MASSACHUSETTS WATER RESOURCES COMMISSION

February 2017 Hydrologic Conditions in Massachusetts

SUMMARY OF CONDITIONS

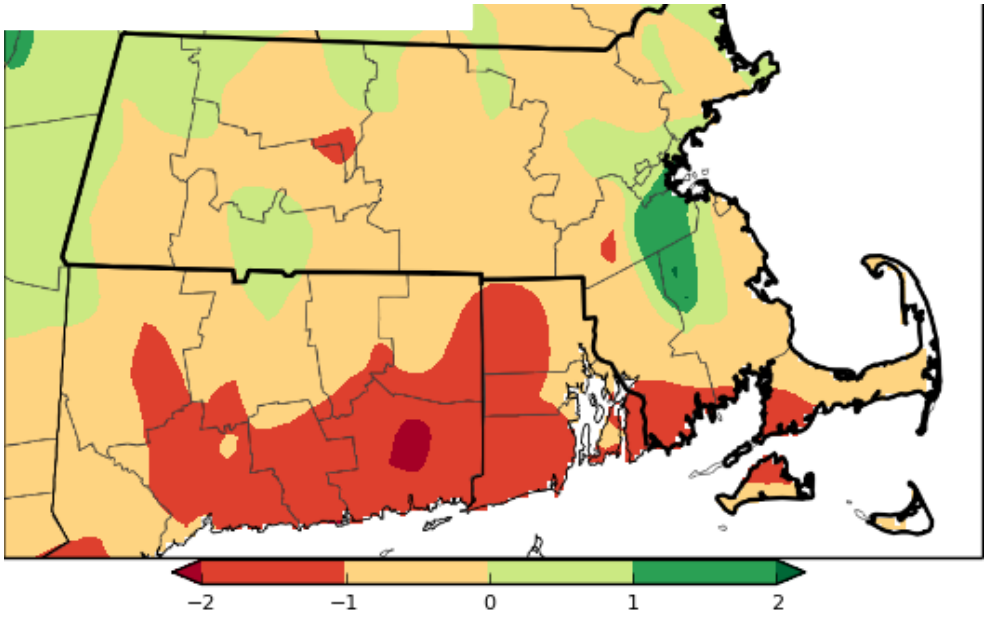
- Precipitation was below average in all regions for the month. The 12-month precipitation deficit remains in all regions except the West.
- Average monthly streamflows continue to maintain normal or near normal conditions in all regions.
- Groundwater levels continue to recover. The West and Northeast regions are closest to normal levels with other regions lagging.
- Reservoir levels have mostly recovered with some impacts remaining in the Northeast and Cape & Islands.
- NOAA projects normal precipitation and temperatures for February.
- Drought effects continue to show in all regions. Appendix I provides values of indices not presented in the main report. Appendix II provides a description of the indices from the Drought Management Plan.

PRECIPITATION

Region	Estimated Rainfall (inches)	Departure from Average February (inches)	MA Drought Plan Levels	
			Standardized Precipitation Index (SPI)	Percent of Normal Index
Western	2.82	-0.57	Normal	Normal
CT River Valley	3.18	-0.22	Watch (12 mo)	Normal
Central	3.51	-0.84	Advisory (12 mo)	Normal
Northeast	3.31	-0.06	Advisory (12 mo)	Normal
Southeast	3.55	-0.75	Advisory (12 mo)	Normal
Cape Cod & Islands	3.52	-1.01	Advisory (12 mo)	Normal

February 2017 Precipitation Departure from Normal

Map based on ACIS Climate Data presented by Northeast Regional Climate Center. http://www.nrcc.cornell.edu/regional/monthly/monthly.html



STREAMFLOW

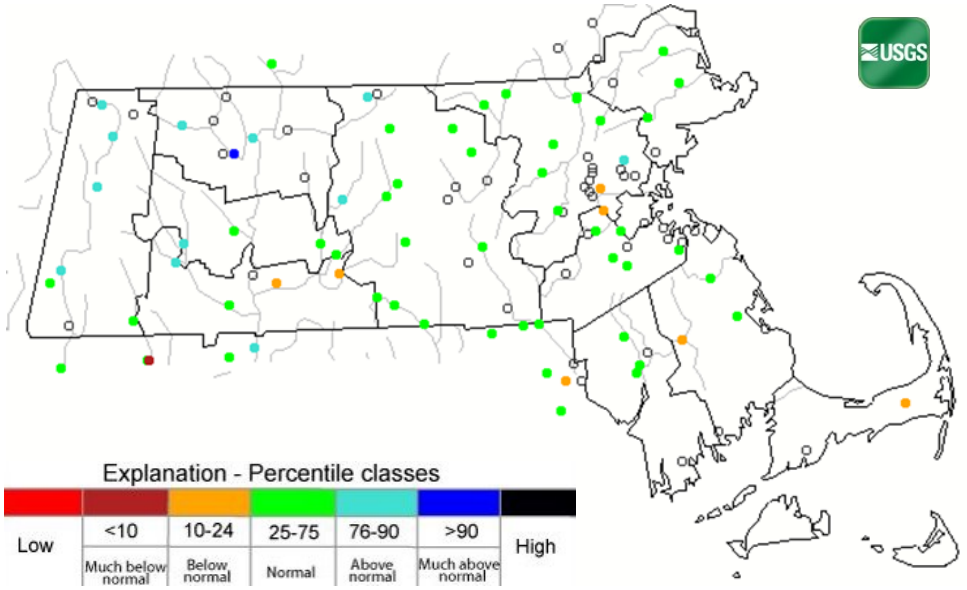
Region	Number of Gages				MA Drought Plan Index (# consecutive months majority below 25th percentile)
	Total Reporting	<25th to 10th percentile	<10th percentile to above record low	Record low	
Western	6	0	0	0	0/ Normal
CT River Valley	11	2	0	0	0/ Normal
Central	11	0	0	0	0/ Normal
Northeast	18	2	0	0	0/ Normal
Southeast	6	1	0	0	0/ Normal

Key to Drought Levels
Normal
Advisory
Watch
Warning
Emergency

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

Average Monthly 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

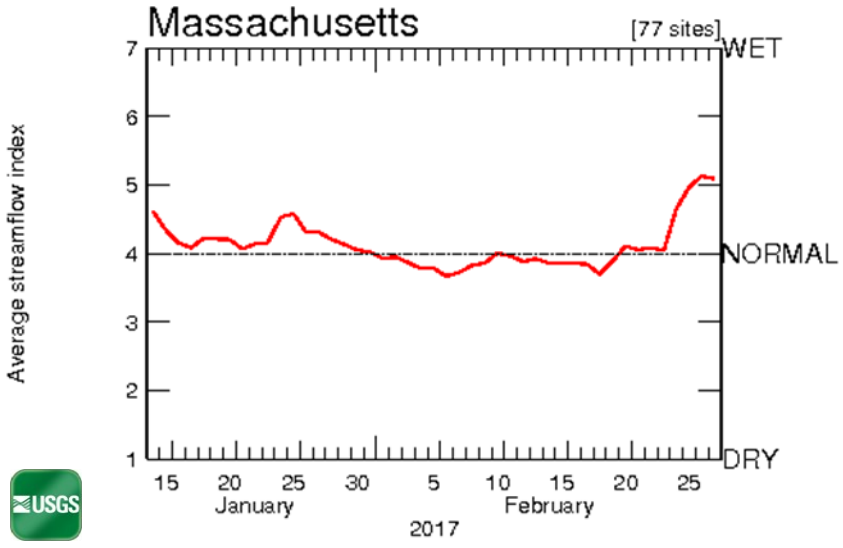


Average Daily Streamflow Compared to Historical for the Day of the Year

This plot depicts data for the 45-day period ending March 2.

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

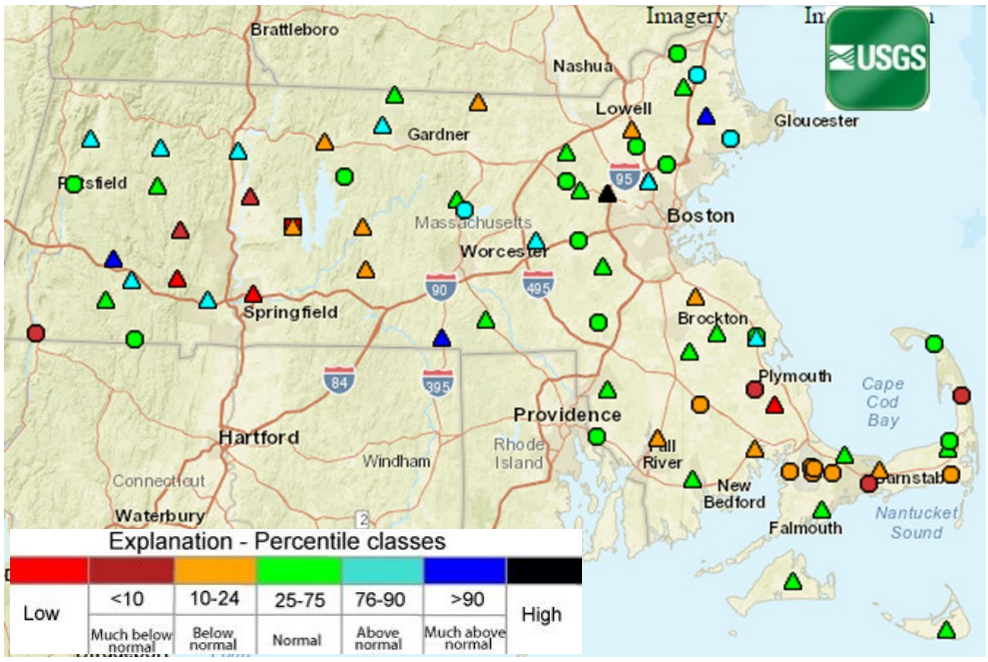


GROUNDWATER

Region	Number of wells				MA Drought Plan Index (# consecutive months majority below 25th percentile)
	Total Reporting	<25th to 10th percentile	<10th percentile to above record low	Record low	
Western	5	0	1	0	0/Normal
CT River Valley	10	1	1	2	0/Normal
Central	9	3	0	0	0/Normal
Northeast	16	2	0	0	0/Normal
Southeast	12	4	0	1	0/Normal
Cape and Islands	13	4	1	0	0/Normal

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

Groundwater Conditions in the Climate Response Network ending February 2017



RESERVOIRS

Region	Number of Reservoirs Reporting	Reservoir Levels	MA Drought Management Plan Reservoir Index
Western	2	Normal	Normal
CT River Valley	2	Below	Normal[1]
Central	3	Below	Normal
Northeast	7	Normal	Watch[2]
Southeast	4	Below	Normal
Cape Cod & Islands	1	Normal	Normal

1 Quabbin reservoir is slightly below normal. This is a large reservoir which would jump the index to warning. The other monitored reservoir in the CT River Valley region has returned to normal. It is a medium reservoir.

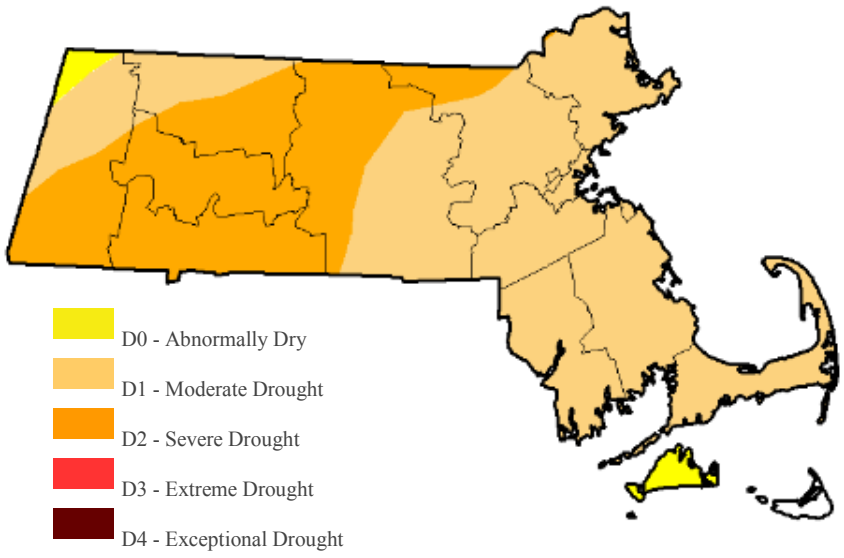
2 All monitored reservoirs except Cambridge have returned to normal. Since Cambridge is a medium reservoir system, it jumps the index to a watch.

DROUGHT CONDITIONS AND FORECASTS BY NOAA AND PARTNERS

U.S. Drought Monitor: Drought Conditions as of February 28, 2017

Summary: Massachusetts has 99 percent of its area in a drought with 37 percent remaining in a severe or extreme drought.

Produced by the National Drought Mitigation Center (NDMC). Intensity based on NDMC criteria. For a weekly updated map see: http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?MA



NOAA: Monthly and Seasonal Temperature and Precipitation Outlook

The Climate Prediction Center one-month outlook for March indicates likely normal temperatures and precipitation for Massachusetts (i.e., equal chances for below normal, normal and above normal; http://www.cpc.noaa.gov/products/predictions/30day/).

The Center's three-month outlook (March through May) shows a greater than 50 percent probability of above normal temperatures and likely normal precipitation (i.e., equal chances for below normal, normal and above normal; http://www.cpc.noaa.gov/products/predictions/long_range/seasonal.php?lead=1)

NOAA: Monthly and Seasonal Drought Outlook

The March projection shows drought persistence for the state. The three-month outlook suggests improvement and/or removal of drought across the state.
http://www.cpc.ncep.noaa.gov/products/Drought/

March 2017

February 16 - May 31, 2017

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
http://www.mass.gov/eea/agencies/dcr/water-res-protection/water-data-tracking/rainfall-program.html

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: http://www.mass.gov/eea/agencies/dcr/water-res-protection/water-data-tracking/

Appendix I: Additional Information

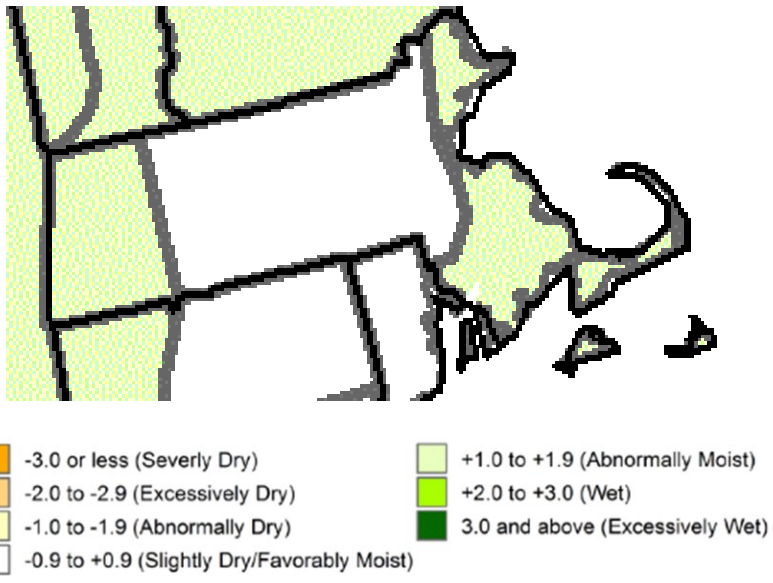
Keetch-Byram Drought Index by DCR Forest Fire Control Districts

The fire index was below 300 in all drought regions which indicates "normal" conditions according to the Massachusetts Drought Management Plan.

Crop Moisture Index for the Week Ending February 25, 2016

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

Region	MA Drought Plan Index
Western	Normal
CT River Valley	Normal
Central	Normal
Northeast	Normal
Southeast	Normal
Cape and Islands	Normal



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** 6-month > -1.0 **or** 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** 6-month = -1.0 to -1.5 **or** 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** 6-month = -1.5 to -3.0 **or** 12-month = -1.5 to -2.0	-2.0 to –2.9 excessively dry	400-600	1 of the following criteria met: 3 month cum. < 65% **or** 6 month cum. < 70% **or** 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** 12-month = -2.0 to -2.5	< -2.9 severely dry	600-800	1 of the following criteria met: 3 month cum. < 65% and 6 month cum. <65%, **or** 6 month cum. <65% and 12 month cum. <65%, **or** 3 month cum. <65% and 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 25th 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).