

## Hydrologic Conditions Quarterly Report: October 2022 to December 2022

### Executive Summary

Cumulative average rainfall from October through December 2022 was 29 percent lower than normal for the District. Normal rainfall is defined as average monthly rainfall for the 1991 to 2020 period of reference. Much lower-than-normal rainfall in October and November caused decreases in streamflow and groundwater levels in many portions of the District. An increase in precipitation in December resulted in many streamflow stations returning to the normal percentile streamflow class. The lower-than-average quarterly rainfall intensified drought conditions and most of the District finished the quarter under severe drought conditions according to the U.S Drought Monitor.

### Precipitation Summary

Rainfall totals, compared to current National Weather Service Climate Normals (1999 to 2020 reference period), from October through December were 3.55 inches below normal across the District at 8.59, with a three-month-total of 8.59 inches. Normal cumulative rainfall for this period is 12.14 inches (Table 1).

Month	Normals (1991 to 2020)	2022	Percent Difference
October	3.62	1.61	-55.52%
November	3.89	2.47	-36.53%
December	4.63	4.51	-2.68%
Totals	12.14	8.59	-29.27%

Table 1. PRISM monthly rainfall totals and percent difference from 1991-2020 monthly precipitation normals

The low precipitation in September continued throughout October and November, with precipitation levels for those months being almost 56 percent (October) and 37 percent (November) lower than normal. Moderate and severe thunderstorms in the District during December partially caused precipitation for that month to almost return 1991 to 2020 normals. Precipitation was lower than normal every month throughout the final quarter of 2022, and the District reported a 29 percent reduction in quarterly rainfall compared to normal.

### Significant Events

#### **Heavy Rainfall – October 30 to 31, November 27, December 14 to 16, and December 31, 2022**

Heavy rainfall from severe thunderstorms was observed over multiple events throughout the fourth quarter. The storms swept across the entire District from west to east. Tornado, severe weather, and flooding warnings were issued for many of the counties in the District during these storm events.

#### **Tropical Storm Nicole – November 10 to 11, 2022**

Hurricane Nicole made landfall as a category one storm near Vero Beach, FL on November 10<sup>th</sup>, 2023. The storm traveled from southeast to northwest across the state, weakening to a tropical storm over land as it passed over the District. High rainfall and strong winds were present throughout the District during this storm event.

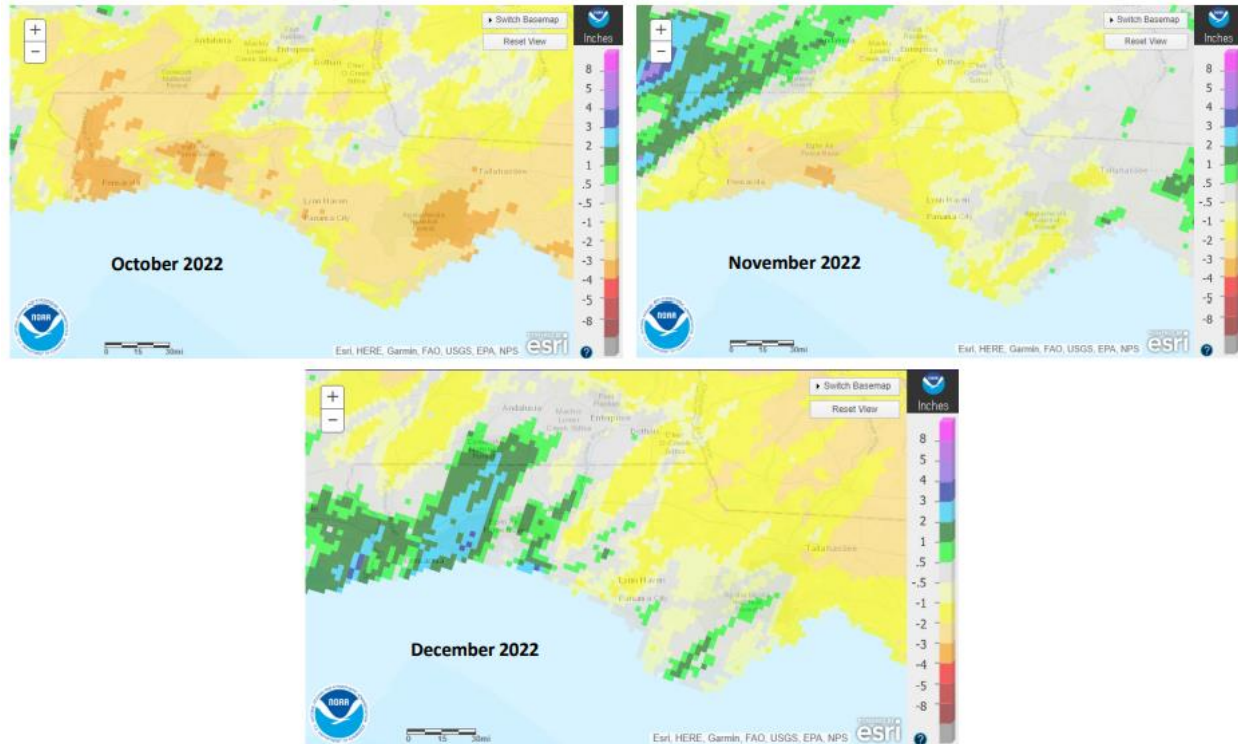


Figure 1. NOAA monthly departure from normal precipitation (1991-2020 precipitation normals);

Source: <http://water.weather.gov/precip/>

## **Temperature**

Outside of three distinct cold fronts, daily temperatures in the fourth quarter hovered in the mid-60s to high 80s. Cold fronts in late October and mid-November dropped temperatures across most of the District into the mid to low 30s. However, in late December a powerful Arctic cold front pushed temperatures below freezing throughout the District. After the Arctic storm, temperatures increased, and the District closed 2022 with daily temperatures above the normal temperature range.

## **Surface Water Levels and Streamflow**

High District streamflow in September sharply decreased throughout October due to below average rainfall. By the end of October, many stations declined into the percentile classes of below normal (between the 10th and 25th percentiles) and much below normal (below the 10th percentile) (Figure 2). However, the District's low October streamflow would slowly rebound over the next two months as monthly precipitation increased over the prior multi-month dry period. By the end of the quarter, only six streamflow stations registered in the below normal percentile class, and one (Sopchoppy River near Sopchoppy, FL) in the much below normal percentile class. Streamflow at the Wakulla River near Crawfordville, FL, station continued to hover around its multi-year median, finishing the quarter slightly under 800 cfs. All other streamflow stations in the District finished 2022 in the normal percentile class. Water Levels at Lake Jackson in Tallahassee, FL, steadily declined throughout the fourth quarter ending December at 77.95 ft NAVD88 (Figure 3). Figures 4 through Figure 9 depict daily, daily median, and long-term average discharge for USGS monitored stations within the District.

## Fourth Quarter Streamflow 2022 (NFWFMD)

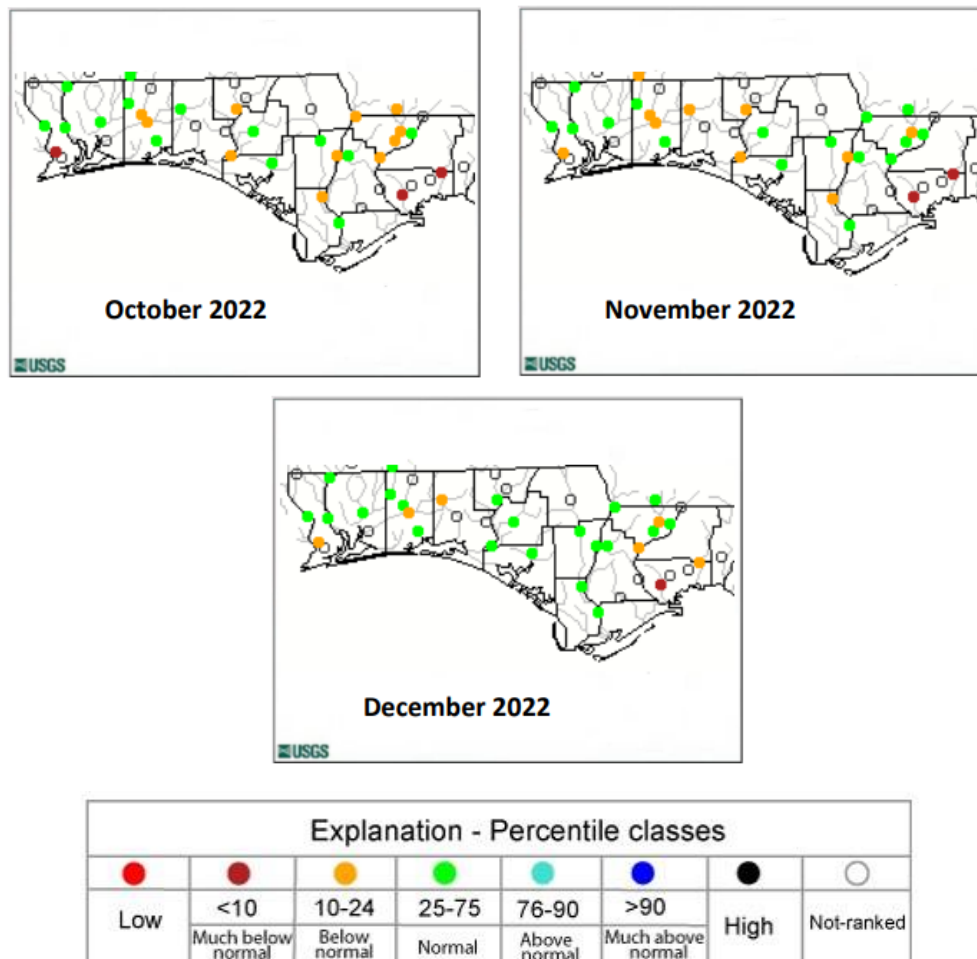


Figure 2. USGS monthly streamflow percentile classifications for the NFWFMD

Source: <http://waterwatch.usgs.gov/index.php>

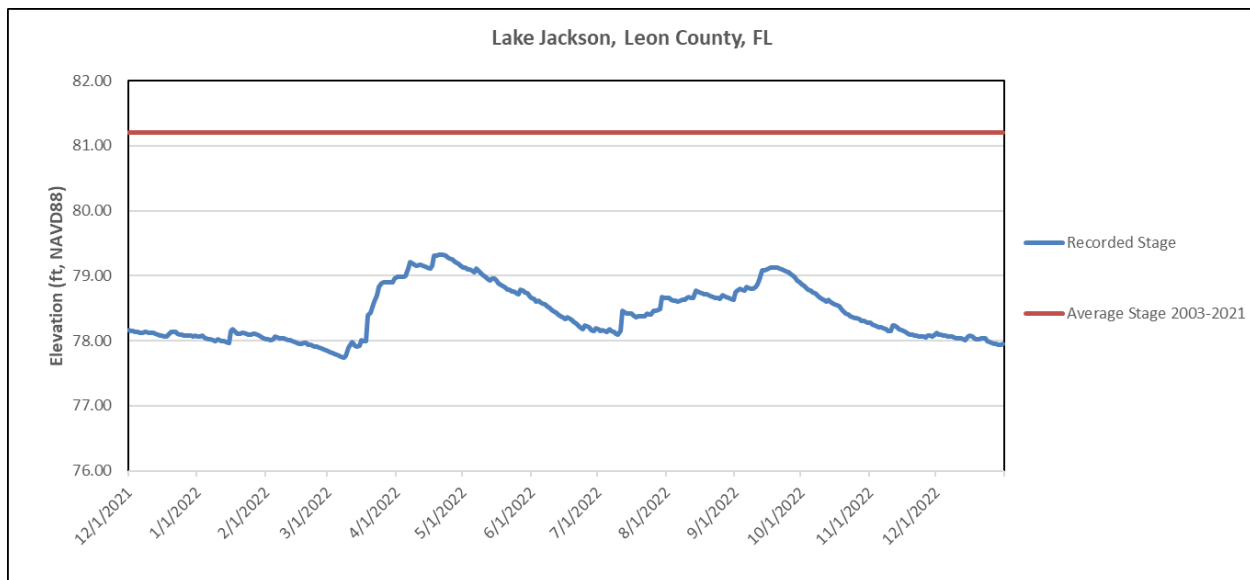


Figure 3. Lake Jackson in Leon County daily stage, December 2021 to December 2022

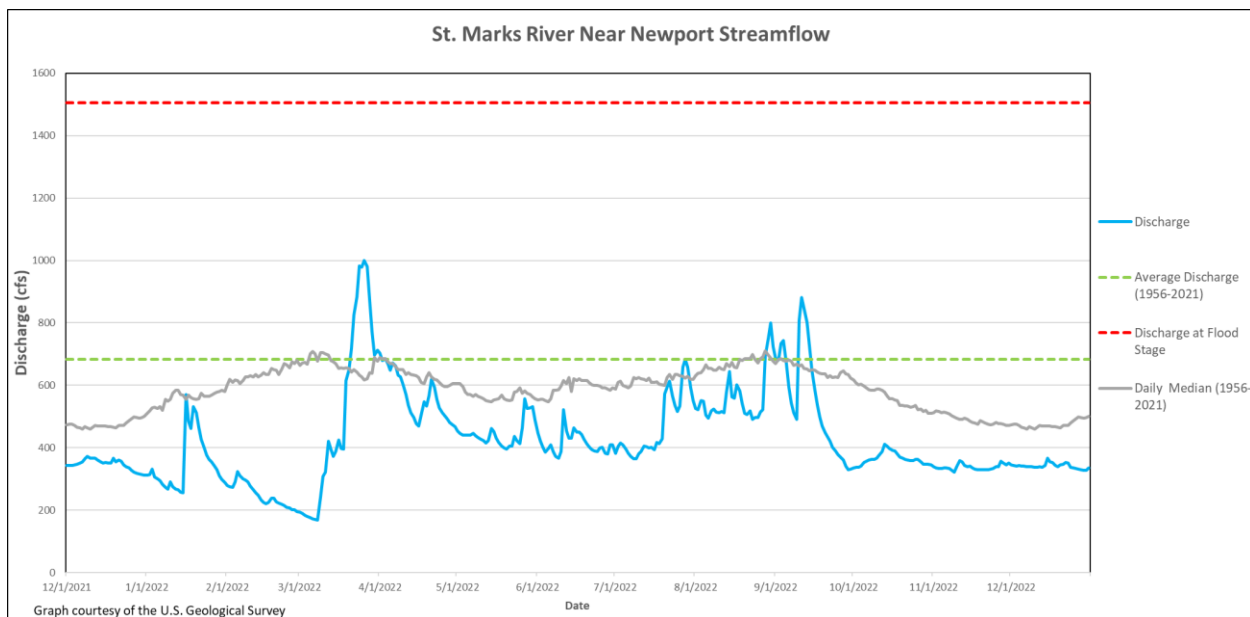


Figure 4. USGS St. Marks River near Newport streamflow, December 2021 to December 2022

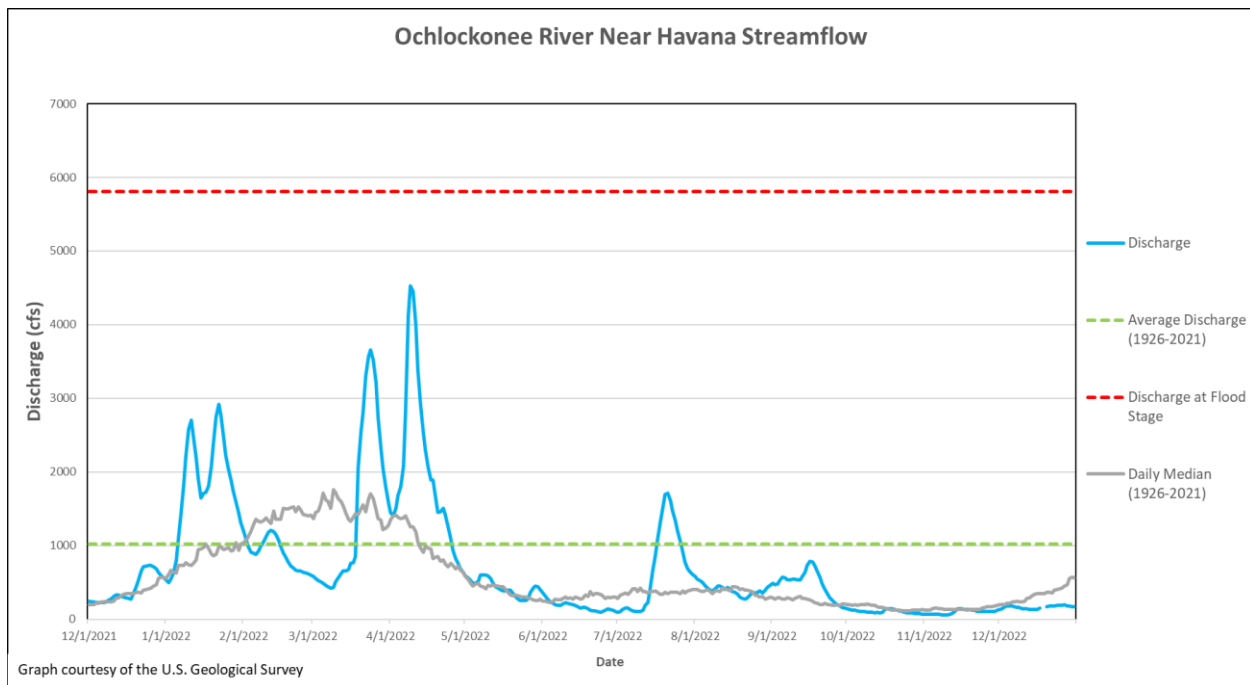


Figure 5. USGS Ochlocknee River near Havana streamflow, December 2021 to December 2022

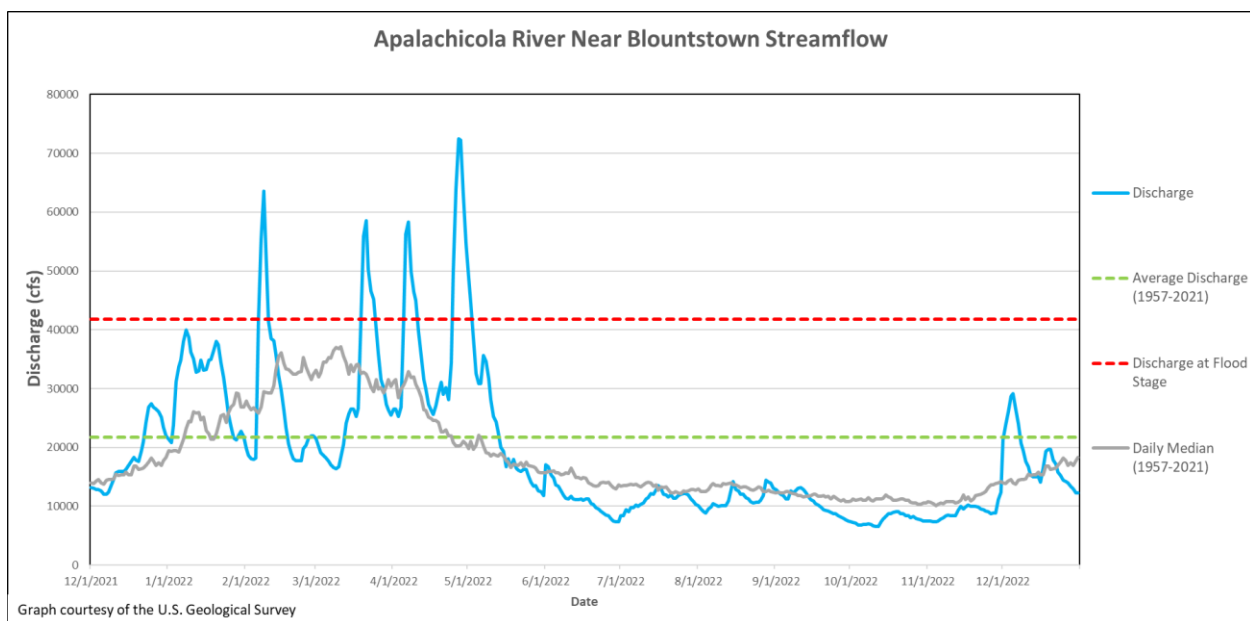


Figure 6. USGS Apalachicola River near Blountstown streamflow, December 2021 to December 2022

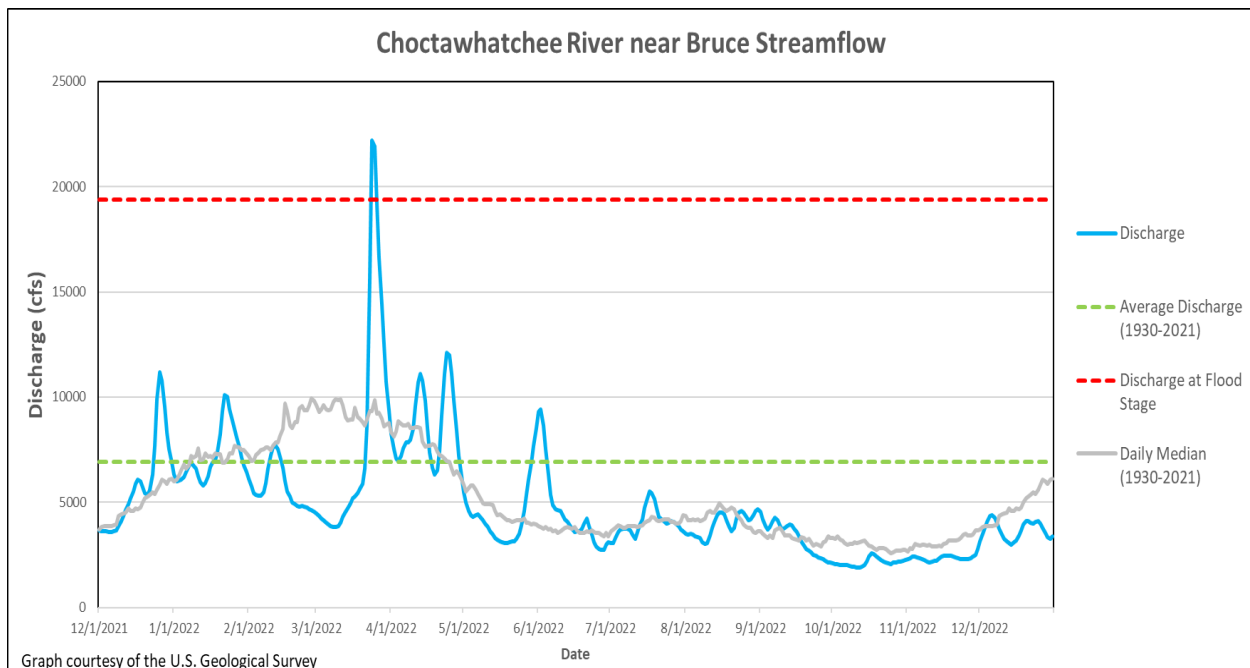


Figure 7. USGS Choctawhatchee River near Bruce streamflow, December 2021 to December 2022

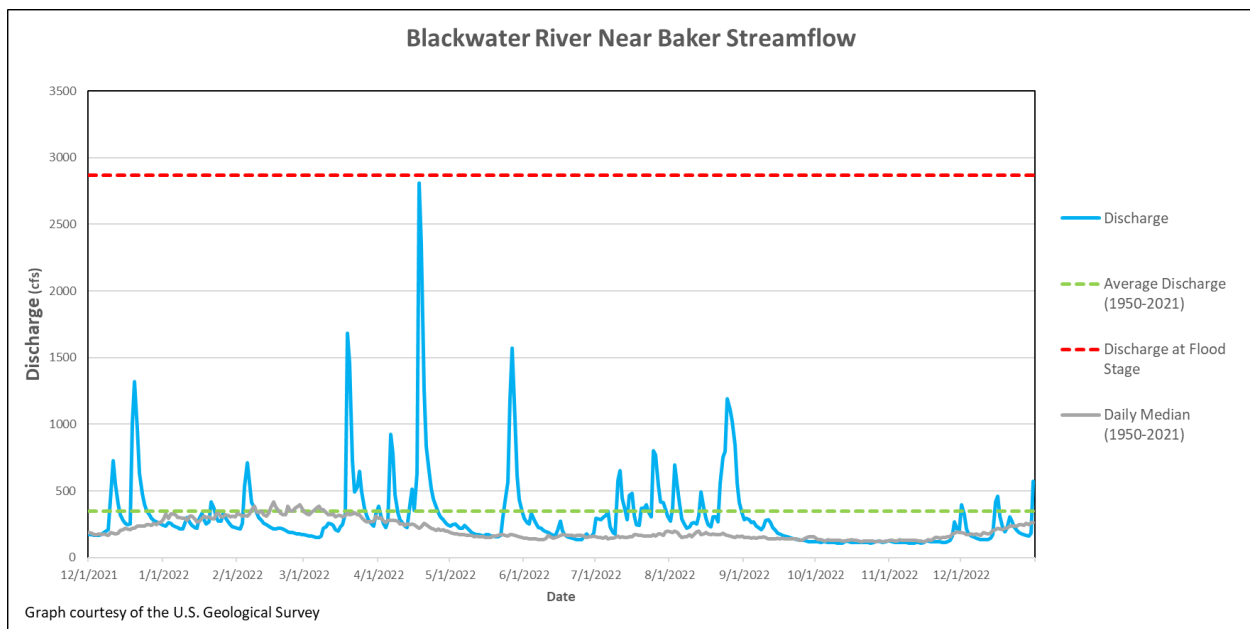


Figure 8. USGS Blackwater River near Baker streamflow, December 2021 to December 2022

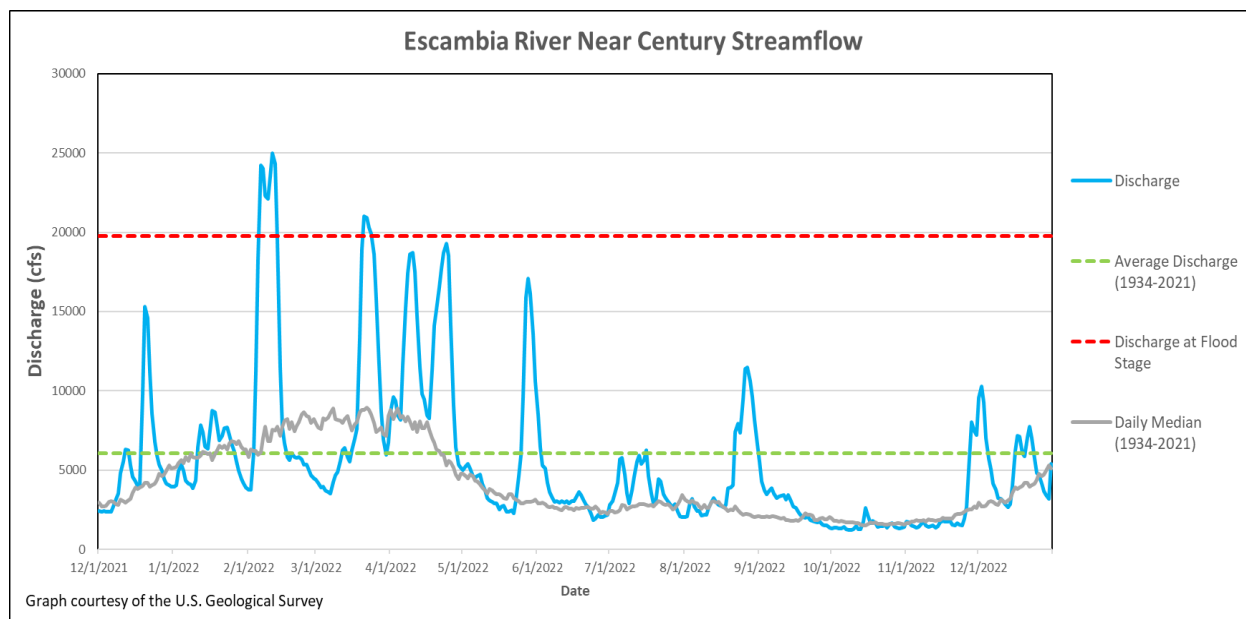


Figure 9. USGS Escambia River near Century streamflow, December 2021 to December 2022

#### **Fourth Quarter Springflow 2022**

At the NFWMD Jackson Blue Spring station (NWFID 5042) manual discharge measurements were conducted in November and December. On November 11, 2022, spring discharge was 88 cfs, while on December 27, 2022, it was slightly higher at 88.2 cfs. Equipment malfunctions at the St. Marks River Natural Bridge Swallet station (NWFID 9257) caused data collection gaps in the fourth quarter. The three weeks of calculable springflow at the St. Marks River Rise in late October and early November remained below multi-year medians (Figure 10).

A new meter was installed in the Wakulla spring vent, however, the rating curve is being developed and spring flows are not yet available for this quarter. During the fourth quarter of 2022, manual discharge measurements at Sally Ward Spring (NWFID 774) were 23.4 cfs on October 11 and 24.7 cfs on November 28. The long-term (November 1, 2004, to November 28, 2022) median flow at Sally Ward Spring is 23.7 cfs (average 23.8 cfs). The Wakulla spring vent flow meter was replaced on June 28, 2022, and flow recorder data during the fourth quarter is unavailable. However, fourth quarter manual discharge measurements at the Wakulla spring vent were 702 cfs on November 28, 2022, 679 cfs on December 12, 2022, and 739 cfs on December 27, 2022. The long-term (October 23, 2022, to December 12, 2022) median flow at Wakulla Spring is 599 cfs (average 588 cfs).

#### **MFL Update**

**St. Marks River Rise MFL:** Per the most current approved data which extends through October 18, 2021, the St. Marks River Rise MFL (long-term average of 419 cfs) is being met.

**Wakulla and Sally Ward Spring System MFL:** Per the most current approved data which extends through December 27, 2022, the MFL (long-term average of 539 cfs) is being met.

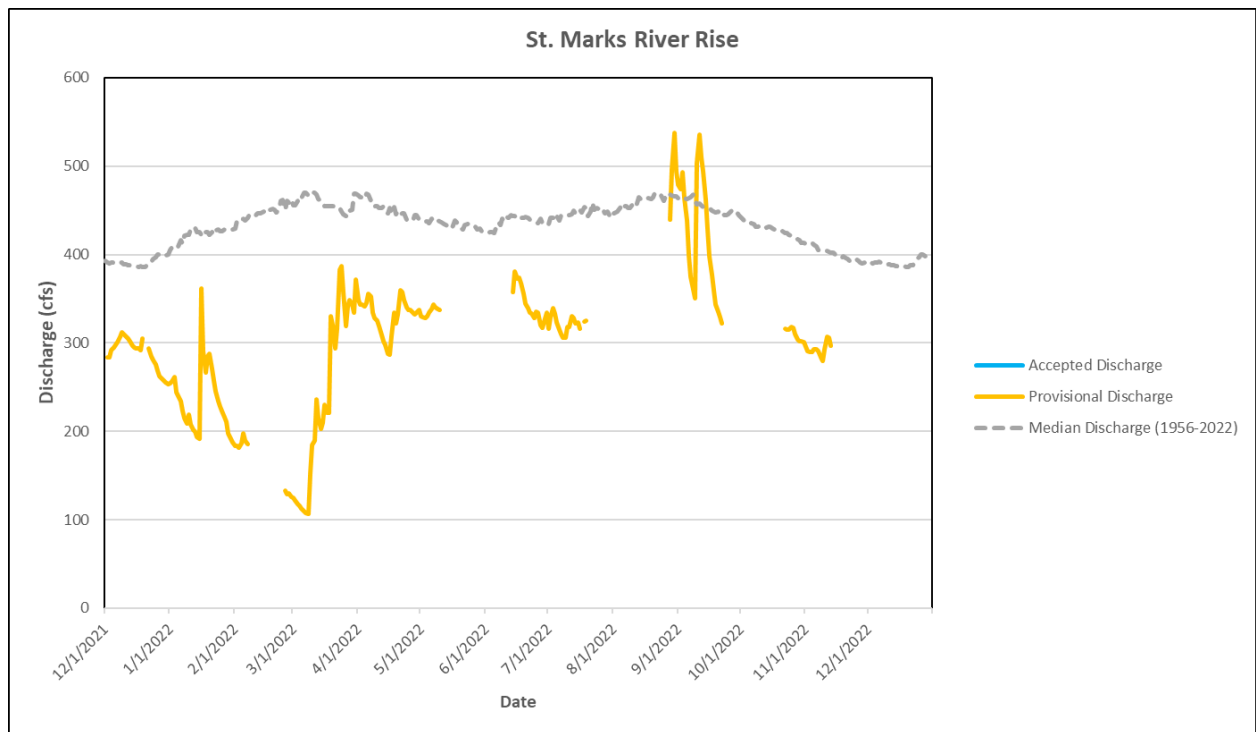


Figure 10. St. Marks River Rise springflow, December 2021 – December 2022

### **Groundwater Levels**

At the end of the fourth quarter of 2022, groundwater levels in the western half of the District were near or above normal while groundwater levels in the eastern portion of the District were below normal, consistent with rainfall patterns for this quarter (Figure 1).

Groundwater levels generally declined at the beginning of the fourth quarter due to below average rainfall. However, as precipitation rates increased in late November and December, groundwater levels increased at the NFWMD Weller Ave Deep Sand and Gravel aquifer monitoring well (NWFID 1382, Figure 12), Okaloosa School Board Floridan aquifer monitoring well (NWFID 1894, Figure 13), and the Fannin Airport Floridan aquifer monitoring well (NWFID 697, Figure 14). However, the east side of the District received less rainfall during the quarter and the groundwater levels at the Floridan aquifer monitoring wells in this region continued to decline (Figures 15 through 17). Due to equipment issues at the USGS-422A near Greenhead well (NWFID 3216) in Washington County, data was unavailable for this quarter.



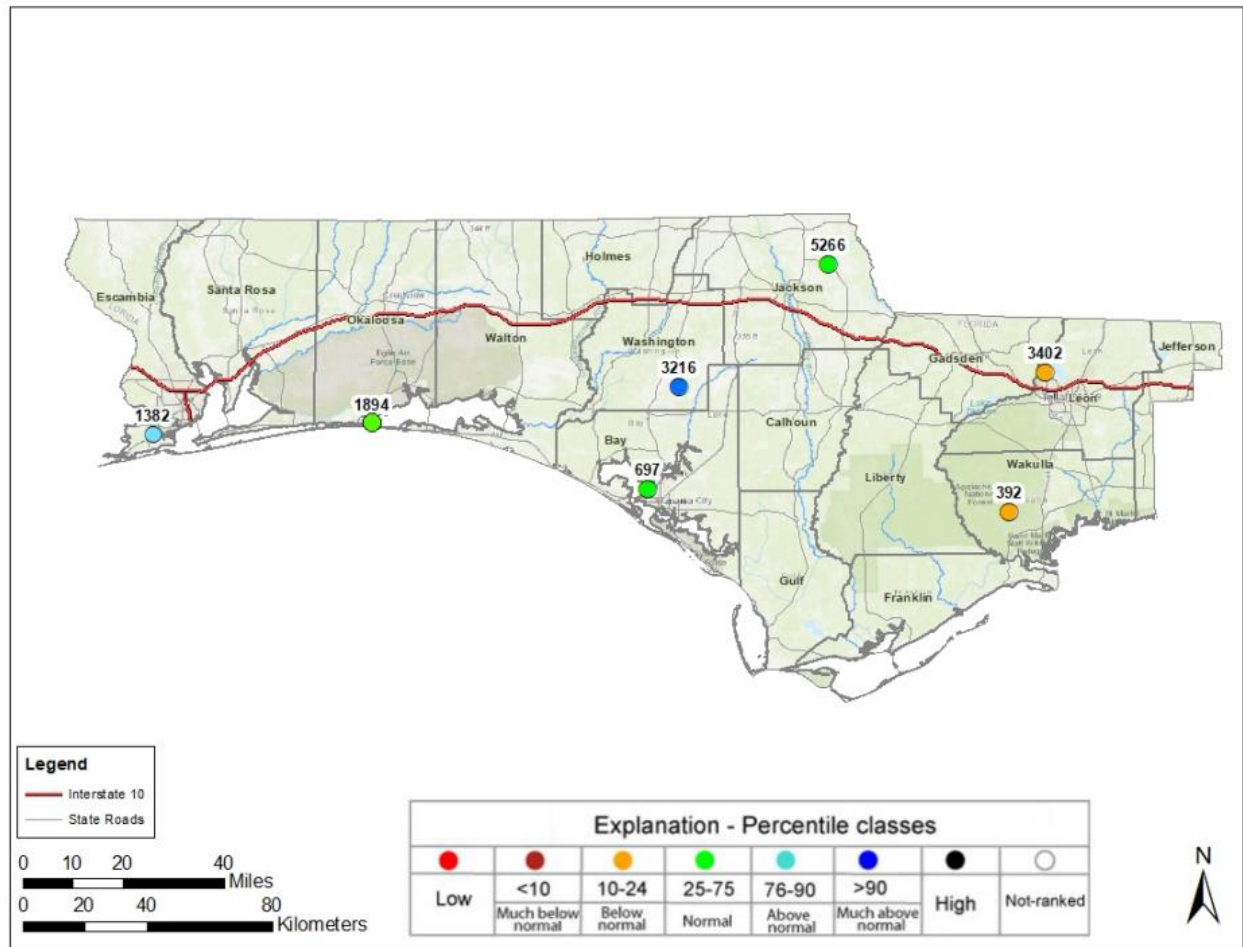


Figure 11. NFWMD groundwater monitoring site locations and percentile classes

Table 2. Monitor Wells Attributes for Stations Shown in Figure 11

NWFID	Total Depth (ft)	Cased Depth (ft)	Aquifer Monitored	Period of Record
1382	232	222	Sand-and-Gravel (main producing zone)	June 1984 to December 2022
1894	672	504	Upper LS Floridan	November 1946 to December 2022
697	345	326	Floridan Aquifer (undifferentiated)	March 1974 to December 2022
3216	150	110	Floridan Aquifer (undifferentiated)	September 1967 to December 2022
5266	158	100	Floridan Aquifer (undifferentiated)	January 1989 to December 2022
3402	225	100	Floridan Aquifer (undifferentiated)	November 1946 to December 2022
392	127	121	Floridan Aquifer (undifferentiated)	January 1967 to December 2022

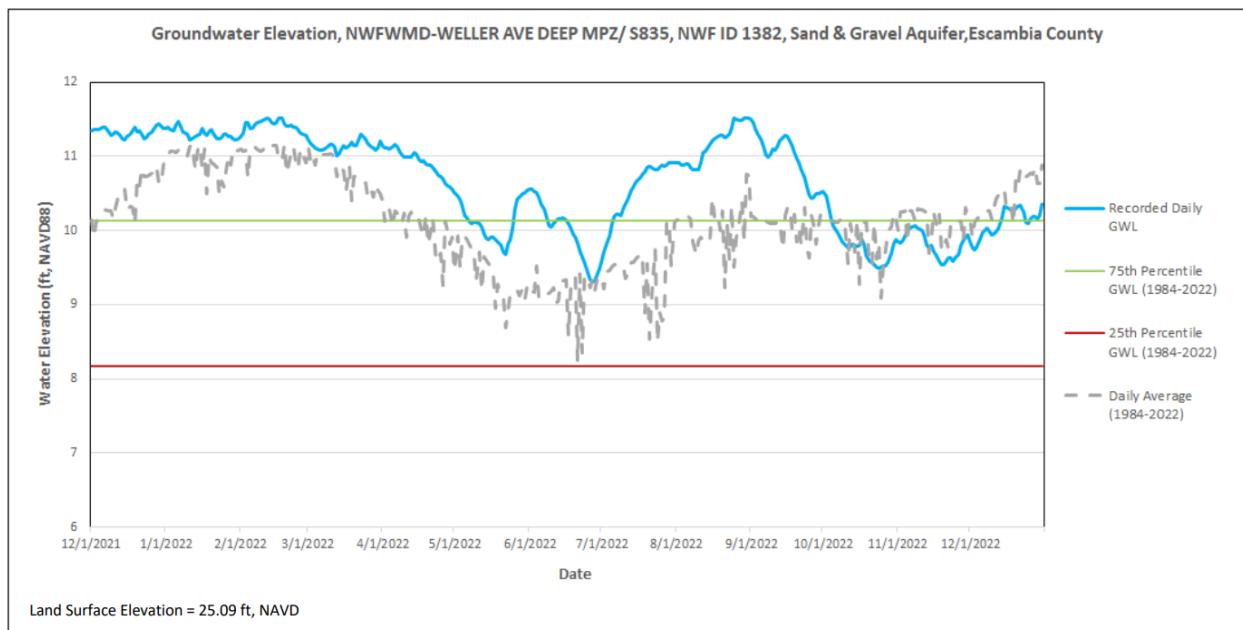


Figure 12. NFWFMD Weller Ave Deep MPZ well groundwater elevation, December 2021 to December 2022

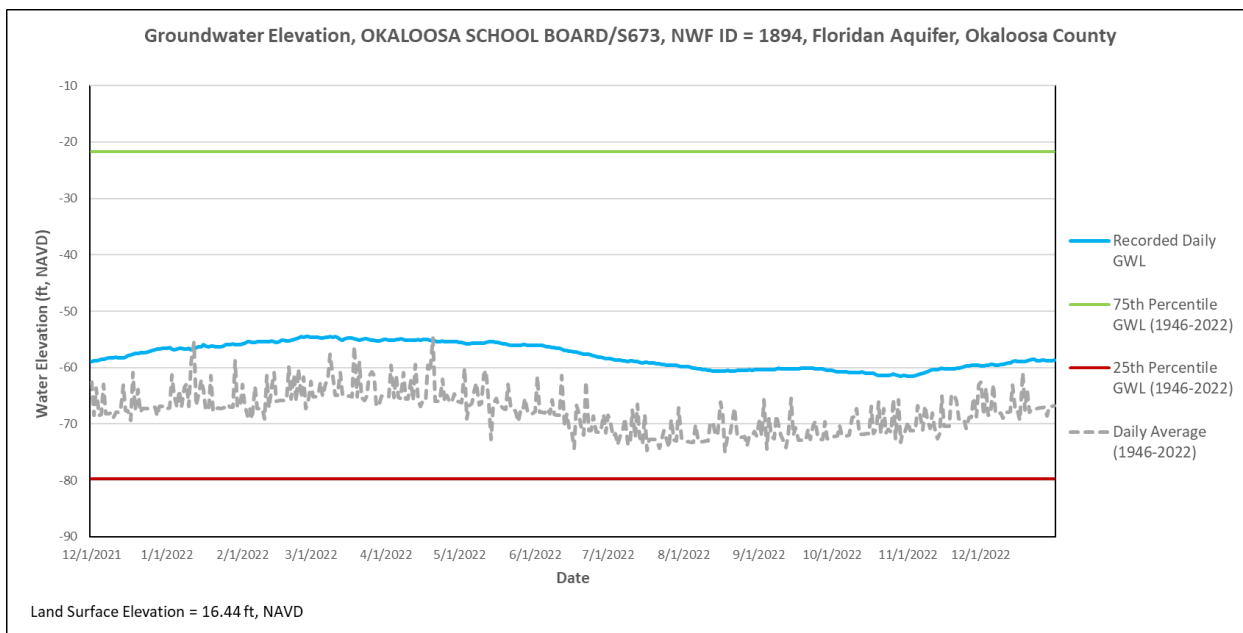


Figure 13. Okaloosa School Board S673 well groundwater elevation, December 2021 to December 2022.

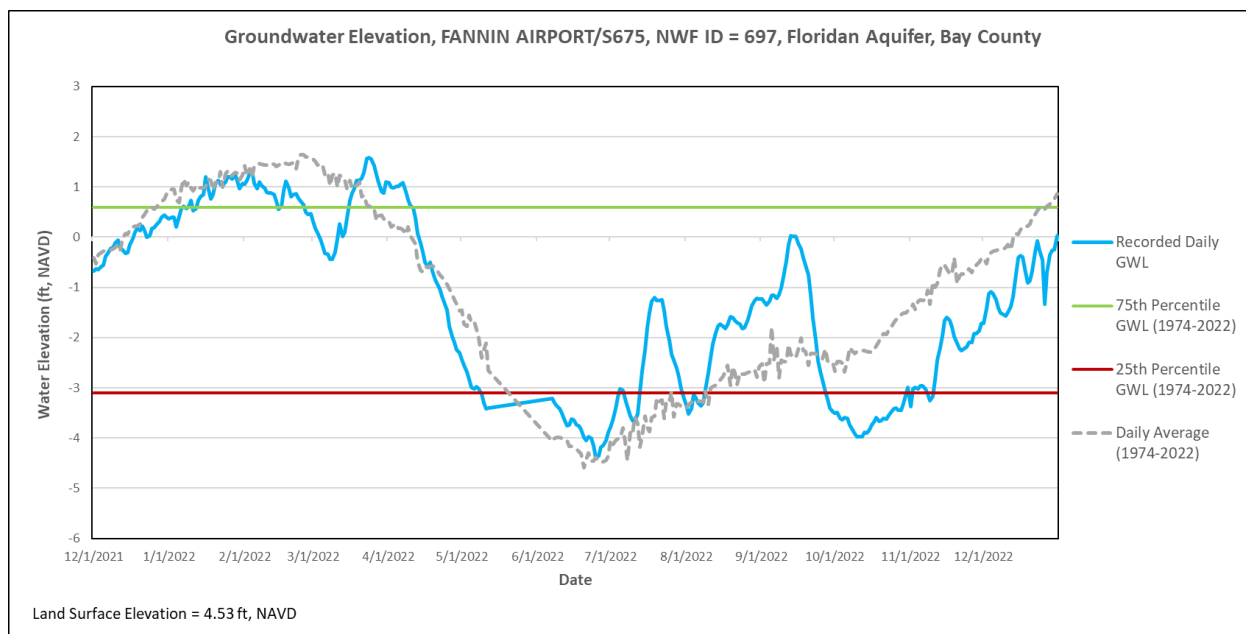


Figure 14. Fannin Airport S675 well groundwater elevation, December 2021 to December 2022

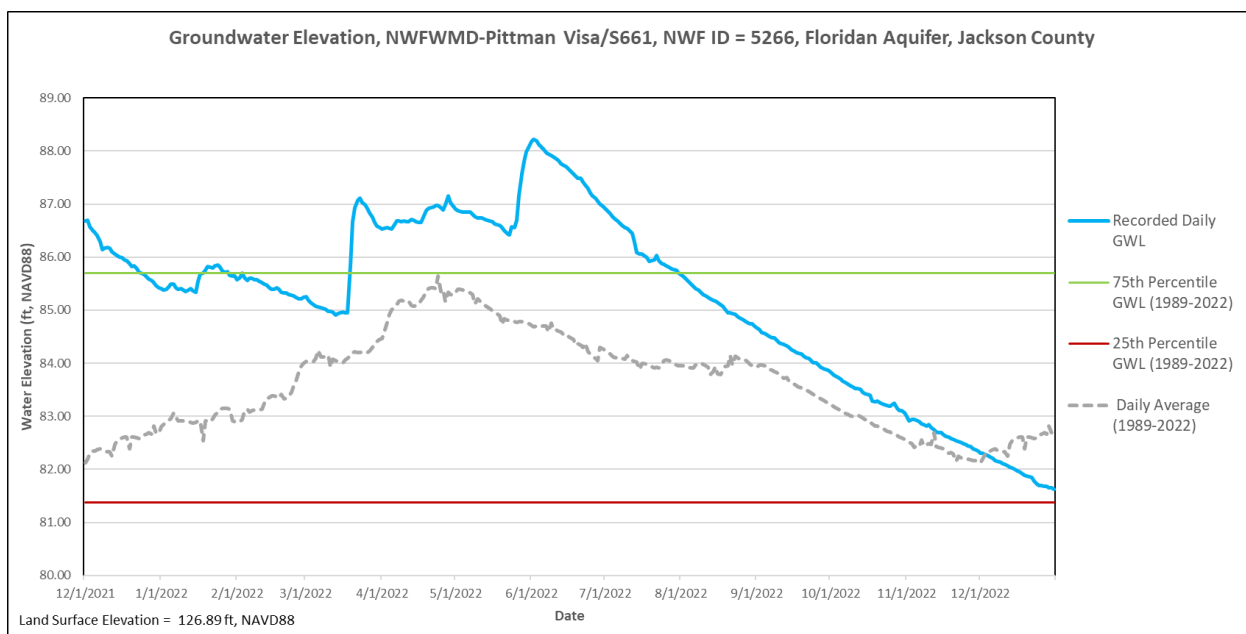


Figure 15. NFWMD Pittman Visa S661 well, groundwater elevation December 2021 to December 2022

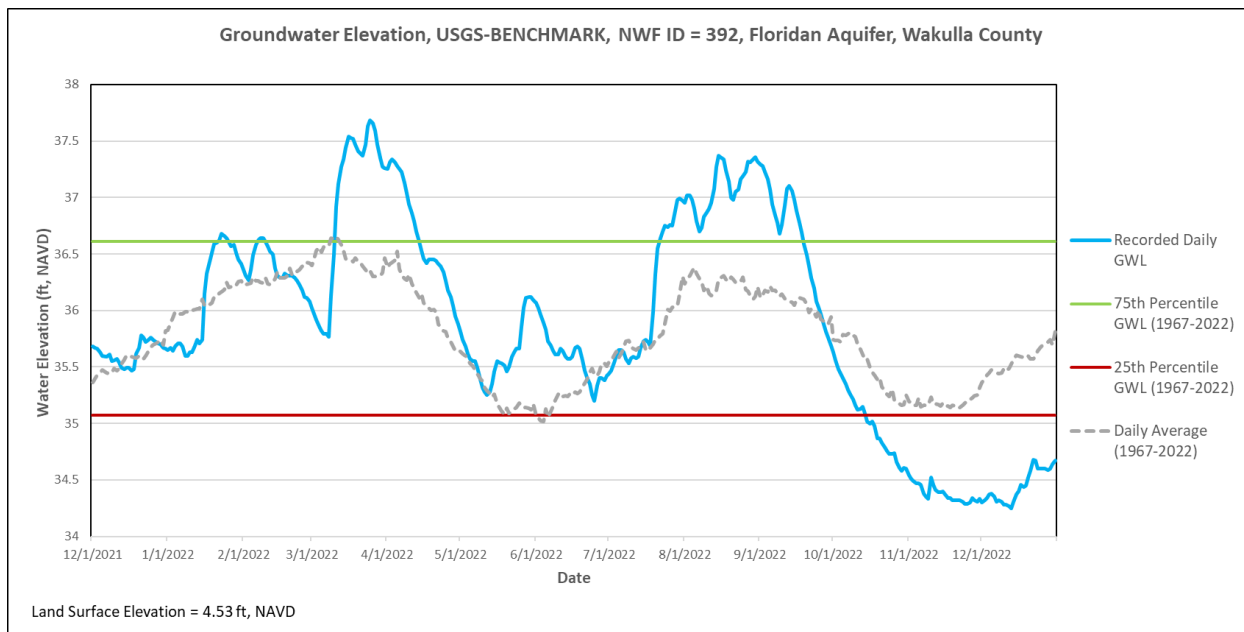


Figure 16. USGS Benchmark well groundwater elevation, December 2021 to December 2022

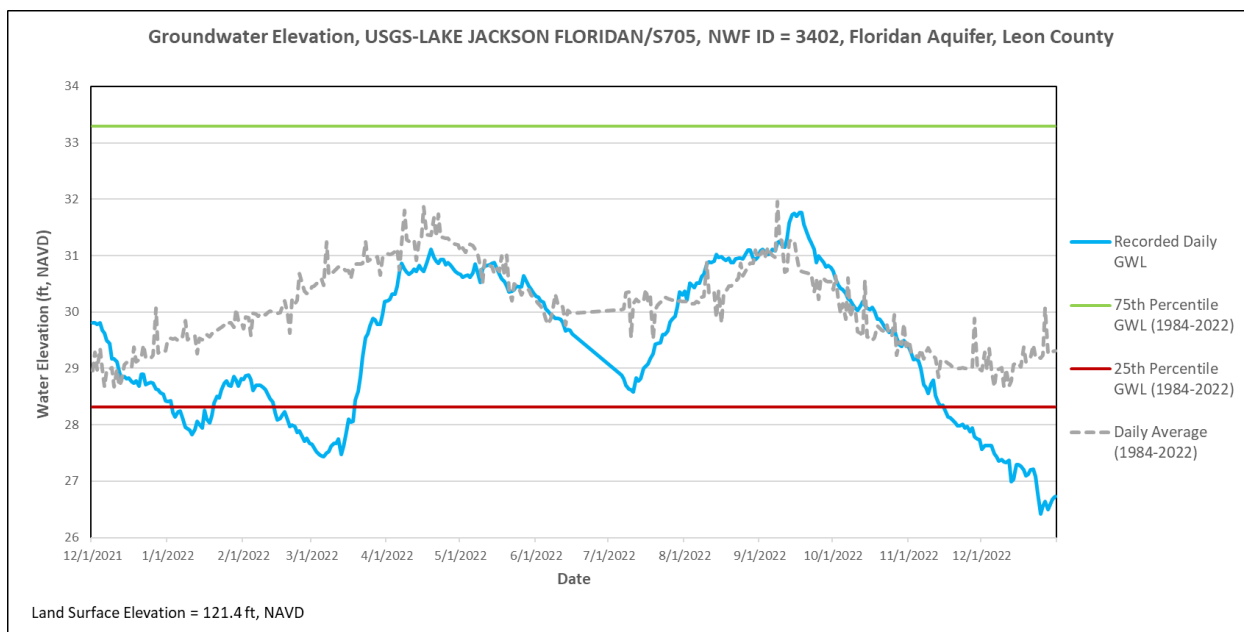


Figure 17. USGS-Lake Jackson Floridan S705 well groundwater elevation, December 2021 to December 2022

## Drought Conditions

The District began the fourth quarter with only the most eastern and south-central counties not under drought conditions (Figure 19). The remainder of the District was either abnormally dry or under moderate drought conditions. As the quarter progressed with below average rainfall in every month, drought conditions intensified across the District. By the end of the year, all of the District but Escambia and Santa Rosa counties had severe drought conditions present (Figure 18).

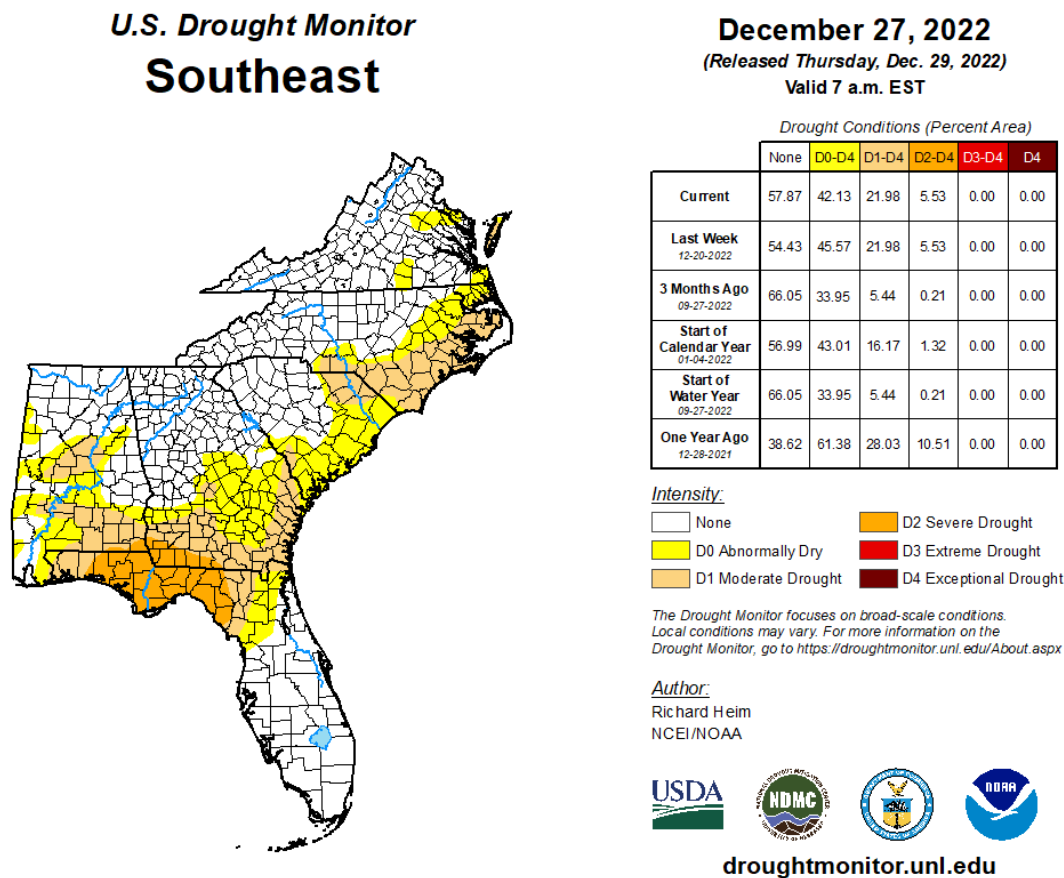
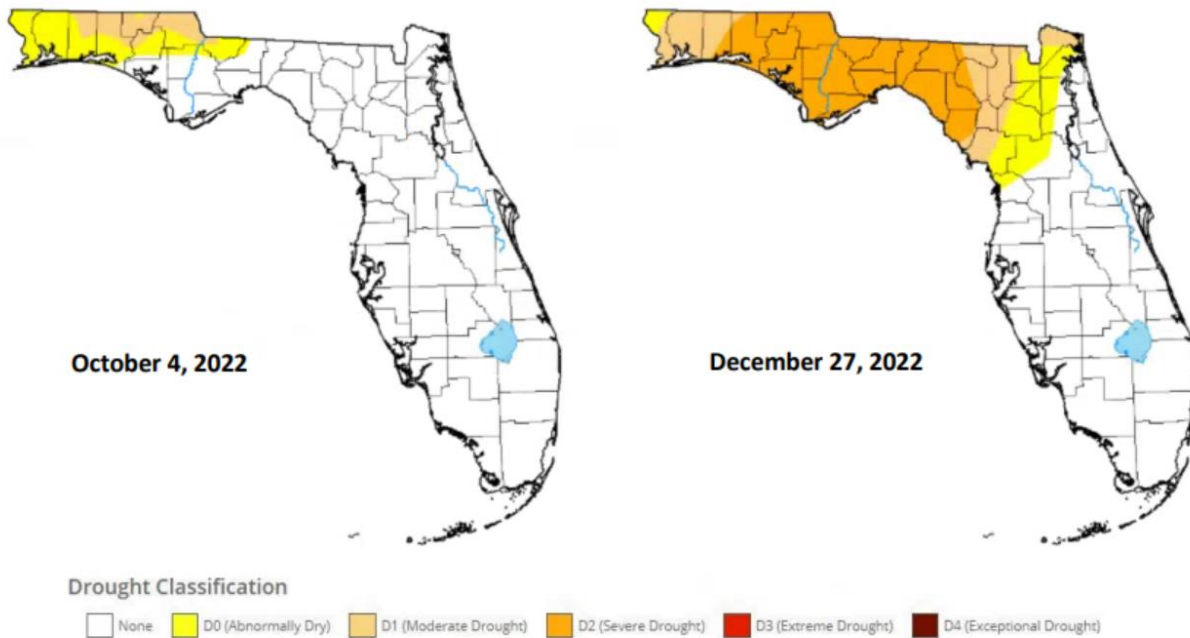


Figure 18. Southeast Climate Region drought conditions at the end of the fourth quarter on December 27th, 2022

# U.S. Drought Monitor

## Florida



### Statistics Comparison

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
2022-07-05	76.50	23.50	0.00	0.00	0.00	0.00	24
2022-09-27	91.16	8.84	0.00	0.00	0.00	0.00	9
Change	14.66	-14.66	0.00	0.00	0.00	0.00	-15

Figure 19. Florida Drought Conditions at the beginning of the quarter on October 4, 2022, compared to at the end of the quarter on December 27, 2022;  
Source: <http://droughtmonitor.unl.edu/Maps/CompareTwoWeeks.aspx>