MASSACHUSETTS WATER RESOURCES COMMISSION

JANUARY 2022 HYDROLOGIC CONDITIONS IN MASSACHUSETTS

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

JANUARY 2022 HYDROLOGIC CONDITIONS

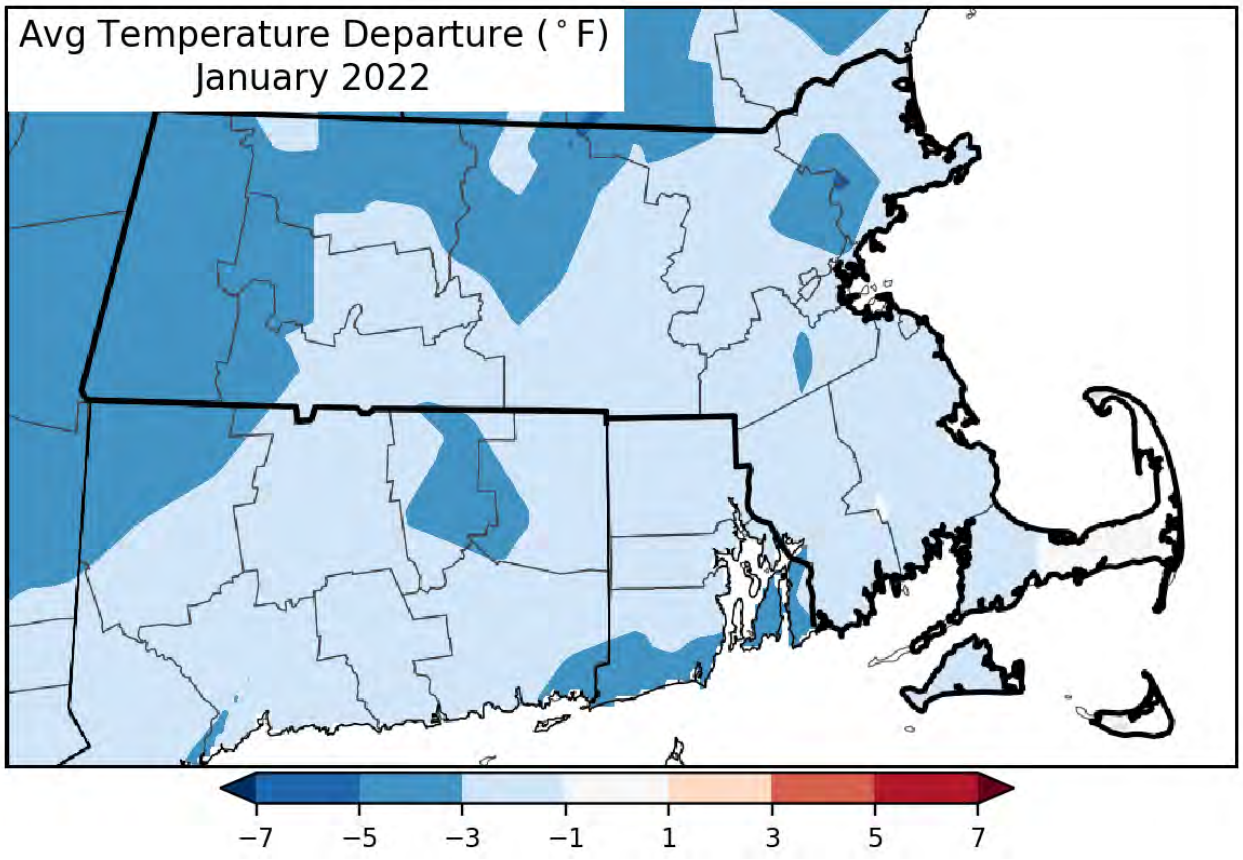
SUMMARY OF CONDITIONS

- Monthly average temperatures were normal to below normal.
- Monthly precipitation was below normal in the Western and CTRV regions and normal to above normal for the rest of the state. Combined with previous months' deficits, the 2– and/or 3-mos SPI show elevated Index Severity Level for all regions.
- Despite multiple snow storms including a Nor'easter at the end of the month, snowfall for the season remains below normal except in the Southeast, Cape Cod, and Islands regions which received the most snowfall in the storms.
- Streamflow was mostly normal across the state. All regions are at Index Severity Level 0.
- Groundwater levels were mostly in the normal range across the State with some exceptions. All regions are at Index Severity Level 0 except the Islands, which is at Level 1, due to low levels on Nantucket.
- Lakes & Impoundments levels were normal to above normal.
- NOAA's February outlook shows chances likely for above-normal temperatures and equal chances of below-normal, normal, or above-normal precipitation.
- NOAA's 3-month outlook shows chances for above-normal 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

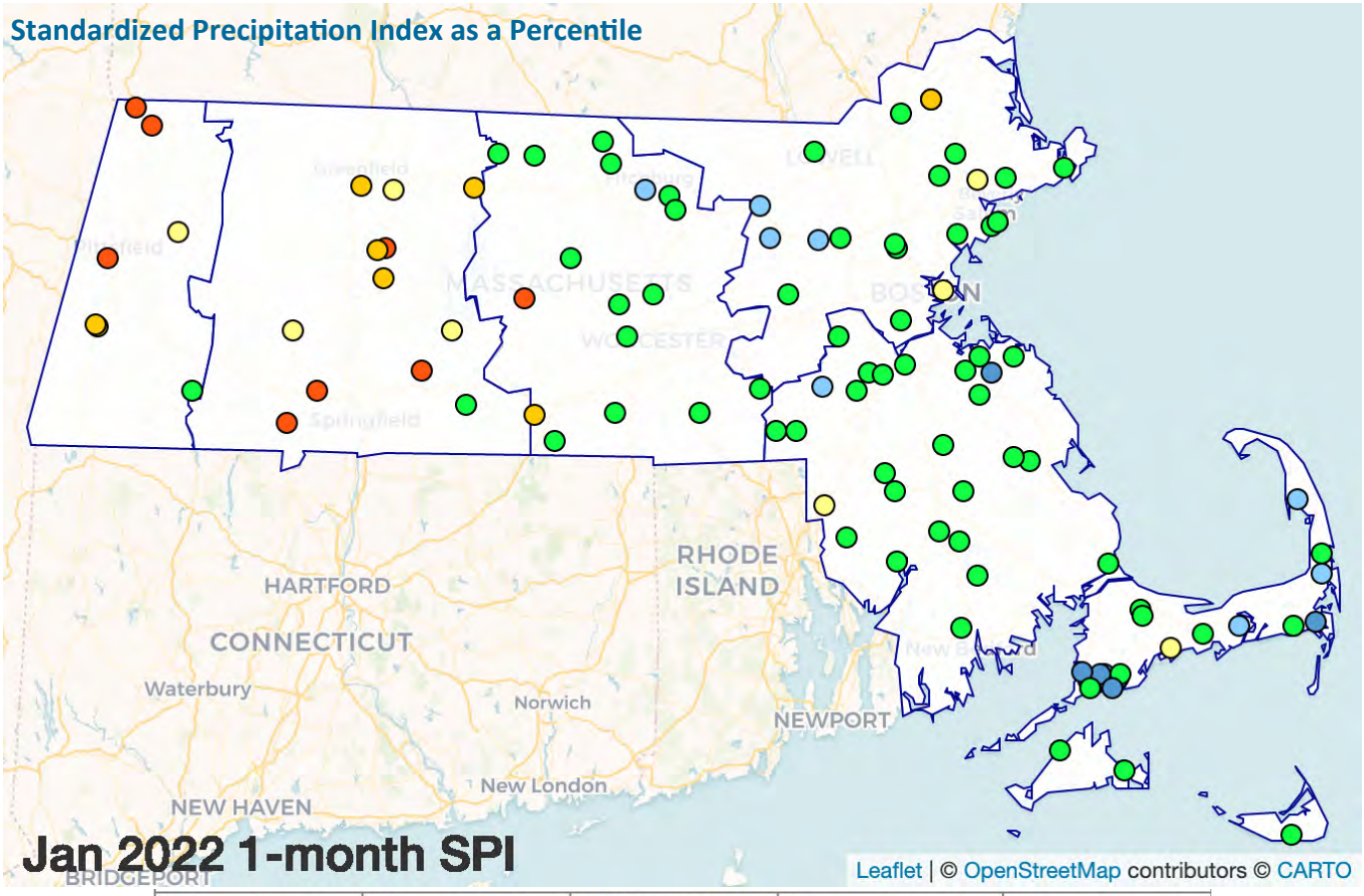
Monthly average temperatures were normal to below normal.

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



PRECIPITATION

January precipitation was below normal in the Western and CTRV regions but normal to above normal in the rest of the state. Combined with previous months' deficits, the 2– and/or 3-mos SPI show elevated Index Severity Level for all regions. Despite multiple snow storms including a Nor'easter at the end of the month, snowfall for the season remains below normal except in the Southeast, Cape Cod, and Islands regions which received the most snow from the storms. Snow coverage maps are available on page 6 and Appendix I provides additional precipitation statistics, including all look-back periods.



REGION	NUMBER OF SITES REPORTING	JANUARY MONTHLY AVERAGE (IN)	DEPARTURE FROM HISTORICAL (IN)	SPI* PERCENTILE 1-MONTH	SPI PERCENTILE 3-MONTH	SPI PERCENTILE 6-MONTH
WESTERN	7	1.62	-1.31	11	19	74
CTRV	12	1.73	-1.52	16	13	53
CENTRAL	17	2.95	-0.60	46	22	75
NORTHEAST	21	3.12	-0.35	54	12	86
SOUTHEAST	27	3.87	-0.10	51	7	76
CAPE COD	18	4.66	0.66	71	11	87
ISLANDS	3	4.59	0.69	65	8	64

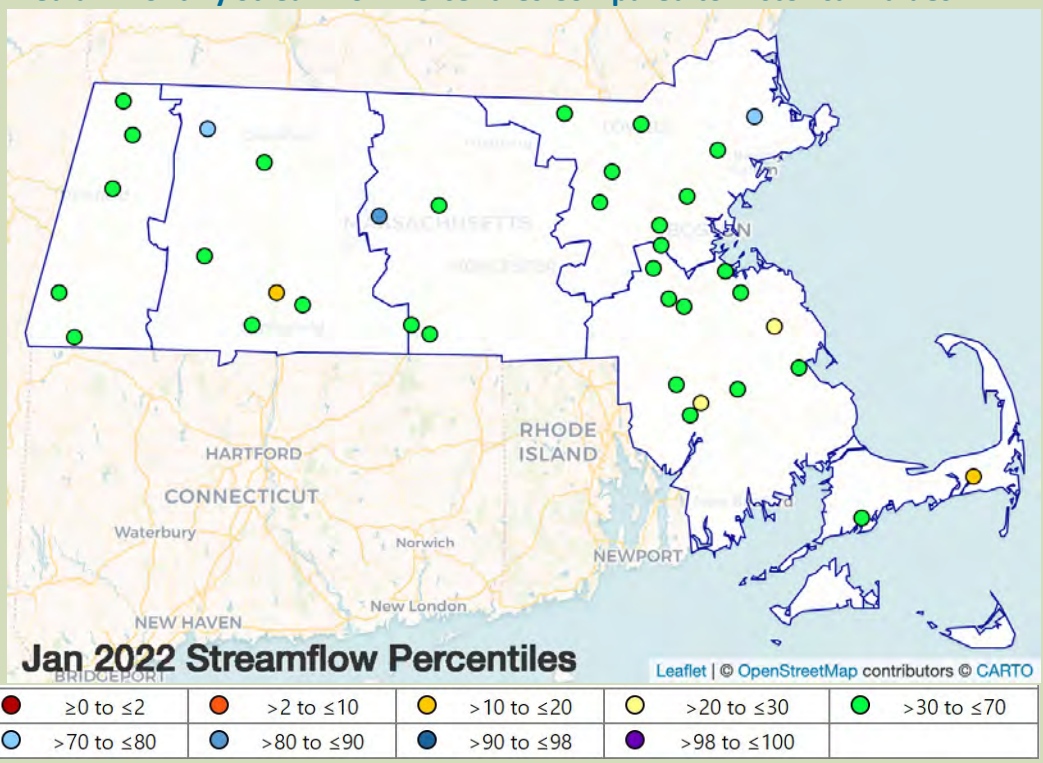
DMP Index Severity Levels			
1	2	3	4

STREAMFLOW

Streamflow was mostly normal during January. Regional monthly streamflow medians were in the normal range, with a some individual gages below normal and a few above normal. All regions are at Index Severity Level 0, but the Southeast and Cape are close to the 30th percentile value for Level 1.

Many gages were affected by ice during January. Thus, only a subset of regularly reporting gages provided data.

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 PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES
WESTERN	5	0	0	0	0	0	56
CTRV	6	0	0	1	0	0	63
CENTRAL	4	0	0	0	0	0	61
NORTHEAST	9	0	0	0	0	0	62
SOUTHEAST	11	0	0	0	2	0	36
CAPE COD	2	0	0	1	0	0	35

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

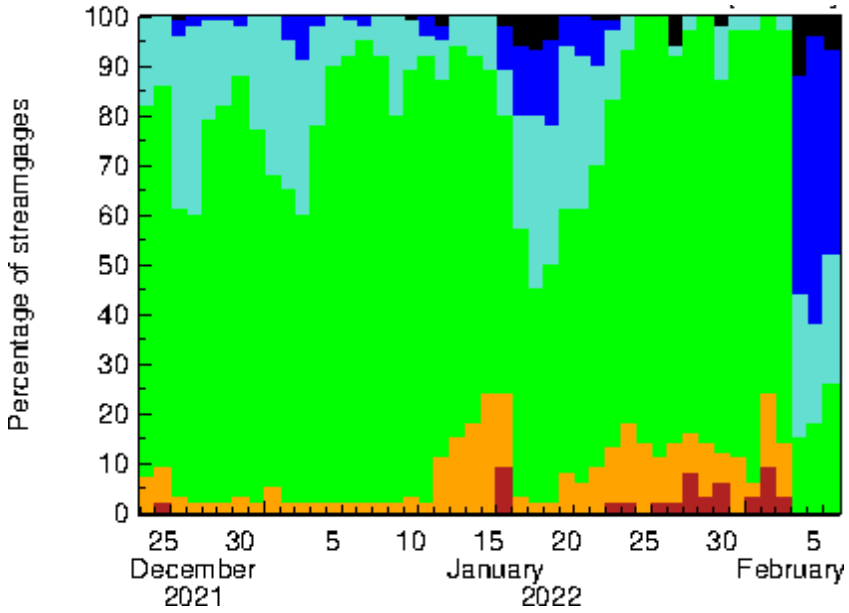
DMP Index Severity Levels			
1	2	3	4

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

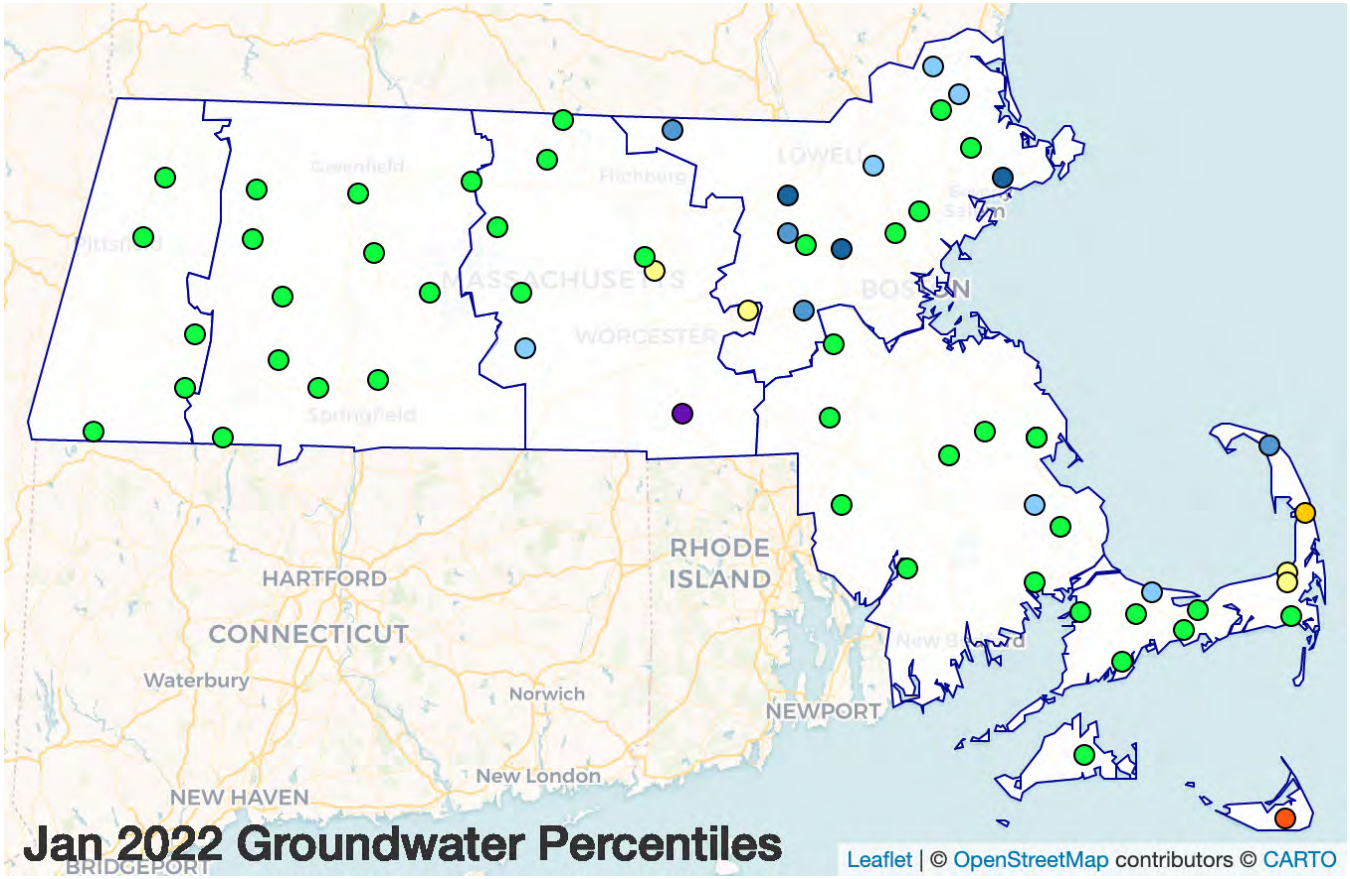
Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		



GROUNDWATER

Percentiles of individual groundwater wells were in the normal to above-normal range throughout much of the state with some exceptions in the Central, Cape Cod, and Islands regions. The Nantucket well showing at Index Severity Level 2 is at its 10th percentile value. The well has been in decline since last May but showed a decrease in decline in January. Other wells nearby on the island that are not part of the DMP show a similar pattern. 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



≥0 to ≤2	>2 to ≤10	>10 to ≤20	>20 to ≤30	>30 to ≤70
>70 to ≤80	>80 to ≤90	>90 to ≤98	>98 to ≤100	

REGION	TOTAL WELLS REPORTING FOR JAN	≥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	52
CTRV	11	0	0	0	0	0	50
CENTRAL	9	0	0	0	2	1	47
NORTHEAST	14	0	0	0	0	3	73
SOUTHEAST	11	0	0	0	1	0	49
CAPE COD	11	0	0	1	2	0	50
ISLANDS	2	0	1	0	0	0	28

DMP Index Severity Levels			
1	2	3	4

LAKES AND IMPOUNDMENTS

REGION	TOTAL REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	1	69
CTRV	2	93
CENTRAL	5	65
NORTHEAST	6	81
SOUTHEAST	1	100
CAPE COD	1	50

At the end of January, 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.

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 April through November.

CROP MOISTURE INDEX (CMI)

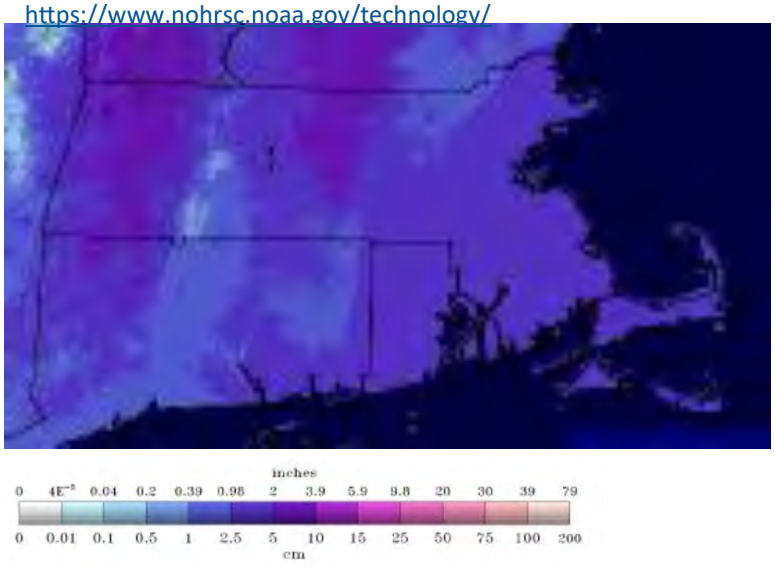
Provided April through November.
https://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml

SNOWFALL

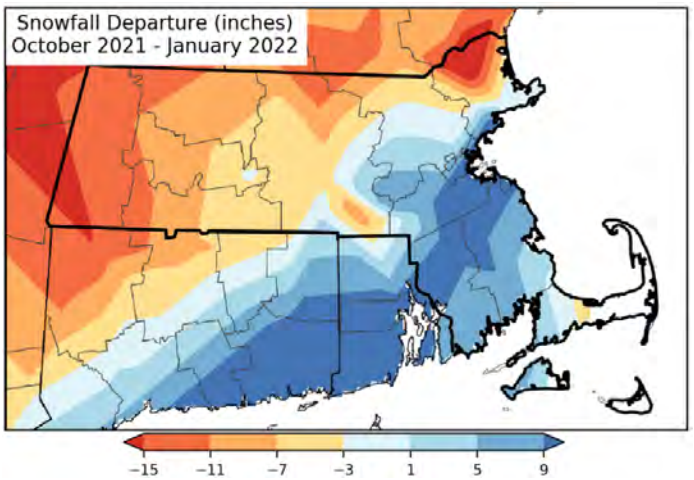
At the end of January snowfall was below normal for the season except in the Southeast, Cape Cod, and Islands regions. Snow cover remained throughout the state at the end of the month. According to the NRCC, the Boston climate site had its 4th snowiest January on record, and Worcester its 15th.

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

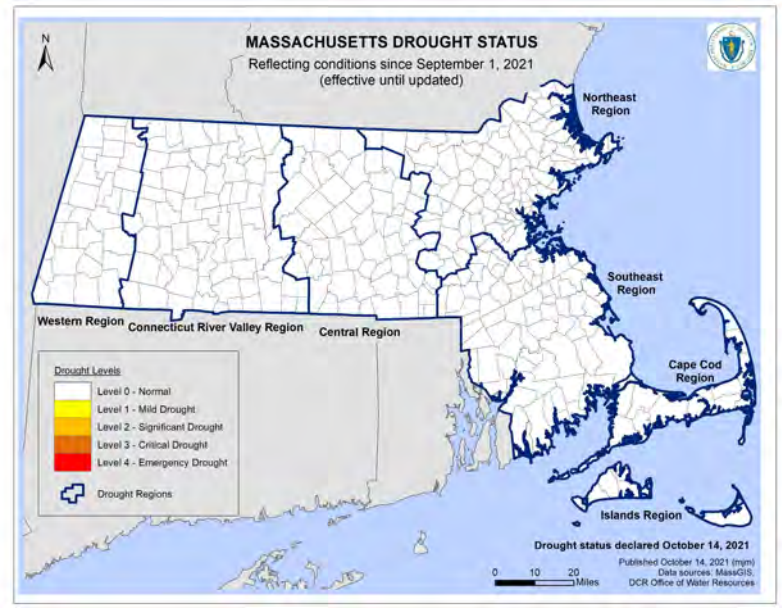
https://www.nohrsc.noaa.gov/technology/



Snowfall Departure:



DROUGHT CONDITIONS AND FORECASTS



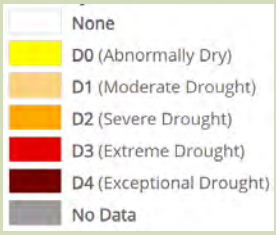
Massachusetts Drought Status

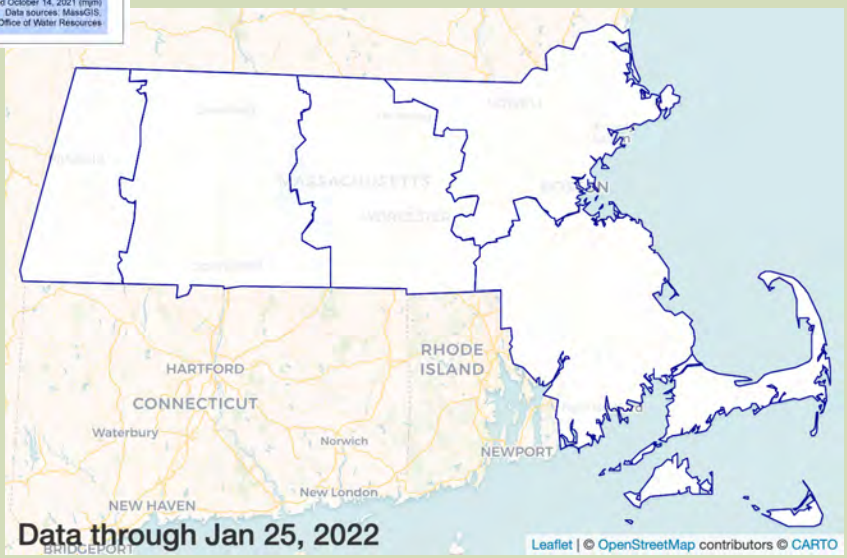
On October 14, 2021 Massachusetts Energy and Environmental Affairs (EEA) Secretary Kathleen Theoharides declared Level 0-Normal Conditions in the Cape Cod Region as well as the Western, Connecticut River Valley, Central, Northeast, Southeast, and Islands Regions. This status remains in effect until further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

U.S. Drought Monitor (USDM)

At the end of January, the USDM showed no 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





Map released Jan 27, 2022

NOAA Climate Prediction Center

Temperature and Precipitation Outlook

February: The outlook issued 1/31 shows 50-60% chances of above-normal temperatures and equal chances of below-normal, normal, or above-normal precipitation.

February through April: The outlook issued 1/20 shows 40-50% chances in the western half of the state for above-normal temperatures, 50-60% chances in the eastern half for above-normal temperatures, and equal chances of below -normal, normal, or above-normal precipitation for the entire state. https://www.cpc.ncep.noaa.gov/

Monthly and Seasonal Drought Outlook

The monthly outlook for February released on 1/31 shows no drought development in the state. The seasonal outlook released on 1/31 and valid through April 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 2/07/2022. 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—January 2022 as percentiles

REGION	NUMBER OF SITES	1-mo	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo
WESTERN	7	11	15	19	74	97	94	73	68
CTRV	12	16	21	13	53	84	80	56	54
CENTRAL	17	46	40	22	75	94	86	74	79
NORTHEAST	21	54	22	12	86	97	93	74	81
SOUTHEAST	27	51	17	7	76	93	86	76	78
CAPE COD	18	71	7	11	87	80	67	27	56
ISLANDS	3	65	10	8	64	66	55	30	63

DMP Index Severity Levels			
1	2	3	4

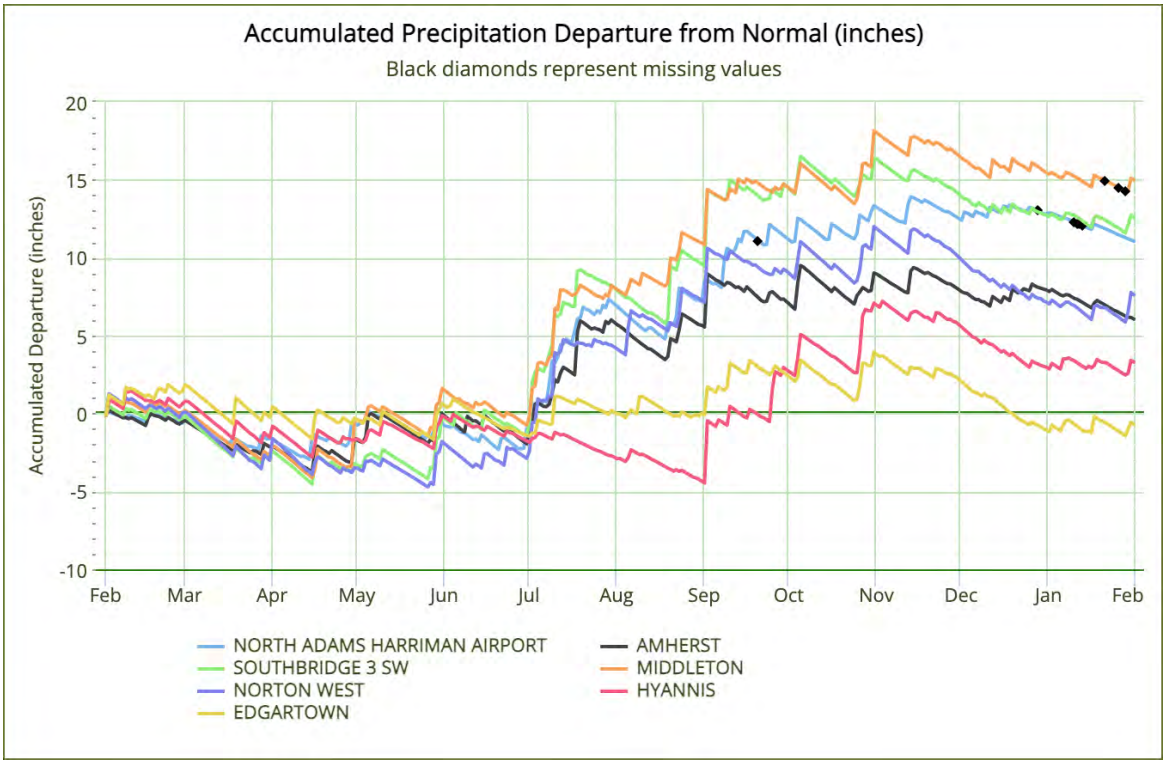
Percent of Average Historical Precipitation—January 2022

REGION	NUMBER OF SITES	HISTORICAL AVERAGE	JANUARY AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF NORMAL
WESTERN	7	2.93	1.62	-1.31	55%
CTRV	12	3.25	1.73	-1.52	53%
CENTRAL	17	3.55	2.95	-0.60	83%
NORTHEAST	21	3.47	3.12	-0.35	90%
SOUTHEAST	27	3.97	3.87	-0.10	97%
CAPE COD	18	4.00	4.66	0.66	117%
ISLANDS	3	3.90	4.59	0.69	118%

Accumulated Precipitation Departure

Graph does not consider starting condition's wetness/ dryness; does not show summer heat waves with high evapotranspiration; 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