

AGENDA

1. Introductions & Drought Response Update: EOEEA, MEMA

2. Updates on Current Conditions and Impacts—DMTF member reports

- Hydrologic: DCR, USGS, NOAA-RFC
- Weather: NOAA-NWS
- Water Supply: DEP, MWRA, MWWA, DPU
- Environmental: DEP, DFG, MRA
- Agricultural: DAR
- Fire Danger: DCR
- Engineering/Infrastructure: DCR
- Public Health: DPH

3. Discussion

4. Recommendation



Hydrologic Conditions in Massachusetts for April 2022

Anne Carroll & Viki Zoltay
DCR Office of Water Resources

Drought Management Task Force

May 6, 2022

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan

Indices

Numbers in parentheses indicate number of data points across the state



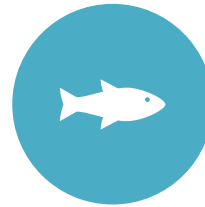
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(16)



Crop Moisture
(national map)

MA Drought Management Plan

Index Severity Levels

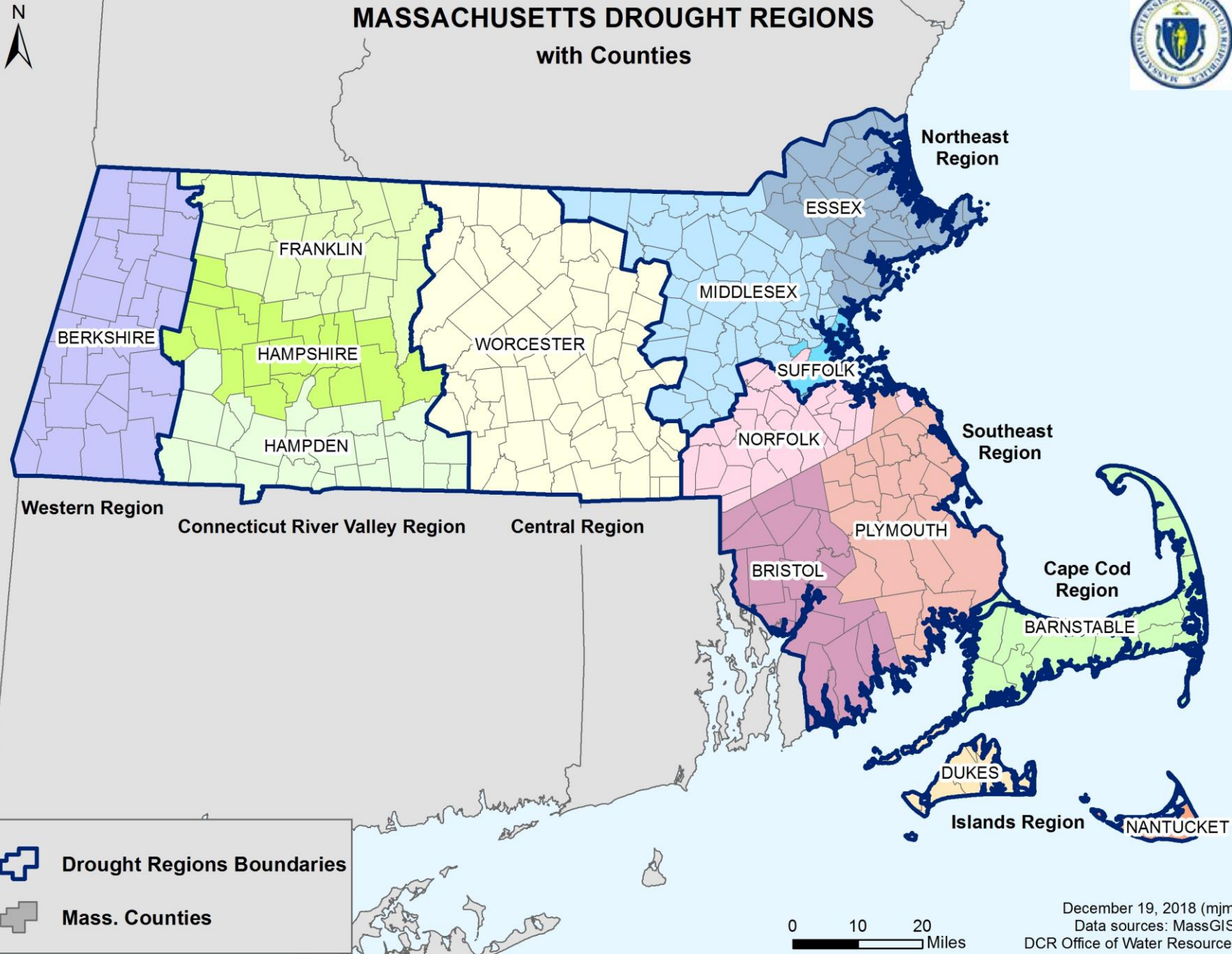
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 th percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0 and > -4.0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

MA Drought Management Plan

Drought Levels

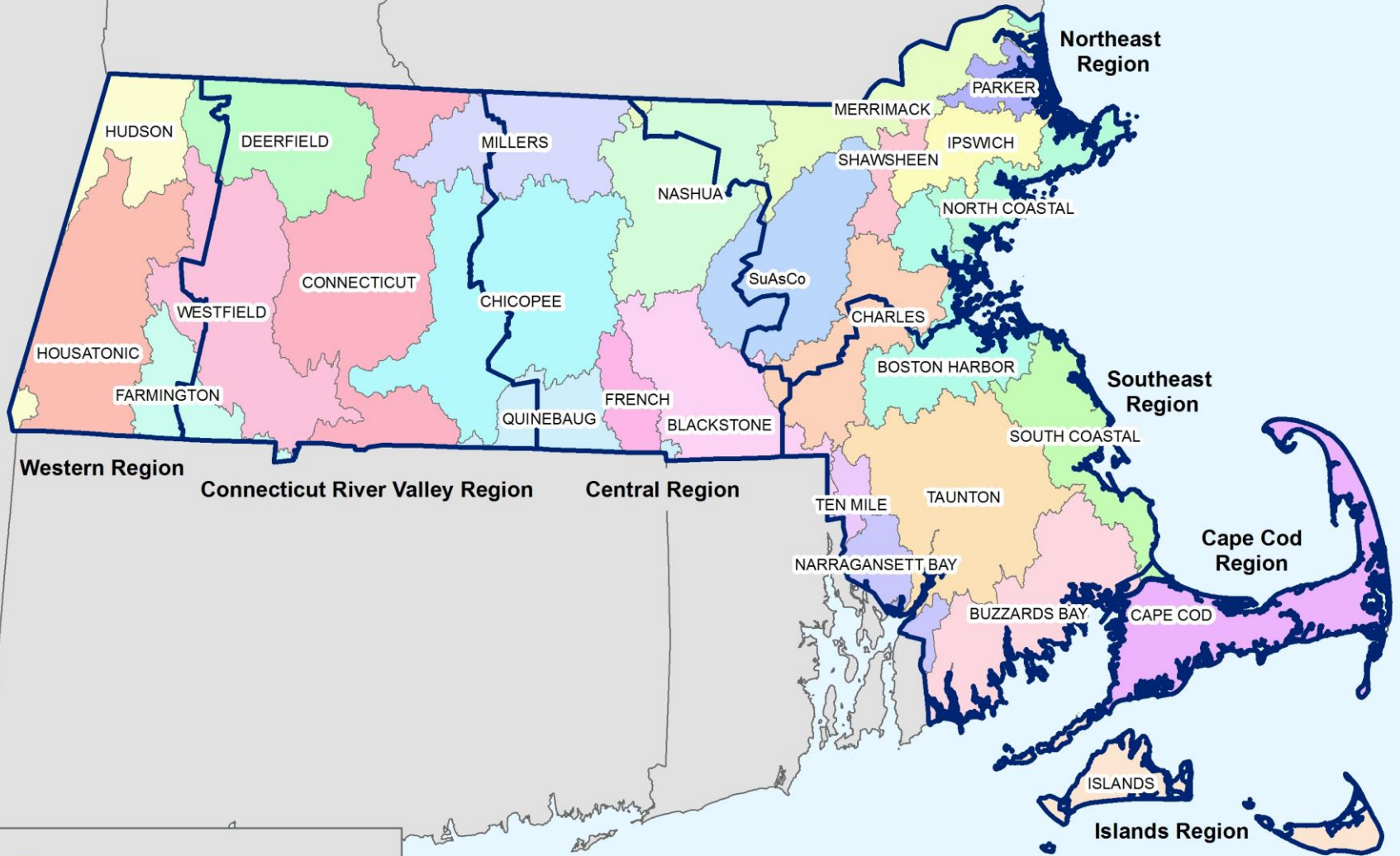


MASSACHUSETTS DROUGHT REGIONS with Counties



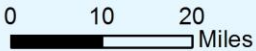


MASSACHUSETTS DROUGHT REGIONS with Watersheds



 **Drought Regions Boundaries**

 **Mass. Counties**



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

Task Force Member Updates



Hydrologic
Conditions



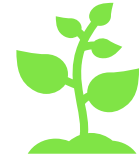
Weather &
Forecast



Water Supply
Impacts



Environmental
Impacts



Agricultural
Impacts



Fire Danger



Engineering/
Infrastructure
Impacts

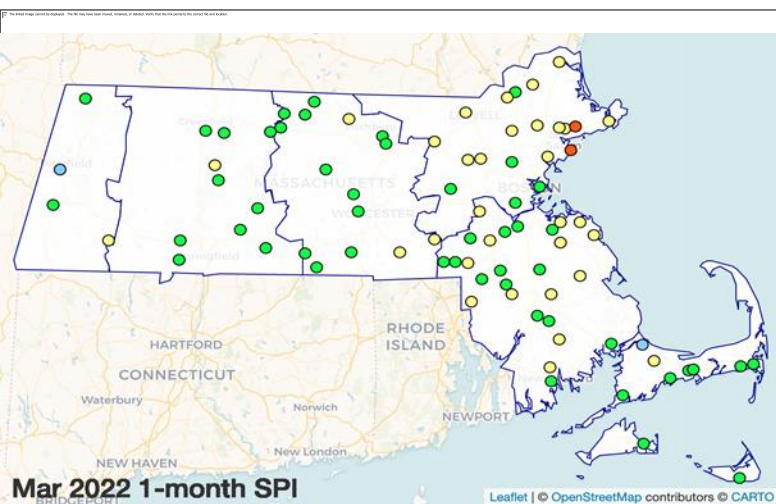
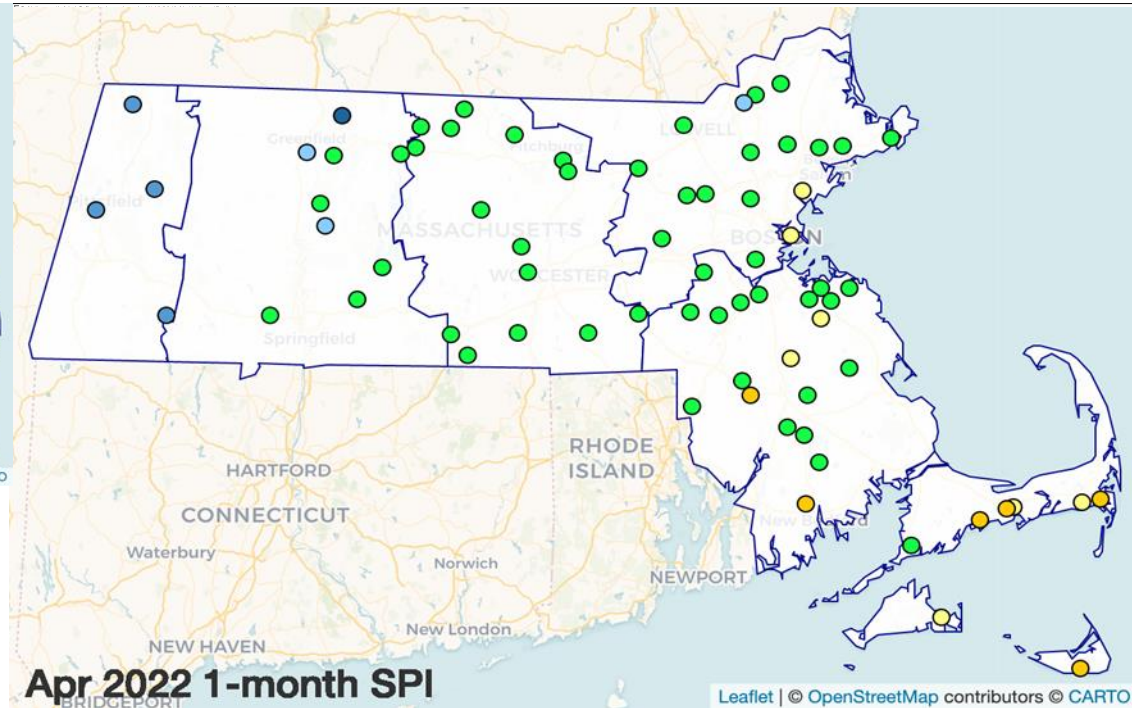
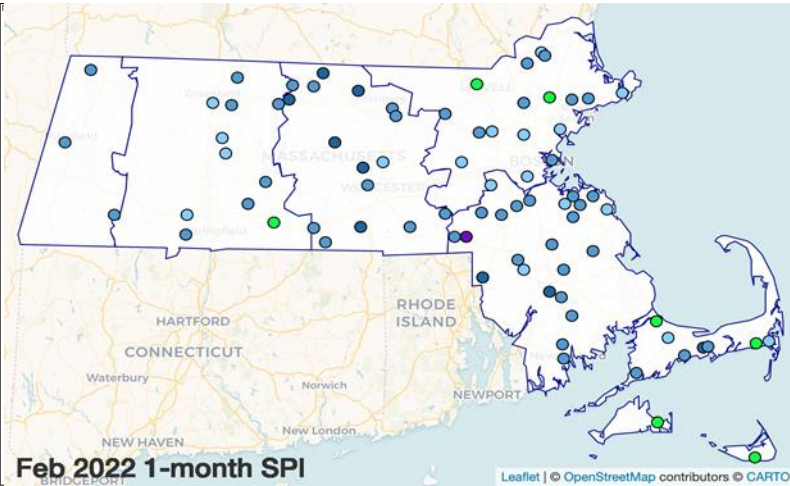


Public Health
Impacts

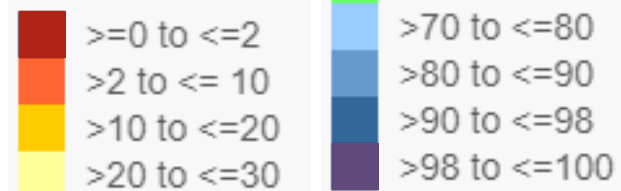
Recent Hydrologic History

- 2022
 - January through March
 - Variable precipitation with scattered
 - Minimal impacts on streamflow and groundwater
 - April
 - Areas of continued low precipitation
 - Impacts on streamflow and groundwater

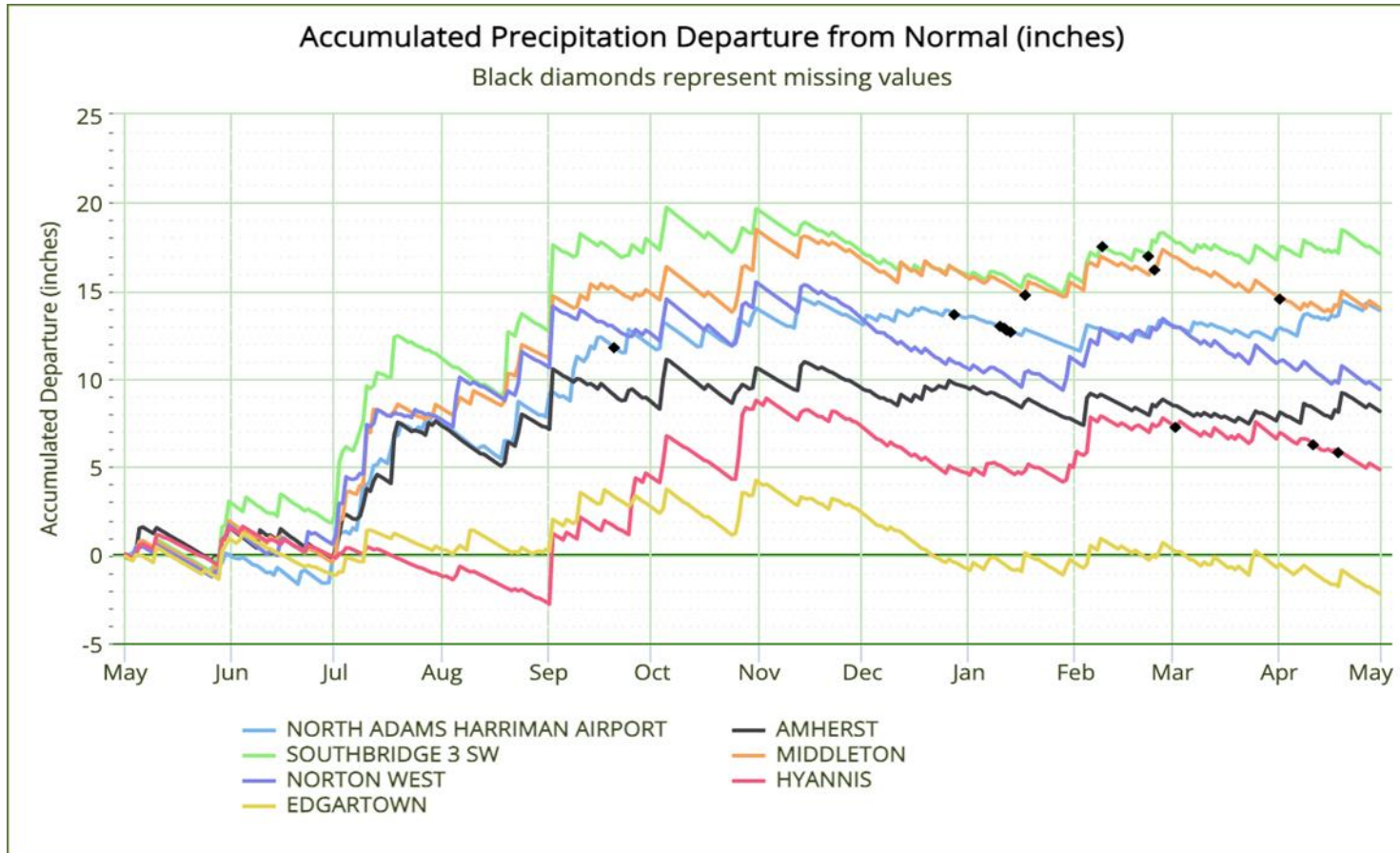
Standardized Precipitation Index, 1 month



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.

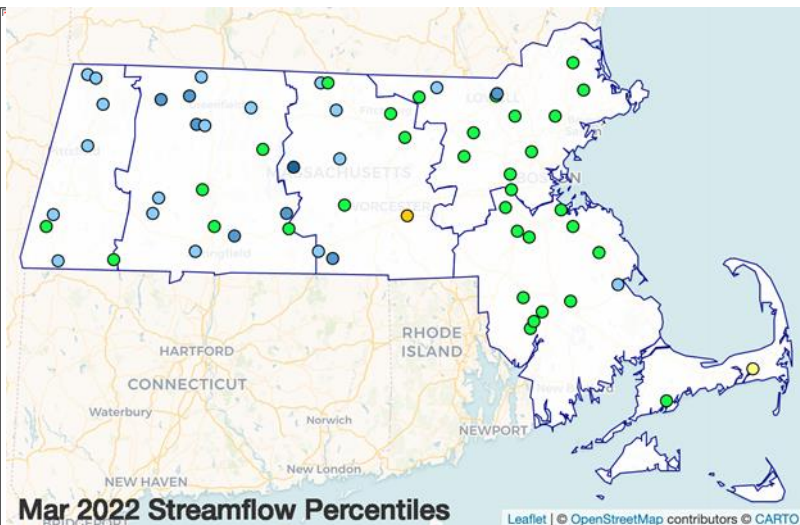
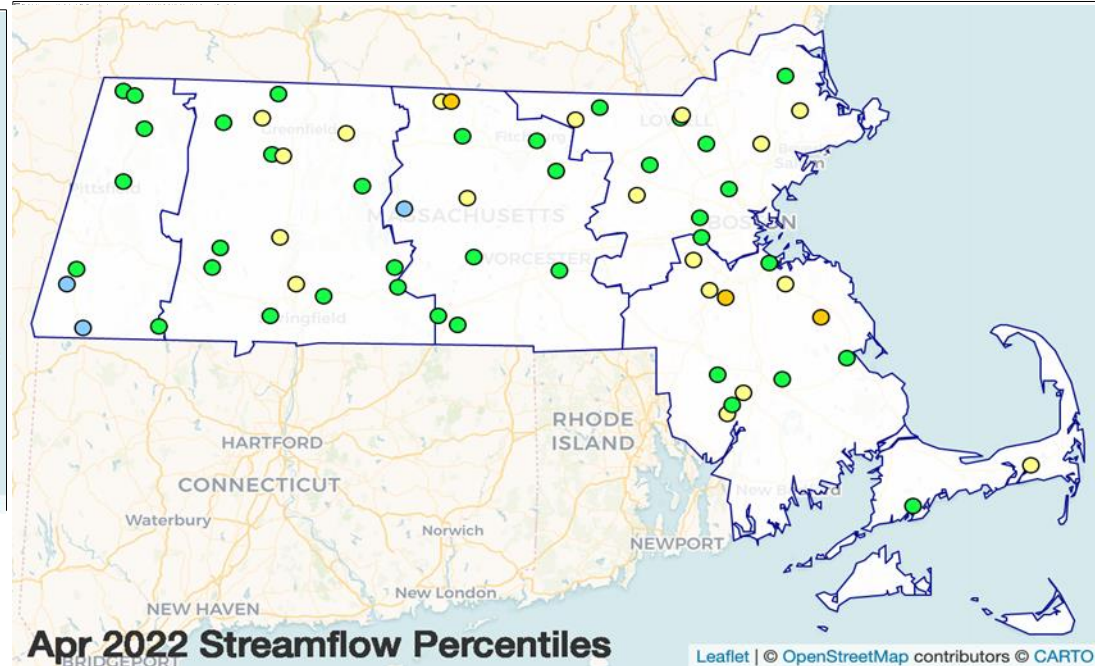
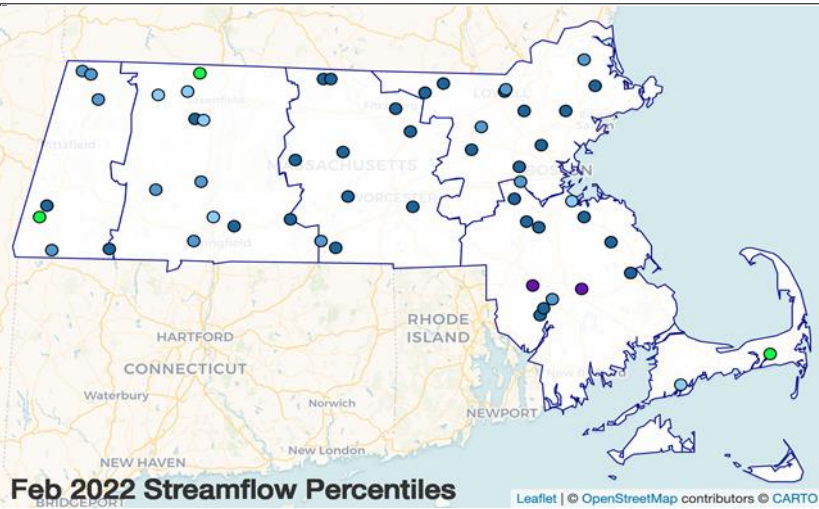
Standardized Precipitation Index as Percentile, April

REGION	NUMBER OF SITES	1-mo*	2-mo	3-mo	6-mo	9-mo	12-mo	24-mo	36-mo*
WESTERN	4	84	76	84	60	91	98	81	82
CTRV	9	64	49	70	34	56	91	63	63
CENTRAL	15	58	42	72	42	83	96	81	82
NORTHEAST	17	46	28	44	18	80	94	82	87
SOUTHEAST	20	37	25	48	19	70	90	68	73
CAPE COD	6	20	24	48	15	79	69	23	46
ISLANDS	2	18	22	33	9	43	46	24	58

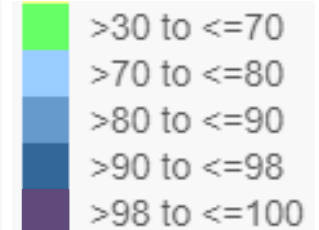
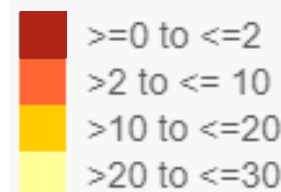
*1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

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

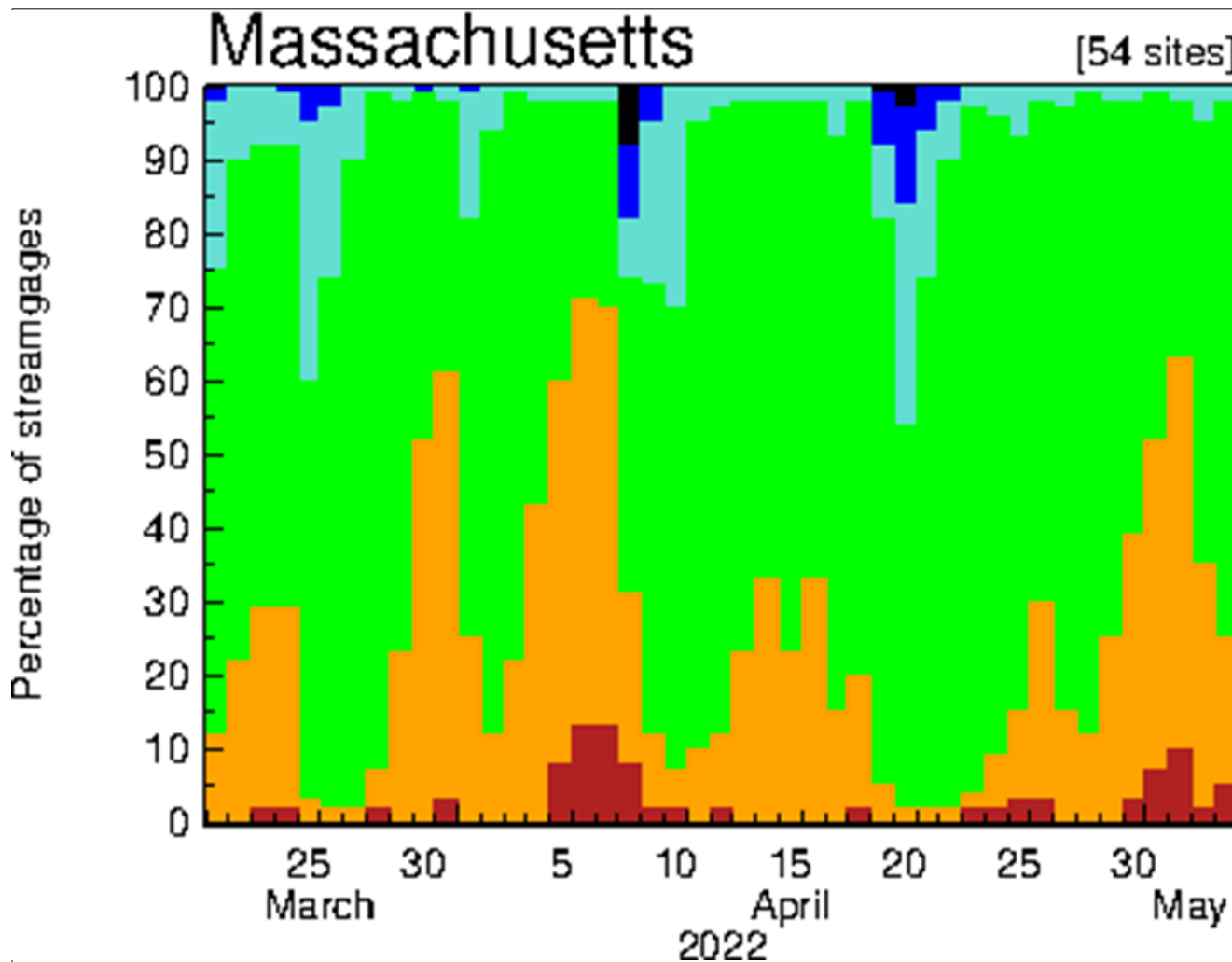
Streamflow Percentiles of Monthly Median



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		

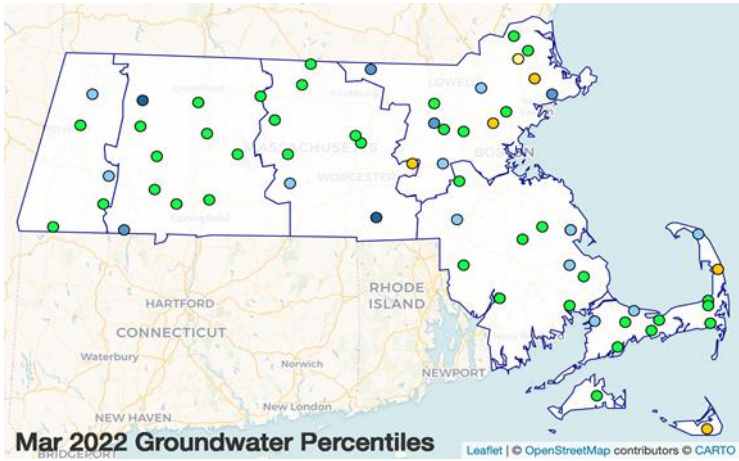
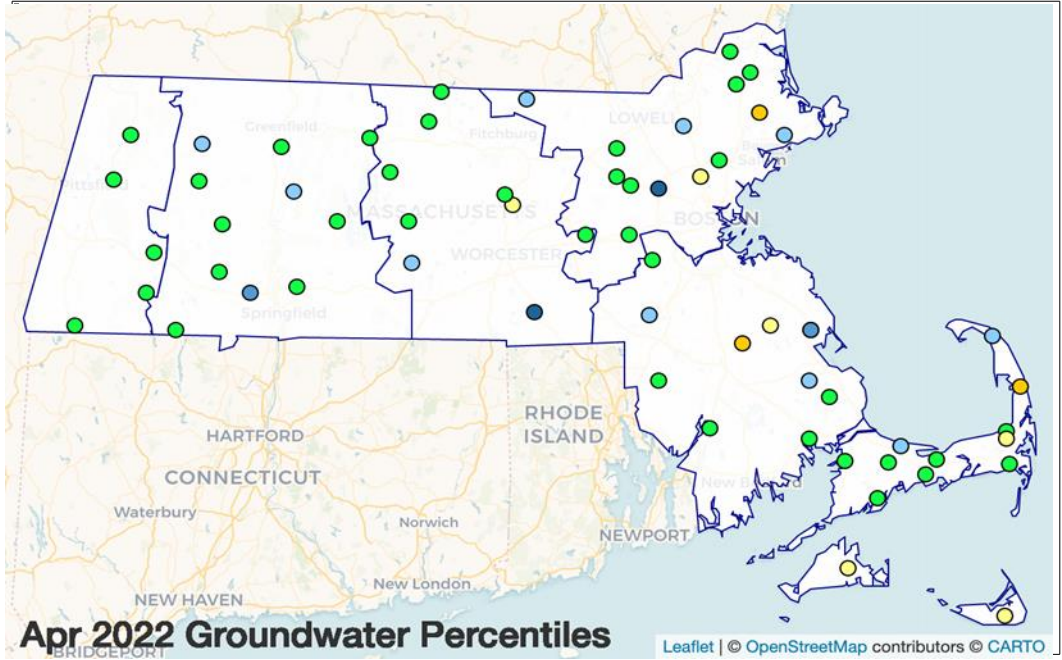
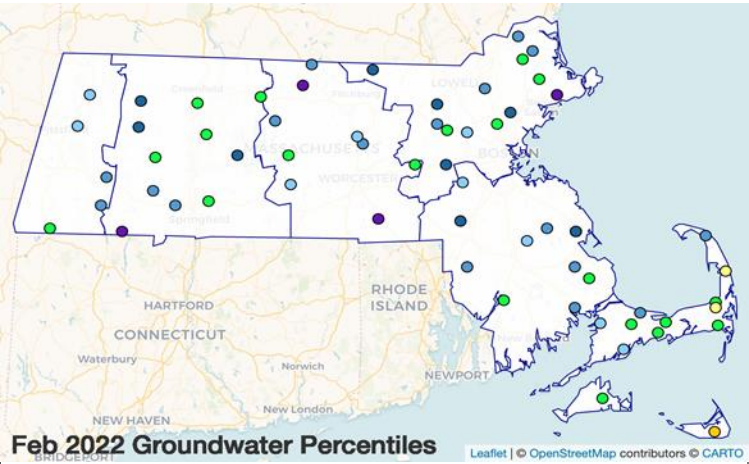
Streamflow Index April

REGION	TOTAL GAGES REPORTING FOR APR	≥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	44
CTRV	15	0	0	0	5	0	34
CENTRAL	11	0	0	1	2	0	37
NORTHEAST	13	0	0	0	4	0	32
SOUTHEAST	12	0	0	2	5	0	29
CAPE COD	2	0	0	0	1	0	39

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 at the end of Month



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

- Nov, Jan, Feb & March Islands Level 1 (Nantucket well)

REGION	TOTAL WELLS REPORTING FOR APR	≥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	0	54
CTRV	11	0	0	0	0	0	52
CENTRAL	9	0	0	0	1	1	48
NORTHEAST	14	0	0	1	1	1	53
SOUTHEAST	11	0	0	1	1	0	53
CAPE COD	11	0	0	1	1	0	53
ISLANDS	2	0	0	0	2	0	27

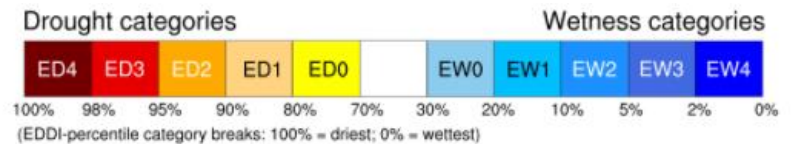
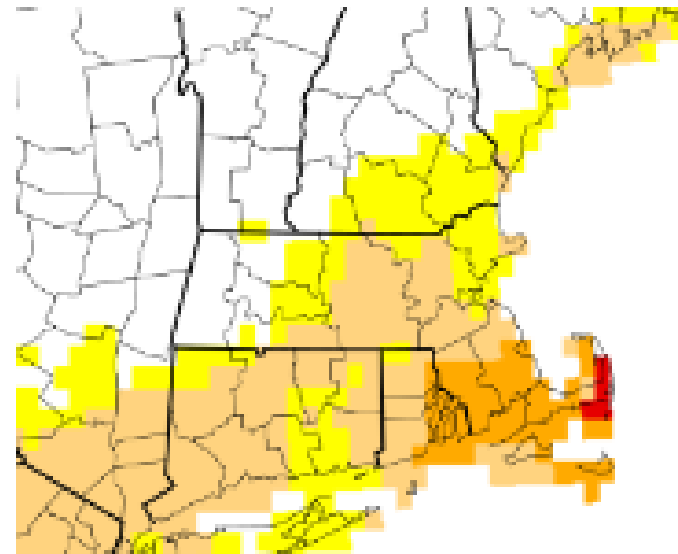
Index Severity Levels				
Level 0	Level 1	Level 2	Level 3	Level 4

Evapotranspiration

CMI week ending April 30th

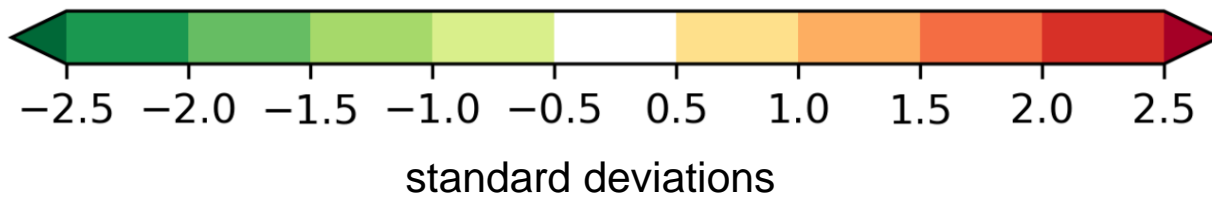


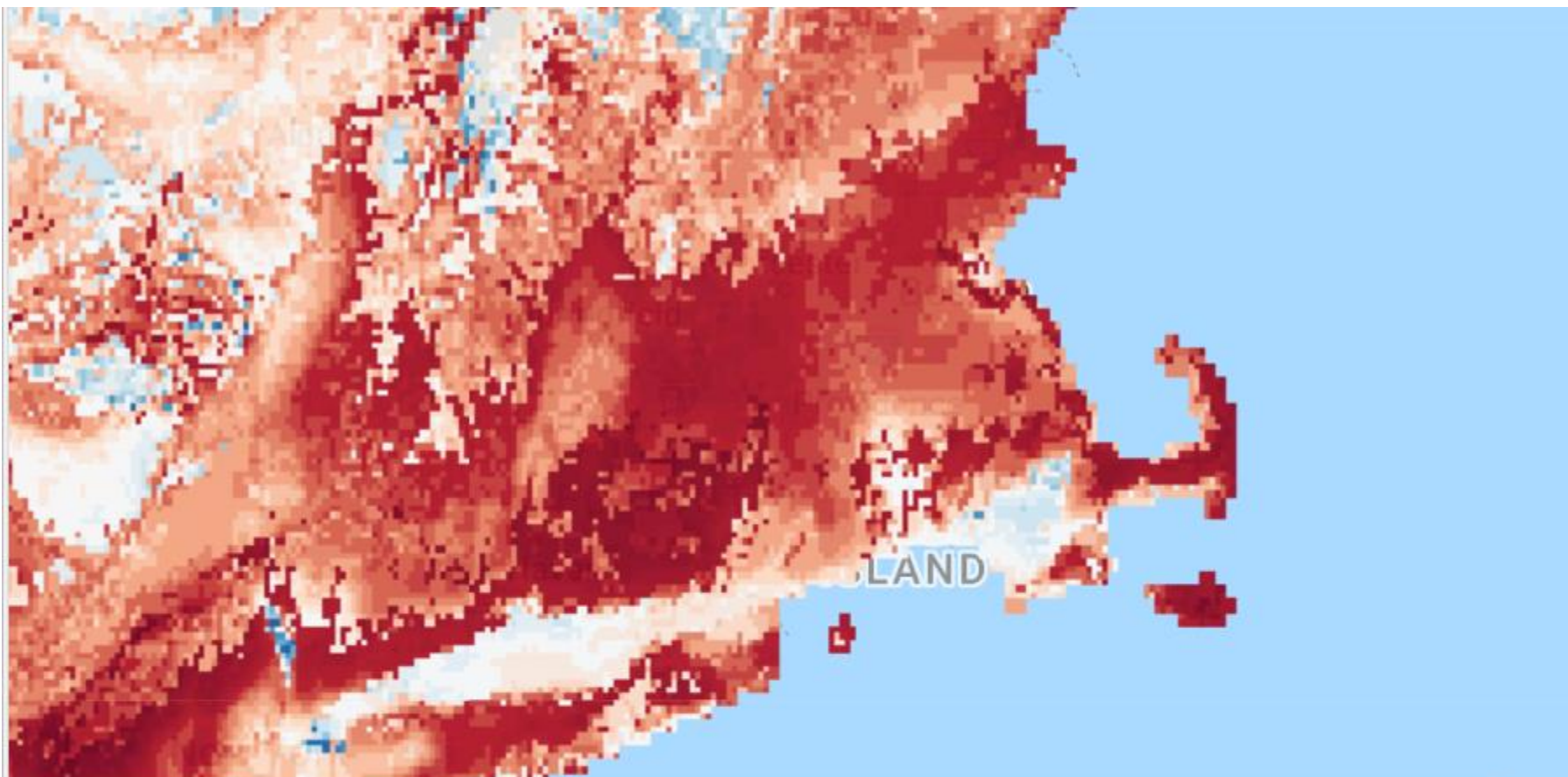
2-month EDDI
Map dated April 25th



EDDI Forecast for May and June 2022

<https://www.ncdc.noaa.gov/temp-and-precip/drought/recovery/eddi>





20 Days Early

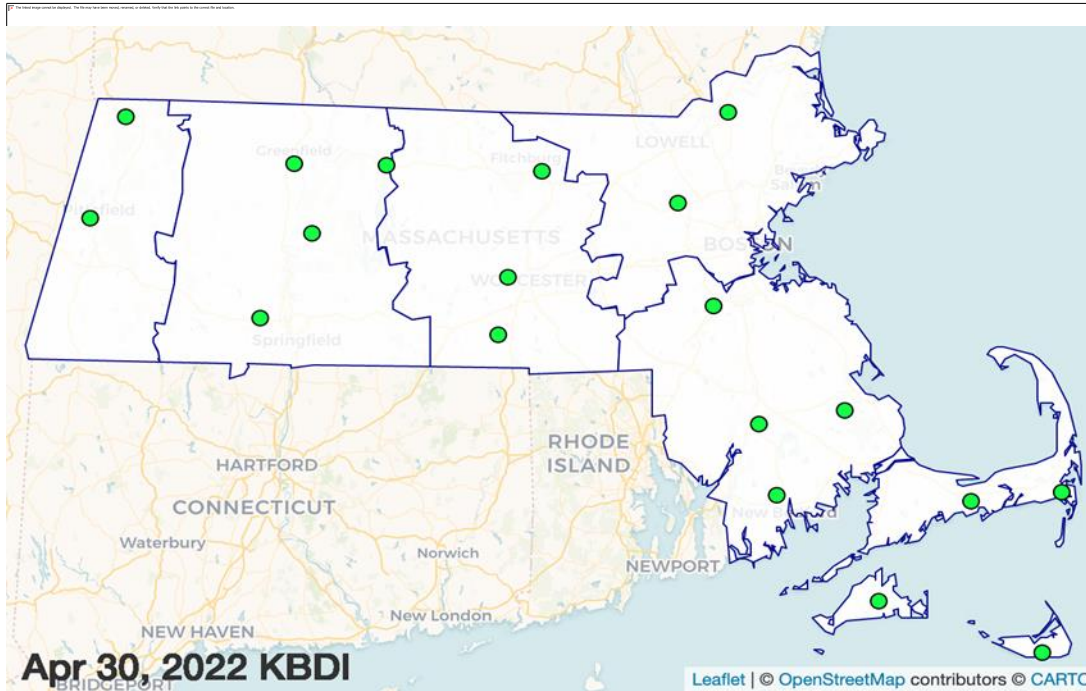
No Difference

20 Days Late

Daily Spring Index Leaf Anomaly, May 2, 2022

USA National Phenology Network, www.usanpn.org

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	8
CTRV	4	35
CENTRAL	3	29
NORTHEAST	2	7
SOUTHEAST	4	35
CAPE COD	2	26
ISLANDS	2	26

Index Severity Levels

Level 0	Level 1	Level 2	Level 3	Level 4
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Lakes & Impoundments

REGION	TOTAL REPORTING FOR MONTH	MEDIAN OF INDIVIDUAL PERCENTILES OR PERCENT FULL
WESTERN	1	100% full
CTRV	2	88
CENTRAL	3	54; 100% & 100% full
NORTHEAST	5	81; 100% & 98% full
SOUTHEAST	2	100% & 99.7% full
CAPE COD	1	47

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

Drought Indices by Region – April 2022

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation (2 mo)	81	49	42	28	25	24	22
Streamflow	44	34	37	32	29	39	N/A
Groundwater	54	52	48	53	53	53	27
Lakes/ Impoundments	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	N/A
ET- CMI EDDI	Level 0	Level 0 1	Level 0 2	Level 0 1	Level 0 3	Level 0 3	Level 0 2
KBDI	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0
<i>Recommend 4/1 (5/6 meeting)</i>	<i>Level 0</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>

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 Drought Management Task Force convenes and makes a recommendation accepted by Secretary of the Executive Office of Energy and Environmental Affairs. Data are preliminary and not final until all data are reported.

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

Drought Indices by Major Basin – April 2022

Drought Index	Boston Harbor	Ipswich
Precipitation (2 mo)	24	17
Streamflow	28	22
Groundwater	28	45
Lakes/ Impoundments	NA	Level 0
ET- CMI EDDI	Level 0 1	Level 0 1
KBDI	Level 0	Level 0

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Drought Levels				
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