

MASSACHUSETTS WATER RESOURCES COMMISSION

AUGUST 2020 HYDROLOGIC CONDITIONS IN MASSACHUSETTS



The Commonwealth of Massachusetts
Charles D. Baker, Governor

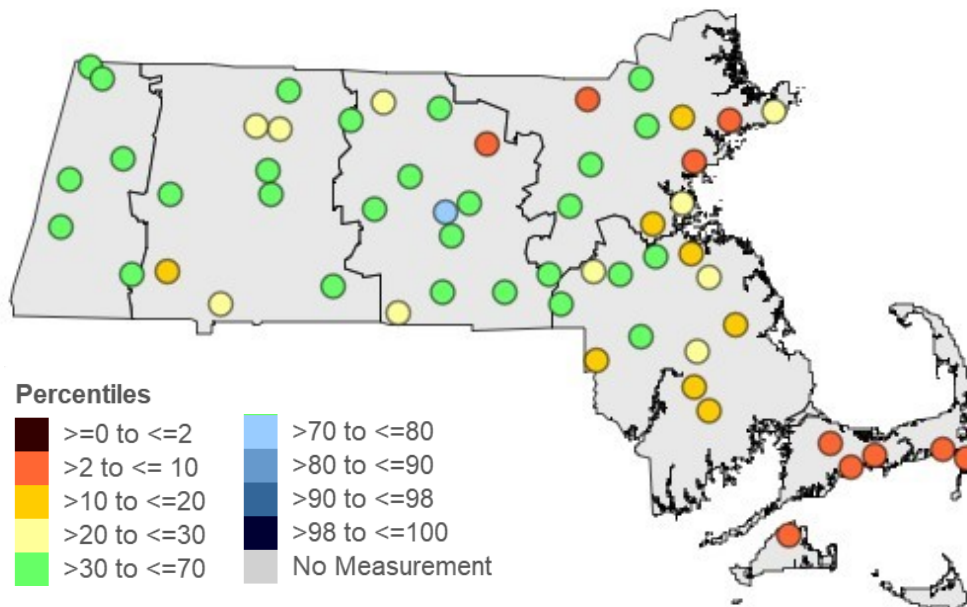
Kathleen A. Theoharides, Secretary, Executive Office of Energy and Environmental Affairs

AUGUST 2020 HYDROLOGIC CONDITIONS

- Monthly temperatures were above average for August, mostly ranging between 1 and 5 degrees above average.
- Precipitation was low in the Cape Cod and Islands Regions and the Index Severity Levels for the 1-month SPI are at Level 3 for those Regions. Precipitation was closer to normal in the other Regions, but longer look-back periods still tripped Index Severity Levels in all regions.
- Monthly median streamflow deteriorated in August. The Western Regions is at Index Severity Level 3 and the CT River Valley, Central, Northeast, and Southeast Regions are at Level 2.
- Groundwater levels varied across the state. Overall, monthly medians declined and the Western, CT River Valley, Central, and Southeast Regions are at Index Severity Level 2.
- For September, NOAA projects equal chances for below-normal, normal, or above-normal temperature and precipitation for all of MA.
- Appendices I and II provide additional precipitation data and information on the Massachusetts Drought Management Plan (DMP).



PRECIPITATION



Precipitation was uneven across MA for the month of August. While precipitation was still below average, the Western, CT River Valley, Central, Northeast, & Southeast Regions did not trip the 1-month SPI. The Cape and Islands, however, again received much below average rainfall and the 1-mos SPI tripped at Index Severity Level 2 for both Regions. Long-term look back periods still tripped for all Regions.

Index Severity Level
1
2
3
4

REGION	NUMBER OF SITES REPORTING FOR AUG	MONTHLY AVERAGE (IN)	DEPARTURE FROM HISTORICAL (IN)	DMP SPI * 1-MONTH	DMP SPI 2-MONTH	DMP SPI 3-MONTH
WESTERN	6	4.43	-0.62	-0.08	-0.35	-0.74
CT RIVER VALLEY	9	4.05	-1.13	-0.40	-0.30	-1.03
CENTRAL	13	4.02	-0.70	-0.21	-0.49	-0.82
NORTHEAST	11	3.48	-1.32	-0.32	-0.79	-0.76
SOUTHEAST	12	3.90	-1.23	-0.35	-1.02	-0.49
CAPE COD	5	3.46	-2.17	-1.33	-2.14	-2.34
ISLANDS	1	3.74	-2.89	-1.59	-1.70	-1.70

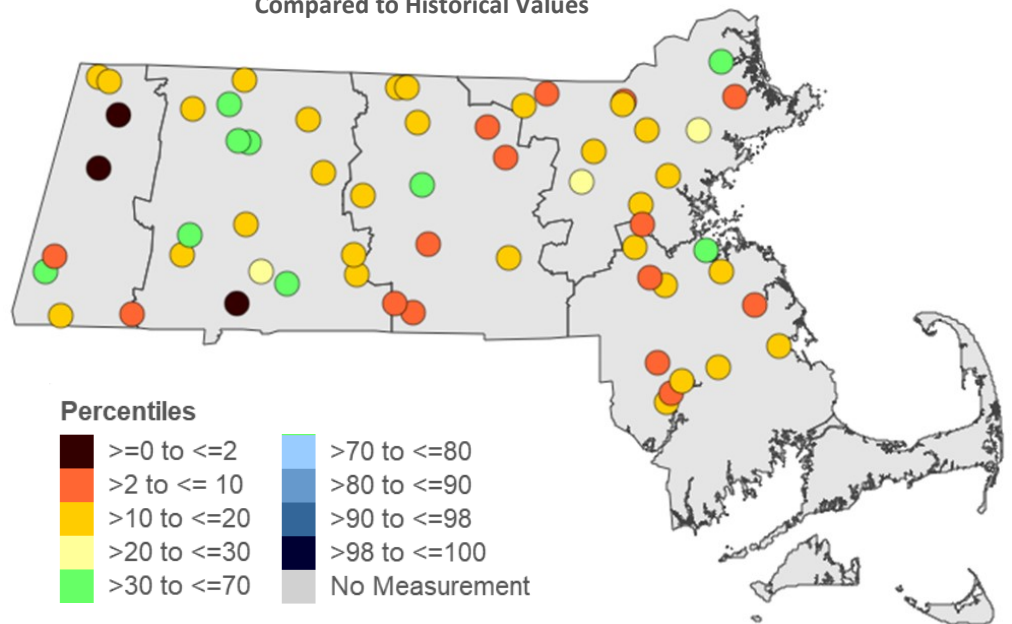
*The Standardized Precipitation Index (SPI) values represent the variation, in standard deviations, from long-term precipitation averages.

STREAMFLOW

Median Monthly Streamflows
Compared to Historical Values

Streamflow Index Severity levels increased for the month of August. The Western Region is at the highest Index Severity of 3 including two gages below the 2nd percentile.

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



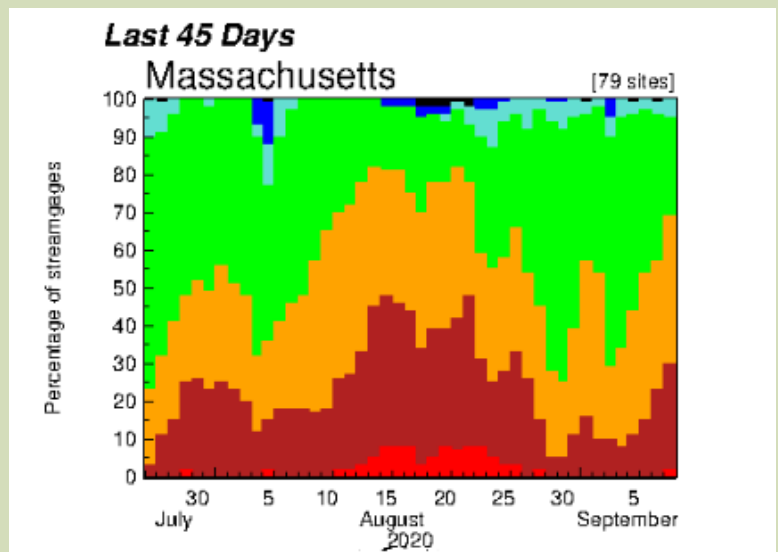
REGION	TOTAL GAGES REPORTING FOR AUG	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 to ≤30 PERCENTILE	>90 PER-CENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES	DMP INDEX SEVERITY
WESTERN	8	2	2	3	0	0	10	3
CT RIVER VALLEY	15	1	0	8	1	0	19	2
CENTRAL	11	0	5	4	0	0	14	2
NORTHEAST	12	0	4	5	2	0	15	2
SOUTHEAST	11	0	4	6	0	0	12	2

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

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		

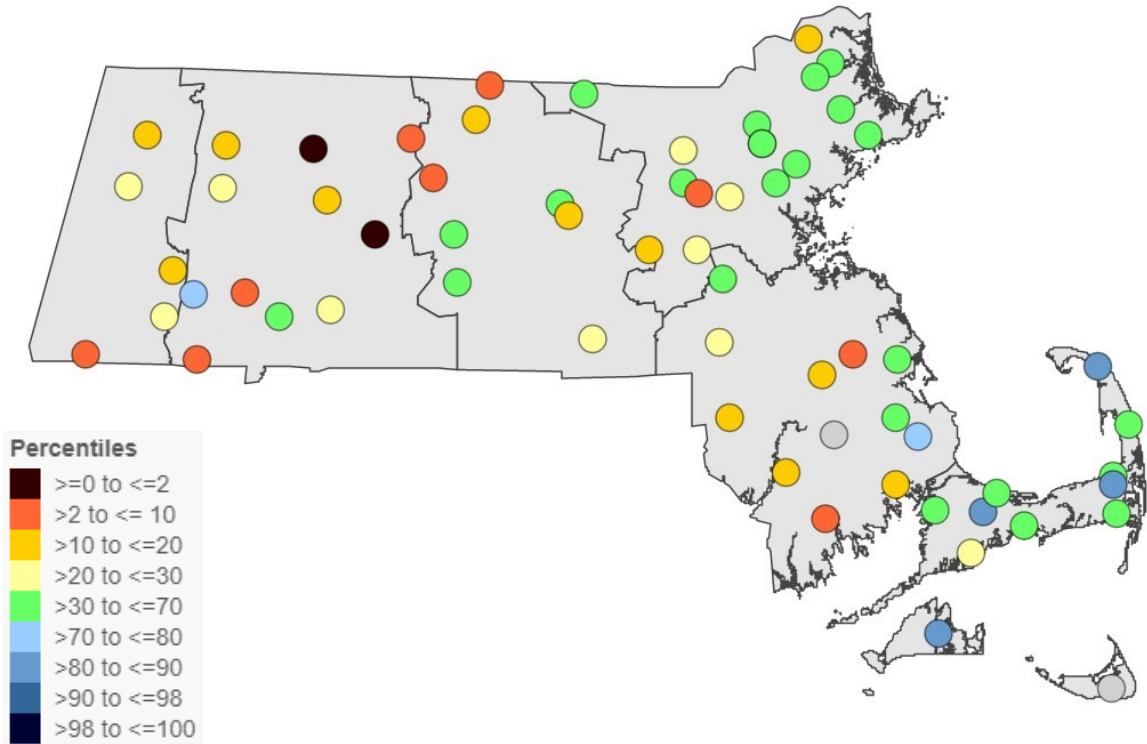


GROUNDWATER

Groundwater levels varied across the state and within some Regions. Overall, end of month levels decreased including numerous below 10th percentile values and two wells below the 2nd percentile. The Western, CT River Valley, Central, and Southeast Regions have elevated to Index Severity Level 2.

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

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



REGION	TOTAL WELLS REPORTING FOR AUG	≥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	2	2	0	13	2
CT RIVER VALLEY	11	2	3	2	2	0	13	2
CENTRAL	9	0	2	3	1	0	16	2
NORTHEAST	16	0	1	1	3	1	37	0
SOUTHEAST	11	0	2	4	1	0	16	2
CAPE COD	10	0	0	0	1	0	56	0
ISLANDS	1*	0	0	0	0	0	83	0

*Nantucket 228 was not measured. However, Nantucket 44 and 46 were both above to well above average.

LAKES AND IMPOUNDMENTS

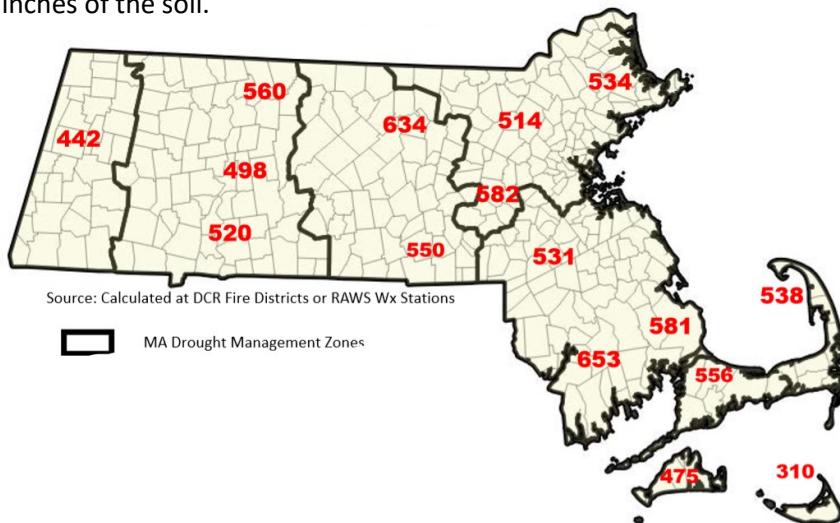
At the end of August, lakes and impoundments in most regions were lower than usual, resulting in an Index Severity Level of 1 for the CT River Valley, Central and Northeast Regions and Level 2 for the Southeast. Although the Western Region did not trip, both communities are looking to escalate voluntary watering restrictions to mandatory status. Several reservoirs are below 2016 levels.

REGION	TOTAL REPORTING FOR AUGUST	MEDIAN OF INDIVIDUAL PERCENTILES	DMP INDEX SEVERITY
WESTERN	2	36	0
CT RIVER VALLEY	2	22	1
CENTRAL	5	21	1
NORTHEAST	8	30	1
SOUTHEAST	2	14	2
CAPE COD	1	67	0
ISLANDS	N/A	N/A	N/A

DMP Index Severity Levels do not necessarily reflect water supply status.

KEETCH BYRAM DROUGHT INDEX (KBDI)

As of August 31st, 2020, KBDI values ranged from 310 to 653 across the state reflecting continued dryness in the top 8 inches of the soil.



REGION	TOTAL REPORTING FOR AUGUST	DMP INDEX SEVERITY
WESTERN	1	2
CT RIVER VALLEY	3	2
CENTRAL	2	3
NORTHEAST	3	2
SOUTHEAST	3	3
CAPE COD	2	2
ISLANDS	2	2

CROP MOISTURE INDEX (CMI)

The weekly CMI for the period ending August 25, 2020 was Abnormally Dry for the Western Region, resulting in an Index Severity Level 1 and Excessively Dry for the remainder of the state resulting in an Index Severity Level 2 for the CT River Valley, Central, Northeast, Southeast, Cape Cod, and Islands Regions.



REGION	DMP INDEX SEVERITY
WESTERN	1
CT RIVER VALLEY	2
CENTRAL	2
NORTHEAST	2
SOUTHEAST	2
CAPE COD	2
ISLANDS	2

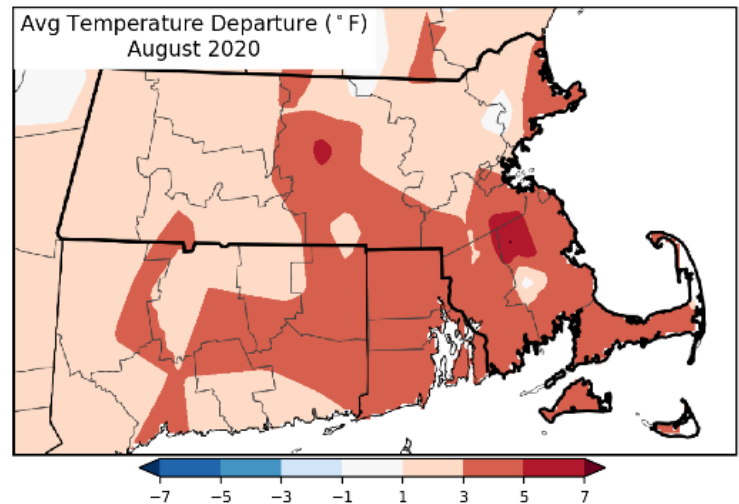
TEMPERATURE

Monthly average temperatures were above historical averages for this time of the year with temperatures mostly between 1 to 5 degrees above average. According to the Northeast Regional Climate Center, this August was the 6th warmest on record for the Worcester climate site.

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

Daily temperatures ranged from 58° to 94° Fahrenheit (°F). Daily departures from historical averages ranged from +10.7 to -7.6 °F.

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



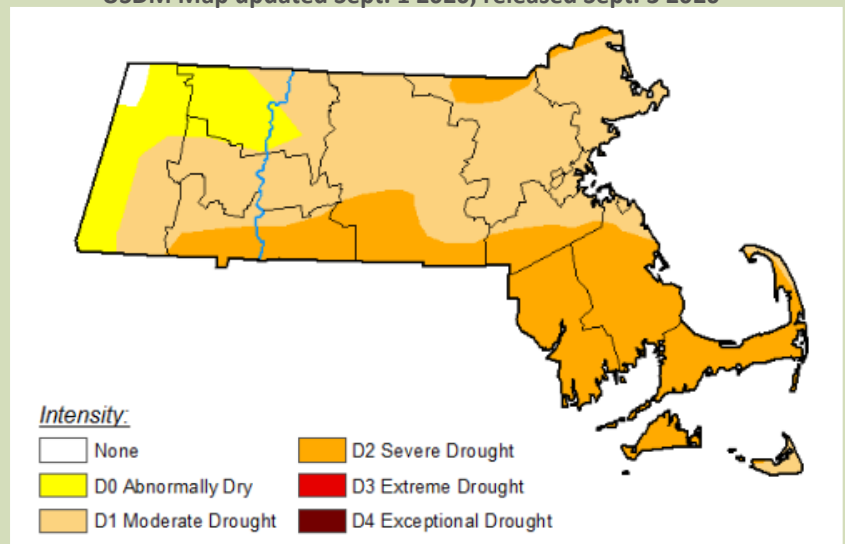
DROUGHT CONDITIONS AND FORECASTS

U.S. Drought Monitor (USDM)

The USDM shows D2 severe drought in the Southeast, Cape Cod, Martha's Vineyard, and the southern part of the Central and CT River Valley Regions; D0 Abnormally Dry for the Western Region, and D1 moderate drought for the remainder of the state, and abnormally dry in the rest of the Regions.

USDM maps are produced by the National Drought Mitigation Center (NDMC). For methods and weekly updates see: <https://droughtmonitor.unl.edu>

USDM Map updated Sept. 1 2020; released Sept. 3 2020



NOAA Climate Prediction Center

Temperature and Precipitation Outlook

September: The outlook released on 8/31 projects equal chances for below-normal, normal, or above-normal temperature and precipitation for all of MA.

September through November: The outlook released 8/20 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 released on 8/31 for September shows drought remaining but improving in the Southeast and drought removal likely through the rest of the State. The seasonal outlook released on 8/20 and valid through November, also shows drought remaining but improving in the Southeast and drought removal likely through the rest of the State.

<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 August 2020

REGION	NUMBER OF SITES	SPI1	SPI2	SPI3	SPI6	SPI9	SPI12	SPI24	SPI36	Key to Drought Plan SPI Severity Levels	
WESTERN	5	-0.08	-0.35	-0.74	-0.66	-0.36	-0.07	0.58	0.53	0	>-0.52
CT RIVER VALLEY	10	-0.40	-0.30	-1.03	-0.99	-0.58	-0.63	0.24	0.79	1	≤ -0.52 and > -0.84
CENTRAL	12	-0.21	-0.49	-0.82	-0.40	-0.27	-0.25	0.97	1.36	2	≤ -0.84 and > -1.28
NORTHEAST	12	-0.32	-0.79	-0.76	-0.64	-0.58	-0.44	0.78	0.68	3	≤ -1.28 and > -2.05
SOUTHEAST	18	-0.35	-1.02	-0.49	0.11	0.08	-0.01	1.53	1.07	4	≤ -2.05
CAPE COD	4	-1.33	-2.14	-2.34	-1.35	-0.45	-0.15	0.94	1.36		
ISLANDS	3	-1.59	-1.70	-1.70	-0.36	-0.03	0.14	1.10	0.27		

Percent of Average Historical Precipitation

REGION	NUMBER OF SITES	HISTORICAL AVERAGE (IN)	AUGUST AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF HISTORICAL
WESTERN	6	4.43	3.81	-0.62	86
CT RIVER VALLEY	9	4.05	2.92	-1.13	72
CENTRAL	13	4.02	3.31	-0.70	82
NORTHEAST	11	3.48	2.16	-1.32	62
SOUTHEAST	12	3.90	2.68	-1.23	69
CAPE COD	5	3.46	1.29	-2.17	38
ISLANDS	1	3.74	0.85	-2.89	23

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	≤ 30 and > 20				200-400	≤ -1.0 and > -2.0
2	≤ 20 and > 10				400-600	≤ -2.0 and > -3.0
3	≤ 10 and > 2				600-700	≤ -3.0 and > -4.0
4	≤ 2				700-800	≤ -4.0

