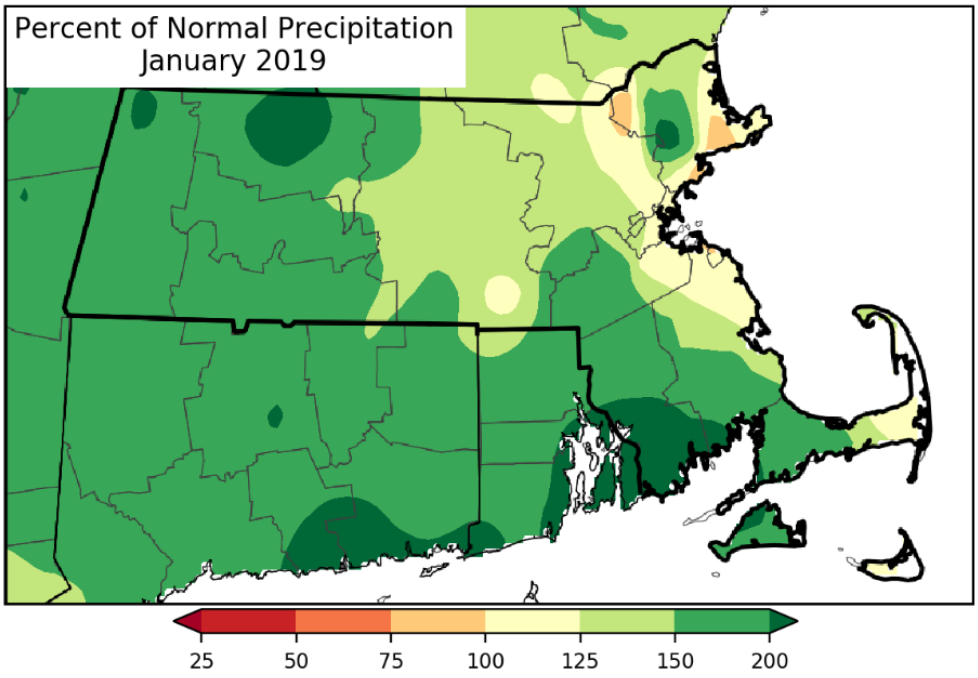
MASSACHUSETTS WATER RESOURCES COMMISSION

# January 2019 Hydrologic Conditions in Massachusetts

## SUMMARY OF CONDITIONS

- Average temperatures were near normal in the West and Central Regions. The rest of the state had areas of up to 2 degrees higher than average.
- Both Precipitation Indices are Normal for all regions.
- Streamflow, Groundwater, and Reservoir Indices are Normal for all regions with continued high values.
- Crop Moisture Index indicates wet conditions. Data for the Fire Index are not collected during the winter.
- NOAA's forecast for February projects equal chances for below normal, normal, or above normal temperatures and 40-50% chance of above normal precipitation across the state.
- Appendix I presents indices not shown in the main report and additional details about precipitation. Appendix II presents the drought level thresholds for all indices.

## PRECIPITATION




Precipitation was above to significantly above average for January.

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

| Region | Estimated Rainfall (inches) | Departure from Average Jan. (inches) | MA Drought Plan Levels | |
|---|---|---|---|---|
| | | | Standardized Precipitation Index (SPI) | Percent of Normal Index |
| **Western** | 4.95 | 1.82 | Normal | Normal |
| **CT River Valley** | 6.02 | 2.61 | Normal | Normal |
| **Central** | 5.09 | 1.33 | Normal | Normal |
| **Northeast** | 4.15 | 0.58 | Normal | Normal |
| **Southeast** | 6.04 | 2.12 | Normal | Normal |
| **Cape Cod & Islands** | 6.11 | 2.21 | Normal | Normal |

| Key to Drought Plan Levels |
|---|
| Normal |
| Advisory |
| Watch |
| Warning |
| Emergency |

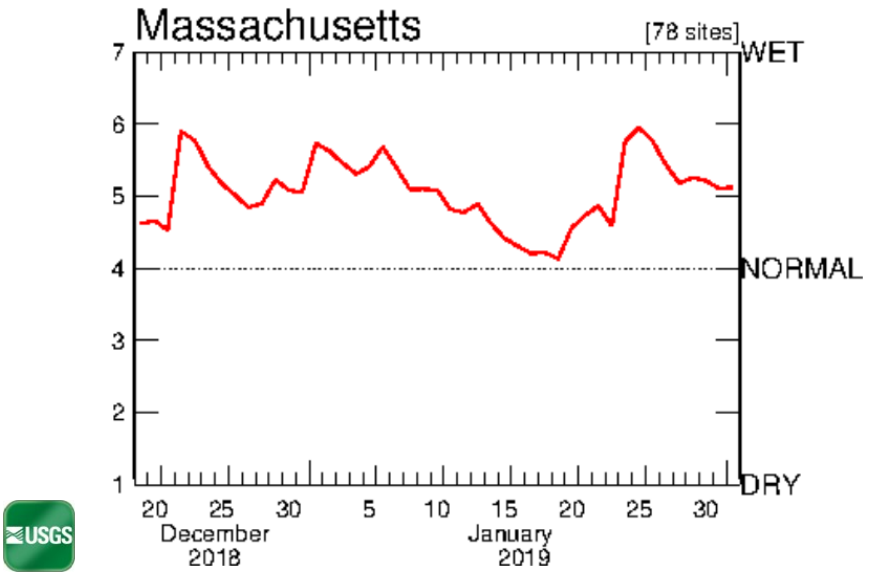
# STREAMFLOW

The vast majority of gages recorded above average flows relative to historical data for the sixth month in a row. 36 of 56 gages remain at greater than 90th percentile flow.

## Average Daily Streamflow Compared to Historical for the Day of the Year

This plot depicts data for the 45-day period ending February 4.
http://waterwatch.usgs.gov/index.php?id=real&sid=w__plot&r=ma

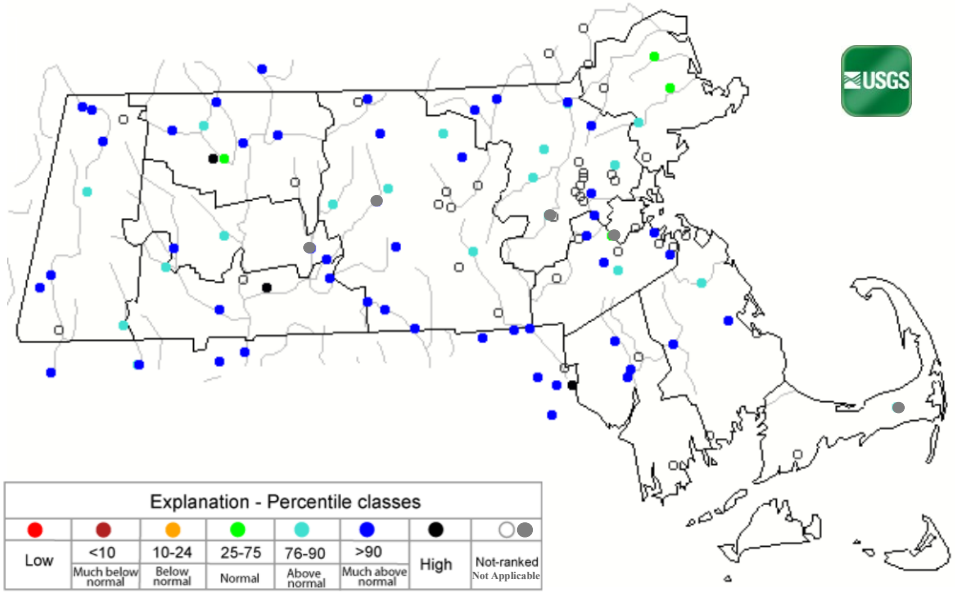
**KEY:**
1 = New record low for day
2 = < 10th percentile
3 = 10th – 24th percentile
4 = 25th – 74th percentile
5 = 75th – 89th percentile
6 = > 90th percentile
7 = New record high for day




## Average January Streamflow Compared to Historical for the Month of the Year

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

http://waterwatch.usgs.gov/index.php?r=ma&id=mv01d




| Region | Number of Gages | | | | >90th percentile flow | MA Drought Plan Index/# of consecutive months majority below 25th percentile |
|---|---|---|---|---|---|---|
| | Total Reporting for January | <25th to 10th percentile | <10th percentile to above record low | Record low | | |
| **Western** | 7 | 0 | 0 | 0 | **5** | Normal/0 |
| **CT River Valley** | 14 | 0 | 0 | 0 | **10** | Normal/0 |
| **Central** | 10 | 0 | 0 | 0 | **6** | Normal/0 |
| **Northeast** | 17 | 0 | 0 | 0 | **10** | Normal/0 |
| **Southeast** | 6 | 0 | 0 | 0 | **5** | Normal/0 |

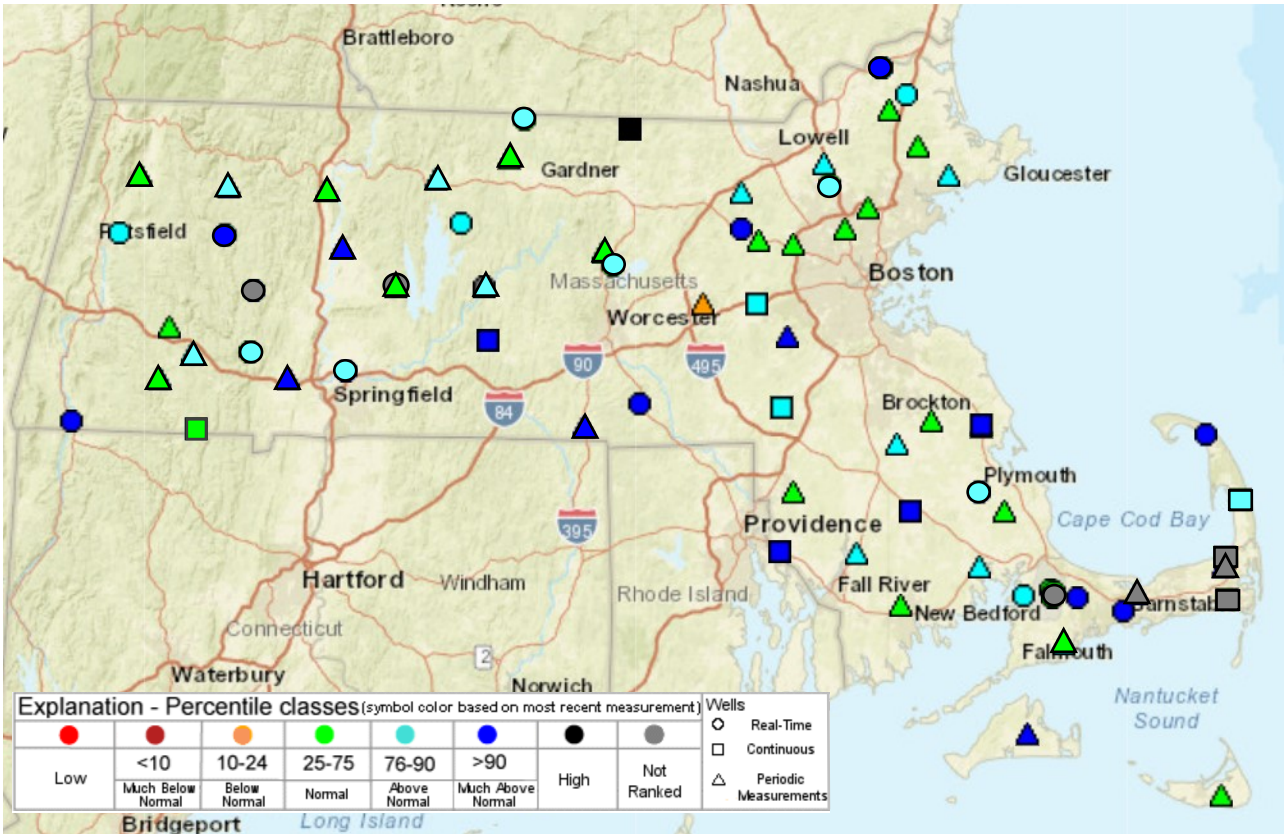
Notes: Gage counts are non-cumulative except for "total reporting". Not all gages report in all months due to ice, beaver dams or other conditions. Streamflow index is not applicable to Cape Cod and the Islands.

# GROUNDWATER

Groundwater levels continue to vary across the State from normal to significantly above normal. There are only two exceptions—one well in the Northeast region is slightly below the 25th percentile and one well is at record high in the Central region.

## Groundwater Conditions in the Climate Response Network at the End of January

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




| Region | Number of wells | | | | | MA Drought Plan Index /# consecutive months majority below 25th percentile |
|---|---|---|---|---|---|---|
| | Total Reporting for January | <25th to 10th percentile | <10th percentile to above record low | Record low | > 90th percentile | |
| **Western** | 5 | 0 | 0 | 0 | **1** | Normal/0 |
| **CT River Valley** | 11 | 0 | 0 | 0 | **5** | Normal/0 |
| **Central** | 10 | 0 | 0 | 0 | **4** | Normal/0 |
| **Northeast** | 16 | 1 | 0 | 0 | **3** | Normal/0 |
| **Southeast** | 12 | 0 | 0 | 0 | **3** | Normal/0 |
| **Cape and Islands** | 8 | 0 | 0 | 0 | **4** | Normal/0 |

Notes: Well counts are non-cumulative except for “total reporting”. Not all data are available in time for reporting.

## RESERVOIRS

At the end of January, most reporting reservoirs were significantly above normal, with some reservoirs spilling.

| Region | Total Reporting for January | Reservoir Levels | MA Drought Management Plan Reservoir Index |
|---|---|---|---|
| **Western** | 2 | Normal | Normal |
| **CT River Valley** | 2 | Normal | Normal |
| **Central** | 4 | Normal | Normal |
| **Northeast** | 6 | Normal | Normal |
| **Southeast** | 3 | Normal | Normal |
| **Cape Cod & Islands** | 1 | Normal | Normal |

## DROUGHT CONDITIONS AND FORECASTS BY NOAA AND PARTNERS

### U.S. Drought Monitor: Drought Conditions as of January 31, 2019

**Summary:** The USDM map shows all regions as normal.

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

**February:** The outlook projects equal chances for below normal, normal, or above normal temperatures and 40-50% chance of above normal precipitation across the state.

**February through April**: The outlook projects equal chances for below normal, normal, or above normal temperatures and precipitation.

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

# DROUGHT CONDITIONS AND FORECASTS BY NOAA AND PARTNERS, cont.

## NOAA Climate Predication Center: Monthly and Seasonal Drought Outlook

The monthly outlook for February and seasonal outlook valid through April do not project drought conditions.

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

**Key Links:** Massachusetts Drought Management: http://www.mass.gov/eea/agencies/dcr/water-res-protection/water-data-tracking/drought-status.html
DCR Precipitation Monitoring Composite Reports and SPI
https://www.mass.gov/service-details/precipitation-composite-estimates-1
https://www.mass.gov/service-details/standardized-precipitation-index-spi-0
This report was prepared by the Massachusetts Department of Conservation and Recreation. Data may be preliminary in nature. Additional information, previous hydrological conditions reports, and drought management information can be found on our web site:
https://www.mass.gov/water-data-tracking

# Appendix I: Additional Information

## Keetch-Byram Drought Index

Data for the Fire Index are not collected during the winter.

## Crop Moisture Index

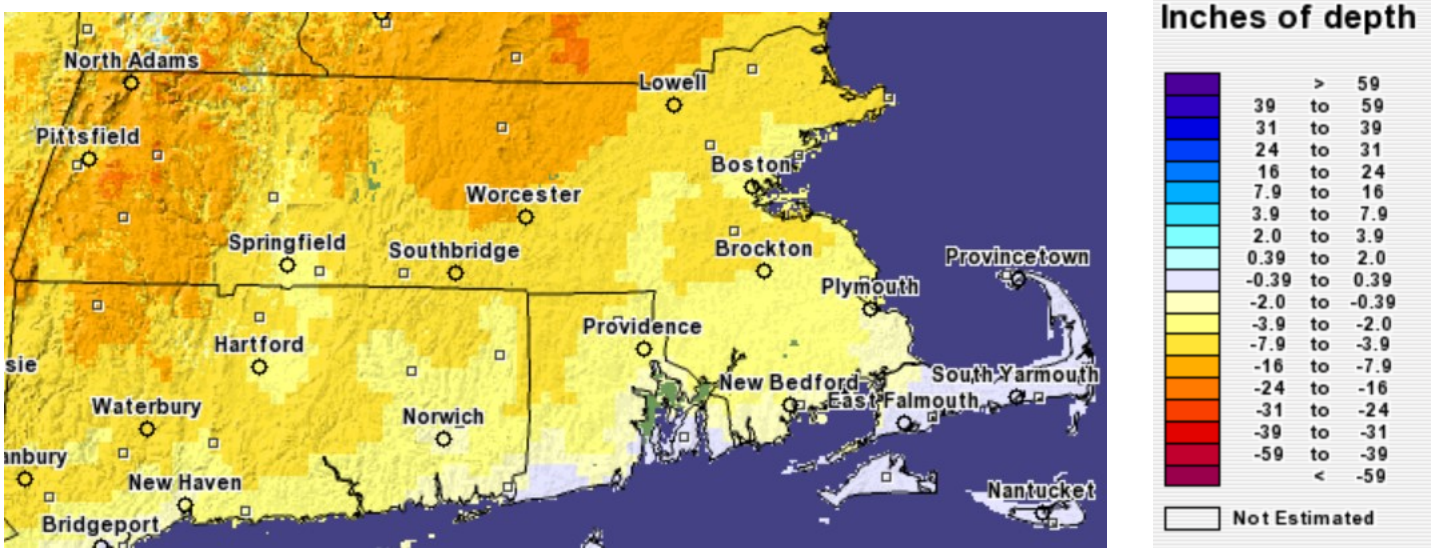
The CMI map for the week ending February 2, 2019 shows abnormally moist to wet conditions.

The Crop Moisture Index shows the short-term need versus available water in a shallow soil profile. This index responds quickly to changing conditions and is subject to frequent change. The drought level for this indicator is determined based on the repeated or extended occurrence at a given level. This indicator is most relevant during growing season. http://www.cpc.noaa.gov/products/analysis_monitoring/regional_monitoring/cmi.gif

## Snowpack as Snow Water Equivalent

NOAA's model shows significant deficit in snowpack across the State.

National Operational Hydrologic Remote Sensing Center's Interactive Snow Information is available at https://www.nohrsc.noaa.gov/interactive/html/map.html



# Appendix I: Additional Information, continued

## Percent of Average Historical Precipitation

| January-19 | Nor- | Actual | Percent Normal | Excess/ Deficit | Excess or Deficit Since Last 10/1/2018 | 2 Months | % Norm | 3 Months | % Norm | 6 Months | % Norm | 12 | % Norm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **State** | 3.64 | 5.37 | 148 | 1.73 | 8.78 | 1.89 | 125 | 7.17 | 163 | 14.98 | 165 | 18.89 | 142 |
| **Western** | 3.13 | 4.95 | 158 | 1.82 | 7.39 | 1.90 | 129 | 6.01 | 159 | 16.17 | 174 | 20.99 | 148 |
| **Connecticut River** | 3.41 | 6.02 | 177 | 2.61 | 9.55 | 3.76 | 153 | 8.71 | 179 | 18.46 | 180 | 23.15 | 151 |
| **Central** | 3.76 | 5.09 | 135 | 1.33 | 7.62 | 1.84 | 124 | 6.77 | 158 | 15.64 | 167 | 19.38 | 142 |
| **Northeast** | 3.57 | 4.15 | 116 | 0.58 | 7.14 | 0.13 | 102 | 6.19 | 155 | 12.31 | 156 | 15.68 | 136 |
| **Southeast** | 3.92 | 6.04 | 154 | 2.12 | 11.02 | 1.89 | 124 | 7.80 | 165 | 16.25 | 169 | 18.96 | 142 |
| **Cape Cod and Islands** | 3.90 | 6.11 | 157 | 2.21 | 9.90 | 1.84 | 123 | 6.85 | 155 | 8.49 | 135 | 13.84 | 130 |

Note: Precipitation values are total rainfall and melted snow in inches.
Values are estimated pending receipt of additional data and final calculations.

## Standardized Precipitation Index for January 2019

| REGION | 3-Month SPI | 6-Month SPI | 12-Month SPI |
|---|---|---|---|
| Western Region | 2.05 | 2.84 | 2.86 |
| Connecticut River Region | 2.60 | 3.07 | 2.93 |
| Central Region | 1.99 | 2.56 | 2.49 |
| Northeast Region | 1.88 | 2.29 | 2.15 |
| Southeast Region | 2.07 | 2.63 | 2.35 |
| Cape & Islands | 1.98 | 1.61 | 1.97 |

# Appendix II: Description of Drought Indices

## (from Table 3 of Massachusetts Drought Management Plan).

| Drought Level | Standardized Precipitation Index | Crop Moisture Index* | Keetch-Byram Drought Index* | Precipitation | Groundwater | Streamflow | Reservoir*** |
|---|---|---|---|---|---|---|---|
| Normal | 3-month > -1.5 **or**<br>6-month > -1.0 **or**<br>12-month > -1.0 | 0.0 to -1.0 slightly dry | < 200 | 1 month below normal | 2 consecutive months below normal** | 1 month below normal** | Reservoir levels at or near normal for the time of year |
| Advisory | 3-month = -1.5 to -2.0 **or**<br>6-month = -1.0 to -1.5 **or**<br>12-month = -1.0 to –1.5 | -1.0 to -1.9 abnormally dry | 200-400 | 2 month cumulative below 65% of normal | 3 consecutive months below normal** | At least 2 out of 3 consecutive months below normal** | Small index Reservoirs below normal |
| Watch | 3-month < -2.0 **or**<br>6-month = -1.5 to -3.0 **or**<br>12-month = -1.5 to -2.0 | -2.0 to –2.9 excessively dry | 400-600 | 1 of the following criteria met:<br>3 month cum. < 65% **or**<br>6 month cum. < 70% **or**<br>12 month cum. < 70% | 4-5 consecutive months below normal** | At least 4 out of 5 consecutive months below normal** | Medium index Reservoirs below normal |
| Warning | 6-month < -3.0 **or**<br>12-month = -2.0 to -2.5 | < -2.9 severely dry | 600-800 | 1 of the following criteria met:<br>3 month cum. < 65% and<br>6 month cum. <65%, **or**<br>6 month cum. <65% and<br>12 month cum. <65%, **or**<br>3 month cum. <65% and<br>12 month cum. <65% | 6-7 consecutive months below normal** | At least 6 out of 7 consecutive months below normal** | Large index reservoirs below normal |
| Emergency | 12-month < -2.5 | <-2.9 severely dry | 600-800 | Same criteria as Warning and previous month was Warning or Emergency | >8 months below normal** | >7 months below normal** | Continuation of previous month's conditions |

* The Crop Moisture Index is subject to frequent change. The drought level for this indicator is determined based on the repeated or extended occurrence at a given level.

** Below normal for groundwater and streamflow are defined as being within the lowest 25$^{th}$ percentile of the period of record.

*** Water suppliers should be consulted to determine if below normal reservoir conditions are due to operational issues.

Source: Massachusetts Drought Management Plan. May 2013 (http://www.mass.gov/eea/docs/eea/wrc/droughtplan.pdf ).