Current Hydrologic Conditions in Massachusetts

Drought Management Task Force

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Division of Water Supply Protection

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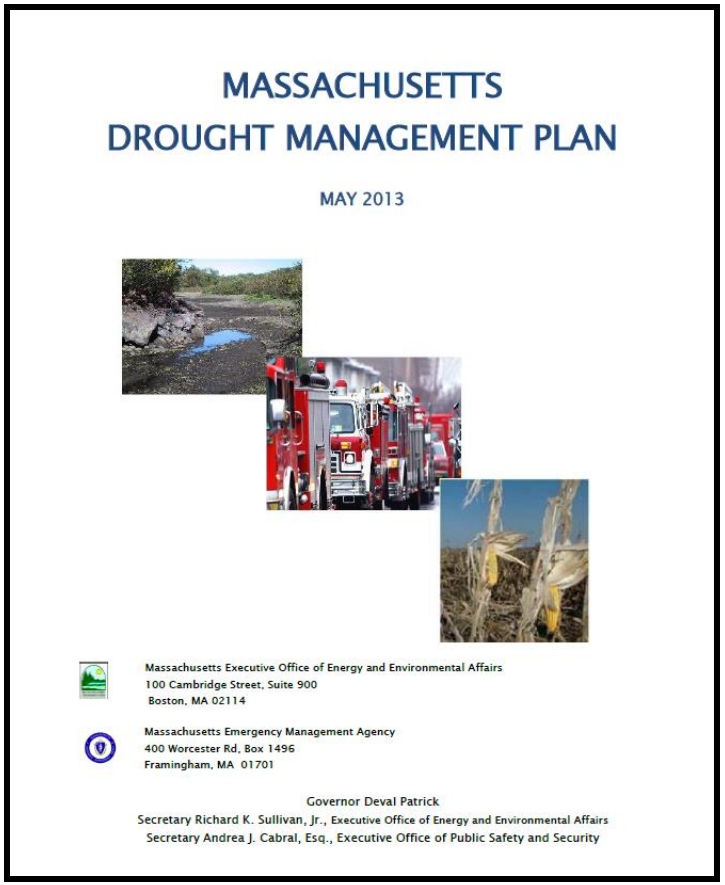
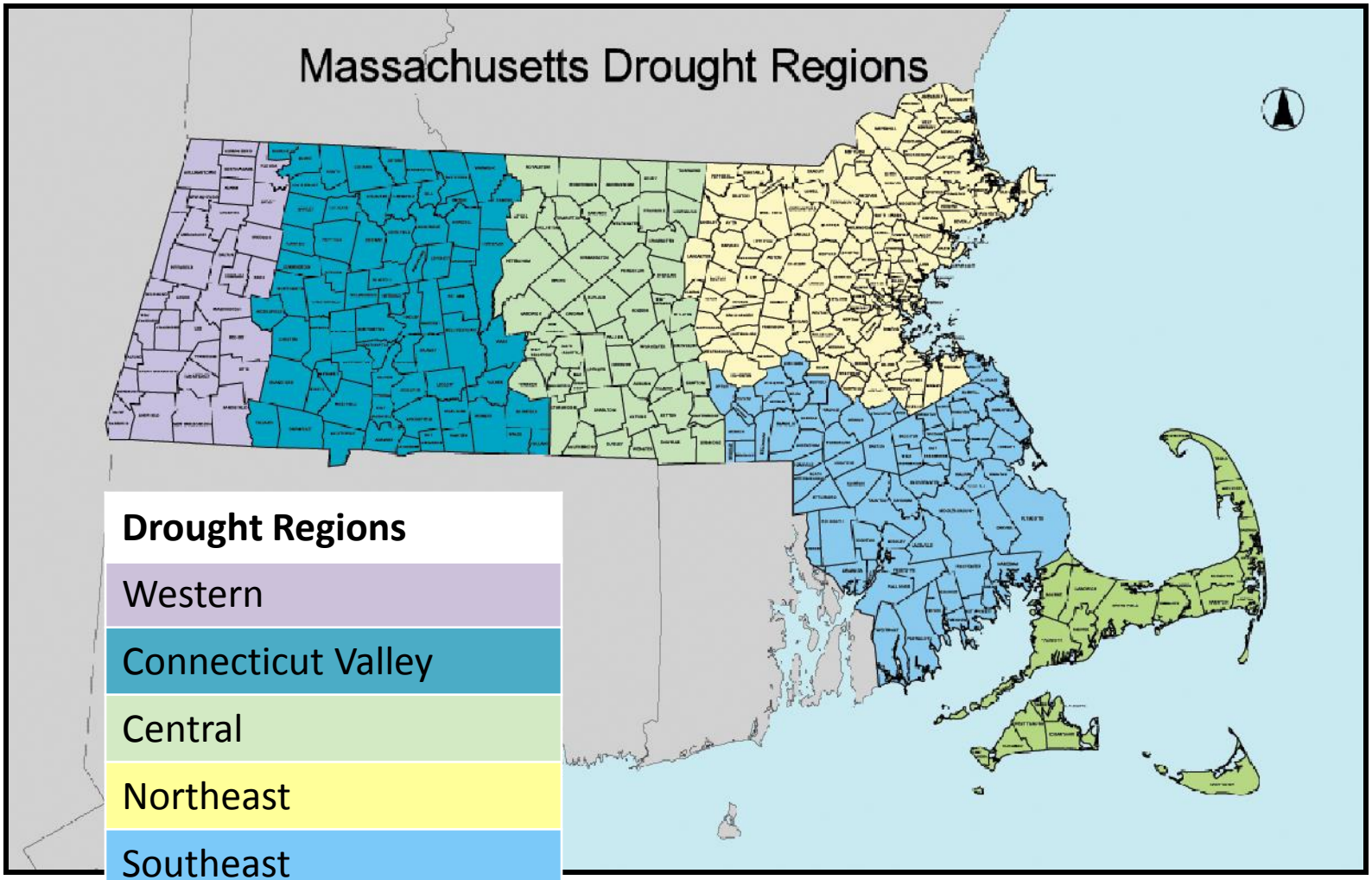
MA Drought Management Plan
Summary / Review



www.mass.gov/eea/wrc-dmtf

Massachusetts Drought Regions



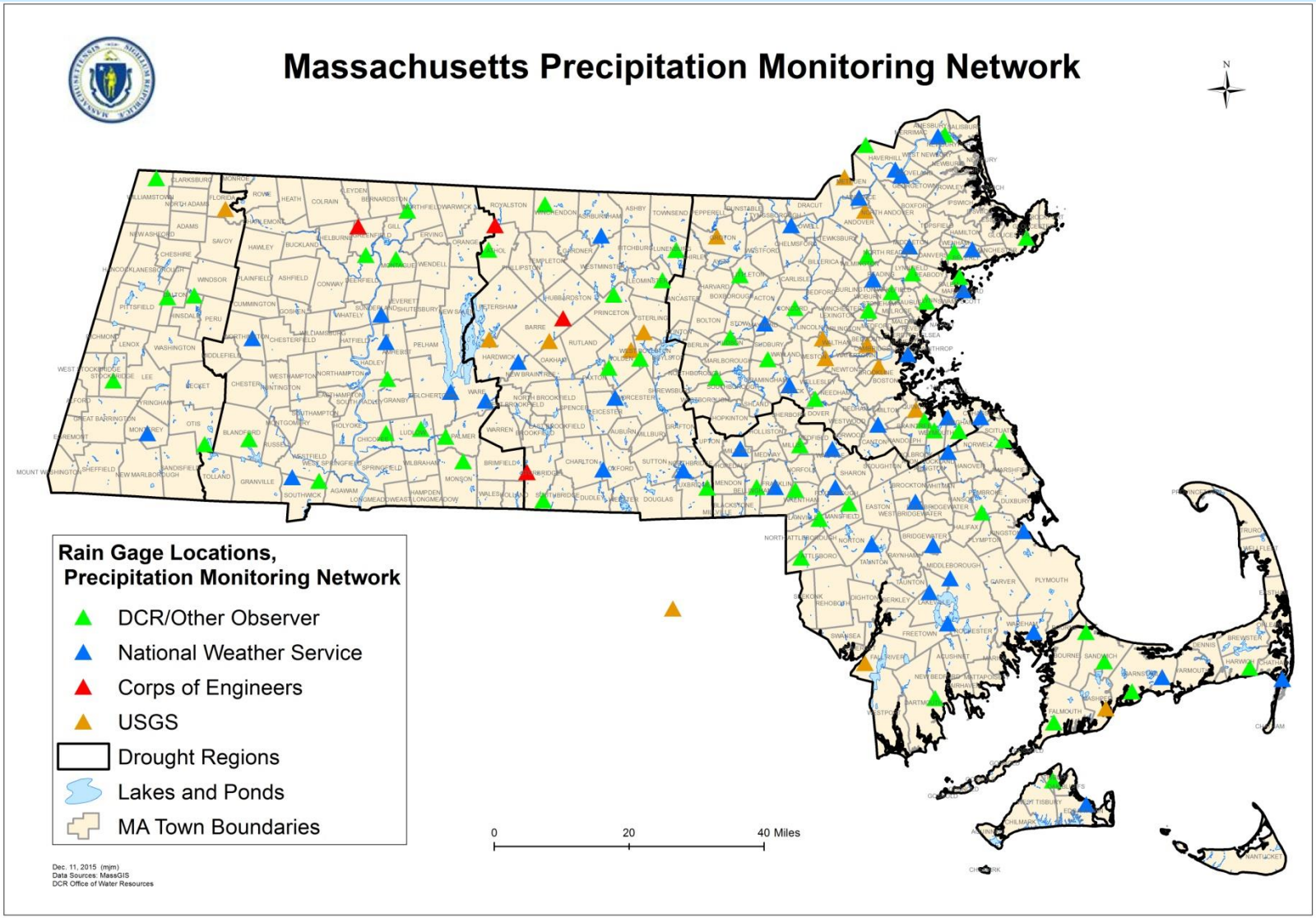
Massachusetts Drought Indicators and Levels

Drought Indicator	Indicator Type
Standardized Precipitation Index	Precipitation
Precipitation Percent Below Normal	Precipitation
Streamflow Months Below Normal	Streamflow
Groundwater Level Months Below Normal	Groundwater
Size of Reservoir (S, M, L) Below Normal	Reservoirs
Crop Moisture Index	Crop Moisture
Keetch-Byram Drought Index	Fire Danger

Drought Levels:
Normal
Advisory
Watch
Warning
Emergency

Drought declaration based on majority of indices

Precipitation Data Sources



Standardized Precipitation Index, July 2016

REGION	3-Month SPI	6-Month SPI	12-Month SPI
Western Region	-0.62	0.12	-0.20
Connecticut River Region	-1.46	-1.23	-0.97
Central Region	-1.44	-1.31	-1.52
Northeast Region	-1.44	-1.31	-1.42
Southeast Region	-0.92	-0.89	-0.61
Cape & Islands	-0.97	-0.26	0.07

Monthly Precipitation Composite Estimate, July 2016

July-16			Percent	Excess/	----------Excess or Deficit Since Last----------								
	Normal	Actual	Normal	Deficit	10/1/2015	2 Months	% Norm	3 Months	% Norm	6 Months	% Norm	12 Months	% Norm
State	3.69	2.09	57	-1.60	-5.47	-2.46	67	-3.18	71	-3.48	84	-5.79	87
Cape Cod and Islands	2.91	2.64	91	-0.27	2.24	-2.80	56	-3.29	67	-1.20	94	1.16	103
Central	3.82	1.97	52	-1.85	-9.13	-3.68	52	-4.71	58	-5.54	76	-10.72	77
Connecticut River	4.21	2.08	49	-2.13	-8.26	-4.12	50	-5.31	56	-5.62	75	-6.58	86
Northeast	3.48	1.52	44	-1.96	-9.57	-3.93	43	-5.10	51	-5.81	73	-10.18	77
Southeast	3.35	1.72	51	-1.63	-4.87	-3.29	51	-3.29	67	-4.17	81	-4.88	89
Western	4.28	3.72	87	-0.56	-2.86	-1.74	79	-2.28	82	0.48	102	-1.83	96

Note: Precipitation values are total rainfall and melted snow in inches.

Values are estimated pending receipt of additional data and final calculations.

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Precipitation values are total rainfall and melted snow in inches.

Precipitation

Region	July Estimated Rainfall: Composite Sites Reporting (inches)	Departure from Normal (inches)	MA Drought Management Plan Levels	
			Standardized Precipitation Index	Percent of Normal Index
Cape Cod & Islands	2.64	-0.27	Normal	Advisory
Central	1.97	-1.85	Watch	Watch
Connecticut River	2.08	-2.13	Advisory	Watch
Northeast	1.52	-1.96	Advisory	Watch
Southeast	1.72	-1.63	Normal	Advisory
Western	3.72	-0.56	Normal	Normal

Reservoir Index

Drought Level	Reservoir Index*
Normal	Reservoir levels at or near normal for the time of year
Advisory	Small index reservoirs below normal
Watch	Medium index reservoirs below normal
Warning	Large index reservoirs below normal
Emergency	Continuation of previous month's conditions

*Water suppliers should be consulted to determine if below normal reservoir conditions are due to operational issues

Reservoir Monitoring

Drought Regions	Reservoir	Size Class	Drought Level
Western	Lenox	Small	Normal
Western	Pittsfield	Medium	Normal
Connecticut Valley	Springfield	Medium	Normal
Connecticut Valley	Quabbin	Large	Normal
Central	North Brookfield	Small	Below Normal
Central	Southbridge	Medium	Below Normal
Central	Worcester	Medium	Below Normal

Reservoir Monitoring, cont.

Drought Regions	Reservoir	Size Class	Drought Level
Northeast	Cambridge	Medium	Below Normal
	Hudson	Medium	Normal
	Lynn	Medium	Below Normal
	North Andover	Medium	Below Normal
	Rockport	Small	Normal
	Salem/Beverly	Medium	Normal
Southeast	Assawompsett	Medium	Below Normal
	Cohasset	Small	Below Normal
	Milford	Medium	Below Normal
Cape and Islands	Falmouth Ashumet	Small	Normal

Reservoirs

General Reservoir Levels in Massachusetts at the end of July 2016		
Region	**Reservoir Levels**	**MA Drought Management Plan Reservoir Index**
Cape Cod & Islands	Normal	Normal
Central	Medium Below Normal	Watch
Connecticut River	Normal	Normal
Northeast	Medium Below Normal	Watch
Southeast	Medium Below Normal	Watch
Western	Normal	Normal

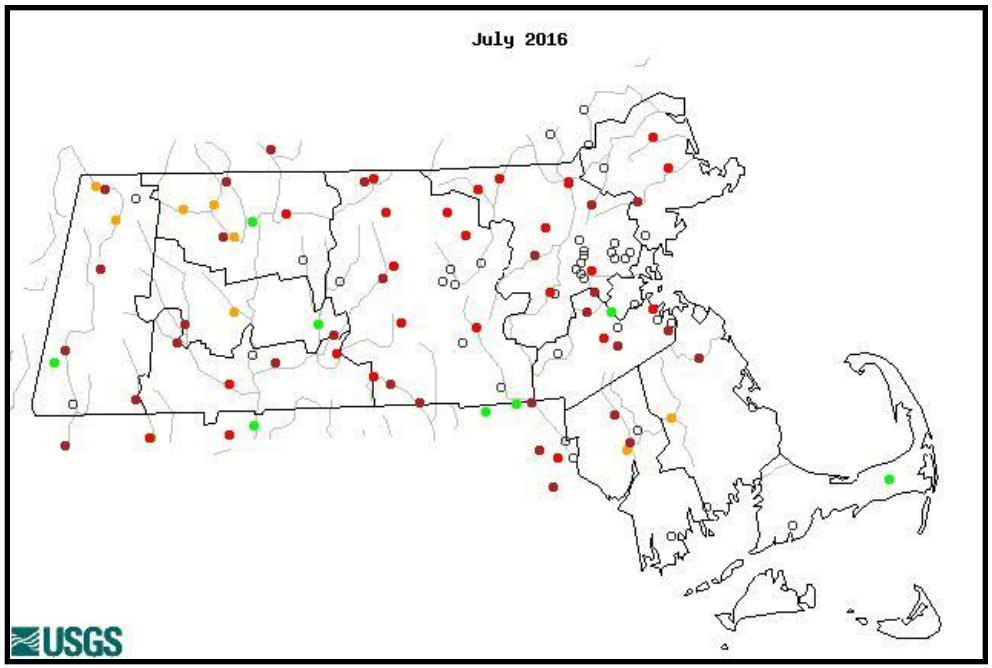
Streamflow Index

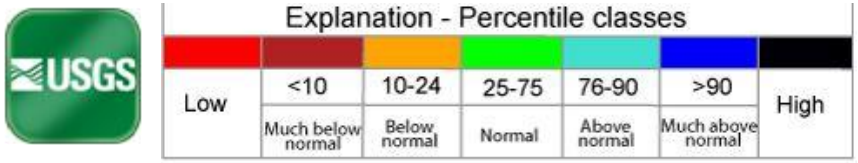
Drought Level	Streamflow Index
Normal	1 month below normal*
Advisory	At least 2 out of 3 consecutive months below normal*
Watch	At least 4 out of 5 consecutive months below normal*
Warning	At least 6 out of 7 consecutive months below normal*
Emergency	Greater than 7 months below normal*

*Below normal for streamflow is defined as being within the lowest 25th percentile of the period of record

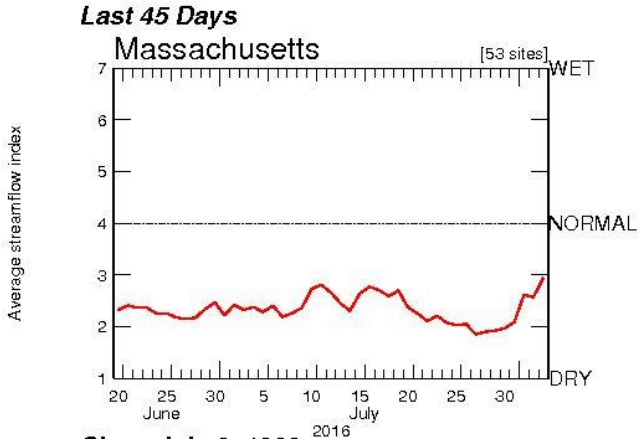
Streamflow

Map of July 2016 Streamflow Compared to Historical Streamflow for July





Real-Time Streamflow Compared to Historical Streamflow for the Day of the Year



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

Gulf Brook, Pepperell (July 21, 2016)

Martins Brook, North Reading (July 28, 2016)

Third Herring Brook, Norwell (August 4, 2016)

Weir River, Hingham (August 10, 2016)

Streamflow

General Streamflow Conditions in Massachusetts July 2016		
Region	**Streamflow Conditions**	**MA Drought Management Plan Streamflow Index**
Cape Cod & Islands	Not Applicable	Not Applicable
Central	Below Normal	Watch
Connecticut River	Below Normal	Watch
Northeast	Below Normal	Watch
Southeast	Below Normal	Watch
Western	Below Normal	Watch

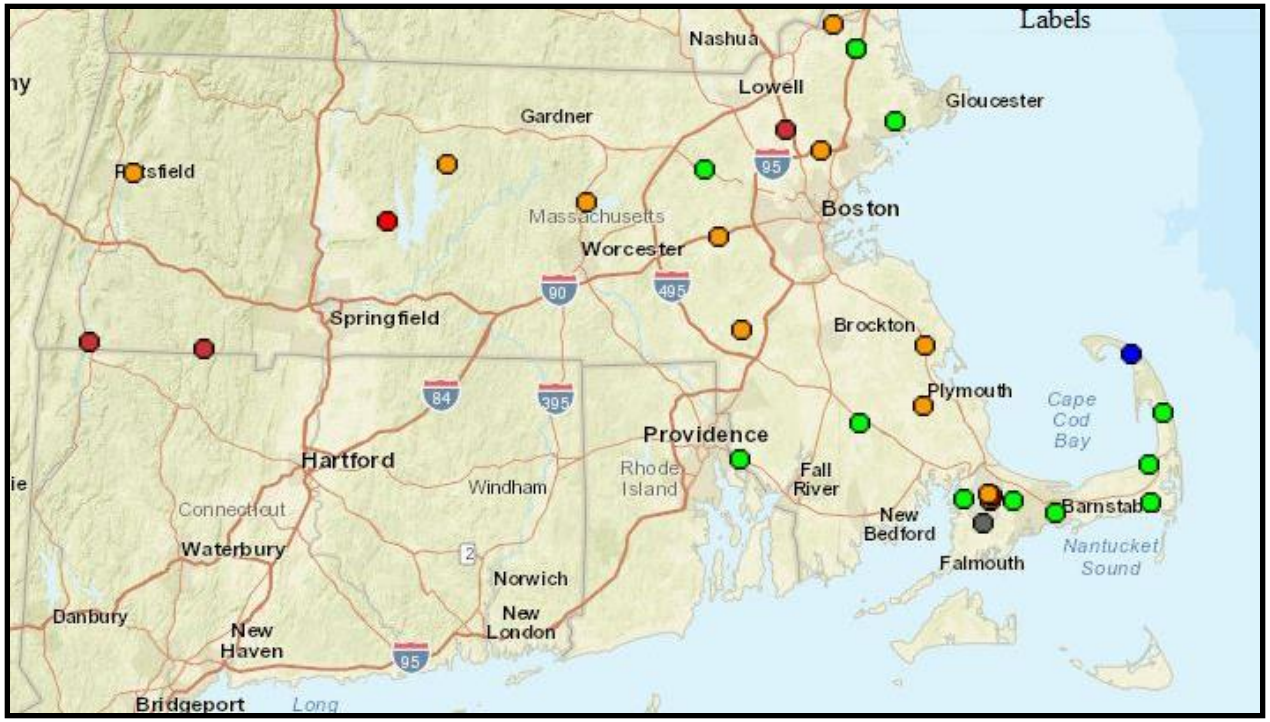
Groundwater Index

Drought Level	Groundwater Index
Normal	2 consecutive months below normal*
Advisory	3 consecutive months below normal*
Watch	4 to 5 consecutive months below normal*
Warning	6 to 7 consecutive months below normal*
Emergency	Greater than 8 months below normal*

*Below normal for groundwater is defined as being within the lowest 25th percentile of the period of record

Groundwater

August 3 2016 Real-Time Groundwater Conditions



Explanation - Percentile classes								
								○ Real Time
New Low	<10 Much Below Normal	10-24 Below Normal	25-75 Normal	76-90 Above Normal	>90 Much Above Normal	New High	Not Ranked	□ Continuous
								△ Periodic Measurements

Groundwater

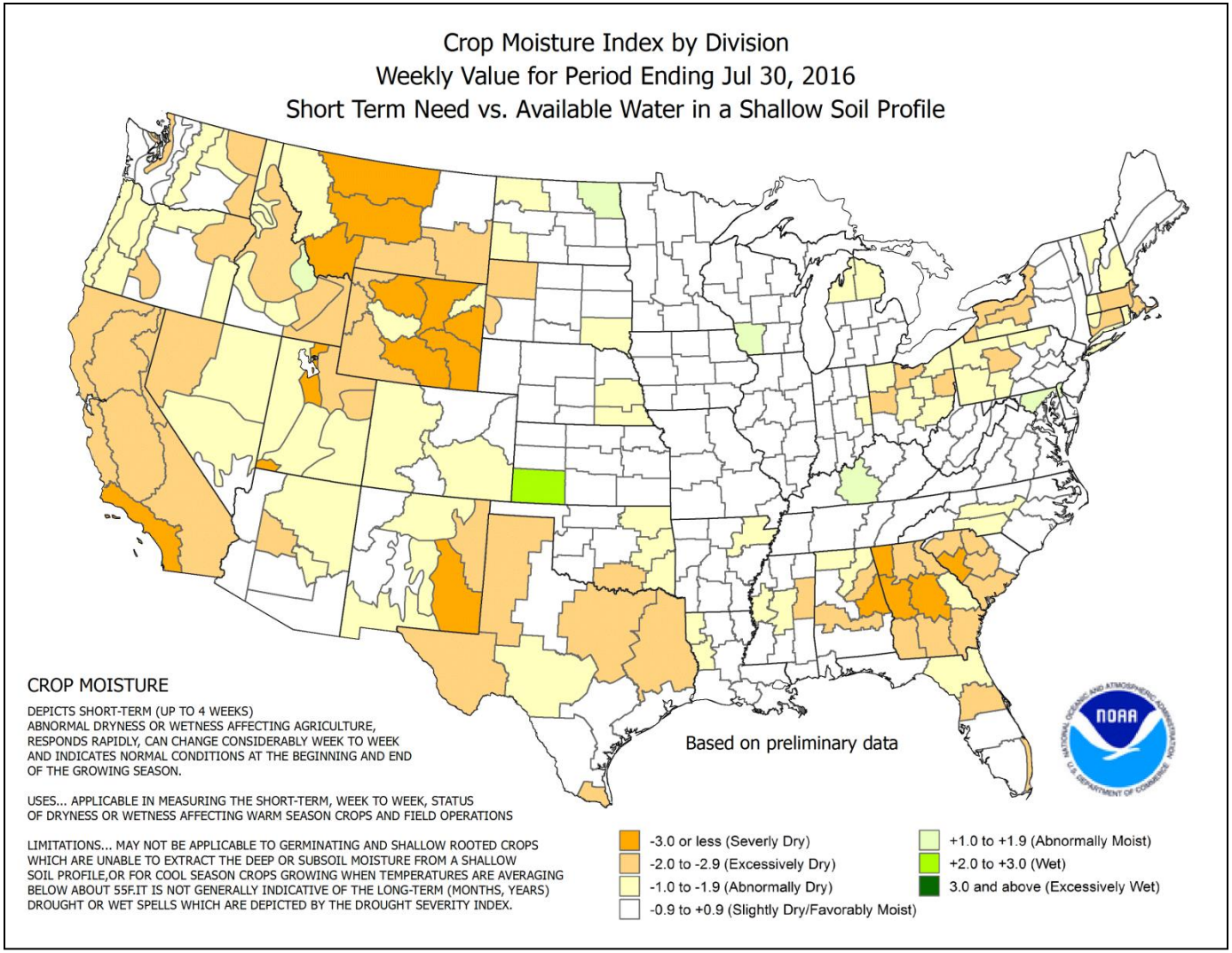
General Groundwater Conditions in Massachusetts July 2016		
Region	**Groundwater Conditions**	**MA Drought Management Plan Groundwater Index**
Cape Cod & Islands	Normal	Normal
Central	Below Normal	Watch
Connecticut River	Below Normal	Watch
Northeast	Below Normal	Watch
Southeast	Below Normal	Advisory
Western	Below Normal	Watch

Crop Moisture and Fire Danger Indices

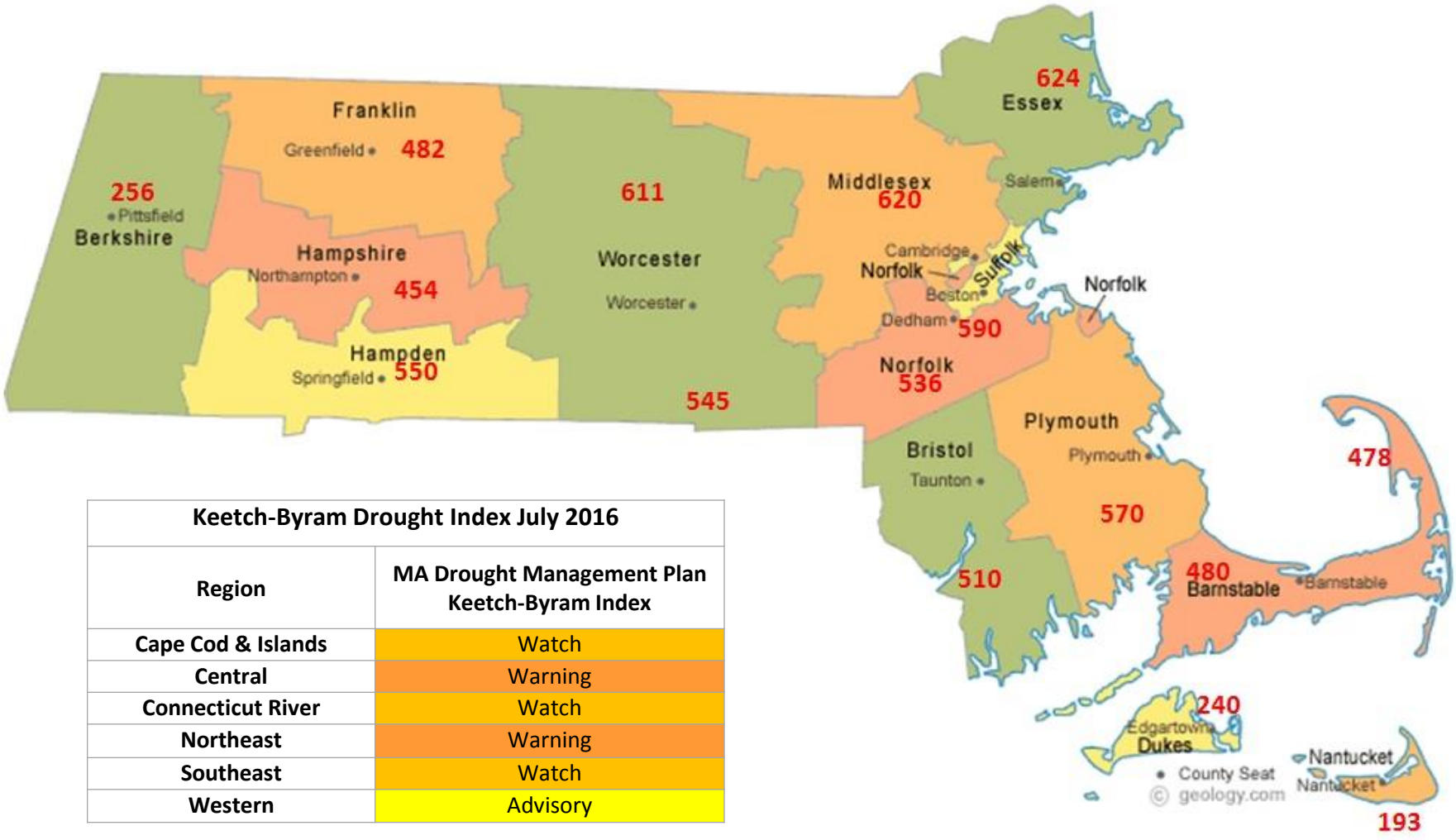
Drought Level	Crop Moisture Index*	Keetch-Byram Drought Index (KBDI)
Normal	0 to -1.0 Slightly dry	less than 200
Advisory	-1 to -1.9 Abnormally dry	200 to 400
Watch	-2 to -2.9 Excessively dry	400 to 600
Warning	< -2.9 Severely dry	600 to 800
Emergency	< -2.9 Severely dry	600 to 800

* 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.

Crop Moisture



Keetch-Byram Drought Index



Keetch-Byram Drought Index July 2016	
Region	**MA Drought Management Plan Keetch-Byram Index**
Cape Cod & Islands	Watch
Central	Warning
Connecticut River	Watch
Northeast	Warning
Southeast	Watch
Western	Advisory

Agency Input and Discussion

Summary of Drought Indices

	Drought Regions					
Drought Indicator	**West**	**CT River**	**Central**	**Northeast**	**Southeast**	**Cape and Islands**
Standardized Precipation Index (SPI)	Normal	Advisory	Watch	Advisory	Normal	Normal
Precipitation % Below Normal	Normal	Watch	Watch	Watch	Advisory	Advisory
Streamflow Months Below Normal	Watch	Watch	Watch	Watch	Advisory	N/A
Groundwater Months Below Normal	Watch	Watch	Watch	Watch	Watch	Normal
Size of reservoir below normal	Normal	Normal	Watch	Watch	Watch	Normal
Crop Moisture Index	Advisory	Watch	Watch	Watch	Watch	Watch
Keetch-Byram Drought Index	Advisory	Watch	Warning	Warning	Watch	Watch

This summary is provided for informational purposes. No changes in drought status are official until the Drought Management Task Force convenes and makes a recommendation accepted by the Secretary of the Executive Office of Energy and Environmental Affairs.