

Hydrologic Conditions in Massachusetts for January 2023

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DCR Office of Water Resources

Drought Management Task Force

February 8, 2023

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan Indices

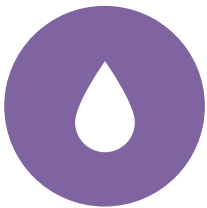
Numbers in parentheses indicate number of data points across the state



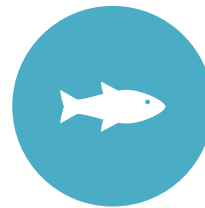
Precipitation (93)



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

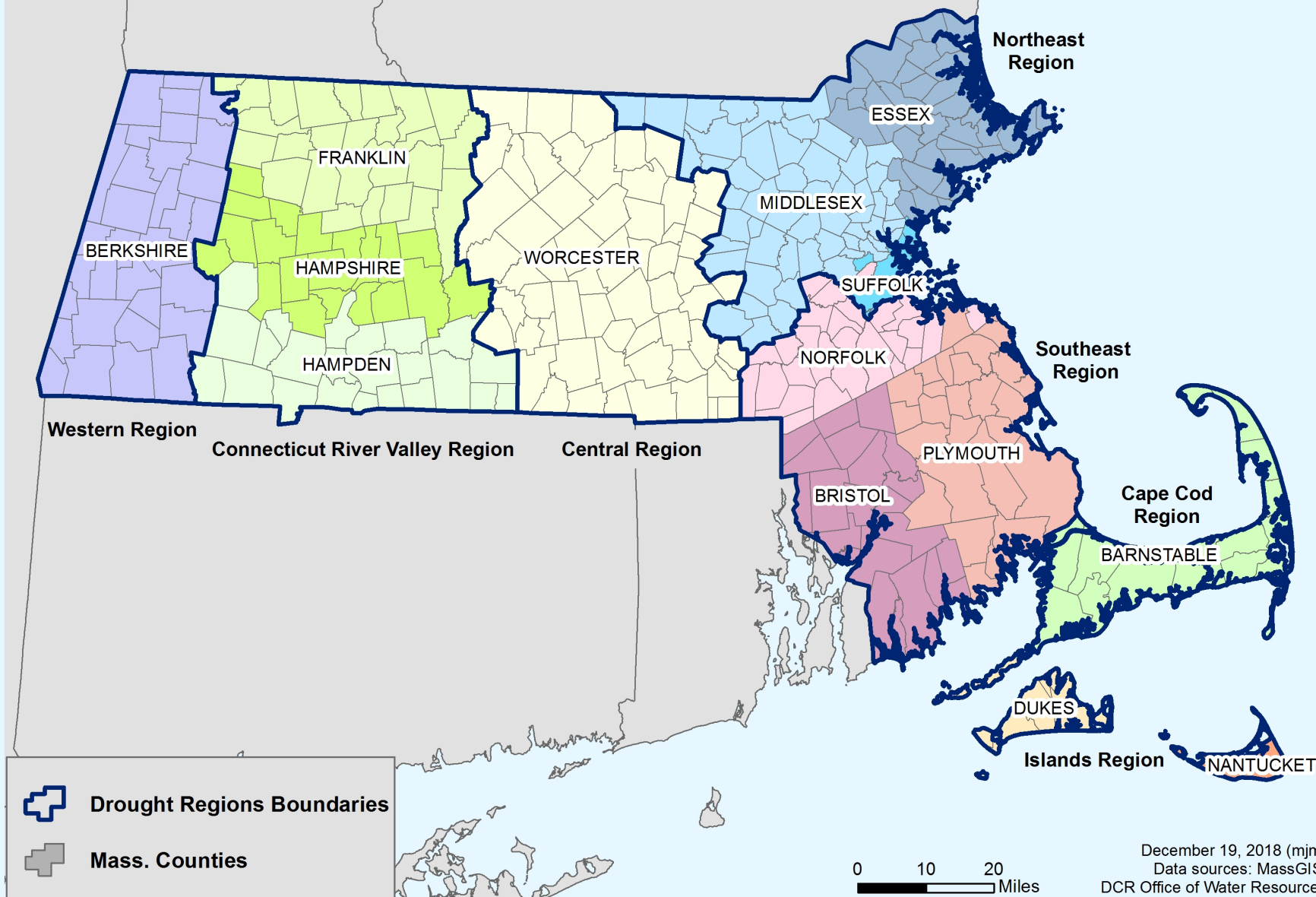
Drought Levels





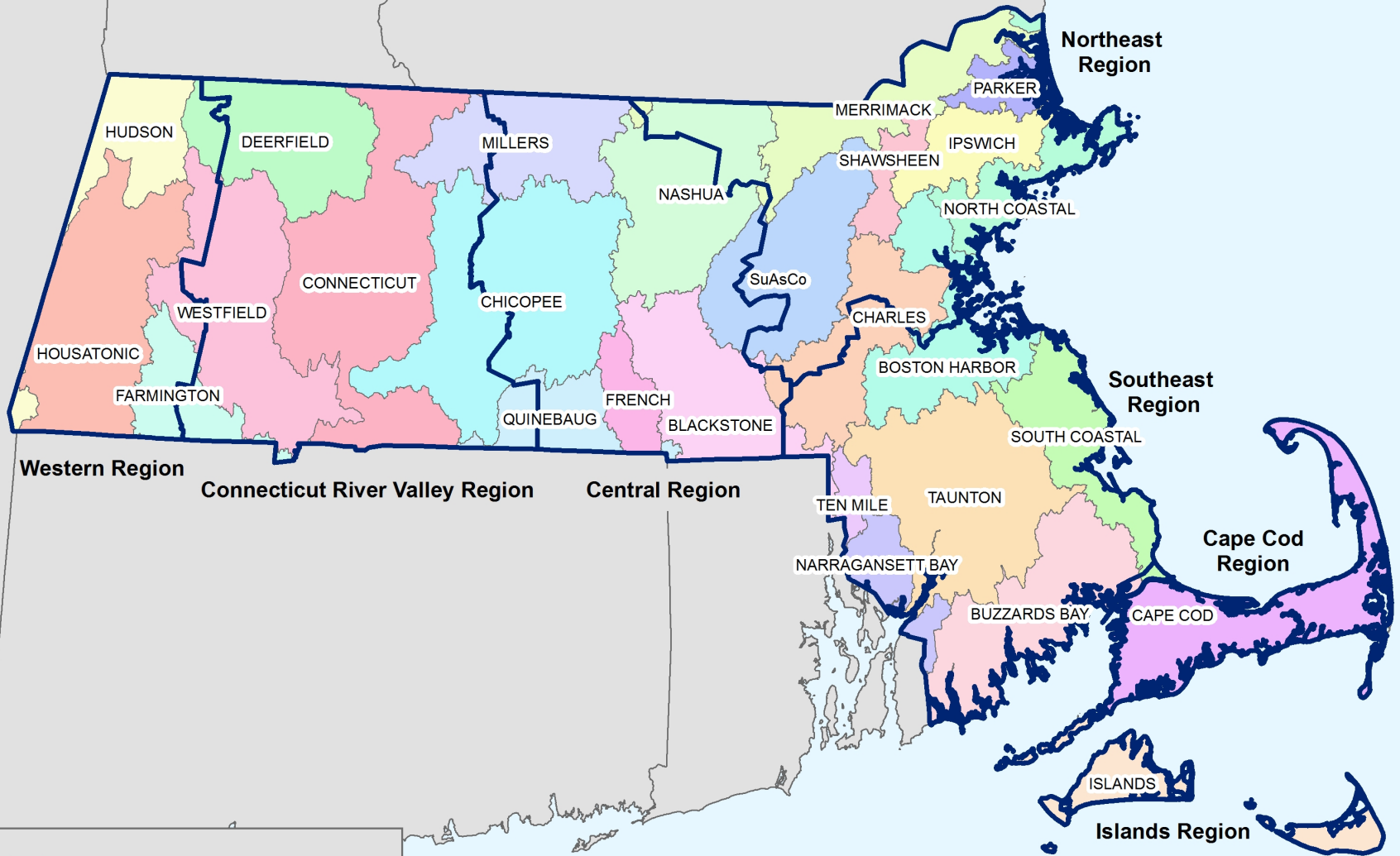
MASSACHUSETTS DROUGHT REGIONS

with Counties





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

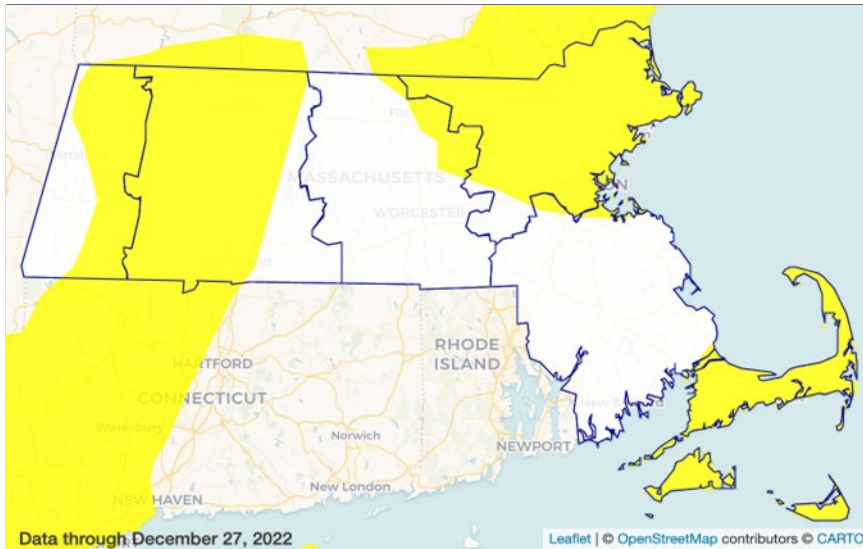


Public Health
Impacts

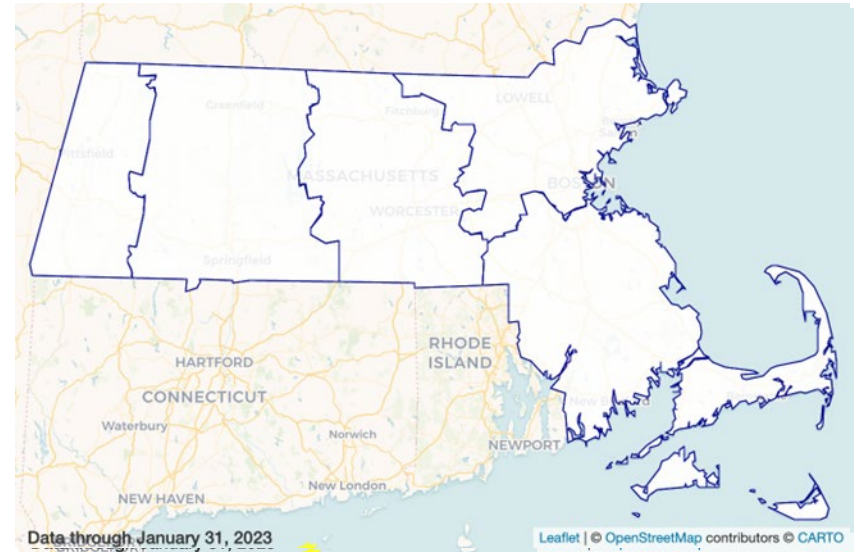
Recent Hydrologic History

- 2022
 - *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
 - *December*
 - normal to above-normal precipitation; improvement, but some areas still lagging
- 2023
 - *January*
 - above-normal precipitation with significant improvement







US Drought Monitor



Data through December 27, 2022

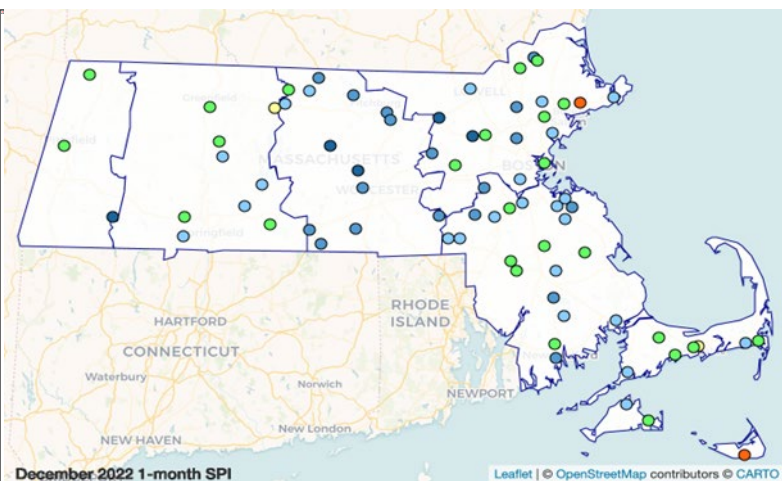
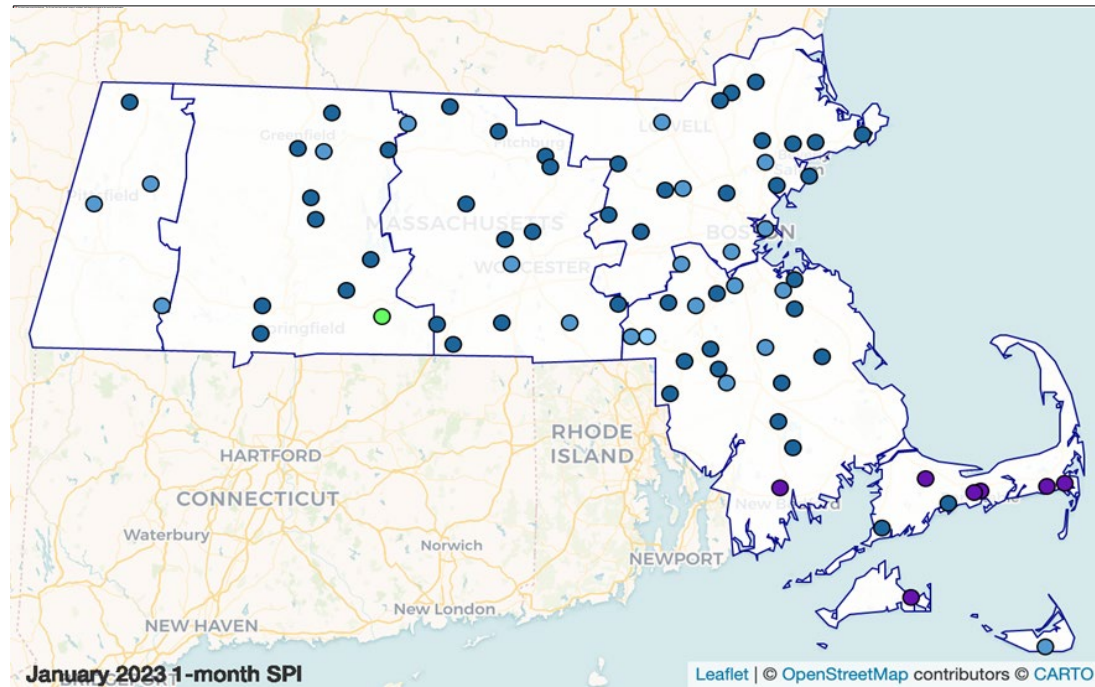
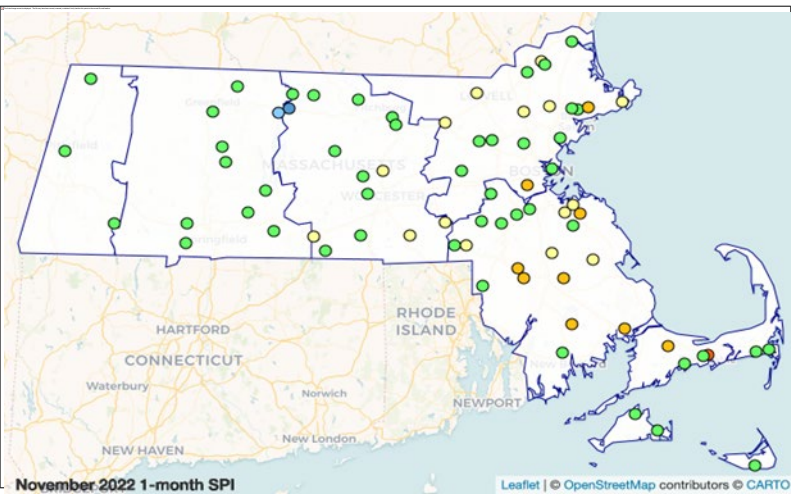


Data through January 31, 2023

	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

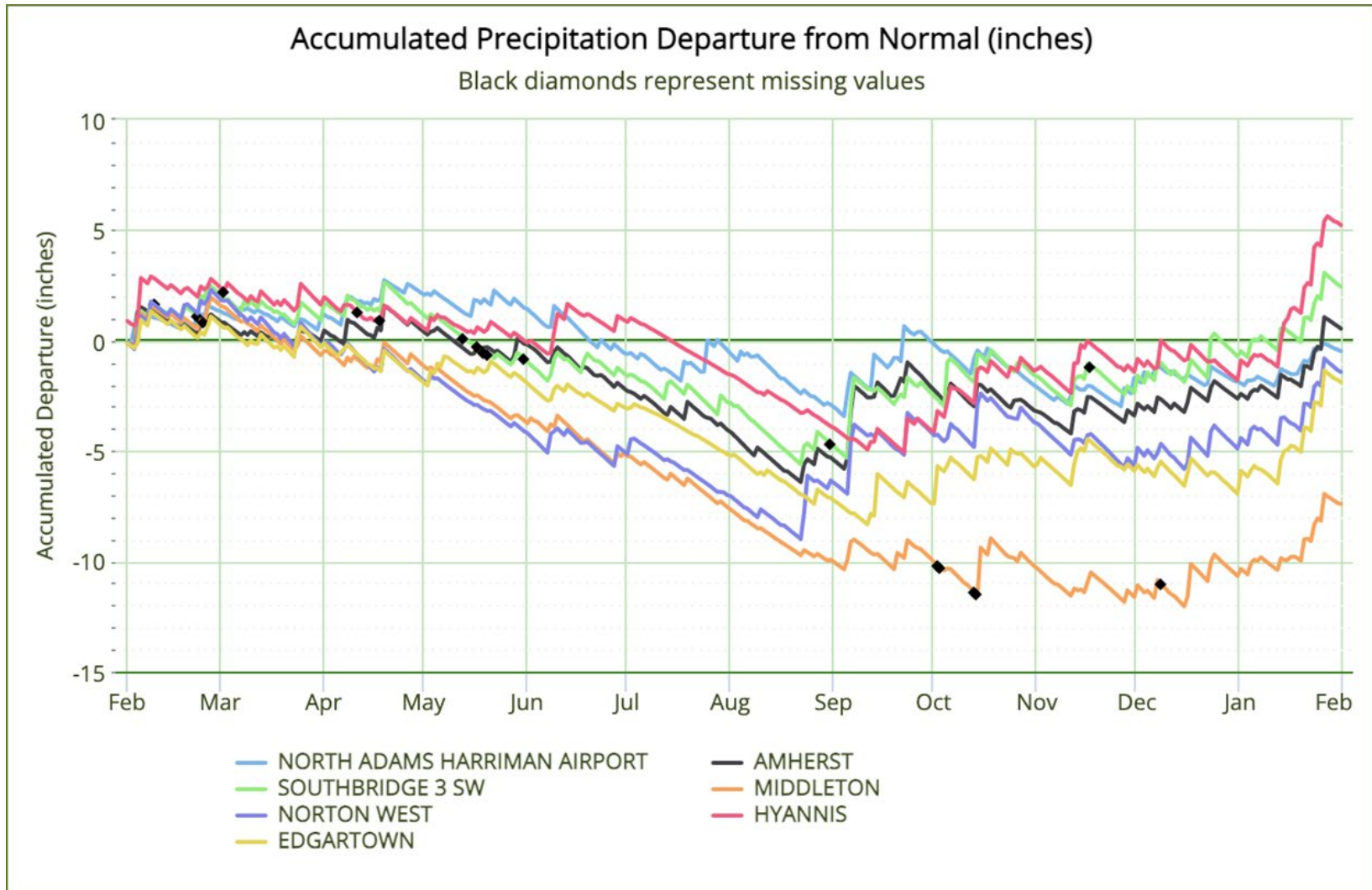


Percentiles

>=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

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.

Data through January 31, 2023

Standardized Precipitation Index as Percentile, January

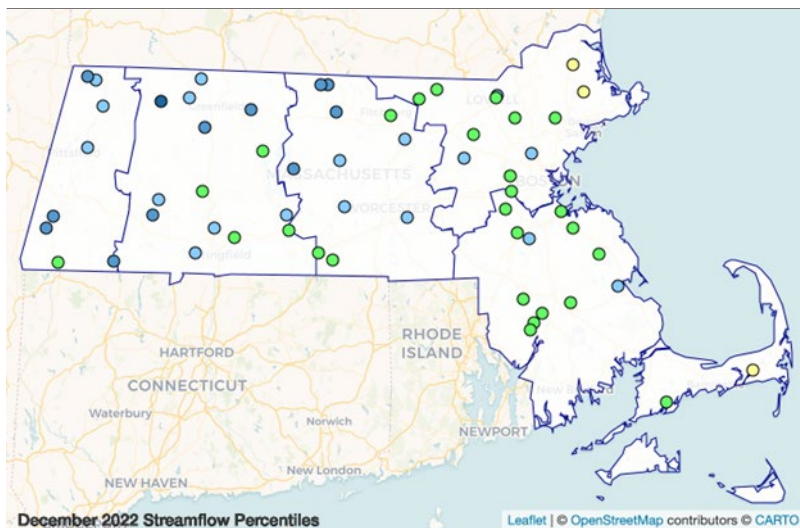
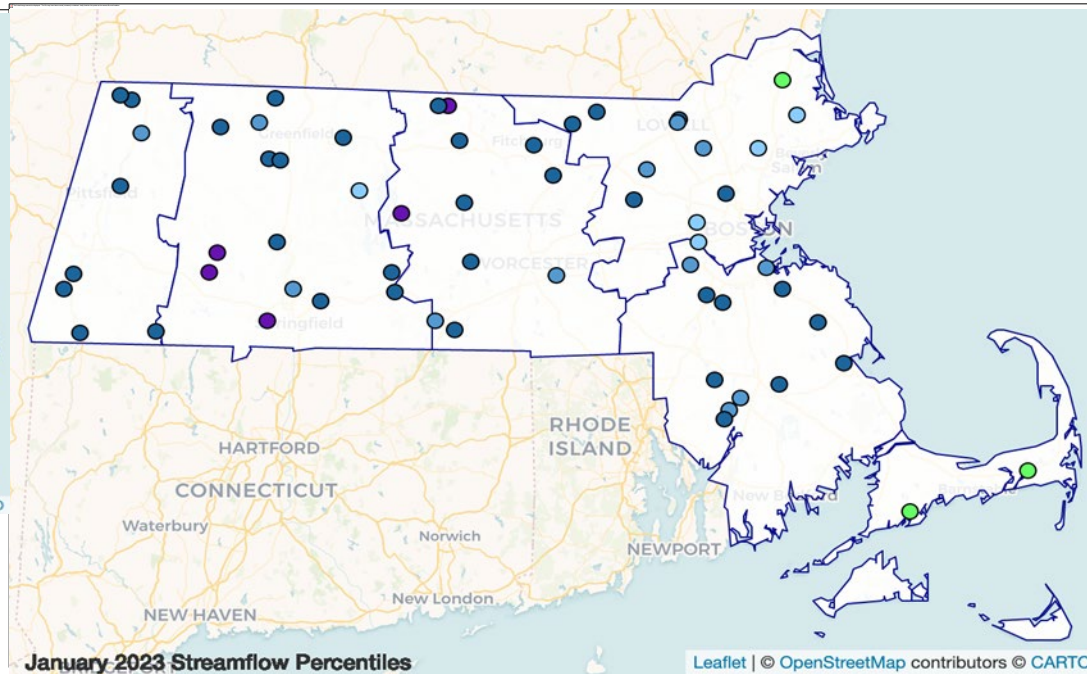
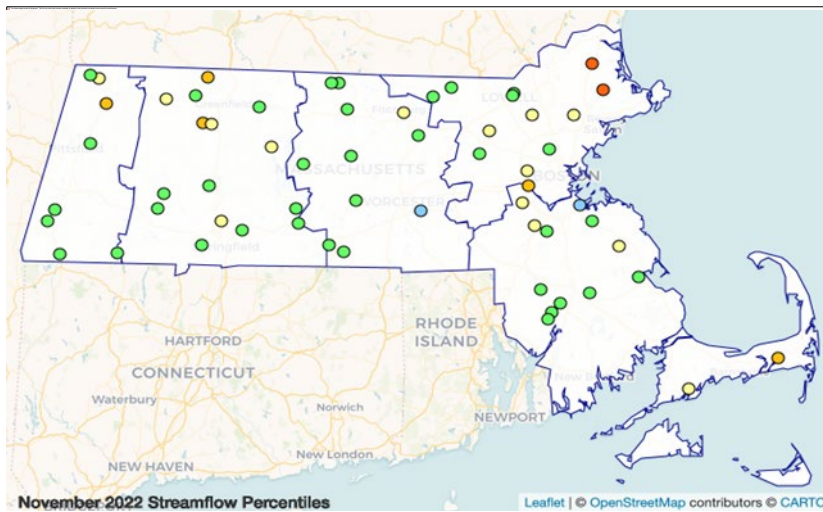
REGION	NUMBER OF SITES	1-mo *	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo*
WESTERN	4	16	26	38	58	74	43	83	70
CTRV	10	40	49	56	75	78	51	76	69
CENTRAL	14	50	46	55	82	85	61	87	77
NORTHEAST	20	45	47	58	76	60	32	67	73
SOUTHEAST	19	51	34	46	65	68	55	71	61
CAPE COD	4	31	27	25	81	85	69	73	27
ISLANDS	2	37	21	20	56	61	44	22	10

* 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.

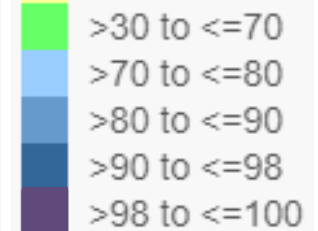
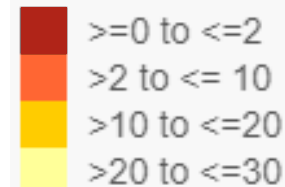
Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Data through January 31, 2023

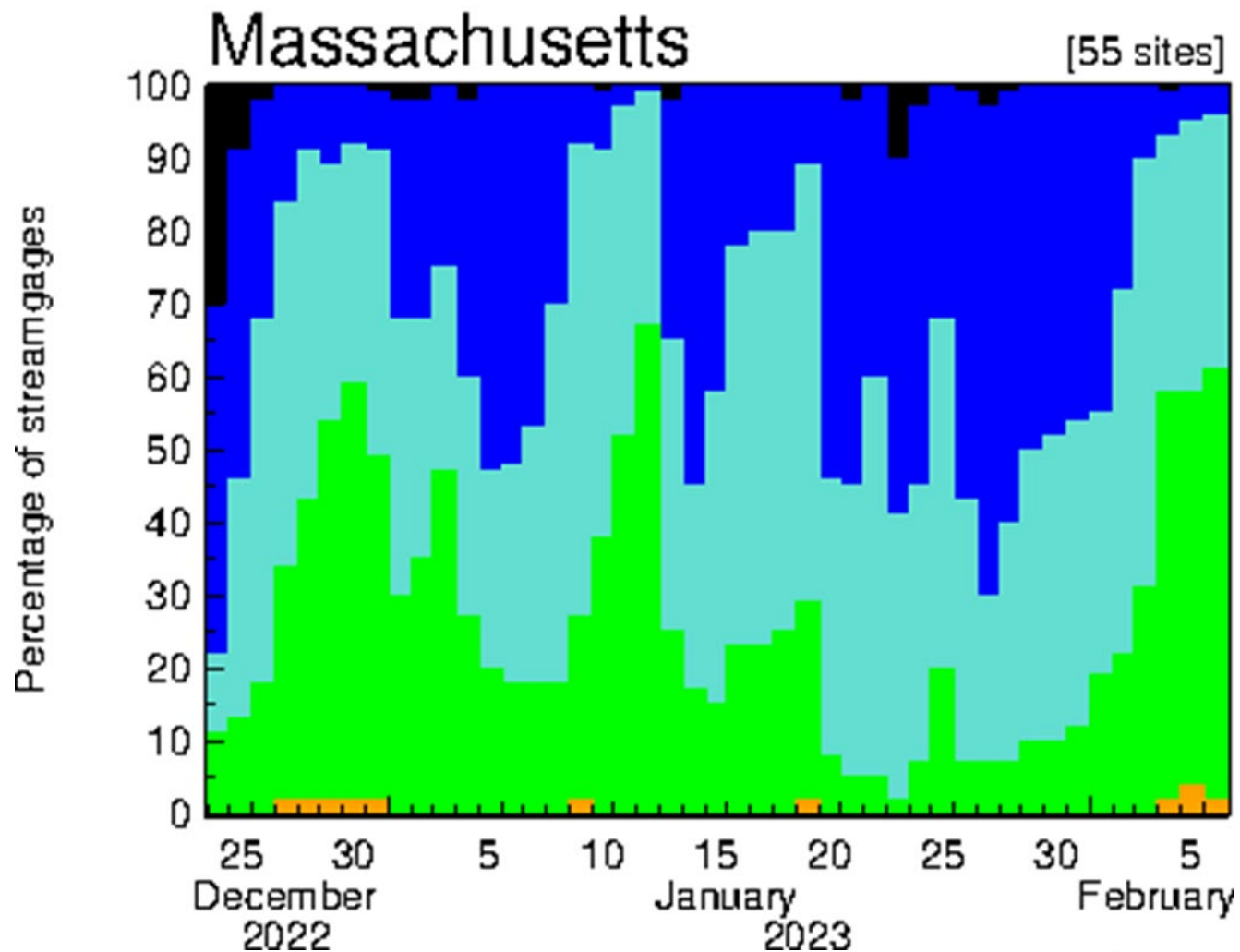
Streamflow Percentiles of Monthly Median



Percentiles



Percent of Gages at Various Percentiles



Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	No Data

Streamflow Index January

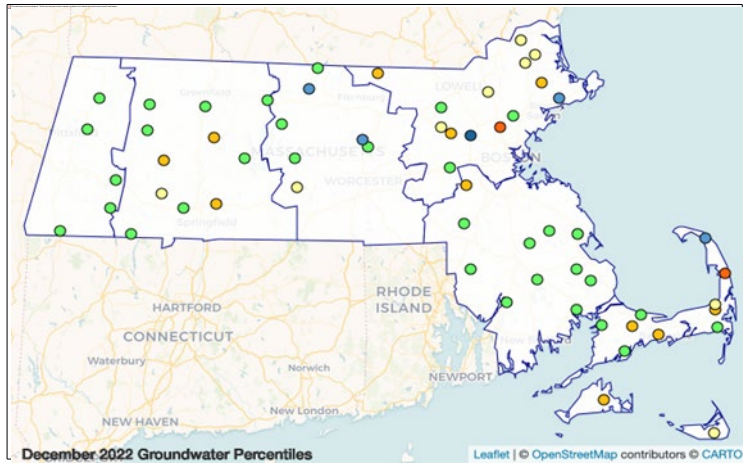
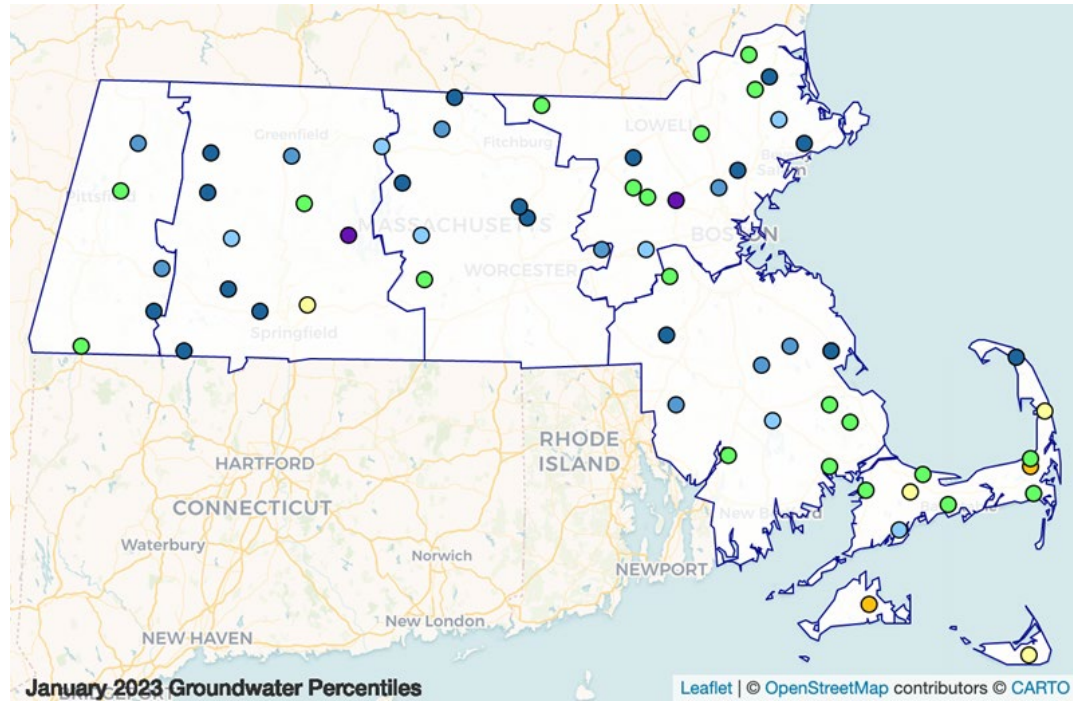
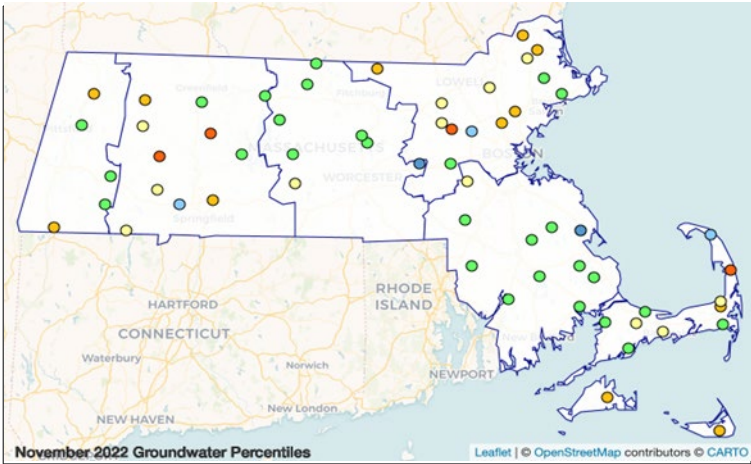
REGION	NUMBER OF GAGES REPORTING	≥0 TO ≤2 PERCENTILE	>2 TO ≤10 PERCENTILE	>10 TO ≤20 PERCENTILE	>20 TO ≤30 PERCENTILE	>90 PERCENTILE	MEDIAN OF INDIVIDUAL GAGE PERCENTILES
WESTERN	8	0	0	3	2	0	26
CTRV	15	0	0	0	5	0	33
CENTRAL	11	0	0	1	2	0	36
NORTHEAST	13	0	0	0	1	0	45
SOUTHEAST	12	0	0	1	4	0	35
CAPE COD	2	0	0	2	0	0	15

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.

Data through January 31, 2023

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

Groundwater Percentiles



Percentiles

	≥ 0 to ≤ 2		> 30 to ≤ 70
	> 2 to ≤ 10		> 70 to ≤ 80
	> 10 to ≤ 20		> 80 to ≤ 90
	> 20 to ≤ 30		> 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	0	0	1	85
CTRV	11	0	0	0	1	6	91
CENTRAL	8	0	0	0	0	4	88
NORTHEAST	14	0	0	0	0	5	72
SOUTHEAST	12	0	0	0	0	3	78
CAPE COD	10	0	0	1	2	1	53
ISLANDS	2	0	0	1	1	0	22

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

Data through January 31, 2023

Lakes & Impoundments

REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	2	100%
CTRV	2	70th
CENTRAL	6	64th
NORTHEAST	4	35th
SOUTHEAST	2	52nd
CAPE COD	1	16th

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

Data through January 31, 2023

Drought Indices by Region, December 2022

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (9 mos)	34	34	44	14	30	22	25
Streamflow	80	76	75	50	65	29	N/A
Groundwater	46	42	68	27	52	28	16
Lakes/ Impoundments	72	34	30	24	79	17	N/A
ET*- CMI EDDI	N/A	N/A	N/A	N/A	N/A	N/A	N/A
KBDI**	N/A	N/A	N/A	N/A	N/A	N/A	N/A

<i>Declaration from 1/9 meeting</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 1</i>	<i>Level 0</i>	<i>Level 1</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. *ET not reported outside growing season **KBDI not reported Dec-March outside fire danger season

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

Drought Indices by Region, January 2023

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (12 mos)	57	57	62	23	49	65	46
Streamflow	97	96	95	83	93	56	N/A
Groundwater	85	91	88	72	78	53	22***
Lakes/ Impoundments	100%	72	69	41	94	17	N/A
ET*- CMI EDDI	N/A	N/A	N/A	N/A	N/A	N/A	N/A
KBDI**	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Recommend for (2/8 meeting)	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0/1
Declaration from 1/9 meeting	Level 0	Level 0	Level 0	Level 1	Level 0	Level 1	Level 2

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 outside growing season **KBDI not reported Dec-March outside fire danger season. *** As of February 7, 2023, this index is at Level 0.

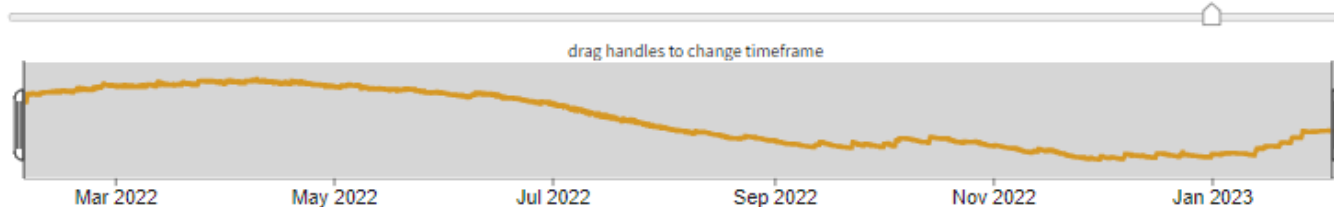
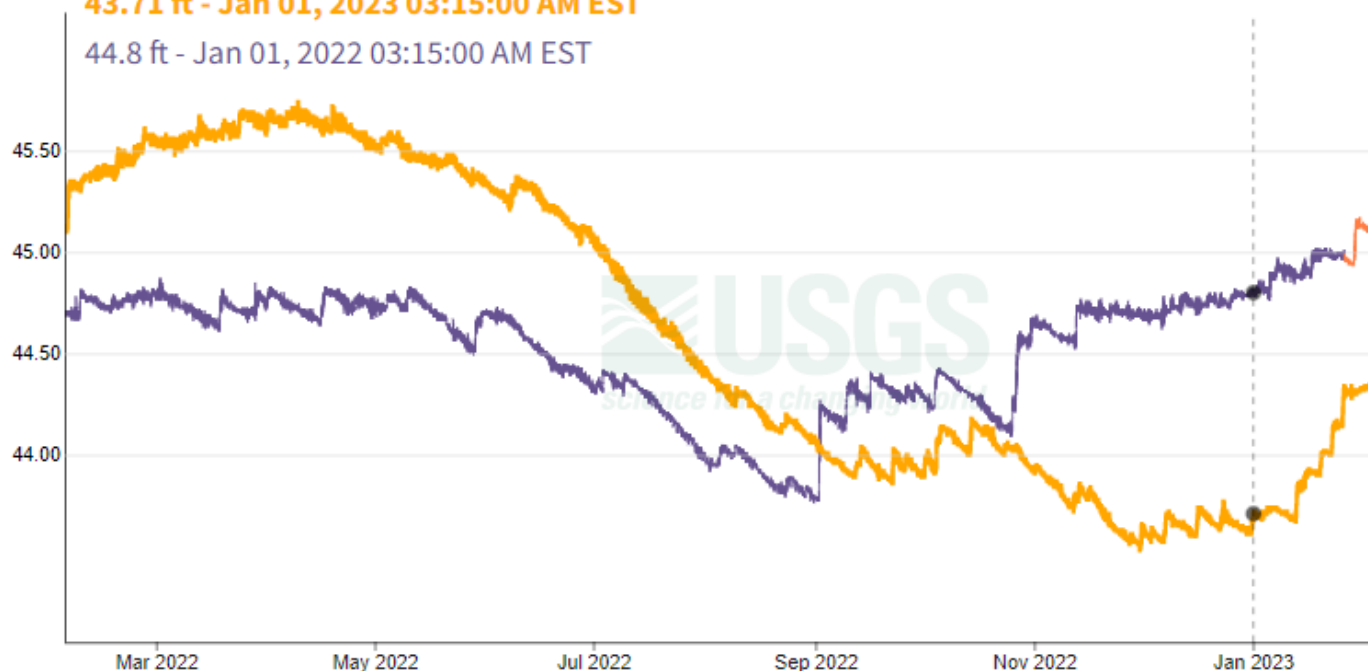
Drought Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Ashumet Pond, Falmouth – Cape Cod

Lake or reservoir water surface elevation above NGVD 1929, ft ⓘ

43.71 ft - Jan 01, 2023 03:15:00 AM EST

44.8 ft - Jan 01, 2022 03:15:00 AM EST



Current: — Provisional
Last year: — Approved — Provisional

☒ Compare to last year

DMP Excerpt

4.3 End of Drought

Determinations regarding the end of a drought focus on the precipitation and groundwater indices. These metrics will be prioritized when evaluating declarations for the end of a drought. Precipitation is a key factor because it is the overall cause of improving conditions. Depending on the severity and length of the drought, surplus precipitation is likely necessary not only for recovery of the shorter but also for the longer look-back periods. In determining the end of drought, the DMTF may discount short-term precipitation surplus and focus on longer term precipitation recovery. Additionally, the DMTF will consider the timing of precipitation events, because the same amount of precipitation can differ in its effect on drought conditions depending on the season. Precipitation occurring during the fall and spring, when the ground is not frozen and evapotranspiration is relatively low, is ideal for groundwater recharge and, therefore, should result in the quickest return to normal groundwater conditions. Groundwater levels are also good recovery indicators because they have a storage component that may require time to recharge to average levels making them, in general, among the last of the indices to respond to improving conditions.

Drought Indices by Region

December

West	CTRV	Central	NE	SE	Cape	Islands
34	34	44	14	30	22	25
80	76	75	50	65	29	N/A
46	42	68	27	52	28	16
72	34	30	24	79	17	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
Level 0	Level 0	Level 0	Level 1	Level 0	Level 1	Level 2

* December = 9 mos

January

Drought Index	West	CTRV	Central	NE	SE	Cape	Islands
Precip*	57	57	62	23	49	65	46
Streamflow	97	96	95	83	93	56	N/A
Groundwater	85	91	88	72	78	53	22
Lakes/Impoundments	100%	72	69	41	94	17	N/A
ET- CMI EDDI	N/A	N/A	N/A	N/A	N/A	N/A	N/A
KBDI	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Rec for (2/8 mtg)	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0

* January = 12 mos

