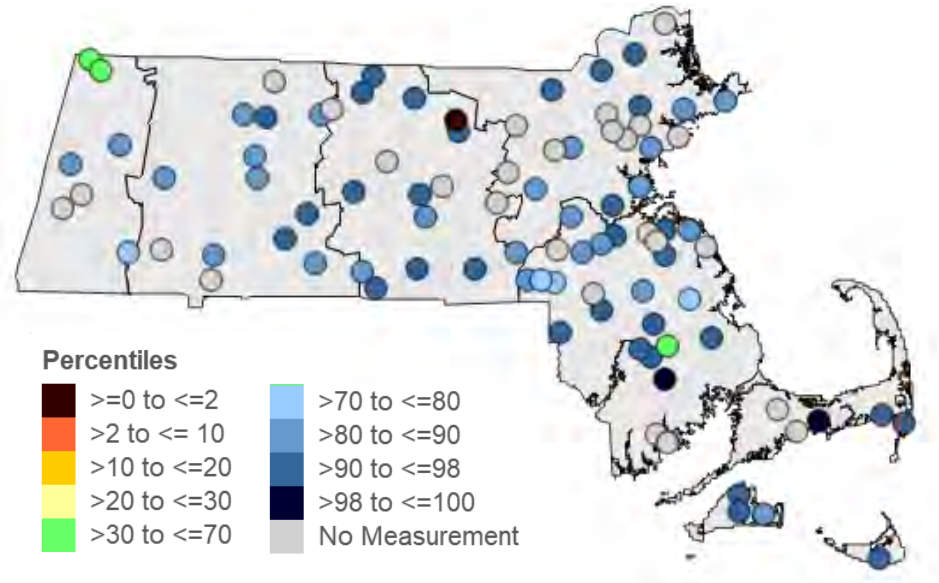
MASSACHUSETTS WATER RESOURCES COMMISSION

December 2019 Hydrologic Conditions in Massachusetts

SUMMARY OF CONDITIONS

- Monthly temperatures were average for December. However, daily temperature in Boston, for example, ranged from 15 to 63 degrees Fahrenheit (deg F) with departures of -13 and +16 (deg F), respectively.
- Precipitation as snow and rain was significantly higher than median values. Index severity levels are 0.
- Streamflow and groundwater were greater than 30th percentile values. Index severity levels are 0.
- Lakes and Impoundments were greater than 30th percentile values. Index severity levels are 0.
- For January, NOAA projects equal chances for below-normal, normal, or above-normal temperatures and precipitation.
- Appendices I and II provide additional precipitation data and information on the Massachusetts Drought Management Plan (DMP), respectively.

PRECIPITATION



Precipitation was significantly above median values for December. All look-back periods for the SPI are at Severity Level 0.

Map from the Northeast Regional Climate Center. http://www.nrcc.cornell.edu/regional/monthly/monthly.html

Region	Number of Sites	December Average (inches)	Departure from Historical (inches)	DMP SPI 1-month	DMP SPI 2-month	DMP SPI 3-month
Western	5	5.20	1.88	0.92	0.69	1.11
CT River Valley	10	6.36	2.45	1.34	0.77	0.86
Central	13	6.94	3.00	1.54	0.82	1.11
Northeast	11	6.42	2.18	1.19	0.77	0.98
Southeast	20	7.70	2.93	1.27	0.97	1.06
Cape Cod	3	8.83	4.70	1.86	1.21	1.68
Islands	4	7.47	3.53	1.53	0.77	1.31

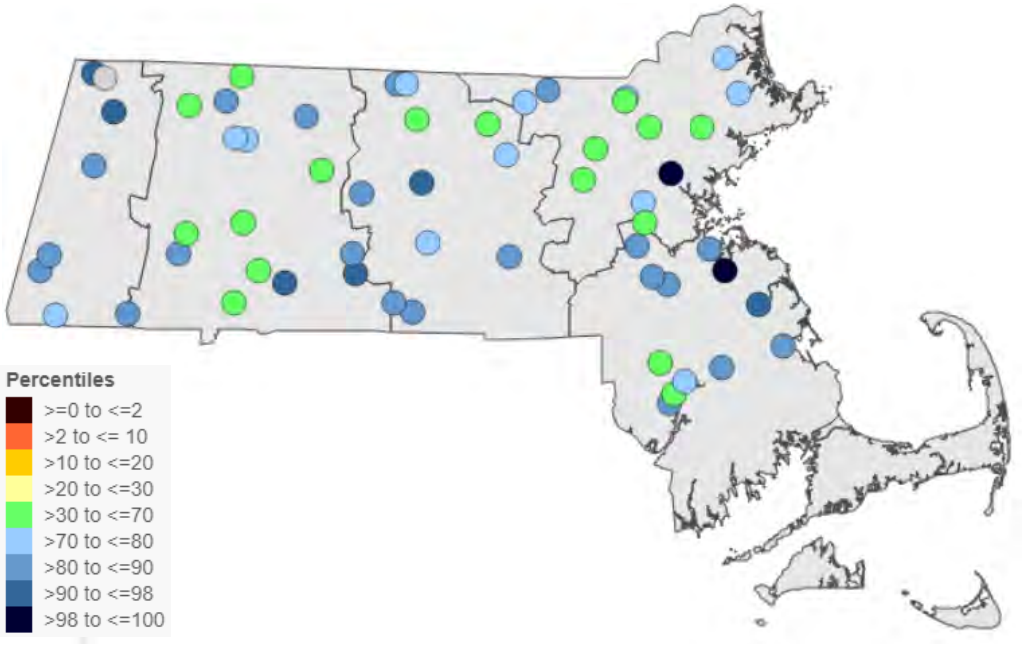
STREAMFLOW

Monthly median streamflows were all greater than their respective 30th percentile values for December, with many recording significantly higher. Eight gages recorded greater than 90th percentile median flows.

Median Monthly Streamflows Compared to Historical Values

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

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

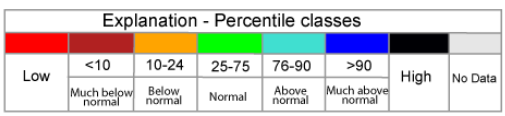


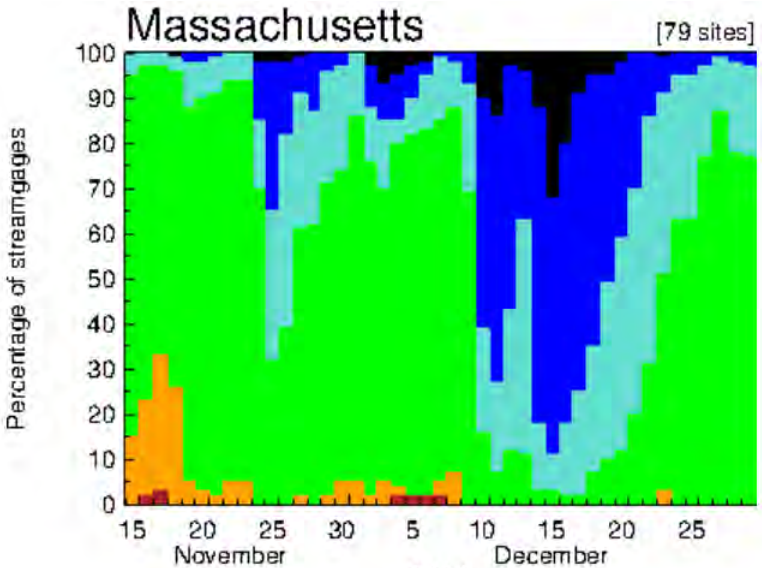
Region	Number of Gages						Median of Individual Gage Percentiles	DMP Index Severity
	Total Reporting for December	≥0 to ≤2 Percentile	>2 to ≤10 Percentile	>10 to ≤20 Percentile	>20 to ≤30 Percentile	> 90 Percentile		
Western	7	0	0	0	0	2	86	0
CT River	15	0	0	0	0	2	73	0
Central	11	0	0	0	0	1	80	0
Northeast	13	0	0	0	0	1	70	0
Southeast	12	0	0	0	0	2	85	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=real&sid=w__plot_sum&r=ma



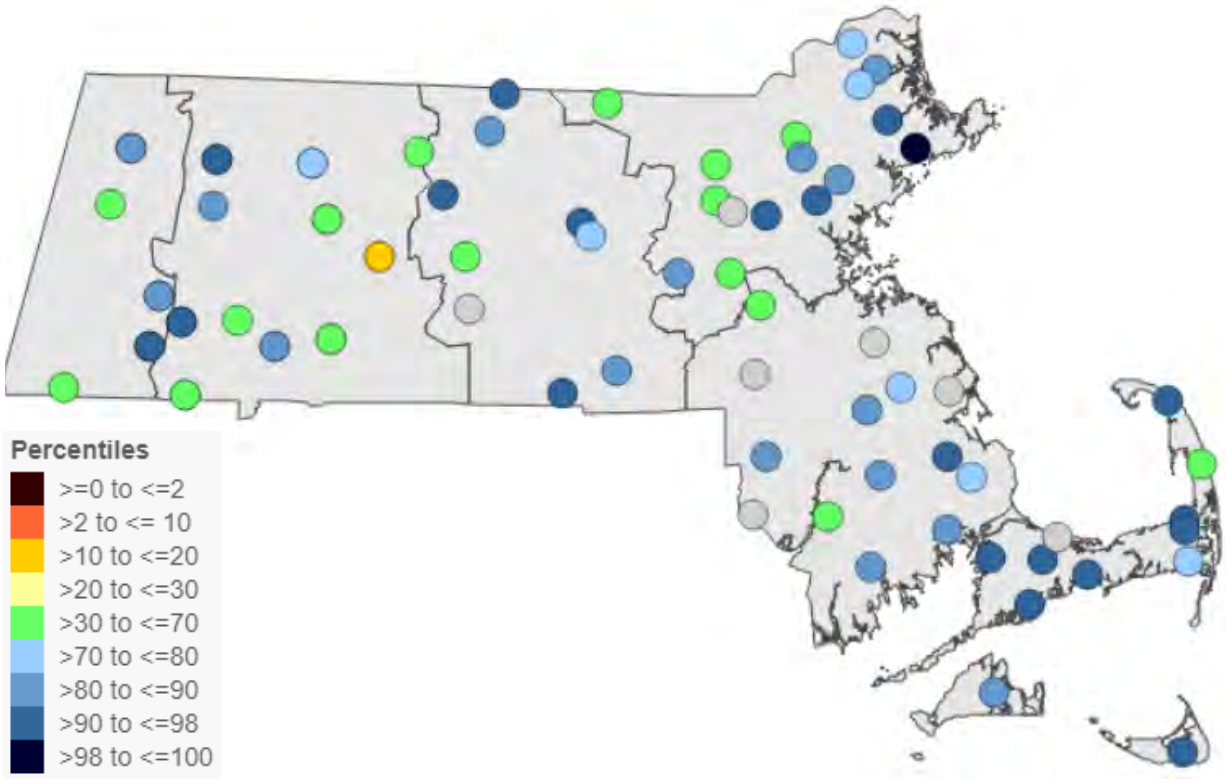


GROUNDWATER

Groundwater levels have recovered at all wells except Pelham 23. This well has been lower than its 30th percentile value since June; however, it did gain over a foot of recharge since November. All other wells are above their 30th percentile values with 20 wells greater than their 90th percentile values.

End of December 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 Dec.	≥0 to ≤2 Percentile	>2 to ≤10 Percentile	>10 to ≤20 Percentile	>20 to ≤30 Percentile	>90th Percentile		
Western	5	0	0	0	0	**1**	82	0
CT River Valley	11	0	0	**1**	0	**2**	67	0
Central	10	0	0	0	0	**4**	89	0
Northeast	14	0	0	0	0	**4**	82	0
Southeast	10	0	0	0	0	**1**	82	0
Cape Cod	9	0	0	0	0	**7**	94	0
Islands	2	0	0	0	0	**1**	87	0

LAKES and IMPOUNDMENTS

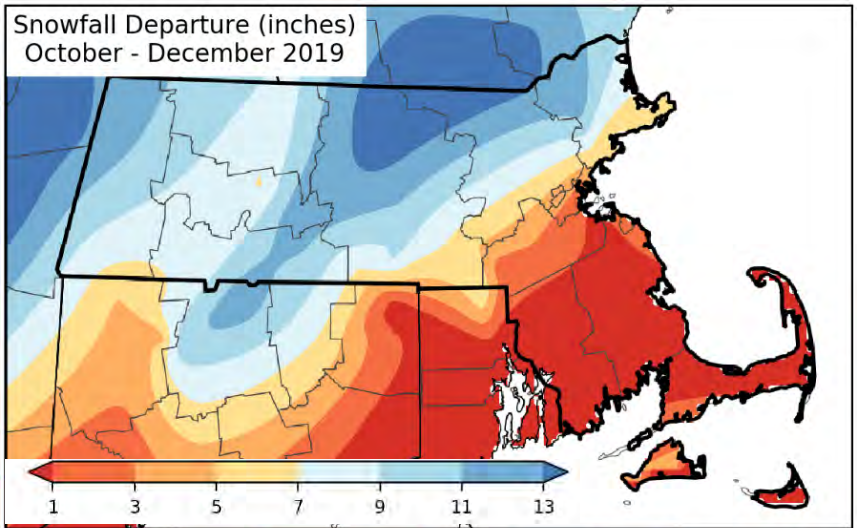
At the end of December, all drought regions were at Index Severity 0.

Region	Total Reporting for Dec.	Median of Lakes and Impoundments Percentiles	DMP Index Severity
Western	2	48	0
CT River Valley	2	58	0
Central	2	82	0
Northeast	7	67	0
Southeast	2	78	0
Cape Cod	1	100	0
Islands	N/A	N/A	N/A

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

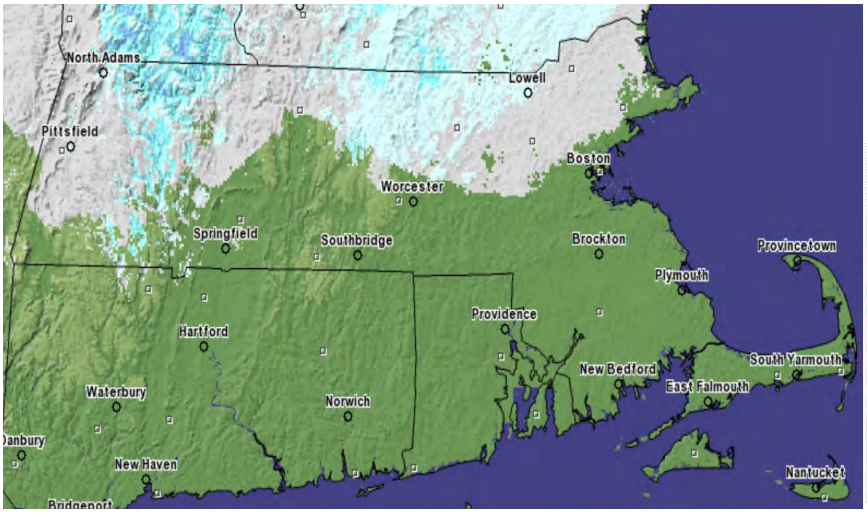
KBDI and CMI are reported seasonally.

SNOW



Season-to-date snowfall departure

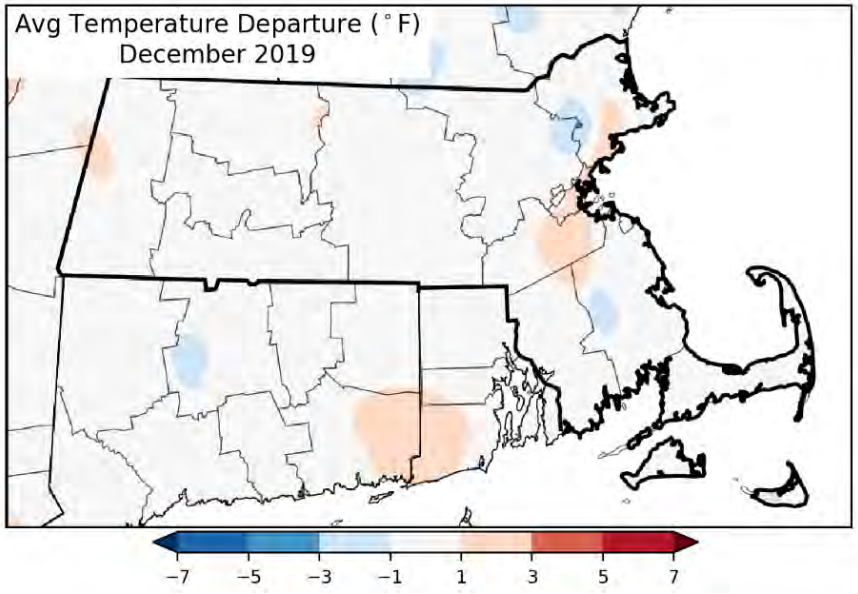
The state received significant snowfall in the first half of December, resulting in above normal snowfall to date.
http://www.nrcc.cornell.edu/regional/monthly/monthly.html



Snow cover

At the end of December, minor amounts of snow remained in the northern and western portions of the state.
https://www.nohrsc.noaa.gov/interactive/html/map.html

TEMPERATURE



Monthly average temperatures were around historical averages for this time of the year. http://www.nrcc.cornell.edu/regional/monthly/monthly.html

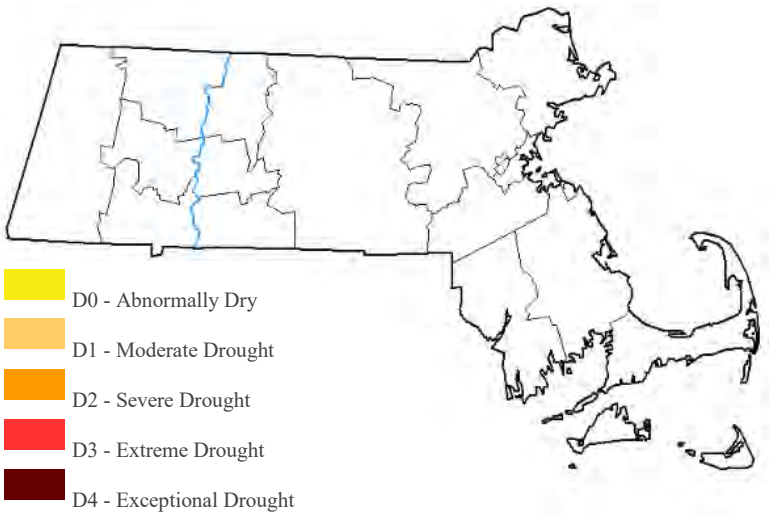
However, daily temperatures ranged from 15 to 63 degrees Fahrenheit (deg F). Daily departures from historical averages ranged from +18 to –18 deg F.

DROUGHT CONDITIONS AND FORECASTS BY NOAA AND PARTNERS

U.S. Drought Monitor as of December 31, 2019

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

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

January: The outlook projects equal chances for below-normal, normal, or above-normal temperatures and precipitation.

February through April: The outlook projects equal chances for below-normal, normal, or above-normal temperatures and precipitation.
https://www.cpc.ncep.noaa.gov/

Monthly and Seasonal Drought Outlook

The monthly outlook for January and seasonal outlook valid through March do not project drought conditions. 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.

Appendix I— Additional Precipitation Data

Standardized Precipitation Index December 2019

Drought Region	Number of Sites	SPI1	SPI2	SPI3	SPI6	SPI9	SPI12	SPI24	SPI36
Western	5	0.92	0.69	1.11	0.27	0.36	0.55	1.32	1.03
Connecticut River	10	1.34	0.77	0.86	0.03	0.30	0.22	1.47	1.11
Central	13	1.54	0.82	1.11	0.60	1.04	0.82	1.90	1.63
Northeast	11	1.19	0.77	0.98	0.66	1.05	0.89	1.35	1.10
Southeast	20	1.27	0.97	1.06	0.68	1.05	0.98	1.91	1.51
Cape Cod	3	1.86	1.21	1.68	0.89	1.10	0.97	1.39	2.01
Islands	4	1.53	0.77	1.31	0.89	1.34	1.51	1.67	1.93

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 Average (inches)	December Average (inches)	Departure from Historical (inches)	Percent of Historical
Western	5	3.62	5.20	1.88	153
Connecticut River	10	3.91	6.36	2.45	162
Central	13	3.96	6.94	3.00	171
Northeast	11	4.17	6.42	2.18	159
Southeast	20	4.45	7.70	2.93	161
Cape Cod	3	4.40	8.83	4.70	201
Islands	4	4.11	7.47	3.53	190

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