MASSACHUSETTS WATER RESOURCES COMMISSION

HYDROLOGIC CONDITIONS IN MASSACHUSETTS

JULY
2024

The Commonwealth of Massachusetts

Maura T. Healey, Governor

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

JULY 2024 HYDROLOGIC CONDITIONS

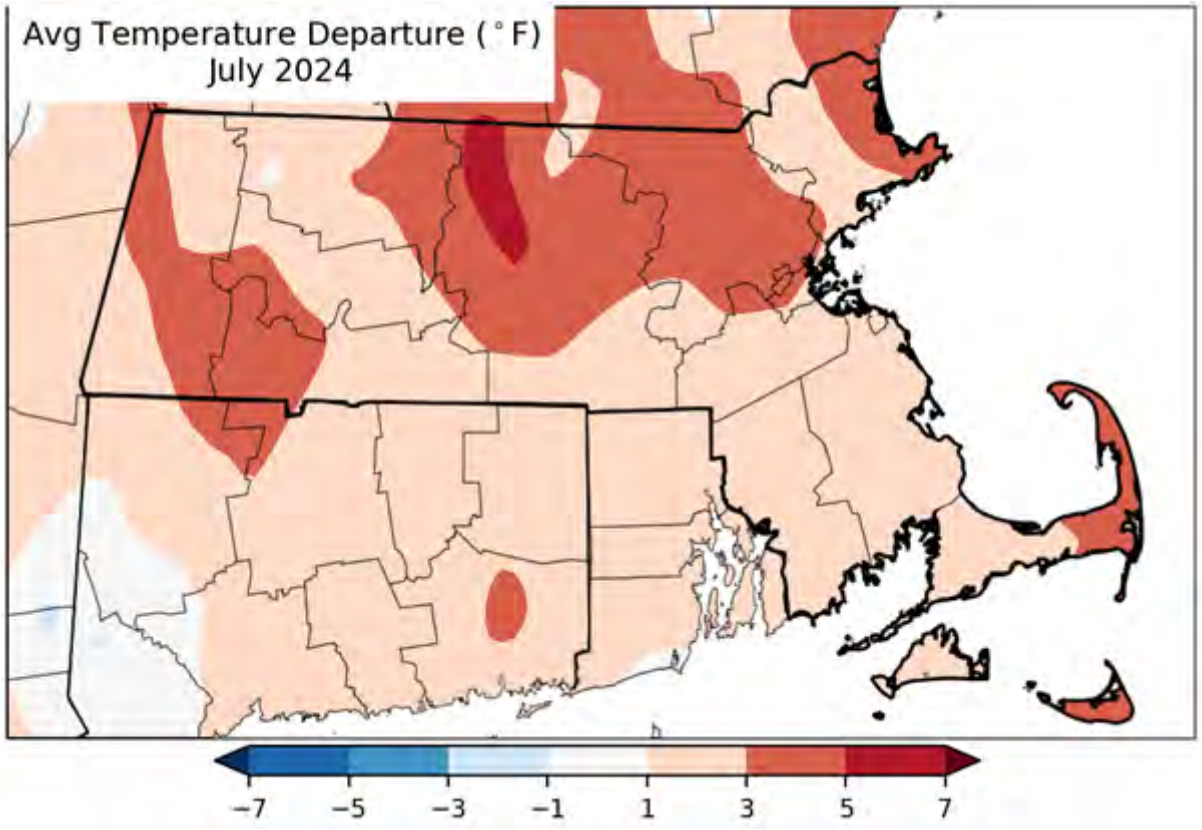
SUMMARY OF CONDITIONS

- Monthly average temperatures were above normal.
- Precipitation was below normal in the Northeast and Southeast Regions and was normal in all other Regions.
- The 2-mos Evaporative Demand Drought Index was at elevated Index Severity Levels (ISLs) in most Regions: The CTRV, Central, Northeast, and Cape Cod Regions are at ISL 1, and the Western and Islands Region at ISL 2. The Southeast Region is normal.
- The Keetch-Byram Drought Index was elevated in all Regions.
- Streamflow regional medians were in the normal range. Several gages were below normal including the Parker River gage, whose median was at the 8th percentile.
- Groundwater regional medians were in the normal range. Several wells are below normal throughout the state but especially in the Northeast Region.
- Lake and impoundment regional medians were in the normal range.
- NOAA's July outlook shows chances likely for above-normal temperatures and chances leaning for 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.

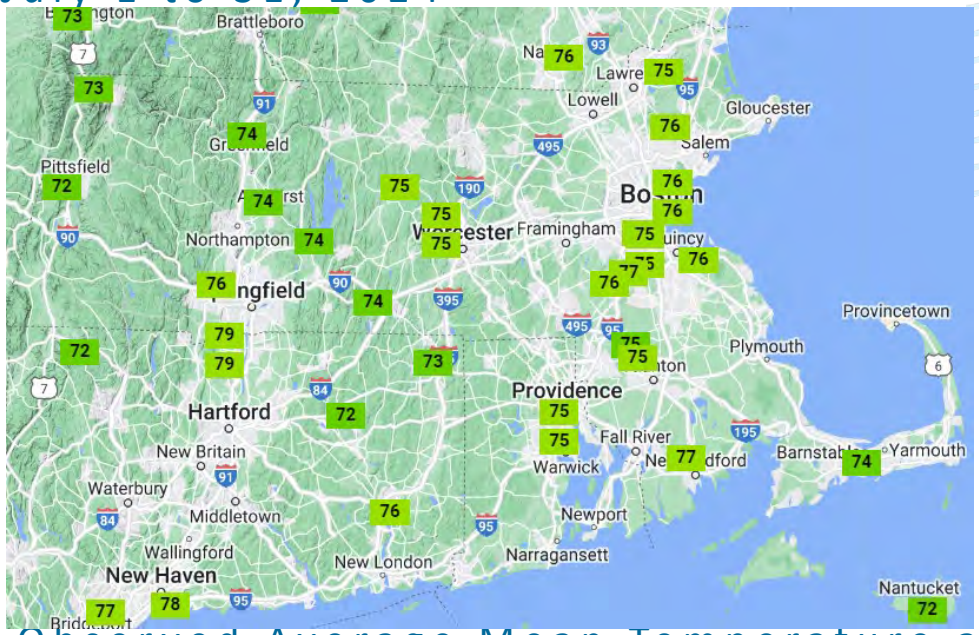
This report was prepared by the Massachusetts Department of Conservation and Recreation. Data may be preliminary. Analysis reflects automated calculations done 08/06/2024. Additional information, previous reports, and the Massachusetts Drought Dashboard with weekly updates to the drought indices can 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 9th warmest July on record, and the Worcester climate site had its 2nd warmest July on record.

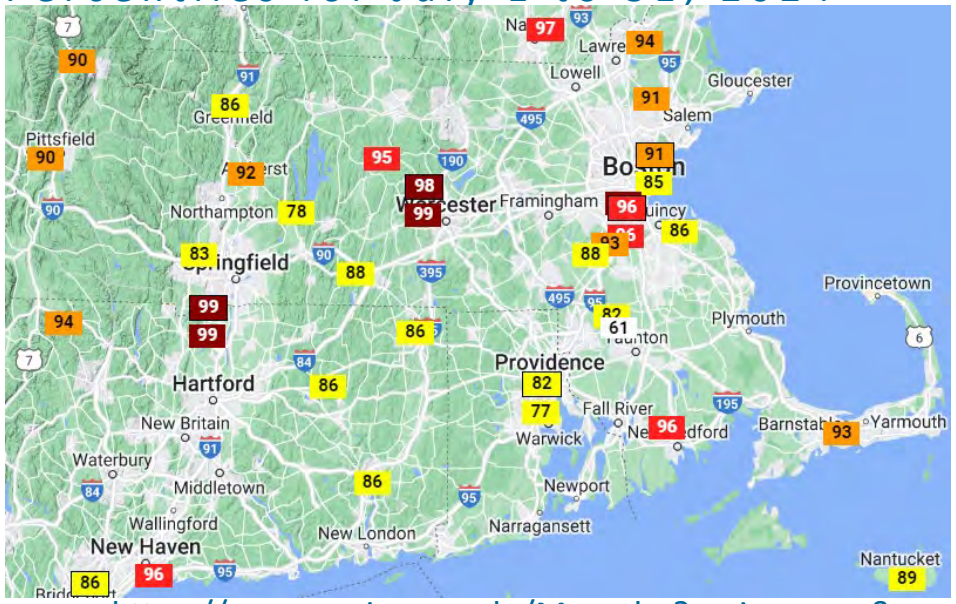
http://www.nrcc.cornell.edu/regional/monthly/monthly.html



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



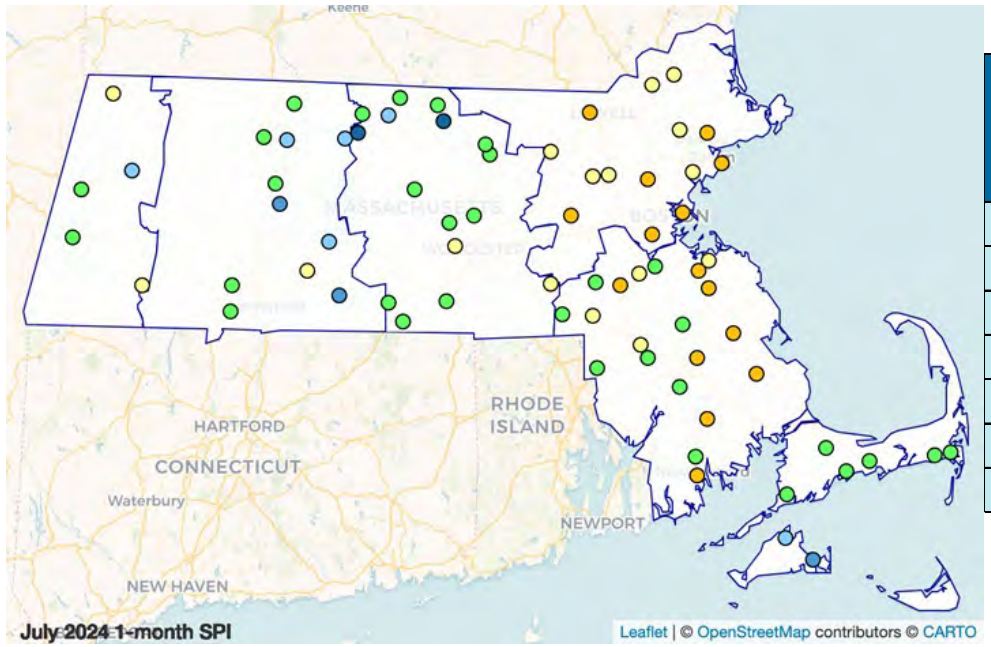
Observed Average Mean Temperature as Percentiles for July 1 to 31, 2024



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

STANDARDIZED PRECIPITATION INDEX (SPI) AS A PERCENTILE

July regional precipitation was below normal in the Northeast and Southeast Regions and was normal in all other Regions. The Northeast Region is at ISL 1 for the 1-mos to 3-mos lookback periods, and the Southeast Region is at ISL for only the 1-mos lookback.



≥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	JULY MONTHLY AVERAGE (IN)	DEPARTURE FROM HISTORICAL (IN)	SPI PERCENTILE 1-MONTH	SPI PERCENTILE 3-MONTH	SPI PERCENTILE 6-MONTH
WESTERN	5	4.47	-0.07	63	37	54
CTRV	11	5.00	0.76	70	61	77
CENTRAL	16	4.31	0.23	54	59	79
NORTHEAST	14	1.84	-1.67	22	29	52
SOUTHEAST	20	2.16	-1.41	26	67	85
CAPE COD	6	2.61	-0.25	52	60	63
ISLANDS	2	3.89	1.11	78	78	87

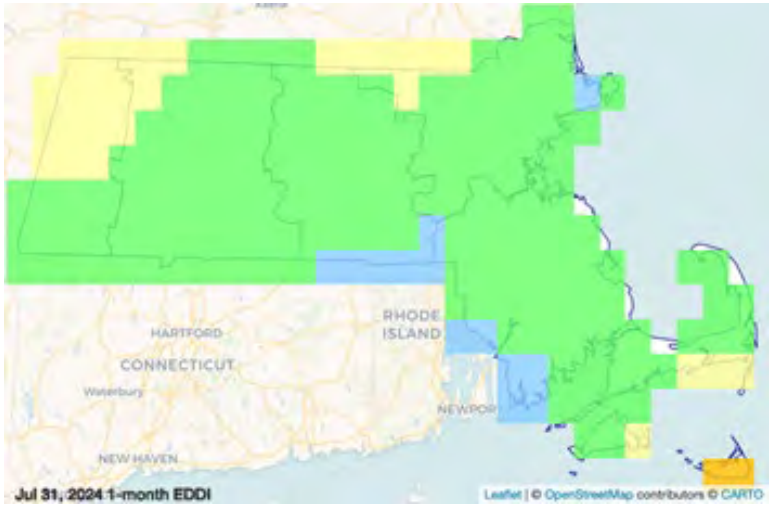
SPI is the Standardized Precipitation Index used in the Drought Management Plan (DMP) expressed here as a percentile and represents the variation from long-term precipitation.

DMP Index Severity Levels			
1	2	3	4

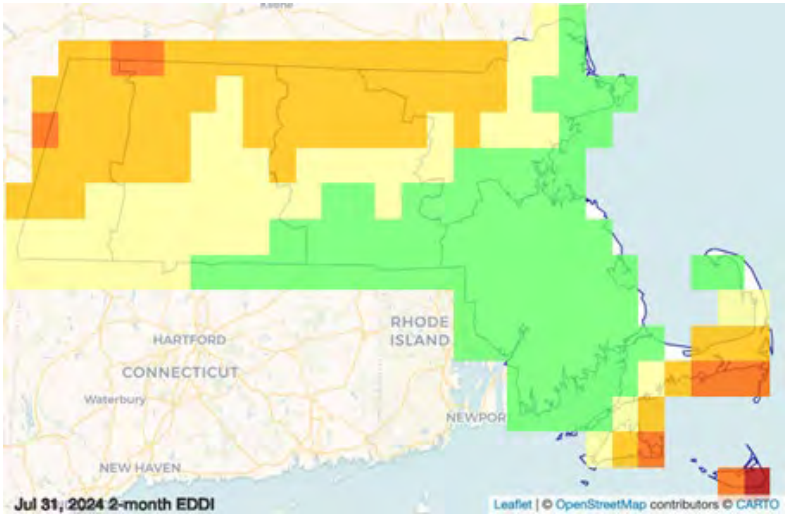
EVAPORATIVE DEMAND DROUGHT INDEX (EDDI)

As of July 31, 2024, the 1-month EDDI percentiles were normal in all Regions. The 2-month EDDI percentiles, which are used in the MA Drought Plan monitoring, are at elevated ISLs in most Regions: The CTRV, Central, Northeast, and Cape Cod Regions are at ISL 1, and the Western and Islands Region are at ISL 2. The Southeast Region is normal.

1-month EDDI



2-month EDDI

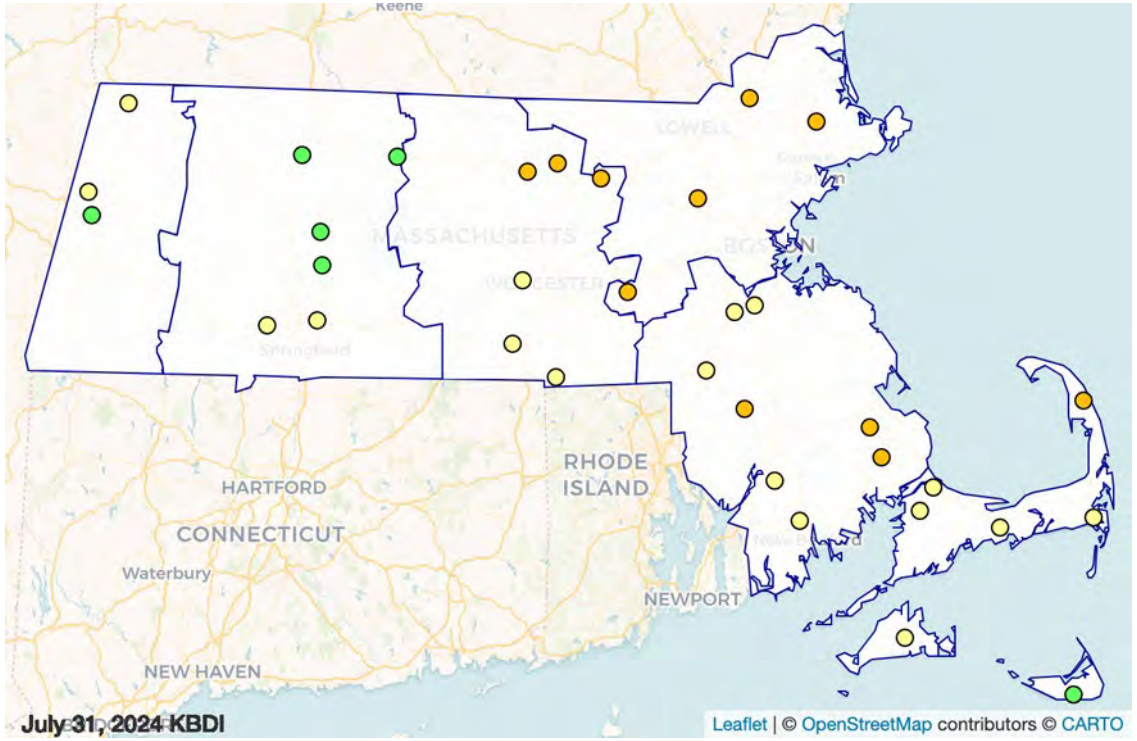


≥0 to ≤2	>2 to ≤10	>10 to ≤20	>20 to ≤30	>30 to ≤70
>70 to ≤80	>80 to ≤90	>90 to ≤98	>98 to ≤100	

REGION	MEDIAN 2-MONTH EDDI (2024-07-31)
WESTERN	16
CTRV	21
CENTRAL	23
NORTHEAST	30
SOUTHEAST	47
CAPE COD	23
ISLANDS	16

DMP Index Severity Levels			
1	2	3	4

At the end of July, the Keetch Byram Drought Index (KBDI) was at ISL 1 in the Western, CTRV, and Islands Regions and was at ISL 2 in the Central, Northeast, Southeast, and Cape Cod Regions.



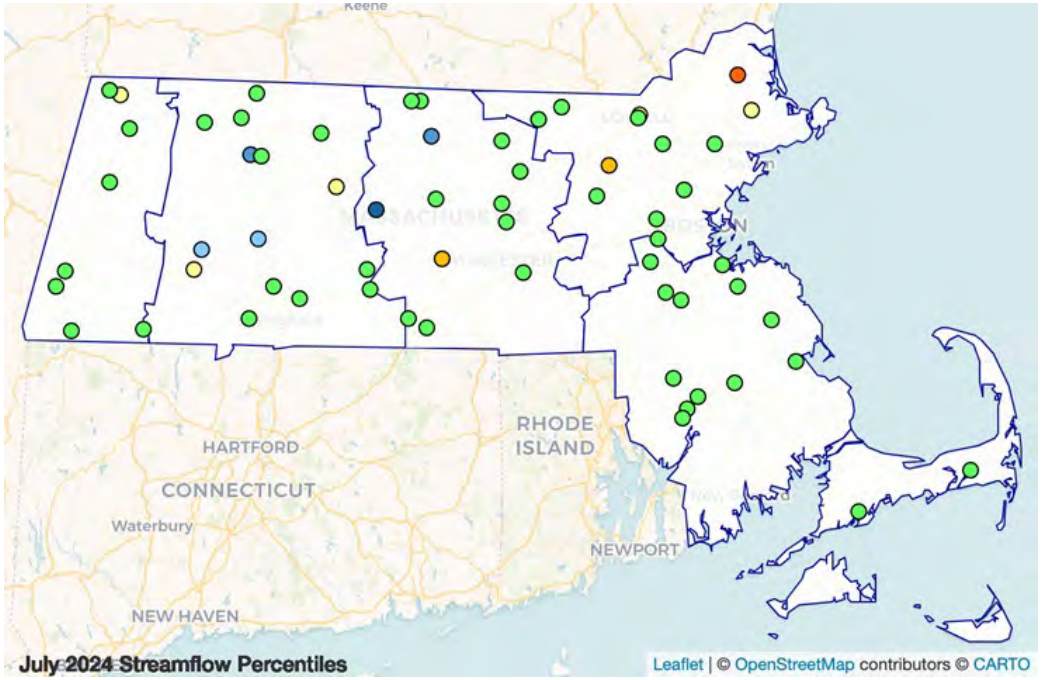
REGION	NUMBER OF SITES REPORTING	HIGHEST OF SITE VALUES
WESTERN	3	358
CTRV	6	309
CENTRAL	6	514
NORTHEAST	4	540
SOUTHEAST	8	472
CAPE COD	5	410
ISLANDS	2	220

DMP Index Severity Levels			
1	2	3	4

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

July streamflow ranged from much below normal to much above normal. Regional medians are all in the normal range, and all Regions are at ISL 0. The Western Region is at the low-end of normal with six individual gages in the 25-30th percentile range. The monthly median of Parker River gage in the Northeast Region is at the 8th percentile.

MEDIAN MONTHLY STREAMFLOW PERCENTILES COMPARED TO HISTORICAL VALUES



≥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 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	0	1	0	34
CTRV	15	0	0	0	3	0	47
CENTRAL	13	0	0	1	0	1	51
NORTHEAST	13	0	1	1	2	0	49
SOUTHEAST	12	0	0	0	0	0	57
CAPE COD	2	0	0	0	0	0	52

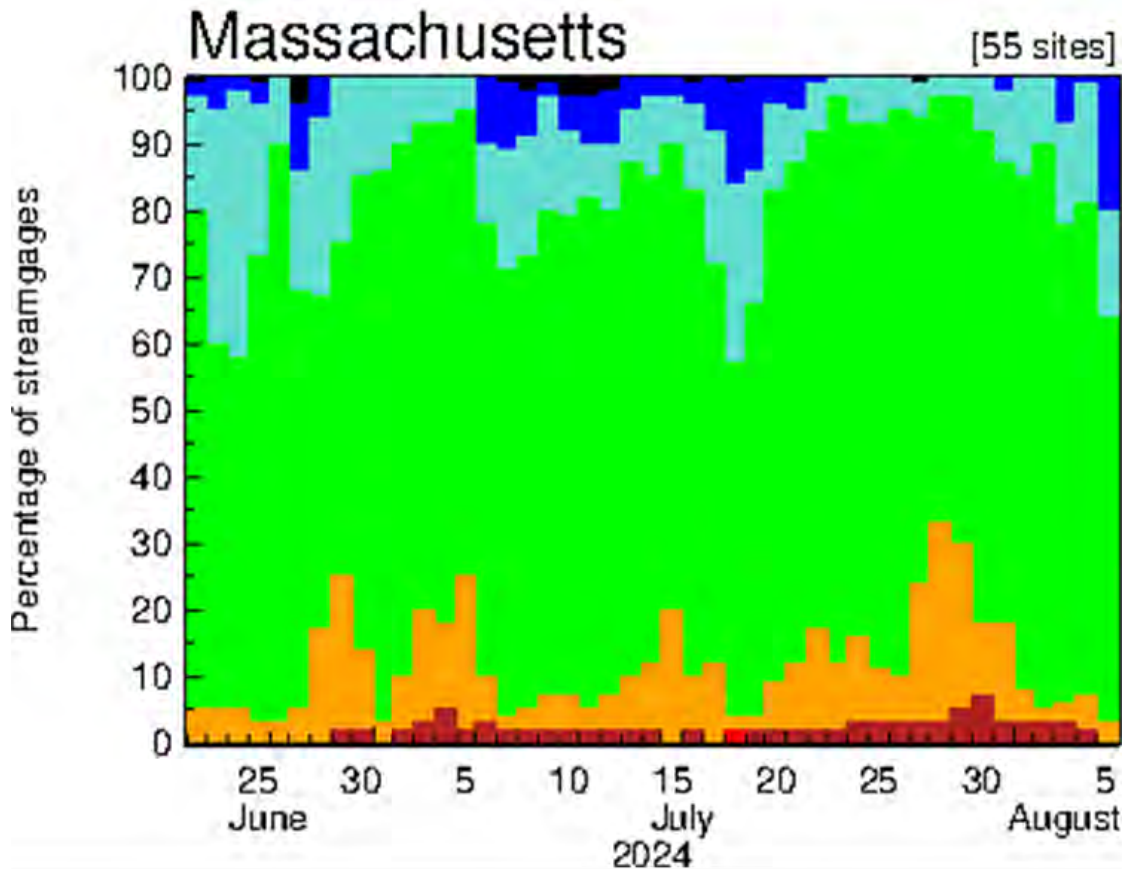
Note: Not all gages report in all months due to ice, beaver dams or other conditions. Streamflow index is not applicable to the Islands.

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 Albany NWS E-5 Monthly Report of Hydrologic Conditions did not indicate river flooding at forecast points in Massachusetts during July nor were there any warnings issued for forecast points. The Norton/Boston NWS E-5 Monthly Reports of Hydrologic Conditions for July has not been received as of the writing of this report.

A search of the Iowa Mesonet database for NWS flood warnings and local storm reports did not yield any flood warnings or flooding storm reports in Massachusetts.

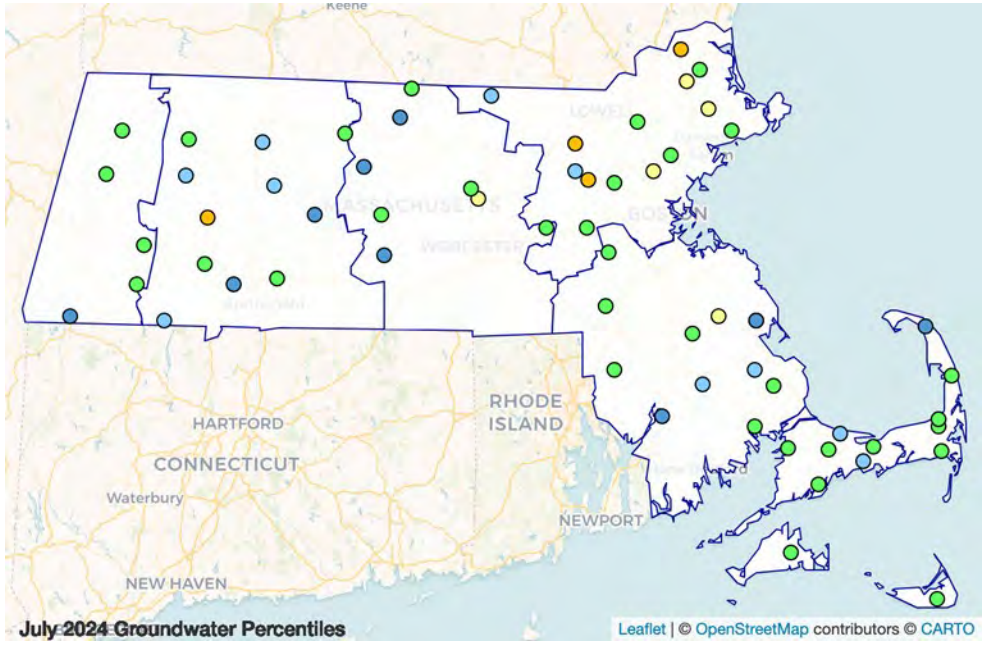
Image: Courtesy of NASA/JPL-Caltech

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

For real-time flood forecasts refer to the Northeast River Forecast Center https://www.weather.gov/nerfc/

July groundwater levels ranged from below normal to much above normal. Regional medians were all in the normal range.

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	NUMBER OF WELLS BELOW NORMAL ≥0 TO ≤30 PERCENTILE	NUMBER OF WELLS NORMAL >30 TO ≤70 PERCENTILE	NUMBER OF WELLS ABOVE NORMAL >70 TO ≤100 PERCENTILE	MEDIAN OF INDIVIDUAL WELL PERCENTILES
WESTERN	5	0	4	1	57
CTRV	11	1	4	6	71
CENTRAL	8	1	4	3	50
NORTHEAST	14	6	6	2	43
SOUTHEAST	12	1	7	4	62
CAPE COD	11	0	8	3	64
ISLANDS	2	0	2	0	49

DMP Index Severity Levels			
1	2	3	4

At the end of July, reported lake and impoundment levels were above their 30th percentile and/or were at or near 100% full except for two systems in the Northeast Region.

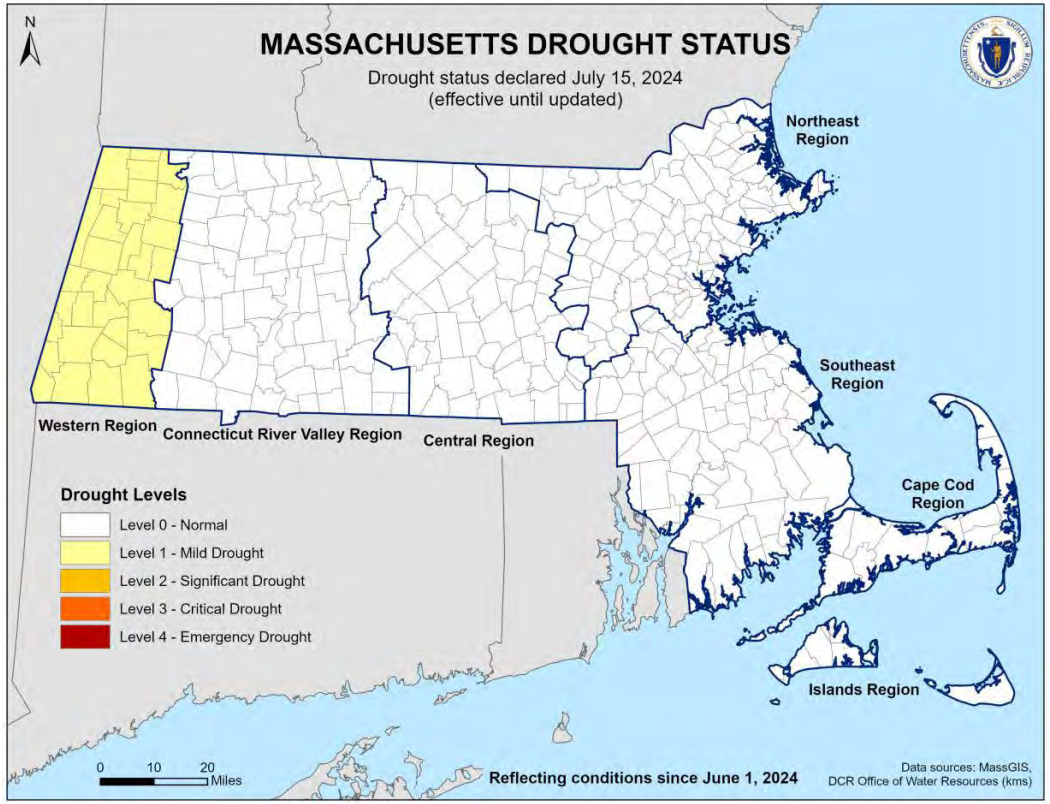
REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	2	56th
CTRV	2	45th
CENTRAL	3	50th
NORTHEAST	4	34th
SOUTHEAST	1	65th
CAPE COD	1	57th

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

DMP Index Severity Levels

1	2	3	4

MASSACHUSETTS DROUGHT STATUS

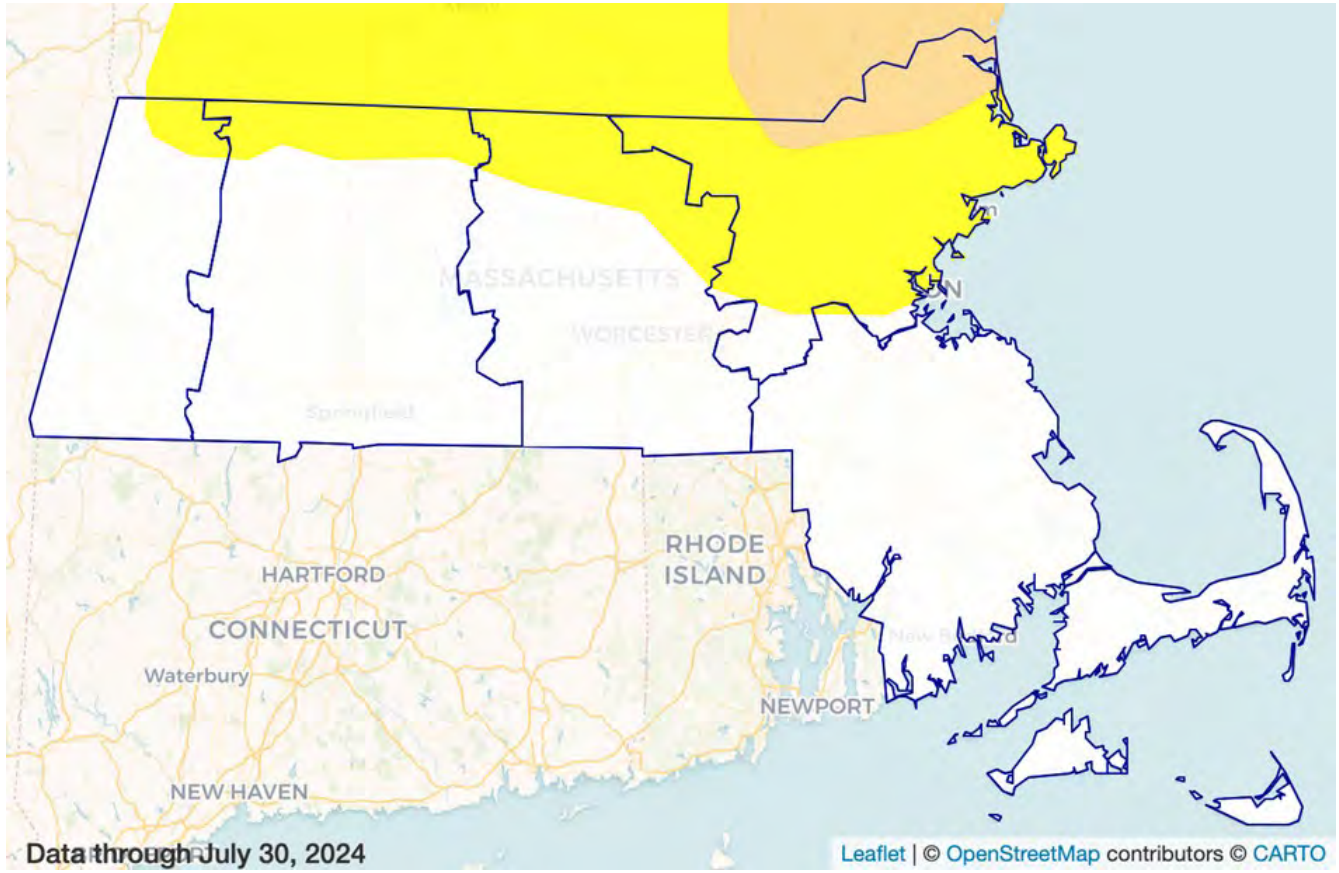


On July 15, 2024, Massachusetts Energy and Environmental Affairs (EEA) Secretary Rebecca L. Tepper declared that starting from June 1, 2024, the Western Region is at Level 1 -Mild Drought Conditions. All other Regions remain at Level 0. This status remains in effect until further updated.

U.S. DROUGHT MONITOR (USDM)

At the end of July, the USDM showed areas of abnormal dryness in the Western, CTRV, Central, and Northeast Regions and Moderate Drought in the Northeast Region.

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

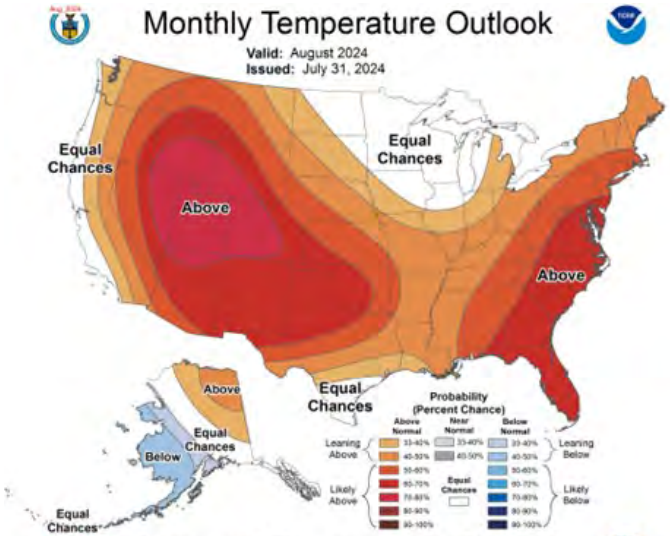


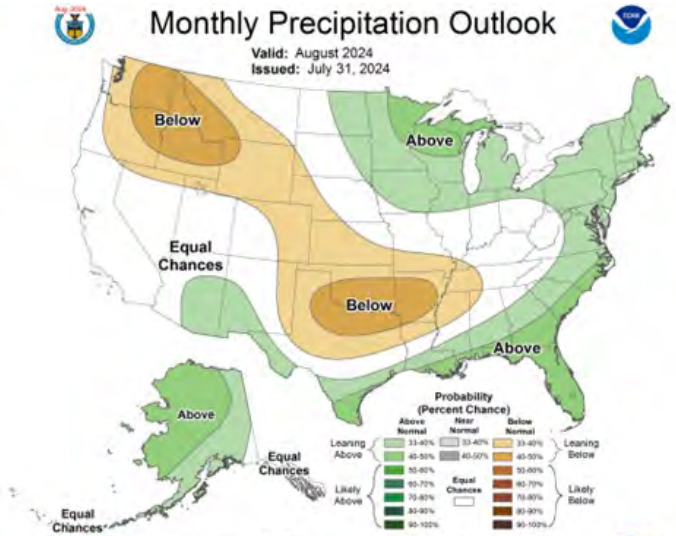
None
D0 (Abnormally Dry)
D1 (Moderate Drought)
D2 (Severe Drought)
D3 (Extreme Drought)
D4 (Exceptional Drought)
No Data

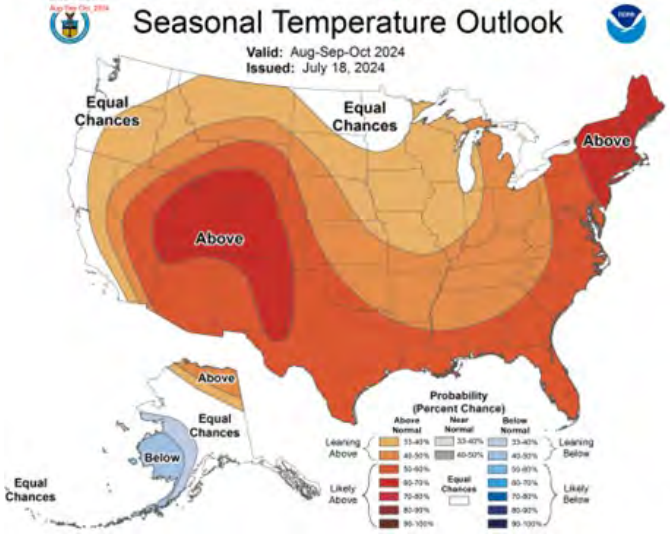
TEMPERATURE AND PRECIPITATION OUTLOOK

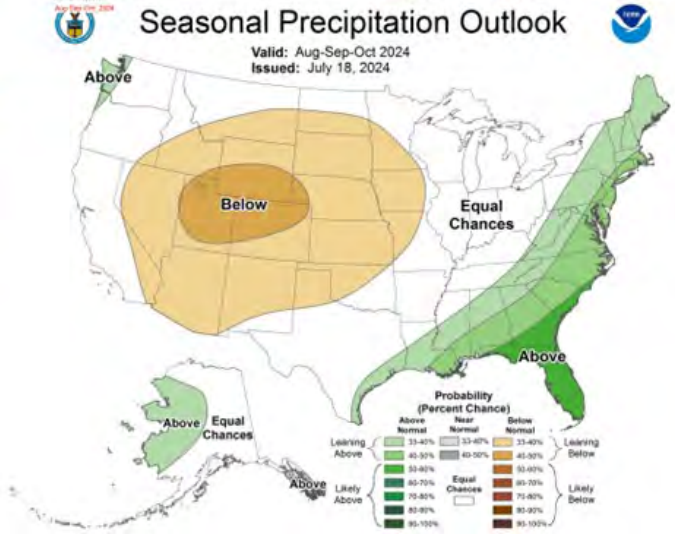
August: The outlook issued 7/31 shows a 50-60% chance of above-normal temperatures and a 33-40% chance of above-normal precipitation.

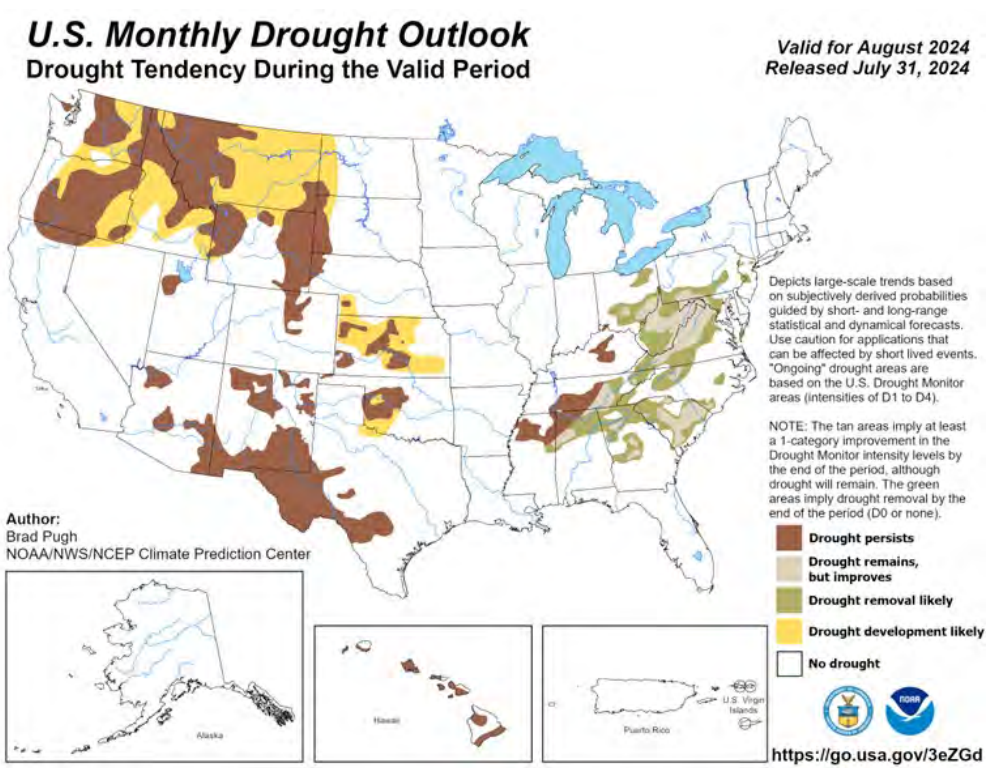
August through October: The seasonal outlook issued 7/18 shows a 60-70% chance of above-normal temperatures, a 33-40% chance of above-normal precipitation in the western, central and northeast parts of the state, and a 40-50% chance of above-normal precipitation in the rest of the state.
https://www.cpc.ncep.noaa.gov/

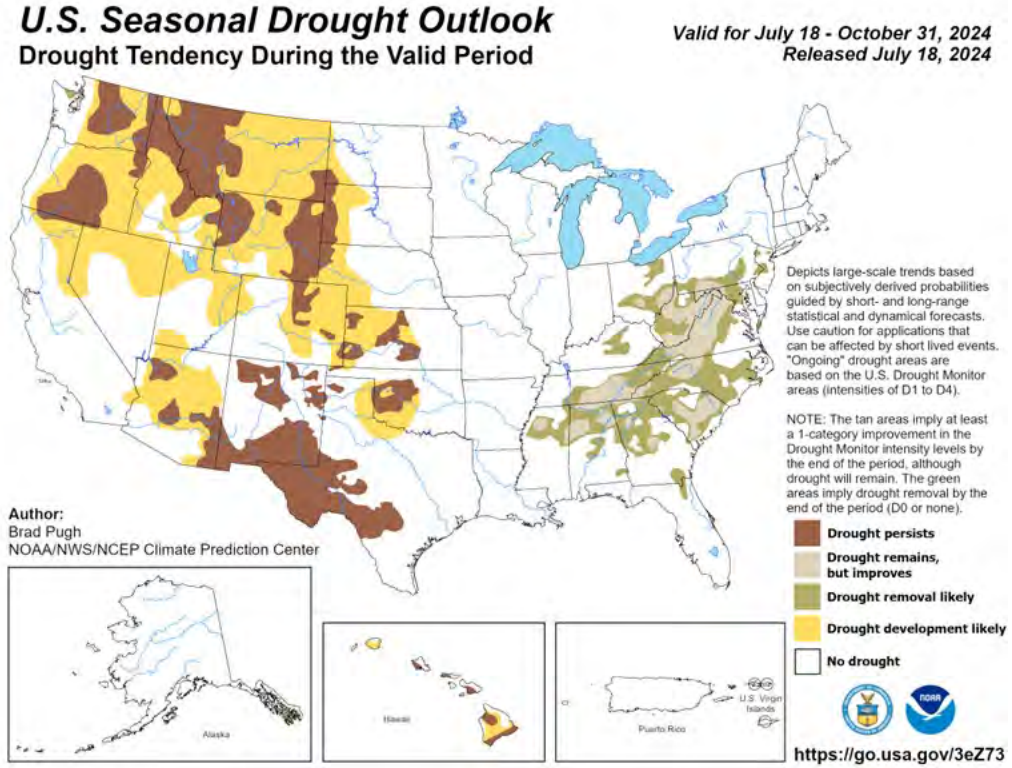












MONTHLY AND SEASONAL DROUGHT OUTLOOK

The monthly outlook for August released on 7/31 shows no drought development.

The seasonal outlook for mid-July through October released on 7/18 shows no drought development.

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

APPENDIX I

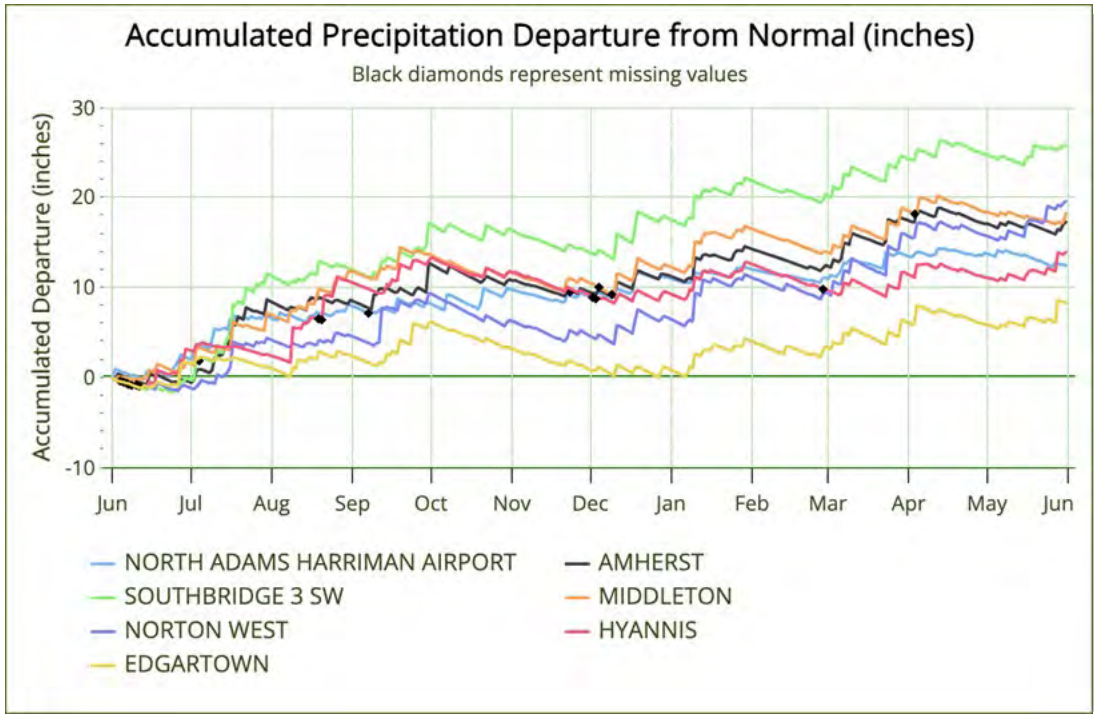
ADDITIONAL PRECIPITATION DATA

Standardized Precipitation Index—July 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	63	45	37	54	75	76	83	85
CTRV	11	70	64	61	77	87	91	95	85
CENTRAL	16	54	50	59	79	91	95	98	96
NORTHEAST	14	22	21	29	52	78	91	90	83
SOUTHEAST	20	26	37	67	85	91	93	94	87
CAPE COD	6	52	41	60	63	66	69	73	91
ISLANDS	2	78	59	78	87	86	89	78	60

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—July 2024

REGION	NUMBER OF SITES REPORTING	HISTORICAL AVERAGE	JULY AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF NORMAL
WESTERN	5	4.54	4.47	-0.07	98%
CTRV	11	4.24	5.00	0.76	118%
CENTRAL	16	4.08	4.31	0.23	106%
NORTHEAST	14	3.51	1.84	-1.67	52%
SOUTHEAST	20	3.57	2.16	-1.41	61%
CAPE COD	6	2.86	2.61	-0.25	91%
ISLANDS	2	2.78	3.89	1.11	140%

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.

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	≤ 30 and > 20					200-400
2	≤ 20 and > 10					400-600
3	≤ 10 and > 2					600-700
4	≤ 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

Massachusetts Water Resources Commission

Executive Office of Energy and Environmental Affairs

www.mass.gov/conservemawater

www.mass.gov/drought-management