

Hydrologic Conditions in Massachusetts for October 2022

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DCR Office of Water Resources

Drought Management Task Force

October 9, 2022

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan

Indices

Numbers in parentheses indicate number of data points across the state



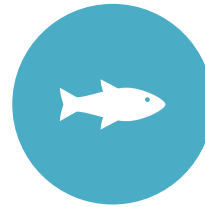
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(16)



Crop Moisture
(national map)

MA Drought Management Plan

Index Severity Levels

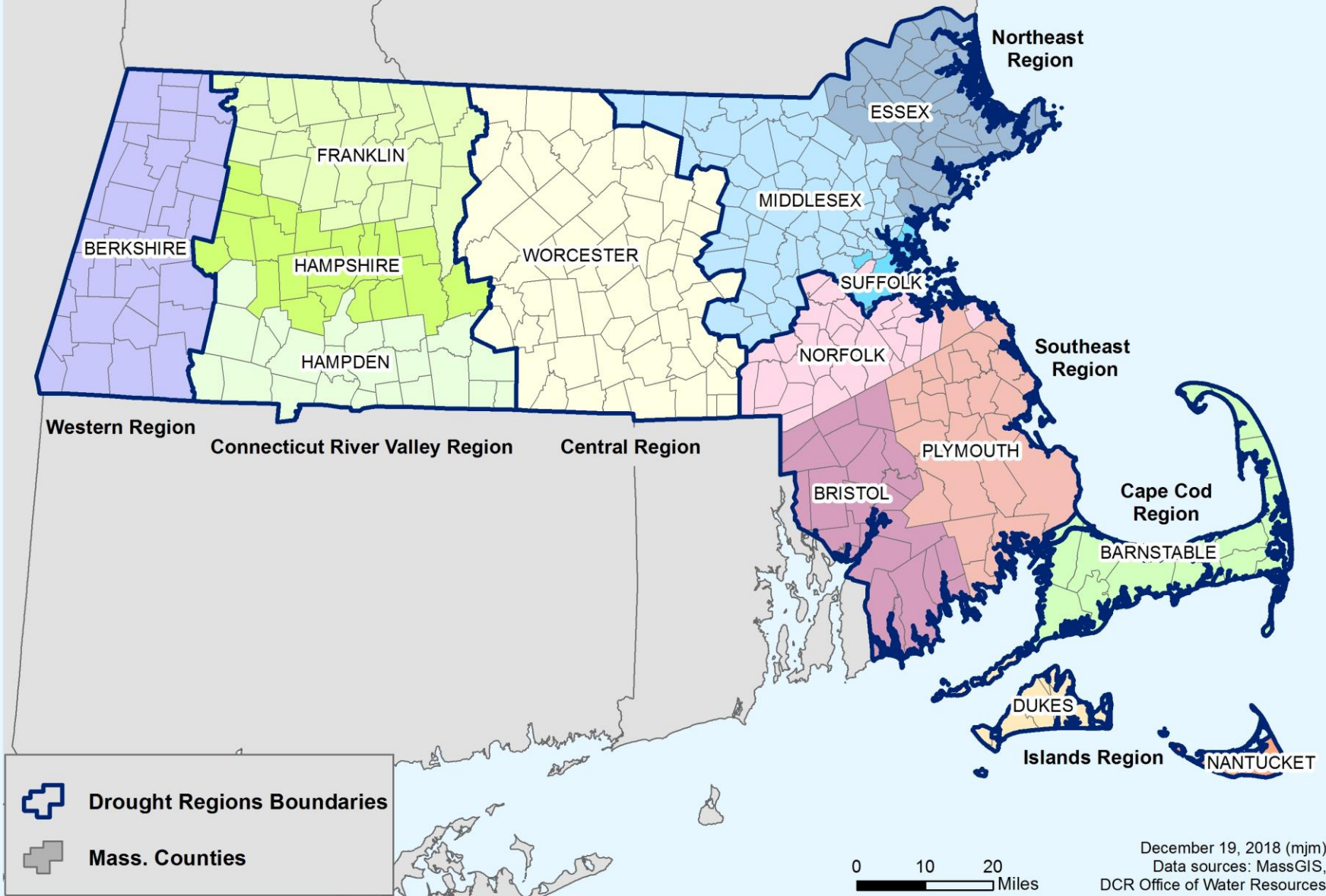
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 th percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0 and > -4.0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

MA Drought Management Plan

Drought Levels



MASSACHUSETTS DROUGHT REGIONS with Counties



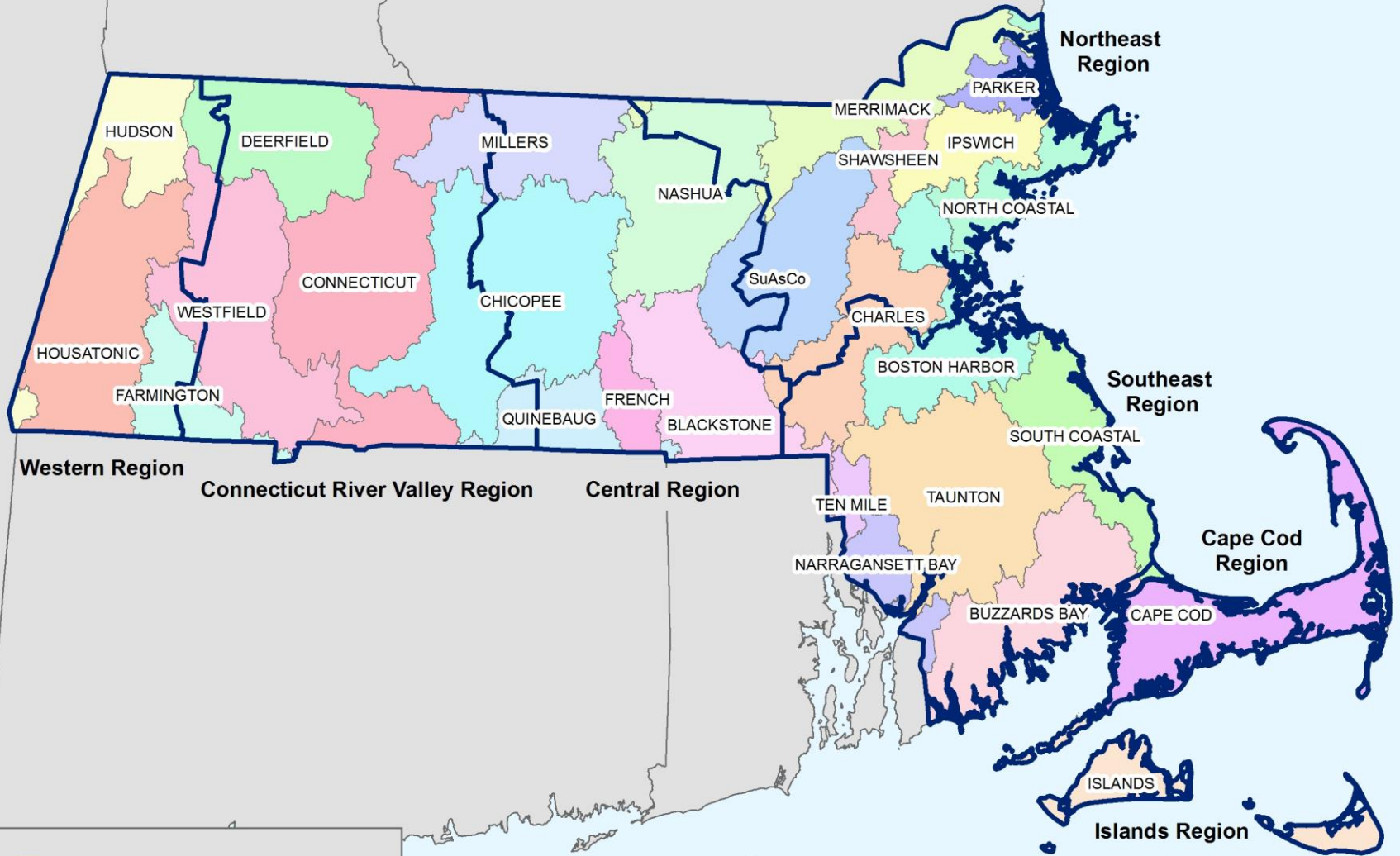
-  Drought Regions Boundaries
-  Mass. Counties

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

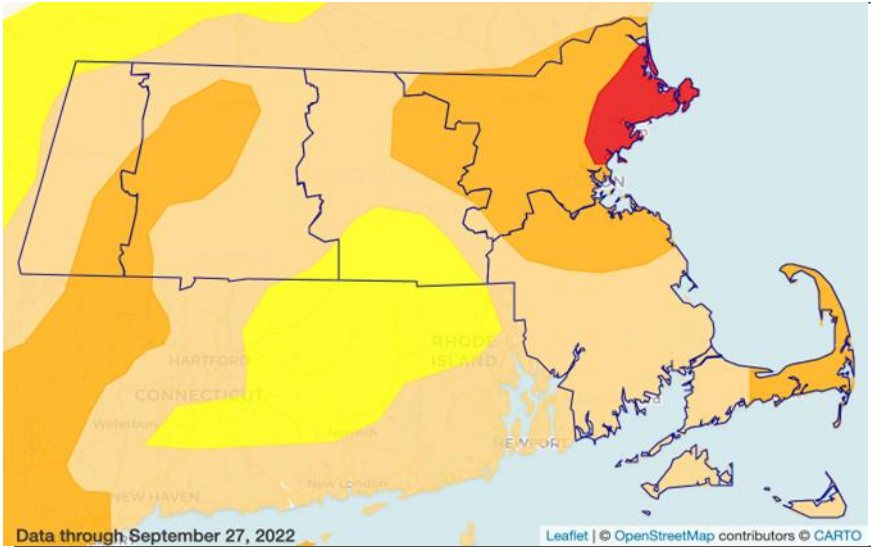


Public Health
Impacts

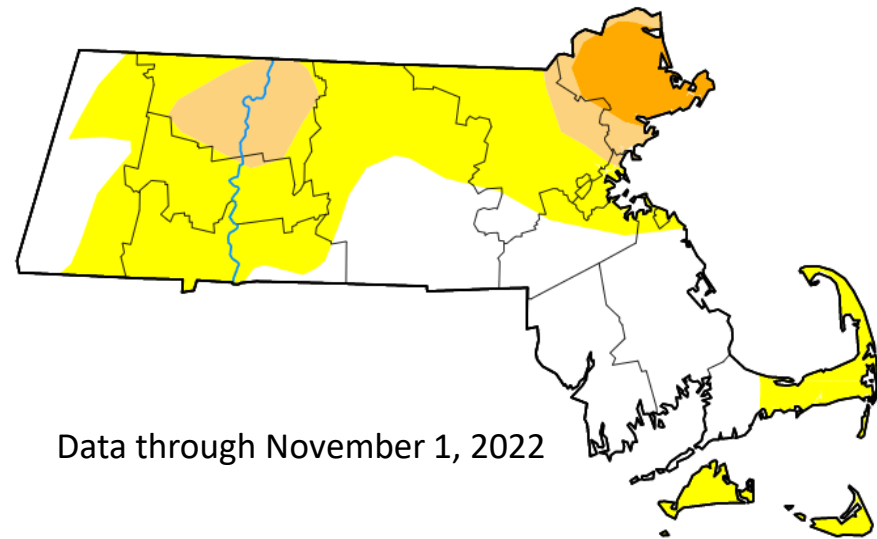
Recent Hydrologic History

- 2022
 - *April*
 - months of variable precipitation resulted in first drought call
 - *May*
 - continued low precipitation plus increased ET especially in NE and SE
 - *June 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

US Drought Monitor

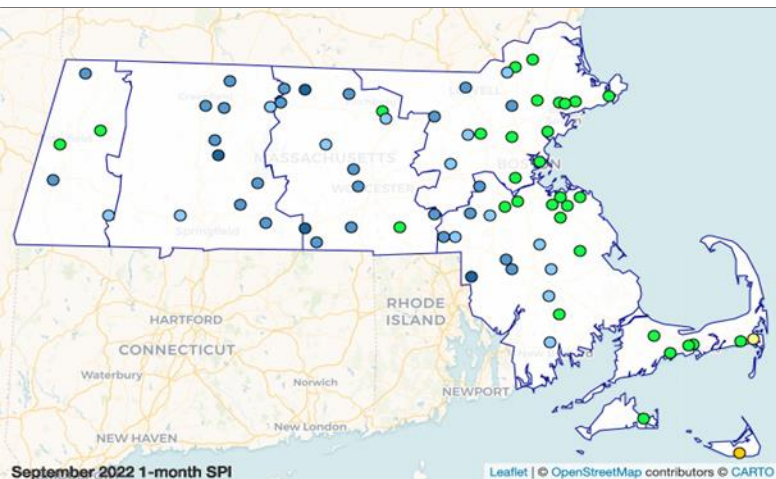
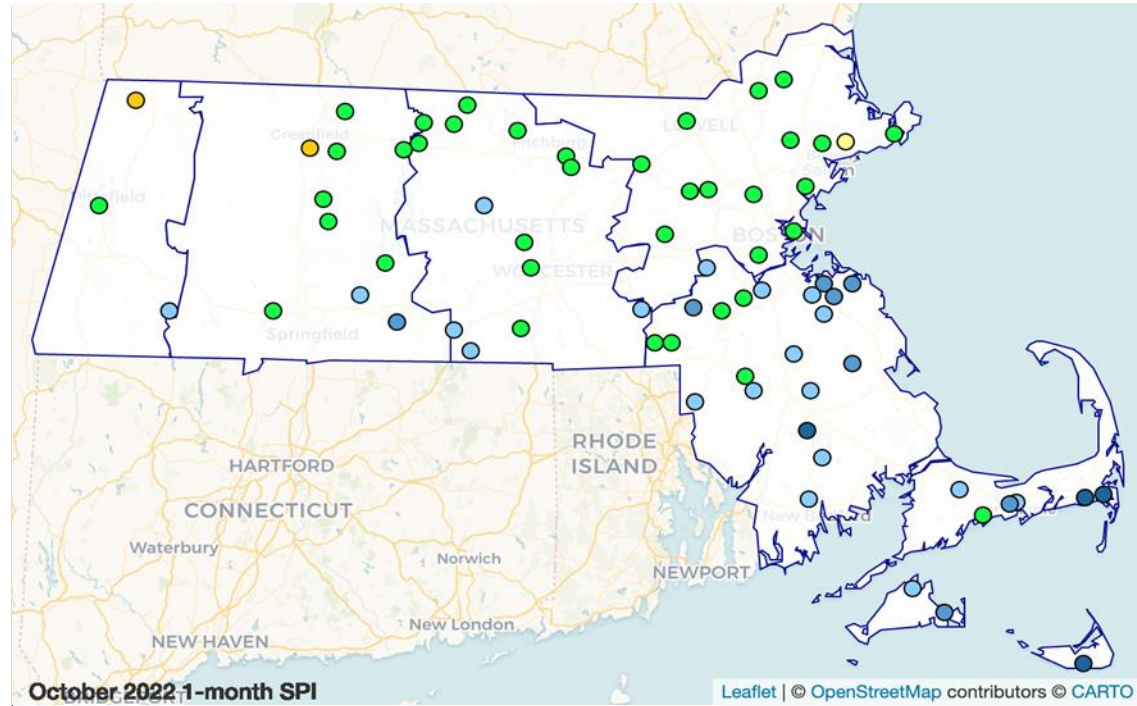
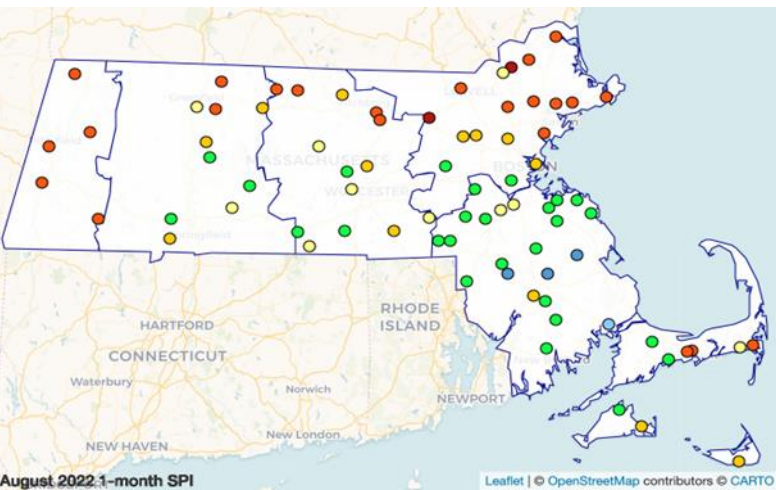


Data through September 27, 2022

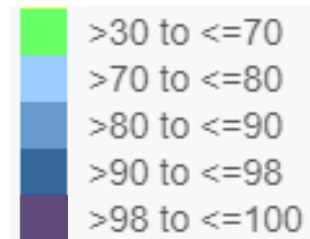
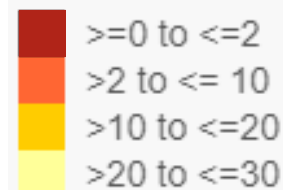


	USDM	MA DMP
None	0	= 1
D0 (Abnormally Dry)	1	= 2
D1 (Moderate Drought)	2,3	= 3
D2 (Severe Drought)	4	= 4
D3 (Extreme Drought)		
D4 (Exceptional Drought)		

Standardized Precipitation Index

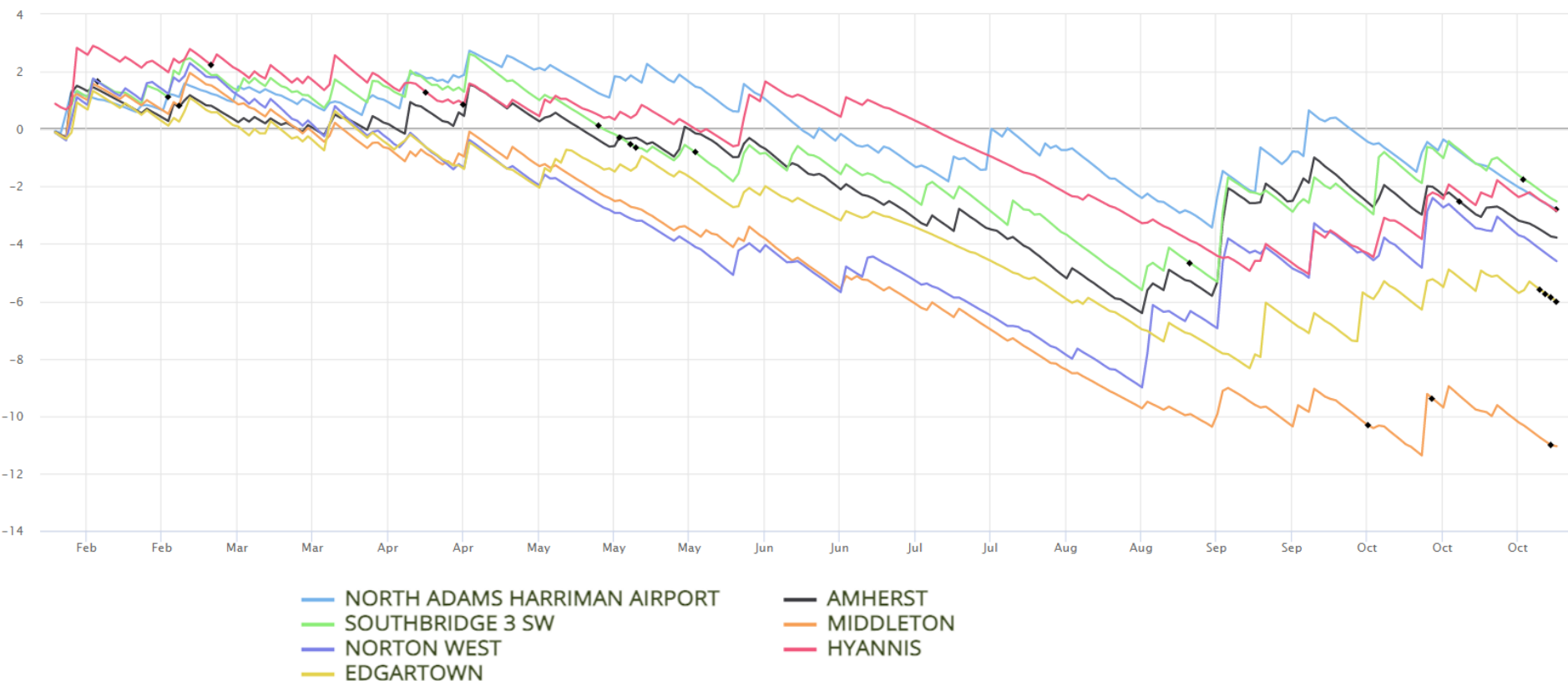


Percentiles



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.

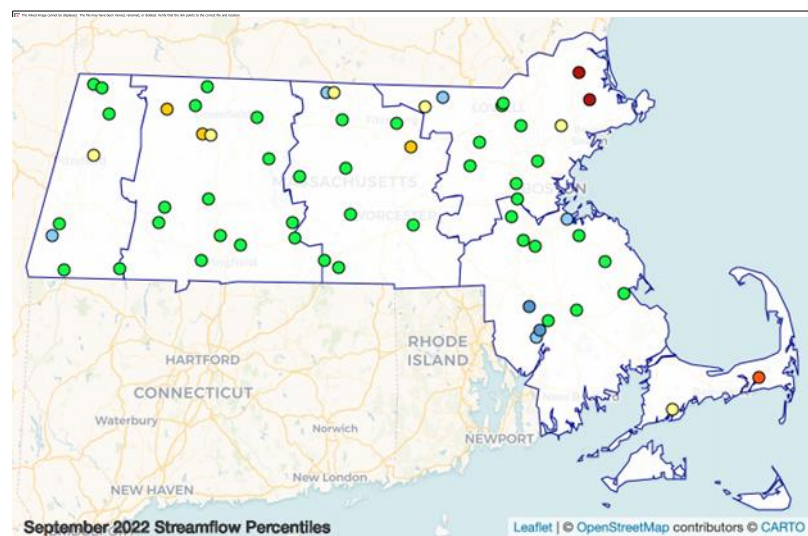
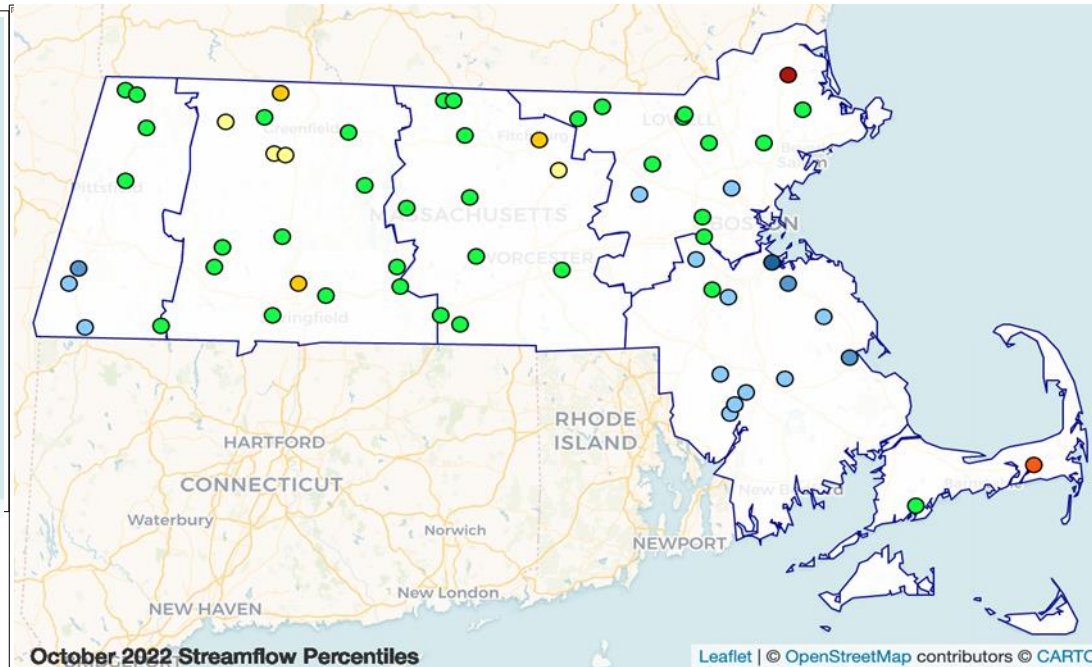
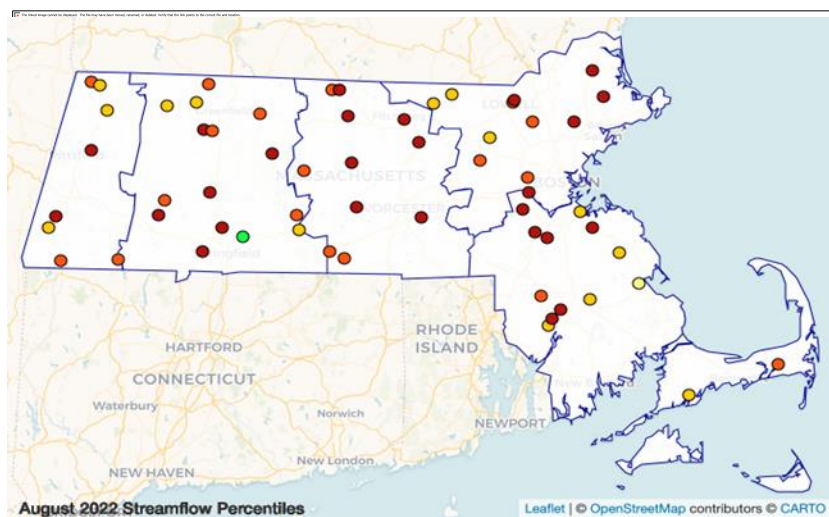
Standardized Precipitation Index as Percentile, October

REGION	NUMBER OF SITES	1-mo *	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo *
WESTERN	3	70	71	46	20	45	35	83	69
CTRV	10	50	78	59	27	42	28	75	64
CENTRAL	14	61	81	66	38	47	31	84	74
NORTHEAST	15	57	56	35	9	12	6	62	68
SOUTHEAST	21	74	80	76	33	34	20	73	64
CAPE COD	6	81	75	58	37	28	15	44	28
ISLANDS	3	85	77	56	53	34	16	34	22

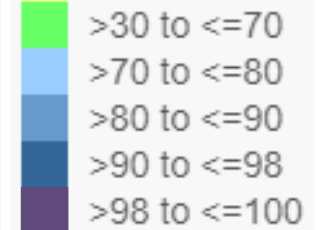
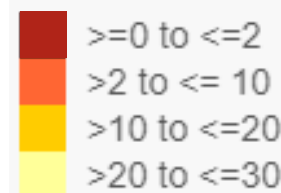
* 1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

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

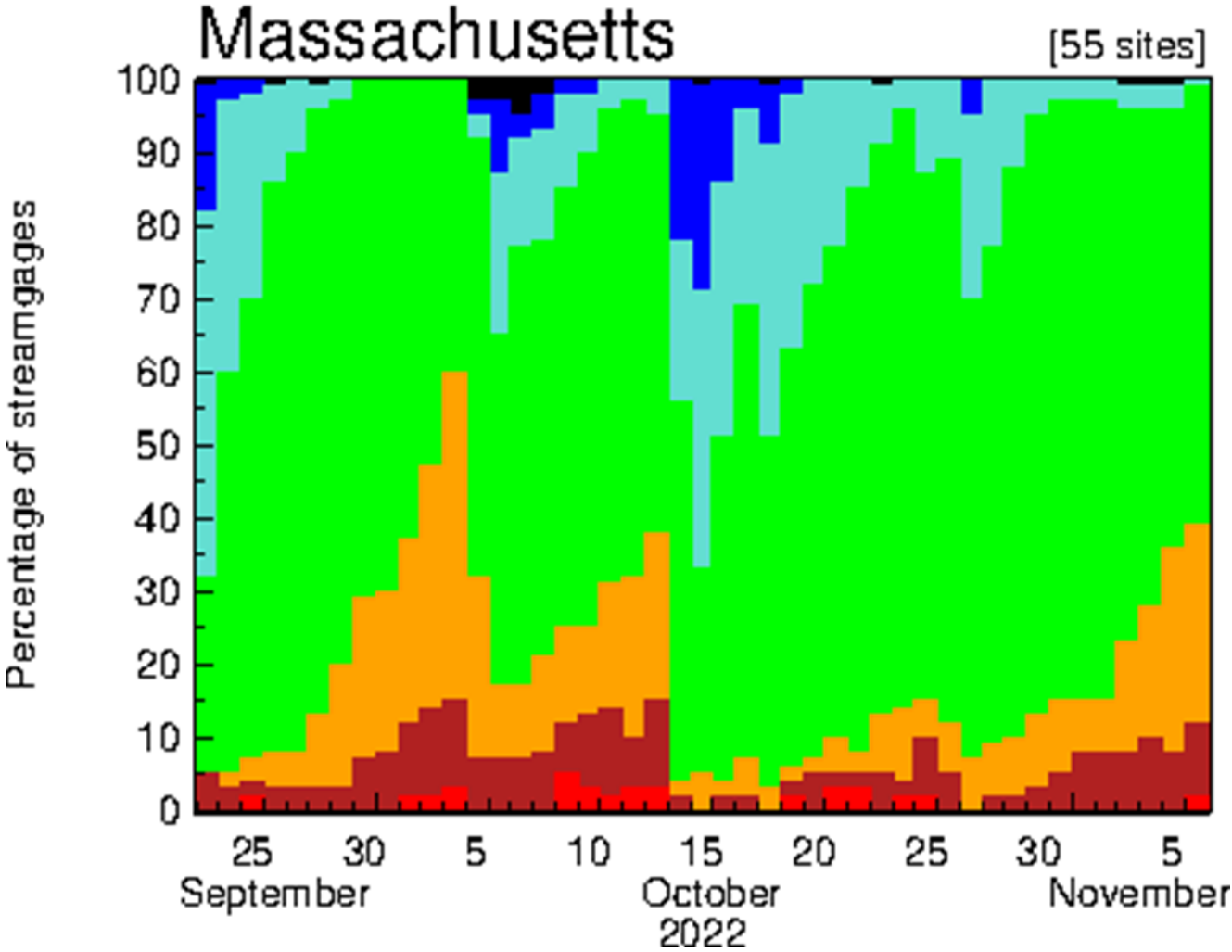
Streamflow Percentiles of Monthly Median



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		

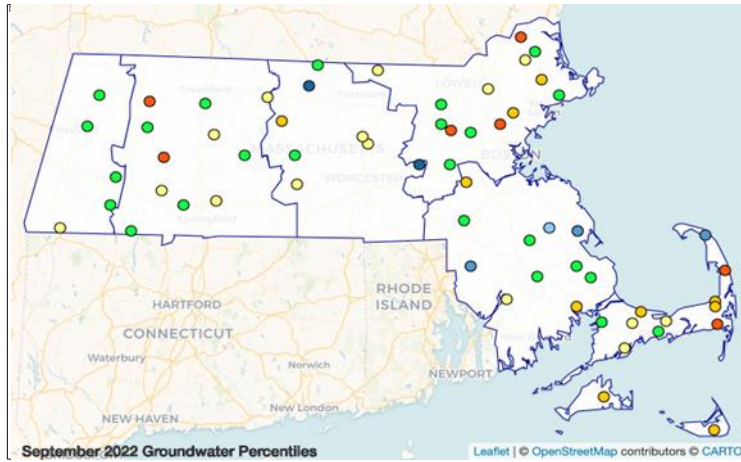
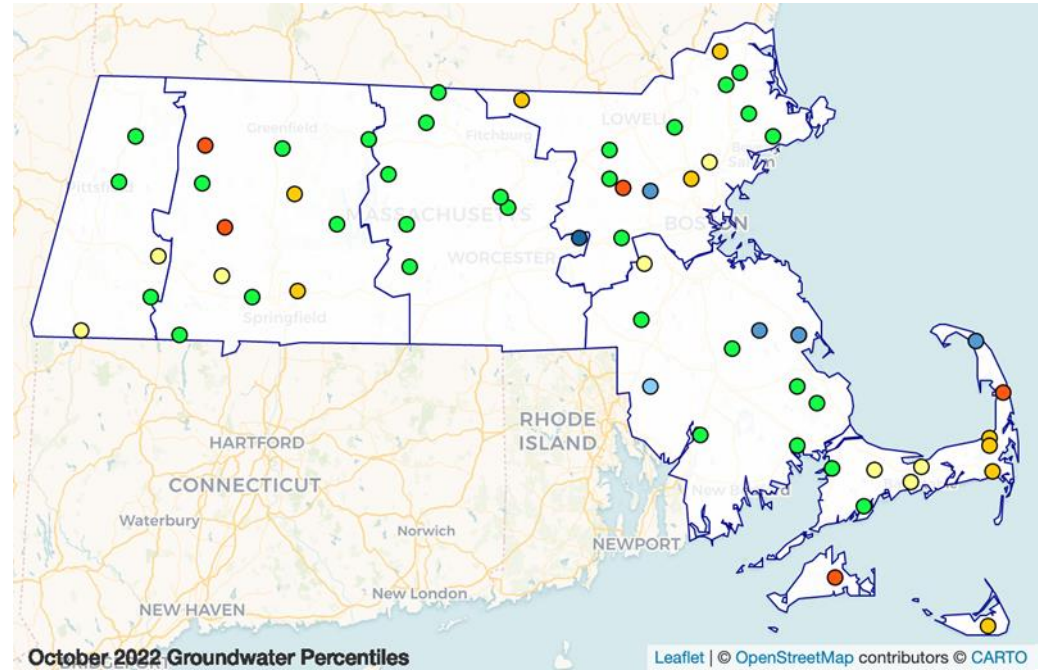
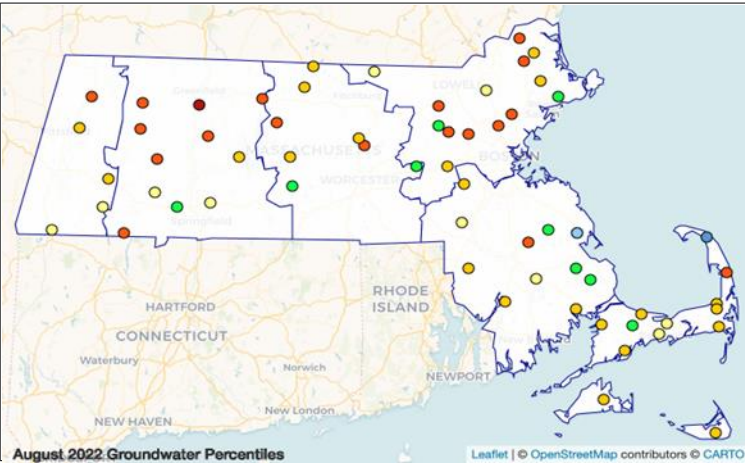
Streamflow Index October

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	0	0	0	61
CTRV	15	0	0	2	3	0	44
CENTRAL	11	0	0	1	1	0	53
NORTHEAST	13	1	0	0	0	0	53
SOUTHEAST	12	0	0	0	0	1	77
CAPE COD	2	0	1	0	0	0	28

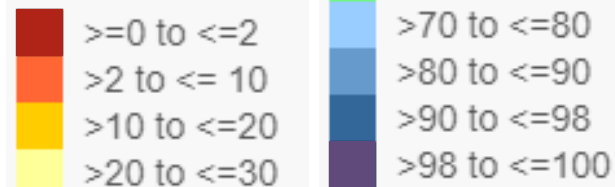
Notes: Not all gages report in all months due to ice, beaver dams or other conditions. The Islands region does not have any streamflow gages.

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	2	0	34
CTRV	11	0	2	2	1	0	37
CENTRAL	8	0	0	0	0	1	49
NORTHEAST	14	0	1	3	1	0	34
SOUTHEAST	11	0	0	0	1	0	63
CAPE COD	10	0	1	3	3	0	23
ISLANDS	2	0	1	1	0	0	12

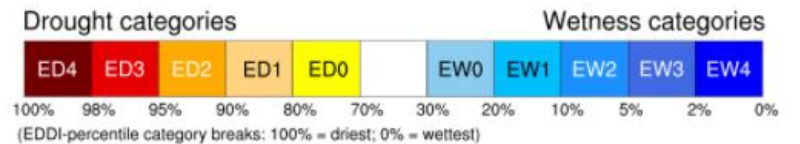
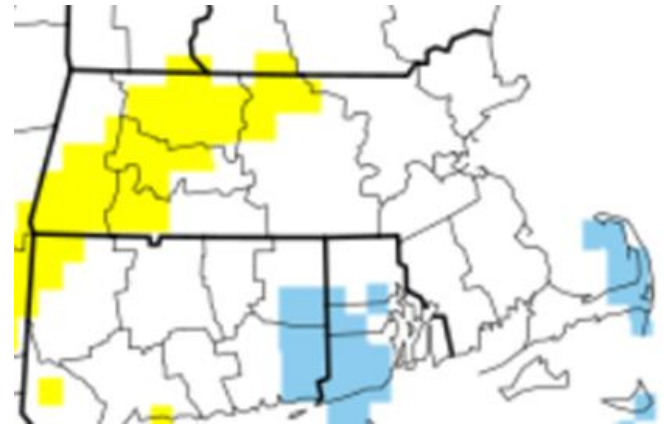
Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Evapotranspiration

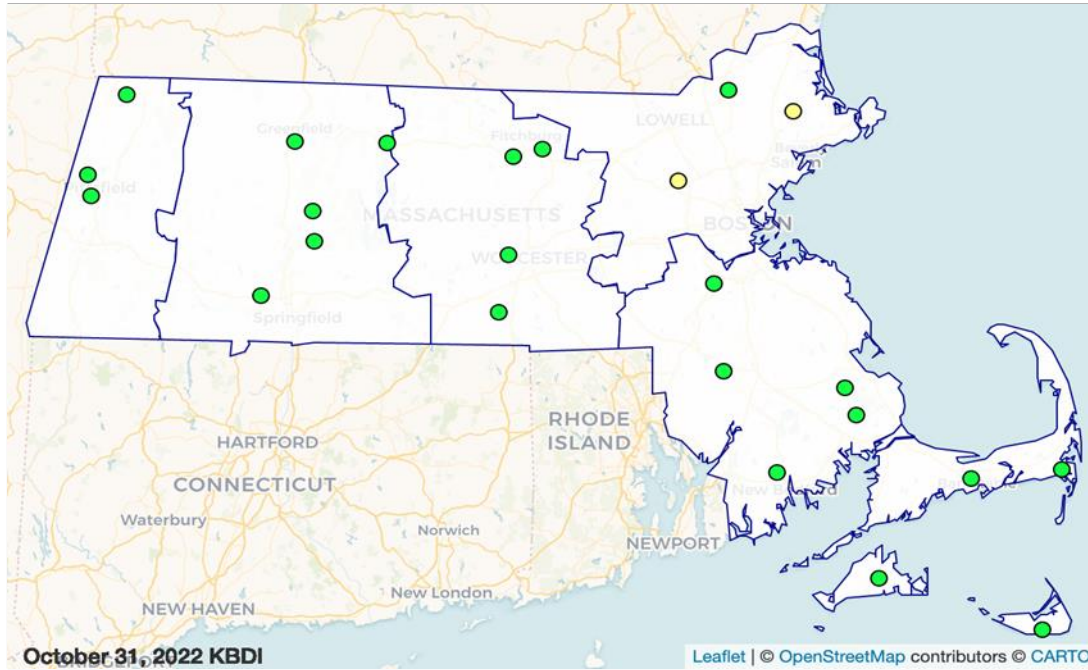
CMI week ending October 29th



2-month EDDI
Map dated October 30th



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	56
CTRV	5	30
CENTRAL	4	197
NORTHEAST	3	346
SOUTHEAST	5	146
CAPE COD	2	21
ISLANDS	2	22

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	2	45th
CTRV	2	13th
CENTRAL	2	39th
NORTHEAST	6	22nd
SOUTHEAST	2	39th
CAPE COD	1	26th

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, September 2022

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (6 mos)	35	34	36	9	18	14	12
Streamflow	60	50	61	48	62	19	N/A
Groundwater	41	29	33	27	45	22	14
Lakes/ Impoundments	38	19	25	14	27	15	N/A
ET- CMI EDDI	Level 0 1	Level 0 1	Level 0 2	Level 0 1	Level 0 1	Level 0 1	Level 0 2
KBDI	Level 0	Level 0	Level 2	Level 2	Level 1	Level 2	Level 2

<i>Declaration from (10/6 meeting)</i>	<i>Level 0</i>	<i>Level 1</i>	<i>Level 1</i>	<i>Level 2</i>	<i>Level 1</i>	<i>Level 2</i>	<i>Level 2</i>
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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, 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

Recommend for (11/9 meeting)	Level 0	Level 1	Level 0	Level 1	Level 0	Level 1	Level 2
Declaration from 10/6 meeting	Level 0	Level 1	Level 1	Level 2	Level 1	Level 2	Level 2

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

Drought Indices by Region

September

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation*	35	34	36	9	18	14	12
Streamflow	60	50	61	48	62	19	N/A
Groundwater	41	29	33	27	45	22	14
Lakes/Impoundments	38	19	25	14	27	15	N/A
ET-CMI EDDI	Level 0 1	Level 0 1	Level 0 2	Level 0 1	Level 0 1	Level 0 1	Level 0 2
KBDI	Level 0	Level 0	Level 2	Level 2	Level 1	Level 2	Level 2
<i>Declaration from (10/6 meeting)</i>	Level 0	Level 1	Level 1	Level 2	Level 1	Level 2	Level 2

October

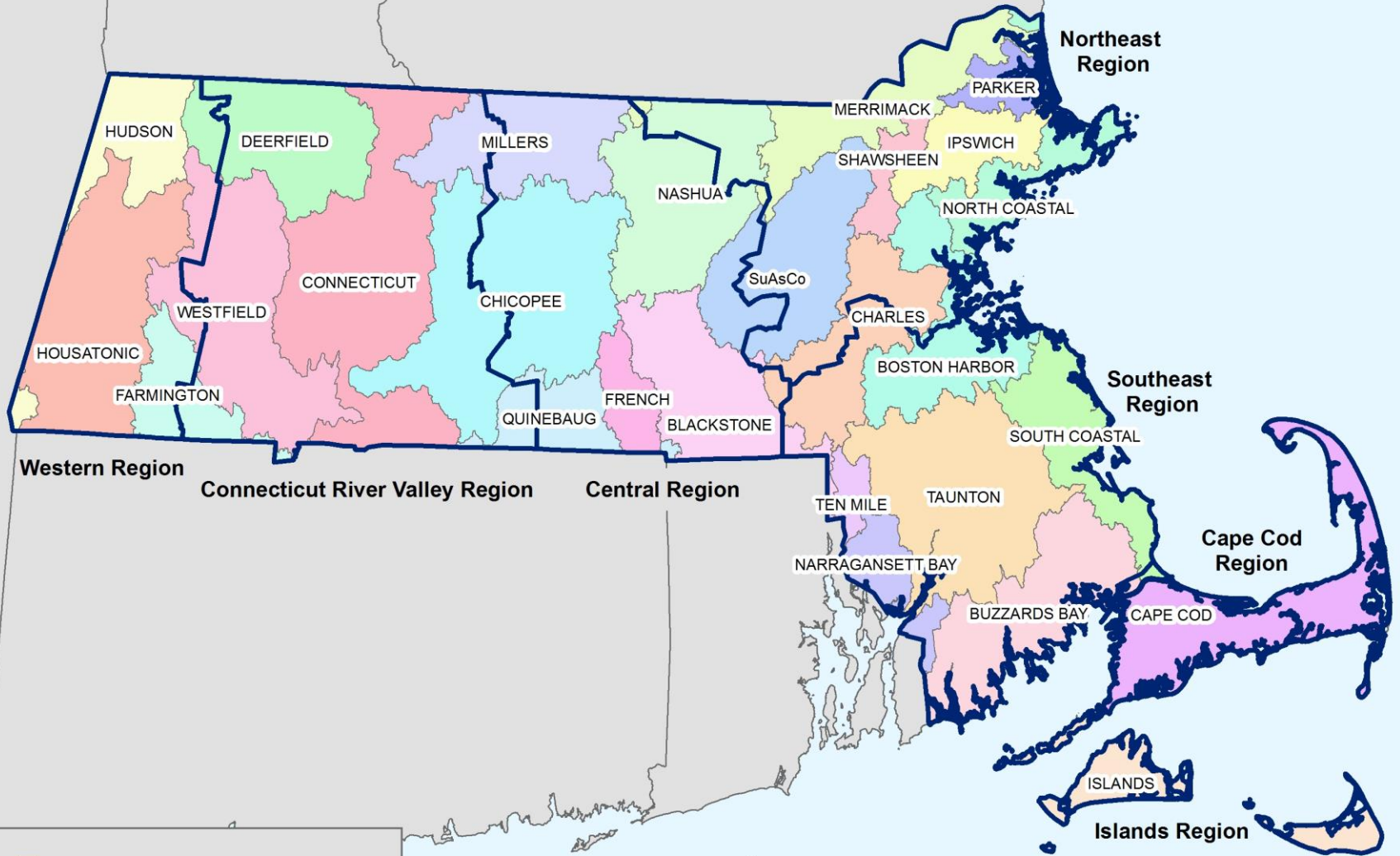
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Precipitation*	45	42	47	12	34	28	34
Streamflow	61	44	53	53	77	28	N/A
Groundwater	34	37	49	34	63	23	12
Lakes/Impoundments	45	13	39	22	39	26	N/A
ET-CMI EDDI	Level 0 1	Level 0 1	Level 0 0	Level 0 0	Level 0 0	Level 0 0	Level 0 0
KBDI	Level 0	Level 0	Level 0	Level 1	Level 0	Level 0	Level 0
<i>Declaration from (10/6 meeting)</i>	Level 0	Level 1	Level 0	Level 1	Level 0	Level 1	Level 2

*Precipitation: September = 6 mo, October = 9 mo

**Essex County Level 2



MASSACHUSETTS DROUGHT REGIONS with Watersheds



-  Drought Regions Boundaries
-  Mass. Counties



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

Drought Indices by Major Basin – October 2022

Region	CTRV	CTRV		Northeast	Northeast
Basin	Connecticut	Deerfield		Merrimack	Parker
Precipitation (9mo)	40	15		12	-
EDDI	1	1		0	0
Streamflow	32	25		51	0
Groundwater	19	50		16	35
KBDI	19	30		196	-
Recommended Level	1	1		2	2

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