

<b>NWS Form E-5</b> (04-2006) (PRES. BY NWS Instruction 10-924)	<b>U.S. DEPARTMENT OF COMMERCE</b> <b>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION</b> <b>NATIONAL WEATHER SERVICE</b>	HYDROLOGIC SERVICE AREA (HSA) <b>Boston/Norton MA</b>	
		<b>MONTHLY REPORT OF HYDROLOGIC CONDITIONS</b>	REPORT FOR: MONTH                      YEAR <b>July                              2021</b>
TO:                      Hydrologic Information Center, W/OS31 NOAA's National Weather Service 1325 East West Highway Silver Spring, MD 20910-3283		SIGNATURE Nicole M. Belk Senior Service Hydrologist	
		DATE <b>August 23<sup>rd</sup> 2021</b>	

When no flooding occurs, include miscellaneous river conditions below the small box, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (NWS Instruction 10-924).

An X inside this box indicates that no flooding occurred within this hydrologic service area.

July 2021 brought a staggering amount of rainfall to the vast majority of southern New England, with rainfall totals ranging mainly between 8 to 16 inches. Localized higher totals of 15 to 20 inches were noted in portions of the Connecticut River Valley Region of MA and northeast CT. Less excessive rainfall totals occurred in central and southern RI, as well as southeast MA, where rainfall totals ranged between 6 and 10 inches. The driest area was the Cape and Islands, where rainfall totals ranged from 2 to 6 inches.

More details for major climate sites in southern New England are included in Table 1. The table also includes rankings for wettest July on record at these locations, and also (where applicable) ranking for all-time wettest month on record at each station. Maps 4 and 5 show rainfall and rainfall departure from normal for May. Map 6 depicts temperature departure from normal.

Looking at NCEI (National Centers for Environmental Information) statewide rankings based on 127 years of record, MA had its wettest July on record, with the State-averaged rainfall total of 10.30". CT had its 3<sup>rd</sup> wettest July on record, averaging 9.35". RI also had its 3<sup>rd</sup> wettest July on record, averaging 7.23". More information is available via the following web page: <https://www.ncdc.noaa.gov/cag/statewide/mapping>

State Drought Declarations were in place on Cape Cod in MA. No other State Drought Declarations were in place in RI, CT and the remainder of MA.

<i>Location</i>	<i>July Rainfall (Inches)</i>	<i>Precipitation Departure from Normal (Inches)</i>	<i>Temperature Departure from Normal (Degrees F)</i>	<i>Ranking for Wettest July on Record</i>	<i>Ranking for All-Time Wettest Month on Record</i>
<i>Boston</i>	10.07	+6.80	-1.7	2	17
<i>Worcester</i>	13.85	+9.92	-2.2	1	3
<i>Providence</i>	7.12	+4.21	-1.5	3	NA
<i>Hartford</i>	10.15	+5.98	-1.3	3	15

Table 1. July 2021 rainfall and departure from normal, temperature departure from normal, and rankings for wettest July on record and wettest all-time month on record, for major climate sites within southern New England. Information is preliminary.

## **Flooding During July**

There were multiple flood events during the month of July, with urban and poor drainage flooding, stream flooding, and even flooding of larger tributary and mainstem rivers. Events are listed sequentially by date(s).

**On July 1<sup>st</sup> into July 2<sup>nd</sup>**, numerous showers thunderstorms with heavy rainfall crossed through southern New England, as a cold front slowly tracked over the region and a wave of low pressure traversed the frontal boundary. A plume of deep moisture aided in producing the heavy rains. This resulted in pockets of urban and poor drainage flooding. Radar estimated that 1.5 to 3 inches of rain fell in the Greater Boston Area and southwest into southern Worcester County. Localized heavy rainfall also occurred in the Chicopee area, where radar estimated 1.5 to 3 inches of rainfall. The most significant flooding occurred in the Boston Area. Reports of urban and poor drainage flooding follow.

There were multiple reports of urban flooding in the Boston area, including the following. Route 1A Northbound was flooded after the Callahan Tunnel, and the Route 1A Airport Exit had 3 cars stuck in floodwaters. Also in Boston, Storrow Drive was flooded and impassable, as well as a ramp to Storrow Drive East from Kenmore to Longfellow. Morton Street near Shattuck Hospital was impassable, and basement flooding was also reported.

In nearby Chelsea, 3 cars were stuck in floodwaters on Columbus Street. In Somerville, an underpass on McGrath Highway at Mystic had 3 cars stuck in floodwaters. In Lynn, Boston Street at Marion Street, as well as Federal Street and Bridge Street, were flooded and impassable. In Revere, cars were stuck in street flooding on Park Avenue. In Charlestown, floodwaters resulted in the closure of the I-93 Northbound ramp to the Tobin Bridge.

In Chicopee, there was an isolated report of street flooding on Pride Montgomery Street in Chicopee.

**On the evening of July 3<sup>rd</sup>**, a slow moving surface low pressure combined with an anomalous closed upper low brought numerous showers, containing moderate to heavy rainfall. Rainfall of 1.5 to 3 inches occurred in the Boston area resulted in several reports of urban and poor drainage flooding. In South Boston a 25-foot section of South Boston Bypass Road was flooded and impassable. In Dorchester, a portion of Morrissey Boulevard was flooded with several cars stuck. In Braintree, flooding was reported on Nicholas Road. Lastly in Chelsea, Beacham Street was closed due to flooding.

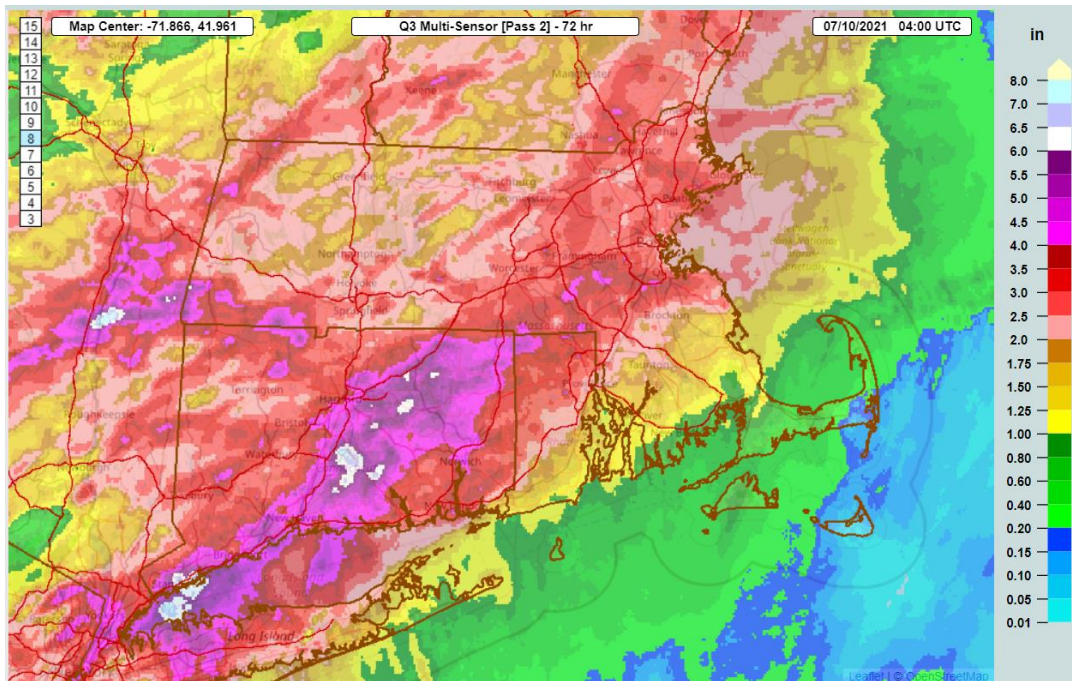
**During Friday July 9<sup>th</sup>**, rains from Tropical Storm Elsa tracked through the area, bringing a widespread soaking rainfall. Showers and thunderstorms preceded Elsa on the 7<sup>th</sup> and 8<sup>th</sup>, soaking the ground in advance of Elsa's approach. Map 1 shows the 72 hour rainfall ending 12 Midnight July 10<sup>th</sup> (through the evening of July 9<sup>th</sup>). Combined rainfall totals ranged from 1.75 to 5 inches of rain across much of southern New England, with localized higher totals over 5 inches. The combined rainfall resulted in numerous reports of both urban and poor drainage flooding as well as stream and river flooding. River Forecast Points that exceeded Flood Stage are listed on Table 2. Other area streams and rivers that reached or exceeded Flood Stage are listed on Table 3. South coastal regions of RI and MA had less rainfall, under 2", and on the Cape and Islands under an inch of rain fell.

NWS Location Identifier	River	Location	Flood Stage	Time/date above FS (EDT)	Crest	Crest Date/Time (EDT)	Below FS (EDT)
CRAR1	Pawtuxet	Cranston	9.0	7/9/2021 08:15 PM	9.02 ft	7/9/2021 09:15 PM	7/9/2021 10:45 PM
DOVM3	Charles	Dover	5.0	7/12/2021 06:15 AM	5.66 ft	7/13/2021 10:30 PM	7/17/2021 03:45 AM
NBRM3	Blackstone	Northbridge	9.0	7/9/2021 9:00 PM	9.16 ft	7/9/2021 11:30 PM	7/10/2021 12:30 AM
SAXM3	Sudbury	Saxonville	10.0	7/9/2021 12:45 PM	10.61 ft	7/10/2021 1:30 AM	7/10/2021 11:15 PM
WOOR1	Blackstone	Woonsocket	9.0	7/10/2021 3:45 AM	9.47 ft	7/10/2021 12:21 PM	7/10/2021 7:00 PM

Table 2. River Forecast Points in NWS Boston/Norton’s Hydrologic Service Area that went above Flood Stage after Elsa’s rainfall. Provisional data courtesy of USGS.

NWS Location Identifier	River	Location	Flood Stage	Time/date above FS (EDT)	Crest	Crest Date/Time (EDT)	Below FS (EDT)
CENR1	Woonasquatucket	Centerdale	5.5	7/9/2021 3:15 PM	5.76 ft	7/9/2021 4:45 PM	7/9/2021 7:00 PM
CVTC3	Willimantic	Coventry	8.0	7/9/2021 1:00 PM	11.28 ft*	7/10/2021 8:15 AM	7/11/2021 4:15 AM
EHDC3	Hockanum	East Hartford	9.0	7/9/2021 1:15 PM	10.44 ft	7/9/2021 5:15 PM	7/10/2021 12:15 PM
MEDM3	Charles	Medway	5.0	7/10/2021 9:00 AM	5.09 ft	7/10/2021 8:30 PM	7/11/2021 4:45 AM
WRNC3	Mount Hope	Warrenville	7.0	7/09/2021 1:00 PM	8.89 ft**	7/10/2021 3:45 AM	7/10/2021 9:15 AM

Table 3. Additional rivers and streams in NWS Boston/Norton’s Hydrologic Service Area that went above Flood Stage after Elsa’s Rainfall. Provisional data, courtesy of USGS. \*Last time the Willimantic River at Coventry crested above 11 ft was March 2011. \*\* Mount Hope River at Warrenville had 2 successive flood crests, one on July 9th and a one during the early morning of July 10th. The crest listed is the second, and higher crest.



Map 1. 72-hour rainfall estimate using MRMS Q3 Multi-Sensor data (radar and observations) from Tropical Storm Elsa and preceding thunderstorms. Rainfall ending 12 AM EDT 7/10/2021 (though the evening of 7/9).

**A summary of additional reported impacts from Elsa follow, occurring on July 9<sup>th</sup>.**

**In northern CT:** In Wethersfield and Berlin, multiple streets in each community were closed due to flooding. In Tolland, significant flooding was reported on several roads, including Shenipsit Lake Road, Old Stafford Road, Charter, Skungamaug, Cider Mill Road and Grant Hill Road. In Marlborough, West Road flooded. In Columbia, floodwaters inundated sections of Parker Bridge Road. One woman was rescued from a flooded truck. In Coventry, floodwaters covered Flanders River Road north of Route 6.

**In eastern MA:** In Boston, a car was stuck in floodwaters on Franklin Park Ave. In Winthrop, Franklin Street was closed due to flooding. In Newton, Albermarle Road was closed due to flooding. In Lynn, cars were stuck in street flooding on the Route 107 Bridge. In Sharon, the Canton Street Underpass was flooded out. In Melrose, Sylvan Street was closed due to flooding. In Framingham, Gates Street was impassable due to flooding. Cars were also stuck in street flooding on Route 9 and Route 126. Ramps connecting Route 9 and Route 126 were also closed. In Peabody, Walnut Street was closed due to flooding. In Danvers, Sherwood Ave. was flooded and closed. In Hyde Park, Truman Parkway was closed due to flooding.

**In Worcester:** Southgate, Gardner, Higgins and Grafton Streets were closed due to flooding. Cambridge Street was flooded from Quinsigamond Ave. to McKeon Road. At the intersection of Southbridge and Southgate Streets, floodwaters inundated the roadway with water coming out of manhole covers. From Worcester to nearby Millbury, significant flooding occurred along Route 146. Flooding also occurred at some businesses in the City.

**On July 12<sup>th</sup>,** more heavy rainfall resulted in localized urban and poor drainage flooding along east coastal MA. Peabody experienced flooding on Spring and Foster Streets. In Hull, Nantasket Ave was closed due to flooding. In Danvers, Sherwood Ave was closed due to flooding.

**On July 16<sup>th</sup> to 19<sup>th</sup>,** repeat rounds of showers and thunderstorms occurred across southern New England, due in large part to a nearly stationary front that moved into the area during the 16<sup>th</sup> through the 19<sup>th</sup>, before finally moving offshore on the 20<sup>th</sup> and 21<sup>st</sup>. This front provided a focus for areas of showers and thunderstorms to develop and persist. The 72-hour rainfall totals ending at 8 pm on the 19<sup>th</sup> are shown in Map 2. Much of central and western MA and northern CT had rainfall totals of 2 to 6 inches, with localized higher amounts. These rains resulted in a significant amount of urban and poor drainage flooding, as well as river and stream flooding. Some flood impacts lasted until as late as July 21<sup>st</sup>.

**In the City of Worcester:** Regarding urban and poor drainage flooding, the City of Worcester had the most severe impacts, with numerous stretches of flooded roadways and cars stuck in floodwaters. Floodwaters also entered some homes. Floodwaters affected the following roadways, but also likely impacted others. In Worcester, Dale Street was flooded so badly that floodwaters were up to the windshields of cars. Five cars were reported stuck in floodwaters on Dewey Street and Parker Street. Cambridge, Bellvue, Highland, Webster, and West Boylston Streets were flooded. Cars were also stuck in floodwaters on Millbury Ave. and McKeon Road. On Pelham Street, flooding encompassed parked cars and also entered the basements and first floors of area homes.

**Elsewhere In Central MA:** In Warren, Chapel Street and Main Street were flooded. In Leicester, Route 56 at Marshall Street was flooded, with debris in the roadway. Portions of Route 9 in Framingham also experienced significant flooding.

**In Western MA:** In Deerfield, Route 5/Route 10 near Wapping Road was flooded in both directions. In Montague, Federal Street in Turners Falls had floodwaters up to 3 feet deep, and floodwaters also entered a local business. In Ludlow, a portion of Center Street was flooded out. In Belchertown, a beaver dam broke, causing a stretch of East Street to flood with water going into homes. This event resulted in evacuations and also a washout of the road. Franklin and River Streets were also flooded and impassable. In Chester, a section of

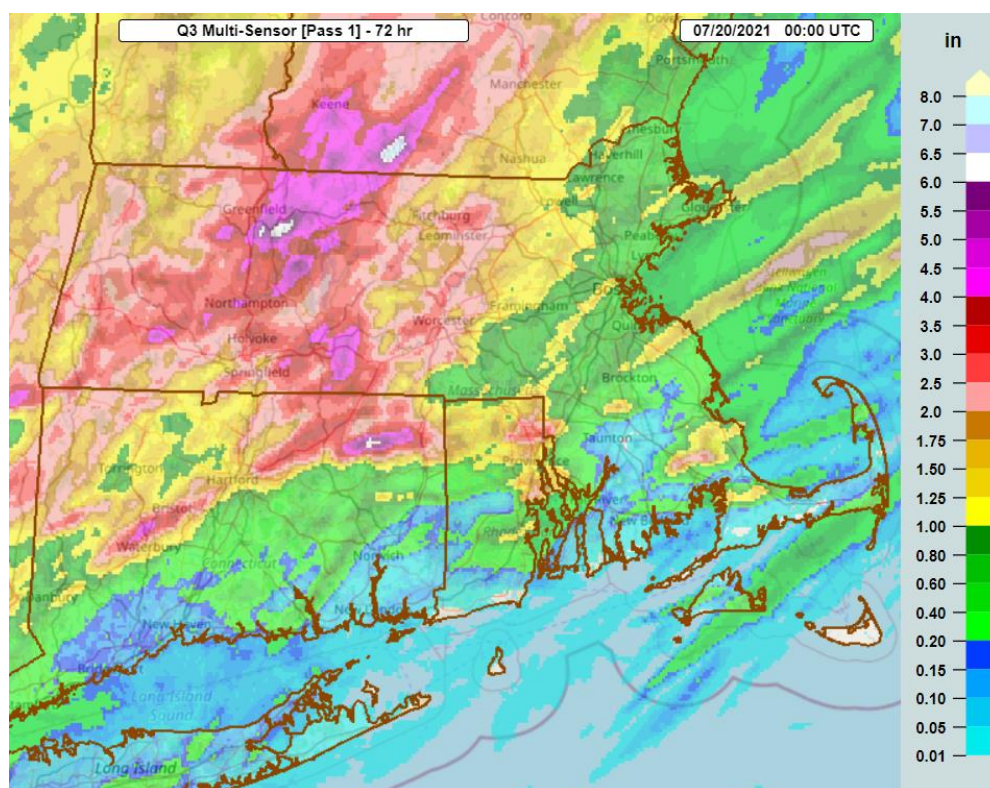


Skyline Trail was washed out, closing the road. In Montague, several streets were flooded out in the Millers Falls section of town.

*In Rhode Island:* In Lincoln RI, Holiday Court and Holiday Drive were flooded and impassable. In Providence, portions of Eddy Street were impassable due to flooding, and Fallon Ave was flooded and impassable.

*In northern Connecticut:* In Eastford CT, a section of Pifershire Road washed out, and a section of Old Colony Road was flooded and impassable. In Ashford, a bridge was washed out on Cushman Road. There was also a partial road washout in Pomfret on a section of Route 244.

In addition to urban and poor drainage flooding, river and stream flooding also occurred as a result of this event. Table 4 shows River Forecast Points in Southern New England that exceeded Flood Stage as a result of this event. Table 5 shows other area rivers and streams in NWS Boston/Norton's County Warning Area that went above Flood Stage as a result of this event.



Map 2. 72-hour rainfall estimate using MRMS Q3 Multi-Sensor data (radar and observations). Rainfall ending 8 pm EDT 7/19/2021.

NWS Location Identifier	River	Location	Flood Stage	Time/date above FS (EDT)	Crest	Crest Date/Time (EDT)	Below FS Date/ Time (EDT)
WSFM3	Westfield	Westfield MA	13.0 ft	7/19/2021 02:45 AM	13.81 ft	7/19/2021 04:45 AM	7/19/2021 07:15 AM*
MHDC3	Connecticut	Middle Haddam CT	7.0	07/20/2021 08:10 PM	7.41ft	07/20/2021 10:50 PM	07/21/2021 08:30 AM

Table 4. River Forecast Points which exceeded Flood stage as a result of the July 16-19 rain event. Information is preliminary. \*Time below Flood Stage at Westfield is estimated.

NWS Location Identifier	River	Location	Flood Stage	Time/date above FS (EDT)	Crest	Crest Date/Time (EDT)	Below FS Date/ Time (EDT)
CRNM3	Green	Colrain MA	7.0 ft	7/18/2021 12:15 AM	7.50 ft	7/18/2021 01:45 AM	7/18/2021 03:15 AM
EHDC3	Hockanum	East Hartford CT	9.0 ft	7/18/2021 09:00 AM	9.46 ft	7/18/2021 11:30 AM	7/18/2021 04:15 PM
EROM3	Millers	Erving MA	7.0 ft	7/18/2021 11:15 AM	7.07 ft	7/18/2021 11:15 AM	7/19/2021 1:00AM**
NMIM3	Mill	Northampton MA	11.0 ft	7/19/2021 12:00 AM	11.39 ft	7/19/2021 12:45 AM	7/19/2021 02:00 AM
WINM3	Priest Brook	Winchendon MA	6.5 ft	7/19/2021 01:30 AM	6.55 ft	7/19/2021 03:45 AM	7/19/2021 05:15 AM
WBFM3	Quaboag	West Brimfield MA	7.0 ft	7/18/2021 04:00 AM	8.90 ft	7/18/2021 05:15 AM	7/18/2021 08:45 AM
HNTM3	West Branch Westfield	Huntington MA	9.0 ft	7/18/2021 09:45 PM	10.92 ft	7/18/2021 10:45 PM	7/19/2021 2:00 AM
WRNC3	Mount Hope	Warrenville CT	7.0 ft	07/17/2021 05:45 PM	10.68 ft	7/17/2021 07:45 PM	7/18/2021 03:15 AM
QBGC3	Quinebaug	Quinebaug CT	6.0	7/18/2021 12:15 PM	6.32 ft	7/18/2021 03:45 PM	7/18/2021 05:45PM
KNTM3	Middle Branch Westfield	Goss Heights MA	5.7	7/17/2021 10:15PM	6.87 ft	7/19/2021 10:15PM	7/21/2021 05:15 AM
CVTC3	Willimantic	Coventry CT	8.0 ft	7/18/2021 08:15 AM	9.75 ft	7/18/2021 05:00 PM	7/19/2021 08:45 AM

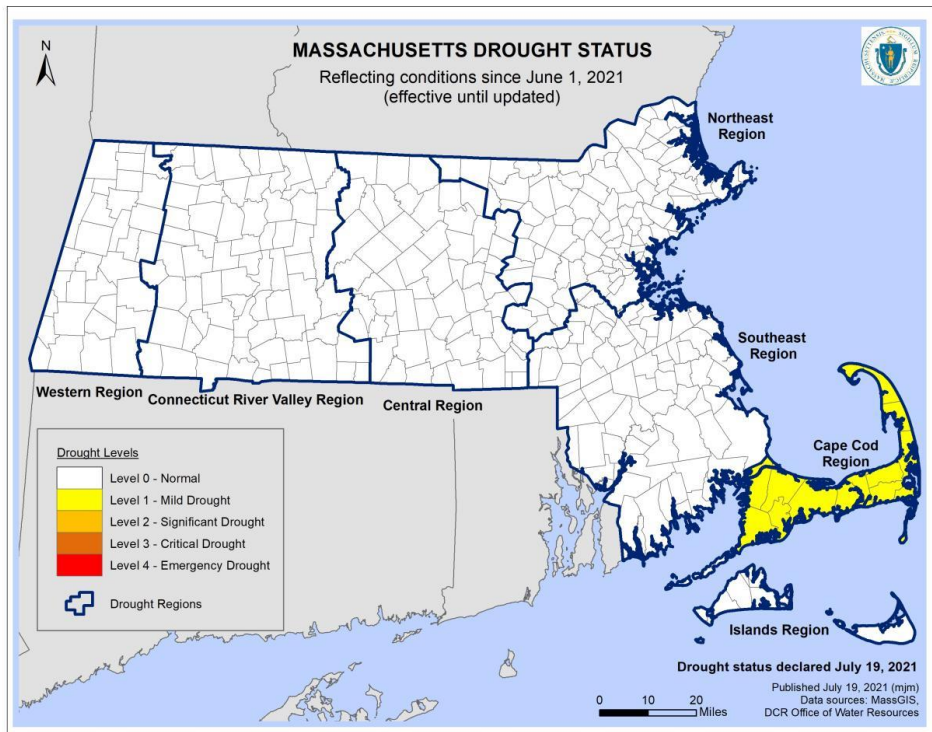
Table 5. Additional USGS rivers and streams that exceeded an established Flood Stage in southern New England, as a result of the July 16-19 rain event. Information is preliminary. \*The Mount Hope River at Warrenville had its 2<sup>nd</sup> highest crest on record, with the #1 crest occurring in September 1938. \*\*The Millers River at Erving had 2 consecutive flood crests just above the 7 foot Flood Stage. The below flood time reflects the time the river fell below Flood Stage after the second crest.

## MA State Drought Declaration Update

The MA Drought Management Task Force (DMTF) convened on July 7<sup>th</sup> to review conditions from June and early July. Improvements across much of the Commonwealth resulted in a return to normal conditions across the Western and Southeast Drought Regions. Due to continued lower rainfall, streamflow and groundwater, a Level 1- Mild Drought continued on Cape Cod. The remaining Drought Regions stayed at normal conditions (no drought). These updates are also available on Map 3.

## U.S. Drought Monitor

On the July 27<sup>th</sup> rendition of the US Drought Monitor (Map 4), normal conditions prevailed across most of the region. Exceptions follow. About ½ of Cape Cod was under D0, or Abnormally Dry Conditions. The mid Cape region and Nantucket were under D1, or Moderate Drought Conditions.

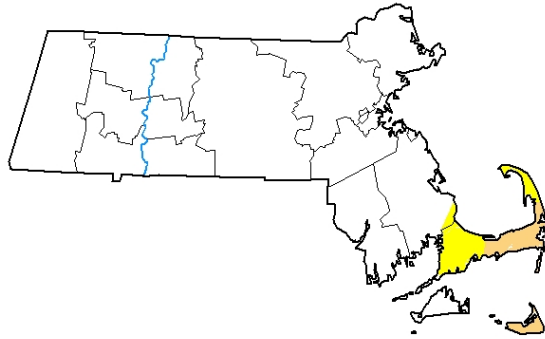


Map 3. MA Drought Declarations from July 19<sup>th</sup> 2021, retroactive to June 1<sup>st</sup> 2021. Map from MA DCR, Office of Water Resources.

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**U.S. Drought Monitor  
Massachusetts**

**July 27, 2021**  
(Released Thursday, Jul. 29, 2021)  
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	94.20	5.80	2.59	0.00	0.00	0.00
<b>Last Week</b> 07-20-2021	94.20	5.80	2.59	0.00	0.00	0.00
<b>3 Months Ago</b> 04-27-2021	6.90	93.10	20.29	0.00	0.00	0.00
<b>Start of Calendar Year</b> 12-29-2020	99.99	0.01	0.00	0.00	0.00	0.00
<b>Start of Water Year</b> 09-29-2020	0.00	100.00	95.92	83.01	28.36	0.00
<b>One Year Ago</b> 07-28-2020	0.00	100.00	55.22	0.00	0.00	0.00

Intensity

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

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U.S. Department of Agriculture



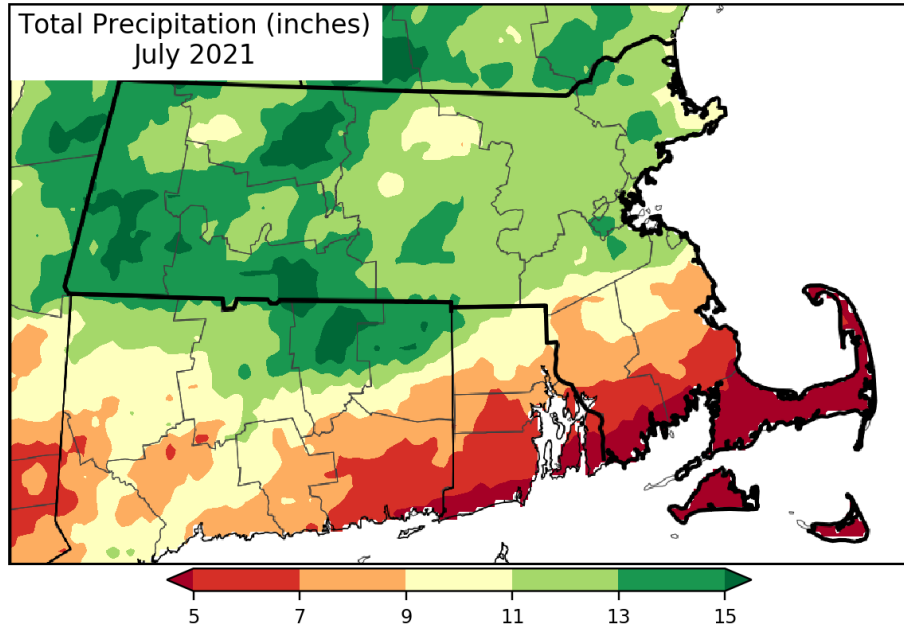
[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

Map 4. US Drought Monitor Map for Massachusetts, valid July 27<sup>th</sup> 2021. Map depicts Cape Cod and Nantucket under D0 (Abnormally Dry) to D1 (Moderate Drought) conditions. The remainder of southern New England was under normal conditions (with respect to drought).

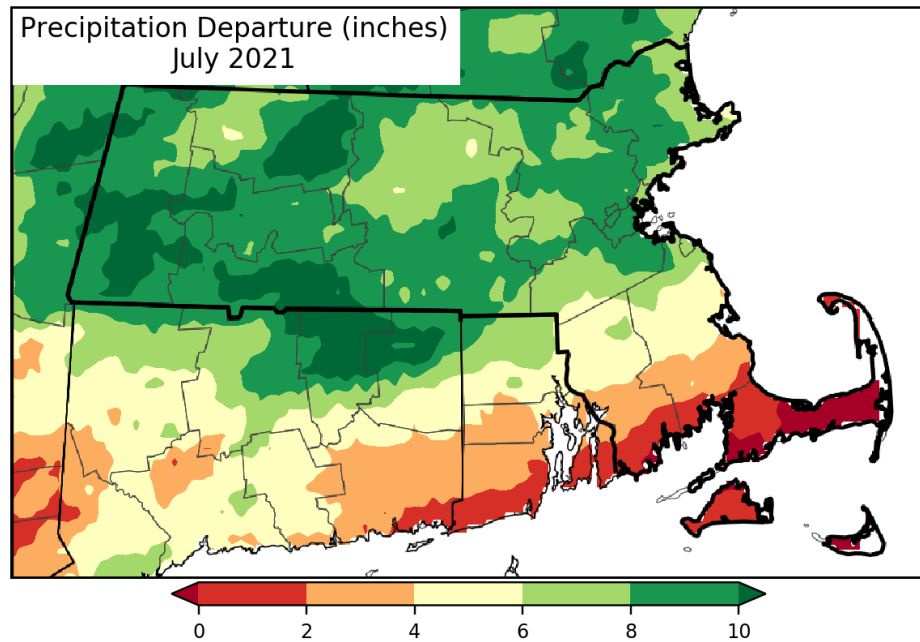
**Streamflow and Groundwater:**

For most of July, USGS gages indicated streamflows were at much above normal to record high flows for any given day. The exception was on Cape Cod, where streamflows were normal to below normal. By the end of the month, USGS groundwater levels were at much above normal levels. The exception was on the Cape and Islands. On Martha’s Vineyard and Nantucket, groundwater varied from above normal to below normal. On Cape Cod, most groundwater wells were running below normal.

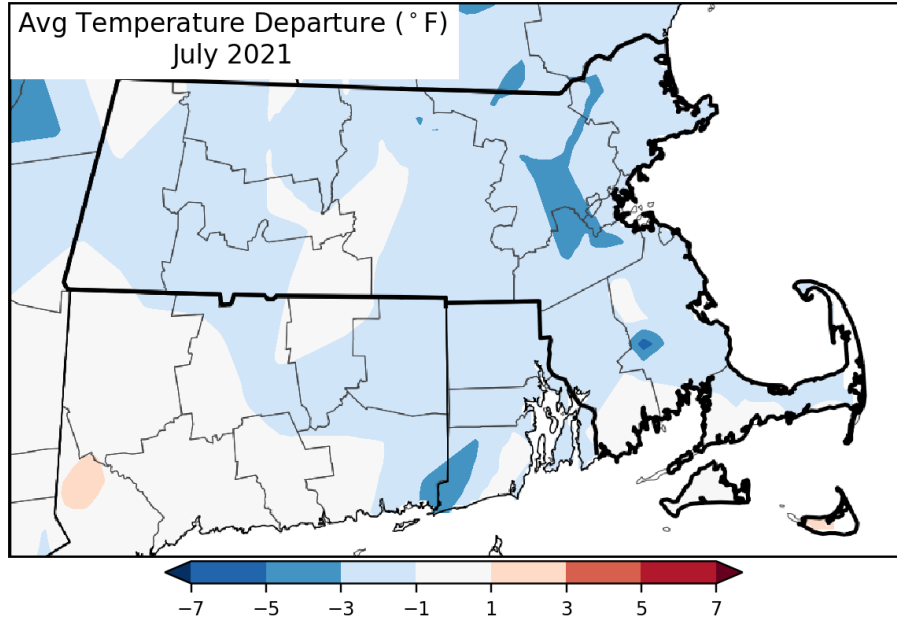




Map 5: July 2021 rainfall for southern New England. From the Northeast Regional Climate Center.



Map 6: July 2021 rainfall departure from normal for southern New England. From the Northeast Regional Climate Center.



Map 7. Average temperature departure from normal across southern New England for July 2021.  
From the Northeast Regional Climate Center.