

MASSACHUSETTS WATER RESOURCES COMMISSION

JUNE  
**2020** HYDROLOGIC CONDITIONS  
IN MASSACHUSETTS



The Commonwealth of Massachusetts  
Charles D. Baker, Governor

Kathleen A. Theoharides, Secretary, Executive Office of Energy and Environmental Affairs

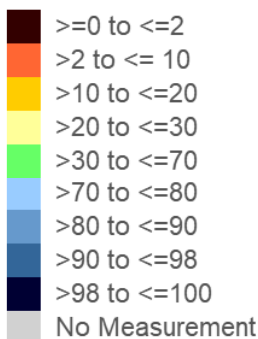
# JUNE 2020 HYDROLOGIC CONDITIONS

- Monthly temperatures were above average for June.
- Precipitation continued to be low in much of the state for the month of June. Index severity levels for the 1-month SPI are at Level 1 for the Western, Central, and Islands Regions and Level 2 for the CT River Valley and Cape Cod Regions.
- Monthly median streamflows were low. The Western, CT River Valley, and Central Regions are at an Index Severity Level 3 and the Northeast Region is at Level 2.
- Groundwater levels varied across the state but were mostly low in the Western, Central (both Level 1), and CT River Valley (Level 2) Regions.
- For July, NOAA projects above-normal temperatures and a slight chance for below-normal precipitation in already-drier areas of the state.
- Appendices I and II provide additional precipitation data and information on the Massachusetts Drought Management Plan (DMP).



## PRECIPITATION

### Percentiles



Precipitation was uneven across MA for the month of June and remained overall on the low side except for the SE Region which remains near normal. All other regions tripped the SPI 2-month lookback except for the Islands, which only tripped the 1-month SPI.

Index Severity Level
1
2
3
4

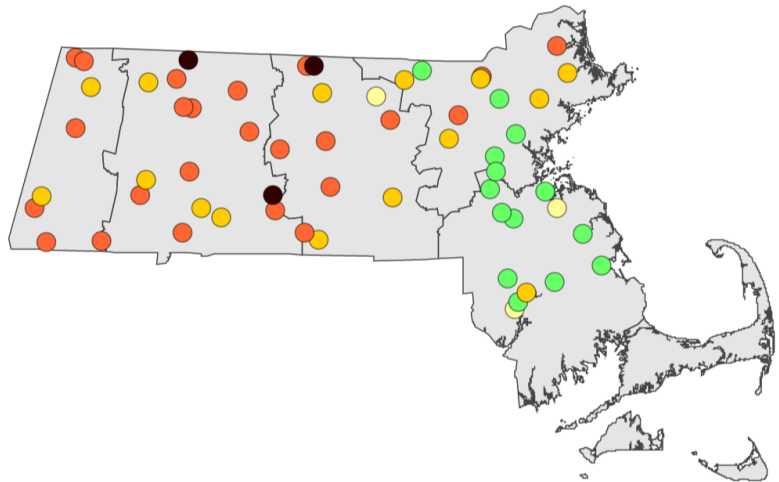
REGION	NUMBER OF SITES	MONTHLY AVERAGE (IN)	DEPARTURE FROM HISTORICAL (IN)	DMP SPI 1-MONTH	DMP SPI 2-MONTH	DMP SPI 3-MONTH
WESTERN	5	3.05	-1.69	-0.75	-1.35	-0.93
CT RIVER VALLEY	10	2.15	-2.23	-1.07	-1.48	-1.22
CENTRAL	10	2.46	-1.56	-0.80	-1.17	-0.36
NORTHEAST	11	2.19	-1.45	-0.51	-0.77	-0.22
SOUTHEAST	15	3.96	0.03	0.10	-0.24	0.67
CAPE COD	4	1.49	-1.86	-1.11	-1.22	-0.08
ISLANDS	4	1.59	-1.45	-0.80	-0.03	0.31

# STREAMFLOW

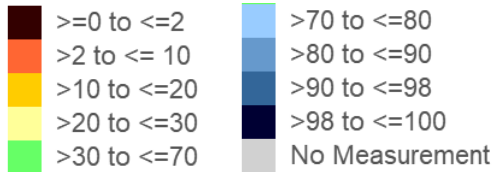
All gages in the Western, CT River Valley, and Central Regions had monthly medians below the 30th percentile, with several at or near record lows. These regions are at an Index Severity Level 3. The NE Region also had low streamflow with many of its gages' monthly medians below the 20th percentile and is at an Index Severity Level 2.

Streamflow is monitored by the Commonwealth of Massachusetts and United States Geological Survey (USGS) cooperative stream gaging program.

Median Monthly Streamflows Compared to Historical Values



## Percentiles



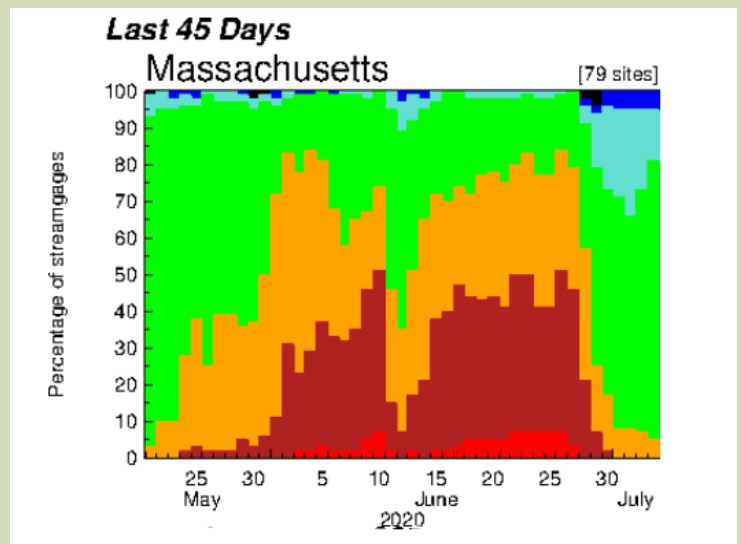
REGION	TOTAL GAGES REPORTING FOR JUNE	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 TO ≤30 PERCENTILE	>90 PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES	DMP INDEX SEVERITY
WESTERN	8	0	6	2	0	0	6	3
CT RIVER VALLEY	15	2	9	4	0	0	8	3
CENTRAL	11	1	6	3	1	0	8	3
NORTHEAST	13	0	3	5	0	0	18	2
SOUTHEAST	12	0	0	1	2	0	34	0

**Notes:** Not all gages report in all months due to ice, beaver dams or other conditions. Streamflow index is not applicable to Cape Cod and the Islands.

## Time Series of Average Daily Streamflows Compared to Historical Values

[https://waterwatch.usgs.gov/index.php?id=real&sid=w\\_plot\\_sum&r=ma](https://waterwatch.usgs.gov/index.php?id=real&sid=w_plot_sum&r=ma)

Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		



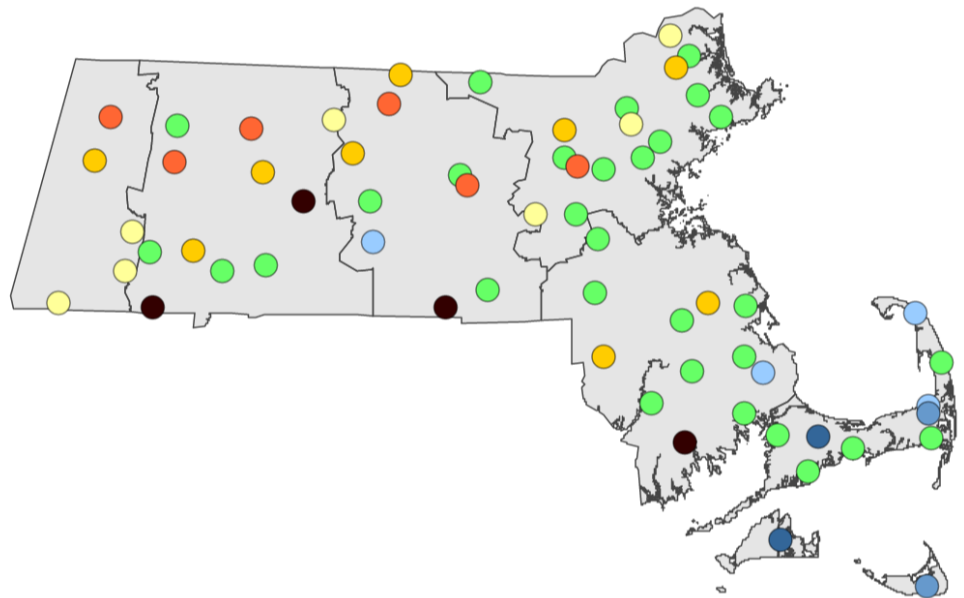
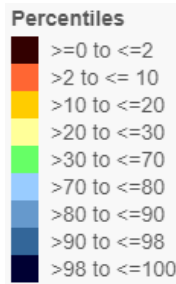


# GROUNDWATER

## End of Month Groundwater Compared to Historical in the Climate Response Network

Groundwater levels varied across the state and within the regions. There were four wells below the 2nd percentile while there were two wells greater than the 90th percentile. Overall levels were low in the Western and Central Regions (Index Severity Level 1) and the CT River Valley Region (Index Severity Level 2).

<https://groundwater-watch.usgs.gov/NetMapT1L2.asp?ncd=crn&sc=25>



REGION	TOTAL WELLS REPORTING FOR JUNE	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 TO ≤30 PERCENTILE	>90 PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES	DMP INDEX SEVERITY
WESTERN	5	0	1	1	3	0	21	1
CT RIVER VALLEY	11	2	2	2	1	0	18	2
CENTRAL	10	1	2	2	1	0	25	1
NORTHEAST	15	0	1	2	2	0	43	0
SOUTHEAST	12	1	0	2	0	0	34	0
CAPE COD	9	0	0	0	0	1	70	0
ISLANDS	2	0	0	0	0	1	89	0

## LAKES AND IMPOUNDMENTS

At the end of June, lakes and impoundments in the Western, Northeast, and Southeast Regions were lower than usual resulting in an Index Severity Level of 1. This is not a reflection of water supply status.

REGION	TOTAL REPORTING FOR THE MONTH	LAKES AND IMPOUNDMENTS: LEVELS (% full) or PERCENTILES (per)	DMP INDEX SEVERITY
WESTERN	2	95%; 93% (lowest in 16 yrs; both below 30th per.)	1
CT RIVER VALLEY	2	97%; 85% (lower than 2016, still above their drought threshold; overall 37th per.)	0
CENTRAL	3	96%; 98%; 88%	0
NORTHEAST	6	Overall 23rd per.	1
SOUTHEAST	2	88%; 92%; (below target level; overall 25th per.)	1
CAPE COD	1	88th per.	0
ISLANDS	N/A	N/A	N/A

## KEETCH BYRAM DROUGHT INDEX (KBDI) AND CROP MOISTURE INDEX (CMI)

As of June 29, 2020 KBDI values ranged from 108 to 438 across the state resulting in an Index Severity Level 1 for the Western, Southeast, and Cape Cod Regions; Index Severity Level 2 for the CT River Valley, Central, and Northeast Regions; and Index Severity Level 0 for the Islands.

The weekly CMI for the period ending June 27, 2020 was -1.0 to -1.9 (Abnormally Dry) for the entire state resulting in an Index Severity Level 1 for all regions.



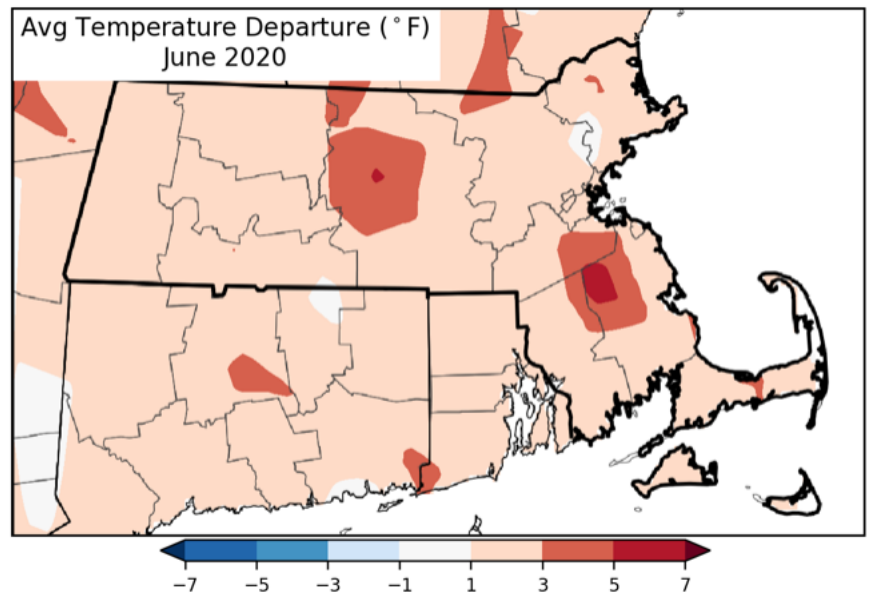
## TEMPERATURE

Monthly average temperatures were overall above historical averages for this time of the year.

<http://www.nrcc.cornell.edu/regional/monthly/monthly.html>

Daily temperatures ranged from 47° to 92° Fahrenheit (°F). Daily departures from historical averages ranged from +11.3 to -7.9 ° F.

<https://w2.weather.gov/climate/xmacis.php?wfo=box>



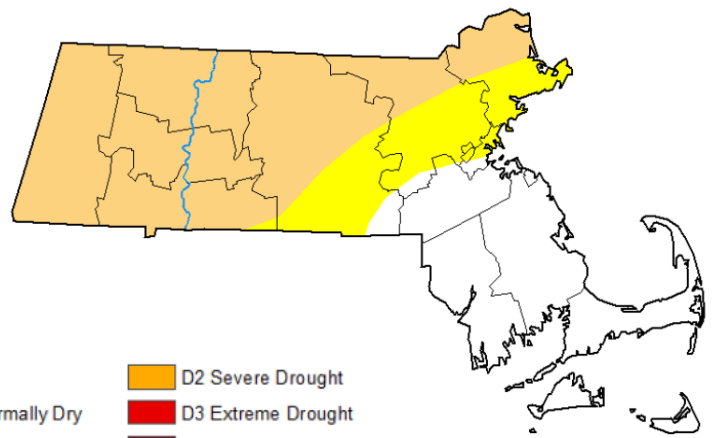
## DROUGHT CONDITIONS AND FORECASTS BY NOAA AND PARTNERS

U.S. Drought Map updated June 30, 2020; released July 2, 2020

**Summary:** The U.S. Drought Monitor shows moderate drought across the Western, CT River Valley, and parts of the Central and Northeast Regions. Other parts of the Central and Northeast regions are Abnormally Dry.

USDM maps are produced by the National Drought Mitigation Center (NDMC). For methods and weekly updates see:

<https://droughtmonitor.unl.edu>



### NOAA Climate Prediction Center:

#### Temperature and Precipitation Outlook

**July:** The outlook projects a 50-60% chance of above-normal temperatures for all of MA. There is a 33-40% chance of below-normal precipitation for the Western, CT River Valley, Central, & Northeast parts of MA, and equal chances for below-normal, normal, or above-normal precipitation for the Southeast, Cape, & Islands.

**July through September:** The outlook projects a 60-70% chance for above-normal temperatures, and equal chances for below-normal, normal, or above-normal precipitation for all of MA. <https://www.cpc.ncep.noaa.gov/>

**Monthly and Seasonal Drought Outlook** The monthly outlook for July shows drought persisting in the western, CT River Valley, and parts of Central and Northeast regions. The seasonal outlook valid through September released June 18th, however, does not project drought conditions.

<http://www.cpc.ncep.noaa.gov/products/Drought>

This report was prepared by the Massachusetts Department of Conservation and Recreation. Data may be preliminary. Additional information, previous reports, and drought management information can be found at:

<https://www.mass.gov/water-data-tracking>

## APPENDIX I – ADDITIONAL PRECIPITATION DATA

### Standardized Precipitation Index June 2020

REGION	NUMBER OF SITES	SPI1	SPI2	SPI3	SPI6	SPI9	SPI12	SPI24	SPI36	Key to Drought Plan SPI Severity Levels	
WESTERN	5	-0.75	-1.35	-0.93	-0.82	0.33	-0.27	1.09	0.62	0	>-0.52
CT RIVER VALLEY	10	-1.07	-1.48	-1.22	-1.40	-0.31	-0.62	1.14	0.49	1	≤ -0.52 and > -0.84
CENTRAL	10	-0.80	-1.17	-0.36	-0.68	0.38	0.13	1.50	1.18	2	≤ -0.84 and > -1.28
NORTHEAST	11	-0.51	-0.77	-0.22	-0.76	0.09	0.15	1.15	0.77	3	≤ -1.28 and > -2.05
SOUTHEAST	15	0.10	-0.24	0.67	-0.25	0.48	0.49	1.25	1.02	4	≤ -2.05
CAPE COD	4	-1.11	-1.22	-0.08	-0.86	0.63	0.55	1.05	1.82		
ISLANDS	4	-0.80	-0.03	0.31	-0.24	0.75	0.54	1.22	1.67		

### Percent of Average Historical Precipitation

REGION	NUMBER OF SITES	HISTORICAL AVERAGE (IN)	JUNE AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF HISTORICAL
WESTERN	5	4.74	3.05	-1.69	65
CT RIVER VALLEY	10	4.38	2.15	-2.23	50
CENTRAL	10	4.03	2.46	-1.56	62
NORTHEAST	11	3.64	2.19	-1.45	60
SOUTHEAST	15	3.92	3.96	0.03	101
CAPE COD	4	3.34	1.49	-1.86	44
ISLANDS	4	3.04	1.59	-1.45	53

DCR Precipitation Reports are available at:

<https://www.mass.gov/service-details/precipitation-composite-estimates-1> and  
<https://www.mass.gov/service-details/standardized-precipitation-index-spi-0>



## APPENDIX II – DROUGHT MANAGEMENT PLAN INFORMATION

The Massachusetts Drought Management Plan (DMP) can be found at <https://www.mass.gov/doc/massachusetts-drought-management-plan/download>. The document provides details on the Drought Indices, how Drought Levels are determined, and actions associated with each drought level.

### Drought Levels (Section 3.1 of the DMP)

- Level 0** Normal
- Level 1** Mild Drought
- Level 2** Significant Drought
- Level 3** Critical Drought
- Level 4** Emergency Drought

### Index Severity Levels (Section 3.4 of the DMP)

SEVERITY LEVEL	STANDARDIZED PRECIPITATION INDEX (SPI)	STREAMFLOW	LAKES AND IMPOUNDMENTS	GROUNDWATER	KEETCH-BRYAM DROUGHT INDEX (KBDI)	CROP MOISTURE INDEX
0	> 30th percentile				< 200	> -1.0
1	$\leq 30$ and $> 20$				200-400	$\leq -1.0$ and $> -2.0$
2	$\leq 20$ and $> 10$				400-600	$\leq -2.0$ and $> -3.0$
3	$\leq 10$ and $> 2$				600-700	$\leq -3.0$ and $> -4.0$
4	$\leq 2$				700-800	$\leq -4.0$

