

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 May 2021

Anne Carroll and Viki Zoltay
DCR Office of Water Resources

Drought Management Task Force

June 8, 2021

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan

Indices

Numbers in parentheses indicate number of data points across the state



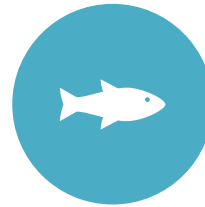
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(16)



Crop Moisture
(national map)

MA Drought Management Plan

Index Severity Levels

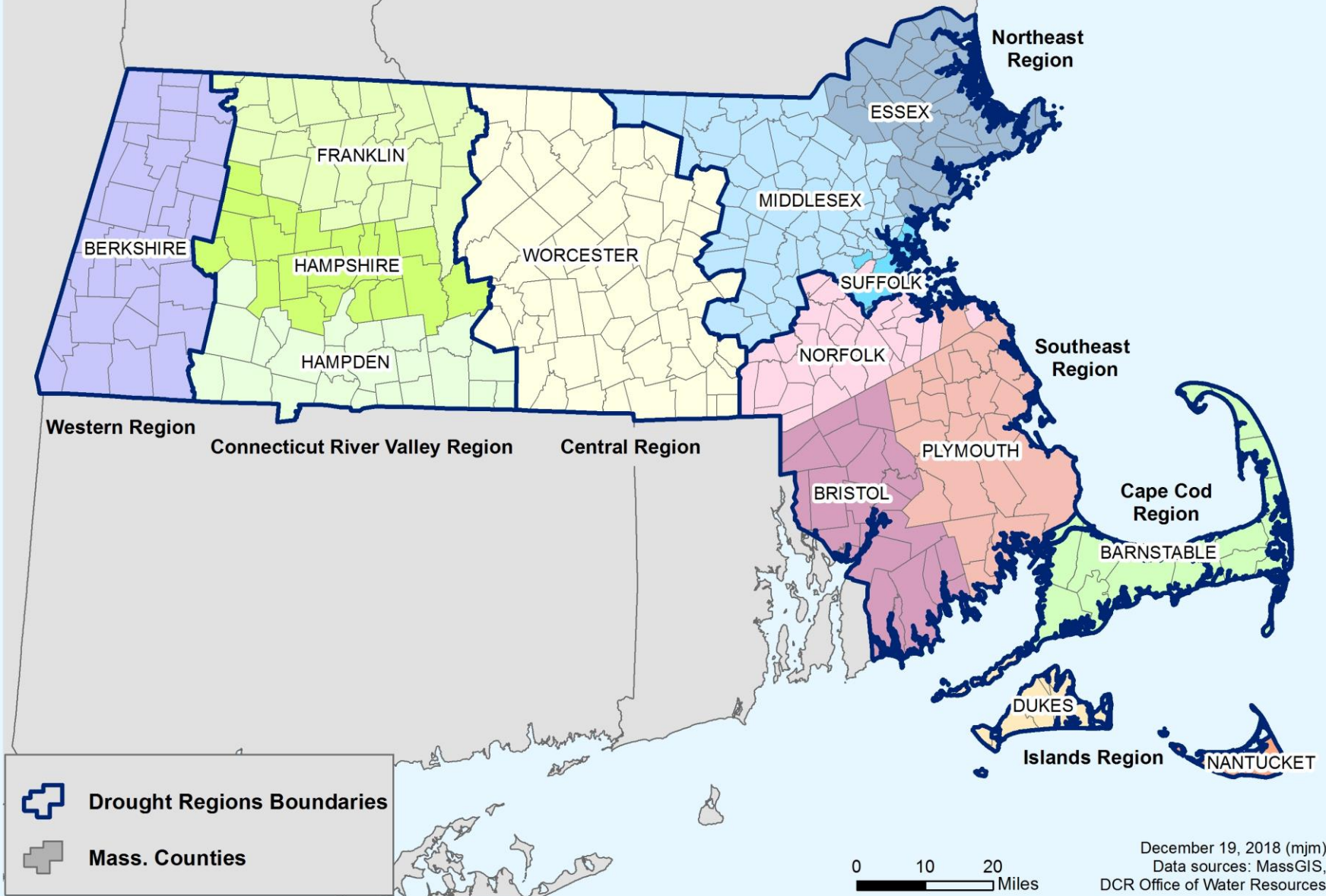
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 th percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0 and > -4.0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

MA Drought Management Plan

Drought Levels



MASSACHUSETTS DROUGHT REGIONS with Counties



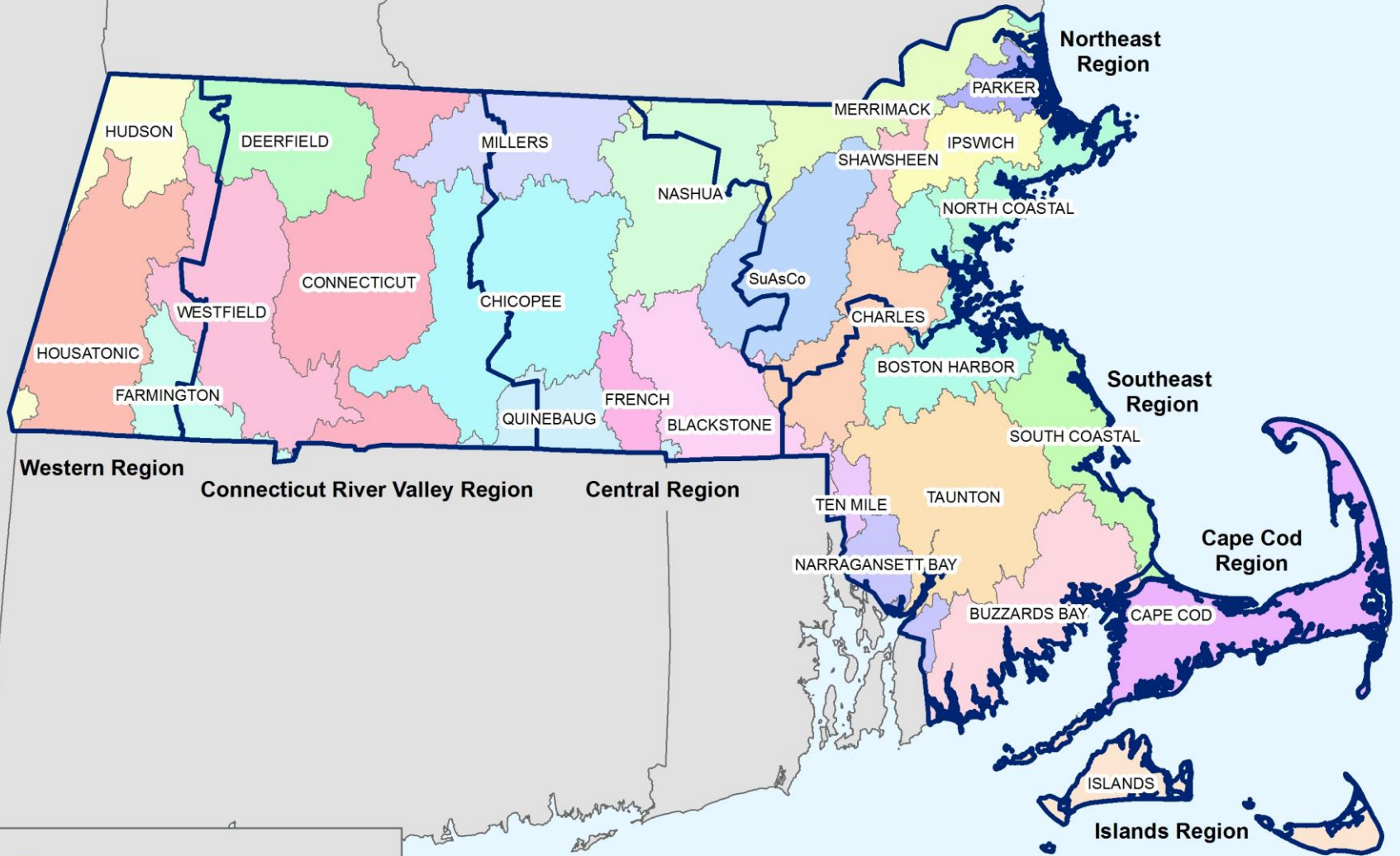
-  Drought Regions Boundaries
-  Mass. Counties

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

0 10 20
Miles

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

Task Force Member Updates



Hydrologic
Conditions



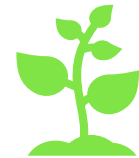
Weather &
Forecast



Water Supply
Impacts



Environmental
Impacts



Agricultural
Impacts



Fire Danger



Engineering/
Infrastructure
Impacts

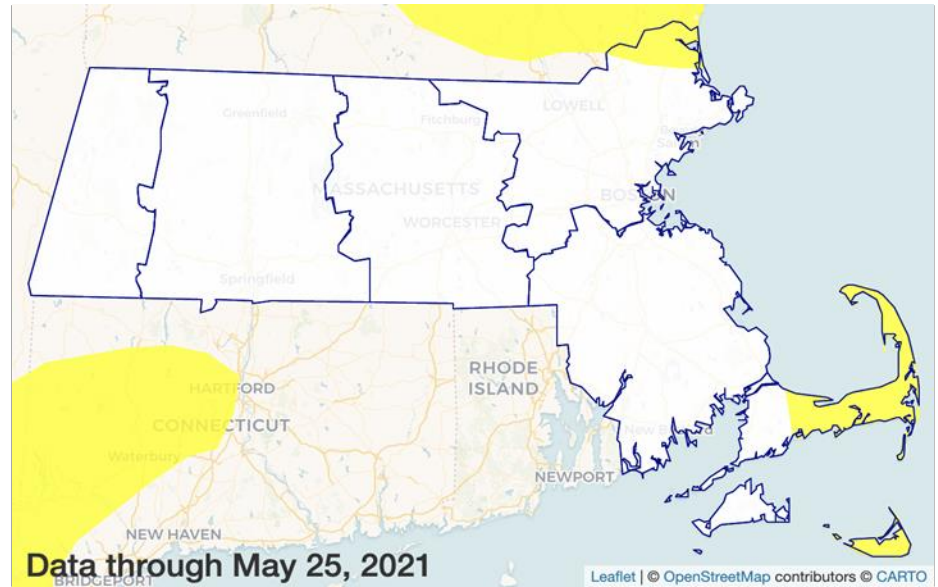
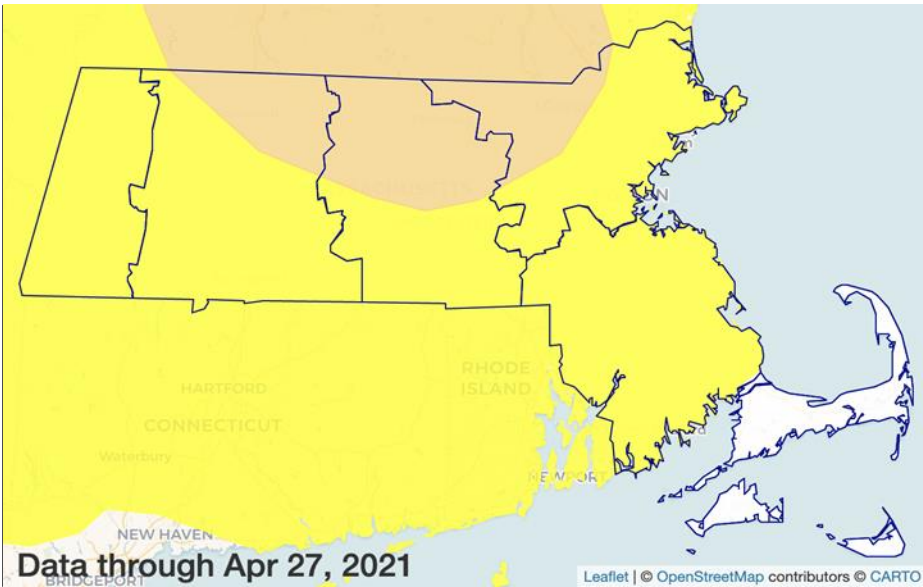








Public Health
Impacts

Recent Hydrologic History

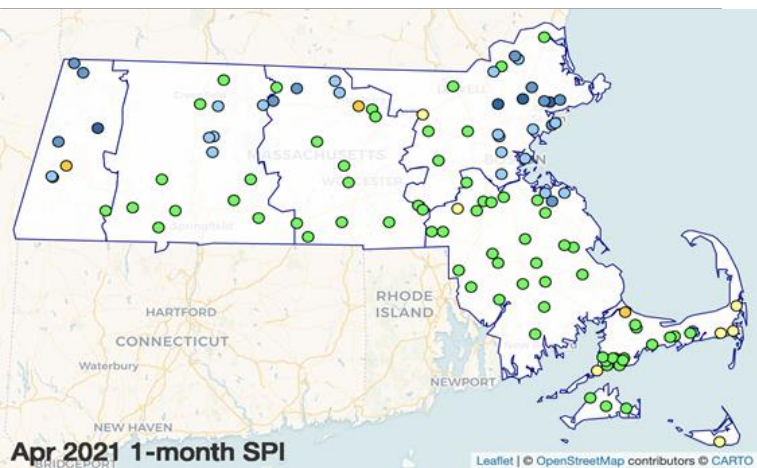
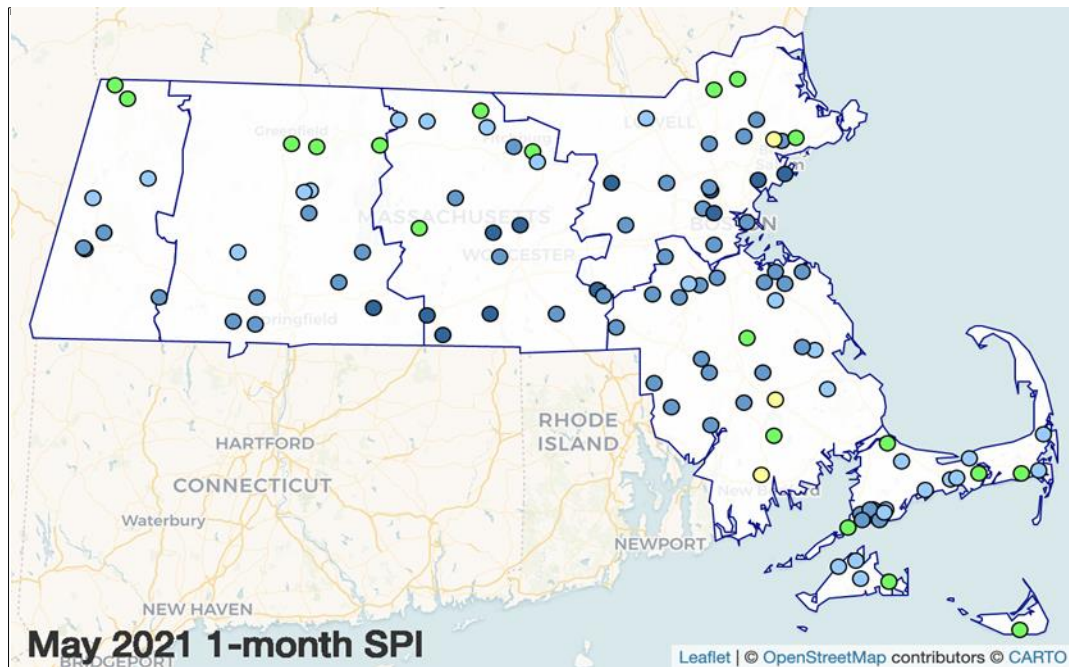
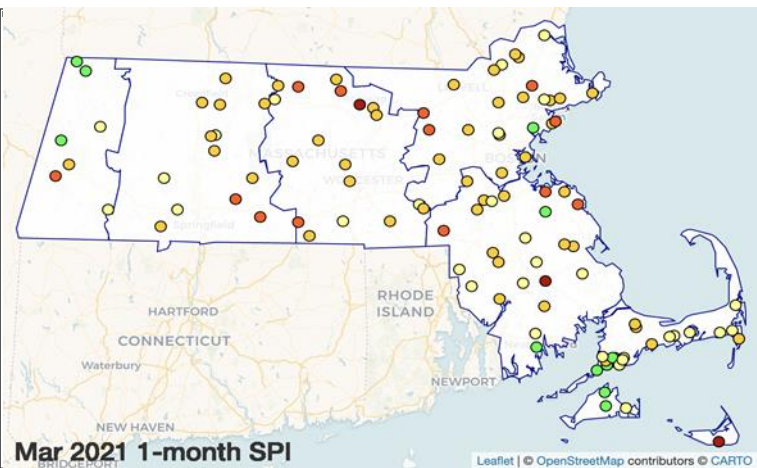
- 2020 – Drought May through November
- 2021
 - January through March - low precipitation across the state with variable impacts on streamflow and groundwater
 - April – mild improvement in some regions

US Drought Monitor

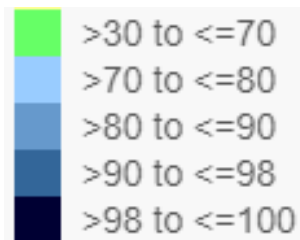
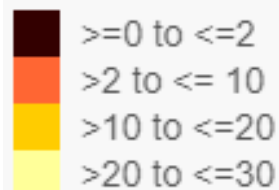


	None		
	D0 (Abnormally Dry)	USDM	MA DMP
	D1 (Moderate Drought)	0	= 1
	D2 (Severe Drought)	1	= 2
	D3 (Extreme Drought)	2,3	= 3
	D4 (Exceptional Drought)	4	= 4

Standardized Precipitation Index, 1 month

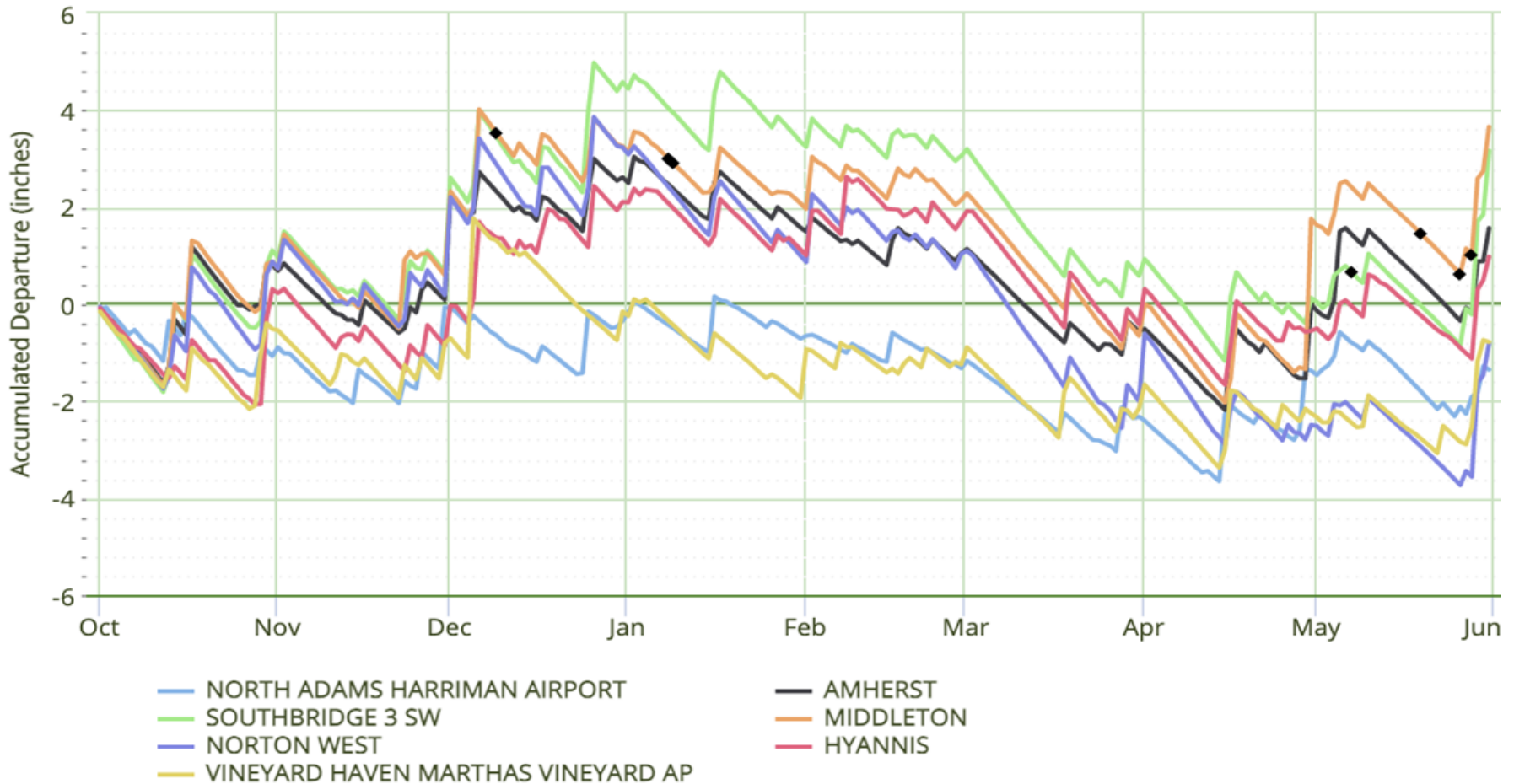


Percentiles



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.

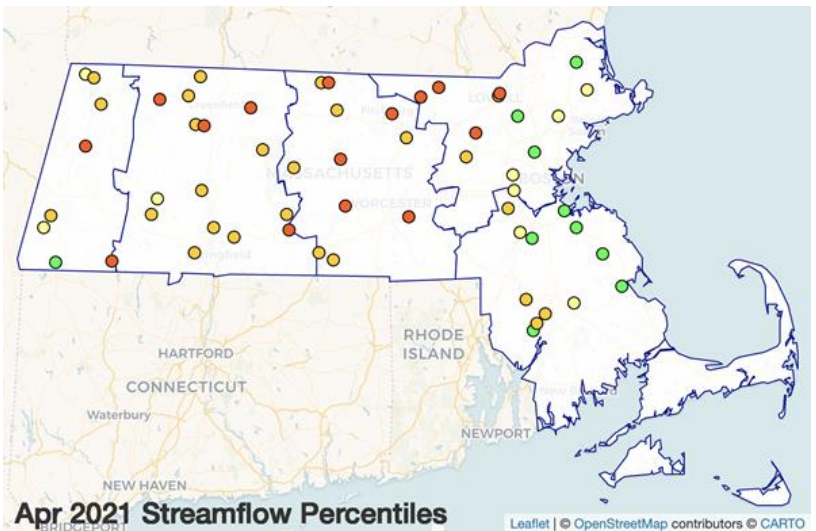
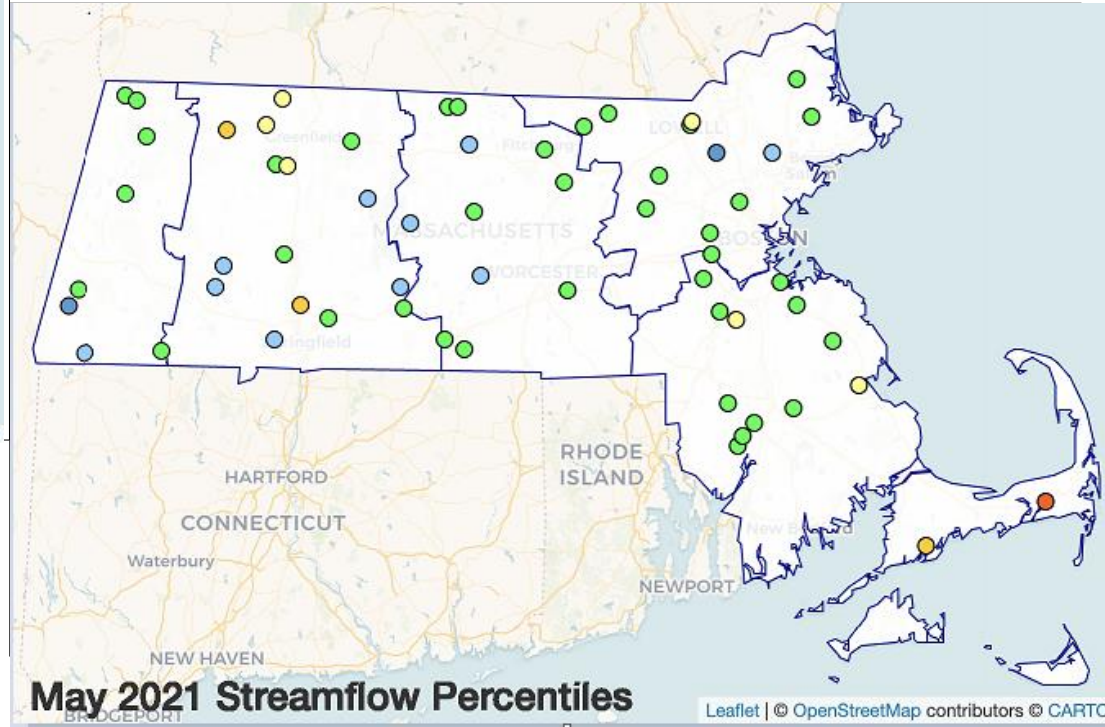
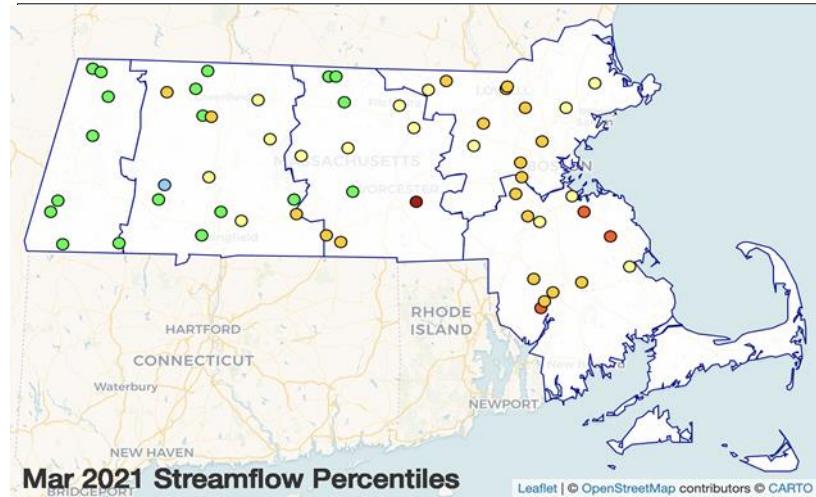
Standardized Precipitation Index as Percentile, May

REGION	NUMBER OF SITES	1-mo*	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo*
WESTERN	8	77	85	74	45	43	27	28	72
CT RIVER VALLEY	13	81	78	57	54	59	34	32	85
CENTRAL	18	86	77	49	68	56	41	49	90
NORTHEAST	20	87	88	63	71	58	32	48	71
SOUTHEAST	26	84	70	45	60	46	32	49	82
CAPE COD	18	76	59	34	48	16	4	32	49
ISLANDS	5	74	58	33	56	27	9	54	81

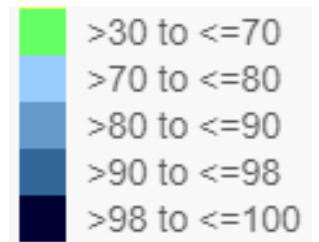
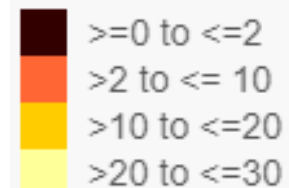
* 1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

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

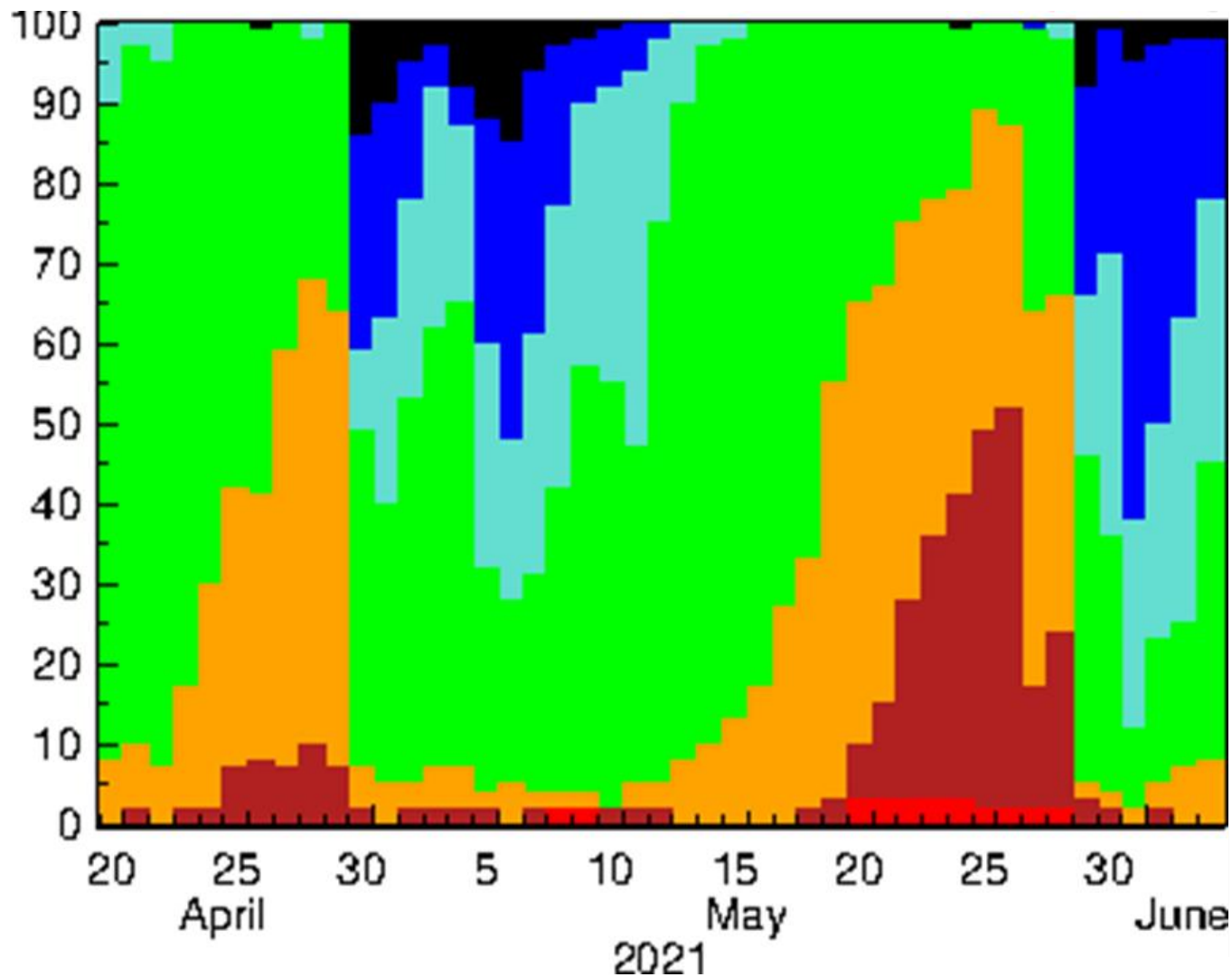
Streamflow Percentiles of Monthly Median



Percentiles



Percent of Gages at Various Percentiles



Streamflow Index May

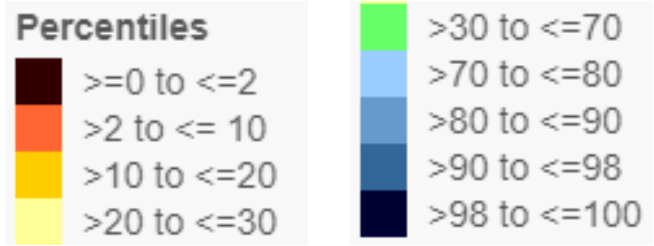
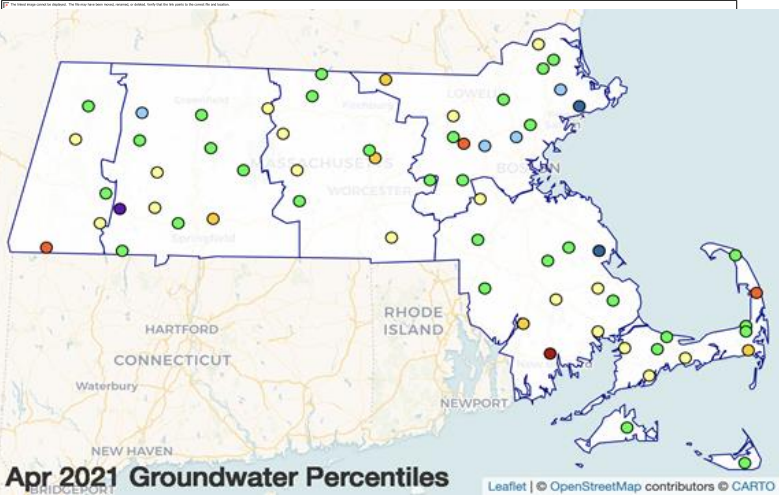
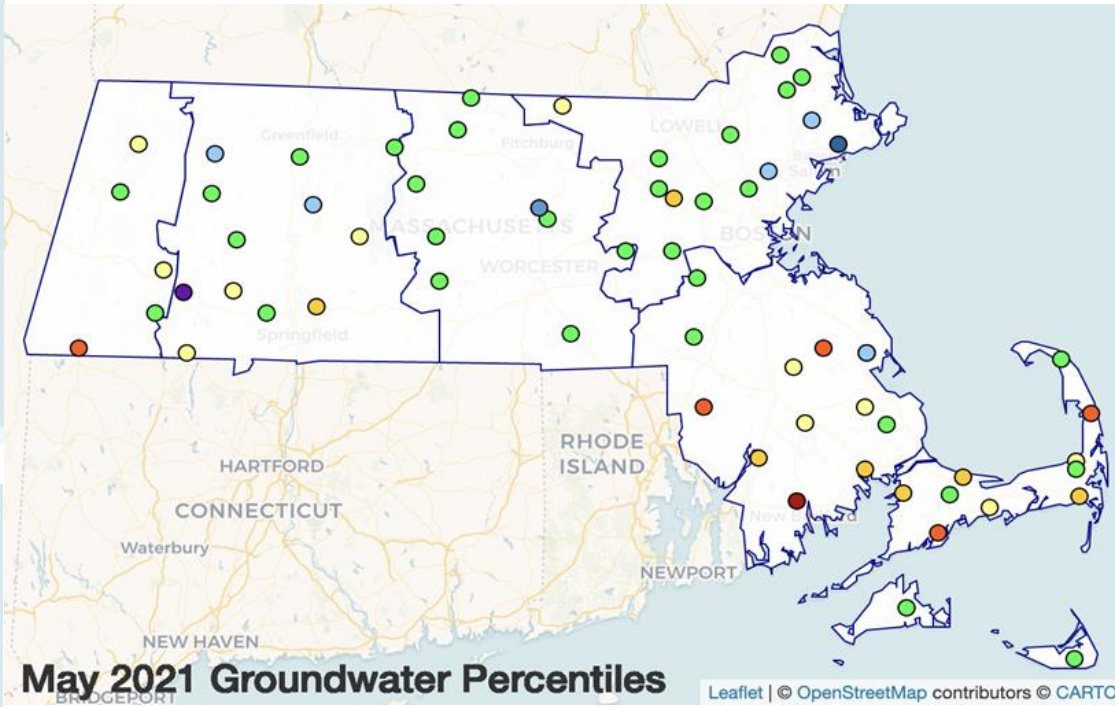
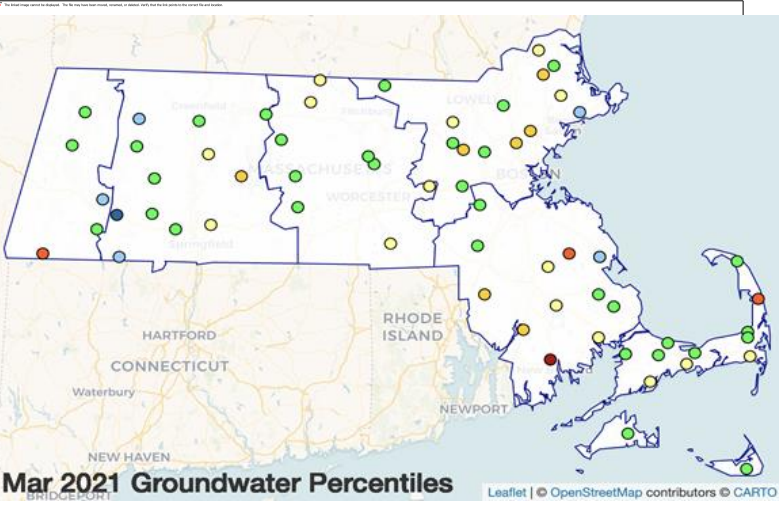
- March
 - Central & Northeast at Level 1
 - Southeast at Level 2
- April
 - Northeast Level 1
 - Western, CT River Valley, Central at Level 2

REGION	TOTAL GAGES REPORTING FOR MAY	≥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	0	65
CT RIVER VALLEY	15	0	0	2	3	0	59
CENTRAL	11	0	0	0	0	0	62
NORTHEAST	13	0	0	0	1	0	58
SOUTHEAST	12	0	0	0	1	0	39
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



Groundwater Index

- March: Southeast Region at Level 1
- April: Western Region at Level 1

REGION	TOTAL WELLS REPORTING FOR MAY	≥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	2	0	28
CT RIVER VALLEY	12	0	0	1	3	1	34
CENTRAL	9	0	0	0	0	0	46
NORTHEAST	14	0	0	1	1	1	56
SOUTHEAST	13	1	2	2	3	0	25
CAPE COD	10	0	2	3	2	0	21
ISLANDS	2	0	0	0	0	0	36

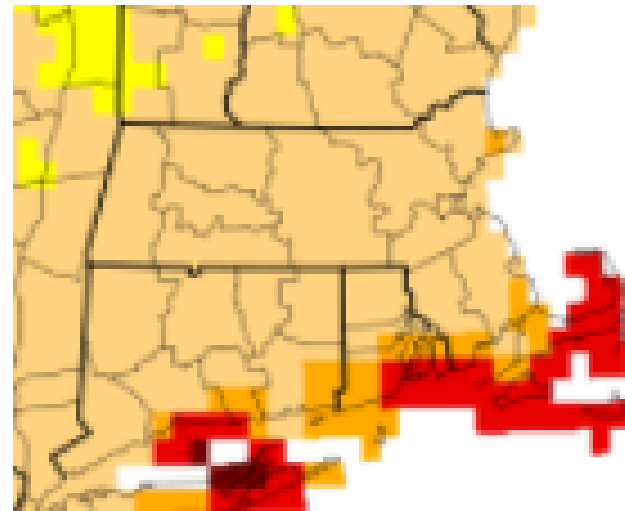
Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Evapotranspiration

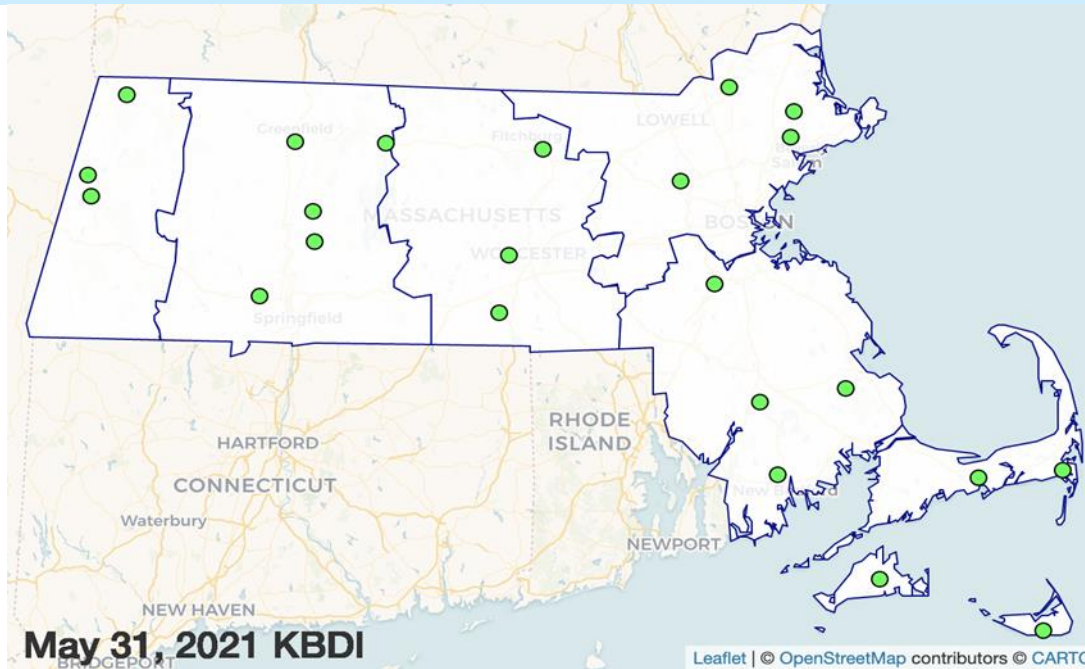
CMI ending May 29
ISL=0



EDDI
(index under consideration to replace CMI)



KBDI



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	26
CT RIVER VALLEY	5	50
CENTRAL	3	33
NORTHEAST	4	174
SOUTHEAST	4	0
CAPE COD	2	0
ISLANDS	2	0

Index Severity Levels

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

REGION	TOTAL REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	2	100% & 100%
CT RIVER VALLEY	2	62
CENTRAL	2	53
NORTHEAST	4	64
SOUTHEAST	1	69
CAPE COD	1	12

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 - April 2021

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation	Level 0	Level 1	Level 1	Level 0	Level 1	Level 1	Level 0
Streamflow	Level 2	Level 2	Level 2	Level 1	Level 0*	N/A	N/A
Groundwater	Level 1	Level 0	Level 0	Level 0	Level 0*	Level 0*	Level 0
Lakes/ Impoundments	Level 0	Level 0	Level 0	Level 0	Level 0	Level 3	N/A
Crop Moisture Index							
KBDI							
<i>Recommend 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>
<i>Effective 3/1 (4/10 meeting)</i>	<i>Level 1</i>	<i>Level 1</i>	<i>Level 1</i>	<i>Level 1</i>	<i>Level 2</i>	<i>Level 1</i>	<i>Level 0</i>

*Median of individual stations is at the 31st percentile.

Lakes & Impoundments Index does not reflect water supply status. KBDI and CMI are not calculated outside of fire and growing seasons. Conditions in all Major Basins were similar to their respective regions except as may be shown on following slides.

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 - 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 1/2</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