

MASSACHUSETTS WATER RESOURCES COMMISSION

MARCH 2022 HYDROLOGIC CONDITIONS IN MASSACHUSETTS



The Commonwealth of Massachusetts
Charles D. Baker, Governor

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

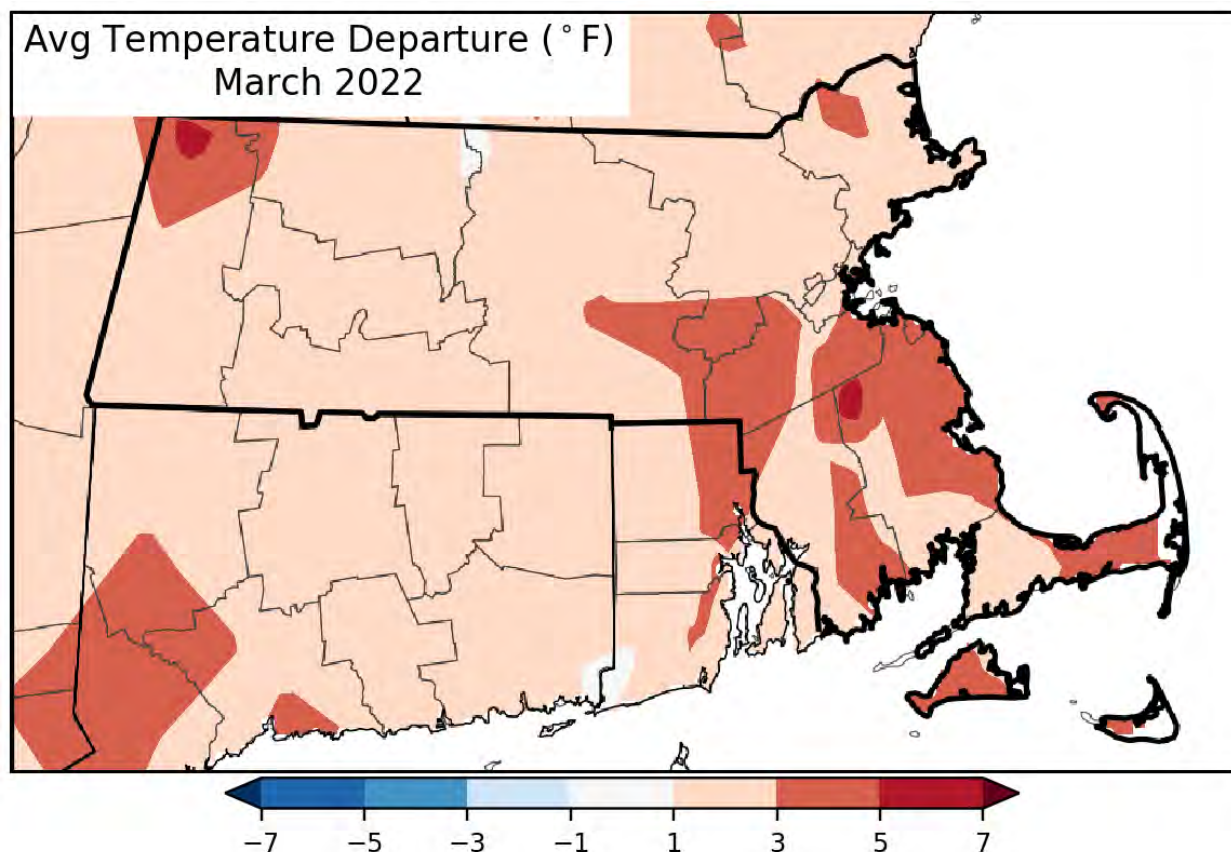
MARCH 2022 HYDROLOGIC CONDITIONS SUMMARY OF CONDITIONS

- Monthly average temperatures were above normal for much of the state.
- Monthly precipitation was normal to below normal. The Northeast Region is at Index Severity Level 1 for March, and the Islands Region is at Index Severity Level 1 for the 6-month look-back period.
- Snowfall remains below normal for the season except in parts of southeastern MA and the Greater Boston area. There was no snow cover at the end of the month.
- Streamflow was normal to above-normal across much of the state. All regions are at Index Severity Level 0.
- Groundwater levels were in the normal to above-normal range across the state with some below normal wells in the eastern portion of the state. All regions are at Index Severity Level 0 except the Islands, which is at Level 1, due to low groundwater levels on Nantucket.
- Lakes & Impoundments were mostly above normal and/or at 100% full.
- NOAA's April outlook shows chances leaning above normal for both temperature and precipitation.
- NOAA's 3-month outlook shows chances leaning above normal for temperatures and equal chances of 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.

TEMPERATURE

Monthly average temperatures were above normal throughout much of the state. According to the Northeast Regional Climate Center, Massachusetts had its 19th warmest March.

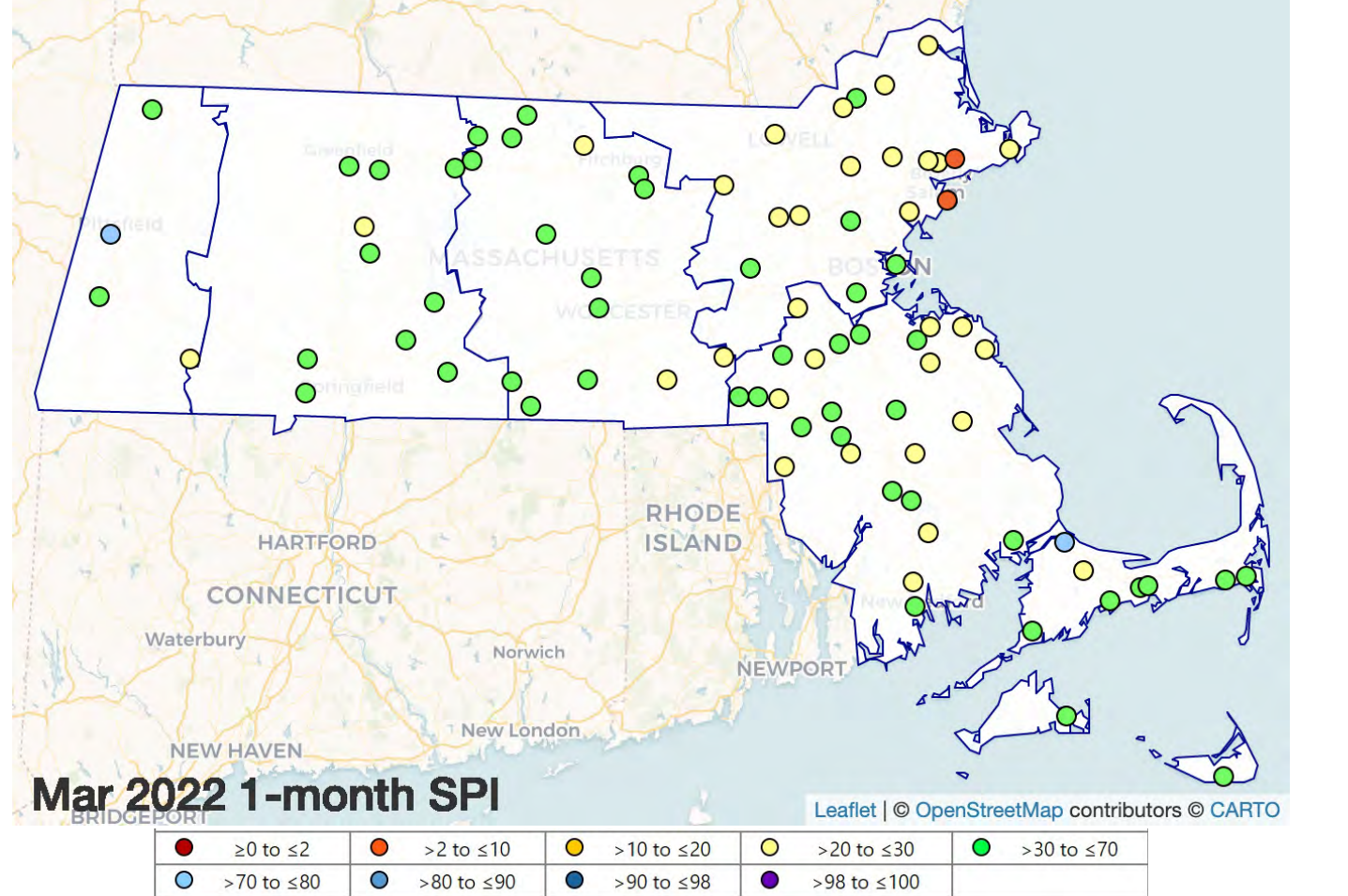
<http://www.nrcc.cornell.edu/regional/monthly/monthly.html>



PRECIPITATION

March precipitation as measured at individual gages was mostly in the normal to below-normal range. The Northeast Region is at an Index Severity Level 1 for March, and the Central and Southeast Regions have March regional medians at the low-end of normal. Combined with previous months’ deficits, the Islands Region is showing an elevated Index Severity Level 1 for the 6-month look-back period. Appendix I provides additional details for precipitation data, including all look-back periods.

Standardized Precipitation Index as a Percentile



REGION	NUMBER OF SITES REPORTING	MARCH MONTHLY AVERAGE (IN)	DEPARTURE FROM HISTORICAL (IN)	SPI PERCENTILE 1-MONTH	SPI PERCENTILE 3-MONTH	SPI PERCENTILE 6-MONTH
WESTERN	4	2.97	-0.28	50	49	66
CTRV	10	3.09	-0.49	47	43	46
CENTRAL	15	3.03	-0.80	36	64	58
NORTHEAST	20	2.37	-1.52	28	46	50
SOUTHEAST	27	3.06	-1.36	31	58	48
CAPE COD	8	3.78	-0.51	45	65	54
ISLANDS	2	3.37	-0.69	42	56	26

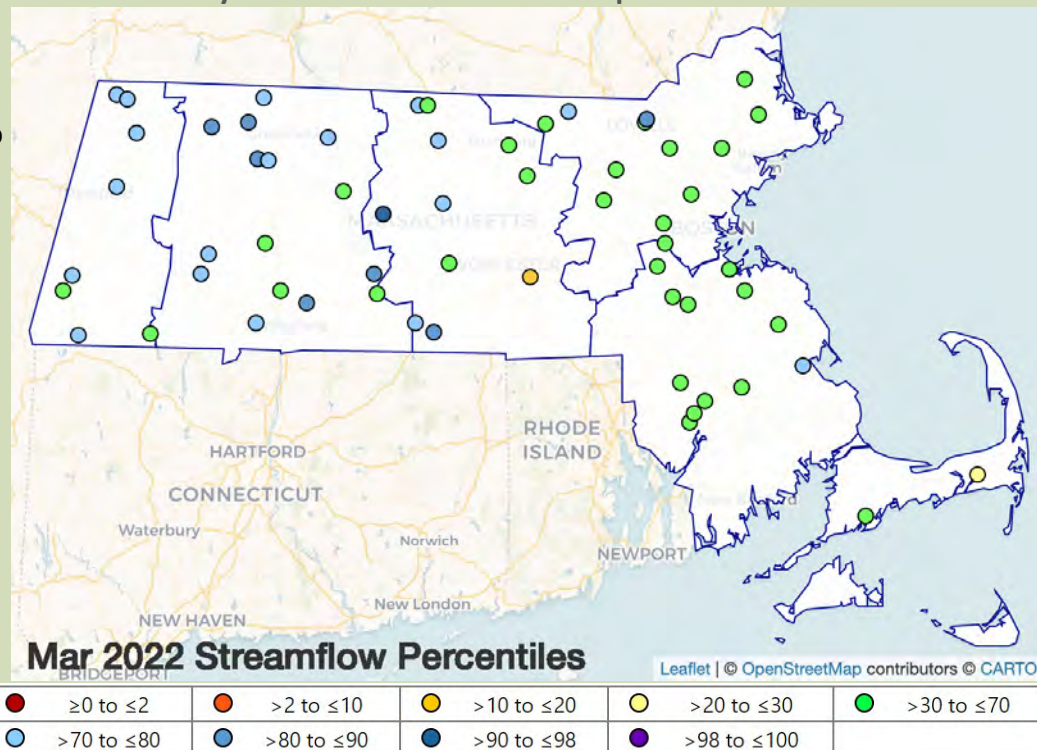
SPI is the Standardized Precipitation Index used in the Drought Management Plan (DMP) expressed here as a percentile and represents the variation, in standard deviations, from long-term precipitation averages.

DMP Index Severity Levels			
1	2	3	4

STREAMFLOW

March percentiles of individual streamflow gages mostly ranged from normal to above normal. Regional monthly streamflow medians were above normal in the Western and Central regions, and normal for the rest of the state. All regions are at Index Severity Level 0. Although the monthly medians are mostly normal, the time series graph below shows an increase in below normal conditions toward the end of the month.

Median Monthly Streamflow Percentiles Compared to Historical Values



REGION	TOTAL GAGES REPORTING FOR MAR	≥ 0 TO ≤ 2 PERCENTILE	> 2 TO ≤ 10 PERCENTILE	> 10 TO ≤ 20 PERCENTILE	> 20 TO ≤ 30 PERCENTILE	> 90 PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES
WESTERN	8	0	0	0	0	0	74
CTRV	15	0	0	0	0	0	80
CENTRAL	11	0	0	1	0	1	71
NORTHEAST	13	0	0	0	0	0	52
SOUTHEAST	12	0	0	0	0	0	51
CAPE COD	2	0	0	0	1	0	43

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

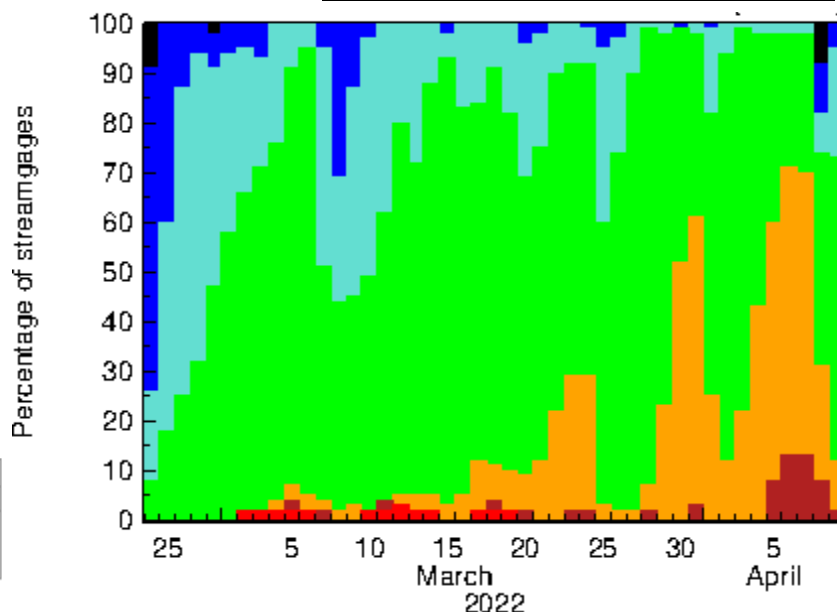
DMP Index Severity Levels			
1	2	3	4

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>

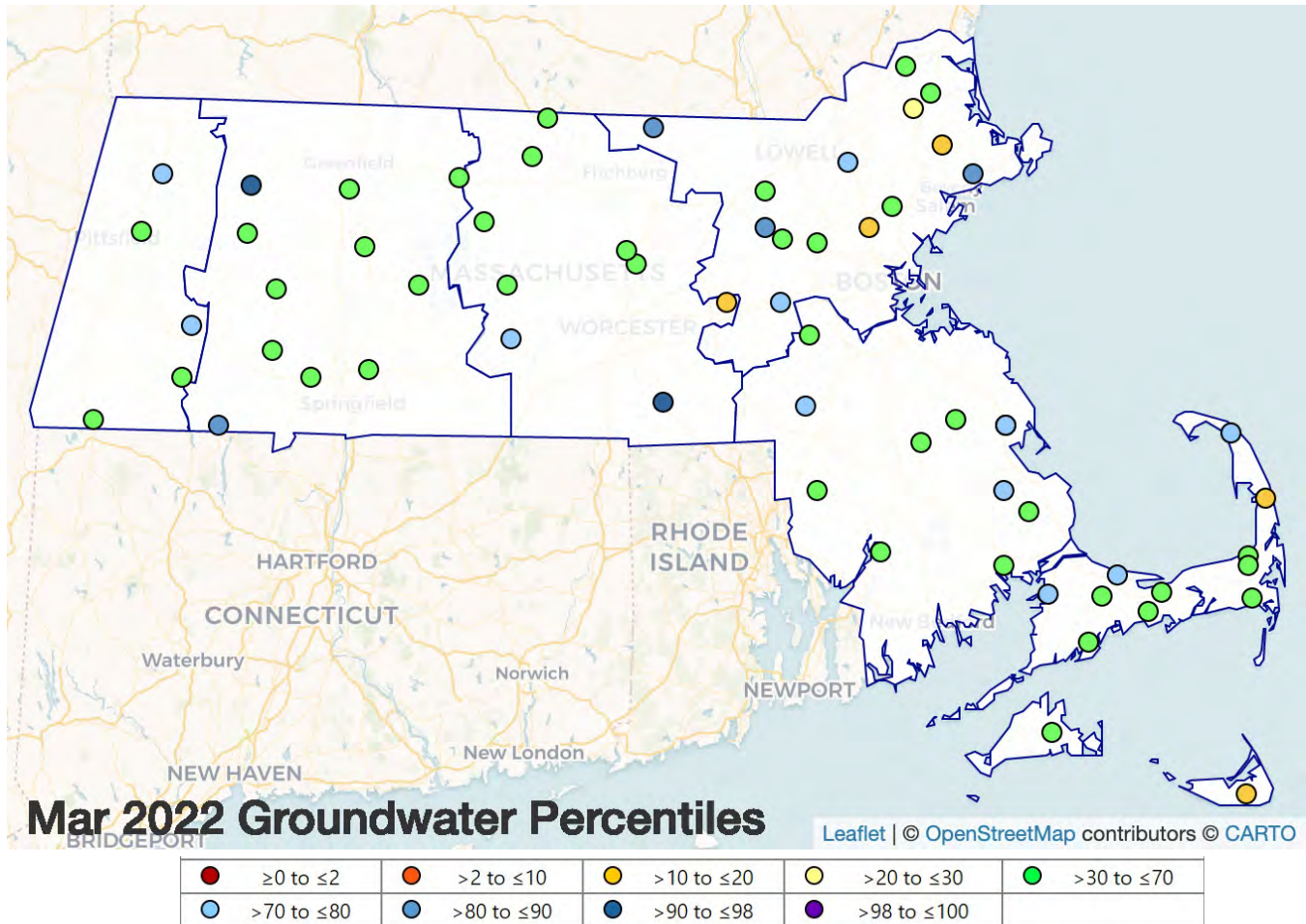
Explanation - Percentile classes							
Low	< 10	10-24	25-75	76-90	> 90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		



GROUNDWATER

Percentiles of individual groundwater wells ranged from significantly below-normal to significantly above-normal range across the state. Below normal wells were in the eastern portion of the state. All regions are at Index Severity Level 0 except the Islands Region, which is at Index Severity Level 1.

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



REGION	TOTAL WELLS REPORTING FOR MAR	≥ 0 TO ≤ 2 PERCENTILE	> 2 TO ≤ 10 PERCENTILE	> 10 TO ≤ 20 PERCENTILE	> 20 TO ≤ 30 PERCENTILE	> 90 PERCENTILE	MEDIAN OF INDIVIDUAL WELL PERCENTILES
WESTERN	5	0	0	0	0	0	57
CTRV	11	0	0	0	0	1	65
CENTRAL	9	0	0	1	0	1	50
NORTHEAST	14	0	0	2	1	0	62
SOUTHEAST	11	0	0	0	0	0	61
CAPE COD	11	0	0	1	0	0	55
ISLANDS	2	0	0	1	0	0	30

DMP Index Severity Levels			
1	2	3	4

LAKES AND IMPOUNDMENTS

At the end of March, most lake and impoundment levels were greater than their 30th percentile values and/or at or near 100% full. All regions are at Index Severity Level 0. The Quabbin, which started spilling February 12th, continued to spill over the lower spillway.

REGION	TOTAL REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	1	100% full
CTRV	2	93
CENTRAL	5	38; 100% & 99.95% full
NORTHEAST	6	68; 100% & 99.9% full
SOUTHEAST	2	96; 99.9% full
CAPE COD	1	56

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

DMP Index Severity Levels			
1	2	3	4

KEETCH BYRAM DROUGHT INDEX (KBDI)

Provided for the months of April through November.

CROP MOISTURE INDEX (CMI)

Provided for the months of April through November.

https://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml

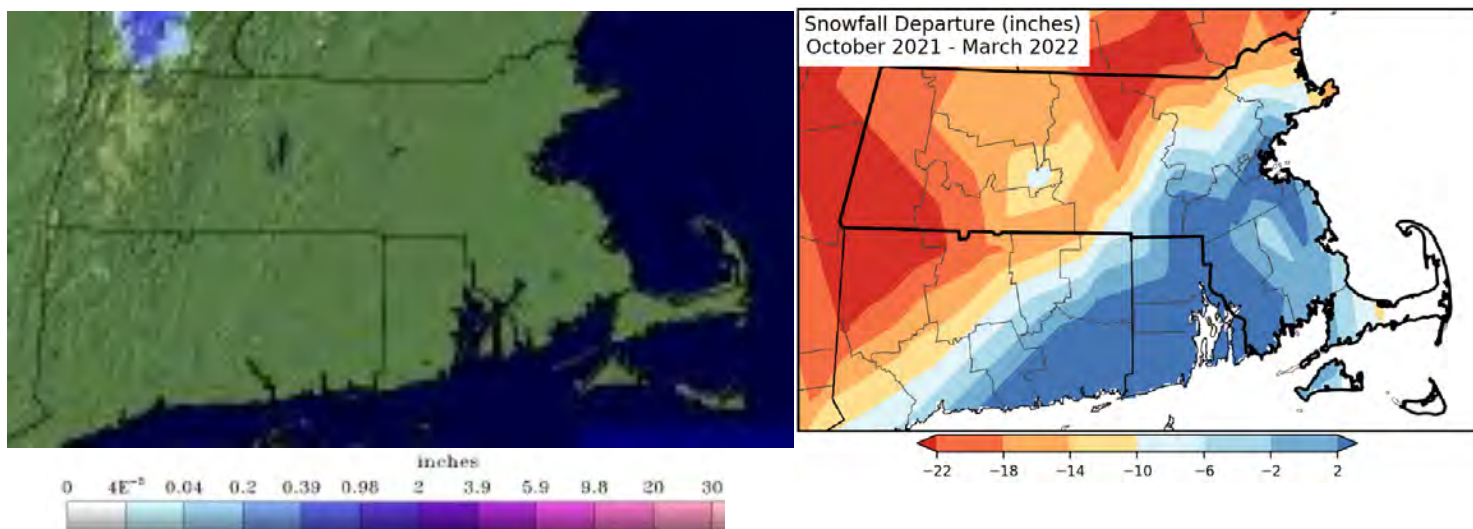
SNOWFALL

At the end of March, snowfall was below normal for the season except in parts of southeastern MA and the Greater Boston area. There was no snow cover remaining at the end of the month.

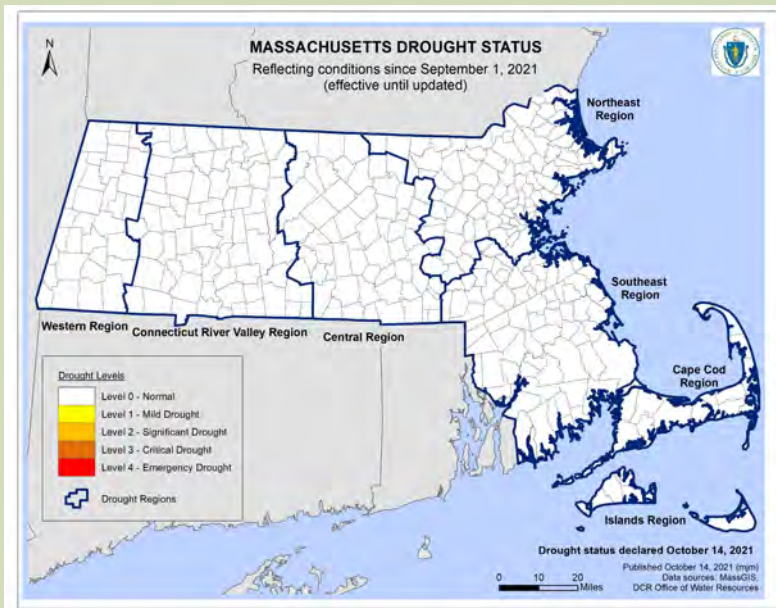
Modeled Snow Water Equivalent at the End of the Month in Inches:

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

Snowfall Departure:



DROUGHT CONDITIONS AND FORECASTS



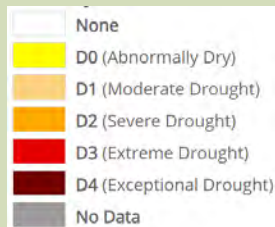
Massachusetts Drought Status

On October 14, 2021 Massachusetts Energy and Environmental Affairs (EEA) Secretary Kathleen Theoharides declared Level 0-Normal Conditions in the Cape Cod Region as well as the Western, Connecticut River Valley, Central, Northeast, Southeast, and Islands Regions. This status remains in effect until further updates.

U.S. Drought Monitor (USDM)

At the end of March, the USDM did not show drought conditions in Massachusetts.

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



NOAA Climate Prediction Center

Temperature and Precipitation Outlook

April: The outlook issued 3/31 shows a 33-40% probability of both above-normal temperatures and precipitation.

April through June: The outlook issued 3/17 shows 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 April released on 3/31 shows no drought development in the state. The seasonal outlook released on 3/31 and valid through June shows no drought development in 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. Analysis reflects automated calculations done 4/10/2022. Additional information, previous reports, and the Massachusetts Drought Dashboard with weekly updates to the drought indices can be found at: <https://www.mass.gov/drought-monitoring>

APPENDIX I – ADDITIONAL PRECIPITATION DATA

Standardized Precipitation Index—March 2022 as percentiles

REGION	NUMBER OF SITES	1-mo*	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo*
WESTERN	4	50	68	49	66	98	97	77	76
CTRV	10	47	69	43	46	95	93	68	73
CENTRAL	15	36	74	64	58	98	96	82	87
NORTHEAST	20	28	52	46	50	96	95	83	92
SOUTHEAST	27	31	59	58	48	93	91	79	80
CAPE COD	8	45	65	65	54	85	77	41	60
ISLANDS	2	42	52	56	26	62	55	35	68

*1- and 36-month SPI is for informational purposes only, not for drought determination.

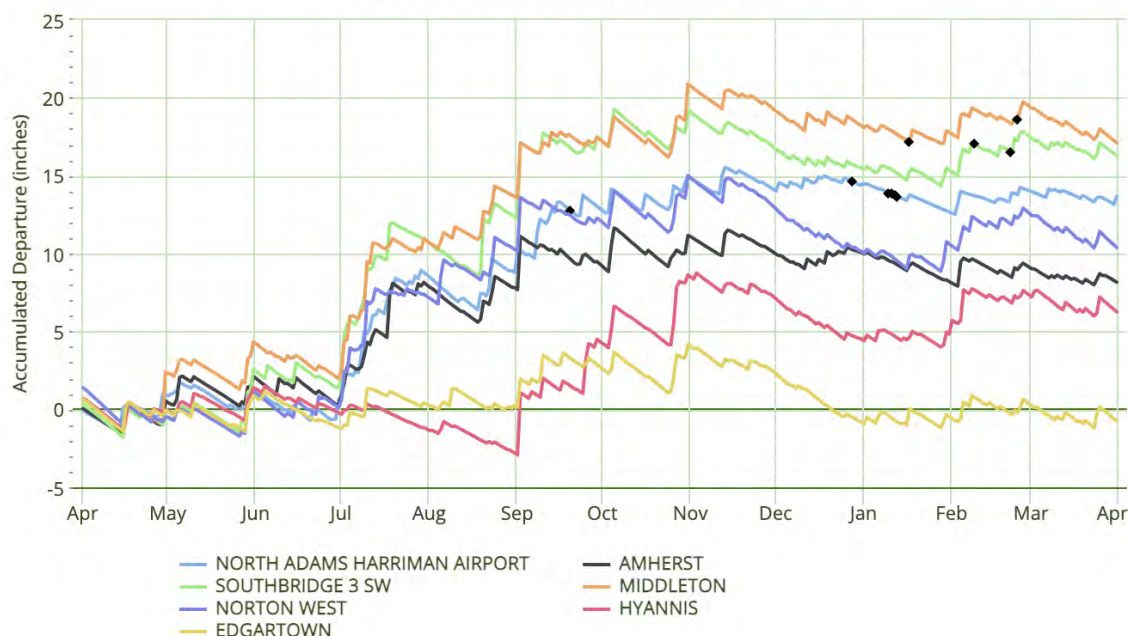
DMP Index Severity Levels			
1	2	3	4

Percent of Average Historical Precipitation—March 2022

REGION	NUMBER OF SITES	HISTORICAL AVERAGE	MARCH AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF NORMAL
WESTERN	4	3.25	2.97	-0.28	91%
CTRV	10	3.58	3.09	-0.49	86%
CENTRAL	15	3.83	3.03	-0.80	79%
NORTHEAST	20	3.89	2.37	-1.52	61%
SOUTHEAST	27	4.42	3.06	-1.36	69%
CAPE COD	8	4.29	3.78	-0.51	88%
ISLANDS	2	4.06	3.37	-0.69	83%

Accumulated Precipitation Departure from Normal (inches)

Black diamonds represent missing values



The graph does not consider starting condition's wetness/dryness; does not show summer heat waves with high evapotranspiration; and only one station per Drought Region is shown. <https://xmacis.rcc-acis.org/>

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

