

Hydrologic Conditions in Massachusetts for mid-August 2022

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DCR Office of Water Resources

Drought Management Task Force

August 23, 2022

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan

Indices

Numbers in parentheses indicate number of data points across the state



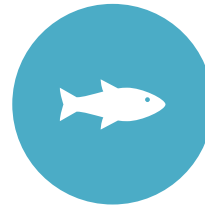
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(16)



Crop Moisture
(national map)

MA Drought Management Plan

Index Severity Levels

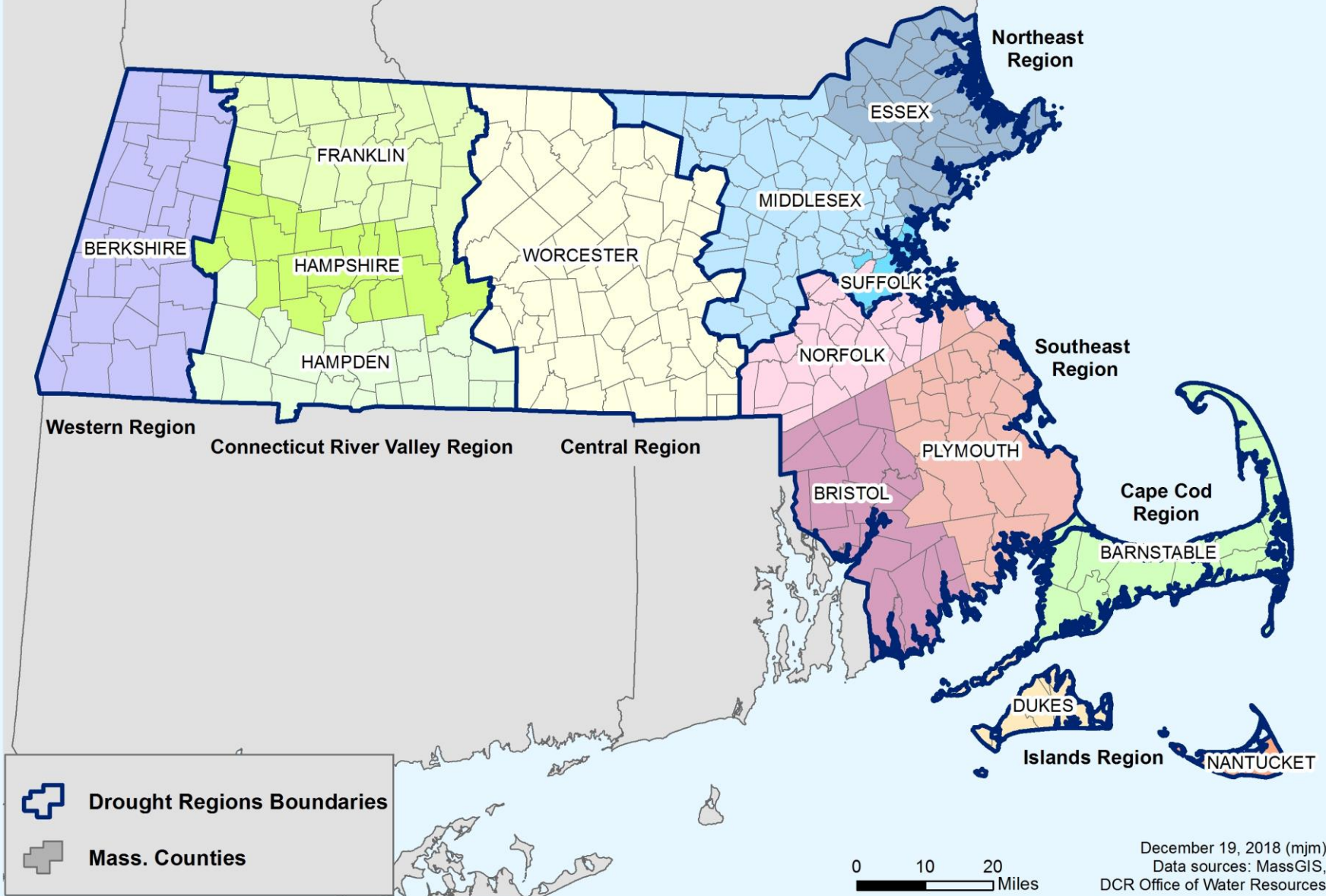
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 th percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0 and > -4.0
4	≤2	700-800	≤-4.0

MA Drought Management Plan

Drought Levels



MASSACHUSETTS DROUGHT REGIONS with Counties



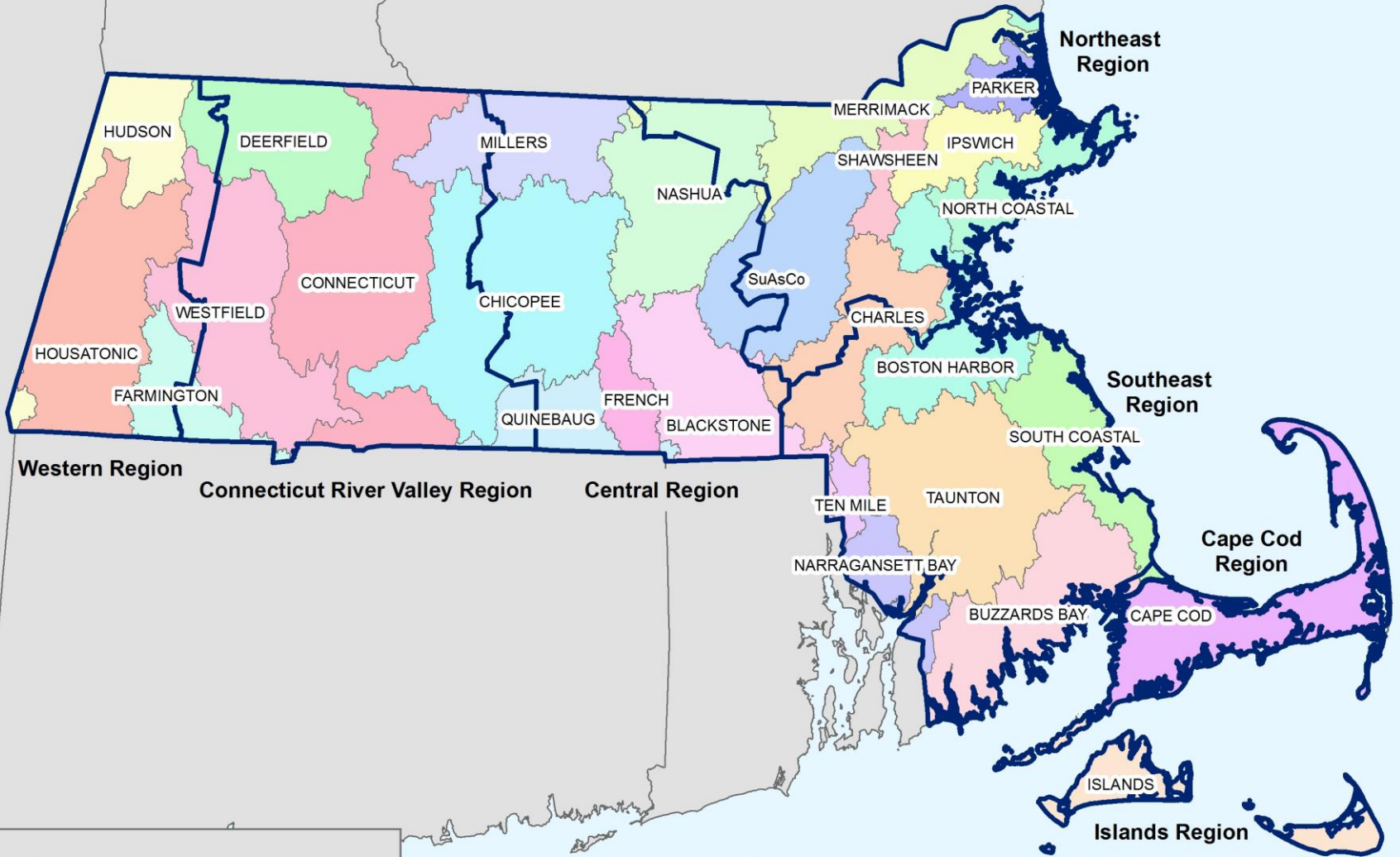
-  Drought Regions Boundaries
-  Mass. Counties

0 10 20
Miles

December 19, 2018 (mjm)
Data sources: MassGIS,
DCR Office of Water Resources

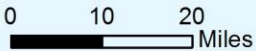


MASSACHUSETTS DROUGHT REGIONS with Watersheds



 **Drought Regions Boundaries**

 **Mass. Counties**



October 11, 2019 (mjm)
Data sources: MassGIS,
DCR Office of Water Resources

Task Force Member Updates



Hydrologic
Conditions



Weather &
Forecast



Water Supply
Impacts



Environmental
Impacts



Agricultural
Impacts



Fire Danger



Engineering/
Infrastructure
Impacts

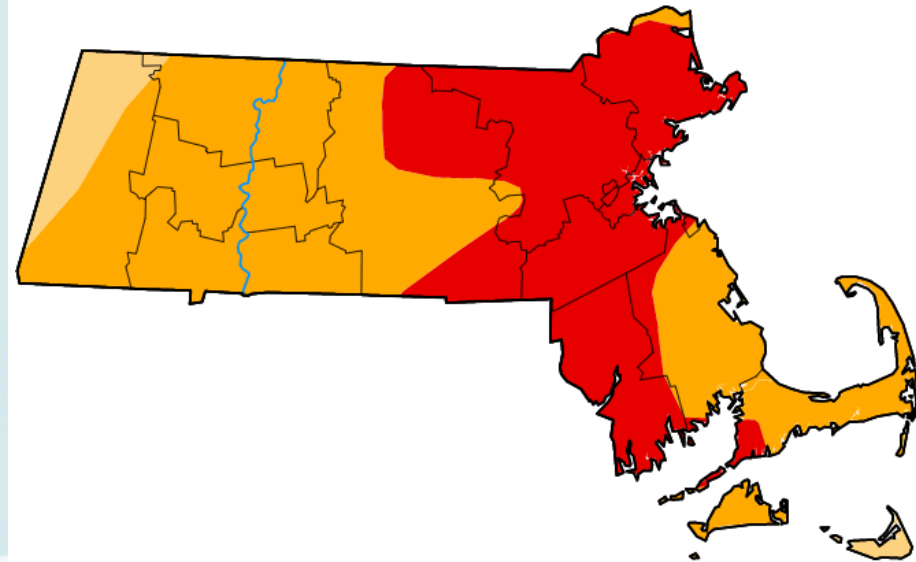
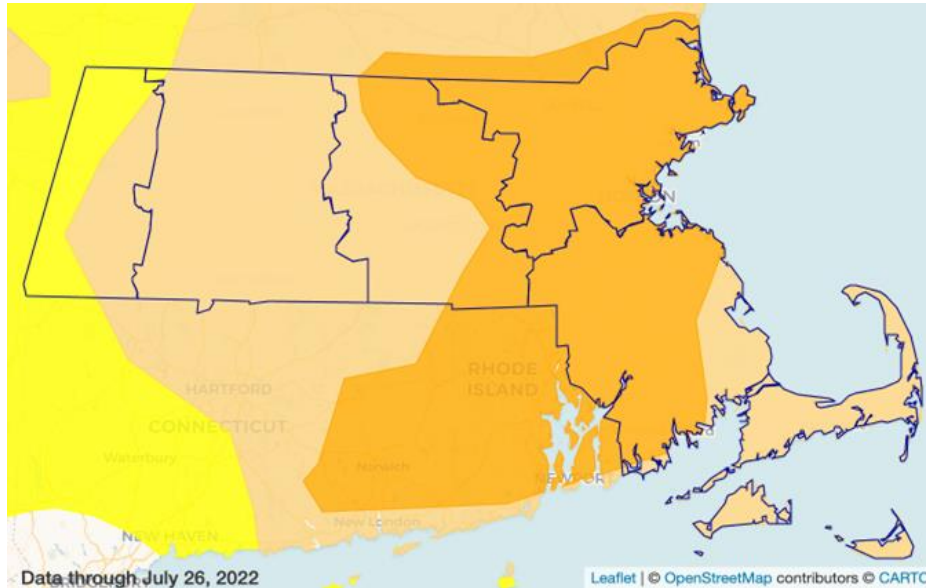


Public Health
Impacts

Recent Hydrologic History

- 2022
 - *January through April*
 - variable precipitation with scattered, minimal impacts until April when first drought levels called
 - *May*
 - continued low precipitation plus increased ET especially in NE and SE
 - flash drought in NE with 2 category jump?
 - *July and August*
 - minimal precipitation with high temperatures
 - with Cape Cod only at 17% of normal since Aug 1

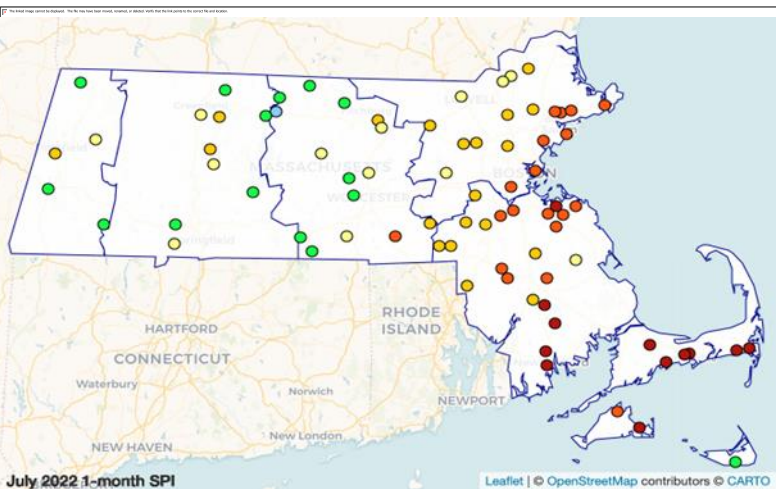
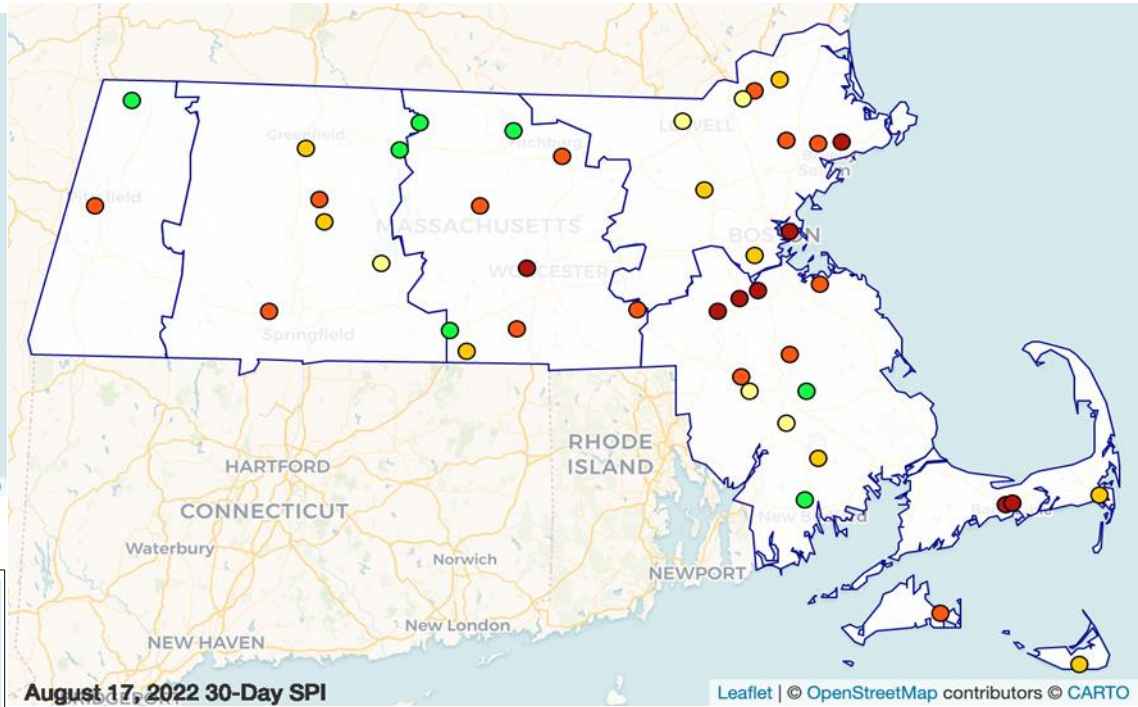
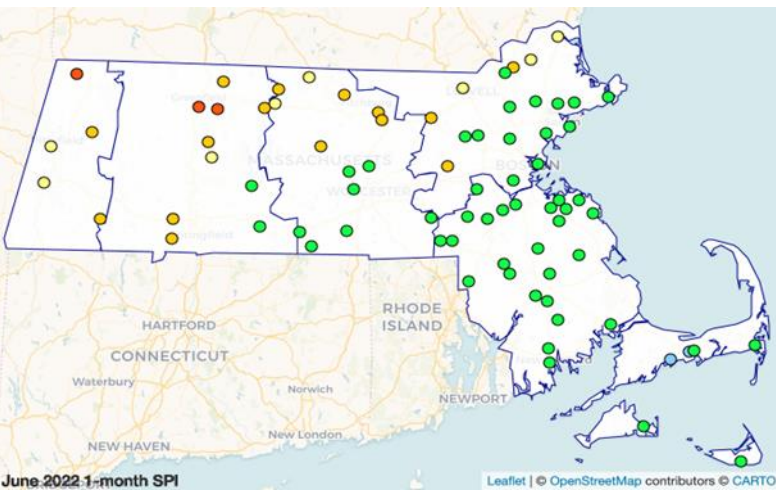
US Drought Monitor



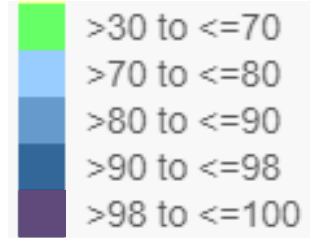
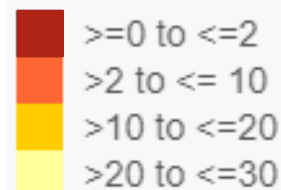
- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

USDM	MA DMP
0	= 1
1	= 2
2,3	= 3
4	= 4

Standardized Precipitation Index

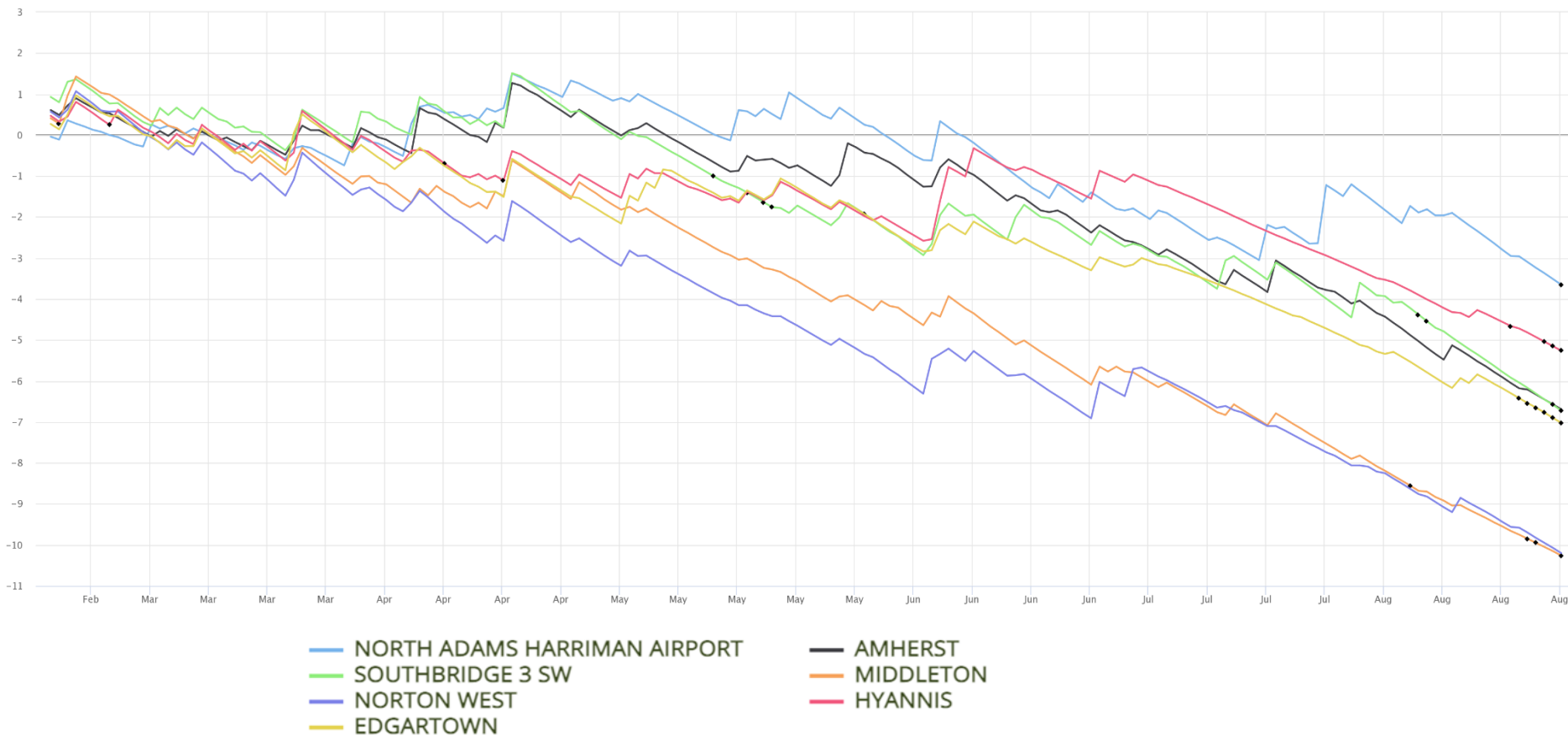


Percentiles



Accumulated Precipitation Departure from 30-Year Average in inches

Black diamonds represent missing values



- Graph does not consider starting condition's wetness/dryness
- Does not show summer heat waves with high ET
- Only 1 station per Drought Region is shown.

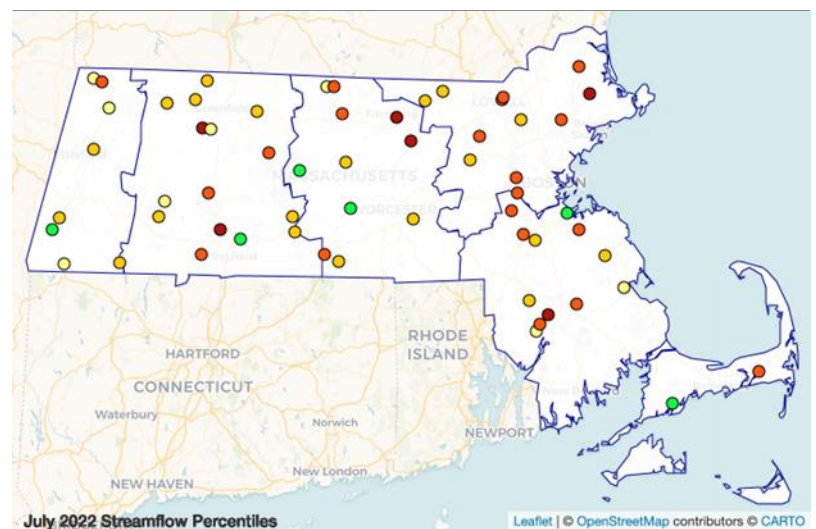
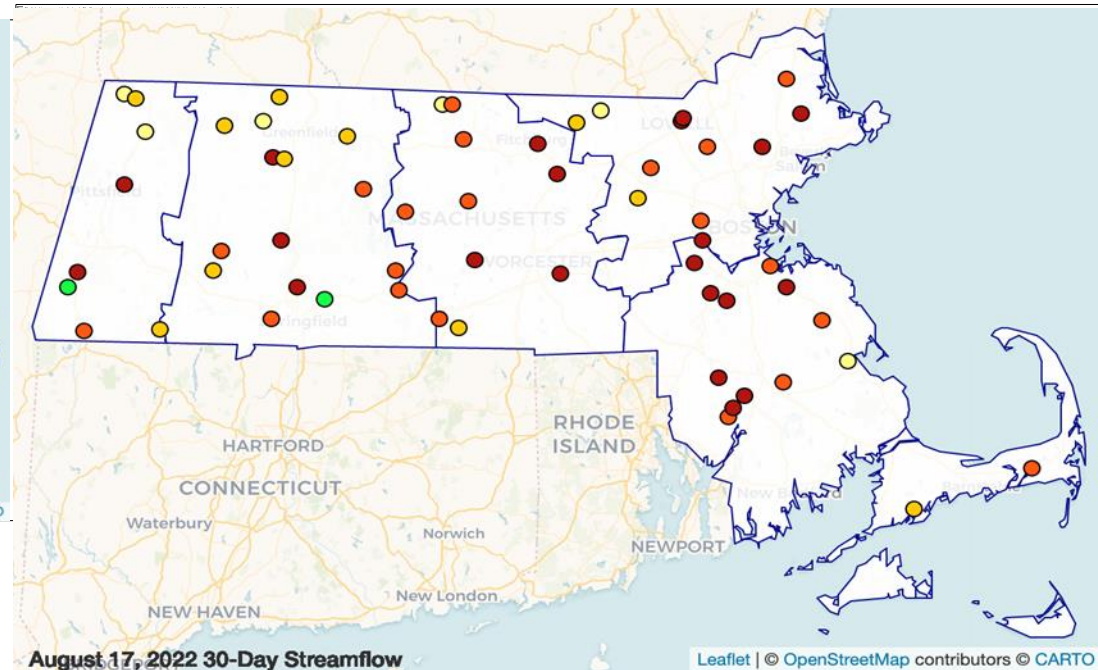
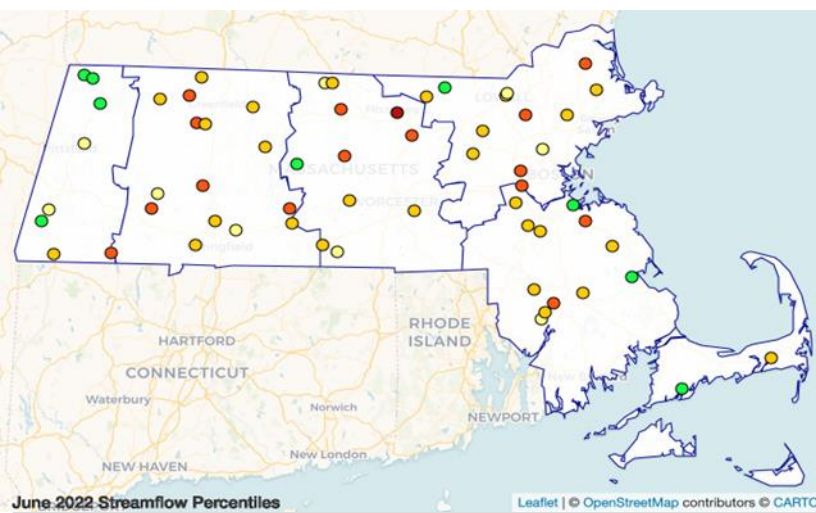
Standardized Precipitation Index as Percentile, mid-August

REGION	NUMBER OF SITES	30-day*	60-day	90-day	180-day	270-day	365-day	730-day	1095-day*
WESTERN	2	21	10	9	27	20	80	81	62
CTRV	6	16	9	8	10	7	43	68	50
CENTRAL	9	6	10	14	13	15	62	80	68
NORTHEAST	10	11	6	6	5	2	39	58	53
SOUTHEAST	11	10	9	10	3	3	26	57	44
CAPE COD	3	2	3	20	4	13	63	27	25
ISLANDS	2	13	14	16	17	10	19	21	29

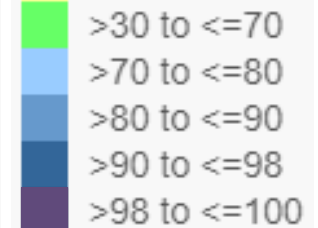
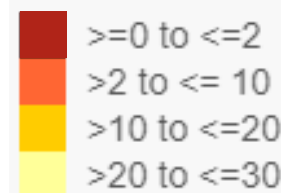
* 1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

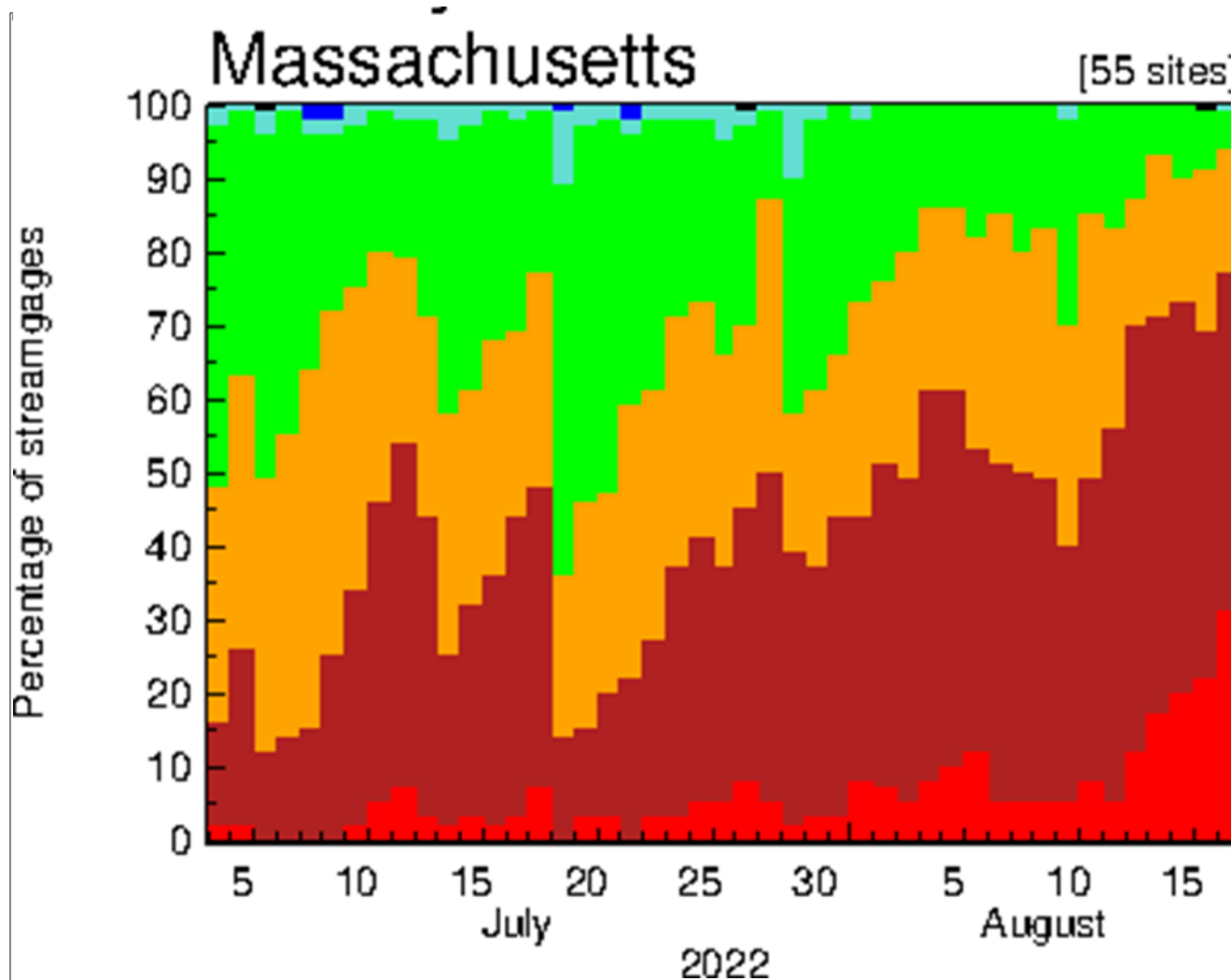
Streamflow Percentiles of Monthly Median



Percentiles



Percent of Gages at Various Percentiles



Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		

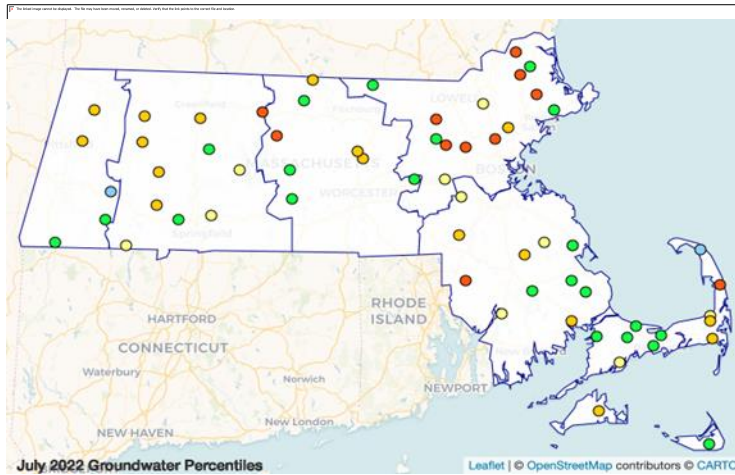
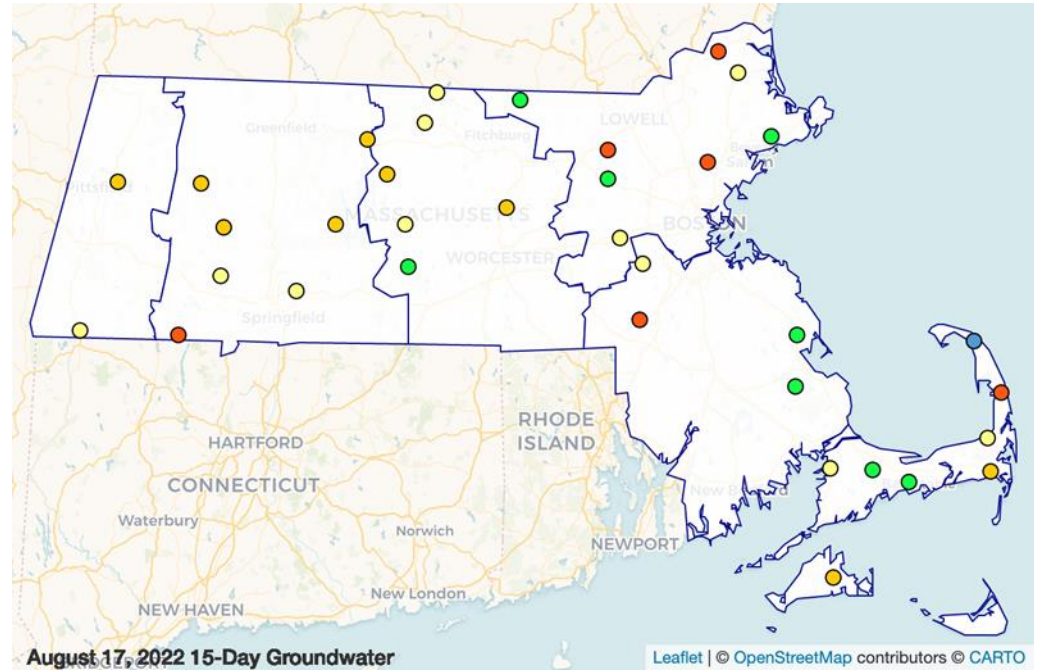
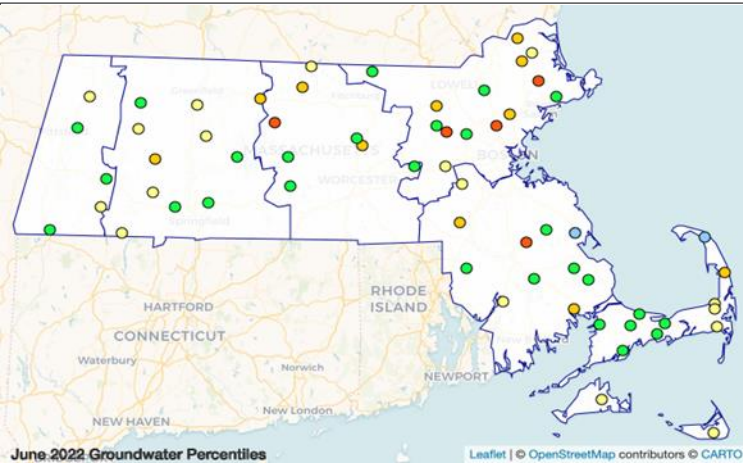
Streamflow Index mid-August

REGION	NUMBER OF GAGES REPORTING	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 TO ≤30 PERCENTILE	>90 PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES
WESTERN	8	2	1	2	2	0	17
CTRV	15	3	5	5	1	0	10
CENTRAL	11	4	5	1	1	0	5
NORTHEAST	12	5	4	2	1	0	3
SOUTHEAST	12	7	4	0	1	0	2
CAPE COD	2	0	1	1	0	0	10

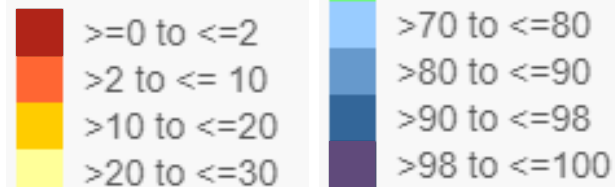
Notes: Not all gages report in all months due to ice, beaver dams or other conditions. The Islands region does not have any streamflow gages.

Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Groundwater Percentiles



Percentiles



Groundwater Index

REGION	NUMBER OF WELLS REPORTING	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 TO ≤30 PERCENTILE	>90 PERCENTILE	MEDIAN OF INDIVIDUAL WELL PERCENTILES
WESTERN	2	0	0	1	1	0	21
CTRV	7	0	1	4	2	0	12
CENTRAL	6	0	0	2	3	0	24
NORTHEAST	14	0	6	2	3	0	16
SOUTHEAST	4	0	1	0	1	0	28
CAPE COD	10	0	1	2	4	0	28
ISLANDS	1	0	0	1	0	0	18

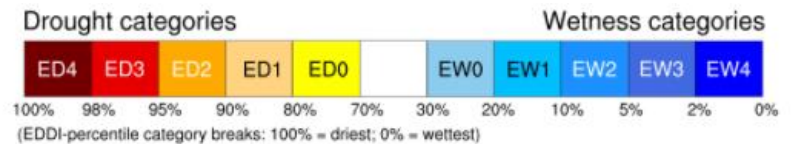
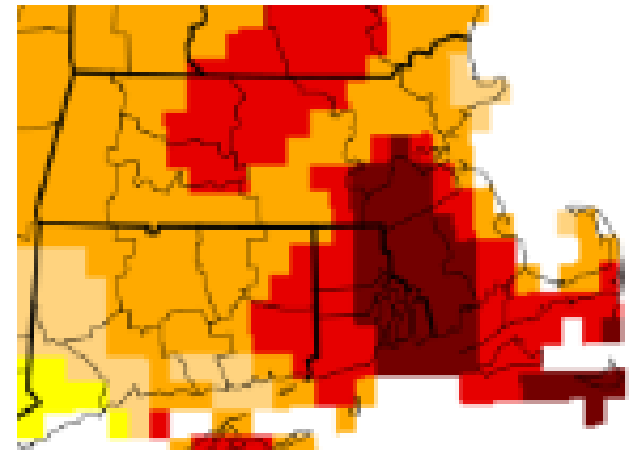
Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Evapotranspiration

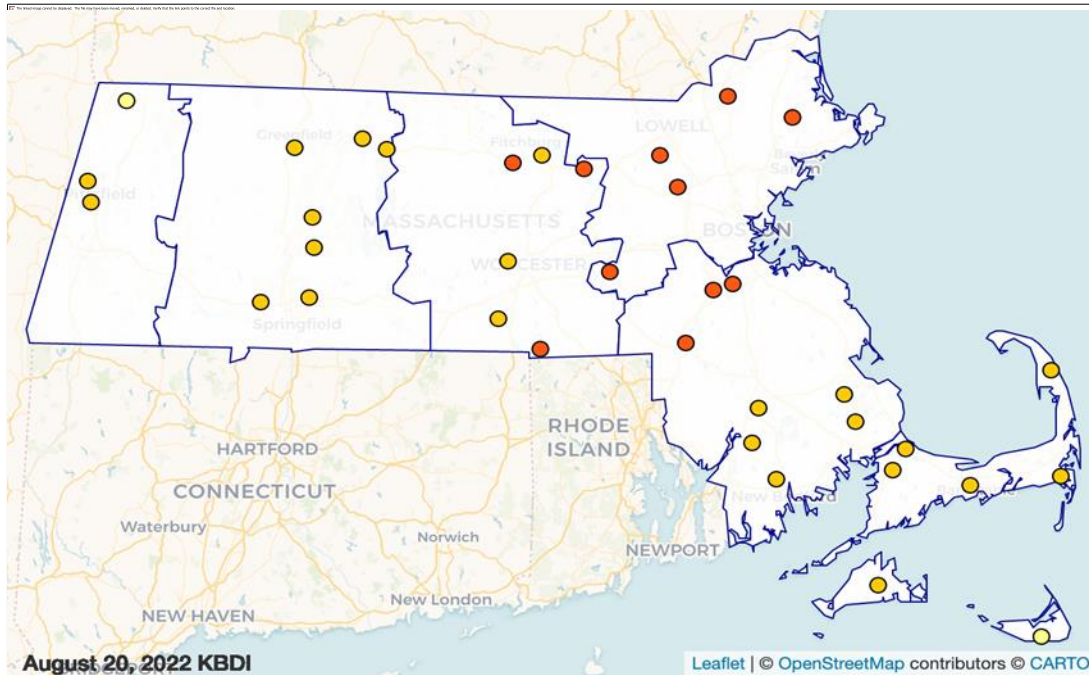
CMI week ending August 13th



2-month EDDI
Map dated August 17th



KBDI - Top 8 inches of soil moisture



Point Values - KBDI Range

● ≥700 to ≤800	● ≥600 to <700	● ≥400 to <600	● ≥200 to <400	● ≥0 to <200
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REGION	NUMBER OF SITES REPORTING	HIGHEST OF SITE VALUES
WESTERN	3	497
CTRV	7	581
CENTRAL	6	678
NORTHEAST	5	654
SOUTHEAST	8	689
CAPE COD	5	511
ISLANDS	2	499

Index Severity Levels

Level 0	Level 1	Level 2	Level 3	Level 4
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Lakes & Impoundments

Not enough data from regions to allow for the calculation of median values

REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN		
CTRV		
CENTRAL		
NORTHEAST		
SOUTHEAST		
CAPE COD		

Notes:

DMP index severity levels do not necessarily reflect water supply status.

The Central Region now has one additional reservoir reporting (Horse Pond in North Brookfield).

Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Drought Indices by Region – end of July 2022

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation	17	11	14	6	7	20	52
Streamflow	21	13	12	7	10	17	N/A
Groundwater	41	19	27	12	22	31	25
Lakes/ Impoundments	31	23	23	7	7	16	N/A
ET- CMI EDDI	Level 0 3	Level 1 3	Level 1 4	Level 2 3	Level 2 3	Level 2 4	Level 2 4
KBDI	Level 1	Level 2	Level 2	Level 2	Level 3	Level 2	Level 1
<i>Recommend 7/22 (8/8 meeting)</i>	<i>Level 1</i>	<i>Level 3</i>	<i>Level 3</i>	<i>Level 3</i>	<i>Level 3</i>	<i>Level 2</i>	<i>Level 1</i>
<i>Effective 7/1 (7/21 meeting)</i>	<i>Level 1</i>	<i>Level 2</i>	<i>Level 3</i>	<i>Level 3</i>	<i>Level 2</i>	<i>Level 1</i>	<i>Level 1</i>

Lakes & Impoundments Index does not reflect water supply status. This summary is provided for informational purposes. No changes in drought status are official until the Secretary of the Executive Office of Energy and Environmental Affairs makes the final drought declaration for the state after receiving a recommendation from the Drought Management Task Force. Data are preliminary and not final until all data are reported.

Drought Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Drought Indices by Region, mid-August 2022

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (60 day)	10	9	10	6	9	3	14
Streamflow	17	10	5	3	2	10	N/A
Groundwater	21	12	24	16	28	28	18
Lakes/ Impoundments	ID	ID	ID	ID	ID	ID	N/A
ET- CMI EDDI	Level 1 3	Level 2 3	Level 2 3	Level 2 3	Level 2 4	Level 2 3	Level 2 4
KBDI	Level 2	Level 2	Level 3	Level 3	Level 3	Level 2	Level 2

Recommend 8/17 (8/23 meeting)	Level 2	Level 3	Level 3	Level 3	Level 3	Level 3	Level 2
Effective 7/1 (8/8 meeting)	Level 1	Level 3	Level 3	Level 3	Level 3	Level 2	Level 1

Lakes & Impoundments Index does not reflect water supply status. This summary is provided for informational purposes. No changes in drought status are official until the Secretary of the Executive Office of Energy and Environmental Affairs makes the final drought declaration for the state after receiving a recommendation from the Drought Management Task Force. Data are preliminary and not final until all data are reported. N/A = not applicable. ID = insufficient data.

Drought Levels				
Level 0	Level 1	Level 2	Level 3	Level 4