# MASSACHUSETTS Drought Management & Planning

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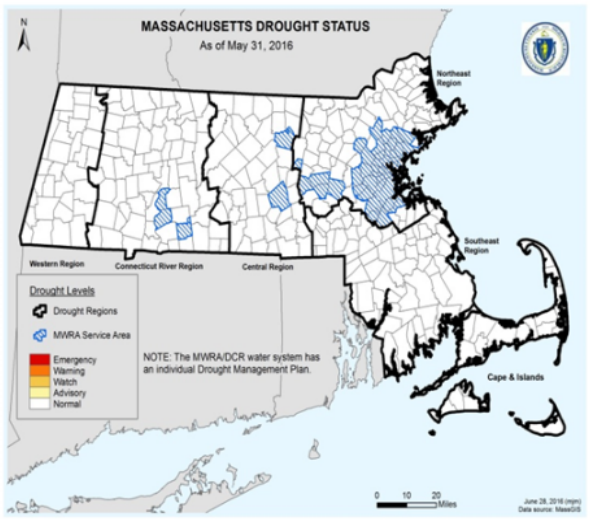
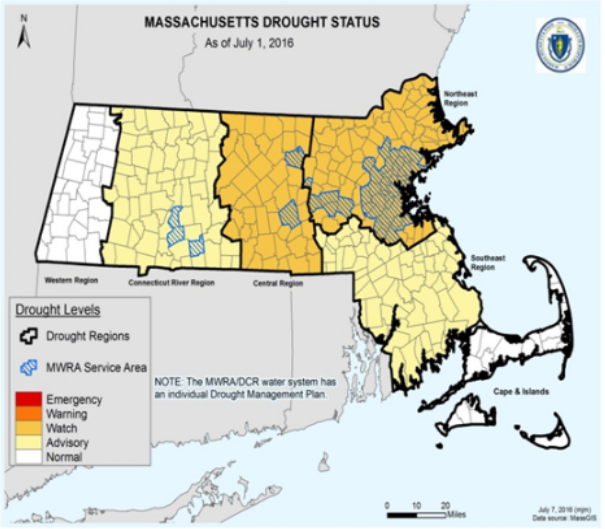
Director of Water Policy
MA Energy & Environmental Affairs

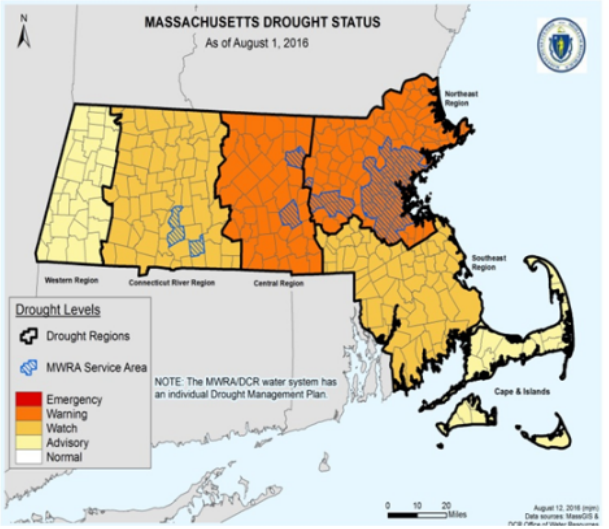
January 21, 2021

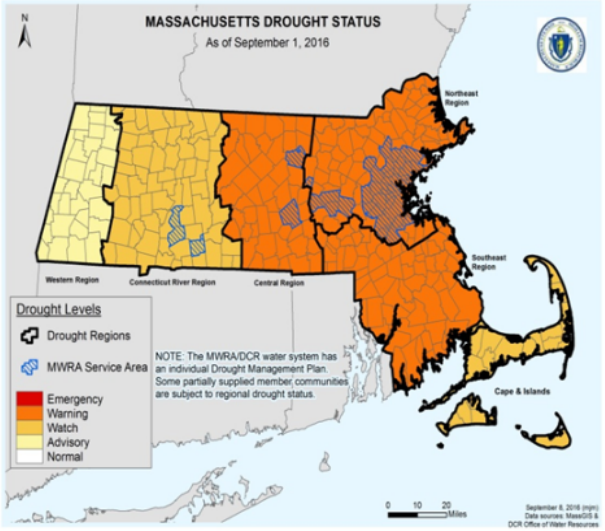
# Drought of 2016 – 2017

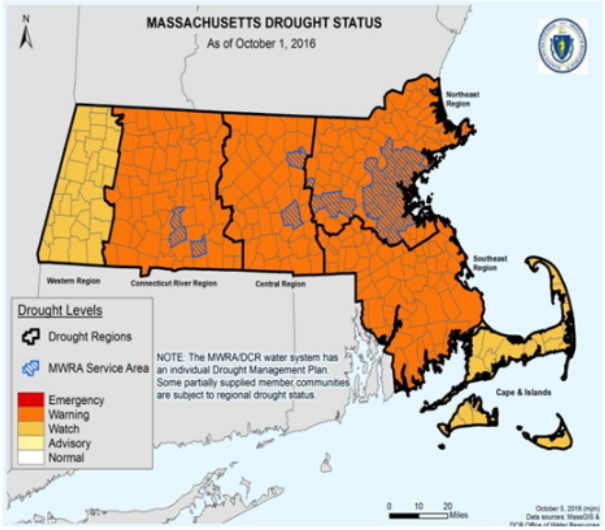
(May through November 2016)

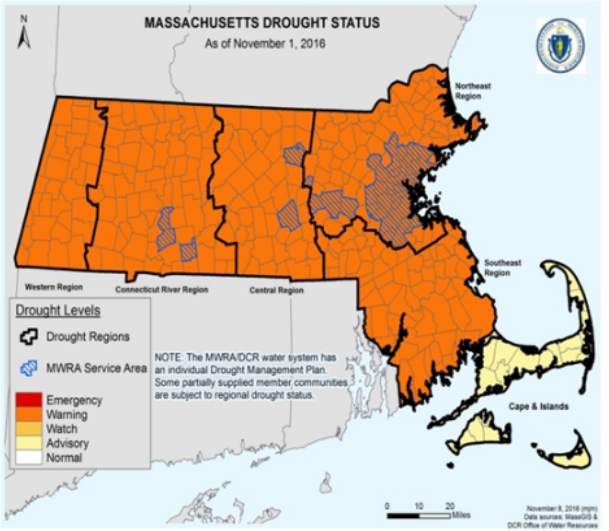


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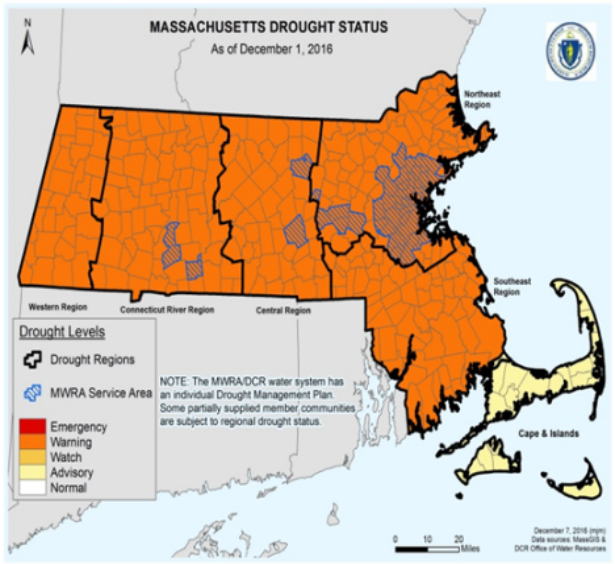
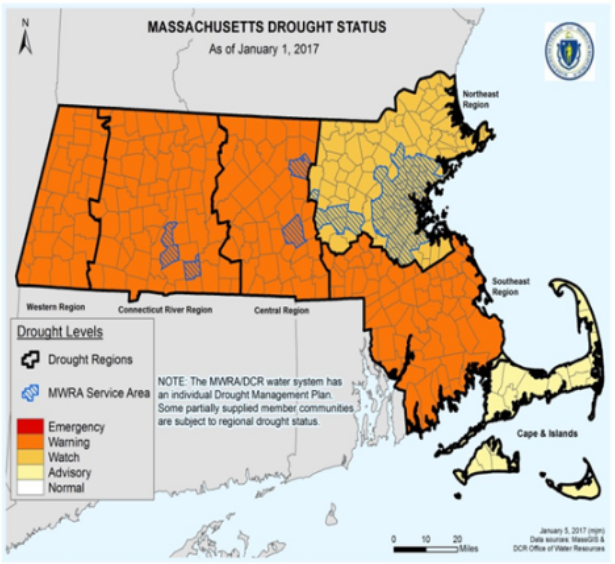
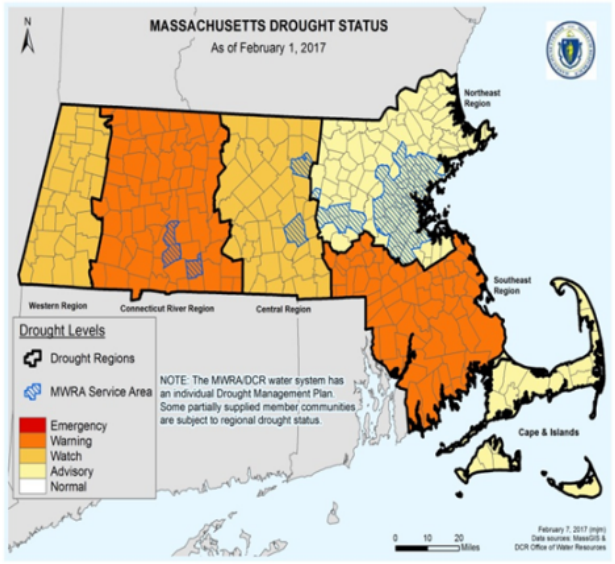
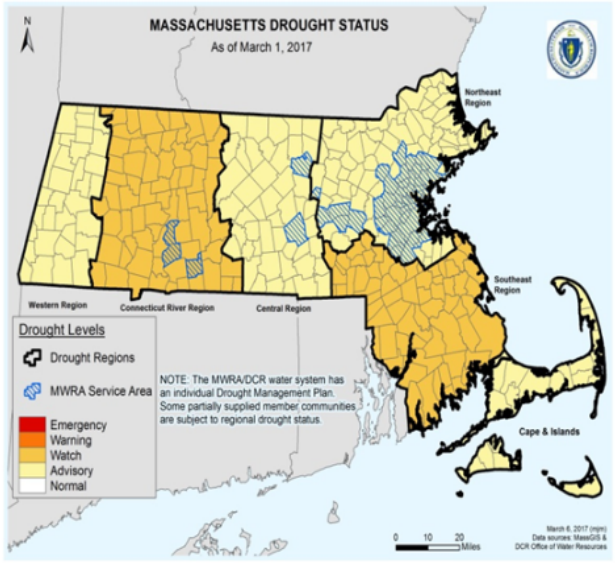
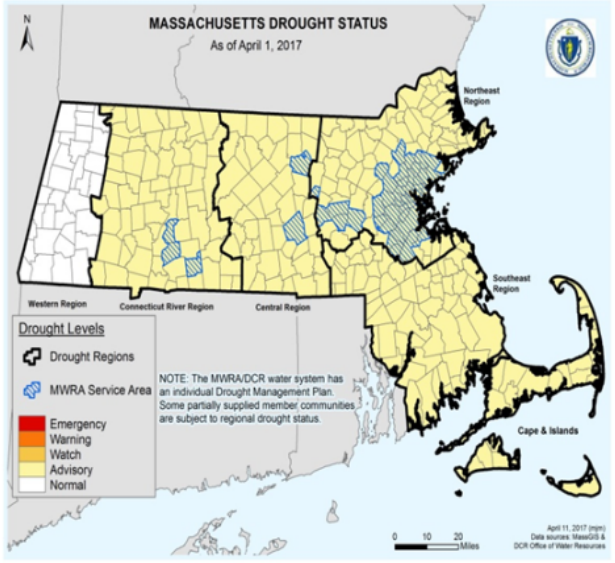
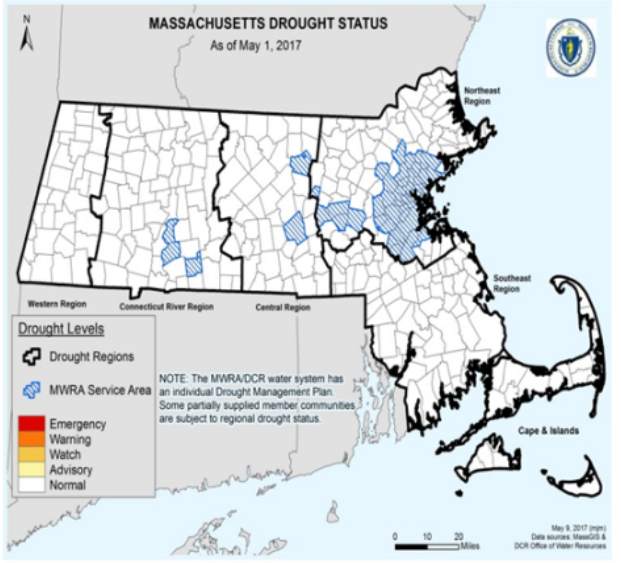


# Lessons Learnt from the 2016 Drought

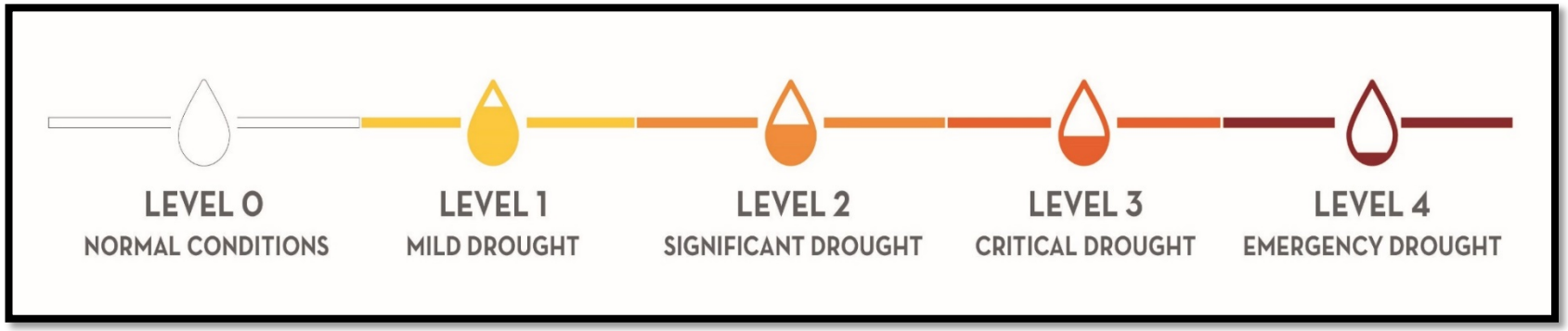
- Missed the onset of drought by at least a few months
- Indices were not sensitive enough; did not reflect severity of the condition
- The drought plan did not include ongoing preparedness
- Needed more robust communication

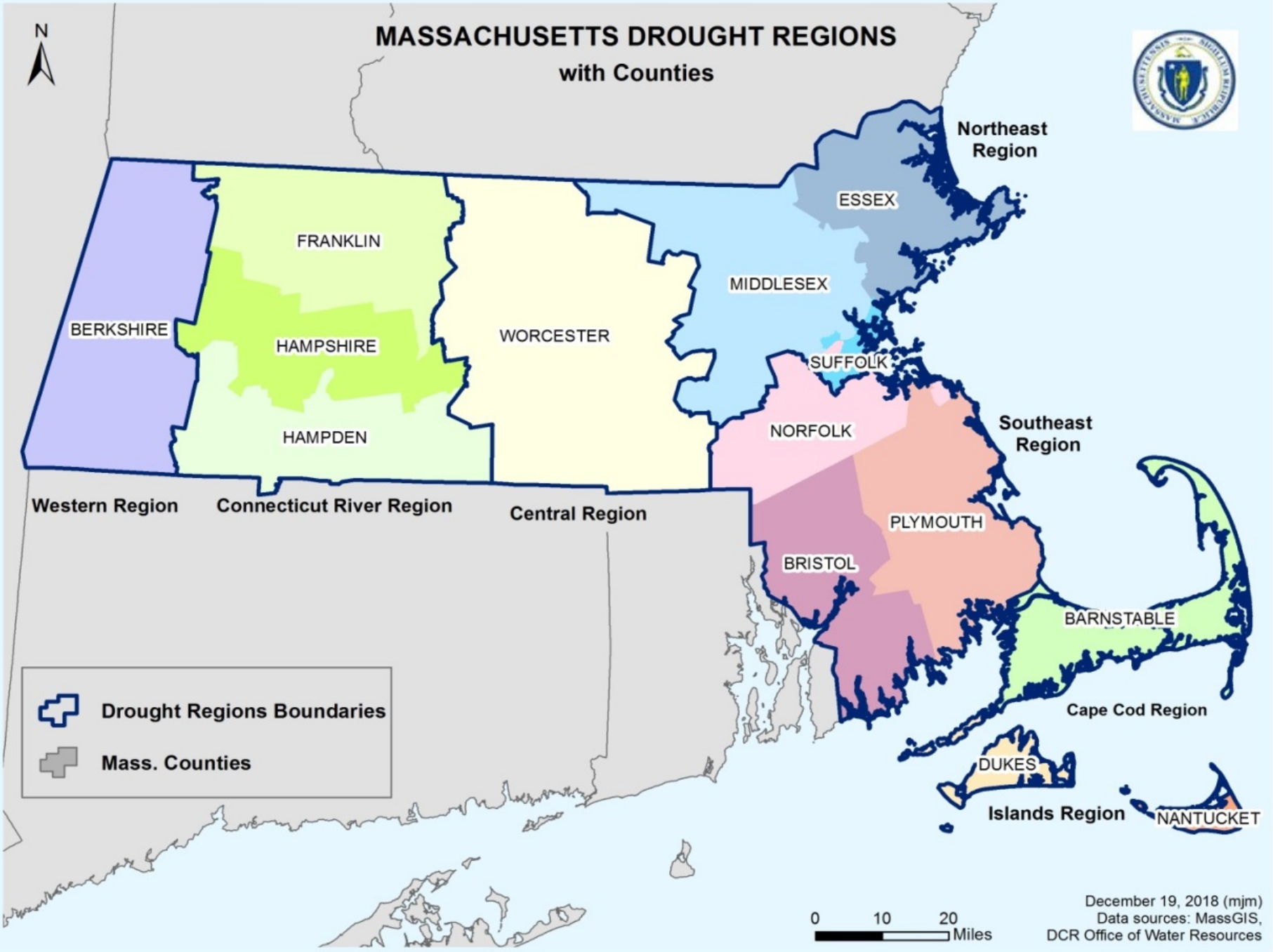
Mattapoisett River, September 2016
(Photo credit: Steve Hurley)

# Updated MA DROUGHT PLAN

## Developed after 2016/17 Drought

# MA Drought Management Plan
# Drought Levels



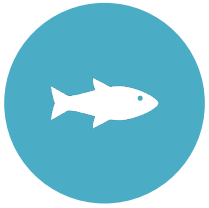

MASSACHUSETTS DROUGHT REGIONS
with Counties
N
Northeast Region
ESSEX
MIDDLESEX
FRANKLIN
BERKSHIRE
HAMPSHIRE
WORCESTER
SUFFOLK
NORFOLK
Southeast Region
HAMPDEN
Western Region
Connecticut River Region
Central Region
PLYMOUTH
BRISTOL
BARNSTABLE
Cape Cod Region
DUKES
Islands Region
NANTUCKET
Drought Regions Boundaries
Mass. Counties
0
10
20
Miles
December 19, 2018 (mjm)
Data sources: MassGIS,
DCR Office of Water Resources

# MA Drought Indices

Precipitation (59)

Streamflow (59)

Groundwater (64)



Lakes and Impoundments (19)

KBDI- Fire Danger (16)

Crop Moisture (national map)

Numbers in parenthesis indicate number of data points across the state

# MA Drought Levels

| MA Drought Levels | Description | Percentiles for Ppt, SF, GW, L/I | KBDI |
|---|---|---|---|
| Level 0 | Normal | > 30th percentile | < 200 |
| Level 1 | MILD Drought | 21 to 30 | 200 - <400 |
| Level 2 | SIGNIFICANT Drought | 11 to 20 | 400 - <600 |
| Level 3 | CRITICAL Drought | 3 to 10 | 600 - <700 |
| Level 4 | EMERGENCY Drought | 0 to 2 | 700 - <800 |

# Topics Reported

Hydrologic Conditions

Weather & Forecast

Water Supply Impacts

Environmental Impacts

Agricultural Impacts

Fire Danger

Engineering/ Infrastructure Impacts

Public Health Impacts

# The NEW Plan….


Martins Brook, North Reading

**Drought Levels**

- new more intuitive nomenclature, same number of levels

**Drought Regions**

- small adjustments to regions, 1 region split, total of 7 regions

**Drought Indices**

- kept 6 of 7, removed duplicate precipitation index

**Methods for Calculating Indices**

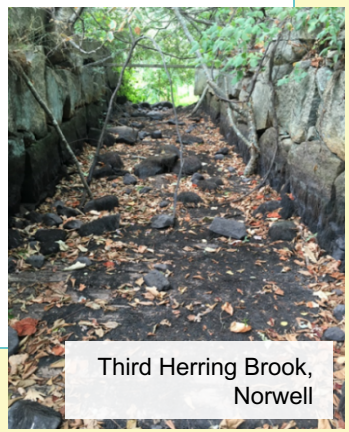
- new method uses percentiles
- detailed description of steps, allows duplication by others

**Additional Information**

- forecasts and impact reports

# The NEW Plan…Drought Preparedness and Response Actions: Guidance for Communities

- Identifies key actions that can be taken at the local level before a drought (to prepare) and during a drought (to respond), along with resources to implement key actions
- Audience: municipalities and/or public water systems, partners that can support and assist with implementation, including environmental groups, concerned citizens, and local boards such as the planning board, conservation commission, and town select board or city council
- **Action 1: Develop a Water Conservation Program**
- **Action 2: Develop a Local Drought Management Plan**



Third Herring Brook, Norwell

# Drought Preparedness

# The NEW Plan…. State Drought Guidance

| State Drought Condition (by Region) | Nonessential Outdoor Water Use Restrictions |
|---|---|
| Level 1 (Mild Drought) | 1 day per week watering, after 5 p.m. or before 9 a.m. (to minimize evaporative losses) |
| Level 2 (Significant Drought) | Limit outdoor watering to hand-held hoses or watering cans, to be used only after 5 p.m. or before 9 a.m. |
| Level 3 (Critical Drought) | Ban on all nonessential outdoor water use |
| Level 4 (Emergency Drought) | Ban on all nonessential outdoor water use |

The actions in this table apply to all outdoor water users and represent one of the most effective ways to minimize the impacts of drought on water supply and the environment.

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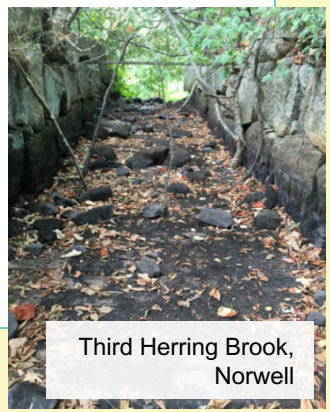
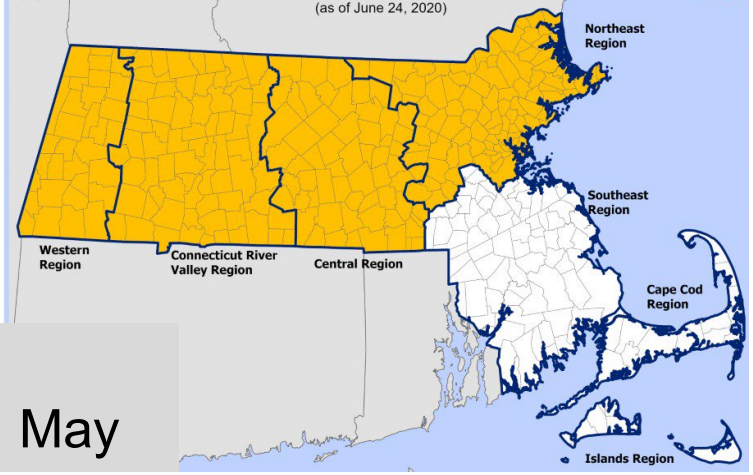


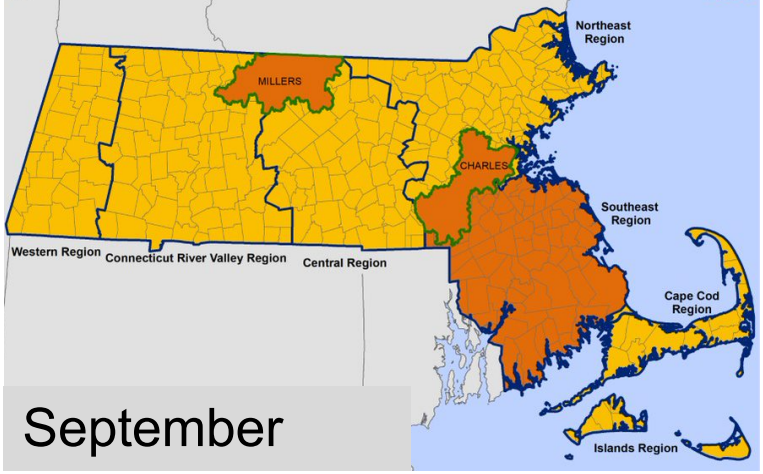
Third Herring Brook, Norwell

# Drought of 2020

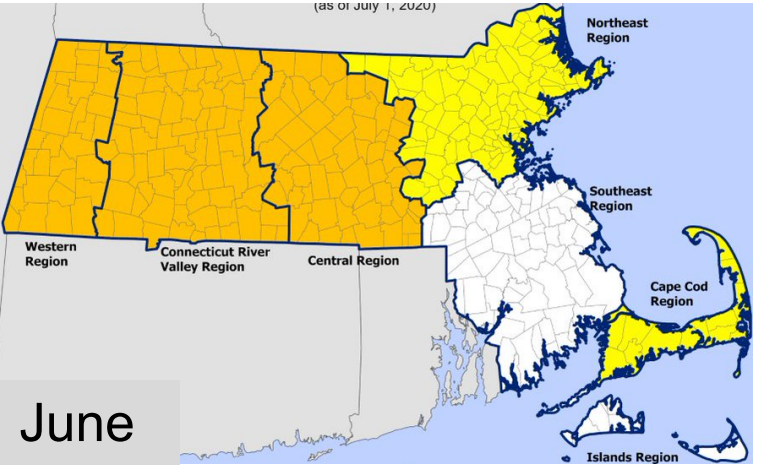
# Drought Status



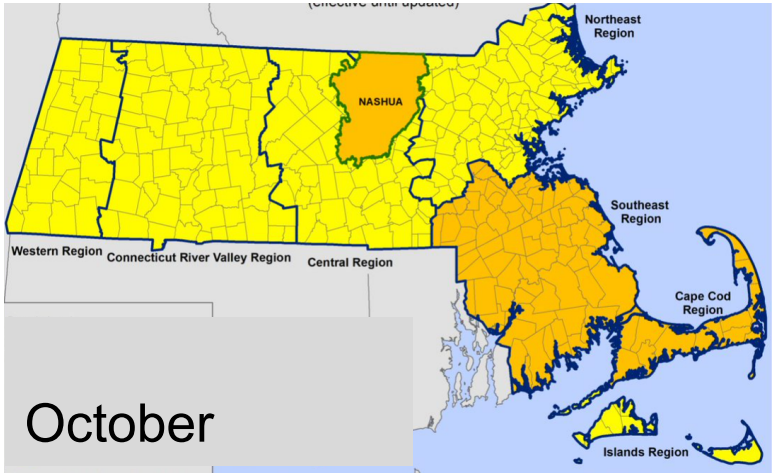

May



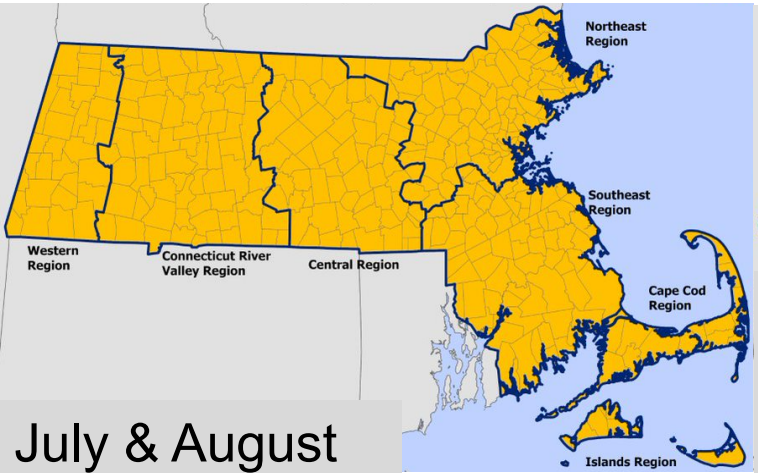

September



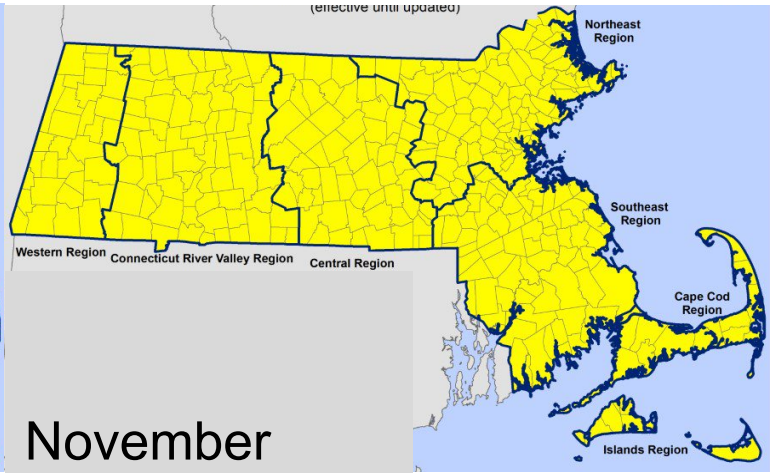

June




October




July & August




November

**Drought Levels**

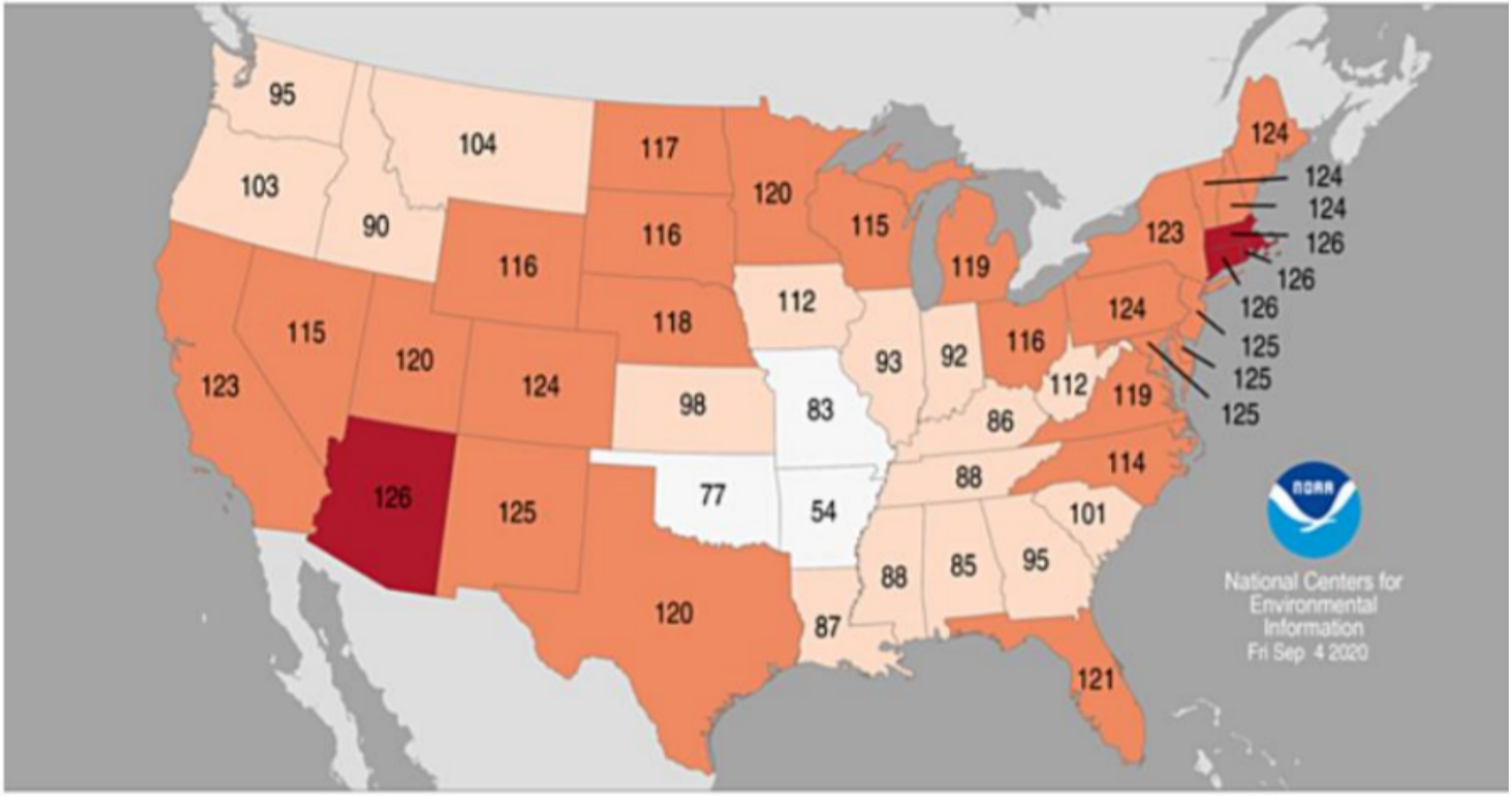
- Normal
- Mild Drought
- Significant Drought
- Critical Drought
- Emergency Drought

Drought Regions

# Statewide Average Temperature Ranks

June – August 2020

Period: 1895–2020



# Similar to 2016 Drought

- Rapid onset
  - Flash drought characteristic
  - Augmented by mid-month occurrence - outside of monthly cycles of data processing (staff with NRCC developing capacity to process and evaluate data weekly)
- Rapid intensification of drought conditions and impacts in SE
- Above normal temperatures with sudden and severe drop in precipitation followed by numerous heat waves and record setting temperature for the summer

# Take-Aways from 2016 & 2020 Droughts

- Climate is changing and MA is predicted to see more short- and long-term droughts
- Have started to experience a newer phenomenon of a "flash drought" with a fast onset and quick deterioration in conditions
- Consistently above normal temperatures – contribution to flash droughts, more evaporation, winter precipitation as rain, greater outdoor use
- Seen many record low streamflow and groundwater levels across the state (worse than during the drought of the 60s) in spite of rainfall amounts being higher
- Need to have a consistent approach to drought planning and mitigation, and communication

**We need to be better PREPARED!!**