

# 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 June 2021

Anne Carroll

DCR Office of Water Resources

## **Drought Management Task Force**

July 7, 2021

Meeting Co-Chairs: EOEEA, MEMA



# MA Drought Management Plan

## Indices

Numbers in parentheses indicate number of data points across the state



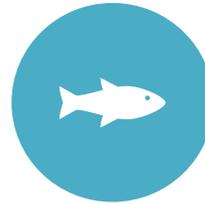
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and  
Impoundments (20)



KBDI - Fire Danger  
(16)



Crop Moisture  
(national map)

# MA Drought Management Plan

## Index Severity Levels

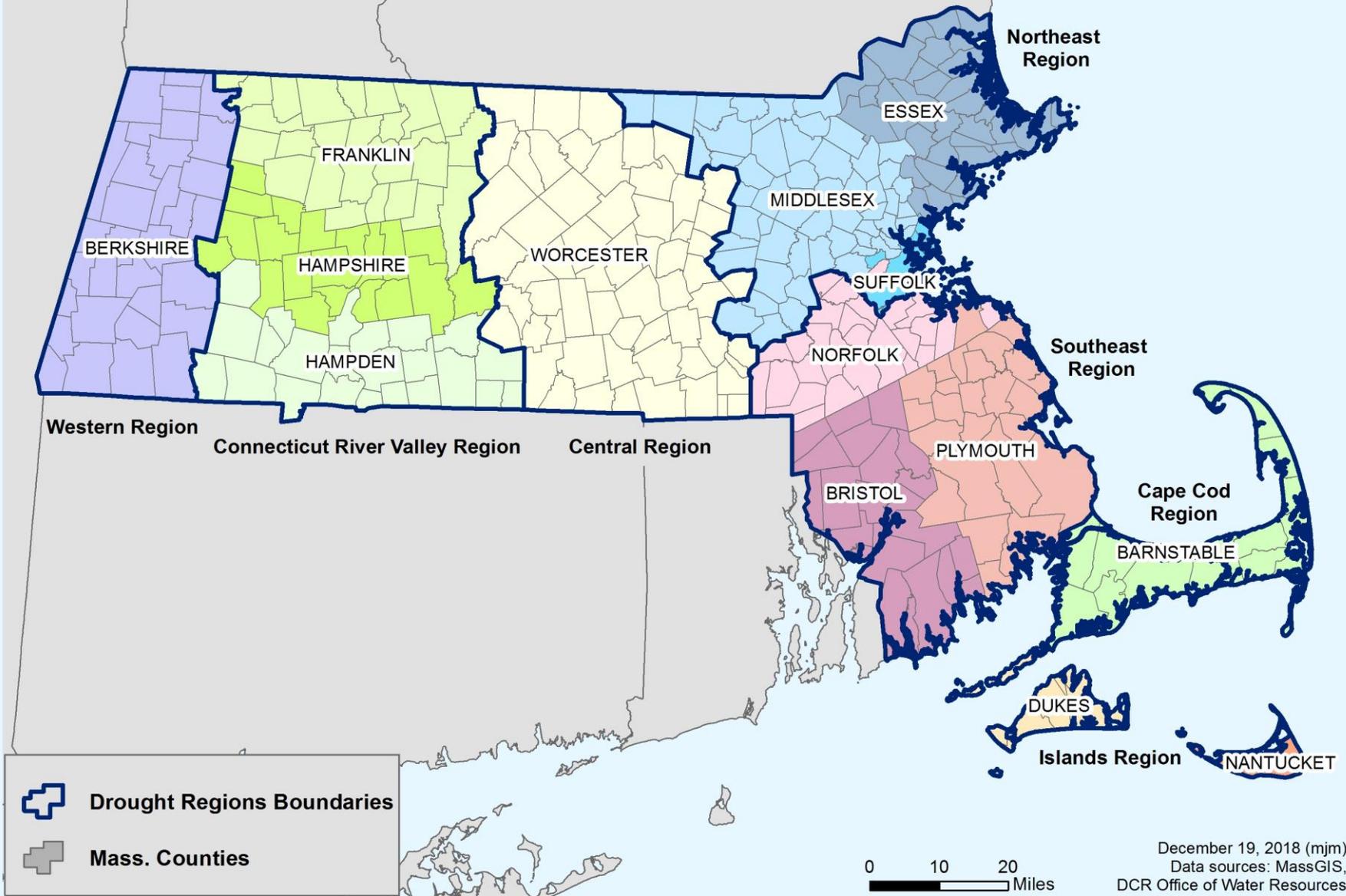
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 <sup>th</sup> percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0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

# MA Drought Management Plan

## Drought Levels



# MASSACHUSETTS DROUGHT REGIONS with Counties

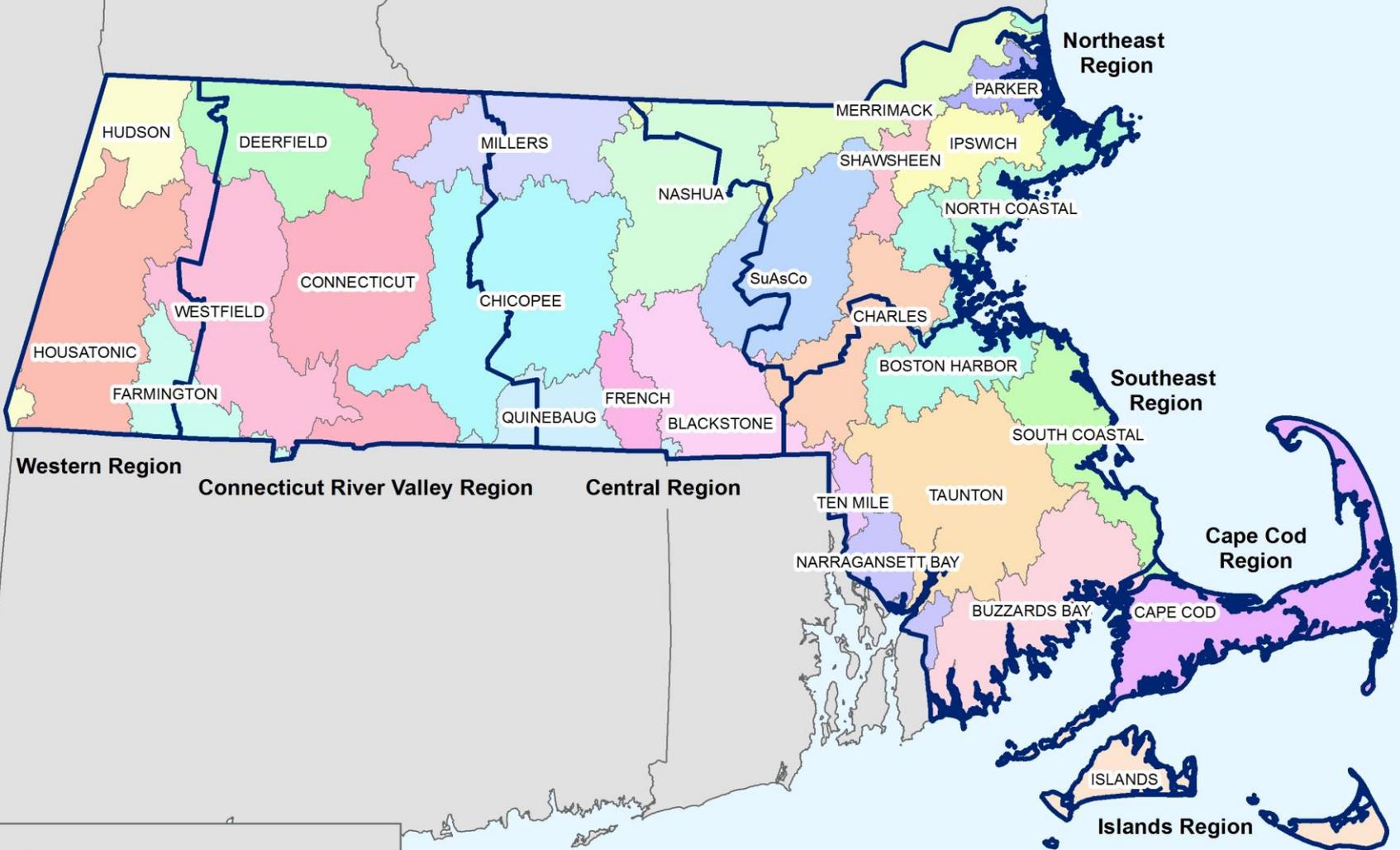


-  Drought Regions Boundaries
-  Mass. Counties

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

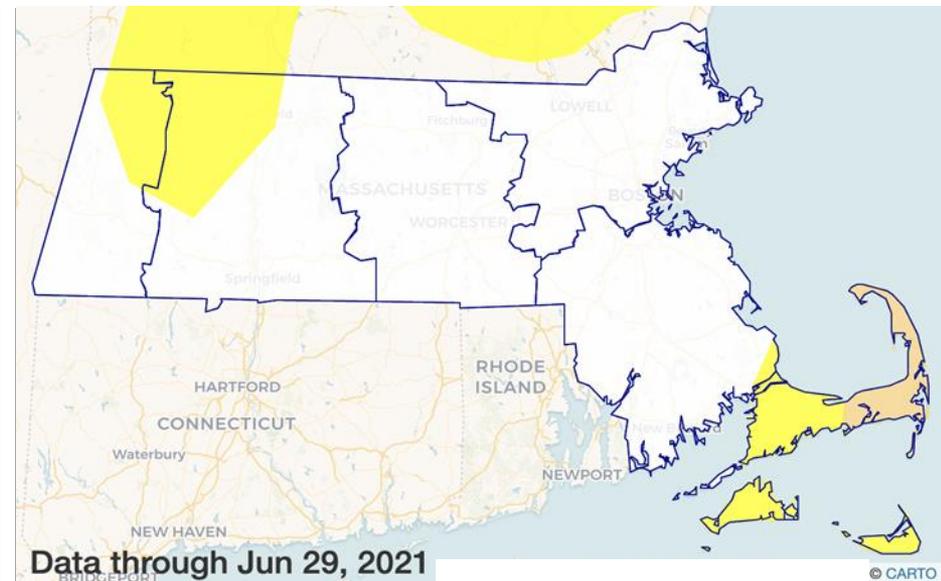
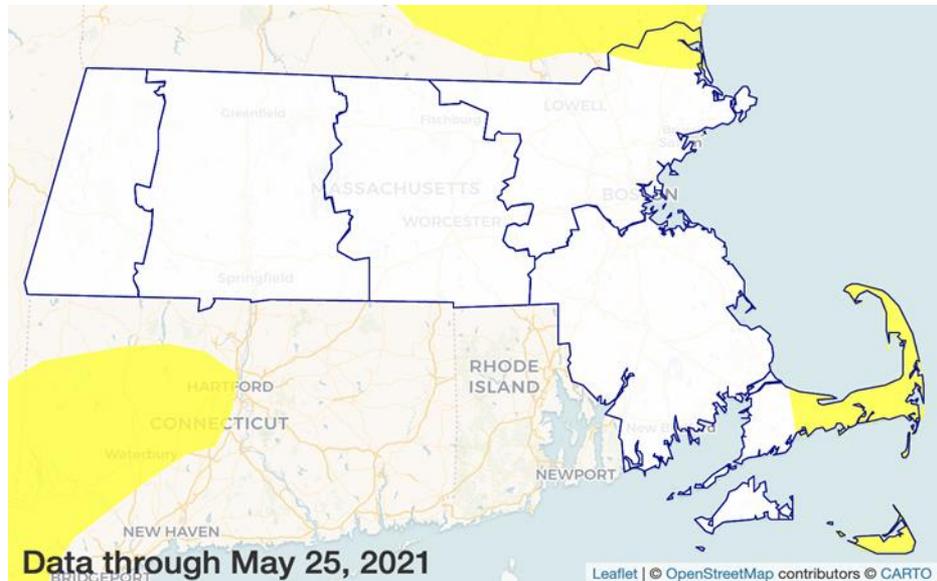


Public Health  
Impacts

# Recent Hydrologic History

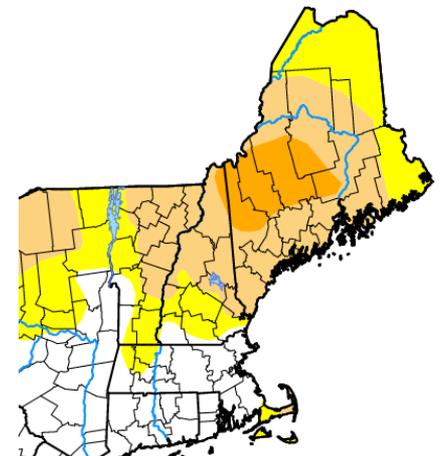
- 2020 – Drought May through November
- 2021
  - January through March - low precipitation across the state with variable impacts on streamflow and groundwater
  - April – mild improvement in some regions
  - May- improvements in some regions, while others stayed the same or degraded

# US Drought Monitor

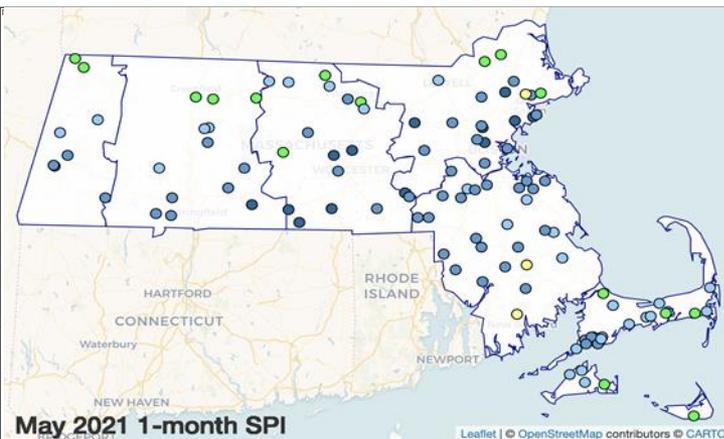
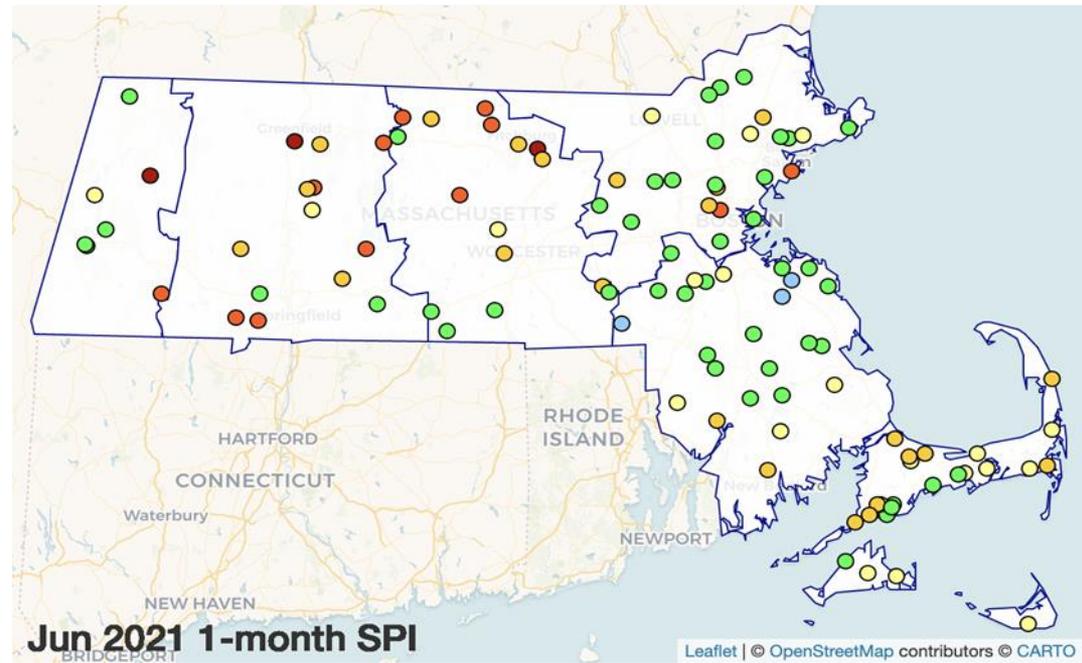
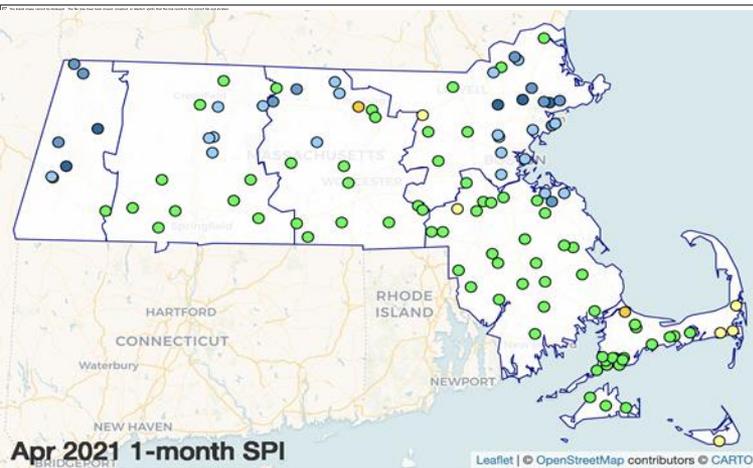


- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

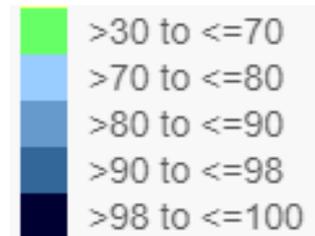
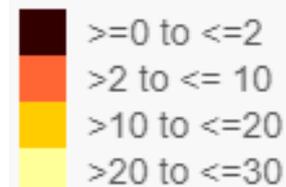
USDM	=	MA DMP
0	=	1
1	=	2
2,3	=	3
4	=	4



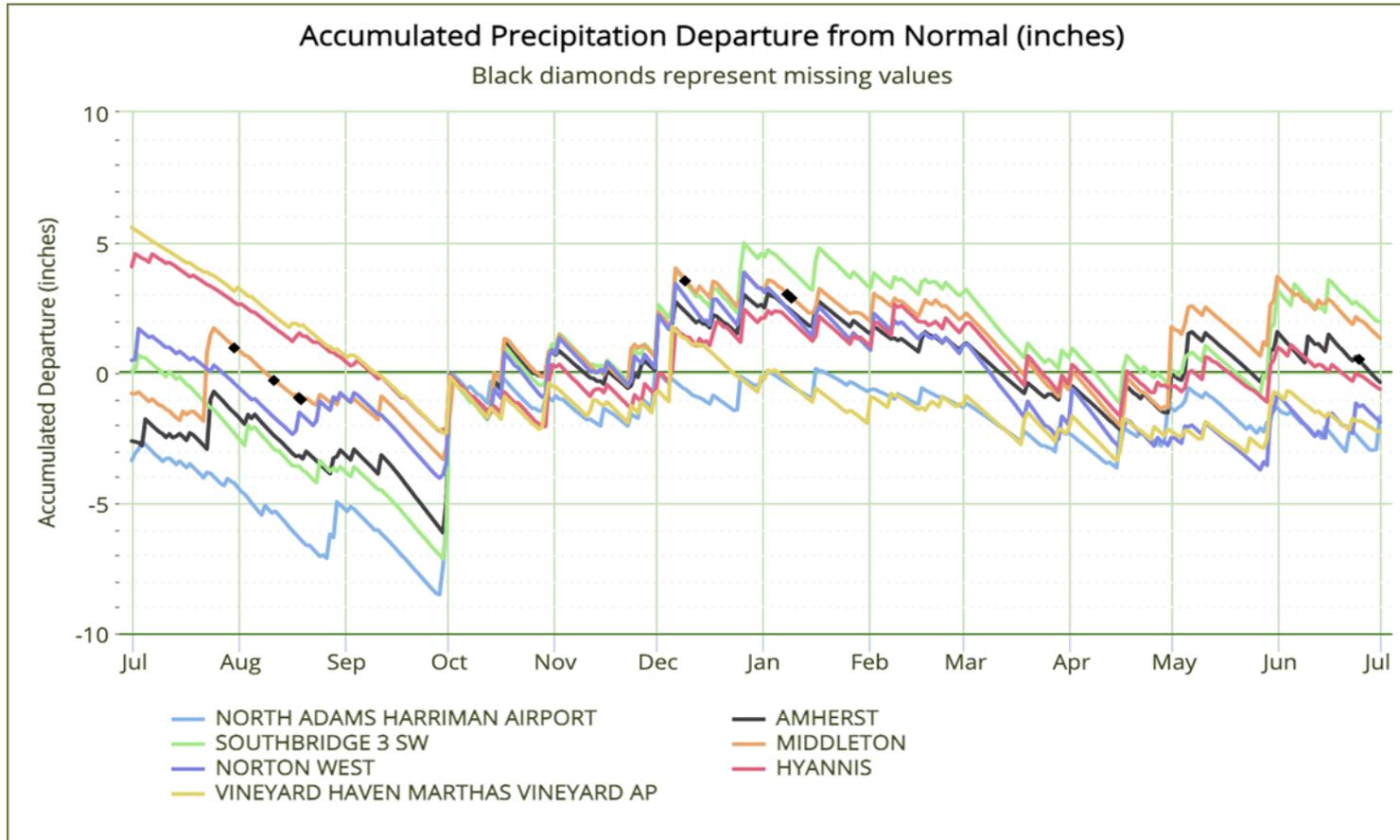
# Standardized Precipitation Index, 1 month



## 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.

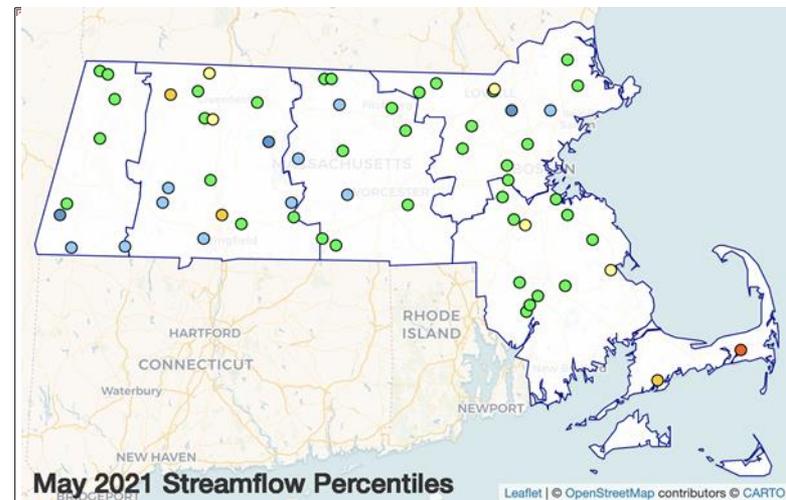
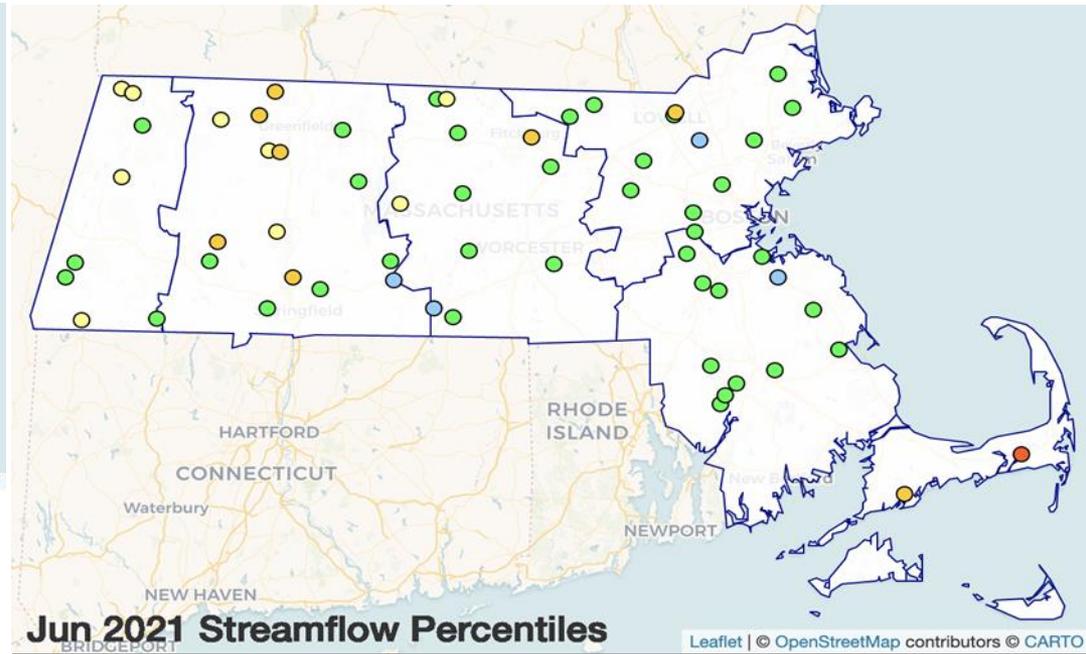
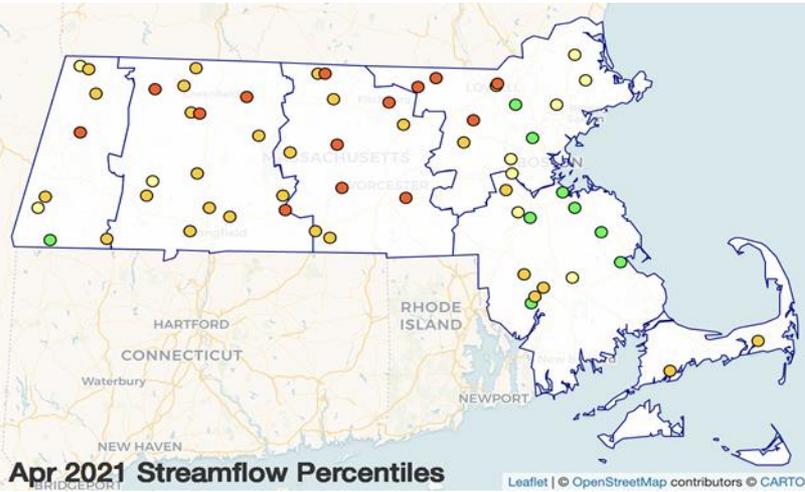
# Standardized Precipitation Index as Percentile, June

REGION	NUMBER OF SITES	1-mo*	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo*
WESTERN	7	35	52	60	36	40	29	35	72
CT RIVER VALLEY	13	11	34	46	23	46	37	27	80
CENTRAL	16	16	50	55	27	58	42	46	88
NORTHEAST	24	38	63	72	44	57	43	49	80
SOUTHEAST	25	48	62	57	33	54	30	45	81
CAPE COD	20	22	47	40	19	31	10	24	46
ISLANDS	4	29	48	44	25	40	11	37	75

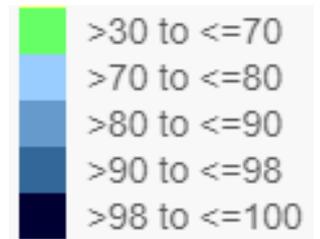
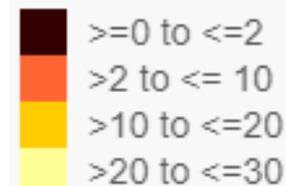
\* 1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

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

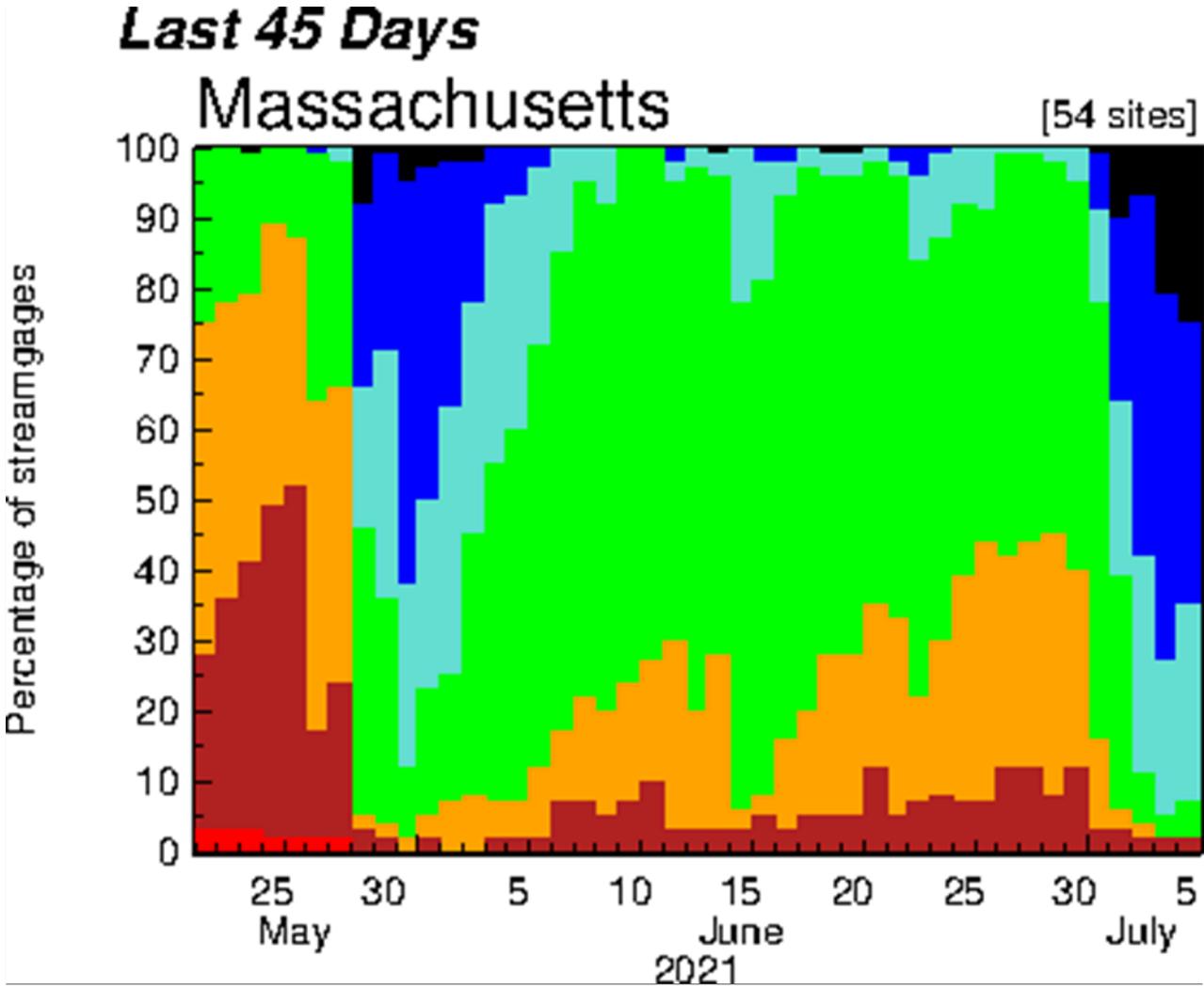
# Streamflow Percentiles of Monthly Median



## Percentiles



# Percent of Gages at Various Percentiles



# Streamflow Index June

## March

- Central & Northeast at Level 1
- Southeast at Level 2

## May

- Cape Cod Level 2

## April

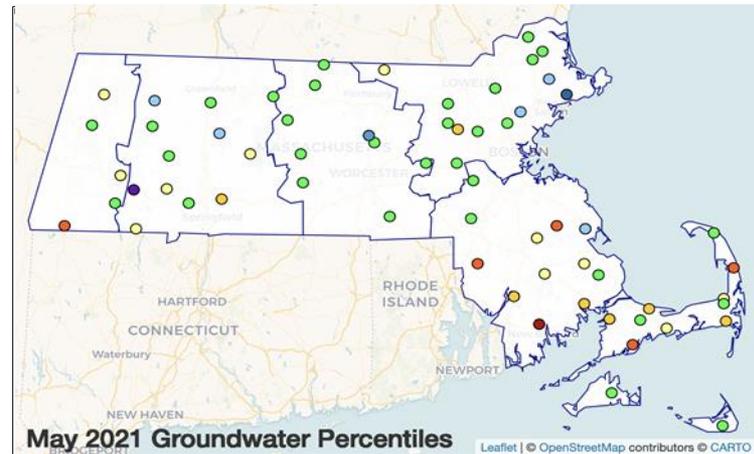
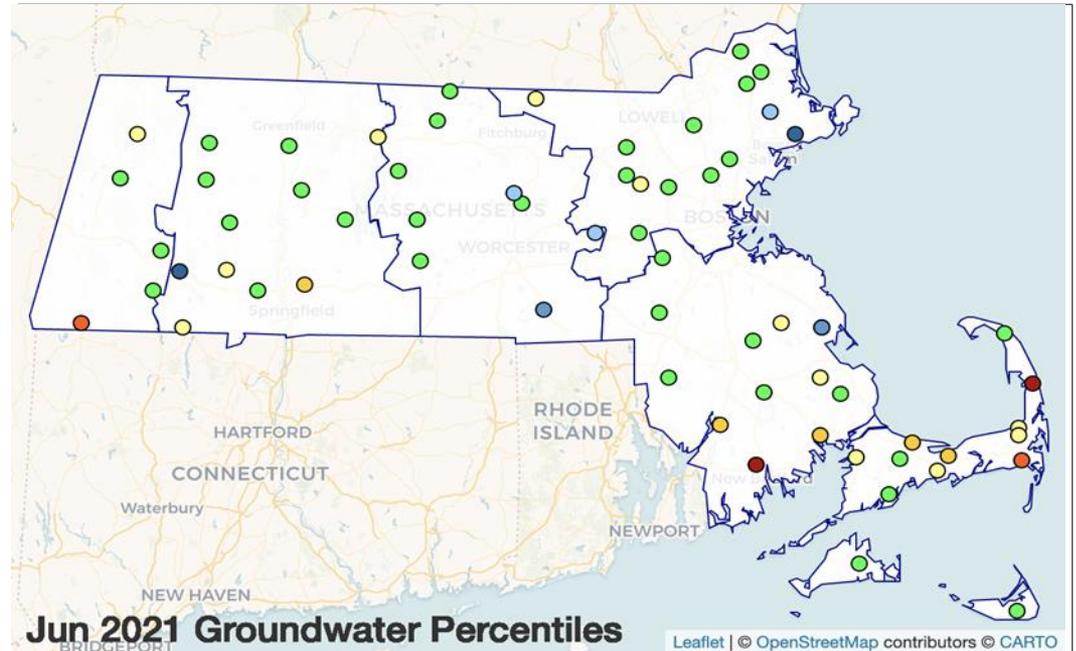
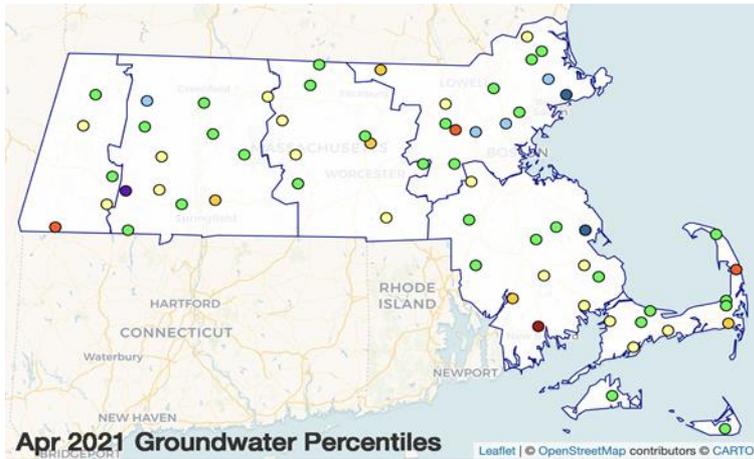
- Northeast Level 1
- Western, CT River Valley, Central at Level 2

REGION	TOTAL GAGES REPORTING FOR JUN	≥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	4	0	33
CT RIVER VALLEY	15	0	0	5	3	0	28
CENTRAL	11	0	0	1	2	0	39
NORTHEAST	13	0	0	1	0	0	55
SOUTHEAST	12	0	0	0	0	0	56
CAPE COD	2	0	1	1	0	0	10

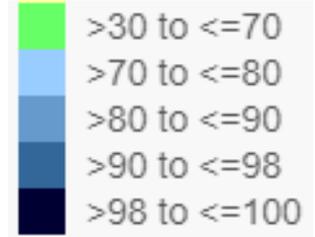
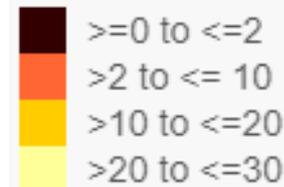
Notes: Not all gages report in all months due to ice, beaver dams or other conditions. The Islands region does not have any streamflow gages.

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

# Groundwater Percentiles at the end of Month



## Percentiles



# Groundwater Index

- March: Southeast Region at Level 1
- April: Western Region at Level 1
- May: Western, Southeast, Cape Cod Level 1

REGION	TOTAL WELLS REPORTING FOR JUN	≥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	1	0	1	0	43
CT RIVER VALLEY	12	0	0	1	3	1	43
CENTRAL	9	0	0	0	0	0	61
NORTHEAST	14	0	0	0	2	1	61
SOUTHEAST	13	1	0	2	2	0	36
CAPE COD	11	1	1	2	4	0	23
ISLANDS	2	0	0	0	0	0	39

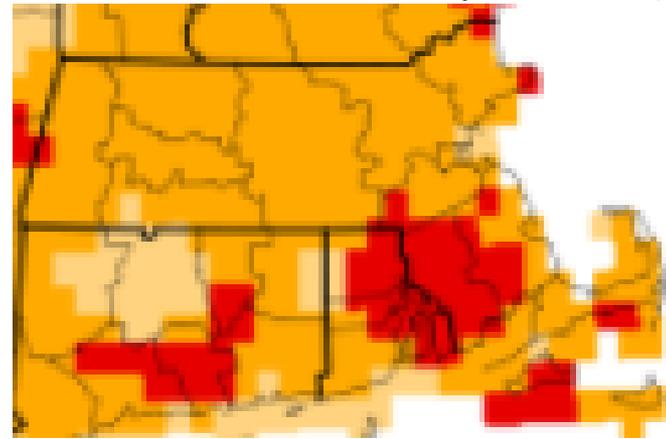
Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

# Evapotranspiration

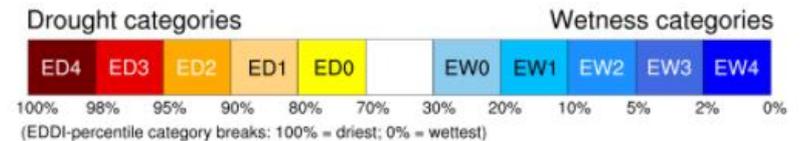
CMI ending June 26  
ISL=0



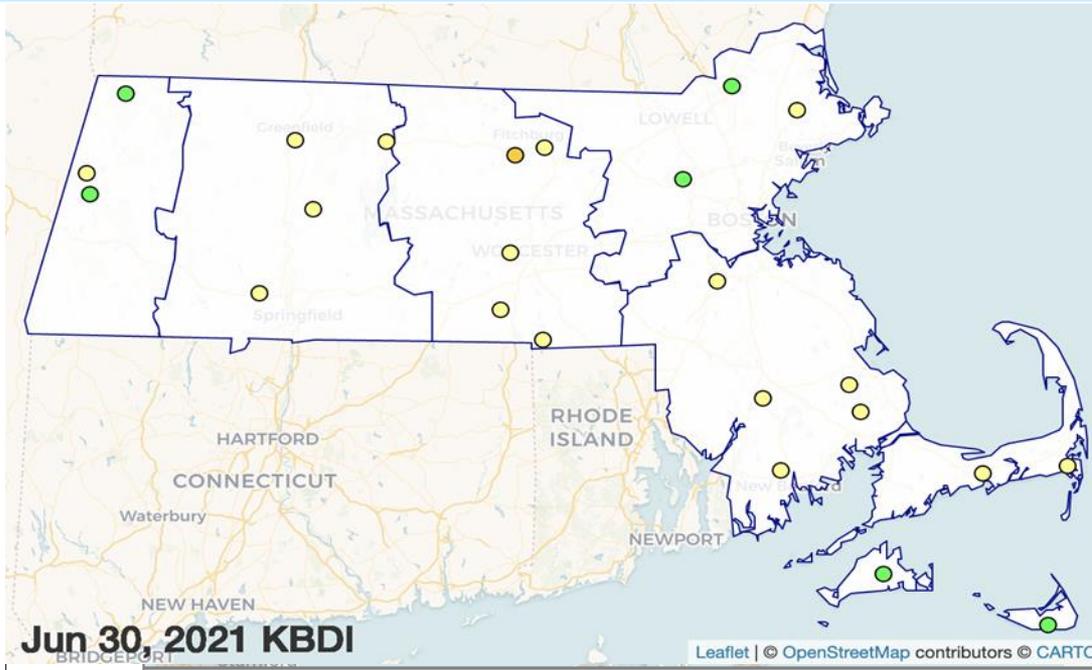
EDDI  
(one of the ET products under consideration to replace CMI)



Map dated June 19



# KBDI



Point Values - KBDI Range									
●	≥700 to ≤800	●	≥600 to <700	●	≥400 to <600	●	≥200 to <400	●	≥0 to <200

REGION	NUMBER OF SITES REPORTING	HIGHEST OF SITE VALUES
WESTERN	3	231
CT RIVER VALLEY	4	351
CENTRAL	5	417
NORTHEAST	3	360
SOUTHEAST	5	281
CAPE COD	2	219
ISLANDS	2	184

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	2	97% & 95%
CT RIVER VALLEY	2	35
CENTRAL	2	43
NORTHEAST	6	37
SOUTHEAST	1	64
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 - May 2021

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation	45	54	68	71	60	48	56
Streamflow	65	59	62	58	39	10	N/A
Groundwater	28	34	46	56	25	21	36
Lakes/ Impoundments	Level 0	62	53	64	69	12	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 0	Level 0	Level 0
<i>Recommend 5/1 (6/8 meeting)</i>	<i>Level 1</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 1</i>	<i>Level 1</i>	<i>Level 0</i>
<i>Effective 4/1 (5/6 meeting)</i>	<i>Level 1</i>	<i>Level 1</i>	<i>Level 1</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 1</i>	<i>Level 0</i>

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 - 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

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