

# Current Water Conditions in Massachusetts

## July 14, 2011



- June precipitation was above normal
- June streamflows were generally above normal and normal
- June ground-water levels were generally normal and above normal
- June reservoir levels were a little above normal

### Precipitation Conditions

Estimated June state-wide average precipitation is 5.33 inches, which is 142 percent of the long-term average for the month. The regions of Massachusetts received between 170 (Connecticut River) and 104 percent (Southeast) of average precipitation during June. June 2011 was the 18<sup>th</sup> wettest June in the last 117 years in Massachusetts according to the National Climate Data Center. The cool weather and above normal rainfall has kept the soil moisture index in the favorably moist range and the fire danger low. July precipitation to date is below normal generally ranging from 0.5 to 4 inches with the highest amounts on the Southeast and Cape Cod.

A table of June 2011 estimated precipitation statistics, based on precipitation data from the Department of Conservation and Recreation and National Weather Service precipitation monitoring networks, is attached. A map at the back of this report shows the distribution of June rainfall in Massachusetts.

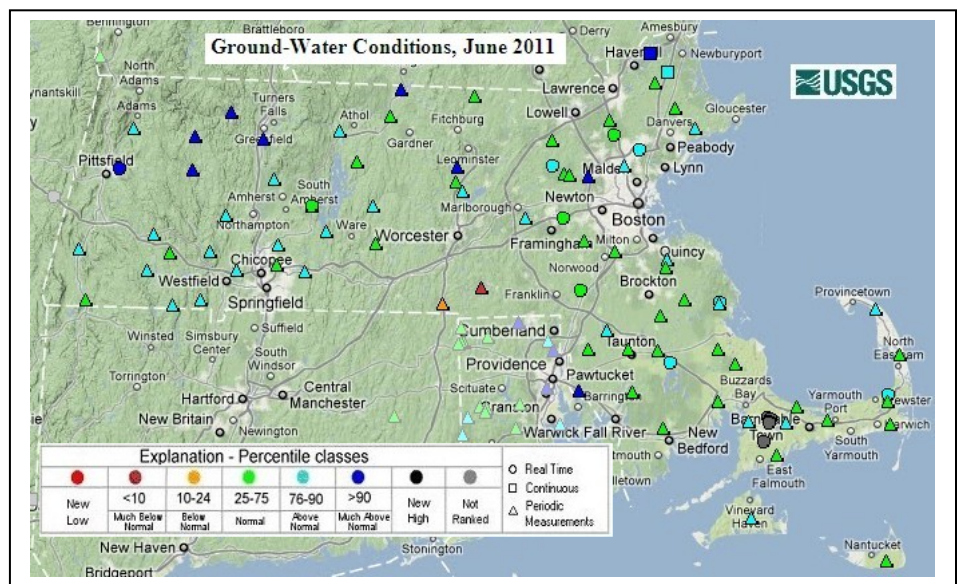
As previously reported in the June Conditions Report; On June 1<sup>st</sup> from approximately 4:30PM to 10:00PM, Western and Central Massachusetts were affected by severe thunderstorms producing heavy rain, strong winds, golf-ball-sized hail, and flash flooding. These storms also produced a total of three tornadoes, the most significant of which was determined by the National Weather Service to be an EF 3 with a maximum wind speed of about 160mph and a maximum width of half a mile. This tornado touched down in Westfield and traveled eastward for a total of 39 miles before lifting in Charlton. Two other tornadoes, both classified as EF 1, briefly touched down in Wilbraham and Brimfield. These tornadoes damaged or destroyed numerous homes and commercial and industrial buildings, brought down thousands of trees, and caused a total of 4 fatalities and 200 injuries

### Ground-Water Levels

Ground-water levels reported by the United States Geological Survey (USGS) at the end of June were generally much above normal in north central and northwest, above normal in south central and southwest, and normal in the remaining areas of Massachusetts. This assessment of ground-water levels is based on 89 wells in Massachusetts with 10 or more years of record. An assessment of ground-water conditions in the Massachusetts drought regions is shown in a table at the end of this report.

The USGS Groundwater Conditions for the end of June 2011 can be viewed at the web site:

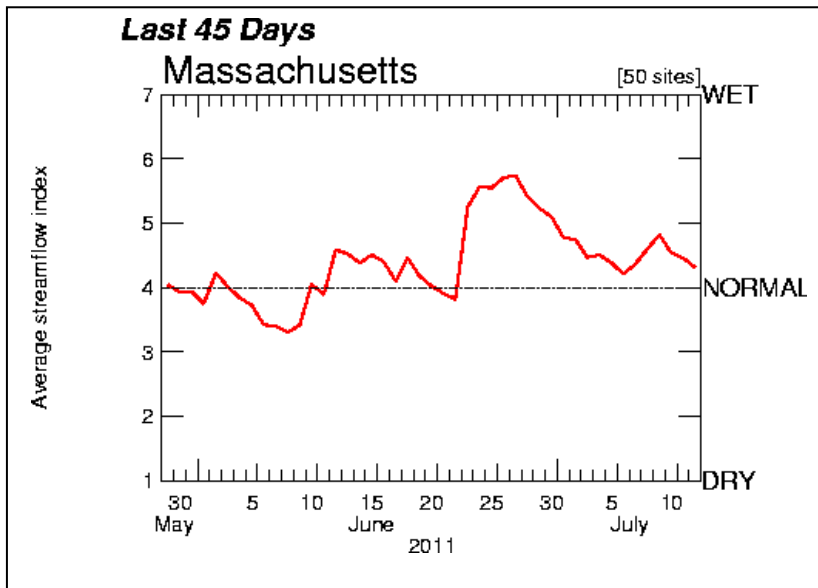
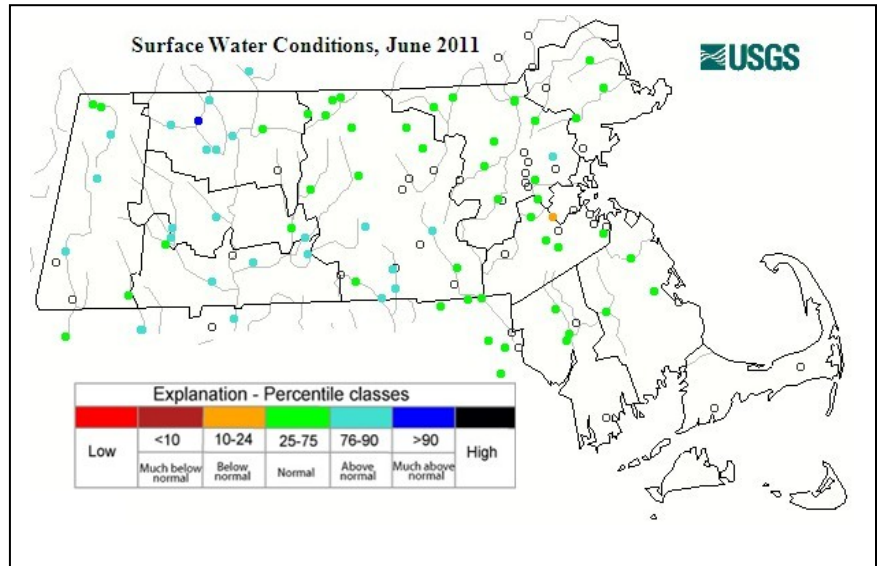
<http://groundwaterwatch.usgs.gov/State/MapsNet.asp?ncd=crn&sc=25>



## Streamflow

Average June 2011 streamflows that are monitored by the Commonwealth of Massachusetts and United States Geological Survey (USGS) cooperative stream gaging program were generally normal in the eastern half and above normal in the western half of the State. As shown in a table at the end of this report MA DCR has listed the drought regions of Massachusetts as having normal, above normal, and no data (Cape Cod and Islands) surface-water conditions for June.

The graph below depicts a composite daily streamflow relative to normal streamflow for Massachusetts for the period of May 28 to July 11, 2011. Generally slightly below normal flows during the first third of June rose to above normal for the remainder of the month and the first part of July. The graph is a composite of 50 real-time gages across the state with a long period of record.



### KEY:

- 1 = New record low for day
- 2 = < 10<sup>th</sup> percentile
- 3 = 10<sup>th</sup> – 24<sup>th</sup> percentile
- 4 = 25<sup>th</sup> – 74<sup>th</sup> percentile
- 5 = 75<sup>th</sup> – 89<sup>th</sup> percentile
- 6 = ≥ 90<sup>th</sup> percentile
- 7 = New record high for day

## Water Supply Reservoir Levels

Surface water reservoir percent-full values for water supply sources provided by water suppliers are listed below. The reservoir percent-full values listed are for the end of June. Reservoirs are generally a little above normal for this time of year.

### June / July 2011 Massachusetts Reservoir Status

Reservoir/City or Town	Percent Full	Reservoir/City or Town	Percent Full
Quabbin	98.4	Beverly/Salem	95.7
Worcester	101	Lynn	82
Cobble Mt./ Springfield	94	Taunton/New Bedford/Assawompsett	100

Note: NA Indicates data not available for this report

## Drought Indices/Forecasts

### US Drought Monitor

The National Drought Mitigation Center's (NDMC's) July 12, 2011 Drought Monitor Map for the United States shown at right indicates no drought conditions in Massachusetts.

### Standardized Precipitation Index (SPI)

The Western Regional Climate Center's (Desert Research Institute, University and Community College System of Nevada) 1-Month Standardized Precipitation Index value for Massachusetts at the end of June was moderately wet. The 3-month values were very wet (west)/moderately wet. The 6-month values were normal (east)/very wet and the 12-month values were very wet (west)/moderately wet (central)/normal (east). Massachusetts SPI values for the drought regions are all normal.

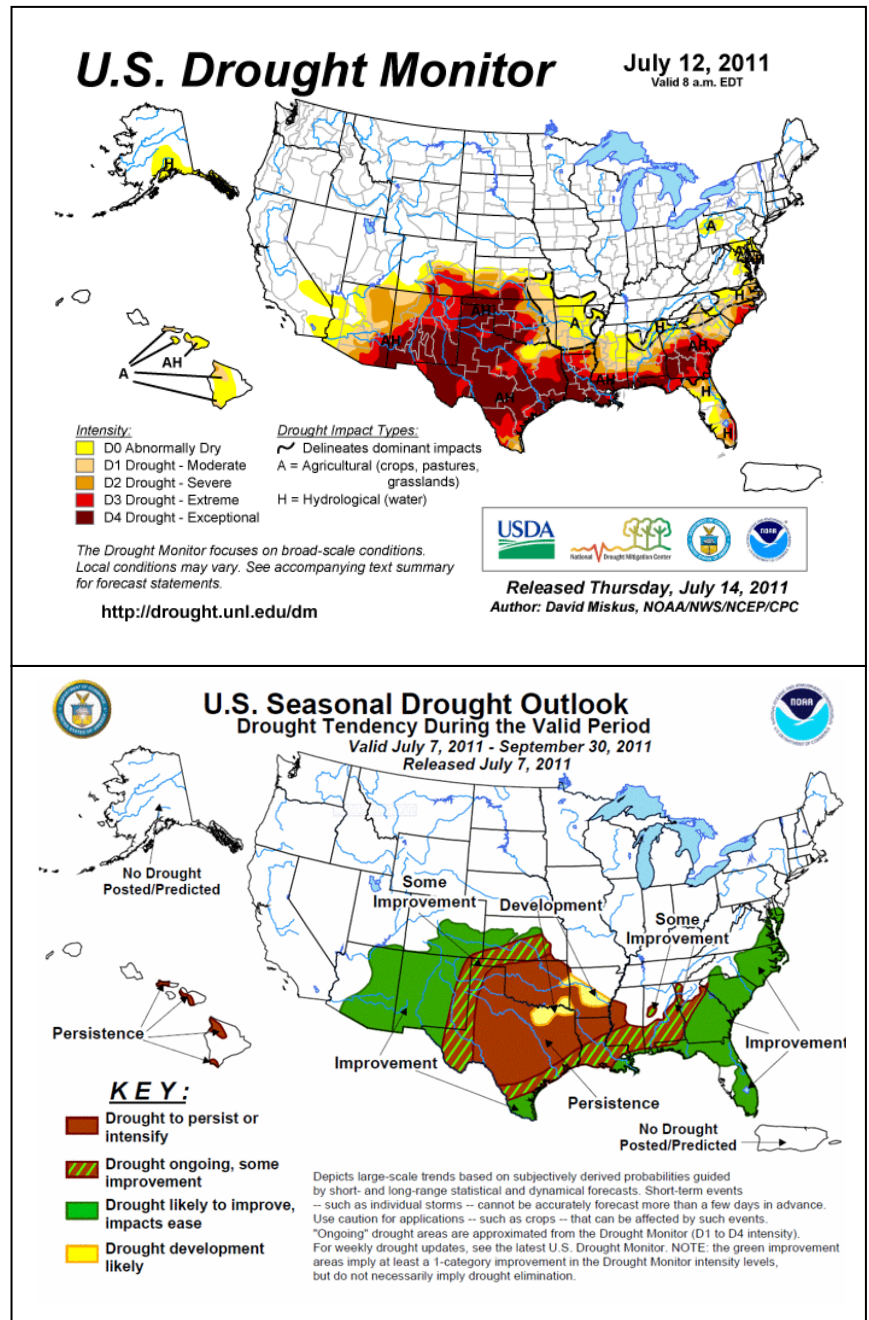
### NWS/NOAA's Climate Prediction Center

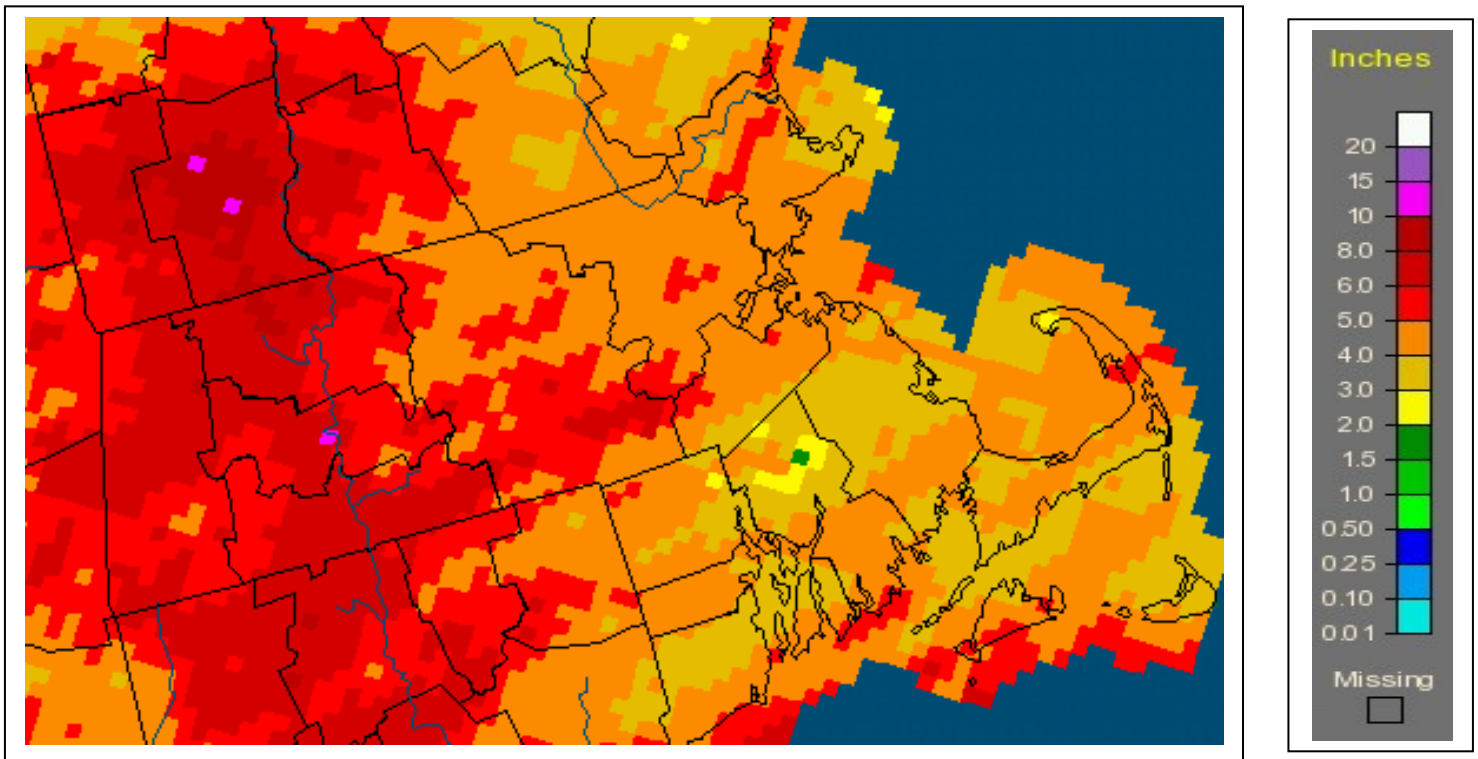
The U.S. Seasonal Drought Outlook dated July 7, 2011, predicts no tendency for drought conditions to develop in Massachusetts through September 2011.

### Extended Forecasts

Clear mild weather with low humidity today will progressively get warmer and more humid each day through Sunday. Cold front moving across the area on Monday or Tuesday could bring unsettled weather followed by cooler weather. The National Weather Service Climate Prediction Center's extended 6 to 10- and 8 to 14-day forecasts are for below normal rainfall and above normal temperatures. The 1-month forecast is for normal rainfall and temperatures. The NWS Climate Prediction Center Information can be found at:

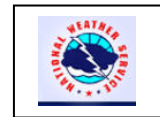
<http://www.cpc.noaa.gov/index.php>





<http://water.weather.gov/precip/>

**TOTAL RAINFALL  
JUNE 2011**



**GENERAL WATER CONDITIONS IN MASSACHUSETTS - JUNE 2011**  
EOEEA and MEMA DROUGHT MANAGEMENT PLAN REGIONS

Massachusetts Regions	Surface-Water Conditions	Ground-Water Conditions
Cape and Islands	ND	Normal
Southeast	Normal	Normal
Northeast	Normal	Normal
Central	Normal	Above Normal
Connecticut River	Above Normal	Above Normal
Western	Above Normal	Above Normal

**Note:** Surface- and ground-water conditions for individual streamflow-gaging stations and wells may differ from general conditions. ND, no data

**Weather Ramblings --- 2010 One of Two Warmest Years On Record; El Niño-Southern Oscillation and Other Climate Patterns Play Major Role**

ScienceDaily (June 29, 2011) — Worldwide, 2010 was one of the two warmest years on record, according to the 2010 *State of the Climate* report, which NOAA has just released. The peer-reviewed report, issued in coordination with the American Meteorological Society, was compiled by 368 scientists from 45 countries. It provides a detailed, yearly update on global climate indicators, notable climate events and other climate information from every continent American Meteorological Society, was compiled by 368 scientists from 45 countries. It provides a detailed, yearly update.

This year's report tracks 41 climate indicators — four more than last year — including temperature of the lower and upper atmosphere, precipitation, greenhouse gases, humidity, cloud cover, ocean temperature and salinity, sea ice, glaciers, and snow cover. Each indicator includes thousands of measurements from multiple independent datasets that allow scientists to identify overall trends.

While several well-known cyclical weather patterns had a significant influence on weather and climate events throughout the year, the comprehensive analysis of indicators shows a continuation of the long-term trends scientists have seen over the last 50 years, consistent with global climate change.

"We're continuing to closely track these indicators because it is quite clear that the climate of the past cannot be assumed to represent the climate of the future. These indicators are vital for understanding and making reliable projections of future climate," said Thomas R. Karl, L.H.D, director of NOAA's National Climatic Data Center in Asheville, N.C.

Last year was marked by important climate oscillations like the El Niño-Southern Oscillation and the Arctic Oscillation, which affected regional climates and contributed to many of the world's significant weather events in 2010.

Highlights of some of the climate indicators include:

- **Temperature:** Three major independent datasets show 2010 as one of the two warmest years since official record-keeping began in the late 19th century. Annual average temperatures in the Arctic continued to rise at about twice the rate of the lower latitudes.
- **Sea Ice & Glaciers:** Arctic sea ice shrank to the third smallest area on record, and the Greenland ice sheet melted at the highest rate since at least 1958. The Greenland ice sheet melt area was approximately 8 percent more than the previous record set in 2007. Alpine glaciers shrank for the 20th consecutive year. Meanwhile, average sea ice extent in the Antarctic grew to an all-time record maximum in 2010.
- **Sea Surface Temperature and Sea Level:** Even with a moderate-to-strong La Niña in place during the latter half of the year, which is associated with cooler equatorial waters in the tropical Pacific, the 2010 average global sea surface temperature was third warmest on record and sea level continued to rise.
- **Ocean Salinity:** Oceans were saltier than average in areas of high evaporation and fresher than average in areas of high precipitation, suggesting that the water cycle is intensifying.
- **Greenhouse Gases:** Major greenhouse gas concentrations continued to rise. Carbon dioxide increased by 2.60 ppm, which is more than the average annual increase seen from 1980-2010.

Several major cyclical weather patterns played a key role in weather and climate in 2010:

- **El Niño-Southern Oscillation:** A strong warm El Niño climate pattern at the beginning of 2010 transitioned to a cool La Niña by July, contributing to some unusual weather patterns around the world and impacting global regions in different ways. Tropical cyclone activity was below normal in nearly all basins around the globe, especially in much of the Pacific Ocean. The Atlantic basin was the exception, with near-record high North Atlantic basin hurricane activity. Heavy rains led to a record wet spring (September -- November) in Australia, ending a decade-long drought.
- **Arctic Oscillation:** In its negative phase for most of 2010, the Arctic Oscillation affected large parts of the Northern Hemisphere causing frigid arctic air to plunge southward and warm air to surge northward. Canada had its warmest year on record while Britain had its coldest winter at the beginning of the year and coldest December at the end of the year. The Arctic Oscillation reached its most negative value in February, the same month several cities along the U.S. East Coast had their snowiest months ever.
- **Southern Annular Mode:** An atmospheric pattern related to the strength and persistence of the storm track circling the Southern Hemisphere and the Antarctic led to an all-time maximum in 2010 of average sea ice volume in the Antarctic.

The *State of the Climate* report is peer-reviewed and published annually as a special supplement to the Bulletin of the American Meteorological Society. The 2010 report is edited by J. Blunden, D.S. Arndt, and M.O. Baringer. The full report and a highlights document are available online (<http://www.ncdc.noaa.gov/bams-state-of-the-climate>).

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This report was prepared by the Massachusetts Department of Conservation and Recreation. Data were obtained from the sources described in the report and may be preliminary in nature. Additional information, previous and future water conditions reports can be found on our web site: <http://www.mass.gov/dcr/watersupply/rainfall/>