

MASSACHUSETTS WATER RESOURCES COMMISSION



# HYDROLOGIC CONDITIONS IN MASSACHUSETTS

FEBRUARY  
2024

The Commonwealth of Massachusetts

*Maura T. Healey, Governor*

*Rebecca L. Tepper, Secretary  
Executive Office of Energy and Environmental Affairs*



# FEBRUARY 2024 HYDROLOGIC CONDITIONS

## SUMMARY OF CONDITIONS



- Monthly average temperatures were above normal.



- Precipitation was below normal except on the Cape and Islands where it was below normal to normal . There was minimal snow cover remaining at the end of February mostly in the western part of the state.



- The Evaporative Demand Drought Index is not reported in February.

- The Keetch-Byram Drought Index is not reported in February.



- Streamflow was normal to above-normal across the state except one gage in the Cape Cod Region that was below normal. There was no flooding reported.



- Groundwater regional medians ranged from normal to above normal except the Islands Region, which is at Index Severity Level (ISL) 1.



- Lake and impoundment levels were above their 30th percentile and/or were at or near 100% full.



- NOAA's March outlook shows chances likely for above-normal and and equal chances for above-normal, normal, or below-normal precipitation.



- NOAA's 3-month outlook shows chances likely for above-normal temperatures, chances leaning for above-normal precipitation in southern part of the state, and equal chances for above-normal, normal, or below-normal precipitation for the northern part of the sate.



- Appendix II provides information on the Massachusetts Drought Management Plan (DMP) including ISL thresholds used in this report.

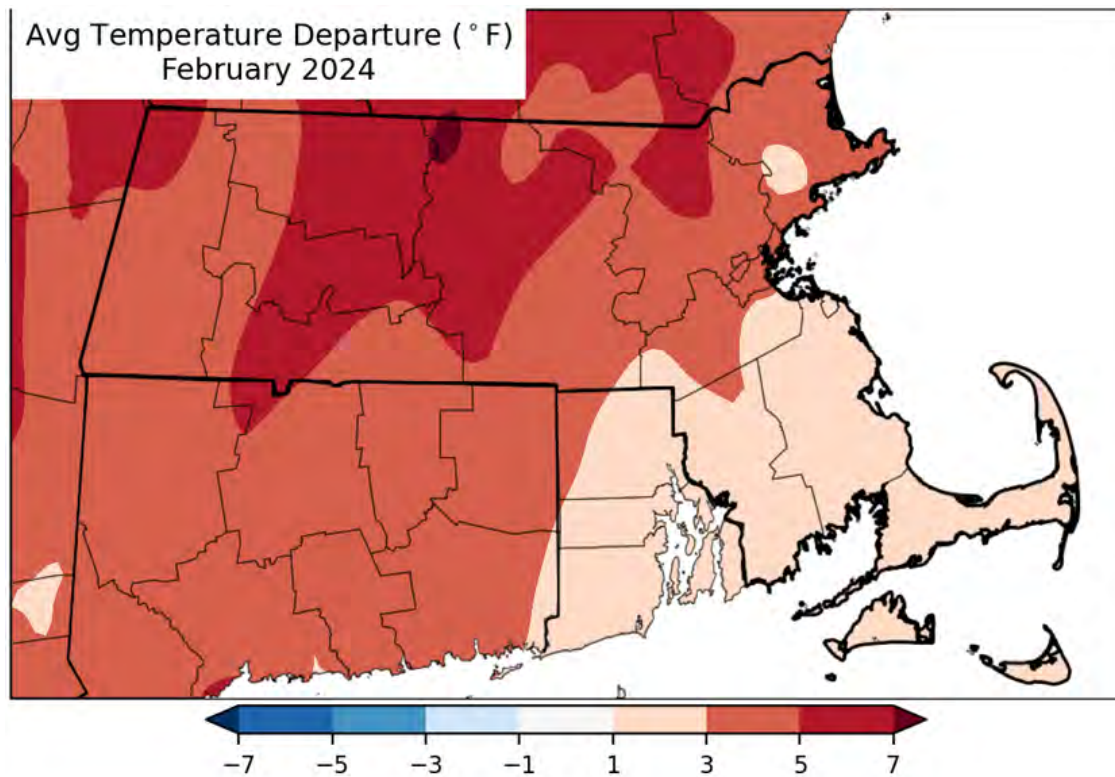


This report was prepared by the Massachusetts Department of Conservation and Recreation. Data may be preliminary. Analysis reflects automated calculations done 03/10/2024. Additional information, previous reports, and the Massachusetts Drought Dashboard with weekly updates to the drought indices can be found at: <https://www.mass.gov/drought-monitoring>



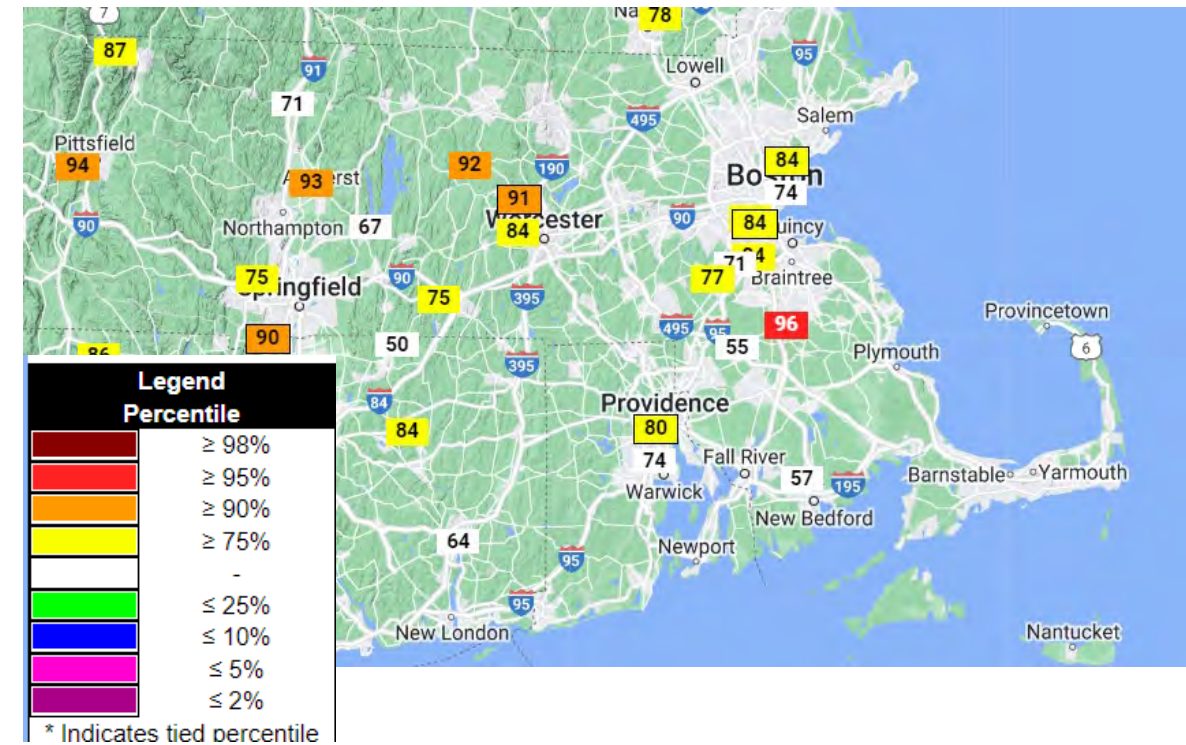
Monthly average temperatures were above normal. According to the Northeast Regional Climate Center (NRCC), Massachusetts had its 6th warmest February on record and its 4th warmest winter (Dec.-Feb.) on record.

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



Observed Average Mean Temperature as Percentiles for Feb 1 to Feb 29, 2024

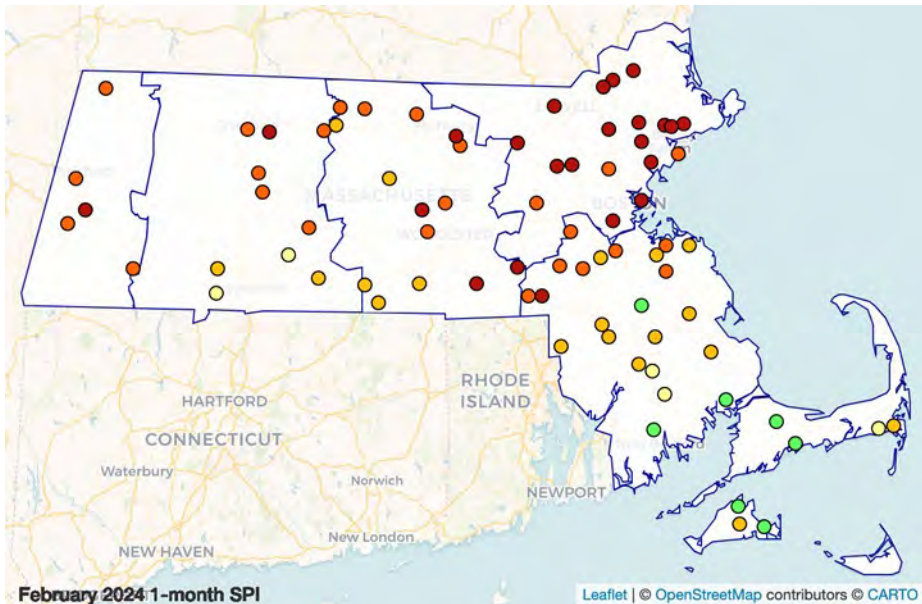
<https://sercc.oasis.unc.edu/Map.php?region=nrcc&>





## STANDARDIZED PRECIPITATION INDEX (SPI) AS A PERCENTILE

February precipitation was below normal except in the Cape Cod and Islands Regions where it was in the low end of normal. According to the NRCC, Massachusetts had its 2nd driest February on record and its 8<sup>th</sup> wettest winter (Dec.-Feb.). In addition to the table below, Appendix I provides all the look-back periods.



<span style="color: red;">●</span> $\geq 0$ to $\leq 2$	<span style="color: orange;">●</span> $> 2$ to $\leq 10$	<span style="color: yellow;">●</span> $> 10$ to $\leq 20$	<span style="color: lightgreen;">●</span> $> 20$ to $\leq 30$	<span style="color: green;">●</span> $> 30$ to $\leq 70$
<span style="color: lightblue;">●</span> $> 70$ to $\leq 80$	<span style="color: blue;">●</span> $> 80$ to $\leq 90$	<span style="color: darkblue;">●</span> $> 90$ to $\leq 98$	<span style="color: purple;">●</span> $> 98$ to $\leq 100$	

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	1.07	-1.63	7	96	79
CTRV	10	1.25	-1.78	9	89	83
CENTRAL	15	1.26	-1.91	8	96	90
NORTHEAST	19	0.71	-2.51	1	91	75
SOUTHEAST	23	1.84	-1.73	14	93	83
CAPE COD	4	2.88	-1.15	31	74	38
ISLANDS	3	2.73	-0.70	36	71	54

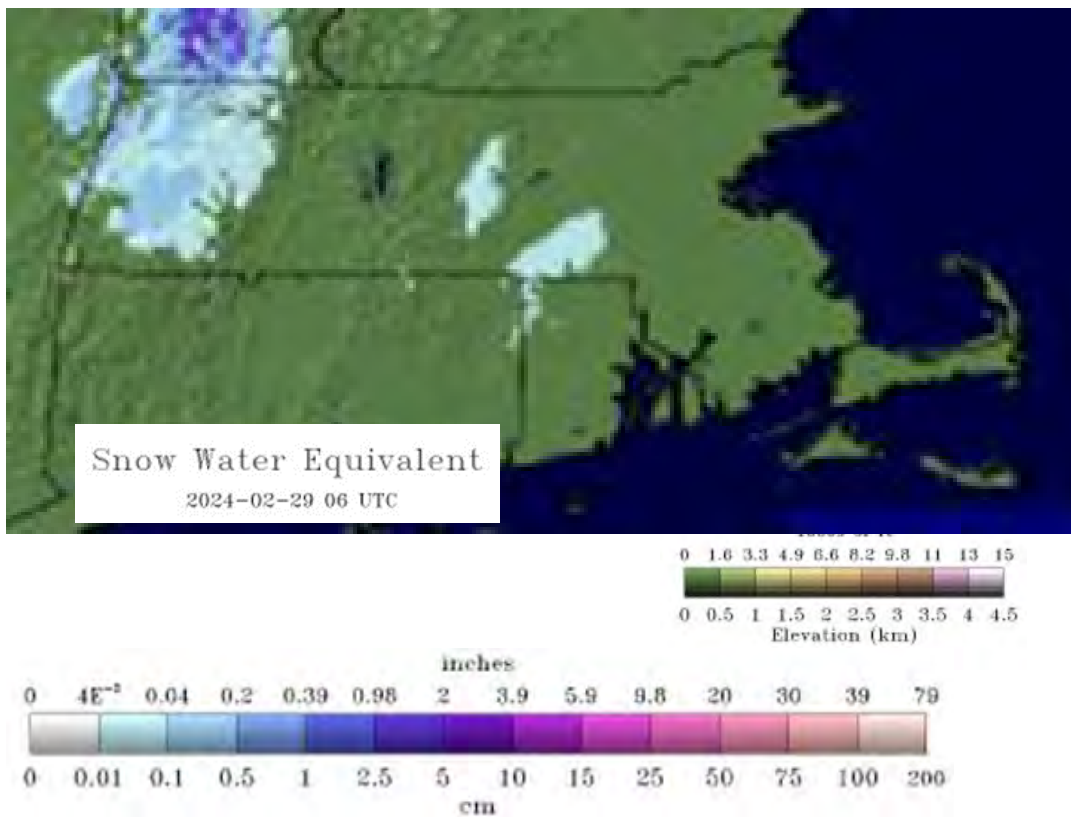
SPI is the Standardized Precipitation Index used in the Drought Management Plan (DMP) expressed here as a percentile and represents the variation from long-term precipitation.

DMP Index Severity Levels			
1	2	3	4

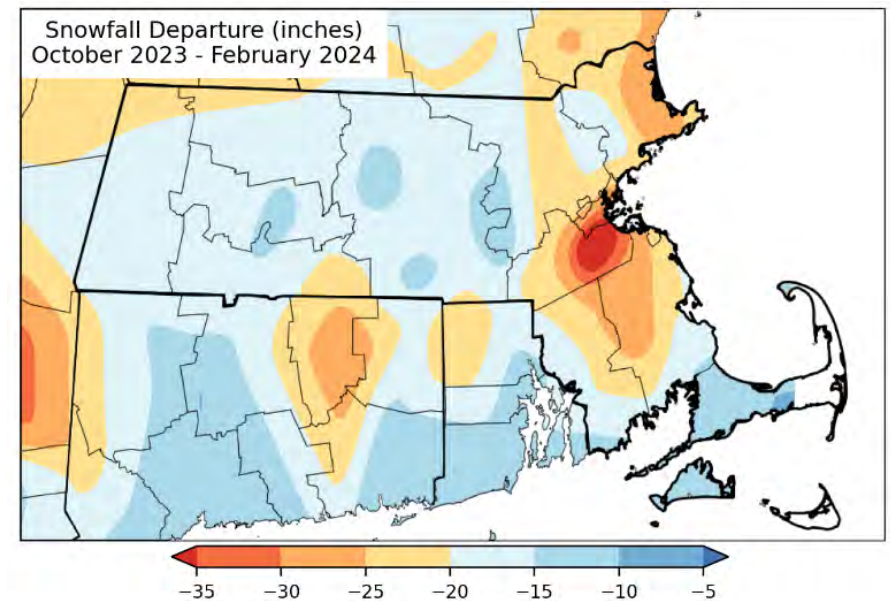
## SNOW COVER

At the end of February, there was minimal snow cover mostly in the western part of the state.

WBUR article about Boston's snowfall deficit. <https://www.wbur.org/news/2024/02/29/boston-no-snow-winter>



## SEASON-TO-DATE SNOWFALL DEPARTURE

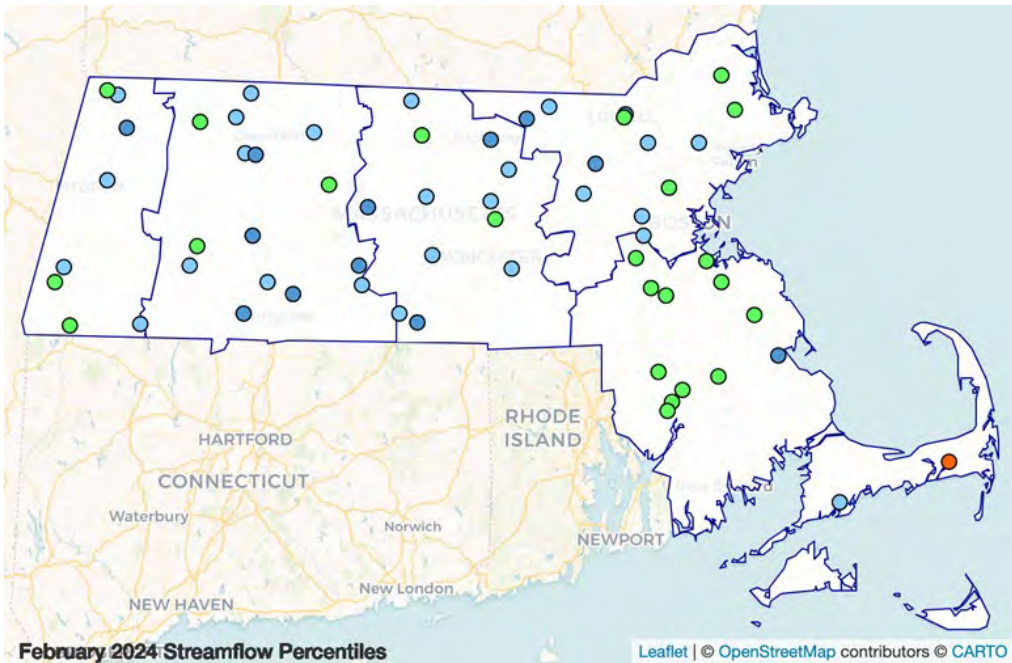


<http://www.nrcc.cornell.edu/regional/monthly/monthly.html>



During February, streamflow was normal to above-normal across the state except one gage in the Cape Cod Region that was below normal.

## MEDIAN MONTHLY STREAMFLOW PERCENTILES COMPARED TO HISTORICAL VALUES



<span style="color: red;">●</span> $\geq 0$ to $\leq 2$	<span style="color: orange;">●</span> $> 2$ to $\leq 10$	<span style="color: yellow;">●</span> $> 10$ to $\leq 20$	<span style="color: lightgreen;">●</span> $> 20$ to $\leq 30$	<span style="color: green;">●</span> $> 30$ to $\leq 70$
<span style="color: lightblue;">●</span> $> 70$ to $\leq 80$	<span style="color: blue;">●</span> $> 80$ to $\leq 90$	<span style="color: darkblue;">●</span> $> 90$ to $\leq 98$	<span style="color: purple;">●</span> $> 98$ 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	74
CTRV	15	0	0	0	0	0	78
CENTRAL	12	0	0	0	0	0	75
NORTHEAST	13	0	0	0	0	0	75
SOUTHEAST	12	0	0	0	0	0	51
CAPE COD	2	0	1	0	0	0	41

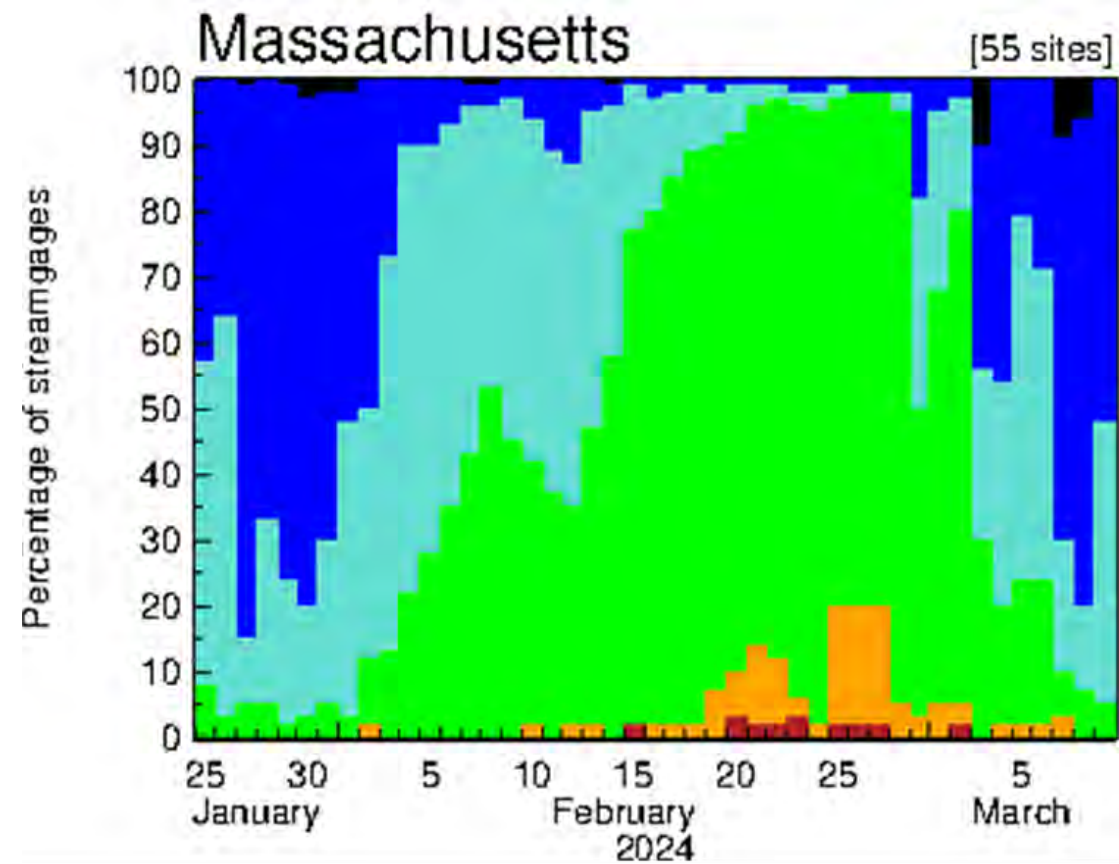
**Note:** Not all gages report in all months due to ice, beaver dams or other conditions. Streamflow index is not applicable to the Islands.

DMP Index Severity Levels			
1	2	3	4

# USGS TIME SERIES OF THE PERCENT OF GAGES AT THEIR RESPECTIVE PERCENTILE FLOWS FOR AVERAGE DAILY STREAMFLOWS COMPARED TO HISTORICAL VALUES

<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		



Both the Norton/Boston and Albany NWS E-5 Monthly Reports of Hydrologic Conditions indicated no river flooding at forecast points occurred in Massachusetts during February and no flood warnings were issued. There were no flood storm reports.

<https://mesonet.agron.iastate.edu/vtec/search.php#eventsbypoint/-93.6530/41.5300>

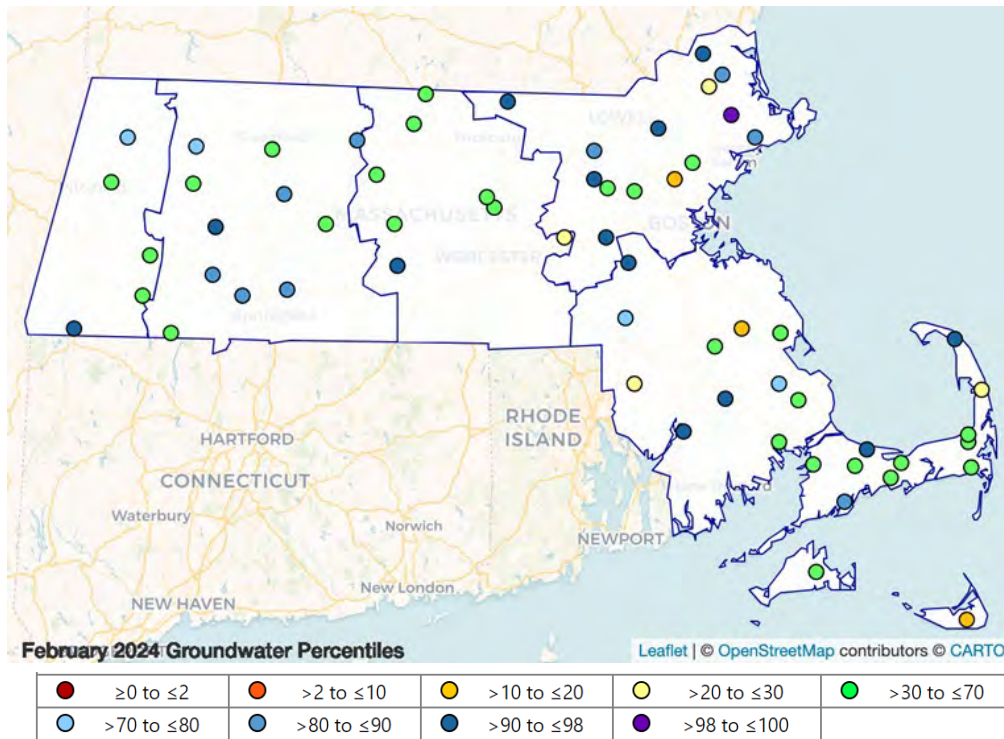


Image: Courtesy of NASA/JPL-Caltech



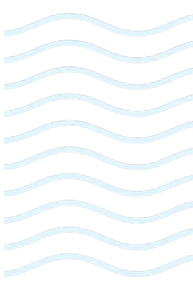
February groundwater levels ranged from below normal to much above normal. Regional medians were normal to above normal except for the Islands Region, which is at ISL 1.

## END OF MONTH GROUNDWATER COMPARED TO HISTORICAL IN THE CLIMATE RESPONSE NETWORK WELLS



REGION	NUMBER OF WELLS 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 WELL PERCENTILES
WESTERN	5	0	0	0	0	1	68
CTRV	11	0	0	0	0	1	83
CENTRAL	8	0	0	0	1	1	52
NORTHEAST	14	0	0	1	1	6	89
SOUTHEAST	12	0	0	1	2	3	56
CAPE COD	11	0	0	0	1	2	59
ISLANDS	2	0	0	1	0	0	26

DMP Index Severity Levels			
1	2	3	4



At the end of February, reporting lake and impoundment levels were above their 30th percentile and/or were at or near 100% full.

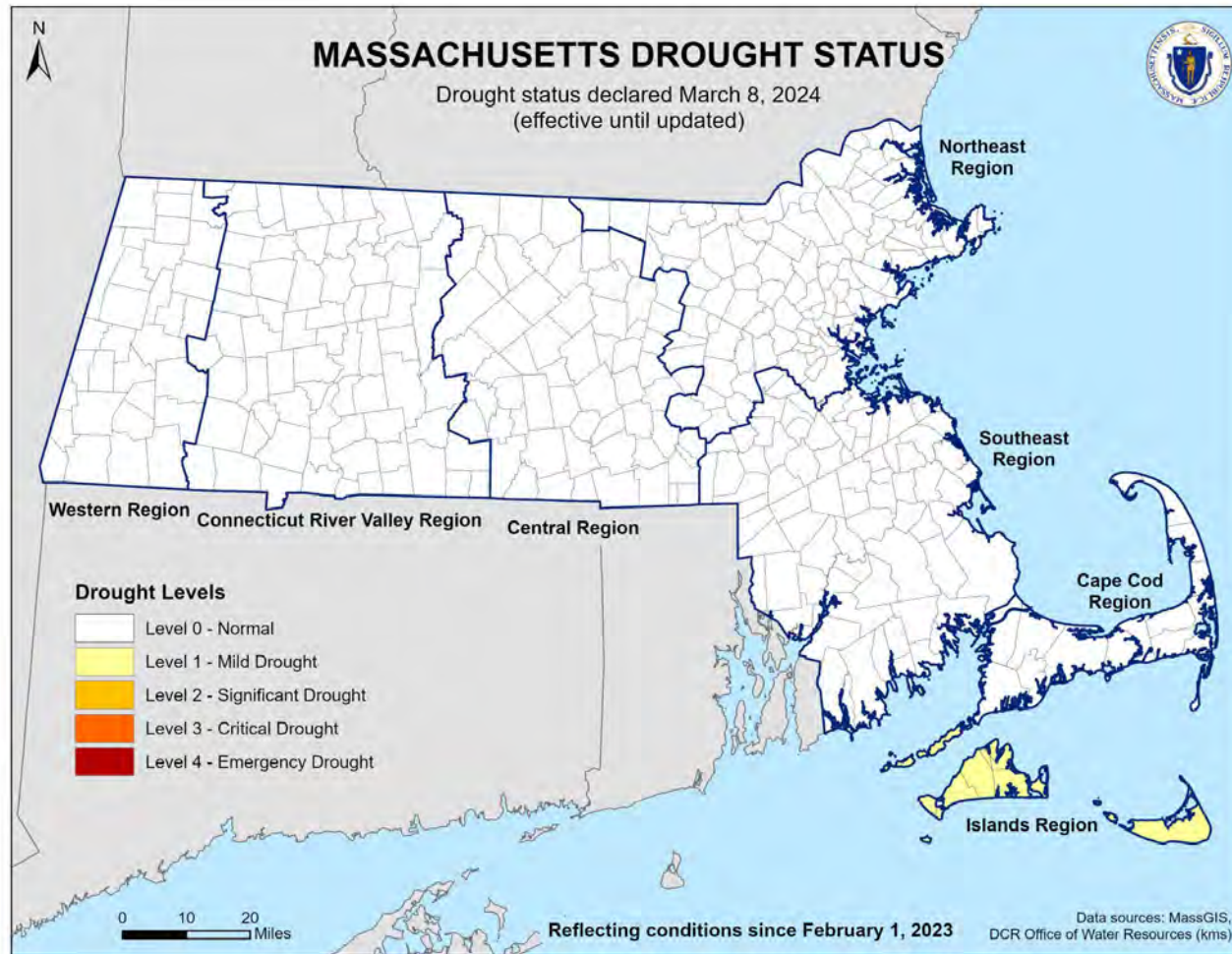
REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	2	84th
CTRV	2	78th
CENTRAL	5	55th
NORTHEAST	5	86th
SOUTHEAST	2	95th
CAPE COD	1	39th

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

DMP Index Severity Levels			
1	2	3	4



## MASSACHUSETTS DROUGHT STATUS



On March 8, 2023, Massachusetts Energy and Environmental Affairs (EEA) Secretary Rebecca L. Tepper declared that starting from February 1, 2023, the Islands Region is at Level 1 Mild Drought. This status remains in effect until further updated.

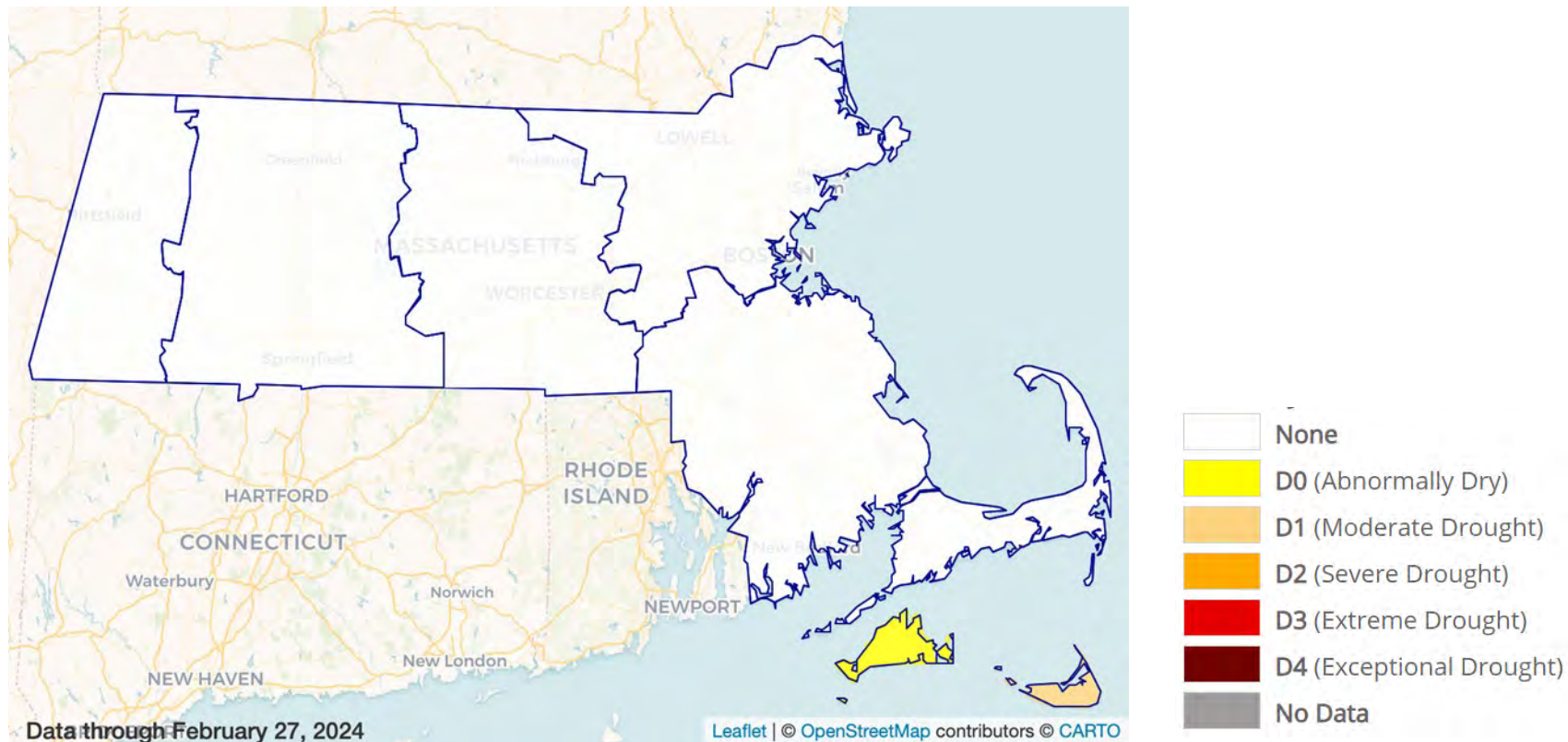




## U.S. DROUGHT MONITOR (USDM)

At the end of February, the USDM showed D1 on Nantucket and D0 on Martha's Vineyard.

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

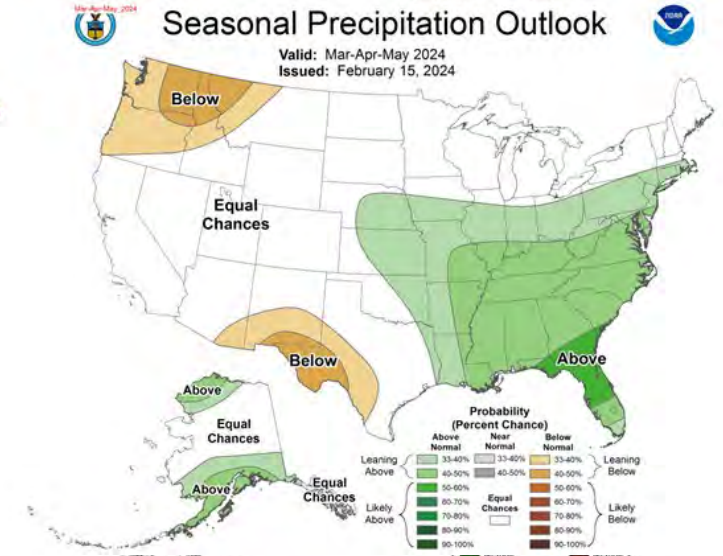
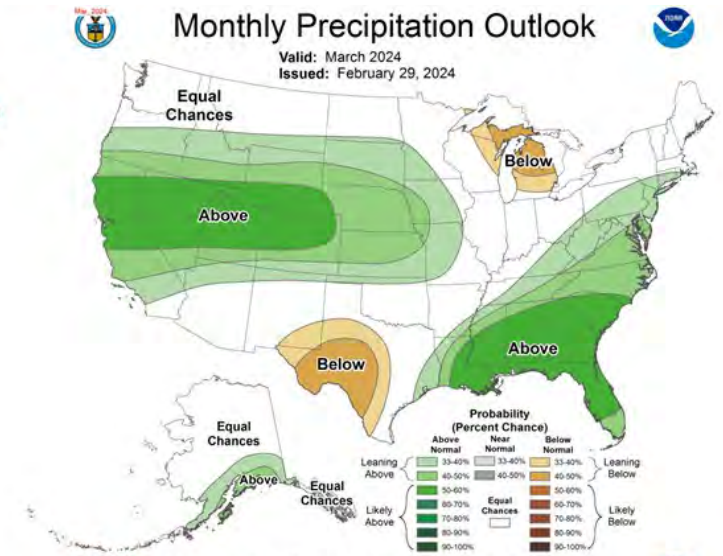
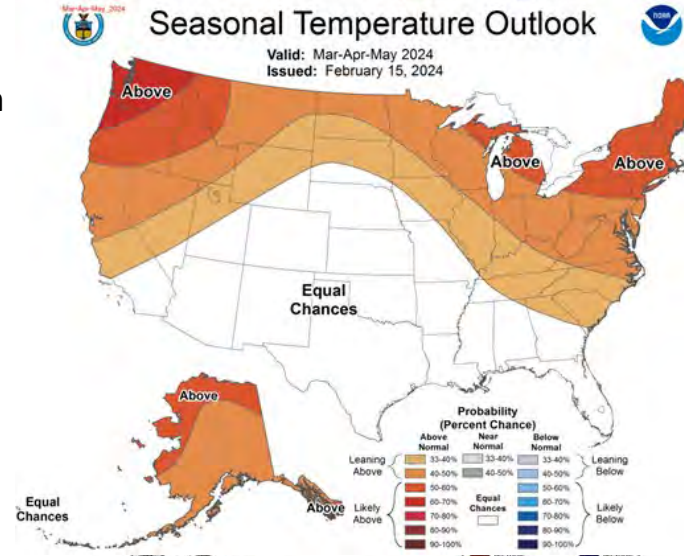
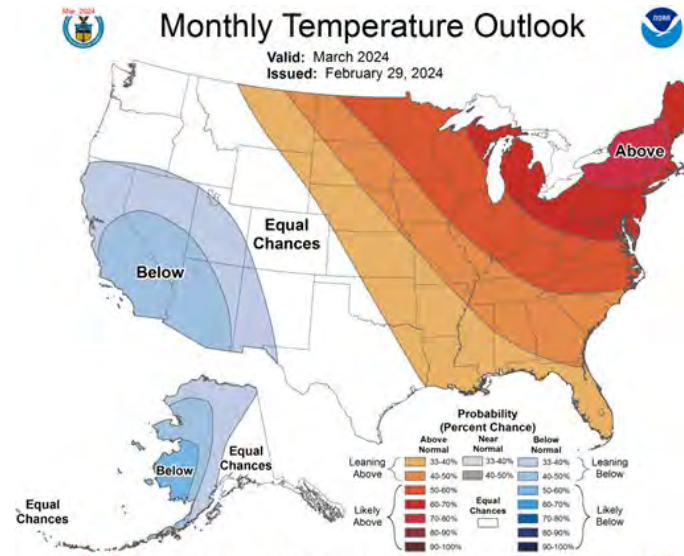


# TEMPERATURE AND PRECIPITATION OUTLOOK

**March:** The outlook issued 2/29 shows a 60-70% chance of above-normal temperatures in the eastern part of the state, 70%-80% chance of above-normal temperatures in the western part of the state, and equal chances for above-normal, normal, or below-normal precipitation across the state.

**March through May:** The seasonal outlook issued 2/15 shows a 50-60% chance of above-normal temperatures, a 33-40% chance of above-normal precipitation in southern part of the state, and equal chances for above-normal, normal, or below-normal precipitation in the rest of the state.

<https://www.cpc.ncep.noaa.gov/>

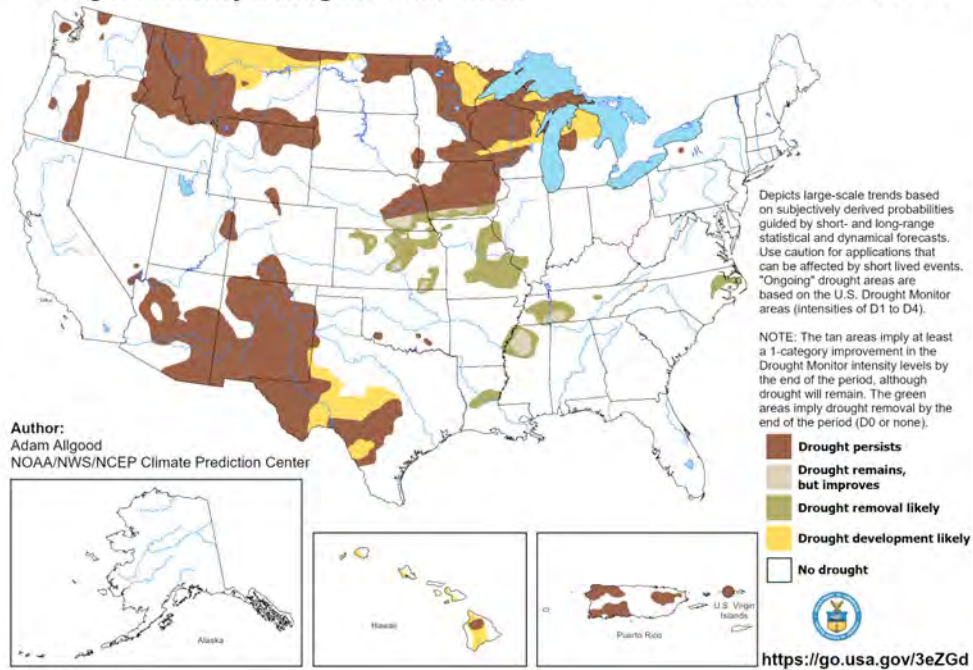




## U.S. Monthly Drought Outlook

### Drought Tendency During the Valid Period

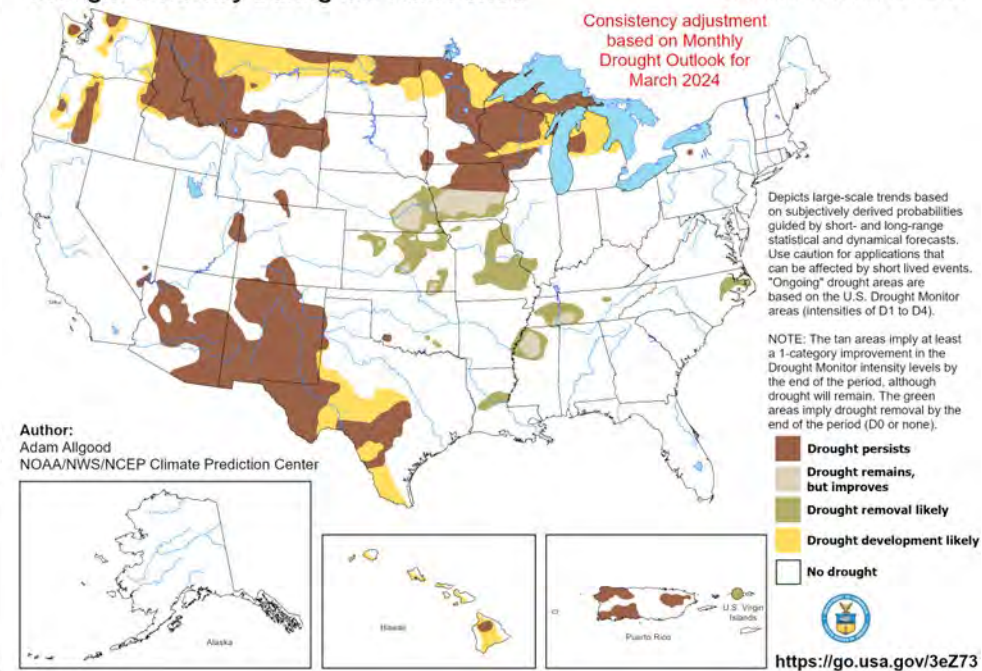
Valid for March 2024  
Released February 29, 2024



## U.S. Seasonal Drought Outlook

### Drought Tendency During the Valid Period

Valid for March 1 - May 31, 2024  
Released February 29, 2024



## MONTHLY AND SEASONAL DROUGHT OUTLOOK

The monthly outlook for March released on 2/29 shows drought removal on Nantucket.

The seasonal outlook for March through May issued on 2/29 shows drought removal on Nantucket.

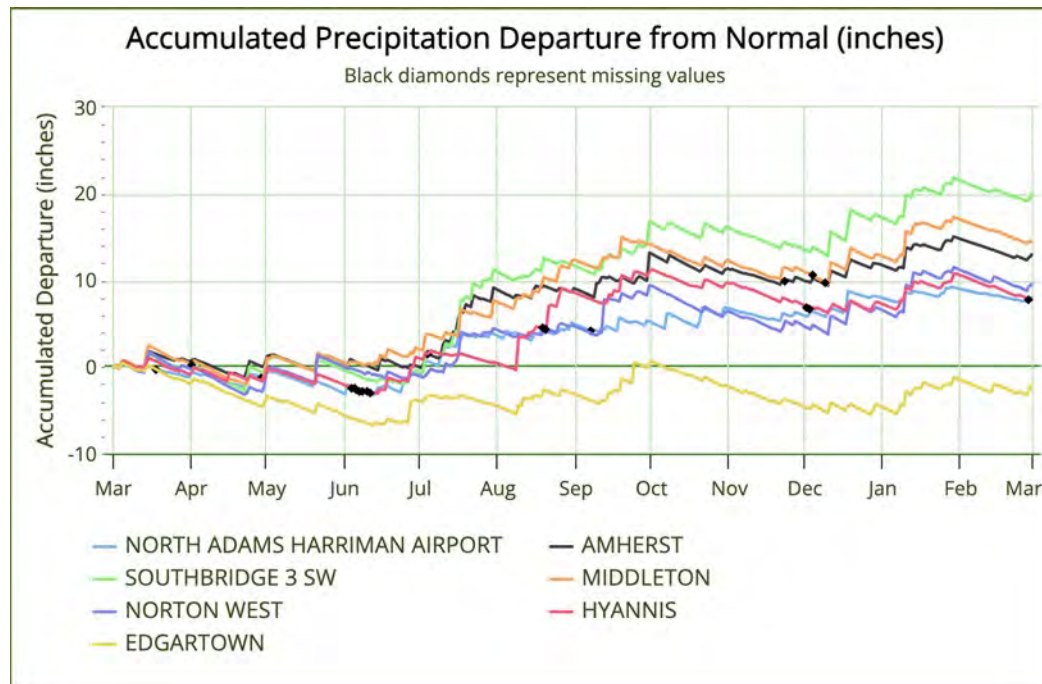
<http://www.cpc.ncep.noaa.gov/products/Drought>



# ADDITIONAL PRECIPITATION DATA

## Standardized Precipitation Index— February 2024 as percentiles

REGION	NUMBER OF SITES	1-mo	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo
WESTERN	5	7	71	96	79	96	87	81	94
CTRV	10	9	74	89	83	95	94	78	92
CENTRAL	15	8	81	96	90	99	98	90	96
NORTHEAST	19	1	74	91	75	98	97	69	88
SOUTHEAST	23	14	84	93	83	93	89	70	84
CAPE COD	4	31	78	74	38	73	53	56	-999
ISLANDS	3	36	78	71	54	60	28	22	36



DMP Index Severity Levels			
1	2	3	4

## 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/>



## ADDITIONAL PRECIPITATION DATA (CONT.)

### Percent of Average Historical Precipitation—February 2024

REGION	NUMBER OF SITES REPORTING	HISTORICAL AVERAGE	FEBRUARY AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF NORMAL
WESTERN	5	2.70	1.07	-1.63	40%
CTRV	10	3.03	1.25	-1.78	41%
CENTRAL	15	3.17	1.26	-1.91	40%
NORTHEAST	19	3.22	0.71	-2.51	22%
SOUTHEAST	23	3.57	1.84	-1.73	52%
CAPE COD	4	4.03	2.88	-1.15	71%
ISLANDS	3	3.43	2.73	-0.70	80%

# 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.

## Index Severity Levels (Section 3.4 of the DMP)

SEVERITY LEVEL	STANDARDIZED PRECIPITATION INDEX (SPI)	STREAMFLOW	LAKES AND IMPOUNDMENTS	GROUNDWATER	EVAPOTRANSPIRATION	KEETCH-BRYAM DROUGHT INDEX (KBDI)
0	> 30th percentile					< 200
1	$\leq 30$ and $> 20$					200-400
2	$\leq 20$ and $> 10$					400-600
3	$\leq 10$ and $> 2$					600-700
4	$\leq 2$					700-800

## 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





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**Massachusetts Water Resources Commission**

**Executive Office of Energy and Environmental Affairs**

[www.mass.gov/conservemawater](http://www.mass.gov/conservemawater)

[www.mass.gov/drought-management](http://www.mass.gov/drought-management)