

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 March 2021

Anne Carroll and Viki Zoltay
DCR Office of Water Resources

Drought Management Task Force

April 06, 2021

Meeting Co-Chairs: EOEEA, MEMA



MA Drought Management Plan Indices



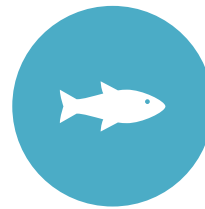
Precipitation (93)



Streamflow (59)



Groundwater (63)



Lakes and
Impoundments (20)



KBDI - Fire Danger
(16)



Crop Moisture
(national map)

Numbers in parentheses indicate number of data points across the state

MA Drought Management Plan

Index Severity Levels

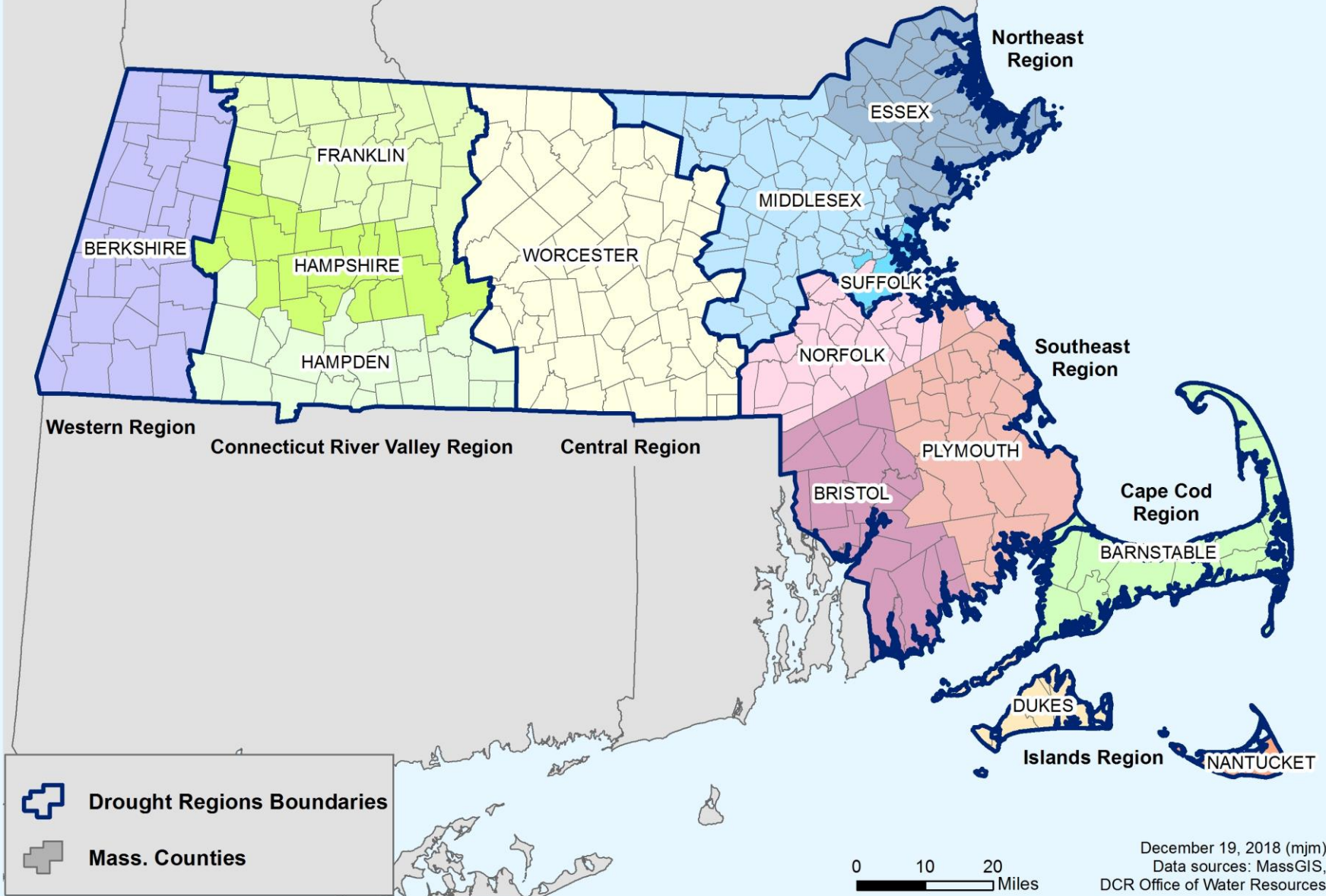
Index Severity Level	Percentiles for: Precipitation, Streamflow, Lakes and Impoundments and Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30 th percentile	< 200	> -1.0
1	≤30 and >20	200-400	≤-1.0 and > -2.0
2	≤20 and >10	400-600	≤-2.0 and < -3.0
3	≤10 and >2	600-700	≤ -3.0 and > -4.0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

MA Drought Management Plan

Drought Levels



MASSACHUSETTS DROUGHT REGIONS with Counties

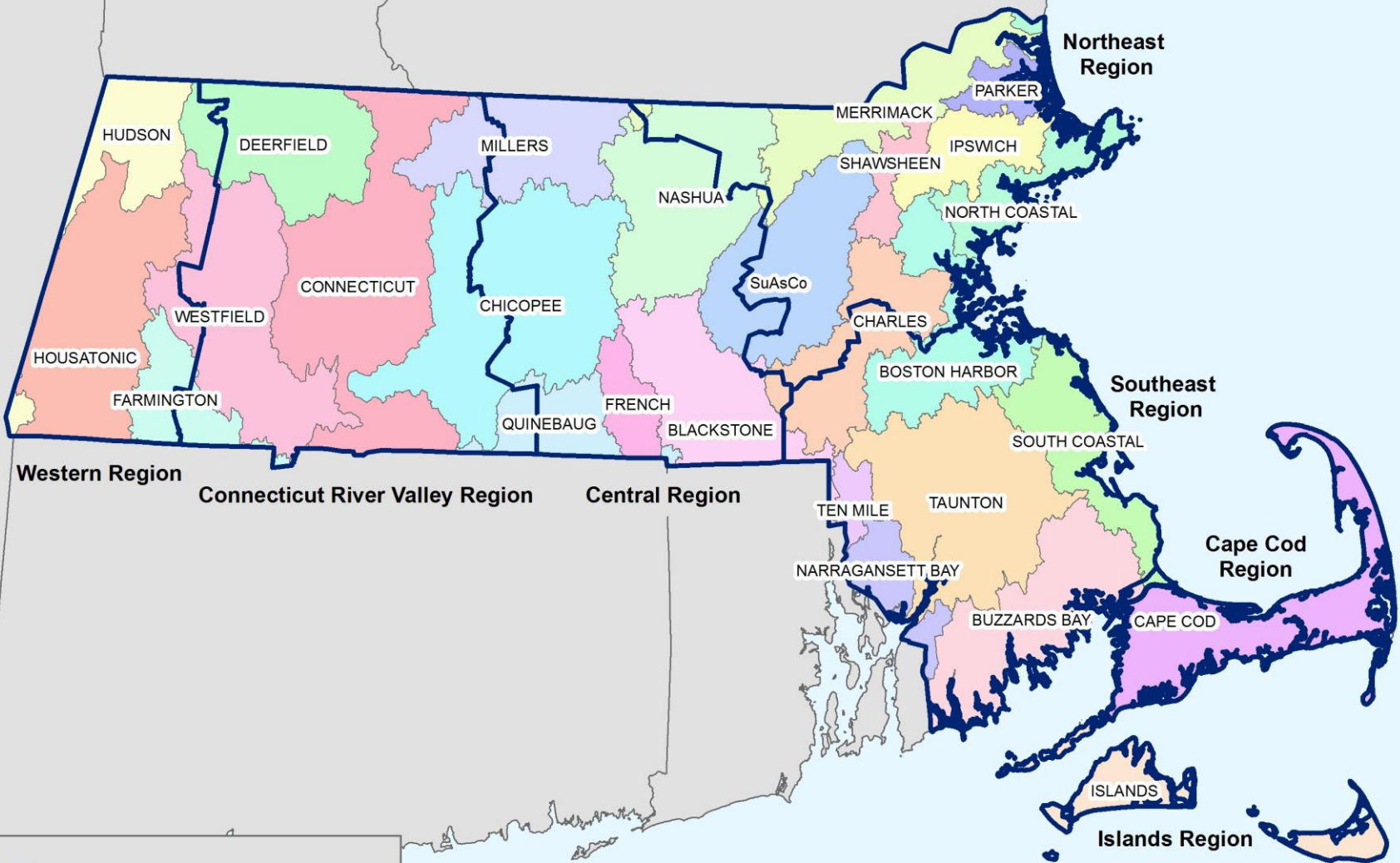


-  Drought Regions Boundaries
-  Mass. Counties

0 10 20
Miles

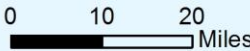
December 19, 2018 (mjm)
Data sources: MassGIS,
DCR Office of Water Resources

MASSACHUSETTS DROUGHT REGIONS with Watersheds



 Drought Regions Boundaries

 Mass. Counties



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

Task Force Member Updates



Hydrologic
Conditions



Weather &
Forecast



Water Supply
Impacts



Environmental
Impacts



Agricultural
Impacts



Fire Danger



Engineering/
Infrastructure
Impacts



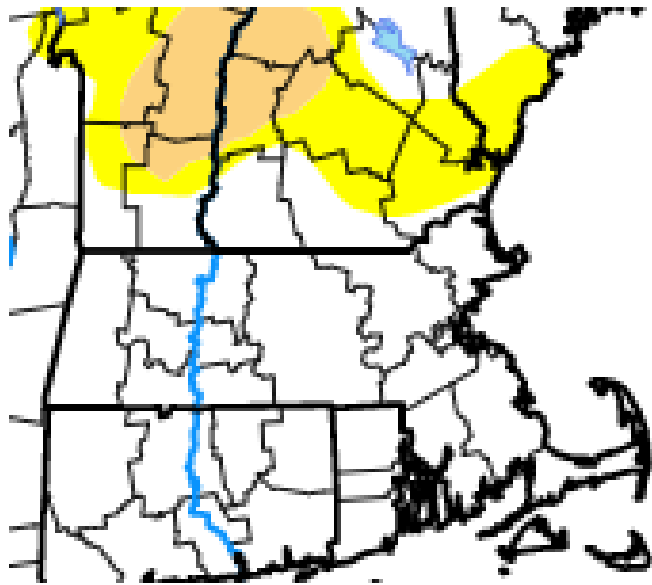
Public Health
Impacts

Recent Hydrologic History

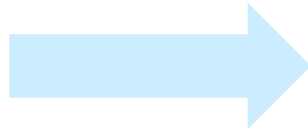
- 2020 Drought – May through November
- 2020 December
 - Above 30th percentile threshold but not fully recharged
- 2021 January – low precipitation especially the western and eastern portions of the state
- 2021 February – low precipitation continued in the Western Region with low streamflow and groundwater

US Drought Monitor

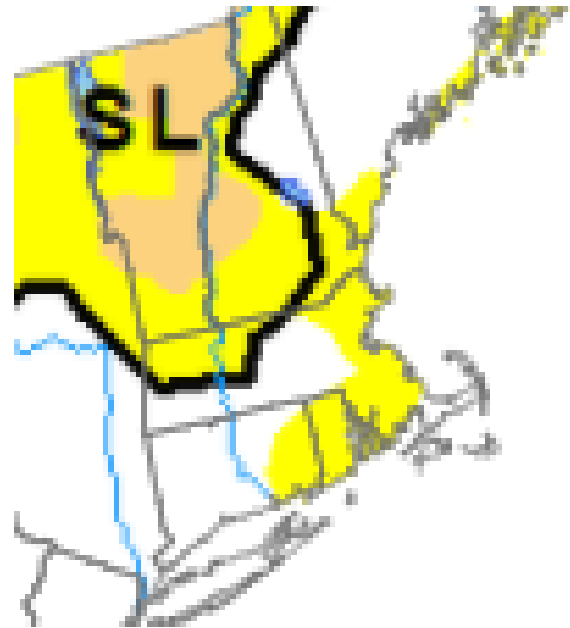
For data as of March 2









Drought expanded weekly in March



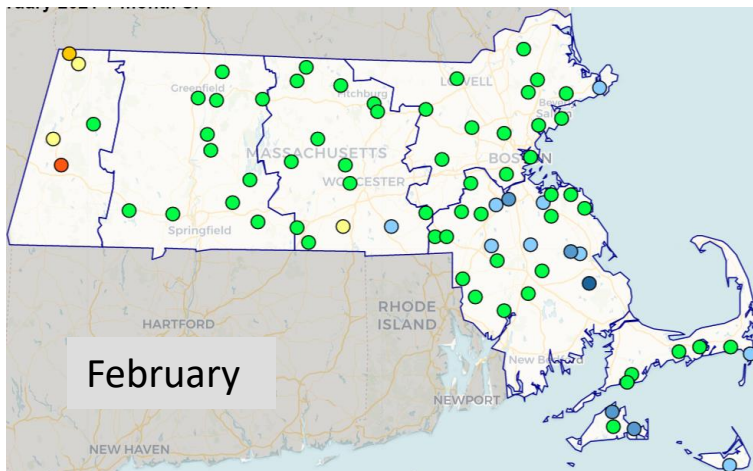
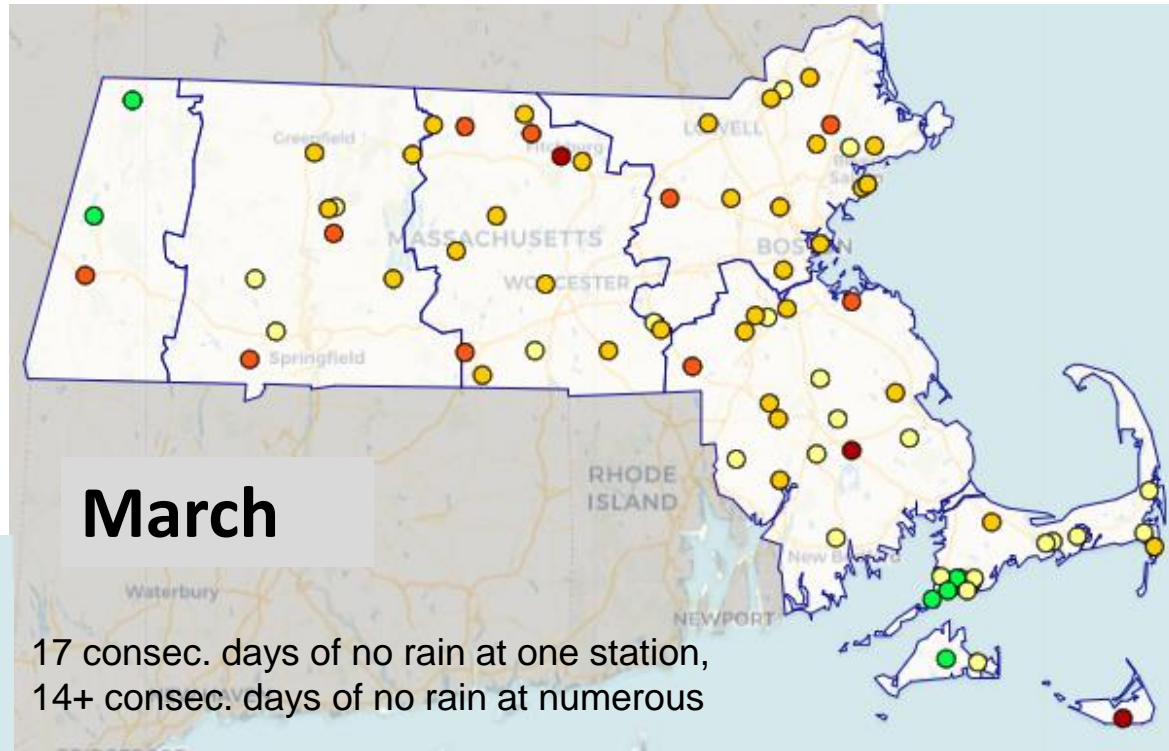
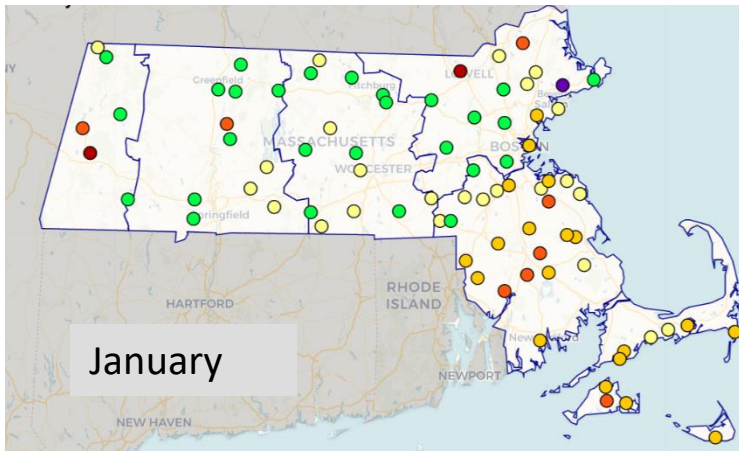
For data as of March 30



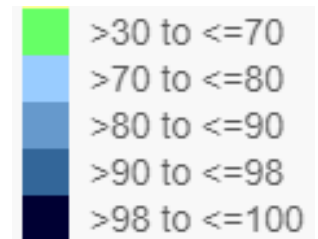
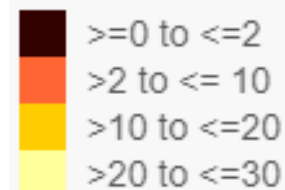
-  None
-  D0 (Abnormally Dry)
-  D1 (Moderate Drought)
-  D2 (Severe Drought)
-  D3 (Extreme Drought)
-  D4 (Exceptional Drought)

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

Precipitation – SPI, 1 month



Percentiles



Precipitation Index – SPI, February

Region	1-month*	2-month	3-month
Western	-0.49	-0.63	-1.53
CT River	-0.87	-0.87	-1.17
Central	-1.14	-0.97	-1.13
Northeast	-1.11	-0.76	-1.10
Southeast	-0.93	-0.48	-0.92
Cape Cod	-0.65	-0.21	-0.76
Islands	-0.55	0.13	-0.61

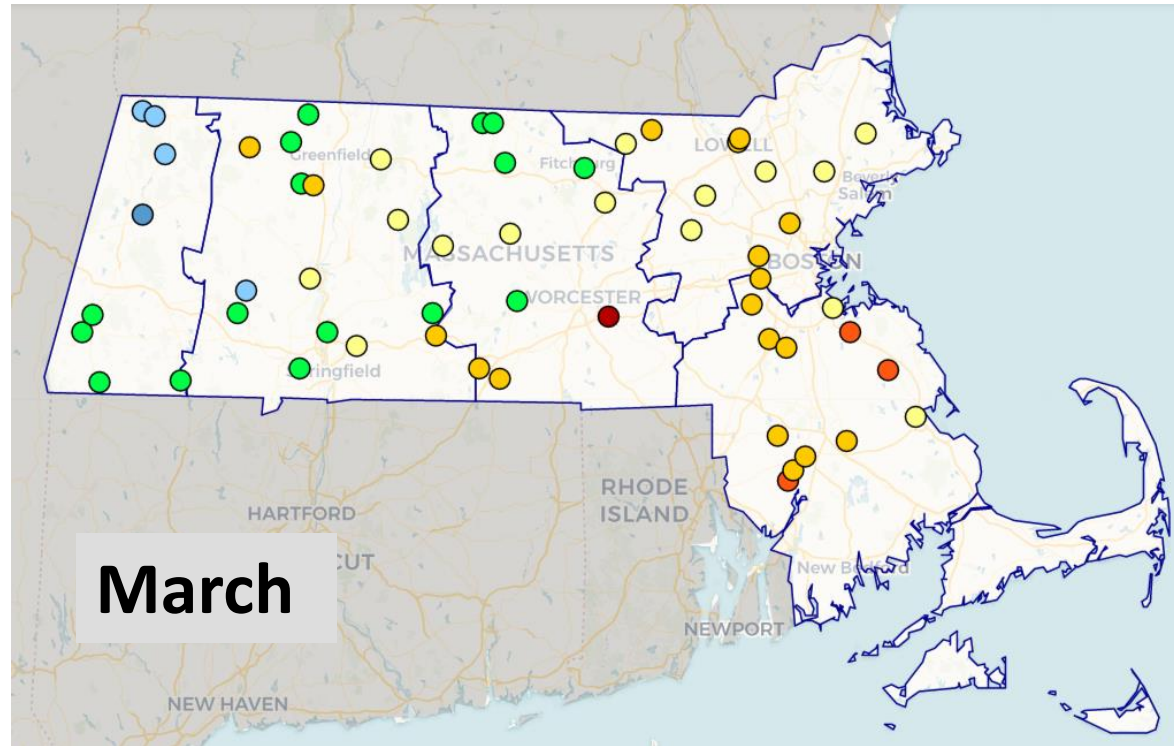
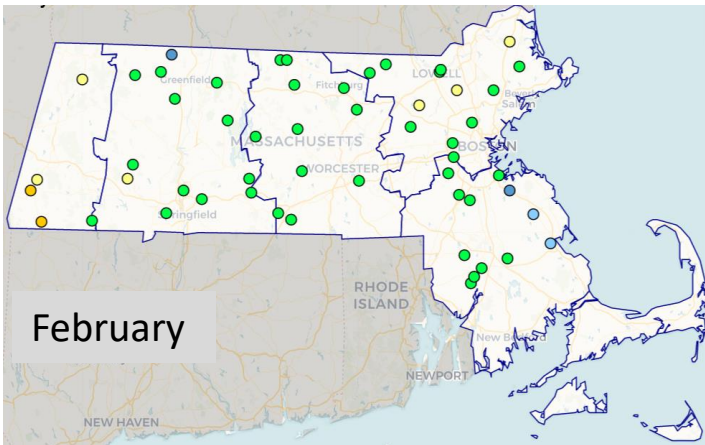
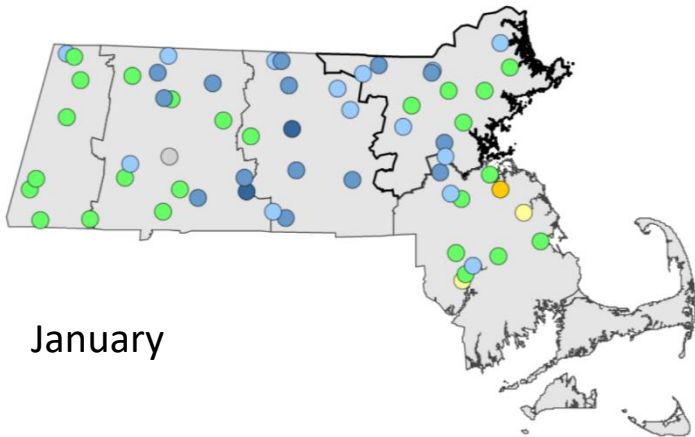
Region	6-month	9-month	12-month
Western	-1.01	-0.91	-1.23
CT River	-0.10	-0.42	-0.90
Central	0.20	-0.41	-0.44
Northeast	-0.22	-0.73	-0.71
Southeast	0.02	-0.69	-0.41
Cape Cod	-0.56	-1.66	-1.67
Islands	-0.36	-1.48	-1.09

Region	24-month	36-month *
Western	-0.70	-0.21
CT River	-0.55	0.69
Central	0.15	1.10
Northeast	-0.03	0.32
Southeast	0.05	0.74
Cape Cod	-0.42	-0.44
Islands	0.18	0.58

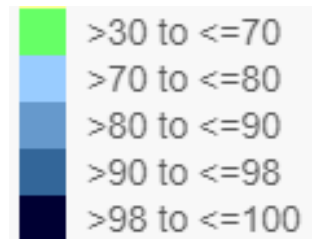
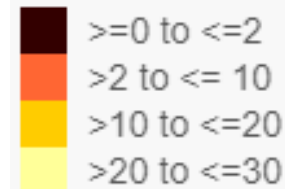
Western	Level 2
CT River	Level 2
Central	Level 2
Northeast	Level 2
Southeast	Level 2
Cape Cod	Level 1
Islands	Level 1

* 1- and 36-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.

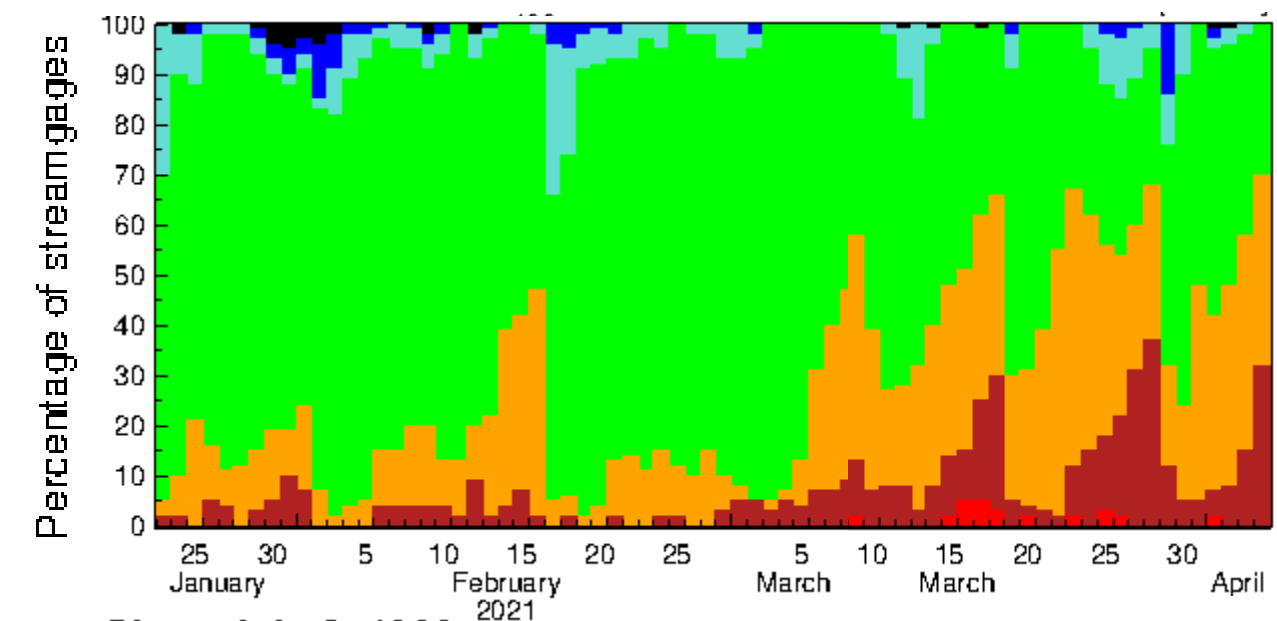
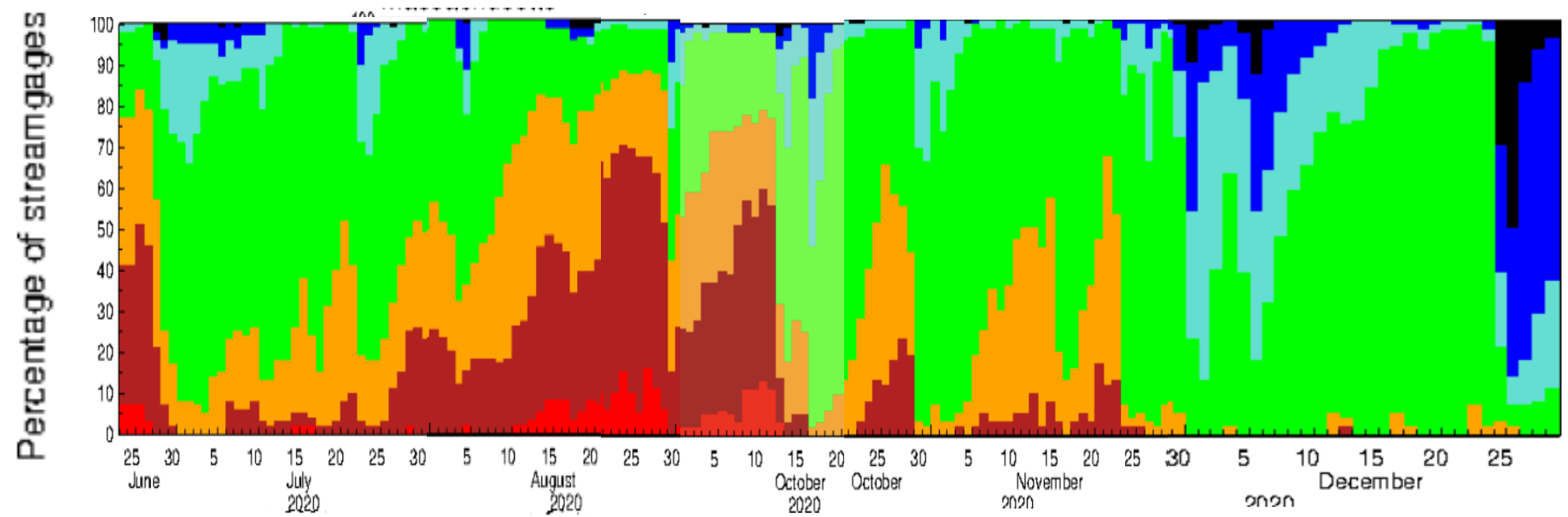
Streamflow Percentiles of Monthly Median



Percentiles



Percent of Gages at Various Percentiles



Streamflow Index

- December and January were at Index Severity Level 0
- February Western Region was Index Severity Level 1

March 2021 Monthly Streamflow Summary

Shading indicates index severity level:

Level 0	Level 1	Level 2	Level 3	Level 4
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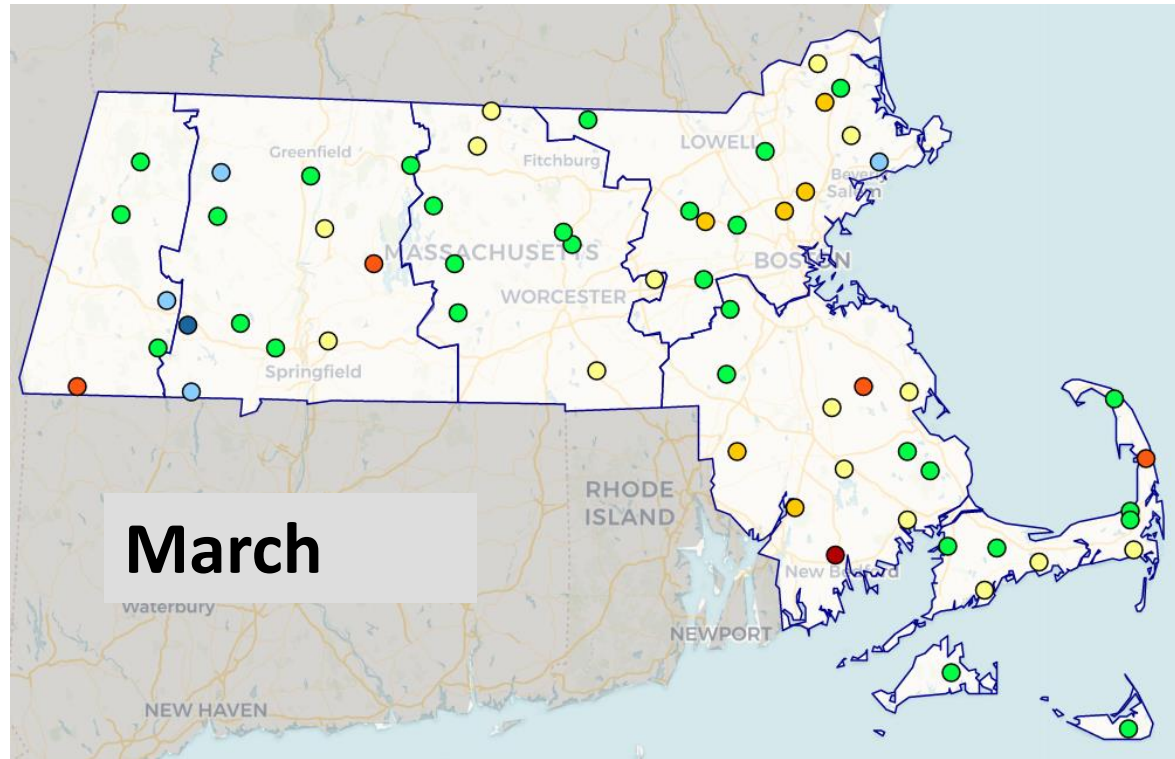
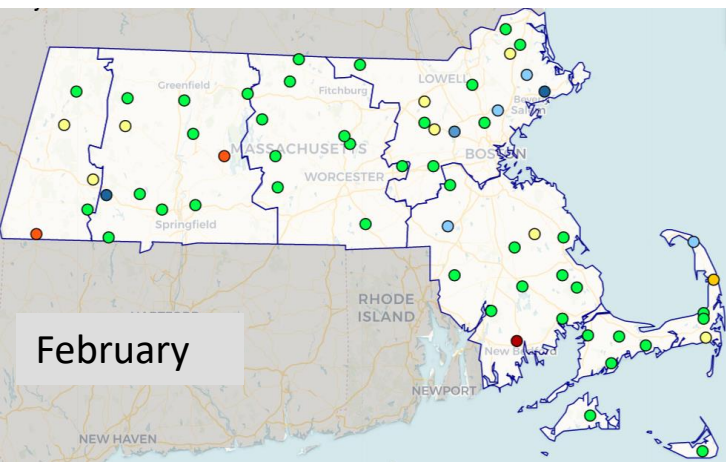
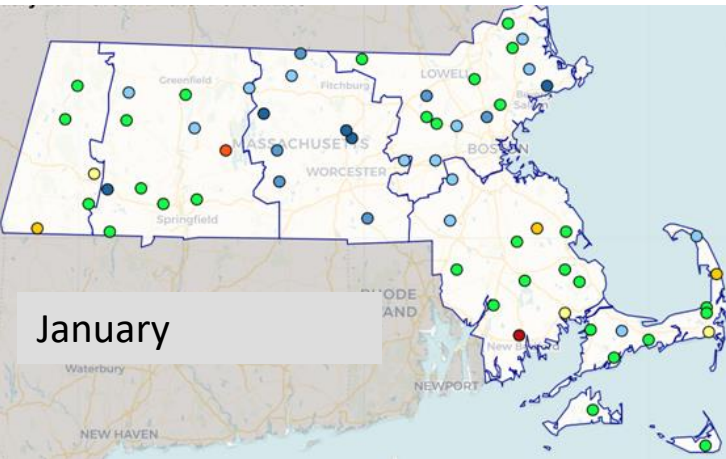
Region	Number of gages reporting	Median of individual gage percentiles
Western	8	69
CT River	15	31
Central	11	27
Northeast	12	21
Southeast	12	14

Number of gages in percentile categories

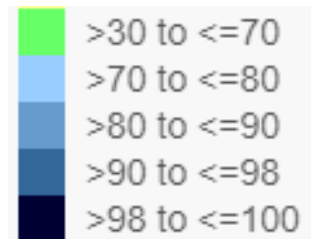
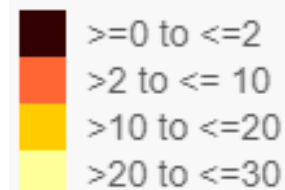
Region	≥0 to ≤2	>2 to ≤10	>10 to ≤20	>20 to ≤30	>30 to ≤90	>90
Western	0	0	0	0	8	0
CT River	0	0	3	4	8	0
Central	1	0	2	3	5	0
Northeast	0	0	5	7	0	0
Southeast	0	3	6	3	0	0

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



Percentiles



Groundwater Index

- December and January were at Index Severity Level 0
- February Western Region was at Index Severity Level 1

March 2021 Monthly Groundwater Summary

Shading indicates index severity level:

Level 0	Level 1	Level 2	Level 3	Level 4
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Region	Number of wells reporting	Median of individual well percentiles
Western	5	36
CT River	11	47
Central	9	31
Northeast	13	37
Southeast	12	25
Cape Cod	9	35
Islands	2	51

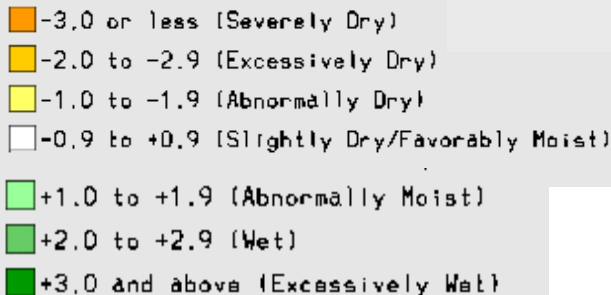
Number of wells in percentile categories

Region	≥0 to ≤2	>2 to ≤10	>10 to ≤20	>20 to ≤30	>30 to ≤90	>90
Western	0	1	0	0	4	0
CT River	0	1	0	2	7	1
Central	0	0	0	4	5	0
Northeast	0	0	4	2	7	0
Southeast	1	1	2	4	4	0
Cape Cod	0	1	0	3	5	0
Islands	0	0	0	0	2	0

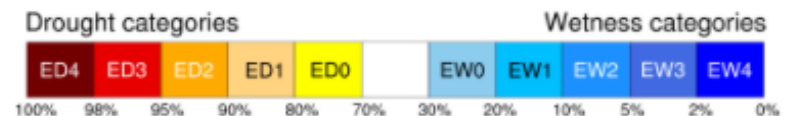
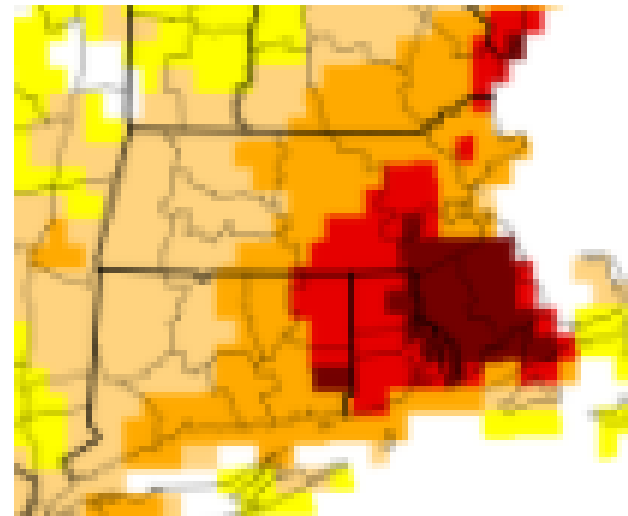
KBDI and CMI/ET

- KBDI – outside of traditional fire season (values <200; Index Severity Level=0)
Fuel moisture showing dry to very dry conditions. In SE, the 100-hour fuel moisture <15%. Fire Danger warnings due to dryness and winds.
- ET - outside of traditional growing season

CMI - ISL=0
Week ending March 27



Evaporative Demand Drought Index
1-month (temp, wind, and others)
(index under consideration to replace CMI)



Lakes & Impoundments

March

Drought Region	Number Reporting	Percentile	DMP Index Severity
Western	2	(100% & 95%)	Level 0
CT River Valley	2	66	Level 0
Central	3	(100%, 100%, 9)	Level 0
Northeast	6	35	Level 0
Southeast	1	(97%)	Level 0
Cape Cod	1	12	Level 2
Islands	NA	NA	NA

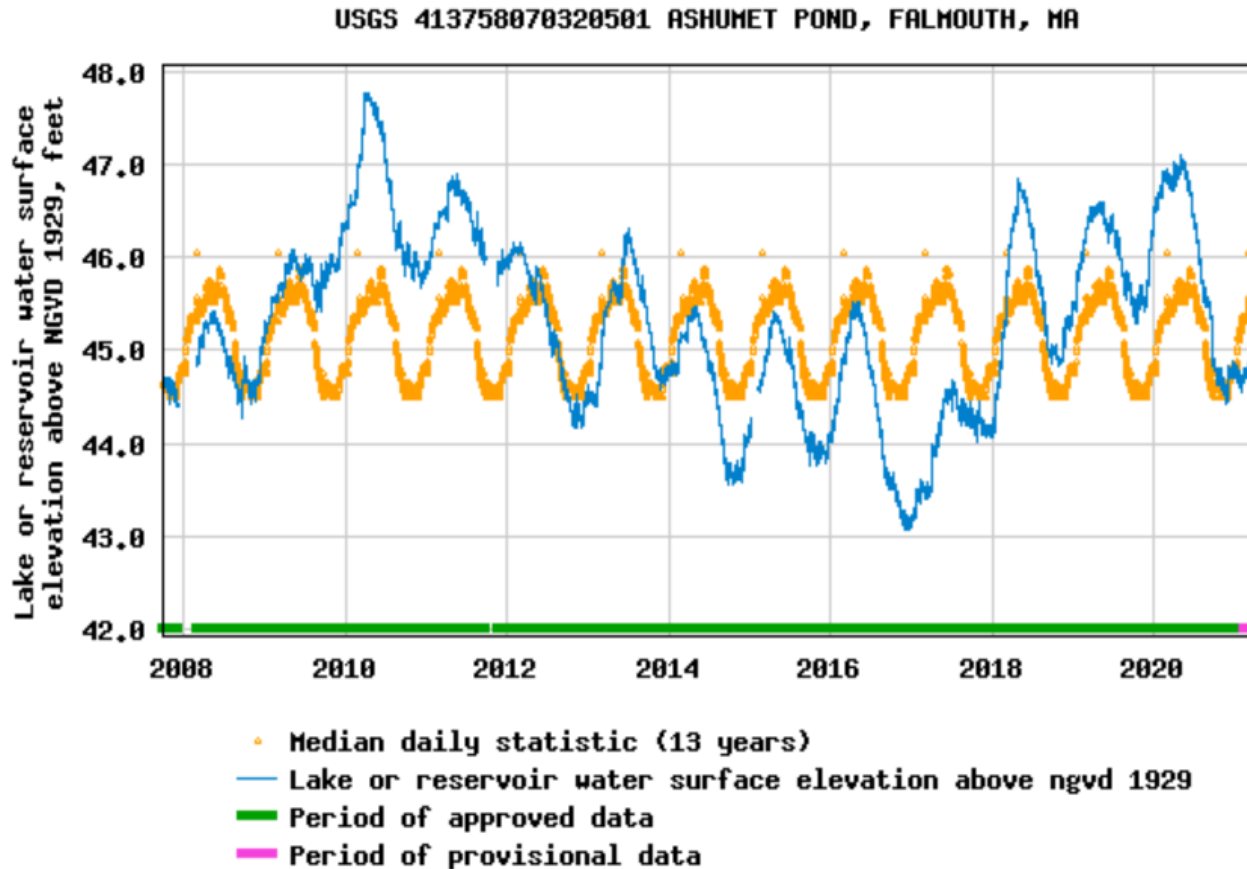
Notes:

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



Lakes & Impoundments

March – Cape Cod



- Usually by this time of year level has started to rise
- 2016 drought shows in 2017 → very slow responder

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 Region - March 2021

Drought Index	Western	CT River Valley	Central	Northeast	Southeast	Cape	Islands
Precipitation	Level 2	Level 2	Level 2	Level 2	Level 2	Level 1	Level 1
Streamflow	Level 0	Level 0	Level 1	Level 1	Level 2	N/A	N/A
Groundwater	Level 0	Level 0	Level 0	Level 0	Level 1	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 3/1 (4/6 meeting)</i>	<i>Level 1</i>	<i>Level 1</i>	<i>Level 1</i>	<i>Level 1</i>	<i>Level 2</i>	<i>Level 1</i>	<i>Level 0</i>
<i>Effective 2/1 (3/10 meeting)</i>	<i>Level 1</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>

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