

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



Task Force Member Updates



Hydrologic
Conditions



Weather &
Forecast



Water Supply
Impacts



Environmental
Impacts



Agricultural
Impacts



Fire Danger



Engineering/
Infrastructure
Impacts



Public Health
Impacts

Hydrologic Conditions in Massachusetts for February 2021

Anne Carroll and Viki Zoltay
DCR Office of Water Resources

Drought Management Task Force

March 10, 2021

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan Indices

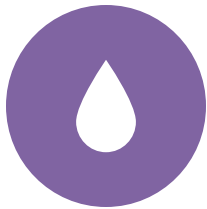
Numbers in parentheses indicate number of data points across the state



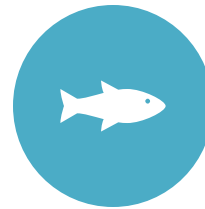
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(16)



Crop Moisture
(national map)

MA Drought Management Plan

Index Severity Levels

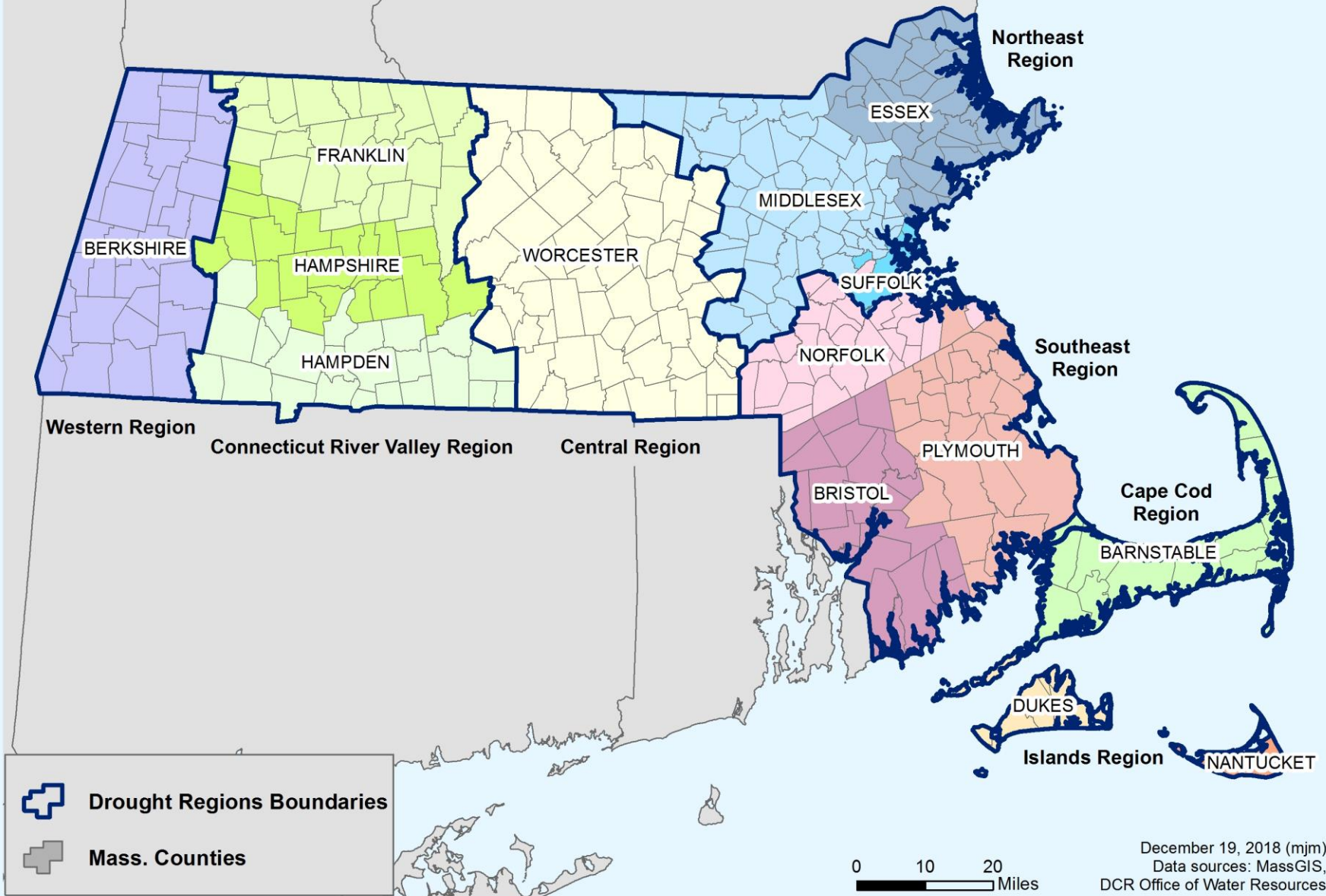
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 th percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0 and > -4.0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

MA Drought Management Plan

Drought Levels



MASSACHUSETTS DROUGHT REGIONS with Counties



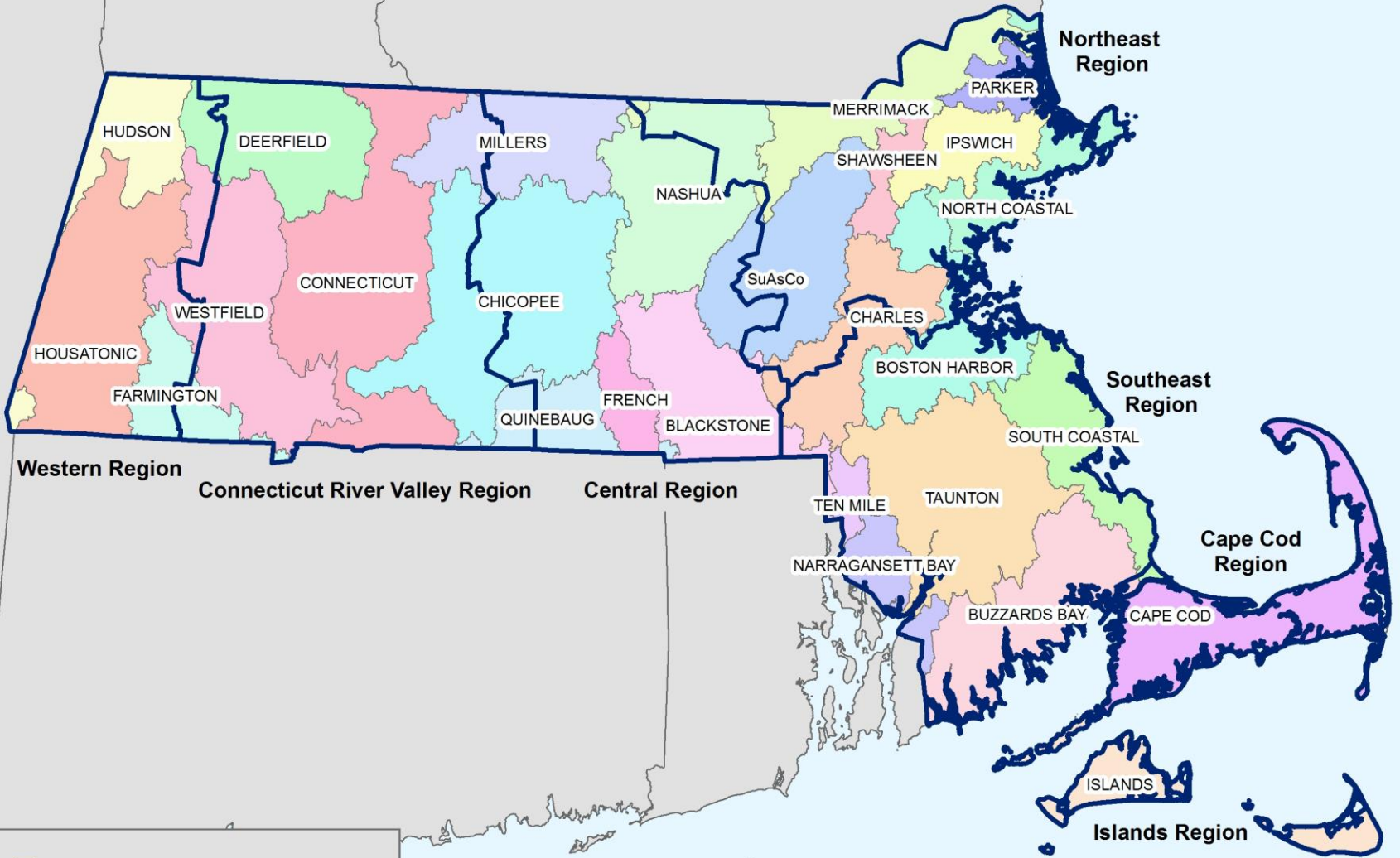
-  Drought Regions Boundaries
-  Mass. Counties

0 10 20
Miles

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

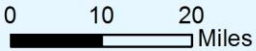


MASSACHUSETTS DROUGHT REGIONS with Watersheds



 **Drought Regions Boundaries**

 **Mass. Counties**



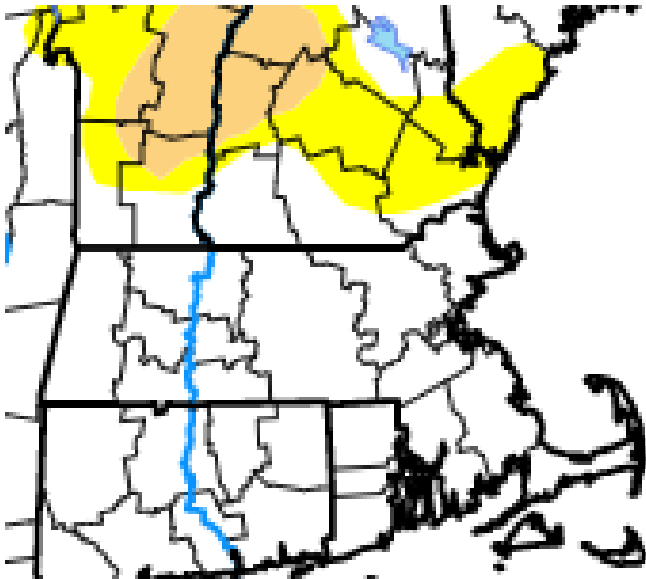
October 11, 2019 (mjm)
Data sources: MassGIS,
DCR Office of Water Resources

Recent Hydrologic History

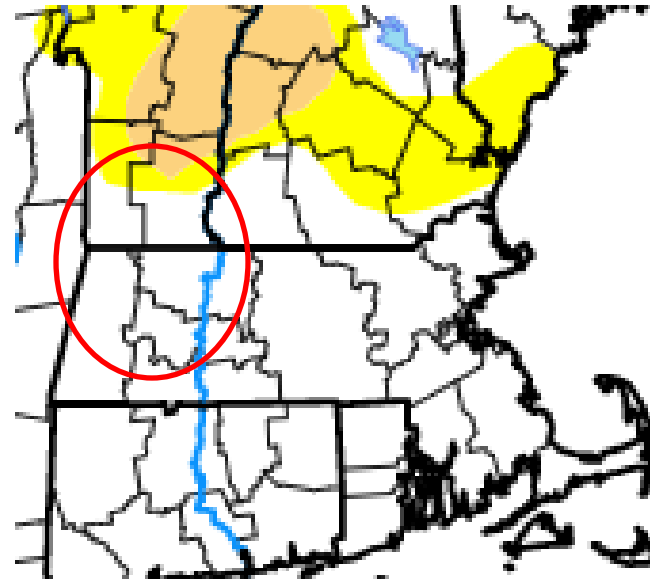
- 2020 Drought – May through November
- 2020 December
 - Well above average precipitation across most of the state except southern half of Western region
 - Hydrology above 30th percentiles but not fully recharged
 - Most regional values hover in the 40th and 50th percentile range
- 2021 January –low precipitation across the state especially the western and eastern portions of the state

US Drought Monitor

For data as of
February 23 and March 2



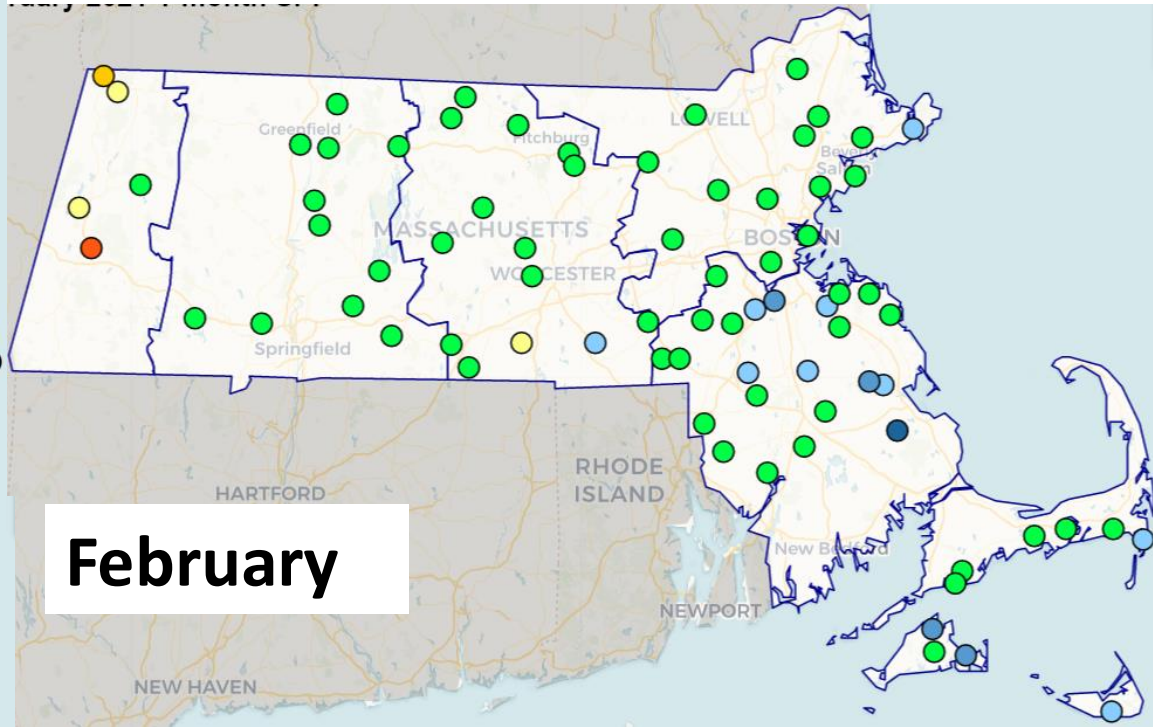
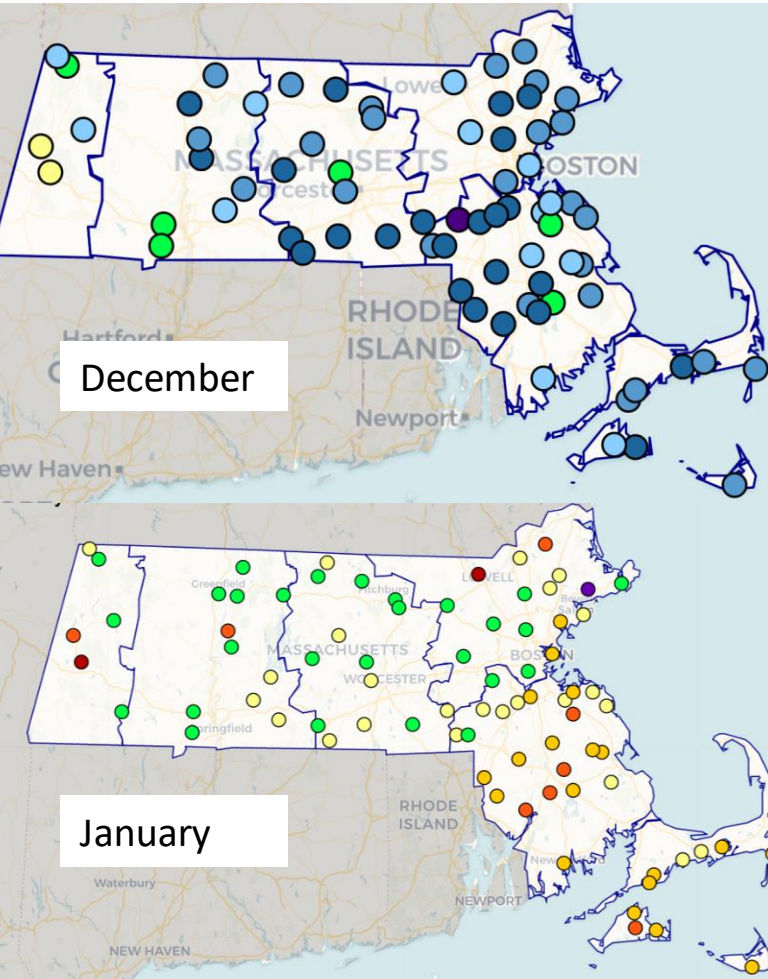
For data as of March 9



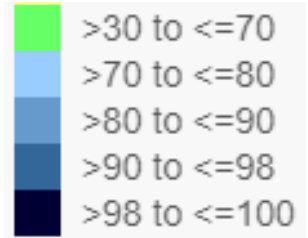
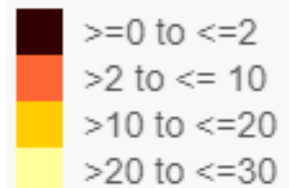
- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

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

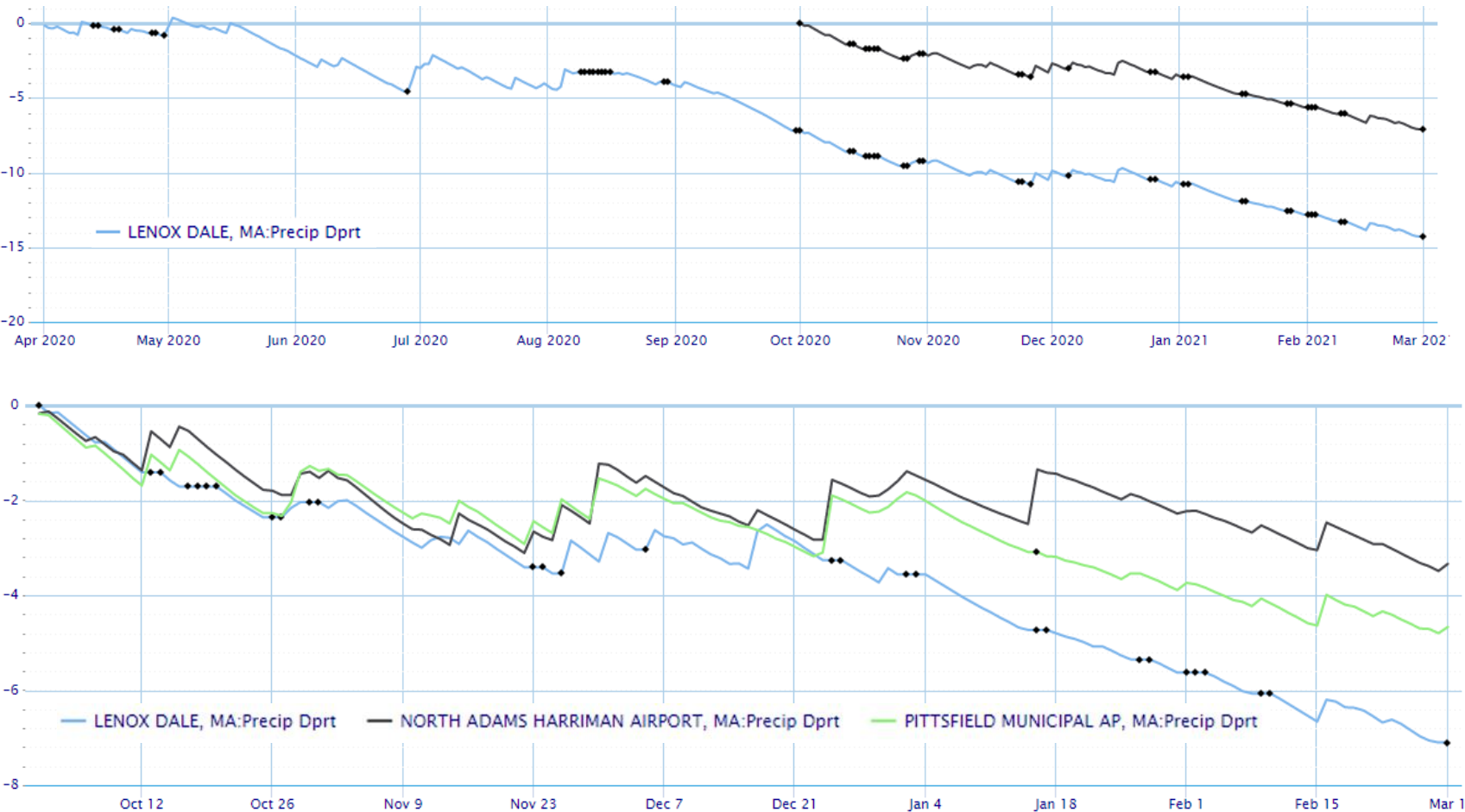
Precipitation – SPI, 1 month



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 data available in Western Region

Precipitation Index – SPI, February

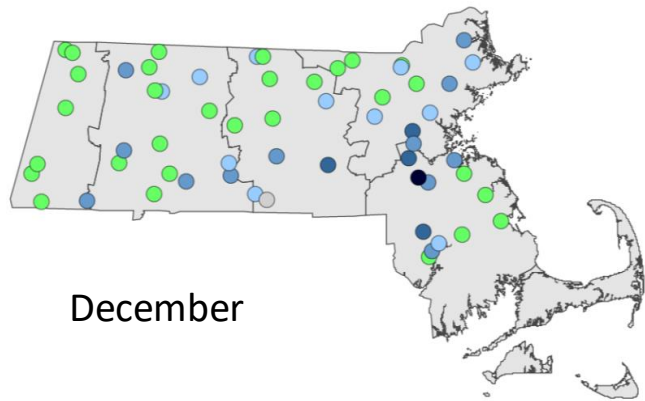
Region	1-month*	2-month	3-month	6-month
Western	-0.77	-1.20	-1.16	-0.69
CT River	-0.21	-0.56	0.28	0.26
Central	0.01	-0.39	0.73	0.31
Northeast	0.07	-0.60	0.12	-0.10
Southeast	0.53	-0.38	0.63	0.00
Cape Cod	0.46	-0.28	0.55	-0.82
Islands	1.01	0.08	0.83	0.06
Region	9-month	12-month	24-month	36-month *
Western	-1.11	-1.06	-1.30	-0.14
CT River	-0.36	-0.58	-0.26	1.00
Central	-0.17	-0.14	0.28	1.26
Northeast	-0.66	-0.53	0.04	0.61
Southeast	-0.37	-0.17	0.34	1.26
Cape Cod	-1.80	-1.33	-0.01	0.45
Islands	-1.10	-0.49	0.32	0.65

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

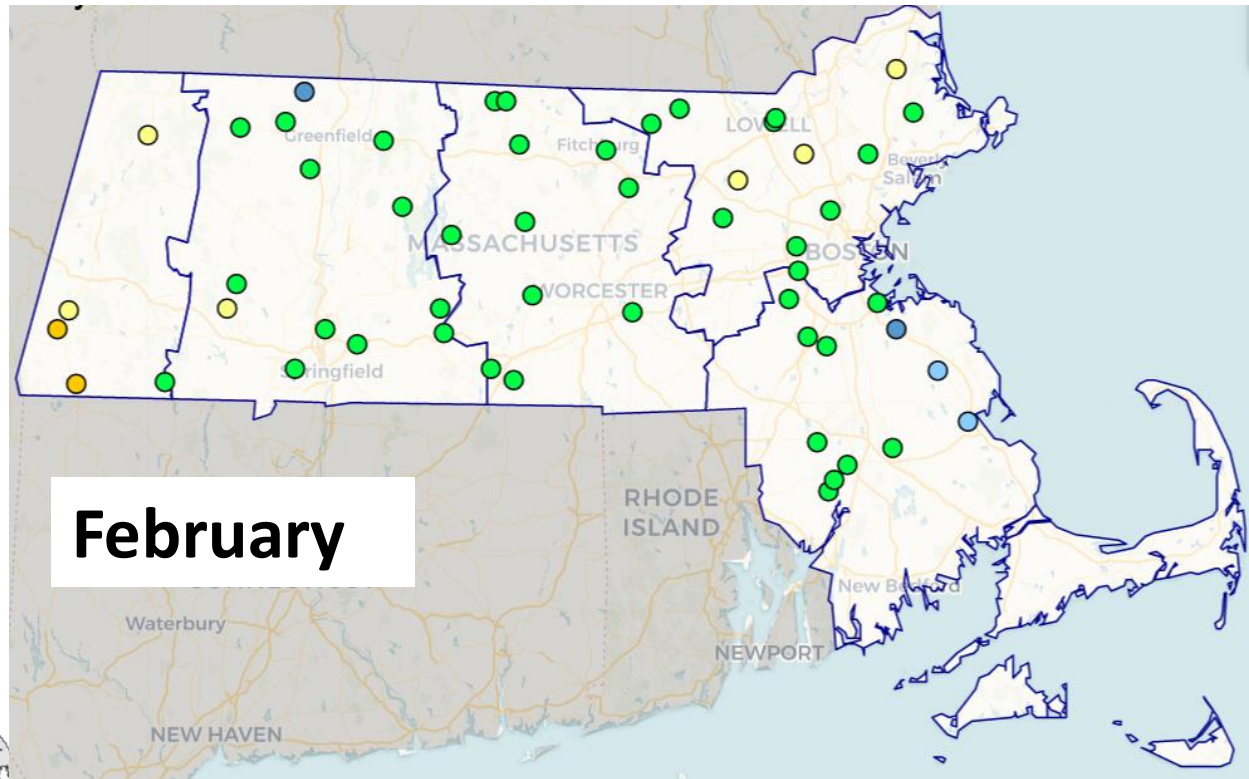
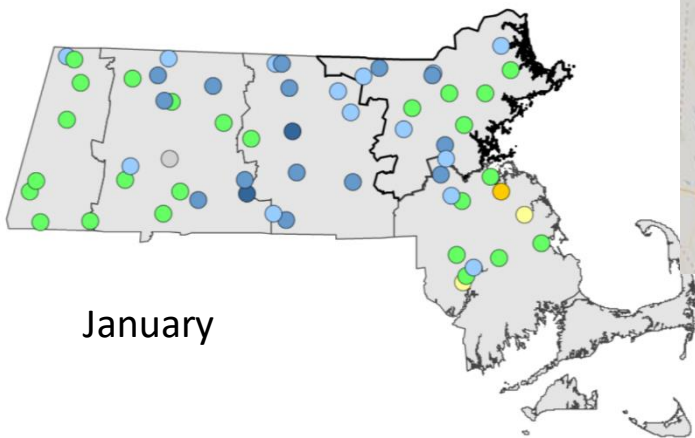


Streamflow Percentiles of Monthly Median

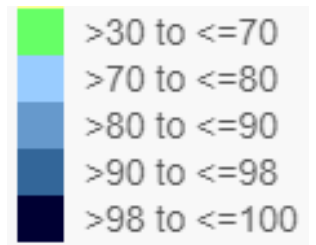
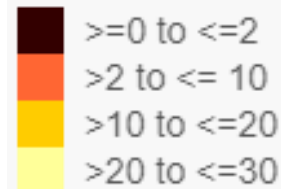
December



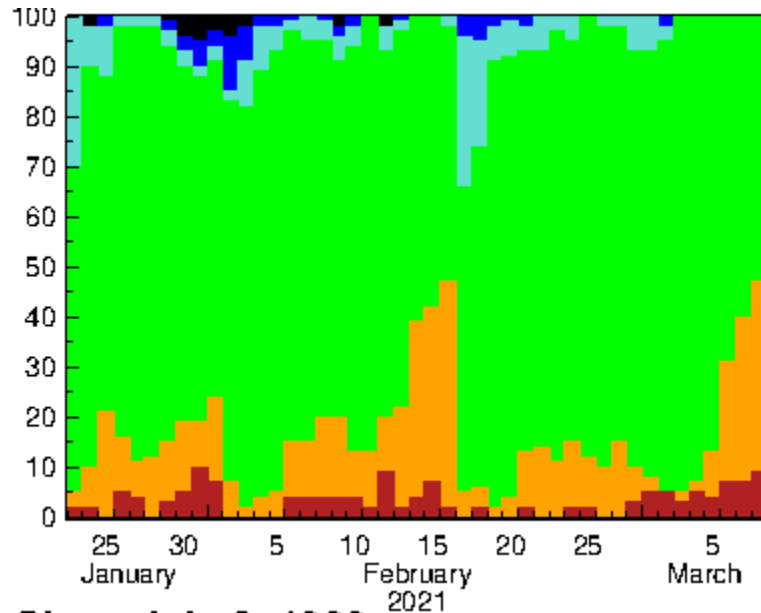
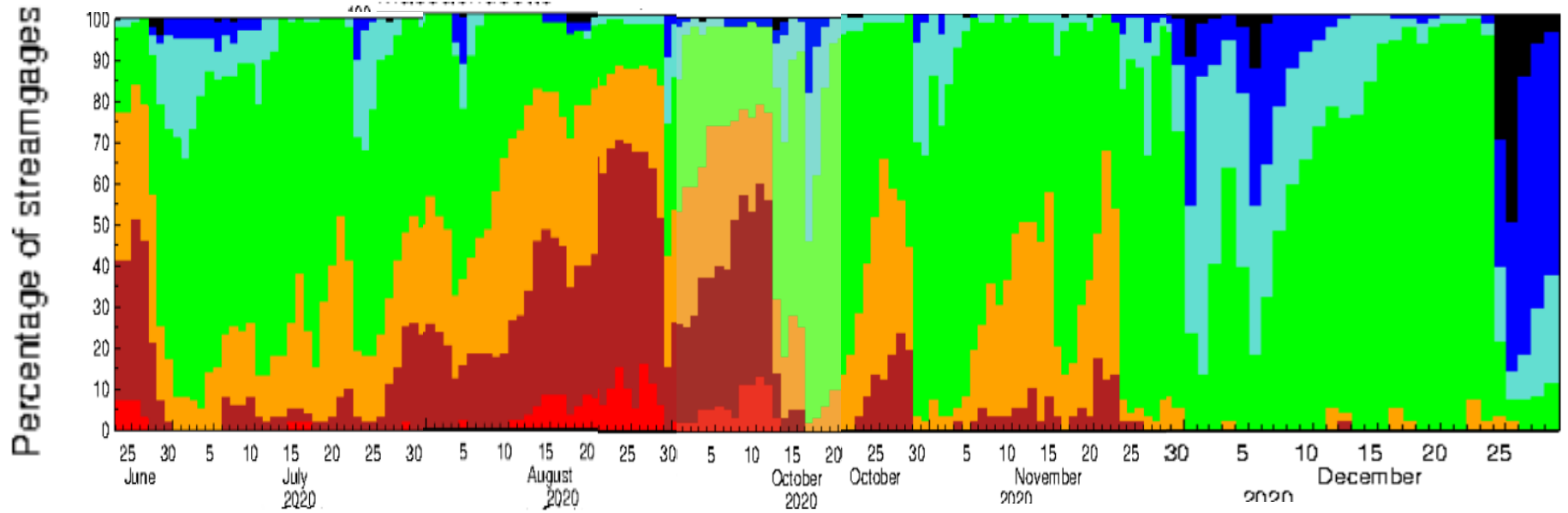
January



Percentiles



Percent of Gages at Various Percentiles



Streamflow Index

- December and January were at Index Severity Level 0

February 2021 Monthly Streamflow Summary

Region	Number of gauges reporting	Median of individual gauge percentiles	DMP Index Severity
Western	5	21	1
CT River	13	50	0
Central	11	46	0
Northeast	13	36	0
Southeast	12	62	0

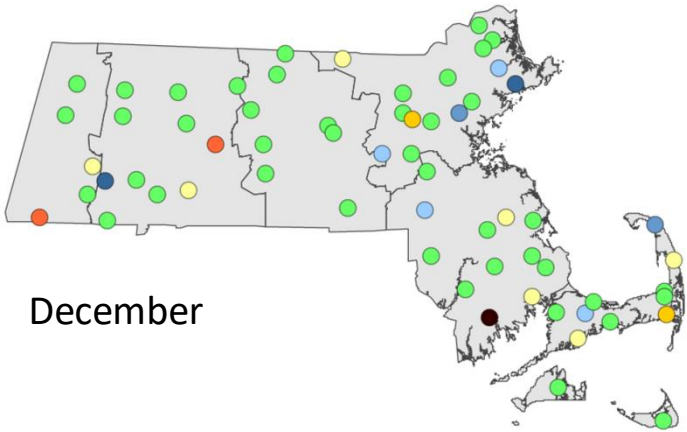
Number of gauges in percentile categories

Region	≥0 to ≤2	>2 to ≤10	>10 to ≤20	>20 to ≤30	>30 to ≤90	>90
Western	0	0	2	2	1	0
CT River	0	0	0	1	12	0
Central	0	0	0	0	11	0
Northeast	0	0	0	3	10	0
Southeast	0	0	0	0	12	0

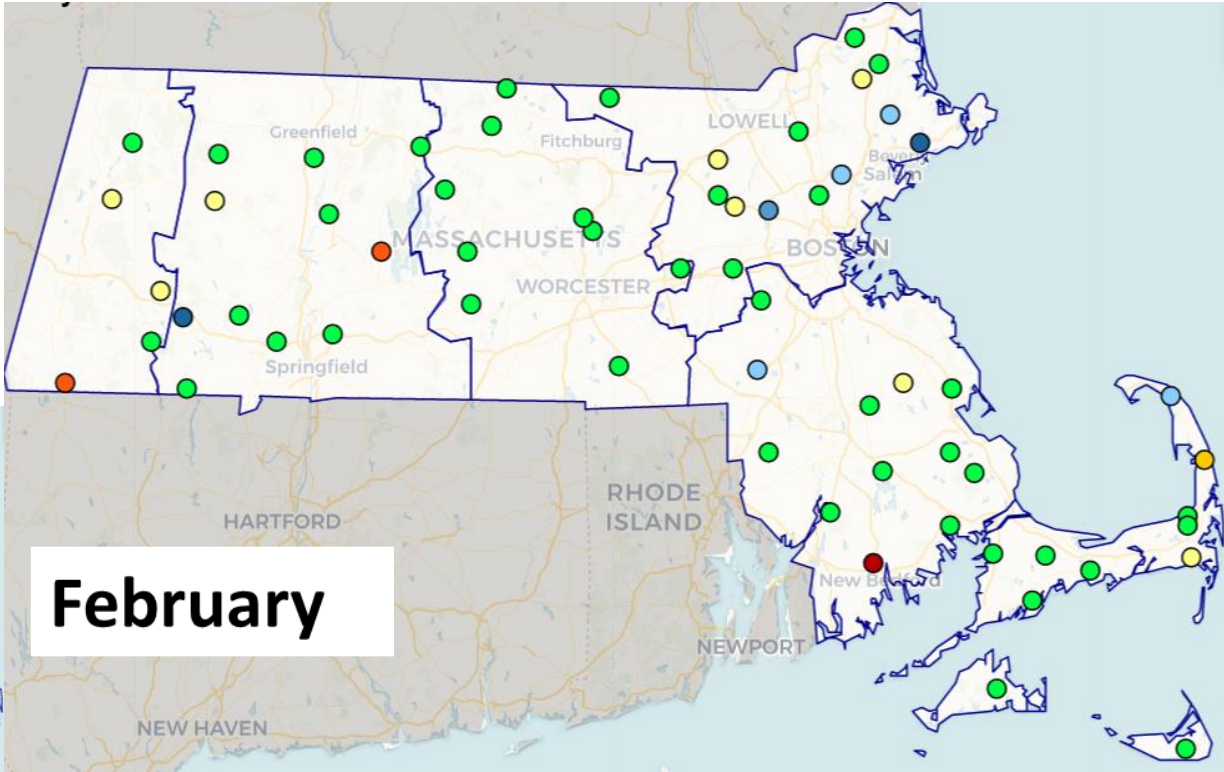
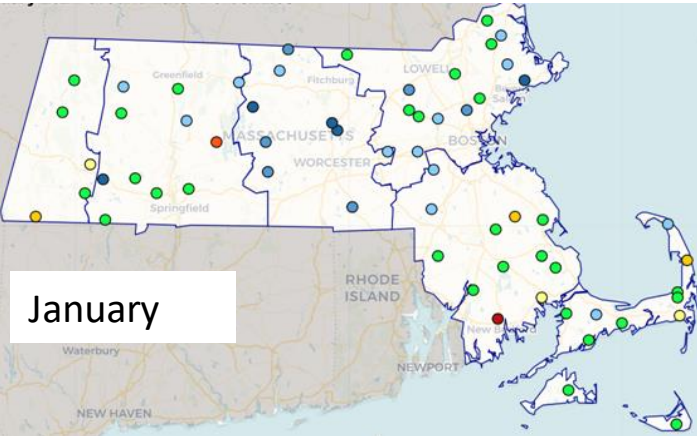
Notes: Not all gages report in all months due to ice, beaver dams or other conditions. Streamflow index is not applicable to Cape Cod and the Islands.

Groundwater Percentiles at the end of Month

December



January



Groundwater Index

- December and January were at Index Severity Level 0

February 2021 Monthly Groundwater Summary

Region	Number of wells reporting	Median of individual well percentiles	DMP Index Severity
Western	5	29	1
CT River	11	45	0
Central	9	48	0
Northeast	14	54	0
Southeast	12	46	0
Cape Cod	9	45	0
Islands	2	49	0

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

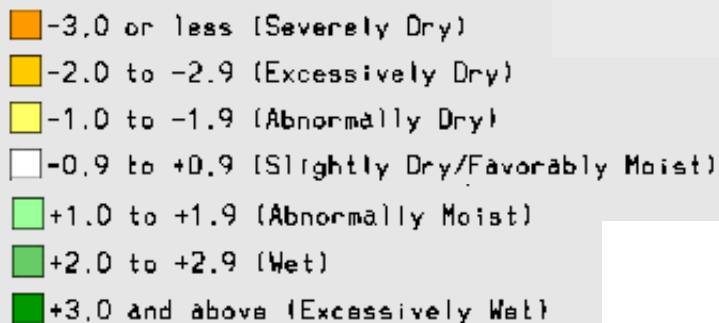
Number of wells in percentile categories

Region	≥0 to ≤2	>2 to ≤10	>10 to ≤20	>20 to ≤30	>30 to ≤90	>90
Western	0	1	0	2	2	0
CT River	0	1	0	1	8	1
Central	0	0	0	0	9	0
Northeast	0	0	0	3	10	1
Southeast	1	0	0	1	10	0
Cape Cod	0	0	1	1	7	0
Islands	0	0	0	0	2	0

KBDI and CMI/ET

- KBDI – outside of fire season [KBDI=0 and Index Severity Level=0]
- ET - outside of traditional growing season

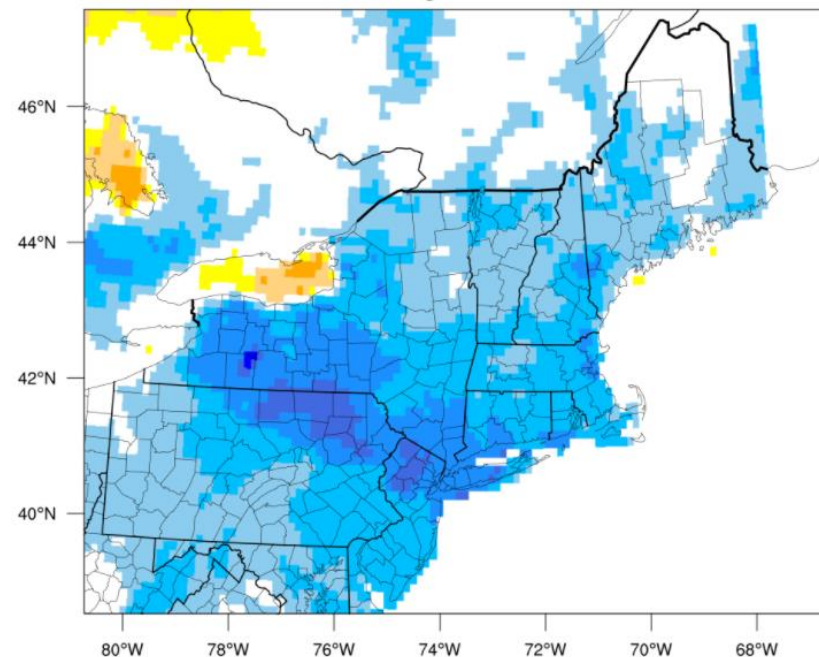
CMI - ISL=0



EDDI - ISL=0

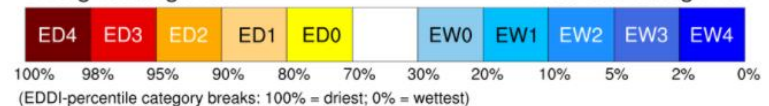
(index under consideration to replace CMI)

1-month EDDI categories for March 4, 2021



Drought categories

Wetness categories



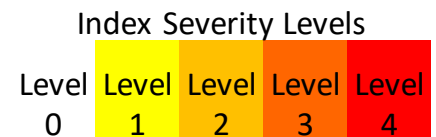
Lakes & Impoundments

February

Drought Region	Number Reporting	Percentile	DMP Index Severity
Western	2	(100% & 94%)	Level 0
CT River Valley	2	43	Level 0
Central	2	51	Level 0
Northeast	6	63	Level 0
Southeast	1	(100% full)	Level 0
Cape Cod	1	20	Level 2
Islands	NA	NA	NA

Notes:

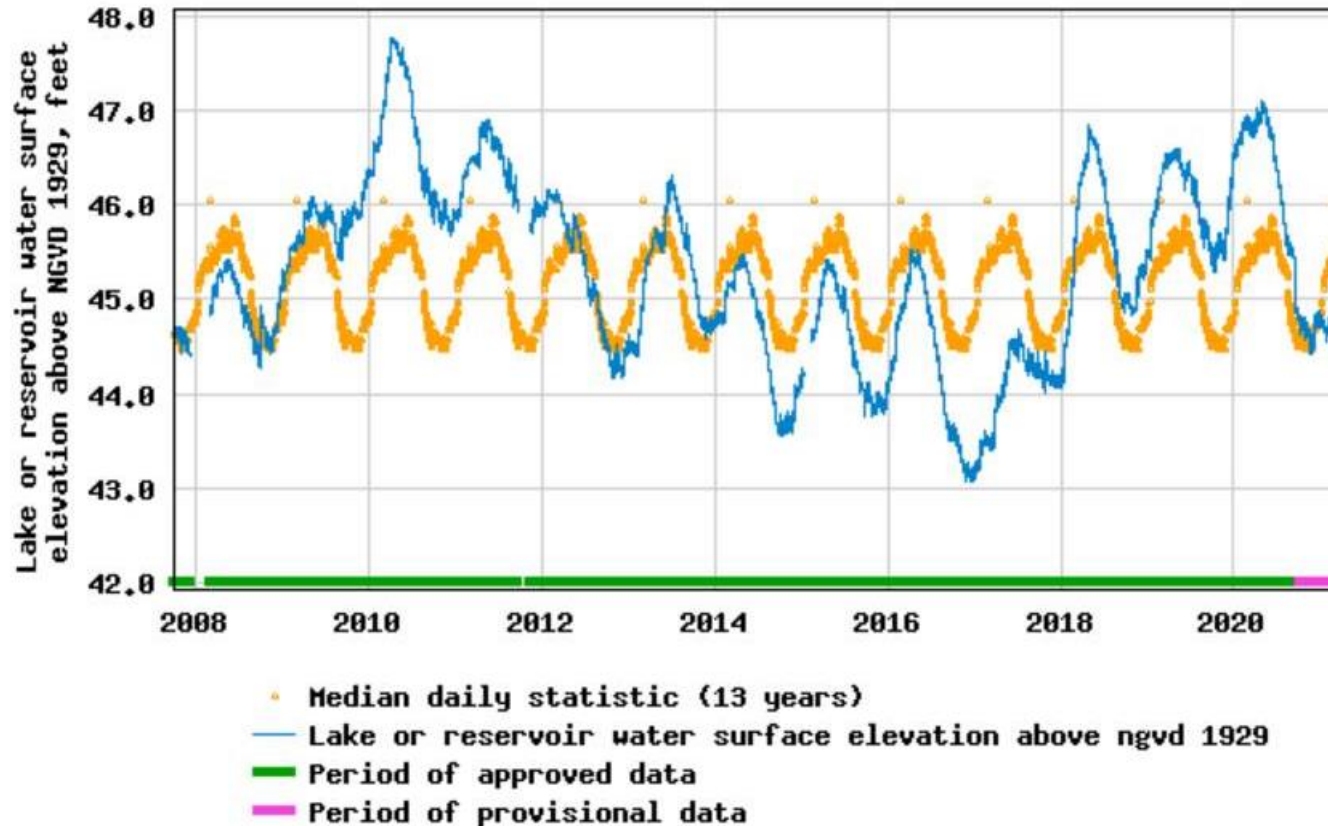
DMP index severity levels do not necessarily reflect water supply status.



Lakes & Impoundments

February – Cape Cod

USGS 413758070320501 ASHUMET POND, FALMOUTH, MA



- 2016 drought shows in 2017 → very slow responder
- Falmouth 6-mo SPI at 11th percentile
- Mashpee well at 38th percentile

Drought Indices by Region - February 2021

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation	Level 2	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0
Streamflow	Level 1	Level 0	Level 0	Level 0	Level 0	N/A	N/A
Groundwater	Level 1	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0
Lakes/ Impoundments	Level 0	Level 0	Level 0	Level 0	Level 0	Level 2	N/A
Crop Moisture Index							
KBDI							
<i>Recommend 2/1 (3/10 meeting)</i>	Level 1	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0
<i>Effective 12/1 (1/6 meeting)</i>	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0	Level 0

Lakes & Impoundments Index does not reflect water supply status. KBDI and CMI are not calculated outside of fire and growing seasons.

Conditions in all Major Basins were similar to their respective regions except as may be shown on following slides.

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 Indices by Watersheds - February 2021

Watershed (regions)	SPI							
	1-month	2-month	3-month	6-month	9-month-	12-month	24-month	36-month
Housatonic (Western)	1	3	2	1	2	2	2	0

Watershed (regions)	# sites (P, Q, Gw)	SPI	Streamflow	Groundwater	KBDI	CMI	L&I
Housatonic (Western)	8	3	2	2	-	-	0