

# MASSACHUSETTS WATER RESOURCES COMMISSION

FEBRUARY 2023 HYDROLOGIC CONDITIONS  
IN MASSACHUSETTS



The Commonwealth of Massachusetts  
Maura T. Healey, Governor  
Rebecca L. Tepper, Secretary, Executive Office of Energy and Environmental Affairs

# FEBRUARY 2023 HYDROLOGIC CONDITIONS

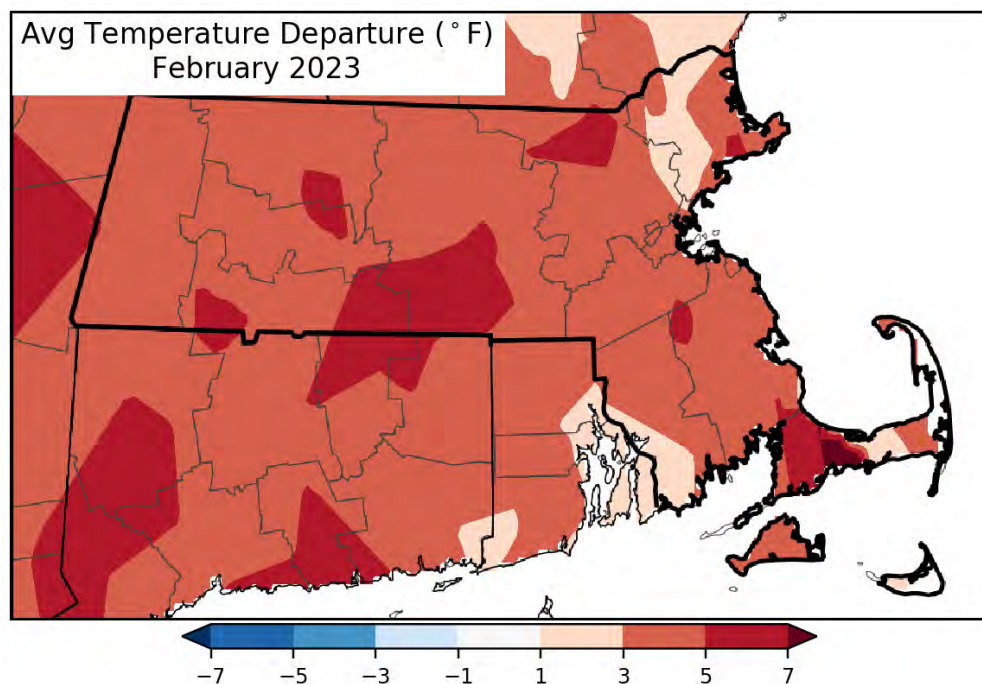
## SUMMARY OF CONDITIONS

- Monthly average temperatures were above normal. Massachusetts had its warmest winter on record.
- Precipitation was below normal in February in all Regions. Index Severity Levels (ISLs) are normal for look-back periods 2-mos through the 6-month time frame for all Regions.
- Streamflow was mostly in the normal to above-normal range. All Regions are at ISL 0.
- Groundwater levels were mostly normal to above normal. All Regions are at ISL 0.
- Lake and impoundment levels varied with some levels below the 30th percentile.
- Keetch Byram Drought Index and Evapotranspiration Index are outside of their reporting seasons.
- Seasonal snowfall is below average across the state. At the end of February, minimal snow water equivalent in the snow cover remained across much of the state.
- NOAA's March outlook shows chances likely for below-normal temperatures, and equal chances for below-normal, normal, or above-normal precipitation.
- NOAA's 3-month outlook shows chances leaning for above-normal temperatures and equal chances for below-normal, normal, or above-normal precipitation.
- Northeast River Forecast Center's spring flood outlook shows below normal flood risk for Massachusetts.
- Appendix II provides information on the Massachusetts Drought Management Plan (DMP).

## TEMPERATURE

Monthly average temperatures were above normal across the state. According to the Northeast Regional Climate Center (NRCC), the Worcester climate site had its eighth warmest February on record and its warmest winter (Dec.-Feb.) on record. The Boston climate site had its fifth warmest winter on record. Massachusetts had its seventh warmest February on record and its warmest winter on record.

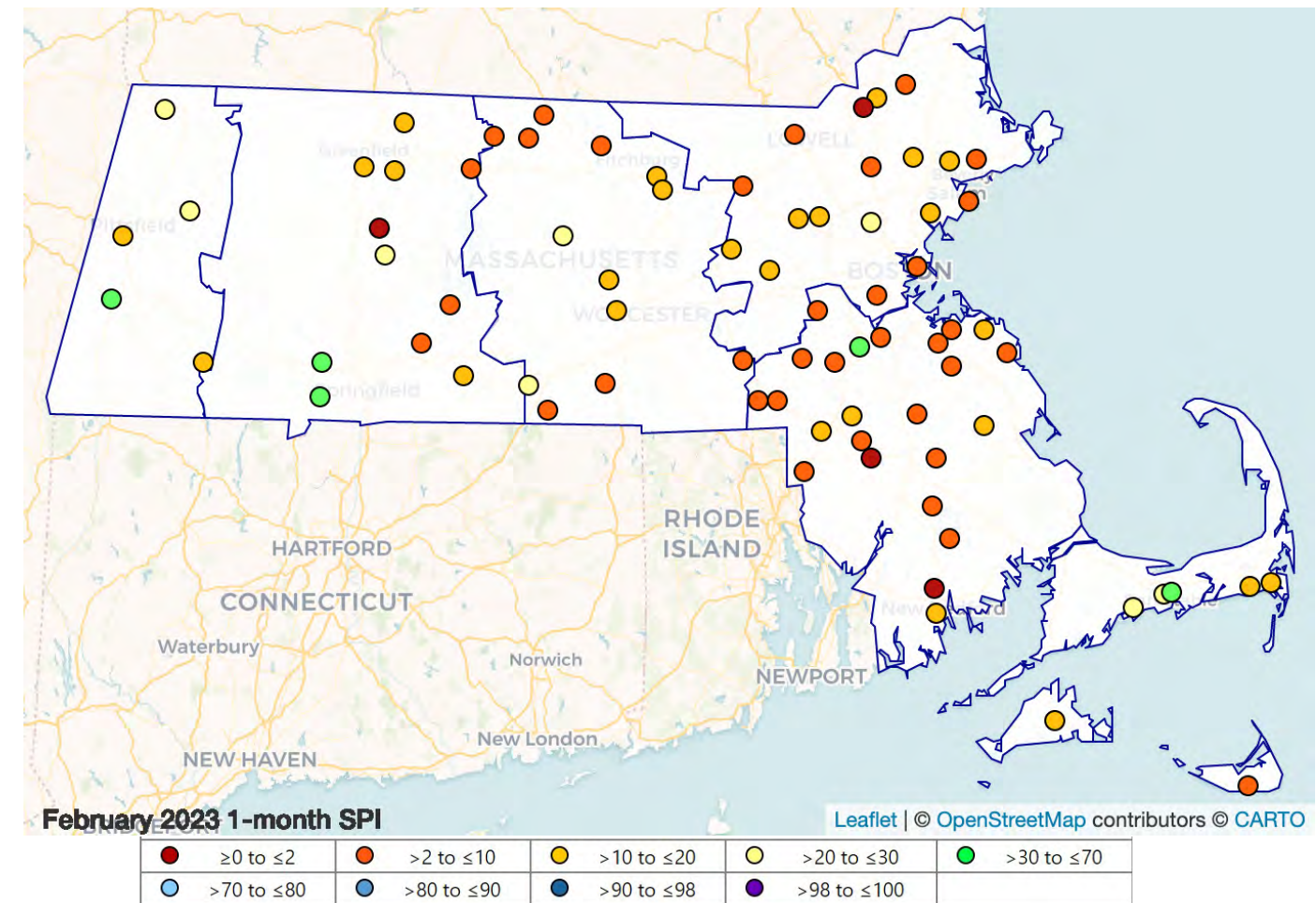
<http://www.nrcc.cornell.edu/regional/monthly/monthly.html>



# PRECIPITATION

February precipitation was below normal. According to the NRCC, it was the fifth driest February on record for Massachusetts. Two longer look-back periods are showing deficits in the Northeast Region for the 9-month and 12-month look-back periods. In addition to the table below, Appendix I provides all look-back periods.

## Standardized Precipitation Index (SPI) 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	5	1.73	-0.99	21	80	83
CTRV	11	1.46	-1.57	11	73	81
CENTRAL	13	1.51	-1.69	10	87	87
NORTHEAST	18	1.43	-1.81	10	81	62
SOUTHEAST	24	1.52	-2.07	9	80	79
CAPE COD	5	2.37	-1.38	21	96	91
ISLANDS	2	1.35	-1.82	12	50	68

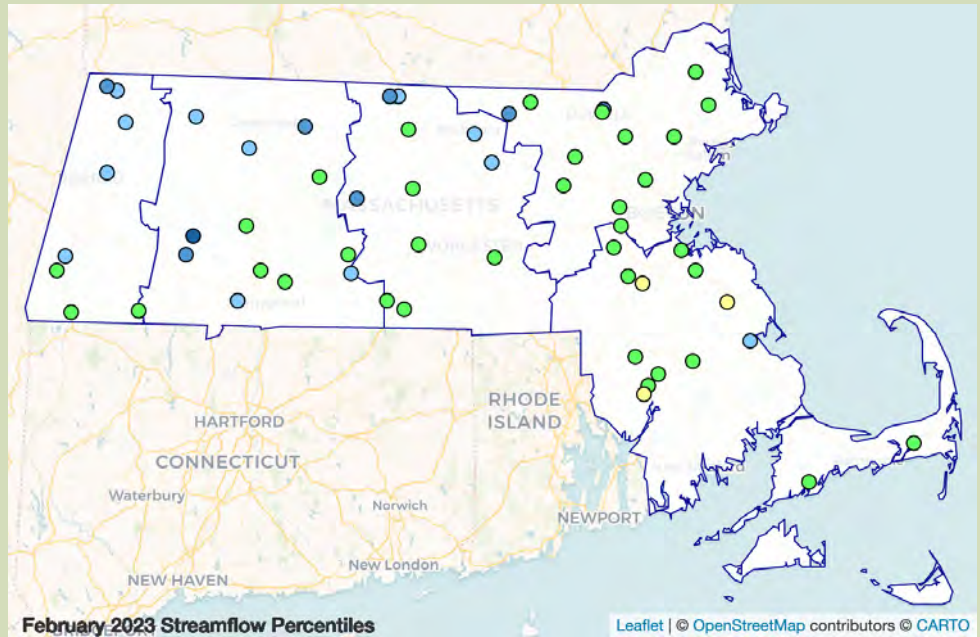
SPI is the Standardized Precipitation Index used in the Drought Management Plan (DMP) expressed here as a percentile and represents the variation, in standard deviations, from long-term precipitation averages.



# STREAMFLOW

## Median Monthly Streamflow Percentiles Compared to Historical Values

During February, percentiles of individual streamflow gages were normal to above normal except for three gages in the Southeast Region.



● $\geq 0$ 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 GAGES REPORTING	$\geq 0$ TO $\leq 2$ PERCENTILE	$> 2$ TO $\leq 10$ PERCENTILE	$> 10$ TO $\leq 20$ PERCENTILE	$> 20$ TO $\leq 30$ PERCENTILE	$> 90$ PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES
WESTERN	8	0	0	0	0	0	73
CTRV	12	0	0	0	0	1	73
CENTRAL	11	0	0	0	0	0	69
NORTHEAST	13	0	0	0	0	0	55
SOUTHEAST	12	0	0	0	3	0	47
CAPE COD	2	0	0	0	0	0	53

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

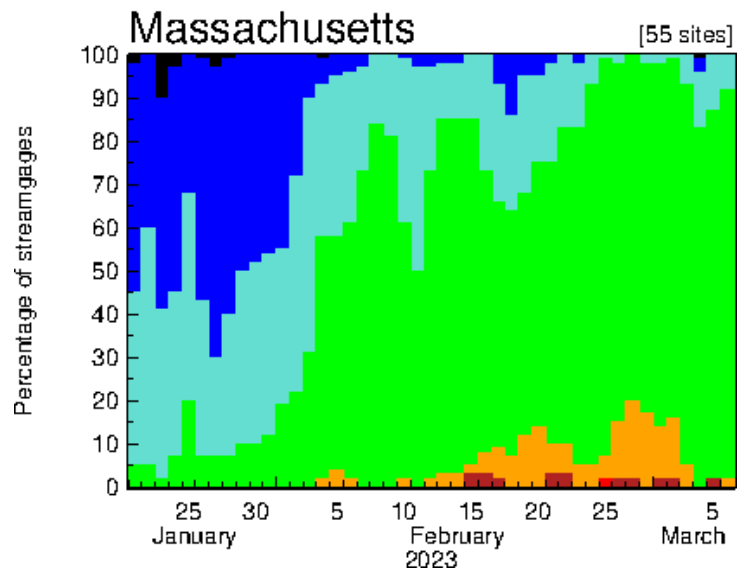
DMP Index Severity Levels			
1	2	3	4

### 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.

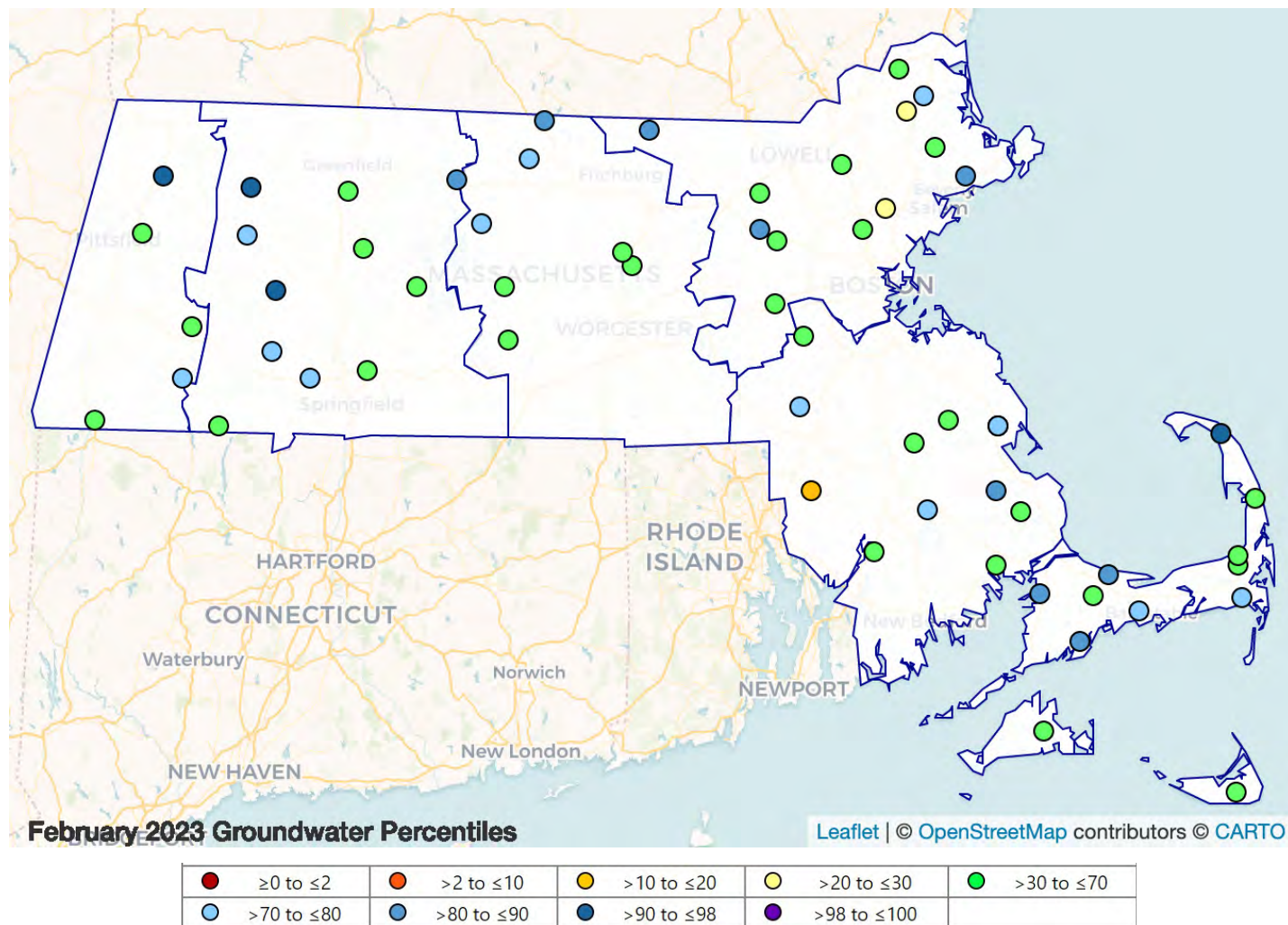
<https://waterdata.usgs.gov/nwis/sw>

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

February groundwater levels ranged from below to above normal across the state. Regional medians of individual well percentiles improved in Cape Cod and Islands Regions. All Regions are at ISL 0.



REGION	NUMBER OF WELLS REPORTING	?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	1	65
CTRV	11	0	0	0	0	2	72
CENTRAL	7	0	0	0	0	0	66
NORTHEAST	13	0	0	0	2	0	62
SOUTHEAST	12	0	0	1	0	0	62
CAPE COD	10	0	0	0	0	1	77
ISLANDS	2	0	0	0	0	0	64

## LAKES AND IMPOUNDMENTS

REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	2	94th
CTRV	2	70th
CENTRAL	5	35th
NORTHEAST	5	27th
SOUTHEAST	2	81st
CAPE COD	1	18th

At the end of February, lake and impoundment levels varied with some levels below the 30th percentile. The Northeast Regions is at ISL 1 and the pond monitored in the Cape Cod Region is at ISL 2.

DMP Index Severity Levels			
1	2	3	4

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

## KEETCH-BYRAM DROUGHT INDEX (KBDI)

KBDI is reported seasonally.

## EVAPOTRANSPIRATION (ET) INDEX

### Crop Moisture Index (CMI) - 2019 Drought Management Plan

CMI is reported seasonally. [https://www.cpc.ncep.noaa.gov/products/monitoring\\_and\\_data/drought.shtml](https://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml)

### Evaporative Demand Drought Index (EDDI) - proposed 2023 Drought Management Plan

EDDI is reported seasonally. <https://psl.noaa.gov/eddi>

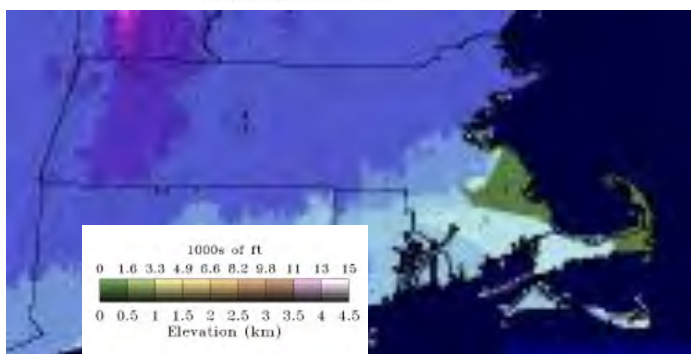
**FLOODING** According to the February NWS E-5 Monthly Reports of Hydrologic Conditions for the Boston/Norton and Albany service areas, there was no flooding within Massachusetts. Northeast River Forecast Center's spring flood outlook shows below normal flood risk for Massachusetts.

**SNOWFALL** At the end of February, there was minimal snow water equivalent in the snow cover across much of the state. Negative snowfall departures exist across the state for the season. According to the NRCC, the Boston climate site had its 7th least snowiest winter (-26.2" departure) and the Worcester climate site had its 19th least snowiest winter (-28.8" departure).

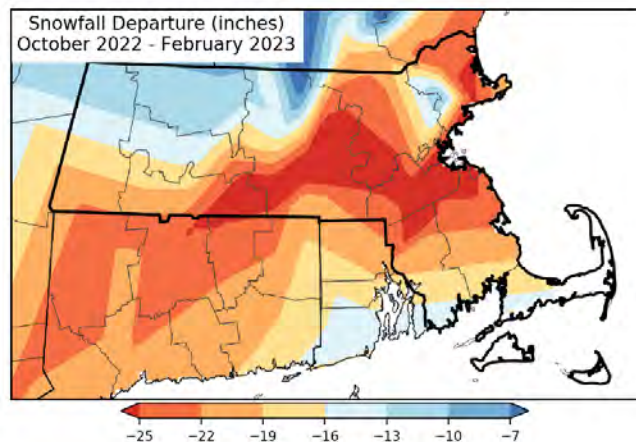
### Snow Cover

#### Snow Water Equivalent

2023-02-28 06 UTC

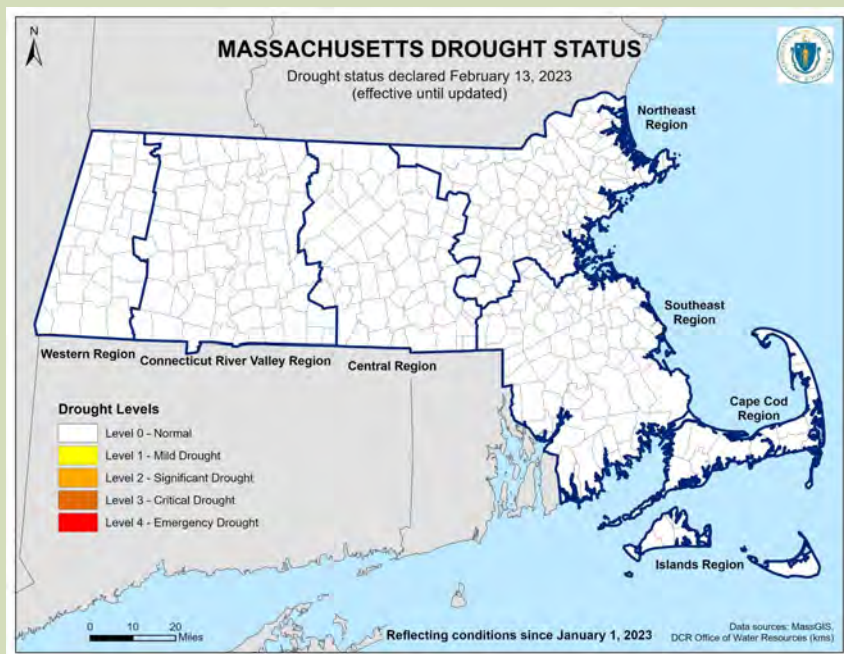


### Season-To-Date Snowfall Departure





# DROUGHT CONDITIONS AND FORECASTS



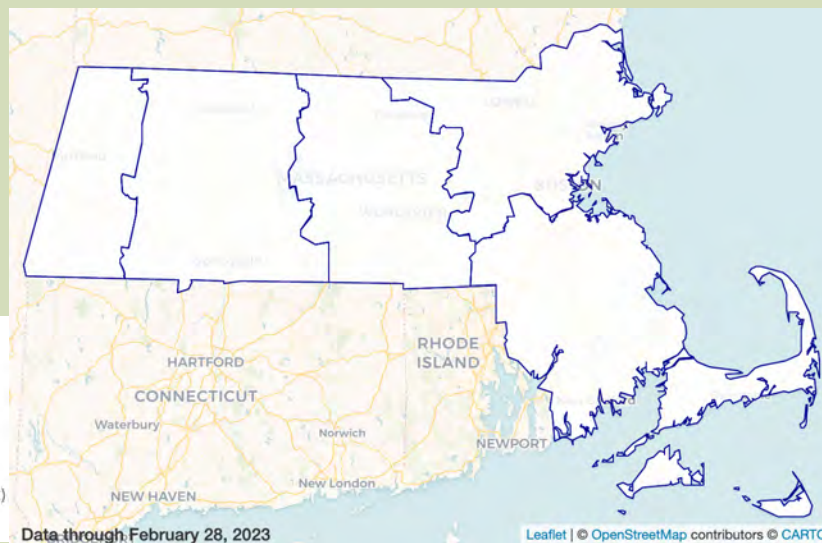
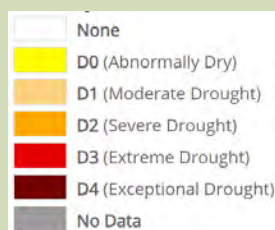
## Massachusetts Drought Status

On February 13, 2023 Massachusetts Energy and Environmental Affairs (EEA) Secretary Rebecca L. Tepper declared Level 0 Normal Conditions for the Western, Connecticut River Valley, Central, Northeast, Southeast, Cape Cod, and Islands Regions. This status remains in effect until further updated.

## U.S. Drought Monitor (USDM)

At the end of February, the USDM showed no areas of drought.

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 50-60% chance for below-normal temperatures and equal chances for above-normal, normal, or below-normal precipitation.

**March through May:** The outlook issued 2/16 shows a 33-40% chance of above-normal temperatures and equal chances for above-normal, normal, or below-normal precipitation. <https://www.cpc.ncep.noaa.gov/>

### Monthly and Seasonal Drought Outlook

The monthly outlook for March and the seasonal outlook for March through May both released on 2/28 show 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. Analysis reflects automated calculations done 03/07/2023. 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 2023 as percentiles

REGION	NUMBER OF SITES	1-mo	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo
WESTERN	5	21	72	80	83	48	51	89	70
CTRV	11	11	69	73	81	50	46	79	64
CENTRAL	13	10	73	87	87	63	51	86	77
NORTHEAST	18	10	71	81	62	27	18	61	73
SOUTHEAST	24	9	68	80	79	58	31	72	68
CAPE COD	5	21	97	96	91	77	52	69	32
ISLANDS	2	12	67	50	68	45	31	-999	-999

DMP Index Severity Levels			
1	2	3	4

### Percent of Average Historical Precipitation—February 2023

REGION	NUMBER OF SITES REPORTING	HISTORICAL AVERAGE	FEBRUARY AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF NORMAL
WESTERN	5	2.72	1.73	-0.99	64%
CTRV	11	3.03	1.46	-1.57	48%
CENTRAL	13	3.20	1.51	-1.69	47%
NORTHEAST	18	3.24	1.43	-1.81	44%
SOUTHEAST	24	3.59	1.52	-2.07	42%
CAPE COD	5	3.75	2.37	-1.38	63%
ISLANDS	2	3.17	1.35	-1.82	43%

### Accumulated Precipitation Departure from 30-Year Normals in Inches

Graph does not consider starting condition's wetness/dryness; does not show summer heat waves with high evapotranspiration; and shows only one station per Drought Region. <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	$\leq 30$ 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	$\leq -4.0$

