

# 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 July 2021

Anne Carroll & Viki Zoltay  
DCR Office of Water Resources

## **Drought Management Task Force**

August 5, 2021

Meeting Co-Chairs: EOEEA, MEMA



# MA Drought Management Plan

## Indices

Numbers in parentheses indicate number of data points across the state



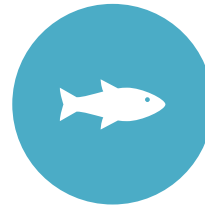
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and  
Impoundments (20)



KBDI - Fire Danger  
(16)



Crop Moisture  
(national map)

# MA Drought Management Plan

## Index Severity Levels

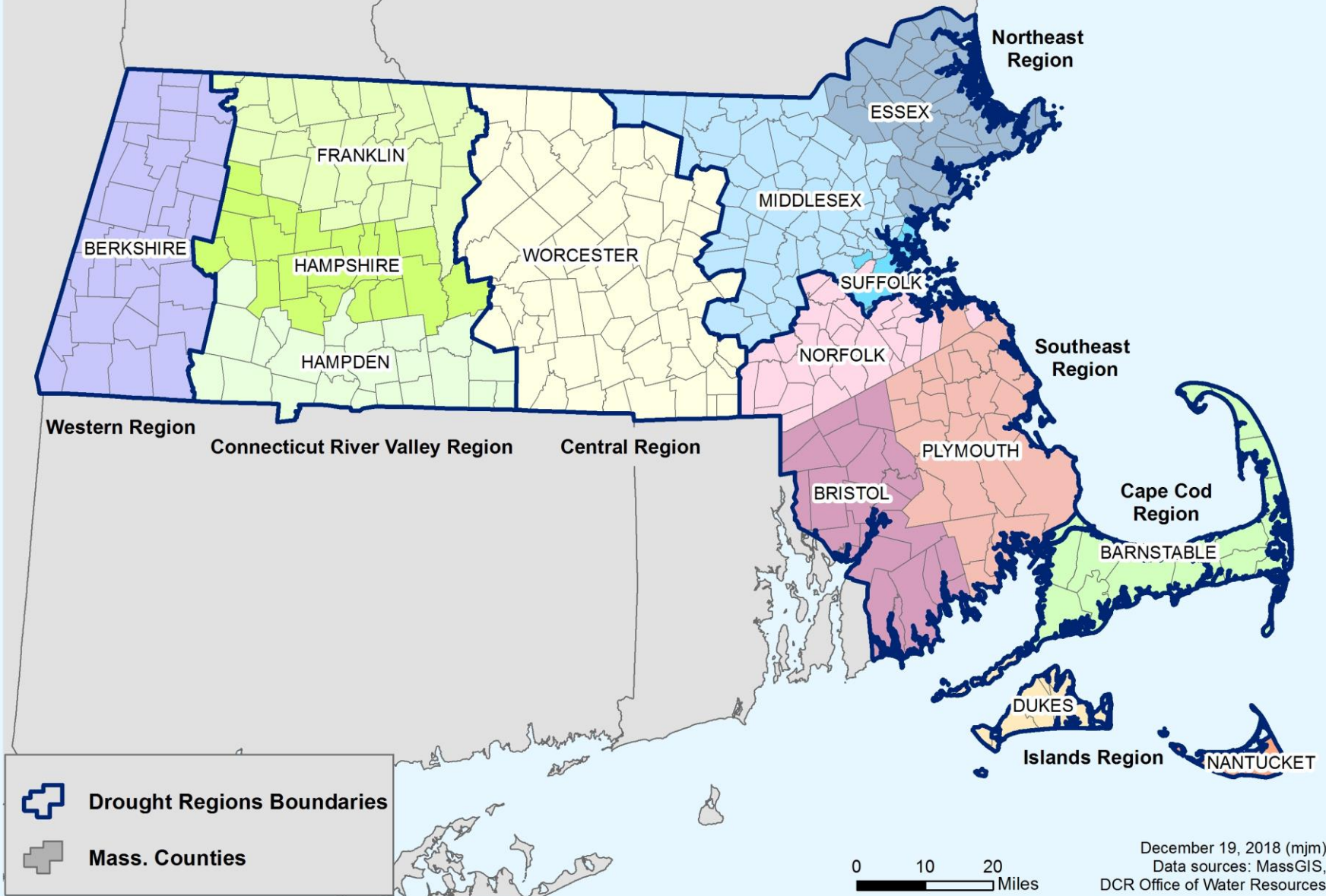
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 <sup>th</sup> percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0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

# MA Drought Management Plan

## Drought Levels



# MASSACHUSETTS DROUGHT REGIONS with Counties



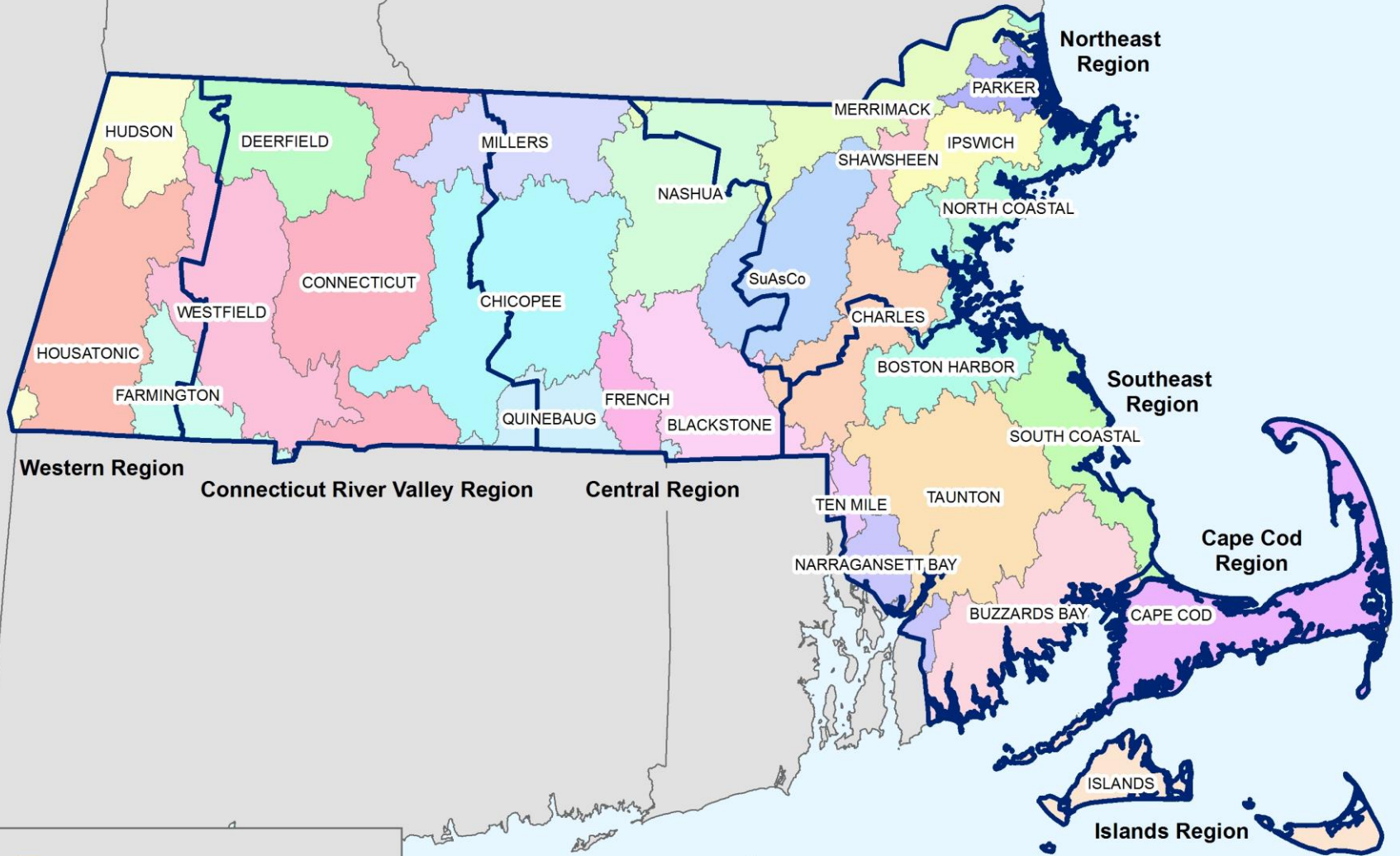
-  Drought Regions Boundaries
-  Mass. Counties

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



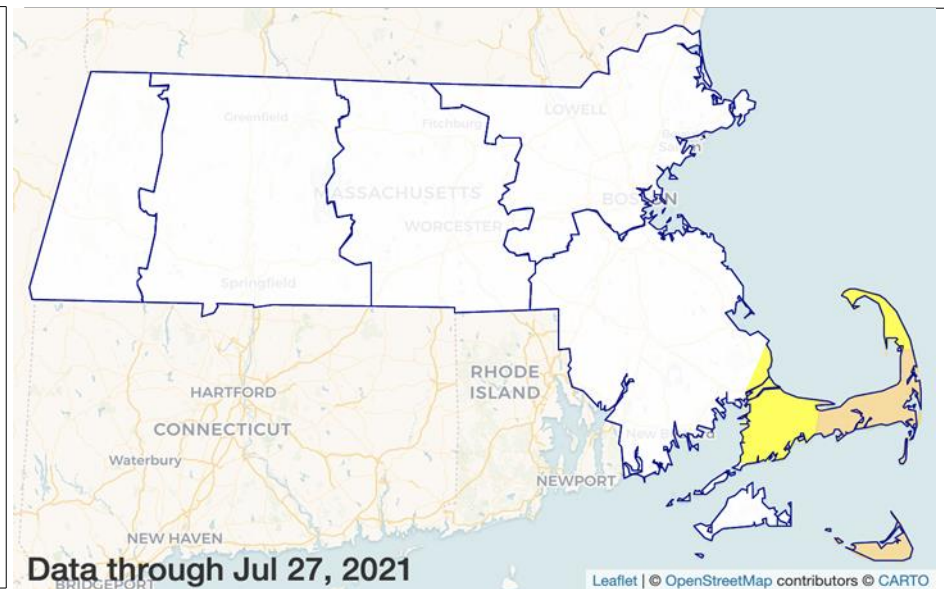
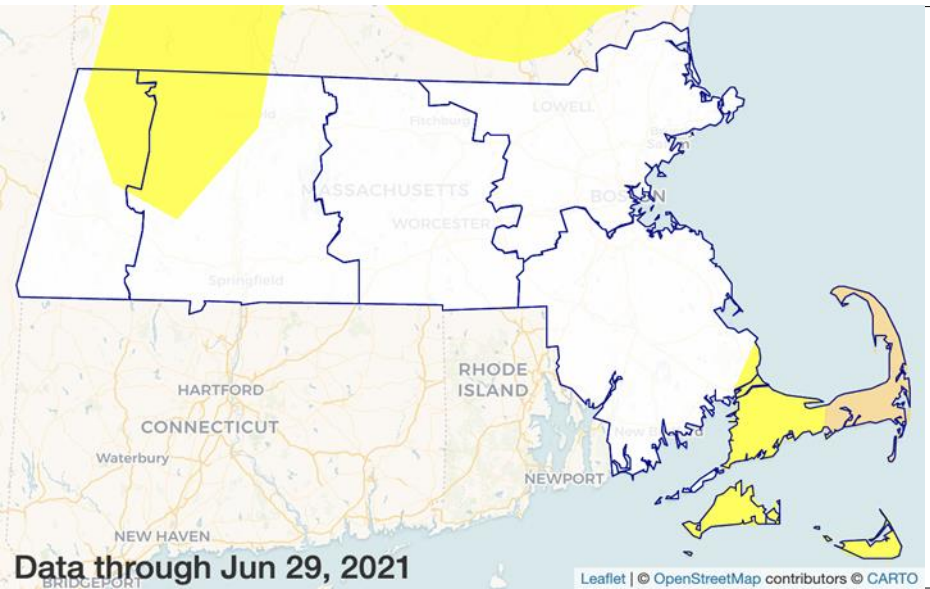
Public Health  
Impacts



# 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 – improvements on and off all regions except the Cape
  - July- excessive rain throughout most of Massachusetts except for the Cape Cod region with mostly normal amounts

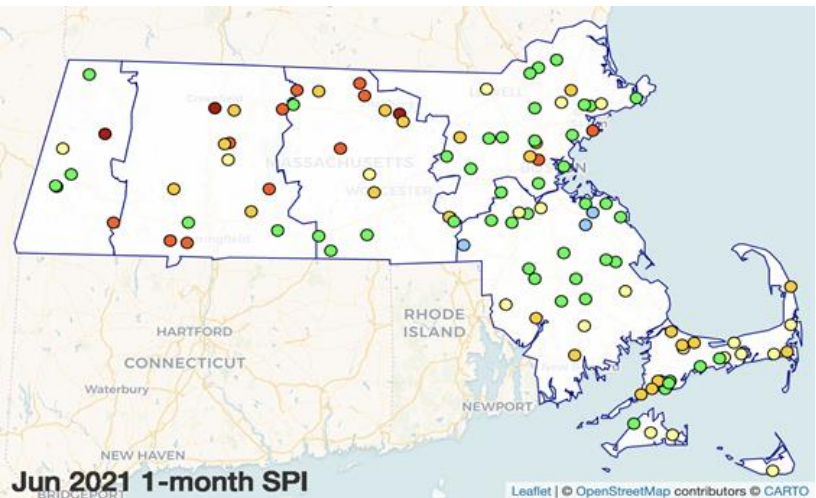
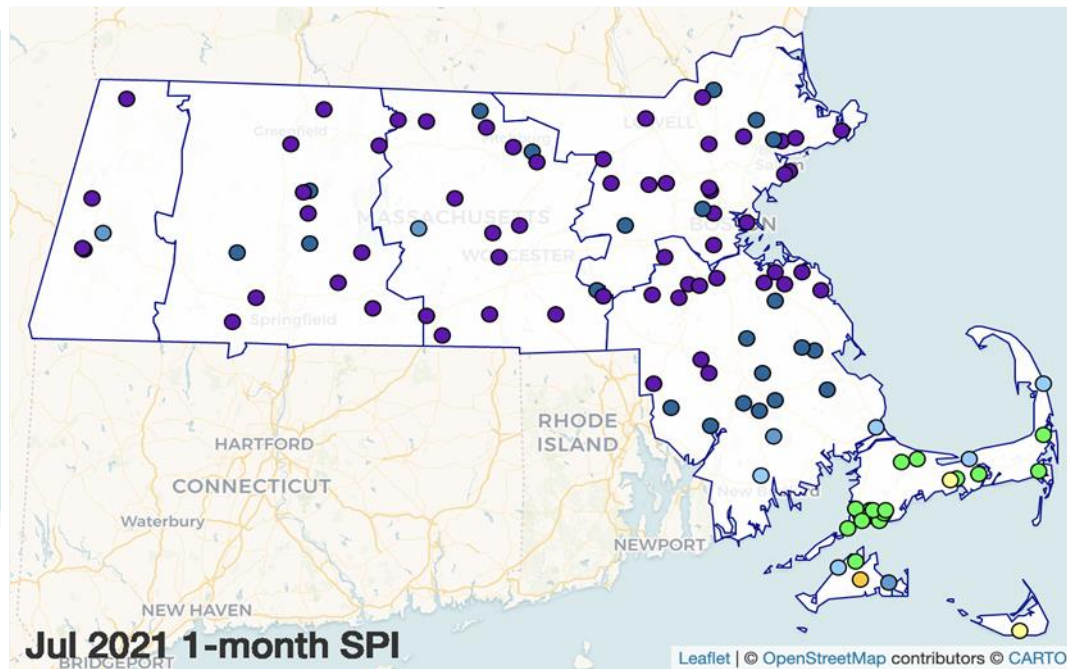
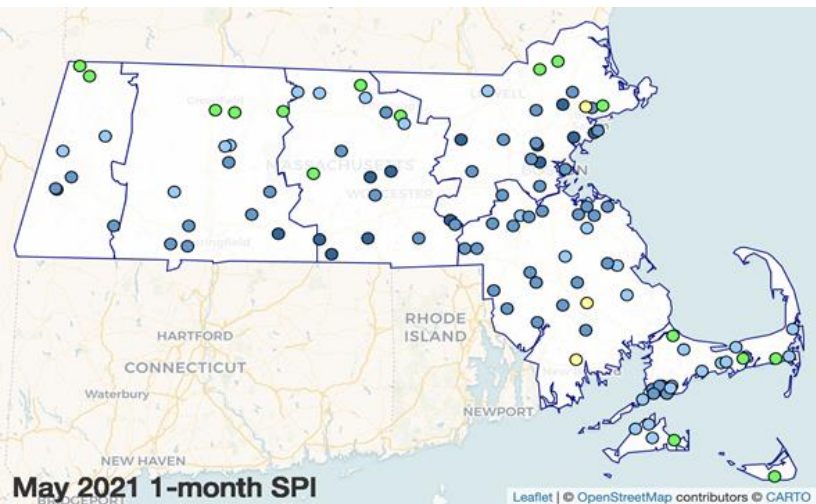
# US Drought Monitor



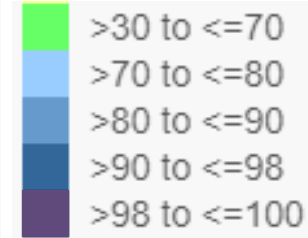
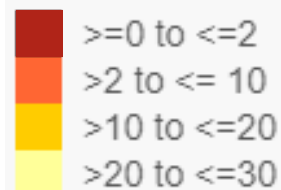
- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

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

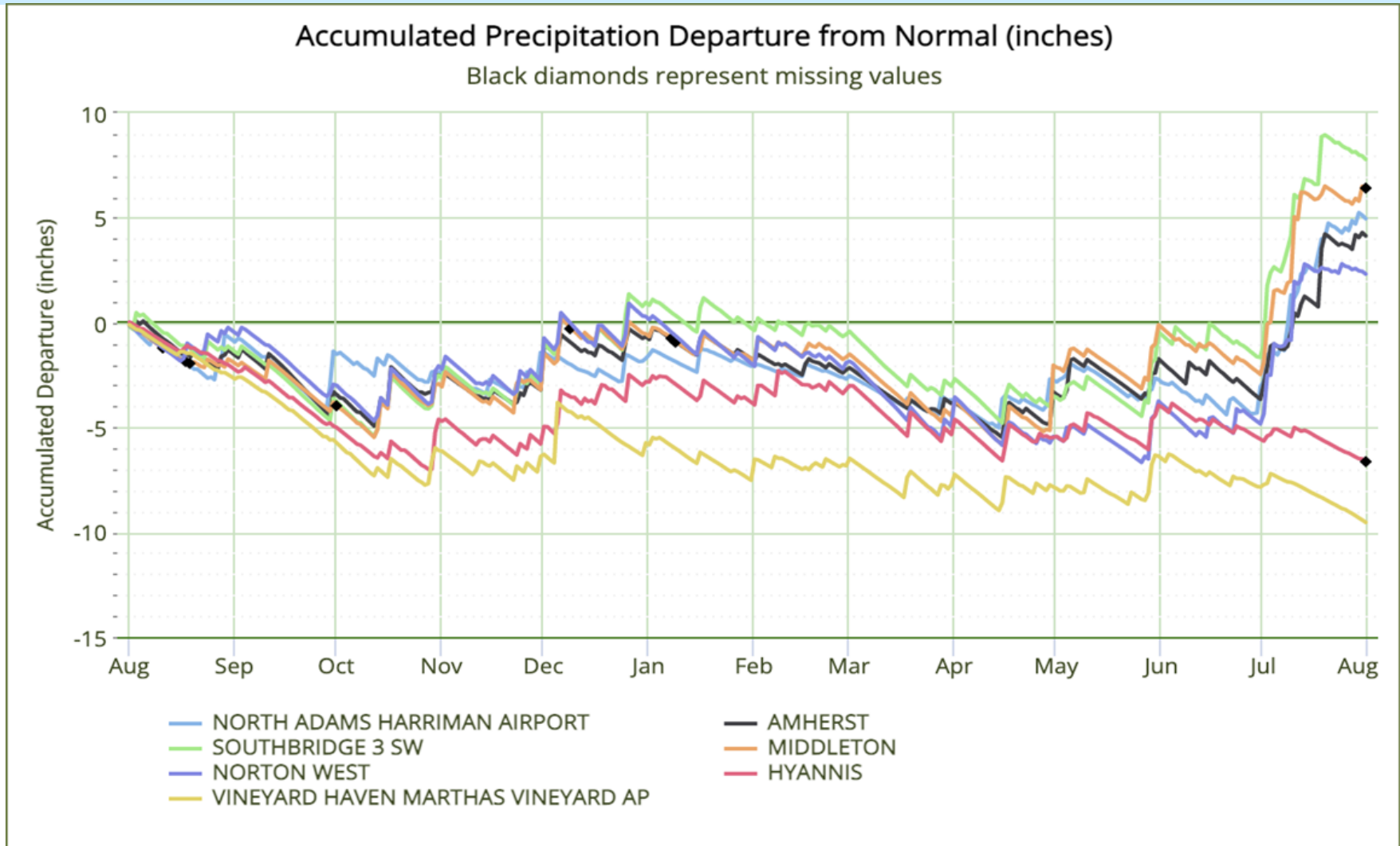
# Standardized Precipitation Index, 1 month



## Percentiles



# 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.

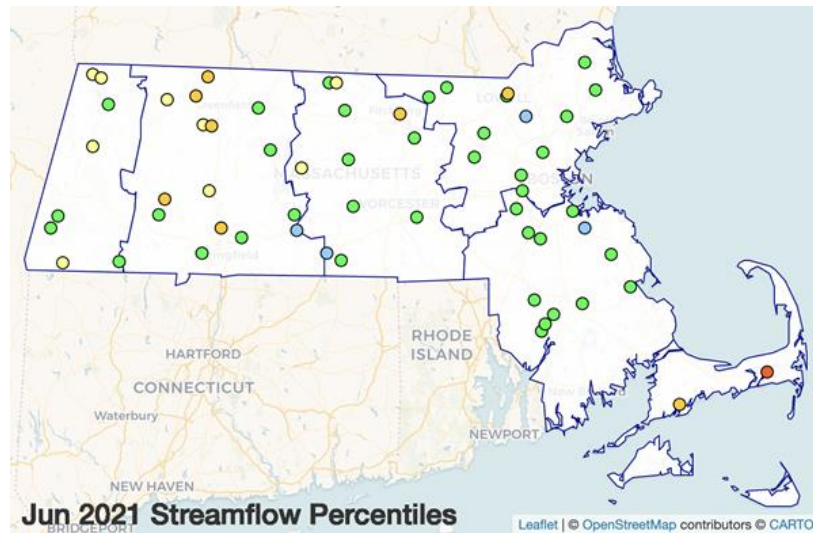
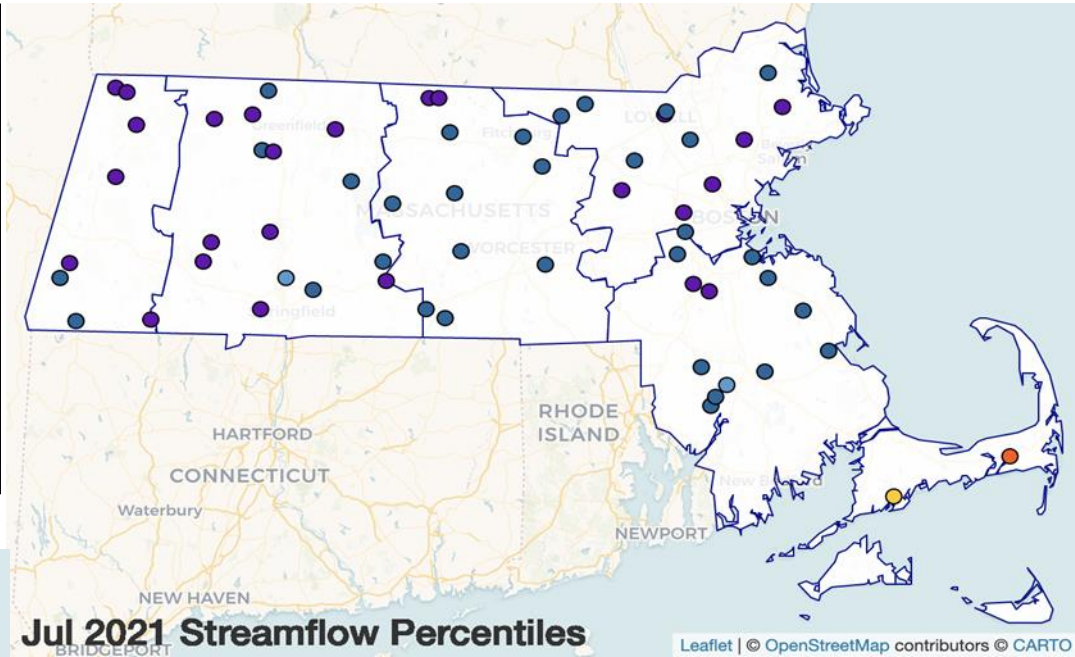
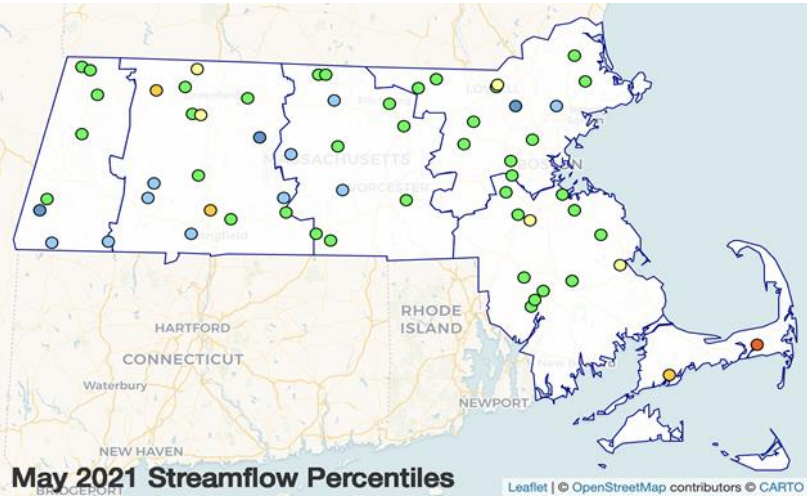
# Standardized Precipitation Index as Percentile, July

REGION	NUMBER OF SITES	1-mo*	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo*
WESTERN	5	99	96	97	92	86	74	54	78
CT RIVER VALLEY	13	100	95	95	91	88	82	61	89
CENTRAL	18	100	95	97	90	90	80	72	93
NORTHEAST	23	99	95	96	91	89	81	69	87
SOUTHEAST	28	98	91	93	83	81	68	55	89
CAPE COD	18	48	29	45	26	24	5	11	47
ISLANDS	5	70	30	45	32	27	12	38	77

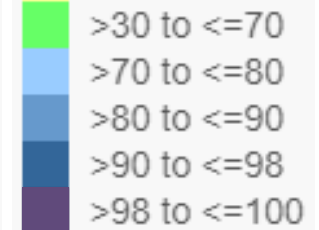
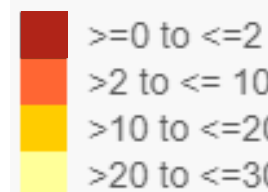
\* 1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

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

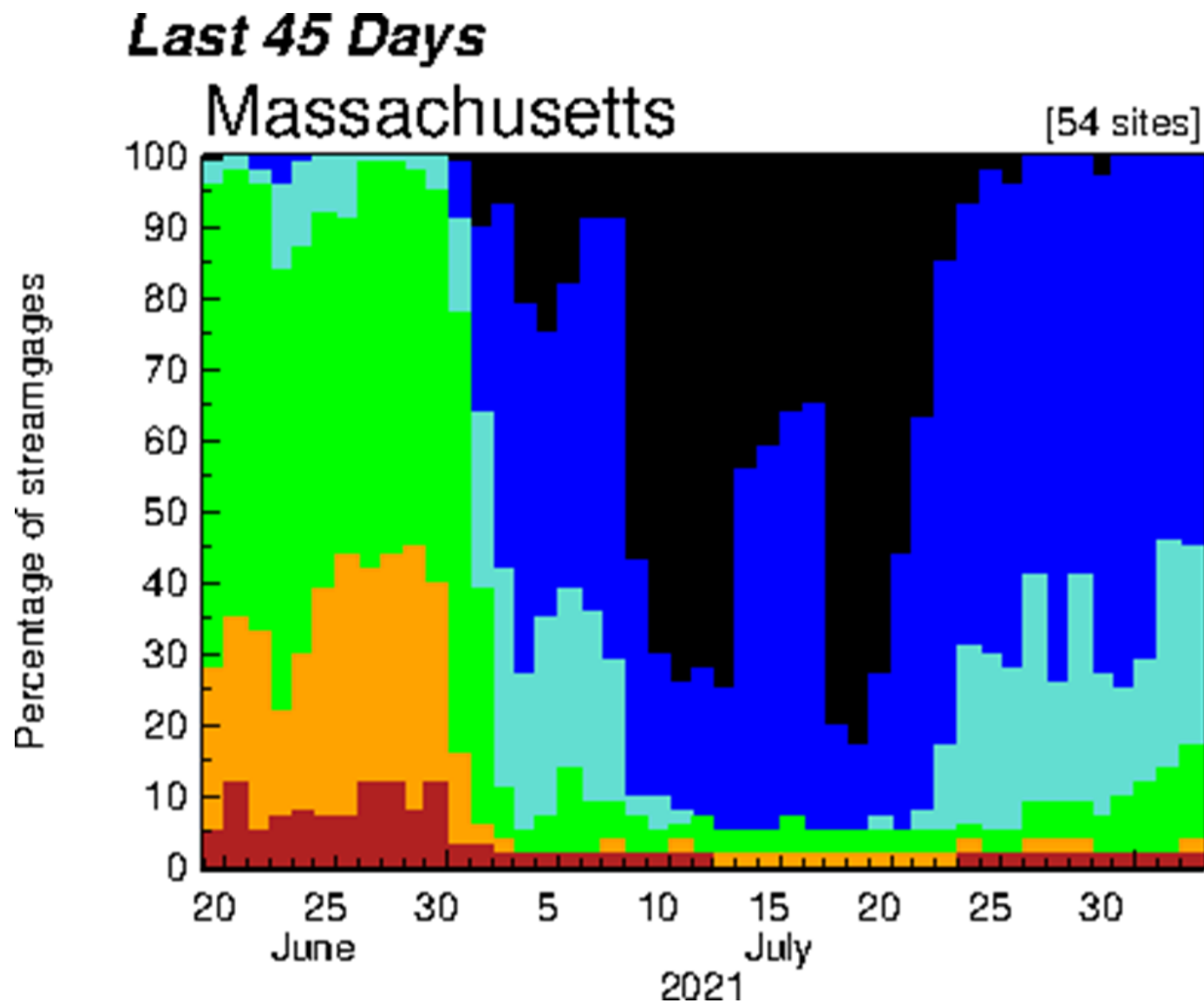
# Streamflow Percentiles of Monthly Median



## Percentiles



# Percent of Gages at Various Percentiles



# Streamflow Index July

May

- Cape Cod Level 2

June

- Cape Cod Level 3
- CT River Valley Level 1

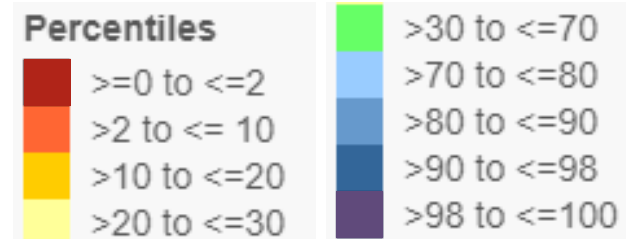
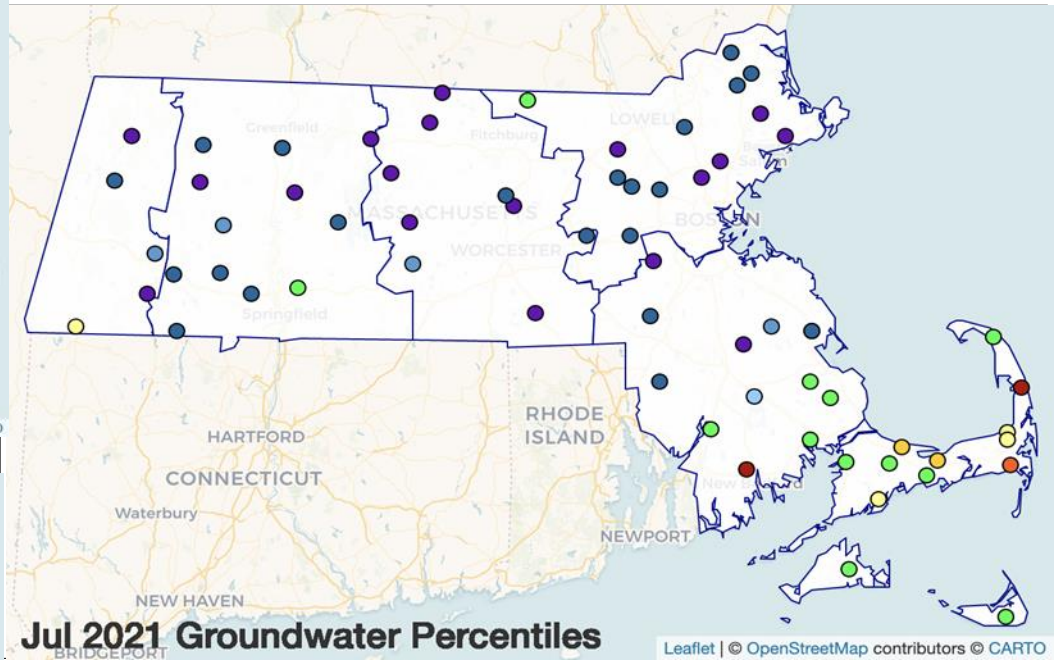
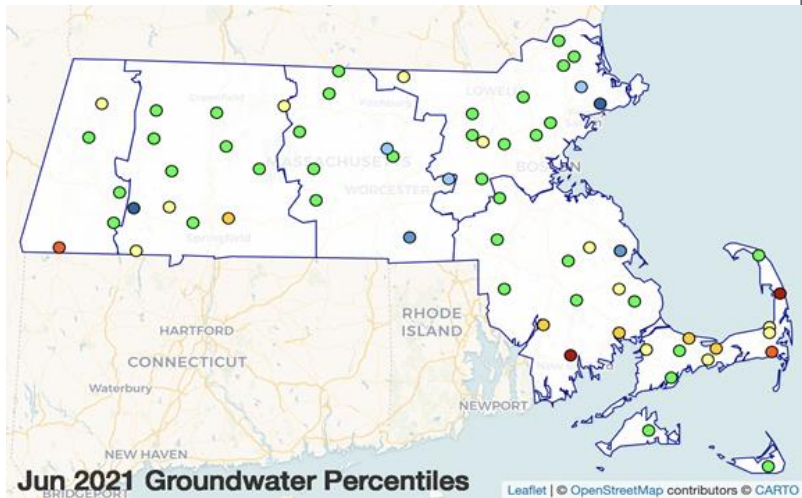
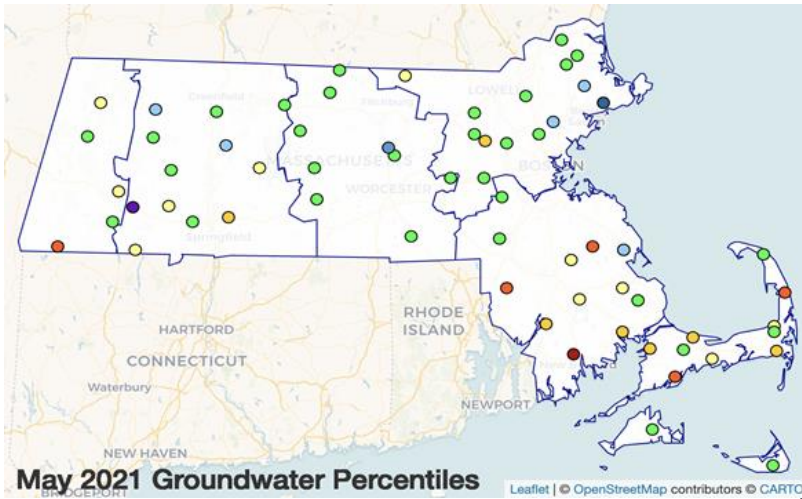
REGION	TOTAL GAGES REPORTING FOR JUL	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 TO ≤30 PERCENTILE	>90 PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES
WESTERN	8	0	0	0	0	8	99
CT RIVER VALLEY	15	0	0	0	0	14	99
CENTRAL	11	0	0	0	0	11	98
NORTHEAST	13	0	0	0	0	13	98
SOUTHEAST	12	0	0	0	0	11	97
CAPE COD	2	0	1	1	0	0	12

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

- May: Western, Southeast, Cape Cod Level 1
- June: Cape Cod Level 1

REGION	TOTAL WELLS REPORTING FOR JUL	≥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	1	3	98
CT RIVER VALLEY	12	0	0	0	0	10	95
CENTRAL	9	0	0	0	0	8	100
NORTHEAST	14	0	0	0	0	13	98
SOUTHEAST	13	1	0	0	0	6	88
CAPE COD	11	1	1	2	3	0	26
ISLANDS	2	0	0	0	0	0	37

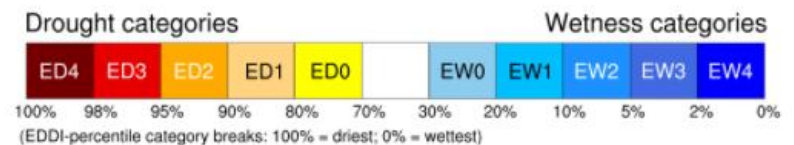
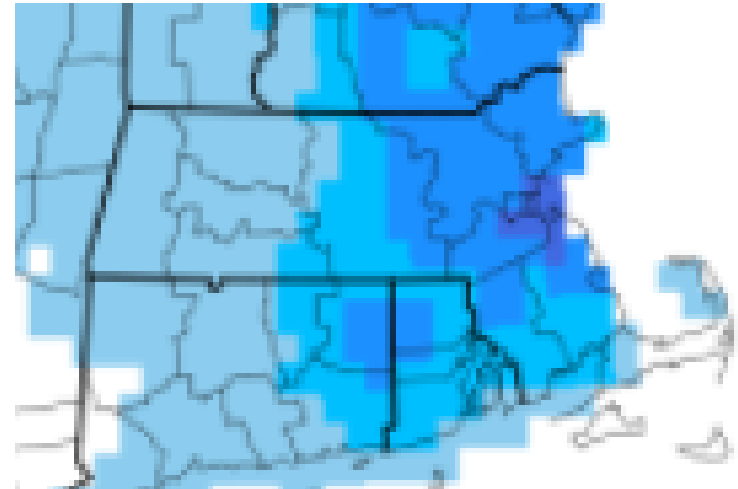
Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

# Evapotranspiration

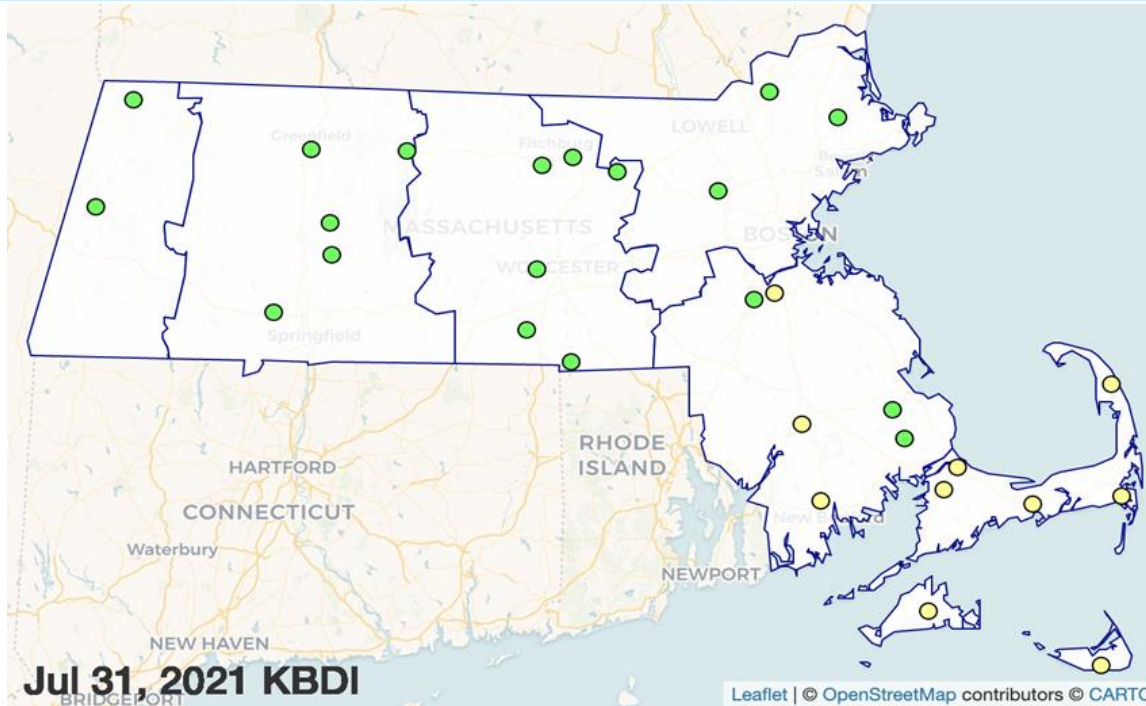
CMI ending July 31  
ISL=0



1-month EDDI  
(one of the ET products under consideration to replace CMI)  
Map dated July 28



# KBDI



**Jul 31, 2021 KBDI**

**Point Values - KBDI Range**

<span style="color: red;">●</span> ≥700 to ≤800	<span style="color: orange;">●</span> ≥600 to <700	<span style="color: yellow;">●</span> ≥400 to <600	<span style="color: lightyellow;">●</span> ≥200 to <400	<span style="color: green;">●</span> ≥0 to <200
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REGION	NUMBER OF SITES REPORTING	HIGHEST OF SITE VALUES
WESTERN	2	15
CT RIVER VALLEY	5	114
CENTRAL	6	161
NORTHEAST	3	108
SOUTHEAST	6	268
CAPE COD	5	355
ISLANDS	2	340

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
CT RIVER VALLEY	2	93
CENTRAL	1	100% full
NORTHEAST	4	95
SOUTHEAST	2	80
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 - June 2021

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation	36	23	27	44	33	19	25
Streamflow	33	28	39	55	56	10	N/A
Groundwater	43	43	61	61	36	23	39
Lakes/ Impoundments	97% & 95%	35	43	37	64	11	N/A
ET	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0
KBDI	Level 1	Level 1	Level 2	Level 1	Level 1	Level 1	Level 0
<i>Recommend 6/1 (7/7 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 5/1 (6/8 meeting)</i>	Level 1	Level 0	Level 0	Level 0	Level 1	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 - 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