Hydrologic Conditions in Massachusetts

Drought Management Task Force

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DCR Office of Water Resources

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Meeting Co-Chairs: EOEEA, MEMA

MA Drought Management Plan
Drought Indices

Index Severity Level	Standardized Precipitation Index	Streamflow	Lakes and Impoundments	Groundwater	Keetch- Byram Drought Index	Crop Moisture Index
0	>30th 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

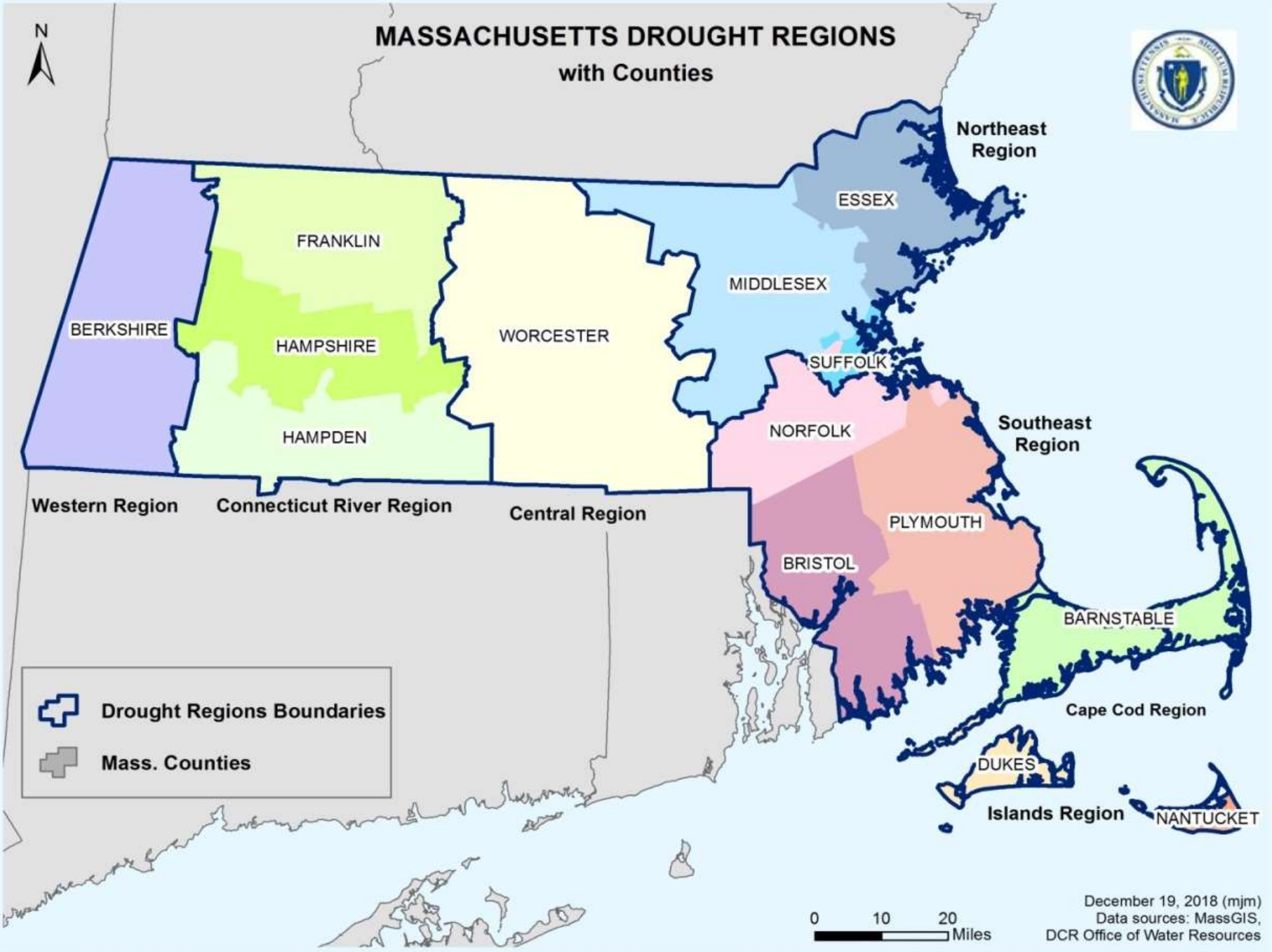
Level 0 – NORMAL

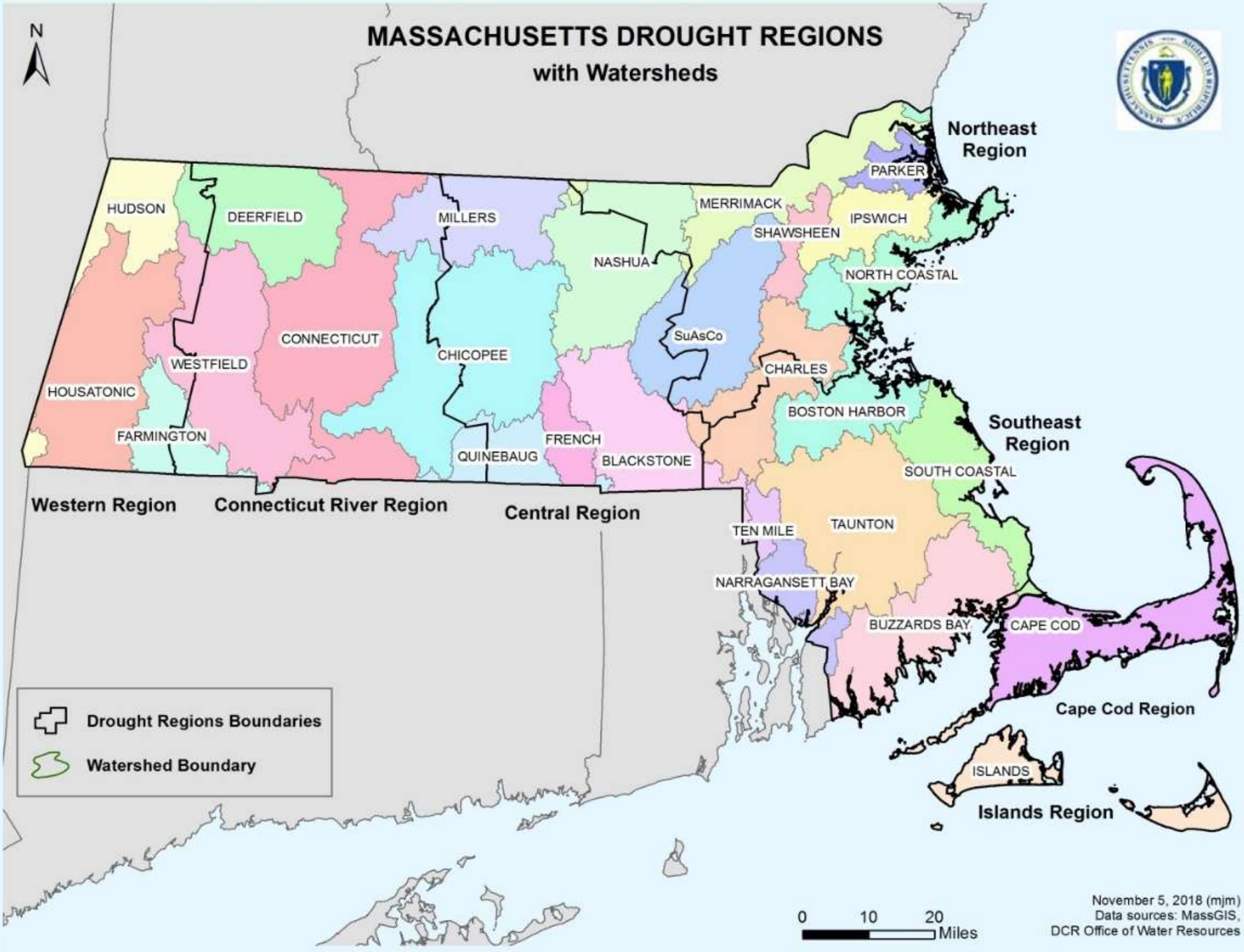
Level 1 – MILD Drought (formerly Advisory)

Level 2 – SIGNIFICANT Drought (formerly Watch)

Level 3 – CRITICAL Drought (formerly Warning)

Level 4 – EMERGENCY Drought


MASSACHUSETTS DROUGHT REGIONS
with Counties
N
Northeast Region
ESSEX
MIDDLESEX
FRANKLIN
BERKSHIRE
HAMPSHIRE
WORCESTER
SUFFOLK
NORFOLK
Southeast Region
HAMPDEN
Western Region
Connecticut River Region
Central Region
PLYMOUTH
BRISTOL
BARNSTABLE
Cape Cod Region
DUKES
Islands Region
NANTUCKET
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
N
Northeast Region
PARKER
MERRIMACK
IPSWICH
SHAWSHEEN
NORTH COASTAL
HUDSON
DEERFIELD
MILLERS
NASHUA
SuAsCo
CHARLES
CONNECTICUT
CHICOPEE
WESTFIELD
HOUSATONIC
FARMINGTON
QUINEBAUG
FRENCH
BLACKSTONE
BOSTON HARBOR
Southeast Region
SOUTH COASTAL
TAUNTON
TEN MILE
NARRAGANSETT BAY
BUZZARDS BAY
CAPE COD
Cape Cod Region
ISLANDS
Islands Region
Western Region
Connecticut River Region
Central Region
Drought Regions Boundaries
Watershed Boundary
0 10 20 Miles
November 5, 2018 (mjm)
Data sources: MassGIS,
DCR Office of Water Resources

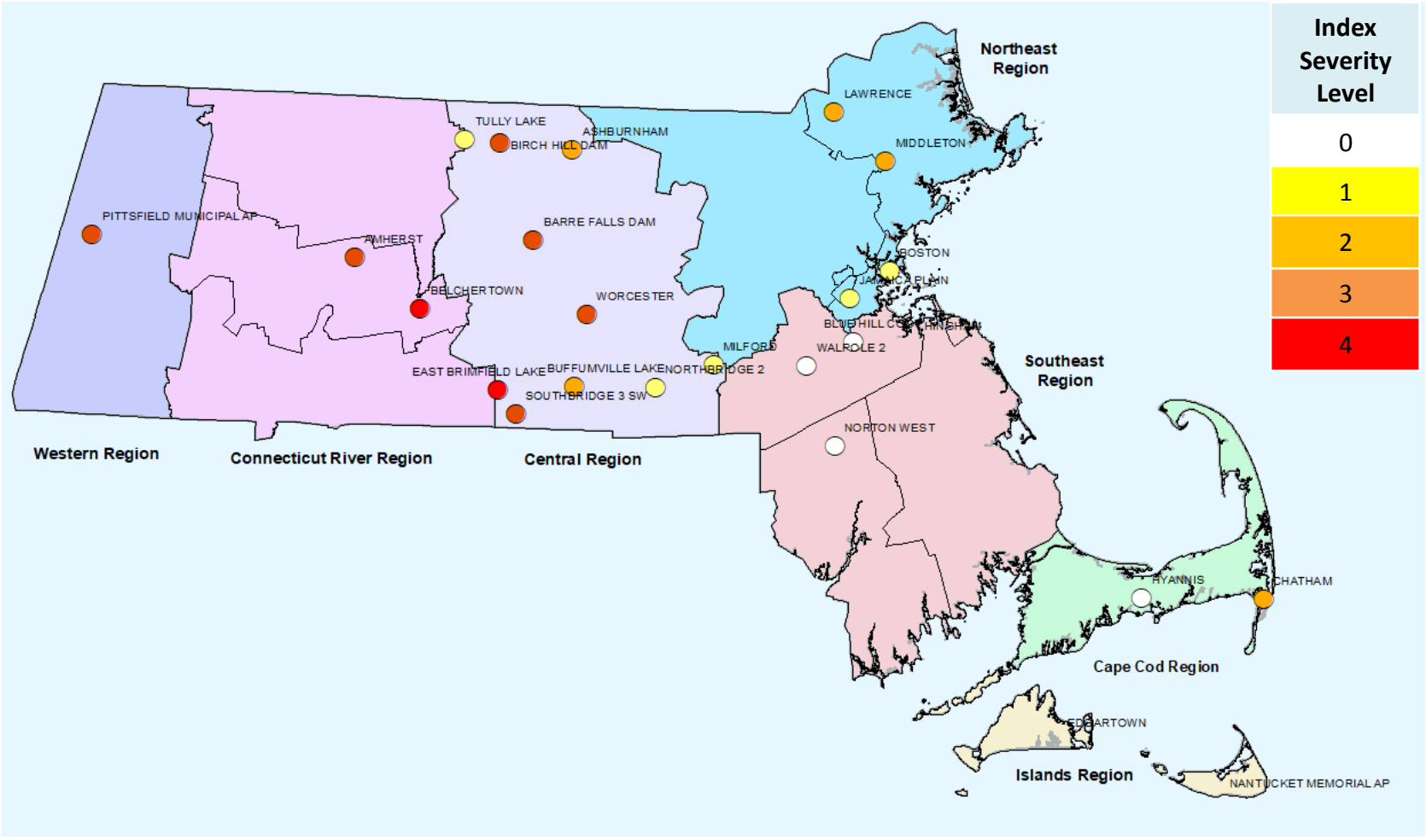
Overview of Recent Conditions

- Early in the year, above normal temperatures and near-normal precipitation caused dry conditions on and off until a wet April.
- May precipitation dropped off significantly continuing into June
- Streamflows also dropped off significantly in the latter half of May continuing into June
- Groundwater is starting to follow the decreasing trend in the Western, CT River Valley, and Central Regions
- Recent high temperatures have contributed to deteriorating conditions

Precipitation Index - SPI

Index Severity Level	Percentile Ranges	SPI Values
0	>30	> -0.52
1	≤30 and >20	≤ -0.52 and > -0.84
2	≤20 and >10	≤ -0.84 and > -1.28
3	≤10 and >2	≤ -1.28 and > -2.05
4	≤2	≤ -2.05

2-month Precipitation Index - SPI



Precipitation Index - SPI

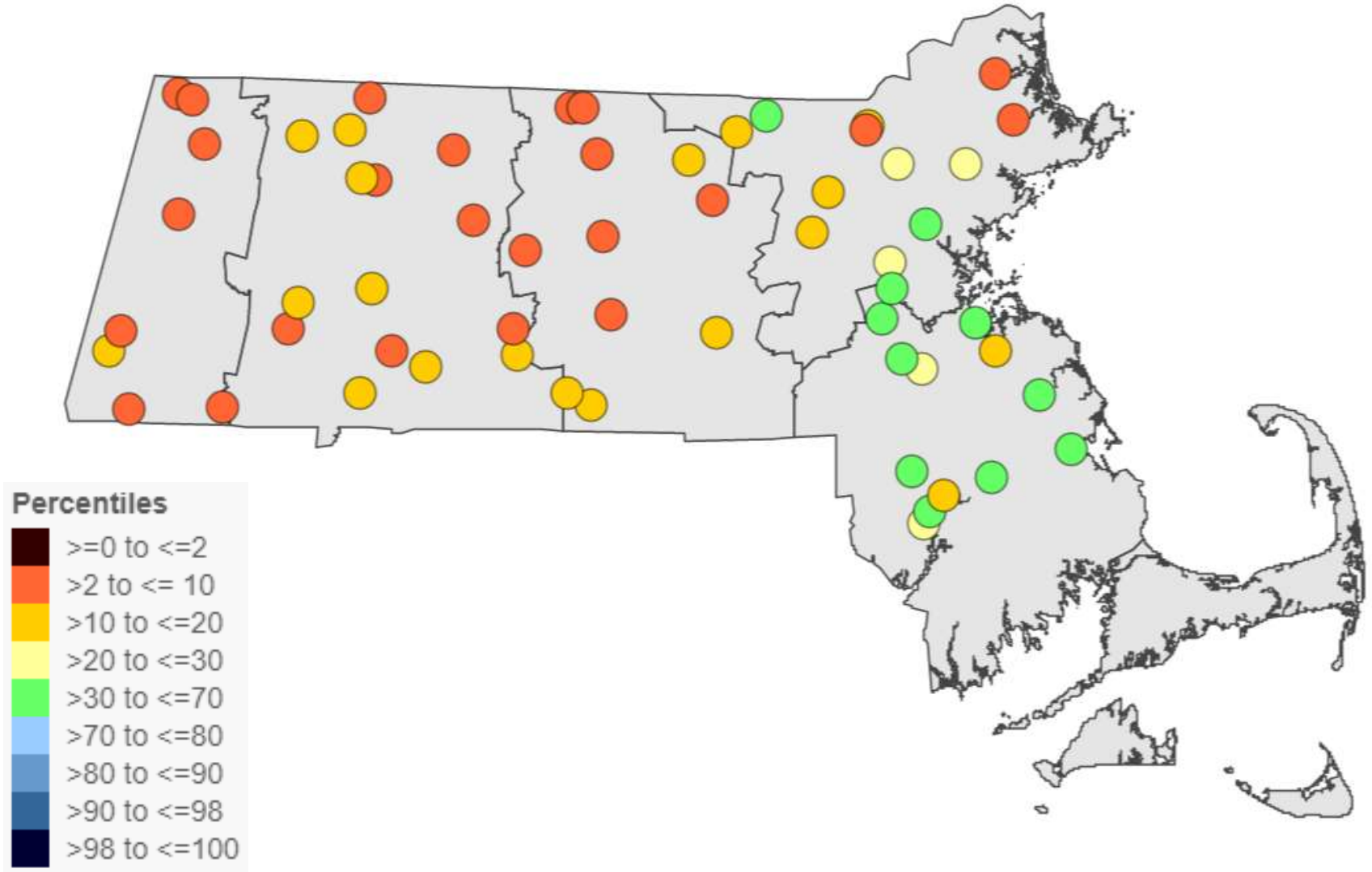
Drought Region	Number of Sites	SPI1*	SPI2	SPI3
Western	1;1;1	-1.62	-1.50	-0.93
Connecticut River	3;2;3	-2.30	-1.84	-1.18
Central	9;5;10	-1.96	-1.28	-0.62
Northeast	5;4;7	-1.72	-0.90	-0.58
Southeast	4;4;5	-0.56	-0.08	0.34
Cape Cod	2;2;2	-1.47	-0.61	-0.33
Islands	2;2;2	-0.77	0.36	0.10

Index Severity Levels

Level 0 | Level 1 | Level 2 | Level 3 | Level 4

*1-month SPI is for informational purposes only, not for drought determination

Streamflow – Percentiles of Monthly Median Last 28 days



Streamflow Index

By Drought Region

- April - All regions at Index Severity Level 0
- May - All regions at Index Severity Level 0

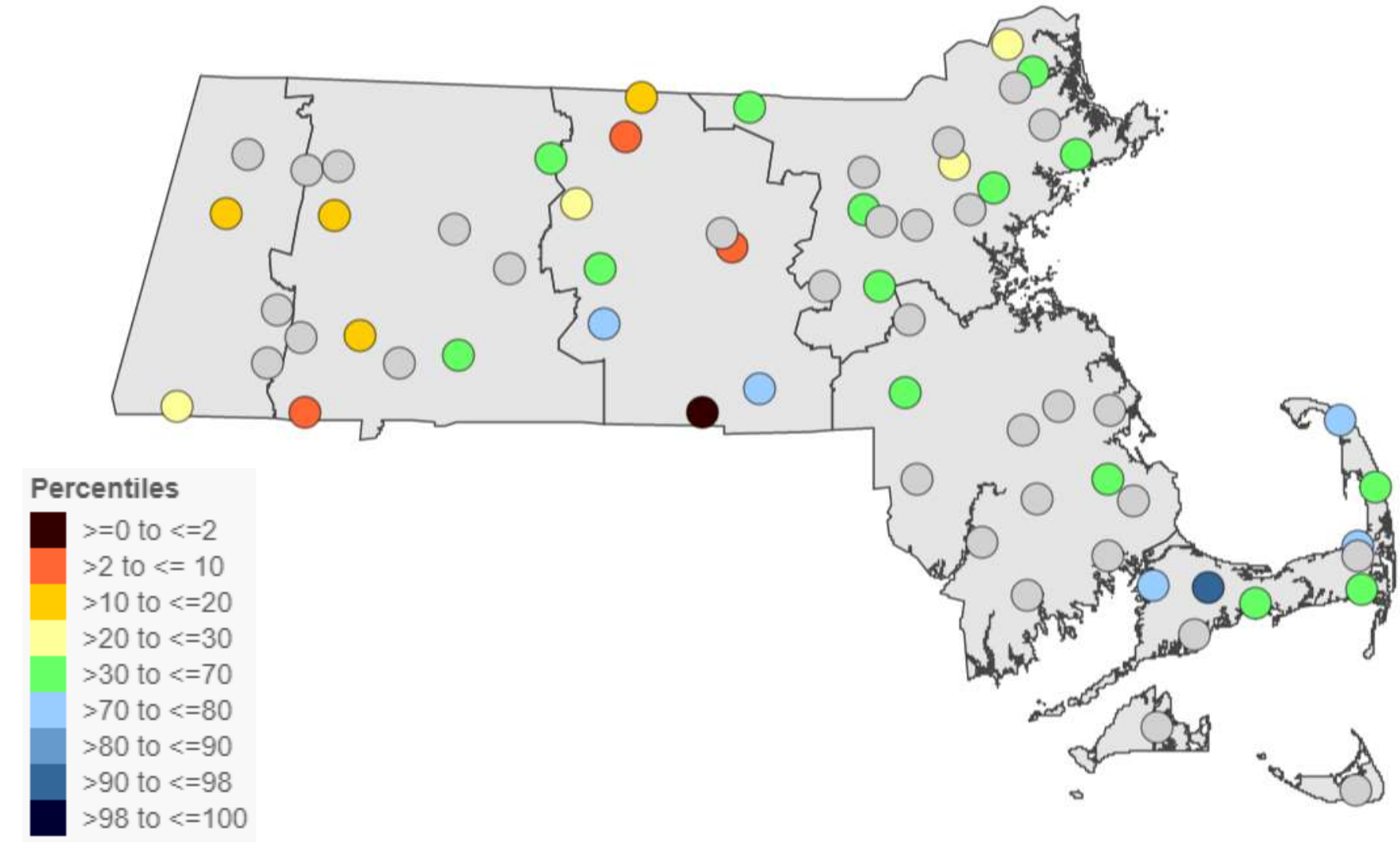
June

- **<u>Two regions at Level 2, two regions at Level 3</u>**

Region	Number of Gages						Median of Individual Gage Percentiles	DMP Index Severity
	Total Reporting for 2020-05-26 to 2020-06-22	≥0 to ≤2 Percentile	>2 to ≤10 Percentile	>10 to ≤20 Percentile	>20 to ≤30 Percentile	> 90 Percentile		
Western	8	0	7	1	0	0	6.25	3
CT River	15	0	7	8	0	0	10.19	2
Central	11	0	7	4	0	0	8.93	3
Northeast	13	0	3	4	3	0	15.49	2
Southeast	12	0	0	2	2	0	32.87	0

Notes: Not all gages report in all months due to ice, beaver dams or other conditions. Streamflow index is not applicable to Cape Cod and the Islands.

Real-Time Groundwater Wells– Percentiles for Current Data – Late June



Grey wells are measured only at the end of the month

Groundwater Index

By Drought Region

- April - All regions at Index Severity Level 0
- May – Western Region at Index Severity Level 1

June

- **<u>Two regions at Level 1, one region at Level 2</u>**

Region	Number of Wells						Median of Individual Percentiles	DMP Index Severity
	Total Reporting for Jun	≥0 to ≤2 Percentile	>2 to ≤10 Percentile	>10 to ≤20 Percentile	>20 to ≤30 Percentile	> 90 Percentile		
Western	2	0	0	1	1	0	22.41	1
CT River Valley	5	0	1	2	0	0	17.65	2
Central	8	1	2	1	1	0	22.75	1
Northeast	8	0	0	0	2	0	40.18	0
Southeast	2	0	0	0	0	0	54.48	0
Cape Cod	7	0	0	0	0	1	71.43	0

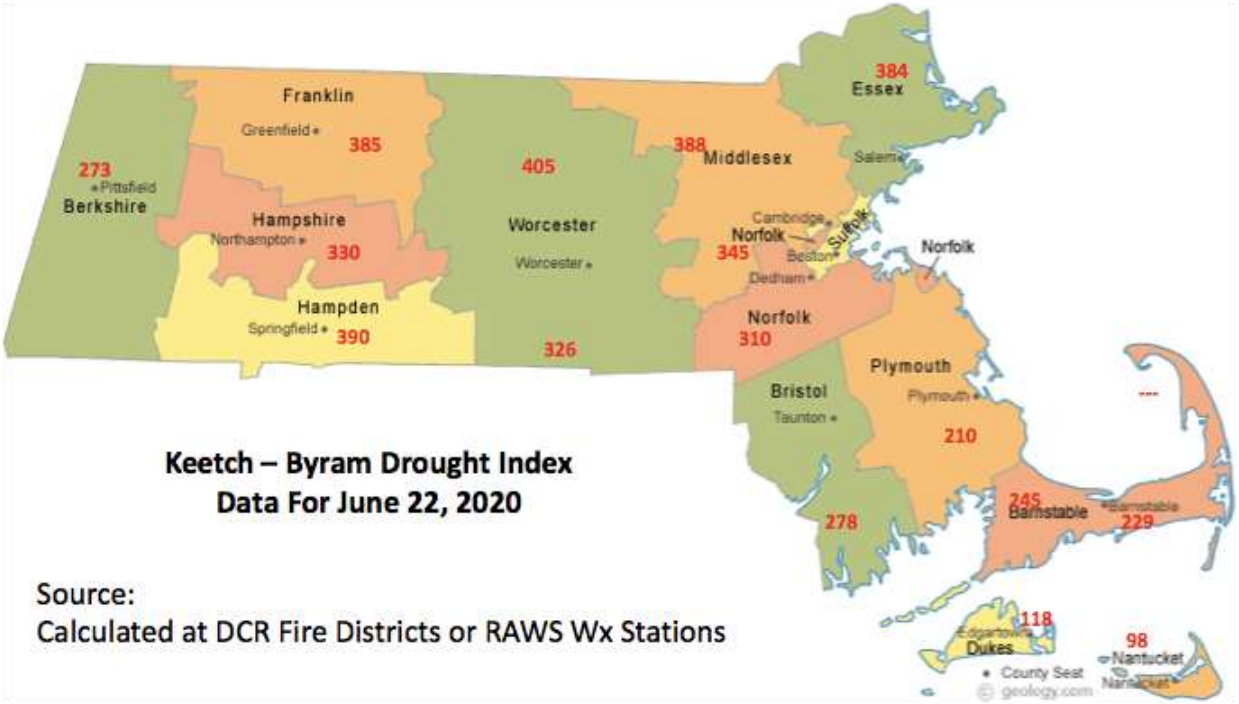
KBDI

Fire Danger Index: dryness of top 8” of soil

- Data from DCR Fire Chief

As of **June 22, 2020:**

- **Drought Index Severity Level 1:** Western, CT River Valley, Northeast, Southeast, and Cape Cod Regions
- **Drought Index Severity Level 2:** Central Region



Crop Moisture Index

The CMI map week ending **June 20, 2020** shows Abnormally Dry conditions (-1.0 to –1.9) resulting in a
Drought Index Severity Level 1 for: Western, CT River Valley, Central, & Northeast Regions

The CMI shows the ***short-term need versus available water*** in a shallow soil profile and responds quickly to changing conditions. The drought level for this indicator is determined based on the repeated or extended occurrence at a given level. This indicator is ***relevant during growing season***.
https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/cmi.gif

Summary of Drought Indices by Drought Region

Drought Indicator	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation	Level 2	Level 3	Level 3	Level 2	Level 0	Level 1	Level 0
Streamflow	Level 3	Level 2	Level 3	Level 2	Level 0	N/A	N/A
Groundwater	Level 1	Level 2	Level 1	Level 0	Level 0	Level 0	Not Available
Lakes/ Impoundments	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	N/A
Crop Moisture Index	Level 1	Level 1	Level 1	Level 1	Level 0	Level 0	Level 0
KBDI - Fire danger	Level 1	Level 1	Level 2	Level 1	Level 1	Level 1	Level 0

1) 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.

DMTF Deliberation