



THE COMMONWEALTH OF MASSACHUSETTS
WATER RESOURCES COMMISSION
100 CAMBRIDGE STREET, BOSTON MA 02114

Meeting Minutes for August 11, 2022

Meeting conducted remotely via Zoom meeting platform, 1:00 p.m.

Minutes approved November 10, 2022

Members in Attendance:

Vandana Rao	Designee, Executive Office of Energy and Environmental Affairs (EEA)
Linda Balzotti	Designee, Department of Housing and Community Development (DHCD)
Duane LeVangie	Designee, Department of Environmental Protection (MassDEP)
Anne Carroll	Designee, Department of Conservation and Recreation (DCR)
Rebecca Quinones	Designee, Department of Fish and Game (DFG)
Hotze Wijnja	Designee, Department of Agricultural Resources (DAR)
Thomas Cambareri	Public Member
Kenneth Weismantel	Public Member
Samantha Woods	Public Member

Members Absent

Todd Callaghan	Designee, Massachusetts Office of Coastal Zone Management (CZM)
Vincent Ragucci	Public Member

Others in Attendance:

Read Porter	EEA
Katie Ronan	Massachusetts Water Resources Authority (MWRA)
Kara Sliwoski	DCR/ Office Water Resources (OWR)
Becca George	DHCD
Sara Cohen	DCR/OWR
Aaron Weieneth	AECOM
Peter Ostroskey	MA State Fire Marshal
Lexi Dewey	Water Supply Citizens Advisory Committee
Erin Graham	OWR
Marie-Francoise Hatte	Water Resources Research Center, UMass Amherst
Andreae Downs	Wastewater Advisory Committee
Vanessa Curran	DCR/OWR
Laurie Agel	UMass Lowell
Rebecca Weidman	MWRA
Todd Melanson	Chelmsford Water District
Bethany Pucino	EEA Intern
Lynn Gilleland	EPA R1 Drinking Water
Christine Hatch	UMass Amherst
Don Hearn	Golf Course Superintendents Association of New England
Kevin Podkowka	DCR, Forest Management
David Brew	MWRA
Stephen Boksanski	Green Industry Alliance

Robert Worthley	Foxborough Water Department
Kristopher Massini	DCR Management Forestry
Deirdre Desmond	MassDEP Office of General Counsel
Alyson Ayotte	Public Utilities Regulatory Authority Connecticut, Water Planning Council
Kate Adams	MA Department Public Health
Linjun Yao	MassDEP
Joy Duperault	CFM, DCR Flood Hazard Management Program
Gerald Clarke	BU/MIT Town of Dover
Bruce Wittchen	CT OPM
Kris Massini	DCR
Maria Szul	Public Utilities Regulatory Authority Connecticut
Jennifer D'Urso	MassDEP
Thomas Maguire	MassDEP
Eric Lindquist	Connecticut Office of Policy and Management
Richard Bradley	
Sharon Lee	

Rao called the meeting to order at 1:08 p.m.

Agenda Item #1: Welcome and Introductions

Rao announced that the meeting was being recorded and all votes would be taken by roll call. She invited those who wish to speak during the meeting to indicate this in the chat window. A roll call of members in attendance was taken.

Agenda Item #2: Executive Director's Report

Rao reported the Drought Management Task Force (DMTF) met twice since the last Water Resources Commission (WRC) meeting- once at the end of July and once in early August. This past Monday, August 8th the DMTF recommended and on Tuesday, August 9th the EEA Secretary declared a Level 3 Critical Drought in four Regions- the Connecticut River Valley, Central, Northeast, and Southeast Regions. The Cape Cod Region is at Level 2 Significant Drought, and the Western and Islands Regions are at Level 1 Mild Drought. In general, drought conditions have worsened over the past month and spread farther south and west.

There has been a lot of coordination between EEA and the agencies. The Drought Mission Group, a group of staff members that coordinates agency actions, continues to meet on weekly basis. Agency staff has been apprised of drought impacts as feedback from stakeholders and the regulated community is received. EEA and Massachusetts Emergency Management Agency (MEMA) have been closely communicating and coordinating. There has been a lot of media coverage on the drought. State staff have been reaching out to the farming community and water suppliers. There was a conference call organized by the state for municipal officials with EEA Secretary Card, the MassDEP Commissioner Suuberg, the state fire marshal, the DCR fire chief, and public health officials. The goals of the meeting were to update municipal officials on the drought conditions and highlight resources and agencies that are available for assistance. State staff are working on organizing a similar meeting for water suppliers, and have reached out

to watershed associations and to farmers. Rao has also reached out to regional planning agencies. This is all part of an effort to engage and maintain clear channels of communication for all levels of government and non-governmental groups.

Rao announced the release of the Water Impact Reporter. This is an online tool for reporting conditions related to water, particularly about drought impacts now. Anyone can submit a report and it will be tracked. A link to the Water Impact Reporter can be found on this webpage on the state website: <https://www.mass.gov/info-details/massachusetts-drought-resources>

Rao gave an update of what other EEA agencies are doing related to the drought. MassDEP is working with water suppliers. DCR has been looking at its own facilities and operations to find ways to reduce water use. They have already done a lot of water conservation work. DCR Forest Fire Control has been getting the message out. DAR has been looking at impacts and preparing resources for the fall harvest. The Department of Capital Asset Management has reached out to facility managers to let them know about the drought. DFG has staff assessing drought impacts in the field. The Department of Public Health has also gotten the message out to local Boards of Health particularly since they are often the first to know when private wells are affected.

Rao opened the meeting to staff and Commissioners for any announcements. Hearing none, she moved on to the next agenda item.

Agenda Item #3: Update: Hydrologic Conditions

Rao introduced Erin Graham of DCR to provide an update on hydrologic conditions for July 2022.

Temperature: Monthly average temperatures were mostly above normal. The Boston climate site had its third warmest July and overall month averaging 3.4 degrees above normal. The Worcester climate site had its 14th warmest July and overall month 2.5 degrees.

Precipitation: July precipitation was varied across the state. In the eastern parts precipitation was very low, especially on Cape Cod. The July SPI for the Cape Cod Region was in the first percentile and the average was only 0.35-inches. Hyannis had its driest July on record, and the Boston and Blue Hill climate sites had their fourth driest July. The western part of the state received more precipitation- the Connecticut River Valley Region (CTRV) was only at Index Severity Level (ISL) 1 for July and the Western and Central Regions were overall normal but had some areas of below-normal precipitation.

Streamflow: Percentiles of the individual streamflow gages were mostly below normal, and all regions are at elevated index severity levels. The time series shows that July started out with about 65% of gages below normal. There was some relief around July 18th, but the percentage of below-normal gages then climbed again and the remainder of the month about 50% of the gages were below normal.

Groundwater: Groundwater levels more varied. Many monitoring wells were below normal, but some were still in the normal range and two were above normal. Three Regions are at ISL 1 and two are at Level 2, but even the Regions that didn't trip have wells below normal.

Lakes and Impoundments: Of those that were reported, levels varied. Four water bodies are still above their 30th percentile, but most are below their 30th percentile and all Regions at an elevated ISL except the Western Region.

Keetch Byram Drought Index: At the end of July all Regions were at elevated ISLs except Cape Cod and the Islands. In particular, the Southeast Region had high values, over 600, and is at ISL 3.

Crop Moisture Index: At the end of July CMI values were in the Slightly Dry/Favorably Moist range in the western parts of the State, Abnormally Dry in the central parts, and excessively dry in the coastal parts. The Western Region is at ISL 0, the CTRV and Central Regions at ISL 1, and the Northeast, Southeast, Cape Cod, and Islands Regions at ISL 2.

Evaporative Demand Drought Index (EDDI): The 1-month EDDI shows elevated evapotranspiration across the state with most of the state at the highest ISL 4.

MA Drought Status: The MA Drought Management Task Force met Monday August 8th and Thursday July 21st. Over the month of July conditions continued to deteriorate in many parts of the state. Comparing the State Drought Status to the map dated July 12th, the Western and Islands Regions stayed at Level 1, but the CTRV, Central, Northeast, and Southeast Regions went from Level 2 to 3, the Cape Cod Region went from Level 0 to Level 2.

United States Drought Monitor (USDM) Drought Status: The USDM from July 28th showed abnormally dry D0 and moderate and severe drought conditions D1 and D2. The August 11th map introduced D3- a swath of D3 and more D2 in the east (Southeast, Cape Cod, and Martha’s Vineyard).

National Oceanic Atmospheric Administration (NOAA) Temperature and Precipitation Outlook: For August, NOAA is showing a 50-60% chance for above-normal temperature and 33-40% chance for below-normal precipitation. The three-month outlook NOAA shows a 60-70% chance of above-normal temperatures and 33-40% chance of above-normal precipitation.

NOAA Monthly and Seasonal Drought Outlook: The monthly outlook shows drought persisting across the state. The seasonal drought outlook shows drought removal likely in the western half of the state, and drought remaining but improving in the eastern half.

Accumulated Precipitation Departure Graph: There has been a steady decline since March.

Cambareri gave an update on Cape Cod conditions and offered to use the Water Impact Reporter. Rao said a link would be added to the next WRC email.

Agenda Item #4: Vote: Meeting Minutes, May 12, 2022

Rao invited a motion to approve the meeting minutes for May 12, 2022.

V O T E	<p>A motion was made by Balzotti with a second by Cambareri to approve the minutes of the May 12, 2022, WRC meeting, amended as follows:</p> <p>Lexi Dewy is added to the list of attendees.</p> <p>The spelling of Weismantel is corrected in four places.</p> <p>The roll call vote to approve was unanimous of those present with Vanessa Curran filling in temporarily for Anne Carroll.</p>
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Agenda Item #5: Heatwaves and Droughts in the Northeast

Rao introduced Dr. Laurie Agel, University of Massachusetts at Lowell. The presentation can be found on the state website at the link: <https://www.mass.gov/doc/presentation-heatwaves-and-droughts-in-the-northeast/download>

Dr. Agel acknowledged her colleagues Mathew Barlow and Christopher Skinner in the Department of Environmental, Earth, and Atmospheric Sciences. The group studies extreme weather and how it affects the Northeast including extreme precipitation, flooding, heat, cold, and droughts. More specifically, the research looks at circulation that precedes or characterizes these events. The presentation focused on characteristic atmospheric patterns that are related to the droughts and heatwaves.

Dr. Agel presented highlights of previous research on heat wave circulation in the Northeast, highlights of current work looking at drought circulation patterns, and circulation this summer and how it fits into the broader research.

As part of research published in the paper “Four Distinct Northeast US Heat Wave Circulation Patterns and Associated Mechanisms, Trends, and Electric Usage”, heat wave days were defined and identified in the Northeast. Using machine learning with two input fields measuring circulation and an output of four groups, four distinct Northeast heat wave circulation patterns were then identified. Pattern 1 was a surprise- the winds are generally from the north/northwest with strong subsidence. Almost a quarter of the Northeast heat waves fall into that pattern. There is a strong seasonality (monthly frequency) to the heat wave patterns. For example, Pattern 1 shows a lot of events in July while the classic heat wave Pattern 2 occurs more likely in April, May, and June. The patterns also have their own precipitation, surface temperature, subsidence, humidity, soil moisture, and precipitable water anomalies. There is a connection to energy usage. Typically, as temperature increases energy usage decreases until about 65°F when air conditioning is tends to be turned on. Pattern 2 stands out for anomalous energy use since this pattern tends to happen in April, May, and June when people usually aren’t running air conditioners. Dr. Agel showed how the heat wave patterns fit into the big picture of circulation. Dr. Agel discussed on-going work with droughts and initial findings. Drought was defined using the 3-mos Standardized Precipitation Evapotranspiration Index (SPEI) (seasonal drought). The driest 10% of periods from 1980-2020 was divided into groups. In total there were 22 events, which ranged from one to five months in duration with the average duration about two months. Dr. Agel looked at what the daily circulation was during the dry events. Precipitation during drought periods was studied. Dr. Agel looked at climatological precipitation anomalies to see if there was a difference within a self-organizing map (SOM) for the wettest and driest days. For the wettest patterns, the driest days are significantly drier. For the driest patterns, the driest days are not much drier, but that may be because precipitation can’t go below zero.

Currently Dr. Agel is looking into whether or not precipitation is less frequent or less intense or a combination of both during drought periods within the SOMs and how this changes seasonally. She is also looking at the circulation differences within patterns on dry days versus wet days. She is studying the circulations changes that occur during the dry-period SOMs and answering the following questions. Are they advecting more dry air? Are they causing more evaporation? Are they suppressing more precipitation? To what level is this type of drought driven by: Changes

between circulation patterns? Changes within circulation patterns? Do trends in pattern frequency play a role?

Dr. Agel discussed connecting heat waves and droughts- how often do heat waves occur during drought periods? Some SOMs support both drought and heat wave days. Some SOMs rarely support heat waves (wettest and driest SOMs). The study also looked at extreme precipitation, which can occur during drought periods, too.

Dr. Agel discussed this summer. For the heat wave July 19-25, the composite best fit Pattern 3. For the whole period May through July, there were some shifts: in May the patterns that fit best were ridging and some were dry; in June there was a shift to the driest patterns; and in July there was a shift to more of the heat wave patterns. Knowing that there are four patterns of heat waves, can heat waves be better forecast, at least in the short term, rather than just looking at surface temperatures? Mathew Barlow has been looking at which heat wave patterns have better predictability.

Dr. Agel ended her presentation and entertained questions.

Rao commented on the flash drought and the trends and patterns she had been noticing. Dr. Agel elaborated on some research she is doing looking at strings of dry days inter-dispersed with rain. Weismantel asked which pattern relates with a westward shift in the Bermuda High during July and August. Dr. Agel responded that she hasn't look at that specifically, but she suspects SOM 15 might correlate and that the mapping doesn't include the complete area of the Bermuda High. Quinones asked about climate projections being used to predict patterns. Dr. Agel responded, maybe, but now the research is focused on 3 to 10-day forecasting. More statistical analysis would be needed, and there is the question of the patterns changing themselves. Hatch asked if there is enough skill in the model to give a percent chance of a heat wave or drought based on entering a pattern. Dr. Agel answered that that is where the research is heading, but it is not there yet.

Rao thanked Dr. Agel for the presentation.

Rao invited a motion to adjourn.

V O T E	A motion was made by Weismantel with a second by LeVangie to adjourn the meeting The roll-call vote to approve was unanimous of those present.

The meeting adjourned at 2:17 p.m.

Documents or Exhibits Used at Meeting:

1. WRC Draft Meeting Minutes: May 12, 2022

2. Interbasin Transfer Act project status report, August 3, 2022

Compiled by: eg

Agendas, minutes, and other documents are available on the web site of the Water Resources Commission at <https://www.mass.gov/water-resources-commission-meetings>. All other meeting documents are available by request to WRC staff at 251 Causeway Street, 8th floor, Boston, MA 02114.