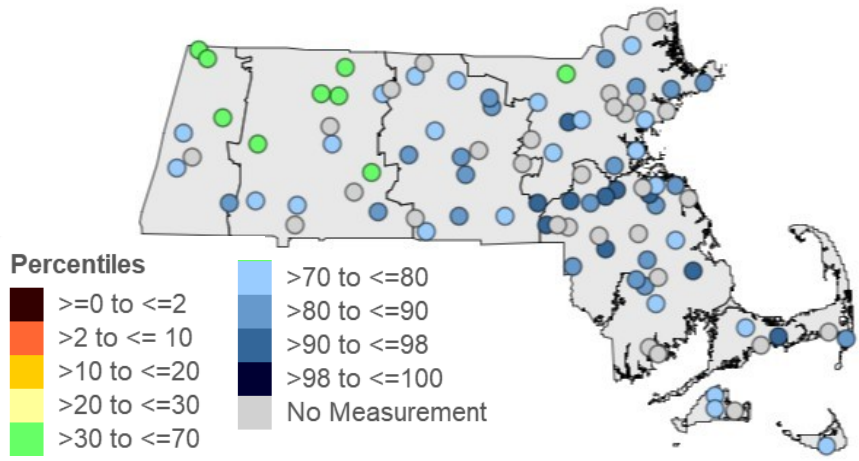
MASSACHUSETTS WATER RESOURCES COMMISSION

April 2020 Hydrologic Conditions in Massachusetts

SUMMARY OF CONDITIONS

- Monthly temperatures were below average for April.
- Precipitation was above average for April. The index severity levels for all SPI look-back periods are 0 for all drought regions.
- Streamflow was normal to above normal for April. Index severity levels are 0.
- Groundwater medians were mostly greater than 30th percentile values. Index severity levels are 0.
- Lakes and Impoundments: All regions are at index severity level 0.
- For May NOAA projects equal chances for above-, below-, or normal temperatures in eastern MA, 33%-40% chances for below normal temperatures for the rest of the state, and 40-50% chances for above-normal precipitation for the entire state.
- Appendices I and II provide additional precipitation data and information on the Massachusetts Drought Management Plan (DMP), respectively.

PRECIPITATION



Precipitation was above normal for the month of April. All look-back periods for the SPI are at Severity Level 0.

Region	Number of Sites	April Average (inches)	Departure from Historical (inches)	DMP SPI 1-month	DMP SPI 2-month	DMP SPI 3-month
Western	6	4.48	1.07	0.80	0.59	0.56
CT River Valley	10	4.33	0.56	0.56	0.37	0.42
Central	12	5.65	1.71	0.85	0.56	0.31
Northeast	13	5.26	1.40	0.80	0.59	0.39
Southeast	17	7.14	2.84	1.25	0.79	0.55
Cape Cod	3	6.29	2.14	0.99	0.33	0.30
Islands	3	4.95	1.23	0.76	0.69	0.80

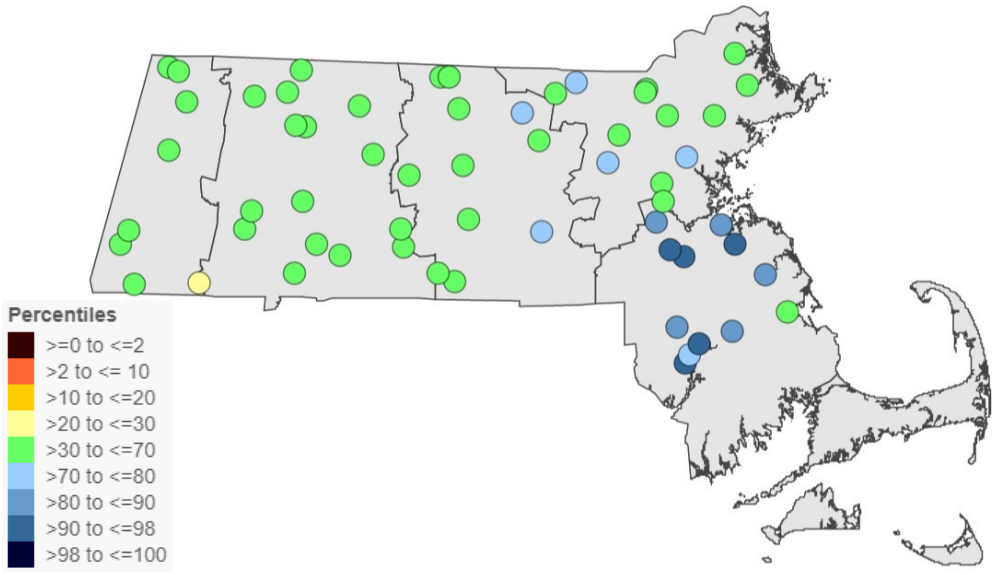
STREAMFLOW

Monthly median streamflows were mostly normal to above normal across the state. Five gages in the Southeast region were above the 90th percentile. One gage, the West Branch of the Farmington River, in the Western Region was just below the 30th percentile.

Median Monthly Streamflows Compared to Historical

Streamflow is monitored by the Commonwealth of Massachusetts and United States Geological Survey (USGS) cooperative stream gaging program.

https://waterdata.usgs.gov/nwis/sw

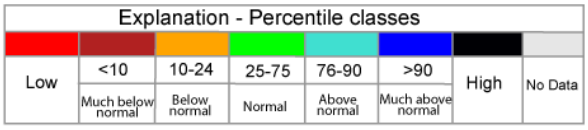


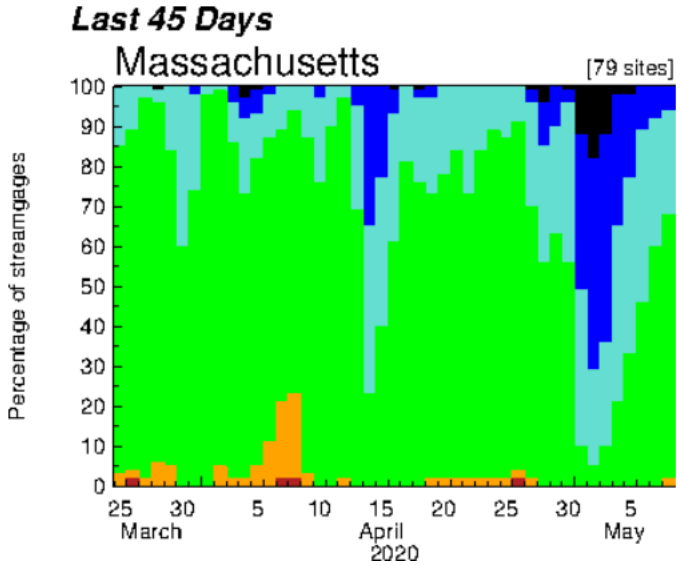
Region	Number of Gages						Median of Individual Gage Percentiles	DMP Index Severity
	Total Reporting for April	≥0 to ≤2 Percentile	>2 to ≤10 Percentile	>10 to ≤20 Percentile	>20 to ≤30 Percentile	> 90 Percentile		
Western	8	0	0	0	1	0	41	0
CT River	15	0	0	0	0	0	45	0
Central	11	0	0	0	0	0	55	0
Northeast	13	0	0	0	0	0	67	0
Southeast	12	0	0	0	0	5	86	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?r=ma&id=pa01d&sid=w__plot_sum





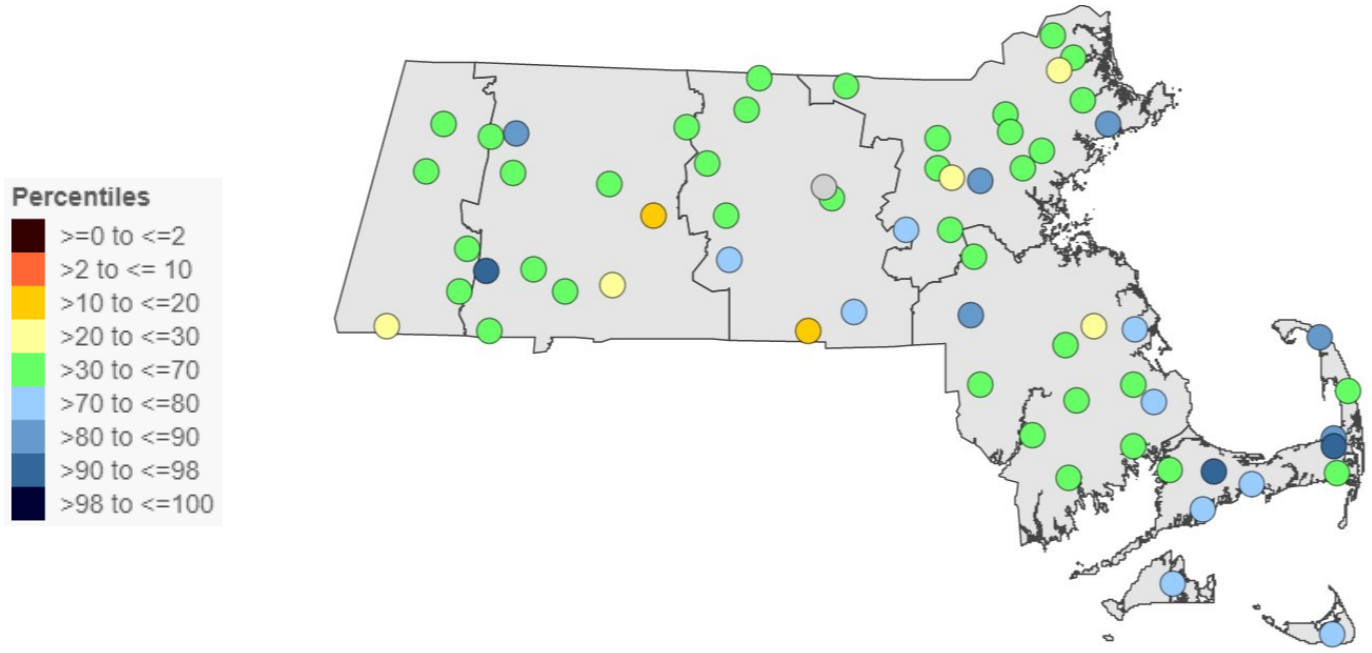
May 14, 2020

GROUNDWATER

All regions except Cape Cod and the Islands had a few wells below their 30th percentile values. Cape Cod had two wells above the 90th percentile. All regions are at an Index Severity of Level 0.

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

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



Region	Number of Wells						Median of Individual Percentiles	DMP Index Severity
	Total Reporting for April	≥0 to ≤2 Percentile	>2 to ≤10 Percentile	>10 to ≤20 Percentile	>20 to ≤30 Percentile	> 90 Percentile		
Western	5	0	0	0	1	0	44	0
CT River Valley	11	0	0	1	1	1	54	0
Central	9	0	0	1	0	0	64	0
Northeast	15	0	0	0	2	0	63	0
Southeast	12	0	0	0	1	0	61	0
Cape Cod	9	0	0	0	0	2	79	0
Islands	2	0	0	0	0	0	76	0

LAKES and IMPOUNDMENTS

At the end of April, all drought regions were at index severity level 0. Several regions had water bodies spilling.

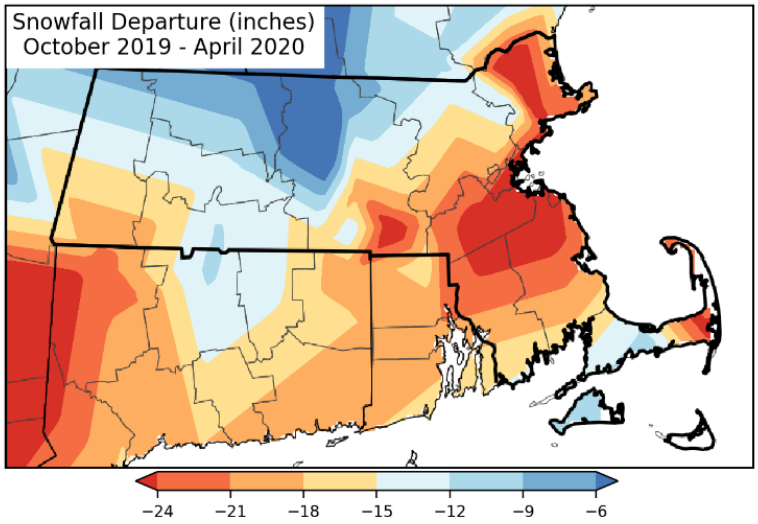
Region	Total Reporting for April	Lakes and Impoundments: Percentiles or Levels	DMP Index Severity
Western	2	levels: 98%; 100%	0
CT River Valley	2	levels: 95%; 99%	0
Central	3	levels: 100%; 100%;104%	0
Northeast	7	levels: 87% to 100%	0
Southeast	2	levels: 100%; 102%	0
Cape Cod	1	percentile: 93	0
Islands	N/A	N/A	N/A

KEETCH BYRAM INDEX (KBDI) and CROP MOISTURE INDEX (CMI)

KBDI values as of the week ending May 8th remained very low due to frequent precipitation events and unseasonably below average temperatures. All KBDI values are below 50 across the state, and remained consistently in single digits across some areas through May 1. All regions are at an index severity level of 0.

CMI values for the week ending May 2 were +2.0 to +3.0 or "Wet" for the entire state resulting in an index severity level of 0 for all regions.

SNOW

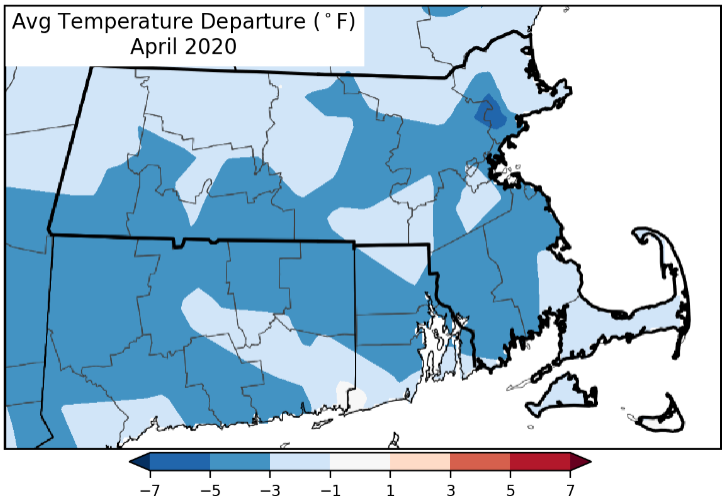


Season-to-date snowfall departure

At the end of April the season-to-date snowfall departure ranged from below six inches to below more than 24 inches across the state.
http://www.nrcc.cornell.edu/regional/monthly/monthly.html

For more information about this season's snowfall see the Northeast Regional Climate Center April webinar "Northeast Snow Season Recap:
http://www.nrcc.cornell.edu/workshops/webinars/2020/04/index.html

TEMPERATURE



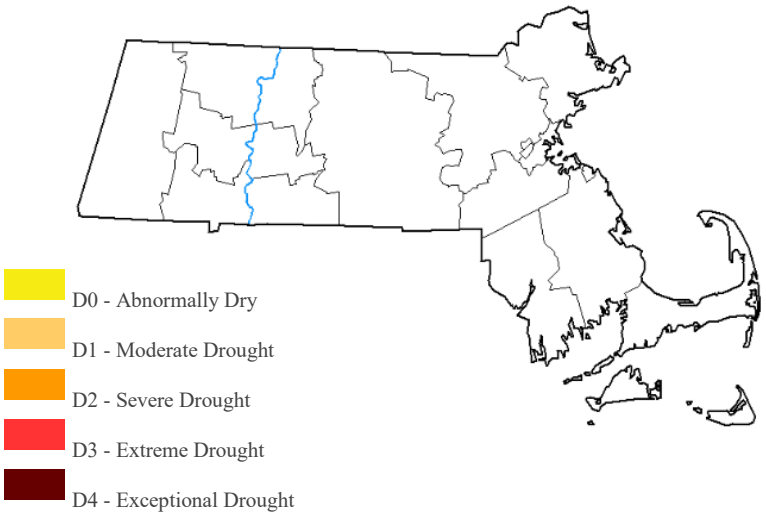
Monthly average temperatures were below average for this time of the year.
http://www.nrcc.cornell.edu/regional/monthly/monthly.html
Daily temperatures ranged from 31 to 62 degrees Fahrenheit (deg F). Daily departures from historical averages ranged from +8.9 to –12.5 deg F.
https://w2.weather.gov/climate/xmacis.php?wfo=box

DROUGHT CONDITIONS AND FORECASTS BY NOAA AND PARTNERS

U.S. Drought Monitor as of April 28, 2020

Summary: The USDM does not show drought conditions at the end of April.

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



NOAA Climate Prediction Center: Temperature and Precipitation Outlook

May: The outlook projects equal chances for above-, below-, or normal temperatures in eastern MA, 33-40% chances of below normal temperatures for the rest of the state, and 40-50% chances for above-normal precipitation for the entire state. **May through July**: The outlook projects 70-80% chance of above normal temperatures and equal chances for above-, below-, or normal precipitation for the entire state.

NOAA Climate Prediction Center: Monthly and Seasonal Drought Outlook

The monthly outlook released April 30 for May does not project drought conditions. The seasonal outlook issued April 16 valid through July predicts does not project drought conditions.

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

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.

Appendix I— Additional Precipitation Data

Standardized Precipitation Index April 2020

Drought Region	Number of Sites	SPI1	SPI2	SPI3	SPI6	SPI9	SPI12	SPI24	SPI36
Western	6	0.80	0.59	0.56	0.44	0.43	0.21	1.20	0.95
Connecticut River	10	0.56	0.37	0.42	0.24	-0.02	-0.29	1.40	1.21
Central	12	0.85	0.56	0.31	0.31	0.48	0.45	1.56	1.54
Northeast	13	0.80	0.59	0.39	0.14	0.01	0.42	1.11	0.90
Southeast	17	1.25	0.79	0.55	0.45	0.23	0.53	1.39	1.23
Cape Cod	3	0.99	0.33	0.30	0.82	1.18	1.43	1.70	2.45
Islands	3	0.76	0.69	0.80	0.53	0.61	0.94	1.11	1.28

Key to Drought Plan SPI Severity Levels	
0	>-0.52
1	≤ -0.52 and > -0.84
2	≤ -0.84 and > -1.28
3	≤ -1.28 and > -2.05
4	≤ -2.05

Percent of Average Historical Precipitation

Drought Region	Number of Sites	Historical (inches)	Actual (inches)	Departure from Historical (inches)	Percent of Historical
Western	6	3.42	4.48	1.07	131
Connecticut River	10	3.76	4.33	0.56	115
Central	12	3.93	5.65	1.71	144
Northeast	13	3.86	5.26	1.40	137
Southeast	17	4.30	7.14	2.84	167
Cape Cod	3	4.15	6.29	2.14	153
Islands	3	3.72	4.95	1.23	133

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 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	Stream-flow	Lakes and Impoundments	Ground-water	Keetch-Byram Drought	Crop Moisture
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