

Hydrologic Conditions in Massachusetts for June 2023

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DCR Office of Water Resources

Drought Management Task Force

July 6, 2023

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan Indices

Numbers in parentheses indicate number of data points across the state



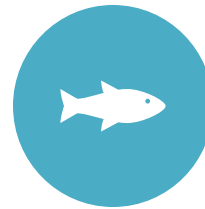
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(16)



Crop Moisture
(national map)

MA Drought Management Plan

Index Severity Levels

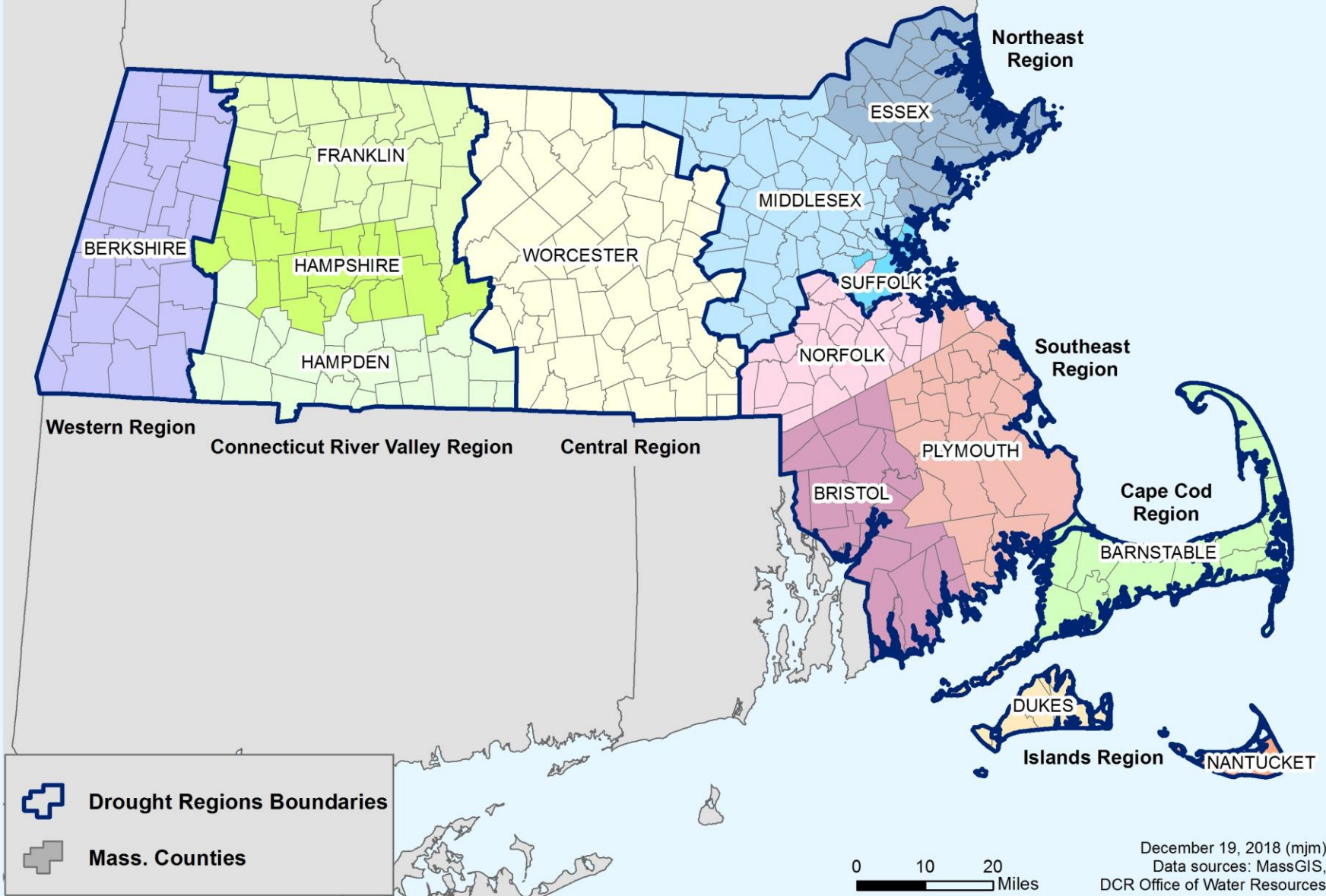
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 th percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0 and > -4.0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

MA Drought Management Plan

Drought Levels



MASSACHUSETTS DROUGHT REGIONS with Counties



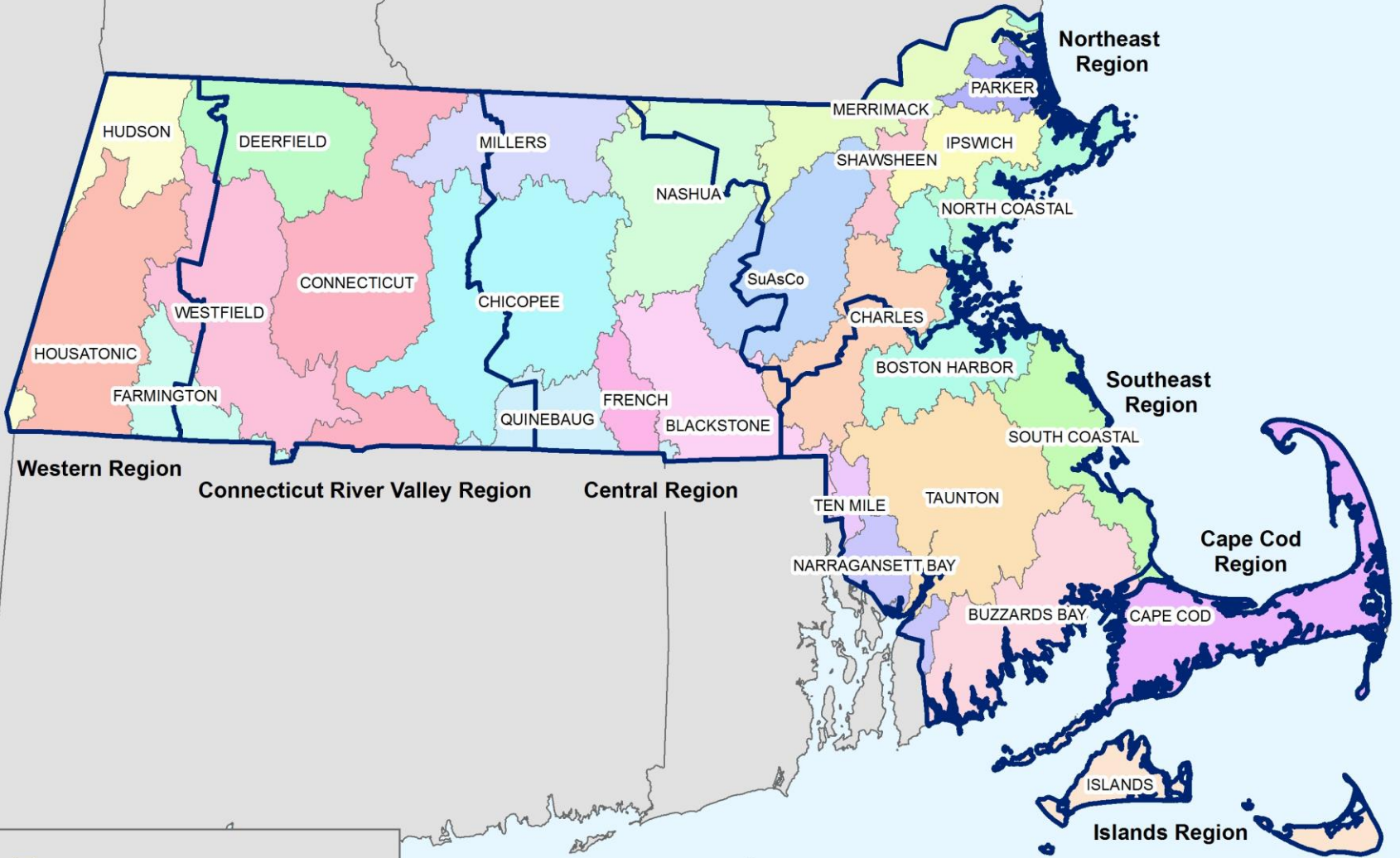
-  Drought Regions Boundaries
-  Mass. Counties

0 10 20
Miles

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

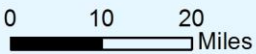


MASSACHUSETTS DROUGHT REGIONS with Watersheds



 **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



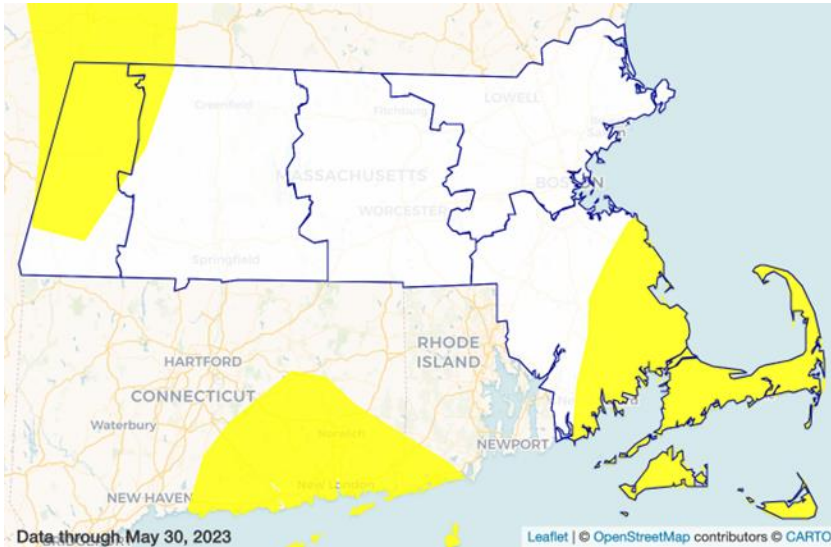
Public Health
Impacts

Recent Hydrologic History

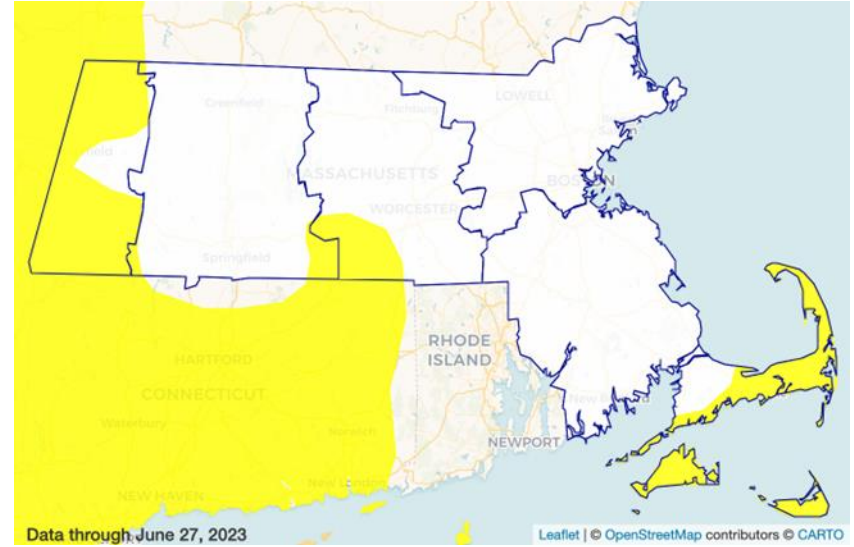
2023

- *February - April:*
 - variable precipitation across months and across the state
 - some above-normal temperatures including multiple heat waves
 - fluctuating impacts on streamflow and groundwater
- *May:*
 - Continue variable conditions across the state
 - Western and Cape Cod regions declared at Level 1 drought
- *June:*
 - Above-normal precipitation throughout much of the state
 - Mostly normal to below-normal temperatures
 - Much improved streamflow in the later part of the month
 - Lingering impacts on groundwater

US Drought Monitor



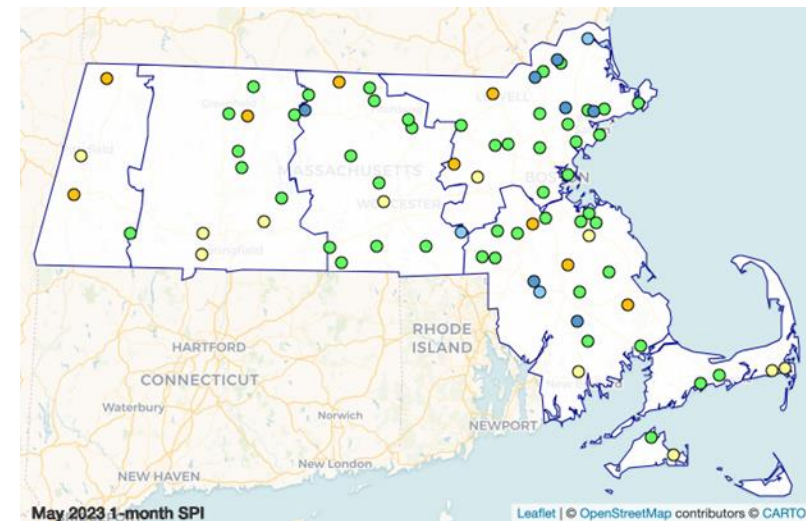
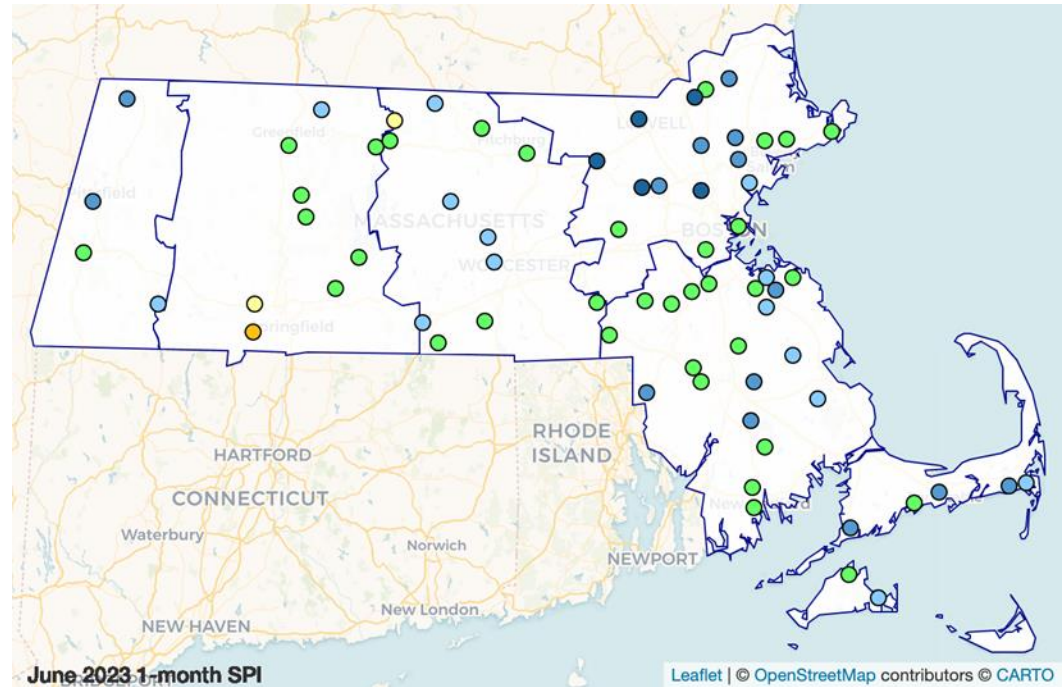
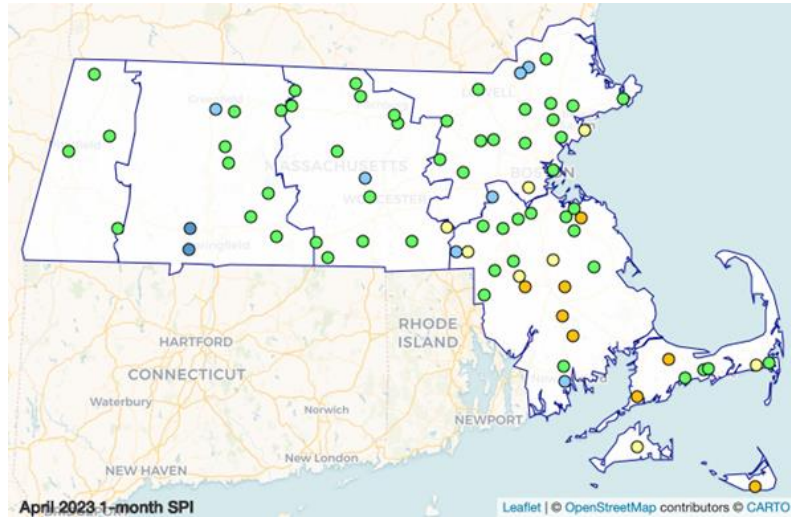
Data through May 30, 2023



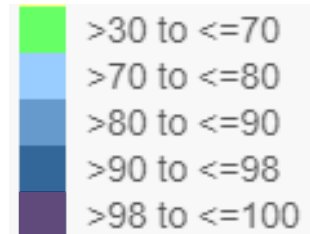
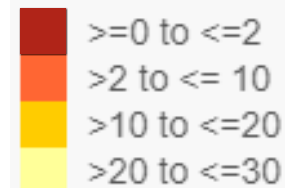
Data through June 27, 2023

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

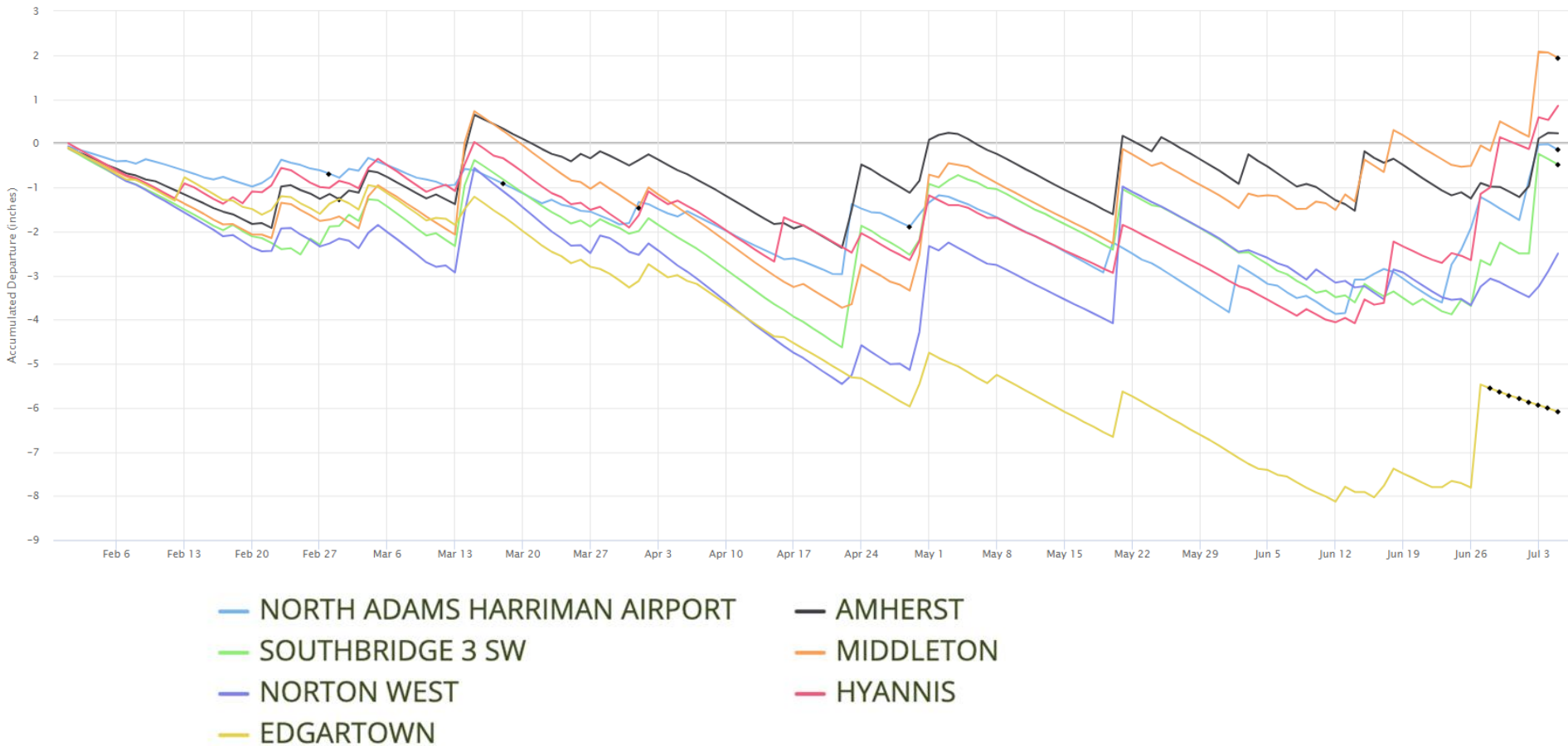
Standardized Precipitation Index



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.

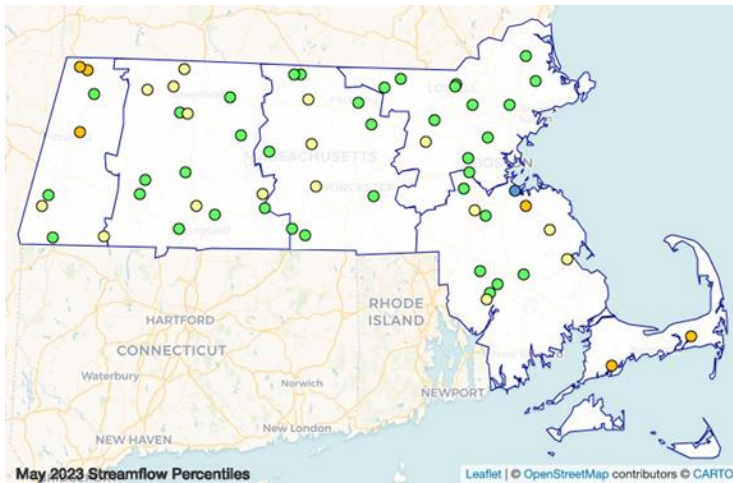
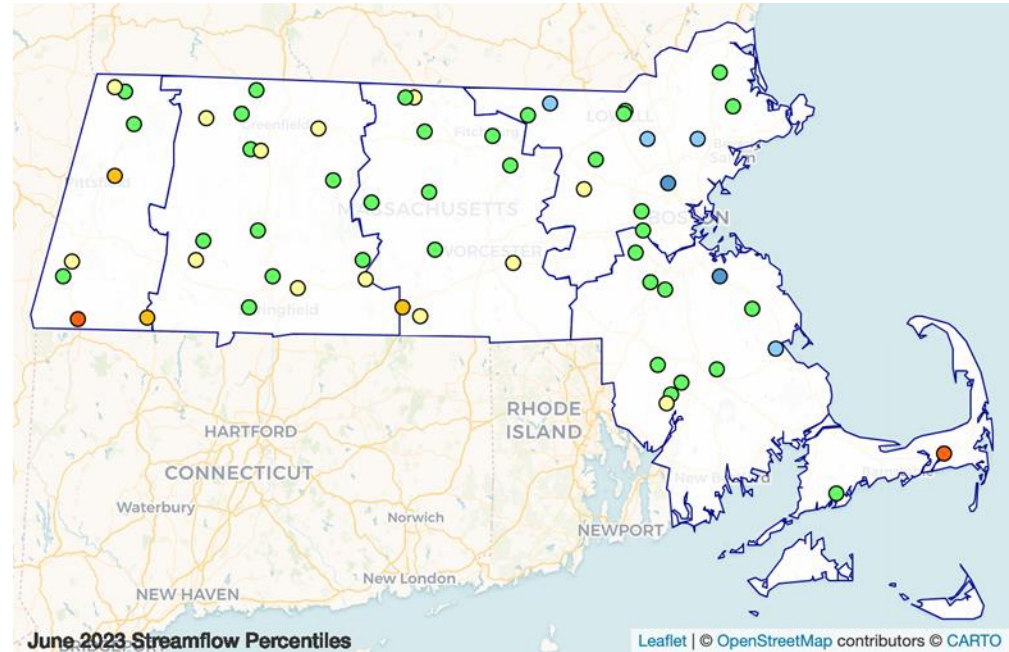
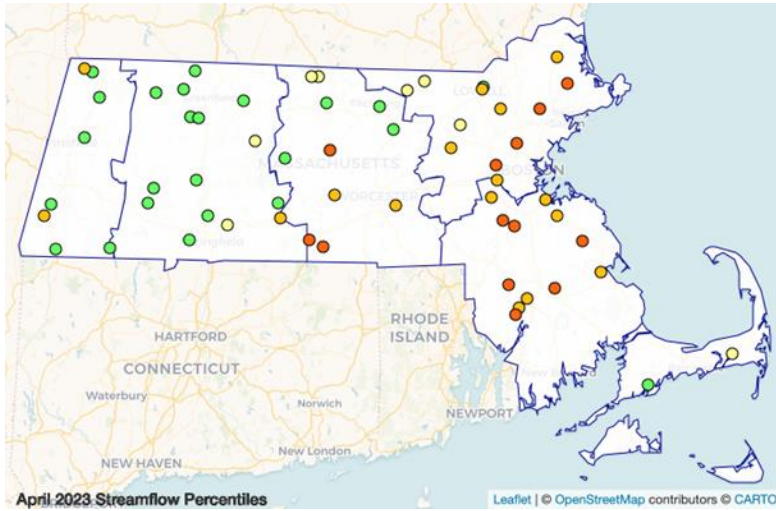
Standardized Precipitation Index as Percentile, June

REGION	NUMBER OF SITES	1-mo *	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo *
WESTERN	4	79	59	60	63	72	57	88	75
CTRV	9	47	45	42	67	69	65	83	72
CENTRAL	12	66	53	56	69	76	67	91	82
NORTHEAST	18	85	77	68	77	68	48	73	71
SOUTHEAST	21	68	50	46	61	64	59	72	61
CAPE COD	5	81	59	55	79	88	69	81	62
ISLANDS	2	73	56	34	63	68	44	32	14

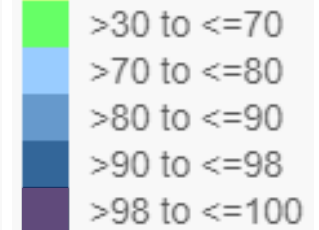
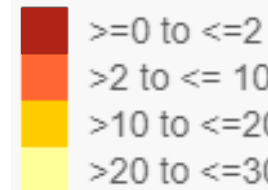
* 1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

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

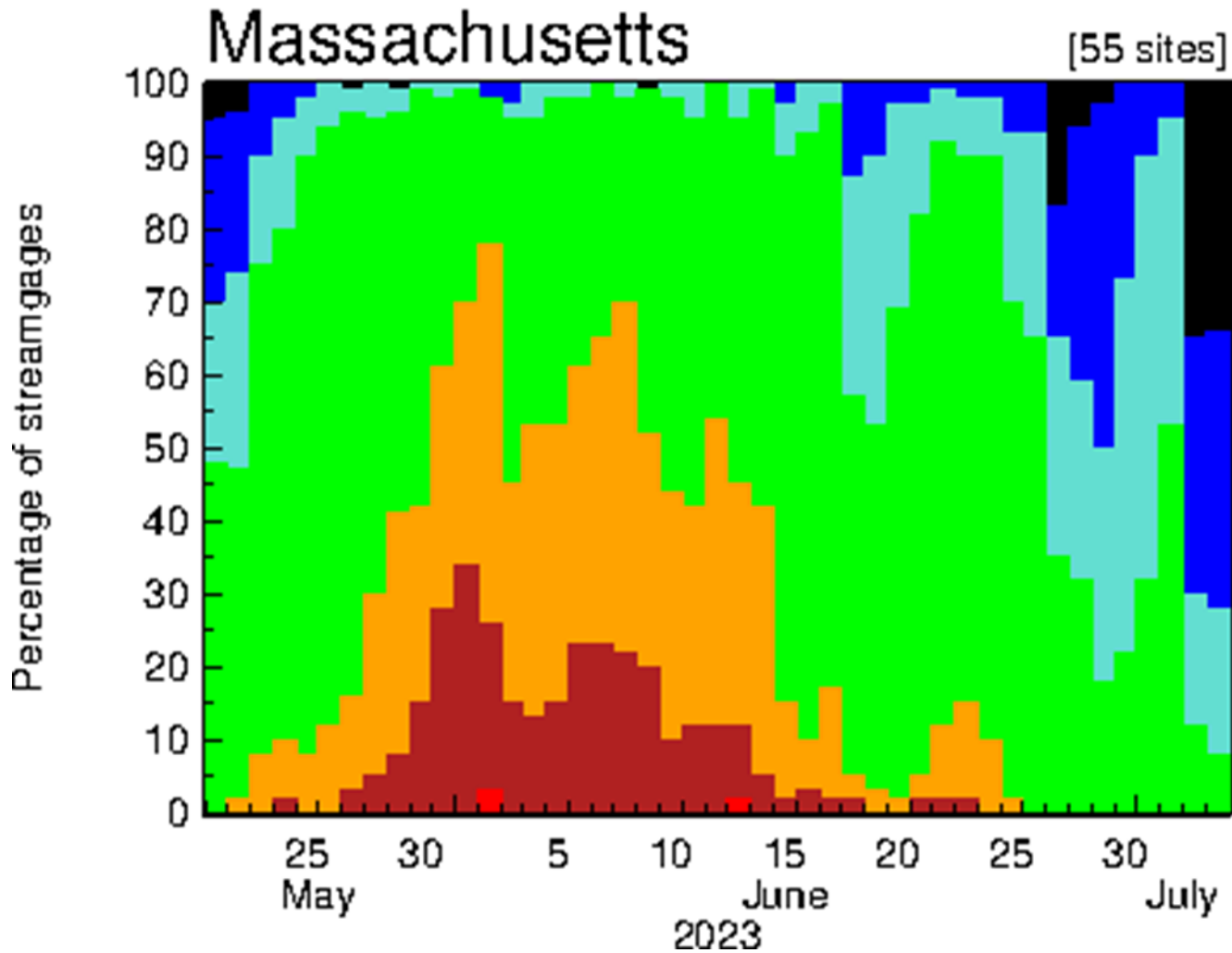
Streamflow Percentiles of Monthly Median



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		

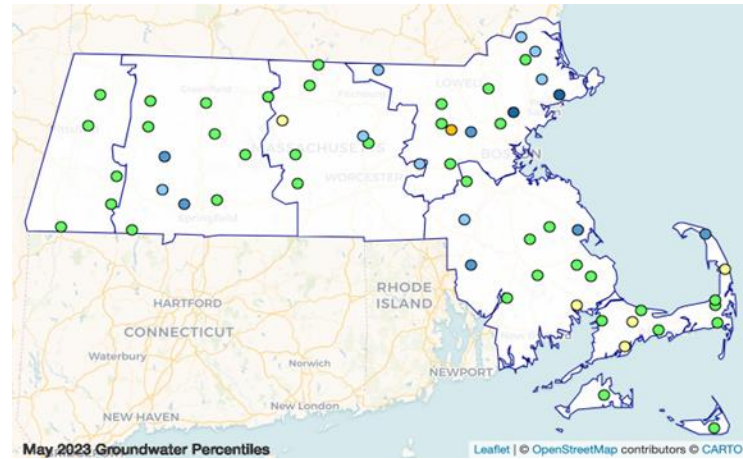
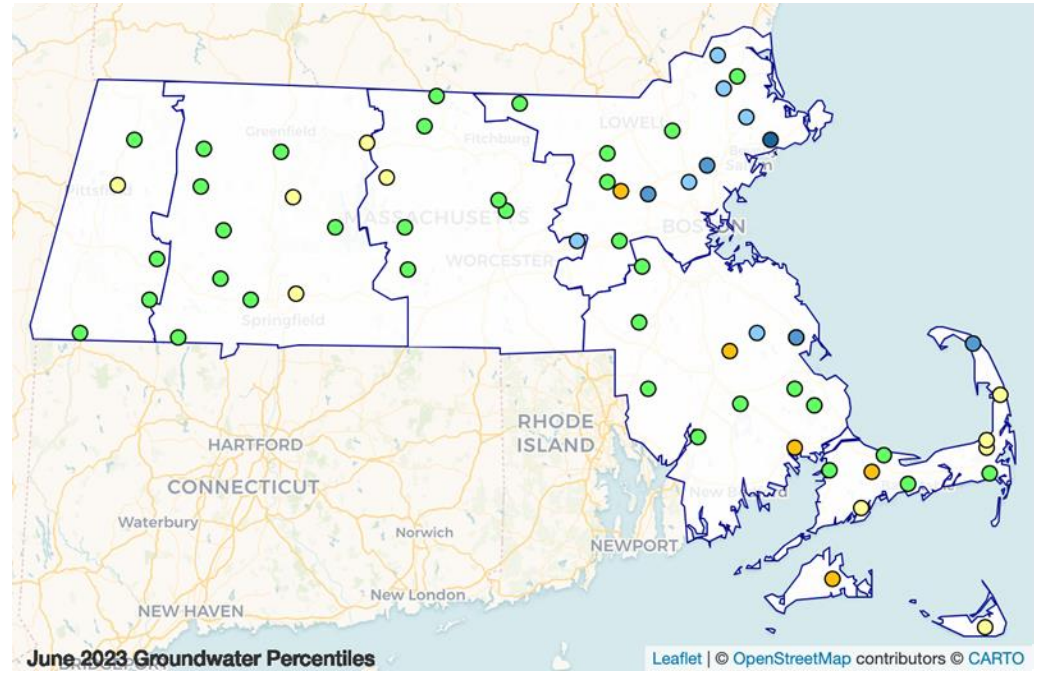
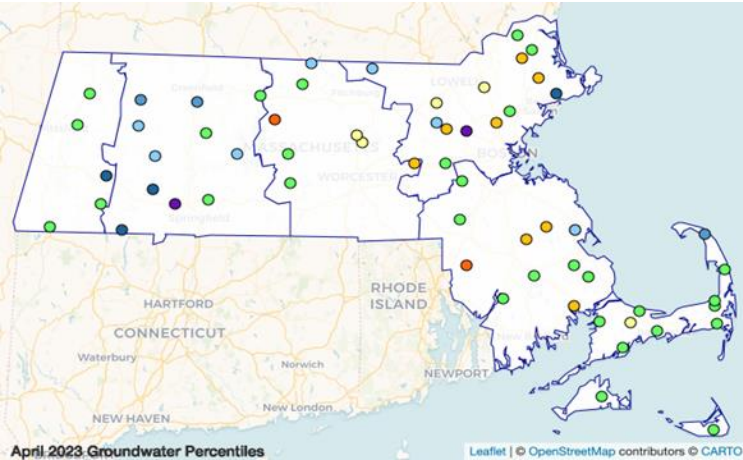
Streamflow Index June

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	2	2	0	23
CTRV	15	0	0	0	6	0	34
CENTRAL	11	0	0	1	3	0	51
NORTHEAST	13	0	0	0	1	0	57
SOUTHEAST	11	0	0	0	1	0	49
CAPE COD	2	0	1	0	0	0	21

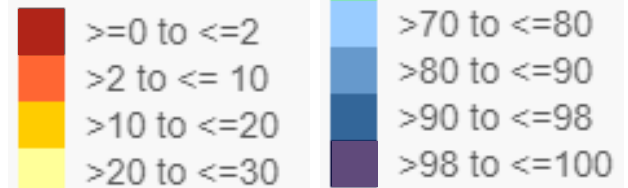
Notes: Not all gages report in all months due to ice, beaver dams or other conditions. The Islands region does not have any streamflow gages.

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

Groundwater Percentiles



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	0	1	0	39
CTRV	11	0	0	0	3	0	49
CENTRAL	8	0	0	0	1	0	48
NORTHEAST	14	0	0	1	0	1	70
SOUTHEAST	12	0	0	2	0	0	46
CAPE COD	10	0	0	1	4	0	31
ISLANDS	2	0	0	1	1	0	23

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

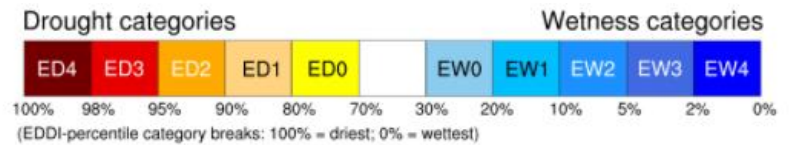
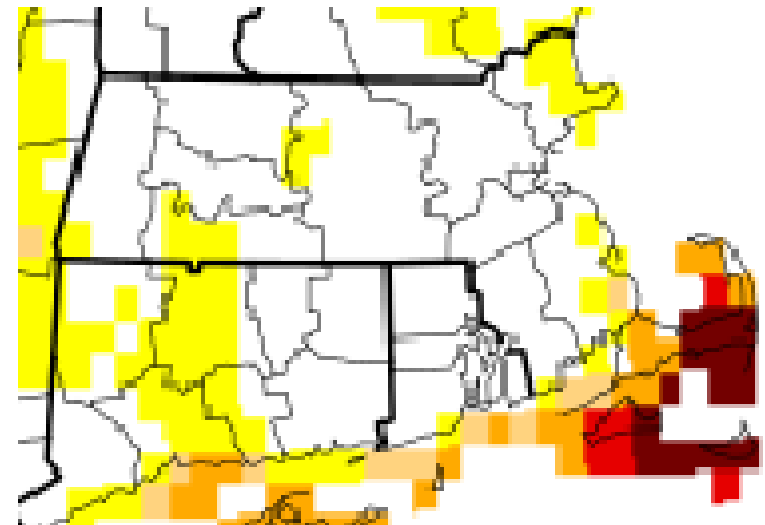
Evapotranspiration

CMI week ending June 24th

CLIMATE DIVISION	CROP MOISTURE INDEX
WESTERN	-0.01
CENTRAL	0.05
COASTAL	0.17

2-month EDDI*

Map dated June 30th

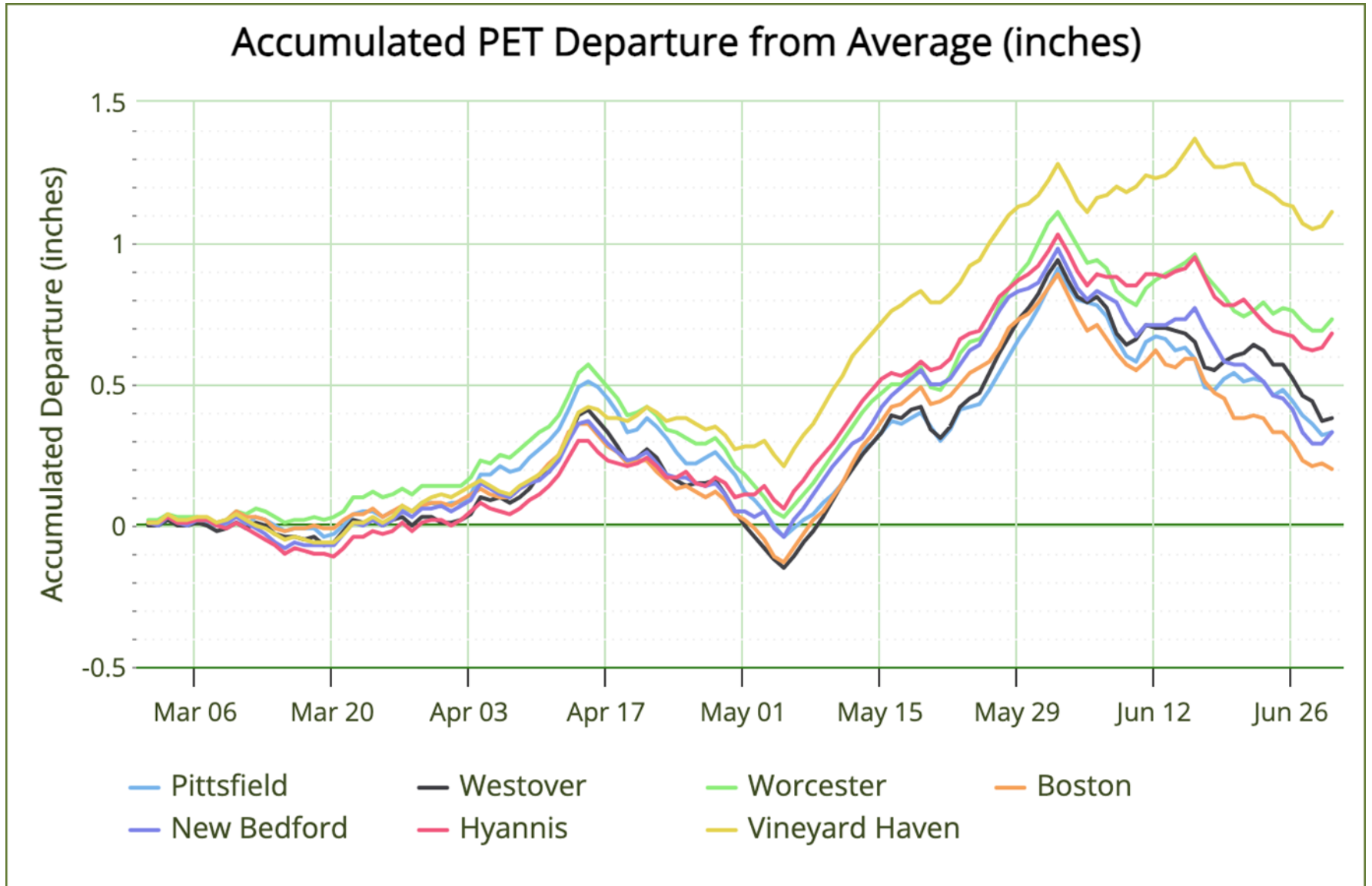


Generated by NOAA/ESRL/Physical Sciences Laboratory

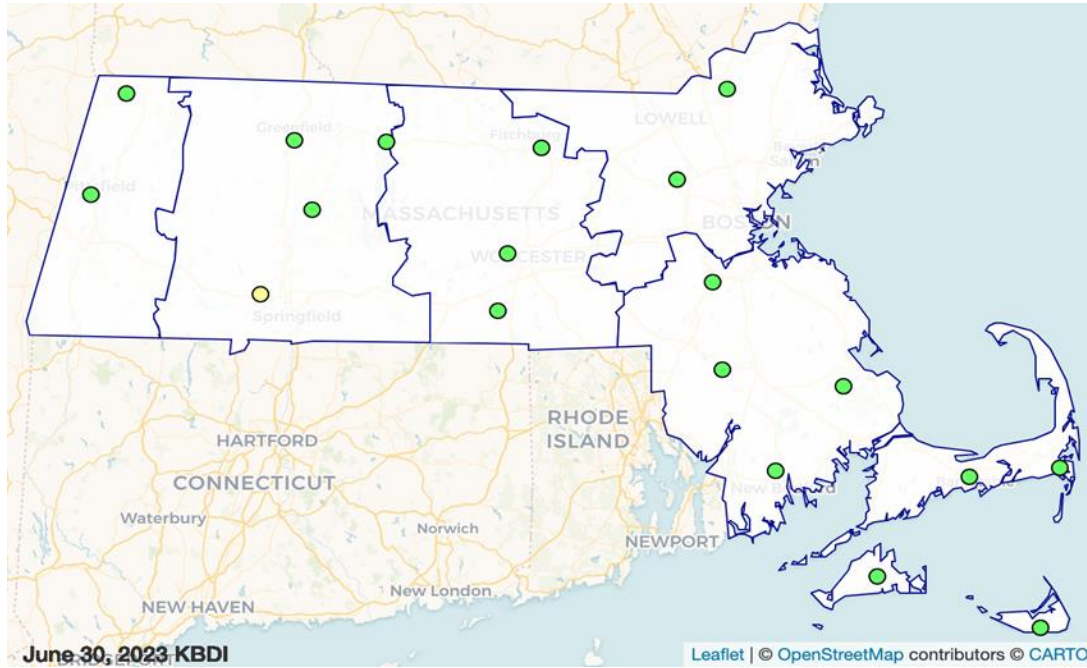
*See warning regarding the potential for EDDI to be showing higher values than observed data. <https://psl.noaa.gov/eddi/warn.html>

Accumulated Potential Evapotranspiration Departure from 30-Year Average in inches

Accumulated Potential Evapotranspiration Departure from Average (Inches) since March 1, 2023



KBDI - Top 8 inches of soil moisture



Point Values - KBDI Range



REGION	NUMBER OF SITES REPORTING	HIGHEST OF SITE VALUES
WESTERN	2	35
CTRV	4	256
CENTRAL	3	58
NORTHEAST	2	28
SOUTHEAST	4	145
CAPE COD	2	33
ISLANDS	2	49

Index Severity Levels



Lakes & Impoundments

REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	1	99%
CTRV	1	94%
CENTRAL	3	84th
NORTHEAST	4	87th
SOUTHEAST	2	80th
CAPE COD	1	35th

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 2023

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (2 mos)	26	49	46	47	34	27	21
Streamflow	26	33	36	45	35	15	N/A
Groundwater	44	61	50	70	54	43	34
Lakes/ Impoundments	100%	70	64	35	52	16	N/A
ET*- CMI EDDI	0 3	0 3	0 3	0 3	0 3	0 4	0 4
KBDI**	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0

6/8 meeting	Level 1	Level 0	Level 0	Level 0	Level 0	Level 1	Level 0

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. N/A = not applicable. ID = insufficient data. *ET not reported, Nov-Mar, outside growing season
 **KBDI not reported, Nov-Mar, outside fire danger season.

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

Drought Indices by Region, June 2023

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (3 mos)	60	42	56	68	46	55	34
Streamflow	23	34	51	57	49	21	N/A
Groundwater	39	49	48	70	46	31	23
Lakes/ Impoundments	99%	94%	84	87	80	35	N/A
ET*- CMI EDDI	0 0	0 0	0 0	0 0	0 0	0 4	0 4
KBDI**	Level 0	Level 1	Level 0	Level 0	Level 0	Level 0	Level 0

<i>Recommend (7/6 meeting)</i>	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0
6/8 meeting	Level 1	Level 0	Level 0	Level 0	Level 0	Level 1	Level 0

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. N/A = not applicable. ID = insufficient data. *ET not reported, Nov-Mar, outside growing season
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Drought Levels				
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