

MASSACHUSETTS WATER RESOURCES COMMISSION

FEBRUARY 2022 HYDROLOGIC CONDITIONS IN MASSACHUSETTS



The Commonwealth of Massachusetts
Charles D. Baker, Governor

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

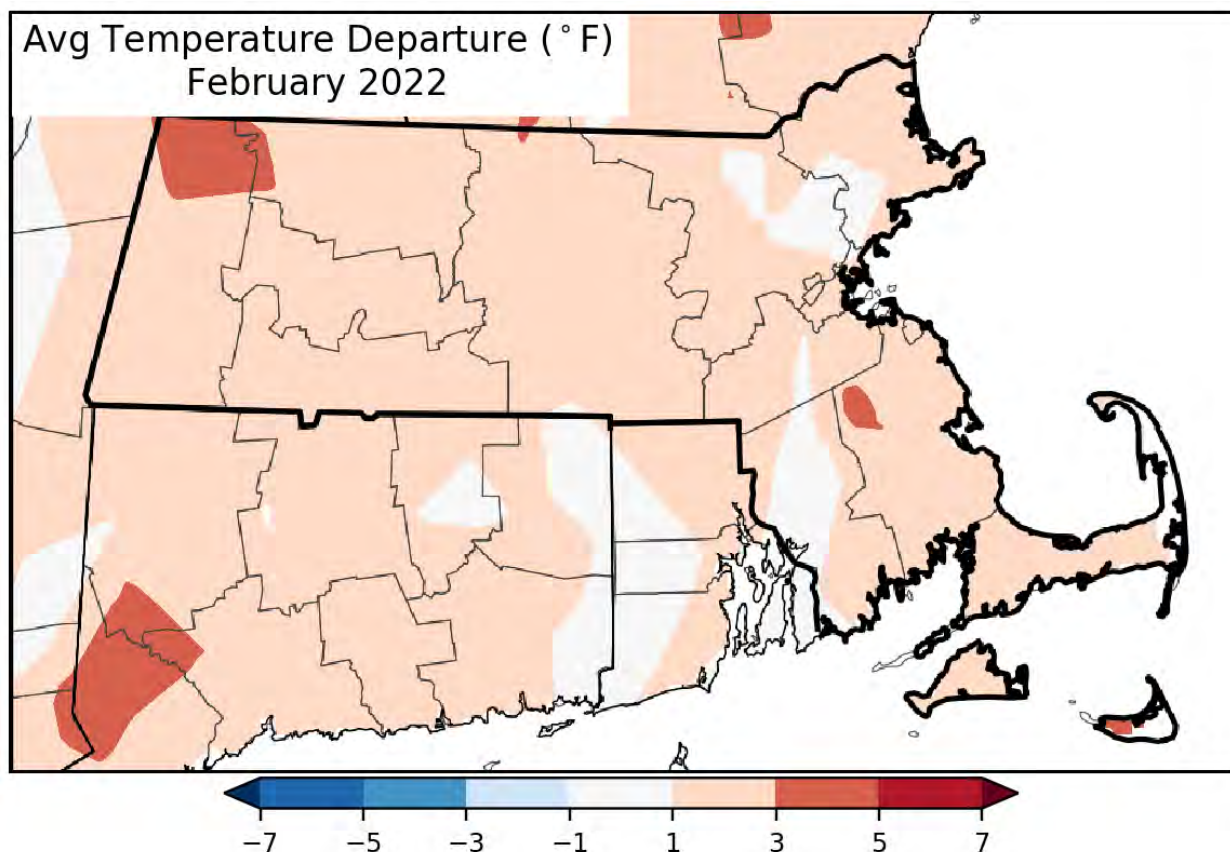
FEBRUARY 2022 HYDROLOGIC CONDITIONS

SUMMARY OF CONDITIONS

- Monthly average temperatures were above normal for much of the state.
- Monthly precipitation was above normal throughout much of the state and normal in the Islands Region. The Islands Region is at Index Severity Level 1 for the 3-month look-back period.
- Snowfall remains below normal for the season except in southeastern MA and the Greater Boston area.
- Streamflow was mostly 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 exceptions. 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 March outlook shows chances leaning above normal for temperatures. For precipitation, the outlook shows equal chances of below-normal, normal, or above-normal precipitation for the southeast, Cape & Islands, and chances leaning above normal for the rest of the state.
- 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

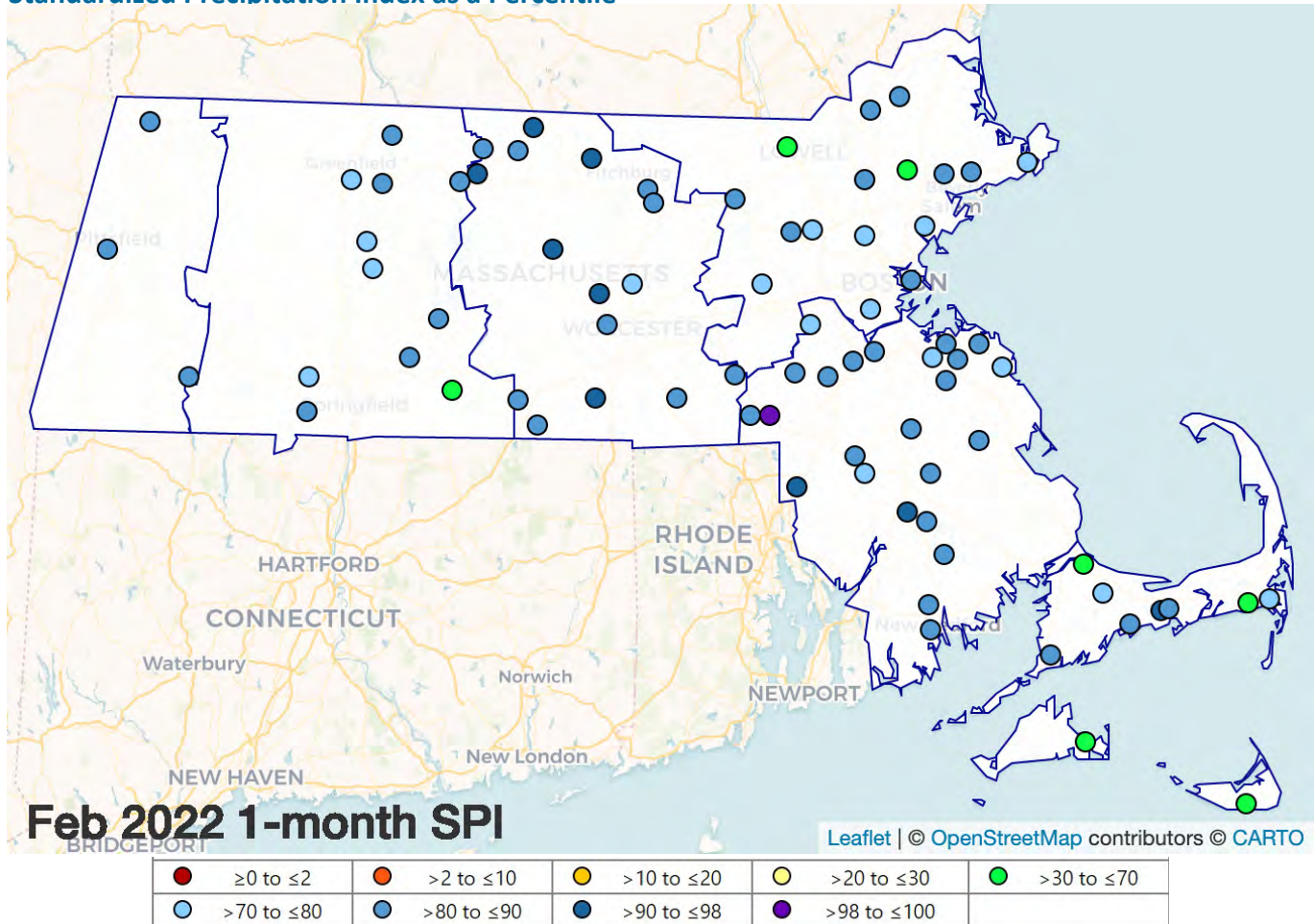
Monthly average temperatures were above normal throughout much of the state. According to the North-east Regional Climate Center, the Worcester climate site had its 18th warmest February, and Massachusetts overall had its 14th warmest. <http://www.nrcc.cornell.edu/regional/monthly/monthly.html>



PRECIPITATION

Overall February precipitation was normal in the Islands Region and above normal in the other regions. Combined with previous months' deficits, the Islands Region is showing an elevated Index Severity Level 1 for the 3-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	FEBRUARY MONTHLY AVERAGE (IN)	DEPARTURE FROM HISTORICAL (IN)	SPI* PERCENTILE 1-MONTH	SPI PERCENTILE 3-MONTH	SPI PERCENTILE 6-MONTH
WESTERN	3	3.92	1.19	89	56	92
CTRV	11	4.23	1.20	81	47	67
CENTRAL	16	5.24	2.03	90	70	86
NORTHEAST	16	4.36	1.07	80	47	83
SOUTHEAST	24	5.51	1.87	86	48	79
CAPE COD	8	4.95	1.24	77	37	92
ISLANDS	2	4.00	0.45	66	27	62

*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.

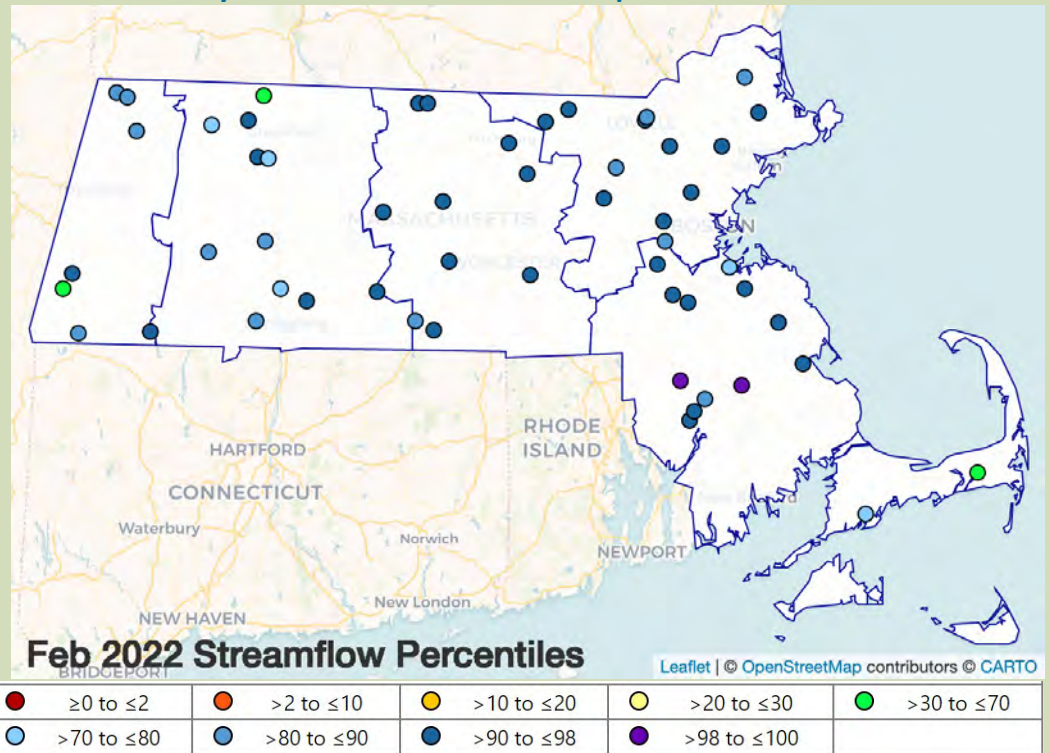
DMP Index Severity Levels			
1	2	3	4

STREAMFLOW

Percentiles of individual streamflow gages were above normal during February with a few gages in the normal range. Regional monthly streamflow medians were much above normal except for Cape Cod, which was normal. All regions are at Index Severity Level 0.

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

Median Monthly Streamflow Percentiles Compared to Historical Values



REGION	TOTAL GAGES REPORTING FOR FEB	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 TO ≤30 PERCENTILE	>90 PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES
WESTERN	7	0	0	0	0	2	89
CTRV	11	0	0	0	0	4	88
CENTRAL	10	0	0	0	0	9	96
NORTHEAST	13	0	0	0	0	9	94
SOUTHEAST	12	0	0	0	0	10	96
CAPE COD	2	0	0	0	0	0	57

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

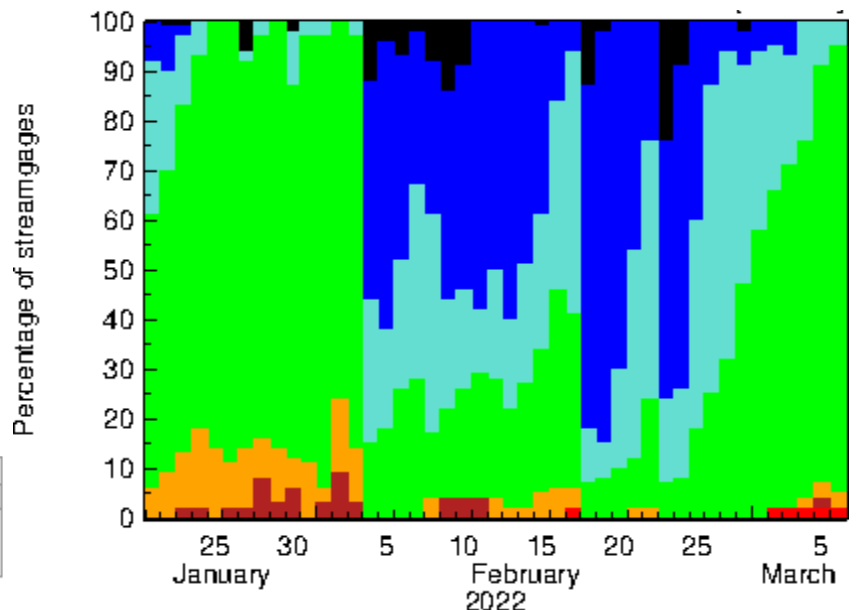
DMP Index Severity Levels			
1	2	3	4

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>

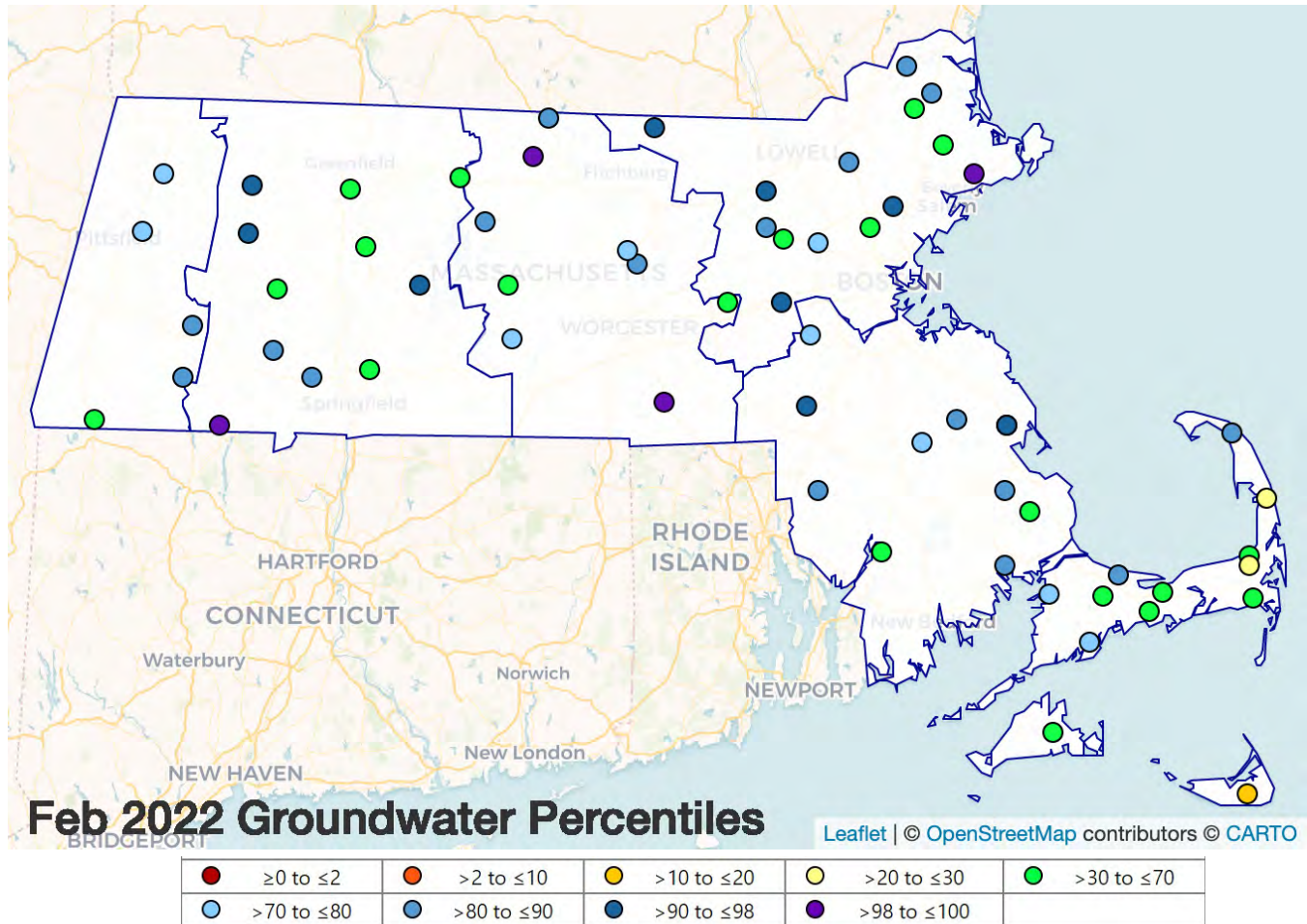
Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		



GROUNDWATER

Percentiles of individual groundwater wells were in the normal to above-normal range throughout most of the state with some exceptions in the Cape Cod and Islands Regions. The Nantucket well showing at Index Severity Level 2 is at its 14th percentile value, a slight improvement since last month. Some other wells nearby on Nantucket that are not part of the DMP network 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



REGION	TOTAL WELLS REPORTING FOR FEB	≥ 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	79
CTRV	11	0	0	0	0	4	83
CENTRAL	9	0	0	0	0	2	85
NORTHEAST	14	0	0	0	0	5	84
SOUTHEAST	11	0	0	0	0	2	82
CAPE COD	11	0	0	0	2	0	57
ISLANDS	2	0	0	1	0	0	28

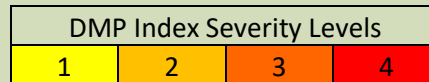
DMP Index Severity Levels			
1	2	3	4

LAKES AND IMPOUNDMENTS

REGION	TOTAL REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	2	87; 100% full
CTRV	2	90
CENTRAL	3	85; 100% full
NORTHEAST	6	84; 100% full
SOUTHEAST	2	100; 100% full
CAPE COD	1	69

At the end of February, most lake and impoundment levels were much 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.



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

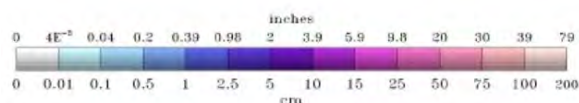
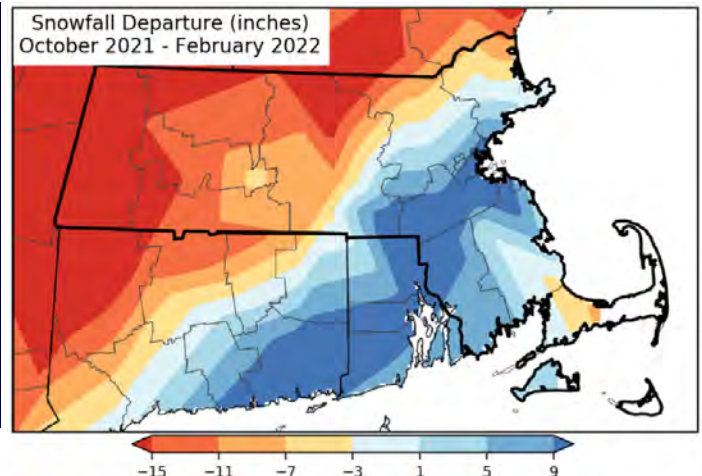
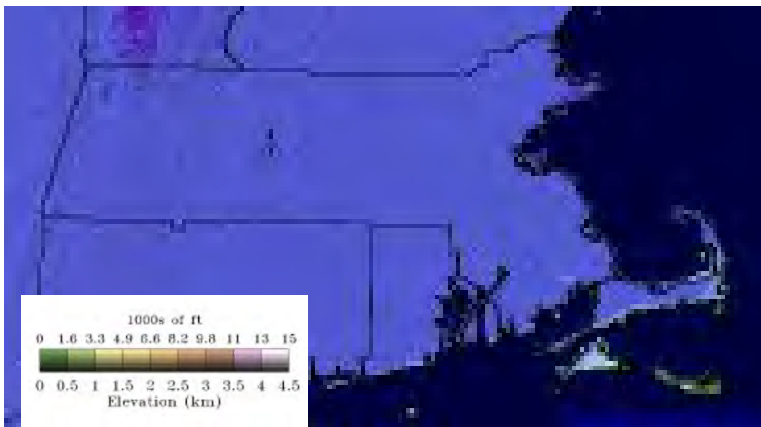
SNOWFALL

At the end of February, snowfall was below normal for the season except in southeastern MA and the Greater Boston area. According to the NRCC, the Boston climate site had its 19th snowiest winter (Dec—Feb). Snow cover remained throughout the state at the end of the month.

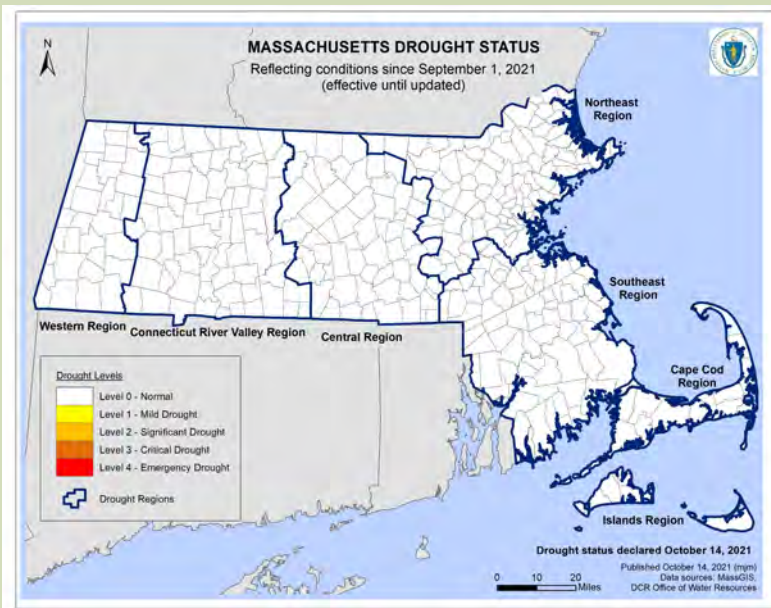
Modeled Snow Water Equivalent at the End of the Month in Inches:

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

Snowfall Departure:



DROUGHT CONDITIONS AND FORECASTS



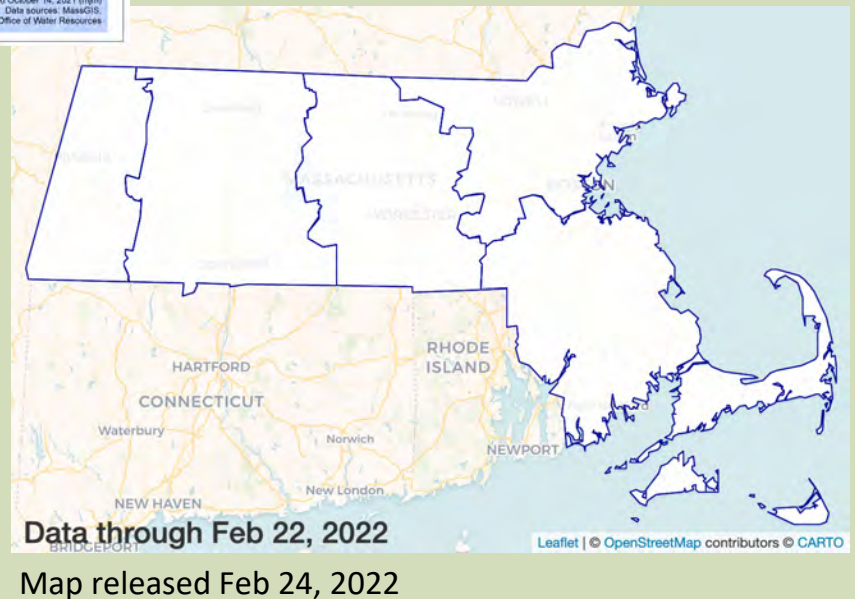
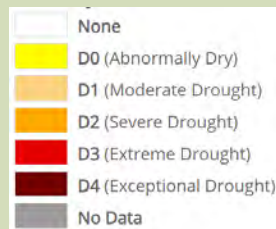
Massachusetts Drought Status

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 February, 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>



NOAA Climate Prediction Center

Temperature and Precipitation Outlook

March: The outlook issued 2/28 shows a 33-40% chance of above-normal temperatures. For precipitation, there are equal chances of below-normal, normal, or above-normal precipitation for southeastern MA, Cape Cod, & the Islands and a 33-40% chance of above-normal precipitation for the rest of the state.

March through May: The outlook issued 2/17 shows a 40-50% chance of 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 March released on 2/28 shows no drought development in the state. The seasonal outlook released on 2/28 and valid through May 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 3/07/2022 and 3/08/22 for precipitation. 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—February 2022 as percentiles

REGION	NUMBER OF SITES	1-mo*	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo*
WESTERN	3	89	47	56	92	98	97	78	79
CTRV	11	81	48	47	67	92	92	68	73
CENTRAL	16	90	81	70	86	96	94	83	86
NORTHEAST	16	80	69	47	83	98	96	85	89
SOUTHEAST	24	86	76	48	79	96	92	83	83
CAPE COD	8	77	84	37	92	83	73	33	58
ISLANDS	2	66	68	27	62	56	51	31	68

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

DMP Index Severity Levels			
1	2	3	4

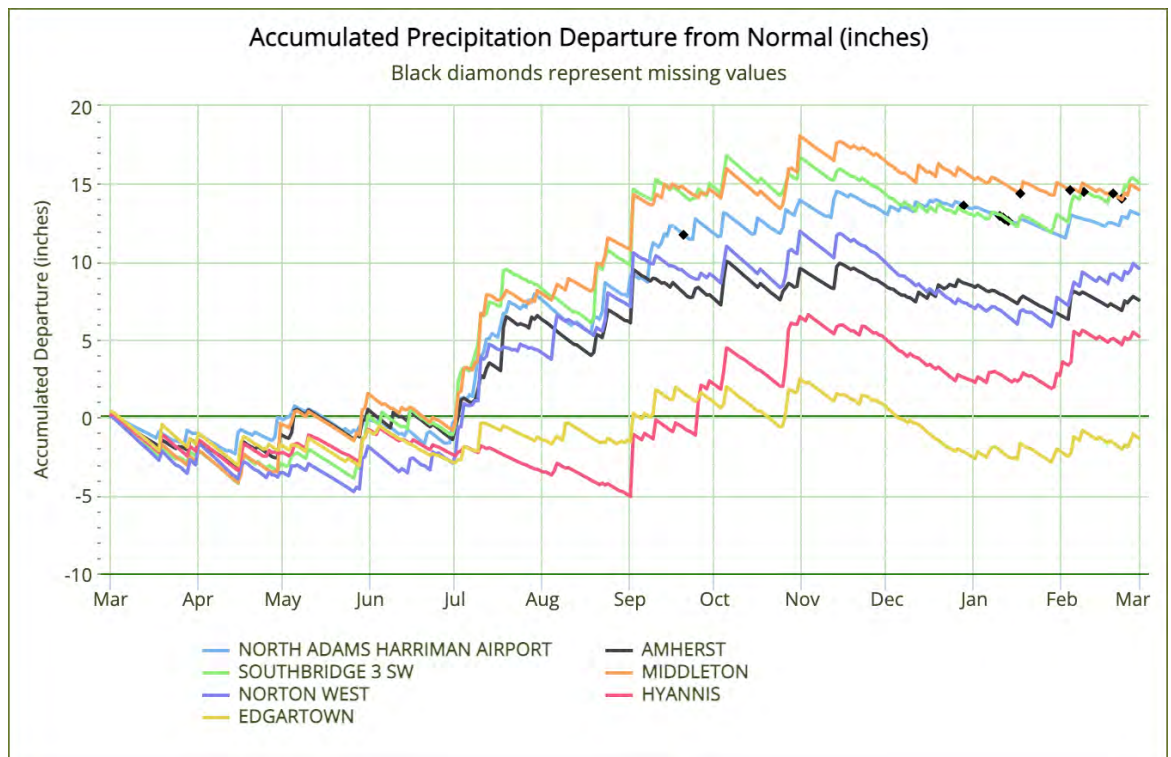
Percent of Average Historical Precipitation—February 2022

REGION	NUMBER OF SITES	HISTORICAL AVERAGE	FEBRUARY AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF NORMAL
WESTERN	3	2.73	3.92	1.19	144%
CTRV	11	3.03	4.23	1.20	140%
CENTRAL	16	3.21	5.24	2.03	163%
NORTHEAST	16	3.29	4.36	1.07	133%
SOUTHEAST	24	3.64	5.51	1.87	151%
CAPE COD	8	3.71	4.95	1.24	133%
ISLANDS	2	3.55	4.00	0.45	113%

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

