

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 June 2022

Anne Carroll & Viki Zoltay
DCR Office of Water Resources

Drought Management Task Force

July 11, 2022

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan

Indices

Numbers in parentheses indicate number of data points across the state



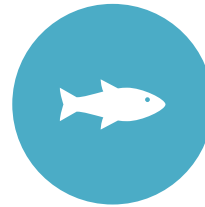
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(16)



Crop Moisture
(national map)

MA Drought Management Plan

Index Severity Levels

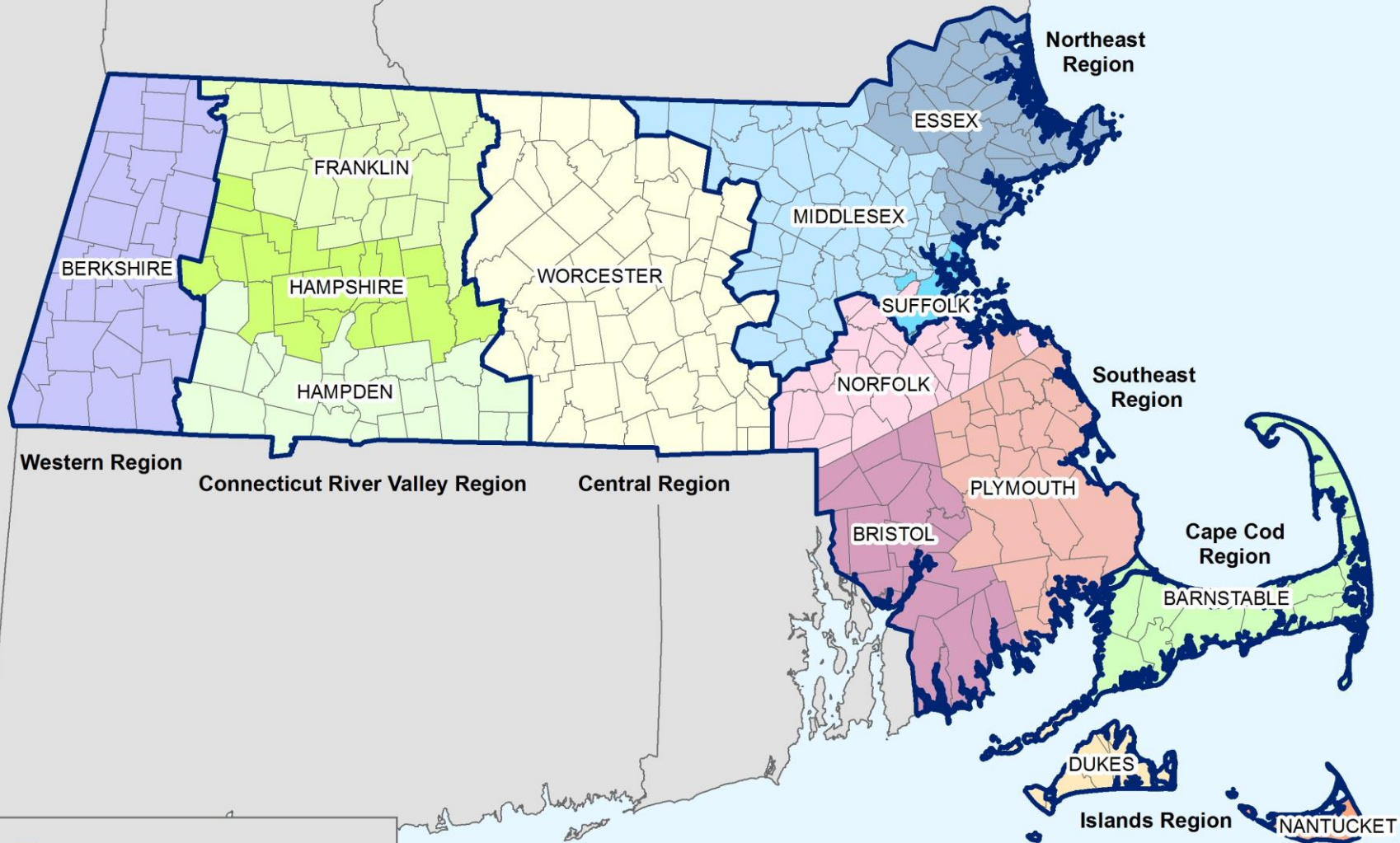
| Index Severity Level | Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater | Keetch-Byram Drought Index | Crop Moisture Index |
|----------------------|--|-------------------------------|------------------------|
| 0 | >30 th percentile | < 200 | > -1.0 |
| 1 | ≤30 and >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

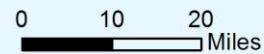
Drought Levels



MASSACHUSETTS DROUGHT REGIONS with Counties

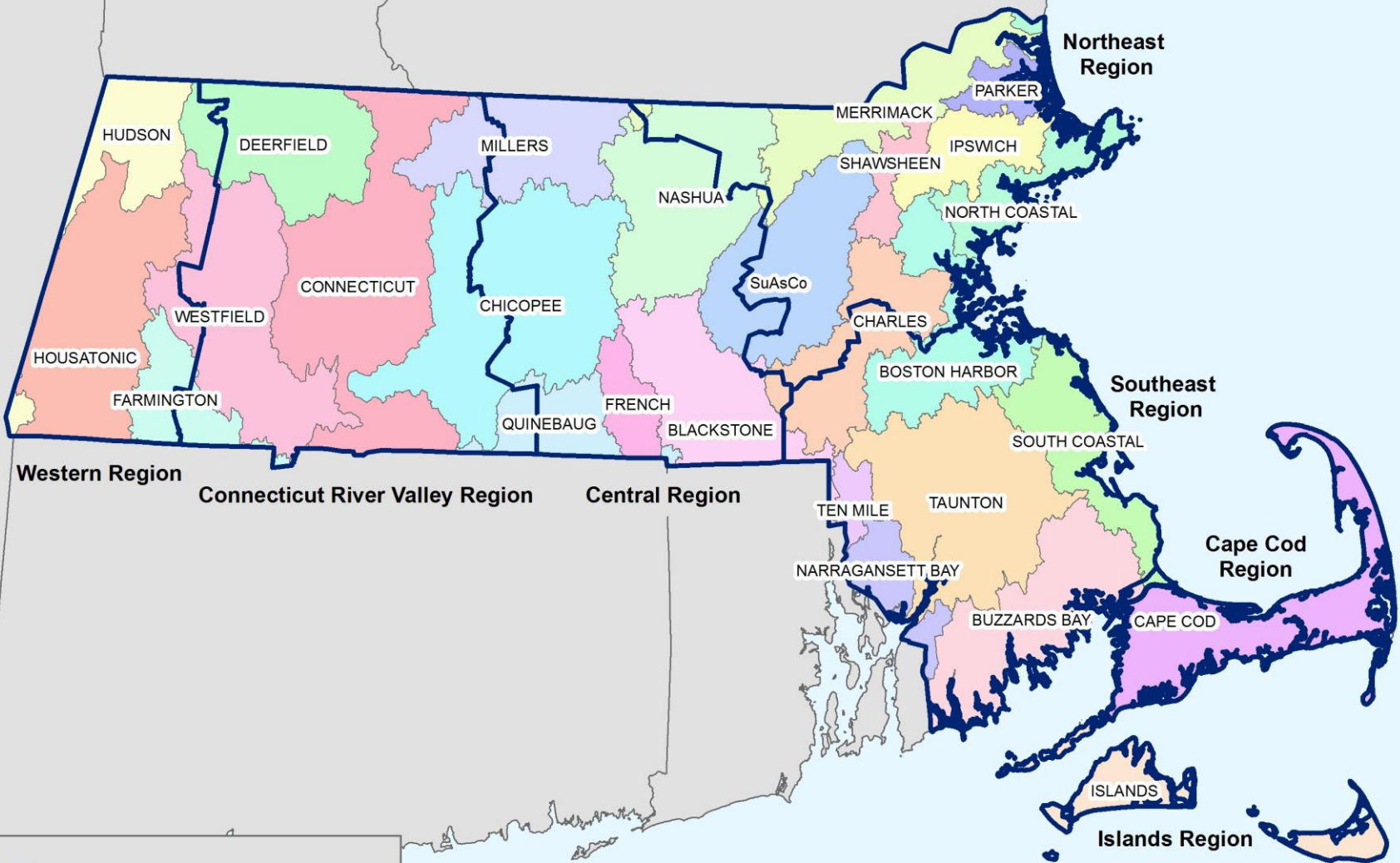


-  Drought Regions Boundaries
-  Mass. Counties



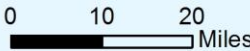
December 19, 2018 (mjm)
Data sources: MassGIS,
DCR Office of Water Resources

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

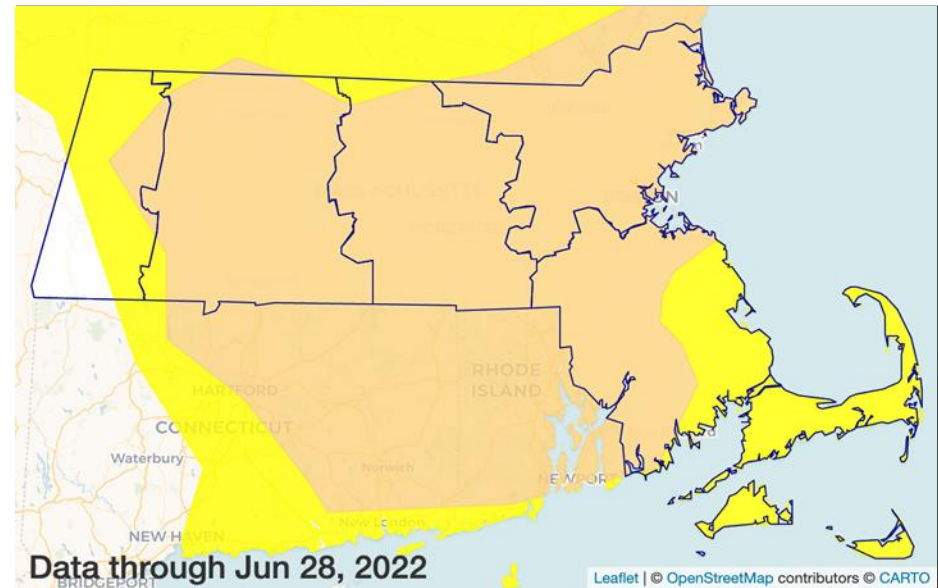
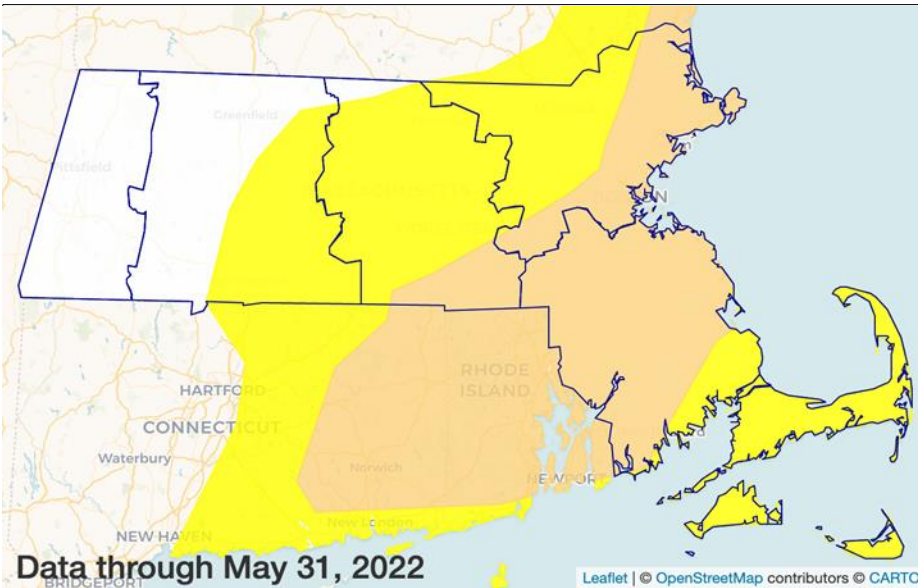


Public Health
Impacts

Recent Hydrologic History

- 2022
 - January through March
 - variable precipitation
 - scattered, minimal impacts on streamflow and groundwater
 - April
 - areas of continued low precipitation
 - impacts on streamflow and groundwater
 - May
 - continued low precipitation plus increased ET especially in NE and SE
 - flash drought in NE with 2 category jump?

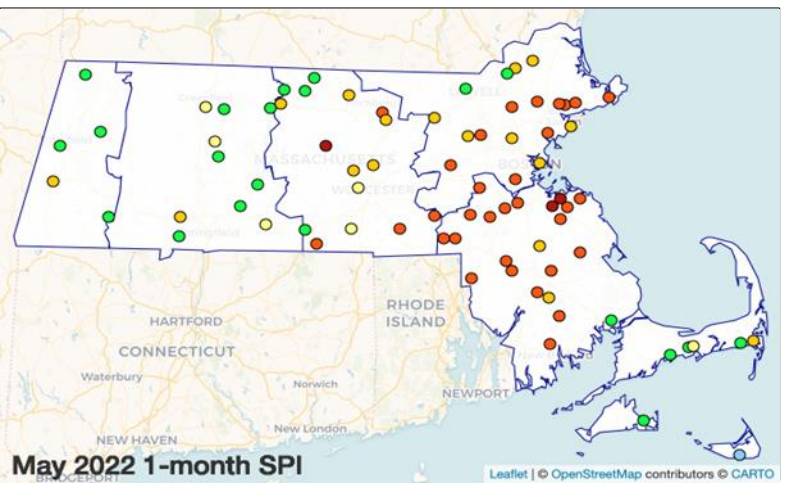
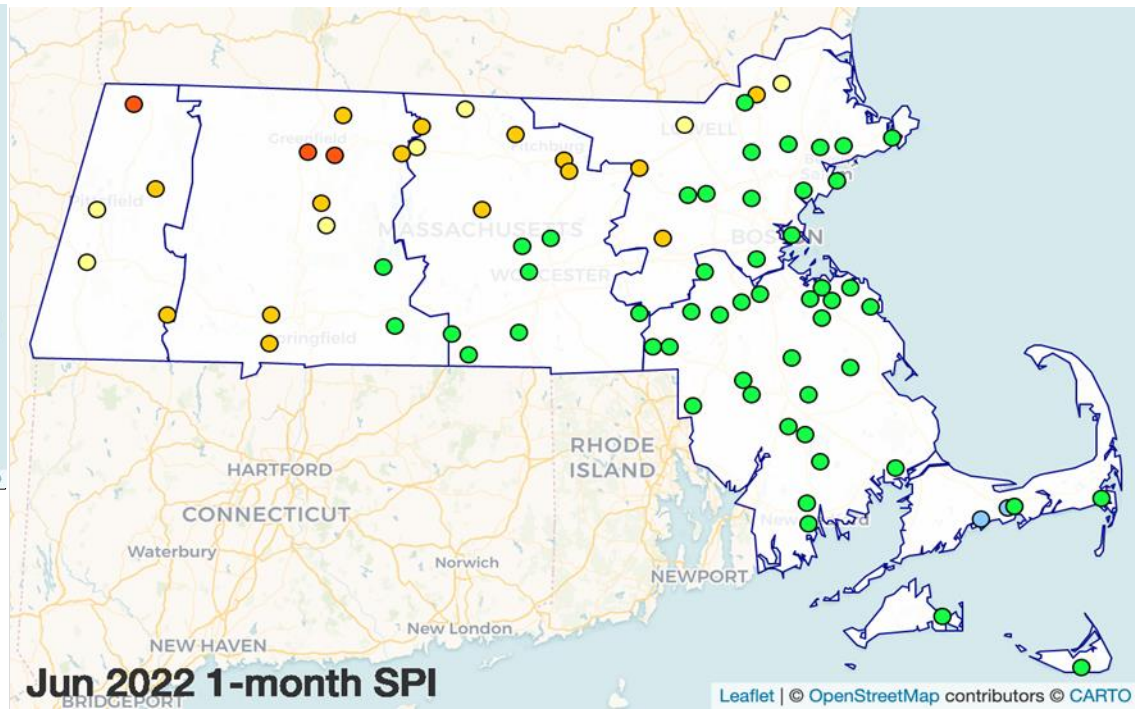
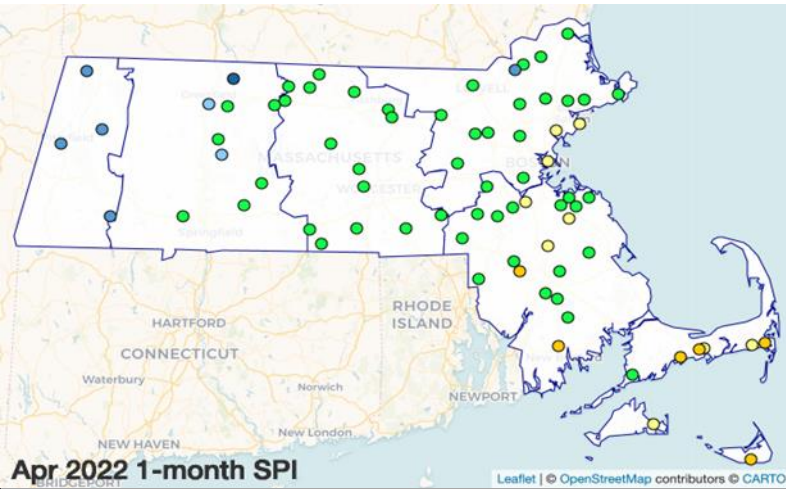
US Drought Monitor



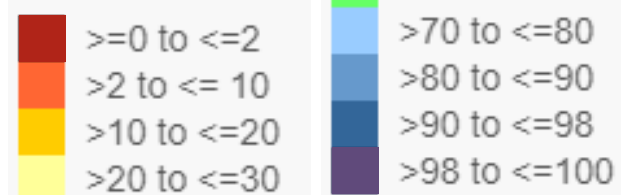
- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

| USDM | = | MA DMP |
|------|---|--------|
| 0 | = | 1 |
| 1 | = | 2 |
| 2,3 | = | 3 |
| 4 | = | 4 |

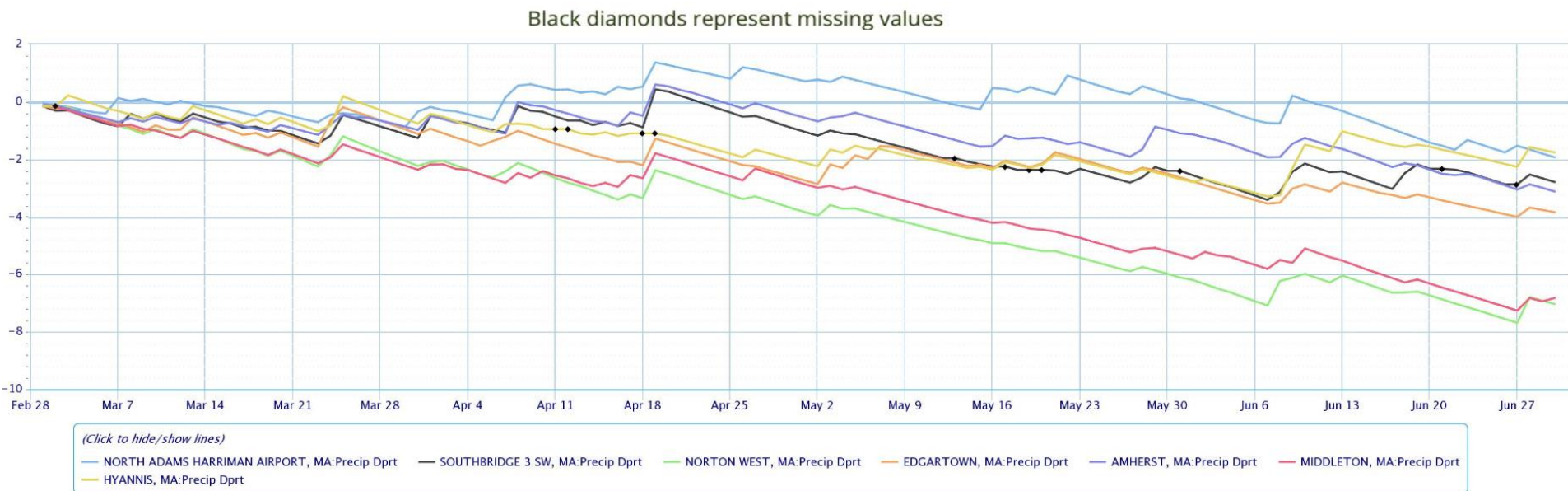
Standardized Precipitation Index, 1 month



Percentiles



Accumulated Precipitation Departure from 30-Year Average in inches



Powered by ACIS

- 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.

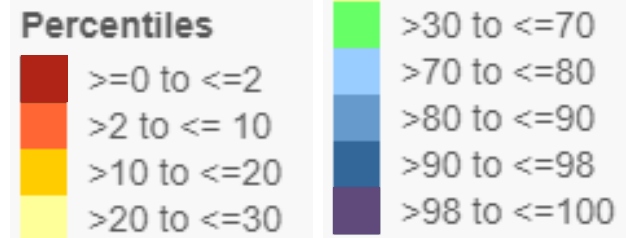
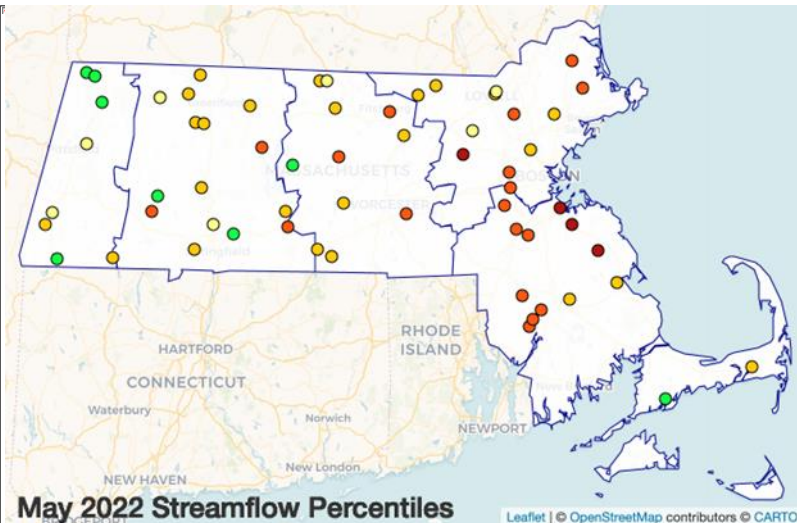
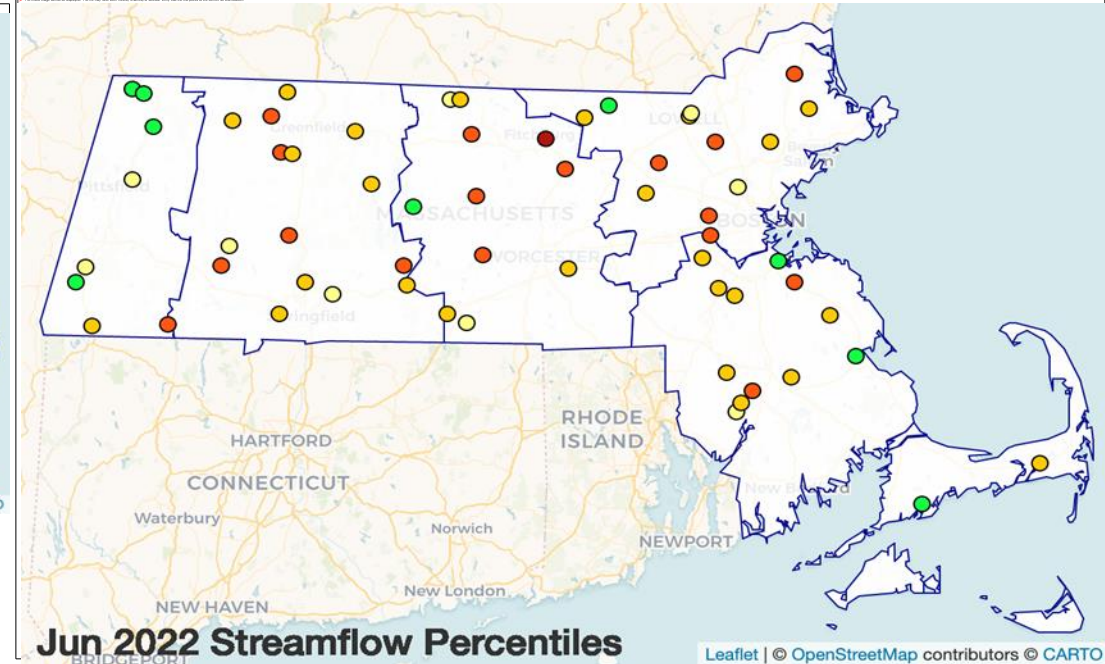
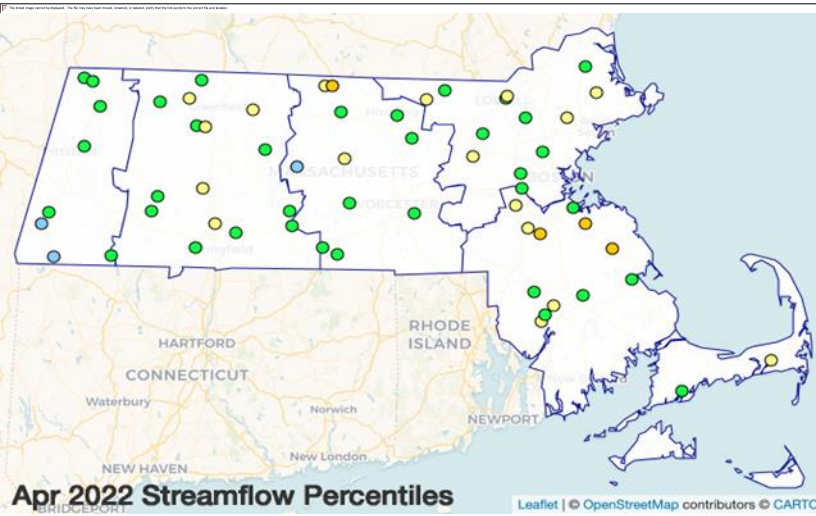
Standardized Precipitation Index as Percentile, June

| REGION | NUMBER OF SITES | 1-mo* | 2-mo | 3-mo | 6-mo | 9-mo | 12-mo | 24-mo | 36-mo* |
|-----------|-----------------|-------|------|------|------|------|-------|-------|--------|
| WESTERN | 5 | 17 | 16 | 37 | 35 | 51 | 96 | 82 | 71 |
| CTRV | 10 | 16 | 15 | 20 | 23 | 31 | 86 | 70 | 64 |
| CENTRAL | 14 | 31 | 15 | 19 | 36 | 38 | 91 | 78 | 77 |
| NORTHEAST | 18 | 39 | 13 | 16 | 19 | 23 | 86 | 77 | 84 |
| SOUTHEAST | 25 | 51 | 19 | 15 | 26 | 27 | 79 | 60 | 66 |
| CAPE COD | 4 | 70 | 51 | 31 | 53 | 48 | 76 | 41 | 37 |
| ISLANDS | 2 | 51 | 53 | 32 | 38 | 20 | 44 | 20 | 40 |

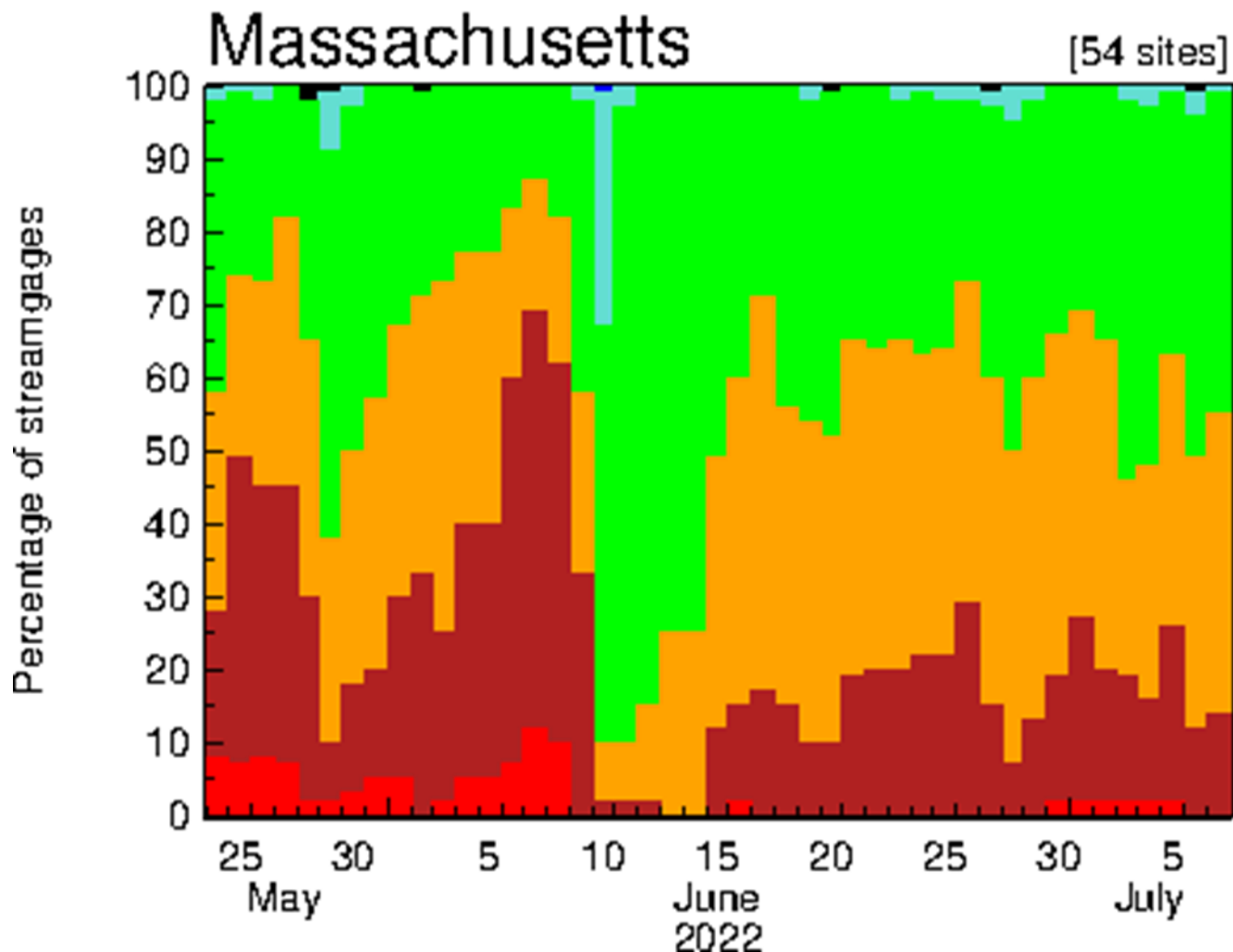
*1- and 36-month SPI is for informational purposes only, not for drought determination. Of the 2- to 24-month look-back periods, the most relevant is selected each month depending on the phase of the drought - onset, during or recovery.

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

Streamflow Percentiles of Monthly Median



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 | | | |

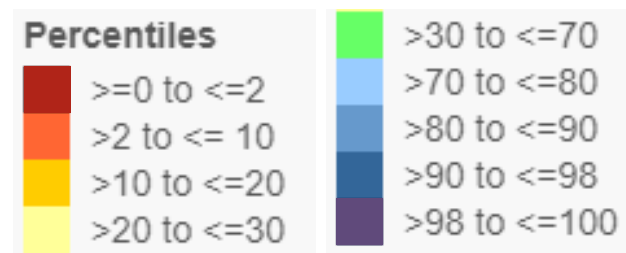
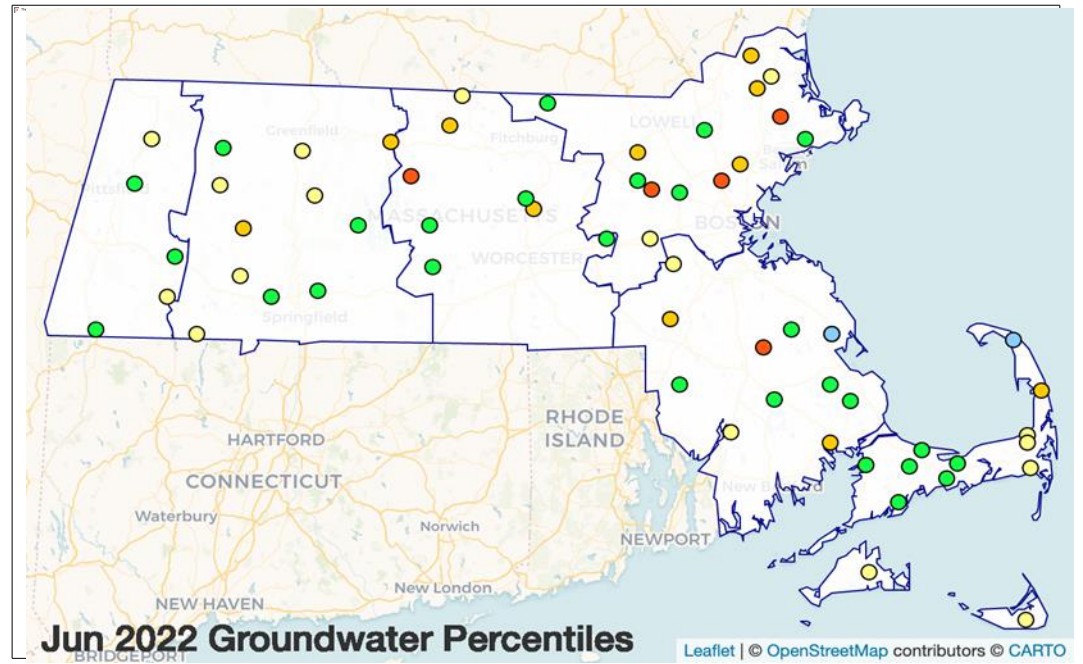
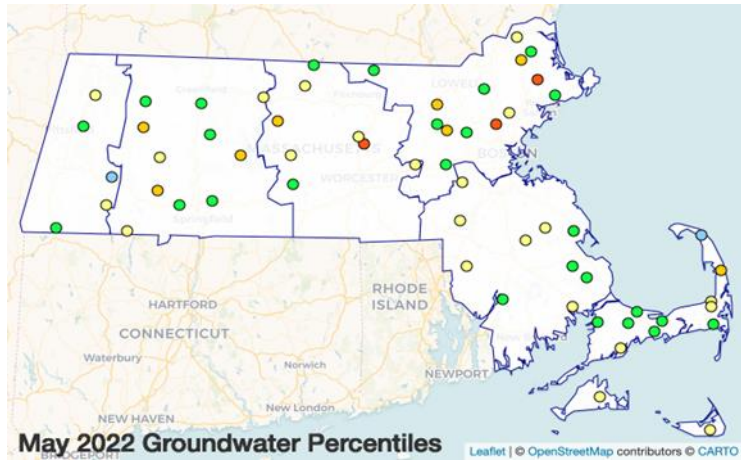
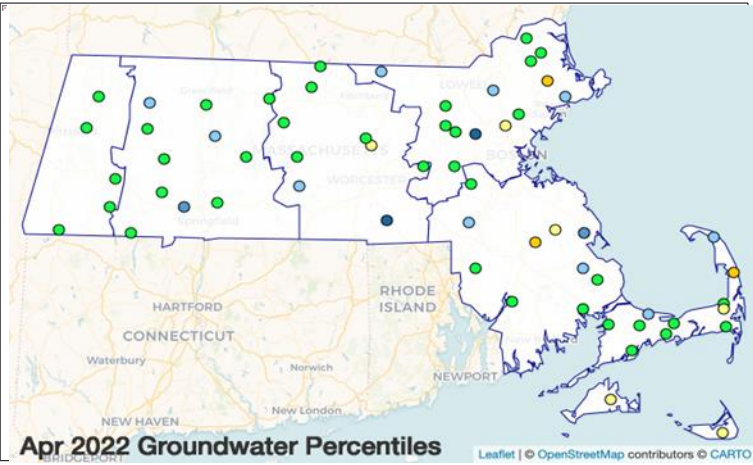
Streamflow Index June

| 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 | 1 | 1 | 2 | 0 | 29 |
| CTRV | 15 | 0 | 5 | 8 | 2 | 0 | 13 |
| CENTRAL | 11 | 1 | 4 | 3 | 2 | 0 | 13 |
| NORTHEAST | 13 | 0 | 5 | 5 | 2 | 0 | 11 |
| SOUTHEAST | 12 | 0 | 2 | 7 | 1 | 0 | 17 |
| 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.

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

Groundwater Percentiles at the end of Month



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 | 2 | 0 | 39 |
| CTRV | 11 | 0 | 0 | 2 | 5 | 0 | 23 |
| CENTRAL | 8 | 0 | 1 | 2 | 1 | 0 | 29 |
| NORTHEAST | 14 | 0 | 3 | 4 | 2 | 0 | 21 |
| SOUTHEAST | 12 | 0 | 1 | 2 | 2 | 0 | 36 |
| CAPE COD | 11 | 0 | 0 | 1 | 3 | 0 | 36 |
| ISLANDS | 2 | 0 | 0 | 0 | 2 | 0 | 24 |

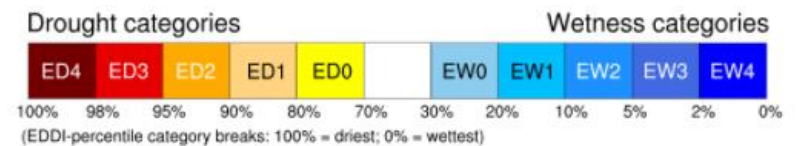
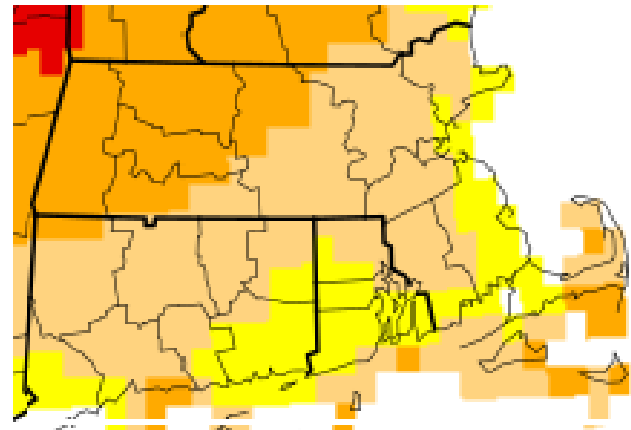
| Index Severity Levels | | | | |
|-----------------------|---------|---------|---------|---------|
| Level 0 | Level 1 | Level 2 | Level 3 | Level 4 |

Evapotranspiration

CMI week ending July 2nd

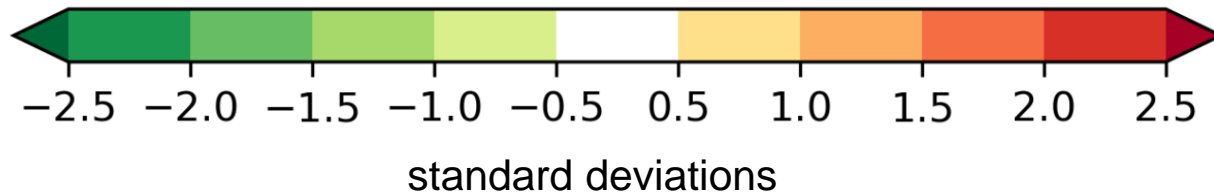


2-month EDDI
Map dated July 2nd

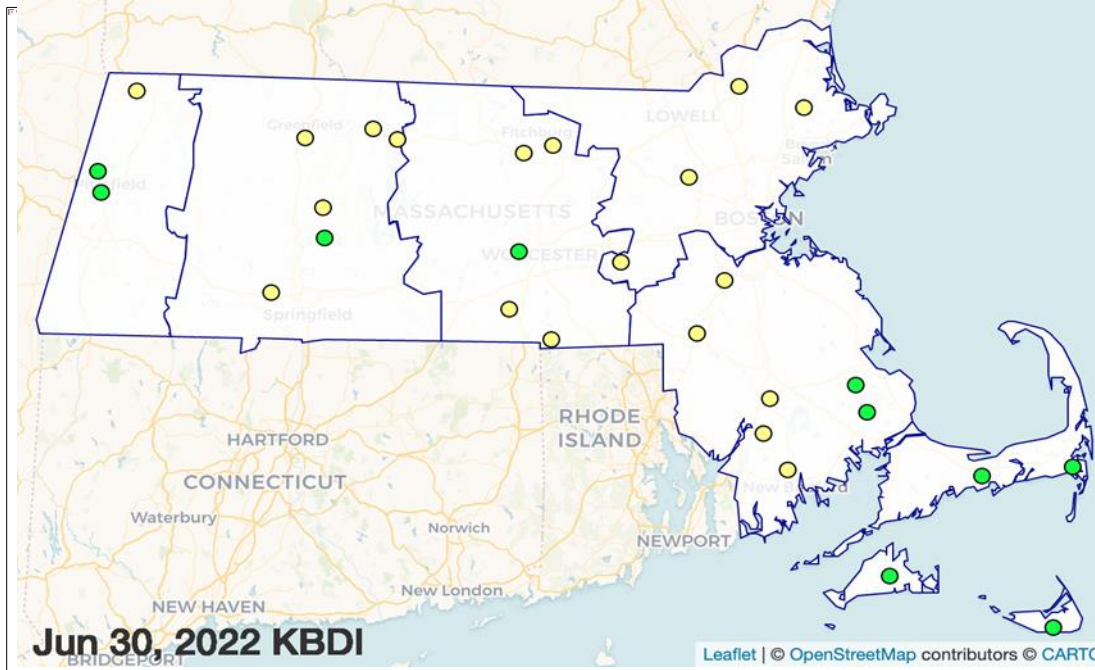


EDDI Forecast for July and August 2022

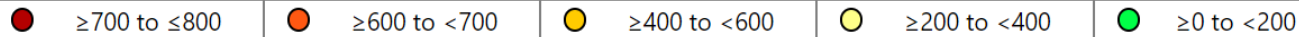
<https://www.ncdc.noaa.gov/temp-and-precip/drought/recovery/eddi>



KBDI - Top 8 inches of soil moisture



Point Values - KBDI Range



| REGION | NUMBER OF SITES REPORTING | HIGHEST OF SITE VALUES |
|-----------|---------------------------|------------------------|
| WESTERN | 3 | 268 |
| CTRV | 6 | 358 |
| CENTRAL | 5 | 394 |
| NORTHEAST | 4 | 330 |
| SOUTHEAST | 7 | 324 |
| CAPE COD | 2 | 89 |
| ISLANDS | 2 | 101 |

Index Severity 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 | 0 | |
| CTRV | 1 | 48th |
| CENTRAL | 4 | 24th |
| NORTHEAST | 5 | 20th |
| SOUTHEAST | 2 | 54th |
| CAPE COD | 1 | 32nd |

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 – May 2022

| Drought Index | Western | CT River Valley | Central | Northeast | Southeast | Cape | Islands |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Precipitation (3 mo) | 61 | 38 | 24 | 9 | 7 | 15 | 30 |
| Streamflow | 29 | 16 | 18 | 11 | 5 | 33 | N/A |
| Groundwater | 41 | 28 | 24 | 28 | 29 | 41 | 29 |
| Lakes/ Impoundments | Level 0 | Level 0 | Level 0 | Level 1 | Level 0 | Level 0 | N/A |
| ET- CMI EDDI | Level 0 2 | Level 0 1 | Level 0 1 | Level 0 2 | Level 0 1 | Level 0 1 | Level 0 2 |
| KBDI | Level 0 | Level 0 | Level 1 | Level 1 | Level 1 | Level 0 | Level 0 |
| <i>Effective 5/1 (6/9 meeting)</i> | <i>Level 0</i> | <i>Level 1</i> | <i>Level 1</i> | <i>Level 2</i> | <i>Level 2</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 Region – June 2022

| Drought Index | Western | CT River Valley | Central | Northeast | Southeast | Cape | Islands |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Precipitation | 16 | 15 | 15 | 13 | 19 | 51 | 53 |
| Streamflow | 29 | 13 | 13 | 11 | 17 | 33 | N/A |
| Groundwater | 39 | 23 | 29 | 21 | 36 | 36 | 24 |
| Lakes/ Impoundments | ND | Level 0 | Level 1 | Level 2 | Level 0 | Level 0 | N/A |
| ET- CMI EDDI | Level 0 3 | Level 0 3 | Level 0 2 | Level 0 2 | Level 0 2 | Level 0 2 | Level 0 2 |
| KBDI | Level 1 | Level 1 | Level 1 | Level 1 | Level 1 | Level 0 | Level 0 |
| <i>Recommend 6/1 (7/11 meeting)</i> | <i>Level 1</i> | <i>Level 2</i> | <i>Level 2</i> | <i>Level 2</i> | <i>Level 2</i> | <i>Level 0</i> | <i>Level 1</i> |
| <i>Effective 5/1 (6/9 meeting)</i> | <i>Level 0</i> | <i>Level 1</i> | <i>Level 1</i> | <i>Level 2</i> | <i>Level 2</i> | <i>Level 0</i> | <i>Level 1</i> |

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