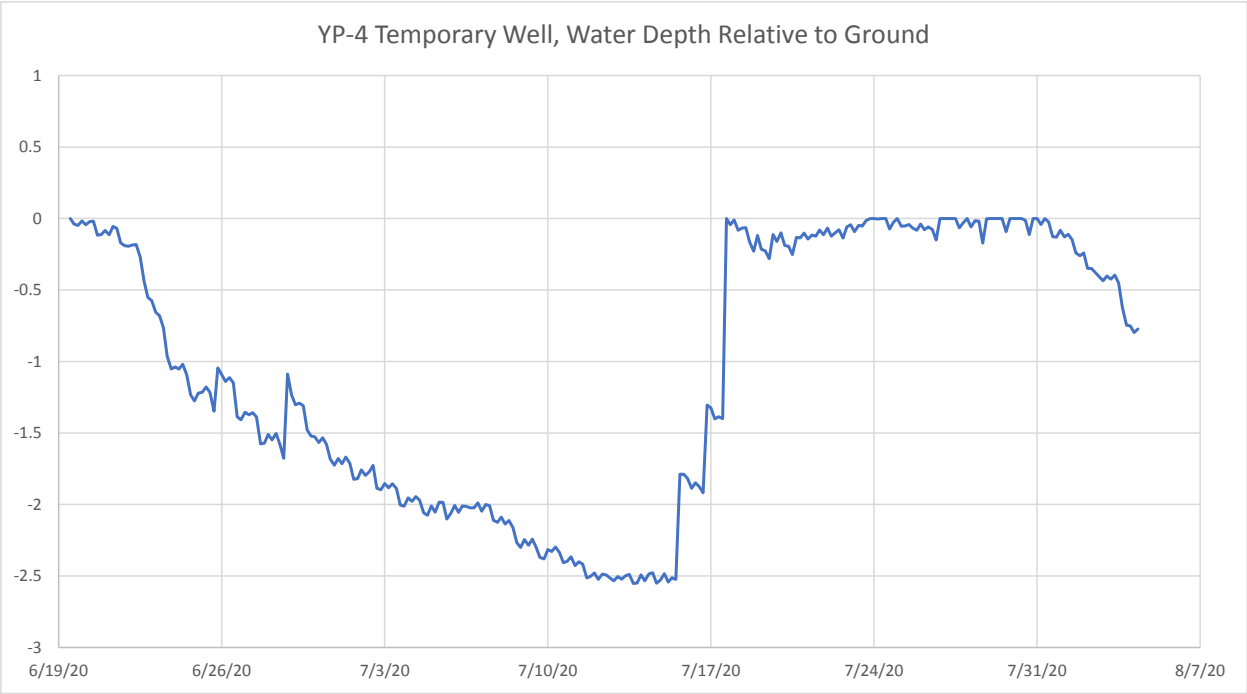


Figure 13- Groundwater elevation for station YP-4 relative to ground measured in ft-NAVD

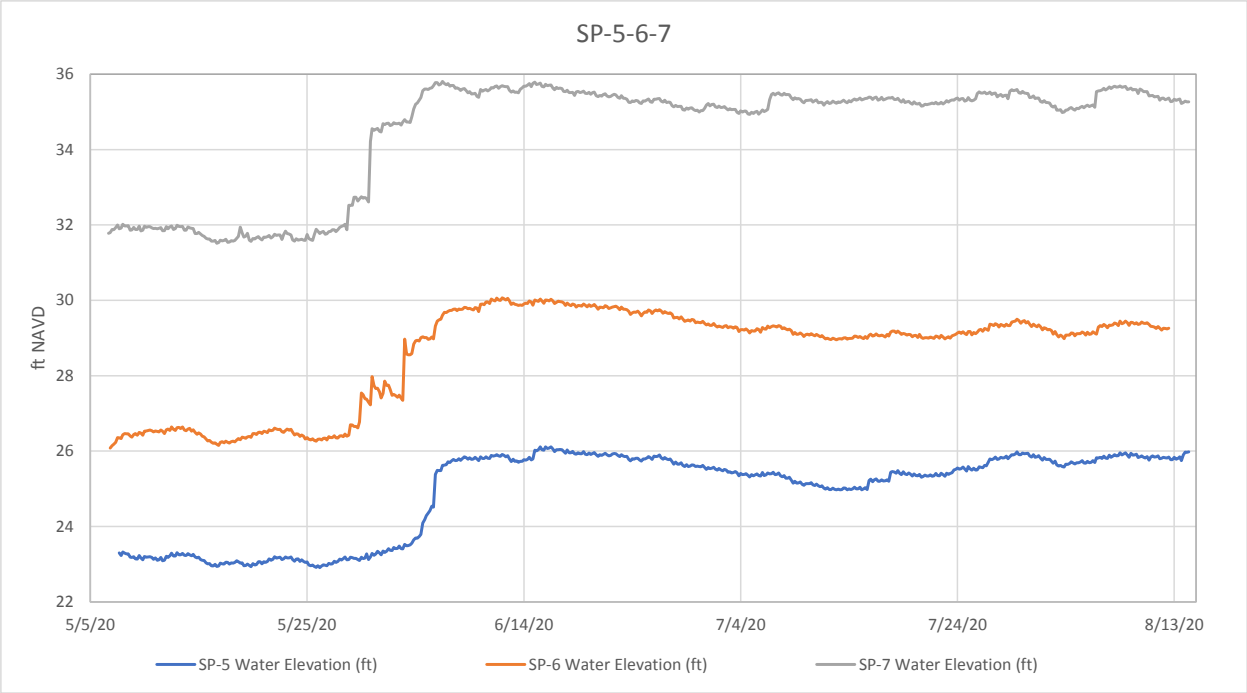


Figure 14- Groundwater elevations for stations SP-5, SP-6, and SP-7

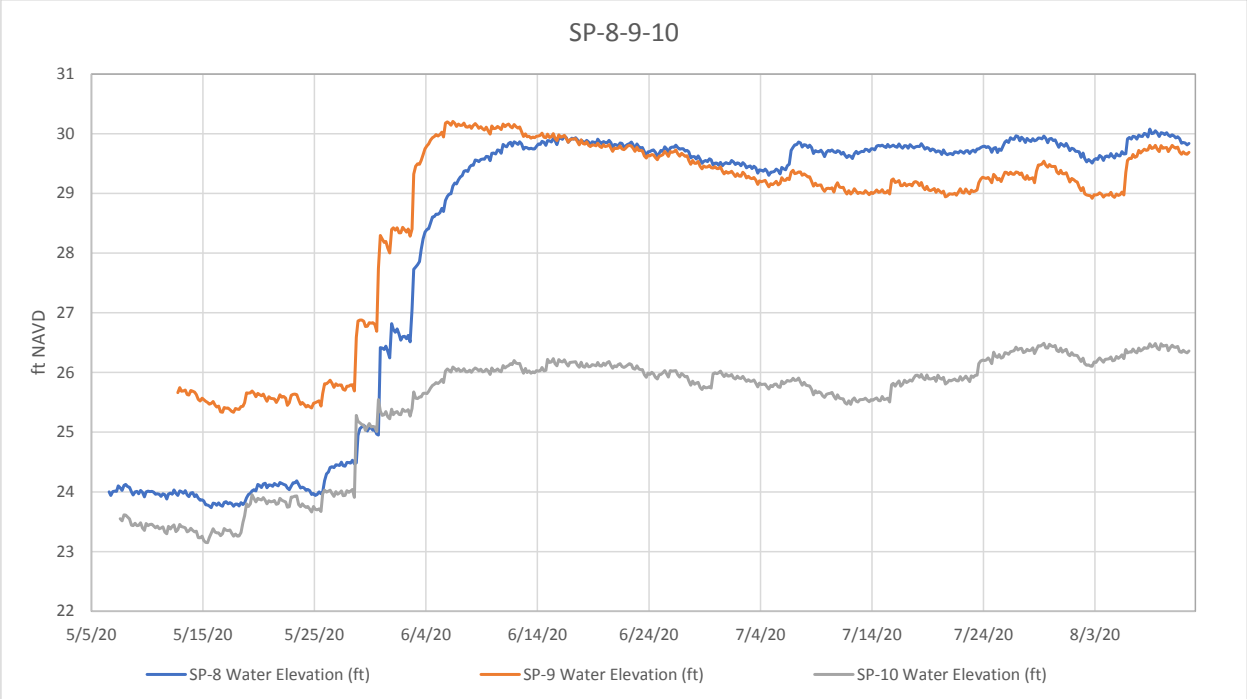


Figure 15- Groundwater elevations for stations SP-8, SP-9, and SP-10

Appendix 2 – 1st Quarter Rain Gage Data

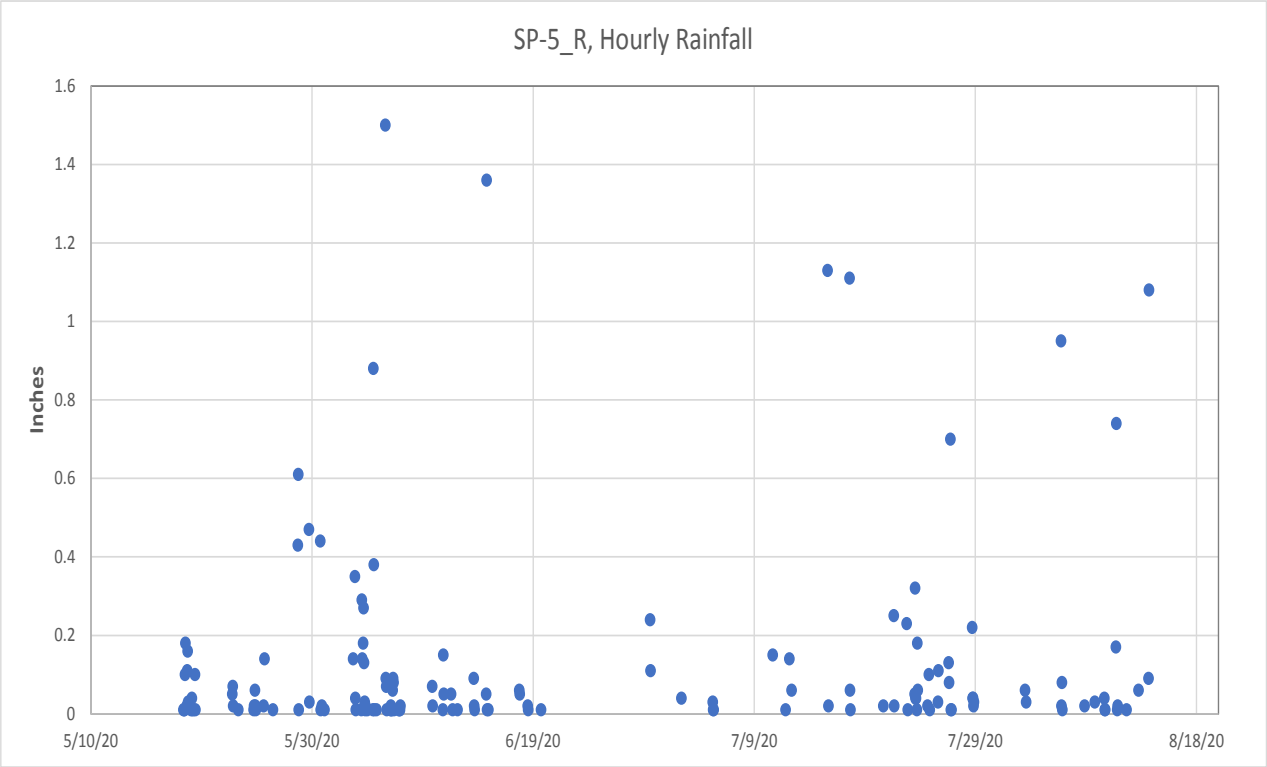


Figure 16- 15-Minute Rainfall for rain gage SP-5_R, Inches

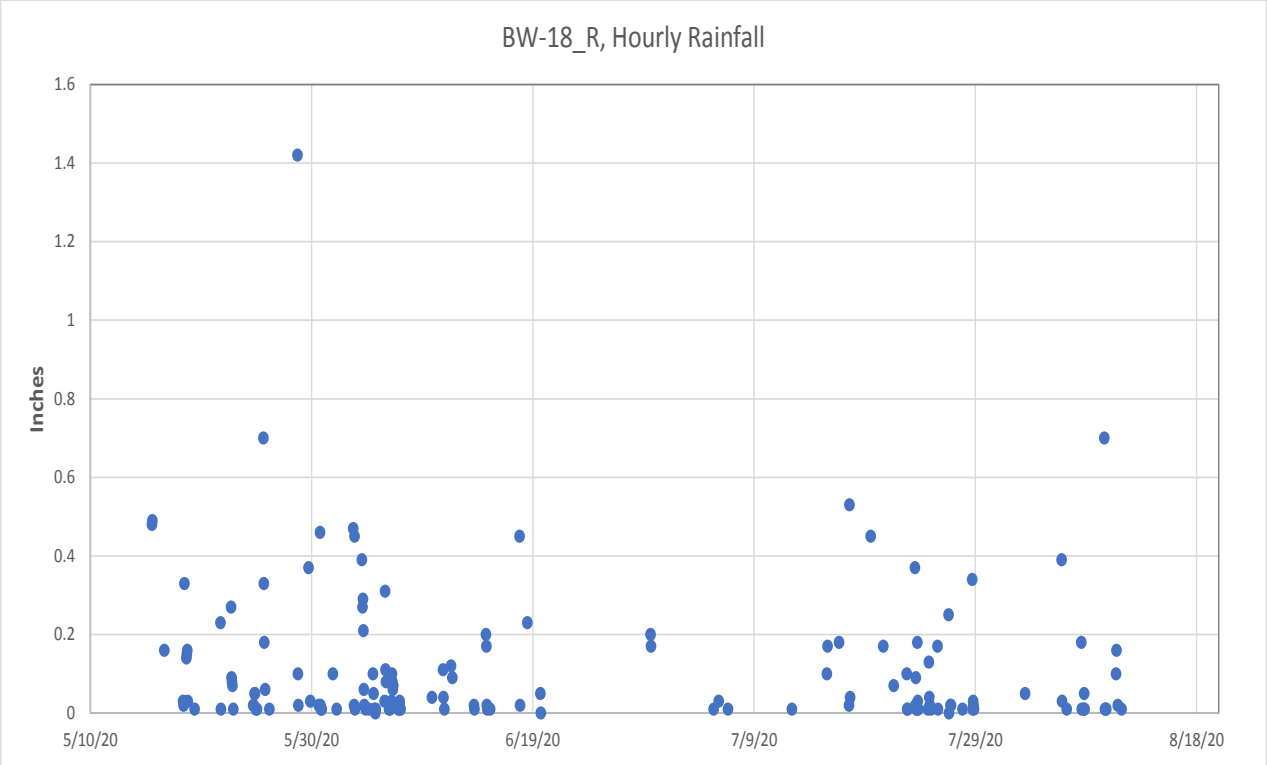


Figure 17- Hourly Rainfall for rain gage BW-18_R in inches

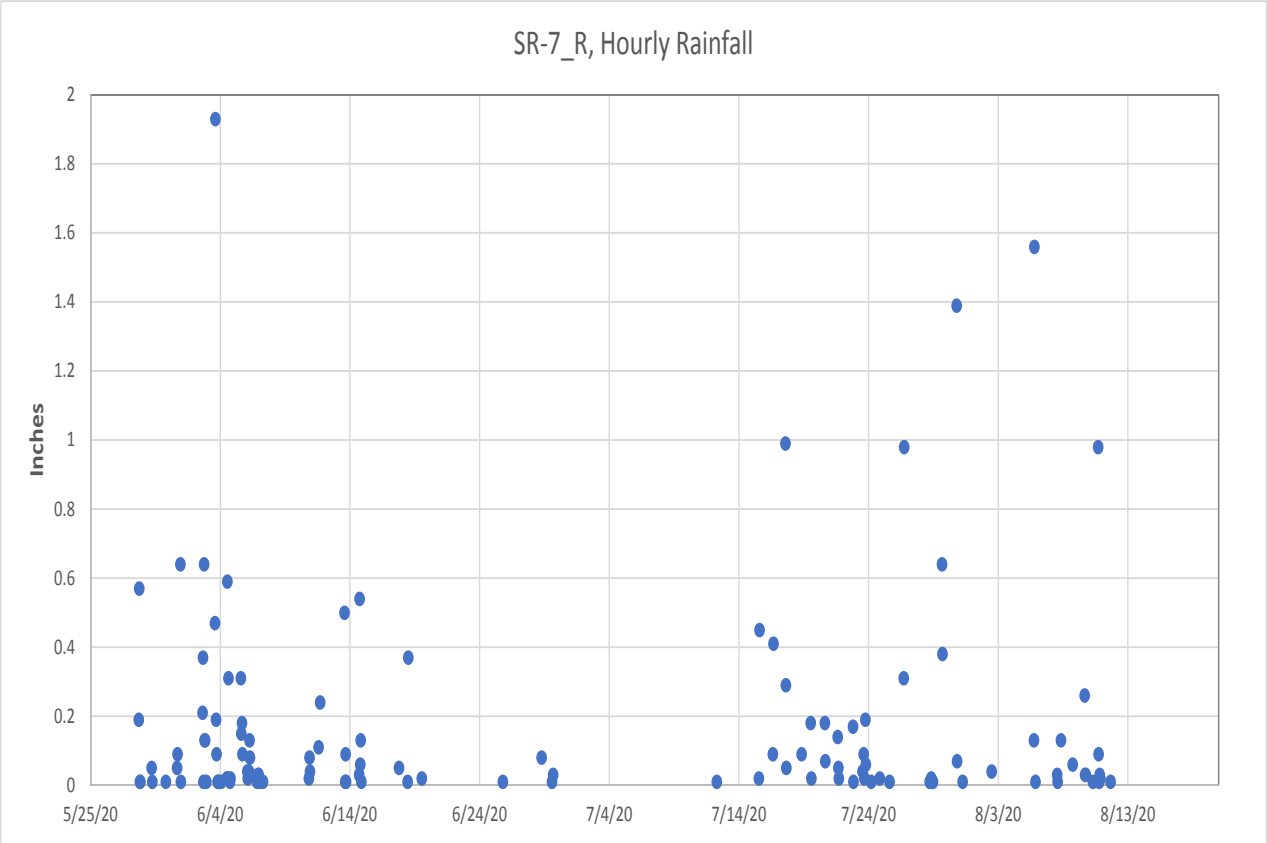


Figure 18- 15-Minute Rainfall for rain gages SR-7_R, Inches

Appendix 3 – 1st Quarter Flow Monitoring Station Data

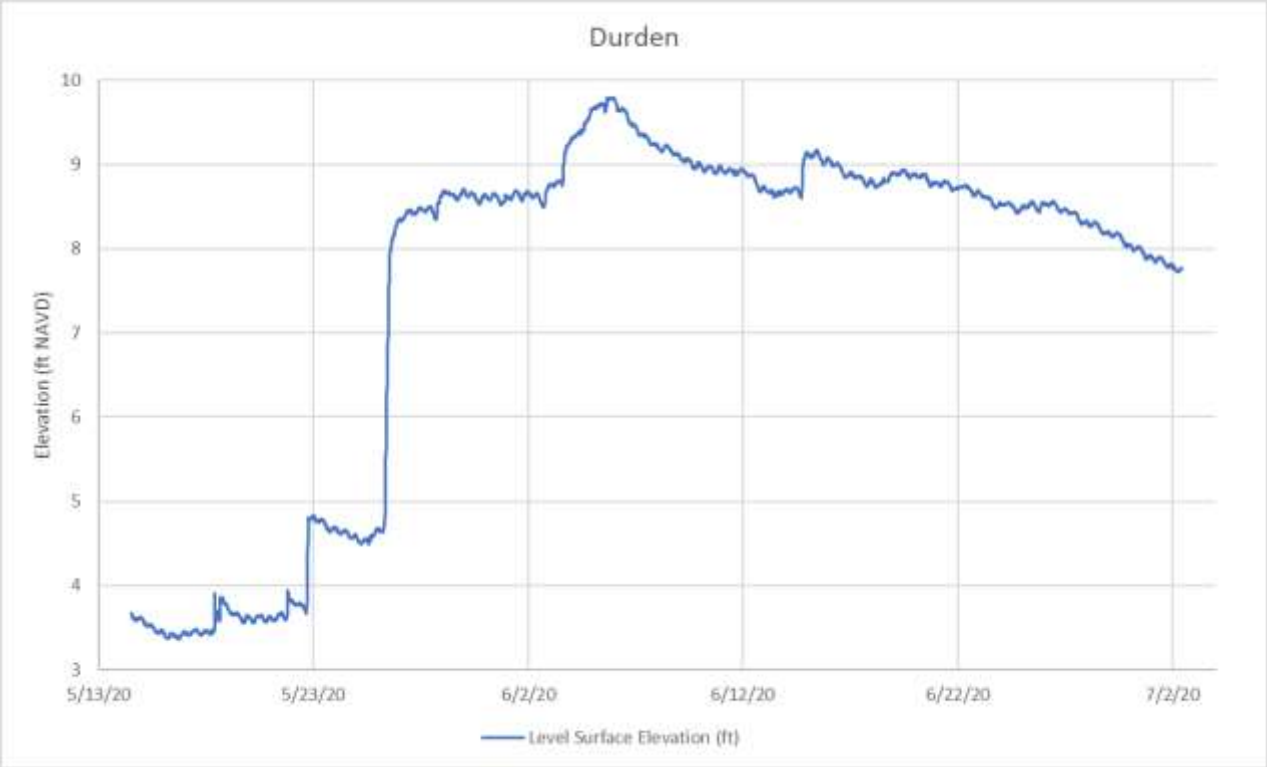


Figure 19- Surface water elevation for flow monitoring station Durden measured in ft-NAVD

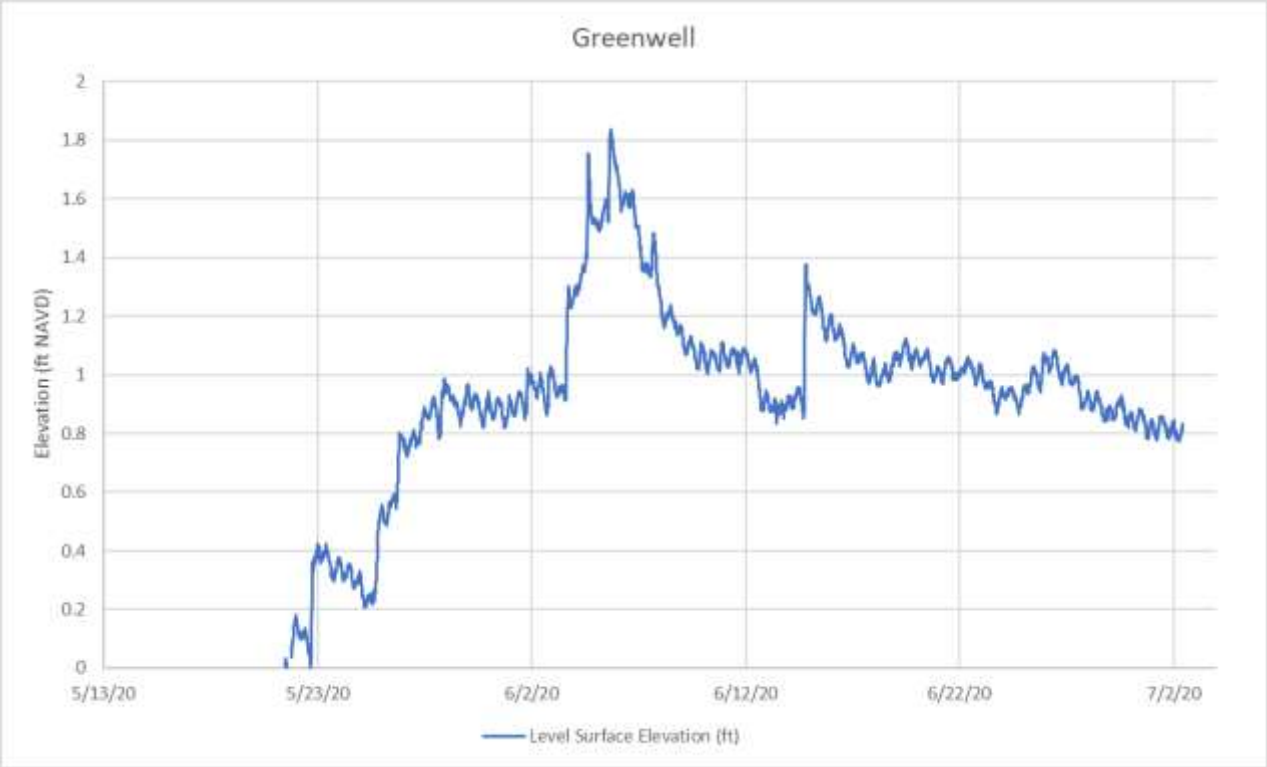


Figure 20- Surface water elevation for flow monitoring station Greenwell Branch measured in ft-NAVD

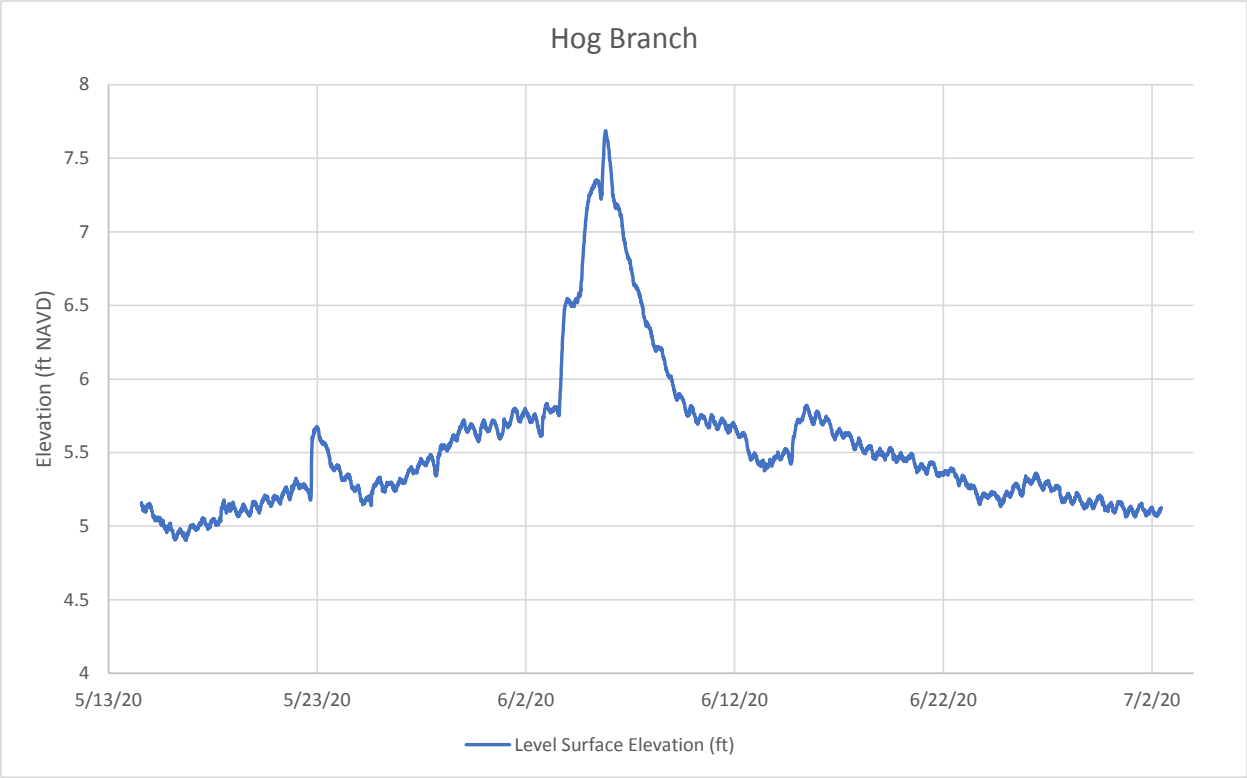


Figure 21- Surface water elevation for flow monitoring station Hog Branch measured in ft-NAVD

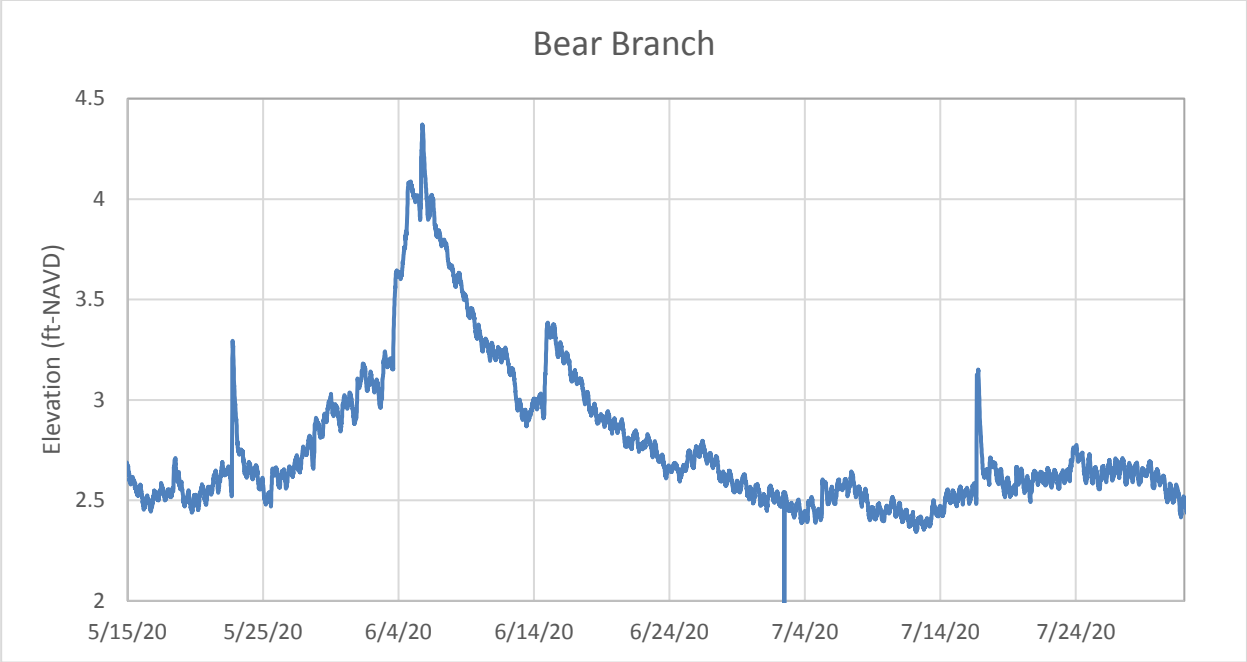


Figure 22 – Surface water elevation for flow monitoring station Bear Branch measured in ft-NAVD

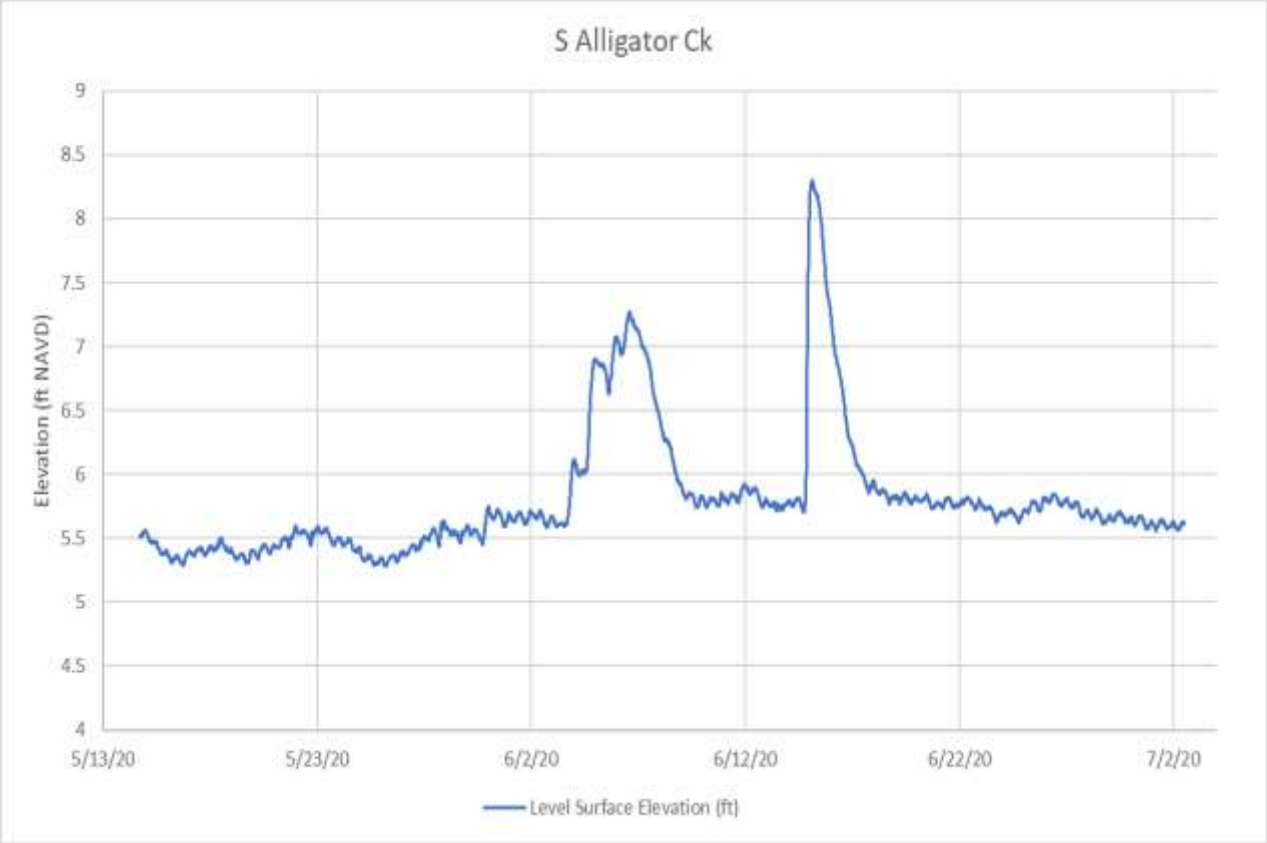


Figure 23- Surface water elevation for flow monitoring station S Alligator Ck measured in ft-NAVD

Figure 24- Surface water elevation for flow monitoring station Winegourd Creek measured in ft-NAVD

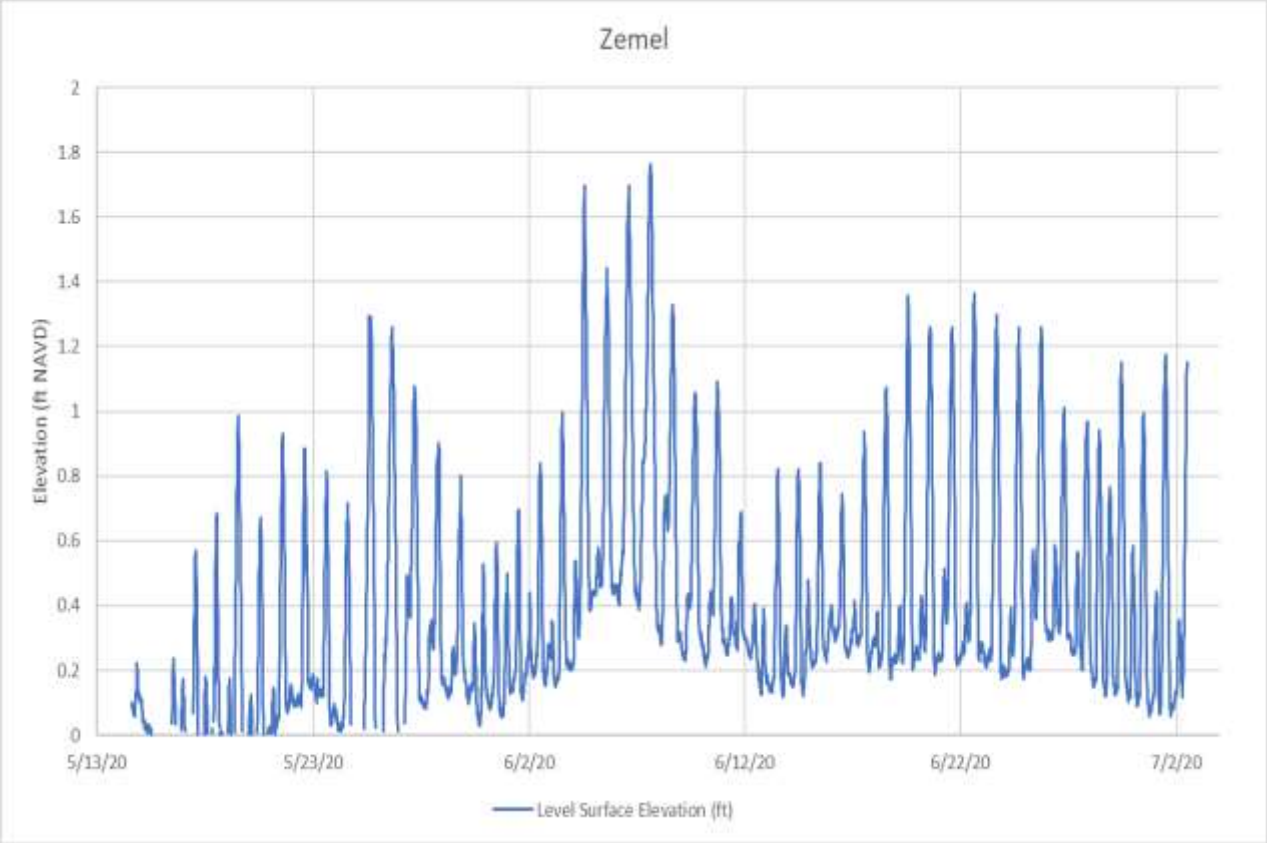


Figure 25- Surface water elevation for flow monitoring station Zemel Canal measured in ft-NAVD

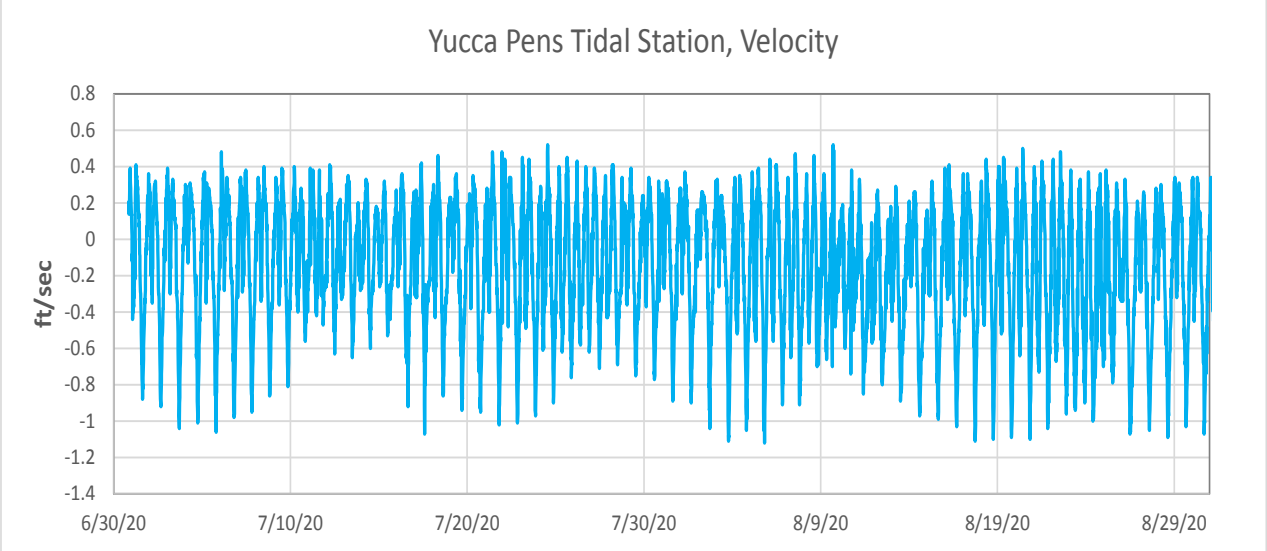


Figure 26 – Measured Yucca Pens Creek Tidal Velocity, X-Vector, ft/sec

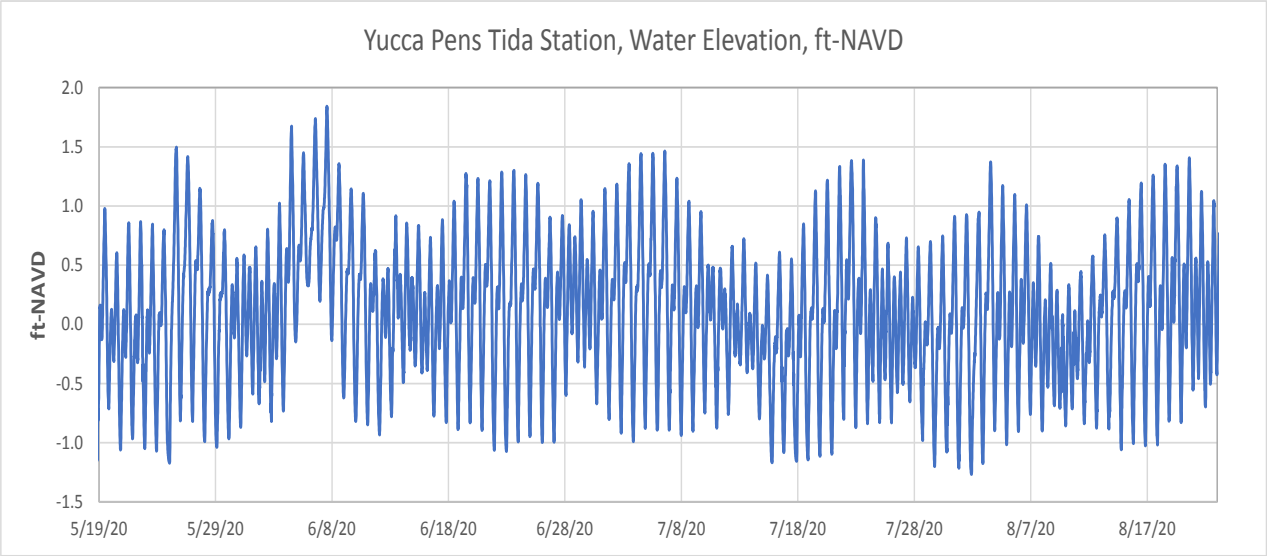


Figure 27 – Measured Yucca Pens Creek Tidal Water Elevation, ft-NAVD

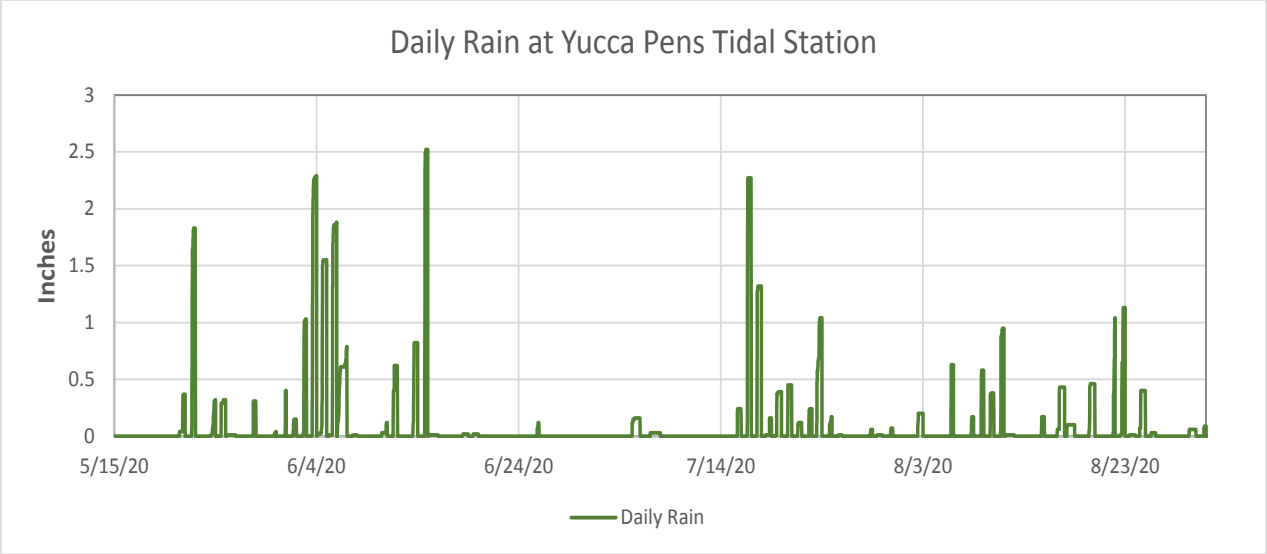


Figure 28 – Measured Rainfall at the Yucca Pens Creek Tidal Station, Inches/day

Table 1 – Flow Measurements for Flow Monitoring Stations Along Burnt Store Road

		CHNEP - Discharge Measurement Summary				
S. Alligator Creek	**Meas. #**	**Date:**	**Stage**	**Discharge (cfs)**	**Rated:**	**Remarks:**
	1a	**5/21/2020**	**5.46**	**0.00**	**G**	**PZF - Point of Zero Flow**
	1b	**5/21/2020**	**5.52**	**0.244**	**F**	**Very low velocities**
	2	**6/10/2020**	**5.82**	**12.20**	**G**	**Box culverts mostly clear**
Bear Creek	**Meas. #**	**Date:**	**Stage**	**Discharge (cfs)**	**Rated:**	**Remarks:**
	1a	**5/21/2020**	**2.31**	**0.00**	**G**	**PZF - Point of Zero Flow**
	1b	**5/21/2020**	**2.68**	**0.145**	**F-P**	**Low Velocities**
	2	**6/9/2020**	**3.52**	**18.60**	**G**	**Mod - High Velocities**
Durden Creek	**Meas. #**	**Date:**	**Stage**	**Discharge (cfs)**	**Rated:**	**Remarks:**
	1	**6/9/2020**	**9.16**	**19.20**	**P**	**Culverts Totally Submerged - Eddy on LEW**
	2	**7/21/2020**	**8.60**	**5.72**	**p**	**Culverts Totally Submerged - Eddy on LEW**
Greenwell	**Meas. #**	**Date:**	**Stage**	**Discharge (cfs)**	**Rated:**	**Remarks:**
	1	**6/9/2020**	**1.23**	**18.90**	**G**	**Culverts Clear**
	2a	**7/21/2020**	**0.98**	**3.26**	**P**	**Culverts Clear**
	2b	**7/21/2020**	**0.98**	**0.33**	**F**	**Pygmy Meter Meas. - Greenwell @ Burnt Store Rd.**
	3	**8/10/2020**	**1.04**	**9.67**	**G**	**Culverts Clear**
Hog Creek	**Meas. #**	**Date:**	**Stage**	**Discharge (cfs)**	**Rated:**	**Remarks:**
	1a	**5/21/2020**	**5.11**	**0.00**	**E**	**PZF - Point of Zero Flow**
	1b	**5/21/2020**	**5.33**	**0.095**	**F-P**	**Low Velocities - Light/Mod Veg. in Box Culvert**
	2	**6/9/2020**	**5.96**	**9.77**	**G-F**	**Low-Mod. Velocities**
Winegourd	**Meas. #**	**Date:**	**Stage**	**Discharge (cfs)**	**Rated:**	**Remarks:**
	1a	**6/9/2020**	**12.55**	**0.00**	**F**	**PZF - Sand bar control may shift with higher flows**
	1b	**6/9/2020**	**12.77**	**0.143**	**F-P**	**Very Low Velocity - Hvy. Debris downstream in channel**
Zemel Canal	**Meas. #**	**Date:**	**Stage**	**Discharge (cfs)**	**Rated:**	**Remarks:**
	1a	**5/21/2020**	**-0.14**	**0.00**	**P**	**PZF - Estimated (Site is Tidal)**
	1b	**5/21/2020**	**0.46**	**3.020**	**F**	**Box Culverts Clear - Tidally influced - Outgoing Tide**

Table 2 – Flow Monitoring Results for the Yucca Pens Creek Tidal Flow Monitoring Station

Yucca Pens	Meas. #	Date:	Stage	Discharge (cfs)	Rated:
Gauging Station	1a	5/21/2020	0.60	-21.60	G
Upstr. @ Constriction	1b	5/21/2020	0.74	-6.56	F
Gauging Station	2a	6/10/2020	0.42	16.60	P
Upstr. @ Constriction	2b	6/10/2020	0.59	22.10	G
Upstr. @ Burnt Store Rd.	2c	6/10/2020	0.78	22.00	P
Upstr. @ Burnt Store Rd.	3	7/21/2020	1.20	0.72	F
Gauging Station	4a	8/10/2020	-0.54	12.80	G
Upstr. @ Constriction	4b	8/10/2020	-0.62	4.66	P
Upstr. @ Burnt Store Rd.	4c	8/10/2020	-0.56	3.07	F

Meas. #	Remarks:
1a	No positive flow - Incoming Tide @ Gauging Station - LEW is undefined due to Mangroves (Estimated)
1b	No positive flow - Incoming Tide @ Gauging Station & Constriction Upstream
2a	Positive Flow - Incoming Tide @ Gauging Station
2b	Positive Flow - Incoming Tide @ Gauging Station - No Tidal Fluctuation observed @ Constriction.
2c	Positive Flow - Incoming Tide @ Gauging Station - No Tidal Fluctuation observed @ Burnt Store Rd.
3	Positive Flow - Outgoing Tide @ Gauging Station - No Tidal Fluctuation observed @ Burnt Store Rd.
4a	Positive Flow - Outgoing Tide @ Gauging Station
4b	Positive Flow - Outgoing Tide @ Gauging Station - Tidal Fluctuation observed @ Constriction.
4c	Positive Flow - Transistional Flow @ Gauging Station from Outgoing to Incoming - No Tidal Fluctuation observed @ Burnt Store Rd.