MASSACHUSETTS WATER RESOURCES COMMISSION

April 2017 Hydrologic Conditions in Massachusetts

SUMMARY OF CONDITIONS

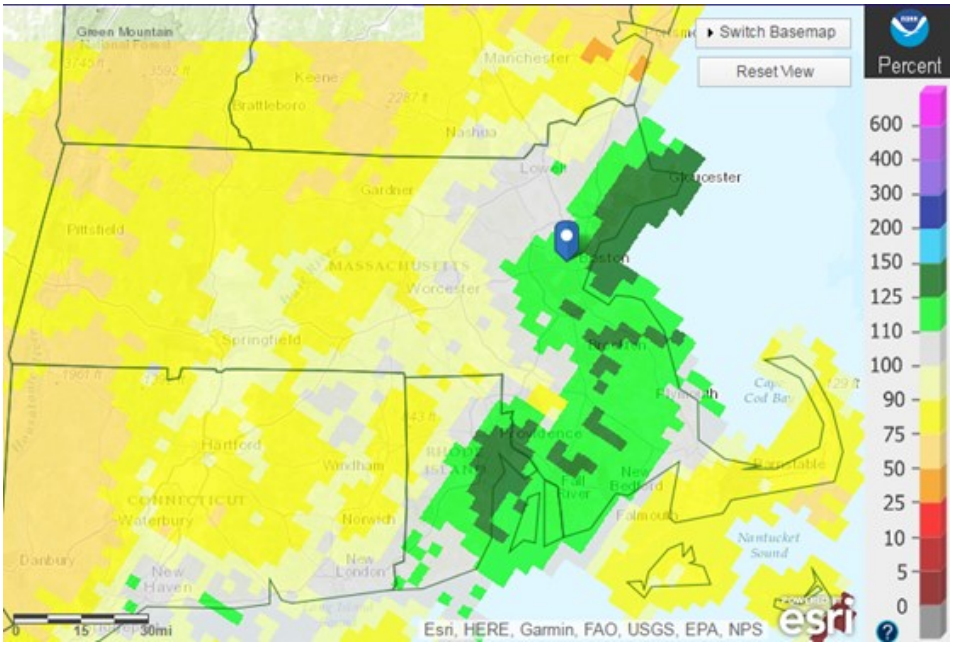
- Precipitation for the month was one to three inches above normal in all regions except the West, which was below normal.
- Average monthly streamflows were normal in all regions.
- Groundwater levels made significant recoveries after last month's stagnation. Only the CT River Valley and Cape & Islands have more than 1 well still below normal.
- Reservoirs are mostly normal, except for the Quabbin, Cambridge, and the Cape.
- NOAA projects above normal precipitation and equal chances for below normal, normal or above normal temperatures for May.
- 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 April (inches)	MA Drought Plan Levels	
			Standardized Precipitation Index (SPI)	Percent of Normal Index
Western	3.24	-0.27	Normal	Normal
CT River Valley	4.56	1.00	Advisory (12 mo)	Normal
Central	4.93	1.11	Advisory (12 mo)	Normal
Northeast	6.52	2.91	Normal	Normal
Southeast	7.17	3.27	Normal	Normal
Cape Cod & Islands	6.39	2.36	Normal	Normal

April 2017 Precipitation, as Percent of Normal

Map from National Weather Service's Quantitative Precipitation Estimates. http://water.weather.gov/precip/



STREAMFLOW

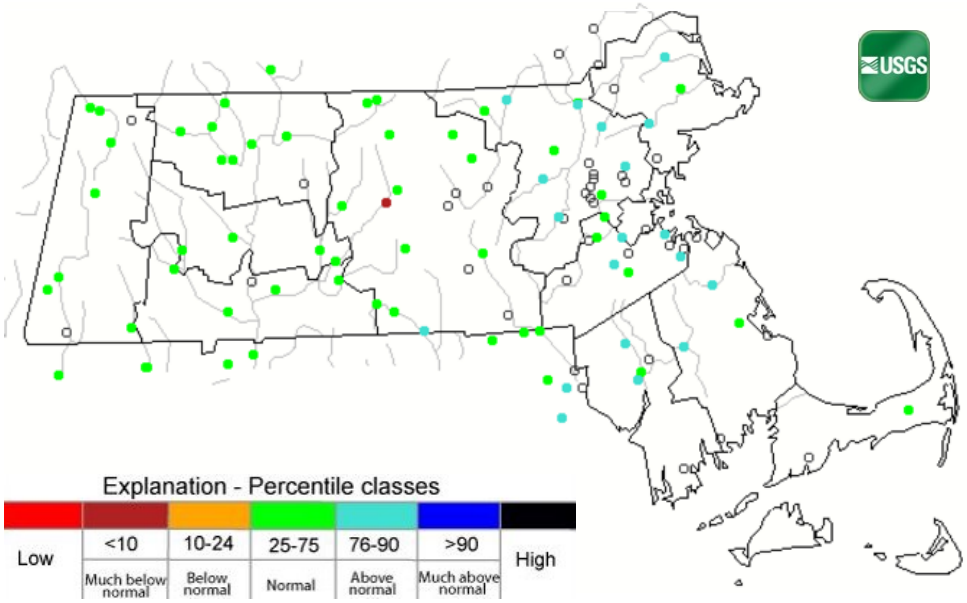
Region	Number of Gages: Total Reporting	<25th to 10th percentile	<10th percentile to above record low	Record low	MA Drought Plan Index (# consecutive months majority below 25th percentile)
Western	7	0	0	0	0/Normal
CT River Valley	14	0	0	0	0/Normal
Central	11	0	0	0	0/Normal
Northeast	19	0	0	0	0/Normal
Southeast	6	0	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

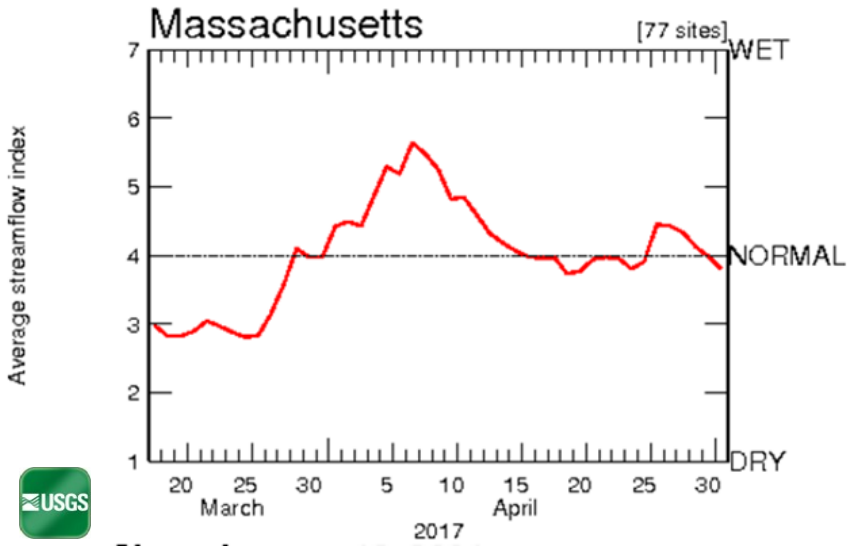


Average Daily Streamflow Compared to Historical for the Day of the Year

This plot depicts data for the 45-day period ending in April.

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

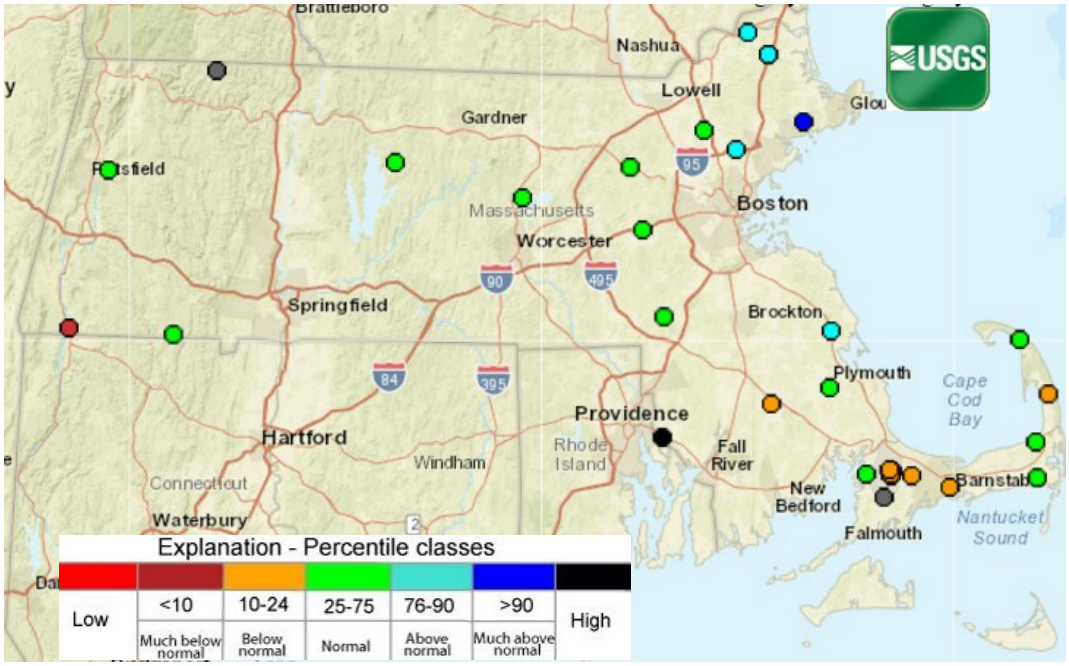


GROUNDWATER

Region	Number of wells				MA Drought Plan Index (# consecutive months majority below
	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	2	0	0	0/Normal
Central	10	1	0	0	0/Normal
Northeast	17	0	0	0	0/Normal
Southeast	12	1	0	0	0/Normal
Cape and Islands	12	4	0	0	0/Normal

Notes: Well counts are non-cumulative except for "total reporting". Not all data are available in time for reporting. *Well is recovering but not fast enough relative to past years.

Groundwater Conditions in the Real-Time Network at end of April 2017



RESERVOIRS

Region	Number of Reservoirs Reporting	Reservoir Levels	MA Drought Management Plan Reservoir Index
Western	1	Normal	Normal
CT River Valley	2	Near Normal	Warning[1]
Central	2	Normal	Normal
Northeast	6	Below (Cambridge)	Watch
Southeast	2	Normal	Normal
Cape Cod & Islands	1	Below	Advisory

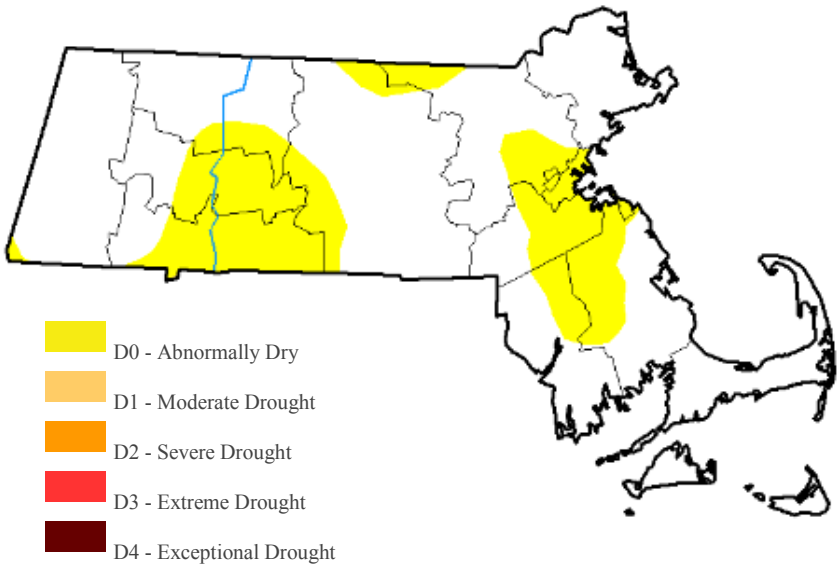
1 Quabbin reservoir is below normal. This is a large reservoir which jumps the index to warning. However, the other monitored reservoir in the CT River Valley region has returned to and remains normal. It is a medium reservoir system.

DROUGHT CONDITIONS AND FORECASTS BY NOAA AND PARTNERS

U.S. Drought Monitor: Drought Conditions as of April 25, 2017

Summary: Massachusetts has only 27 percent of its area remaining in an abnormally dry condition according to the U.S. Drought Monitor.

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

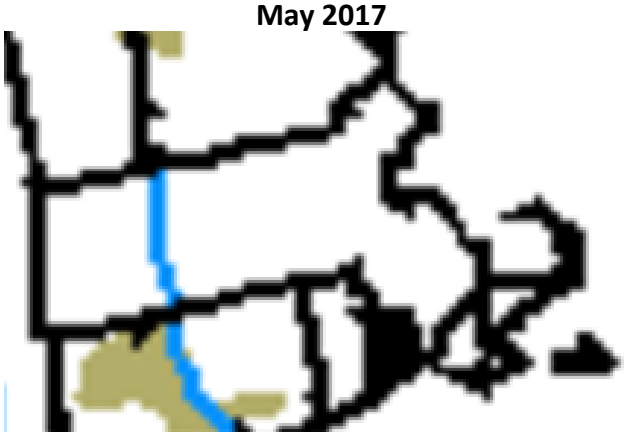
The Climate Prediction Center's outlook for May indicates equal chances of below, normal, or above normal temperatures and above normal precipitation for Massachusetts. (http://www.cpc.noaa.gov/products/predictions/30day/).

The Center's outlook for May through July projects above normal temperatures and equal chances for below normal, normal and above normal precipitation (http:// www.cpc.noaa.gov/products/predictions/long_range/seasonal.php?lead=1)

NOAA: Monthly and Seasonal Drought Outlook

The May and three-month projections do not show any remaining drought.
http://www.cpc.ncep.noaa.gov/products/Drought/

May 2017



April 20 - July 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

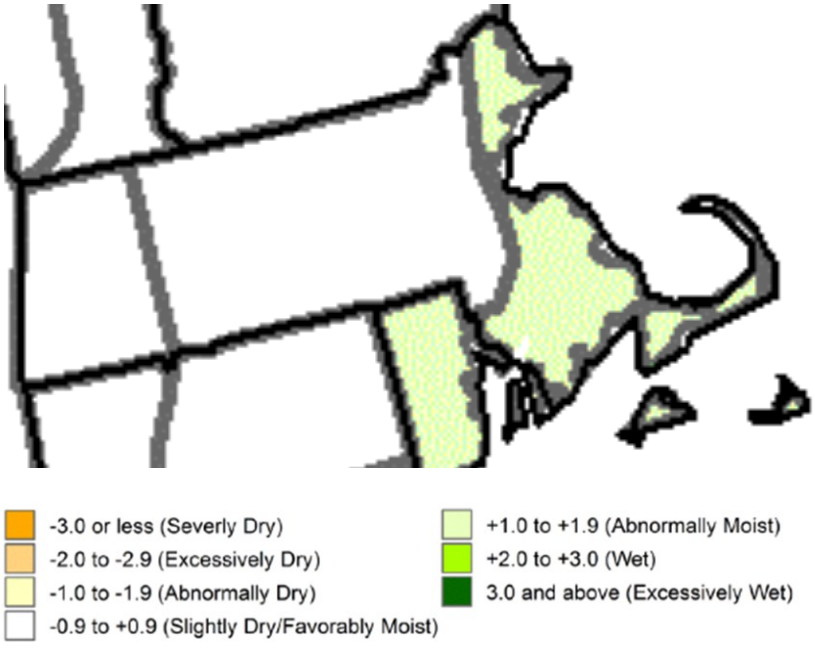
Keetch-Byram Drought Index

The fire index was below 300 in all drought regions which indicates "normal" conditions according to the Massachusetts Drought Management Plan. In particular, the Fire Chief reports that most values are 70's through low 100's. No fire concerns at any of the 13 reporting districts related to ground fuel conditions.

Crop Moisture Index for the Week Ending April 29, 2017

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).