

Hydrologic Conditions in Massachusetts for mid-September to mid- October 2024

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DCR Office of Water Resources

Drought Management Task Force

November 6, 2024

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan Indices

Numbers in parentheses indicate number of data points across the state



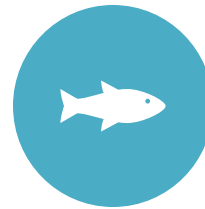
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(36)



Evapotranspiration
(national map)

MA Drought Management Plan

Index Severity Levels

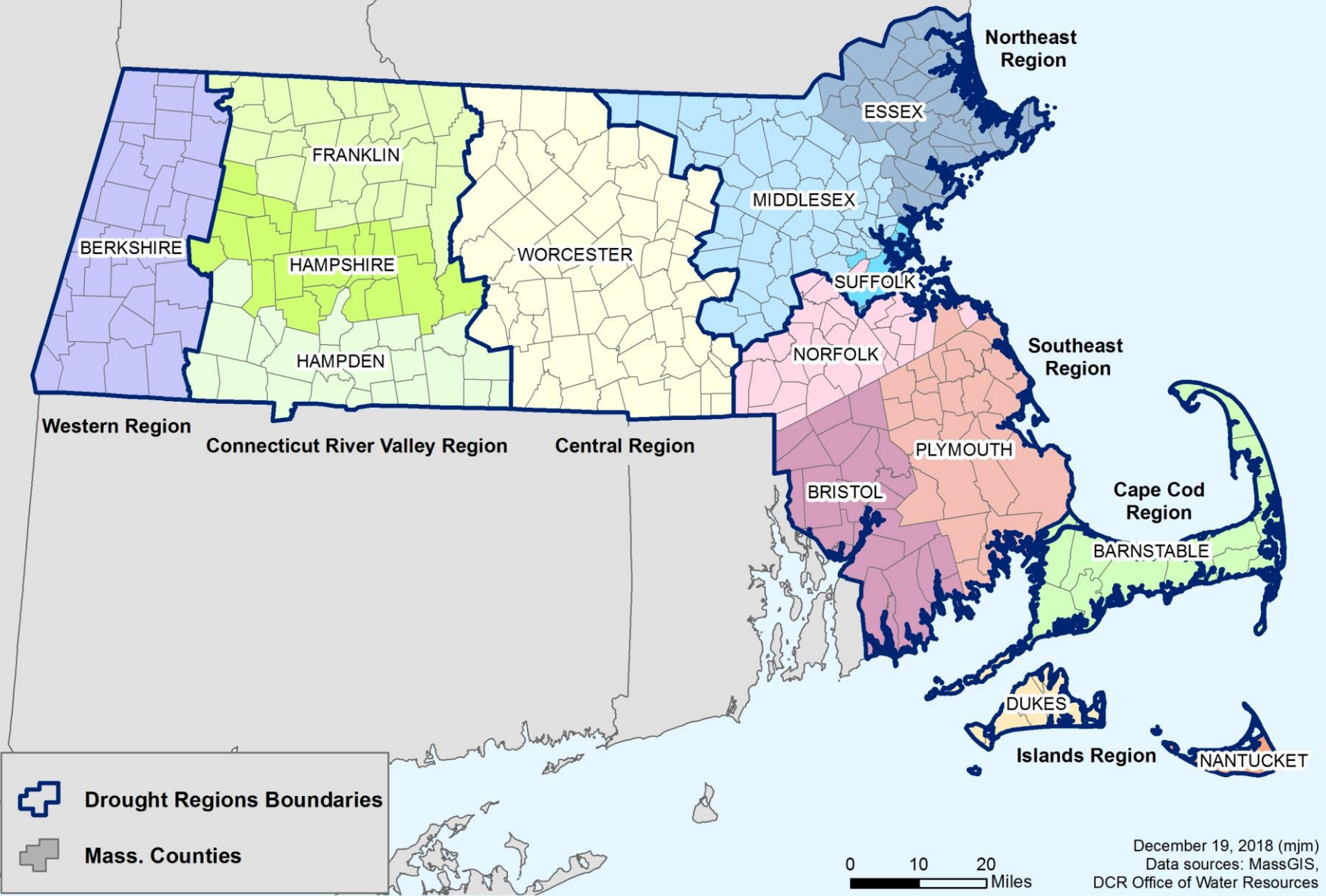
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments, Groundwater, and Evapotranspiration	Keetch-Byram Drought Index
0	>30 th percentile	< 200
1	≤30 and >20	200-400
2	≤20 and >10	400-600
3	≤10 and >2	600-700
4	≤2	700-800

MA Drought Management Plan

Drought Levels



MASSACHUSETTS DROUGHT REGIONS with Counties



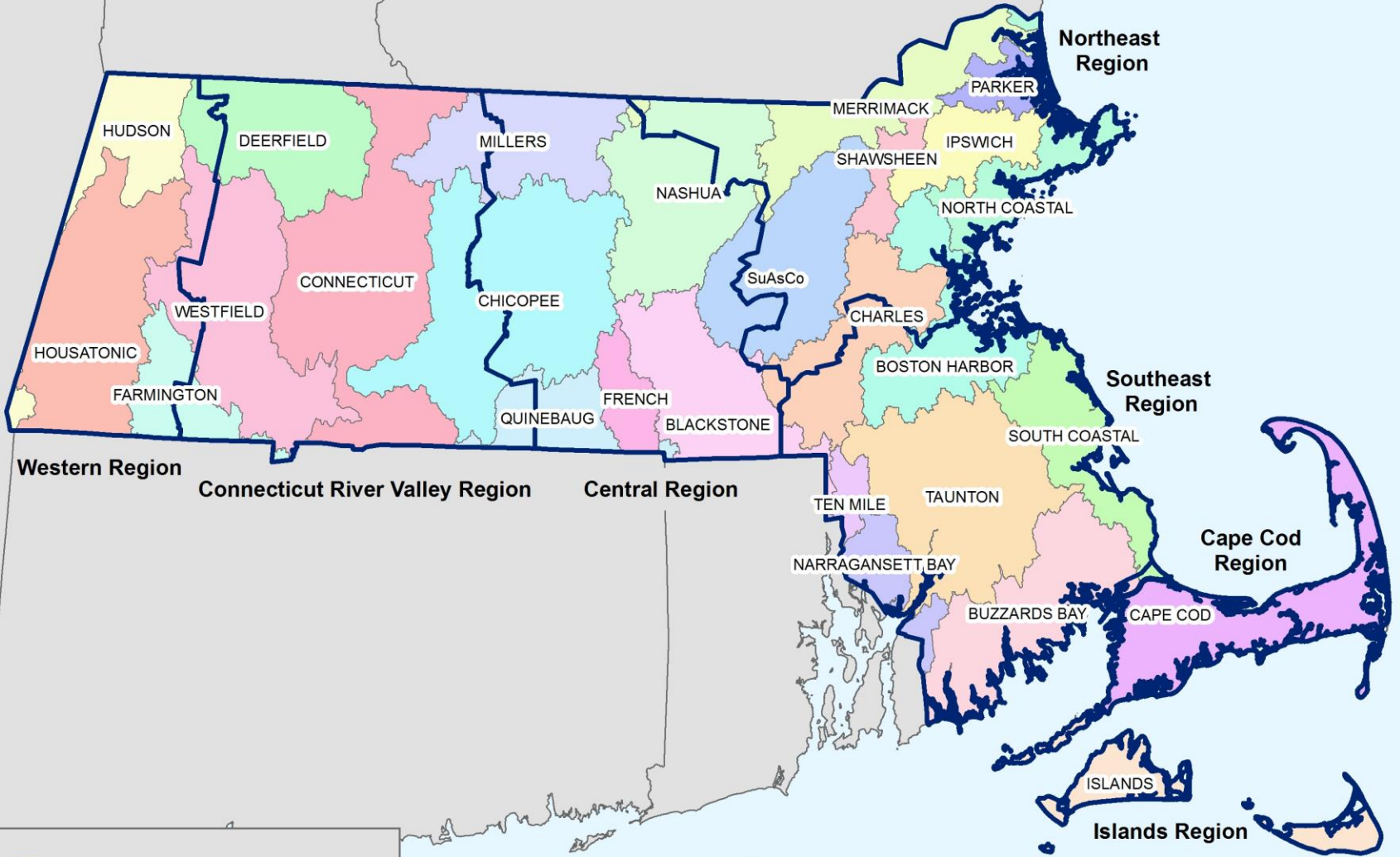
-  Drought Regions Boundaries
-  Mass. Counties

0 10 20
Miles

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

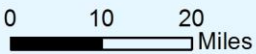


MASSACHUSETTS DROUGHT REGIONS with Watersheds



 Drought Regions Boundaries

 Mass. Counties



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

Task Force Member Updates



Hydrologic
Conditions



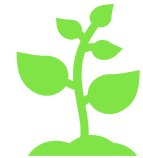
Weather &
Forecast



Water Supply
Impacts



Environmental
Impacts



Agricultural
Impacts



Fire Danger



Engineering/
Infrastructure
Impacts

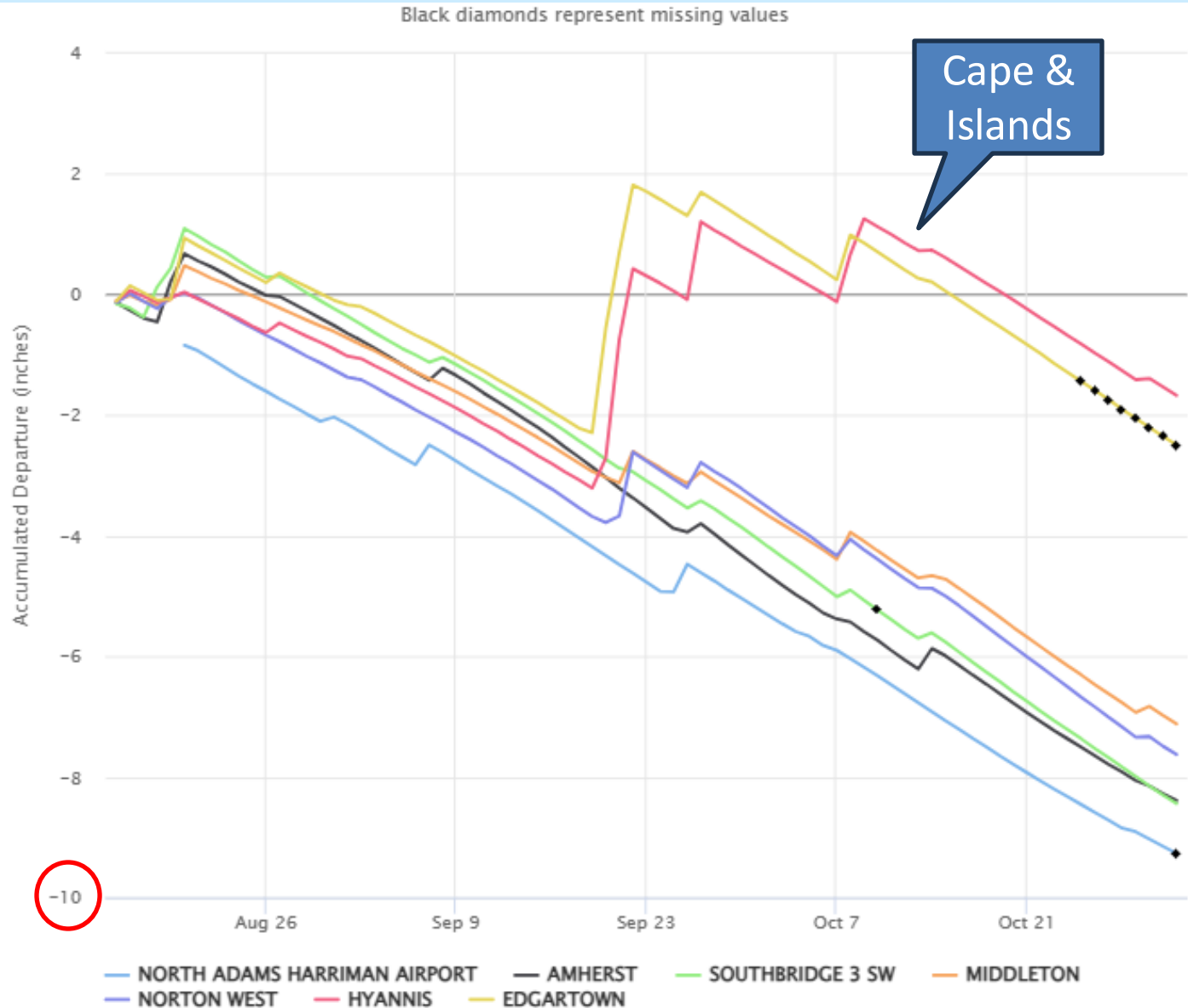


Public Health
Impacts

Up to 9" of Precipitation Deficit since mid-August

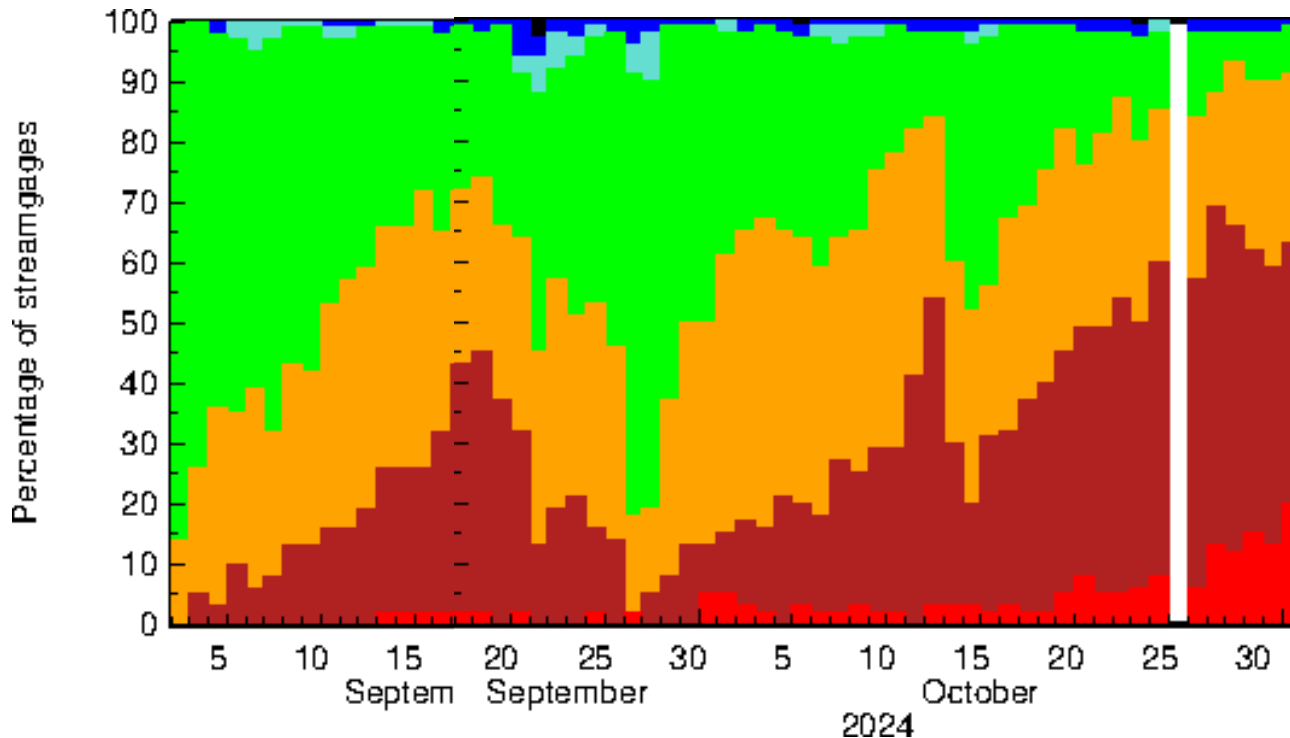
Minimal rain including weeks of no rain since we last met

- Record breaking monthly precipitation, i.e., 0th percentile
- Boston area broke its longest dry stretch in the past 25 years (<https://www.wbur.org/news/2024/09/13/boston-rain-dry-stretch-weather-newsletter>)



Fast Deterioration in Conditions from 2nd week of September onward

- With the exception of a few days at end of September, the majority of streamflows were below to well below normal with an increasing number of *record lows* by end of October

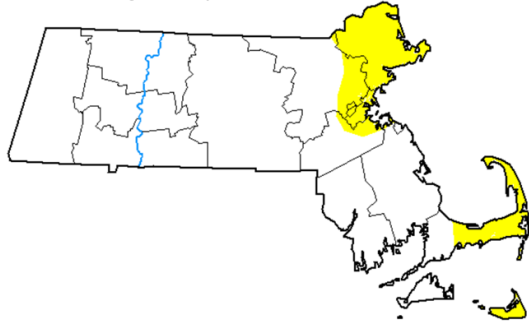


Recent Hydrologic History

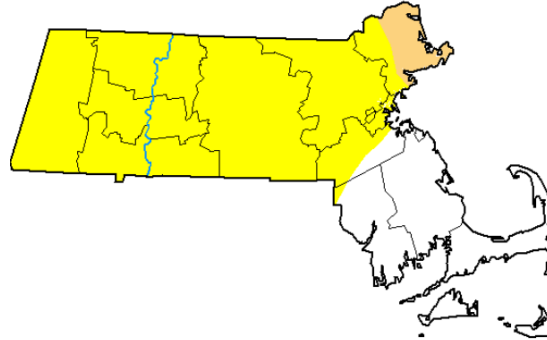
- **Mid-August**
 - Precipitation deficit start its significant decline
- **September**
 - Western, CTRV, Central, Northeast: Significantly below-normal precipitation drying out areas with mild to significant impacts to streamflow
 - Only Central and Northeast declared as Level 1 – Mild Drought
- **October**
 - Continued lack of rain with windy and dry conditions
 - Significant to record low streamflows across Western, CTRV, Central, Northeast and Southeast

US Drought Monitor

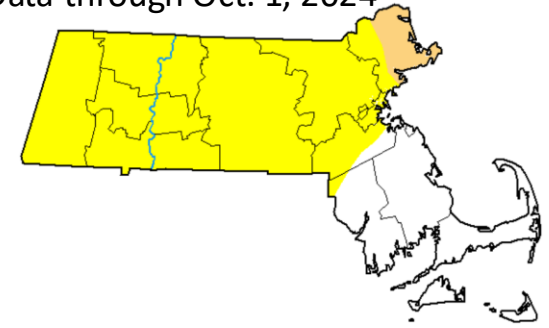
Data through September 17, 2024



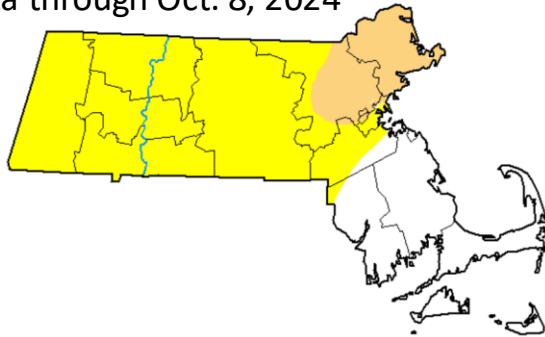
Data through Sept. 24, 2024



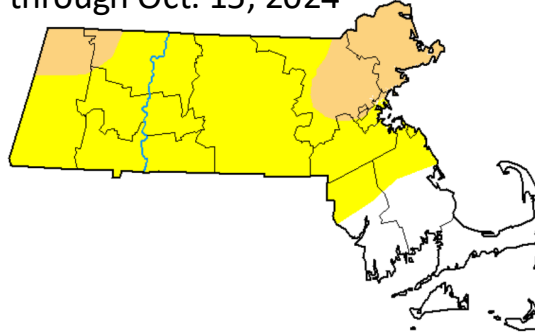
Data through Oct. 1, 2024



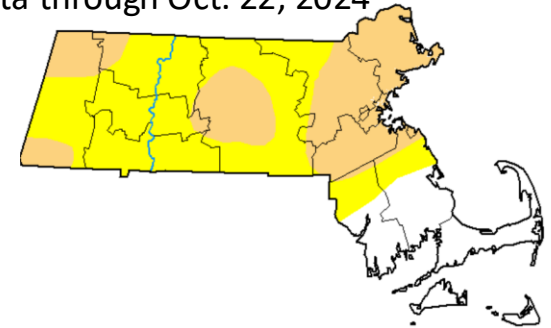
Data through Oct. 8, 2024



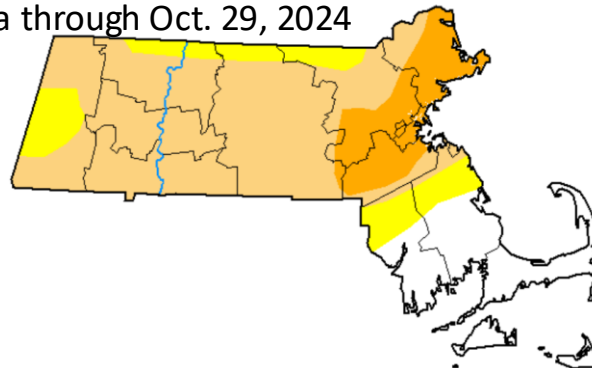
Data through Oct. 15, 2024



Data through Oct. 22, 2024



Data through Oct. 29, 2024

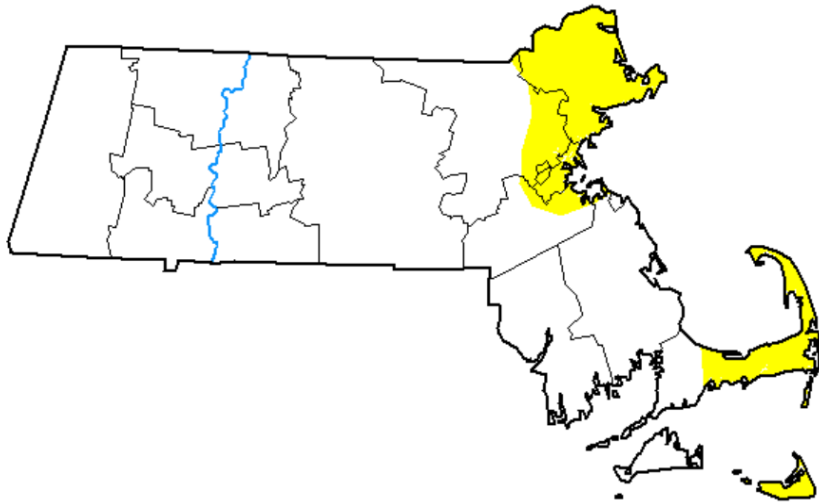


- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

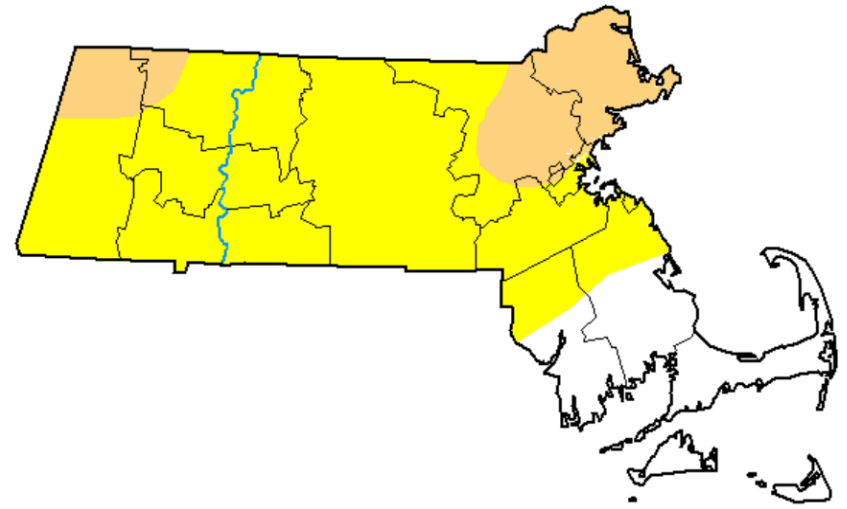
USDM MA DMP

0	=	1
1	=	2
2,3	=	3
4	=	4

US Drought Monitor



Data through September 17, 2024

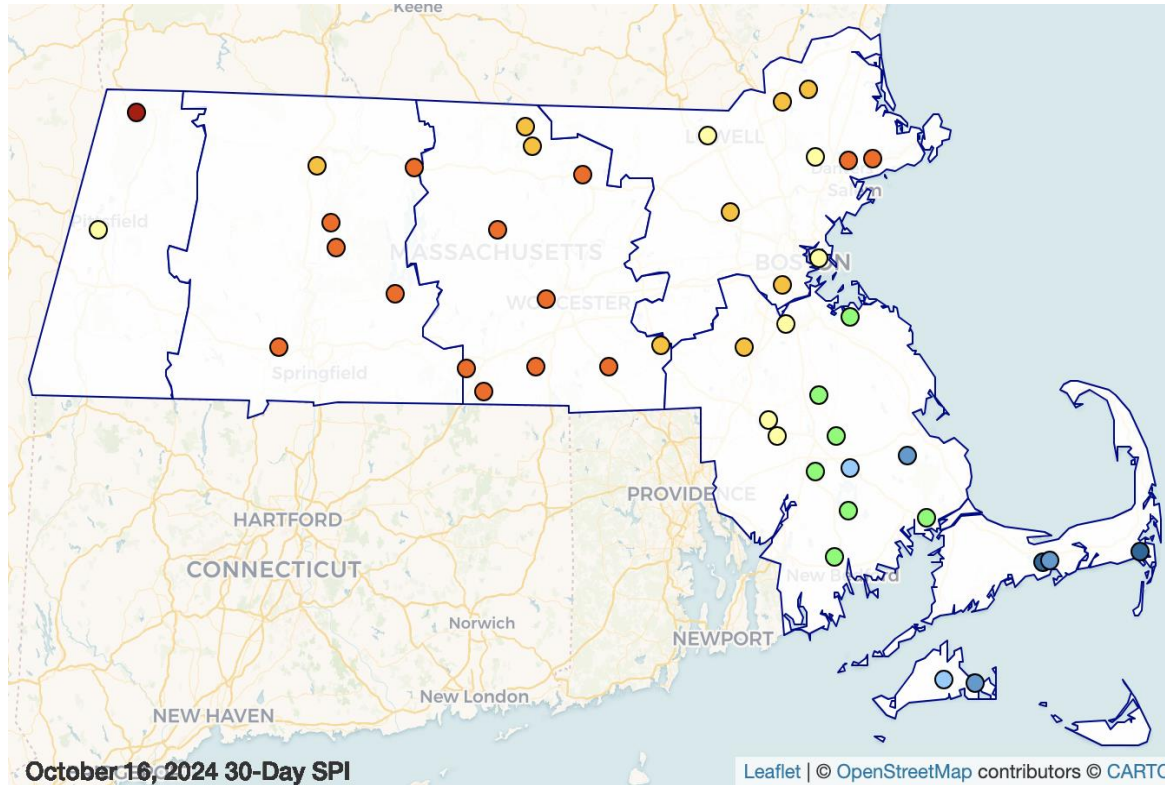


Data through October 15, 2024





- 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

	>=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

Standardized Precipitation Index as Percentile

REGION	NUMBER OF SITES	30-day*	60-day	90-day	180-day	270-day	365-day	730-day	1095-day
WESTERN	2	12	3	33	32	62	75	80	73
CTRV	6	7	5	16	30	58	70	85	70
CENTRAL	10	6	3	9	21	52	76	94	86
NORTHEAST	9	17	3	13	14	34	54	86	62
SOUTHEAST	13	47	14	20	33	70	80	82	67
CAPE COD	3	94	68	50	48	60	49	61	81
ISLANDS	2	80	51	37	47	63	54	52	46

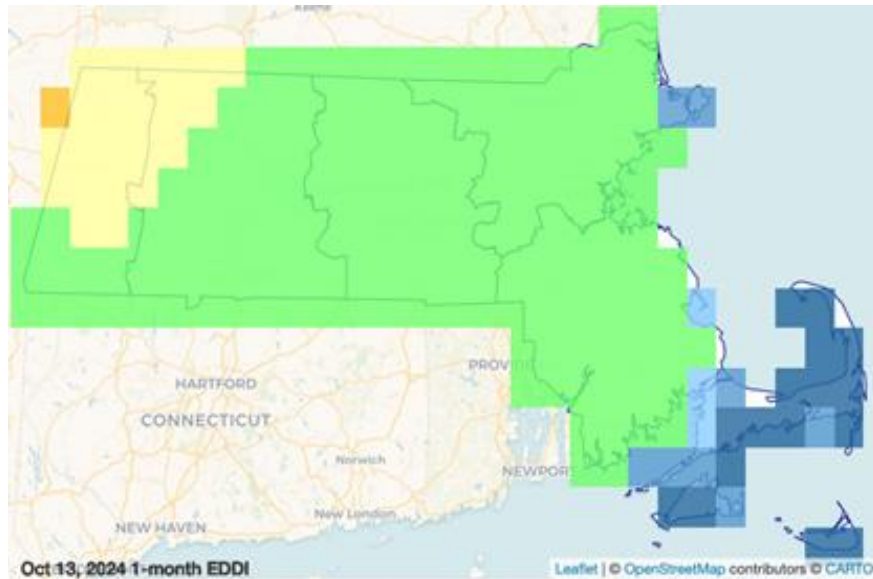
* 1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

N/A: Not Available

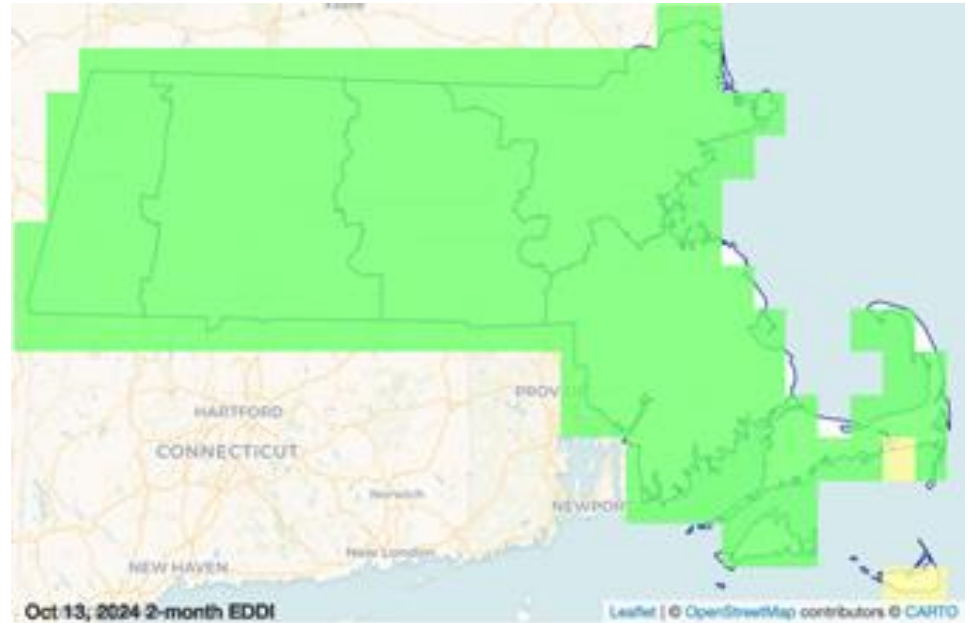
Drought Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Evapotranspiration

1-month (mid-Sept. to mid-Oct.)



2-month (mid-Aug. to mid-Oct.)

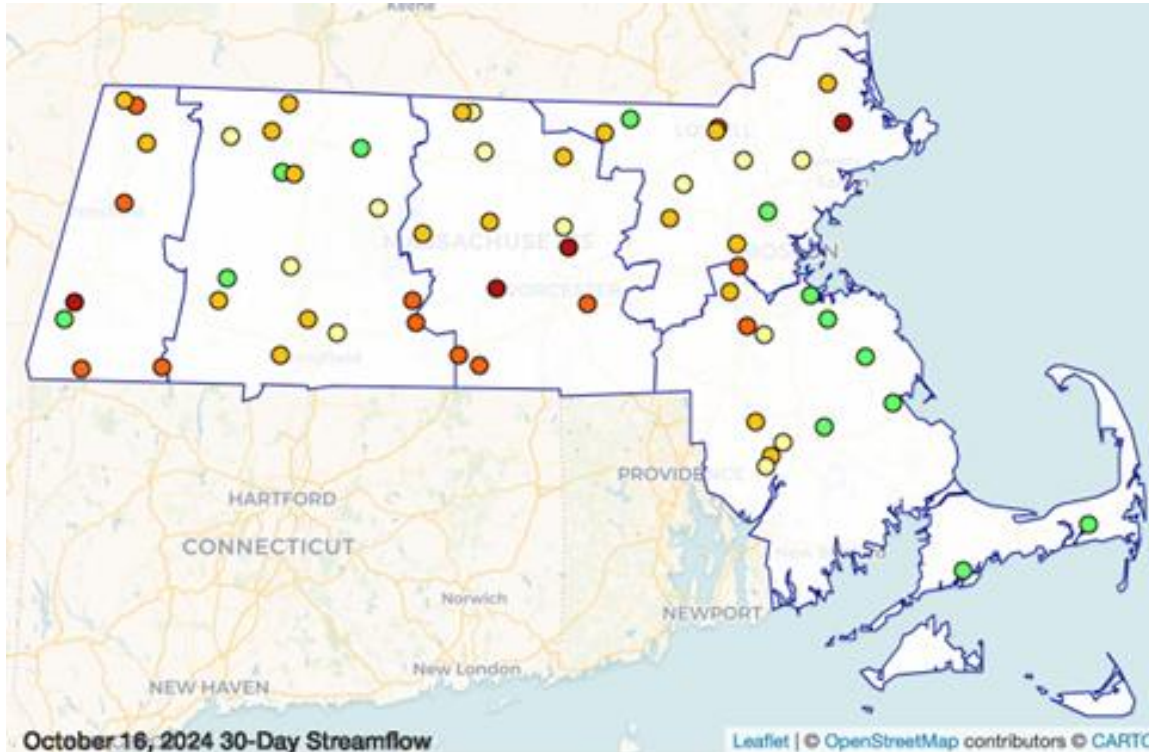


Drought Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

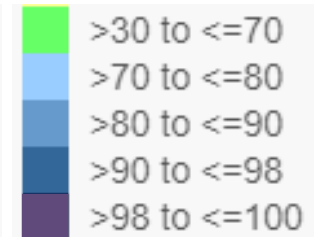
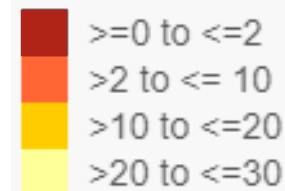
REGION	MEDIAN 2-MONTH EDDI (2024-10-13)
WESTERN	40
CTRV	42
CENTRAL	53
NORTHEAST	47
SOUTHEAST	42
CAPE COD	45
ISLANDS	42

Streamflow

Percentiles of Monthly Median



Percentiles



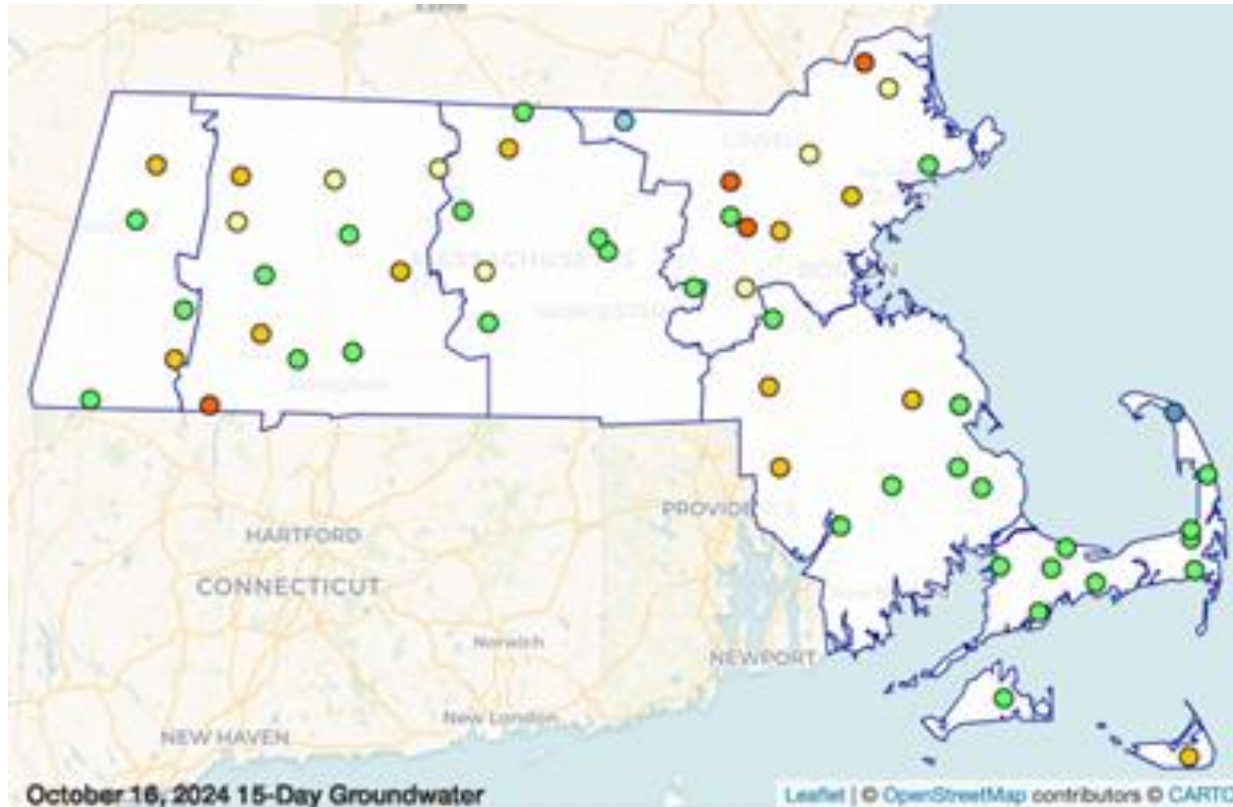
Streamflow Index

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	1	4	2	0	0	7
CTRV	15	0	2	6	5	0	20
CENTRAL	12	2	3	4	3	0	11
NORTHEAST	13	1	2	5	3	0	20
SOUTHEAST	12	0	1	3	3	0	25
CAPE COD	2	0	0	0	0	0	60

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.

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

Groundwater Percentiles



Percentiles

- ≥ 0 to ≤ 2
- > 2 to ≤ 10
- > 10 to ≤ 20
- > 20 to ≤ 30

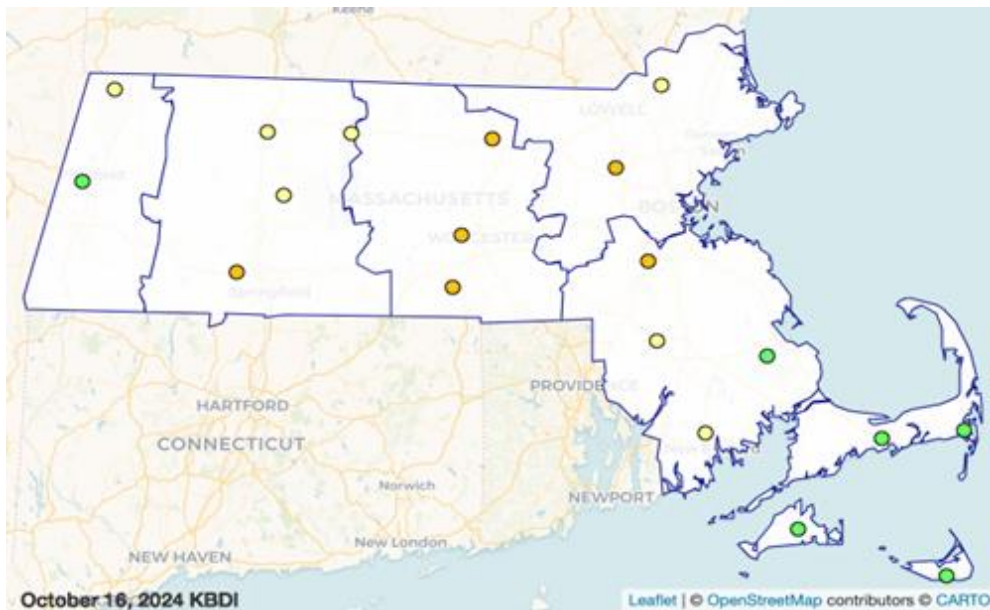
- > 30 to ≤ 70
- > 70 to ≤ 80
- > 80 to ≤ 90
- > 90 to ≤ 98
- > 98 to ≤ 100

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	39
CTRV	11	0	1	3	3	0	27
CENTRAL	8	0	0	1	1	0	35
NORTHEAST	11	0	3	2	3	0	25
SOUTHEAST	10	0	0	3	0	0	50
CAPE COD	10	0	0	0	0	0	59
ISLANDS	2	0	0	1	0	0	40

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

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	2	308
CTRV	4	434
CENTRAL	3	450
NORTHEAST	2	442
SOUTHEAST	4	557
CAPE COD	2	30
ISLANDS	2	99

Drought Levels

Level 0	Level 1	Level 2	Level 3	Level 4
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Drought Indices by Region

mid-September to mid-October 2024

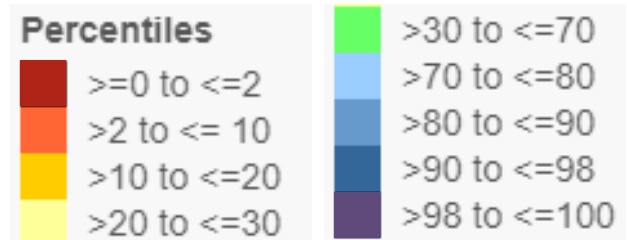
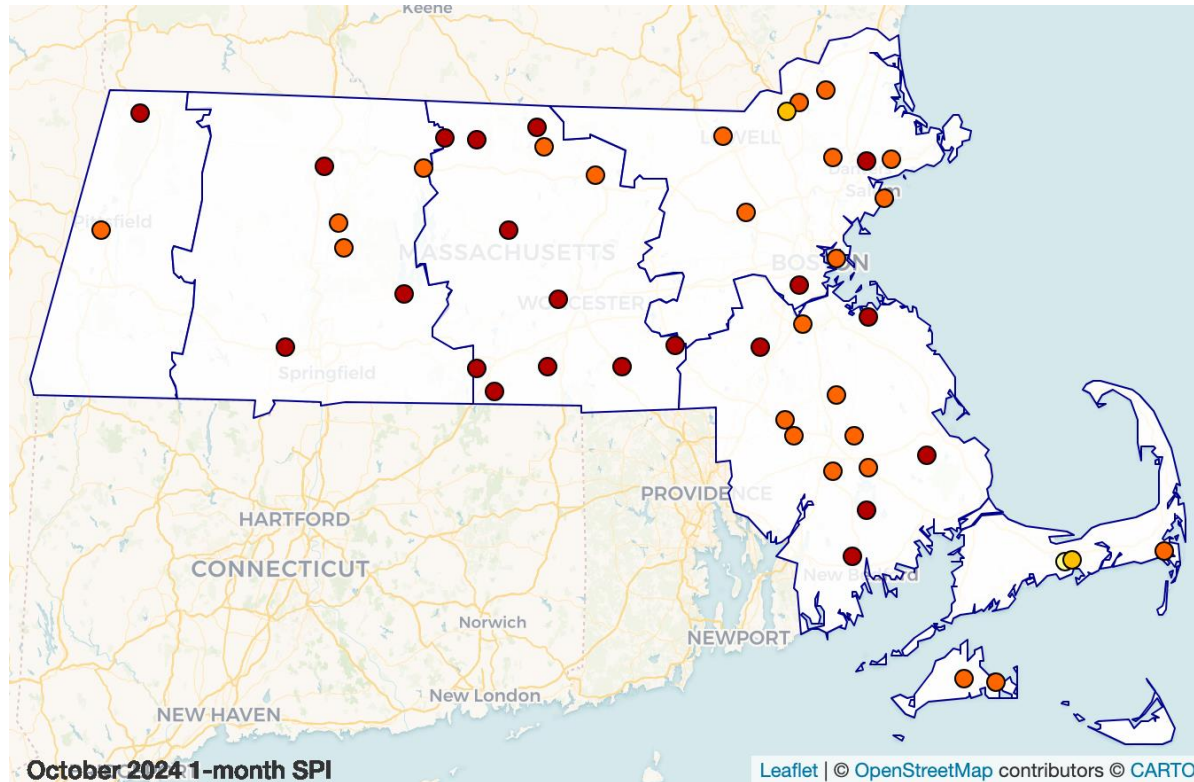
Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (60-day)	3	5	3	3	14	68	51
Streamflow	7	20	11	20	25	60	N/A
Groundwater	39	27	35	25	50	59	40
Lakes/ Impoundments	ID	ID	ID	ID	ID	ID	N/A
ET	40	42	53	47	42	45	42
KBDI	308	434	450	442	557	30	99

Mid-Month October	Level 2	Level 2	Level 2	Level 2	Level 1	Level 0	Level 0
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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.

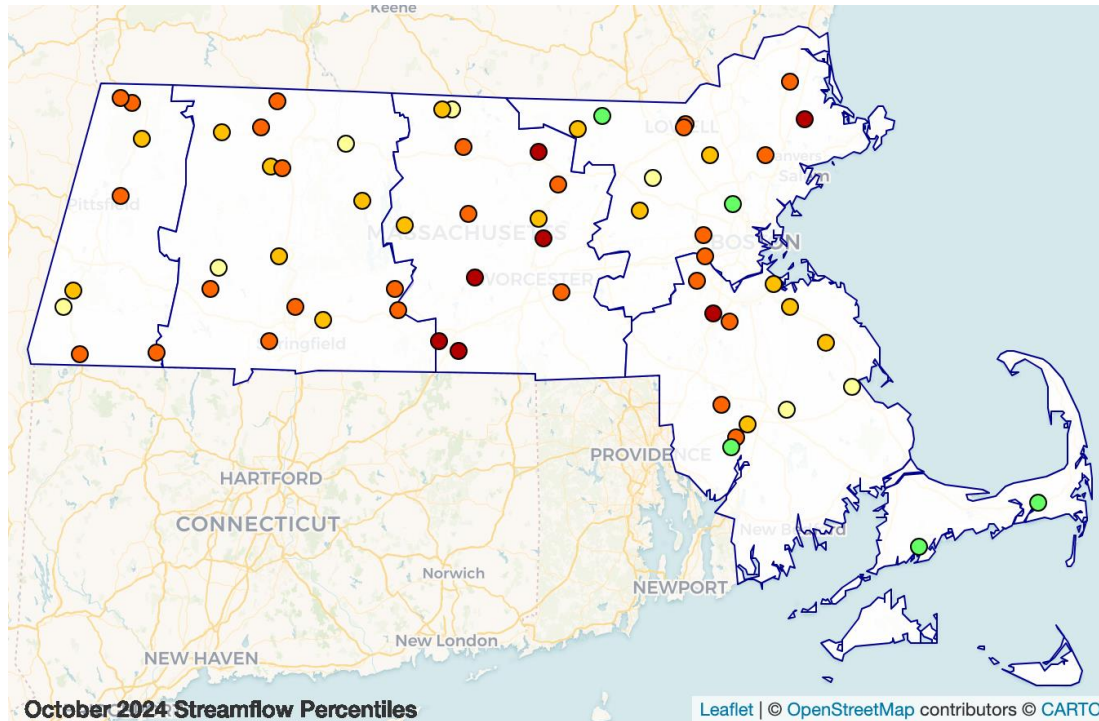
Drought Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Standardized Precipitation Index

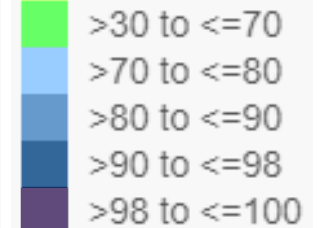
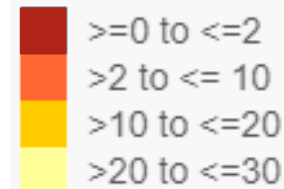


Streamflow

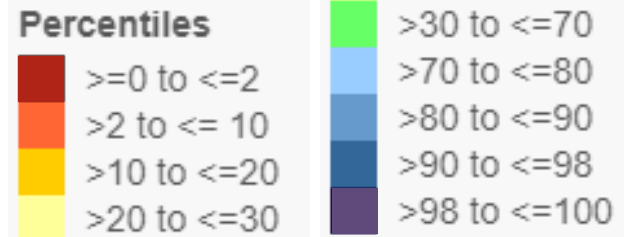
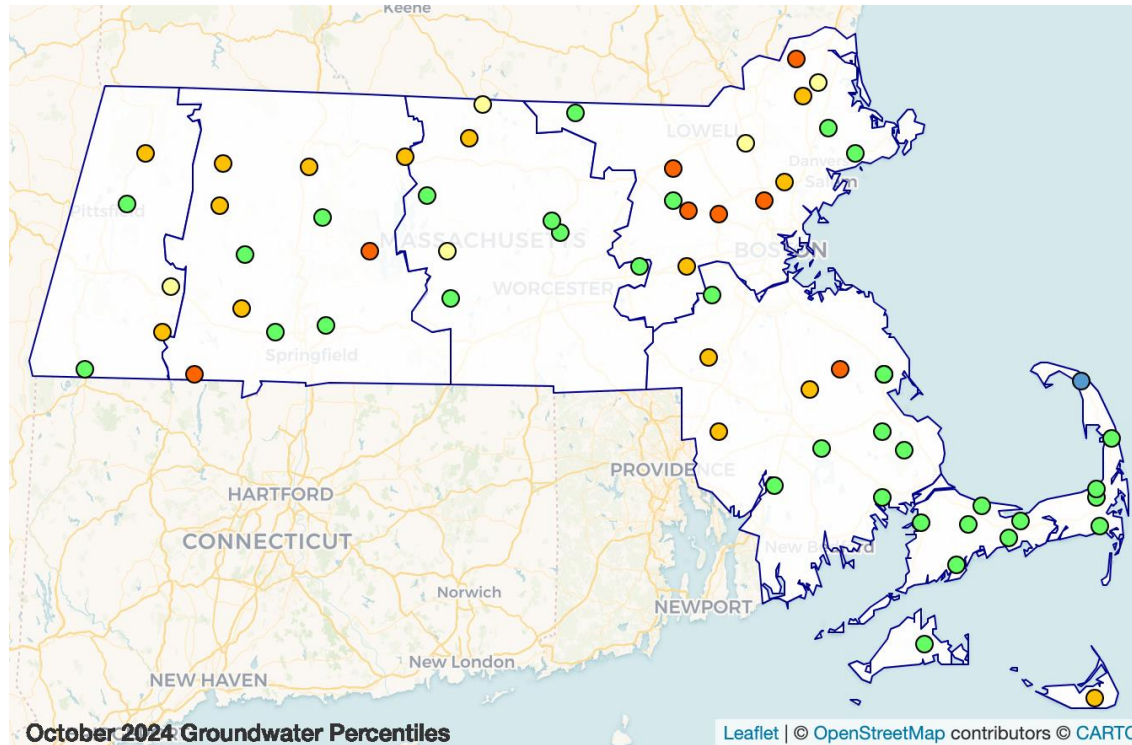
Percentiles of Monthly Median



Percentiles



Groundwater Percentiles



DRAFT Drought Indices by Region

October 1st through October 31st 2024

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (3-month)	14	8	4	10	9	34	20
Streamflow	7	11	4	9	14	51	N/A
Groundwater	28	19	33	18	41	54	37
Lakes/ Impoundments	37	31	21	15	29	43	N/A
ET	19	23	26	23	26	33	31
KBDI	354	481	576	587	588	126	145

<i>End of October</i>	<i>Level 2</i>	<i>Level 2</i>	<i>Level 3</i>	<i>Level 2</i>	<i>Level 2</i>	<i>Level 0</i>	<i>Level 0</i>
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Drought Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

DRAFT Drought Indices by Region

Mid-Sept to Mid-October

October 1st – 31st

Drought Index	West	CTRV	Central	NE	SE	Cape	Islands
Precip	3	5	3	3	14	68	51
SF	7	20	11	20	25	60	N/A
GW	39	27	35	25	50	59	40
L/I	ID	ID	ID	ID	ID	ID	N/A
ET	40	42	53	47	42	45	42
KBDI	308	434	450	442	557	30	99
<i>Drought Levels</i>	Lev 2	Level 2	Level 2	Level 2	Level 1	Level 0	Level 0

West	CTRV	Central	NE	SE	Cape	Islands
14	8	4	10	9	34	20
7	11	4	9	14	51	N/A
28	19	33	18	41	54	37
37	31	21	15	29	43	N/A
19	23	26	23	26	33	31
354	481	576	587	588	126	145
Level 2	Level 2	Level 3	Level 2	Level 2	Level 0	Level 0

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

Drought Indices by Region

September 1st through September 30th 2024

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (2 mos)	32	29	30	28	34	56	55
Streamflow	13	38	19	21	20	43	N/A
Groundwater	42	41	57	36	54	57	40
Lakes/ Impoundments	ID	45	42	36	49	68	N/A
ET	56	58	58	51	49	55	52
KBDI	306	409	548	555	532	45	71

<i>September</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 1</i>	<i>Level 1</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</i>
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Drought Levels				
Level 0	Level 1	Level 2	Level 3	Level 4