

# MASSACHUSETTS WATER RESOURCES COMMISSION

## APRIL 2022 HYDROLOGIC CONDITIONS IN MASSACHUSETTS



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

# APRIL 2022 HYDROLOGIC CONDITIONS

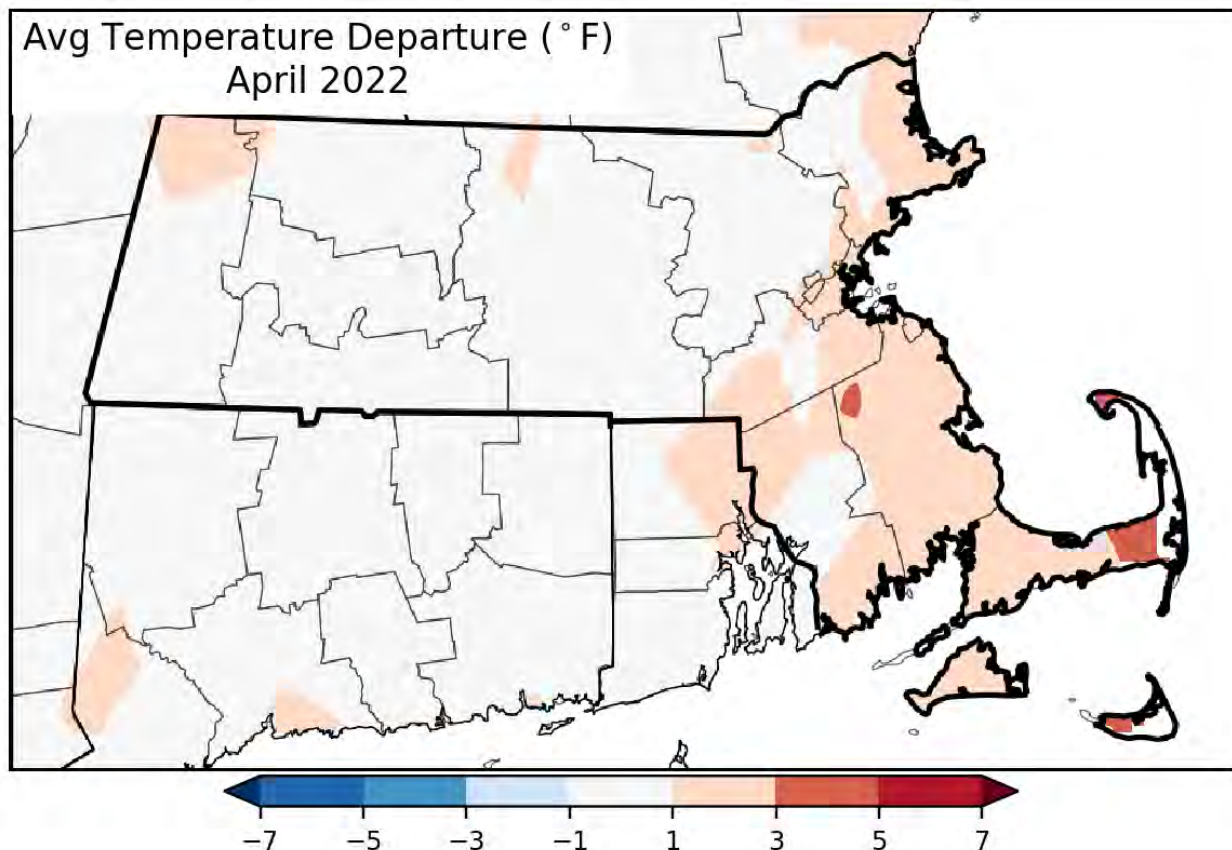
## SUMMARY OF CONDITIONS

- Monthly average temperatures were normal to above normal.
- Monthly precipitation varied across the state from below normal to above normal. The Northeast, Southeast, Cape Cod, and Islands Regions are at Index Severity Level 1 for the 2-month look-back period.
- Snowfall is below normal for the season with no snow cover at the end of April.
- Streamflow was mostly in the normal to below-normal range across the state. The Southeast Region is at Index Severity Level 1.
- Groundwater levels were mostly in the normal to below-normal range across the state with some exceptions. The Islands Region is at Index Severity Level 1.
- Lakes & Impoundments were normal to above normal and/or at or near 100% full.
- Keetch Byram Drought Index was normal across the state.
- Evaporative Demand Drought Index was elevated for most of the state except in the west.
- NOAA's May outlook shows chances leaning for above-normal temperatures in the southern parts of the state, and equal chances of below-normal, normal, or above-normal temperature for the northern parts. For precipitation, the outlook shows 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 II provides information on the Massachusetts Drought Management Plan (DMP).

## TEMPERATURE

Monthly average temperatures were normal to above normal across the state.

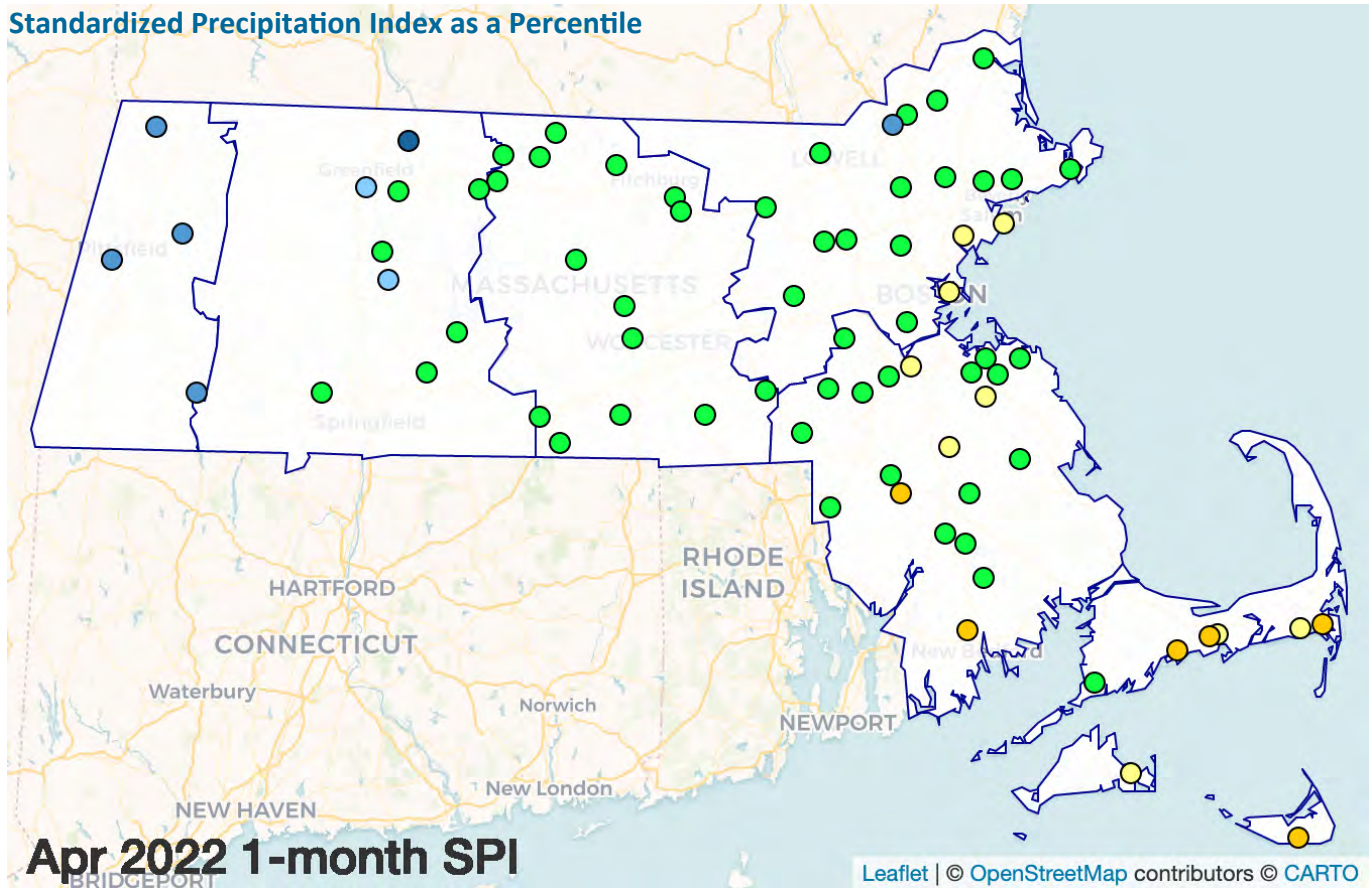
<http://www.nrcc.cornell.edu/regional/monthly/monthly.html>



# PRECIPITATION

April precipitation varied across the state. The Western, CT River Valley, Central, and Northeast Regions were above normal to normal, whereas the Cape and Islands Regions were below normal. The Southeast Region was overall on the low end of normal, but with areas of below-normal precipitation. Combined with March’s deficits, the Northeast, Southeast, Cape Cod, and Islands Regions are showing an elevated Index Severity Level 1 for the 2-month look-back period. Appendix I provides additional details for precipitation data, including all look-back periods.

Standardized Precipitation Index as a Percentile



Apr 2022 1-month SPI

● $\geq 0$ 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 SITES REPORTING	APRIL MONTHLY AVERAGE (IN)	DEPARTURE FROM HISTORICAL (IN)	SPI PERCENTILE 1-MONTH	SPI PERCENTILE 3-MONTH	SPI PERCENTILE 6-MONTH
WESTERN	4	4.89	1.34	84	84	60
CTRV	9	4.26	0.60	64	70	34
CENTRAL	15	3.97	0.07	58	72	42
NORTHEAST	19	3.46	-0.37	46	44	18
SOUTHEAST	21	3.31	-0.87	36	48	19
CAPE COD	6	2.54	-1.51	20	48	15
ISLANDS	2	2.27	-1.60	18	33	9

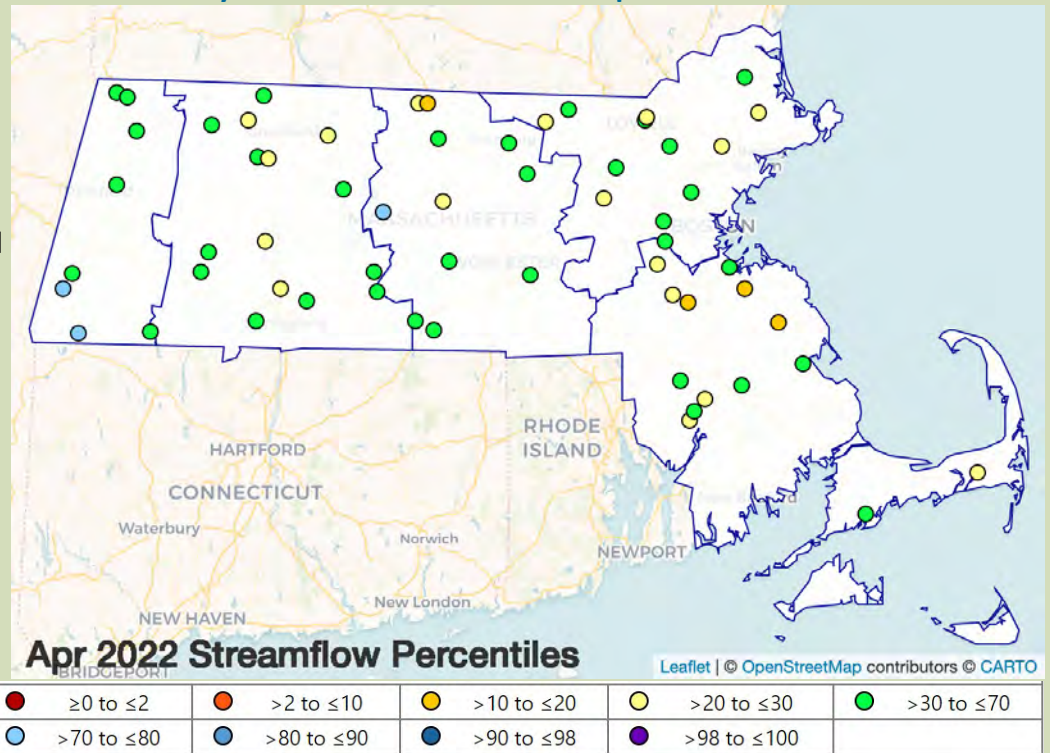
\*SPI is the Standardized Precipitation Index used in the Drought Management Plan (DMP) expressed here as a percentile and represents the variation, in standard deviations, from long-term precipitation averages.

DMP Index Severity Levels			
1	2	3	4

# STREAMFLOW

Percentiles of individual streamflow gages were mostly in the normal to below-normal range during April with a few gages in the above-normal range. Regional monthly streamflow medians were at the low end of normal in all regions except for the Southeast, which is at Index Severity Level 1.

## Median Monthly Streamflow Percentiles Compared to Historical Values



REGION	TOTAL GAGES REPORTING FOR APR	$\ge 0$ TO $\le 2$ PERCENTILE	$> 2$ TO $\le 10$ PERCENTILE	$> 10$ TO $\le 20$ PERCENTILE	$> 20$ TO $\le 30$ PERCENTILE	$> 90$ PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES
WESTERN	8	0	0	0	0	0	44
CTRV	15	0	0	0	5	0	34
CENTRAL	11	0	0	1	2	0	37
NORTHEAST	13	0	0	0	5	0	32
SOUTHEAST	12	0	0	3	4	0	29
CAPE COD	2	0	0	0	1	0	39

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

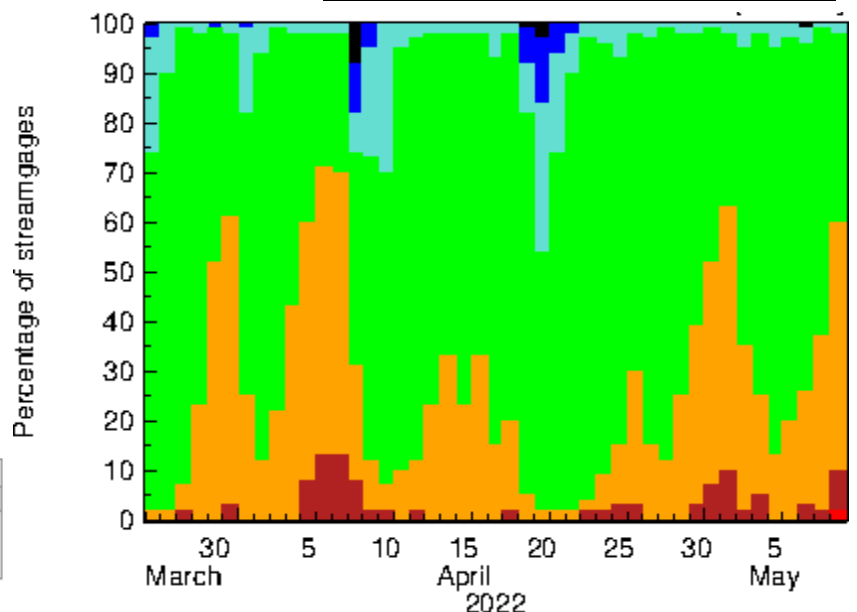
DMP Index Severity Levels			
1	2	3	4

### 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>

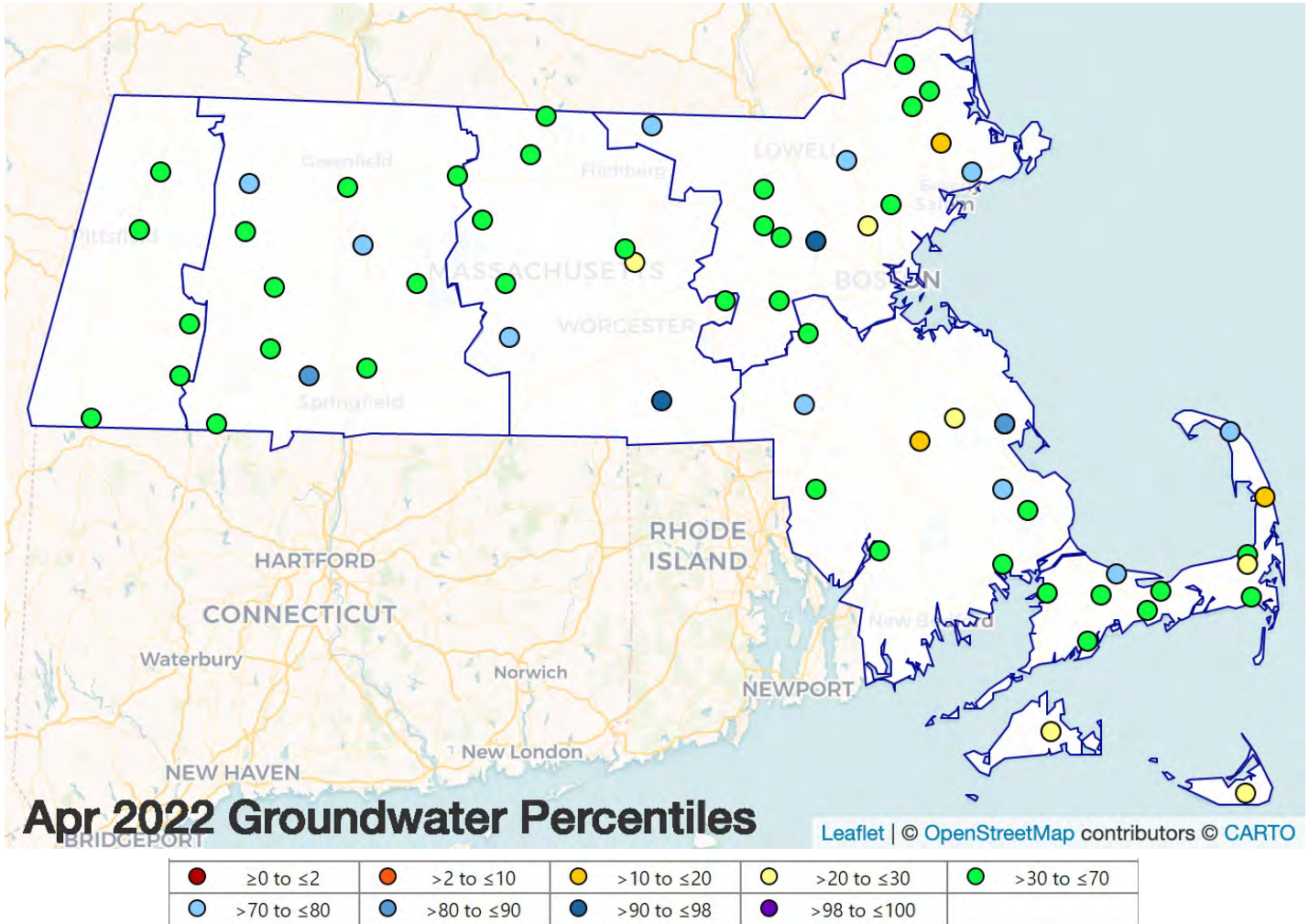
Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		



# GROUNDWATER

Percentiles of individual groundwater wells varied across the state from below normal to above normal. 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 APR	$\geq 0$ TO $\leq 2$ PERCENTILE	$> 2$ TO $\leq 10$ PERCENTILE	$> 10$ TO $\leq 20$ PERCENTILE	$> 20$ TO $\leq 30$ PERCENTILE	$> 90$ PERCENTILE	MEDIAN OF INDIVIDUAL WELL PERCENTILES
WESTERN	5	0	0	0	0	0	54
CTRV	11	0	0	0	0	0	52
CENTRAL	9	0	0	0	1	1	48
NORTHEAST	14	0	0	1	1	1	53
SOUTHEAST	11	0	0	1	1	0	53
CAPE COD	11	0	0	1	1	0	53
ISLANDS	2	0	0	0	2	0	27

DMP Index Severity Levels			
1	2	3	4

## LAKES AND IMPOUNDMENTS

REGION	TOTAL REPORTING FOR MONTH	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	1	100% full
CTRV	2	88th
CENTRAL	3	54th; 100% & 100% full
NORTHEAST	6	83rd; 100% & 98% full
SOUTHEAST	2	100% & 99.7% full
CAPE COD	1	47th

At the end of April 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)

REGION	NUMBER OF SITES REPORTING	HIGHEST OF SITE VALUES
WESTERN	2	8
CTRV	4	35
CENTRAL	3	29
NORTHEAST	2	7
SOUTHEAST	4	35
CAPE COD	2	26
ISLANDS	2	26

At the end of April all KBDI values were below 200. All Regions are at Index Severity Level 0.

## EVAPOTRANSPIRATION (ET) INDEX

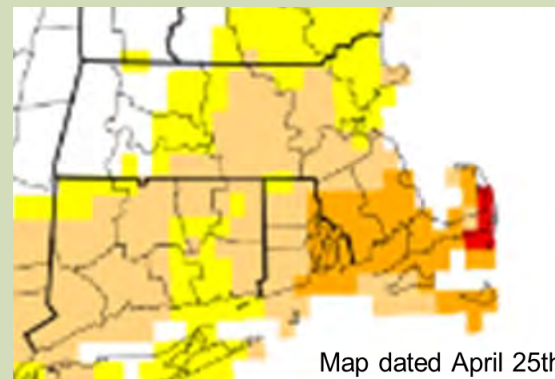
### Crop Moisture Index (CMI) - 2019 Drought Management Plan

All CMI values were in the Slightly Dry/Favorably Moist range. All regions are at Index Severity Level 0.

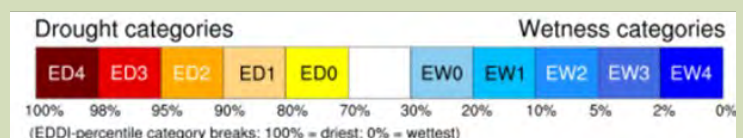
[https://www.cpc.ncep.noaa.gov/products/monitoring\\_and\\_data/drought.shtml](https://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml)

### Evaporative Demand Drought Index (EDDI) - proposed 2022 Drought Management Plan

The 2-month EDDI shows elevated ET across most of the state except in the west. The Southeast, Cape and Islands Regions show especially elevated values.



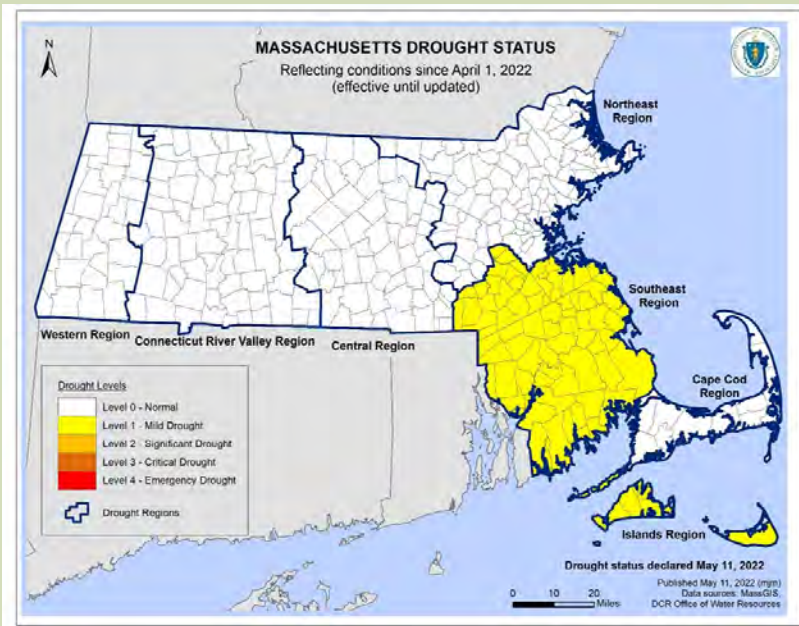
Map dated April 25th



## SNOWFALL

Snowfall is mostly below normal for the season. At the end of April no snow cover remained.

# DROUGHT CONDITIONS AND FORECASTS



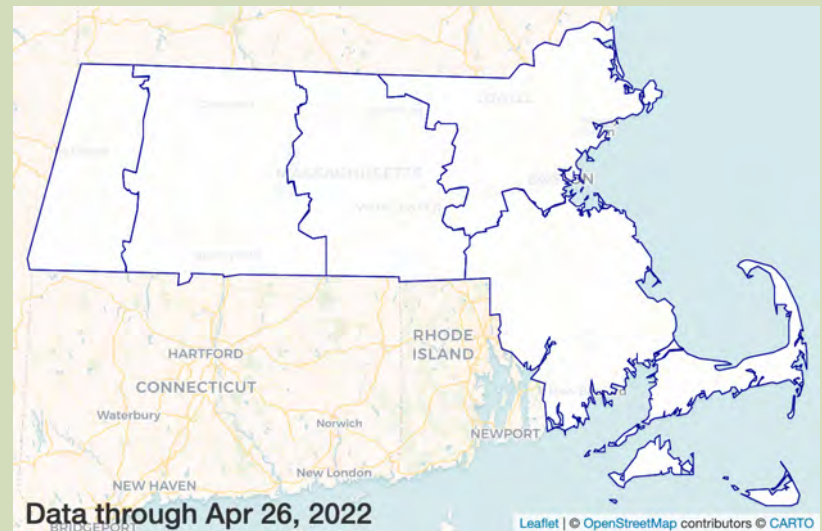
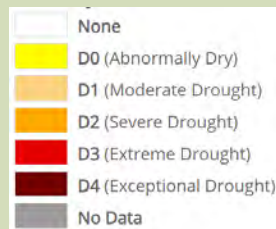
## Massachusetts Drought Status

On May 11, 2022 Massachusetts Energy and Environmental Affairs (EEA) Secretary Bethany A. Card declared Level 1 Drought Conditions in the Southeast and Islands Regions. All other Regions are at Level 0-Normal Conditions. This status remains in effect until further updates.

## U.S. Drought Monitor (USDM)

At the end of April, 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

**May:** The outlook issued 4/30 shows a 33-40% chance of above-normal temperatures for the southern parts of the state and equal chances of below-normal, normal, or above-normal temperatures for the northern parts. For precipitation, there are equal chances of below-normal, normal, or above-normal precipitation for the entire state.

**May through July:** The outlook issued 4/21 shows a 50-60% chance of above-normal temperatures for the south central and southeastern parts of the state, and a 40-50% chance of above-normal temperatures for the rest of the state. For precipitation there are 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 May released on 4/30 shows no drought development in the state. The seasonal outlook released on 4/30 and valid through July shows no drought development in the state.

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—April 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	84	76	84	60	91	98	81	82
CTRV	9	64	49	70	34	56	91	63	63
CENTRAL	15	58	42	72	42	83	96	81	82
NORTHEAST	19	46	28	44	18	76	93	79	87
SOUTHEAST	21	36	24	48	19	70	90	70	72
CAPE COD	6	20	24	48	15	79	69	23	46
ISLANDS	2	18	22	33	9	43	46	24	58

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

DMP Index Severity Levels			
1	2	3	4

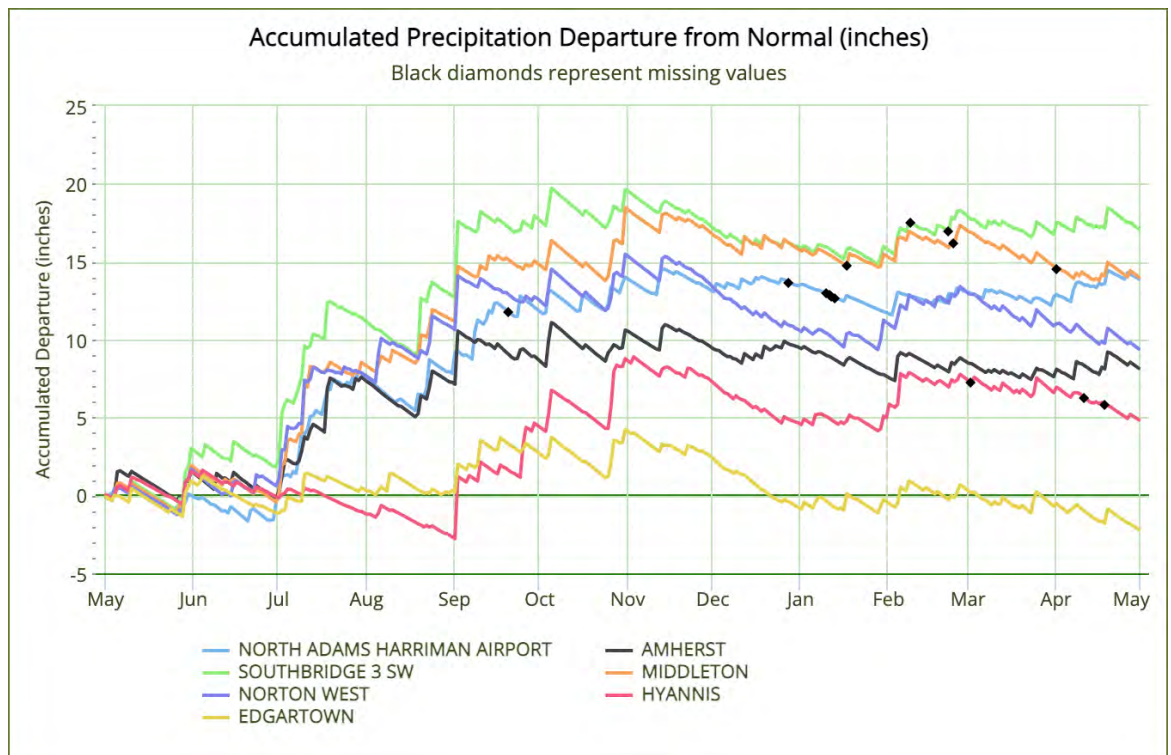
## Percent of Average Historical Precipitation—April 2022

REGION	NUMBER OF SITES	HISTORICAL AVERAGE	APRIL AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF NORMAL
WESTERN	4	3.55	4.89	1.34	138%
CTRV	9	3.66	4.26	0.60	116%
CENTRAL	15	3.90	3.97	0.07	102%
NORTHEAST	19	3.83	3.46	-0.37	90%
SOUTHEAST	21	4.18	3.31	-0.87	79%
CAPE COD	6	4.05	2.54	-1.51	63%
ISLANDS	2	3.87	2.27	-1.60	59%

## 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

