

MASSACHUSETTS WATER RESOURCES COMMISSION

JANUARY 2021

HYDROLOGIC CONDITIONS
IN MASSACHUSETTS



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

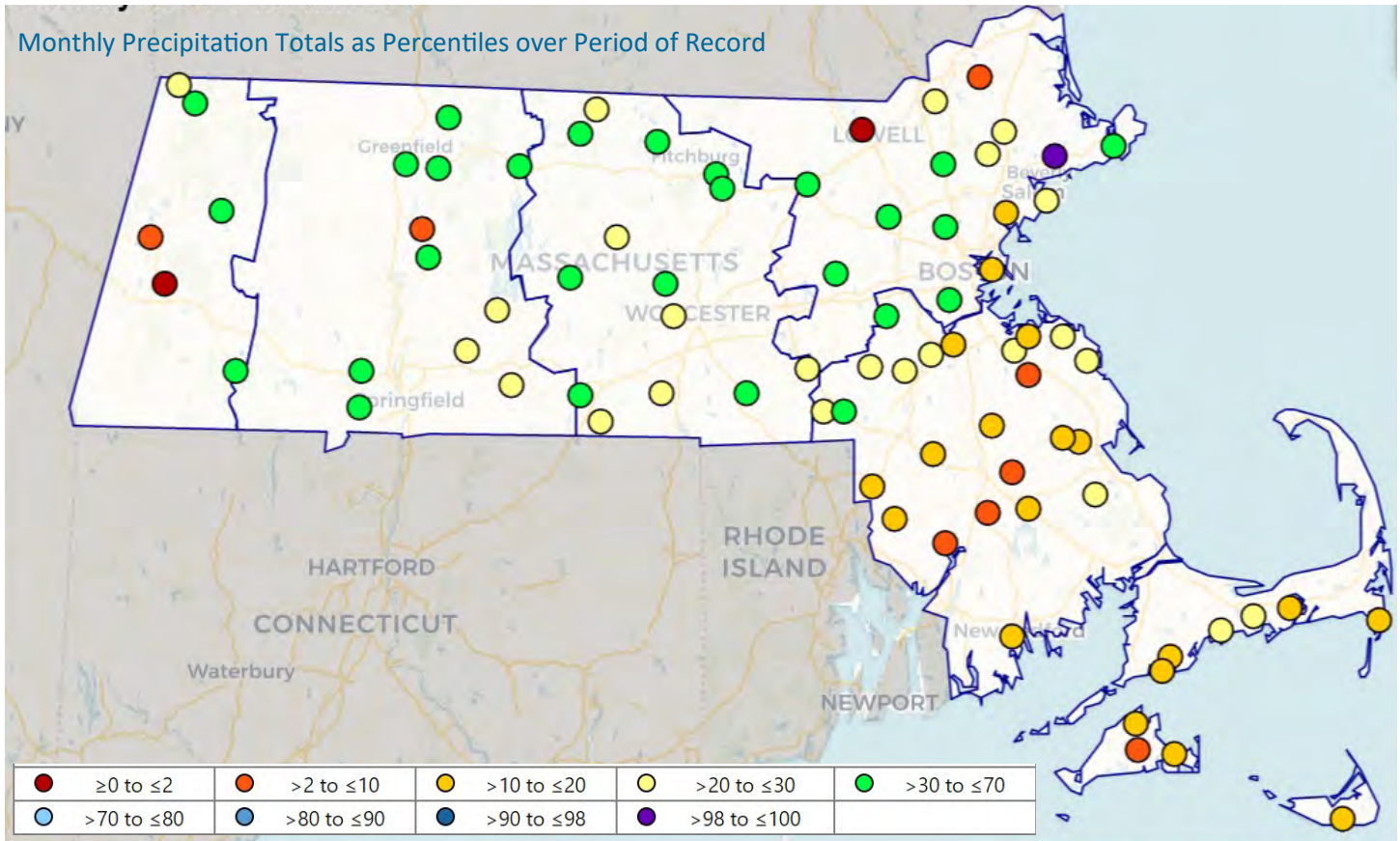
JANUARY 2021 HYDROLOGIC CONDITIONS SUMMARY OF CONDITIONS

- Monthly average temperatures were above to well above normal.
- Precipitation was below normal. Due to above normal temperatures, month-end snowpack only remained in the Berkshires.
- Monthly median streamflows were normal to above normal.
- Groundwater was mostly in the normal range.
- Lakes & Impoundments levels were in the normal range.
- NOAA's February outlook projects equal chances for below-normal, normal, or above-normal temperature and above-normal precipitation.
- NOAA's 3-month outlook projects above-normal temperatures and equal chances for below-normal, normal, or above-normal precipitation.
- Appendices I and II provide additional precipitation data and information on the Massachusetts Drought Management Plan (DMP), respectively.



PRECIPITATION

January was relatively dry for most of the state and especially in the Southeast, Cape Cod, and Islands drought regions. For those regions, the 1-month Standardized Precipitation Index is at Index Severity Level 2. Longer look-back periods are still showing some deficits in some regions from the 2020 drought. Appendix I provides additional details for precipitation data.



REGION	NUMBER OF SITES REPORTING FOR JAN.	ACTUAL MONTHLY AVERAGE (IN)	DEPARTURE FROM HISTORICAL (IN)	DMP SPI * 1-MONTH	DMP SPI 3-MONTH	DMP SPI 6-MONTH
WESTERN	6	1.92	-1.13	-0.50	-0.26	-0.55
CT RIVER VALLEY	11	2.32	-0.93	-0.36	0.44	0.16
CENTRAL	14	2.56	-1	-0.42	0.81	0.21
NORTHEAST	16	2.78	-0.76	-0.51	0.28	-0.28
SOUTHEAST	24	2.27	-1.68	-0.95	0.34	-0.30
CAPE COD	6	2.50	-1.51	-0.96	-0.24	-1.08
ISLANDS	4	1.88	-1.8	-1.08	0.03	-0.86

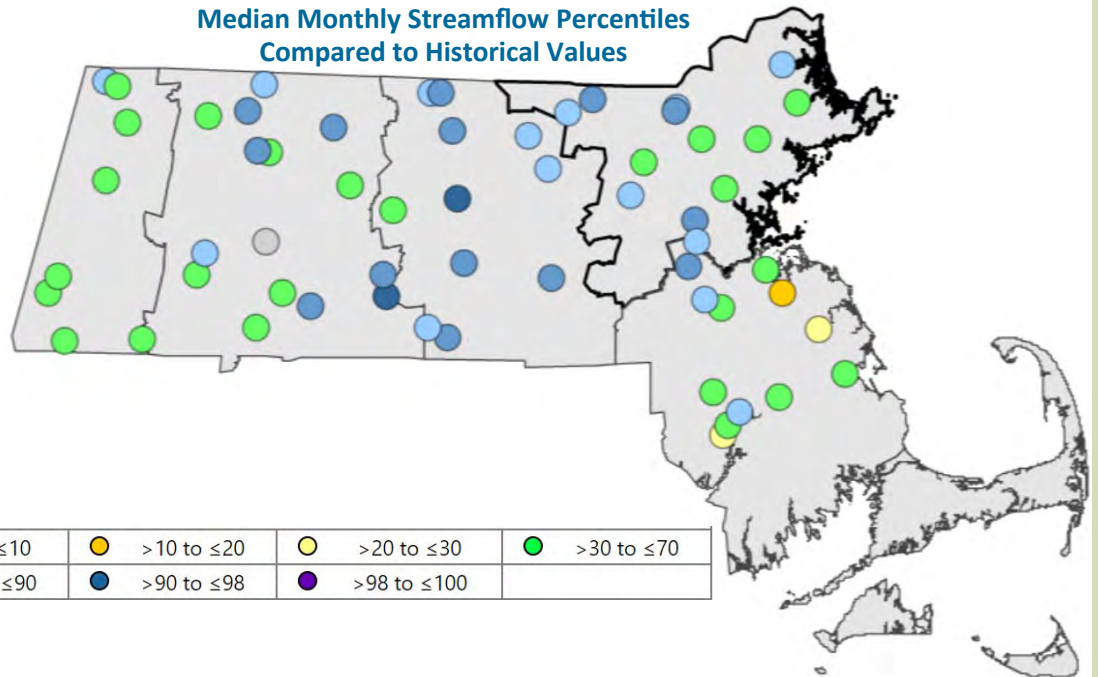
*The Standardized Precipitation Index (SPI) values represent the variation, in standard deviations, from long-term precipitation averages.

Index Severity Levels			
1	2	3	4

STREAMFLOW

All but three gages were above the 30th percentile, indicating Level 0 for Drought Index Severity level. Three streams with smaller watersheds in the Southeast region were below the 30th percentile. This area coincides with some of the lowest January precipitation showing effects on the smaller streams.

Median Monthly Streamflow Percentiles Compared to Historical Values



REGION	TOTAL GAGES REPORTING FOR JAN	≥ 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	0	0	0	0	0	50	0
CT RIVER VALLEY	14	0	0	0	0	0	76	0
CENTRAL	11	0	0	0	0	1	81	0
NORTHEAST	13	0	0	0	0	0	73	0
SOUTHEAST	12	0	0	1	2	0	57	0

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.

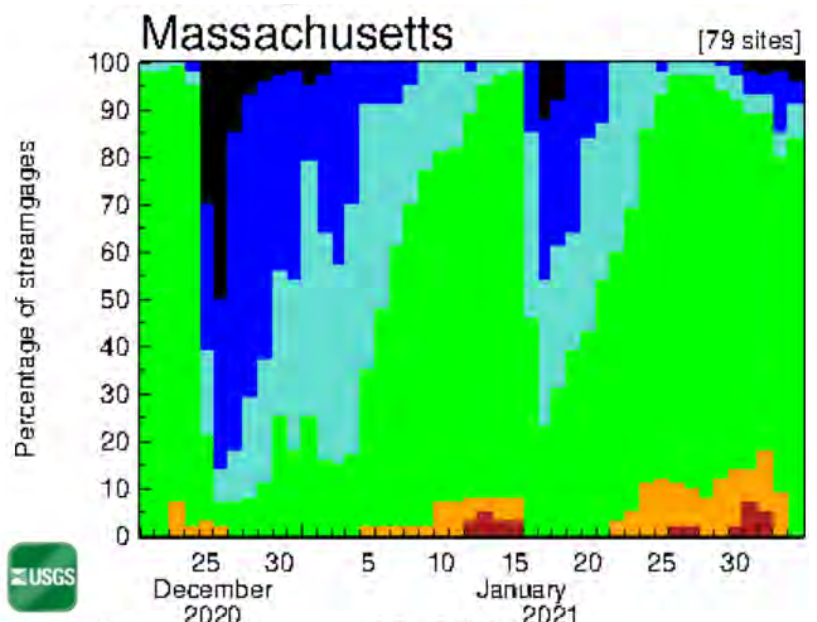
Index Severity Levels			
1	2	3	4

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>

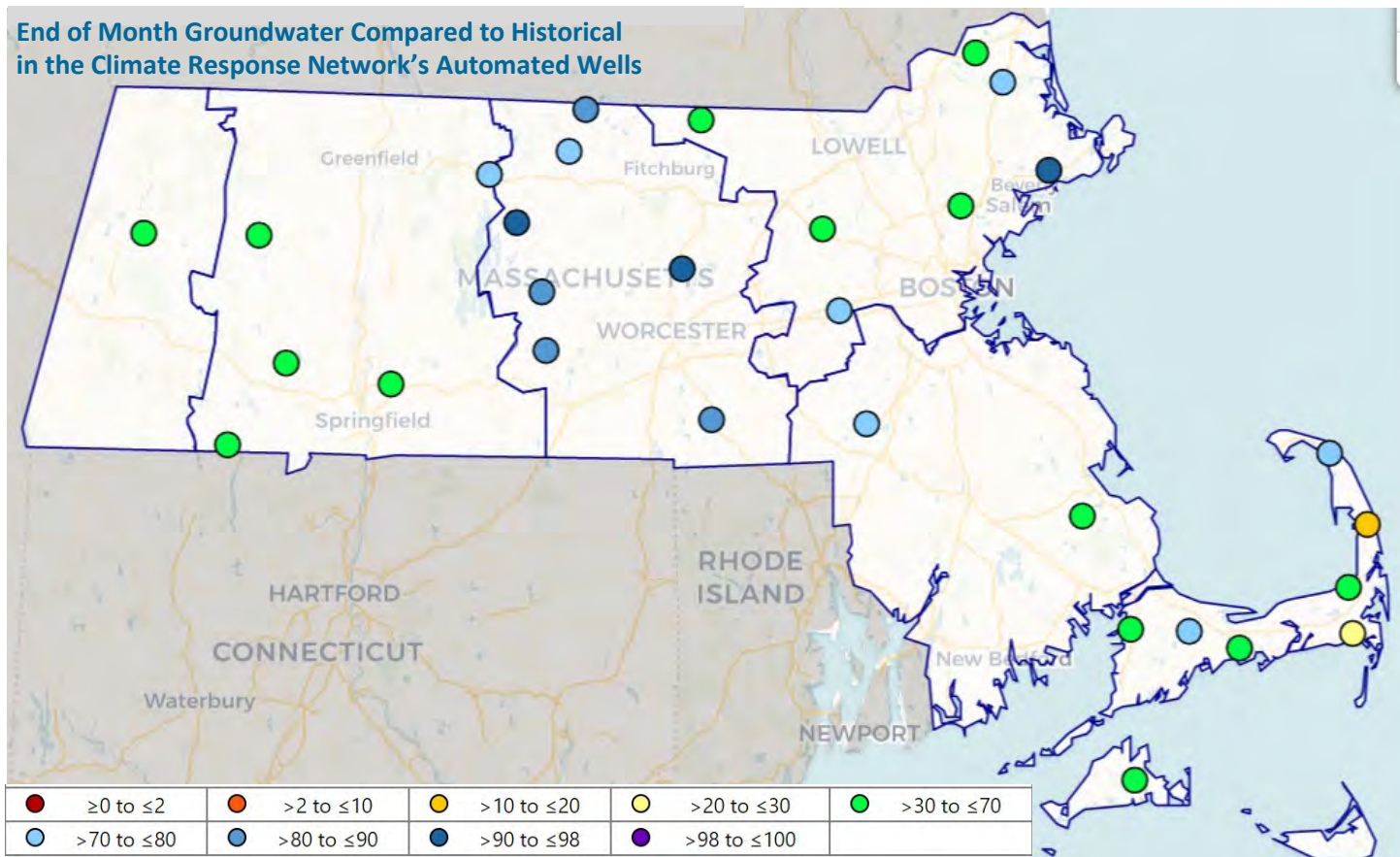
Explanation - Percentile classes							
Low	< 10	10-24	25-75	76-90	> 90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		



GROUNDWATER

All regional medians are above the 30th percentile. Regional percentiles have improved or nearly stayed the same since last month; a few individual wells are still lower than the 30th percentile. The figure below only shows automated wells due to a USGS database system upgrade. However, the table reflects analysis using all wells in the Climate Response Network that are monitored per the state's Drought Management Plan and that reported for January.

**End of Month Groundwater Compared to Historical
in the Climate Response Network's Automated Wells**



REGION	TOTAL WELLS REPORTING FOR JAN.	≥ 0 TO ≤ 2 PERCENTILE	> 2 TO ≤ 10 PERCENTILE	> 10 TO ≤ 20 PERCENTILE	> 20 TO ≤ 30 PERCENTILE	> 30 TO ≤ 70 PERCENTILE	MEDIAN OF INDIVIDUAL WELL PERCENTILES	DMP INDEX SEVERITY
WESTERN	5	0	0	0	0	0	45	0
CT RIVER VALLEY	11	0	0	0	0	0	66	0
CENTRAL	9	0	0	0	0	2	82	0
NORTHEAST	14	0	0	0	0	1	74	0
SOUTHEAST	11	0	1	0	2	0	46	0
CAPE COD	10	0	0	1	1	0	48	0
ISLANDS	2	0	0	0	0	0	55	0

Index Severity Levels			
1	2	3	4

LAKES AND IMPOUNDMENTS

REGION	TOTAL REPORTING FOR JANUARY	MEDIAN OF INDIVIDUAL PERCENTILES	DMP INDEX SEVERITY
WESTERN	2	N/A*	0
CT RIVER VALLEY	2	52	0
CENTRAL	3	75	0
NORTHEAST	5	45	0
SOUTHEAST	2	42	0
CAPE COD	1	31	0
ISLANDS	N/A	N/A	N/A

At the end of January, most lakes and impoundments were greater than their 30th percentile value for this time of the year.

*Median calculation not applicable: individual system levels 100% and 94.4% full.

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

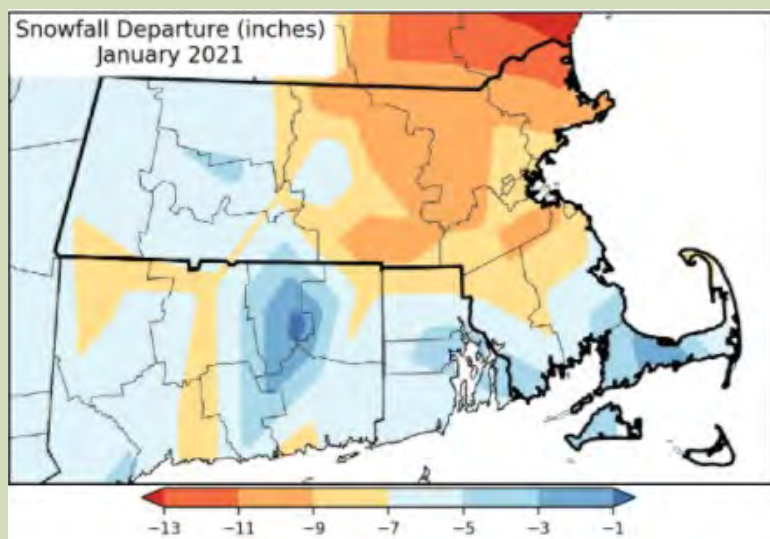
KEETCH BYRAM DROUGHT INDEX (KBDI)

KBDI is provided seasonally.

CROP MOISTURE INDEX (CMI)

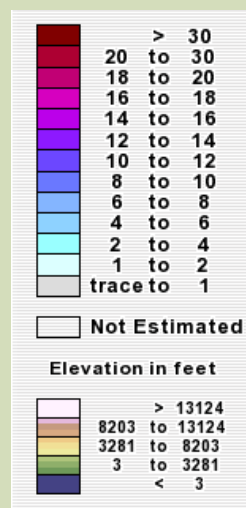
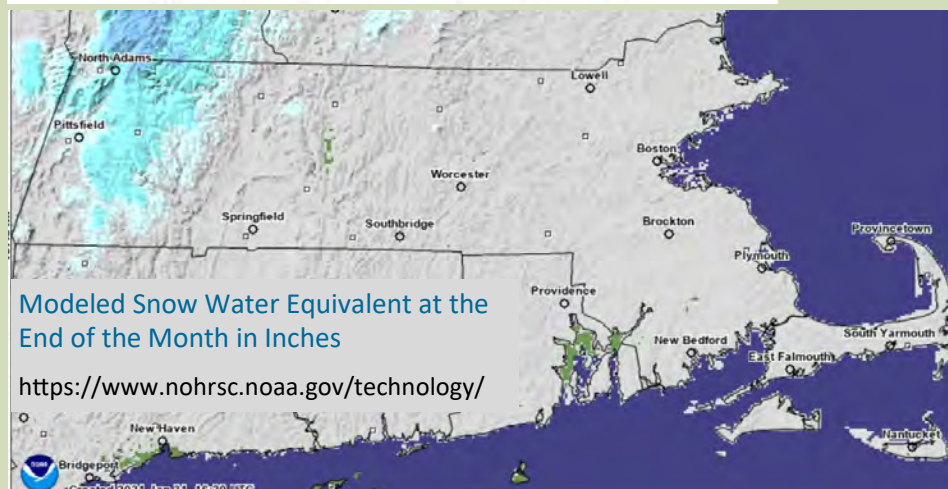
CMI is provided seasonally.

SNOWFALL



This month's snowfall was below to well below average. Season-to-date snowfall totals are also mostly below average across the state.

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



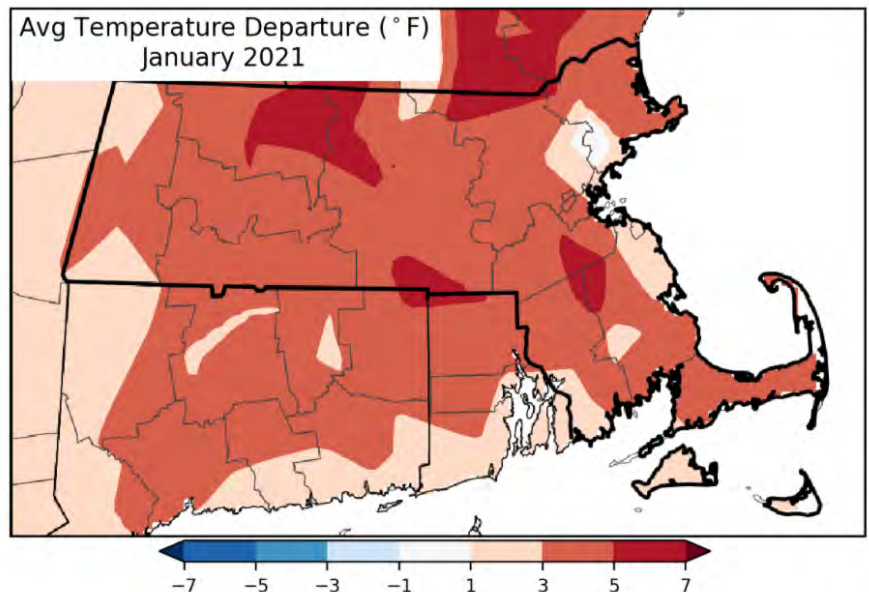
TEMPERATURE

Monthly average temperatures were above to well above normal.

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

Daily average temperature departures from historical averages ranged from +15.9 to -16.7 ° F.

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



DROUGHT CONDITIONS AND FORECASTS

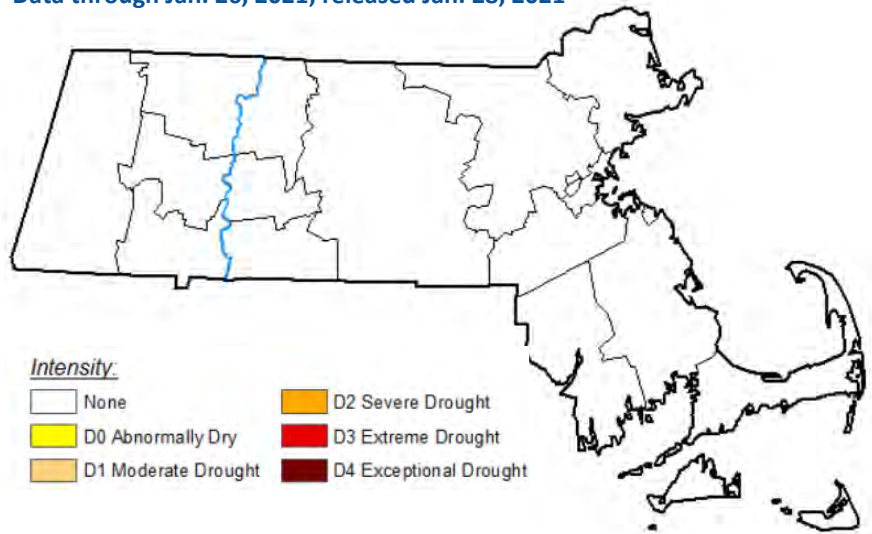
U.S. Drought Monitor (USDM)

Throughout the month of January, and as of January 26th, there were no drought conditions shown on the USDM.

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



Data through Jan. 26, 2021; released Jan. 28, 2021



NOAA Climate Prediction Center

Temperature and Precipitation Outlook

February: The outlook released 1/31 shows equal chances of below-normal, normal, or above-normal temperatures and 33-40% probability of above-normal precipitation.

February through April: The outlook released 1/21 projects a 40-50% chance of above-normal temperatures, and equal chances of below-normal, normal, or above-normal precipitation. <https://www.cpc.ncep.noaa.gov/>

Monthly and Seasonal Drought Outlook

The monthly outlook for February released on 1/31 shows no drought development. The seasonal outlook released on 1/21 and valid through April shows no drought development.

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 January 2021

REGION	NUMBER OF SITES	SPI1	SPI2	SPI3	SPI6	SPI9	SPI12	SPI24	SPI36
WESTERN	6	-0.50	-0.37	-0.26	-0.55	-1.23	-0.79	-1.05	0.28
CT RIVER VALLEY	11	-0.36	0.29	0.44	0.16	-0.65	-0.46	-0.27	1.14
CENTRAL	14	-0.42	0.93	0.81	0.21	-0.40	-0.08	0.27	1.38
NORTHEAST	16	-0.51	0.31	0.28	-0.28	-0.70	-0.47	0.07	0.79
SOUTHEAST	24	-0.95	0.51	0.34	-0.30	-0.72	-0.42	0.22	1.23
CAPE COD	6	-0.96	0.57	-0.24	-1.08	-2.01	-1.52	-0.14	0.60
ISLANDS	4	-1.08	0.28	0.03	-0.86	-1.25	-0.90	0.03	1.02

Key to Index Severity Levels
0
1
2
3
4

Percent of Average Historical Precipitation

REGION	NUMBER OF SITES	HISTORICAL AVERAGE (IN)	JANUARY AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF HISTORICAL
WESTERN	6	3.05	1.92	-1.13	63%
CT RIVER VALLEY	11	3.25	2.32	-0.93	71%
CENTRAL	14	3.56	2.56	-1	72%
NORTHEAST	16	3.54	2.78	-0.76	79%
SOUTHEAST	24	3.95	2.27	-1.68	57%
CAPE COD	6	4.01	2.50	-1.51	62%
ISLANDS	4	3.68	1.88	-1.8	51%

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

