

# VIRGINIA DROUGHT MONITORING TASK FORCE

## Drought Status Report

### April 2019

#### Summary

The Virginia Drought Monitoring Task Force (DMTF) met on Tuesday, April 16, 2019 to discuss the status of drought monitoring and hydrologic conditions in the Commonwealth of Virginia. During the past year, precipitation fell across Virginia at near-record to record levels (Appendix A). Consequently, groundwater levels and reservoir levels are above normal to well above normal. Streamflows are at normal to above-normal levels across nearly the entire Commonwealth. High base flows in the streams (due to continued higher than normal groundwater levels) are directly related to above normal rainfall over recent months. Hydrologic conditions, both currently and over the recent past, indicate little likelihood for hydrologic drought during the upcoming summer and fall months. Variations in rainfall during these months, however, could result in rainfall deficits that can affect crop resources (agricultural drought).

The most recent weekly [U.S. Drought Monitor](#) web page map for Virginia (released April 18, 2019) showed no areas of abnormally dry (D0) conditions in the Commonwealth.

The National Weather Service [Monthly Drought Outlook](#), also released on April 18, 2019, indicated equal chances of above or below normal rainfall. The current U. S. [Seasonal Drought Outlook](#) for the period through July 31, 2019 (released April 18, 2019) indicated no drought likelihood in Virginia.

#### Reports:

Written reports were submitted from the Virginia State Climatology Office, the U. S. Geological Survey (USGS), the Virginia Department of Health Office of Drinking Water (VDH-ODW), the Virginia Department of Forestry (DOF), and the DEQ. The report from the Climatology Office discusses recent precipitation and temperature records within the Commonwealth's 13 Drought Evaluation Regions and the resulting implications for drought conditions. The USGS report described streamflow and groundwater levels at drought indicator stations in Virginia. The VDH-ODW report lists any public water supplies impacted by dry conditions, the DOF report was an update on the status of forest resources with respect to current climatic conditions, and the DEQ report contained a listing of current conditions at the 4 large multi-purpose reservoirs listed as key reservoir storage indicators in the [Virginia Drought Assessment and Response Plan](#). The DEQ report also included the results of a prediction of drought potential for the summer of 2019 based upon streamflow conditions during the previous winter recharge season.

Verbal reports were provided by the National Weather Service (NWS) and the U.S Army Corps of Engineers (USACE) Wilmington District office. NWS staff provided a presentation that reviewed current and forecast weather conditions across the region. The USACE described conditions affecting Philpott and J.H. Kerr reservoirs in the Roanoke drought evaluation region. Reservoir levels at both projects are at or above guide curve levels, with plenty of storage currently available at Kerr for spring spawning releases.

The next DMTF meeting was scheduled for [June 13, 2019](#).

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## Report from the Climatology Office at the University of Virginia

April 16, 2019

Averaged across the Commonwealth, the year 2018 was one of the wettest ever recorded. Although not yet ruled official, one NOAA station appears to have broken the all-time Virginia record for calendar year precipitation (The Montebello Fish Hatchery, with approximately 90 inches).

The year 2019 has also started out wet, with all Drought Regions receiving at least 94% of normal for the first three months, and only two (Northern Coastal Plain and York–James) below normal. Current Water Year (starting October 1, 2018) total precipitation has been well above normal for all Regions, with a statewide average of about 140% of normal. The critical colder period of the year has, thus, been good for the reduction of any lingering deficits of deep soil and groundwater reserves.

Over the course of the late fall and winter months, a number of storms, most tracking in from the west and southwest, brought large amounts of moisture into Virginia. During the Spring and Summer, several outbreaks of thunderstorms led to massive rainfalls to many locations. Due to this, the official station observations belie the actual amounts received, averaged overall, during these thunderstorm events.

We are at the time of year when mid-latitude storms and associated frontal passages (which can often bring well distributed rainfall) are due to give way to thunderstorm activity as the primary moisture source. Overall, thunderstorms tend to deliver rainfall that can vary greatly over relatively small areas.

Although the likelihood of long-term (water supply) moisture shortages later this year seems unlikely, it is important to note that short-term (agricultural) drought can still occur, due to rapid drying of the topsoil layers in the absence of inputs in the weekly timeframe. In addition, the timing of wet and dry spells is just as important as their intensity, and the resulting differences in crop yields can be dramatic.

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**U.S. Geological Survey**  
**April 15, 2019**

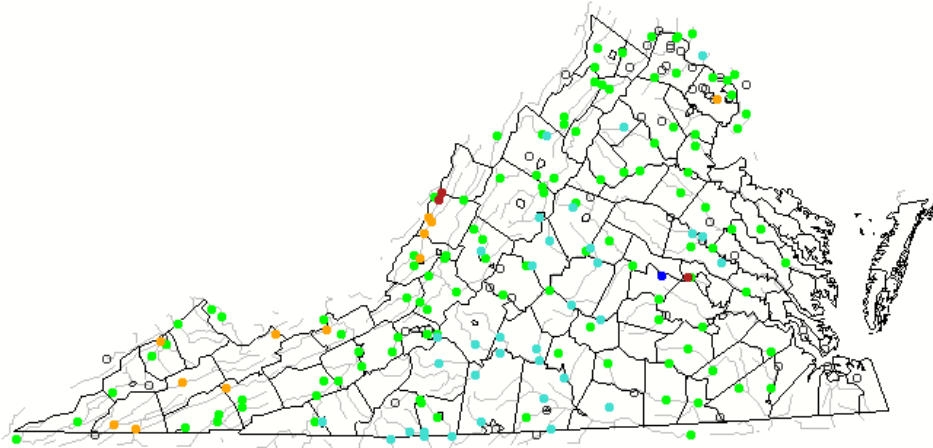
Streamflows are at normal levels across most of the Commonwealth (fig. 1). Two areas, the Upper James and Clinch River basins, are both showing below normal 7-day average flow when compared to historical streamflow (fig. 2). The high base flows in the streams is directly related to the precipitation that has fallen over the past couple of months. Widespread rainfall totals of 2-6 inches were seen in March 2019 (fig 3), while large areas saw 5-10 inches in February 2019 with the far southwest portion of the state receiving 10-15 inches (fig 4). The monthly runoff duration hydrograph for the Commonwealth shows streamflows have been much above normal since September 2018 (fig. 5).

Groundwater levels in all but one of the observation wells in the Virginia Climate Response Network are reporting at or above normal water levels (fig. 6). The only exception is the Prince William County well (49V 1), which is currently reporting water levels below the 10<sup>th</sup> percentile for this time of year. Further data analysis and field verification is needed to determine the validity of this data. Prior to the end of March 2019, water levels at 49V 1 were normal to above normal. As with the streamflows, above normal precipitation in February has increased the base groundwater levels as we head into the spring.

Currently, the [USGS Quick Drought Response Index](https://va.water.usgs.gov/webmap/drought/) (QuickDRI) shows most of the state in at, or wetter than, average conditions (fig. 7). The extreme southwest portion of the state is drier, and the neighboring states of Kentucky and West Virginia are much drier when compared to Virginia. There is less than a 10% probability for a drought in most areas for the July-September time frame, with some areas indicating as high as a 20% chance in July (<https://va.water.usgs.gov/webmap/drought/>).

The current surface water and groundwater conditions indicate that drought conditions are not likely this summer. Variations in rainfall patterns could certainly change this forecast.

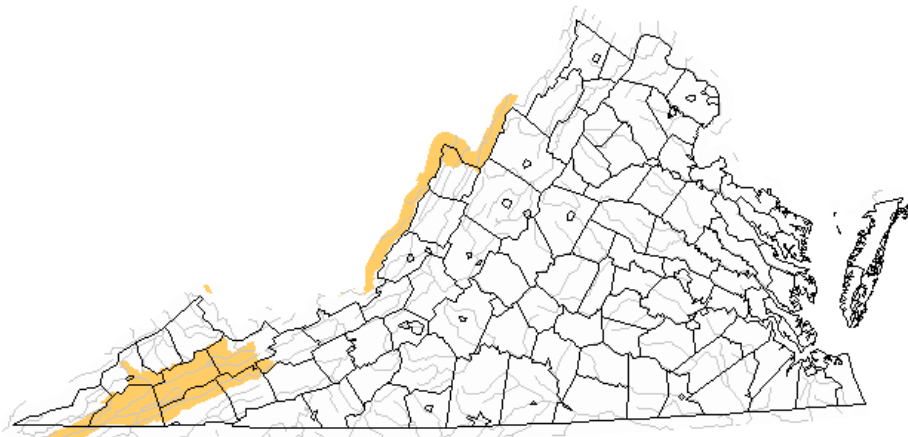
Sunday, April 14, 2019



Explanation - Percentile classes							
<span style="color: red;">●</span>	<span style="color: orange;">●</span>	<span style="color: green;">●</span>	<span style="color: cyan;">●</span>	<span style="color: blue;">●</span>	<span style="color: black;">●</span>	<span style="color: grey;">○</span>	
Low	<10 Much below normal	10-24 Below normal	25-75 Normal	76-90 Above normal	>90 Much above normal	High	Not-ranked

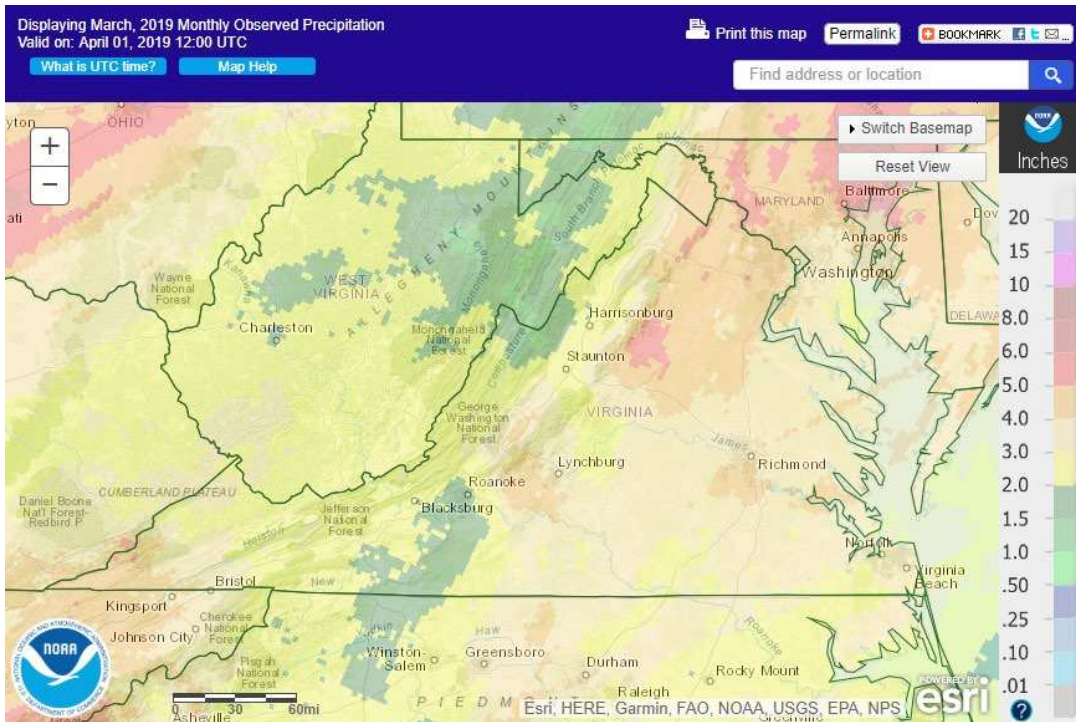
**Figure 1.** 7-day average streamflow compared to historical streamflow at individual stations for April 14, 2019, in Virginia. <https://waterwatch.usgs.gov/index.php?m=pa07d&r=va&w=map>

Sunday, April 14, 2019

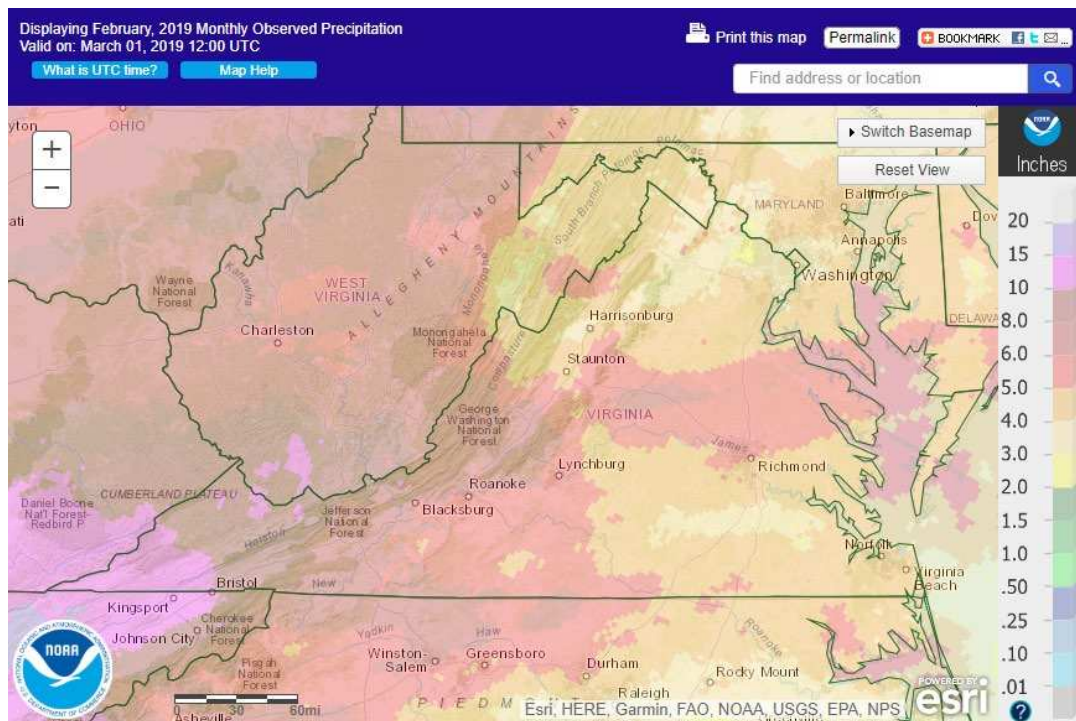


Explanation - Percentile classes			
Low	≤5	6-9	10-24
Extreme hydrologic drought	Severe hydrologic drought	Moderate hydrologic drought	Below normal

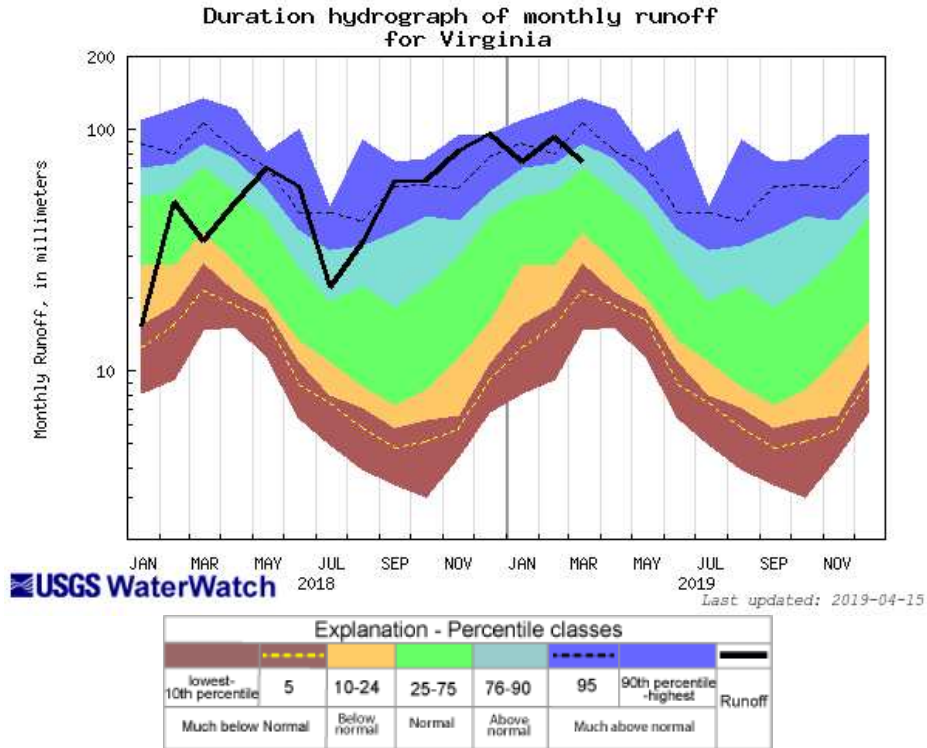
**Figure 2.** 7-day average streamflow compared to historical streamflow in river basins for April 14, 2019, in Virginia. <https://waterwatch.usgs.gov/index.php?m=dryw&r=va>



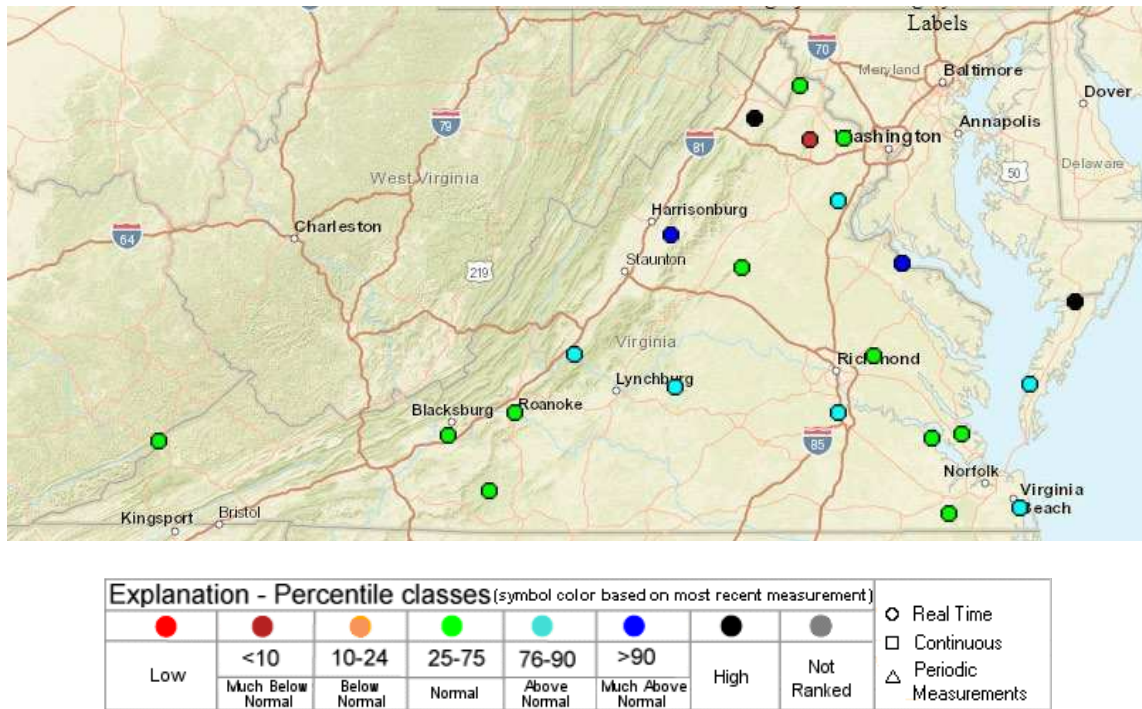
**Figure 3.** March 2019 rainfall totals from the National Weather Service.  
<https://water.weather.gov/precip/> - accessed April 15, 2019



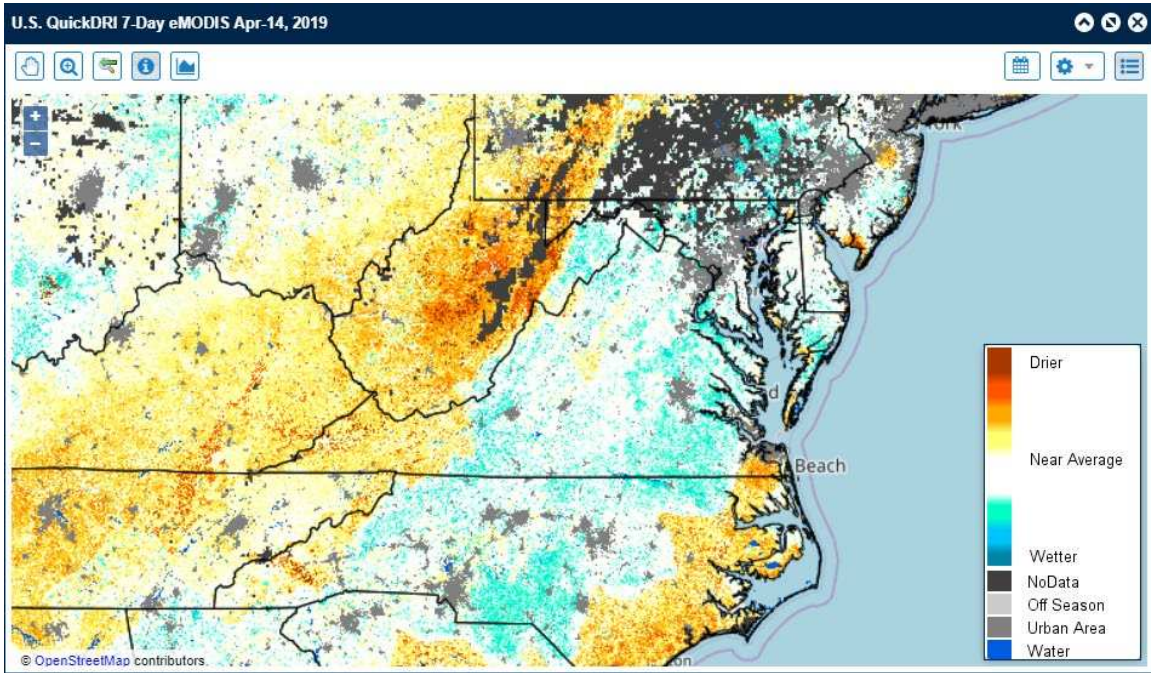
**Figure 4.** April 2019 rainfall totals from the National Weather Service.  
<https://water.weather.gov/precip/> - accessed April 15, 2019



**Figure 5.** Streamflow duration hydrograph for monthly runoff in Virginia through March 2019. <https://waterwatch.usgs.gov/index.php?id=hucdr>



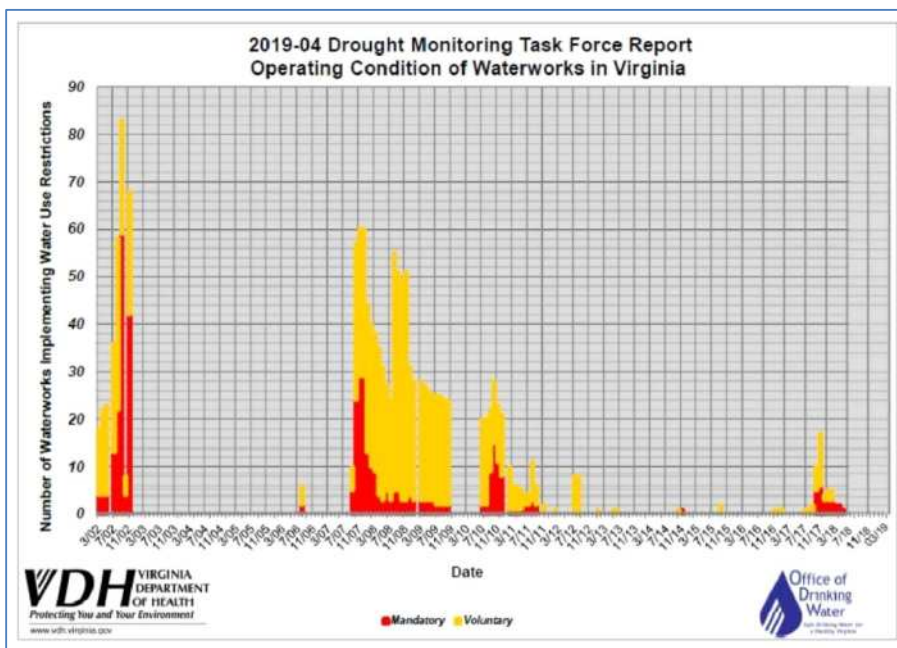
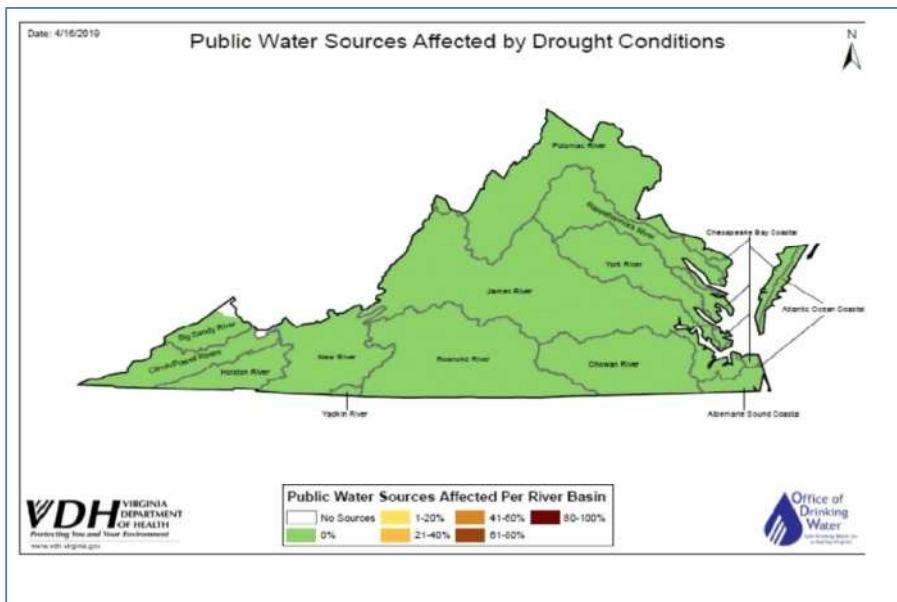
**Figure 6.** Groundwater-level conditions from the Virginia Climate Response Network for April 15, 2019. <http://groundwaterwatch.usgs.gov/NetMapT1L2.asp?ncd=crn&sc=51>



**Figure 7.** USGS QuickDRI 7-day analysis for April 14, 2019. <https://vegdiri.cr.usgs.gov/viewer/>

## Virginia Department of Health, Office of Drinking Water Public Water Supply Report - April, 2019

As of April 2019, there are no waterworks implementing water use restrictions in Virginia. VDH-ODW's Drought Monitoring map and trend are illustrated below. The map reflects the percentage of public surface water sources operating under drought restrictions within the main river basins of Virginia. The trend shows the amount of waterworks that have been affected by drought conditions since March 2002.





## Virginia Department of Forestry Drought Report

April 16, 2019

Virginia's spring wildfire season officially runs from February 15 – April 30. The spring 2019 wildfire season is shaping up to be one of our lightest on record in terms of overall wildfire activity, thanks to a continuation of the above average precipitation that was experienced in the Commonwealth during 2018. Thus far in 2019, the VDOF has suppressed 168 wildfires which have burned 958 acres. Agency suppression efforts on these fires protected 104 homes and 82 other structures, with a total value protected of over 17 million dollars. As has been the case now for several years, Virginia's wildfire activity continues to be much lower than our historical averages.

The VDOF uses the Keech-Byrum Drought Index (KBDI) as one predictor for setting the agencies daily response readiness level. KBDI levels range from a low of zero, meaning saturated soil moisture levels, to a high of 800, which indicates extreme drought, in terms of soil moisture. Soil moisture levels directly relate to forest fuel moisture conditions, and as forest fuels dry, the potential for wildfire starts, as well as the burning intensity of wildfires, increase. Virginia has experienced very low KBDI readings (indicating wetter soil conditions) since the spring of 2018, and this is reflected in Virginia's low wildfire occurrence during this same period.

In terms of forest health, soil quality is vital to forest health and productivity. Wetter soil conditions tend to limit the potential for any significant concerns related to either insects or disease.

## Virginia Department of Environmental Quality

### Conditions of Major Drought Indicator Reservoirs, April, 2019

Four large multi-purpose reservoirs are identified as drought indicators in the Virginia Drought Assessment and Response Plan: Smith Mountain Lake, Lake Moomaw, Lake Anna and Kerr Reservoir. Below is a summary of reported conditions at these reservoirs on April 19, 2019:

**Smith Mountain Lake** on the Staunton River in the Roanoke drought evaluation region was at an adjusted elevation of 795.01 ft, 0.01 ft above full pool level and 2.01 ft above Watch level. The adjusted elevation is the level the lake would be if the water currently held in the lower Leesville Lake for reuse were pumped back into Smith Mountain Lake. Recent 7-day inflows have been above the normal range.

**Lake Moomaw** on the Jackson River in the Upper James drought evaluation region was at 1583.93 ft, which is 1.93 ft above the top of the conservation pool (1582.0 feet MSL) and 18.93 ft above the Drought Watch level. Recent 7-day average inflows to Lake Moomaw have been normal to above normal.

**Lake Anna** on the North Anna River in the Northern Piedmont drought evaluation region was reported at elevation 250.1 ft. The Drought Watch stage for Lake Anna is elevation 248 feet and below.

**J. H. Kerr Reservoir** on the Staunton River in the Roanoke drought evaluation region was at 302.86 feet, which is 0.86 feet above the guide curve level for this time period. Recent inflows to J. H. Kerr Reservoir have been above normal.

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**Table 2: Current water levels at Drought Indicator Reservoirs:**

Reservoir Name	Date / Time	Reported Elevation (ft msl)	Drought Watch Range (ft msl)	Drought Warning Range (ft msl)	Current Guide Curve Elevation (ft msl)	Drought Evaluation Region(s) represented
Smith Mt Lake	April 19/05:00	795.01	793 – 791.5	791.5 – 790.0		Roanoke River
Lake Moomaw	April 19/09:30	1583.93	1565 – 1562.5	1562.5 – 1560.0		Upper & Middle James River
Lake Anna	April 19	250.0	248 - 246	246 – 244		Northern Piedmont
J. H. Kerr Reservoir	April 19 / 0800	301.45	3 – 6 ft below guide curve	> 6 ft below guide curve	302.00	Roanoke River, Southeast Virginia

DEQ conducted a statistical analysis of streamflow records for the period from November, 2018 through February, 2019 following the method described by [Austin \(2014\)](#) to predict probabilities for streamflows during the summer of 2019 to drop below drought indicator levels. The analysis indicated very low probability summer drought flows in 2019 (Figure 1), in contrast with the greater probabilities predicted during the spring of 2018 (Figure 2).

Figure 1: 2019 prediction:

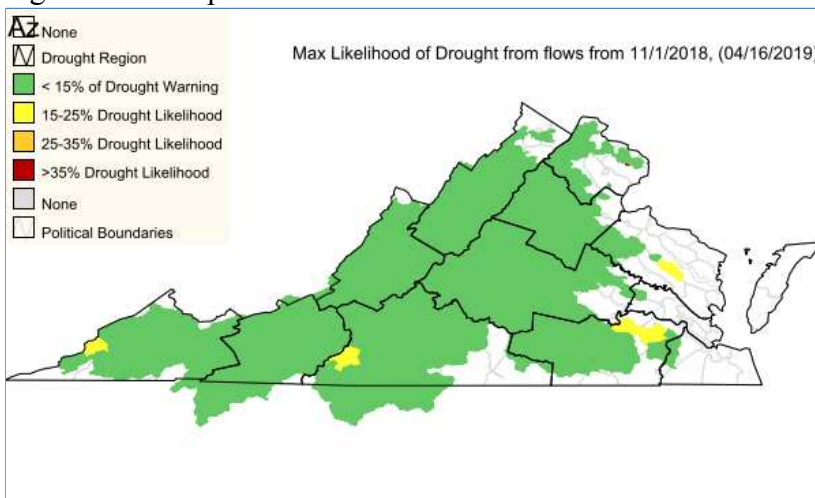
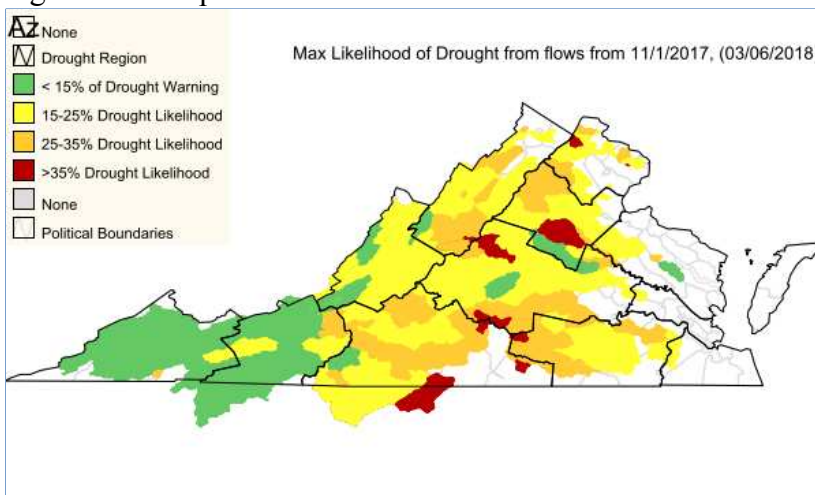


Figure 2: 2018 prediction:



## Appendix A

### PRELIMINARY PRECIPITATION SUMMARY

Prepared:  
4/10/19

DROUGHT REGION		OBSERVED	Mar 1, 2019 NORMAL	- Mar 31, 2019 DEPARTURE	% OF NORM.
1	Big Sandy	3.20	4.25	-1.05	75%
2	New River	2.13	3.67	-1.54	58%
3	Roanoke	2.97	4.27	-1.30	70%
4	Upper James	3.11	3.79	-0.68	82%
5	Middle James	3.93	4.06	-0.13	97%
6	Shenandoah	3.47	3.20	0.27	108%
7	Northern Virginia	4.45	3.66	0.79	122%
8	Northern Piedmont	4.24	3.81	0.43	111%
9	Chowan	3.92	4.37	-0.45	90%
10	Northern Coastal Plain	3.19	4.28	-1.09	75%
11	York-James	3.65	4.69	-1.04	78%
12	Southeast Virginia	2.76	4.20	-1.44	66%
13	Eastern Shore	3.95	4.31	-0.36	92%
	Statewide	3.42	4.04	-0.62	85%

DROUGHT REGION		OBSERVED	Feb 1, 2019 NORMAL	- Mar 31, 2019 DEPARTURE	% OF NORM.
1	Big Sandy	12.31	7.83	4.48	157%
2	New River	7.48	6.60	0.88	113%
3	Roanoke	8.29	7.58	0.71	109%
4	Upper James	8.58	6.64	1.94	129%
5	Middle James	8.67	7.18	1.49	121%
6	Shenandoah	6.78	5.61	1.17	121%
7	Northern Virginia	8.45	6.33	2.12	133%
8	Northern Piedmont	8.16	6.78	1.38	120%
9	Chowan	8.71	7.54	1.17	116%
10	Northern Coastal Plain	7.53	7.42	0.11	101%
11	York-James	8.16	8.22	-0.06	99%
12	Southeast Virginia	7.72	7.70	0.02	100%
13	Eastern Shore	8.06	7.50	0.56	107%
	Statewide	8.56	7.17	1.39	119%

DROUGHT REGION		OBSERVED	Jan 1, 2019 NORMAL	- Mar 31, 2019 DEPARTURE	% OF NORM.
1	Big Sandy	16.46	11.56	4.90	142%
2	New River	10.29	9.81	0.48	105%
3	Roanoke	12.11	11.50	0.61	105%
4	Upper James	12.03	9.92	2.11	121%
5	Middle James	11.91	10.84	1.07	110%
6	Shenandoah	9.70	8.46	1.24	115%
7	Northern Virginia	12.48	9.61	2.87	130%
8	Northern Piedmont	11.29	10.30	0.99	110%
9	Chowan	12.41	11.65	0.76	107%
10	Northern Coastal Plain	10.52	11.17	-0.65	94%
11	York-James	12.02	12.36	-0.34	97%
12	Southeast Virginia	12.02	11.86	0.16	101%
13	Eastern Shore	12.31	11.06	1.25	111%
	Statewide	12.05	10.81	1.24	111%

DROUGHT REGION		OBSERVED	Dec 1, 2018 NORMAL	- Mar 31, 2019 DEPARTURE	% OF NORM.
1	Big Sandy	22.33	15.20	7.13	147%
2	New River	16.05	12.52	3.53	128%
3	Roanoke	18.78	14.75	4.03	127%
4	Upper James	18.07	12.87	5.20	140%
5	Middle James	17.39	14.01	3.38	124%
6	Shenandoah	14.93	11.05	3.88	135%
7	Northern Virginia	18.04	12.71	5.33	142%
8	Northern Piedmont	16.48	13.58	2.90	121%
9	Chowan	16.84	14.67	2.17	115%
10	Northern Coastal Plain	14.37	14.45	-0.08	99%
11	York-James	16.62	15.75	0.87	106%
12	Southeast Virginia	16.82	15.04	1.78	112%
13	Eastern Shore	16.65	14.30	2.35	116%
	Statewide	17.50	13.93	3.57	126%

DROUGHT		Nov 1, 2018 - Mar 31, 2019			
REGION	OBSERVED	NORMAL	DEPARTURE	% OF NORM.	
1	Big Sandy	27.36	18.48	8.88	148%
2	New River	20.16	15.55	4.61	130%
3	Roanoke	25.76	18.11	7.65	142%
4	Upper James	23.40	16.23	7.17	144%
5	Middle James	24.38	17.52	6.86	139%
6	Shenandoah	20.26	14.10	6.16	144%
7	Northern Virginia	25.08	16.12	8.96	156%
8	Northern Piedmont	23.33	17.38	5.95	134%
9	Chowan	23.41	17.78	5.63	132%
10	Northern Coastal Plain	21.14	17.59	3.55	120%
11	York-James	22.45	19.12	3.33	117%
12	Southeast Virginia	21.35	18.11	3.24	118%
13	Eastern Shore	22.02	17.24	4.78	128%
	Statewide	23.58	17.16	6.42	137%

DROUGHT		Oct 1, 2018 - Mar 31, 2019			
REGION	OBSERVED	NORMAL	DEPARTURE	% OF NORM.	
1	Big Sandy	30.73	21.36	9.37	144%
2	New River	26.00	18.72	7.28	139%
3	Roanoke	32.48	21.82	10.66	149%
4	Upper James	27.54	19.48	8.06	141%
5	Middle James	30.39	21.36	9.03	142%
6	Shenandoah	22.85	17.29	5.56	132%
7	Northern Virginia	27.81	19.60	8.21	142%
8	Northern Piedmont	27.49	21.37	6.12	129%
9	Chowan	28.87	21.36	7.51	135%
10	Northern Coastal Plain	29.18	21.10	8.08	138%
11	York-James	27.36	22.65	4.71	121%
12	Southeast Virginia	24.61	21.77	2.84	113%
13	Eastern Shore	25.65	20.45	5.20	125%
	Statewide	28.60	20.66	7.94	138%

DROUGHT REGION		OBSERVED	Sep 1, 2018 NORMAL	- Mar 31, 2019 DEPARTURE	% OF NORM.
1	Big Sandy	37.50	24.82	12.68	151%
2	New River	35.75	22.13	13.62	162%
3	Roanoke	43.33	26.05	17.28	166%
4	Upper James	36.96	22.98	13.98	161%
5	Middle James	37.97	25.49	12.48	149%
6	Shenandoah	32.39	20.96	11.43	155%
7	Northern Virginia	36.18	23.67	12.51	153%
8	Northern Piedmont	36.65	25.65	11.00	143%
9	Chowan	33.65	25.79	7.86	130%
10	Northern Coastal Plain	35.25	25.19	10.06	140%
11	York-James	33.59	27.55	6.04	122%
12	Southeast Virginia	28.89	26.20	2.69	110%
13	Eastern Shore	32.41	24.06	8.35	135%
	Statewide	36.67	24.66	12.01	149%

DROUGHT REGION		OBSERVED	Aug 1, 2018 NORMAL	- Mar 31, 2019 DEPARTURE	% OF NORM.
1	Big Sandy	43.26	28.65	14.61	151%
2	New River	41.86	25.44	16.42	165%
3	Roanoke	49.25	29.77	19.48	165%
4	Upper James	43.42	26.31	17.11	165%
5	Middle James	43.43	29.31	14.12	148%
6	Shenandoah	39.67	24.29	15.38	163%
7	Northern Virginia	41.38	27.52	13.86	150%
8	Northern Piedmont	44.82	29.47	15.35	152%
9	Chowan	38.85	30.10	8.75	129%
10	Northern Coastal Plain	40.34	29.05	11.29	139%
11	York-James	37.59	32.42	5.17	116%
12	Southeast Virginia	34.48	31.32	3.16	110%
13	Eastern Shore	34.95	27.93	7.02	125%
	Statewide	42.57	28.49	14.08	149%

DROUGHT		Jul 1, 2018 - Mar 31, 2019			
REGION	OBSERVED	NORMAL	DEPARTURE	% OF NORM.	
1	Big Sandy	47.28	33.13	14.15	143%
2	New River	45.93	29.23	16.70	157%
3	Roanoke	54.31	34.16	20.15	159%
4	Upper James	46.52	30.35	16.17	153%
5	Middle James	48.52	33.72	14.80	144%
6	Shenandoah	45.28	28.05	17.23	161%
7	Northern Virginia	50.98	31.29	19.69	163%
8	Northern Piedmont	50.42	33.87	16.55	149%
9	Chowan	45.89	34.61	11.28	133%
10	Northern Coastal Plain	47.56	33.50	14.06	142%
11	York-James	46.94	37.52	9.42	125%
12	Southeast Virginia	42.60	36.39	6.21	117%
13	Eastern Shore	41.09	31.93	9.16	129%
	Statewide	48.16	32.83	15.33	147%

DROUGHT		Jun 1, 2018 - Mar 31, 2019			
REGION	OBSERVED	NORMAL	DEPARTURE	% OF NORM.	
1	Big Sandy	52.55	37.27	15.28	141%
2	New River	48.30	33.08	15.22	146%
3	Roanoke	58.30	38.05	20.25	153%
4	Upper James	51.27	34.06	17.21	151%
5	Middle James	55.46	37.23	18.23	149%
6	Shenandoah	55.82	31.76	24.06	176%
7	Northern Virginia	57.31	35.15	22.16	163%
8	Northern Piedmont	60.01	37.88	22.13	158%
9	Chowan	51.38	38.26	13.12	134%
10	Northern Coastal Plain	55.74	37.06	18.68	150%
11	York-James	50.77	40.93	9.84	124%
12	Southeast Virginia	47.52	40.00	7.52	119%
13	Eastern Shore	45.94	34.91	11.03	132%
	Statewide	54.23	36.62	17.61	148%

DROUGHT		May 1, 2018 - Mar 31, 2019			
REGION	OBSERVED	NORMAL	DEPARTURE	% OF NORM.	

1	Big Sandy	57.83	42.09	15.74	137%
2	New River	53.74	37.29	16.45	144%
3	Roanoke	65.97	42.38	23.59	156%
4	Upper James	57.16	38.34	18.82	149%
5	Middle James	64.02	41.47	22.55	154%
6	Shenandoah	63.77	35.60	28.17	179%
7	Northern Virginia	65.15	39.49	25.66	165%
8	Northern Piedmont	67.33	42.10	25.23	160%
9	Chowan	58.75	42.35	16.40	139%
10	Northern Coastal Plain	63.76	41.22	22.54	155%
11	York-James	56.94	45.20	11.74	126%
12	Southeast Virginia	54.08	43.86	10.22	123%
13	Eastern Shore	51.39	38.43	12.96	134%
	Statewide	61.38	40.88	20.50	150%

DROUGHT REGION	OBSERVED	Apr 1, 2018 NORMAL	- Mar 31, 2019 DEPARTURE	% OF NORM.	
1	Big Sandy	61.80	45.85	15.95	135%
2	New River	58.64	40.84	17.80	144%
3	Roanoke	71.51	46.18	25.33	155%
4	Upper James	62.51	41.74	20.77	150%
5	Middle James	69.25	44.81	24.44	155%
6	Shenandoah	67.43	38.52	28.91	175%
7	Northern Virginia	68.78	42.79	25.99	161%
8	Northern Piedmont	72.08	45.39	26.69	159%
9	Chowan	62.15	45.78	16.37	136%
10	Northern Coastal Plain	67.18	44.31	22.87	152%
11	York-James	59.38	48.50	10.88	122%
12	Southeast Virginia	57.02	47.11	9.91	121%
13	Eastern Shore	53.38	41.35	12.03	129%
	Statewide	65.77	44.30	21.47	148%

DROUGHT REGION	OBSERVED	Mar 1, 2018 NORMAL	- Mar 31, 2019 DEPARTURE	% OF NORM.	
1	Big Sandy	66.68	50.10	16.58	133%



2	New River	63.25	44.51	18.74	142%
3	Roanoke	74.94	50.45	24.49	149%
4	Upper James	65.30	45.53	19.77	143%
5	Middle James	71.69	48.87	22.82	147%
6	Shenandoah	69.31	41.72	27.59	166%
7	Northern Virginia	70.80	46.45	24.35	152%
8	Northern Piedmont	73.86	49.20	24.66	150%
9	Chowan	65.17	50.15	15.02	130%
10	Northern Coastal Plain	69.63	48.59	21.04	143%
11	York-James	62.11	53.19	8.92	117%
12	Southeast Virginia	60.49	51.31	9.18	118%
13	Eastern Shore	56.91	45.66	11.25	125%
	Statewide	68.81	48.34	20.47	142%

DROUGHT		Feb 1, 2018 - Mar 31, 2019			
REGION	OBSERVED	NORMAL	DEPARTURE	% OF NORM.	
1	Big Sandy	74.55	53.68	20.87	139%
2	New River	67.60	47.44	20.16	142%
3	Roanoke	79.39	53.76	25.63	148%
4	Upper James	70.38	48.38	22.00	145%
5	Middle James	75.86	51.99	23.87	146%
6	Shenandoah	72.94	44.13	28.81	165%
7	Northern Virginia	74.83	49.12	25.71	152%
8	Northern Piedmont	79.51	52.17	27.34	152%
9	Chowan	66.99	53.32	13.67	126%
10	Northern Coastal Plain	73.11	51.73	21.38	141%
11	York-James	64.83	56.72	8.11	114%
12	Southeast Virginia	62.13	54.81	7.32	113%
13	Eastern Shore	58.86	48.85	10.01	120%
	Statewide	73.12	51.47	21.65	142%

DROUGHT		Jan 1, 2018 - Mar 31, 2019			
REGION	OBSERVED	NORMAL	DEPARTURE	% OF NORM.	
1	Big Sandy	76.68	57.41	19.27	134%
2	New River	69.49	50.65	18.84	137%
3	Roanoke	81.99	57.68	24.31	142%

4	Upper James	72.60	51.66	20.94	141%
5	Middle James	79.20	55.65	23.55	142%
6	Shenandoah	74.78	46.98	27.80	159%
7	Northern Virginia	76.50	52.40	24.10	146%
8	Northern Piedmont	81.41	55.69	25.72	146%
9	Chowan	71.91	57.43	14.48	125%
10	Northern Coastal Plain	76.62	55.48	21.14	138%
11	York-James	68.90	60.86	8.04	113%
12	Southeast Virginia	65.92	58.97	6.95	112%
13	Eastern Shore	61.99	52.41	9.58	118%
	Statewide	75.90	55.11	20.79	138%