

# Current Water Conditions in Massachusetts

## April 14, 2011



- March precipitation was near normal
- March streamflows were generally above normal
- March ground-water levels were generally normal
- March reservoir levels were normal

### Precipitation Conditions

Estimated March state-wide average precipitation was 3.76 inches, which is 93 percent of the long-term average for the month. The regions of Massachusetts received between 152 (Connecticut River) and 45 percent (Cape Cod and Islands) of average precipitation during March. March 2011 was the 42<sup>nd</sup> wettest March in the last 117 years in Massachusetts according to the National Climate Data Center. Most of the rainfall occurred at the beginning of March and coupled with warming conditions and a melting snow pack resulted in minor flooding along many rivers. Since then, low March precipitation occurring before green-up has resulted in some increase in fire danger in the northeastern and southeastern parts of the State. April precipitation to date has generally ranged from 0.5 (west) to 5 inches with a forecast that indicates another inch or more on the weekend.

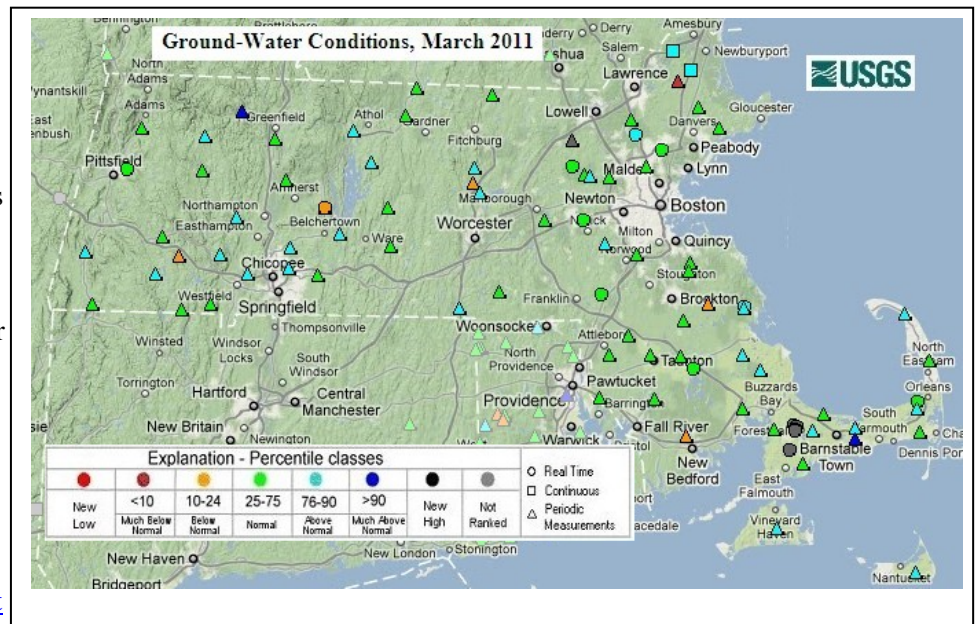
A table of March 2011 estimated precipitation statistics, based on precipitation data from the Department of Conservation and Recreation and National Weather Service precipitation monitoring networks, is attached. A map at the back of this report shows the distribution of March rainfall in Massachusetts.

### Ground-Water Levels

Ground-water levels reported by the United States Geological Survey (USGS) at the end of March were above normal on Cape Cod and generally normal across the rest of the State. 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 March 2011 can be viewed at the web site:

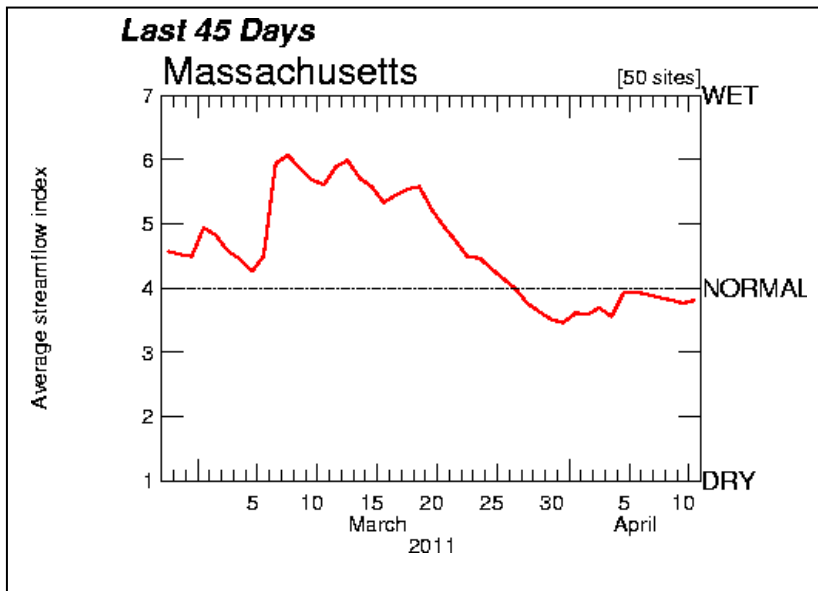
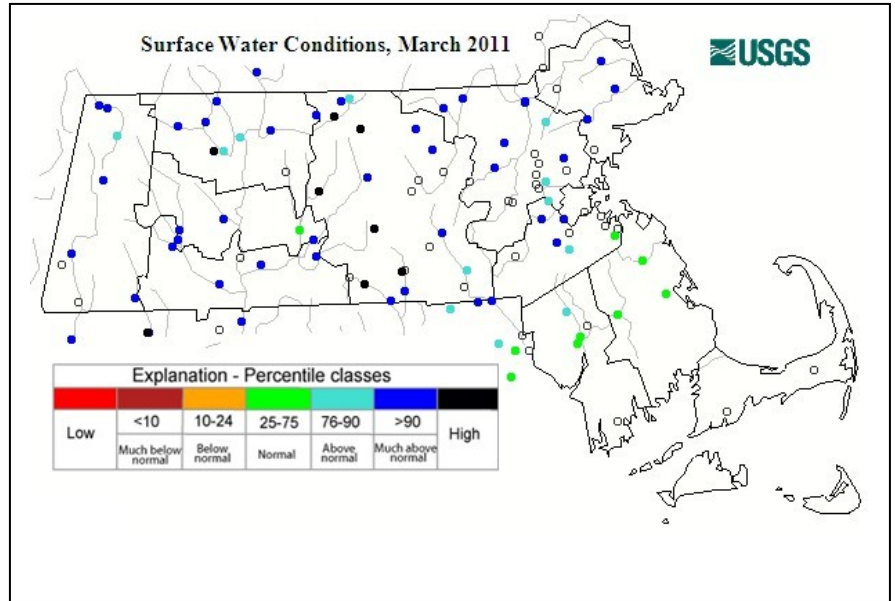
[http://ma.water.usgs.gov/water\\_statement/2011\\_09/index.html](http://ma.water.usgs.gov/water_statement/2011_09/index.html)



## Streamflow

Average March 2011 streamflows that are monitored by the Commonwealth of Massachusetts and United States Geological Survey (USGS) cooperative stream gaging program were normal in the southeast area and generally above or much above normal in the remainder 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 above normal, normal, and no data (Cape Cod and Islands) surface-water conditions for March.

The graph below depicts a composite daily streamflow relative to normal streamflow for Massachusetts for the period of February 28 to April 10, 2011. Generally much above normal flows during the first two thirds of the month fell to slightly below normal flows at the end of the month and the first part of April. Many rivers and streams went above flood stage during the 2<sup>nd</sup> week of March. 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 March. Reservoirs are generally normal for this time of year.

### March / April 2011 Massachusetts Reservoir Status

Reservoir/City or Town	Percent Full	Reservoir/City or Town	Percent Full
Quabbin	95.9	Beverly/Salem	100
Worcester	103.6	Lynn	76.3
Cobble Mt./ Springfield	93	Taunton/New Bedford/Assawompsett	97.6

Note: NA Indicates data not available for this report

## Drought Indices/Forecasts

### US Drought Monitor

The National Drought Mitigation Center's (NDMC's) April 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 and, 3-Month Standardized Precipitation Index values across Massachusetts at the end of March were normal/moderately wet (west). The 6-month values were normal/very wet/extremely wet (west). The 12-month values were normal/moderately wet (west). Massachusetts SPI values for the drought regions are all normal.

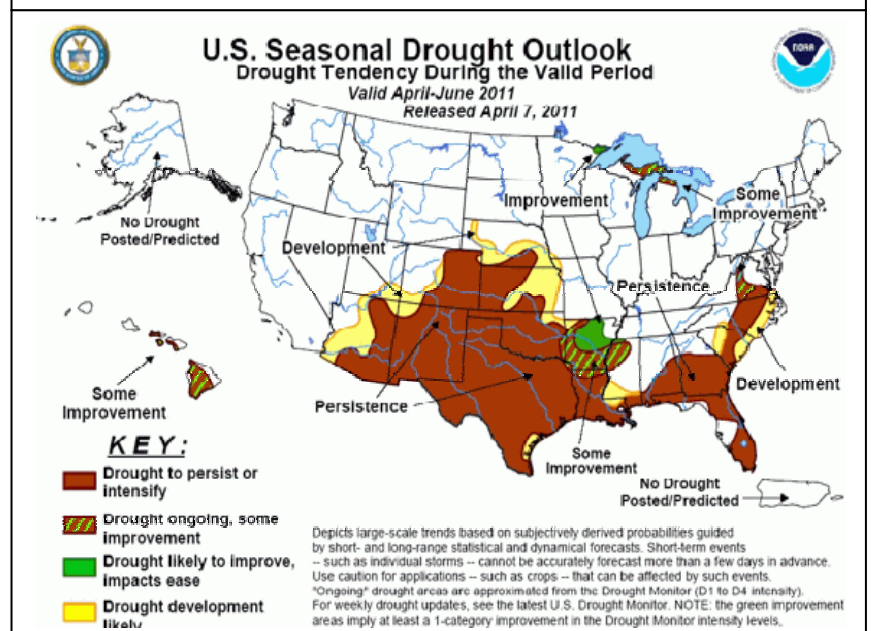
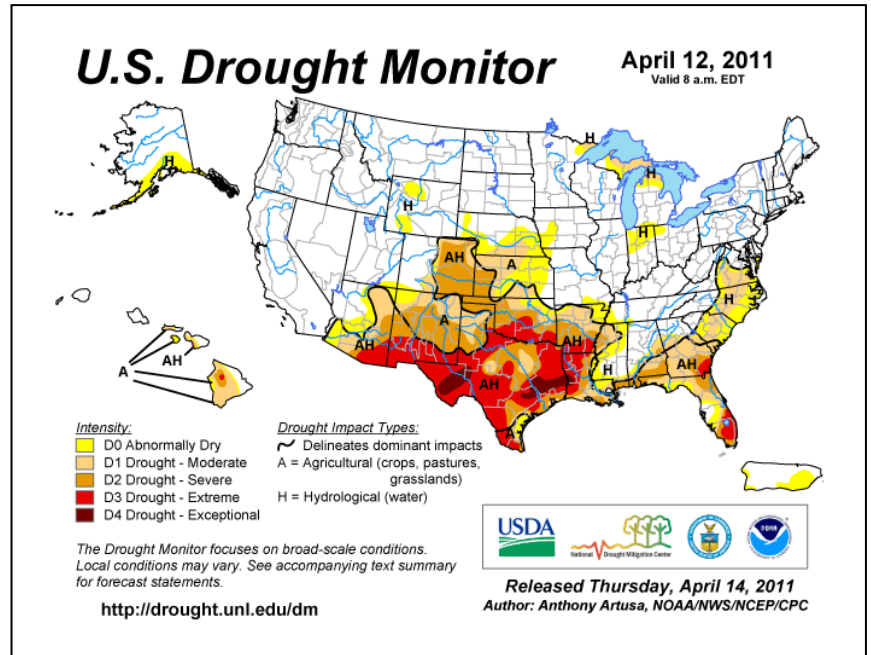
### NWS/NOAA's Climate Prediction Center

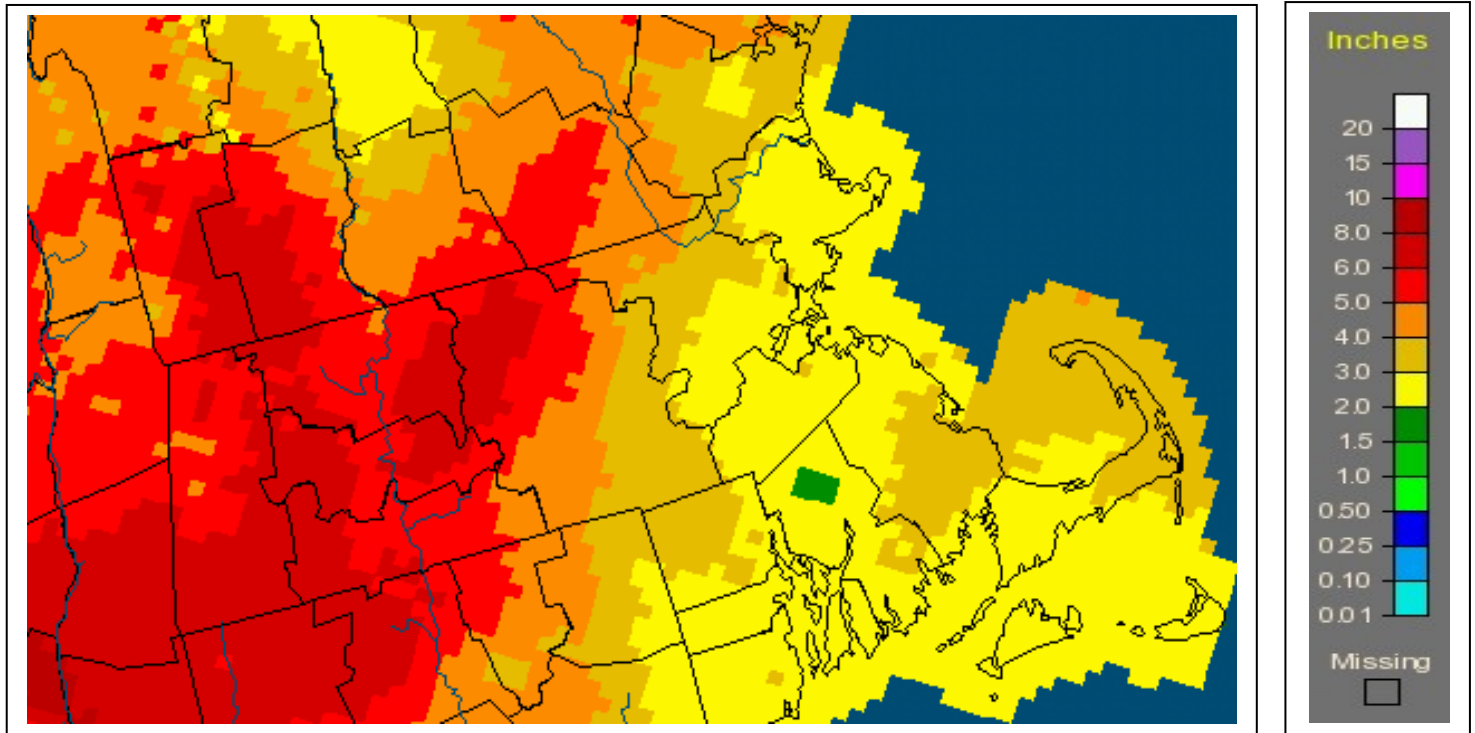
The U.S. Seasonal Drought Outlook dated April 7, 2011, predicts no tendency for drought conditions to develop in Massachusetts through June 2011.

### Extended Forecasts

Clear and breezy weather with high temperatures in the 40's and 50's are forecast for today and Friday. Saturday will see increasing clouds with rain later in the day that will continue into early Sunday. One to one and one half inches of rain is possible. Clearing late Sunday and into Monday and Tuesday is forecast. The National Weather Service Climate Prediction Center's extended 6 to 10-day forecast is for above normal temperatures and normal rainfall. The 8 to 14-day forecast is for above normal temperatures and rainfall. The 1-month forecast is for below normal temperatures and above normal rainfall. The NWS Climate Prediction Center Information can be found at:

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





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

**TOTAL RAINFALL  
MARCH 2011**



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

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

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

## Gulf Stream could be threatened by Arctic flush

Rapid warming in the Arctic is creating a new and fast-growing pool of fresh water in the Arctic Ocean. Measuring at least 7500 cubic kilometres, it could flush into the Atlantic Ocean and slow the Gulf Stream, bringing colder winters to Europe.

The water is mostly coming from melting permafrost and rising rainfall, which is increasing flows in Siberian rivers that drain into the Arctic, such as the Ob and Yenisei. More comes from melting sea ice, says Laura de Steur of the Royal Netherlands Institute of Sea Research in 't Horntje, who is tracking the build-up.

Salinity anomalies like this are a regular feature of the Arctic. The last major event occurred in the 1960s. They happen when strong winds circling the Arctic restrict southward water movement. Eventually, the winds falter and the water flushes into the Atlantic through the Fram strait, between Greenland and Europe.

Recent Arctic melting runs the risk of increasing the freshwater build-up, potentially making the consequences of the eventual breakout more extreme, says de Steur. This is the first time that scientists have measured a salinity anomaly in the Arctic in detail, and in time to analyse how the freshwater pool breaks out into the North Atlantic.

De Steur believes the consequences could be more dramatic than in the past, because of how global warming is changing the dynamics of the region. "Sea ice is melting quicker. It is thinner and more mobile, and could exit the Arctic faster. Also more of it will enter the Atlantic as liquid water rather than ice."

### Conveyor breakdown

A dramatic freshening of the North Atlantic could disrupt the engine of a global ocean circulation system called the thermohaline circulation, or ocean conveyor. This system, of which the Gulf Stream forms a part, is driven by dense, salty water in the North Atlantic plunging to the ocean bottom near Greenland.

"In the worst case, these Arctic surges can significantly change the densities of marine surface waters in the far North Atlantic," says de Steur.

Some 13,000 years ago, a major freshening of the North Atlantic shut down the circulation and plunged the Earth into a cold snap, known as the Younger Dryas era, which lasted for 1300 years. That was the result of an influx of fresh water much larger than is building up now, but some climate models do predict the circulation could weaken in coming decades, says Detlef Quadfasel of the climate centre at Hamburg University in Germany. The discovery of pooling fresh water in the Arctic suggests how this could happen.

The monitoring is being carried out as part of Project Clamer, a 10-nation European project into the impact of climate change on the waters around Europe.

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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/>