MASSACHUSETTS WATER RESOURCES COMMISSION

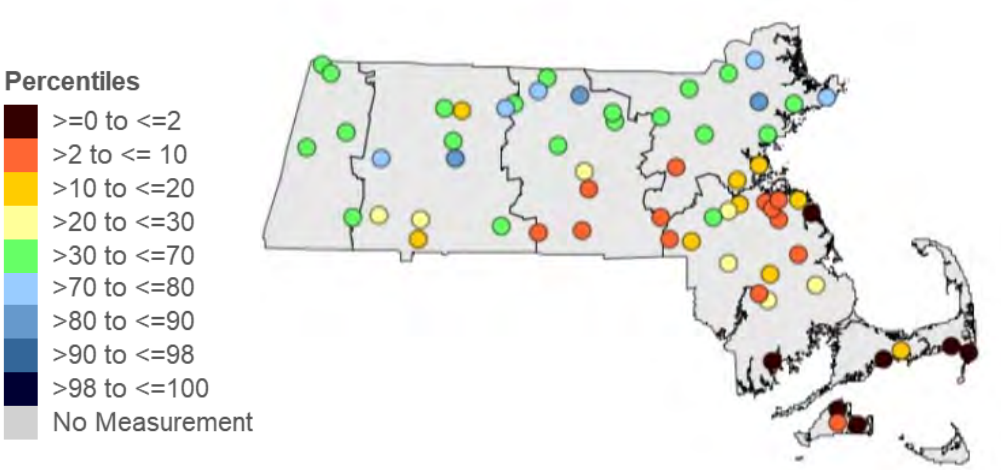
JULY 2020 HYDROLOGIC CONDITIONS IN MASSACHUSETTS

The Commonwealth of Massachusetts
Charles D. Baker, Governor
Kathleen A. Theoharides, Secretary, Executive Office of Energy and Environmental Affairs

JULY 2020 HYDROLOGIC CONDITIONS

- Monthly temperatures were above average for July, mostly ranging between 3 and 7 degrees above average. Statewide, it was the 2nd hottest July on record.
- Precipitation was low in the Southeast Region and very low in the Cape Cod and Islands Regions. Index Severity Levels for the 1-month SPI are at Level 4 for Cape Cod, Level 3 for the Islands, Level 2 for the Southeast, and Level 1 for the CT River Valley.
- Monthly median streamflow improved in July. The Western and CT River Valley Regions are at an Index Severity Level 1.
- Groundwater levels varied across the state but were mostly low in the Western, Central, and CT River Valley Regions (all Level 1).
- For August, NOAA projects a 50-60% chance for above-normal temperatures and a 40%-50% chance for above-normal precipitation.
- 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 July, and uneven within some regions. The Western, Central, and Northeast Regions did not trip the 1-month SPI, but longer-term deficits still remain in some regions. Cape Cod precipitation was only 0.8" and the Islands only 0.48". The Index Severity Levels for these regions are Level 4 and Level 3, respectively. The Southeast was low as well (Level 2).

Index Severity
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	4.34	-0.33	0.18	-0.62	-1.11
CT RIVER VALLEY	10	4.08	-0.73	-0.52	-0.92	-1.16
CENTRAL	12	3.77	-0.70	0.06	-0.83	-1.21
NORTHEAST	12	3.43	-0.11	0.07	-0.55	-0.86
SOUTHEAST	18	3.51	-1.84	-1.15	-0.37	-0.59
CAPE COD	4	3.05	-2.25	-2.05	-2.01	-2.01
ISLANDS	3	2.68	-2.19	-1.77	-1.56	-0.77

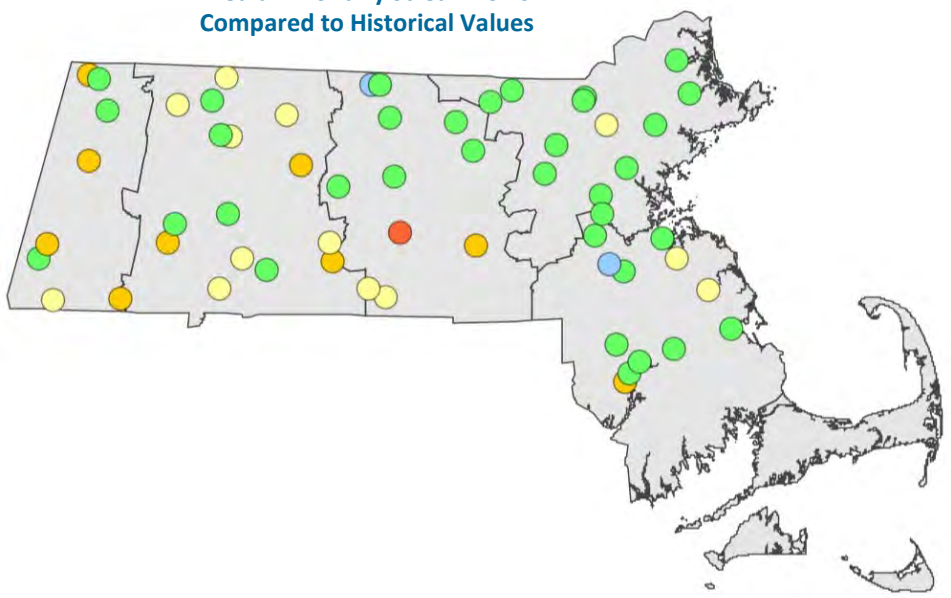
*The Standardized Precipitation Index (SPI) values represent the variation, in standard deviations, from long-term precipitation averages.

STREAMFLOW

Streamflow Index Severity levels improved in the month of July. Only the Western and the CT River Valley regions are at Severity Level 1. Scattered storms in July kept most streamflow levels within normal ranges for a majority of the month.

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



https://

Percentiles

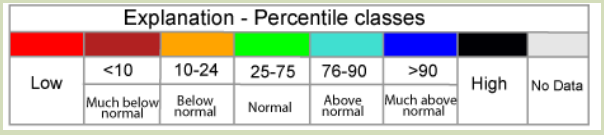
>=0 to <=2	>70 to <=80
>2 to <= 10	>80 to <=90
>10 to <=20	>90 to <=98
>20 to <=30	>98 to <=100
>30 to <=70	No Measurement

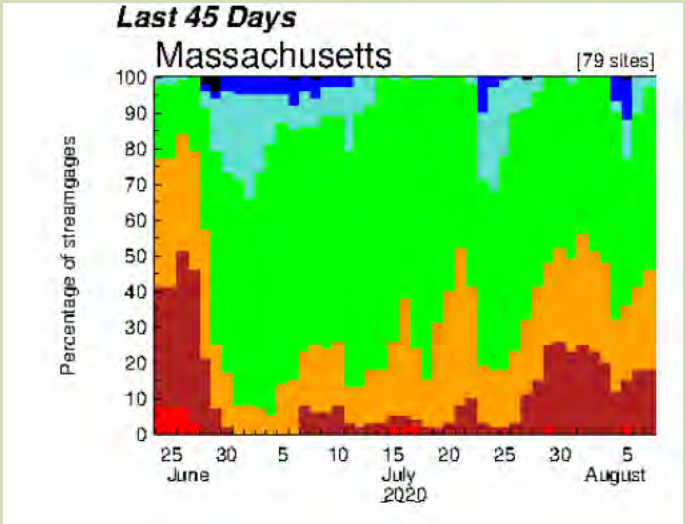
REGION	TOTAL GAGES REPORTING FOR JULY	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 to ≤30 PERCENTILE	>90 PER-CENTILE	MEDIAN OF INDIVIDUAL GAGE PERCEN-TILES	DMP INDEX SEVERITY
WESTERN	8	0	0	4	1	0	22	1
CT RIVER VALLEY	15	0	0	3	7	0	27	1
CENTRAL	11	0	1	1	2	0	36	0
NORTHEAST	13	0	0	0	1	0	45	0
SOUTHEAST	12	0	0	1	2	0	46	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



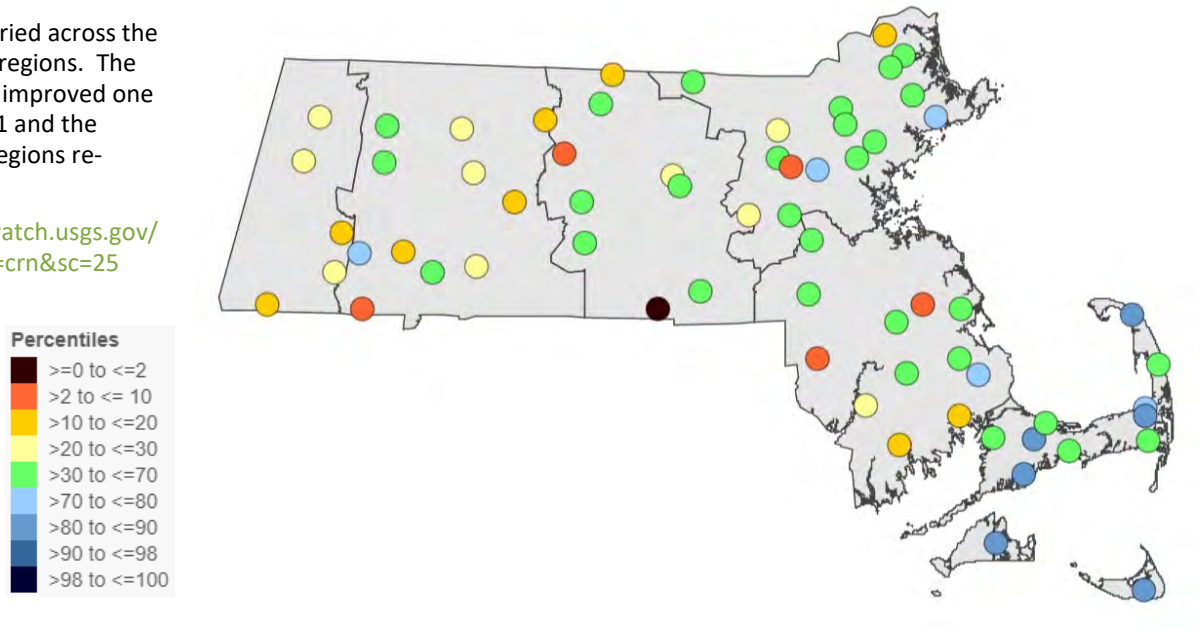


GROUNDWATER

Groundwater levels varied across the state and within most regions. The CT River Valley Region improved one severity level to Level 1 and the Western and Central regions remained at Level 1.

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 JULY	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 TO ≤30 PERCENTILE	>90 PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCEN-TILES	DMP INDEX SEVERITY
WESTERN	5	0	0	2	3	0	22	1
CT RIVER VALLEY	11	0	1	3	3	0	28	1
CENTRAL	10	1	1	1	2	0	30	1
NORTHEAST	15	0	1	1	1	0	47	0
SOUTHEAST	12	0	2	2	1	0	35	0
CAPE COD	10	0	0	0	0	0	70	0
ISLANDS	2	0	0	0	0	0	84	0

LAKES AND IMPOUNDMENTS

At the end of July, lakes and impoundments in the Western, Northeast, and Southeast Regions were lower than usual, resulting in an Index Severity Level of 1 for the Western and Northeast Regions and Level 2 for the Southeast. This is not a reflection of water supply status. However, two reservoirs are below 2016 levels.

REGION	TOTAL REPORTING FOR THE MONTH	LAKES AND IMPOUNDMENTS: PERCENTILES	DMP INDEX SEVERITY
WESTERN	2	25	1
CT RIVER VALLEY	2	31	0
CENTRAL	4	33	0
NORTHEAST	7	26	1
SOUTHEAST	2	15	2
CAPE COD	1	65	0
ISLANDS	N/A	N/A	N/A

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

As of August 5th, 2020, KBDI values ranged from 295 to 613 across the state resulting in an Index Severity Level 1 for the Western and Islands Regions; Index Severity Level 2 for the CT River Valley, Central, Northeast, and Cape Cod Regions; and Index Severity Level 3 for the Southeast Region. The Western Region dropped almost 100 points, as that area received the most rainfall over the past week or so. There are concerns for southeast and south central portions of the state as conditions continue to deteriorate and fire activity increases.

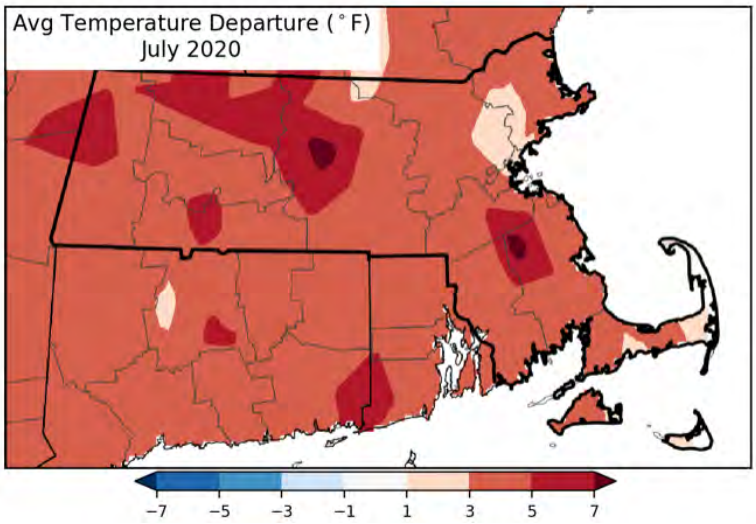
The weekly CMI for the period ending August 1, 2020 was –1.0 to –1.9 (Abnormally Dry) for the Western, CT River Valley & Central Regions, resulting in an Index Severity Level 1 for those regions; and –2.0 to –2.9 (Excessively Dry) for the Northeast, Southeast, Cape Cod, and Islands Regions, resulting in an Index Severity Level 2 for those regions.

TEMPERATURE

Monthly average temperatures were above historical averages for this time of the year with temperatures mostly between 3 to 7 degrees above average. According to the Northeast Regional Climate Center, statewide it was the 2nd hottest July on record.

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

Daily temperatures ranged from 59° to 95° Fahrenheit (°F). Daily departures from historical averages ranged from +12.7 to –9.2 ° F.



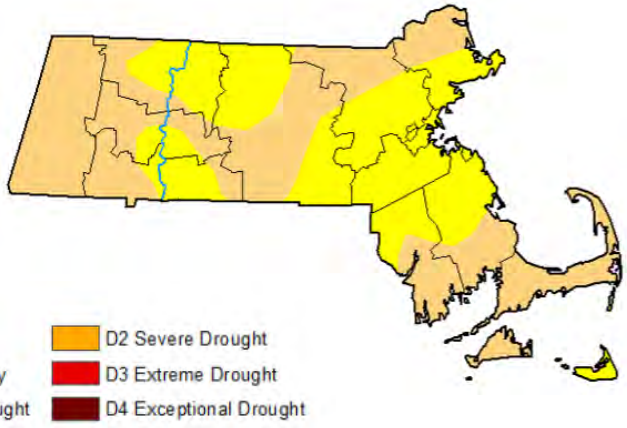
DROUGHT CONDITIONS AND FORECASTS BY NOAA AND PARTNERS

U.S. Drought Map updated July 28, 2020; released July 30, 2020

Summary: The U.S. Drought Monitor shows moderate drought in the Western and Cape Cod Regions and a mix of moderate drought 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



NOAA Climate Prediction Center:

Temperature and Precipitation Outlook

August: The outlook released on 7/31 projects a 50-60% chance of above-normal temperatures for all of MA and a 40-50% chance of above normal precipitation for all of MA.

August through October: The outlook released 7/16 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 7/31 for August shows drought persisting in the Western Region and part of the Central Region. The seasonal outlook released on 7/16 and valid through October, however, projects drought removal in the Central through Western Regions.

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 July 2020

REGION	NUMBER OF SITES	SPI1	SPI2	SPI3	SPI6	SPI9	SPI12	SPI24	SPI36
WESTERN	5	0.18	-0.62	-1.11	-0.34	0.01	-0.11	1.06	0.58
CT RIVER VALLEY	10	-0.52	-0.92	-1.16	-0.79	-0.46	-0.51	0.84	0.73
CENTRAL	12	0.06	-0.83	-1.21	-0.45	-0.30	-0.10	1.26	1.34
NORTHEAST	12	0.07	-0.55	-0.86	-0.55	-0.45	-0.47	0.89	0.37
SOUTHEAST	18	-1.15	-0.37	-0.59	-0.21	0.09	0.06	1.25	0.94
CAPE COD	4	-2.05	-2.01	-2.01	-0.81	-0.26	-0.12	0.75	1.46
ISLANDS	3	-1.77	-1.56	-0.77	0.10	0.08	0.31	1.20	1.79

Key to Drought Plan SPI Severity Levels	
0	>-0.52
1	≤ -0.52 and > -0.84
2	≤ -0.84 and > -1.28
3	≤ -1.28 and > -2.05
4	≤ -2.05

Percent of Average Historical Precipitation

REGION	NUMBER OF SITES	HISTORICAL AVERAGE (IN)	JULY AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF HISTORICAL
WESTERN	5	4.34	4.01	-0.33	92
CT RIVER VALLEY	10	4.08	3.35	-0.73	82
CENTRAL	12	3.77	3.07	-0.70	80
NORTHEAST	12	3.43	3.32	-0.11	98
SOUTHEAST	18	3.51	1.67	-1.84	47
CAPE COD	4	3.05	0.80	-2.25	26
ISLANDS	3	2.68	0.48	-2.19	18

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