MA Drought Management Plan Revisions

Water Resources Commission Meeting, December 14, 2023

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Revision Process

2022

- June - Change in Evapotranspiration (ET) Index presented and agreed upon at DMTF meeting
- July - Change in ET Index presented and agreed upon at WRC meeting

2023

- July - Draft Drought Management Plan released for public comment
- August - Comment period ended
- November - Summary of revisions presented to the WRC
- December - Final DMP voted on by WRC and published

Proposed Changes - Highlights

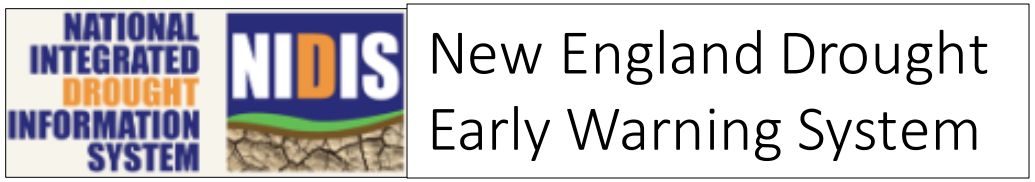
- Administrative changes
  - Task force members, their representatives and responsibilities
  - Added description of the Division of Marine Fisheries' role
  - Included description of the MWRA system and its customers
- Amended drought history and impacts to include
  - Droughts since 2019 revision
  - Fast onset and intensification droughts
  - Increased frequency and severity of recent droughts which are projected to continue with a changing climate
- Communication - Updated the types of meetings and participants for each type
- Actions – Minor updates to the table of response actions for each level of drought

Proposed Changes - Highlights (contd)

- Updated Water Management Act requirements for nonessential water use to include registered public water suppliers
- Community guidance – Information for data analysis to assist water conservation and revenue resilience
- New Appendix F: Private Wells FAQ
- Index changes
  - Revised calculations to include weekly (in addition to monthly) calculations
  - Document the addition of the streamflow index for Cape Cod from May 2021
  - Updated station locations maps for each index's network
  - Recommendation for new ET index

Evapotranspiration (ET) Index Update

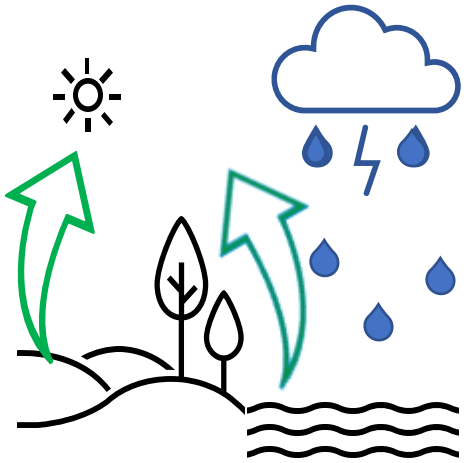
- Cornell NRCC & Northeast DEWS provided initial assessment and analysis of various ET product options



- Evaluation of results by technical group like 2019 DMP revision
  - State and federal staff comprised of USGS, NOAA NWS, NOAA NERFC, MassDEP, DFG, DCR, EEA
  - Reviewed analyses and made recommendation
- Presented to and approved by the DMTF on June 15, 2022
- Presented to Water Resources Commission at July 2022 meeting
- Presented to Water Resources Commission at November meeting with other DMP revisions

ET Index: Goals for Revision

- **Timely identification of drought onset/intensification**
  - Currently, no signal from Crop Moisture Index (CMI) - can cause delays in drought onset/intensification identification



- Show the **effect of temperature/ET on "available" precipitation**
  - Help identify "flash droughts" by knowing when impacts will occur more quickly than when just low precip
  - With climate change, importance of identifying **heat/ET in addition to precip-induced dryness**

ET Index: 2-month EDDI

- Options Evaluated: National products such as GRACE, NWM, ESI, SPEI, EDDI
- Choose **Evaporative Demand Drought Index (EDDI)** – Theoretical maximum ET (based on temperature, radiation, wind, etc.), aka 'thirst of the atmosphere'
  - EDDI is better than CMI and other options at signaling the role of temperature and ET in drought
  - Helps identify drought onset/intensification in a timelier manner especially when it is ET rather than precipitation-induced
  - Provides additional information to complement the other indices

Public Comments

Comments Received From:

- Massachusetts Water Resources Authority
- Massachusetts Water Works Association
- Internal comments from agencies

Comments in 8 Areas (key areas of response highlighted):

- General Policy
- Background Section
- Authority and Coordination
- Drought Declaration Process
- Drought Indices and Data
- Drought Communication
- Stage Agency Responsibilities
- Drought Actions

Next Steps

- Vote by WRC at December 2023 meeting
- Publish final Drought Management Plan on website
- Consider the DMP as a ‘working document’
  - minor changes can continue to be made by staff (such as website addresses, agency representatives, formatting and editorial changes)
  - major changes will be brought back to the WRC

General Policy Comments	Response
Re-examine how the state DMP and the US Drought Monitor are related	• Aware of issues & working on messaging • Improvements made iteratively with each drought
Concerned that the 2019 DMP methodology resulted in too frequent declarations; public gets desensitized. Request a sensitivity analysis of the triggers	• Disagree. Sensitivity analysis conducted- found consistent alignment with USDM. • Increased frequency due to increased drought. • All of the Northeast is experiencing this.
Include definition of other types of drought – meteorological, agricultural, hydrological, socio-economic	• Drought indices and state staff reports are comprehensive in informing the DMTF of the various impacts of drought.
DMP include language about WMA new multi-year category	• DMP is a policy and guidance document • Provides an overview of relevant programs • For details WMA regulations should be reviewed

Drought Declaration Comments	Response
Add a description of the MWRA regional water supply system and include a map	• Added a new section on MWRA under agency descriptions • Included map there
Separate Islands into separate regions	• Islands already smallest drought region • Insufficient data to support separate analyses
Weight the indices so it is clear which are triggers for a declaration	• Select indices already given preference during onset and end of drought per DMP method

Drought Indices and Data Comments	Response
Add GW network analysis to the DMP as an appendix	• Work not complete • Will be presented to WRC and made publicly available at a later date
Expand the Lakes & Impoundments index to get more data points	• Agree that more data points would be beneficial • USGS expert confirmed importance of Cape Cod data/location • WRC L&I study with USGS will inform index methodology and site selection once complete
Concerned about ET index; that EDDI relies more heavily on temperature than precipitation	• Reflects one part of water cycle like other indices • Important inclusion that is not currently captured • Temperature is having significantly larger impact on drought in recent years

Further response on DMP-USDM comparative analysis

- It does not appear that the MA DMP is leading to drought declarations significantly more often than the USDM would indicate, and maybe at worst they are a month off from each other.
- The data will likely never be directly comparable, as with the DMP we are generally looking at monthly medians, while the USDM changes weekly. So, the DMP data are maybe a bit “smoothed out”.
- For each analysis period/drought duration, the intensity is similar in USDM and MA-DMP during the drought, if not necessarily in the same month.
- For the month to month, it appears that the USDM can be more intense at times. This may have to do with the weekly updates catching short and intense periods of drought.
- In some cases, it appears the DMP declaration improved/resolved earlier than USDM.
- We didn’t see anything that indicated that the DMP is routinely calling droughts where USDM is detecting nothing over multiple months, it might just be a one-month delay.
- Our analysis concludes that the DMP is not causing an over-declaration of drought as compared to USDM.