MASSACHUSETTS WATER RESOURCES COMMISSION

HYDROLOGIC CONDITIONS IN MASSACHUSETTS

JUNE
2024

The Commonwealth of Massachusetts

Maura T. Healey, Governor

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

JUNE 2024 HYDROLOGIC CONDITIONS

SUMMARY OF CONDITIONS

- Monthly average temperatures were above normal.

- Precipitation was below normal in the Western Region and normal in the remaining Regions. The Western Region is at Index Severity Level (ISL) 1 for the 1-mos to 3-mos lookback periods.

- The 2-mos Evaporative Demand Drought Index was at ISL 1 in the Western, CTRV, and Cape Cod Regions and at ISL 2 in the Islands Region. The Central, Northeast, and Southeast Regions were normal.

- The Keetch-Byram Drought Index was elevated in all Regions except the Southeast and Island at the end of June.

- Streamflow regional medians ranged from below normal to above normal. The Western Region is at ISL 1.

- Groundwater regional medians were all in the normal range.

- Lake and impoundment levels were above their 30th percentile and/or were at or near 100% full except for one system in the Western Region. As a result that region is at ISL 2.

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

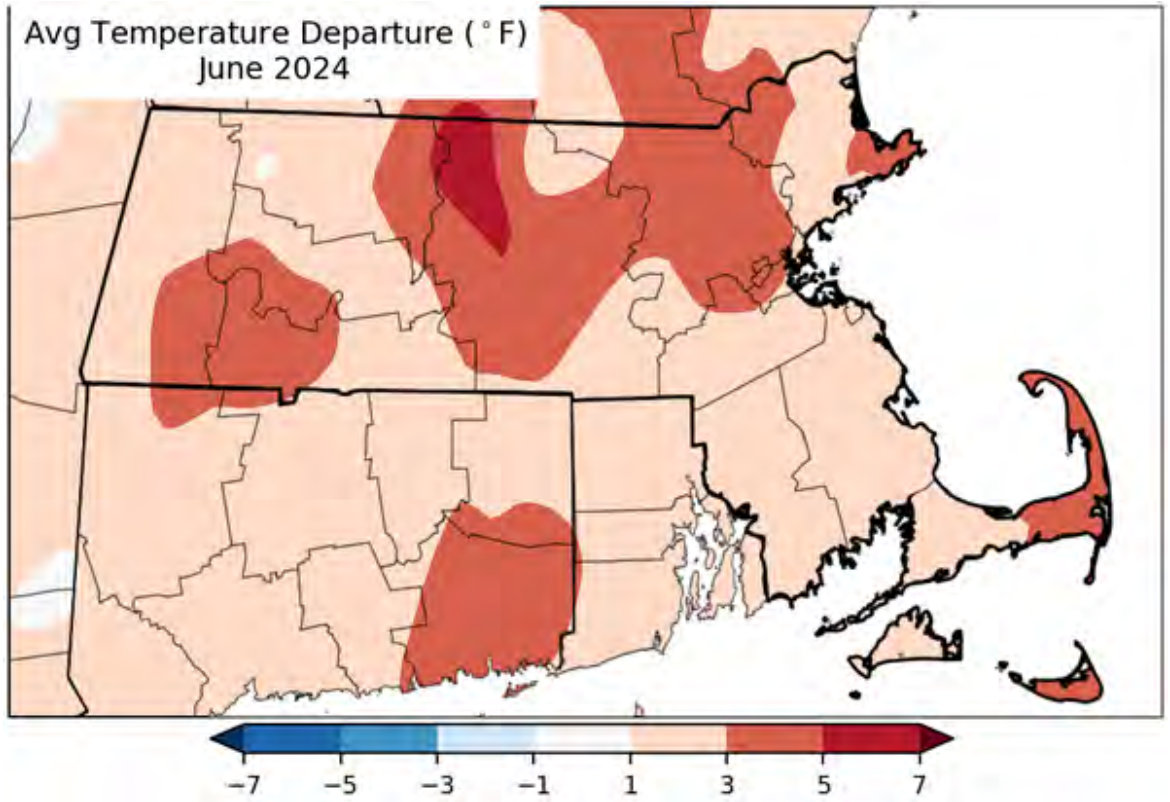
- NOAA's 3-month outlook shows chances likely for above-normal temperatures and chances leaning for above-normal precipitation.

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

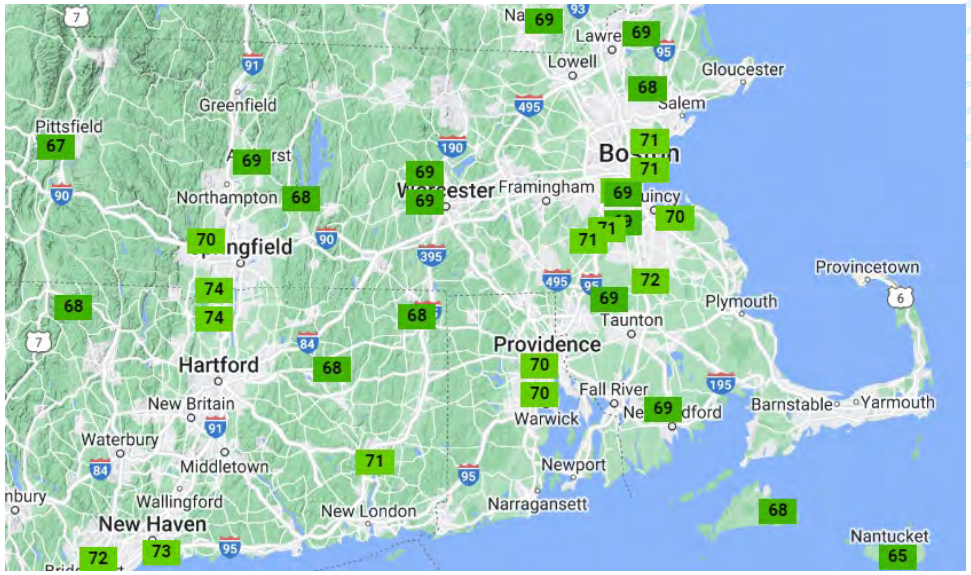
This report was prepared by the Massachusetts Department of Conservation and Recreation. Data may be preliminary. Analysis reflects automated calculations done 07/09/2024. Additional information, previous reports, and the Massachusetts Drought Dashboard with weekly updates to the drought indices can 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 second warmest June on record.

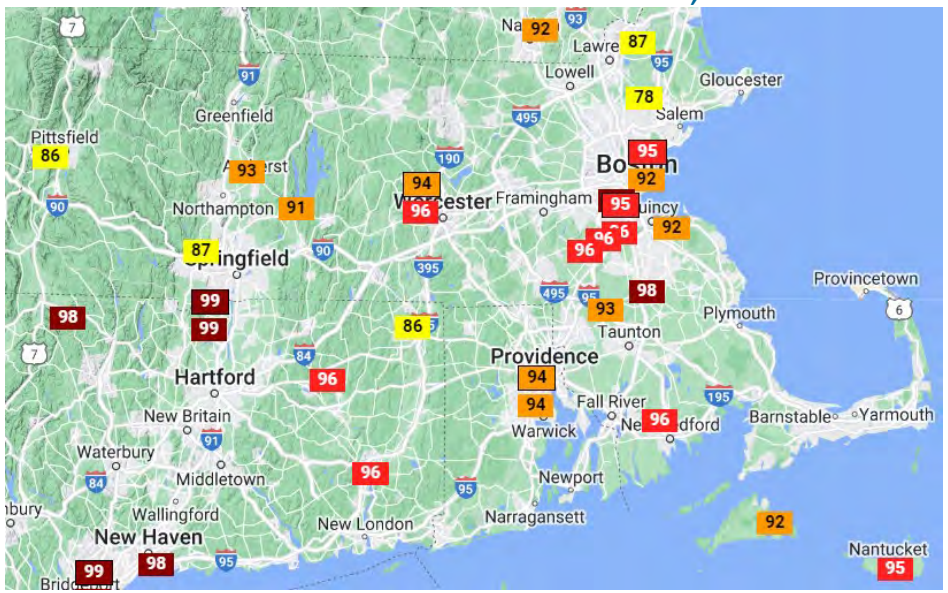
http://www.nrcc.cornell.edu/regional/monthly/monthly.html



Observed Average Mean Temperature, °F June 1 to 30, 2024



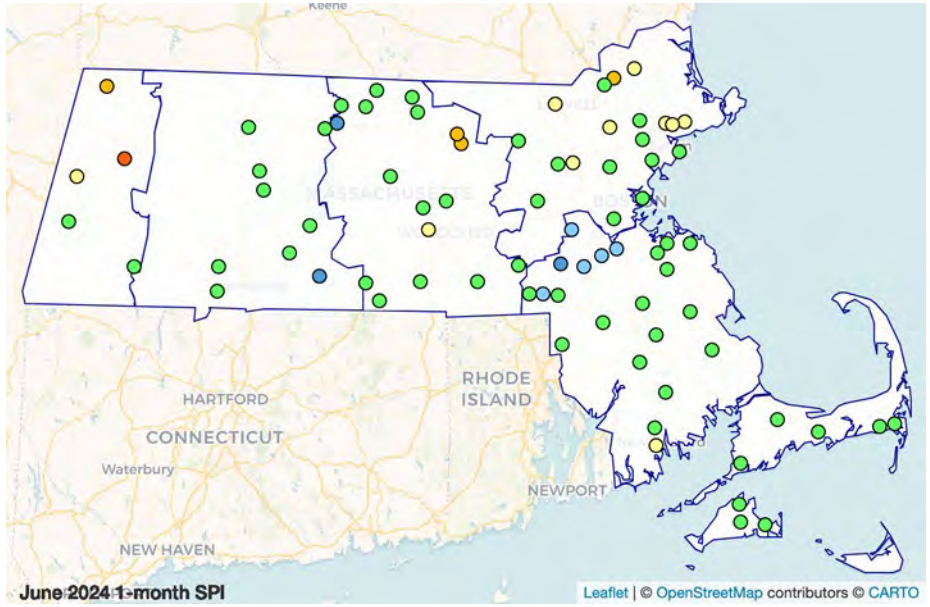
Observed Average Mean Temperature as Percentiles for June 1 to 30, 2024



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

STANDARDIZED PRECIPITATION INDEX (SPI) AS A PERCENTILE

June regional precipitation was below normal in the Western Region and normal in all other Regions. The Northeast Region was at the low end of normal. The Western Region is at ISL 1 for the 1-mos to 3-mos lookback 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	JUNE MONTHLY AVERAGE (IN)	DEPARTURE FROM HISTORICAL (IN)	SPI PERCENTILE 1-MONTH	SPI PERCENTILE 3-MONTH	SPI PERCENTILE 6-MONTH
WESTERN	5	3.61	-0.80	28	25	69
CTRV	9	4.44	0.40	59	61	92
CENTRAL	17	3.58	-0.38	48	69	92
NORTHEAST	19	2.53	-1.03	33	49	87
SOUTHEAST	22	3.74	-0.03	55	80	97
CAPE COD	5	2.23	-0.99	40	57	85
ISLANDS	3	2.46	-0.75	47	63	91

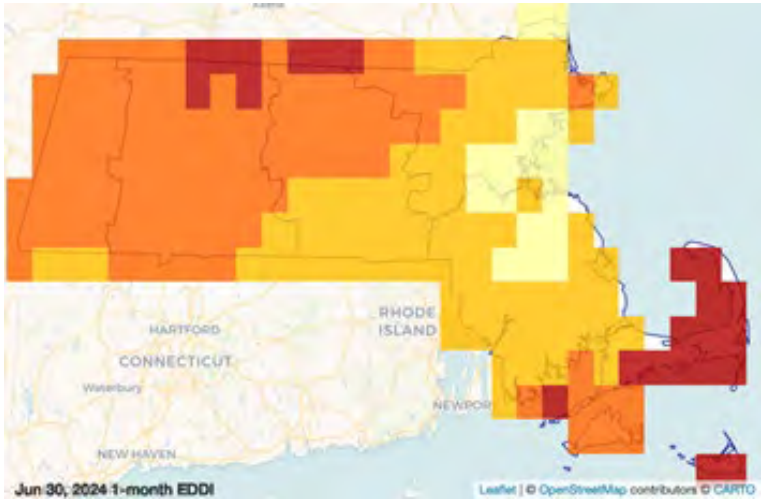
SPI is the Standardized Precipitation Index used in the Drought Management Plan (DMP) expressed here as a percentile and represents the variation from long-term precipitation.

DMP Index Severity Levels			
1	2	3	4

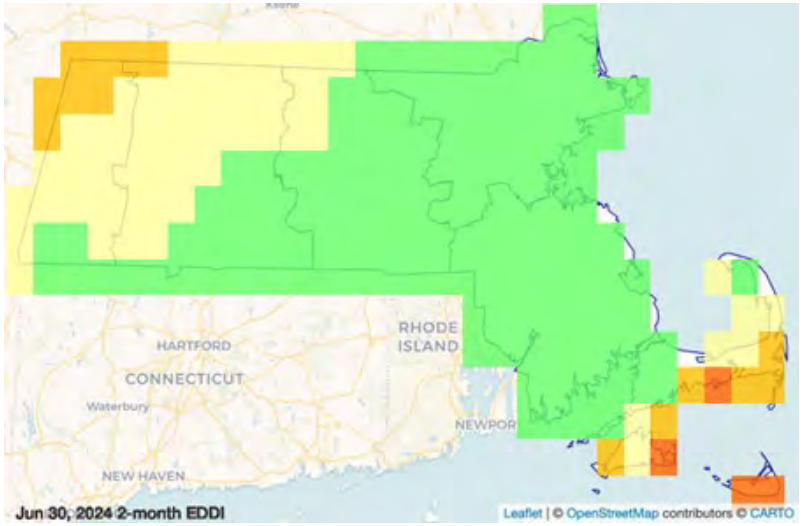
EVAPORATIVE DEMAND DROUGHT INDEX (EDDI)

As of June 30, 2024, the 1-month EDDI percentiles were below normal in all Regions. The 2-month EDDI percentiles, which are used in the MA Drought Plan monitoring, are at elevated ISLs: The Western ,CTRV, and Cape Cod Regions are at ISL 1, and the Islands Region at ISL 2. The Central, Northeast, and Southeast Regions are normal.

1-month EDDI



2-month EDDI

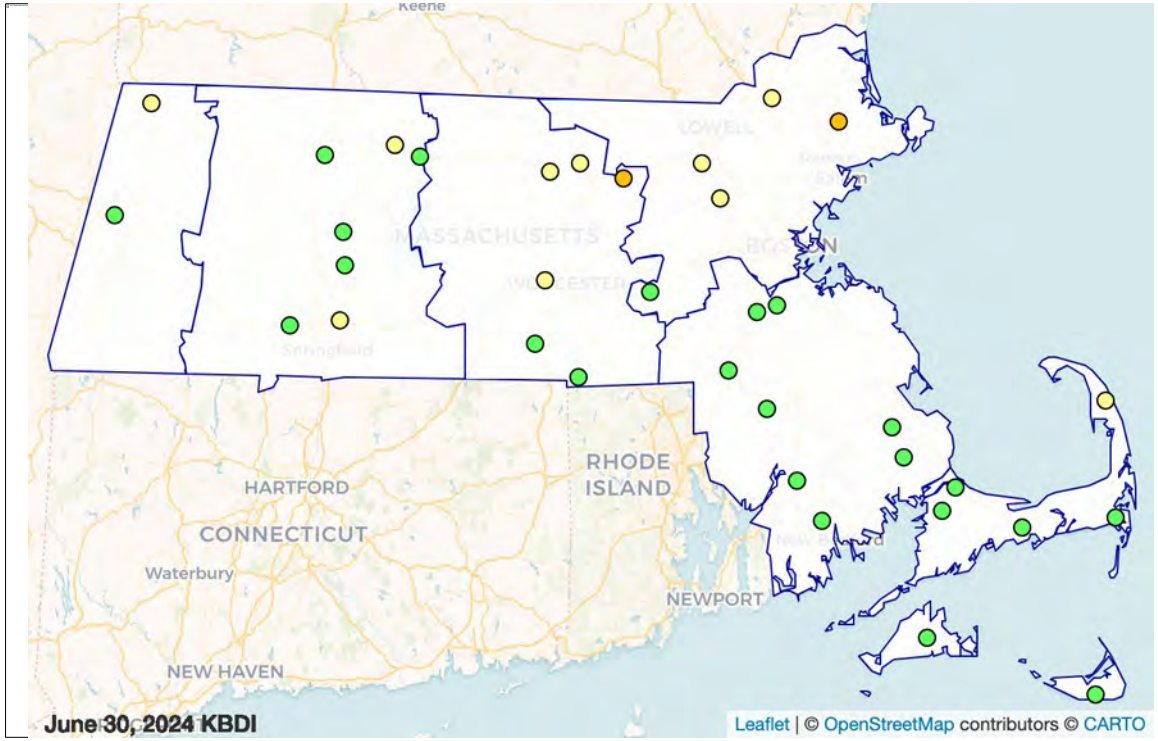


≥0 to ≤2	>2 to ≤10	>10 to ≤20	>20 to ≤30	>30 to ≤70
>70 to ≤80	>80 to ≤90	>90 to ≤98	>98 to ≤100	

DMP Index Severity Levels			
1	2	3	4

REGION	MEDIAN 2-MONTH EDDI (2024-06-30)
WESTERN	26
CTRV	30
CENTRAL	42
NORTHEAST	47
SOUTHEAST	51
CAPE COD	28
ISLANDS	18

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



REGION	NUMBER OF SITES REPORTING	HIGHEST OF SITE VALUES
WESTERN	2	239
CTRV	7	251
CENTRAL	6	405
NORTHEAST	5	402
SOUTHEAST	8	199
CAPE COD	5	250
ISLANDS	2	84

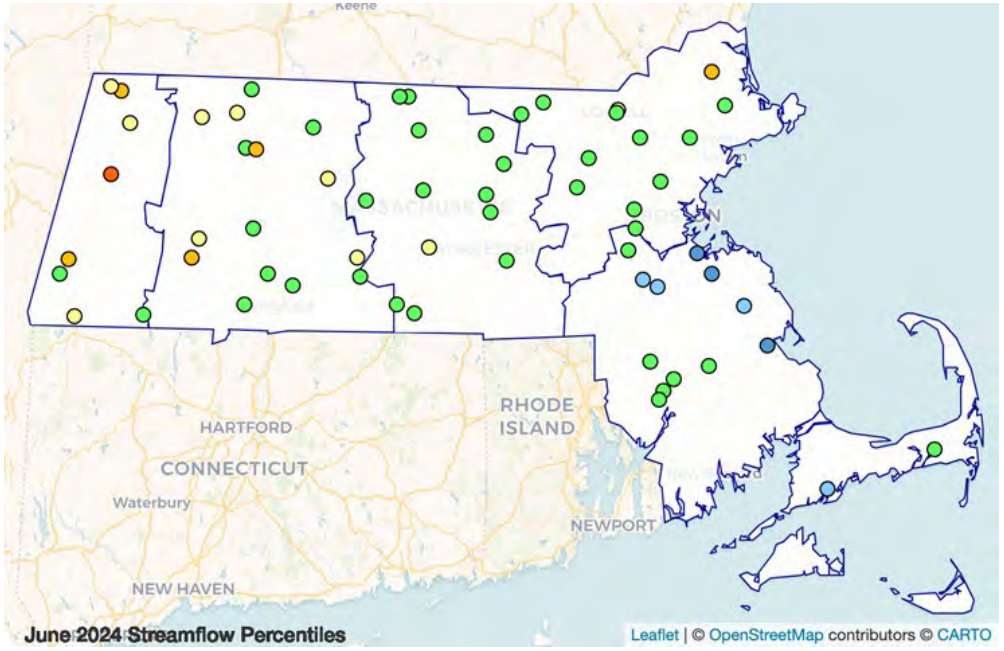
DMP Index Severity Levels

1	2	3	4

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

The medians of individual stream gages ranged from below normal in the Western, CTRV, Central, and Northeast Regions to above normal in the Southeast and Cape Cod. The Western Region is at ISL 1, and the CTRV median is at the low-end of normal.

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	1	2	3	0	24
CTRV	15	0	0	2	6	0	33
CENTRAL	13	0	0	0	1	0	52
NORTHEAST	13	0	0	1	1	0	47
SOUTHEAST	12	0	0	0	0	0	71
CAPE COD	2	0	0	0	0	0	57

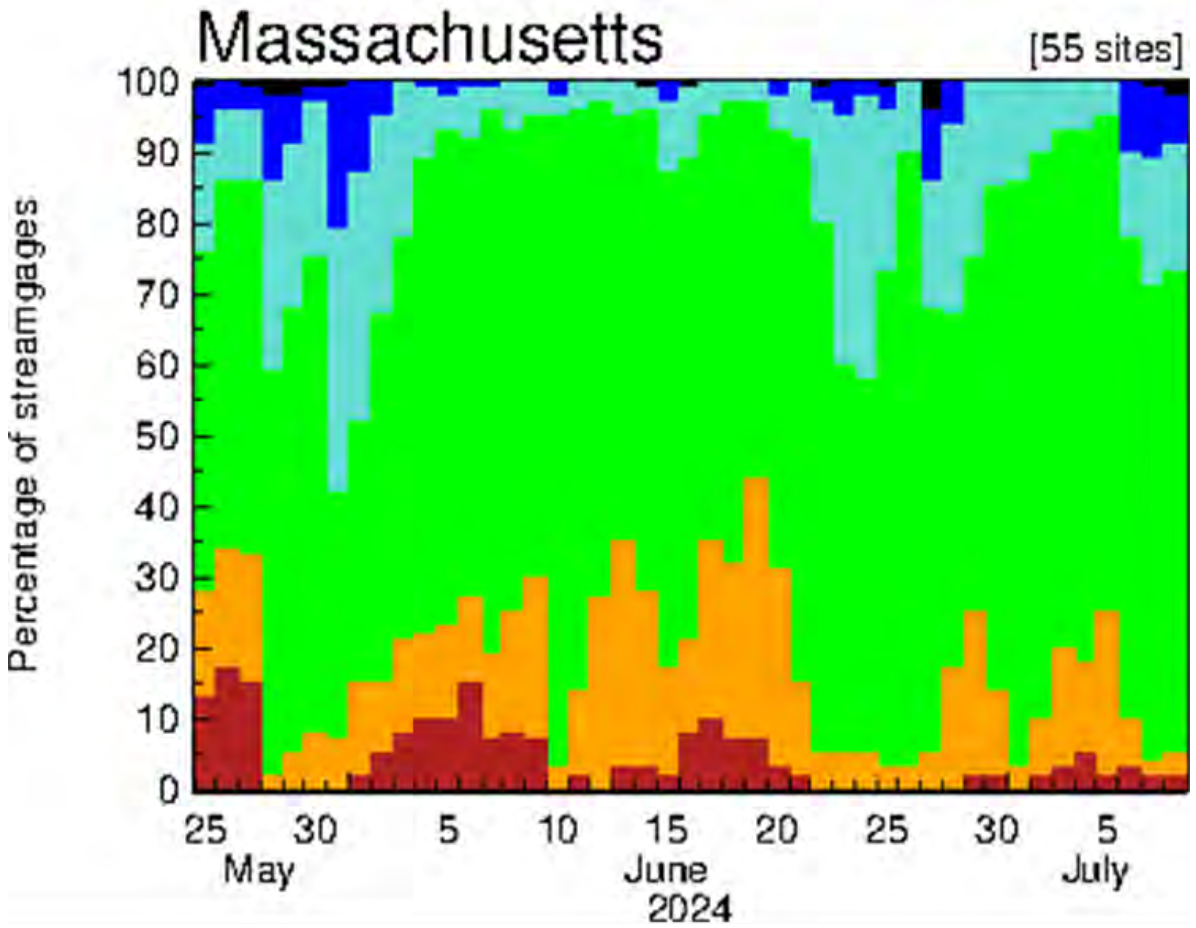
Note: Not all gages report in all months due to ice, beaver dams or other conditions. Streamflow index is not applicable to the Islands.

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 June nor were there any warnings issued for forecast points.

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

June 19th: areal flood warning in Franklin and Hampshire Counties

June 20th : flash flood warning in Franklin County

June 21st : storm reports of urban flooding in West Springfield (Hampden County) and Southbridge (Worcester County)

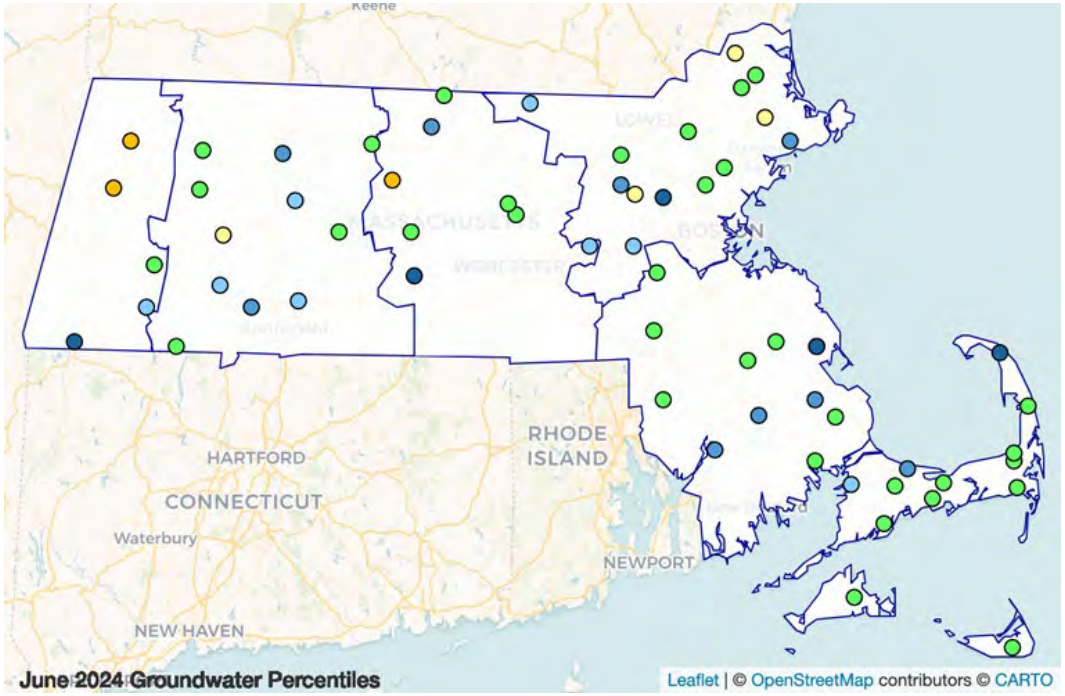
June 26th : flash flood warnings in Hampden, Worcester, Middlesex, Norfolk, Suffolk, and Plymouth Counties. Storm reports of urban flooding in Worcester County (Worcester), Middlesex County (Framingham), Suffolk (West Roxbury, South Boston, Winthrop), and Norfolk (Dedham).

Image: Courtesy of NASA/JPL-Caltech

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

June 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	≥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	2	0	1	61
CTRV	11	0	0	0	1	0	62
CENTRAL	8	0	0	1	0	1	57
NORTHEAST	14	0	0	0	3	1	53
SOUTHEAST	12	0	0	0	0	1	67
CAPE COD	11	0	0	0	0	1	65
ISLANDS	2	0	0	0	0	0	54

DMP Index Severity Levels			
1	2	3	4

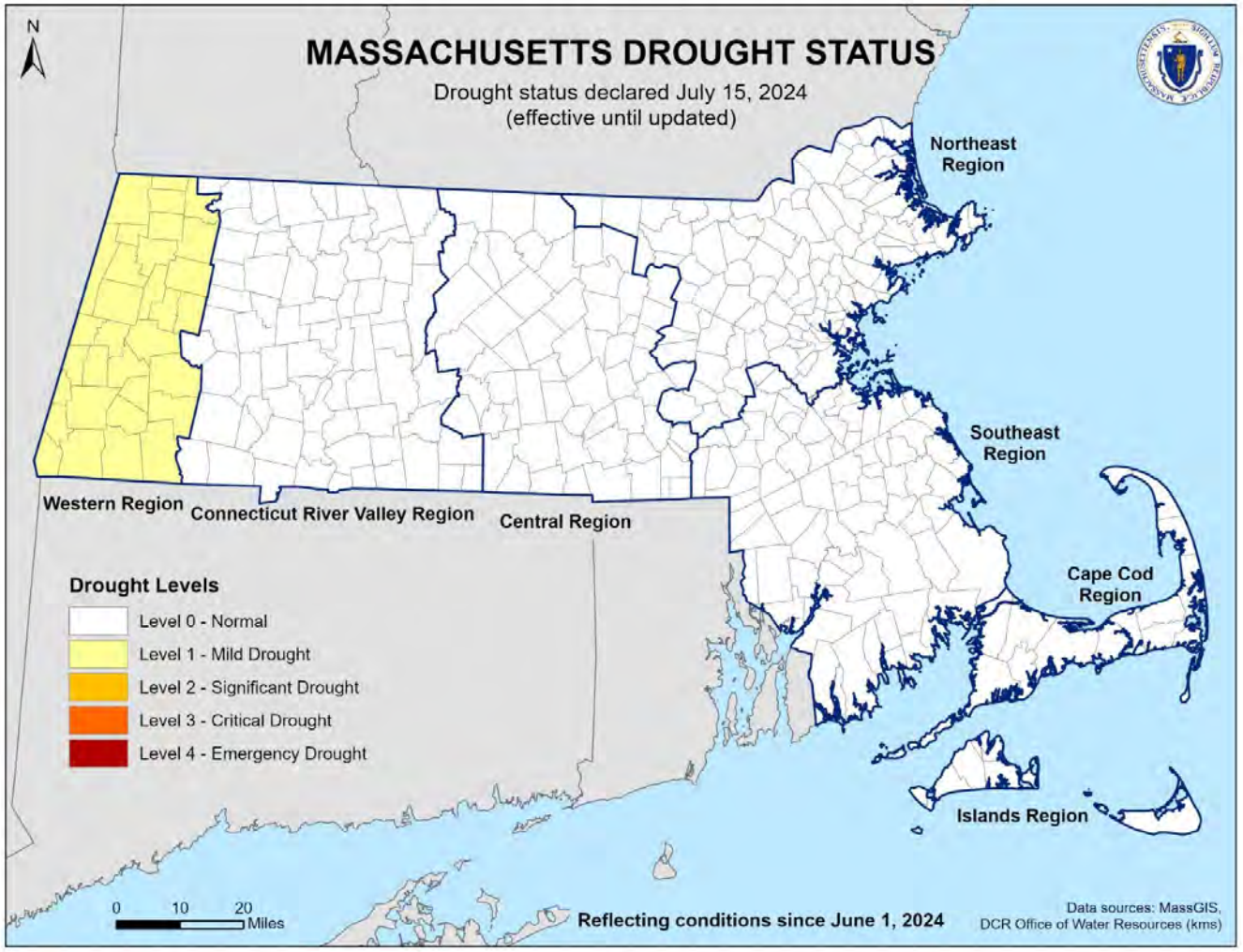
At the end of June, reported lake and impoundment levels were above their 30th percentile and/or were at or near 100% full except for one system in the Western Region, which is below normal. As a results, the Western Region is at ISL 2.

REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	2	17th
CTRV	2	52nd
CENTRAL	3	47th
NORTHEAST	5	69th
SOUTHEAST	2	89th
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

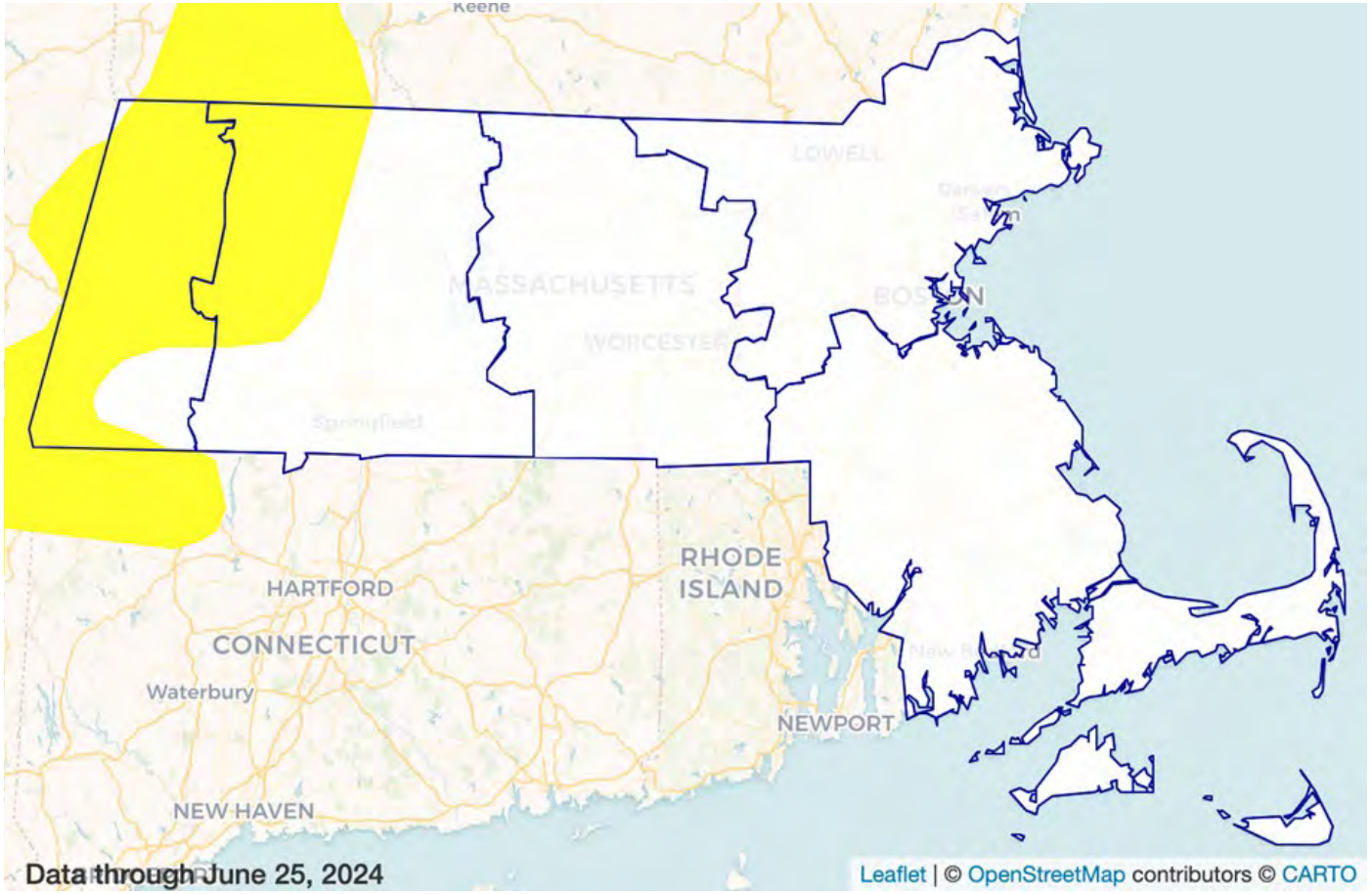


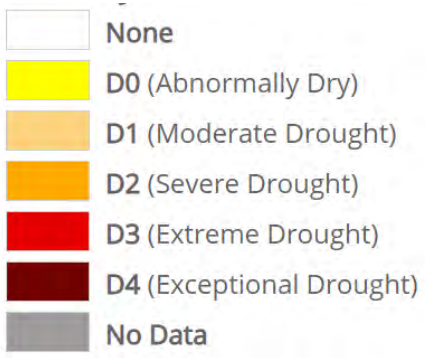
On July 15, 2024, Massachusetts Energy and Environmental Affairs (EEA) Secretary Rebecca L. Tepper declared that starting from June 1, 2024, the Western Region is at Level Mild Drought Conditions. All other Regions remain at Level 0. This status remains in effect until further updated.

U.S. DROUGHT MONITOR (USDM)

At the end of June, the USDM showed areas of abnormal dryness in the Western and CTRV Regions.

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

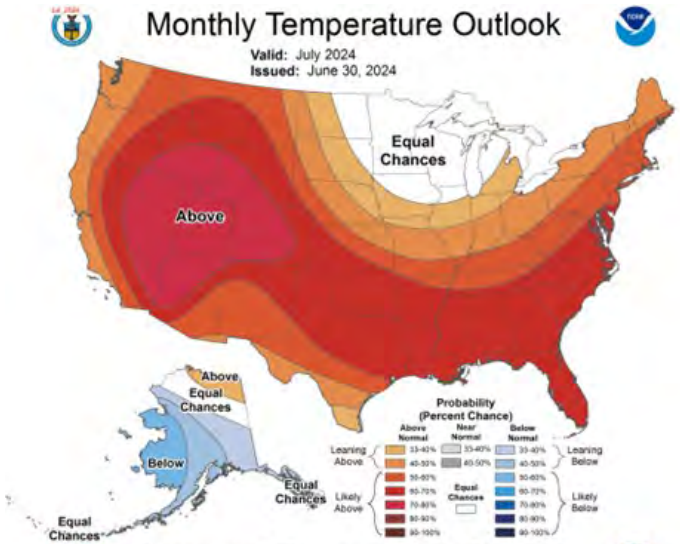


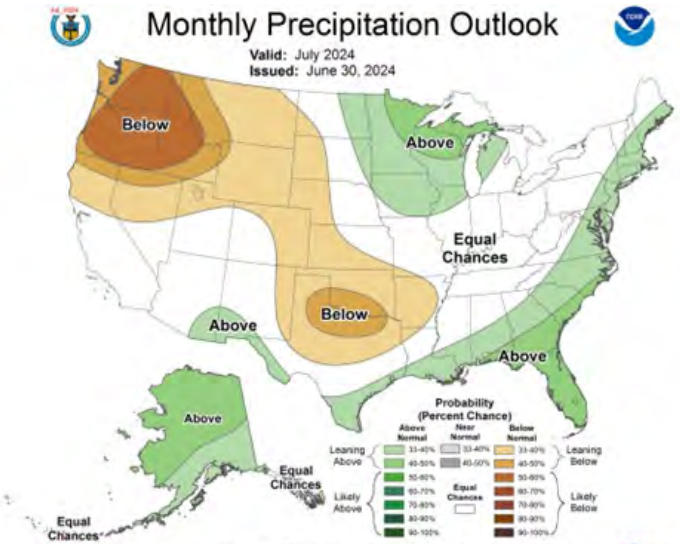


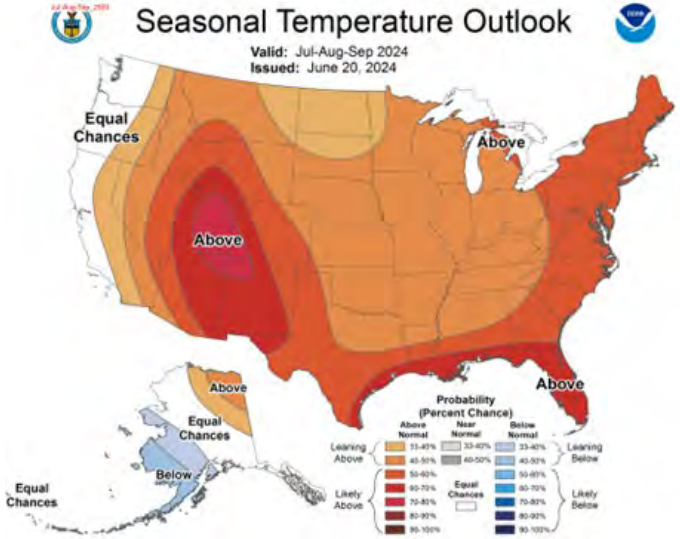
TEMPERATURE AND PRECIPITATION OUTLOOK

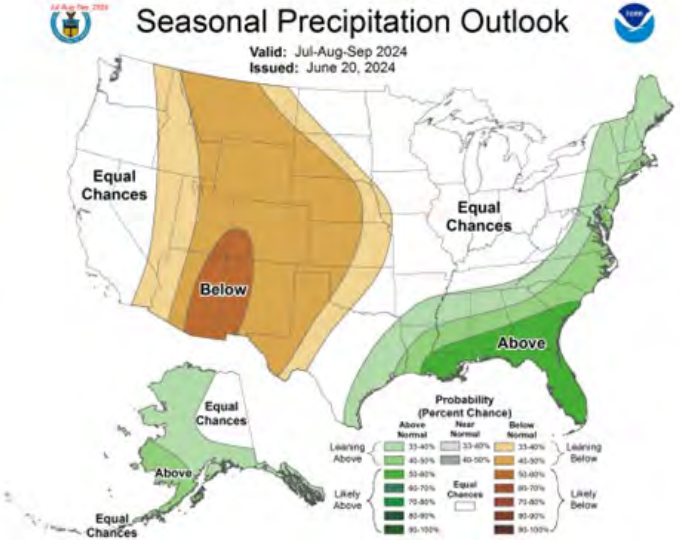
July: The outlook issued 6/30 shows a 50-60% chance of above-normal temperatures and a 33-40% chance of above-normal precipitation.

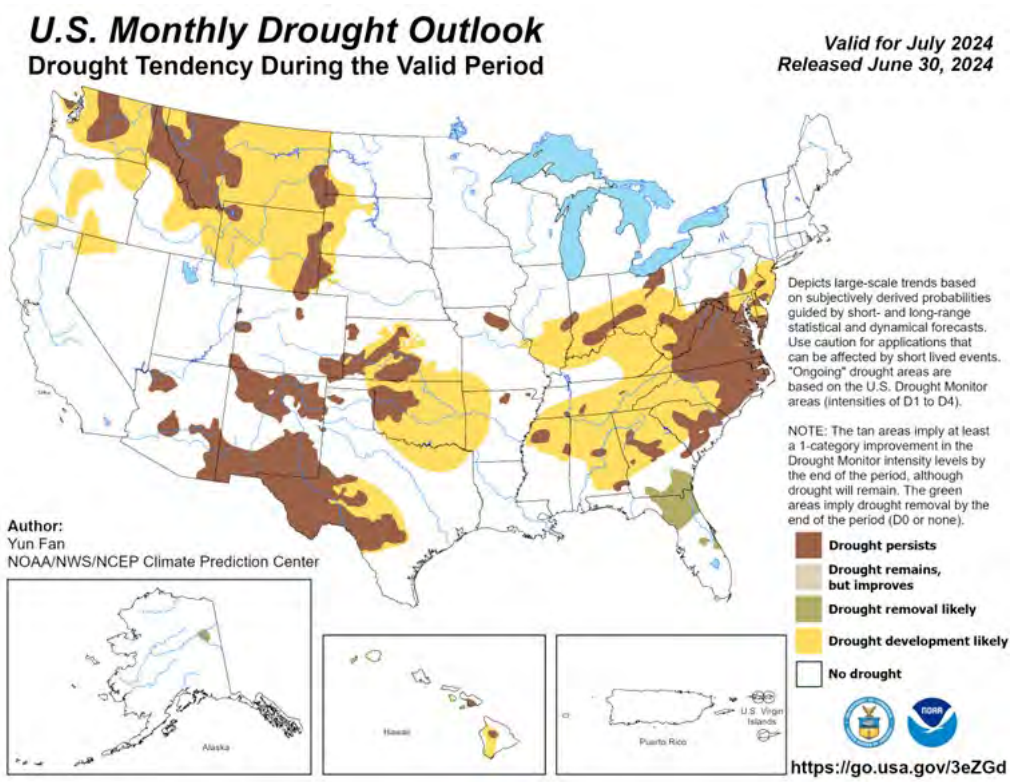
July through September: The seasonal outlook issued 6/20 shows a 50-60% chance of above-normal temperatures, a 33-40% chance of above normal precipitation in the western, northern, and central parts of the state, and a 40-50% chance of above normal precipitation in the southeastern parts of the state. https://www.cpc.ncep.noaa.gov/

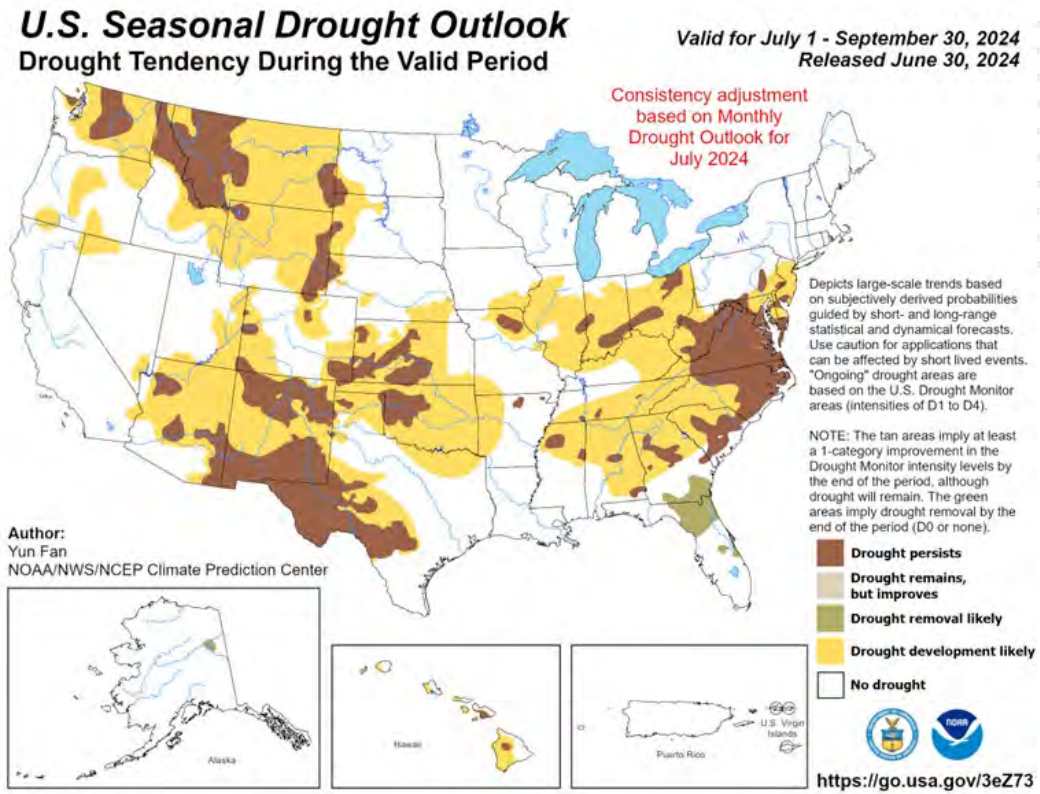












MONTHLY AND SEASONAL DROUGHT OUTLOOK

The monthly outlook for July released on 6/30 shows no drought development.

The seasonal outlook for July through September released on 6/30 shows no drought development.

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

APPENDIX I

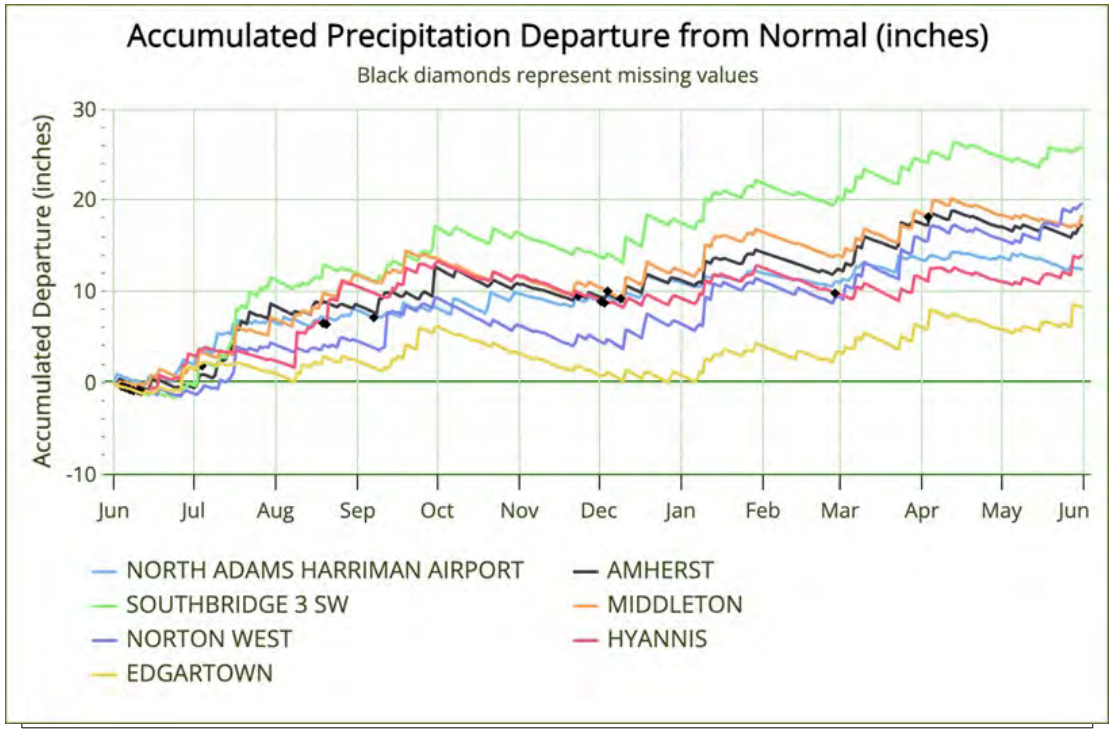
ADDITIONAL PRECIPITATION DATA

Standardized Precipitation Index—June 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	28	22	25	69	81	91	78	92
CTRV	9	59	59	61	92	86	98	95	94
CENTRAL	17	48	63	69	92	89	99	97	98
NORTHEAST	19	33	43	49	87	81	98	89	93
SOUTHEAST	22	55	83	80	97	90	98	92	94
CAPE COD	5	40	67	57	85	53	72	70	90
ISLANDS	3	47	75	63	91	54	76	54	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—June 2024

REGION	NUMBER OF SITES REPORTING	HISTORICAL AVERAGE	JUNE AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF NORMAL
WESTERN	5	4.41	3.61	-0.80	82%
CTRV	9	4.04	4.44	0.40	110%
CENTRAL	17	3.96	3.58	-0.38	90%
NORTHEAST	19	3.56	2.53	-1.03	71%
SOUTHEAST	22	3.77	3.74	-0.03	99%
CAPE COD	5	3.22	2.23	-0.99	69%
ISLANDS	3	3.21	2.46	-0.75	77%

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