

Hydrologic Conditions in Massachusetts for February 2024

Anne Carroll & Viki Zoltay
DCR Office of Water Resources

Drought Management Task Force

March 08, 2024

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan

Indices

Numbers in parentheses indicate number of data points across the state



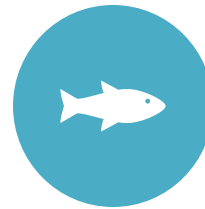
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(36)



Evapotranspiration
(national map)

MA Drought Management Plan

Index Severity Levels

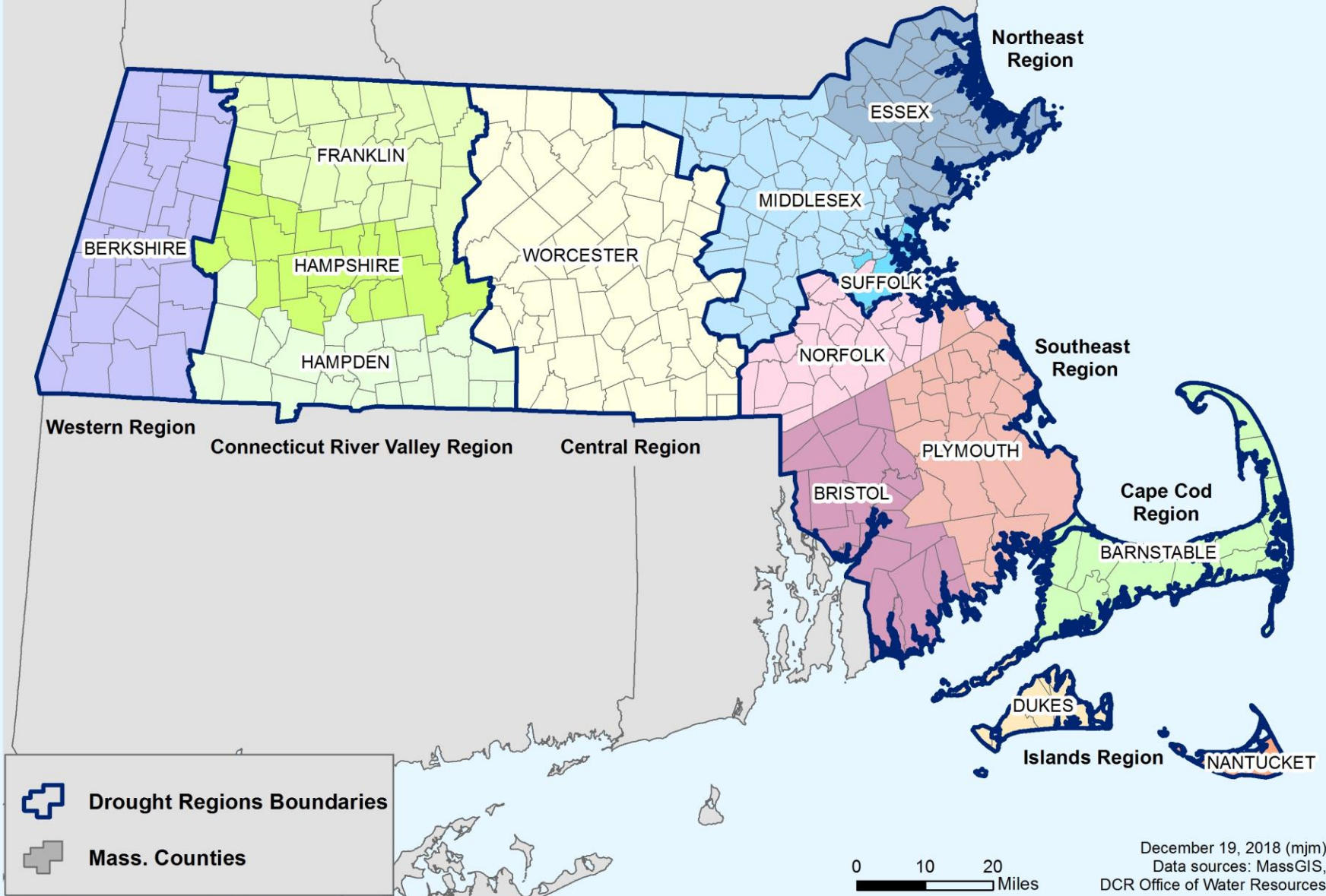
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments, Groundwater, and Evapotranspiration	Keetch-Byram Drought Index
0	>30 th percentile	< 200
1	≤30 and >20	200-400
2	≤20 and >10	400-600
3	≤10 and >2	600-700
4	≤2	700-800

MA Drought Management Plan

Drought Levels



MASSACHUSETTS DROUGHT REGIONS with Counties



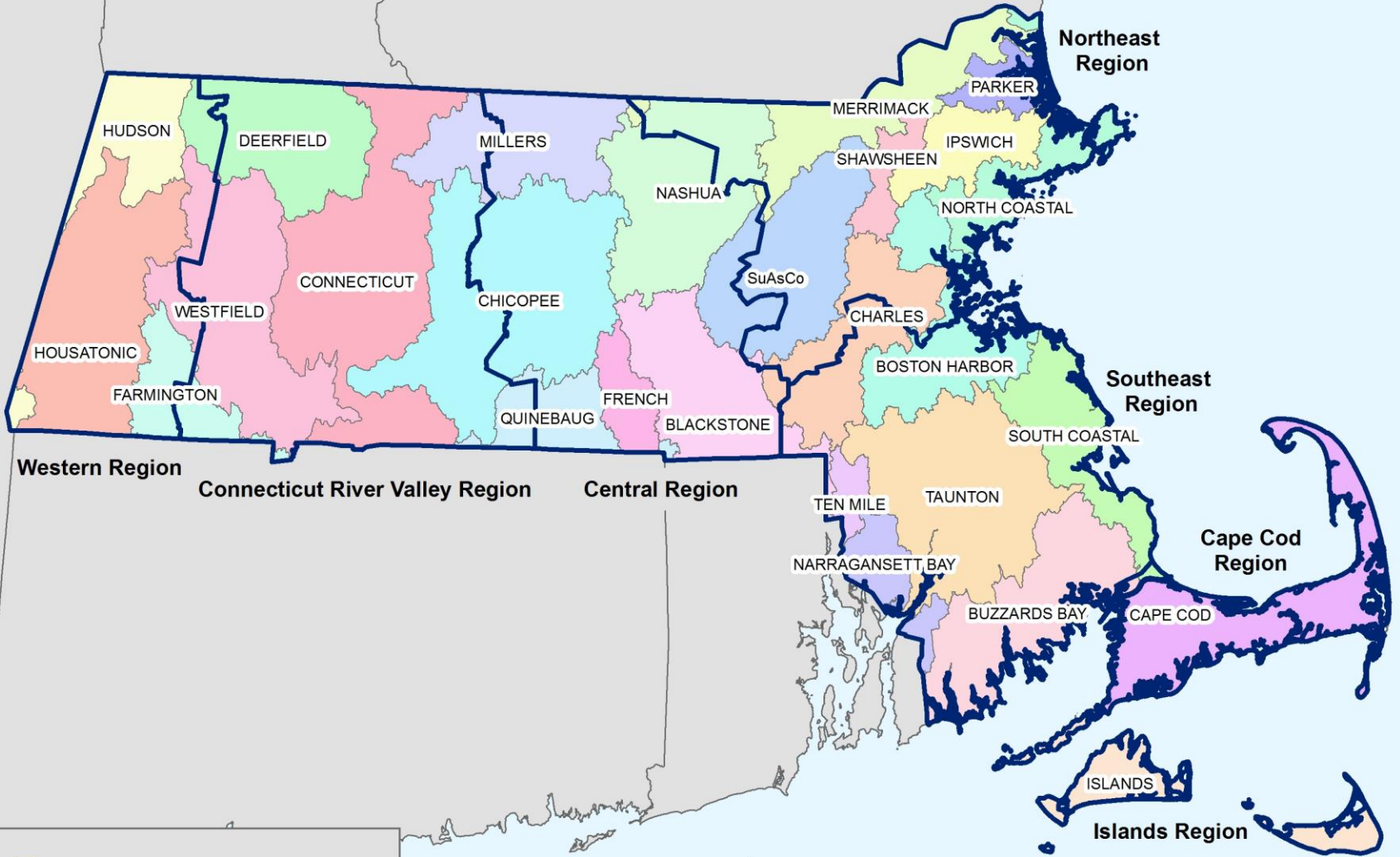
-  Drought Regions Boundaries
-  Mass. Counties

0 10 20
Miles

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

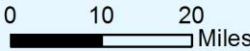


MASSACHUSETTS DROUGHT REGIONS with Watersheds



 Drought Regions Boundaries

 Mass. Counties



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

Task Force Member Updates



Hydrologic
Conditions



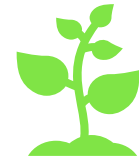
Weather &
Forecast



Water Supply
Impacts



Environmental
Impacts



Agricultural
Impacts



Fire Danger



Engineering/
Infrastructure
Impacts

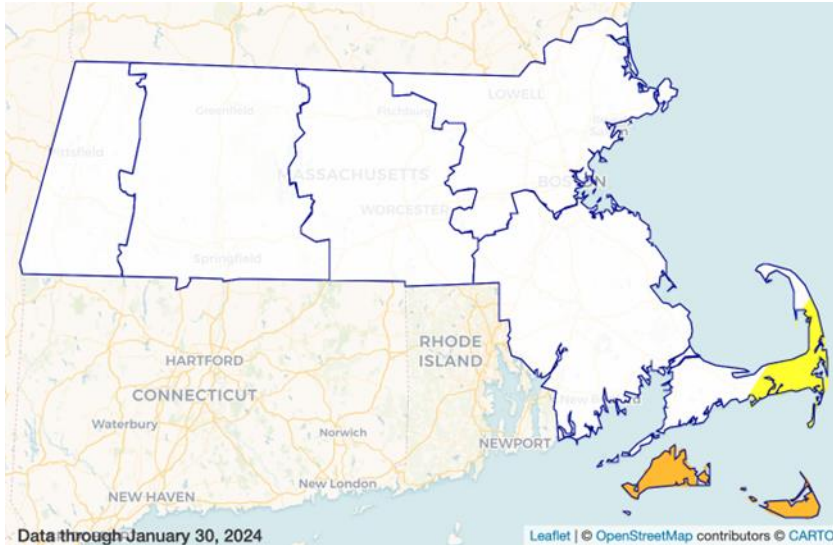


Public Health
Impacts

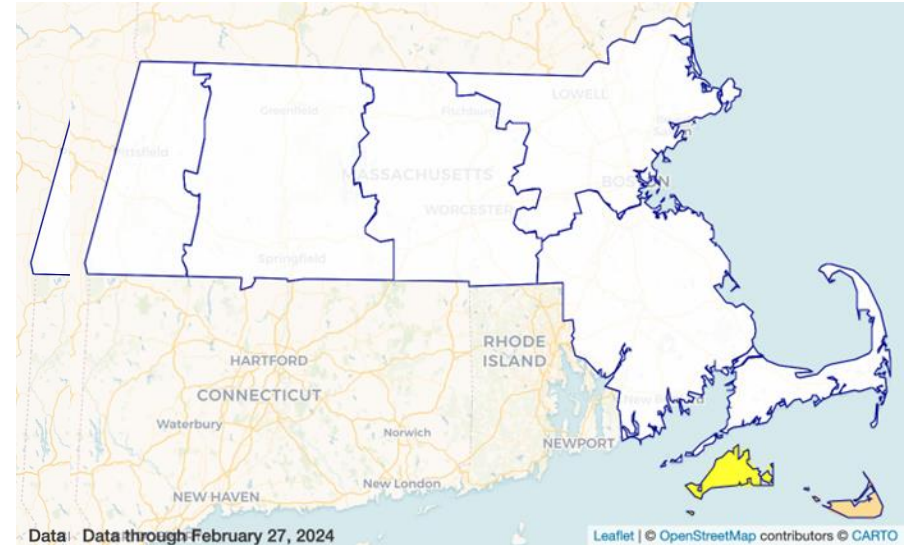
Recent Hydrologic History

- ***June – September 2023***
 - Above-normal precipitation across state w/mostly normal on the Islands
 - Declining and below-normal groundwater on the Islands & some on the Cape
- ***October-November 2023***
 - Below-normal precipitation across the state
 - Below-normal groundwater on Islands and some on the Cape
 - November is the first month that the Islands are declared to be in a drought
- ***December 2023***
 - Normal precipitation but 2- and 3- month still elevated for Islands and Cape
 - Well-below normal for groundwater on the Islands, Cape is variable
- ***January 2024***
 - Above-normal precipitation with flooding in some areas of the state
 - Martha's Vineyard fared better than Nantucket for precipitation and groundwater improvements
- ***February 2024***
 - Below-normal to normal precipitation on the Islands; below to well below precipitation across the state especially the Northeast
 - Groundwater improvement on Martha's Vineyard; not as much on Nantucket

US Drought Monitor



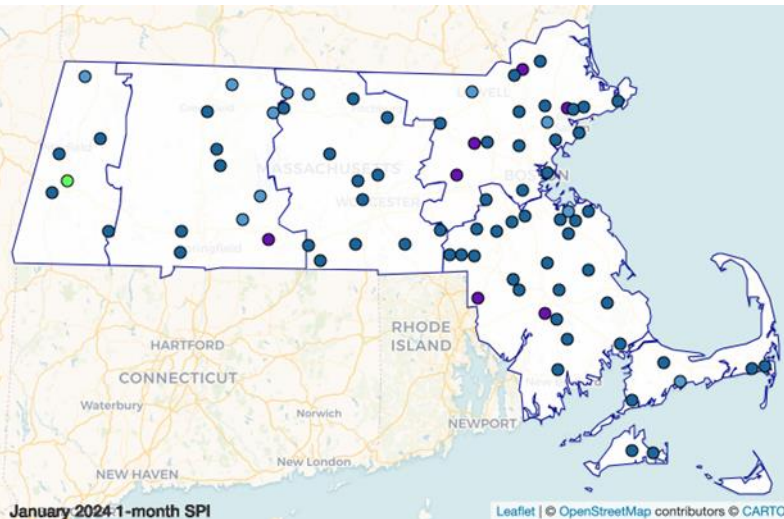
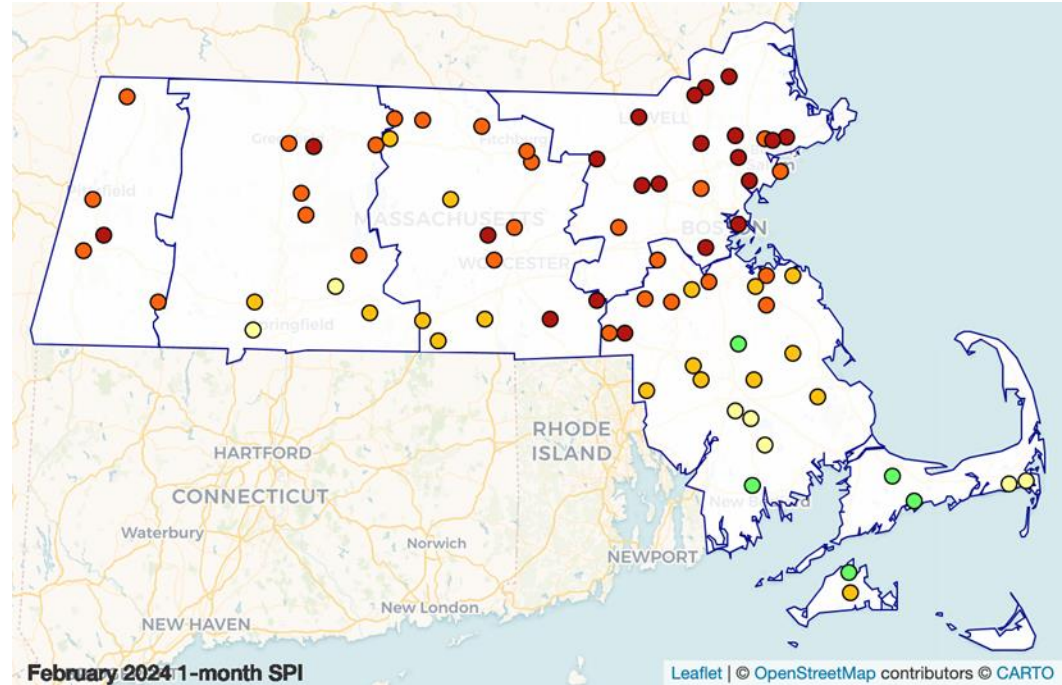
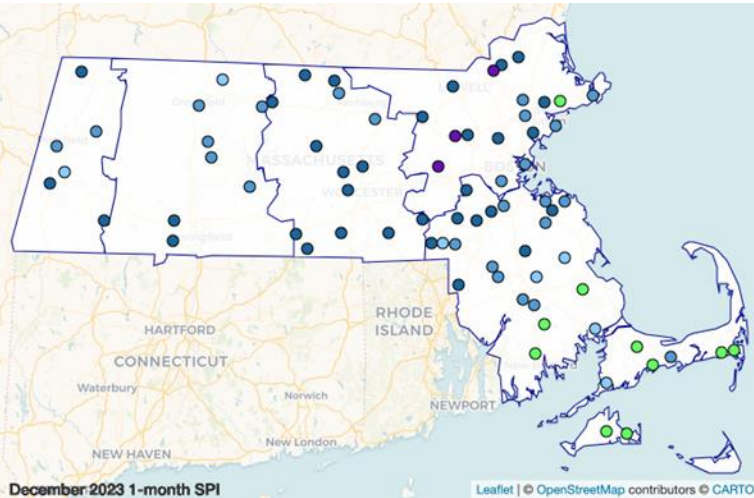
Data through January 30, 2023



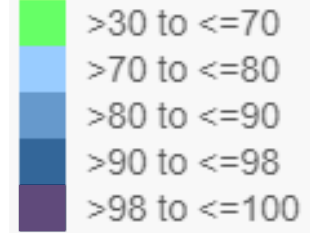
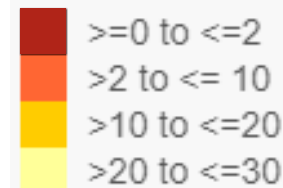
Data through February 27, 2024

	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)		

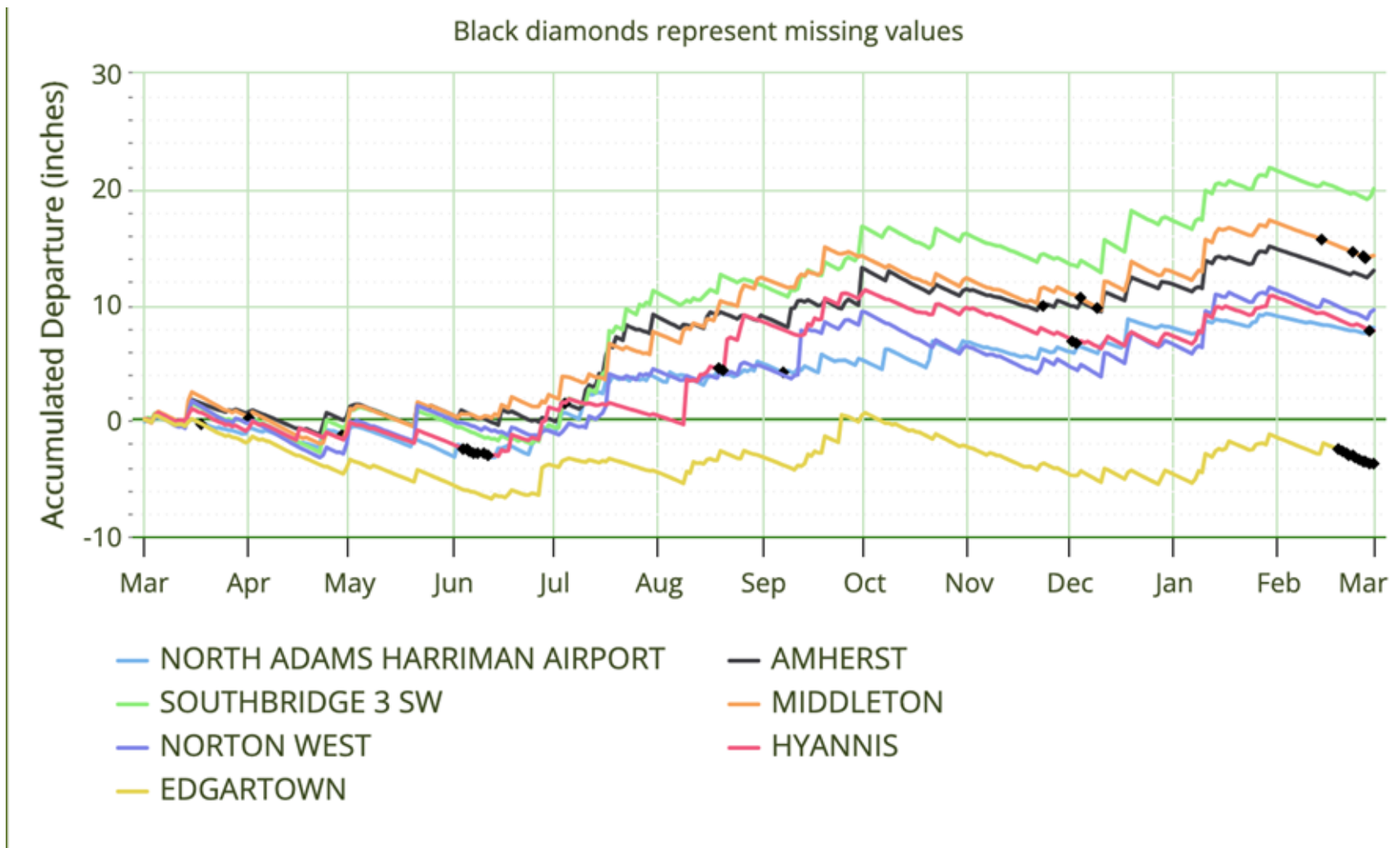
Standardized Precipitation Index



Percentiles



Accumulated Precipitation Departure from 30-Year Average in inches



- 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

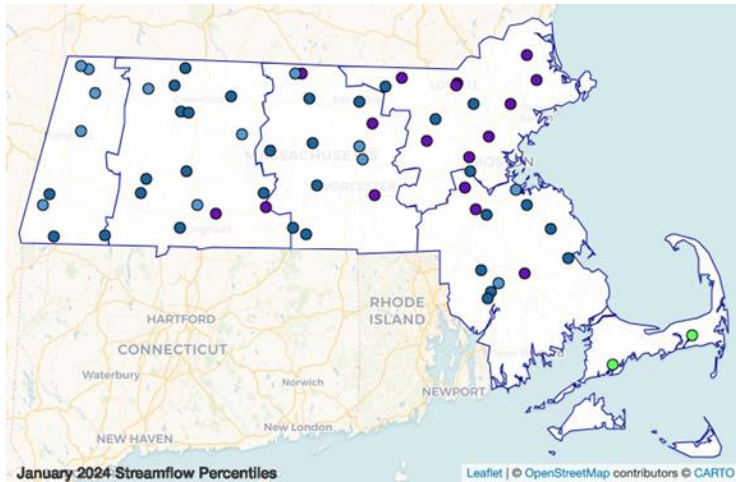
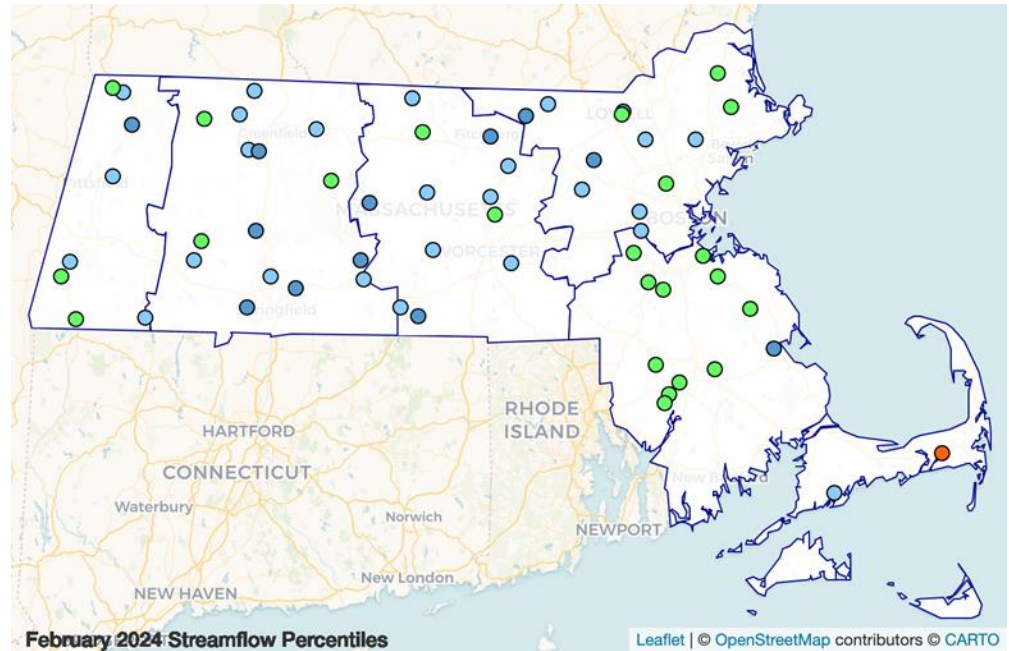
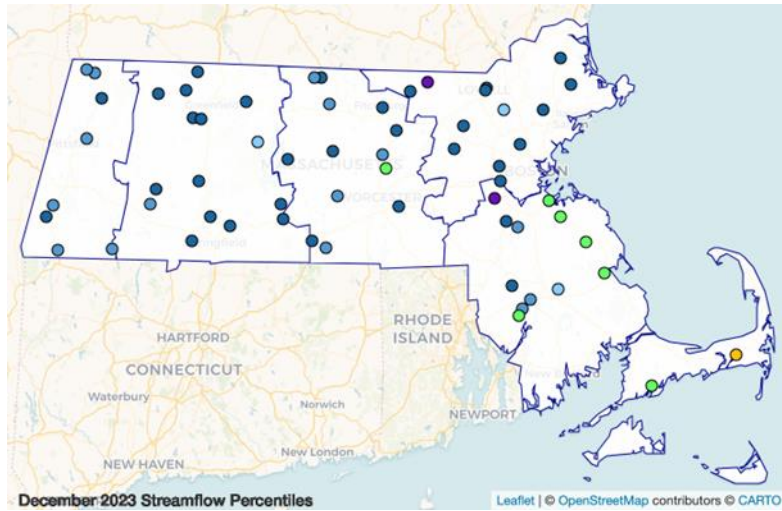
REGION	NUMBER OF SITES	1-mo *	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo *
WESTERN	5	7	71	96	79	96	87	81	94
CTRV	10	9	74	89	83	95	94	79	92
CENTRAL	15	8	81	96	91	99	98	90	96
NORTHEAST	19	2	74	91	74	98	97	69	89
SOUTHEAST	22	16	83	94	84	94	90	71	84
CAPE COD	4	31	80	75	38	73	53	56	N/A
ISLANDS	2	45	75	63	43	44	10	9	N/A

* 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.

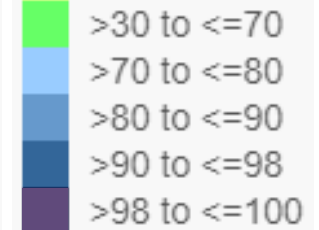
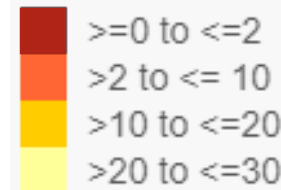
N/A: Not Available

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

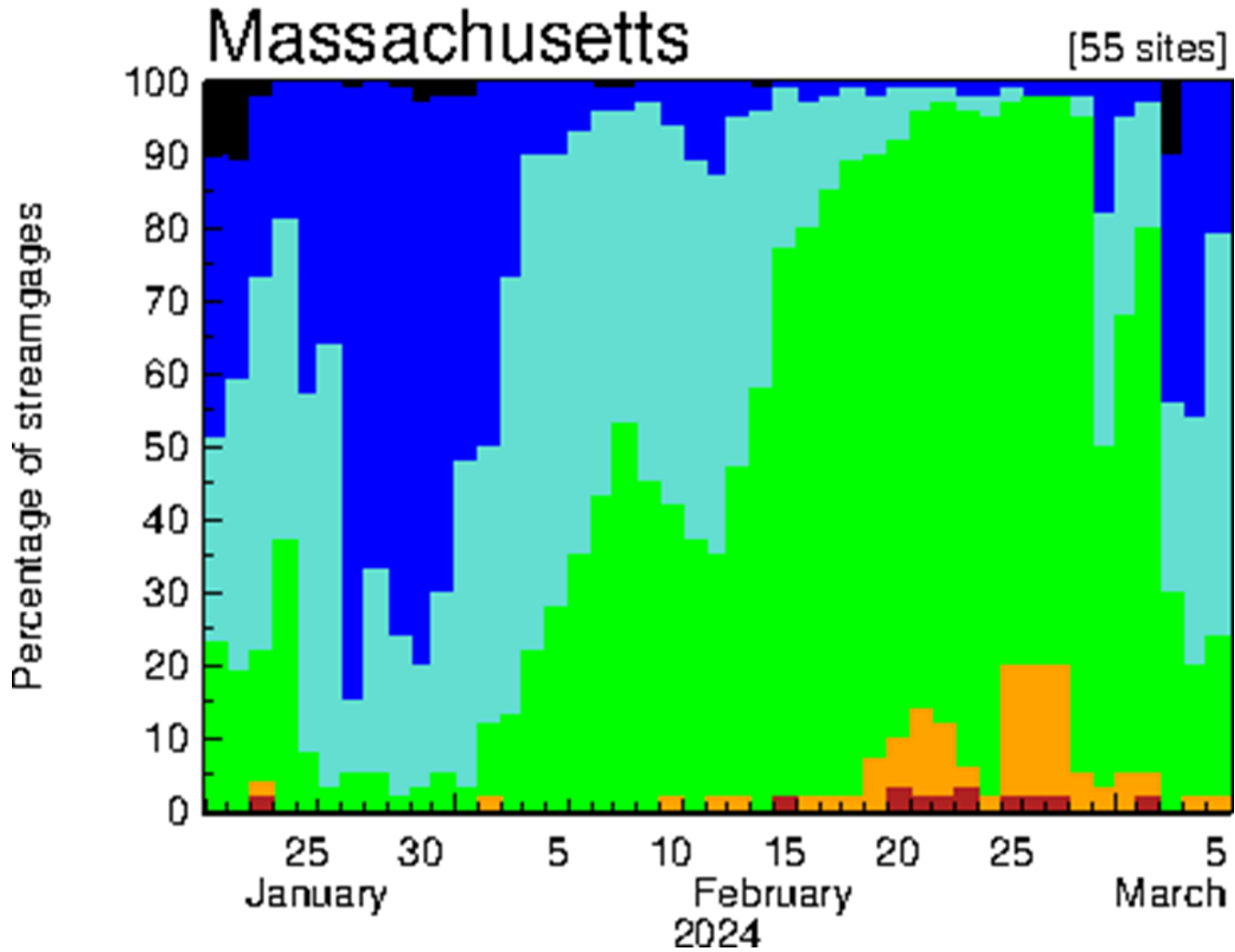
Streamflow Percentiles of Monthly Median



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		

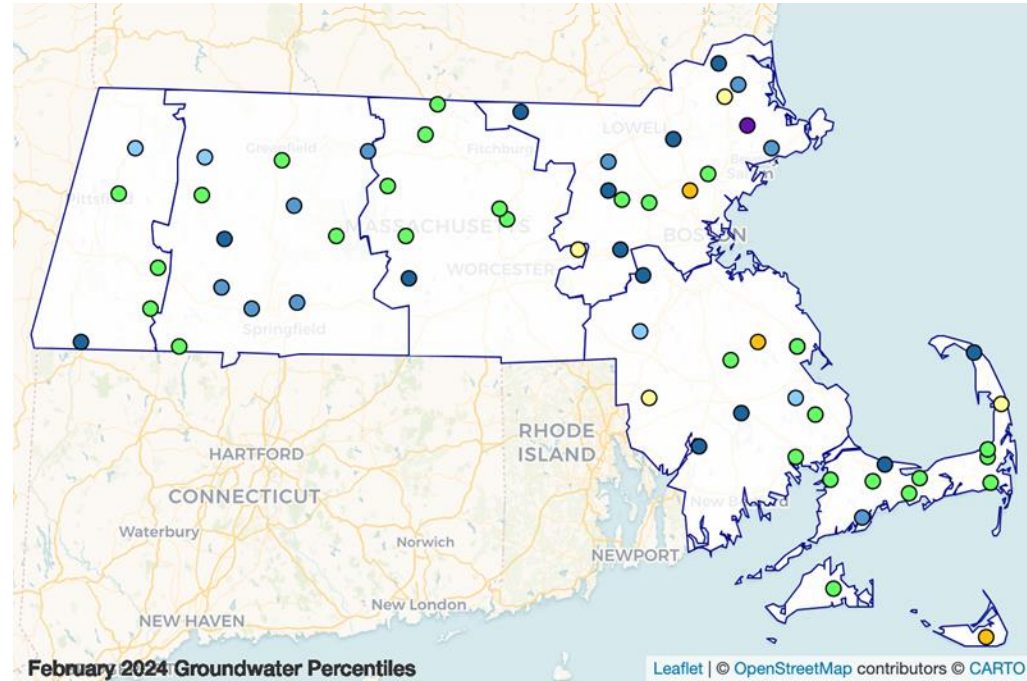
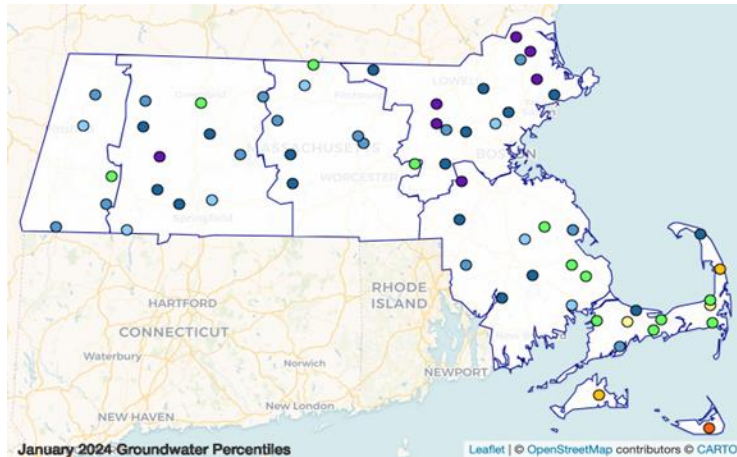
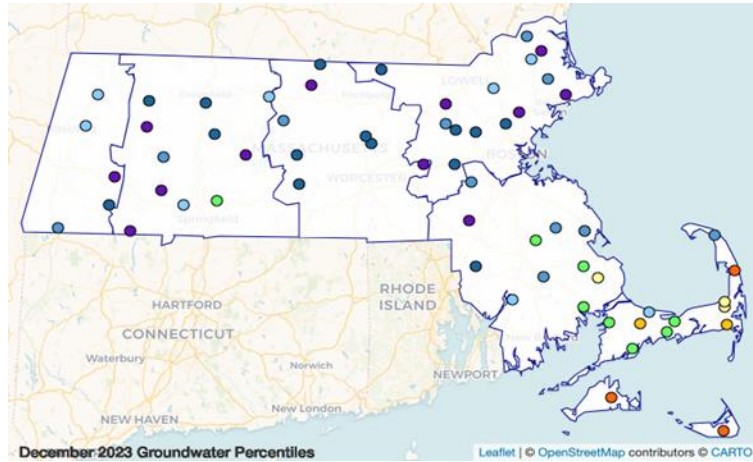
Streamflow Index

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	0	74
CTRV	15	0	0	0	0	0	78
CENTRAL	12	0	0	0	0	0	75
NORTHEAST	13	0	0	0	0	0	75
SOUTHEAST	12	0	0	0	0	0	51
CAPE COD	2	0	1	0	0	0	41

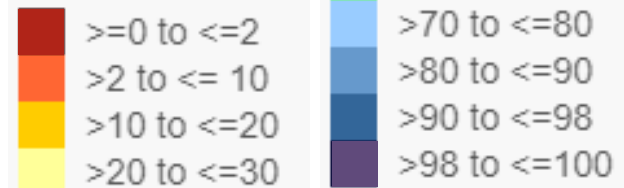
Notes: Not all gages report in all months due to ice, beaver dams or other conditions. The Islands region does not have any streamflow gages.

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	1	68
CTRV	11	0	0	0	0	1	83
CENTRAL	8	0	0	0	1	1	52
NORTHEAST	14	0	0	1	1	6	89
SOUTHEAST	12	0	0	1	2	3	56
CAPE COD	11	0	0	0	1	2	59
ISLANDS	2	0	0	1	0	0	26

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	84th
CTRV	2	78th
CENTRAL	3	43rd
NORTHEAST	5	86th
SOUTHEAST	2	95th
CAPE COD	1	39th

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, January 2024

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (3 mos)	90	90	92	92	89	58	55
Streamflow	86	97	95	99	97	50	N/A
Groundwater	84	90	85	98	83	39	10
Lakes/ Impoundments	ID	93rd	100th	95 th , 100%	100th	42nd	N/A
ET* 2-mos 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>Declarations for January</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>
--	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

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, February 2024

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (3 mos)	96	89	96	91	94	75	63
Streamflow	74	78	75	75	51	41	N/A
Groundwater	68	83	52	89	56	59	26
Lakes/ Impoundments	84	78	43	86	95	39	N/A
ET* 2-mos 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 (03/08 meeting)	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	Level 1
--------------------------------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------

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