

# Hydrologic Conditions in Massachusetts for August 2022

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DCR Office of Water Resources

## **Drought Management Task Force**

September 7, 2022

Meeting Co-Chairs: EOEEA, MEMA



# MA Drought Management Plan Indices

Numbers in parentheses indicate number of data points across the state



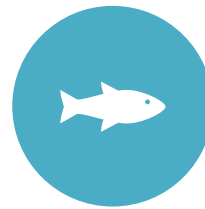
Precipitation (93)



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

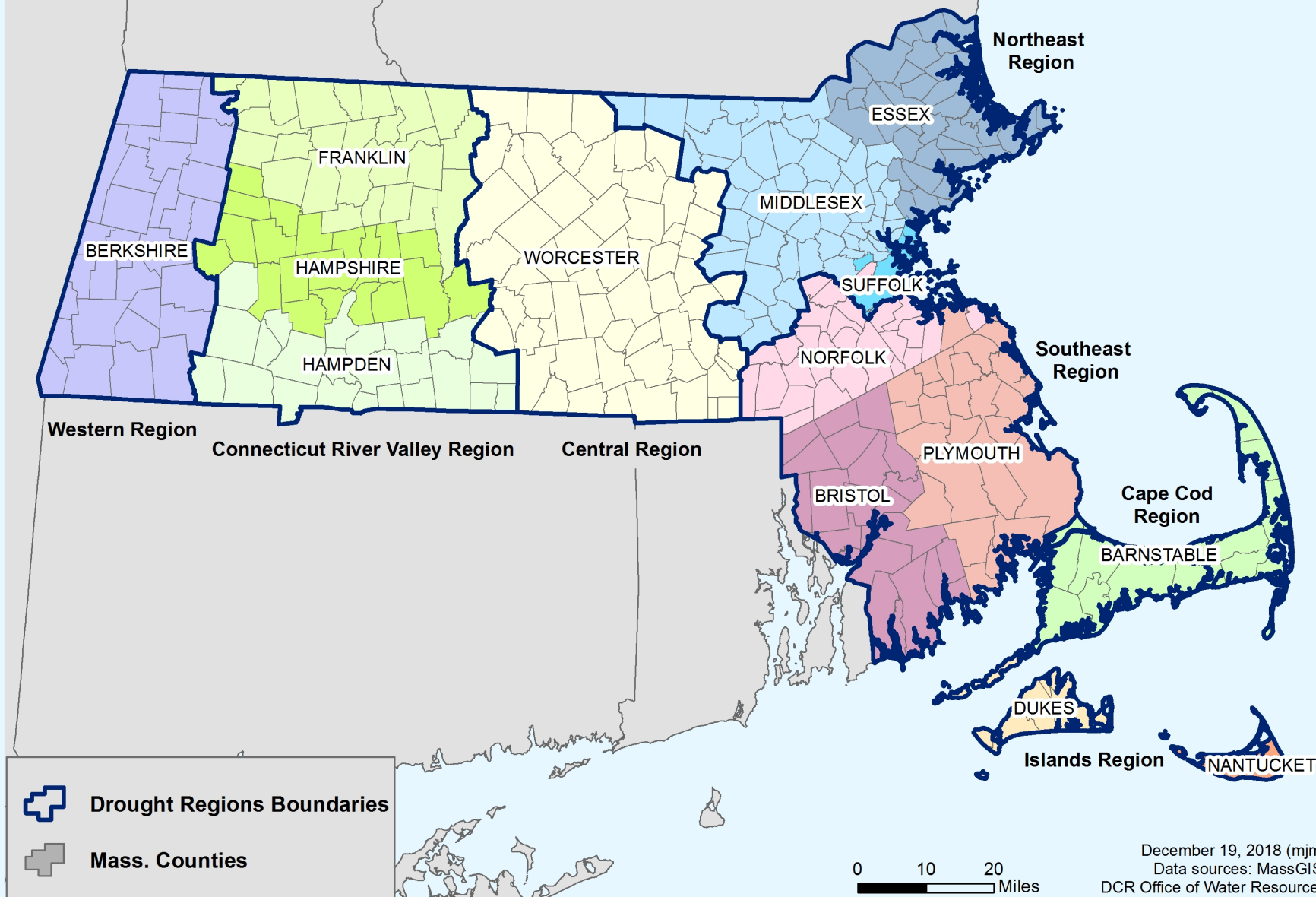
# MA Drought Management Plan

## Drought Levels



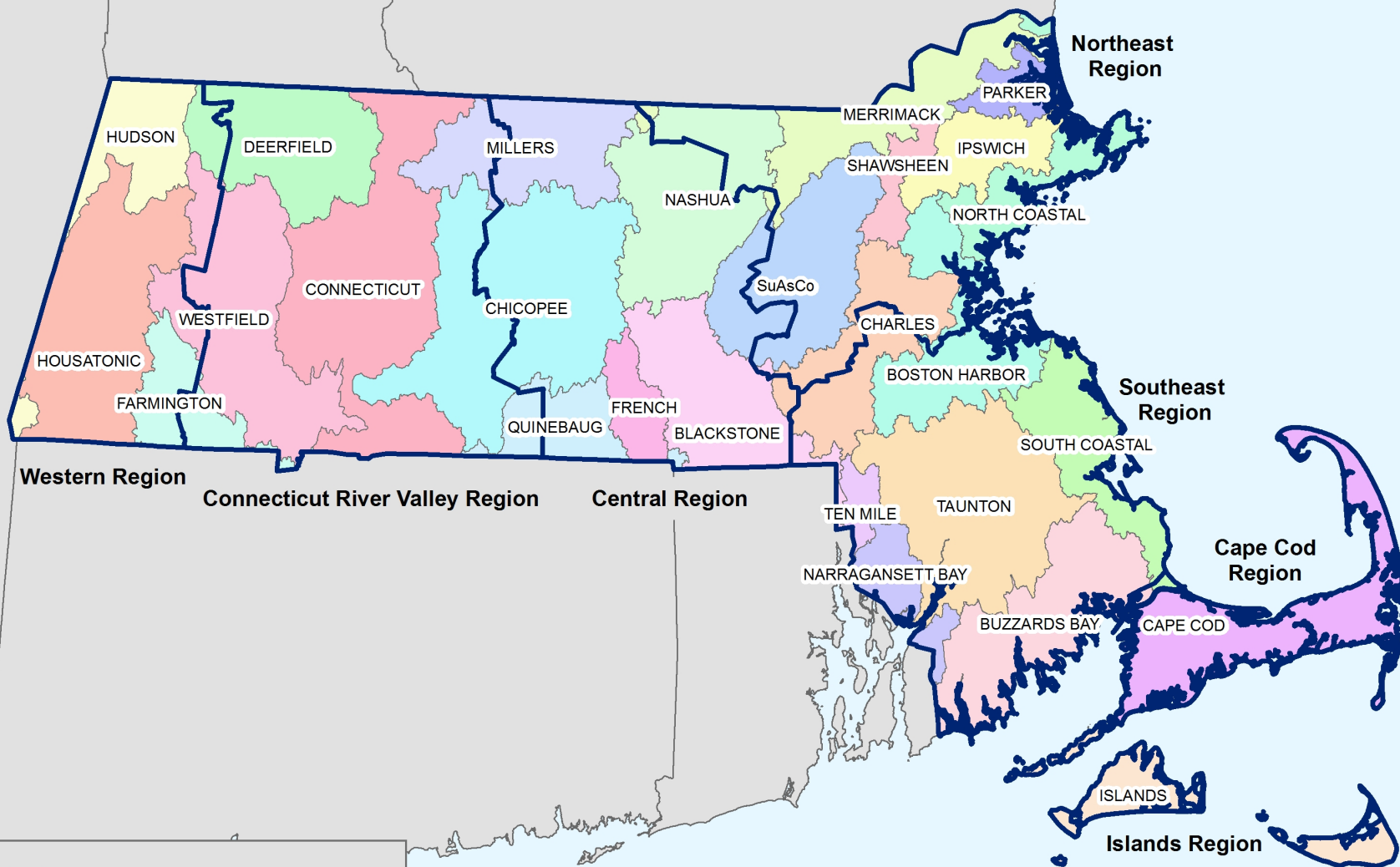


# MASSACHUSETTS DROUGHT REGIONS with Counties





# 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



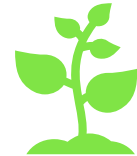
Weather &  
Forecast



Water Supply  
Impacts



Environmental  
Impacts



Agricultural  
Impacts



Fire Danger



Engineering/  
Infrastructure  
Impacts

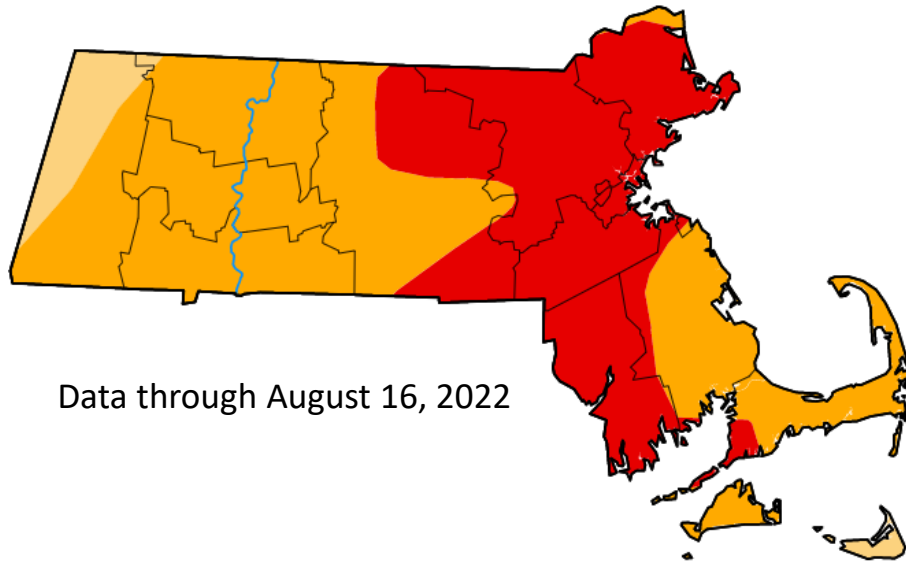


Public Health  
Impacts

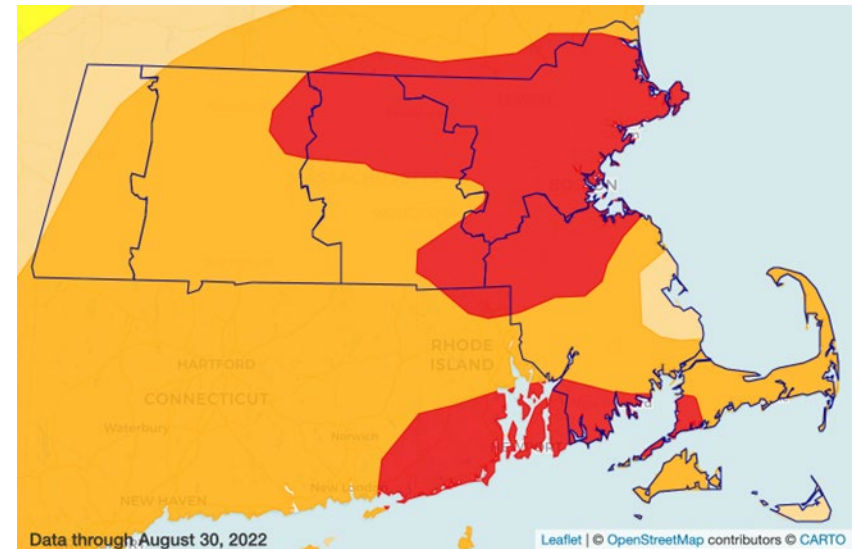
# Recent Hydrologic History

- 2022
  - *January through April*
    - variable precipitation with scattered, minimal impacts until April when first drought levels called
  - *May*
    - continued low precipitation plus increased ET especially in NE and SE
    - likely flash drought in NE with 2 category jump
  - *June through August*
    - minimal precipitation with high temperatures
    - storms in late August brought limited improvement to parts of the Southeast Region







# US Drought Monitor



Data through August 16, 2022

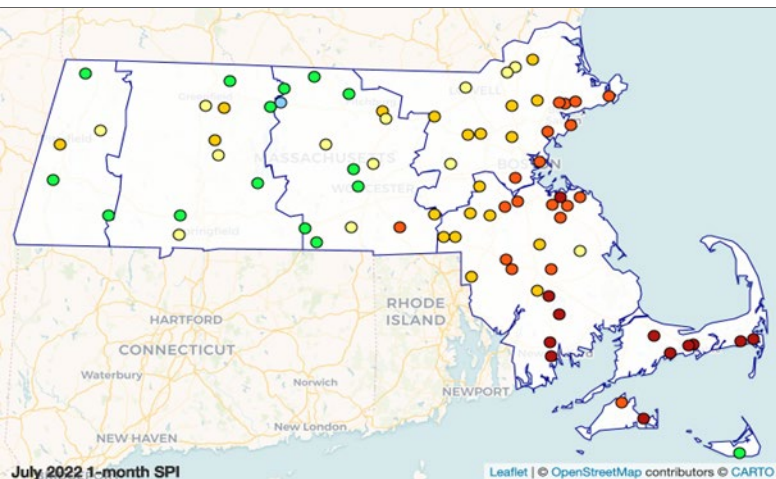
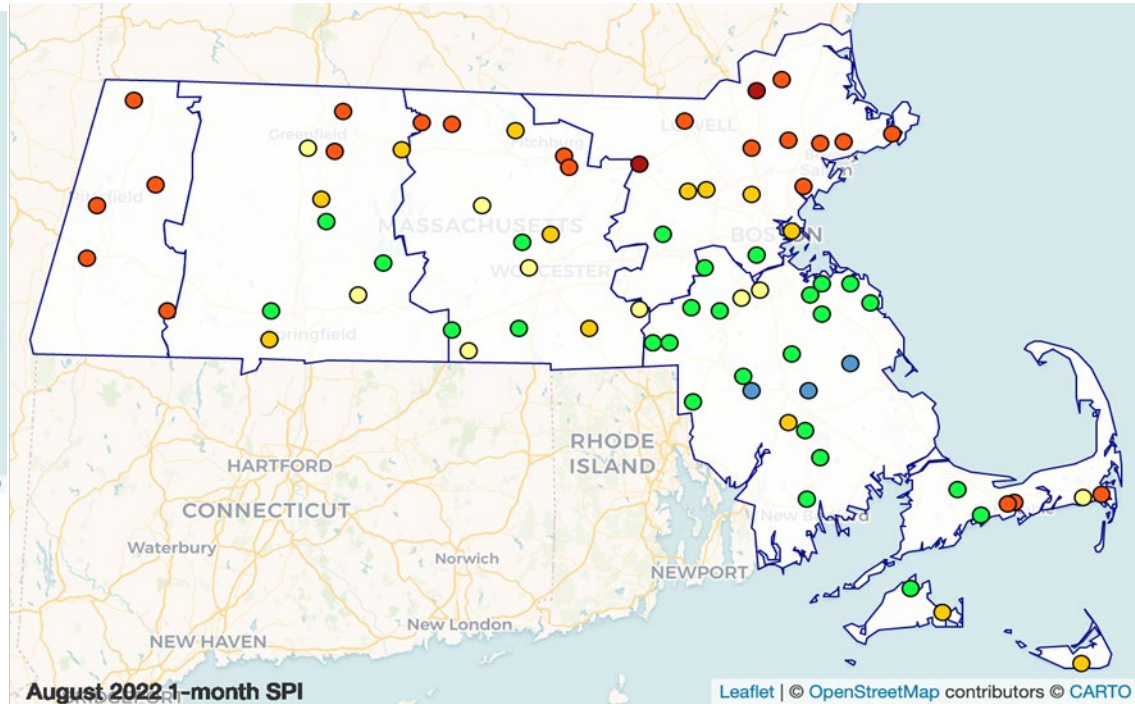
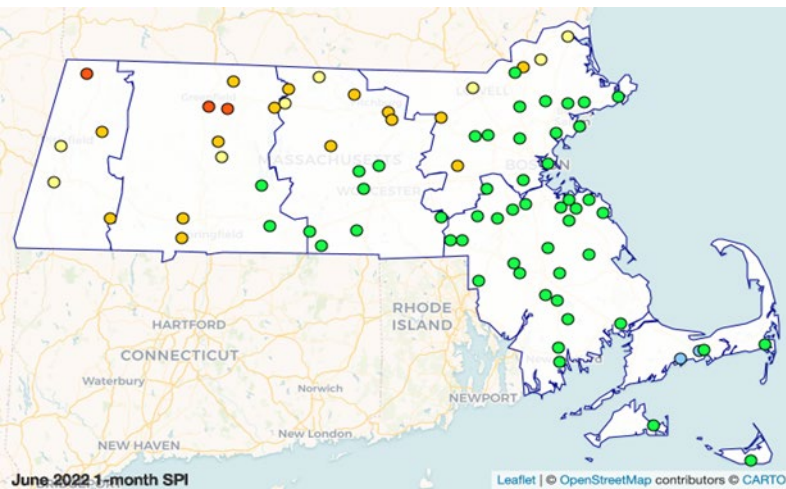


Data through August 30, 2022





	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

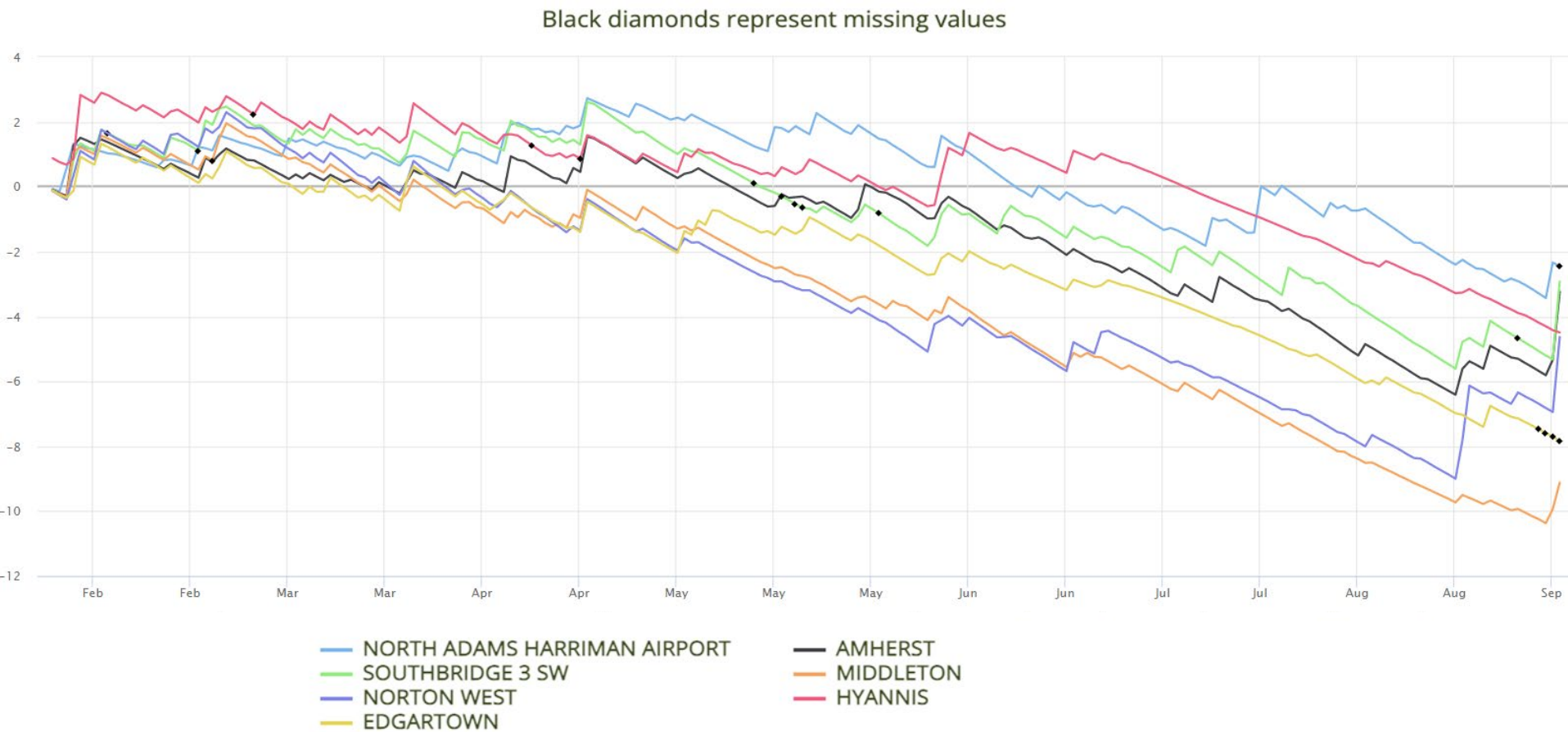


## Percentiles

  $\geq 0$  to  $\leq 2$   
  $> 2$  to  $\leq 10$   
  $> 10$  to  $\leq 20$   
  $> 20$  to  $\leq 30$

  $> 30$  to  $\leq 70$   
  $> 70$  to  $\leq 80$   
  $> 80$  to  $\leq 90$   
  $> 90$  to  $\leq 98$   
  $> 98$  to  $\leq 100$

# 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.

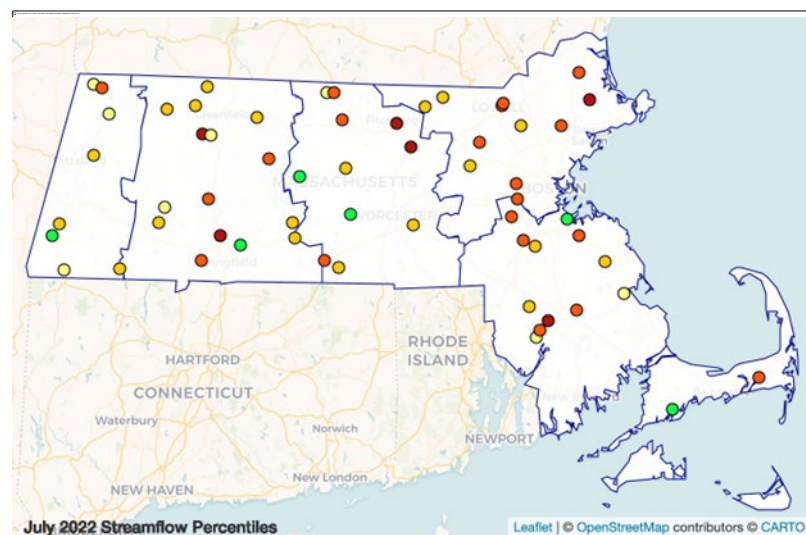
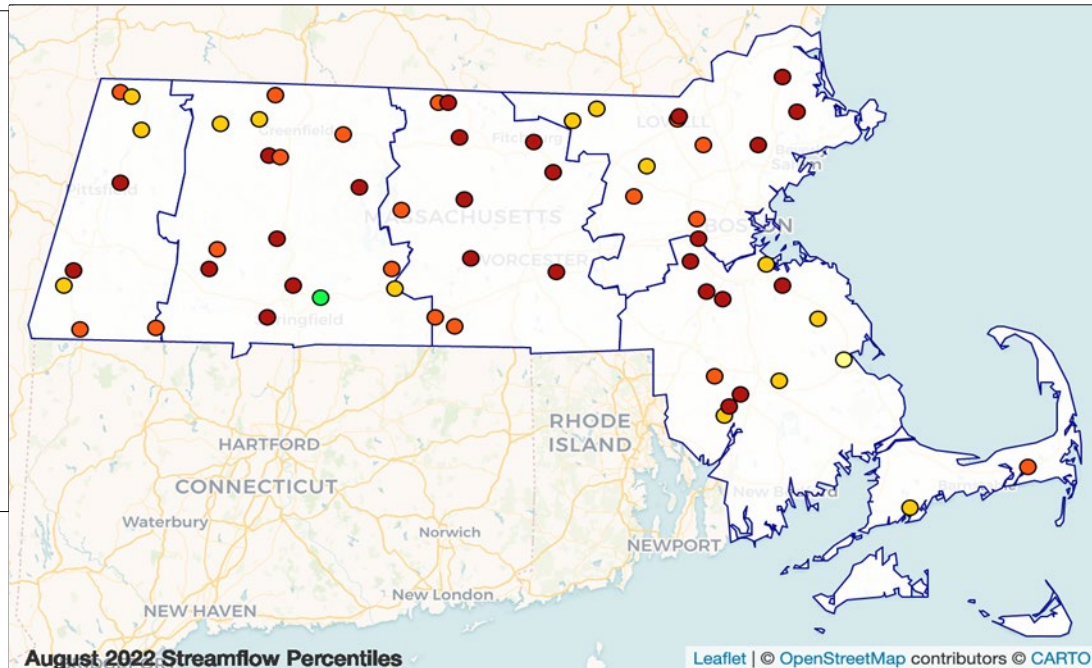
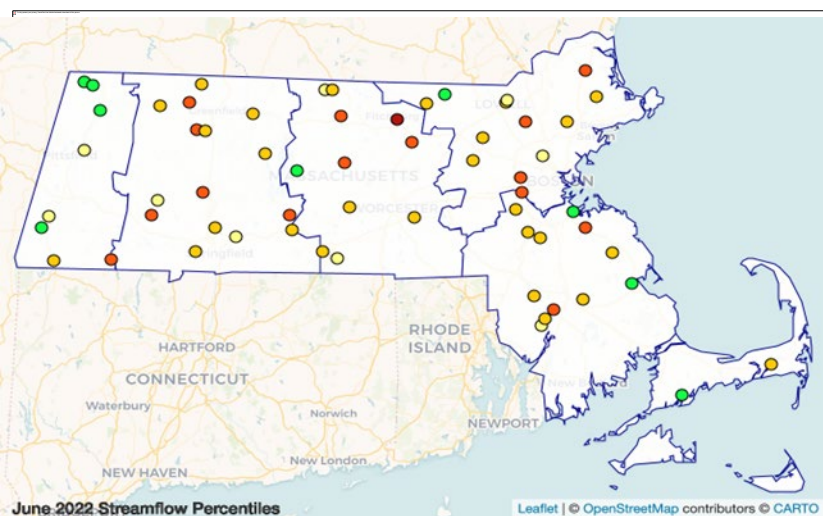
# Standardized Precipitation Index as Percentile, August

REGION	NUMBER OF SITES	1-mo *	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo*
WESTERN	5	7	14	7	17	21	53	78	69
CTRV	10	21	17	8	14	13	31	71	56
CENTRAL	14	20	21	11	9	20	44	71	69
NORTHEAST	16	10	3	6	3	5	24	73	68
SOUTHEAST	22	53	18	24	7	8	32	61	54
CAPE COD	6	18	2	15	8	11	64	46	26
ISLANDS	3	20	20	29	15	11	17	22	27

\* 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

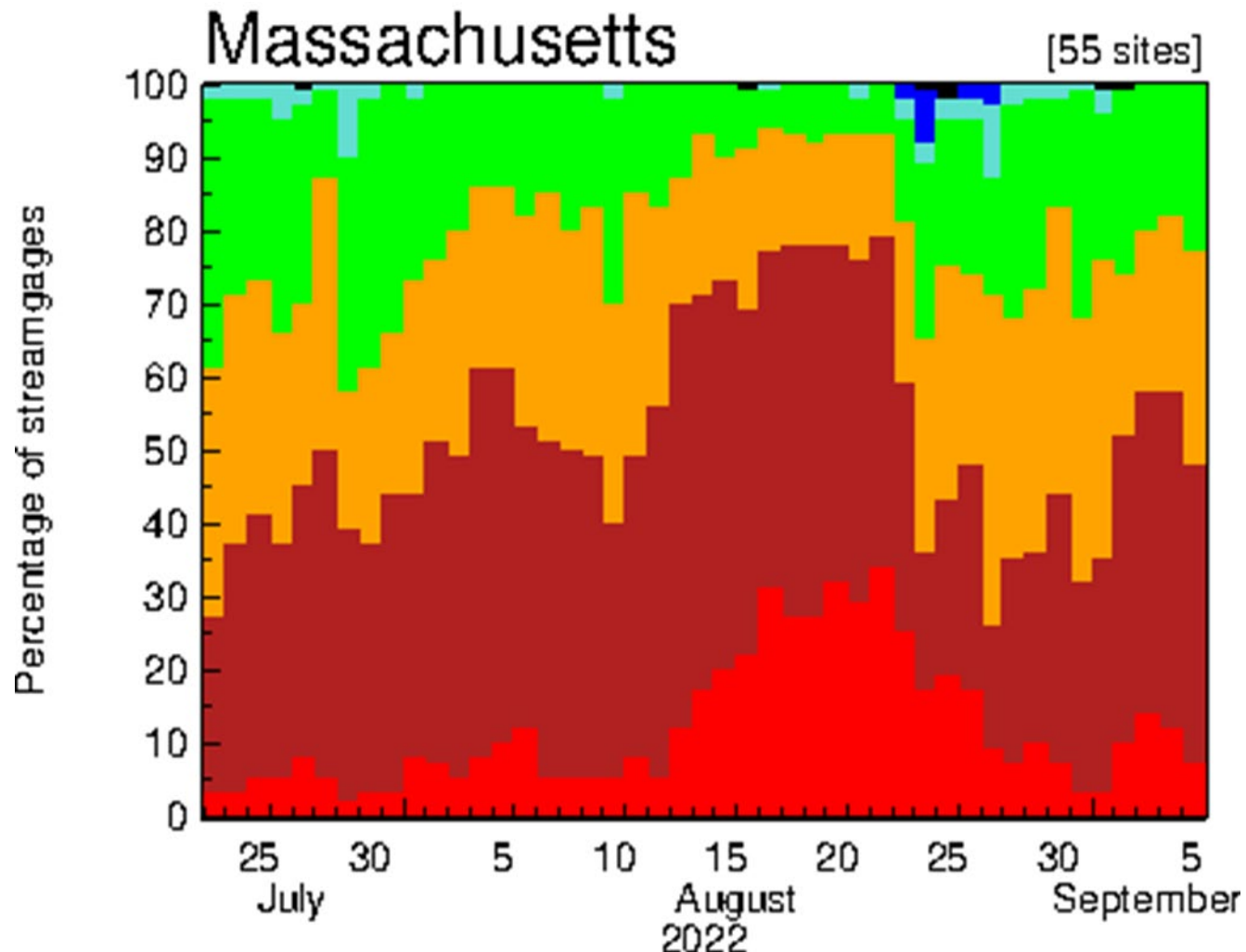


## Percentiles

>=0 to <=2
>2 to <= 10
>10 to <=20
>20 to <=30

>30 to <=70
>70 to <=80
>80 to <=90
>90 to <=98
>98 to <=100

# 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		

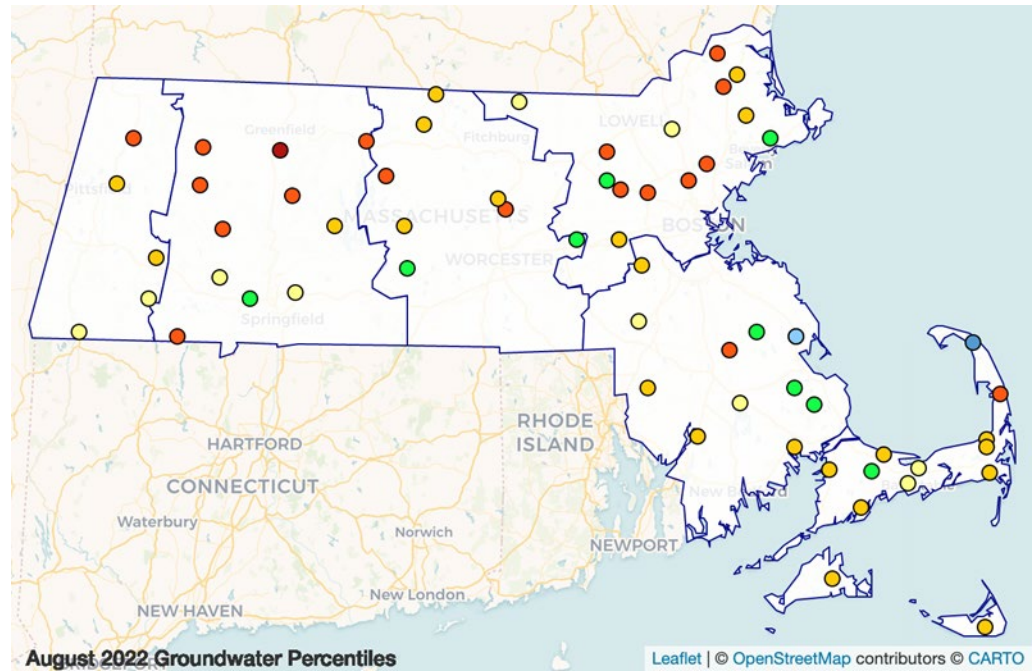
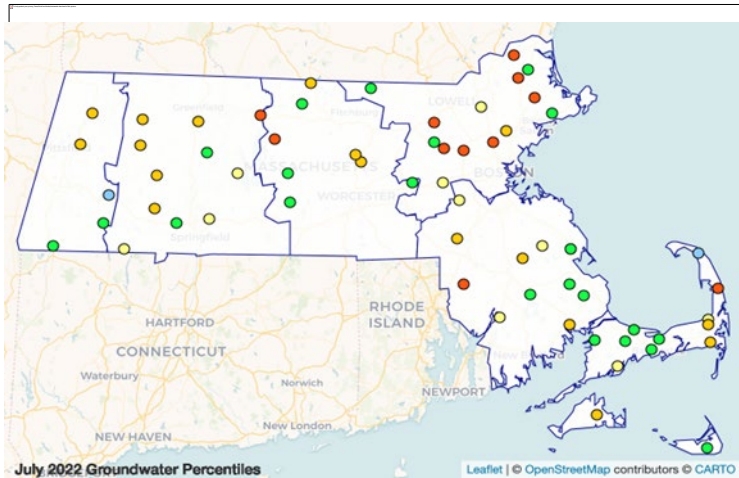
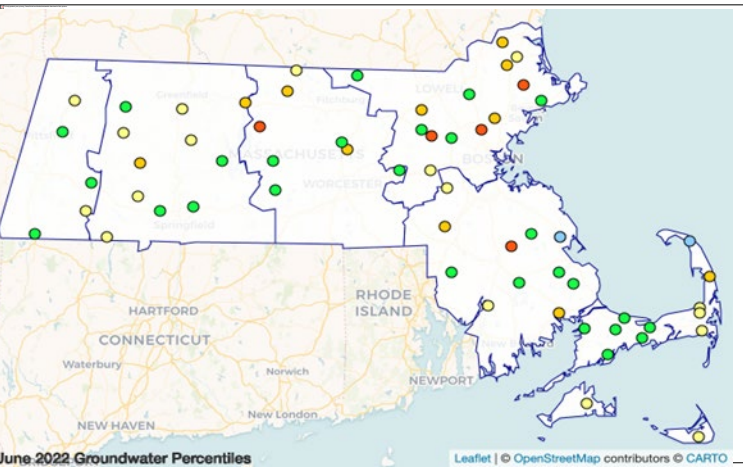
# Streamflow Index August

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	2	3	3	0	0	7
CTRV	15	6	5	3	0	0	4
CENTRAL	11	7	4	0	0	0	1
NORTHEAST	12	5	4	3	0	0	4
SOUTHEAST	12	6	1	4	1	0	2
CAPE COD	2	0	1	1	0	0	7

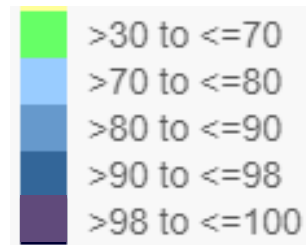
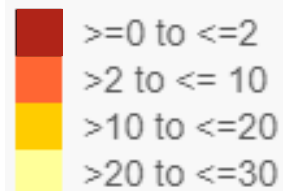
Notes: Not all gages report in all months due to ice, beaver dams or other conditions. The Islands region does not have any streamflow gages.

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	1	2	2	0	15
CTRV	11	1	6	1	2	0	5
CENTRAL	8	0	2	4	0	0	15
NORTHEAST	14	0	7	3	2	0	10
SOUTHEAST	12	0	1	4	2	0	27
CAPE COD	11	0	1	6	2	0	19
ISLANDS	2	0	0	2	0	0	16

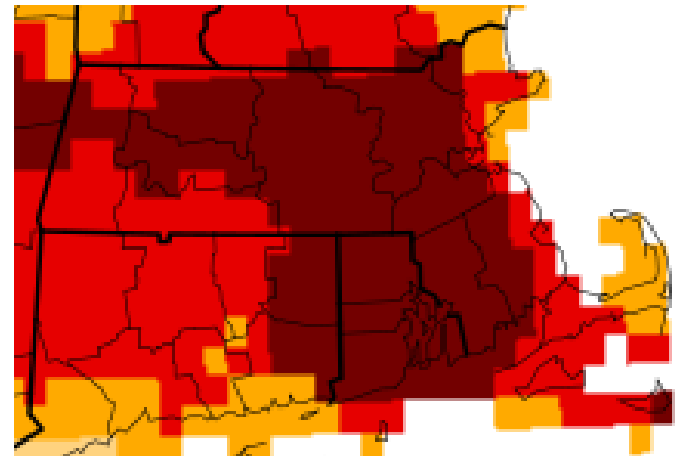
Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

# Evapotranspiration

CMI week ending August 27th

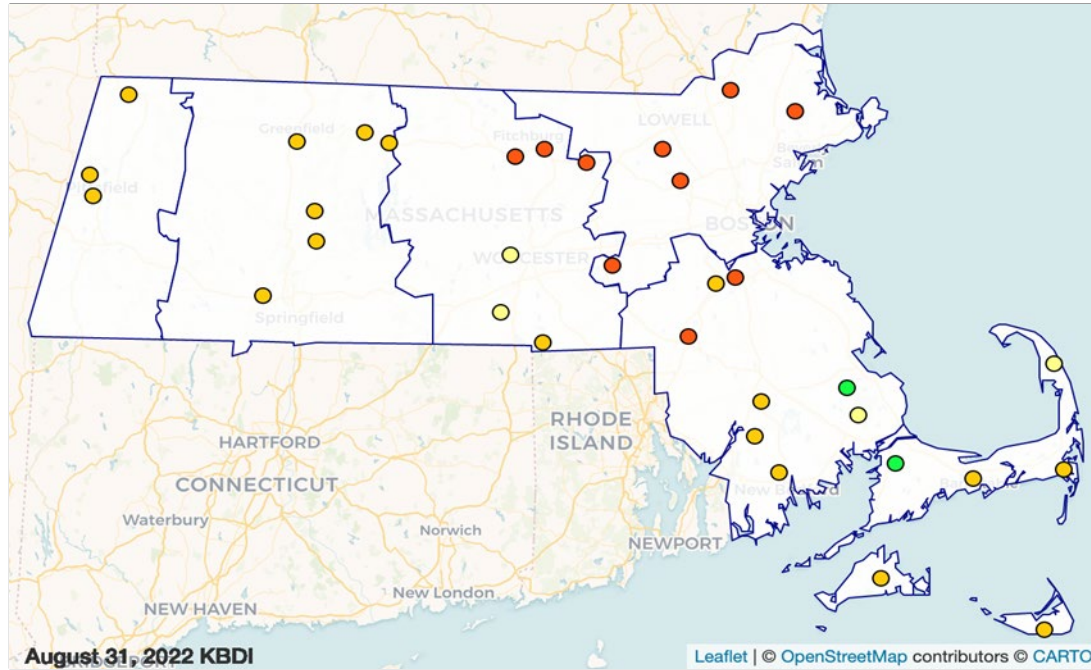


2-month EDDI  
Map dated August 29th



Generated by NOAA/ESRL/Physical Sciences Laboratory

# KBDI - Top 8 inches of soil moisture



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	528
CTRV	6	493
CENTRAL	6	692
NORTHEAST	5	692
SOUTHEAST	8	609
CAPE COD	4	561
ISLANDS	2	503

Index Severity Levels

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

REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	0	
CTRV	2	16th
CENTRAL	4	29th
NORTHEAST	6	9th
SOUTHEAST	2	22nd
CAPE COD	1	25th

## Notes:

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

The Central Region now has one additional reservoir reporting (Horse Pond in North Brookfield).

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

# Drought Indices by Region, mid-August 2022

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (60 day)	10	9	10	6	9	3	14
Streamflow	17	10	5	3	2	10	N/A
Groundwater	21	12	24	16	28	28	18
Lakes/ Impoundments	ID	ID	ID	ID	ID	ID	N/A
ET- CMI   EDDI	Level 1   3	Level 2   3	Level 2   3	Level 2   3	Level 2   4	Level 2   3	Level 2   4
KBDI	Level 2	Level 2	Level 3	Level 3	Level 3	Level 2	Level 2

<b>Recommend 8/17 (8/23 meeting)</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 2</b>
<b>Effective 7/1 (8/8 meeting)</b>	<b>Level 1</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 2</b>	<b>Level 1</b>

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.

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

# Drought Indices by Region, August 2022

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (3 mos)	7	8	11	6	24	15	29
Streamflow	7	4	1	4	2	7	N/A
Groundwater	15	5	15	10	27	19	16
Lakes/ Impoundments	ID	16	29	9	22	25	N/A
ET- CMI   EDDI	Level 1   4	Level 1   4	Level 1   4	Level 1   4	Level 1   4	Level 1   3	Level 1   4
KBDI	Level 2	Level 2	Level 3	Level 3	Level 3	Level 2	Level 2

<b>Recommend for (9/7 meeting)</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 2</b>
<b>Declaration from 8/23 meeting</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 3</b>	<b>Level 2</b>

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Drought Levels				
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