

# MASSACHUSETTS WATER RESOURCES COMMISSION

## MARCH 2021 HYDROLOGIC CONDITIONS IN MASSACHUSETTS



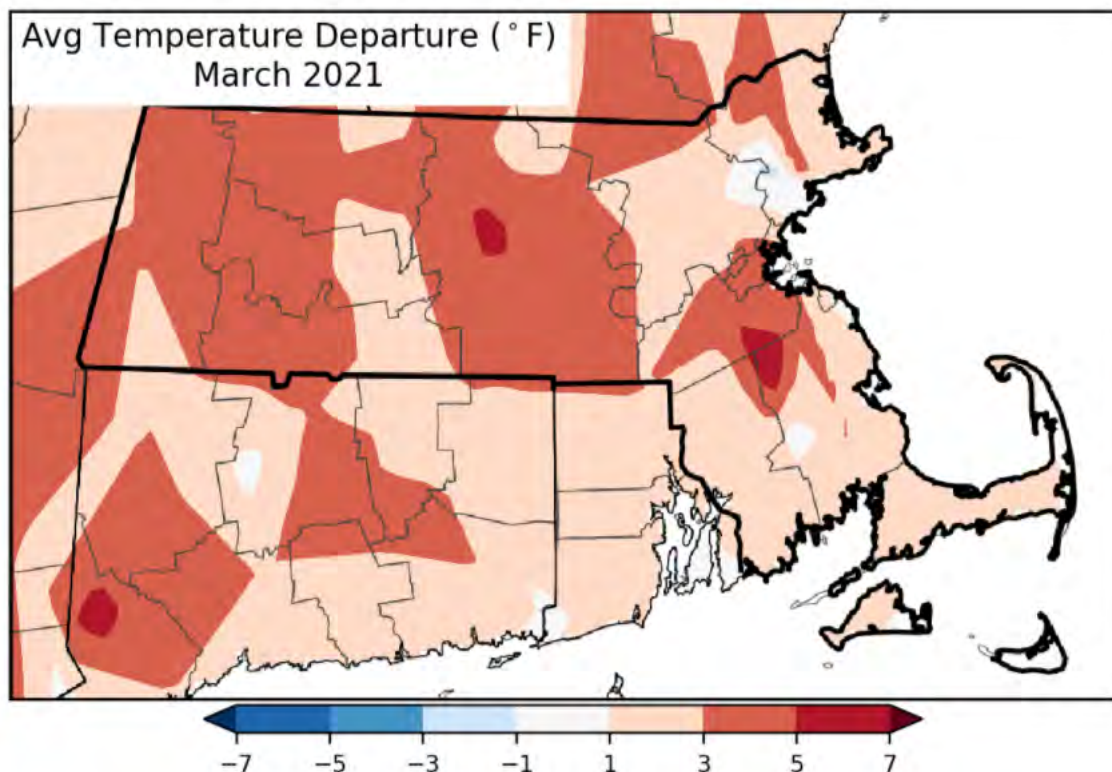
The Commonwealth of Massachusetts  
Charles D. Baker, Governor

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

## MARCH 2021 HYDROLOGIC CONDITIONS SUMMARY OF CONDITIONS

- Monthly average temperatures were above normal across most of the state.
- Precipitation was mostly below normal across the state. All regions tripped 1-mo SPI index severity levels except for the Islands.
- Regional monthly streamflow medians were near normal to below normal in all regions except the Western Region, which was above normal. The Central and Northeast Regions are at Index Severity 1, and the Southeast Region is at Index Severity Level 2.
- Groundwater levels varied. While several regions came close, only the Southeast Region tripped the Index Severity Level 1.
- Lakes & Impoundments levels were generally in the normal range. One monitored pond in the Cape Cod Region was much below normal for this time of year.
- NOAA's outlook for April projects chances for above-normal temperatures and equal chances for below-normal, normal, or above-normal precipitation.
- NOAA's 3-month outlook projects above-normal temperatures and chances for above-normal precipitation.
- Appendices I and II provide additional precipitation data and information on the Massachusetts Drought Management Plan (DMP), respectively.

### TEMPERATURE



Monthly average temperatures were above normal across most of the state.

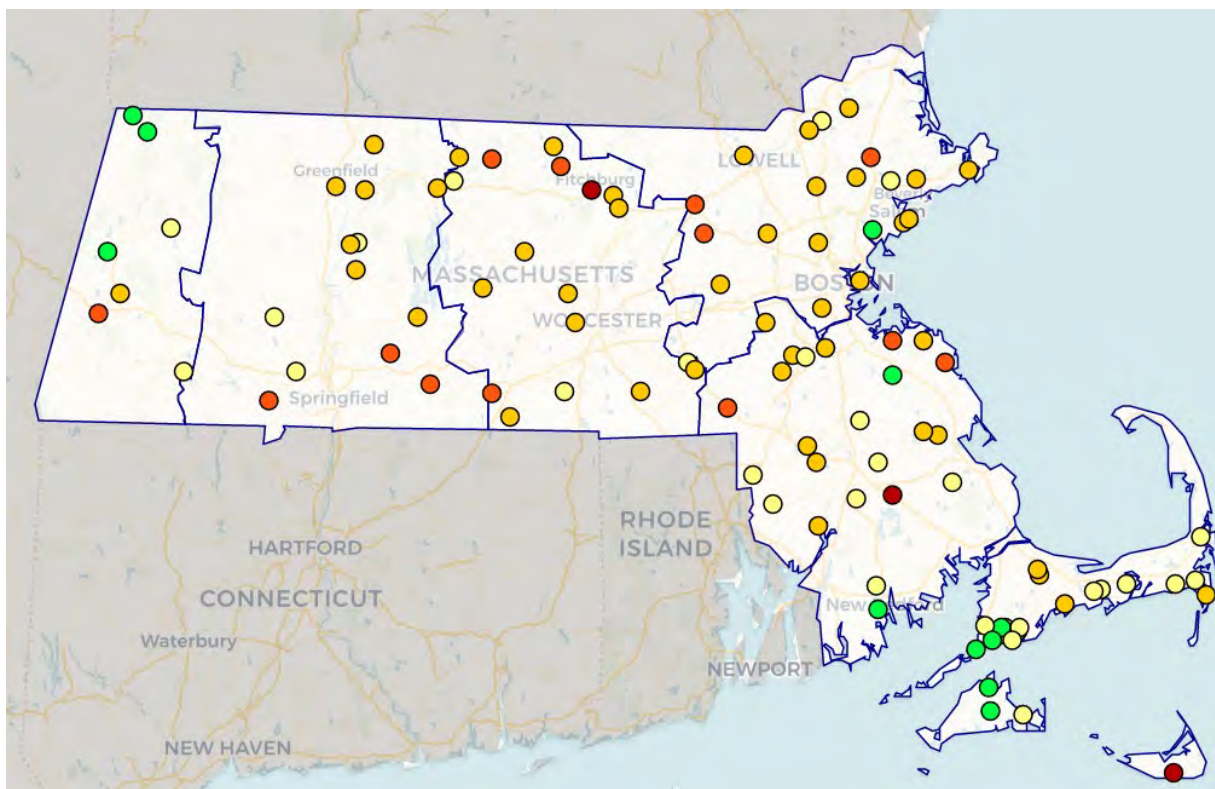
<http://www.nrcc.cornell.edu/regional/monthly/monthly.html>



## PRECIPITATION

Precipitation in March was below normal across the state. All regions tripped 1-month SPI index severity levels except for the Islands. Appendix I provides additional details for precipitation data.

### March SPI as Percentiles over Period of Record



● $\geq 0$ to $\leq 2$	● $> 2$ to $\leq 10$	● $> 10$ to $\leq 20$	● $> 20$ to $\leq 30$	● $> 30$ to $\leq 70$
● $> 70$ to $\leq 80$	● $> 80$ to $\leq 90$	● $> 90$ to $\leq 98$	● $> 98$ to $\leq 100$	

REGION	NUMBER OF SITES REPORTING	MARCH MONTHLY AVERAGE (IN)	DEPARTURE FROM HISTORICAL (IN)	SPI * 1-MONTH	SPI 3-MONTH	SPI 6-MONTH
WESTERN	7	2.04	-1.22	-0.71	-1.06	-0.90
CT RIVER VALLEY	13	1.86	-1.68	-0.97	-1.17	0.05
CENTRAL	18	1.85	-1.99	-1.08	-1.09	0.22
NORTHEAST	20	1.88	-2.07	-1.10	-1.03	-0.19
SOUTHEAST	24	2.26	-2.22	-0.90	-0.89	0.02
CAPE COD	18	2.77	-1.53	-0.66	-0.77	-0.47
ISLANDS	4	2.53	-1.47	-0.32	-0.56	-0.02

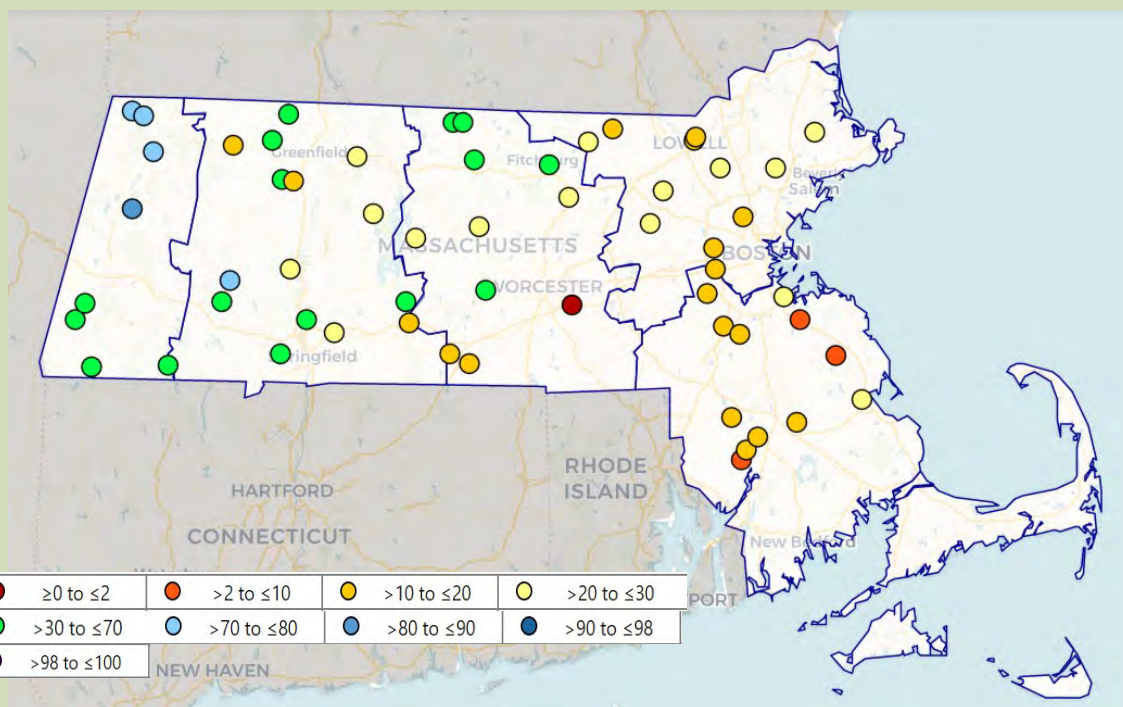
\*SPI is the Standardized Precipitation Index used in the Drought Management Plan (DMP) and represents the variation, in standard deviations, from long-term precipitation averages.

DMP Index Severity Levels			
1	2	3	4

# STREAMFLOW

## Monthly Median Streamflow Percentiles Compared to Historical Values

The regional median of streamflow gages tripped index levels in the Central, Northeast, and Southeast Regions. The Southeast Region was the worst at Index Severity Level 2. All reporting gages' medians were below the 30th percentile for both the Southeast and Northeast Regions. The CT River Valley was very close to tripping the Level 1 Index Severity Level and had 7 reporting gages below the 30th percentile. Streamflow in the Western Region benefitted from snowmelt and the medians of individual gages were all above the 30th percentile to well above the 30th percentile.



REGION	TOTAL GAGES REPORTING FOR MARCH	$\geq 0$ TO $\leq 2$ PERCENTILE	$> 2$ TO $\leq 10$ PERCENTILE	$> 10$ TO $\leq 20$ PERCENTILE	$> 20$ TO $\leq 30$ PERCENTILE	$> 90$ PERCENTILE	MEDIAN OF GAGE PERCENTILES
WESTERN	8	0	0	0	0	0	69
CT RIVER VALLEY	15	0	0	3	4	0	31
CENTRAL	11	1	0	2	3	0	27
NORTHEAST	12	0	0	5	7	0	21
SOUTHEAST	12	0	3	6	3	0	14

**Note:** 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.

DMP Index Severity Levels			
1	2	3	4

### Time Series of the Percent of Gages at Their Respective Percentile Flows for Average Daily Streamflows Compared to Historical Values

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

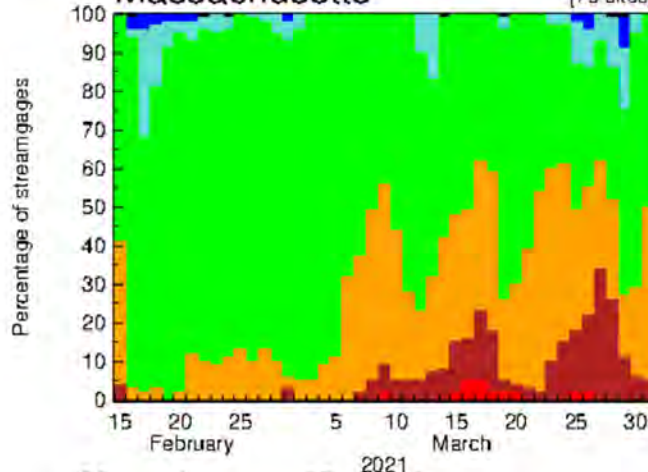
<https://waterdata.usgs.gov/nwis/sw>

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		

### Last 45 Days

#### Massachusetts

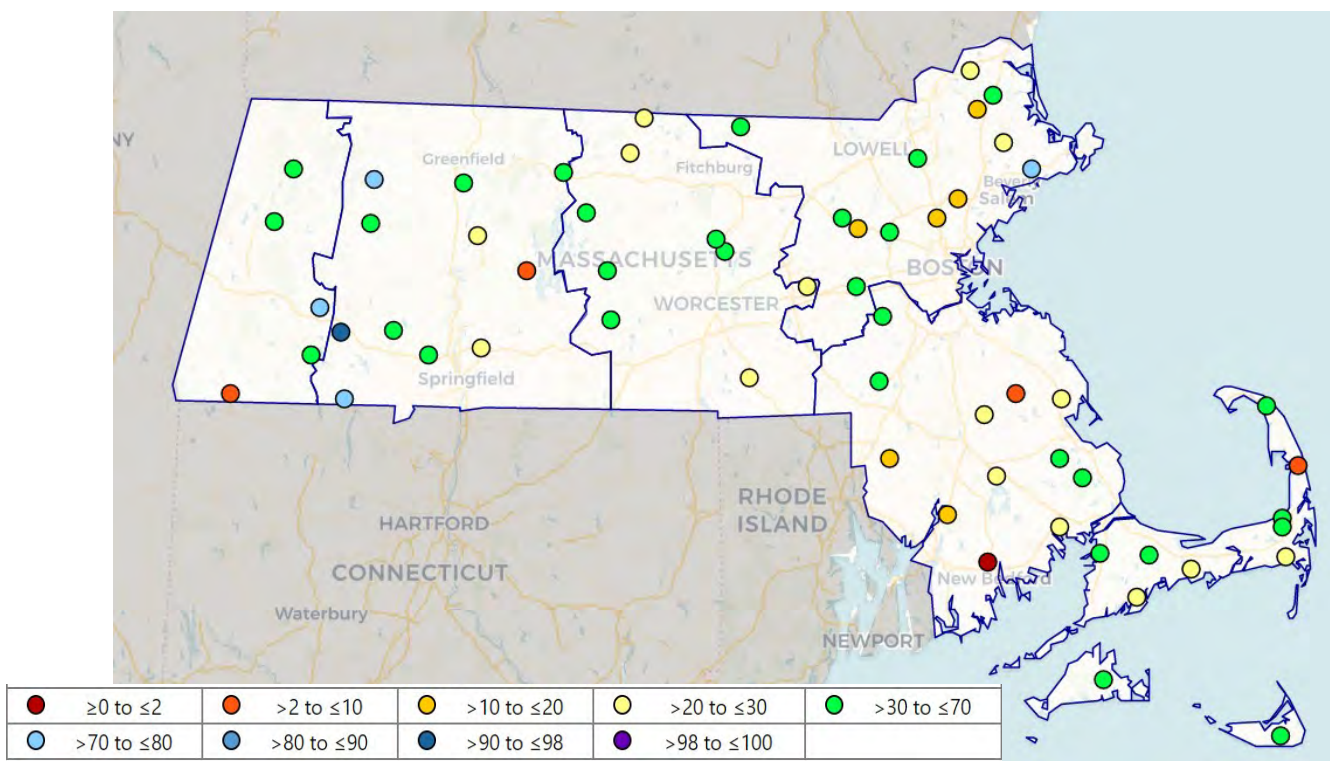
[79 sites]



## GROUNDWATER

Groundwater well levels varied across regions and the state. All regions except the Islands have wells below the 30th percentile and there is one well in the CT River Valley above the 90th percentile. The Southeast Region median is below the 30th percentile, while other regions are above, but several are close. The Western Region is no longer at Index Severity Level 1 as most wells have benefitted from some recharge from snowmelt.

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



REGION	TOTAL WELLS REPORTING FOR MARCH	$\geq 0$ TO $\leq 2$ PERCENTILE	$> 2$ TO $\leq 10$ PERCENTILE	$> 10$ TO $\leq 20$ PERCENTILE	$> 20$ TO $\leq 30$ PERCENTILE	$> 90$ PERCENTILE	MEDIAN OF WELL PERCENTILES
WESTERN	5	0	1	0	0	0	36
CT RIVER VALLEY	11	0	1	0	2	1	47
CENTRAL	9	0	0	0	4	0	31
NORTHEAST	13	0	0	4	2	0	37
SOUTHEAST	12	1	1	2	4	0	25
CAPE COD	9	0	1	0	3	0	35
ISLANDS	2	0	0	0	0	0	51

DMP Index Severity Levels			
1	2	3	4



## LAKES AND IMPOUNDMENTS

REGION	TOTAL REPORTING FOR MARCH	MEDIAN OF INDIVIDUAL PERCENTILES or PERCENT FULL	DMP INDEX SEVERITY
WESTERN	2	100% & 95% full	0
CT RIVER VALLEY	2	66	0
CENTRAL	6	*	0
NORTHEAST	6	35	0
SOUTHEAST	1	97% full	0
CAPE COD	1	12	2

At the end of March, most lakes and impoundments were greater than their 30th percentile value for this time of the year. The pond monitored in the Cape Cod Region is below normal.

\* Lakes and Impoundments in the Central Region varied percentile-wise. The non-water supply impoundment was low at the 9th percentile; however, three reservoir systems were at 100%. Two reservoir systems had levels lower than typical for this time of year (one had dam maintenance, the other was still well above its drought level).

DMP Index Severity Levels			
1	2	3	4

Note: Islands Region does not have any monitoring locations for Lakes and Impoundments  
DMP Index Severity Levels do not necessarily reflect water supply status.

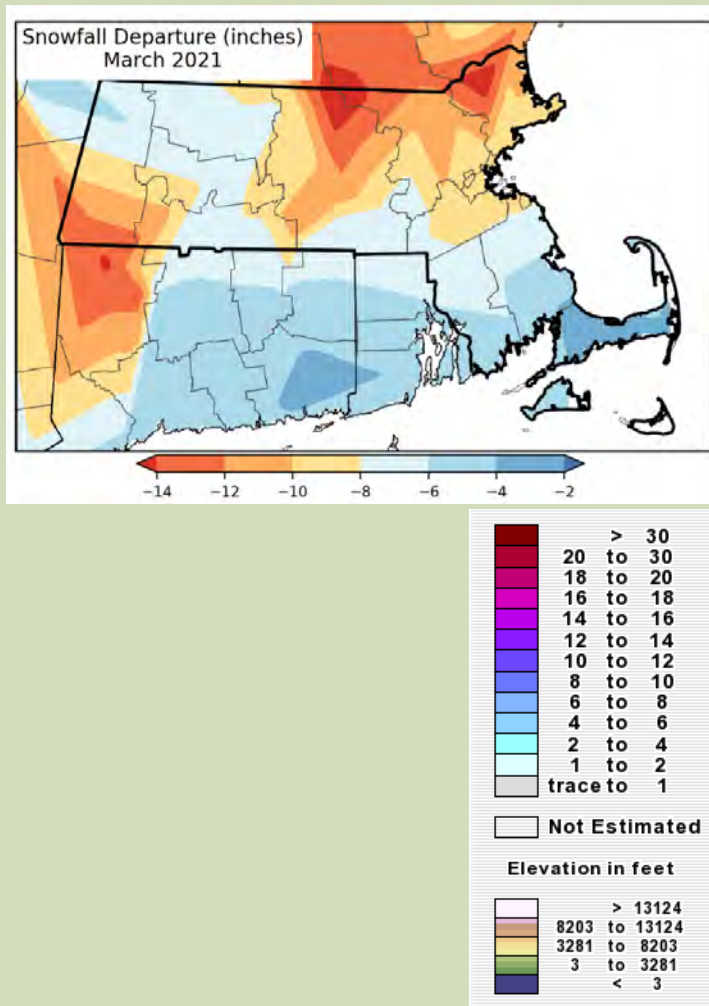
## KEETCH BYRAM DROUGHT INDEX (KBDI)

KBDI all less than 200; Index Severity Level 0.

## CMI

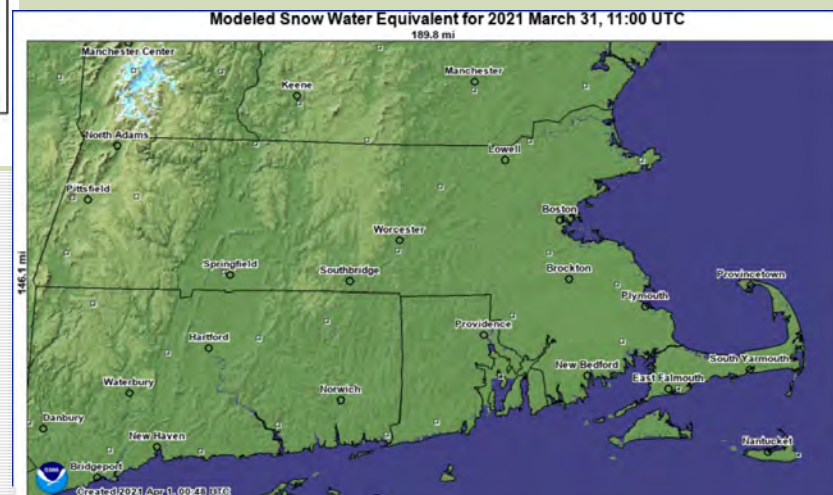
CMI is provided seasonally.

## SNOWFALL



This month's snowfall was mostly below average.

<http://www.nrcc.cornell.edu/>



Modeled Snow Water Equivalent at the End of the Month in Inches

<https://www.nohrsc.noaa.gov/technology/>

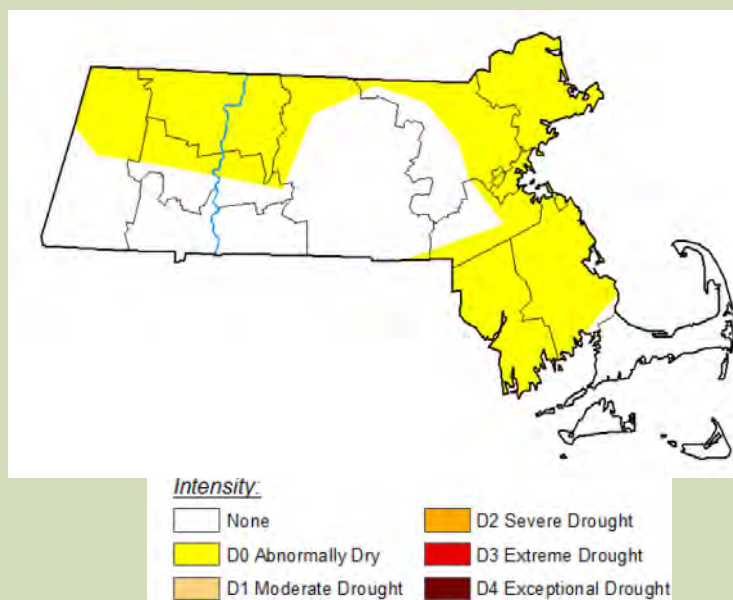
# DROUGHT CONDITIONS AND FORECASTS

## U.S. Drought Monitor (USDM)

Data through Mar. 30, 2021; released April 1, 2021

Throughout the month of March, levels of D0 were introduced across the state.

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

**April:** The outlook released 3/31 shows a 40-50% probability of above-normal temperatures and equal chances of below-normal, normal, or above-normal precipitation.

**April through June:** The outlook released 3/18 shows a 40-50% probability of above-normal temperatures; and a 33-40% probability of above-normal precipitation.

<https://www.cpc.ncep.noaa.gov/>

### Monthly and Seasonal Drought Outlook

The monthly outlook for April released on 3/31 shows drought development is likely across the state except for the southwestern corner. The seasonal outlook released on 3/18 and valid through June shows no drought development.

<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>

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 I – ADDITIONAL PRECIPITATION DATA

### Standardized Precipitation Index March 2021

REGION	NUMBER OF SITES	SPI1	SPI2	SPI3	SPI6	SPI9	SPI12	SPI24	SPI36
WESTERN	7	-0.71	-0.63	-1.06	-0.90	-0.91	-1.29	-1.13	0.05
CT RIVER VALLEY	13	-0.97	-0.90	-1.17	0.09	-0.29	-0.74	-0.33	0.89
CENTRAL	18	-1.08	-0.94	-1.09	0.22	-0.34	-0.46	0.11	1.14
NORTHEAST	20	-1.10	-0.74	-1.03	-0.19	-0.62	-0.64	-0.03	0.51
SOUTHEAST	24	-0.90	-0.43	-0.89	0.05	-0.70	-0.45	0.10	0.72
CAPE COD	18	-0.66	-0.21	-0.77	-0.47	-1.56	-1.57	-0.42	-0.26
ISLANDS	4	-0.32	0.13	-0.56	-0.02	-0.98	-0.59	0.18	0.58

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)	MARCH AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF HISTORICAL
WESTERN	7	3.26	2.04	-1.22	63%
CT RIVER VALLEY	13	3.54	1.86	-1.68	53%
CENTRAL	18	3.84	1.85	-1.99	48%
NORTHEAST	20	3.95	1.88	-2.07	48%
SOUTHEAST	24	4.48	2.26	-2.22	50%
CAPE COD	18	4.30	2.77	-1.53	64%
ISLANDS	4	4.00	2.53	-1.47	63%



## 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, methods for Drought Levels determination, 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	$\leq -4.0$

