

MASSACHUSETTS WATER RESOURCES COMMISSION

HYDROLOGIC CONDITIONS IN MASSACHUSETTS

MAY
2024

The Commonwealth of Massachusetts

Maura T. Healey, Governor

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



MAY 2024 HYDROLOGIC CONDITIONS

SUMMARY OF CONDITIONS



- Monthly average temperatures were mostly above normal.



- Precipitation was normal in Western, CTRV, and Northeast Regions and above normal in the Central, Southeast, Cape Cod, and Islands Regions.



- The 2-mos Evaporative Demand Drought Index was normal in the Cape Cod and Islands Regions, and the remaining Regions had less demand than normal.



- The Keetch-Byram Drought Index was in the normal range at the end of May.



- Streamflow regional medians ranged from below normal to above normal. The Western Region is at Index Severity Level (ISL) 1.
- Groundwater regional medians ranged from normal to above normal.



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



- NOAA's May outlook shows chances leaning for above-normal temperatures and chances leaning above-normal precipitation.



- NOAA's 3-month outlook shows chances likely for above-normal temperatures and chances leaning for above-normal precipitation.



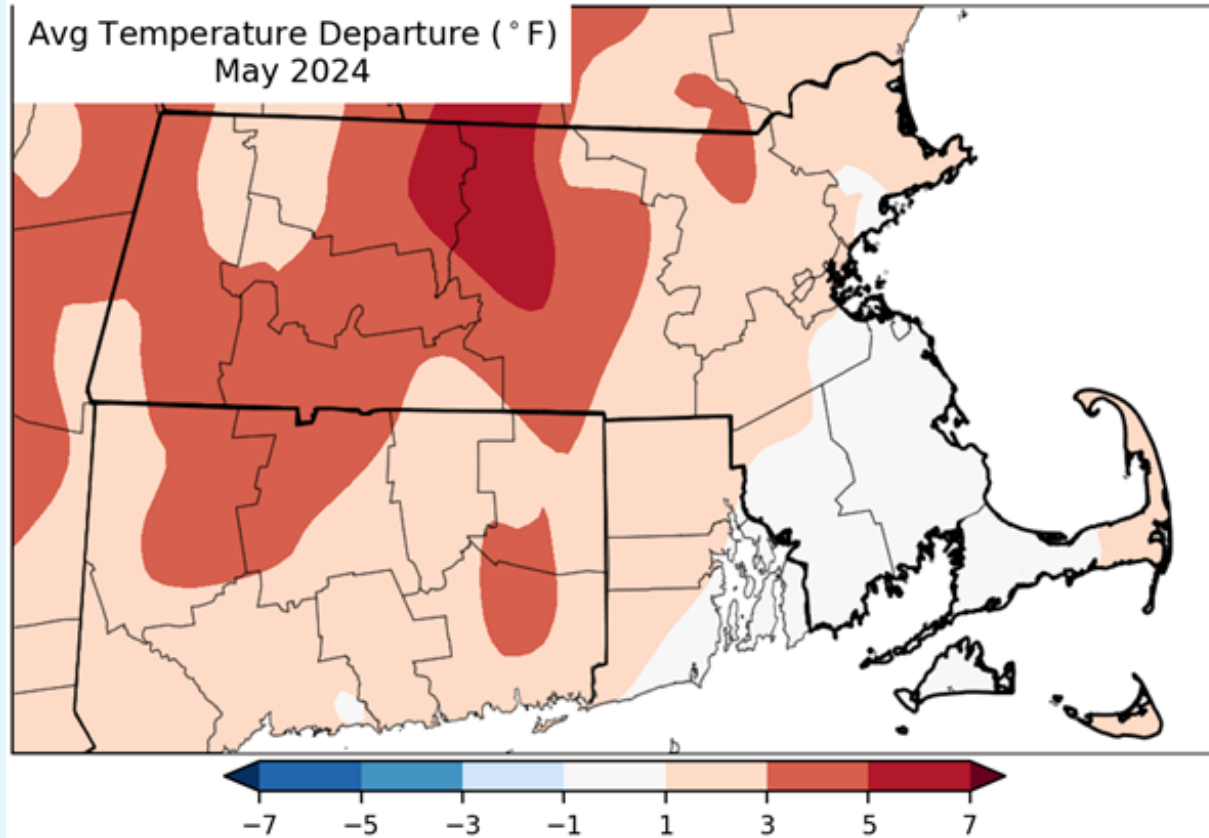
- Appendix II provides information on the Massachusetts Drought Management Plan (DMP) including ISL thresholds used in this report.



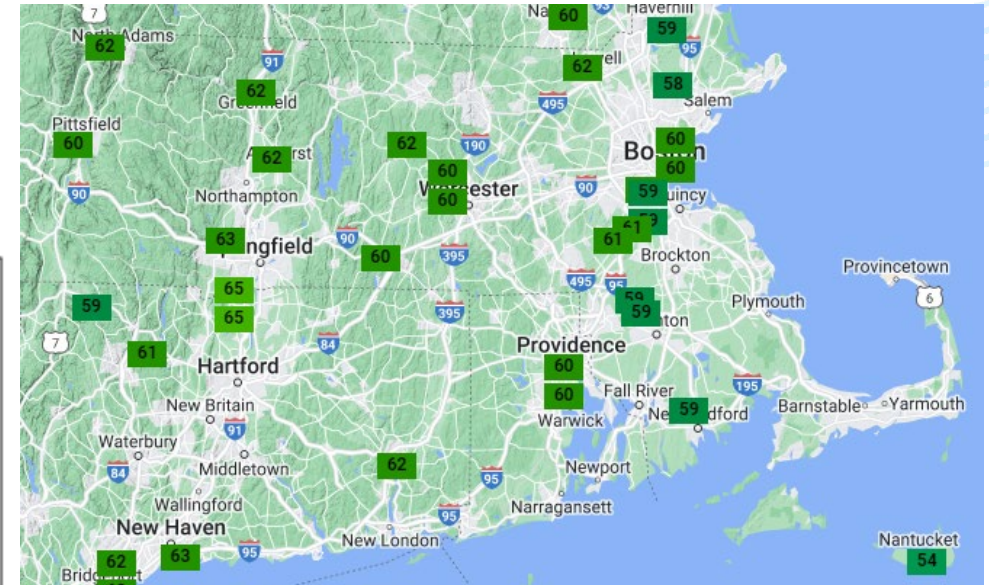
This report was prepared by the Massachusetts Department of Conservation and Recreation. Data may be preliminary. Analysis reflects automated calculations done 06/10/2024. Additional information, previous reports, and the Massachusetts Drought Dashboard with weekly updates to the drought indices can be found at: <https://www.mass.gov/drought-monitoring>

Monthly average temperatures were mostly above normal with the southeastern part of the state normal. According to the Northeast Regional Climate Center (NRCC), Massachusetts had its ninth warmest May on record.

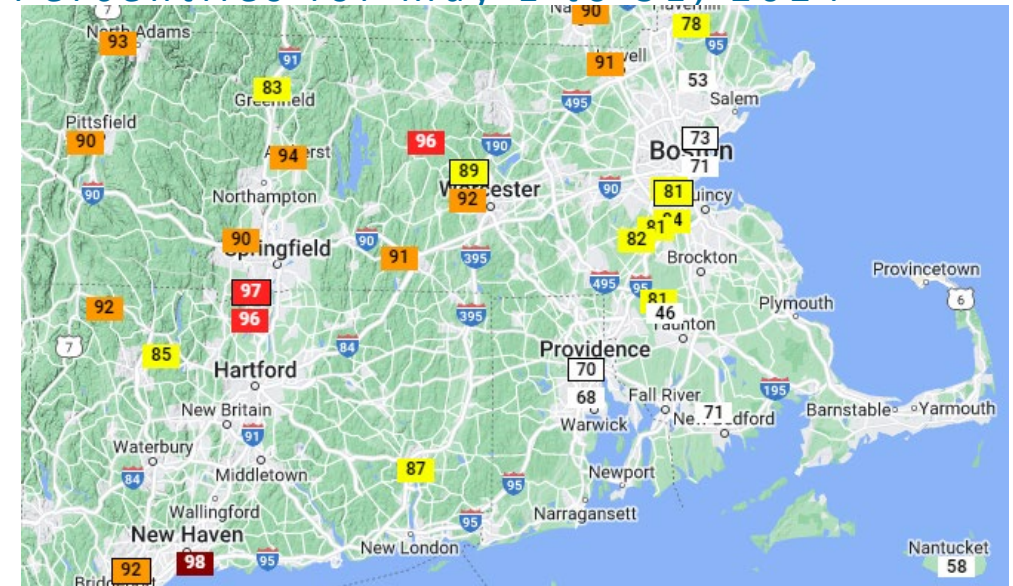
<http://www.nrcc.cornell.edu/regional/monthly/monthly.html>



Observed Average Mean Temperature, °F May 1 to 31, 2024



Observed Average Mean Temperature as Percentiles for May 1 to 31, 2024

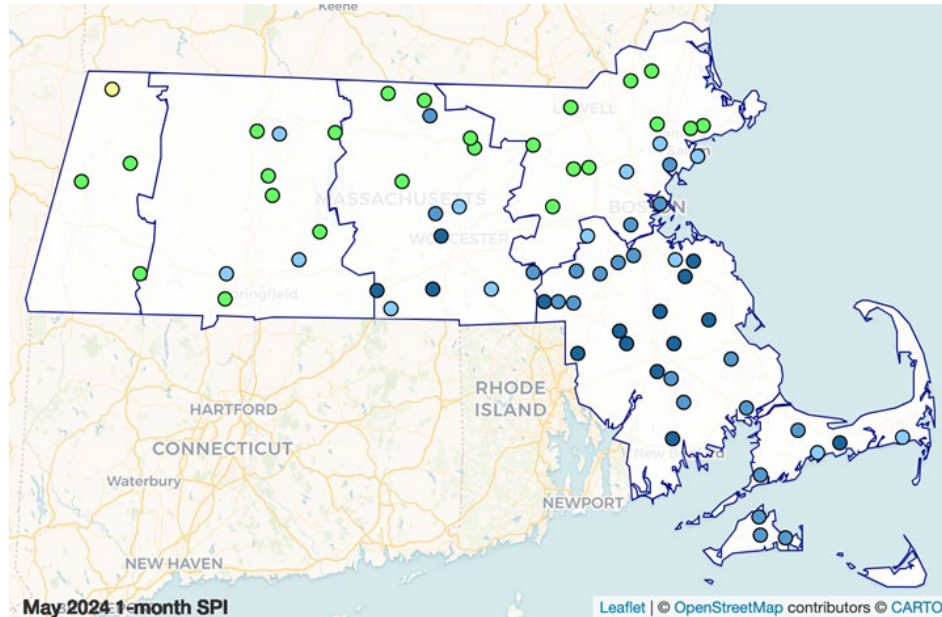


<https://sercc.oasis.unc.edu/Map.php?region=nrcc&>



STANDARDIZED PRECIPITATION INDEX (SPI) AS A PERCENTILE

May regional precipitation was normal in the Western, CTRV, and Northeast Regions and above normal in the Central, Southeast, Cape Cod, and Islands Regions. According to the NRCC, the Worcester climate site had its second wettest May on record. In addition to the table below, Appendix I provides all the look-back periods.



● ≥ 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	NUMBER OF SITES REPORTING	MAY MONTHLY AVERAGE (IN)	DEPARTURE FROM HISTORICAL (IN)	SPI PERCENTILE 1-MONTH	SPI PERCENTILE 3-MONTH	SPI PERCENTILE 6-MONTH
WESTERN	4	3.42	-0.46	40	91	96
CTRV	9	4.22	0.42	61	93	96
CENTRAL	14	5.08	1.27	79	95	99
NORTHEAST	16	3.93	0.48	61	93	96
SOUTHEAST	23	6.22	2.62	90	98	99
CAPE COD	5	5.53	1.90	89	88	89
ISLANDS	3	5.92	2.20	88	91	92

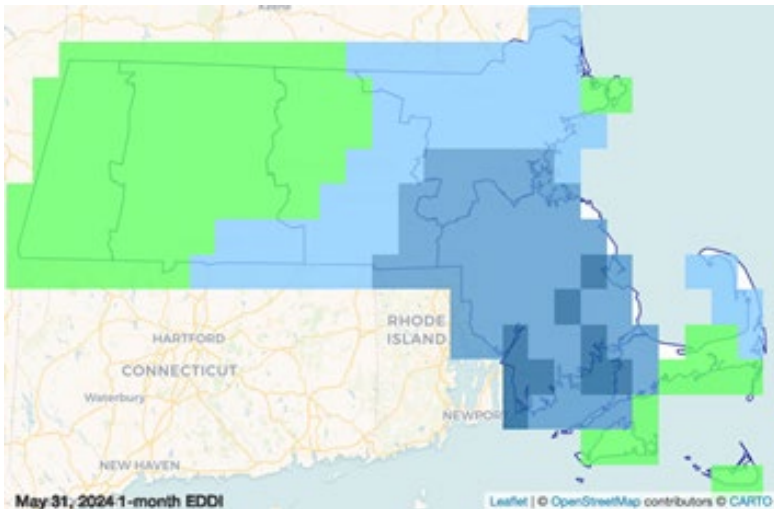
SPI is the Standardized Precipitation Index used in the Drought Management Plan (DMP) expressed here as a percentile and represents the variation from long-term precipitation.

DMP Index Severity Levels			
1	2	3	4

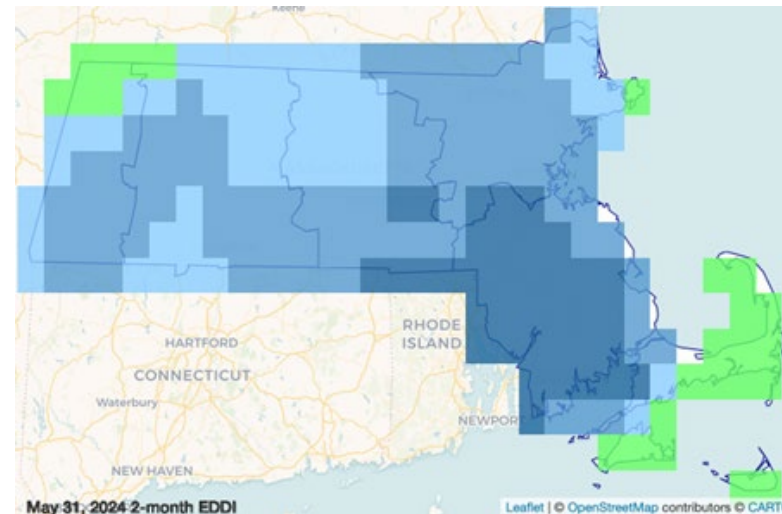
EVAPORATIVE DEMAND DROUGHT INDEX (EDDI)

As of May 31, 2024, the 1-month EDDI values were normal in the Western, CTRV, and Islands Regions. The remaining Regions had less demand than normal. The 2-month EDDI values, which are used in the MA Drought Plan monitoring, were normal in the Cape Cod and Islands Regions, and the remaining Regions had less demand than normal.

1-month EDDI



2-month EDDI



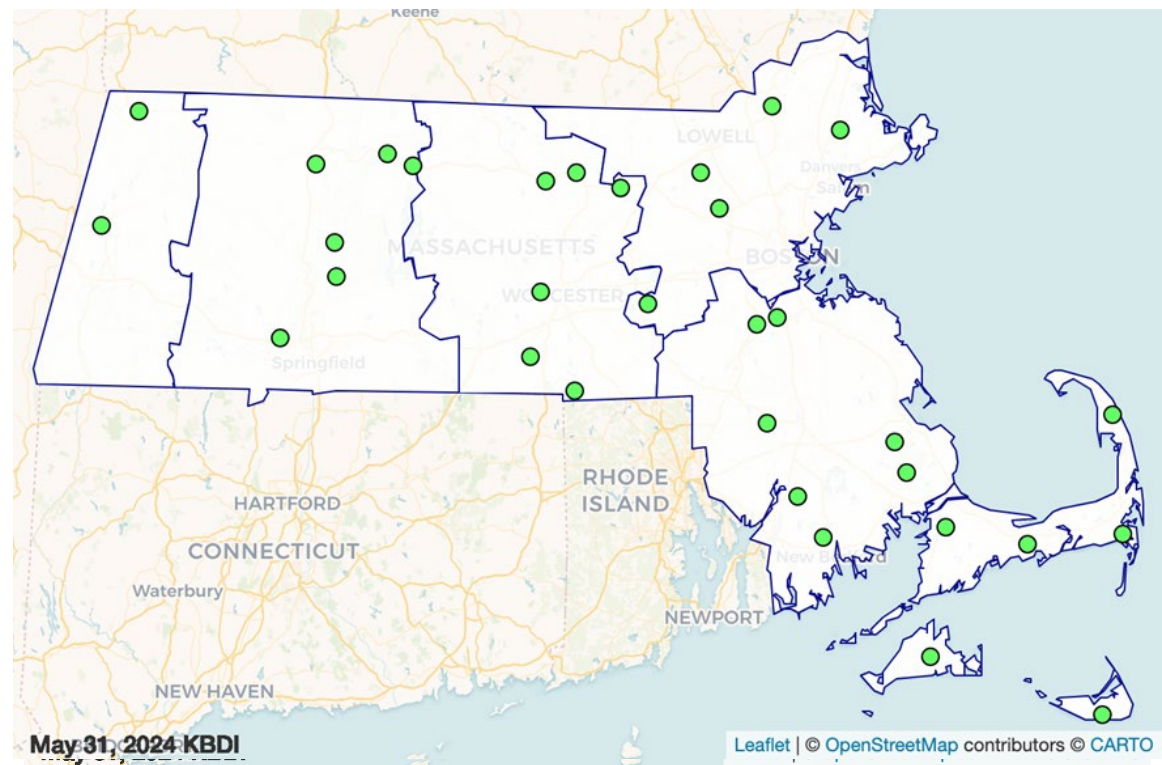
● ≥ 0 to ≤ 2	● > 2 to ≤ 10	● > 10 to ≤ 20	● > 20 to ≤ 30	● > 30 to ≤ 70
● > 70 to ≤ 80	● > 80 to ≤ 90	● > 90 to ≤ 98	● > 98 to ≤ 100	

REGION	MEDIAN 2-MONTH EDDI (2024-05-31)
WESTERN	80
CTRV	79
CENTRAL	84
NORTHEAST	86
SOUTHEAST	93
CAPE COD	66
ISLANDS	52

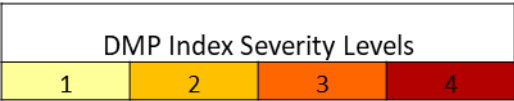
DMP Index Severity Levels			
1	2	3	4



At the end of May, the Keetch Byram Drought Index (KBDI) was in the normal range in all Regions.



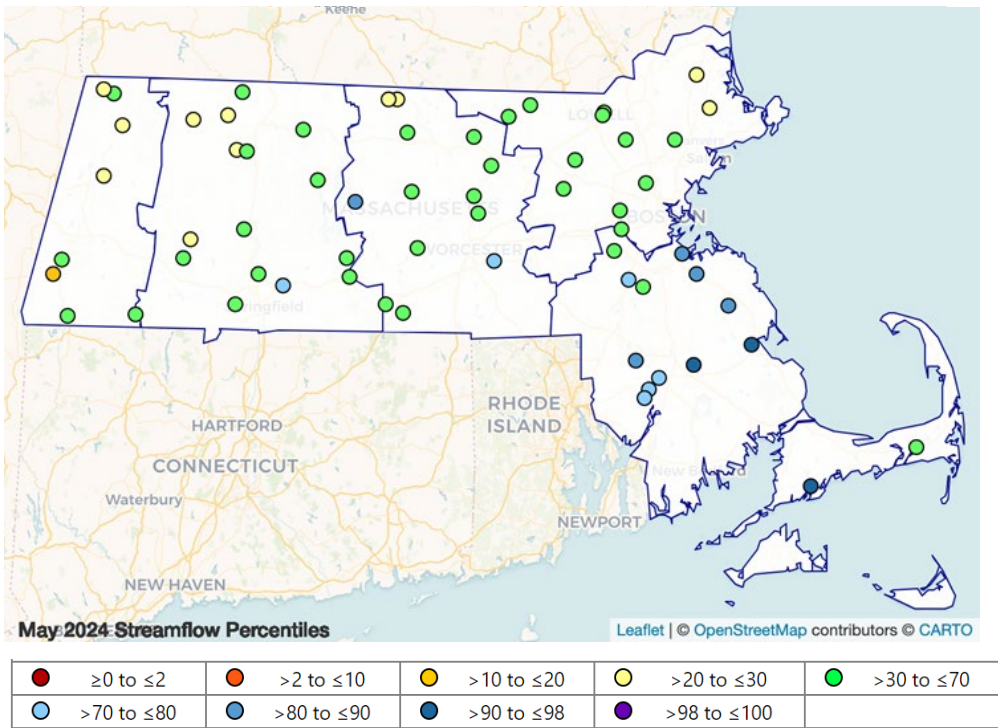
REGION	NUMBER OF SITES REPORTING	HIGHEST OF SITE VALUES
WESTERN	2	153
CTRV	6	78
CENTRAL	6	108
NORTHEAST	5	72
SOUTHEAST	7	18
CAPE COD	4	82
ISLANDS	2	51



Point Values - KBDI Range				
≥700 to ≤800	≥600 to <700	≥400 to <600	≥200 to <400	≥0 to <200

The medians of individual stream gages ranged from below normal to above normal. The Western Region is at ISL 1 while in the Southeast and Cape Cod Regions, three gages were above their respective 90th percentile values.

MEDIAN MONTHLY STREAMFLOW PERCENTILES COMPARED TO HISTORICAL VALUES



REGION	NUMBER OF GAGES REPORTING	≥ 0 TO ≤ 2 PERCENTILE	> 2 TO ≤ 10 PERCENTILE	> 10 TO ≤ 20 PERCENTILE	> 20 TO ≤ 30 PERCENTILE	> 90 PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES
WESTERN	8	0	0	1	3	0	28
CTRV	15	0	0	0	4	0	39
CENTRAL	13	0	0	0	2	0	62
NORTHEAST	13	0	0	0	2	0	55
SOUTHEAST	12	0	0	0	0	2	80
CAPE COD	2	0	0	0	0	1	69

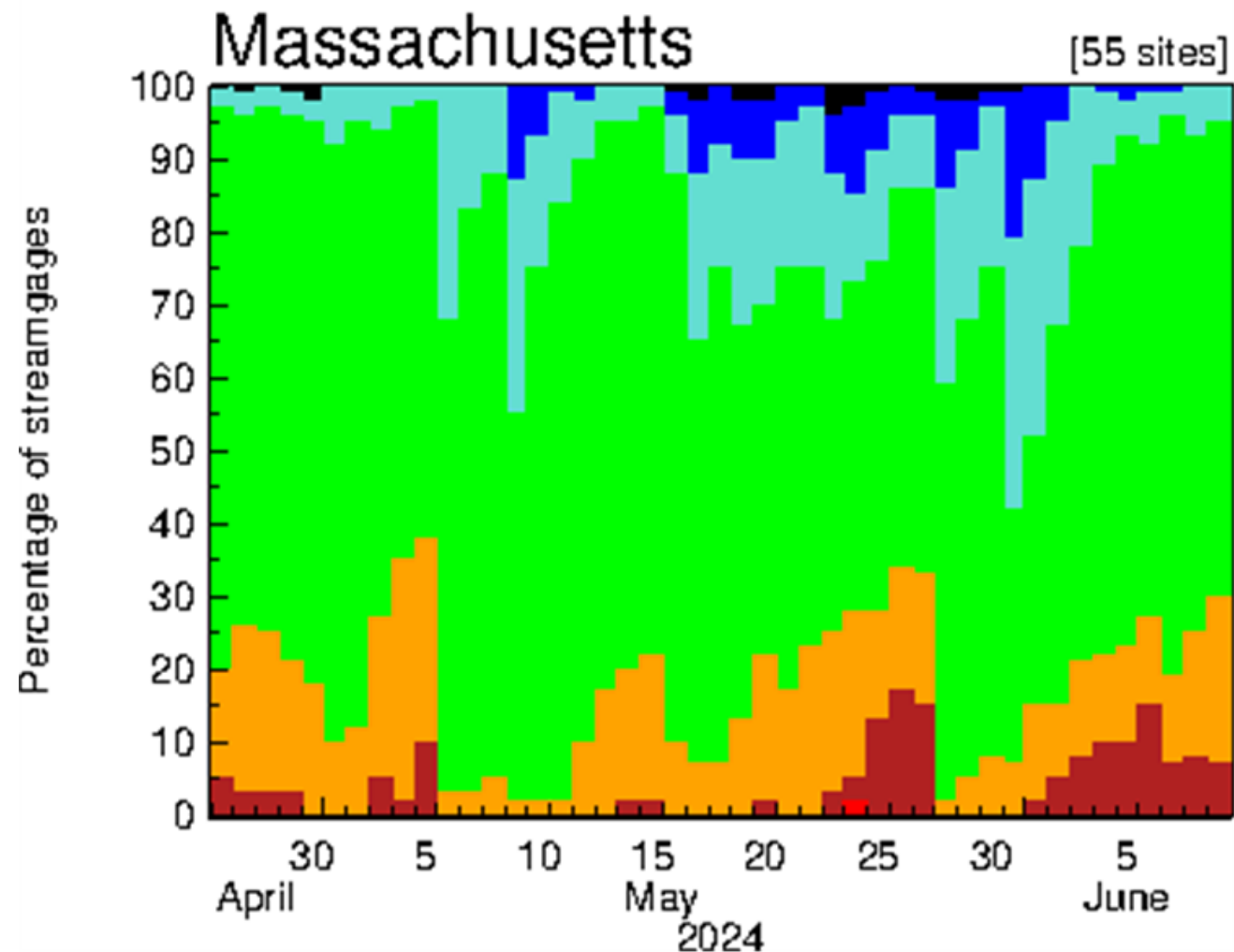
Note: Not all gages report in all months due to ice, beaver dams or other conditions. Streamflow index is not applicable to the Islands.

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		



The Norton/Boston and Albany NWS E-5 Monthly Reports of Hydrologic Conditions did not indicate river flooding at forecast points in Massachusetts during May.

Results of a search of the Iowa Mesonet database for NWS flood warnings and local storm reports are listed below.

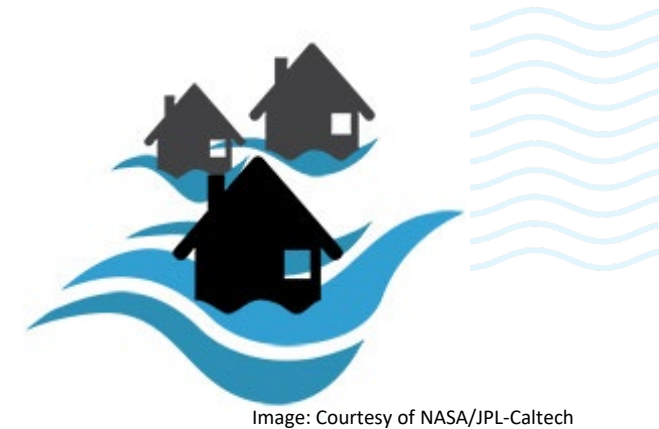
May 16th: two areal flood warnings and a local storm flood report in Bristol county

May 21st : flash flood warning and four local storm flood reports in Franklin county

May 23rd : flash flood warning and four local storm flood reports in Bristol county

There were no flood warnings for river forecast points.

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



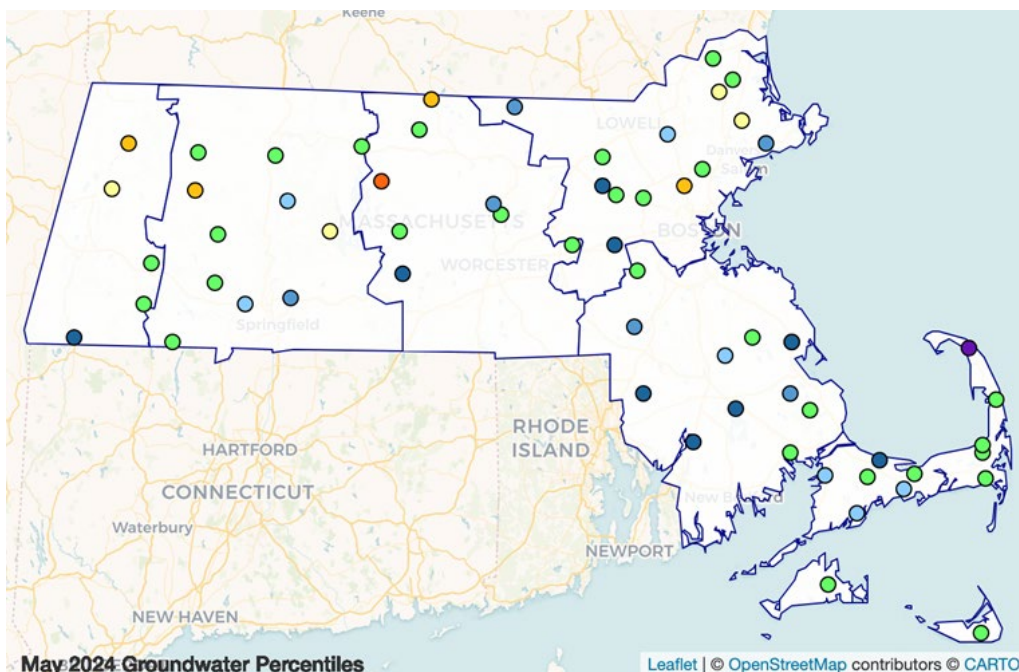
NOAA 2024 Atlantic Hurricane Outlook projects above-normal activity in the Atlantic for this season.

<https://www.noaa.gov/news-release/noaa-predicts-above-normal-2024-atlantic-hurricane-season>



May groundwater levels ranged from below normal to much above normal. Regional medians were normal except for the Southeast Region, which was above normal.

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



● ≥ 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	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	1	1	1	49
CTRV	11	0	0	1	1	0	48
CENTRAL	8	0	1	1	0	1	40
NORTHEAST	14	0	0	1	2	2	53
SOUTHEAST	12	0	0	0	0	5	88
CAPE COD	11	0	0	0	0	2	70
ISLANDS	2	0	0	0	0	0	53

DMP Index Severity Levels			
1	2	3	4



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

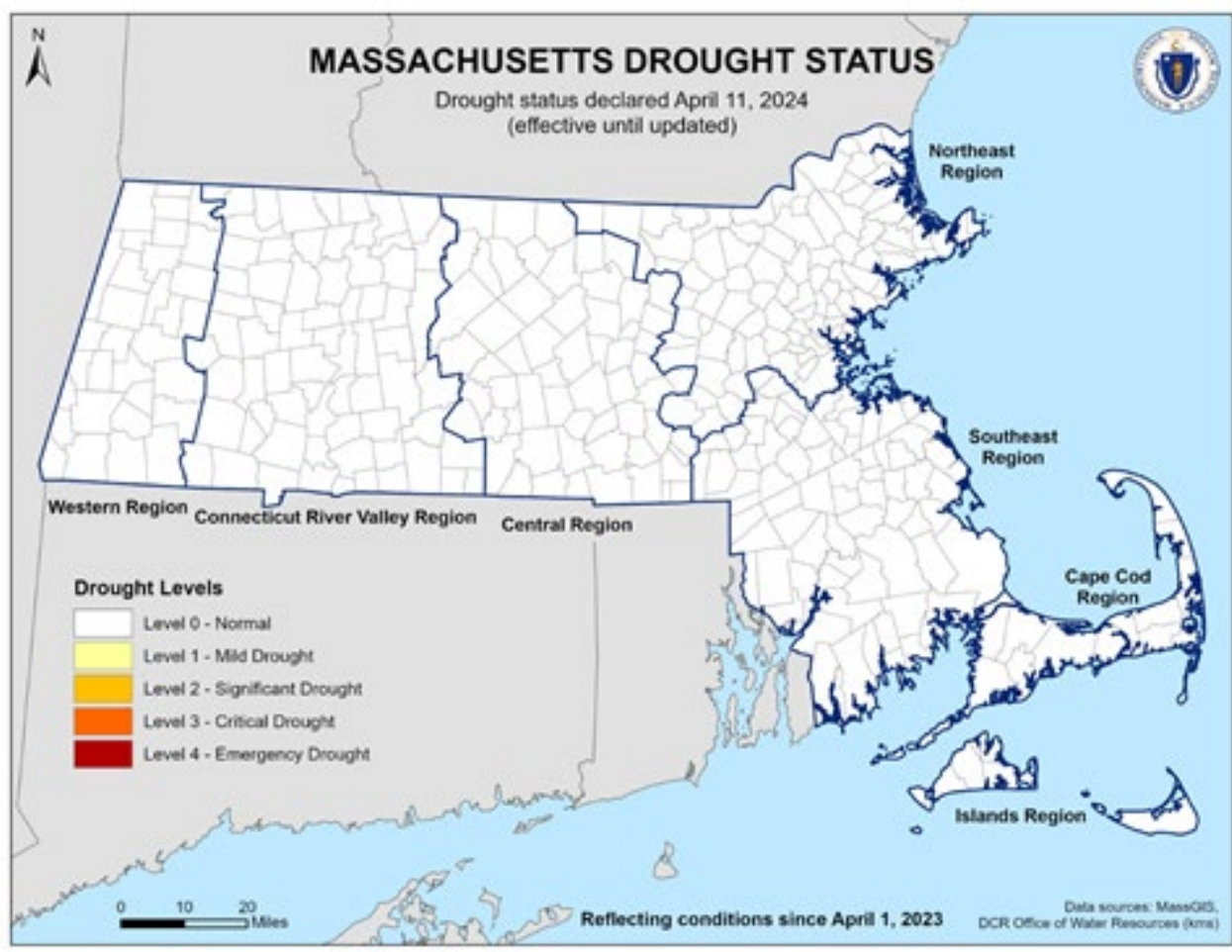
REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	1	100% full
CTRV	2	71st
CENTRAL	3	87th
NORTHEAST	4	70th
SOUTHEAST	1	97th
CAPE COD	1	70th

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

DMP Index Severity Levels			
1	2	3	4



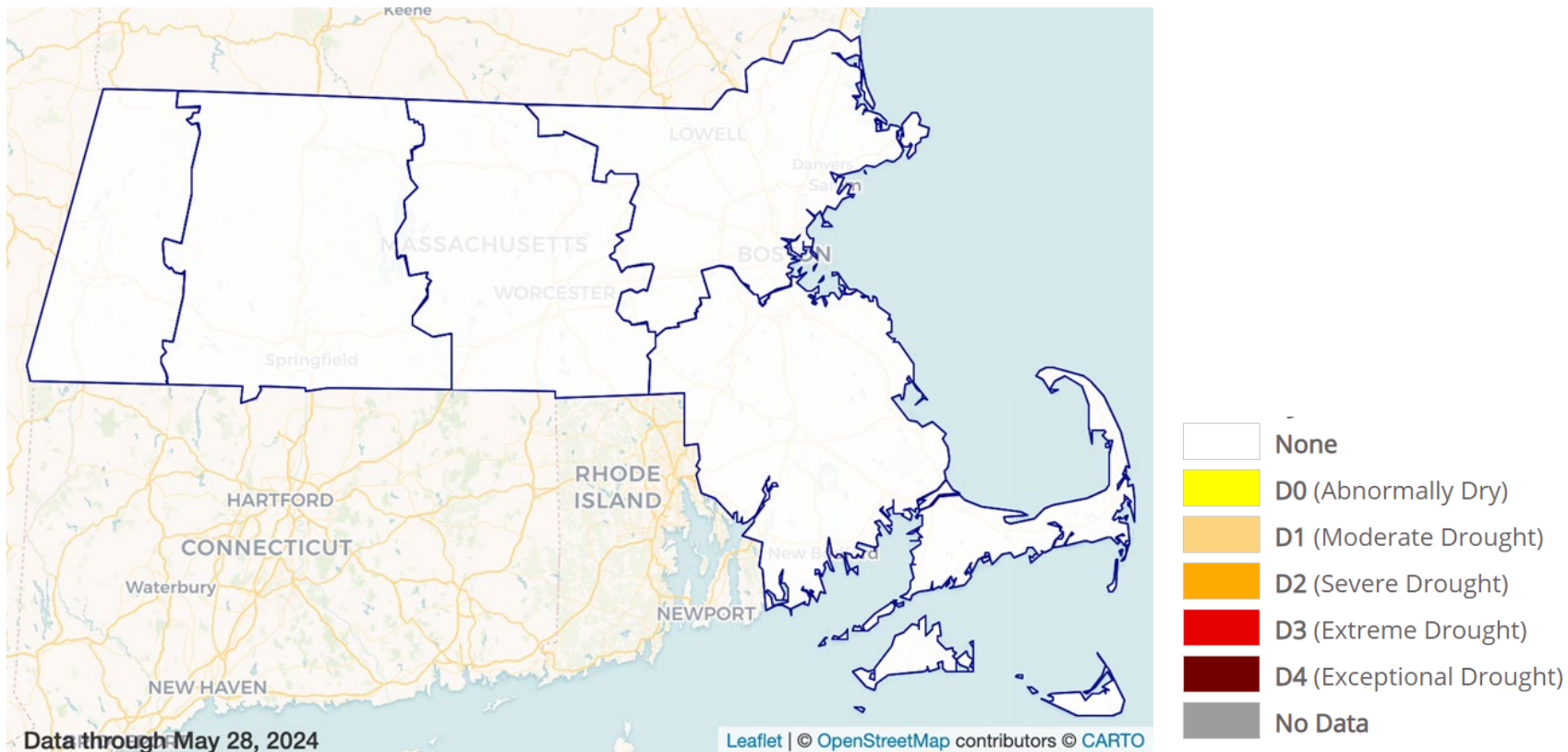
MASSACHUSETTS DROUGHT STATUS



U.S. DROUGHT MONITOR (USDM)

At the end of May, the USDM showed no areas of drought or abnormal dryness.

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

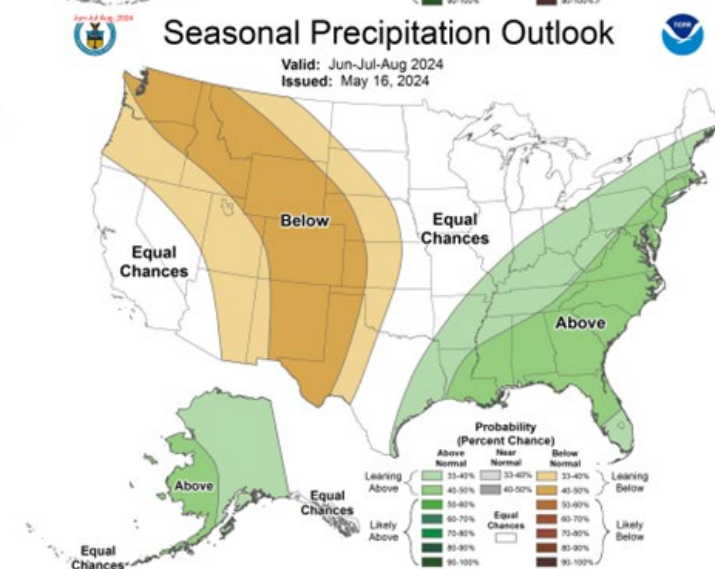
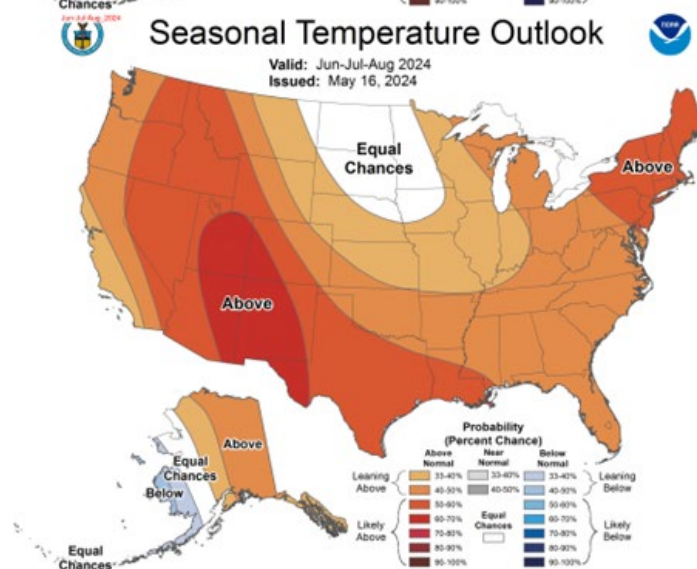
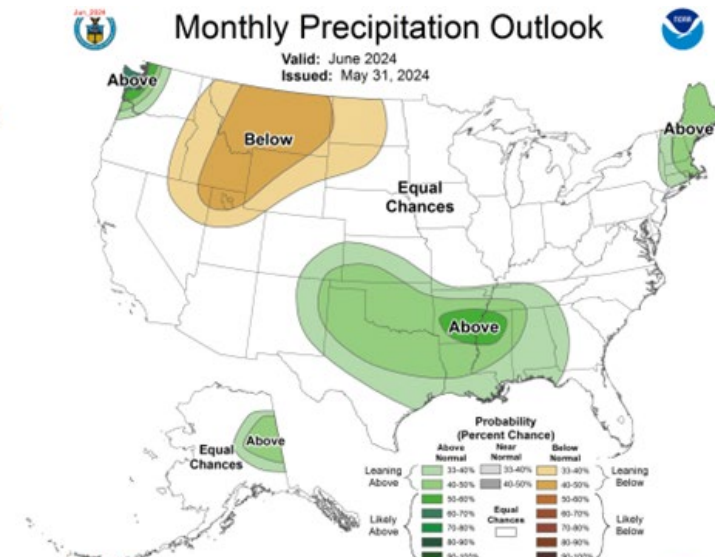
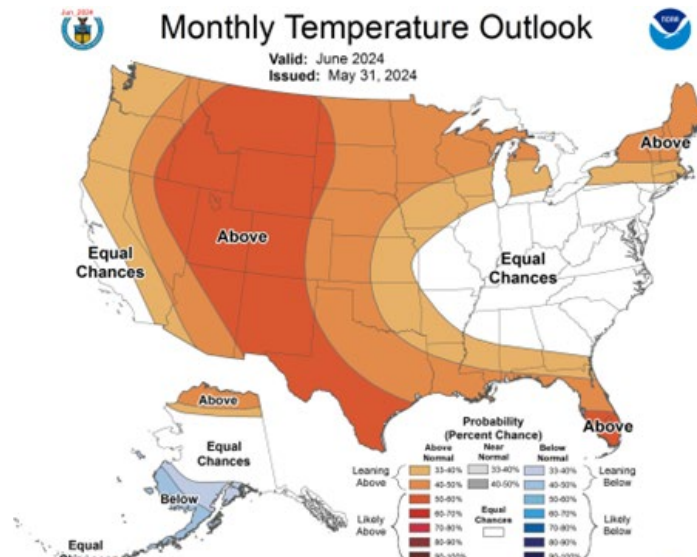


TEMPERATURE AND PRECIPITATION OUTLOOK

June: The outlook issued 5/31 shows a 33-40% chance of above-normal temperatures, a 33-40% chance of above-normal precipitation in the western part of the state, and a 40-50% chance of above normal-precipitation in the eastern part of the state.

June through August: The seasonal outlook issued 5/18 shows a 50-60% chance of above-normal temperatures, a 33-40% chance of above normal precipitation in the western and northern parts of the state, and a 40-50% chance of above normal precipitation in the southern central and southeastern parts of the state.

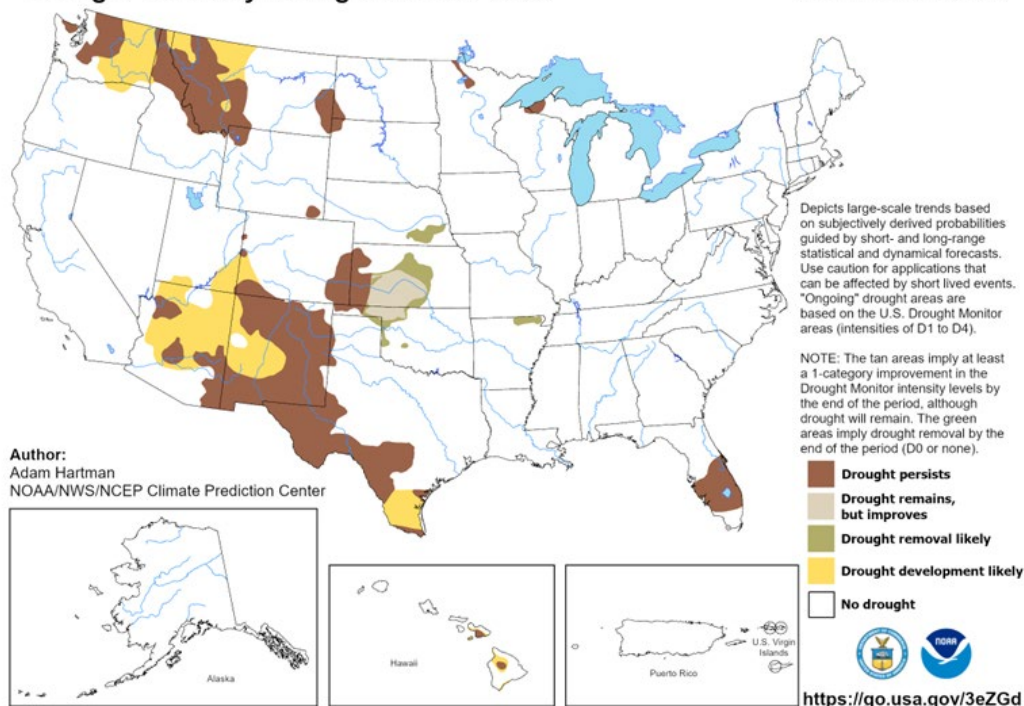
<https://www.cpc.ncep.noaa.gov/>



U.S. Monthly Drought Outlook

Drought Tendency During the Valid Period

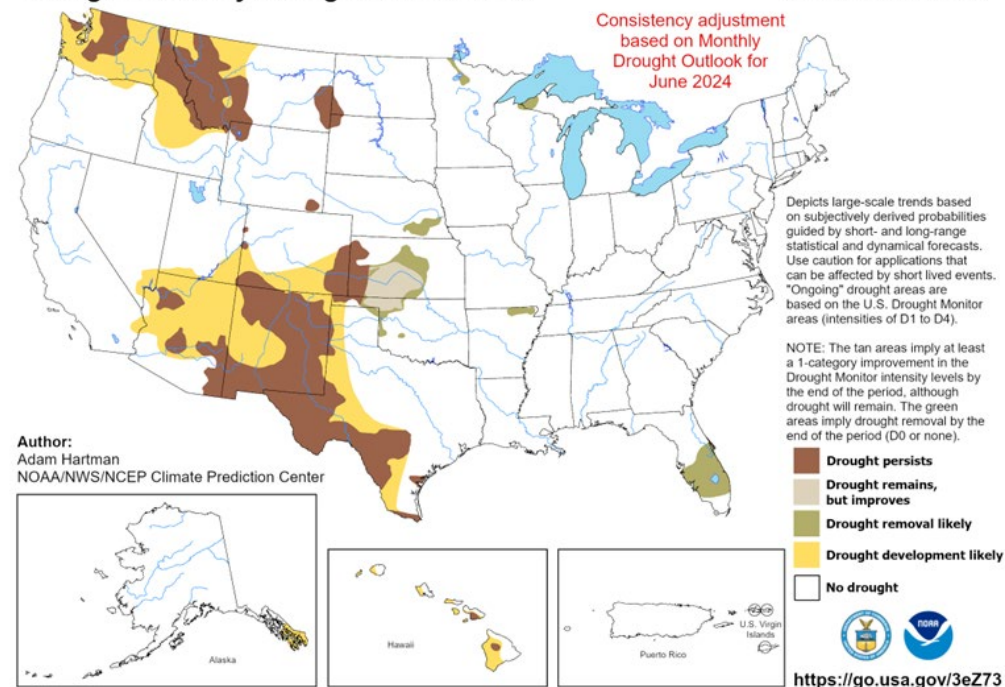
Valid for June 2024
Released May 31, 2024



U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid for June 1 - August 31, 2024
Released May 31, 2024



MONTHLY AND SEASONAL DROUGHT OUTLOOK

The monthly outlook for June released on 5/31 shows no drought development.

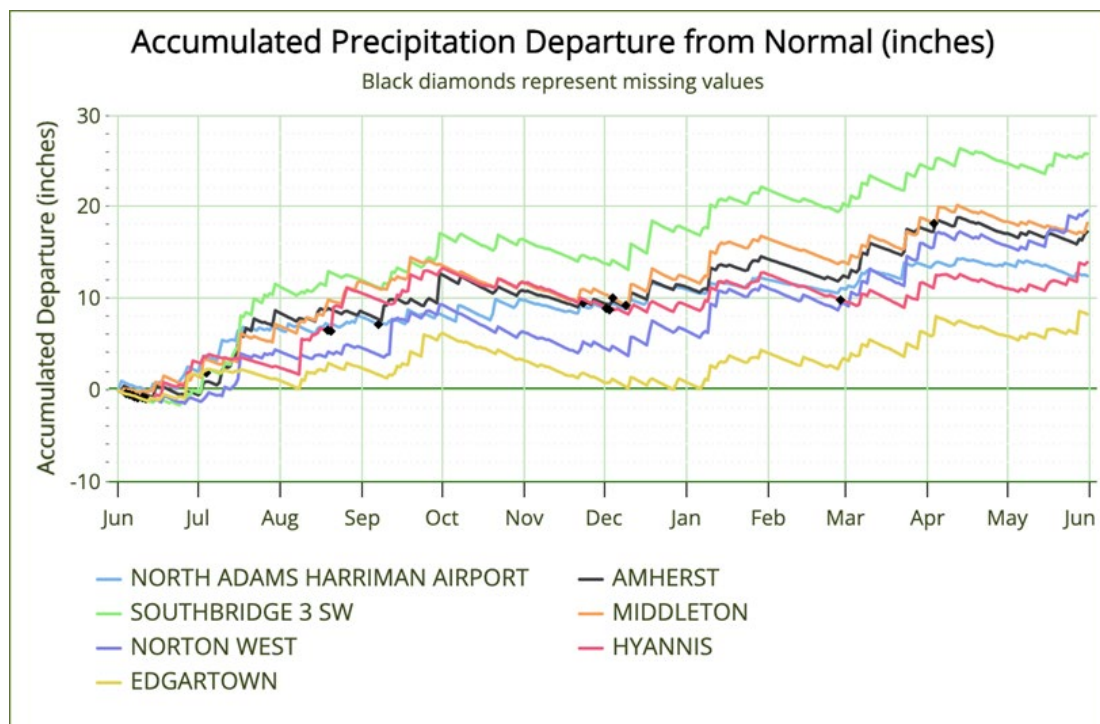
The seasonal outlook for June through August released on 5/31 shows no drought development.

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

ADDITIONAL PRECIPITATION DATA

Standardized Precipitation Index— May 2024 as percentiles

REGION	NUMBER OF SITES	1-mo	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo
WESTERN	4	40	40	91	96	84	97	77	94
CTRV	9	61	65	93	96	94	98	92	97
CENTRAL	14	79	75	95	99	98	100	98	98
NORTHEAST	16	61	62	93	96	91	99	90	94
SOUTHEAST	23	90	85	98	99	97	98	94	94
CAPE COD	5	89	77	88	89	67	85	86	90
ISLANDS	3	88	74	91	92	79	81	52	58



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—May 2024

REGION	NUMBER OF SITES REPORTING	HISTORICAL AVERAGE	MAY AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF NORMAL
WESTERN	4	3.88	3.42	-0.46	88%
CTRV	9	3.80	4.22	0.42	111%
CENTRAL	14	3.81	5.08	1.27	133%
NORTHEAST	16	3.45	3.93	0.48	114%
SOUTHEAST	23	3.60	6.22	2.62	173%
CAPE COD	5	3.63	5.53	1.90	152%
ISLANDS	3	3.72	5.92	2.20	159%



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)

Drought Levels (Section 3.1 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	≤ 30 and > 20					200-400
2	≤ 20 and > 10					400-600
3	≤ 10 and > 2					600-700
4	≤ 2					700-800

- Level 0 Normal
- Level 1 Mild Drought
- Level 2 Significant Drought
- Level 3 Critical Drought
- Level 4 Emergency Drought



Massachusetts Water Resources Commission

Executive Office of Energy and Environmental Affairs

www.mass.gov/conservemawater

www.mass.gov/drought-management