

Hydrologic Conditions in Massachusetts for December 2023

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DCR Office of Water Resources

Drought Management Task Force

January 09, 2024

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan Indices

Numbers in parentheses indicate number of data points across the state



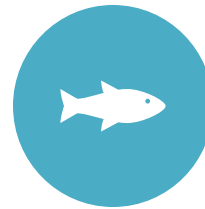
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(16)



Crop Moisture
(national map)

MA Drought Management Plan

Index Severity Levels

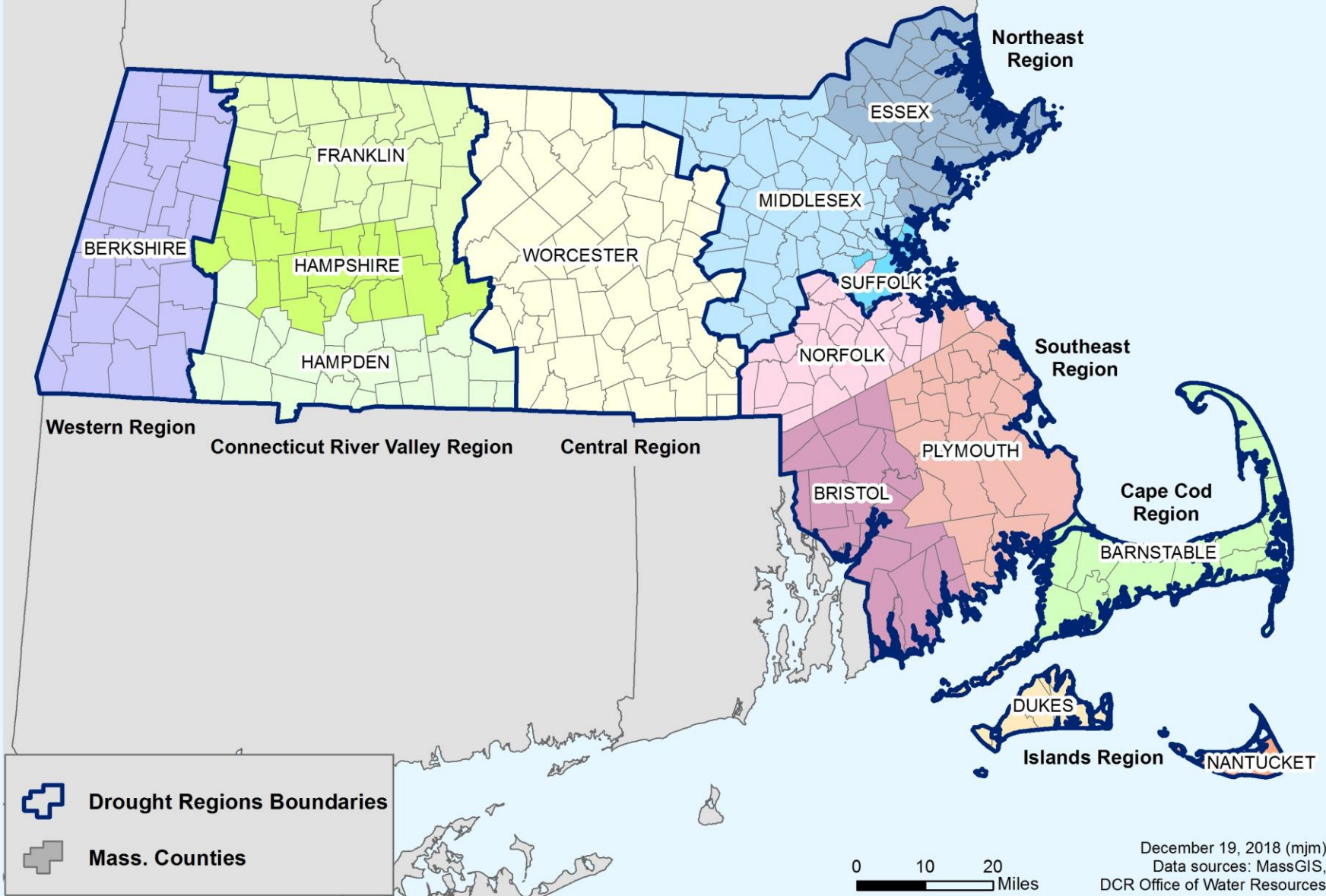
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 th percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0 and > -4.0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

MA Drought Management Plan

Drought Levels



MASSACHUSETTS DROUGHT REGIONS with Counties

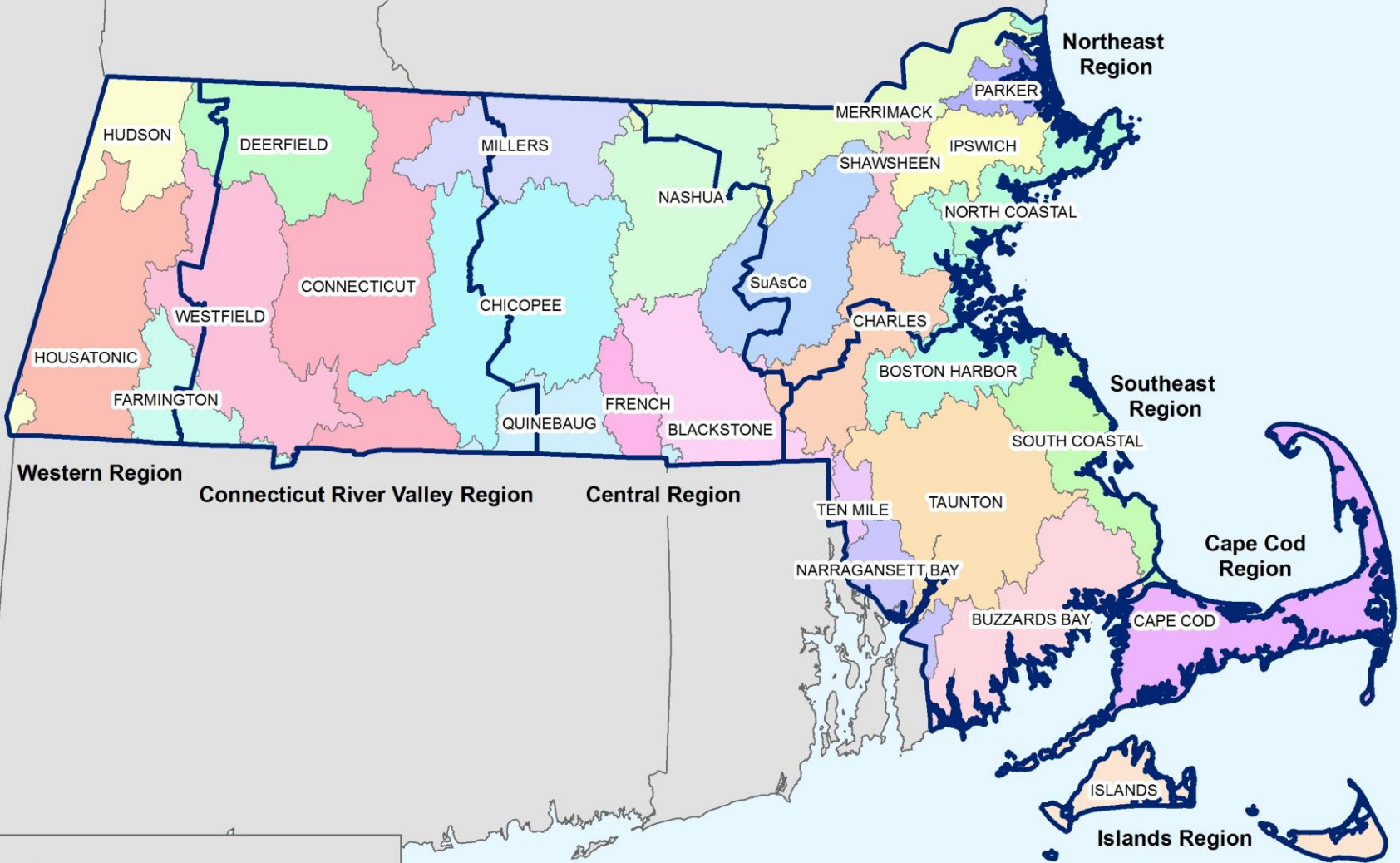


-  Drought Regions Boundaries
-  Mass. Counties

0 10 20
Miles

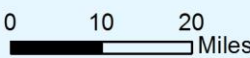
December 19, 2018 (mjm)
Data sources: MassGIS,
DCR Office of Water Resources

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



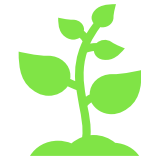
Weather &
Forecast



Water Supply
Impacts



Environmental
Impacts



Agricultural
Impacts



Fire Danger



Engineering/
Infrastructure
Impacts



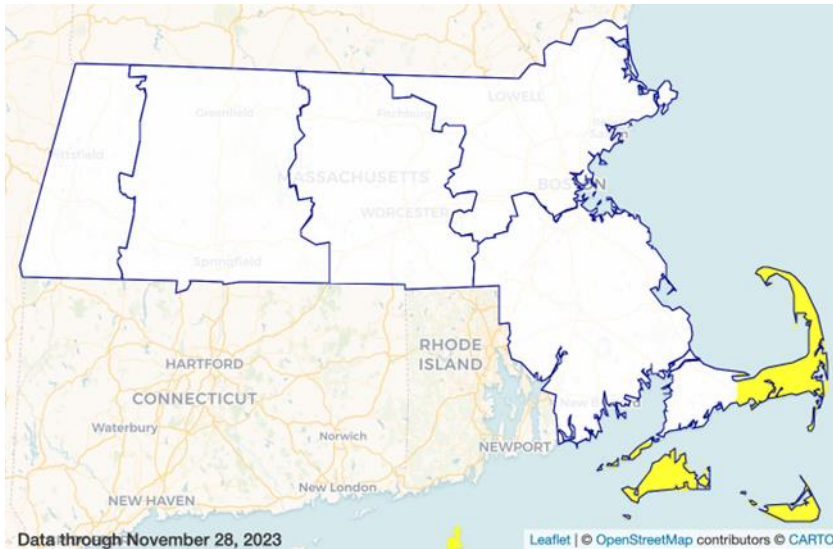
Public Health
Impacts

Recent Hydrologic History

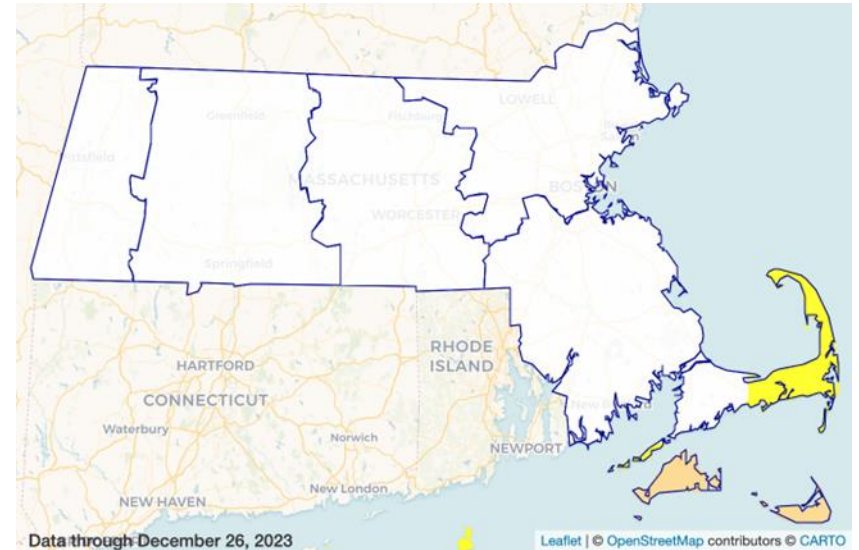
2023

- *February - May*
 - Variable precipitation across the state w/ below-normal on the Islands
 - Some above-normal temperatures including multiple heat waves
 - Fluctuating impacts on streamflow and groundwater in some regions
 - Western and Cape Cod regions declared at Level 1 drought in May
- *June - September*
 - Above-normal precipitation across state w/mostly normal on the Islands
 - Consistently declining and below-normal groundwater on the Islands and some on the Cape
- *October-November*
 - Below-normal precipitation
 - Below-normal groundwater on Islands and some on the Cape
- *December*
 - Normal precipitation but 2- and 3- month still elevated for Islands and Cape
 - Well-below normal for groundwater on the Islands, Cape is variable

US Drought Monitor



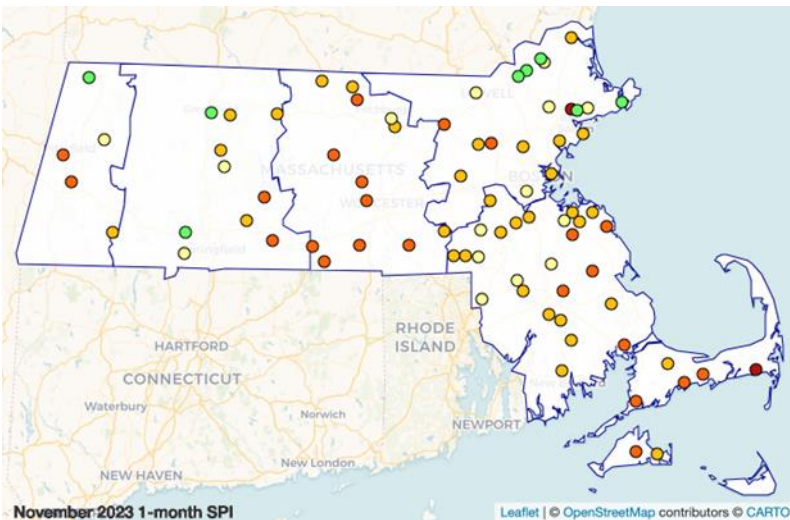
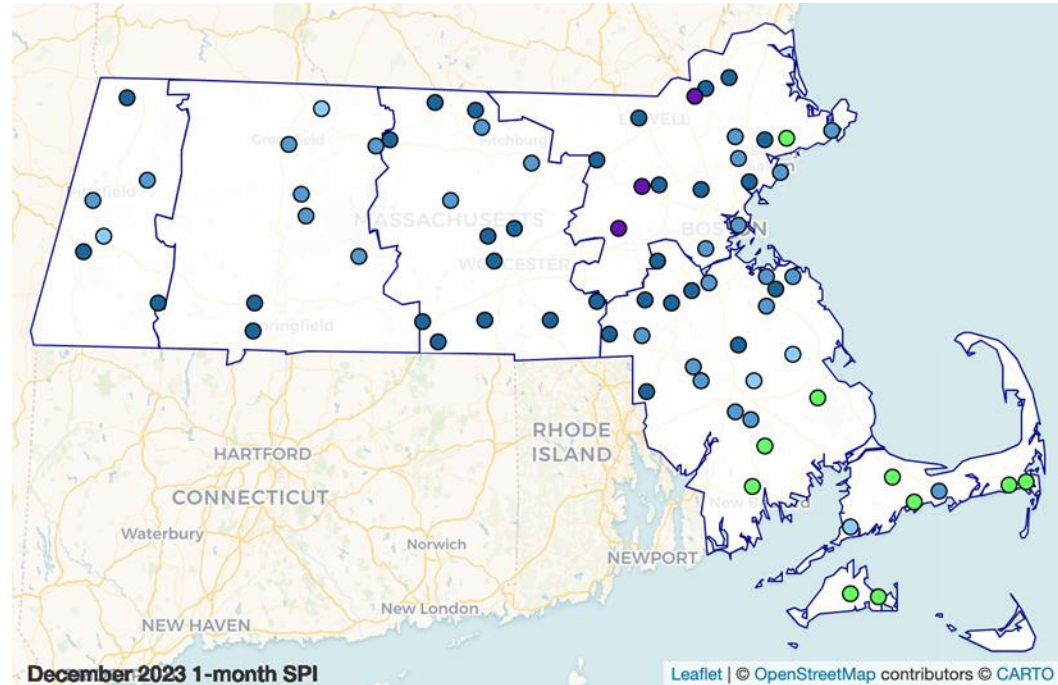
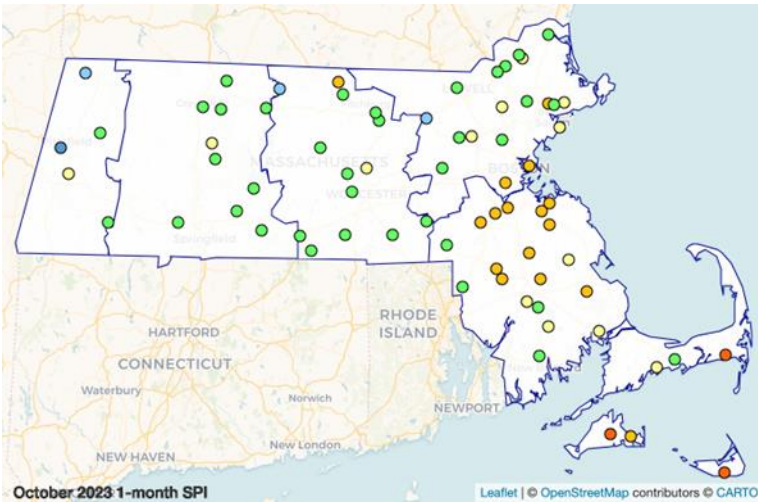
Data through November 28, 2023



Data through December 26, 2023

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

Standardized Precipitation Index



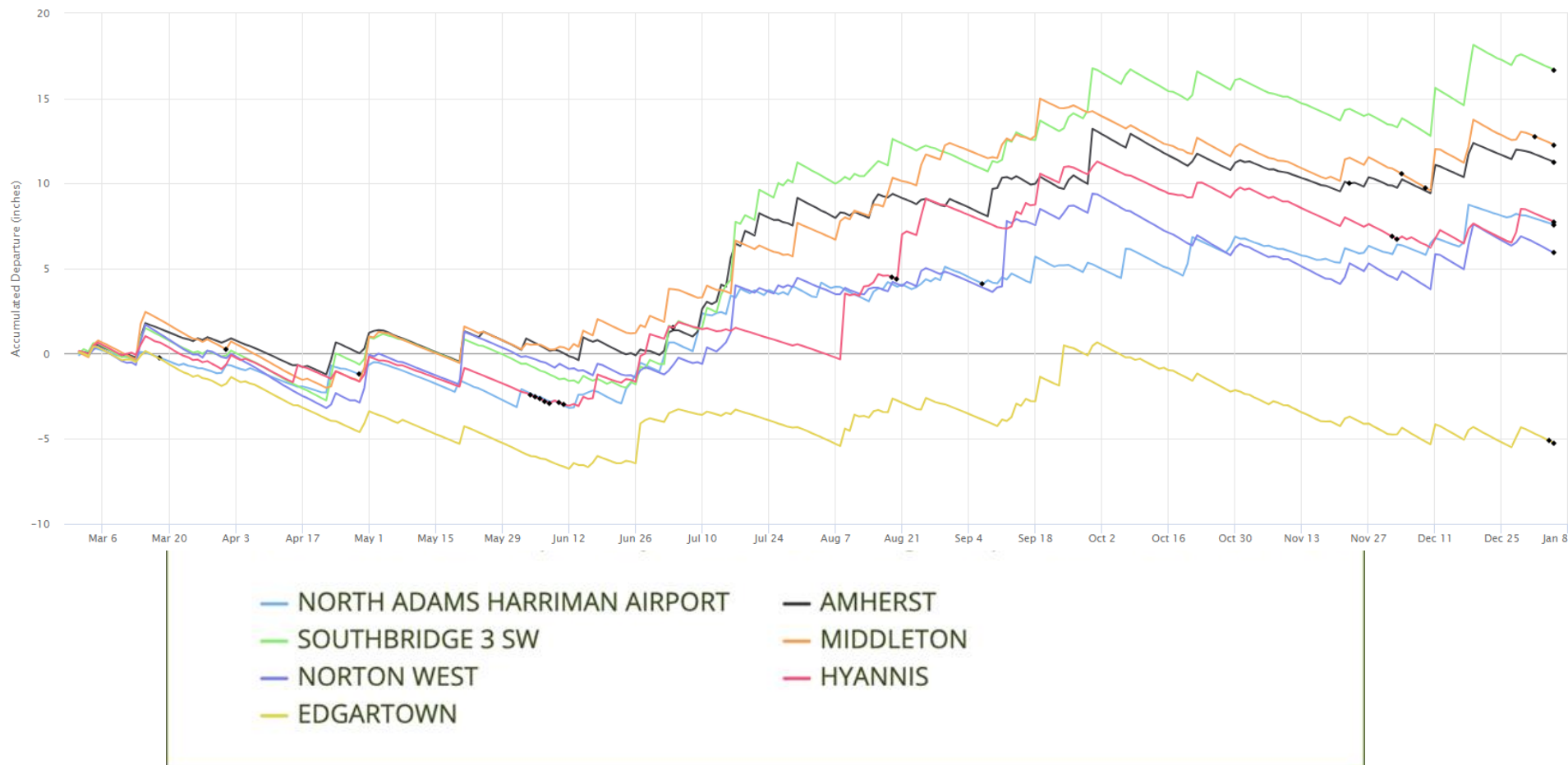
Percentiles

- ≥ 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

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.

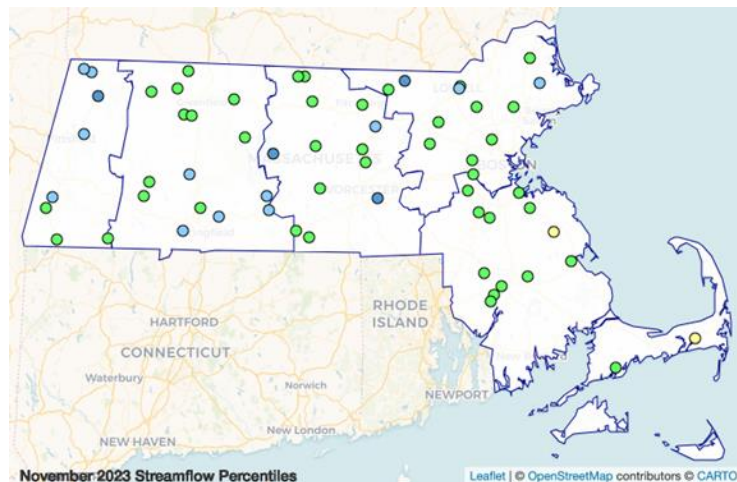
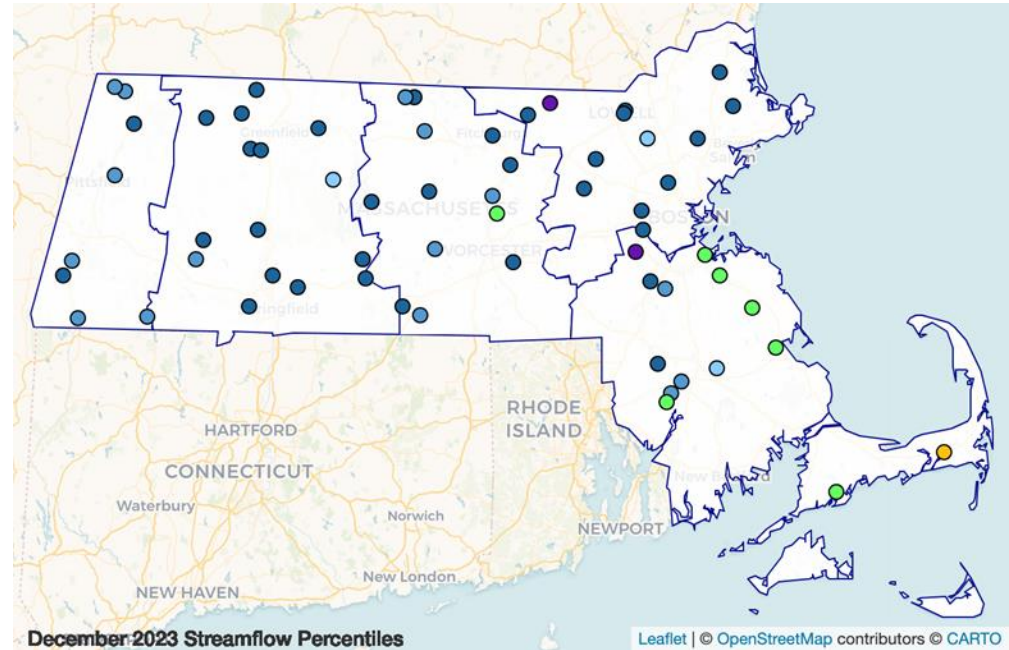
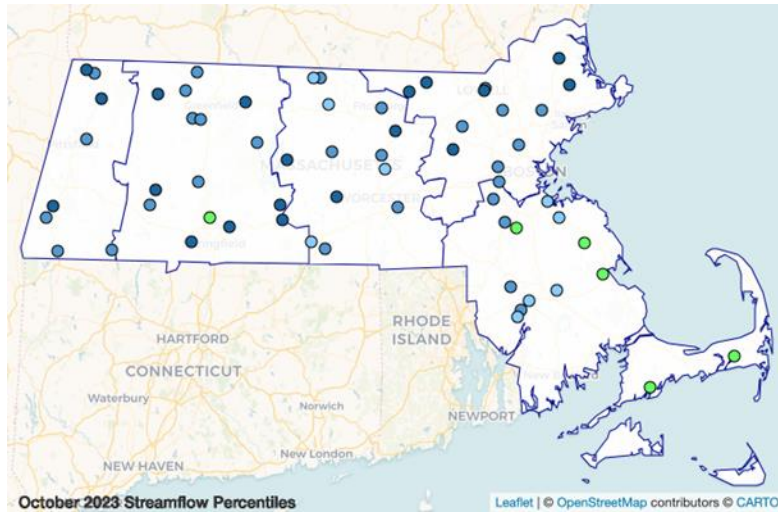
Standardized Precipitation Index as Percentile

REGION	NUMBER OF SITES	1-mo *	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo*
WESTERN	6	92	65	73	92	90	88	76	91
CTRV	8	87	59	52	95	92	94	80	88
CENTRAL	14	94	68	60	98	97	97	90	95
NORTHEAST	18	91	73	53	96	95	96	70	87
SOUTHEAST	22	87	59	38	89	85	86	70	80
CAPE COD	6	61	25	12	61	60	76	73	84
ISLANDS	2	55	21	7	45	26	36	18	25

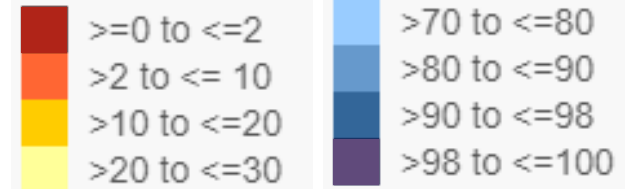
* 1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

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

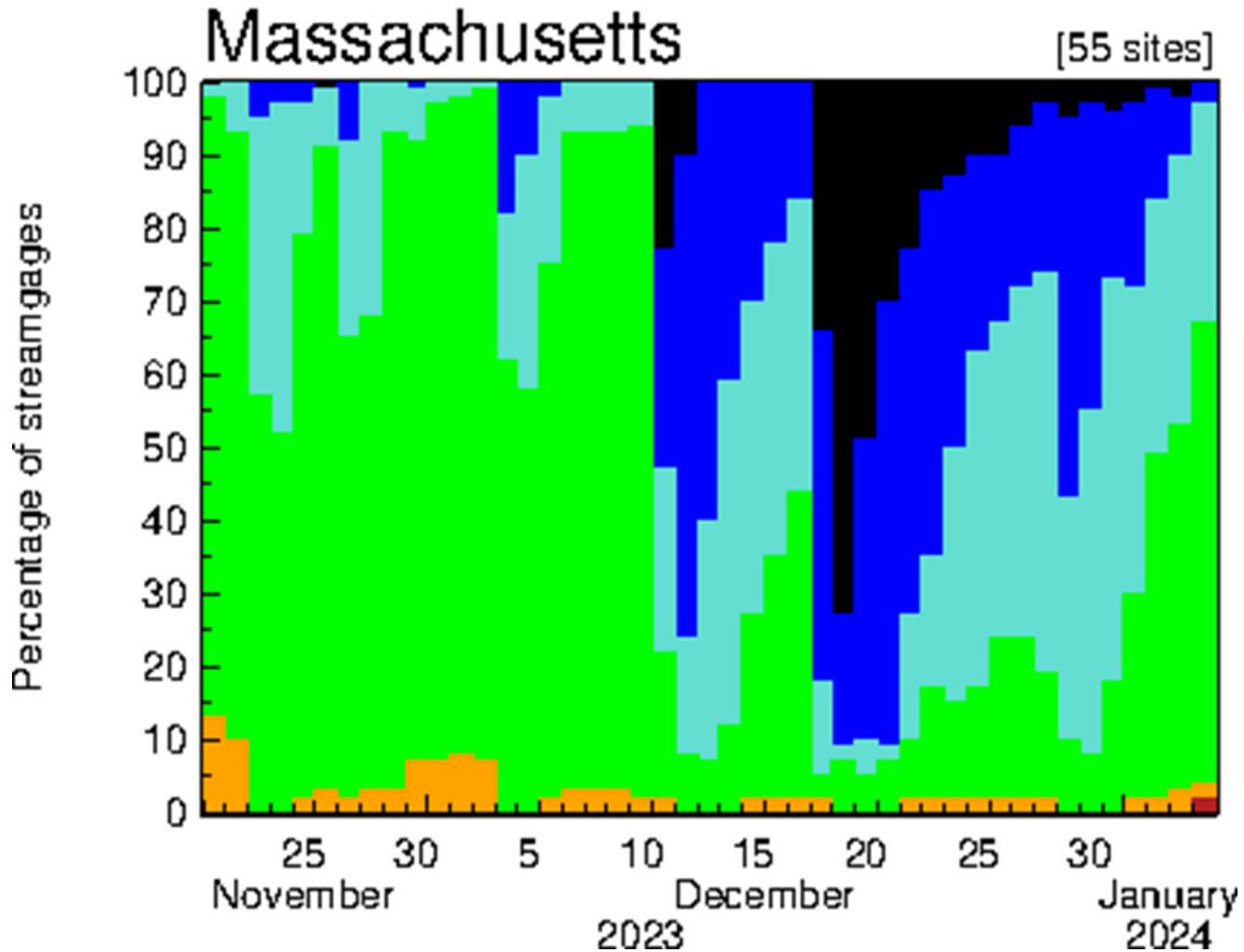
Streamflow Percentiles of Monthly Median



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		

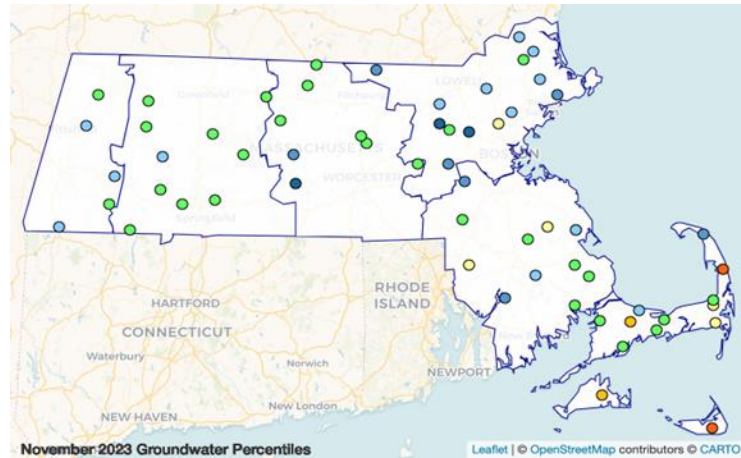
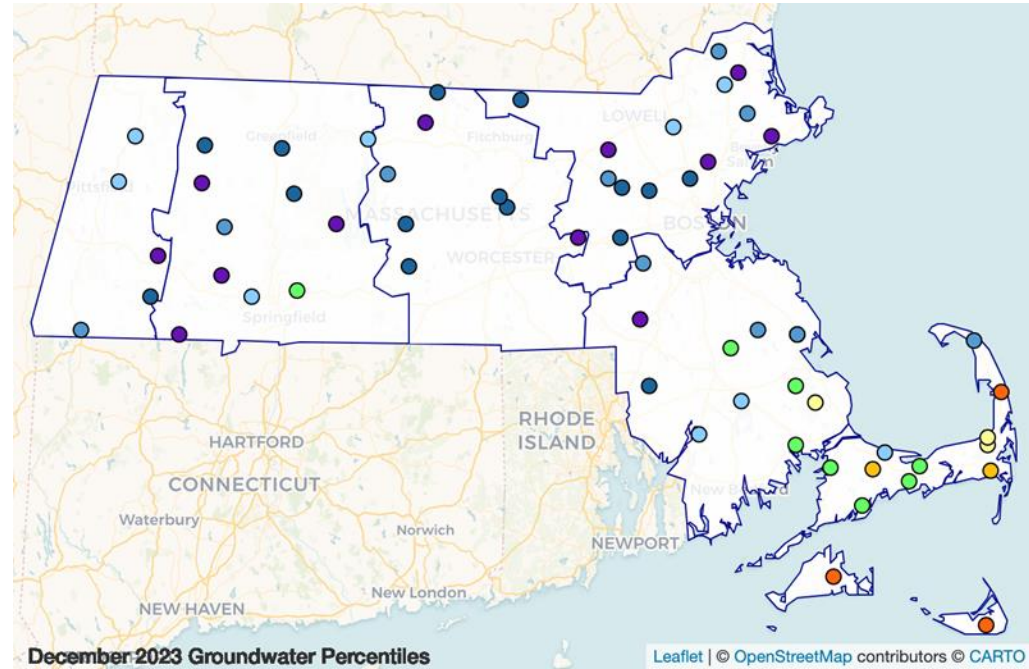
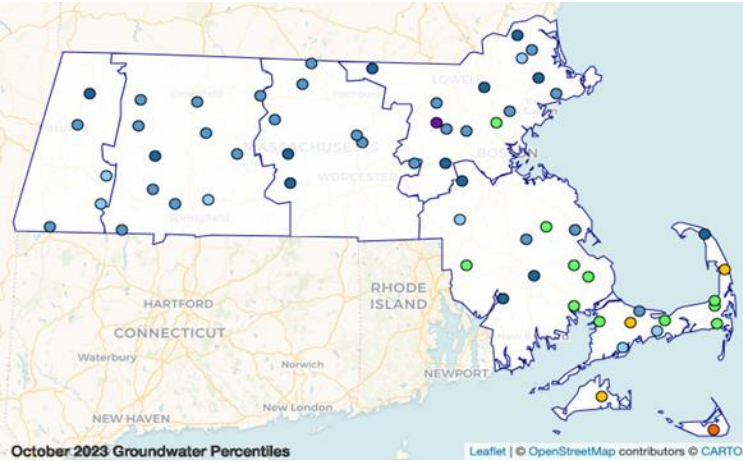
Streamflow Index

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	2	89
CTRV	15	0	0	0	0	13	94
CENTRAL	13	0	0	0	0	7	91
NORTHEAST	13	0	0	0	0	12	96
SOUTHEAST	12	0	0	0	0	3	79
CAPE COD	2	0	0	1	0	0	33

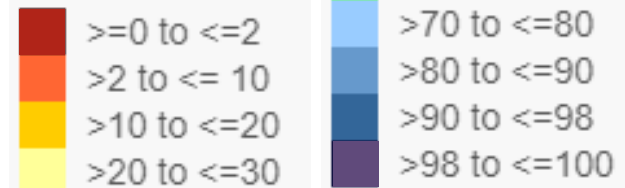
Notes: Not all gages report in all months due to ice, beaver dams or other conditions. The Islands region does not have any streamflow gages.

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

Groundwater Percentiles



Percentiles



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	2	81
CTRV	11	0	0	0	0	7	97
CENTRAL	8	0	0	0	0	7	94
NORTHEAST	14	0	0	0	0	9	94
SOUTHEAST	12	0	0	0	1	2	74
CAPE COD	11	0	1	2	2	0	34
ISLANDS	2	0	2	0	0	0	6

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

Lakes & Impoundments

REGION	NUMBER OF SITES REPORTING	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	2	64th
CTRV	2	89th
CENTRAL	3	85th
NORTHEAST	2	86th
SOUTHEAST	2	91st
CAPE COD	1	37th

Notes:

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

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

Drought Indices by Region, November 2023

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (2 mos)	28	23	14	17	10	6	3
Streamflow	73	69	65	63	47	37	N/A
Groundwater	75	60	62	76	58	47	12
Lakes/ Impoundments	ID	80th	ID	ID	66th	33rd	N/A
ET*- CMI EDDI	0 0	0 0	0 0	0 0	0 0	0 0	0 0
KBDI**	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0

<i>Declarations for November</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</i>	<i>Level 0</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, Nov-Mar, outside growing season
 **KBDI not reported, Nov-Mar, outside fire danger season..

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

Drought Indices by Region, December 2023

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (3 mos)	73	52	60	53	38	12	7
Streamflow	89	94	91	96	79	33	N/A
Groundwater	81	97	94	94	74	34	6
Lakes/ Impoundments	64th	89th	85th	86th	91st	37th	N/A
ET* 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 (01/09 meeting)	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	Level 3

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