

AGENDA

1. Introductions & Drought Response Update: EOEEA, MEMA

2. Updates on Current Conditions and Impacts—DMTF member reports

- Hydrologic: DCR, USGS, NOAA-RFC
- Weather: NOAA-NWS
- Water Supply: DEP, MWRA, MWWA, DPU
- Environmental: DEP, DFG, MRA
- Agricultural: DAR
- Fire Danger: DCR
- Engineering/Infrastructure: DCR
- Public Health: DPH

3. Discussion

4. Recommendation



Hydrologic Conditions in Massachusetts for August 2021

Anne Carroll & Viki Zoltay
DCR Office of Water Resources

Drought Management Task Force

September 8, 2021

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan

Indices

Numbers in parentheses indicate number of data points across the state



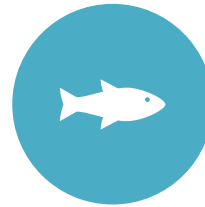
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(16)



Crop Moisture
(national map)

MA Drought Management Plan

Index Severity Levels

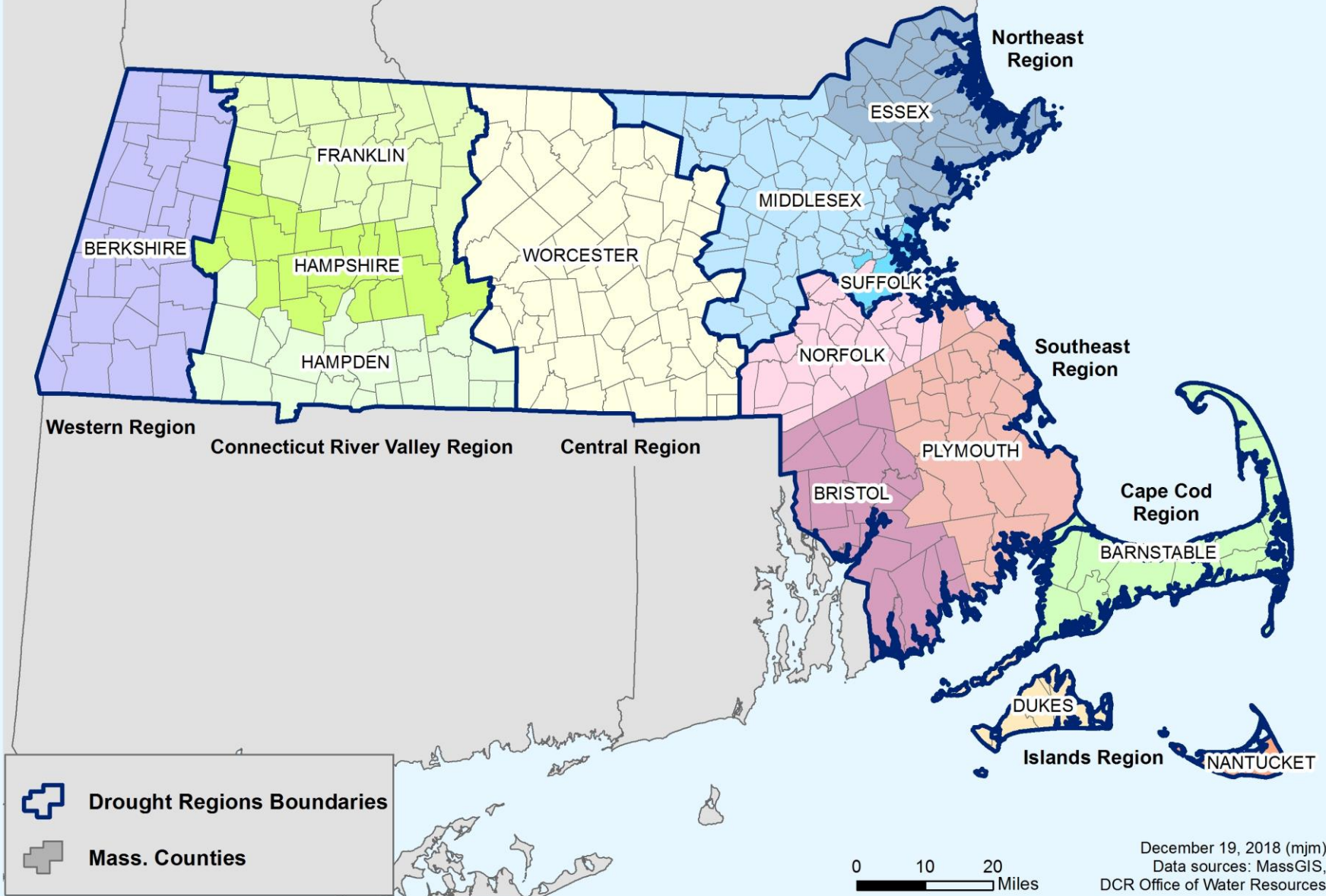
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 th percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0 and > -4.0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

MA Drought Management Plan

Drought Levels



MASSACHUSETTS DROUGHT REGIONS with Counties



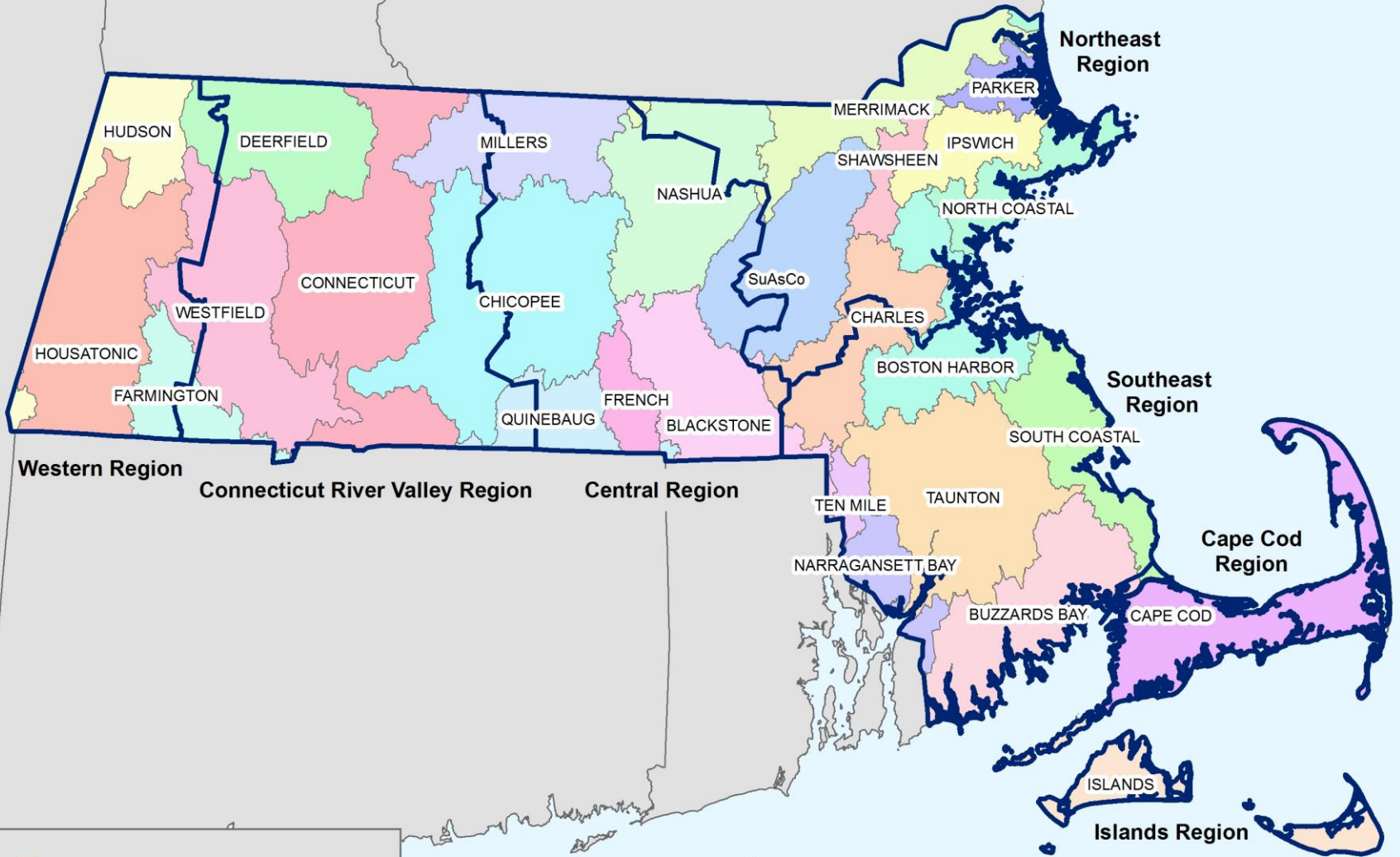
-  Drought Regions Boundaries
-  Mass. Counties

0 10 20
Miles

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

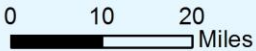


MASSACHUSETTS DROUGHT REGIONS with Watersheds



 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

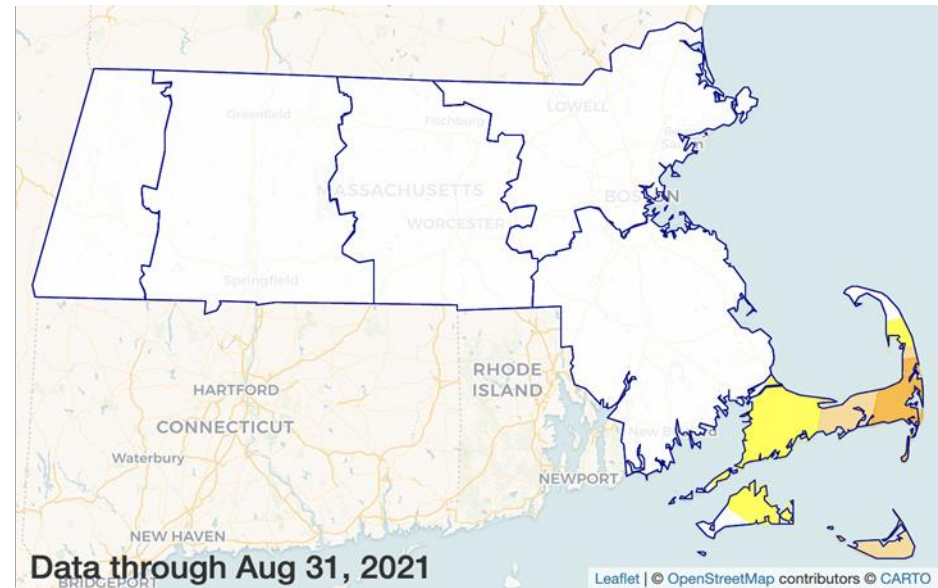
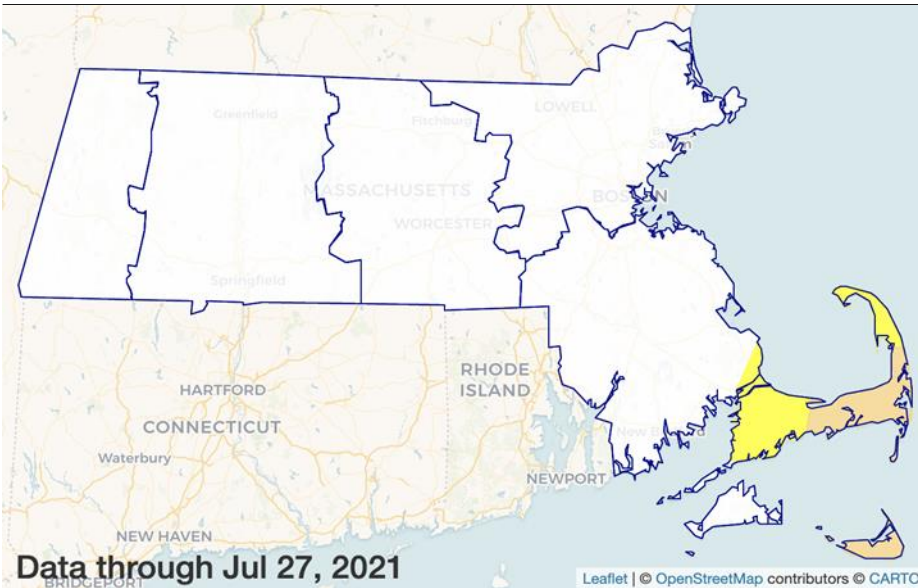


Public Health
Impacts

Recent Hydrologic History

- 2020 – Drought May through November
- 2021
 - January through March - low precipitation across the state with variable impacts on streamflow and groundwater
 - April through June – variable improvements across all regions except the Cape
 - July- excessive rain throughout most of Massachusetts except for the Cape Cod region with mostly normal amounts

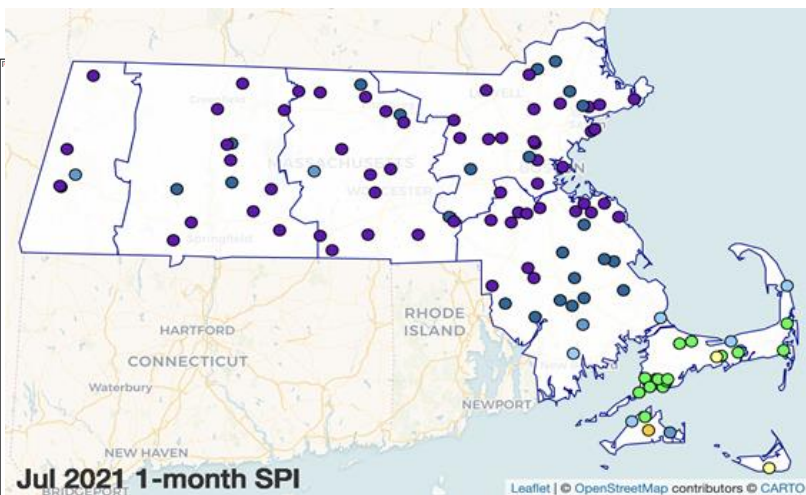
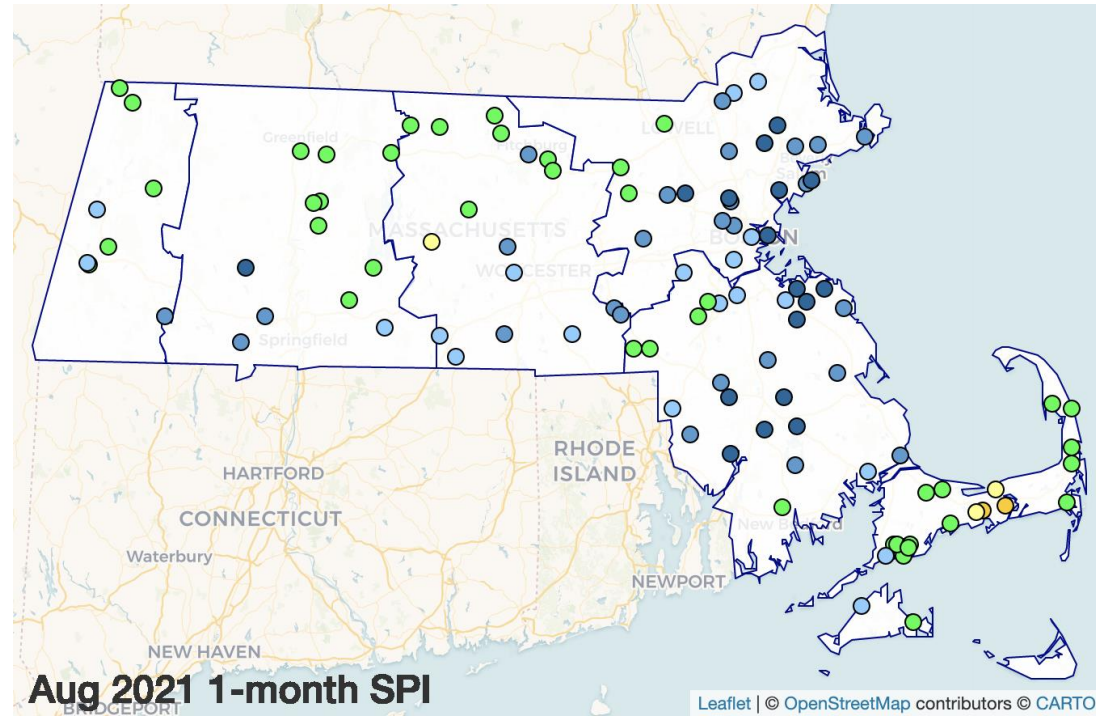
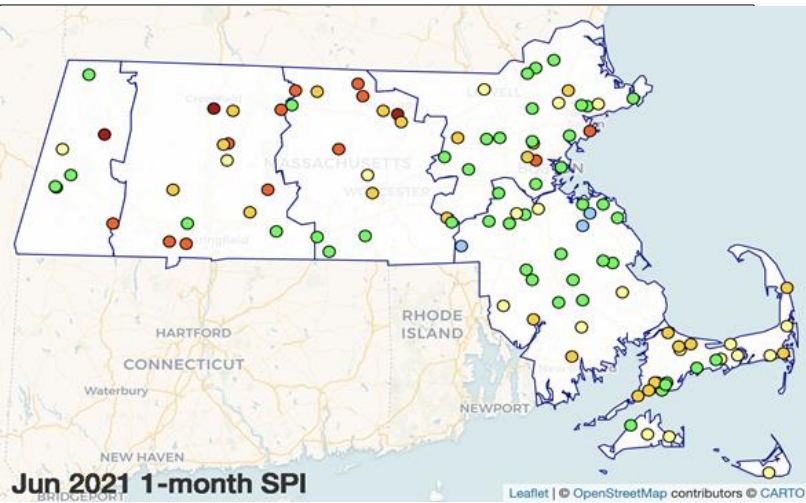
US Drought Monitor



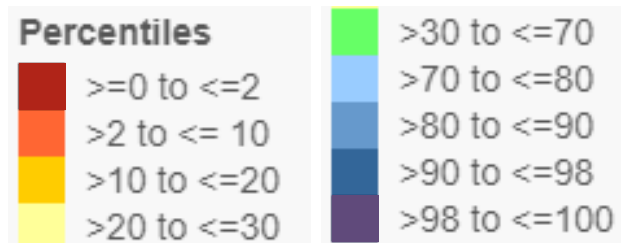
- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

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

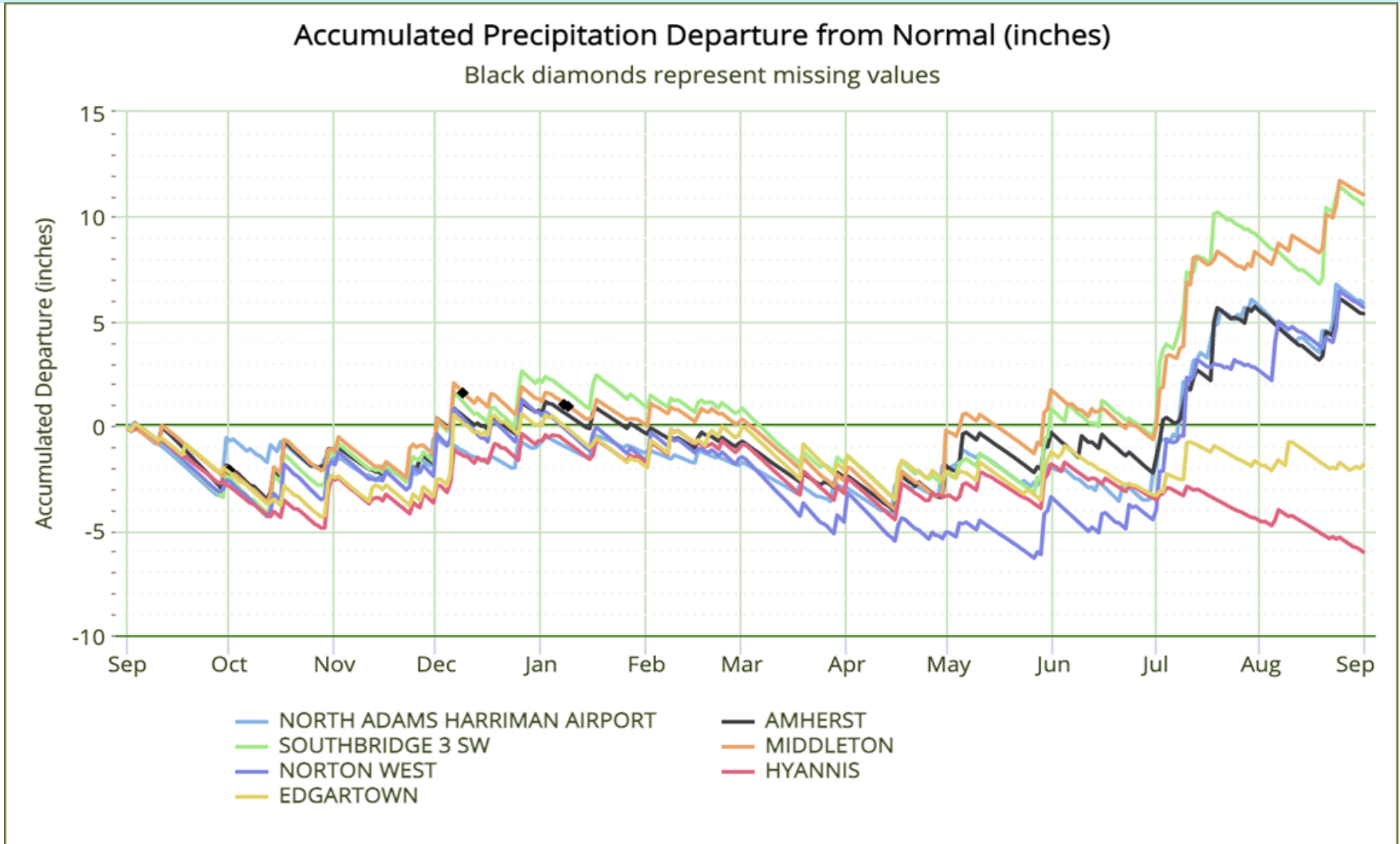
Standardized Precipitation Index, 1 month



Both stations on Nantucket have too many missing values for the month; therefore, statistics were not calculated.



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.

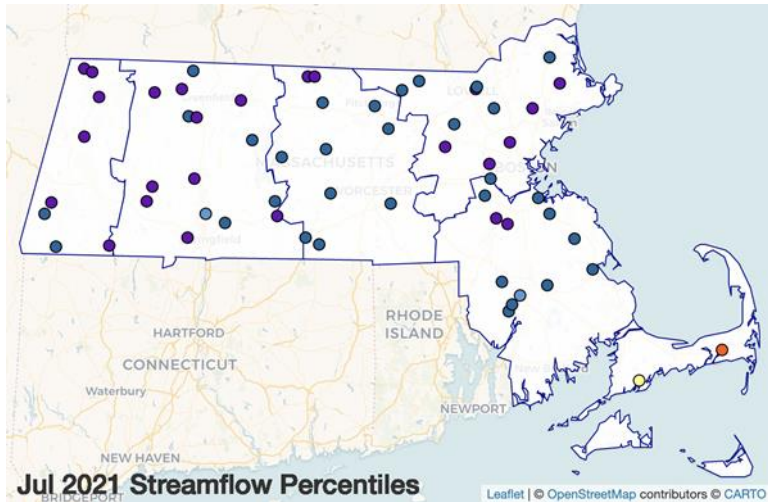
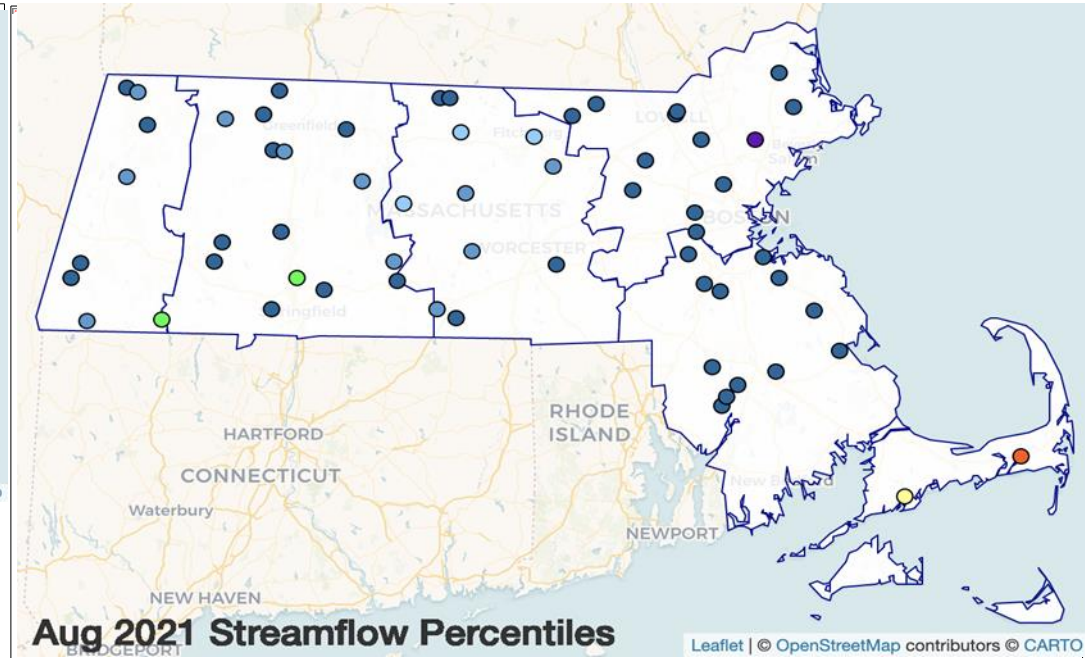
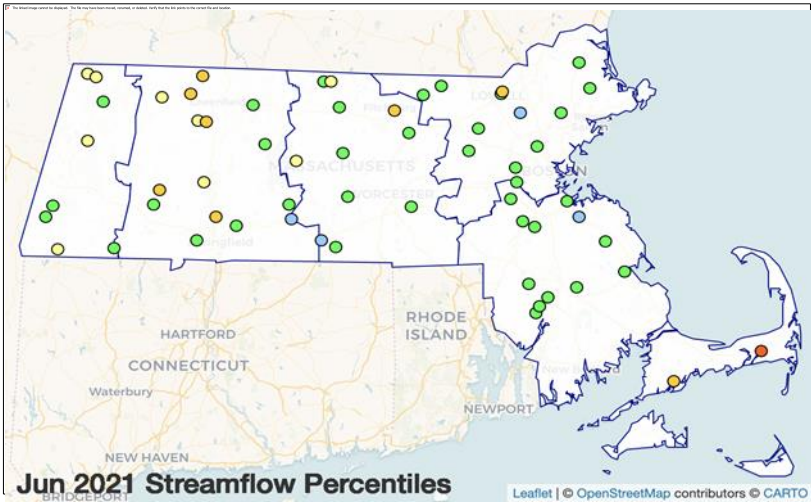
Standardized Precipitation Index as Percentile, August

REGION	NUMBER OF SITES	1-mo*	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo*
WESTERN	8	63	99	96	97	92	83	75	81
CTRV	12	62	99	93	91	90	87	58	85
CENTRAL	17	74	99	94	90	91	83	72	92
NORTHEAST	25	88	99	97	95	95	89	72	89
SOUTHEAST	27	85	99	95	88	90	79	66	91
CAPE COD	18	43	42	27	20	29	12	15	49
ISLANDS	2	63	72	54	42	68	49	51	87

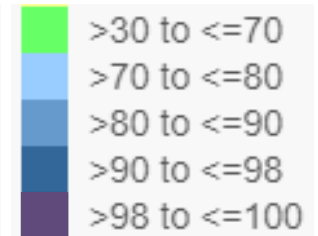
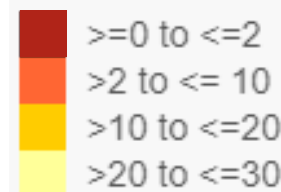
*1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

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

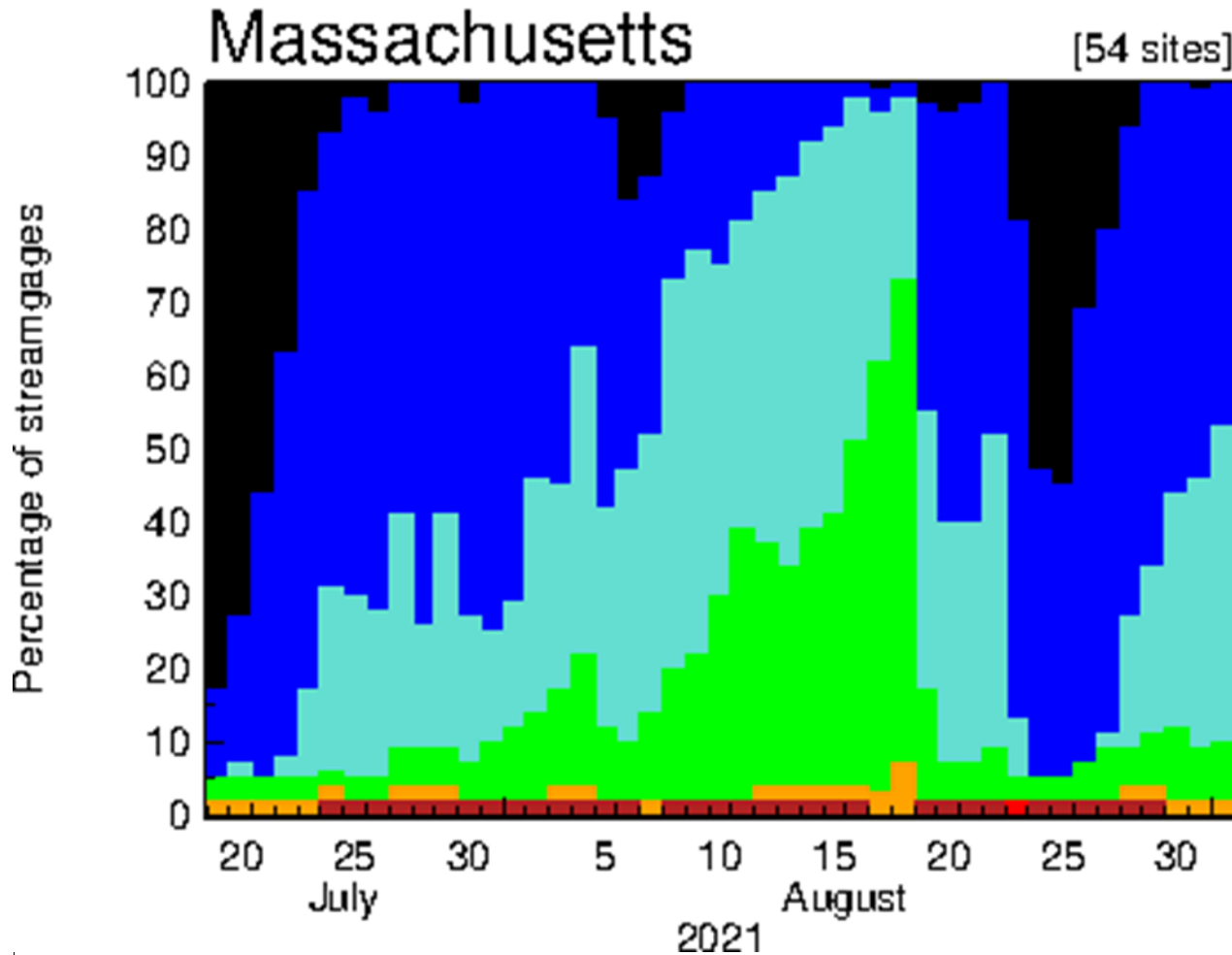
Streamflow Percentiles of Monthly Median



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 August

June

- Cape Cod Level 3
- CT River Valley Level 1

July and August

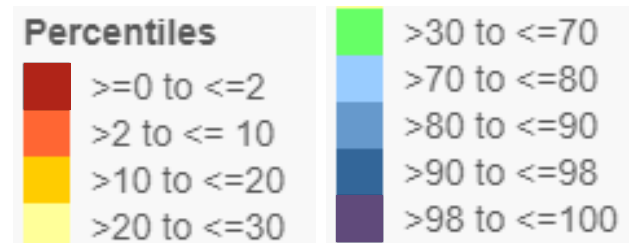
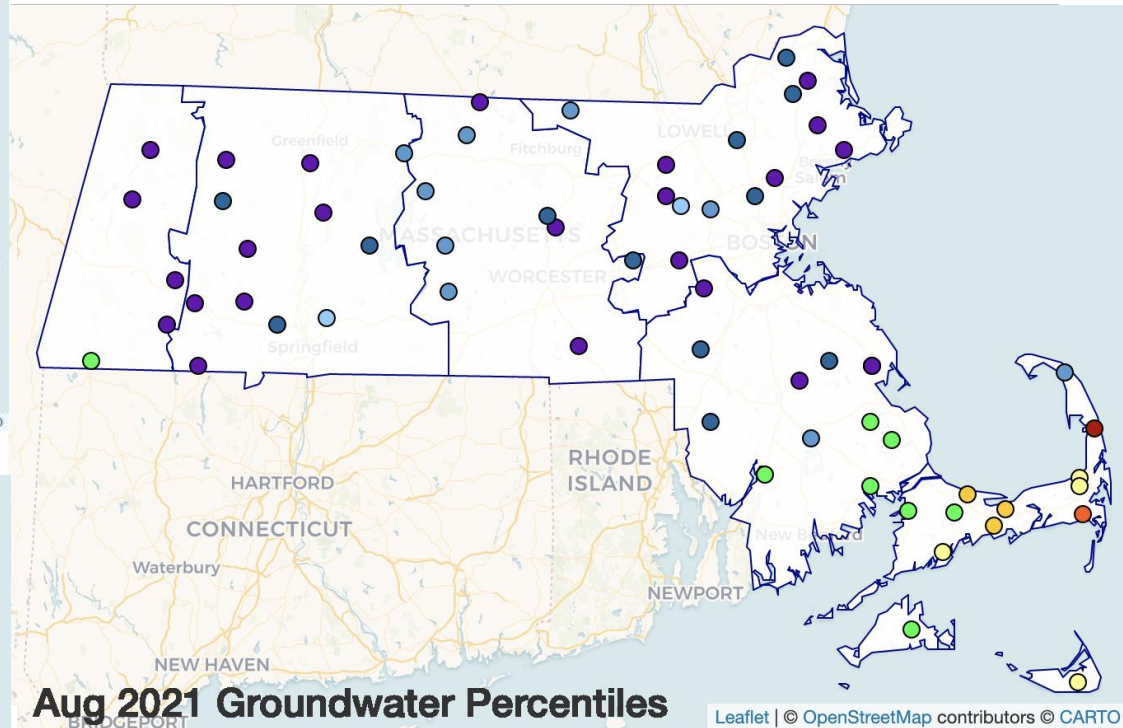
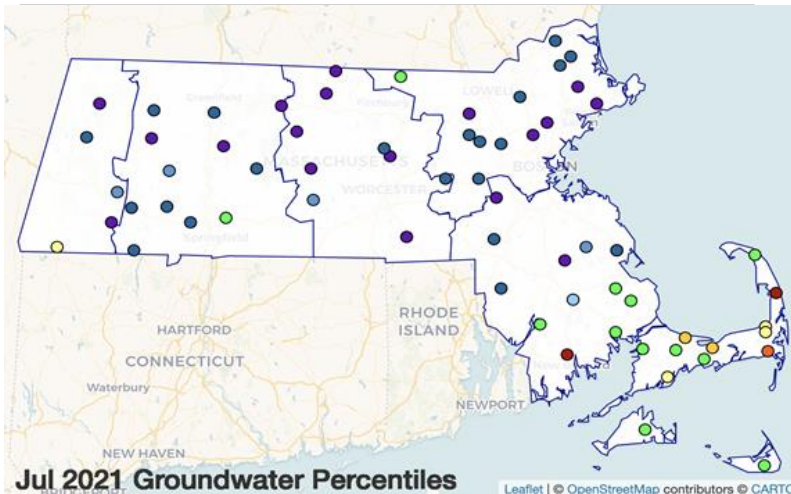
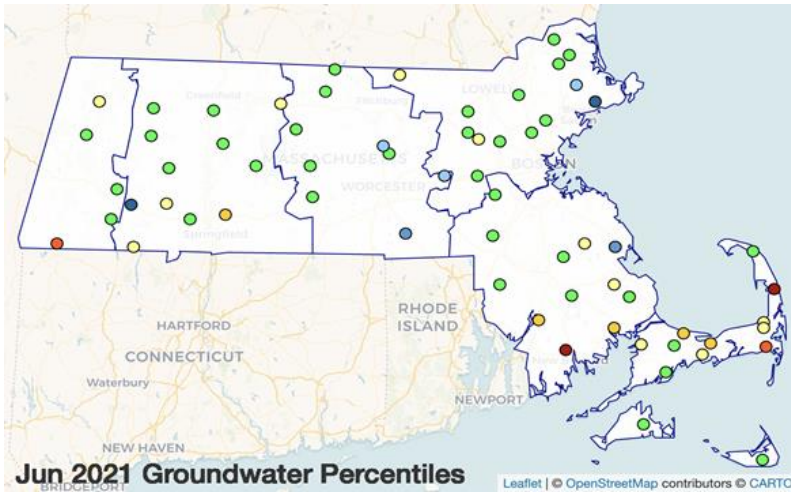
- Cape Cod Level 2

REGION	TOTAL GAGES REPORTING FOR AUG	≥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	0	0	0	4	90
CTRV	15	0	0	0	0	10	94
CENTRAL	11	0	0	0	0	4	87
NORTHEAST	13	0	0	0	0	13	97
SOUTHEAST	12	0	0	0	0	12	95
CAPE COD	2	0	1	0	1	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 at the end of Month



Groundwater Index

- June: Cape Cod Level 1 at 23 percentile
- July: Cape Cod Level 1 at 26 percentile
- August: Cape Cod Level 1 at 21 percentile

REGION	TOTAL WELLS REPORTING FOR AUG	≥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	0	0	4	100
CTRV	12	0	0	0	0	10	100
CENTRAL	9	0	0	0	0	5	96
NORTHEAST	14	0	0	0	0	11	99
SOUTHEAST	12	0	0	0	0	7	95
CAPE COD	11	1	1	3	3	0	21
ISLANDS	2	0	0	0	1	0	35

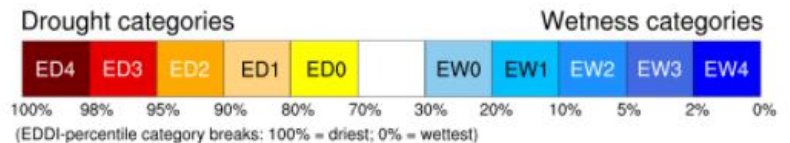
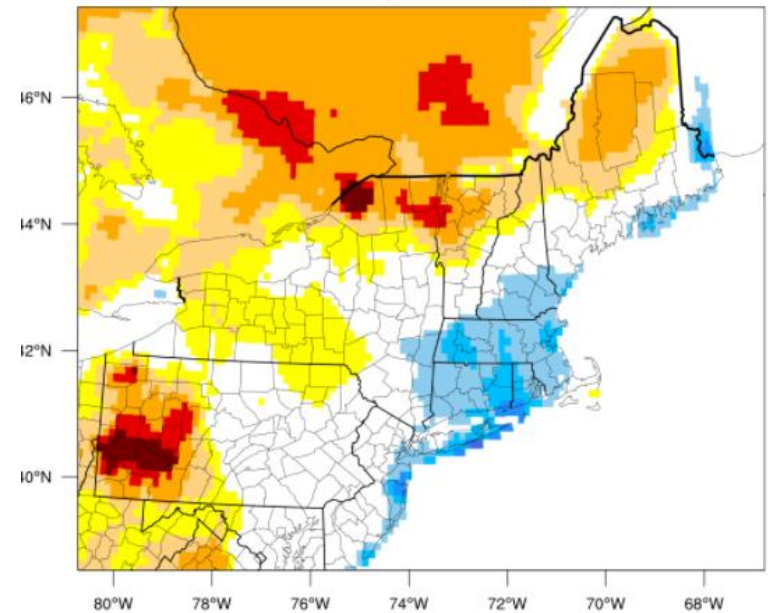
Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Evapotranspiration

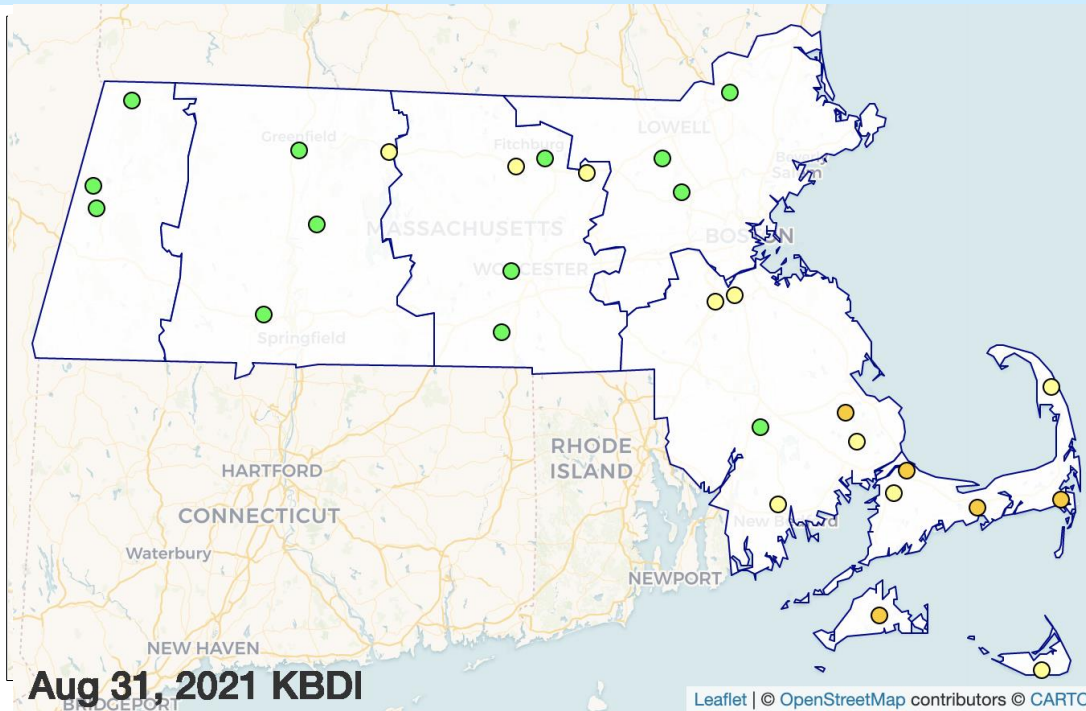
CMI week ending August 28th
ISL=0



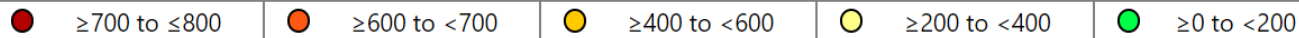
1-month EDDI
(one of the ET products under consideration to replace CMI)
Map dated August 27th



KBDI



Point Values - KBDI Range



REGION	NUMBER OF SITES REPORTING	HIGHEST OF SITE VALUES
WESTERN	3	111
CTRV	4	221
CENTRAL	5	258
NORTHEAST	3	167
SOUTHEAST	6	463
CAPE COD	5	482
ISLANDS	2	485

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

Lakes & Impoundments

REGION	TOTAL REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	1	100% full
CTRV	2	79
CENTRAL	2	100
NORTHEAST	4	100
SOUTHEAST	2	96
CAPE COD	1	11

Notes:

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

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

Drought Indices by Region - July 2021

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation	92	91	90	91	83	26	32
Streamflow	99	99	98	98	97	12	N/A
Groundwater	98	95	100	98	88	26	37
Lakes/ Impoundments	100%	93	100%	95	80	11	N/A
ET	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0
KBDI	Level 0	Level 0	Level 0	Level 0	Level 1	Level 1	Level 1
<i>Recommend 7/1 (8/5 meeting)</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 1</i>	<i>Level 0</i>
<i>Effective 6/1 (7/7 meeting)</i>	Level 0	Level 0	Level 0	Level 0	Level 0	Level 1	Level 0

Lakes & Impoundments Index does not reflect water supply status. Conditions in all Major Basins were similar to their respective region. 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 Secretary of the Executive Office of Energy and Environmental Affairs. 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 - August 2021

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation	97	91	90	95	88	20	29
Streamflow	90	94	87	97	95	17	N/A
Groundwater	100	100	96	99	93	21	35
Lakes/ Impoundments	100%	79	100	100	96	11	N/A
ET	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0
KBDI	Level 0	Level 1	Level 1	Level 0	Level 2	Level 2	Level 2
<i>Recommend 8/1 (9/8 meeting)</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 1</i>	<i>Level 0</i>
<i>Effective 7/1 (8/5 meeting)</i>	Level 0	Level 0	Level 0	Level 0	Level 0	Level 1	Level 0

Lakes & Impoundments Index does not reflect water supply status. Conditions in all Major Basins were similar to their respective region. 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 Secretary of the Executive Office of Energy and Environmental Affairs. Data are preliminary and not final until all data are reported.

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