

# The Massachusetts Drought Story

A Changing Experience

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# Overview

- Background on drought management in MA
- Changing nature of droughts
- Revising the DMP
- Remaining issues to tackle

# MA Drought Monitoring & DMTF



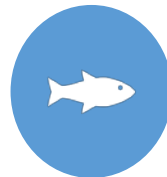
Precipitation (57)



Streamflow (59)



Groundwater (63)



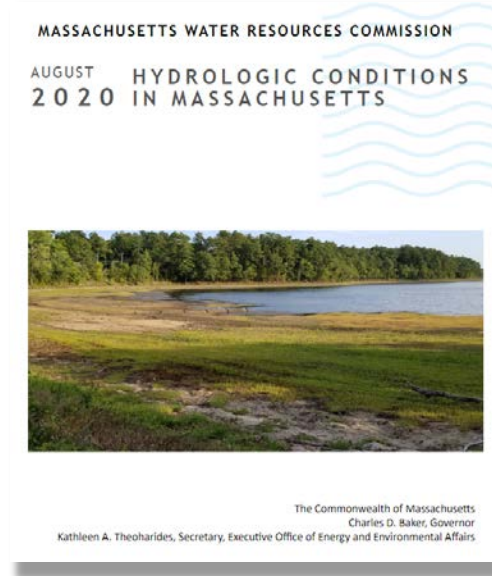
Lakes and  
Impoundments (20)



KBDI - Fire Danger (16)



Crop Moisture (national map)

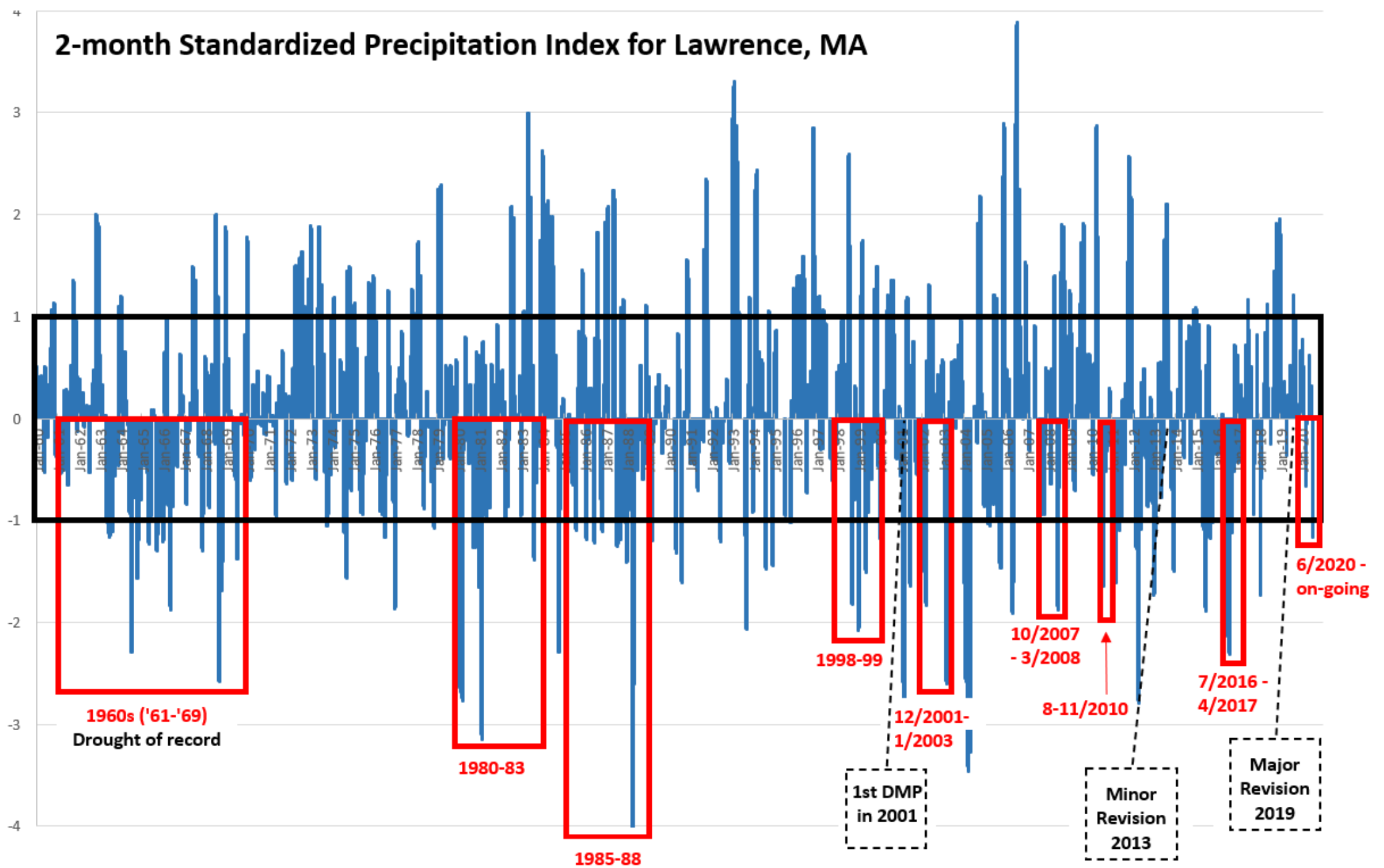


## Drought Management Task Force



State agencies  
Federal partners  
Local stakeholders

# MA Drought History

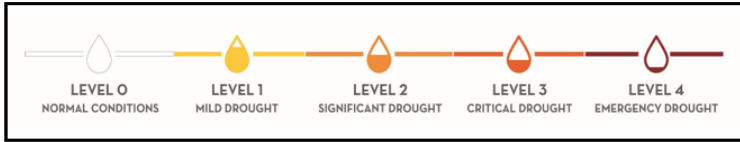


# Revising the Drought Management Plan, 2019

- Revise indices to
  - Earlier signaling of onset and intensification
  - Severity to reflect on-the-ground conditions
  - Temperature effect on the water budget
- Operationalize the DMP
  - Help from MA Emergency Management Agency
  - Efficient implementation of the plan during droughts
- Add more actions
  - Separate preparedness and response actions
  - Guidance to prepare & assistance during droughts for communities, residents and industries

# Revised Drought Management Plan

- Drought Mission Group
- Communication



- Guidance and assistance

### LEVEL 1 - MILD DROUGHT

#### What does this mean?

- Rain below normal for 1 to 2 months
- River and stream flows decline
- Gardens begin to wilt
- Fire danger is elevated

Map legend:

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

#### What you can do!

- Minimize overall water use
- Toilets, faucets and showers are more than 60% of indoor use. Make sure yours are WaterSense efficient!
- Limit outdoor watering to 1 day a week (only from 5:00 pm - 9:00 am), or less frequently if required by your water supplier.



### What we really pay for when we pay for water.



### TIPS FOR SAVING WATER

When in Drought or Not – Please Do Your Part!

- LIMIT LAWN WATERING, ESPECIALLY DURING A DROUGHT!**  
Lawns naturally go dormant during dry conditions. They'll revive when conditions improve.
  - If you are in a region at Drought Level 3, **Critical Drought** (Severe Drought) or Drought Level 4, **Emergency Drought**: Do not water your lawn.

### TIPS FOR SAVING WATER

When in Drought or Not – Please Do Your Part!

- Choose high-efficiency plumbing products and appliances (look for the WaterSense or Energy Star labels).
- Fix leaks in toilets, pipes, and showers. A single dripping faucet can waste up to 100 gallons of water per week.

# Revised Drought Management Plan

## Simplified, high level changes

- Quicker onset/intensification → remove time delay in indices
- Reflect severity → frequency as unit of measure (based on U.S. Drought Monitor)
- Less rain deficit but more impact → test new indices to show ET demand from temperature

Drought Index	2001/2013 DMP	2019 DMP
Precipitation	severity partly based on # months, min 2 months	severity only based on %tile thresholds, min 2 months
Streamflow	severity based on # months, min 2 months	severity only based on %tile thresholds, no min
Groundwater	severity based on # months, min 3 months	
Lakes and Impoundments	Severity based population served, severity partly based on # months	
Fire Danger	Keetch-Byram Drought Index (KBDI)	KBDI
Soil Moisture	Crop moisture index– developed for crops grown in other states, rarely or insufficiently elevated	<<<researching new indicator to capture ET demand from temperature>>>



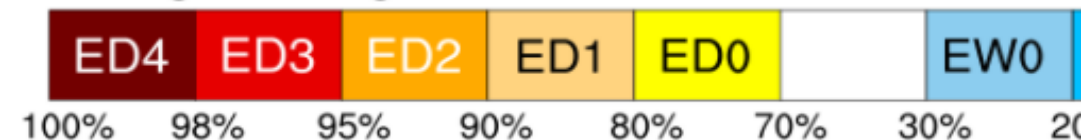
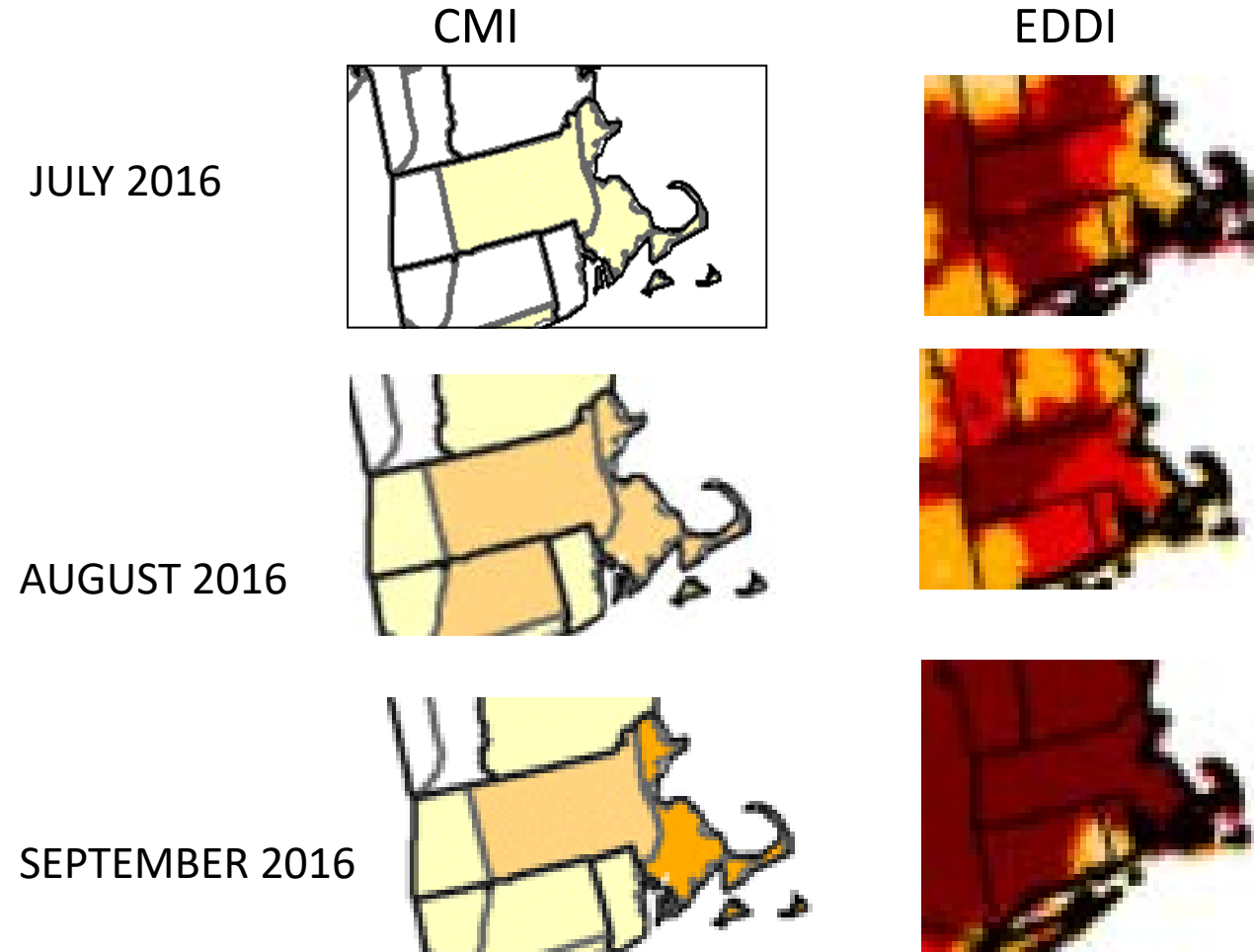
# More on Record Low Streamflow and Groundwater

## 2016 Drought

- Record setting heat waves
- Data showed
  - Precipitation > DOR
  - Streamflow – record lows
  - Groundwater – record lows

→ Need to capture Temp/ET better!

- Seeing again in 2020 drought





# What about Land Use and Water Use?

## 2016 Drought → Anecdotal evidence for impact by LU and/or WU changes

- Some highly developed areas showed *disproportionate impacts* with even more record lows in streamflow and groundwater
- *Significant development* (LU and WU change) at many sites since start of POR
  - Most wells installed in the 1960s
  - Streamflow gages late 1930's and early 1940's or the mid 1960's



# Partial Wishlist for Improving Drought Management

- Capability to evaluate conditions weekly – real time sensors, automation of calculations
- Network analyses – more sites, biases, outdated designations
- Capturing impacts – drought impact reporter (private wells!)
- More guidance and tools for water managers - threshold setting for PWSs
- Understanding sources of increasing impacts – climate, land use, water use
- Understanding effect of climate change on using frequency as measure of severity!