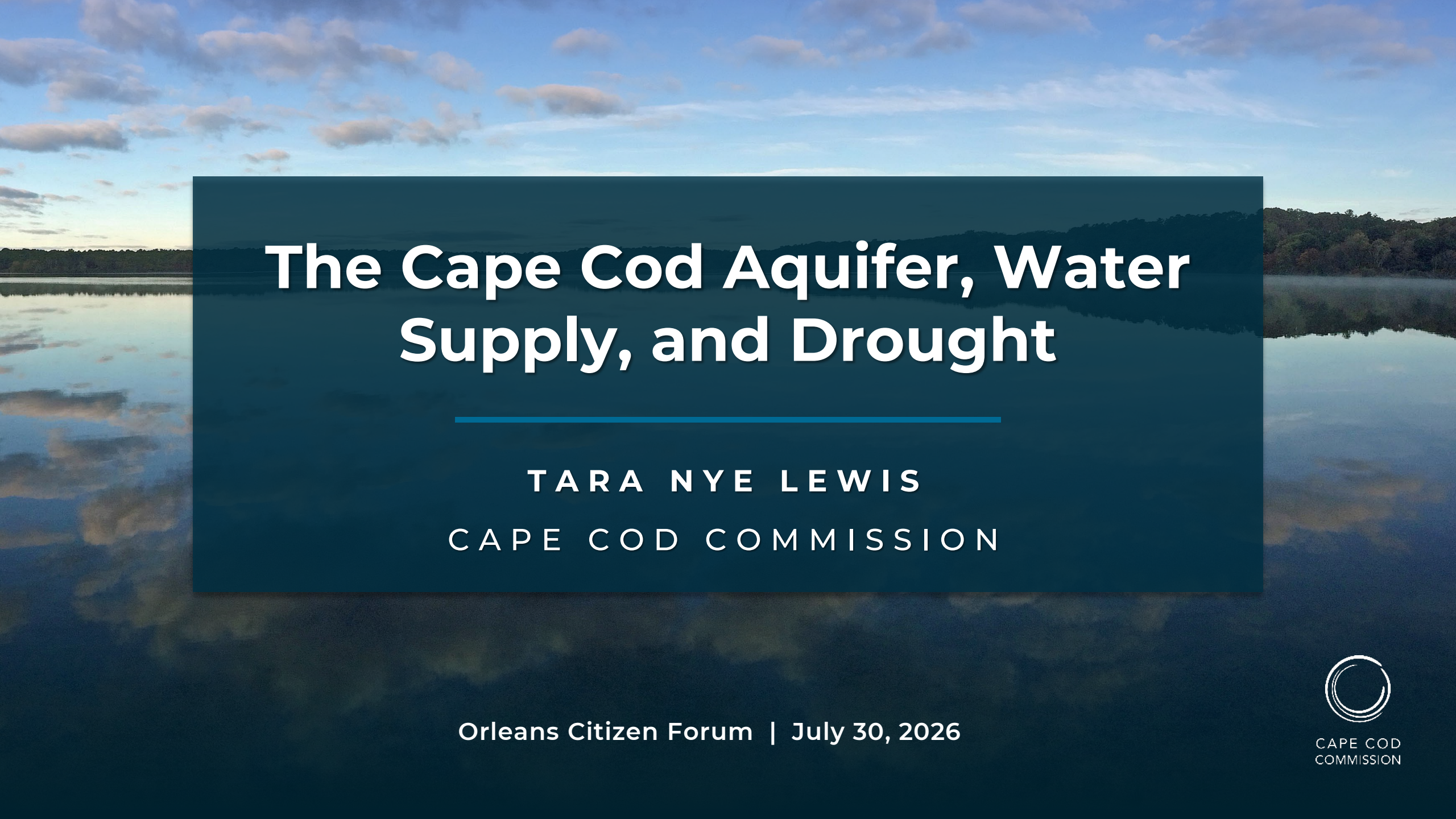




# The Cape Cod Aquifer, Water Supply, and Drought

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TARA NYE LEWIS  
CAPE COD COMMISSION

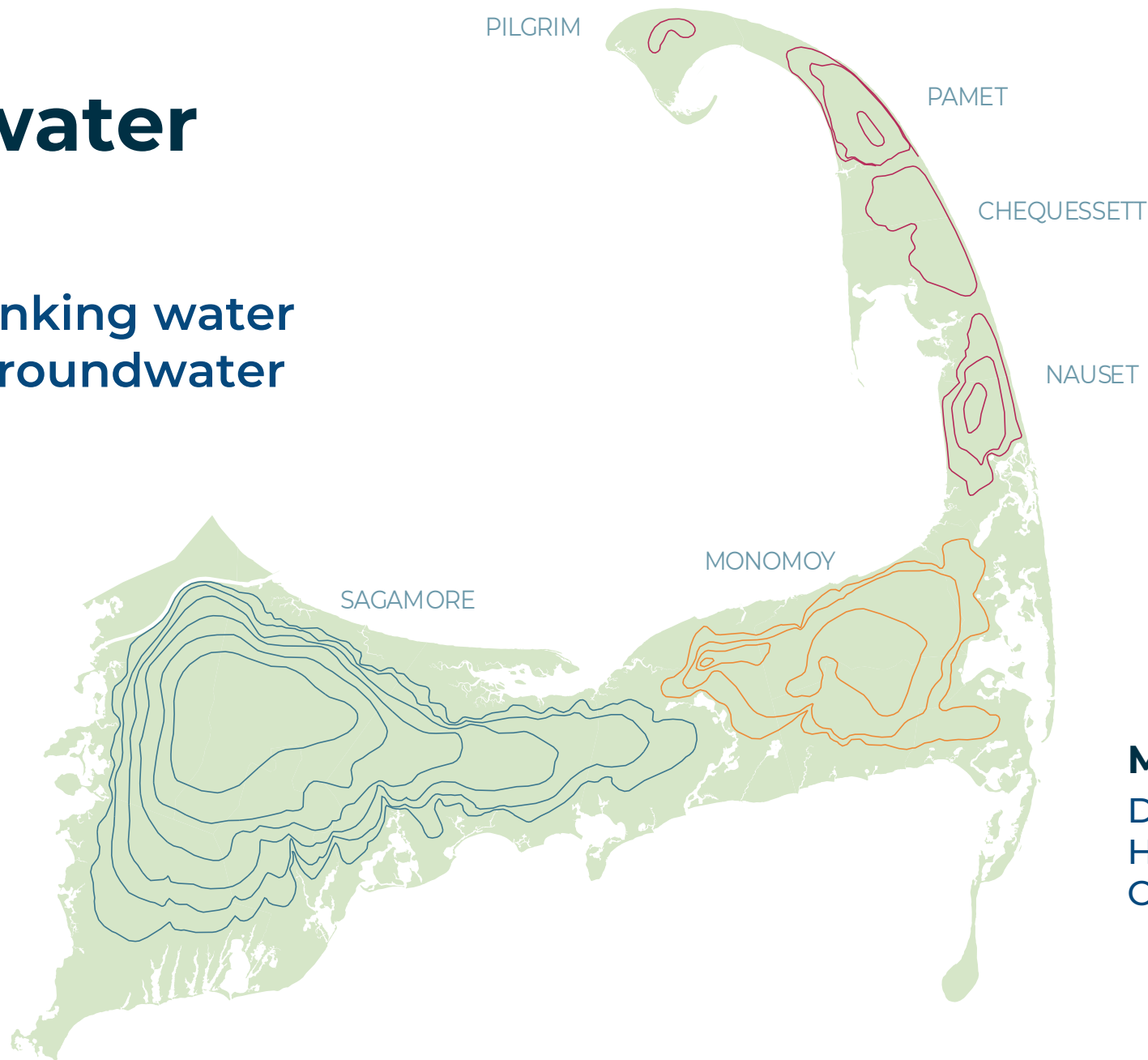
Orleans Citizen Forum | July 30, 2026



CAPE COD  
COMMISSION

# Groundwater Lenses

Majority of drinking water comes from groundwater lenses



## Outer Cape Lenses

Eastham, Wellfleet, Truro, Provincetown

## Sagamore Lens

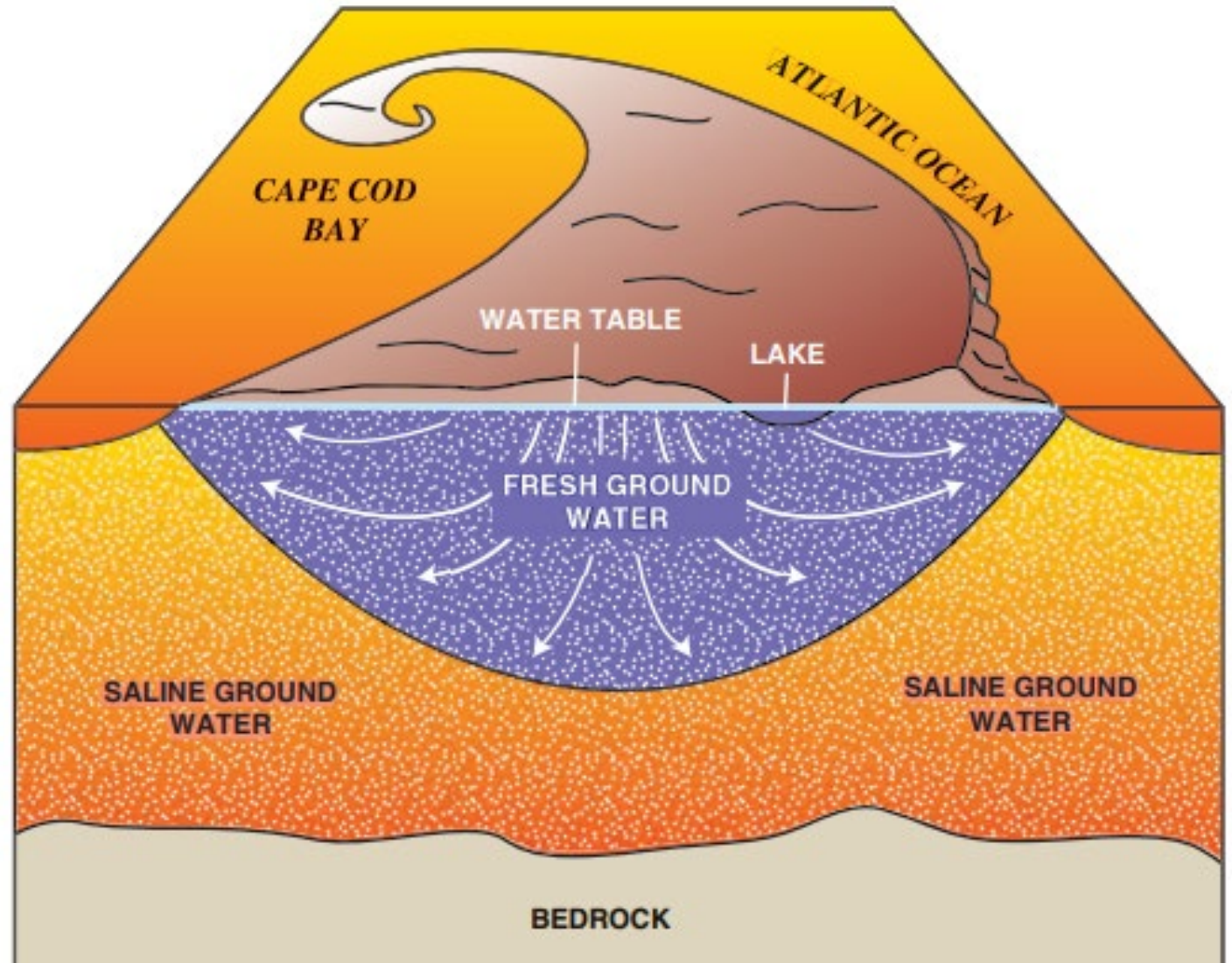
Bourne, Falmouth, Sandwich, Mashpee, Barnstable, Yarmouth

## Monomoy Lens

Dennis, Chatham, Harwich, Brewster, Orleans

## What is an aquifer?

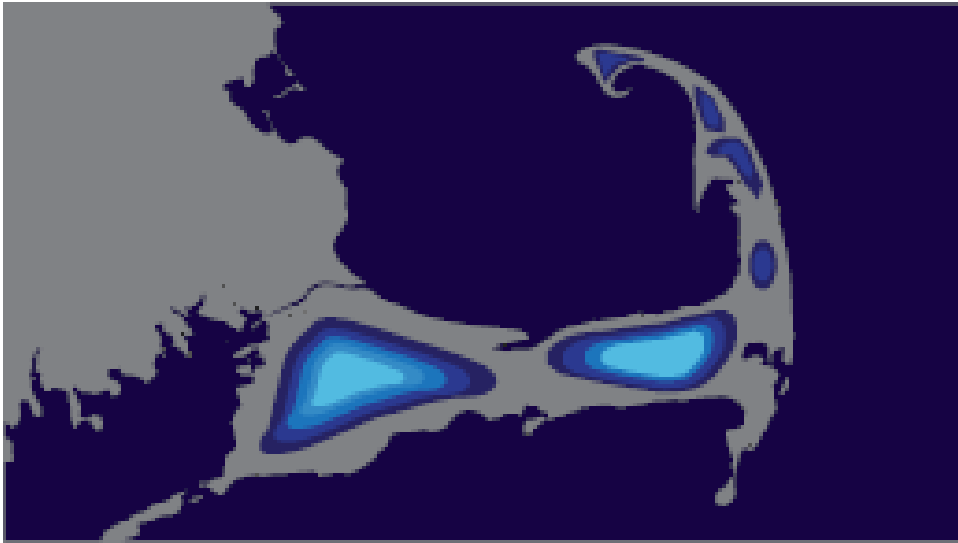
The Cape Cod aquifer is an underground layer of rock and sandy soil that is porous enough to hold water. The water, referred to as groundwater, is always moving through the sand and gravel towards the coast.



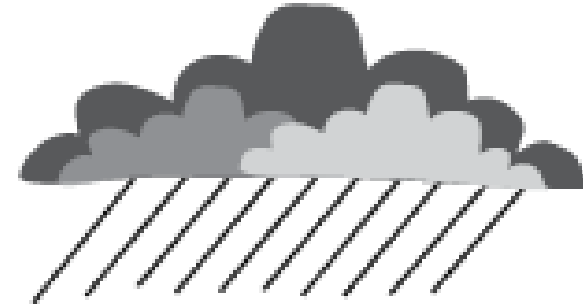
Schematic diagram of Cape Cod aquifer system

not to scale

# GROUNDWATER MOVES



The aquifer is comprised of six lenses of groundwater that are separated by major drainage divides



Groundwater is in a state of dynamic equilibrium between recharge from precipitation and discharge to surrounding marine waters

BELOW IS A CROSS-SECTION OF THE MID-CAPE

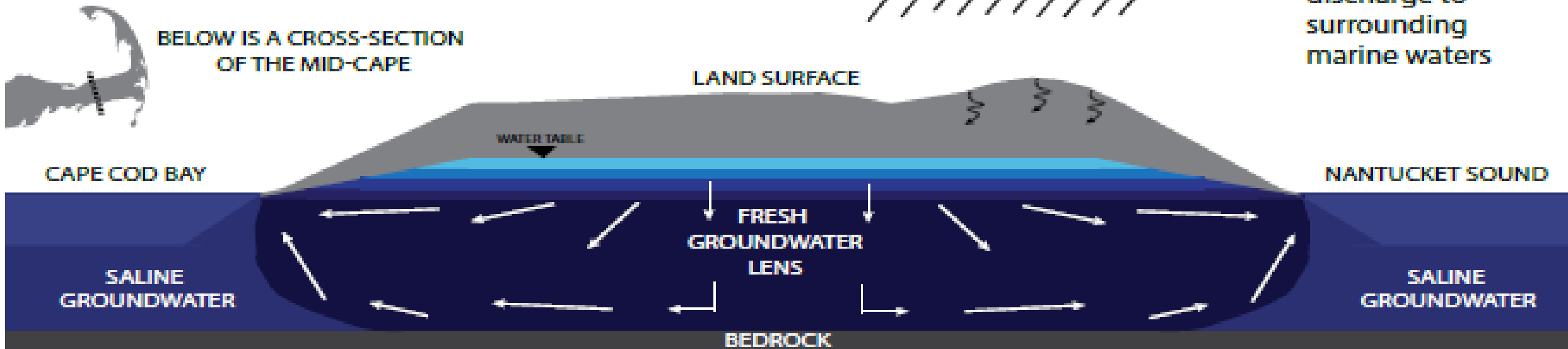


DIAGRAM DRAWN WITH VERTICAL EXAGGERATION FOR ILLUSTRATION PURPOSES

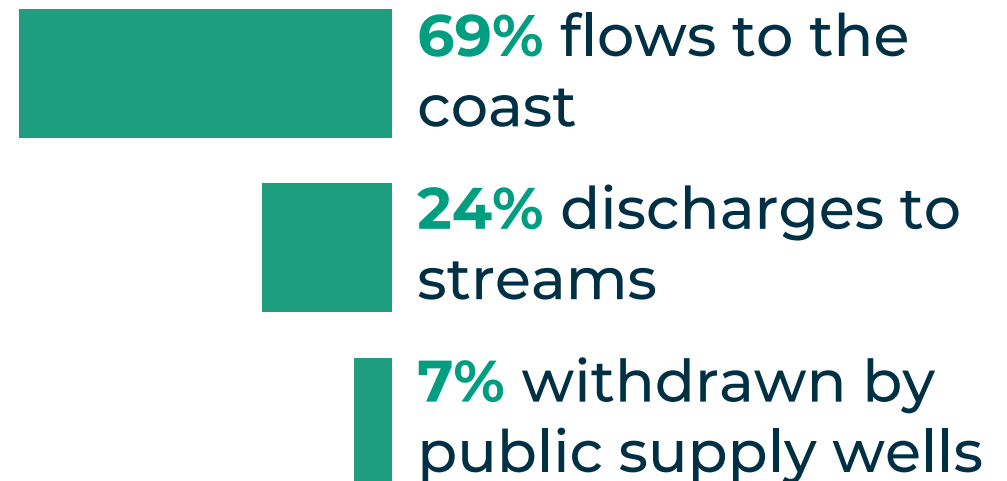
## How much water goes into the aquifer?

The Cape Cod aquifer is replenished solely by precipitation. Approximately **450 million gallons of water enter the aquifer daily** or about 164 billion gallons a year.



## What happens to the water in the aquifer?

Of the annual 164 billion gallons per year:

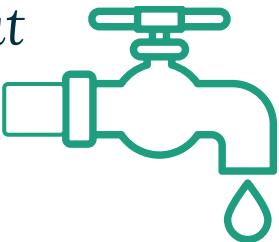


# Water pumping volumes governed by the Water Management Act

Public water supply wells are permitted through the Water Management Act. MassDEP considers safe aquifer yield, impacts to surface water resources, and determines when water use restrictions are required during the permitting process.

Water suppliers pump about

**11** Billion gallons  
of water per year



Overall pumping will often fluctuate from year to year depending largely on precipitation and water restrictions, but average annual pumping remains relatively constant.

## Not a water quantity issue

The amount of water pumped by public water supplies remains well below permitted amounts.



**PERMITTED TO BE PUMPED**  
(estimated: permitted volumes may be more)



**PUMPED ON AVERAGE**

# CAPE COD WATER SUPPLY | UNDERSTANDING THE CAPE COD AQUIFER

## Conservation and responsible management remains critically important to:



Prevent water supply operations from impacting surface water resources (ponds, streams, wetlands)



Maintain operational flexibility in the event of source water contamination (e.g. PFAS) or equipment failure



Minimize drawdown during drought conditions



Minimize stress on water system and infrastructure



Preserve capacity for fire response and emergency operations



Ensure essential needs are met, such as drinking water, wildlife habitats

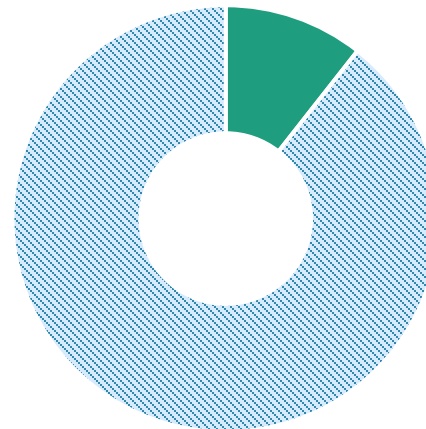
## Accessing the aquifer is the main challenge facing public water suppliers

Wells have daily permitted withdrawal limits and physical limits on the amount that can be pumped in the short-term. These short-term limits can constrain a supplier's ability to meet peak summer demand, particularly when things like fire response or equipment failure reduce the number of wells a supplier has available to draw from.

## Futureproofing the water supply system

Existing permit and physical limitations are why new wells may be needed to provide flexibility and redundancy even when existing wells can adequately supply demand.

### A 2025 mapping analysis of Potential Public Water Supply Areas on Cape Cod indicates that:



*less than **11%** of land area could be considered suitable for water supply development*

# Can't we just drill more wells?

## New Wells Need



400-foot Zone I  
radius



No incompatible  
land uses



Time

## Current Drinking Water Supplies on Cape Cod



○ Public Supply Wells (Zone I)

■ Wellhead Protection Areas (Zone II)

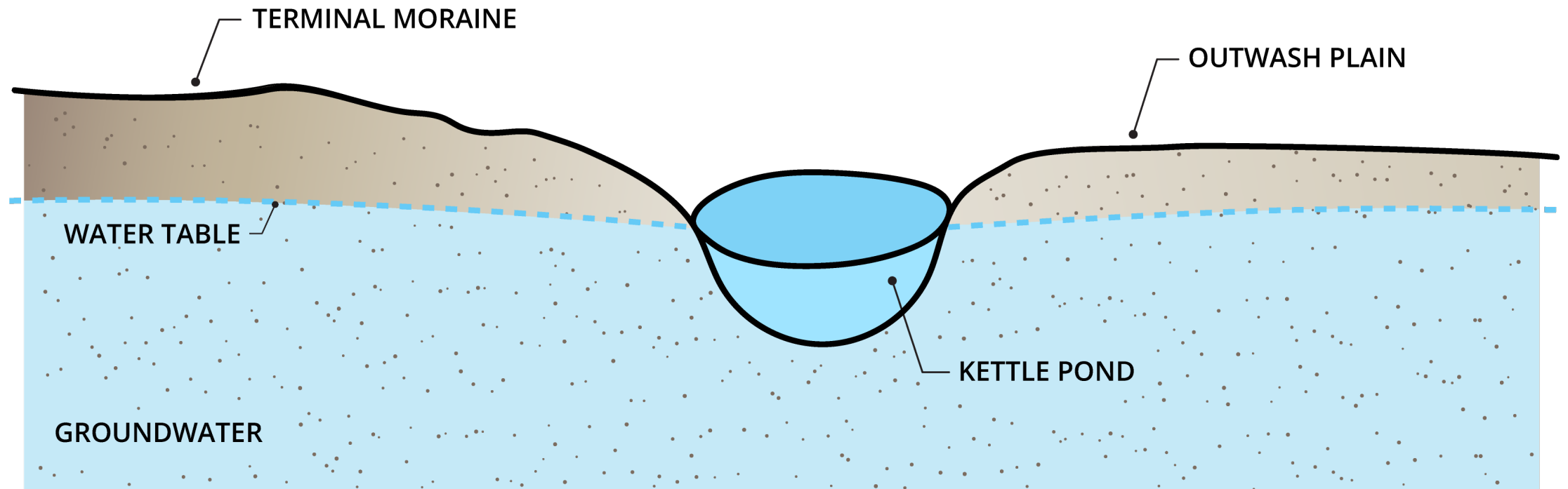
# What does drought make you think of?

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# Ponds Are Connected to Groundwater

Most Cape Cod ponds lack surface water connections and are instead linked to the aquifer and nearby ponds via groundwater



Drought is a moisture deficit **relative** to the average water availability at a **given location** and **season**

Map released: July 9, 2026

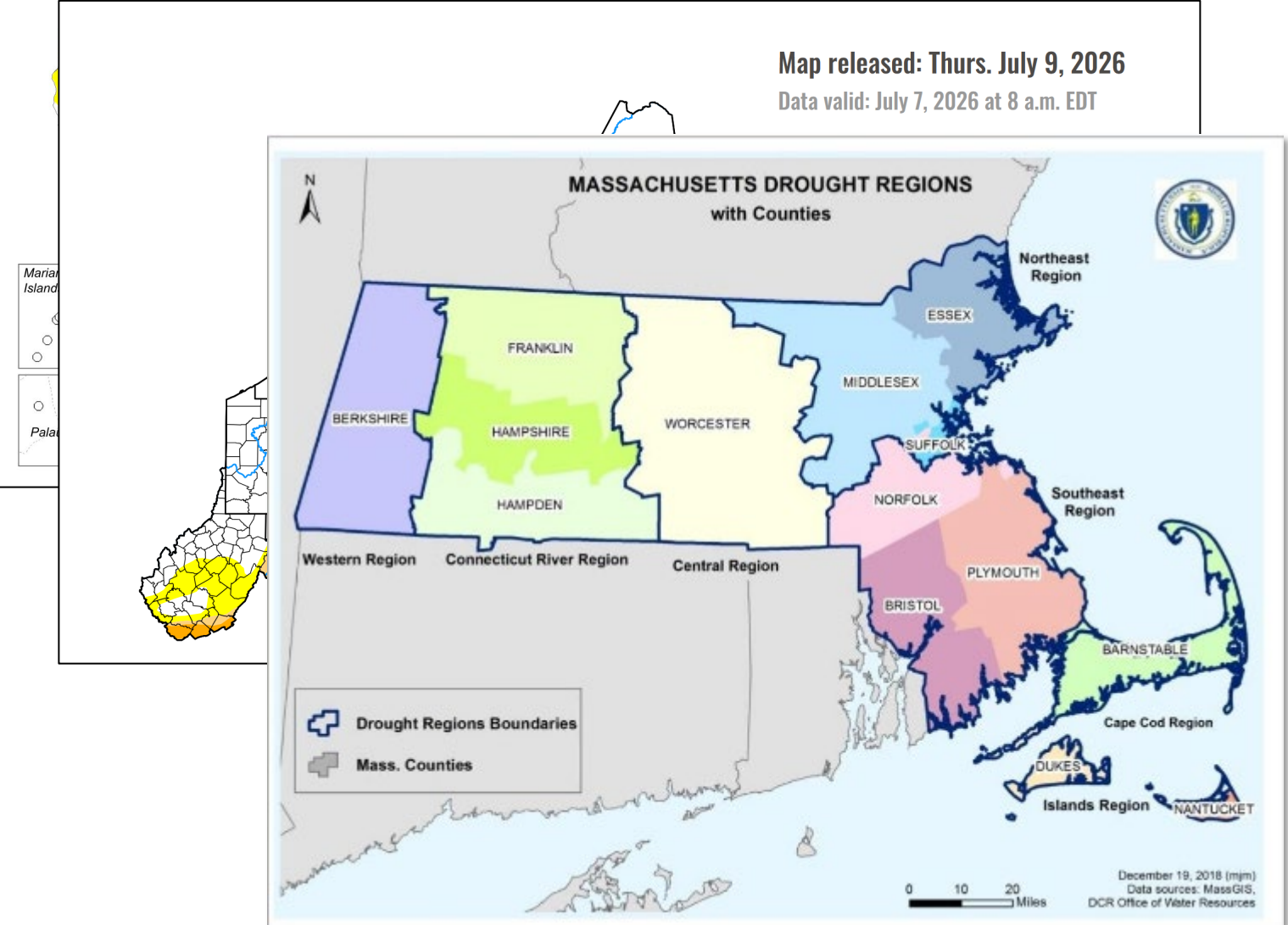
Data valid: July 7, 2026

☐ View grayscale version of the map



Map released: Thurs. July 9, 2026

Data valid: July 7, 2026 at 8 a.m. EDT



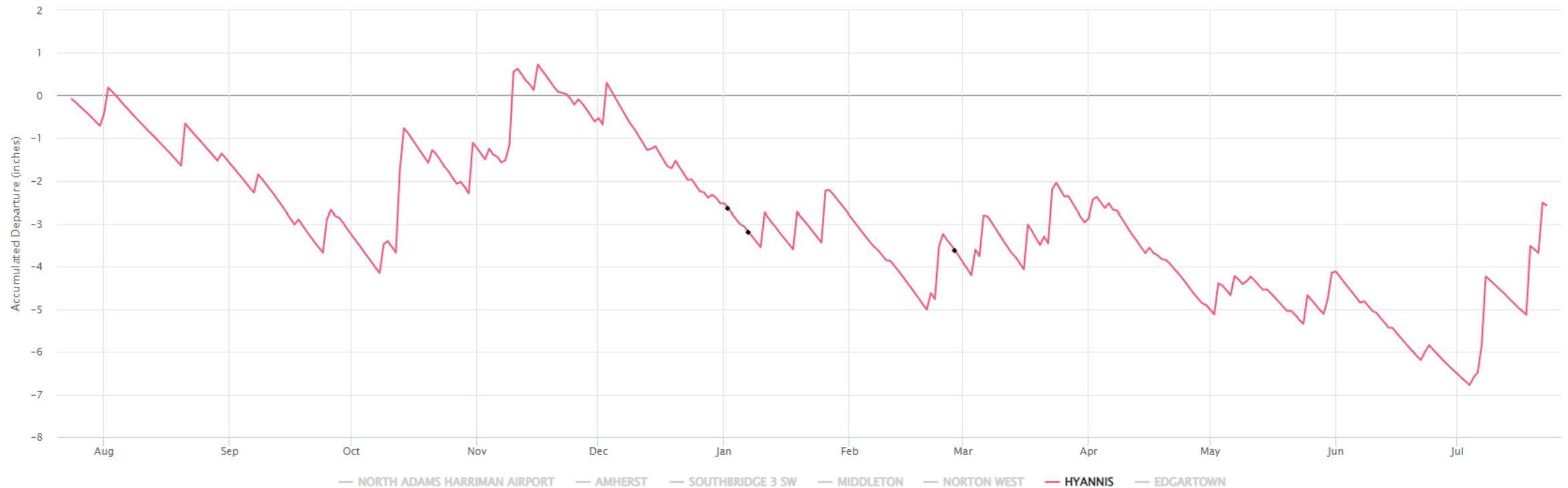
# 12-MONTH ACCUMULATED PRECIPITATION

## HYANNIS JULY 2025 – JULY 2026

The following graph shows a time series of accumulated precipitation departure from normal (average values) for one location per Drought Region for the past year. This graph is created by the Applied Climate Information System which can be found on the [ACIS webpage](#).

Accumulated Precipitation Departure from Normal (inches)

Black diamonds represent missing values



Accumulation start date

2025-07-24

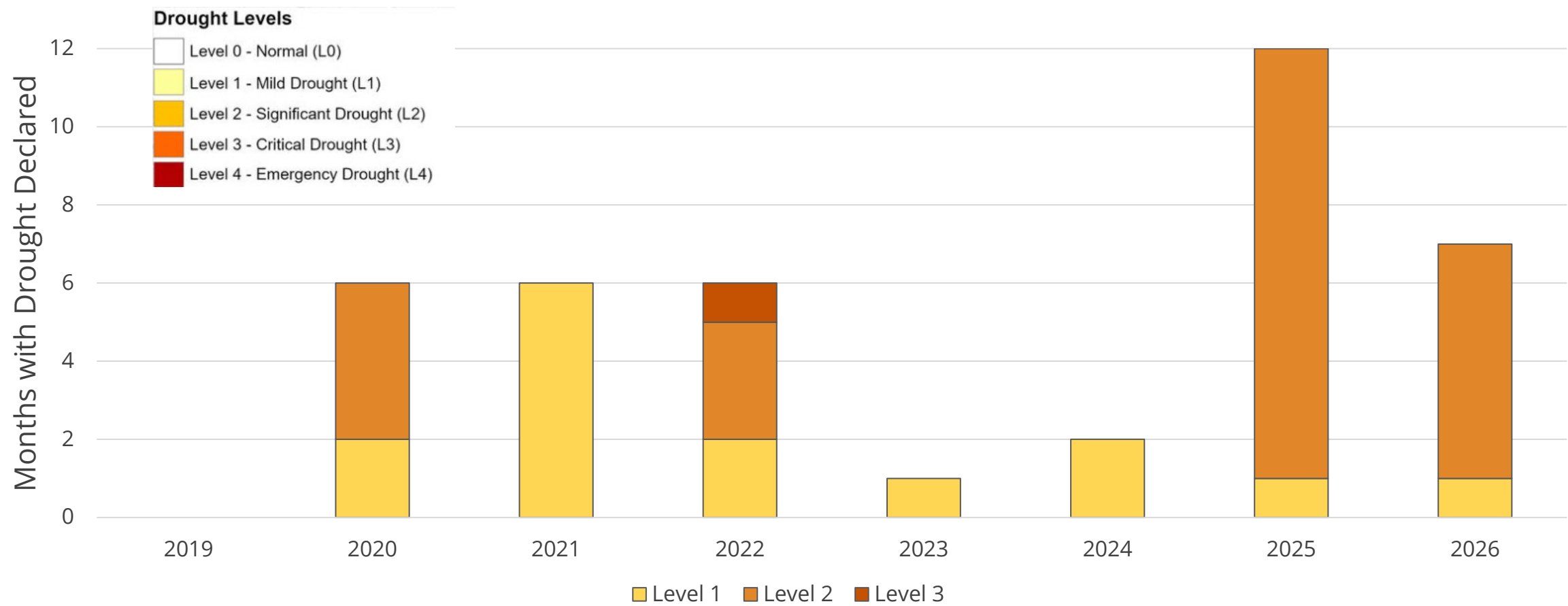


Powered by ACIS

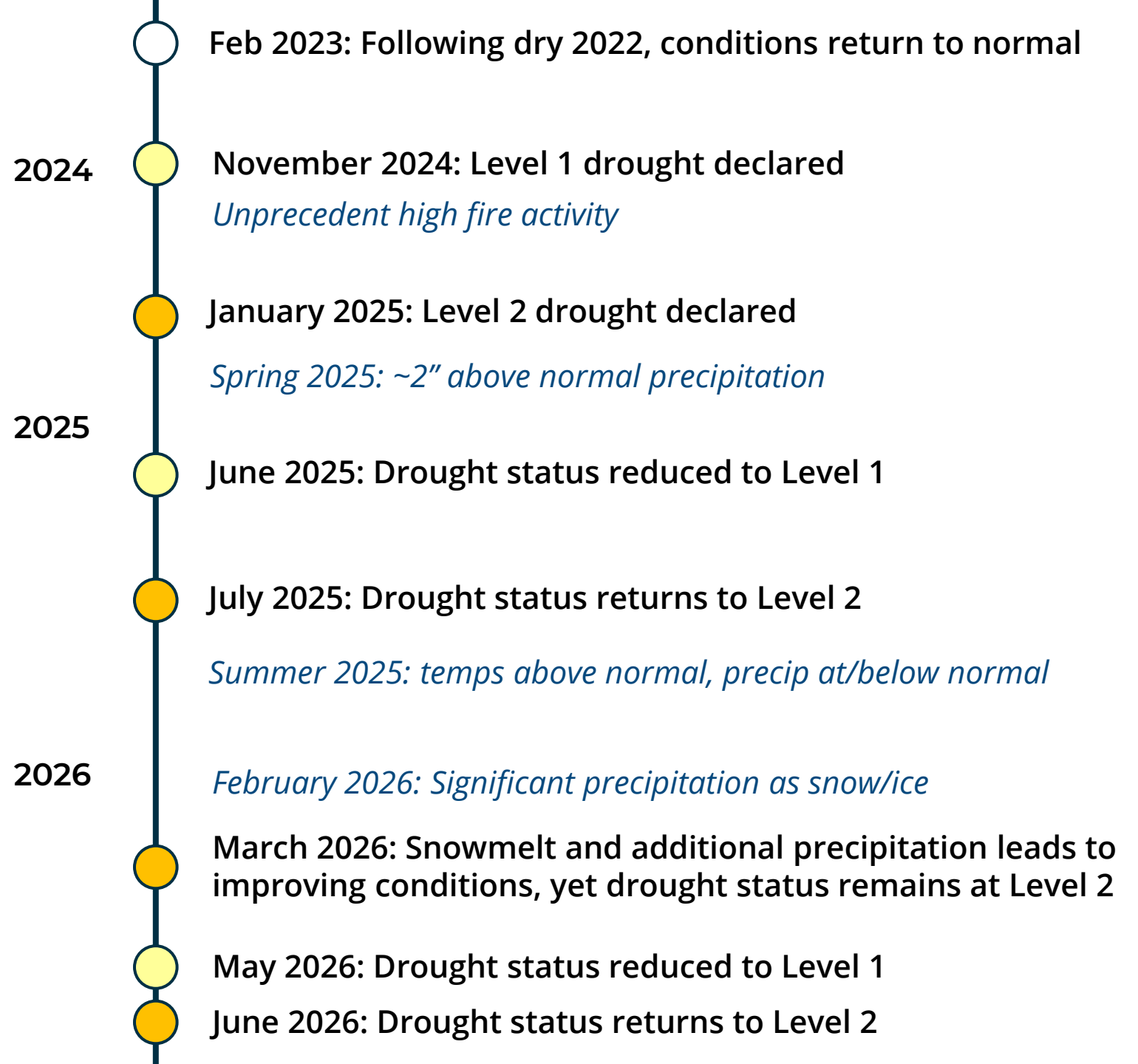
Massachusetts Drought Dashboard  
<https://nedews.nrcc.cornell.edu/ma?tab=pcpngf>

# Months with Drought Declarations

## MASSACHUSETTS 2019-2026



# Cape Cod's Recent Drought History



# How is drought status determined?

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**Precipitation**



**Streamflow**



**Keetch-Byram Drought Index**  
(fire danger/potential & soil moisture)



**Lakes and Ponds**



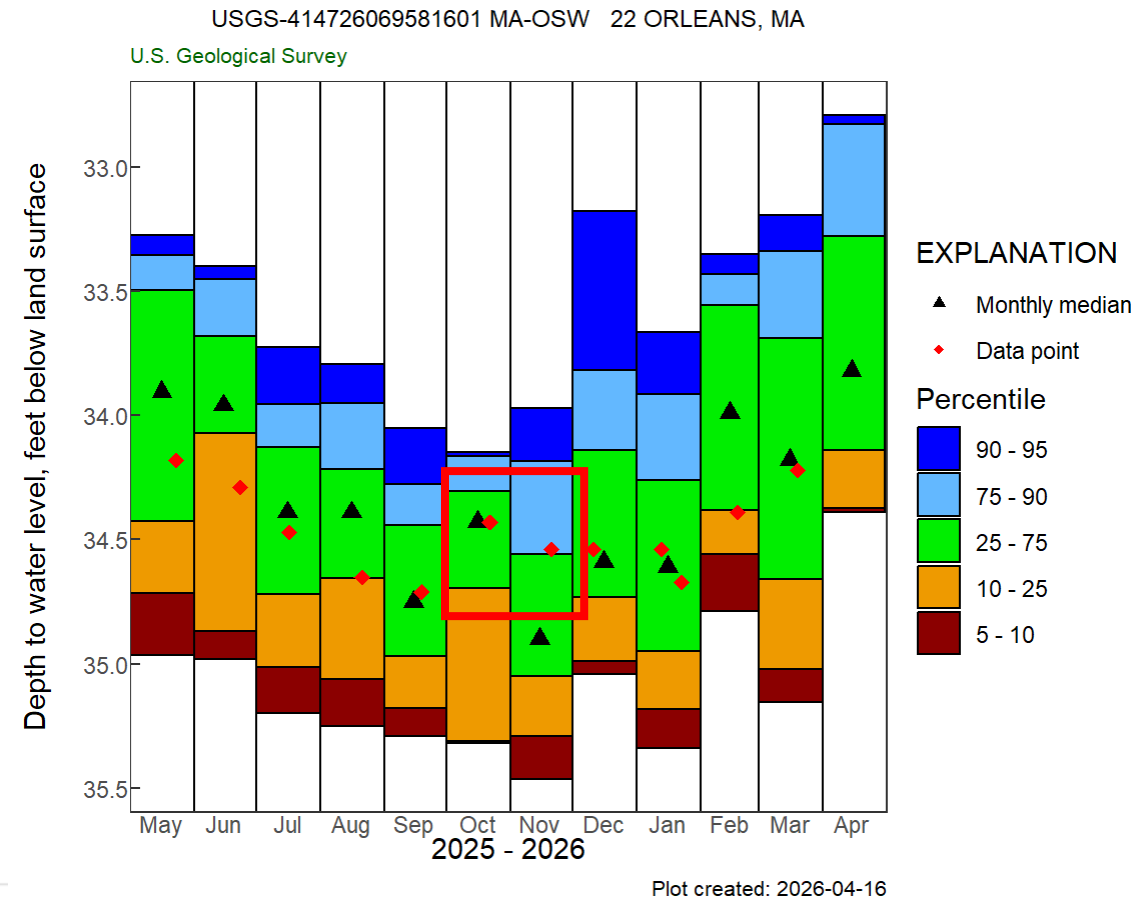
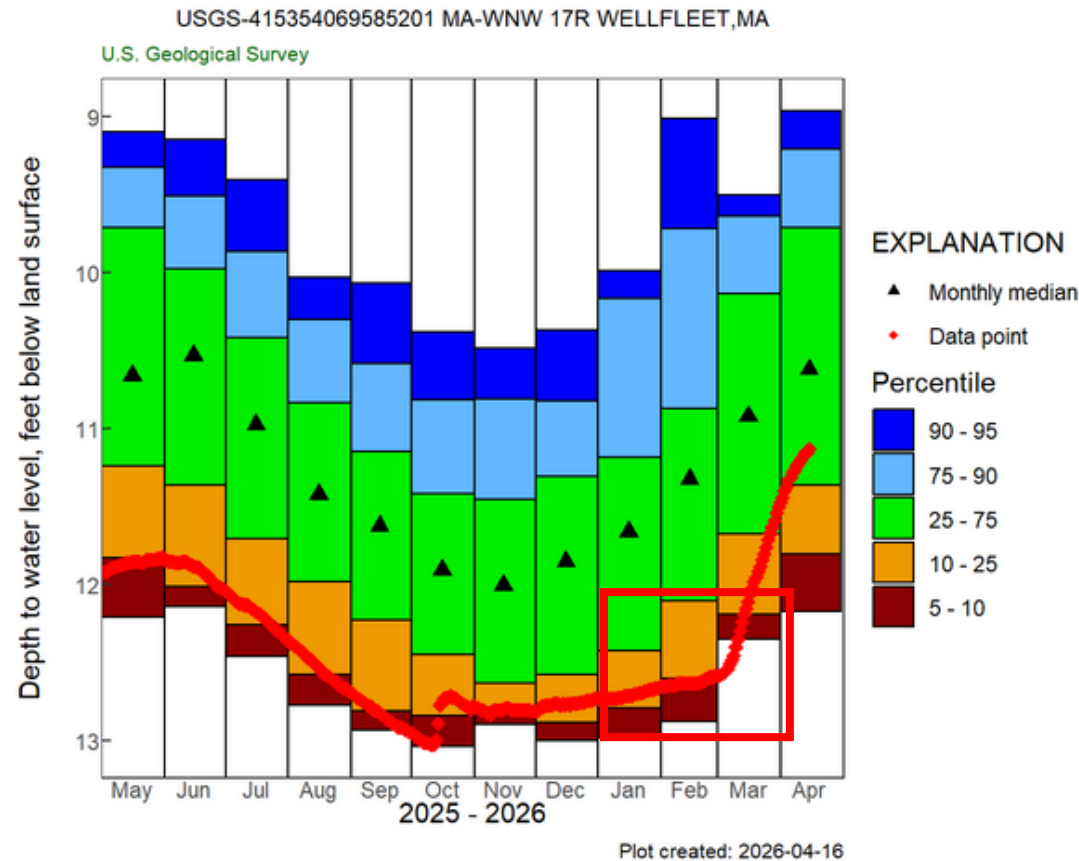
**Groundwater**



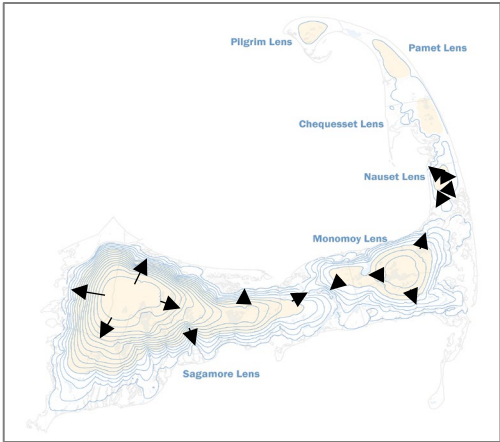
**Evapotranspiration**

# With drought – timing matters

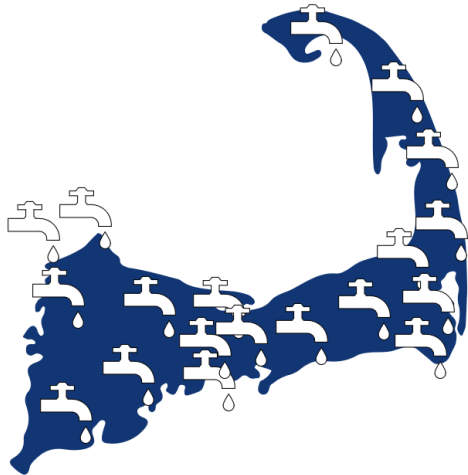
## Depth to water level, feet below land surface



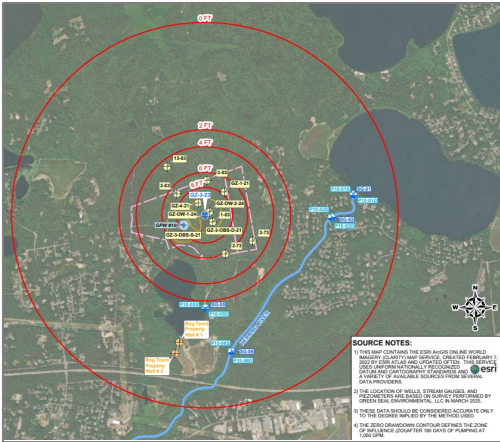
# Why is the conversation so complicated?



One aquifer, six lenses



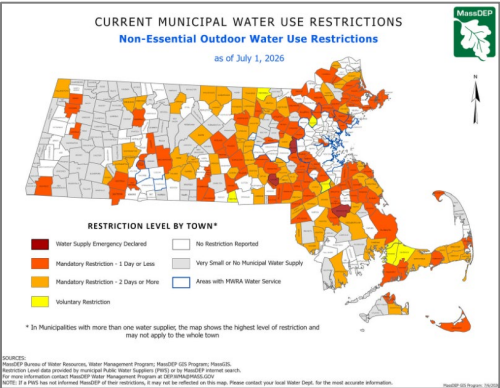
Twenty water suppliers



Localized well effects



Perceived contradictions in messaging



Inconsistent restrictions



Different expectations about water



# Thank you

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Tara Nye Lewis  
Water Resources Analyst  
Cape Cod Commission

June 2026, Orleans Citizen Forum



CAPE COD  
COMMISSION