

Hydrologic Conditions in Massachusetts for July 2022

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DCR Office of Water Resources

Drought Management Task Force

August 8, 2022

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan

Indices

Numbers in parentheses indicate number of data points across the state



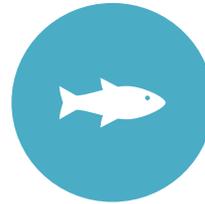
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(16)



Crop Moisture
(national map)

MA Drought Management Plan

Index Severity Levels

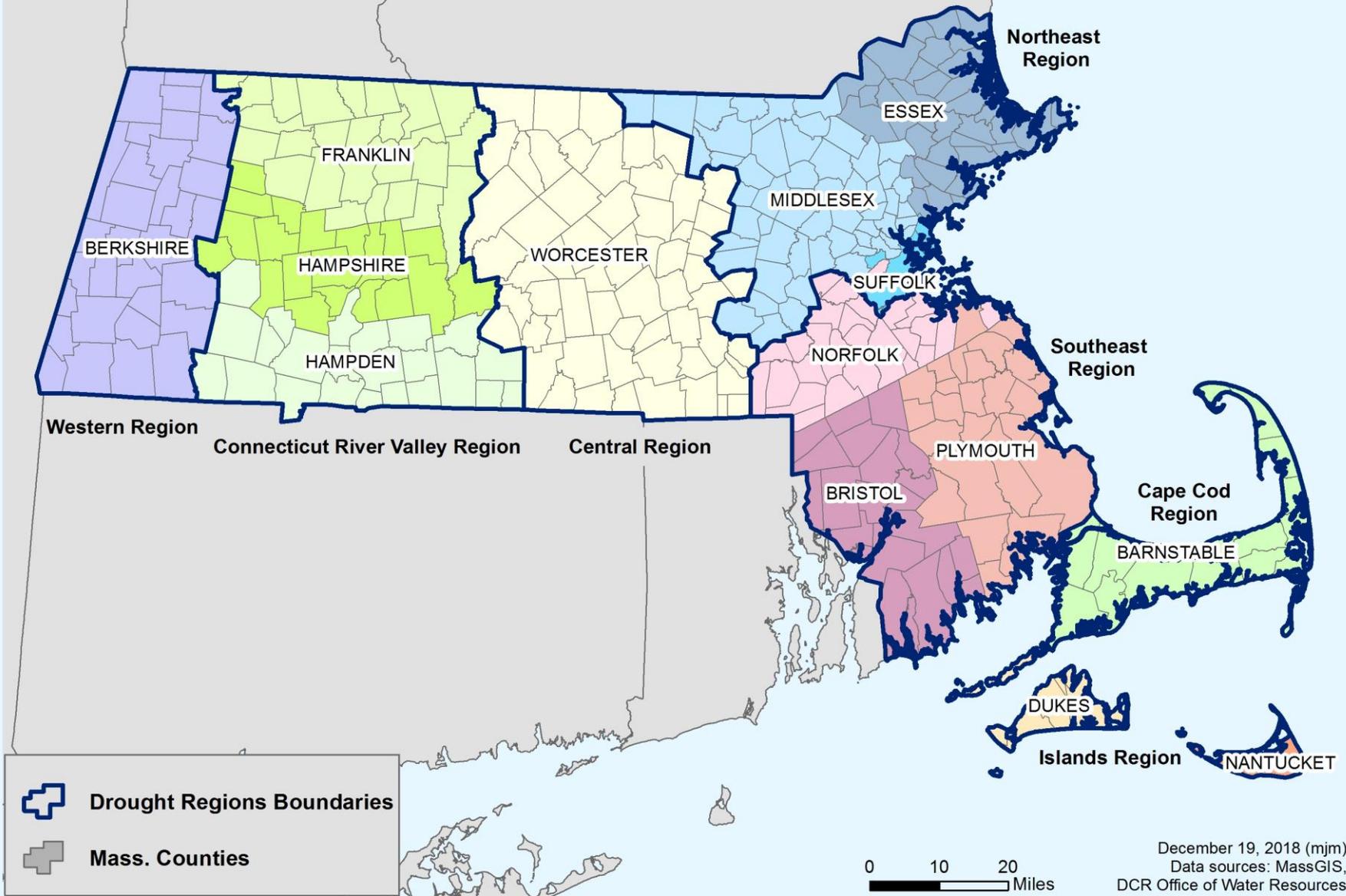
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 th percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0 and > -4.0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

MA Drought Management Plan

Drought Levels



MASSACHUSETTS DROUGHT REGIONS with Counties

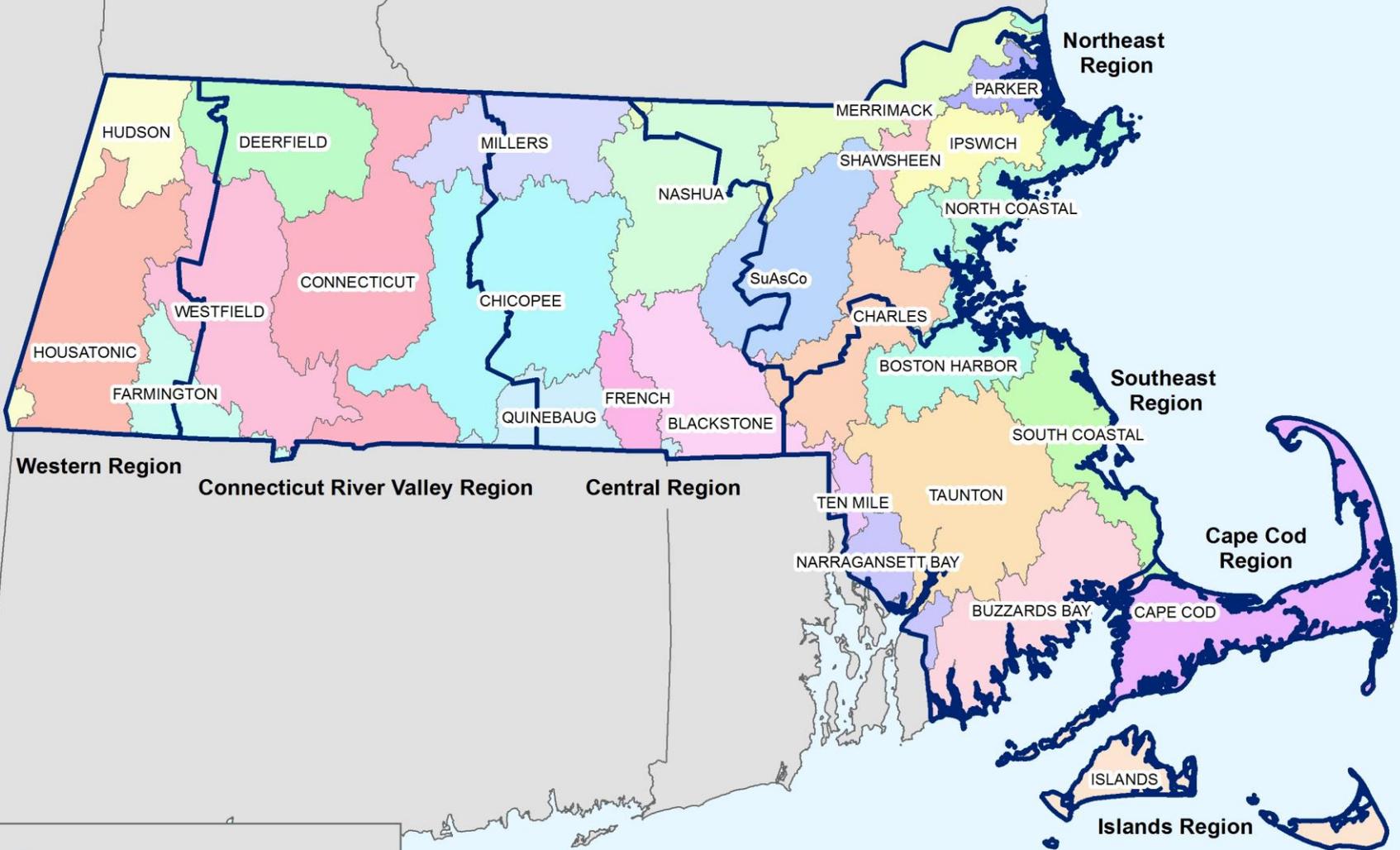


-  Drought Regions Boundaries
-  Mass. Counties

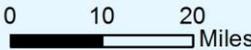
0 10 20
Miles

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

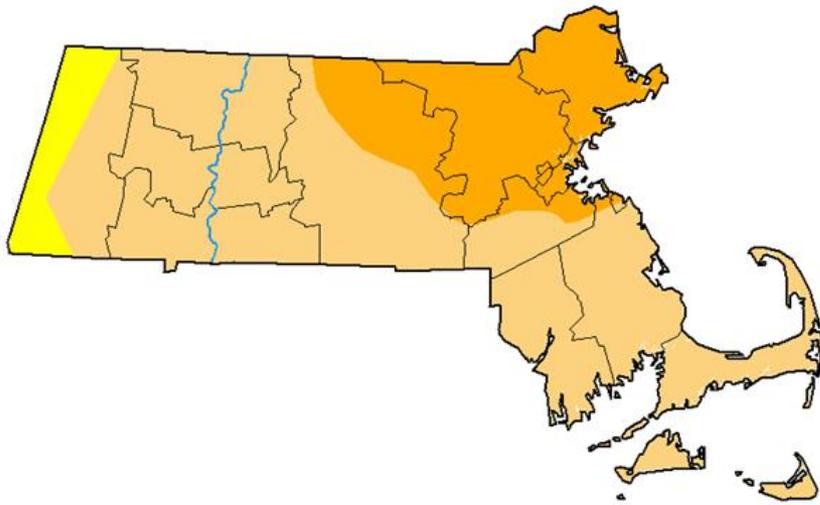


Public Health
Impacts

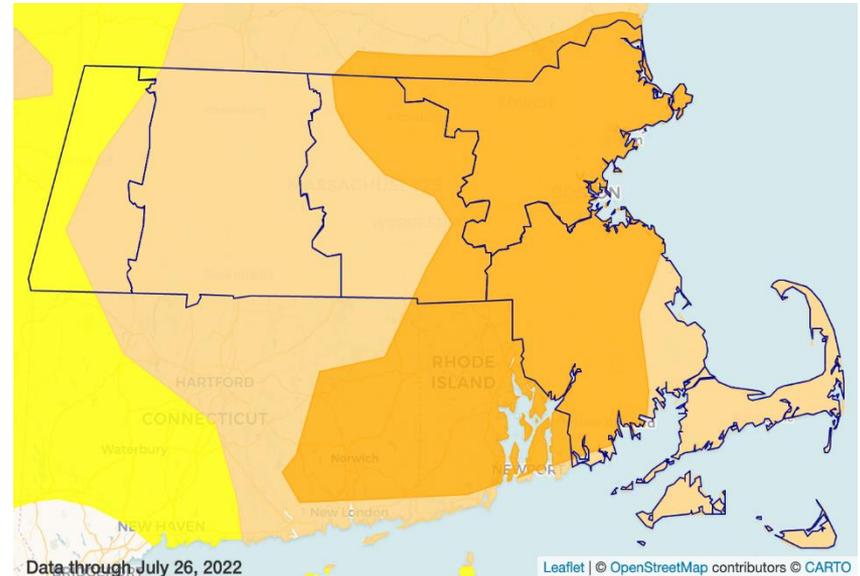
Recent Hydrologic History

- 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
 - minimal precipitation with high temperatures
 - close to no precipitation on Cape Cod

US Drought Monitor



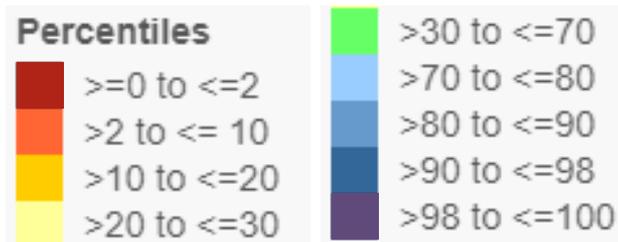
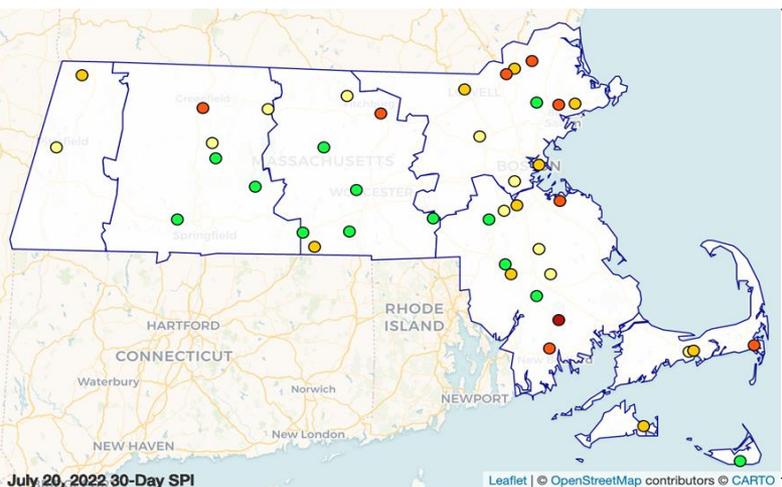
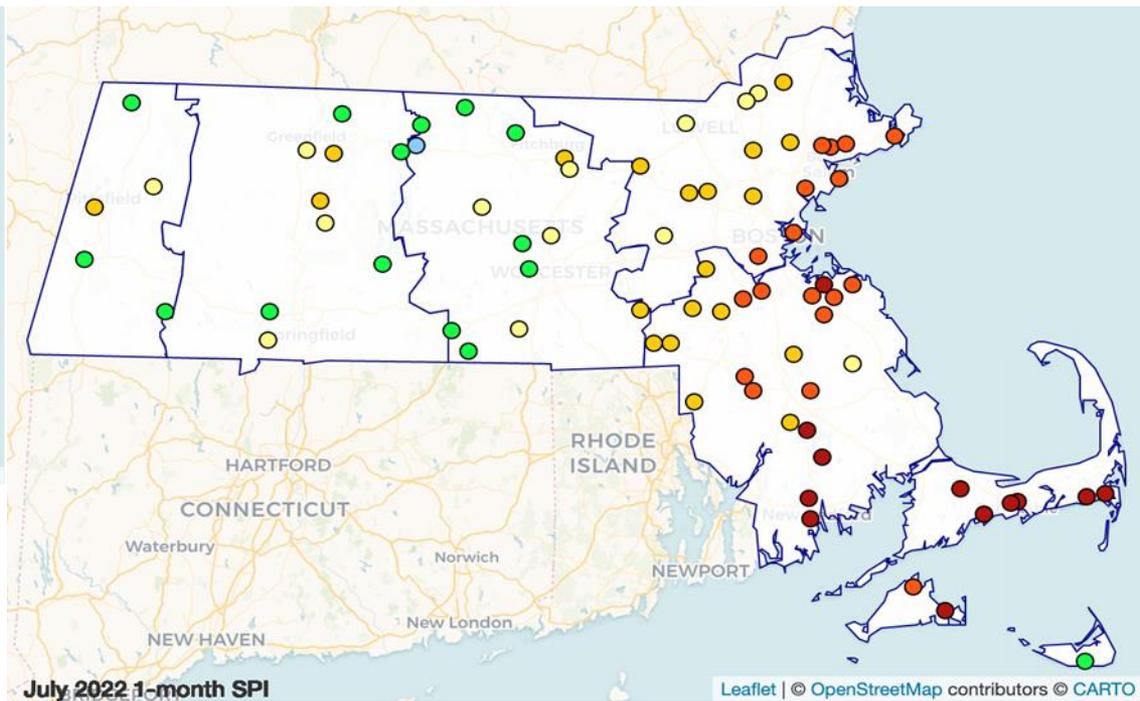
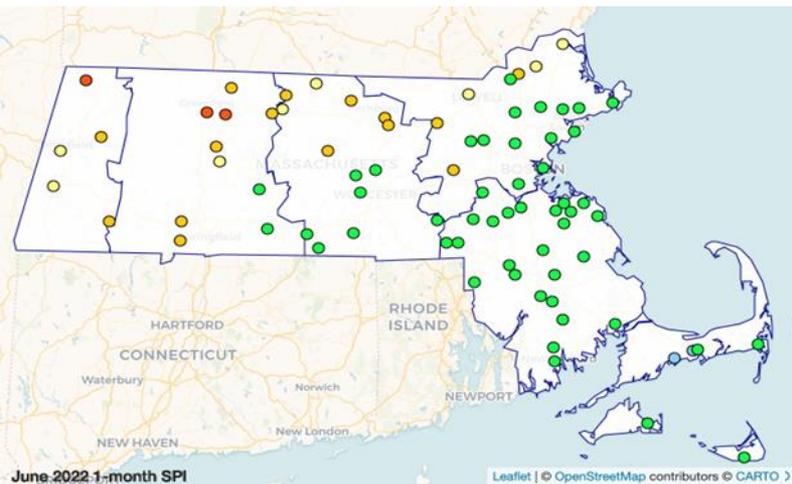
Data through July 19, 2022



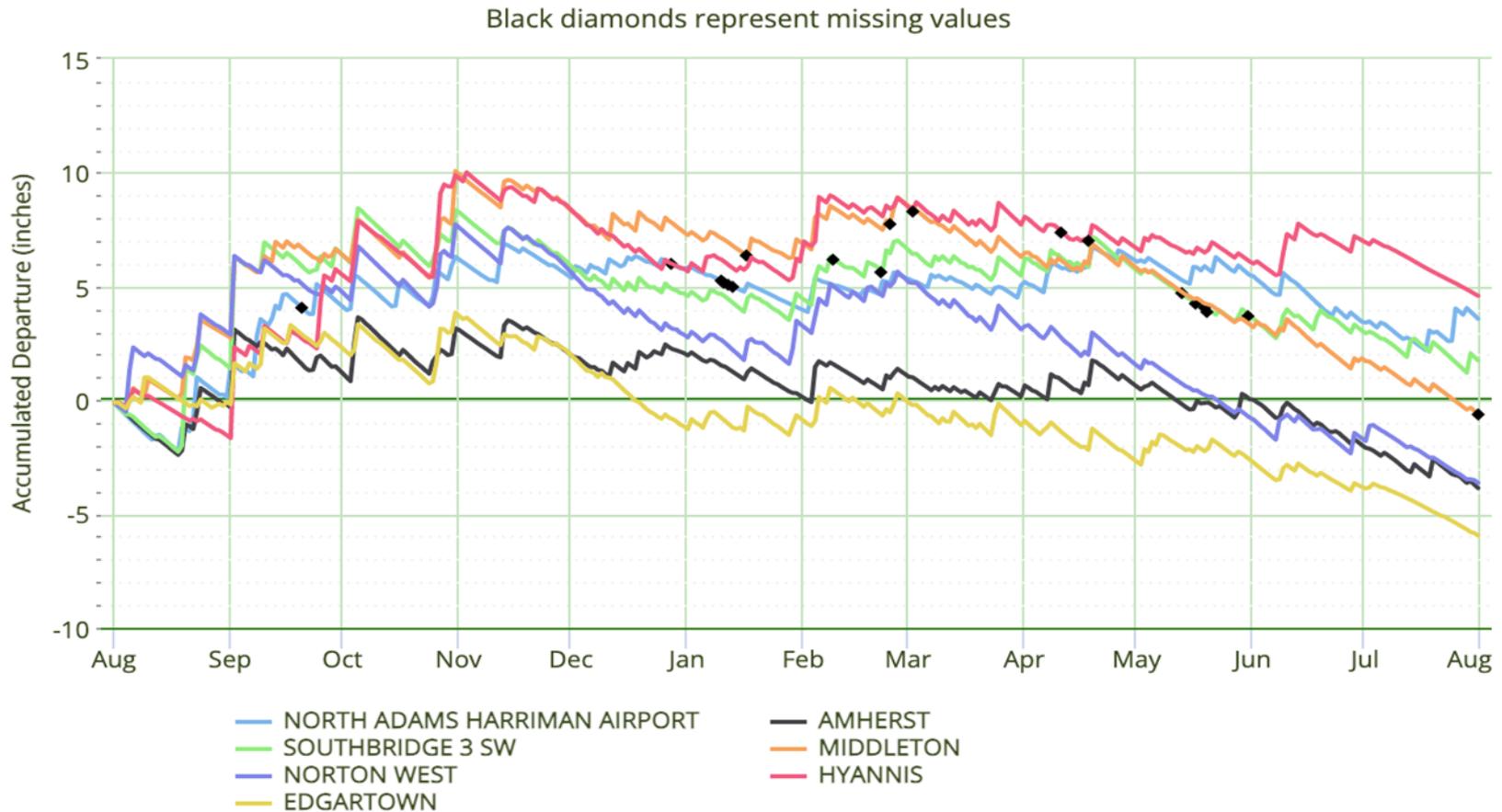
- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

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

Standardized Precipitation Index, 1 month



Accumulated Precipitation Departure from 30-Year Average in inches



- 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.

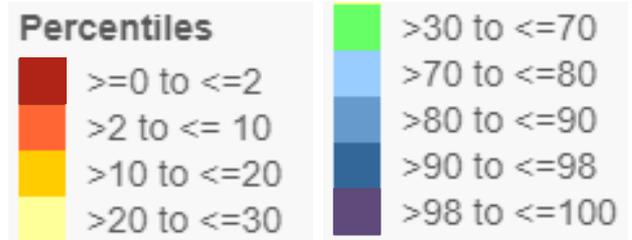
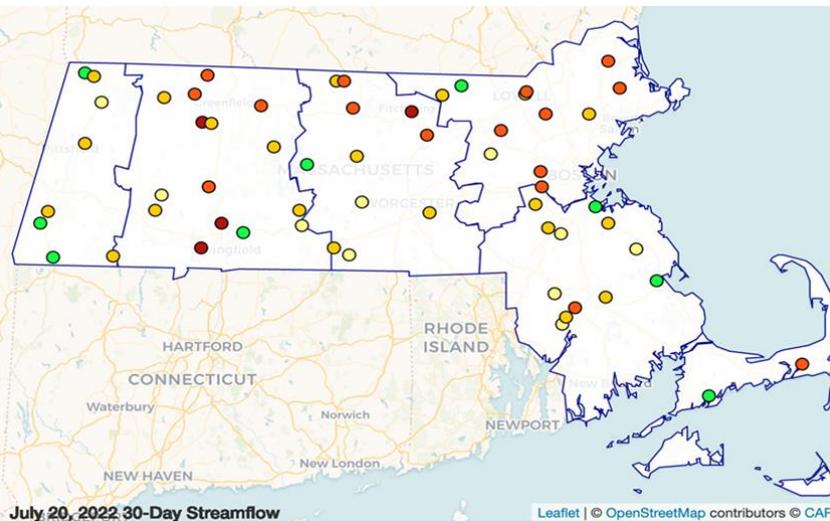
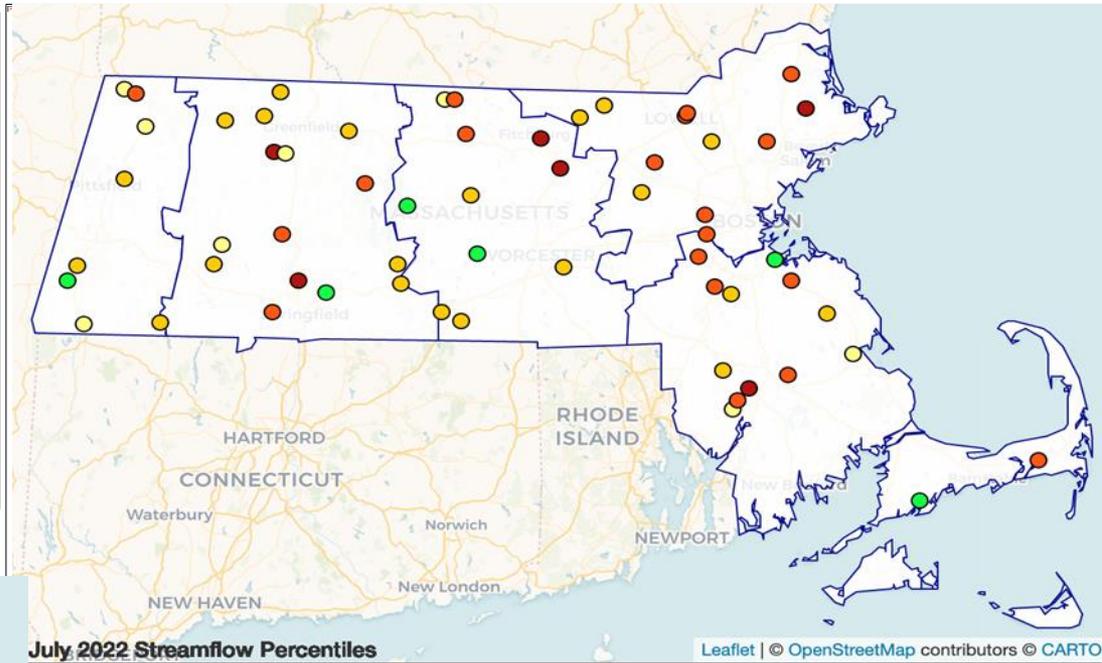
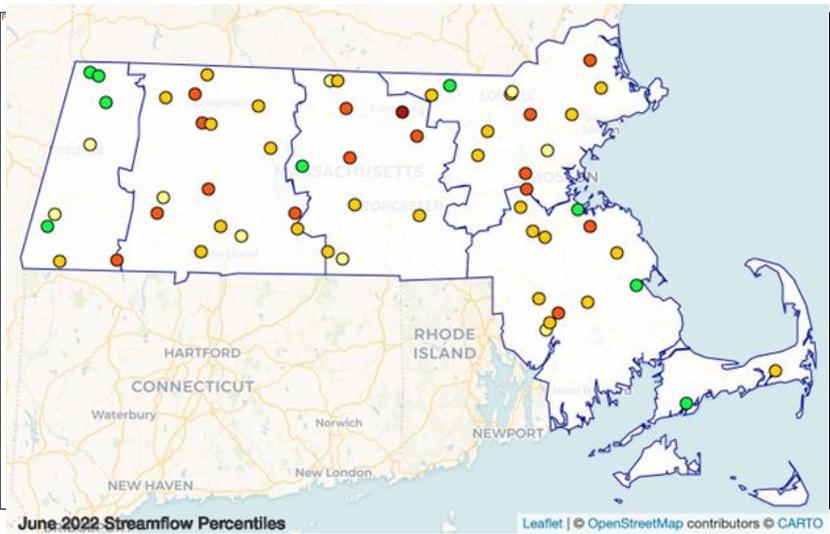
Standardized Precipitation Index as Percentile, July

REGION	NUMBER OF SITES	1-mo *	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo *
WESTERN	5	45	21	17	46	32	72	81	70
CTRV	9	27	15	11	26	12	43	69	60
CENTRAL	14	34	23	14	33	20	62	83	72
NORTHEAST	19	12	13	6	9	5	43	76	77
SOUTHEAST	23	7	21	7	14	6	41	59	55
CAPE COD	6	1	27	20	14	9	68	42	30
ISLANDS	3	3	54	52	28	10	24	21	32

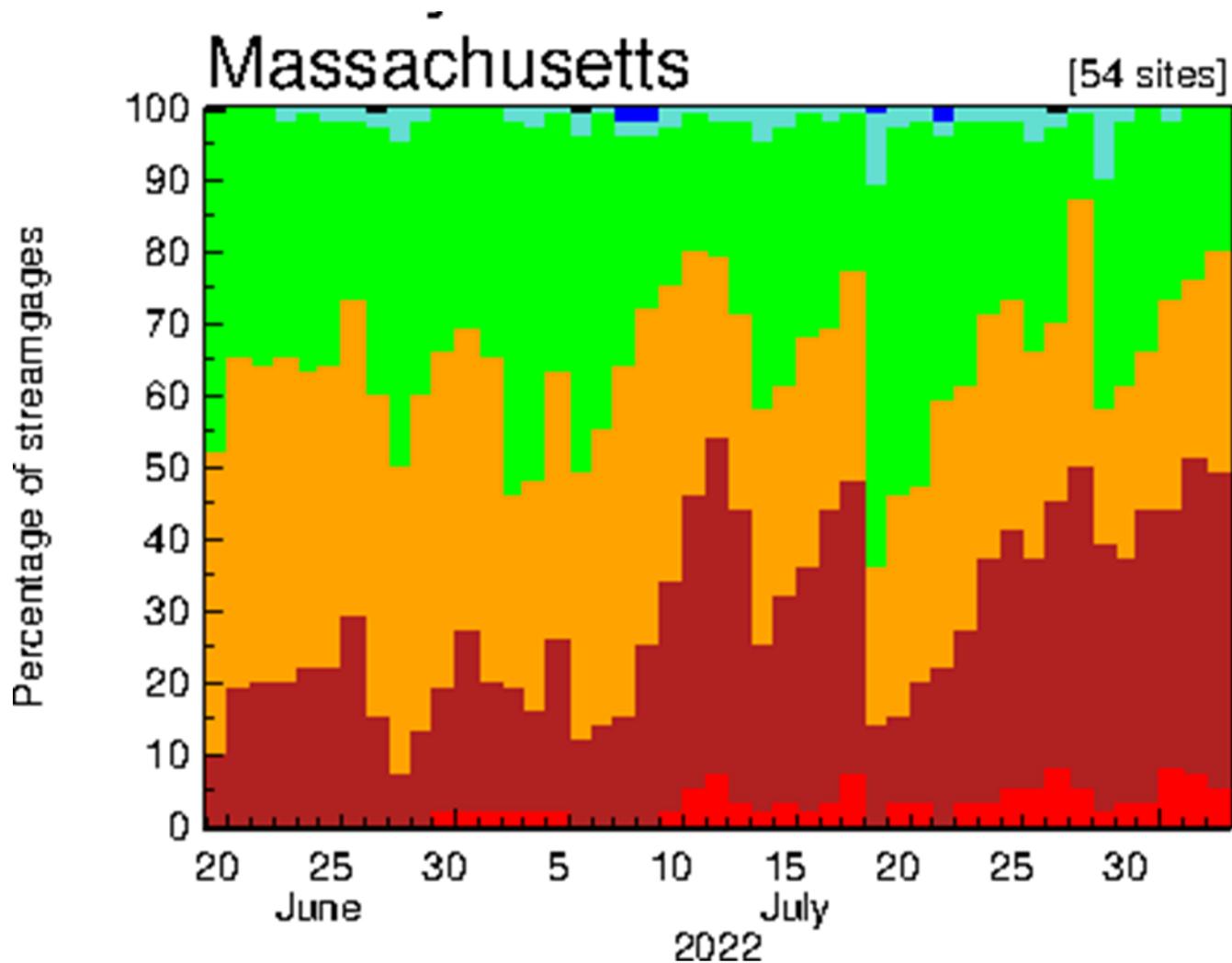
* 1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

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

Streamflow Percentiles of Monthly Median



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		

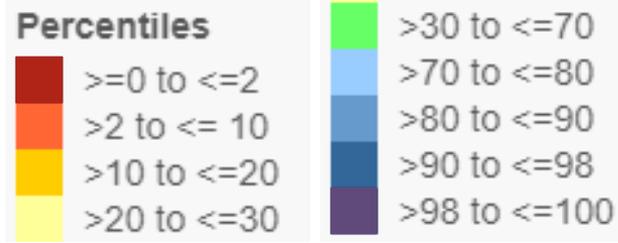
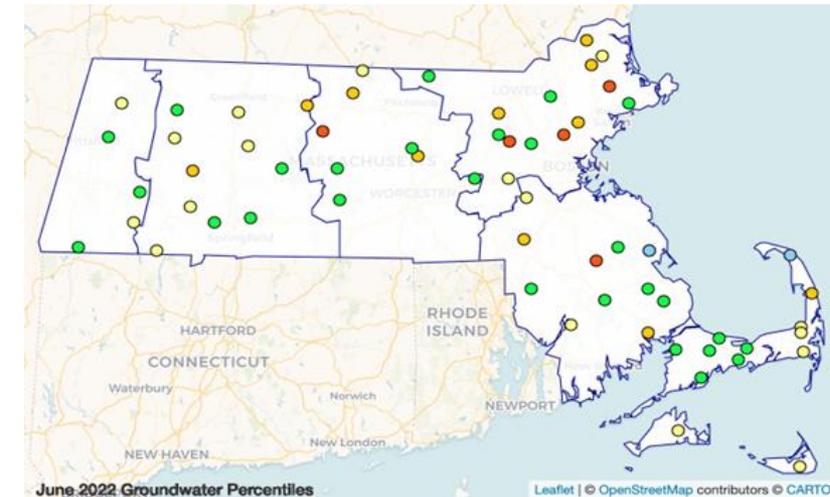
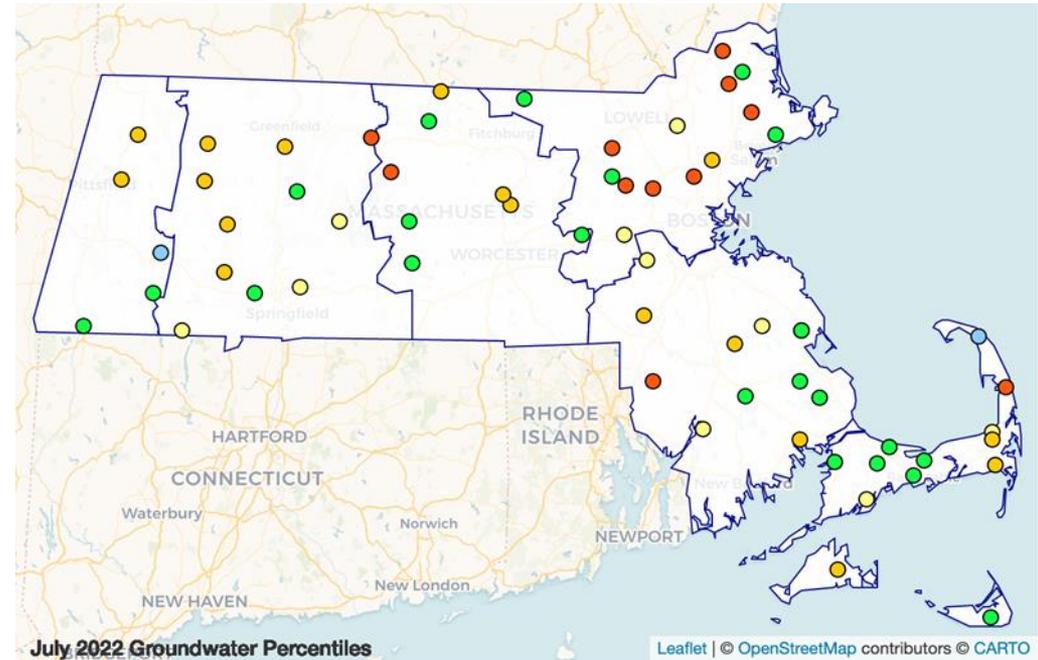
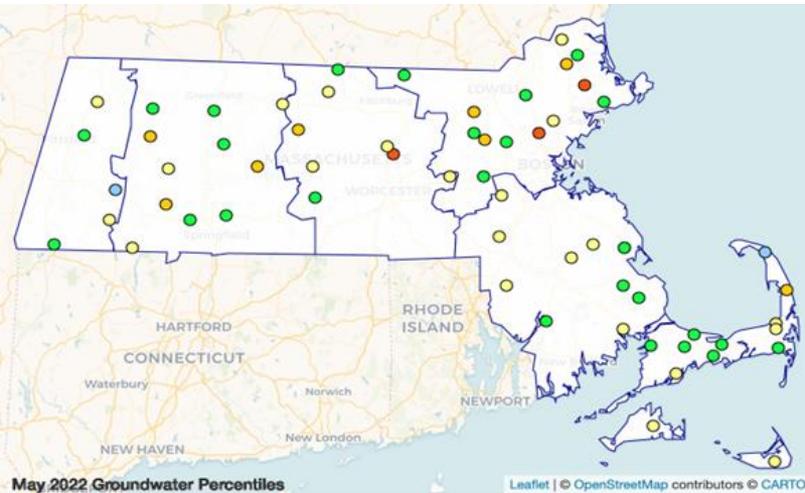
Streamflow Index July

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	0	1	3	3	0	21
CTRV	15	2	3	7	2	0	13
CENTRAL	11	2	2	4	1	0	12
NORTHEAST	12	1	7	4	0	0	7
SOUTHEAST	12	1	5	3	2	0	10
CAPE COD	2	0	1	0	0	0	17

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



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	5	0	0	2	0	0	41
CTRV	11	0	1	5	3	0	19
CENTRAL	8	0	1	3	0	0	27
NORTHEAST	14	0	7	1	2	0	12
SOUTHEAST	12	0	1	3	3	0	22
CAPE COD	11	0	1	2	2	0	31
ISLANDS	2	0	0	1	0	0	25

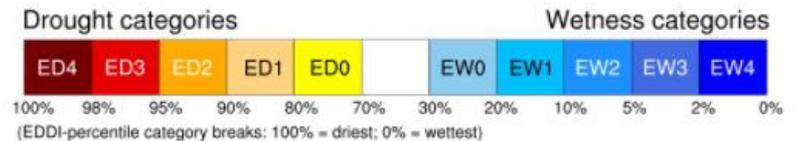
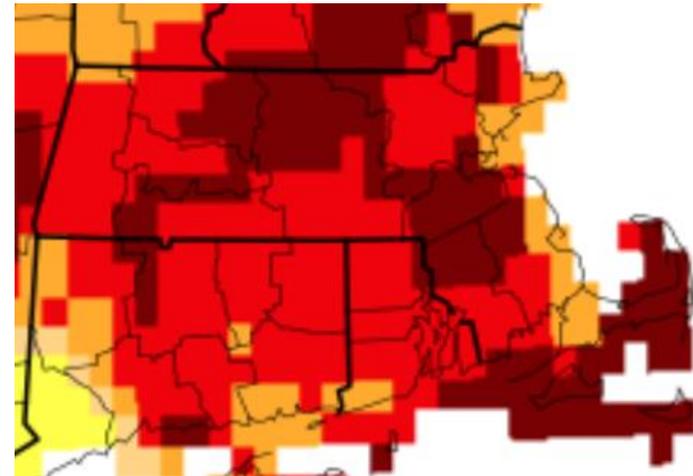
Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Evapotranspiration

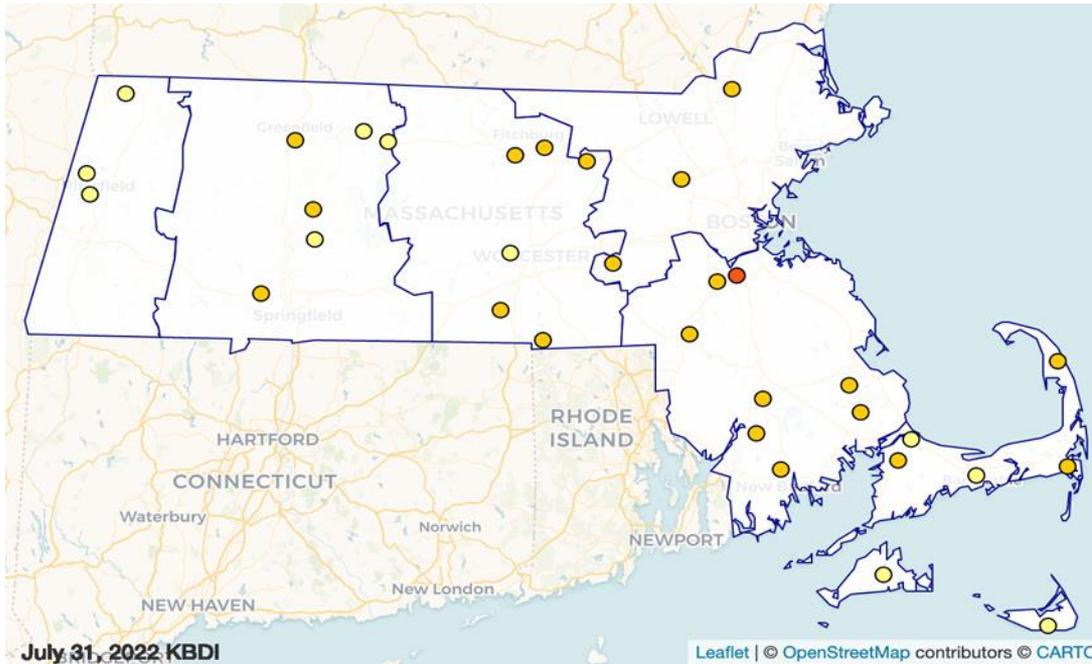
CMI week ending July 30th



2-month EDDI
Map dated July 31st



KBDI - Top 8 inches of soil moisture



Point Values - KBDI Range



REGION	NUMBER OF SITES REPORTING	HIGHEST OF SITE VALUES
WESTERN	3	348
CTRV	6	454
CENTRAL	6	589
NORTHEAST	3	563
SOUTHEAST	8	619
CAPE COD	5	491
ISLANDS	2	393

Index Severity Levels



Lakes & Impoundments

REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	1	31st
CTRV	2	23rd
CENTRAL	4	23rd
NORTHEAST	5	7th
SOUTHEAST	2	7th
CAPE COD	1	16th

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 – mid-July 2022

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation	13	10	7	6	7	10	35
Streamflow	23	14	18	9	21	26	N/A
Groundwater	Level 0	Level 2	Level 1	Level 2	Level 0	Level 0	Level 1
Lakes/ Impoundments	ND	ND	Level 3	Level 2	ND	Level 0	N/A
ET- CMI EDDI	Level 0 3	Level 0 3	Level 0 3	Level 1 3	Level 1 3	Level 1 4	Level 1 4
KBDI	Level 1	Level 2	Level 2	Level 2	Level 2	Level 1	Level 1
Effective 7/1 (7/21 meeting)	Level 1	Level 2	Level 3	Level 3	Level 2	Level 1	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.

Some indices' data are based on fewer measurements than for typical monthly reporting.

Drought 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>

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

Drought Indices by Major Basin – July 2022

Region	CTRV	West
Basin	Connecticut	Hudson
Precipitation	10	18
Streamflow	3	25
Groundwater	44	17
EDDI	3	3
KBDI	454	253
Recommended Level	3	2

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