MASSACHUSETTS WATER RESOURCES COMMISSION

NOVEMBER
2020

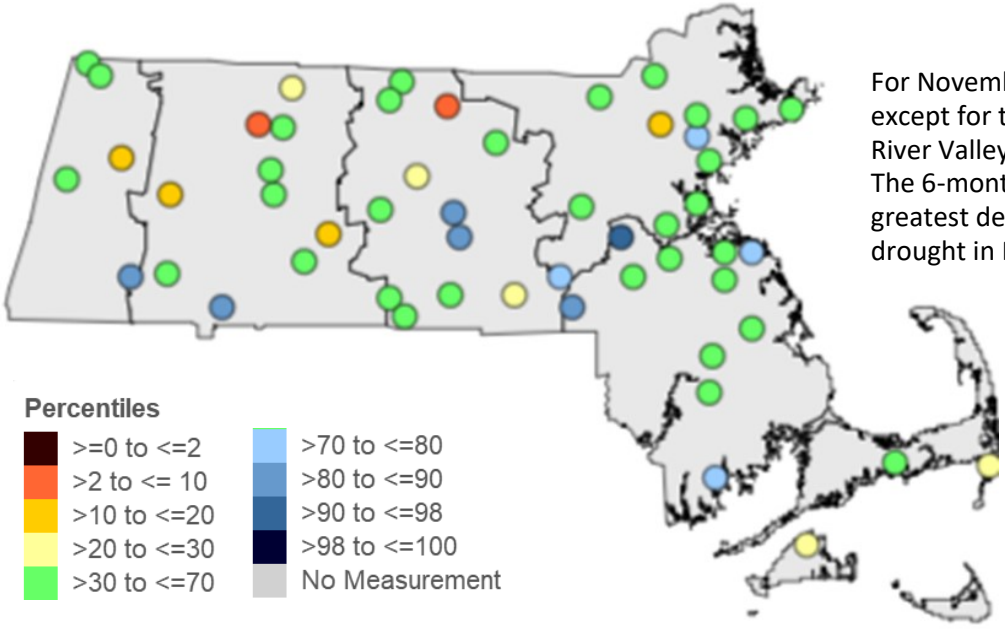
HYDROLOGIC CONDITIONS IN MASSACHUSETTS

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

NOVEMBER 2020 HYDROLOGIC CONDITIONS

- Monthly average temperatures were above normal.
- Precipitation was near average except for tripping the 1-month SPI in the CT River Valley, Cape Cod, & Islands Regions.
- Monthly median streamflow improved to average in November for most gages.
- Groundwater levels varied across the state. While there was improvement in some Regions, below average levels remain in the CT River Valley, Central, Northeast, & Southeast Regions.
- The NOAA December outlook shows chances for above-normal temperatures and above-normal precipitation. The 3-month outlook shows chances for above normal temperatures and equal chances for below-normal, normal, or above-normal precipitation.
- Appendices I and II provide additional precipitation data and information on the Massachusetts Drought Management Plan (DMP).

PRECIPITATION



For November, precipitation was near average except for tripping the 1-month SPI in the CT River Valley, Cape Cod, and Islands Regions. The 6-month look-back period shows the greatest deficits reflecting the start of the drought in May.

Index Severity Level
1
2
3
4

REGION	NUMBER OF SITES REPORTING FOR NOV	ACTUAL MONTHLY AVERAGE (IN)	DEPARTURE FROM HISTORICAL (IN)	DMP SPI * 1-MONTH	DMP SPI 3-MONTH	DMP SPI 6-MONTH
WESTERN	5	3.99	0.43	0.18	-0.12	-0.92
CT RIVER VALLEY	10	2.90	-0.87	-0.52	-0.01	-0.59
CENTRAL	13	3.56	-0.41	0.03	-0.18	-0.55
NORTHEAST	11	3.54	-0.50	0.07	0.02	-0.68
SOUTHEAST	11	4.74	0.24	0.11	-0.01	-0.49
CAPE COD	2	2.41	-1.52	-0.68	-1.23	-2.60
ISLANDS	1	2.42	-1.86	-0.85	-0.85	-1.75

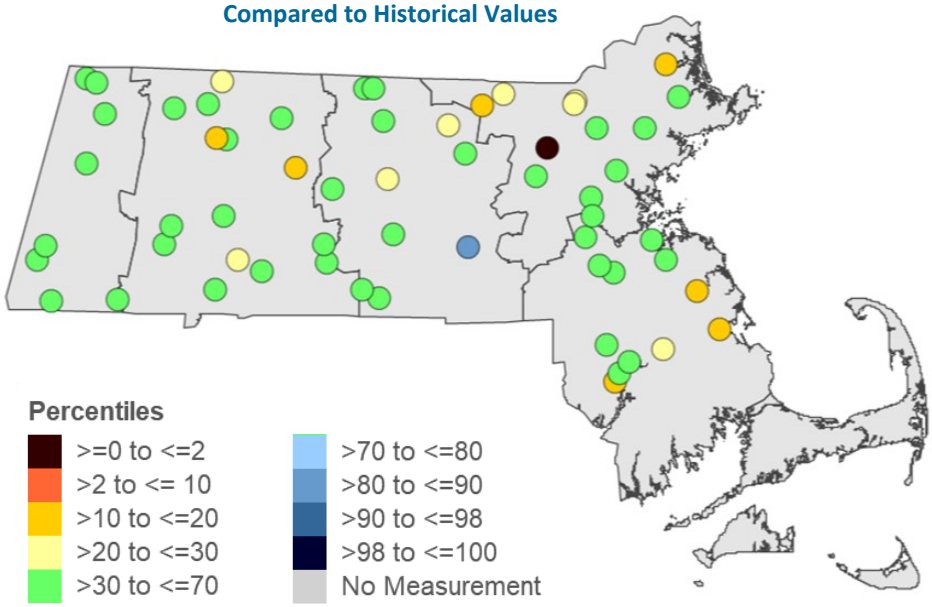
*The Standardized Precipitation Index (SPI) values represent the variation, in standard deviations, from long-term precipitation averages.

STREAMFLOW

Overall streamflows improved in November. While some individual gage medians were below the 30th percentile, no Regions tripped index severity levels.

Streamflow is monitored by the Commonwealth of Massachusetts and United States Geological Survey (USGS) cooperative stream gaging program.
https://waterdata.usgs.gov/nwis/sw

Median Monthly Streamflows Compared to Historical Values

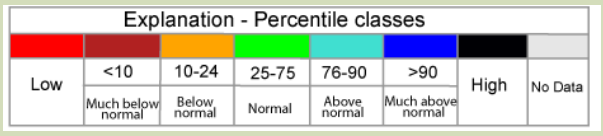


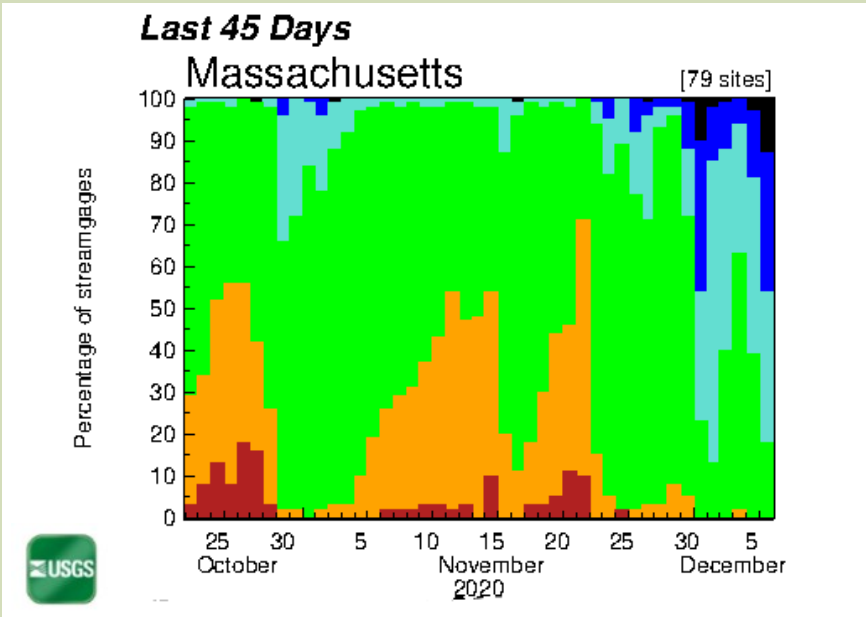
REGION	TOTAL GAGES REPORTING FOR NOV	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 to ≤30 PERCENTILE	>90 PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES	DMP INDEX SEVERITY
WESTERN	8	0	0	0	0	0	47	0
CT RIVER VALLEY	15	0	0	2	2	0	41	0
CENTRAL	11	0	0	0	2	0	39	0
NORTHEAST	13	1	0	2	3	0	32	0
SOUTHEAST	12	0	0	3	1	0	32	0

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

Time Series of Average Daily Streamflows Compared to Historical Values

https://waterwatch.usgs.gov/index.php?id=pa01d&sid=w__plot_sum&r=ma



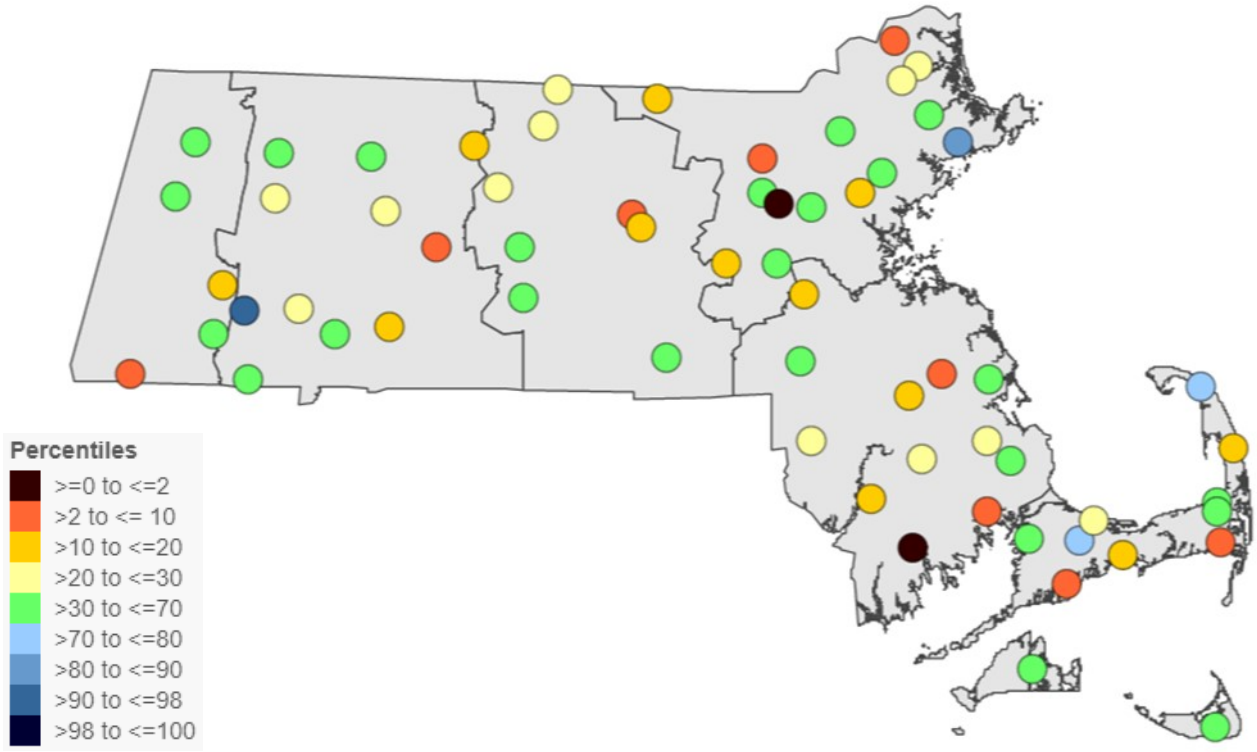


GROUNDWATER

Groundwater levels varied across the state and within some Regions. While there was improvement in some Regions, there are wells still below normal; the CT River Valley, Central, Northeast, & Southeast Regions are at Index Severity Level 1.

https://groundwaterwatch.usgs.gov/NetMapT1L2.asp?ncd=crn&sc=25

End of Month Groundwater Compared to Historical in the Climate Response Network



REGION	TOTAL WELLS REPORTING FOR NOV	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 TO ≤30 PERCENTILE	>90 PERCENTILE	MEDIAN OF INDIVIDUAL WELL PERCEN-TILES	DMP INDEX SEVERITY
WESTERN	5	0	1	1	0	0	32	0
CT RIVER VALLEY	11	0	1	2	3	1	29	1
CENTRAL	9	0	1	2	3	0	27	1
NORTHEAST	14	1	2	2	2	0	29	1
SOUTHEAST	12	1	2	3	3	0	24	1
CAPE COD	10	0	2	2	1	0	36	0
ISLANDS	2	0	0	0	0	0	60	0

LAKES AND IMPOUNDMENTS

At the end of November, many lakes and impoundments were lower than usual. Although only one region tripped index severity level, several regions were close. In general, however, lakes & impoundment levels have started to recover.

REGION	TOTAL REPORTING FOR NOVEMBER	MEDIAN OF INDIVIDUAL PERCENTILES	DMP INDEX SEVERITY
WESTERN	2	32	0
CT RIVER VALLEY	2	34	0
CENTRAL	2	32	0
NORTHEAST	6	31	0
SOUTHEAST	2	8	3
CAPE COD	1	50	0
ISLANDS	N/A	N/A	N/A

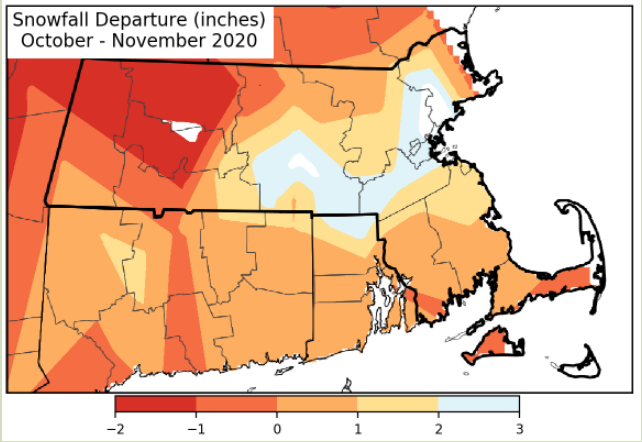
DMP Index Severity Levels do not necessarily reflect water supply status.

KEETCH BYRAM DROUGHT INDEX (KBDI)

As of December 7, DCR Chief Fire Warden Celino reported that the KBDI is below 100 in most areas, and the snow cover combined with increasing frozen conditions will zero out the KBDI #'s across most of the state. Fire activity has been very minimal; there have been two fires in the last week– both surface fires in leaf litter with no control issues or burning into the duff and soil layers due to cold, moist soil conditions. This is the last report of the season.

CROP MOISTURE INDEX (CMI)

CMI is provided seasonally.

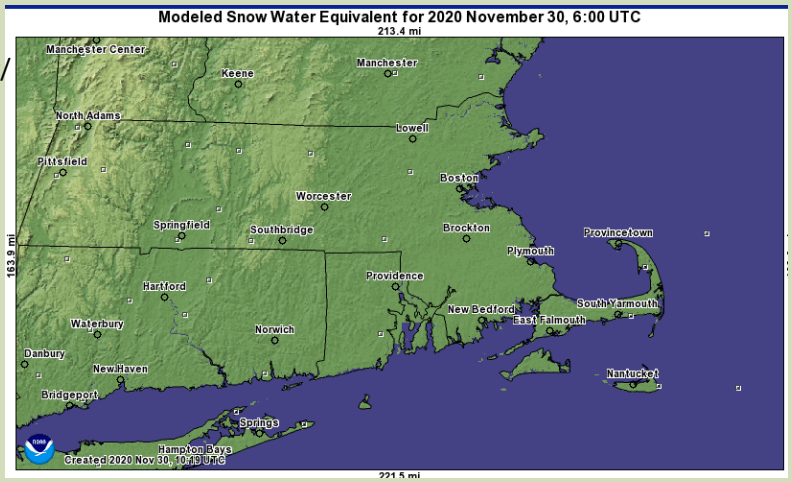


SEASON-TO-DATE SNOWFALL DEPARTURE

http://www.nrcc.cornell.edu/

MODELED SNOW WATER EQUIVALENT, END OF MONTH

https://www.nohrsc.noaa.gov/technology/



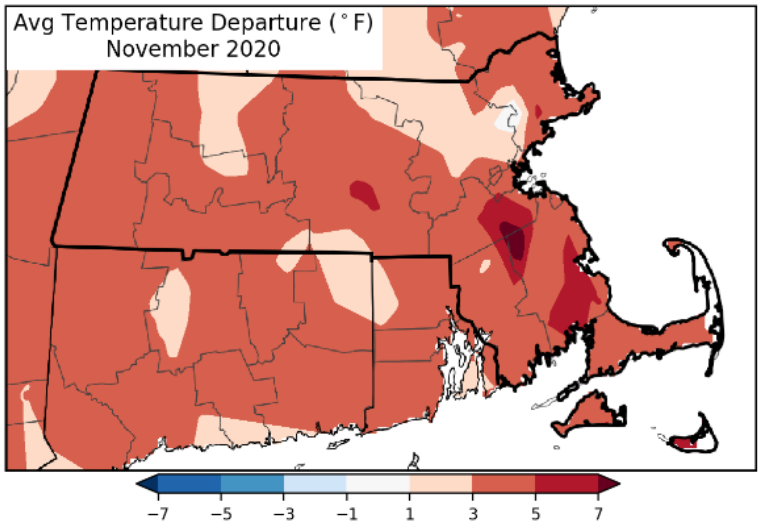
TEMPERATURE

Monthly average temperatures were above normal. According to the Northeast Regional Climate Center, this November ranked as the 7th warmest for Massachusetts.

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

Daily average temperatures ranged from 29° to 64.5° Fahrenheit (°F). Daily departures from historical averages ranged from +18.3 to –15.1 ° F.

https://w2.weather.gov/climate/xmacis.php?wfo=box



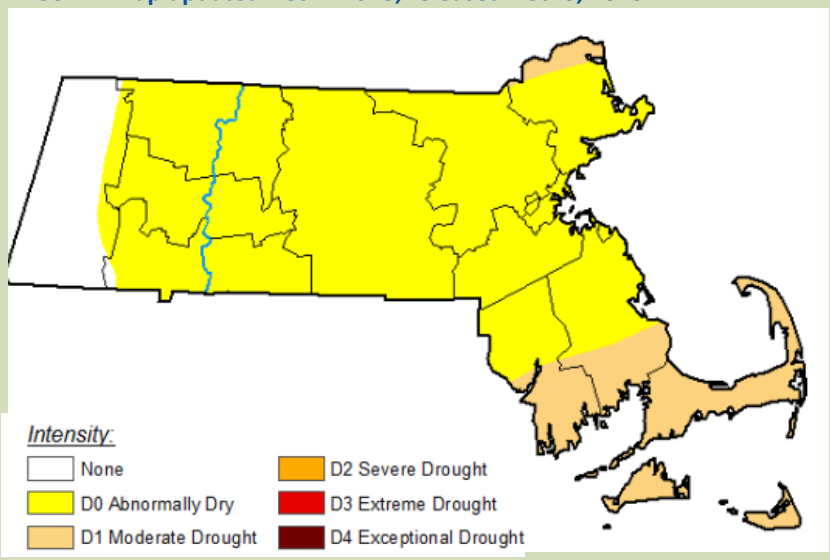
DROUGHT CONDITIONS AND FORECASTS

U.S. Drought Monitor (USDM)

At the beginning of December, the USDM showed only D0 (Abnormally dry) and D1 (Moderate Drought) throughout the state except for the Western Region. Over the course of the month, drought levels improved, including the removal of drought in the West at the beginning of the November.

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

USDM Map updated Dec. 1 2020; released Dec. 3, 2020



NOAA Climate Prediction Center

Temperature and Precipitation Outlook

December: The outlook released 11/30 shows a 33-40% chance of above-normal temperatures and 40-50% chance for the western half of the state and 50-60% chance for the eastern half of above-normal precipitation.
December through February: The outlook released 11/19 projects a 40-50% chance of above-normal temperatures, and equal chances of below-normal, normal, or above-normal precipitation. https://www.cpc.ncep.noaa.gov/

Monthly and Seasonal Drought Outlook

The monthly outlook for December released on 11/30 shows drought removal likely for the southeast and northern regions of the state. The seasonal outlook released on 11/19 and valid through February shows drought improvement and removal in the eastern part of the state.

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

This report was prepared by the Massachusetts Department of Conservation and Recreation. Data may be preliminary. Additional information, previous reports, and drought management information can be found at: https://www.mass.gov/water-data-tracking

DCR Precipitation Reports are available at https://www.mass.gov/service-details/precipitation-composite-estimates-1 and https://www.mass.gov/service-details/standardized-precipitation-index-spi-0

APPENDIX I – ADDITIONAL PRECIPITATION DATA

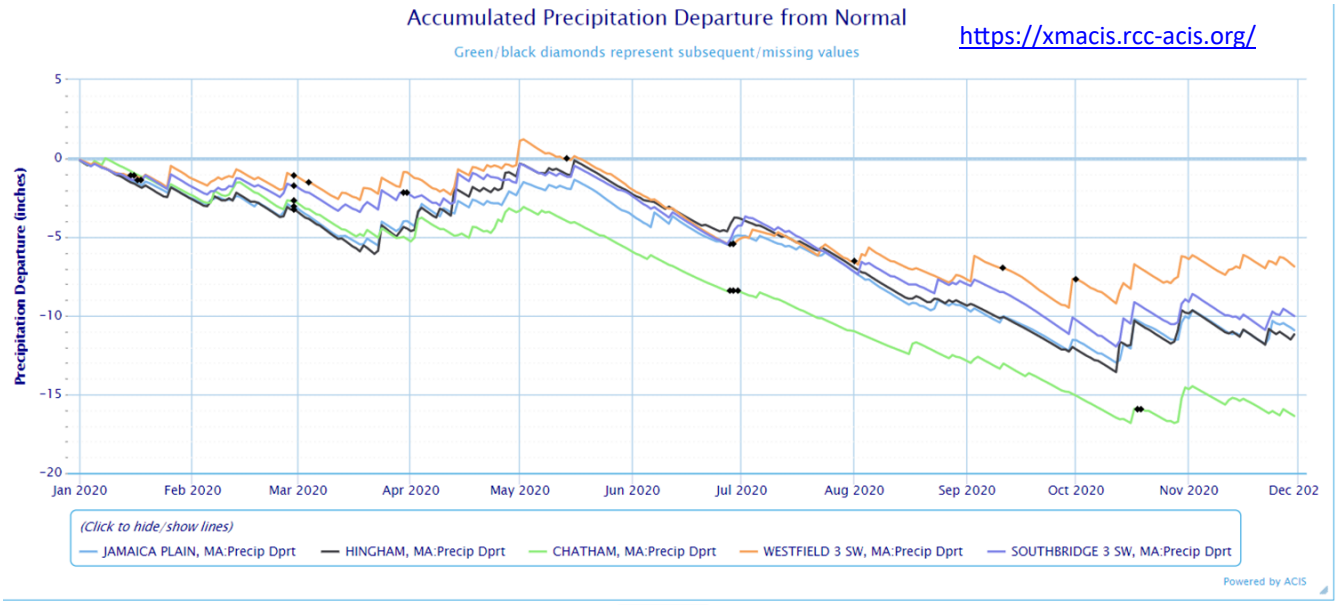
Standardized Precipitation Index November 2020

REGION	NUMBER OF SITES	SPI1	SPI2	SPI3	SPI6	SPI9	SPI12	SPI24	SPI36
WESTERN	5	0.18	-0.27	-0.12	-0.92	-0.75	-0.49	-0.12	0.74
CT RIVER VALLEY	10	-0.52	0.32	-0.01	-0.59	-0.73	-0.64	-0.32	0.71
CENTRAL	13	0.03	0.46	-0.18	-0.55	-0.48	-0.34	0.23	1.13
NORTHEAST	11	0.07	0.56	0.02	-0.68	-0.63	-0.55	-0.06	0.85
SOUTHEAST	11	0.11	0.61	-0.01	-0.49	-0.01	0.03	0.47	1.04
CAPE COD	2	-0.68	-0.50	-1.23	-2.60	-1.85	-1.17	-0.37	0.07
ISLANDS	1	-0.85	-0.20	-0.85	-1.75	-0.73	-0.37	0.42	-0.06

Key to Index Severity Levels
0
1
2
3
4

Percent of Average Historical Precipitation

REGION	NUMBER OF SITES	HISTORICAL AVERAGE (IN)	NOVEMBER AVERAGE (IN)	DEPARTURE FROM HISTORICAL AVERAGE (IN)	PERCENT OF HISTORICAL
WESTERN	5	3.57	3.99	0.43	111
CT RIVER VALLEY	10	3.76	2.90	-0.87	77
CENTRAL	13	3.97	3.56	-0.41	90
NORTHEAST	11	4.03	3.54	-0.50	88
SOUTHEAST	11	4.50	4.74	0.24	106
CAPE COD	2	3.93	2.41	-1.52	62
ISLANDS	1	4.28	2.42	-1.86	56



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