

# Hydrologic Conditions in Massachusetts for November 2022

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DCR Office of Water Resources

## **Drought Management Task Force**

December 7, 2022

Meeting Co-Chairs: EOEEA, MEMA



# MA Drought Management Plan

## Indices

Numbers in parentheses indicate number of data points across the state



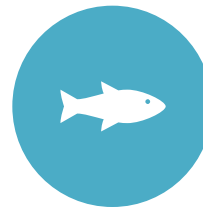
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and  
Impoundments (20)



KBDI - Fire Danger  
(16)



Crop Moisture  
(national map)

# MA Drought Management Plan

## Index Severity Levels

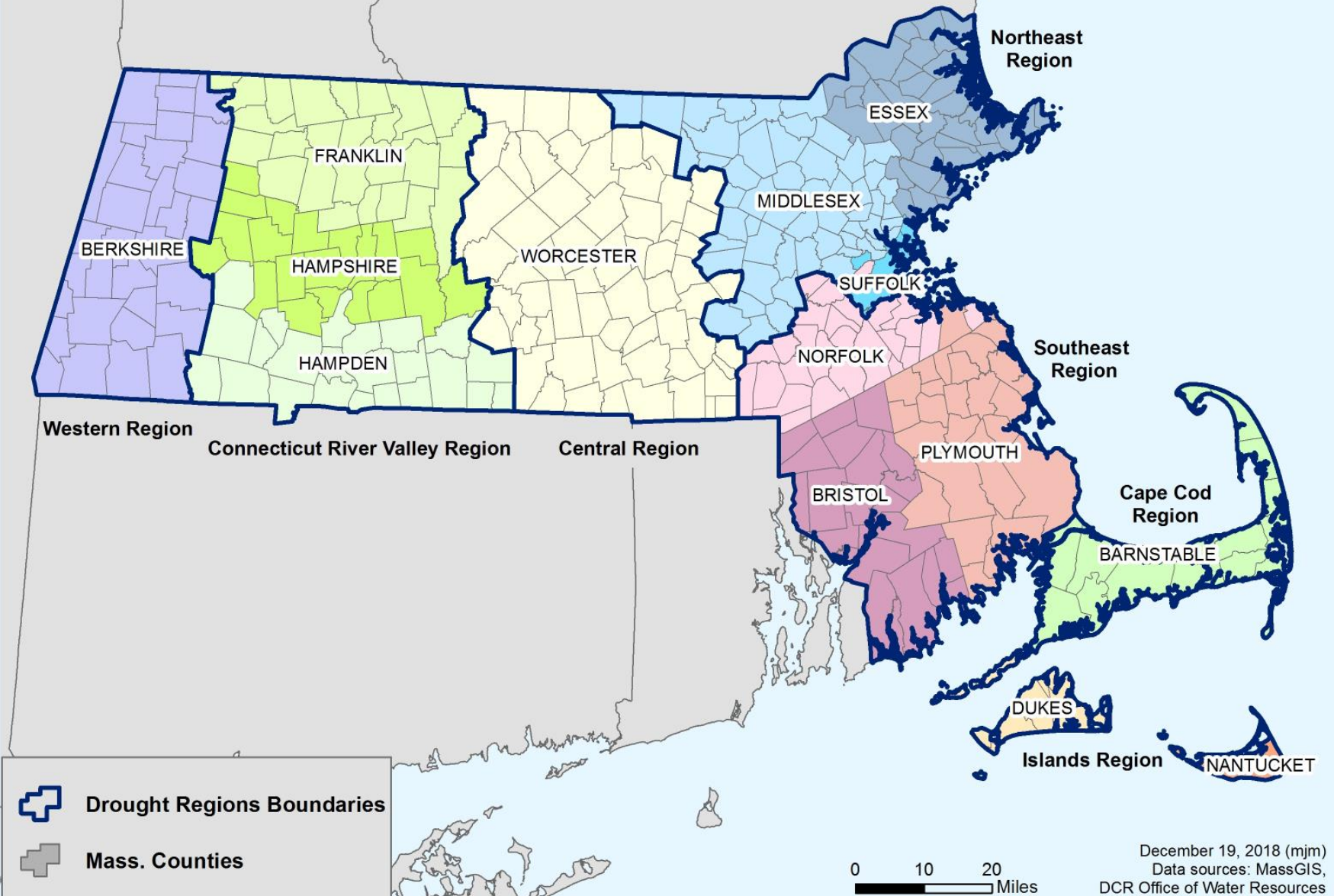
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 <sup>th</sup> percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0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

# MA Drought Management Plan

## Drought Levels



# MASSACHUSETTS DROUGHT REGIONS with Counties



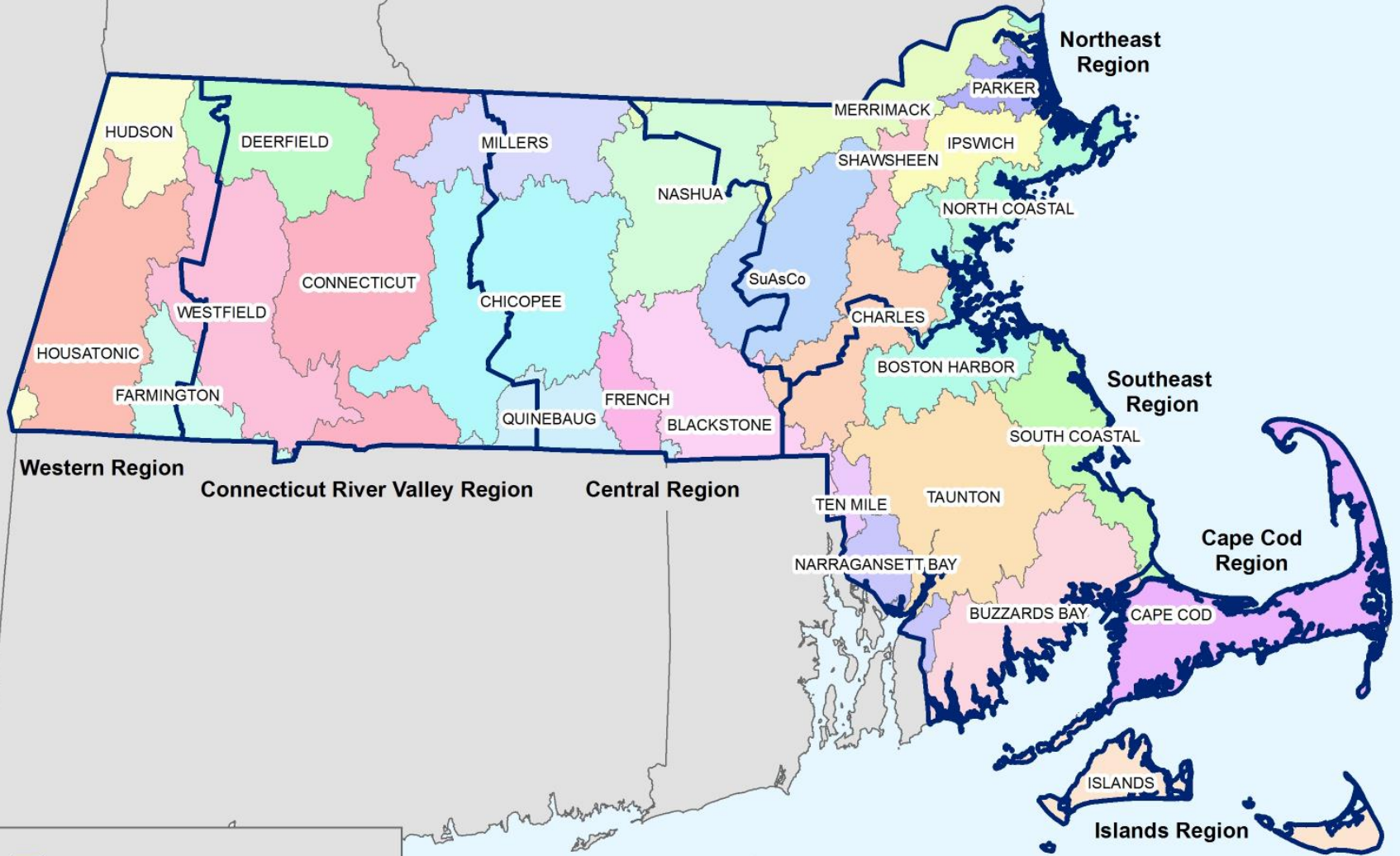
-  Drought Regions Boundaries
-  Mass. Counties

0 10 20  
Miles

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

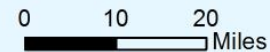


# MASSACHUSETTS DROUGHT REGIONS with Watersheds



 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



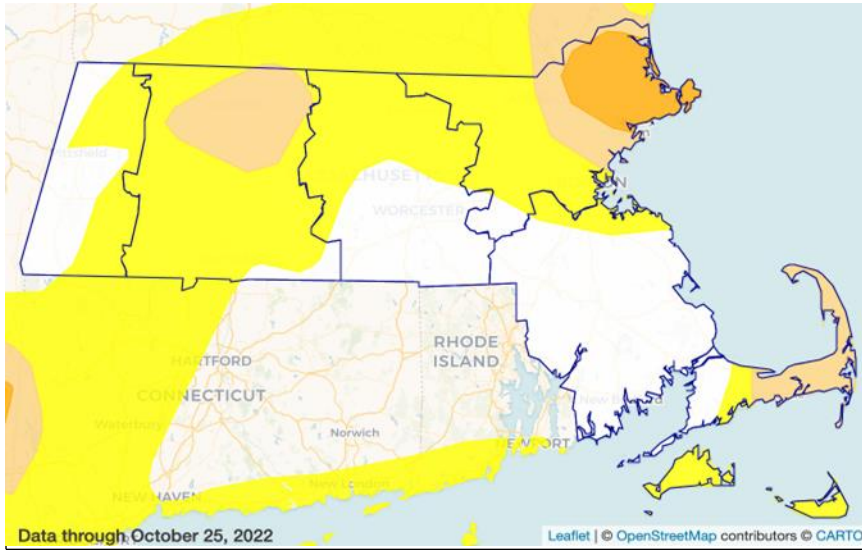
Public Health  
Impacts

# Recent Hydrologic History

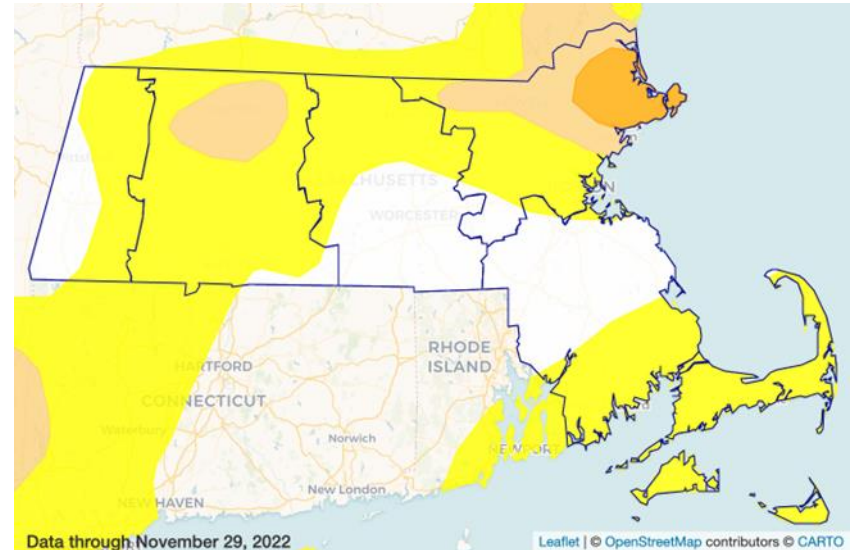
- 2022
  - *April*
    - months of variable precipitation resulted in first drought call
  - *May through August*
    - minimal precipitation with high temperatures
    - storms in late August brought limited improvement to parts of the Southeast Region
  - *September & October*
    - more widespread precipitation events and improvement across the state; lingering effects especially in the Northeast and Cape Cod Regions
  - November
    - normal to below-normal precipitation with little to no improvement



# US Drought Monitor



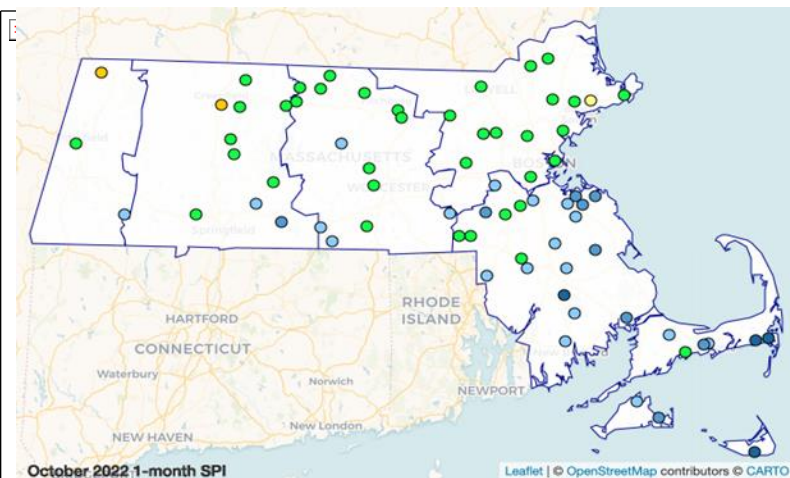
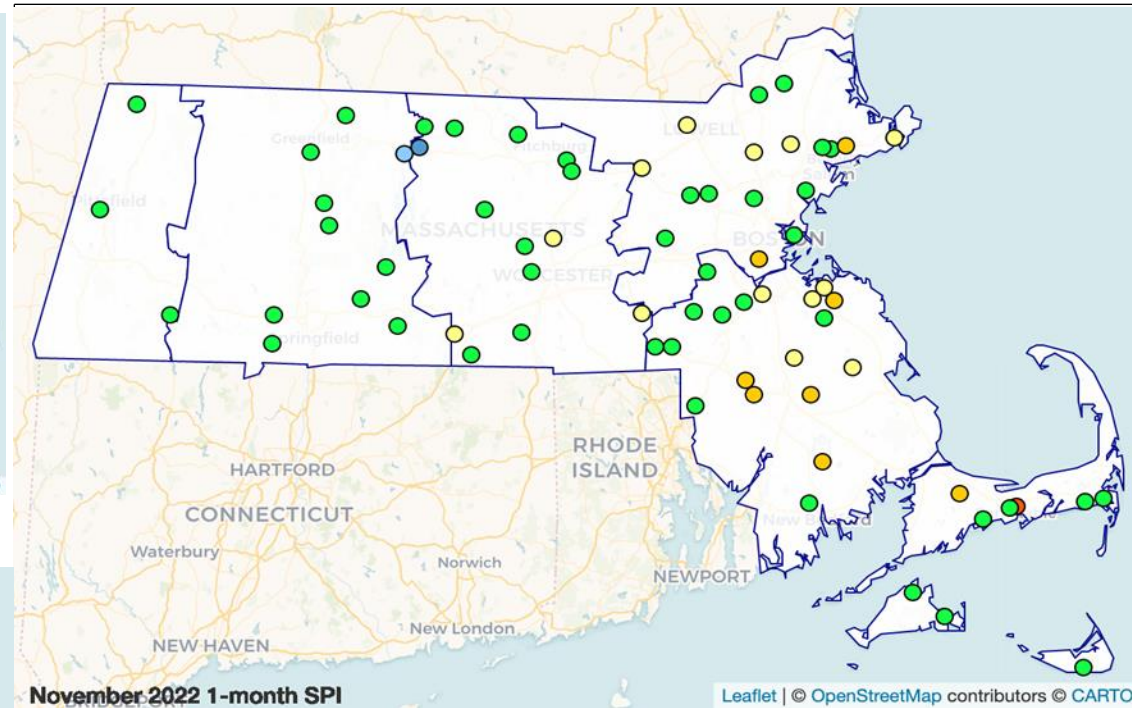
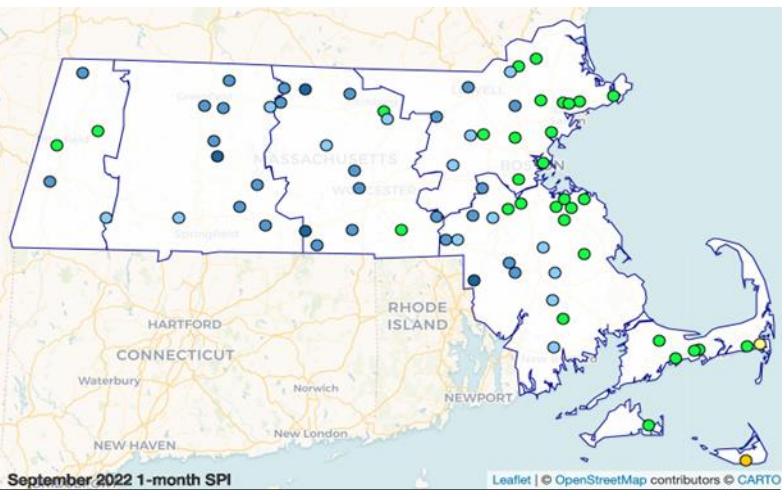
Data through October 25, 2022



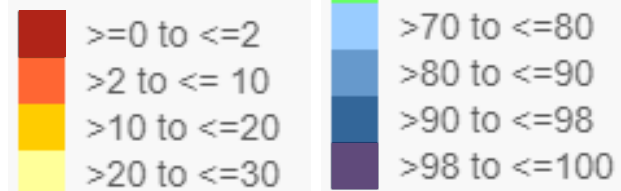
Data through November 29, 2022

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

# Standardized Precipitation Index

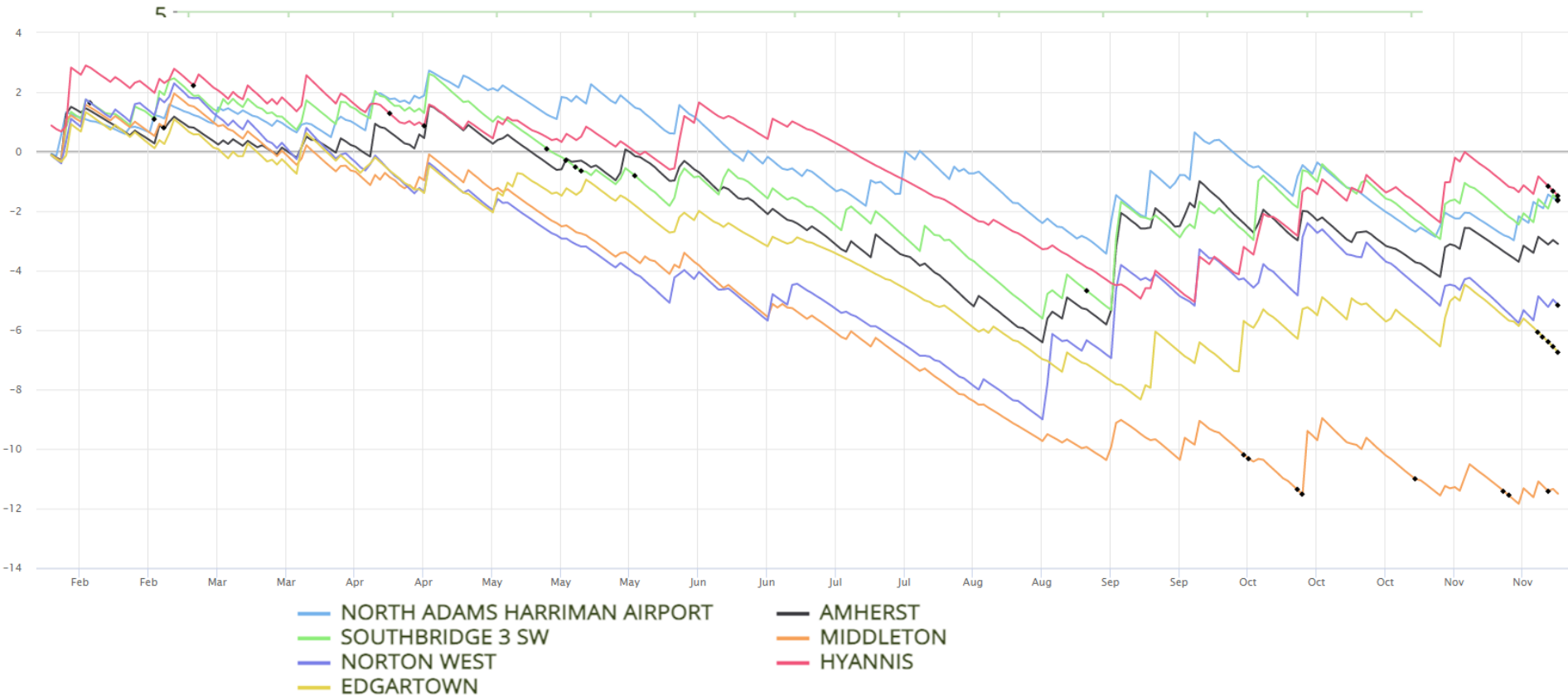


## Percentiles



# 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.

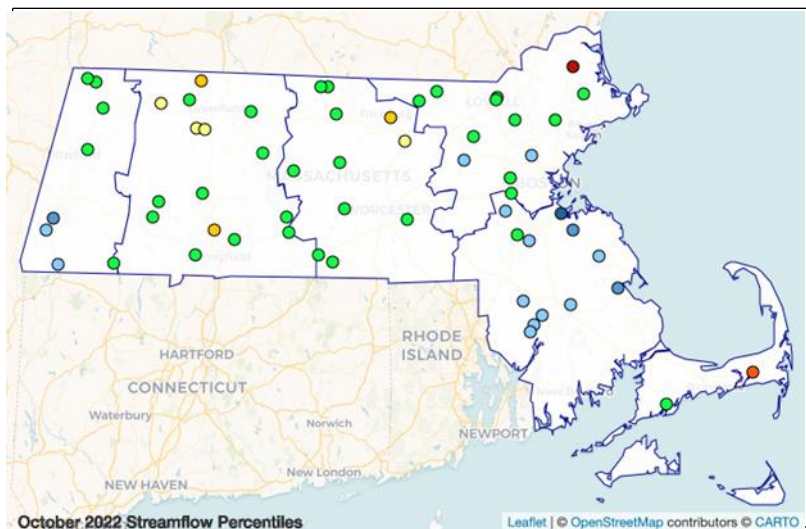
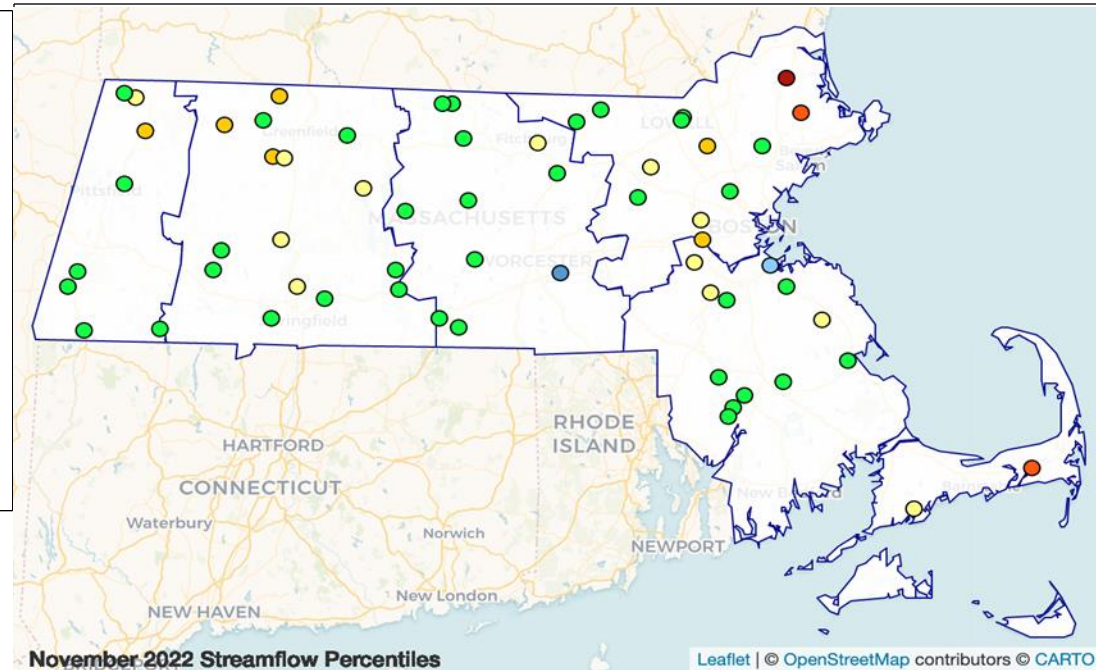
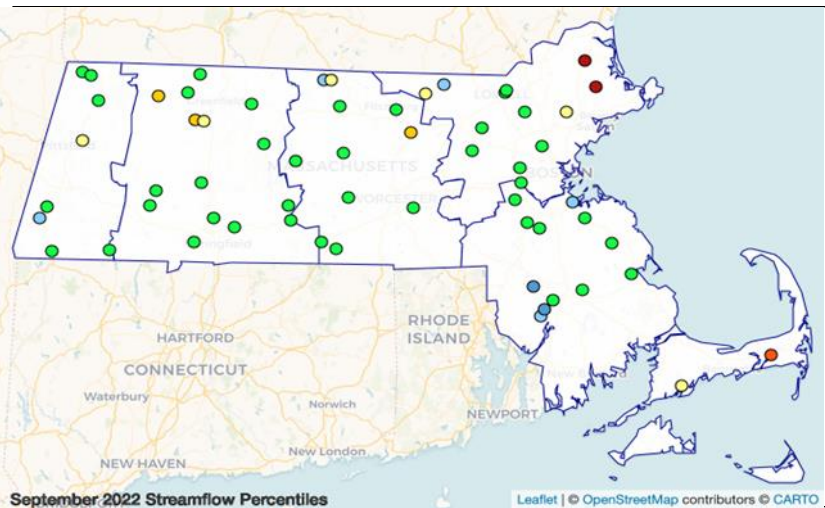
# Standardized Precipitation Index as Percentile, November

REGION	NUMBER OF SITES	1-mo *	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo *
WESTERN	3	57	61	69	24	37	40	81	69
CTRV	10	49	52	75	36	36	35	76	63
CENTRAL	14	44	50	71	41	30	38	81	74
NORTHEAST	17	32	40	40	11	7	8	60	68
SOUTHEAST	19	30	54	66	42	18	19	69	61
CAPE COD	6	57	76	71	46	17	20	49	30
ISLANDS	3	52	75	72	49	30	23	38	24

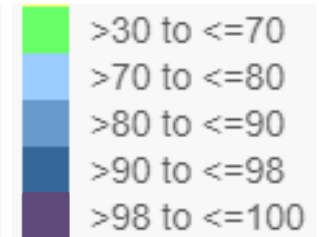
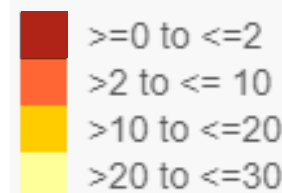
\* 1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

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

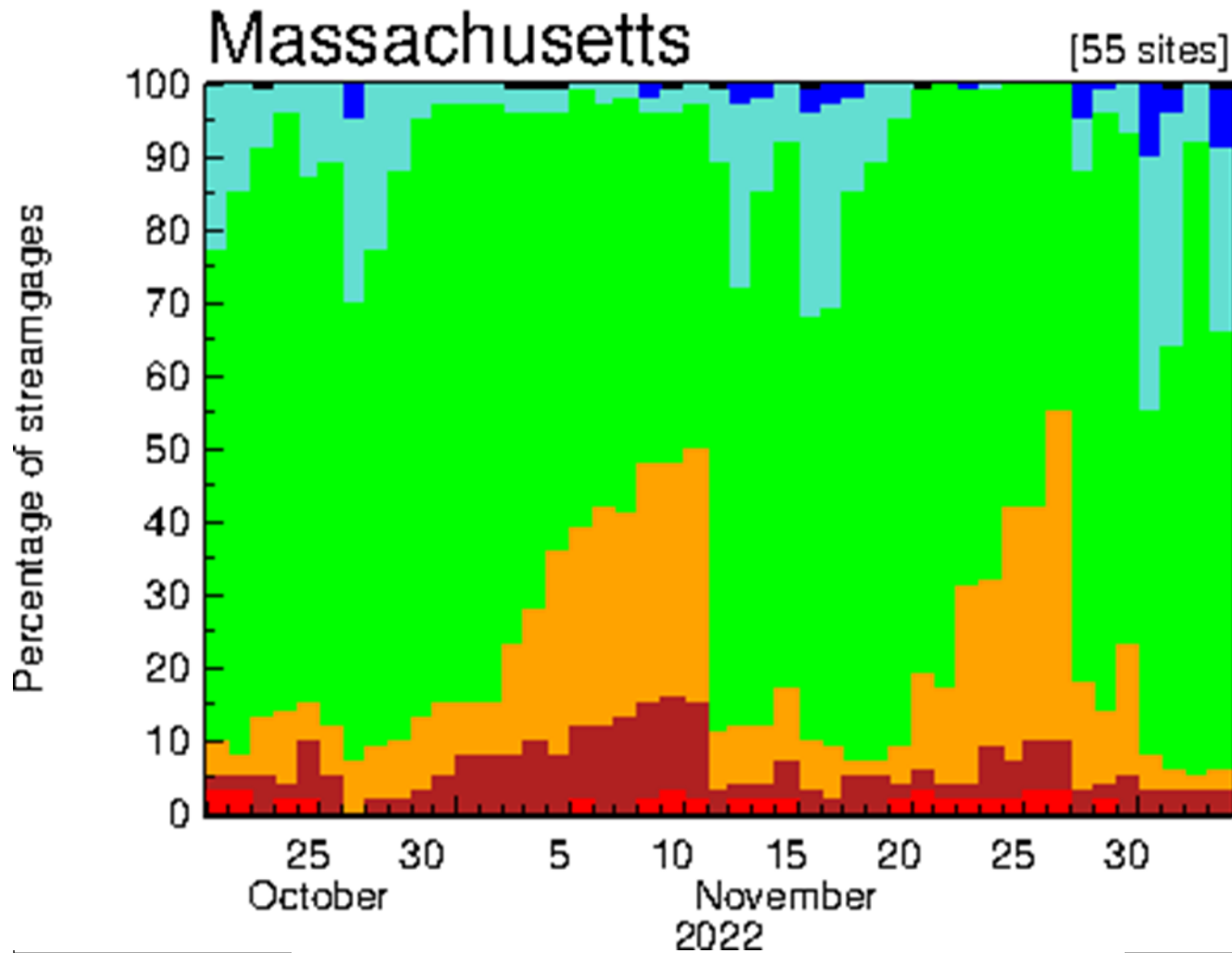
# Streamflow Percentiles of Monthly Median



## 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		

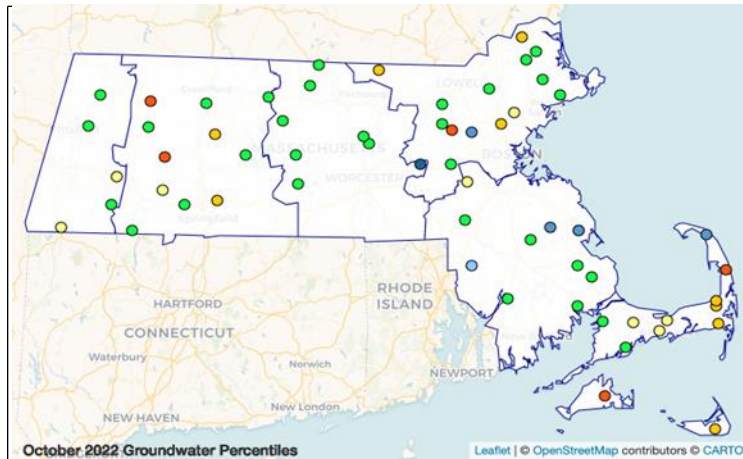
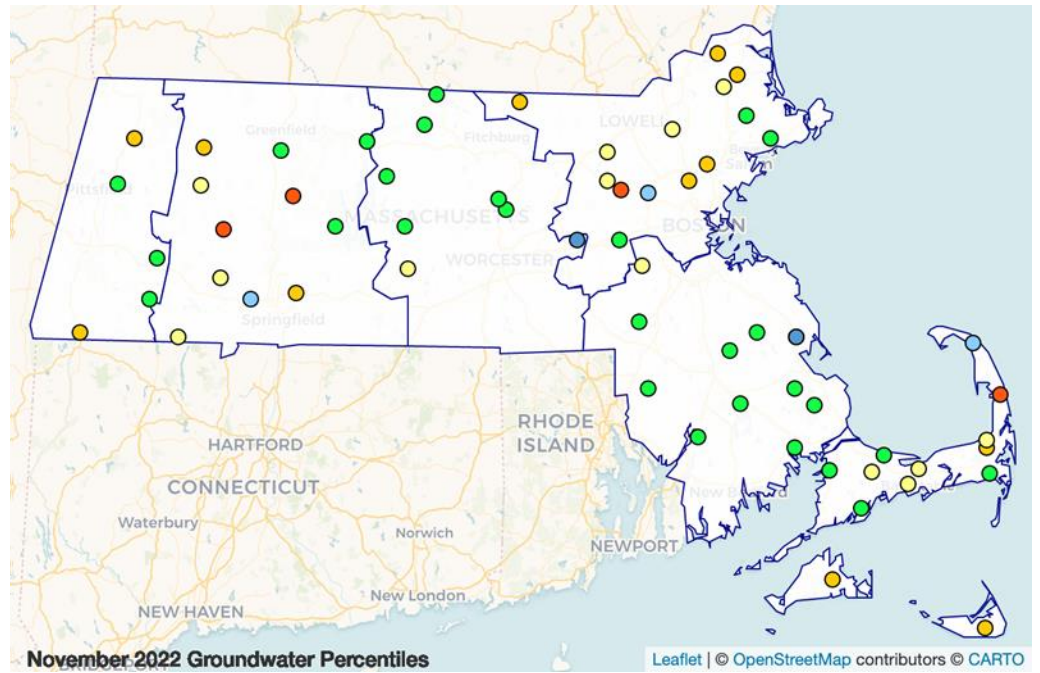
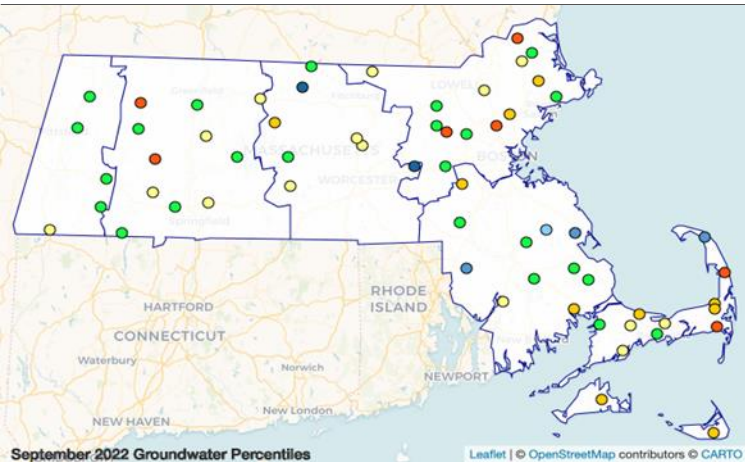
# Streamflow Index November

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	0	1	1	0	42
CTRV	15	0	0	3	4	0	33
CENTRAL	11	0	0	0	1	0	49
NORTHEAST	13	1	1	2	2	0	31
SOUTHEAST	12	0	0	0	3	0	37
CAPE COD	2	0	1	0	1	0	14

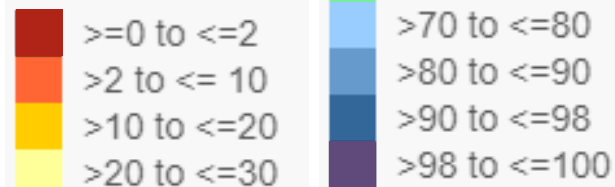
Notes: Not all gages report in all months due to ice, beaver dams or other conditions. The Islands region does not have any streamflow gages.

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	2	0	0	50
CTRV	11	0	2	2	3	0	24
CENTRAL	8	0	0	0	1	0	53
NORTHEAST	14	0	1	5	4	0	22
SOUTHEAST	12	0	0	0	1	0	46
CAPE COD	11	0	1	1	4	0	25
ISLANDS	2	0	0	2	0	0	14

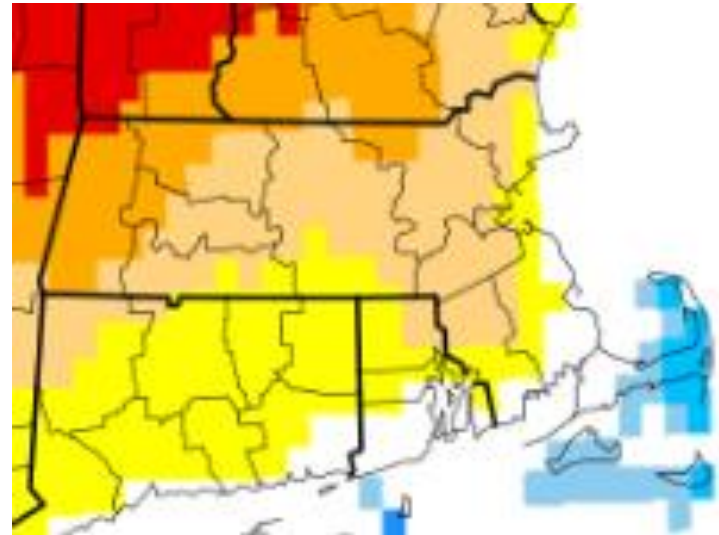
Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

# Evapotranspiration

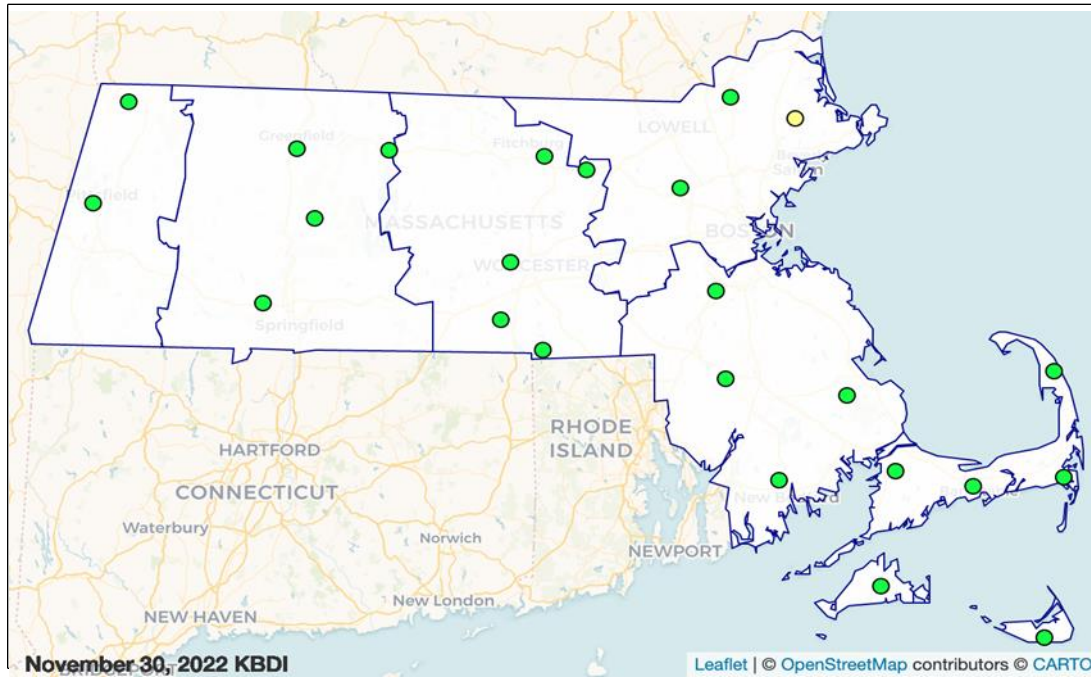
CMI week ending November 26th



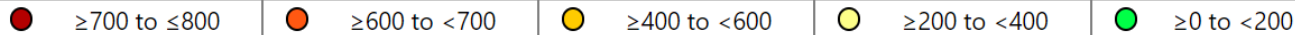
2-month EDDI  
Map dated November 30th



# KBDI - Top 8 inches of soil moisture



Point Values - KBDI Range



REGION	NUMBER OF SITES REPORTING	HIGHEST OF SITE VALUES
WESTERN	2	0
CTRV	4	1
CENTRAL	5	9
NORTHEAST	3	258
SOUTHEAST	4	2
CAPE COD	4	10
ISLANDS	2	0

Index Severity Levels



# Lakes & Impoundments

REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	1	35th
CTRV	2	17th
CENTRAL	3	45th
NORTHEAST	5	15th
SOUTHEAST	2	35th
CAPE COD	1	15th

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, October 2022

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (9 mos)	45	42	47	12	34	28	34
Streamflow	61	44	53	53	77	28	N/A
Groundwater	34	37	49	34	63	23	12
Lakes/ Impoundments	45	13	39	22	39	26	N/A
ET- CMI   EDDI	Level 0   1	Level 0   1	Level 0   0	Level 0   0	Level 0   0	Level 0   0	Level 0   0
KBDI	Level 0	Level 0	Level 0	Level 1	Level 0	Level 0	Level 0

<b><i>Declaration from 11/9 meeting</i></b>	<b><i>Level 0</i></b>	<b><i>Level 1</i></b>	<b><i>Level 0</i></b>	<b><i>Level 1</i></b>	<b><i>Level 0</i></b>	<b><i>Level 1</i></b>	<b><i>Level 2</i></b>
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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, November 2022

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (9 mos)	37	36	30	7	18	17	30
Streamflow	42	33	49	31	37	14	N/A
Groundwater	50	24	53	22	46	25	14
Lakes/ Impoundments	35	17	45	15	35	15	N/A
ET- CMI   EDDI	Level 0   3	Level 0   2	Level 0   2	Level 0   2	Level 0   1	Level 0   0	Level 0   0
KBDI	Level 0	Level 0	Level 0	Level 1	Level 0	Level 0	Level 0

<b>Recommend for (12/7 meeting)</b>	<b>Level 0</b>	<b>Level 1</b>	<b>Level 0</b>	<b>Level 2</b>	<b>Level 0</b>	<b>Level 2</b>	<b>Level 2</b>
<b>Declaration from 11/9 meeting</b>	<b>Level 0</b>	<b>Level 1</b>	<b>Level 0</b>	<b>Level 1</b>	<b>Level 0</b>	<b>Level 1</b>	<b>Level 2</b>

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

# Drought Indices by Region

## October

West	CTRV	Central	NE	SE	Cape	Islands
45	42	47	12	34	28	34
61	44	53	53	77	28	N/A
34	37	49	34	63	23	12
45	13	39	22	39	26	N/A
Level 0   1	Level 0   1	Level 0   0	Level 0   0	Level 0   0	Level 0   0	Level 0   0
Level 0	Level 0	Level 0	Level 1	Level 0	Level 0	Level 0
Level 0	Level 1	Level 0	Level 1	Level 0	Level 1	Level 2

\* October = 9 mo

## November

Drought Index	West	CTRV	Central	NE	SE	Cape	Islands
Precip*	37	36	30	7	18	17	30
Streamflow	42	33	49	31	37	14	N/A
Groundwater	50	24	53	22	46	25	14
Lakes/Impoundments	35	17	45	15	35	15	N/A
ET- CMI   EDDI	Level 0   3	Level 0   2	Level 0   2	Level 0   2	Level 0   1	Level 0   0	Level 0   0
KBDI	Level 0	Level 0	Level 0	Level 1	Level 0	Level 0	Level 0
Rec for (12/7 meeting)	Level 0	Level 1	Level 0	Level 2	Level 0	Level 2	Level 2

\* November = 9 mo