Northeast Cape Coral - Mid-Hawthorn Aquifer, Water Shortage Order & Joint Action Plan

Cape Coral City Council Meeting

January 30, 2025

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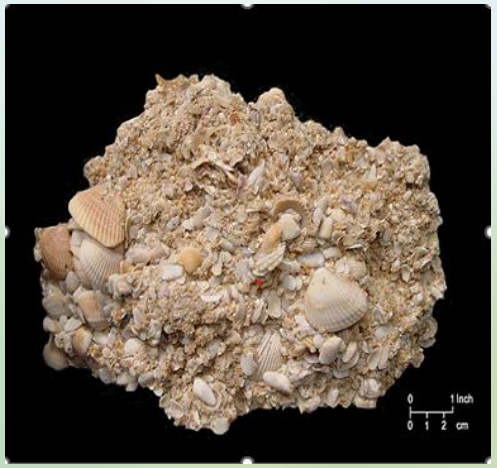
Presentation Outline

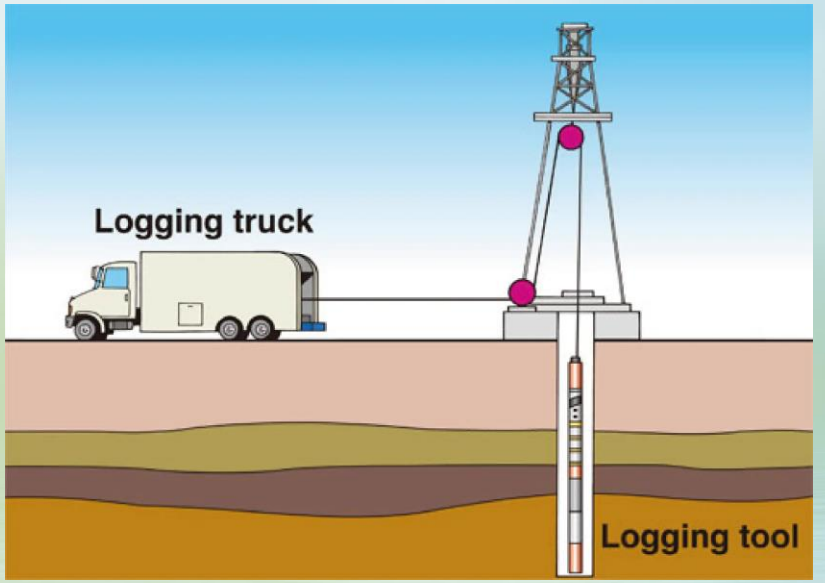
1. Description of Mid Hawthorn Aquifer
2. USGS Monitoring Well L-4820 and Water Levels
3. Joint Action Plan for Northeast Cape Coral

Defining Underground Geology and Aquifer Characteristics

- Well drilling
- Analyze rock cuttings during drilling
- Geological cores
- Geophysical logging
- Aquifer performance tests for aquifer properties
- Laboratory analysis, bench tests, water quality
- Technical publications
- Monitoring wells



Geological Cores

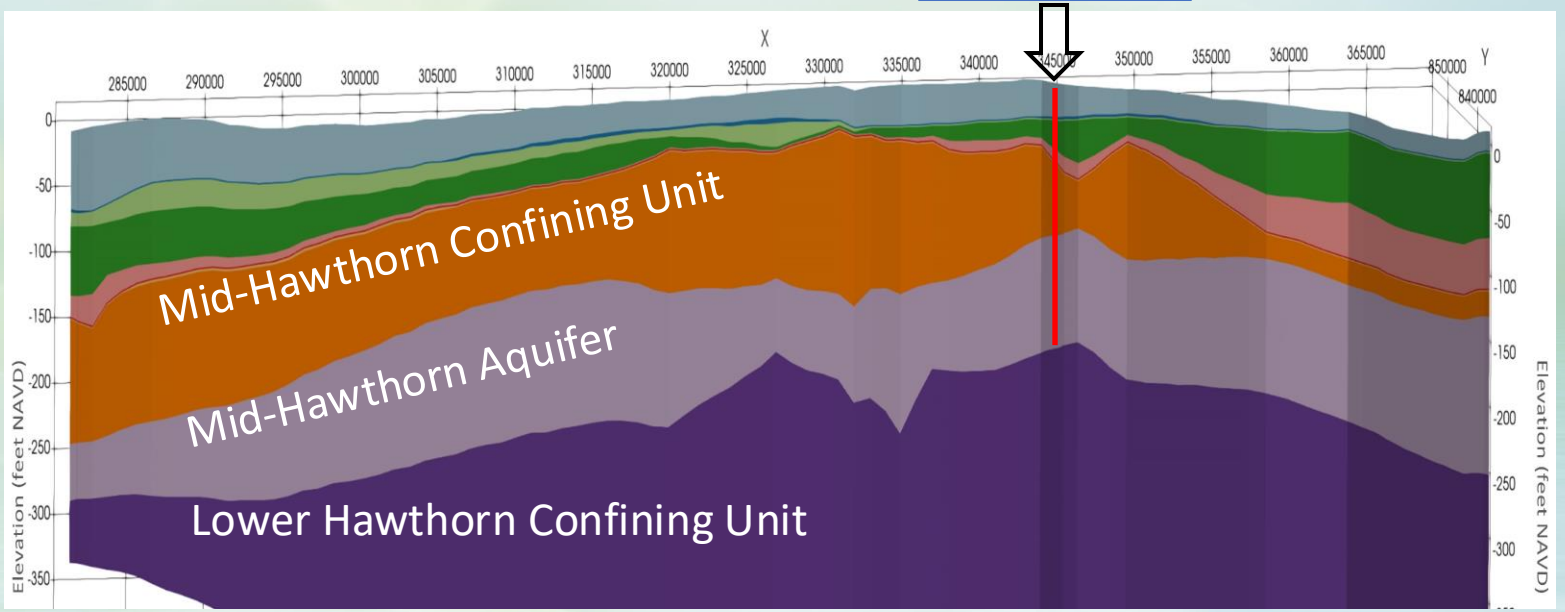


Geophysical Logging

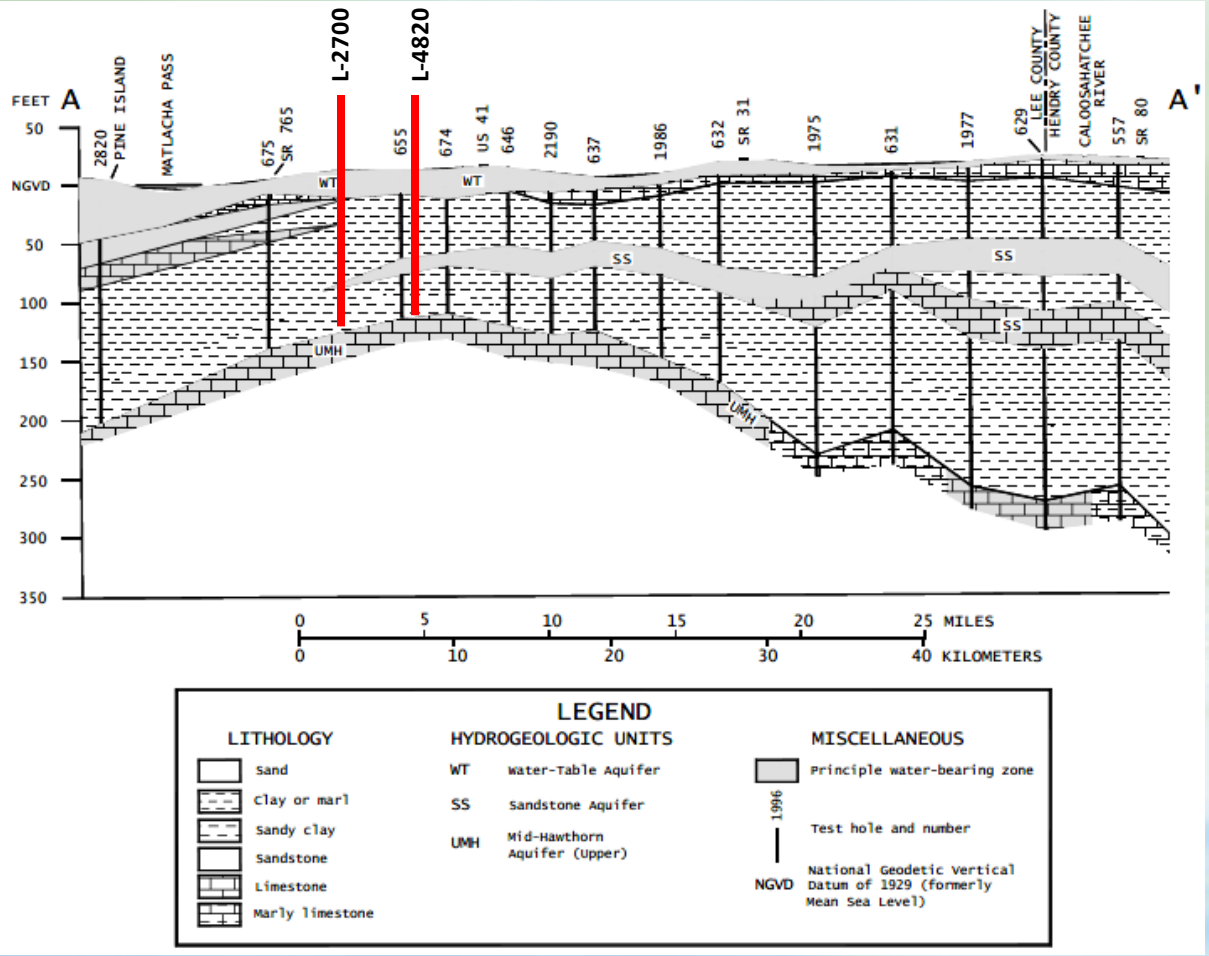
Well Drilling

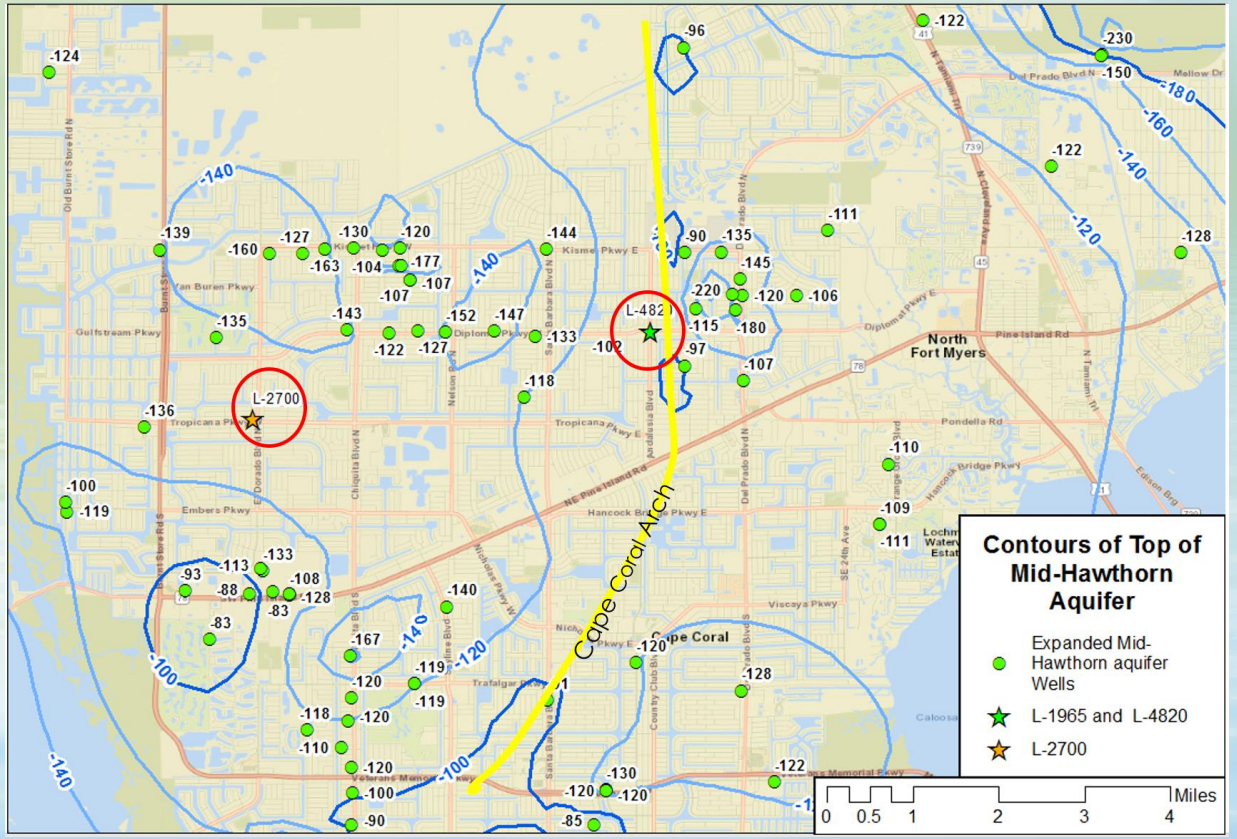
Mid-Hawthorn Aquifer East-West Geologic Cross Section

Monitoring Well L-4820



Mid-Hawthorn Aquifer Structural High for Top of Aquifer





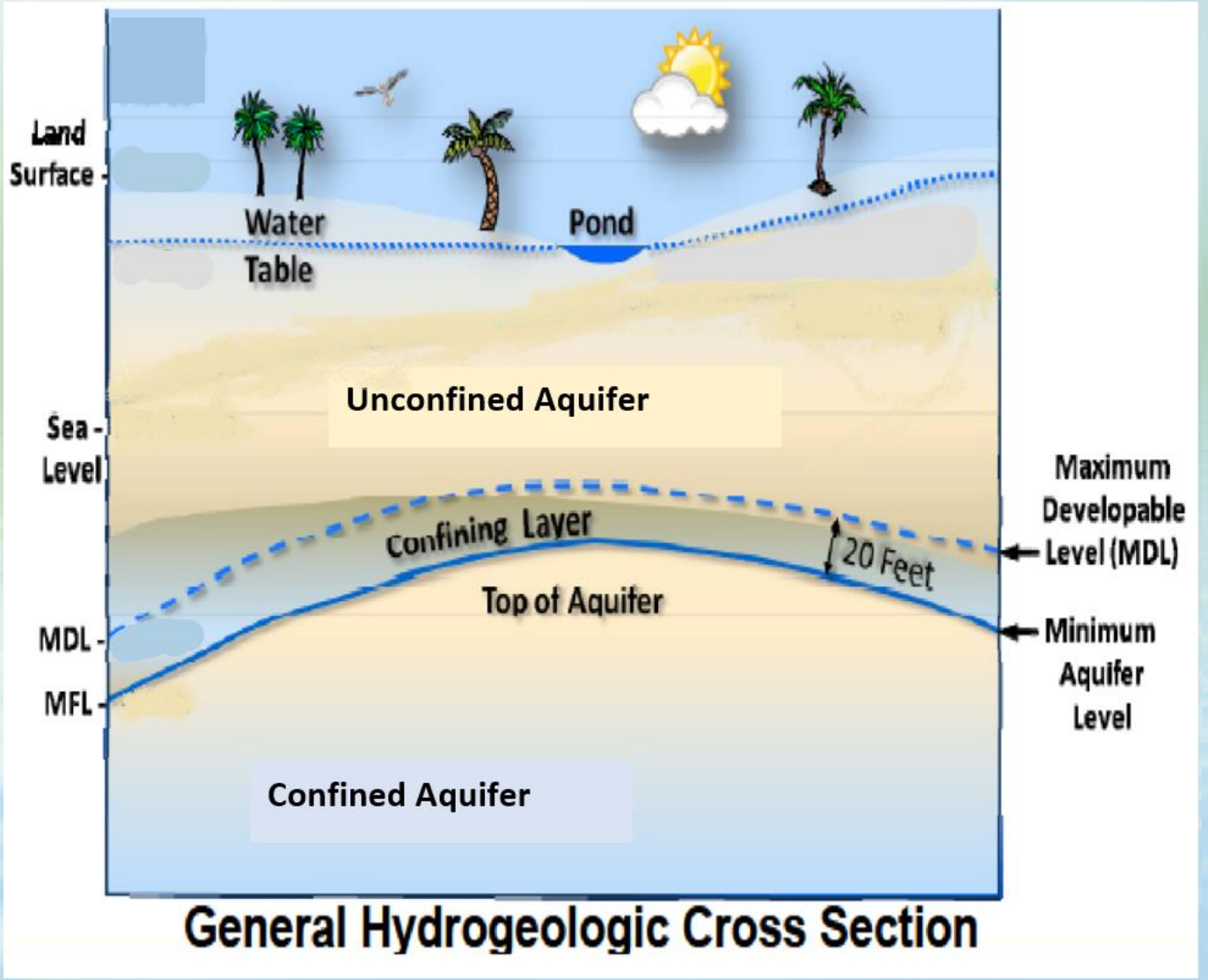
The top of the aquifer in other wells that are away from the ridge is deeper and therefore have lower MFLs/MDLs

MFL and MDL

- A minimum flow and minimum water level (MFL) is designed to protect to protect the aquifer from significant harm, and in this area, due to excessive pumping from wells
- The MFL for the LWC aquifers equals the structural top of the aquifer for the following:
  - Lower Tamiami
  - Sandstone
  - Mid-Hawthorn

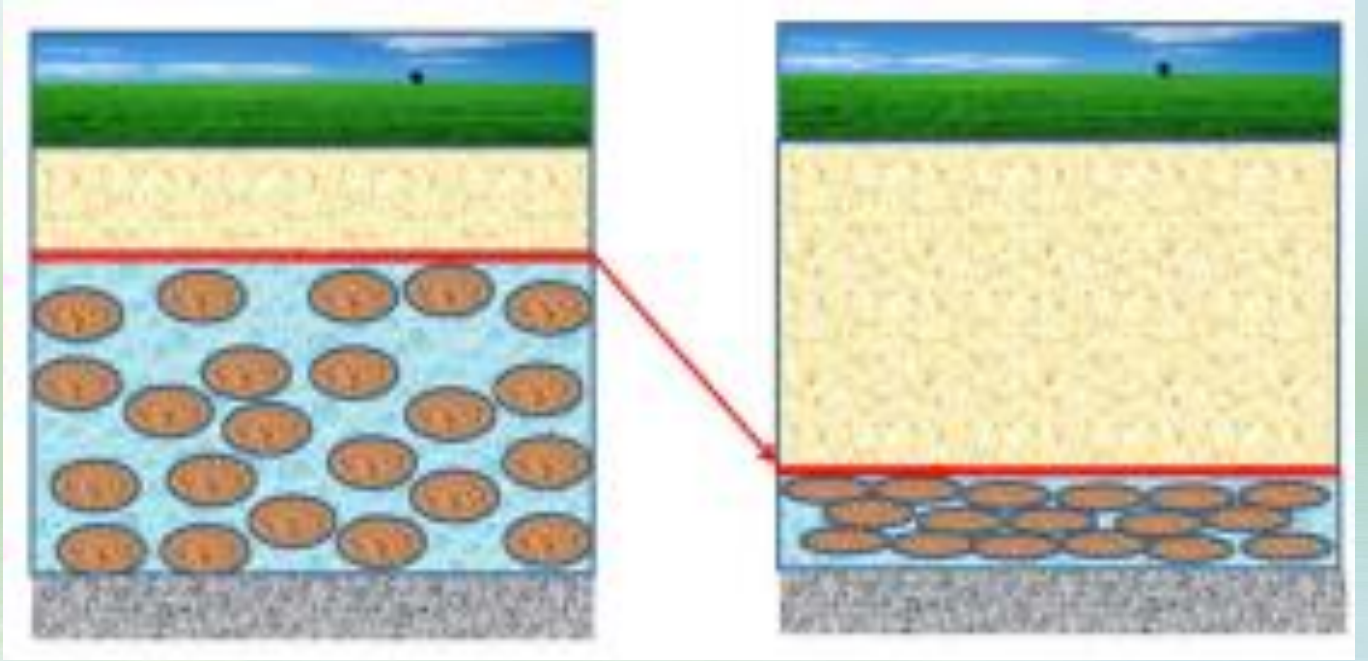
An MFL violation occurs when the water level drops below the top of the uppermost geologic stratum that comprises the aquifer, at any point in time.

- The maximum developable limit (MDL) is permitting criteria to prevent harm with a 20-foot buffer above the MFL.



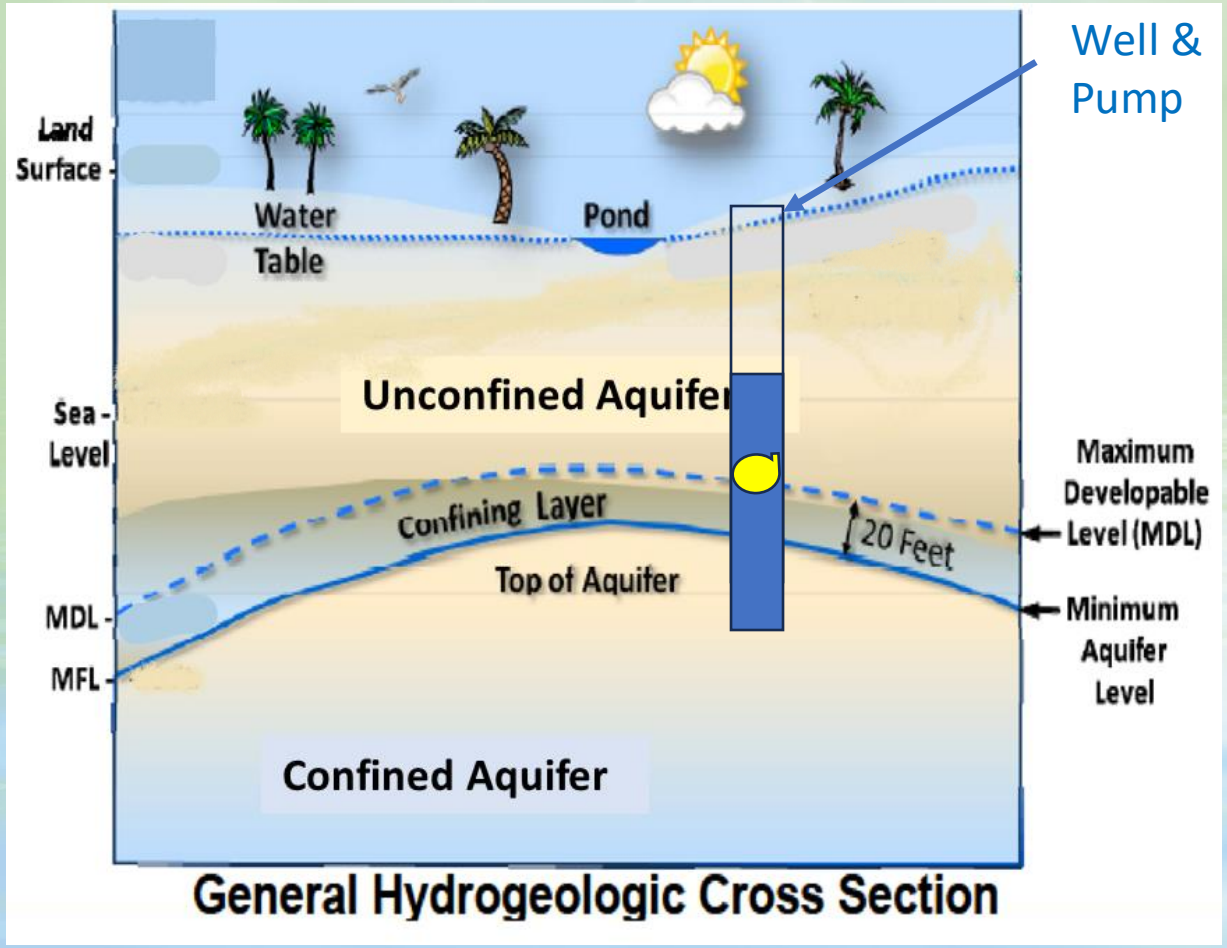
Minimum Flow and Level = Top of Aquifer

- Structure of aquifer supported by water in aquifer and aquifer materials
- When water level drops below top of aquifer, water can no longer provide structural support, resulting in aquifer compaction
- Aquifer compaction irreversibly reduces porosity and permeability of aquifer; reducing well yields and possibly causing land subsidence
- MFL rule designed to prevent significant harm (i.e., aquifer compaction) to the resource

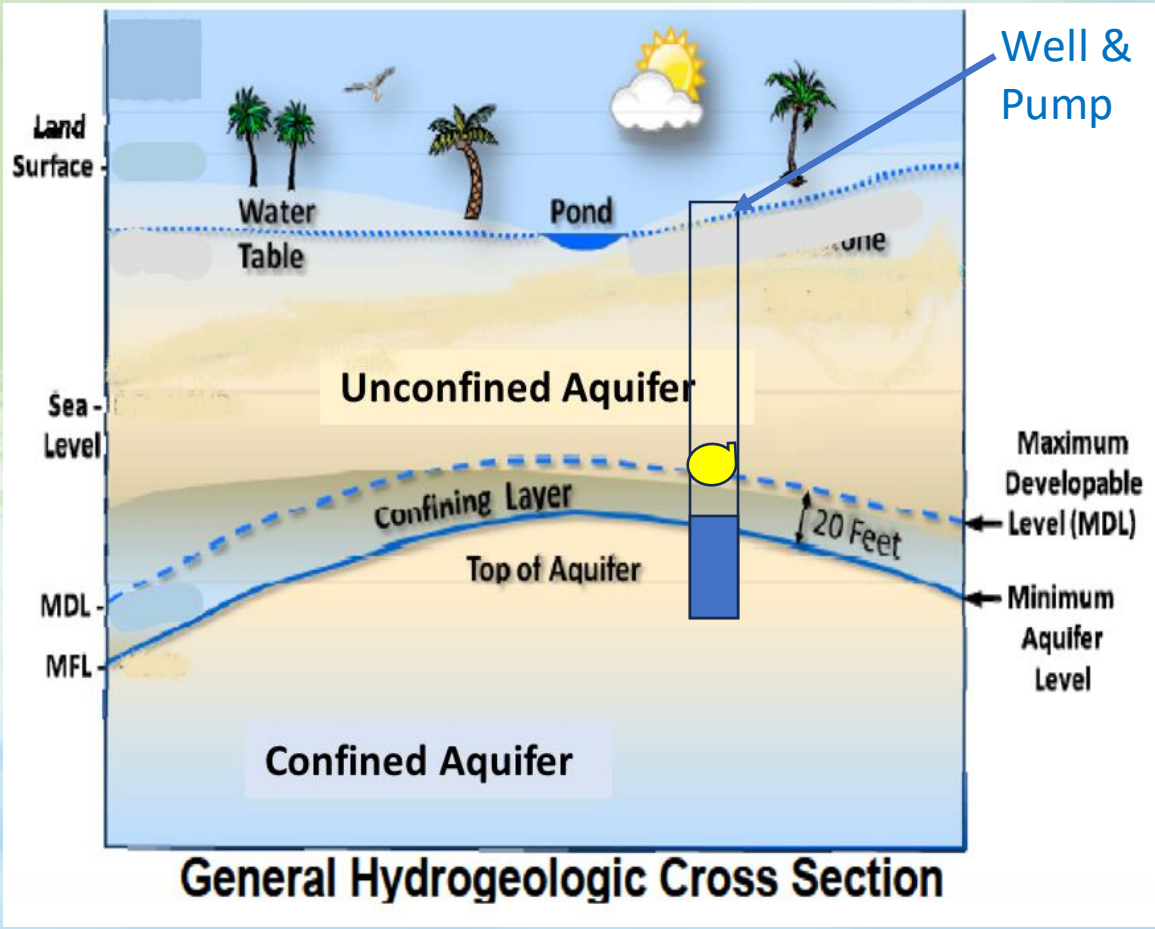


Water Levels and Wells

At Well Construction

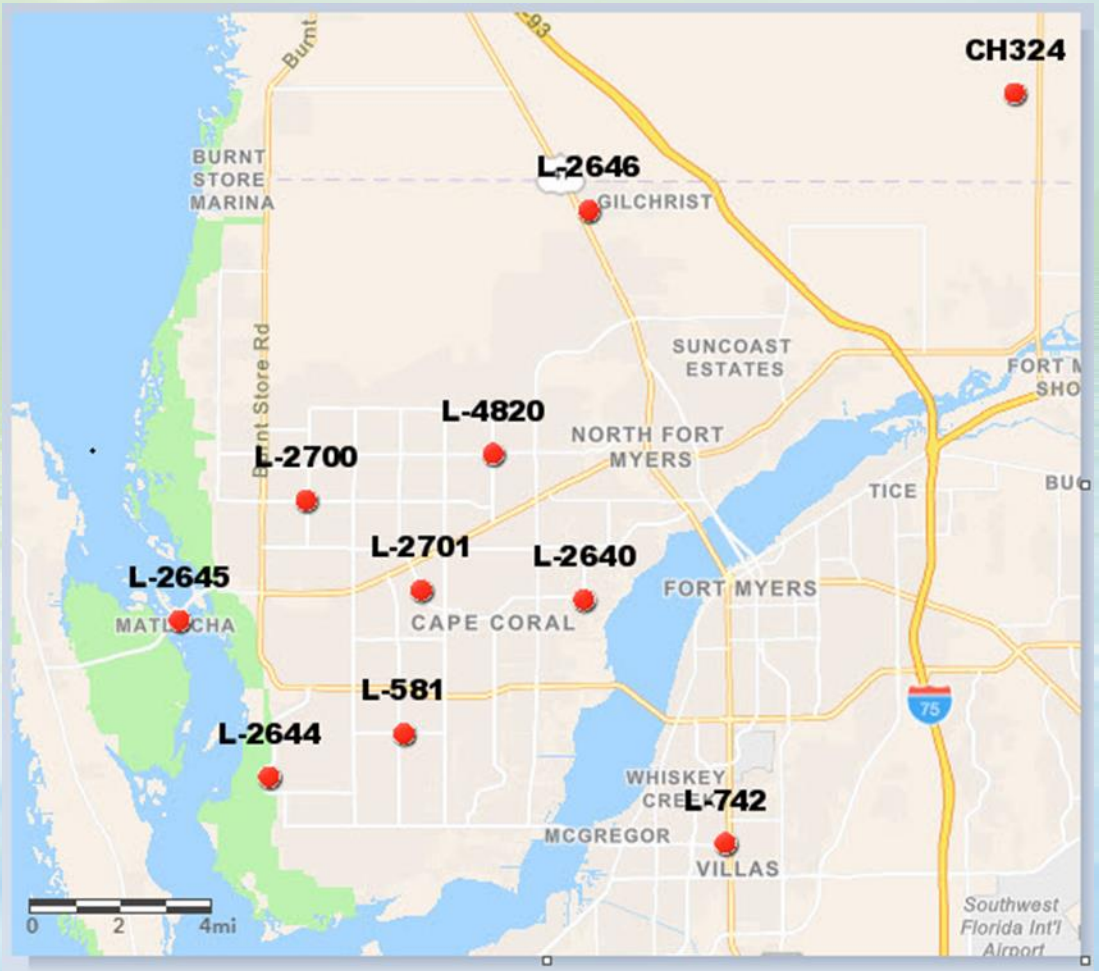


Declining Water Levels



Monitoring is Key to Understand Current State of Ground Water Resources

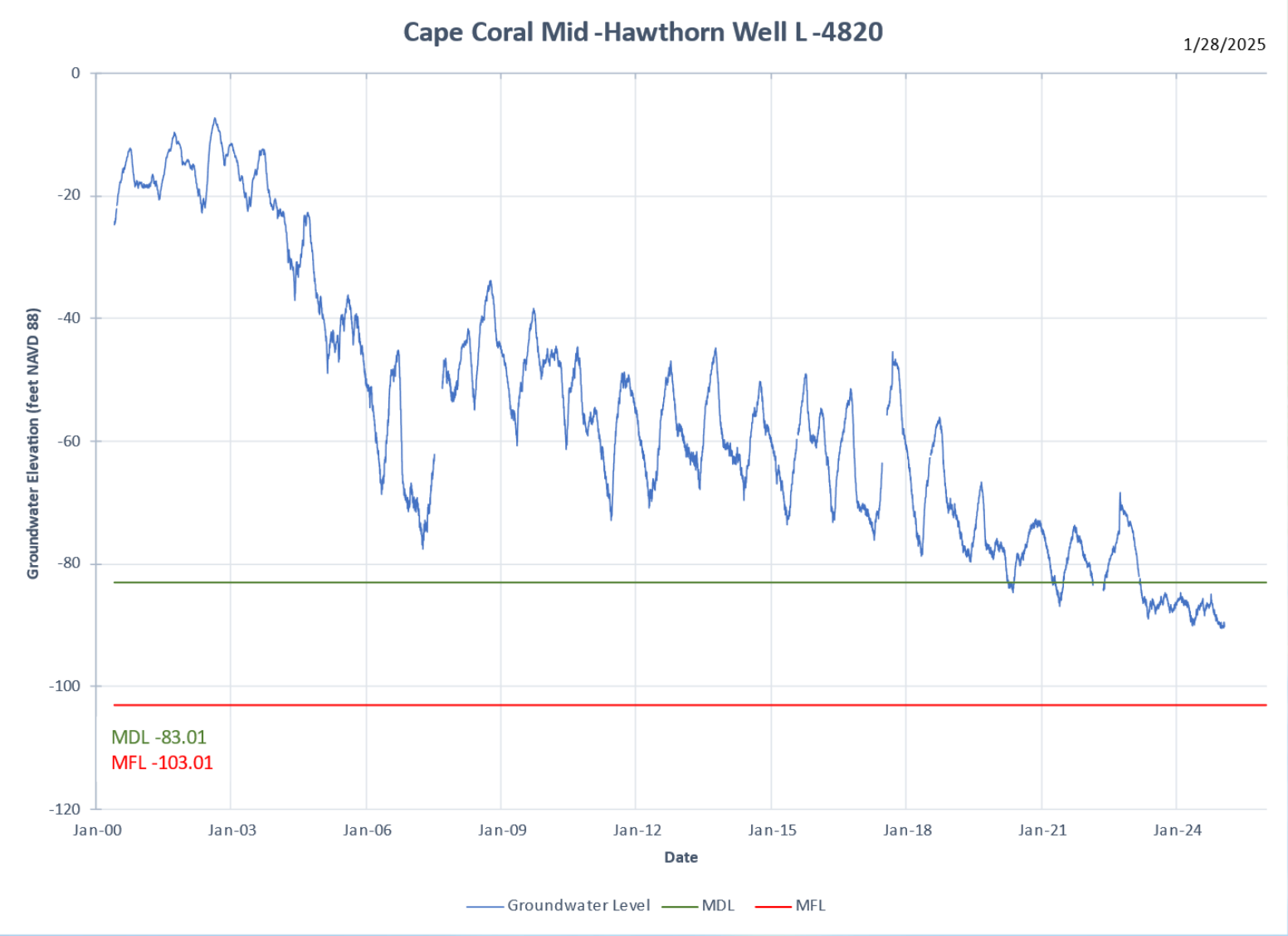
- Comprehensive monitoring network across the District
- Monitor various aquifers present in different regions
- Monitor water levels and water quality where appropriate
- Evaluate specific data and trends
- Data stored and available through USGS and the SFWMD corporate database DBHYDRO

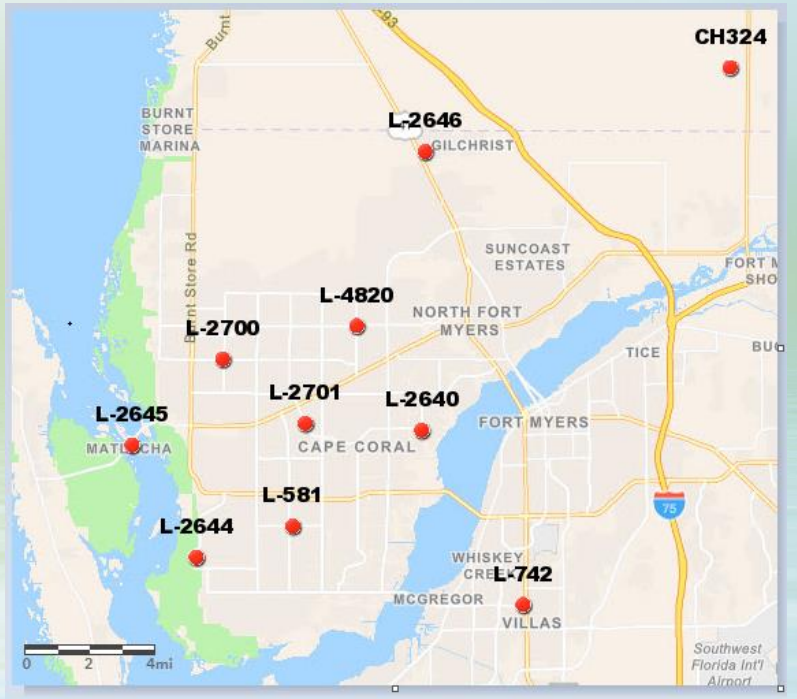


Monitoring Well L-4820 Location

- SE corner of Andalusia Blvd and Diplomat Parkway
- Constructed in 1980
- Total Depth ~180 feet
- Cased Depth ~120 feet
- Daily groundwater levels since May 2000
- Mid-Hawthorn aquifer is present from ~135 to 219 feet below land surface

Mid-Hawthorn Aquifer Well L-4820 Water Levels (2000 to current)



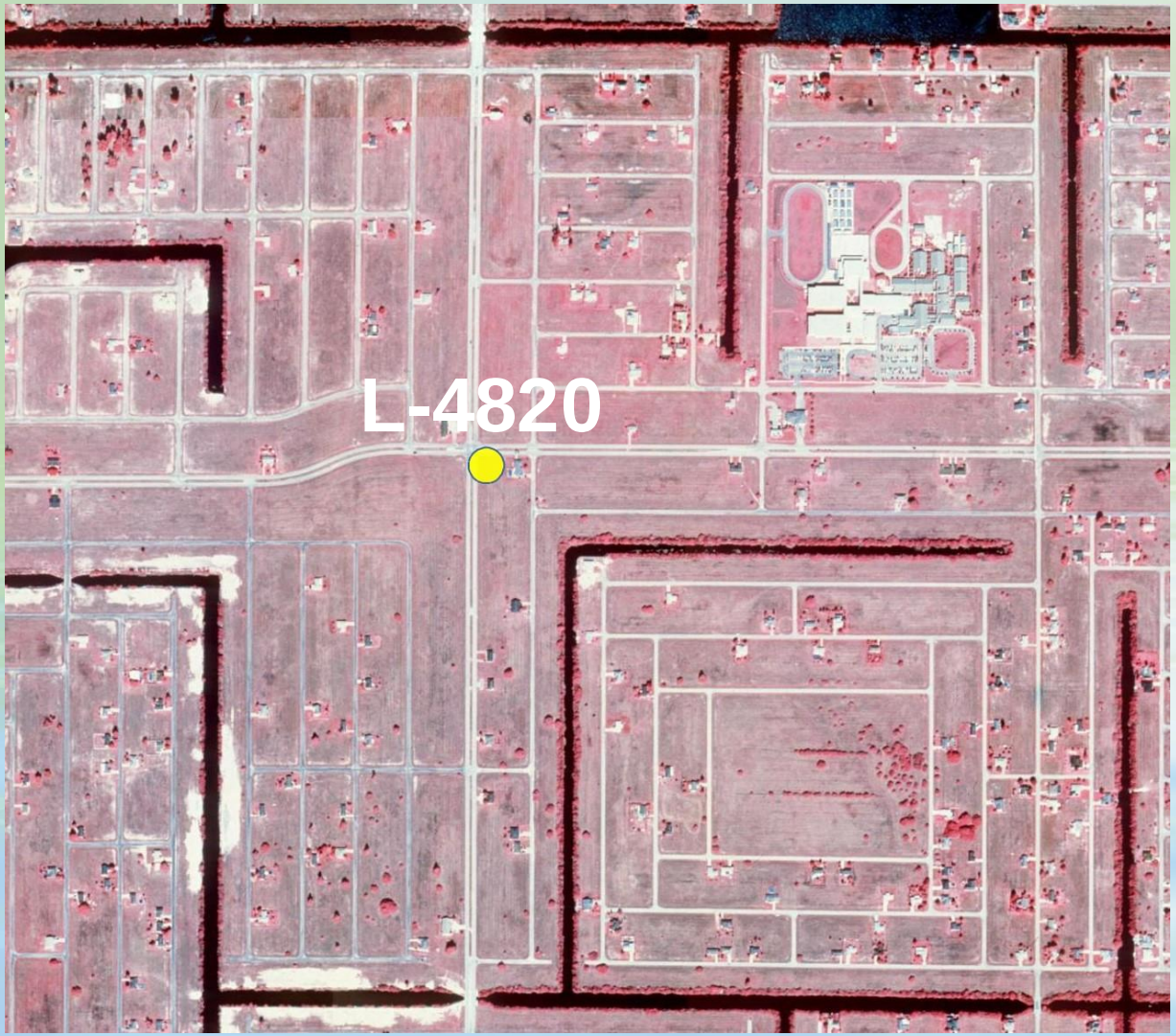


Significant Harm Threshold (MFL)

1/21/2025 Level -89.86' NAVD

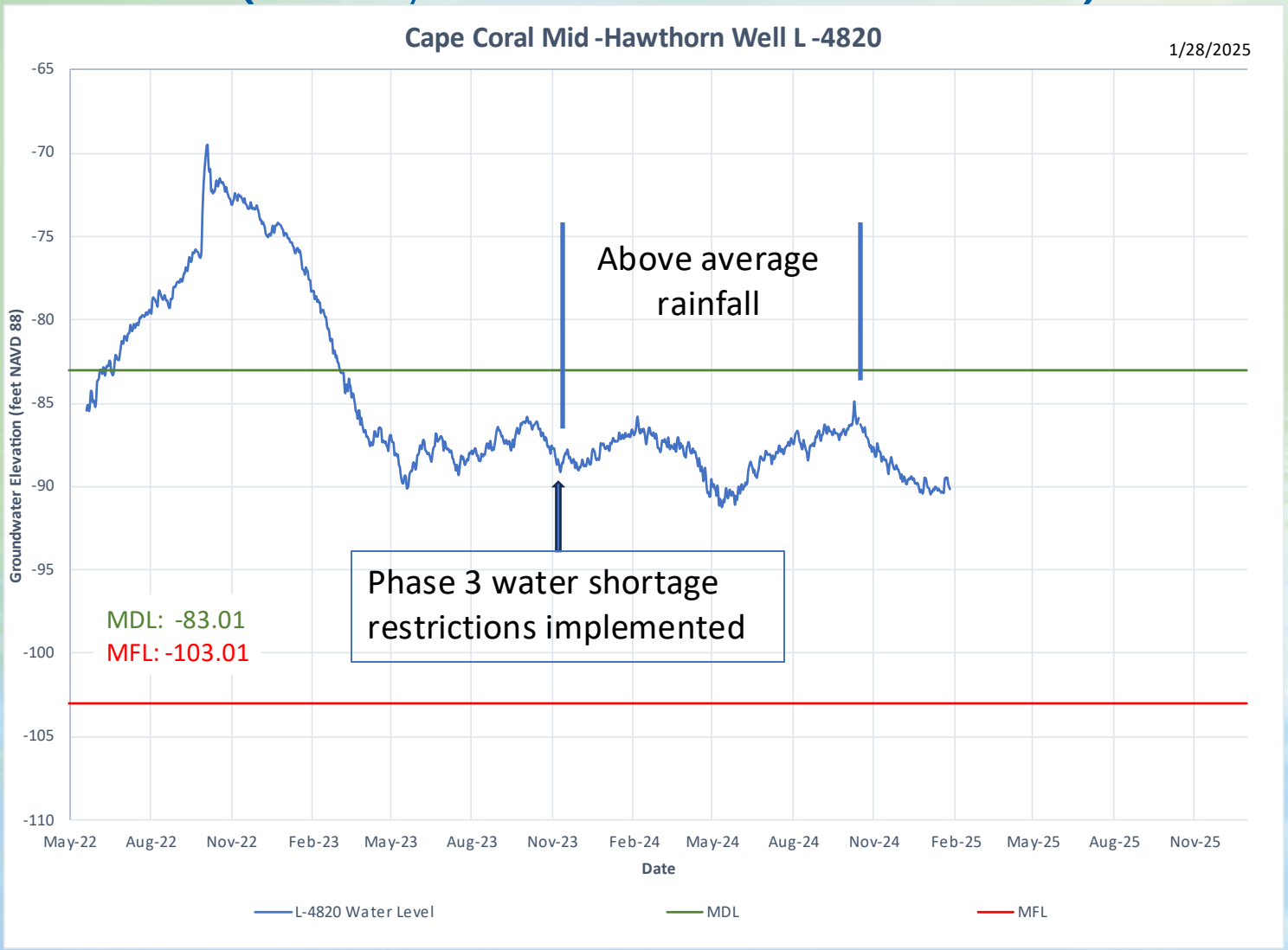
NE Cape Coral 2000 vs 2023 Increase in Development

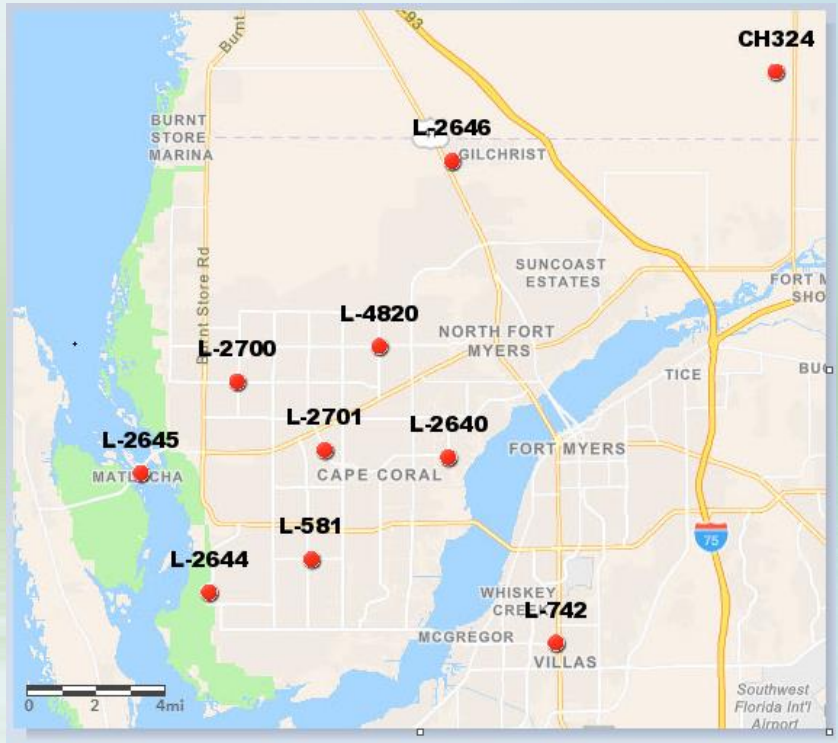
L-4820 in 2000



L-4820 in 2023

Mid-Hawthorn Aquifer Well L-4820 Water Levels (May 2022 to current)

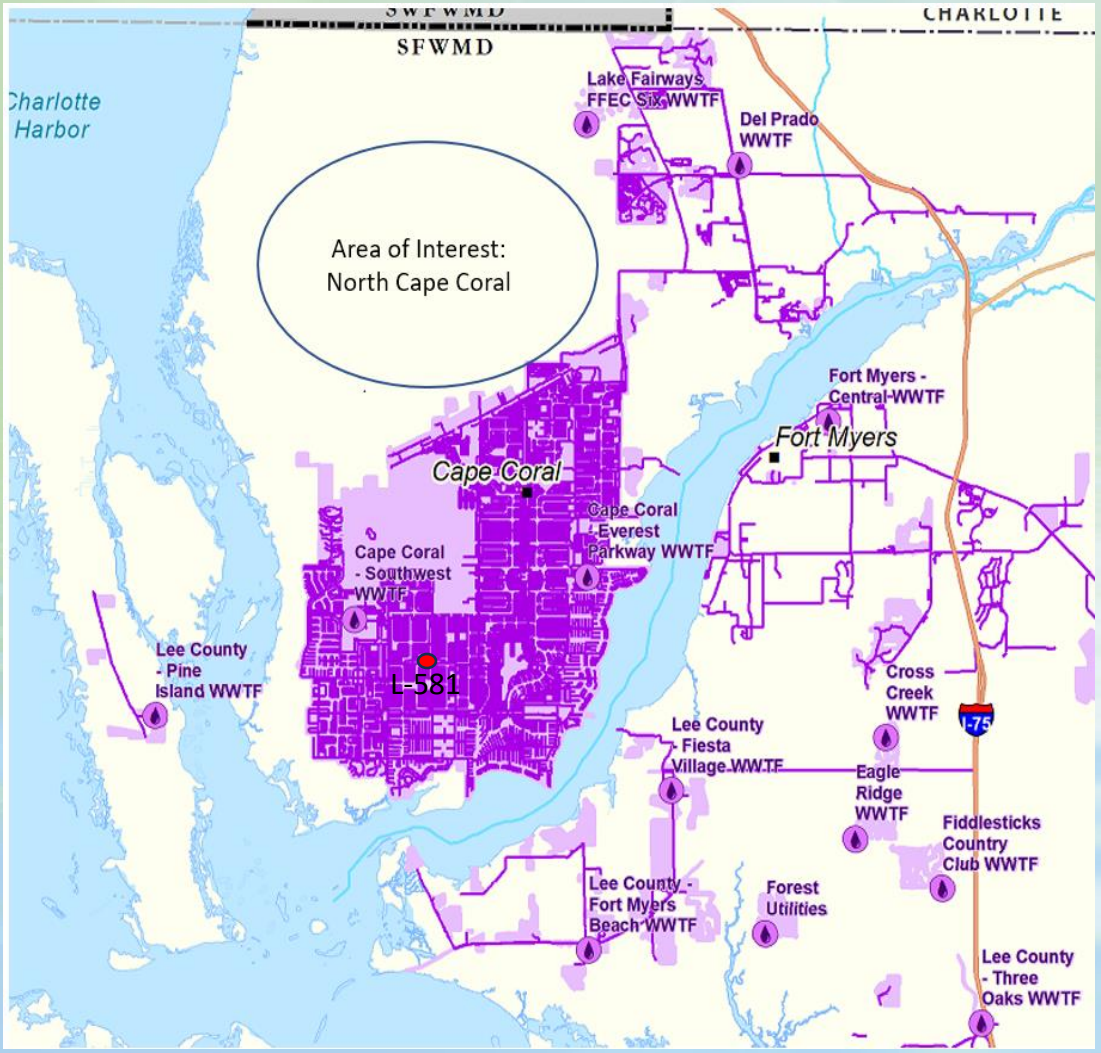




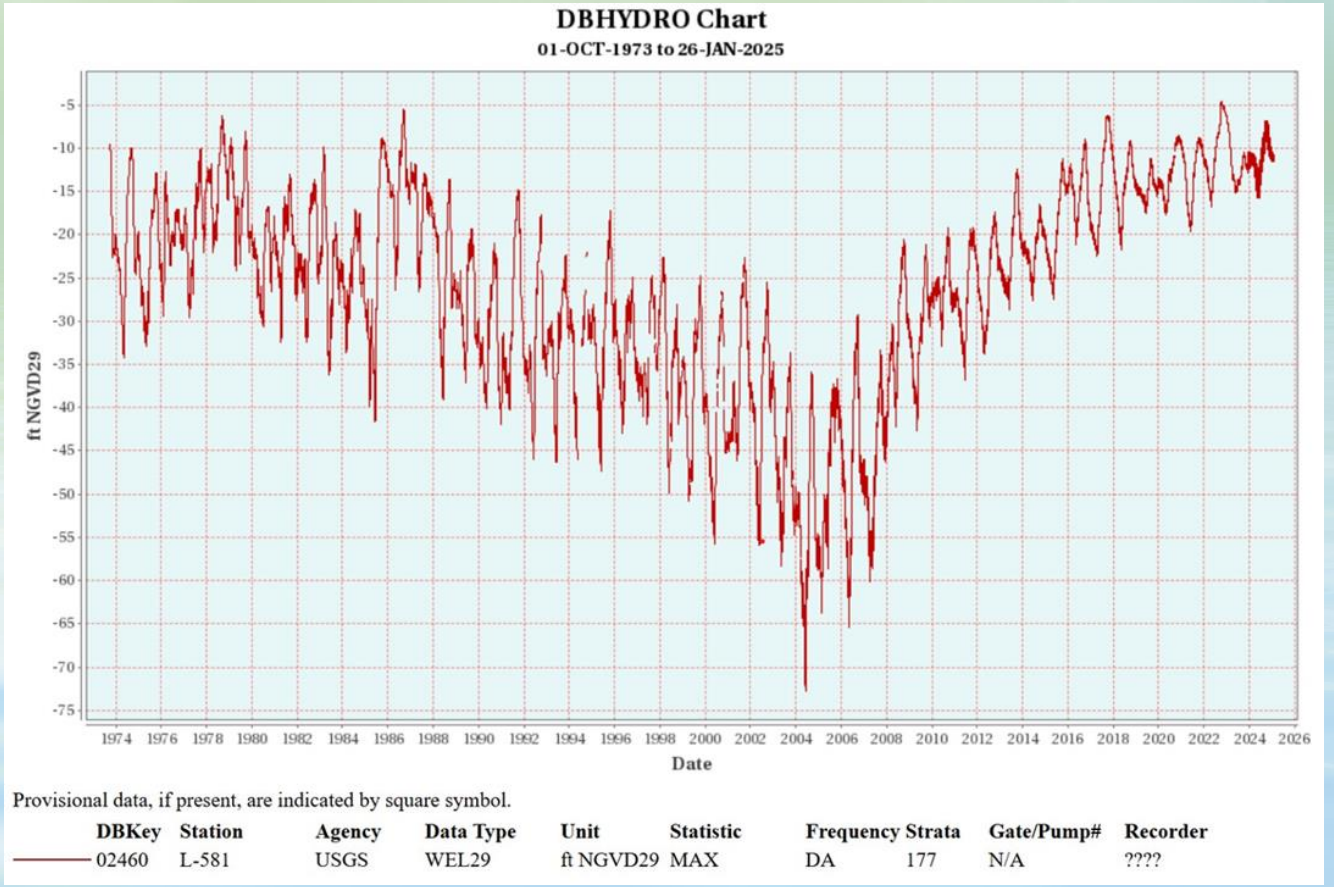
Recent wet seasons have not shown groundwater level rebound despite 134% of average rainfall in 2024 wet season

1/27/2025 Level -89.86' NAVD

Water Levels Recover When Domestic Wells Are No Longer Needed



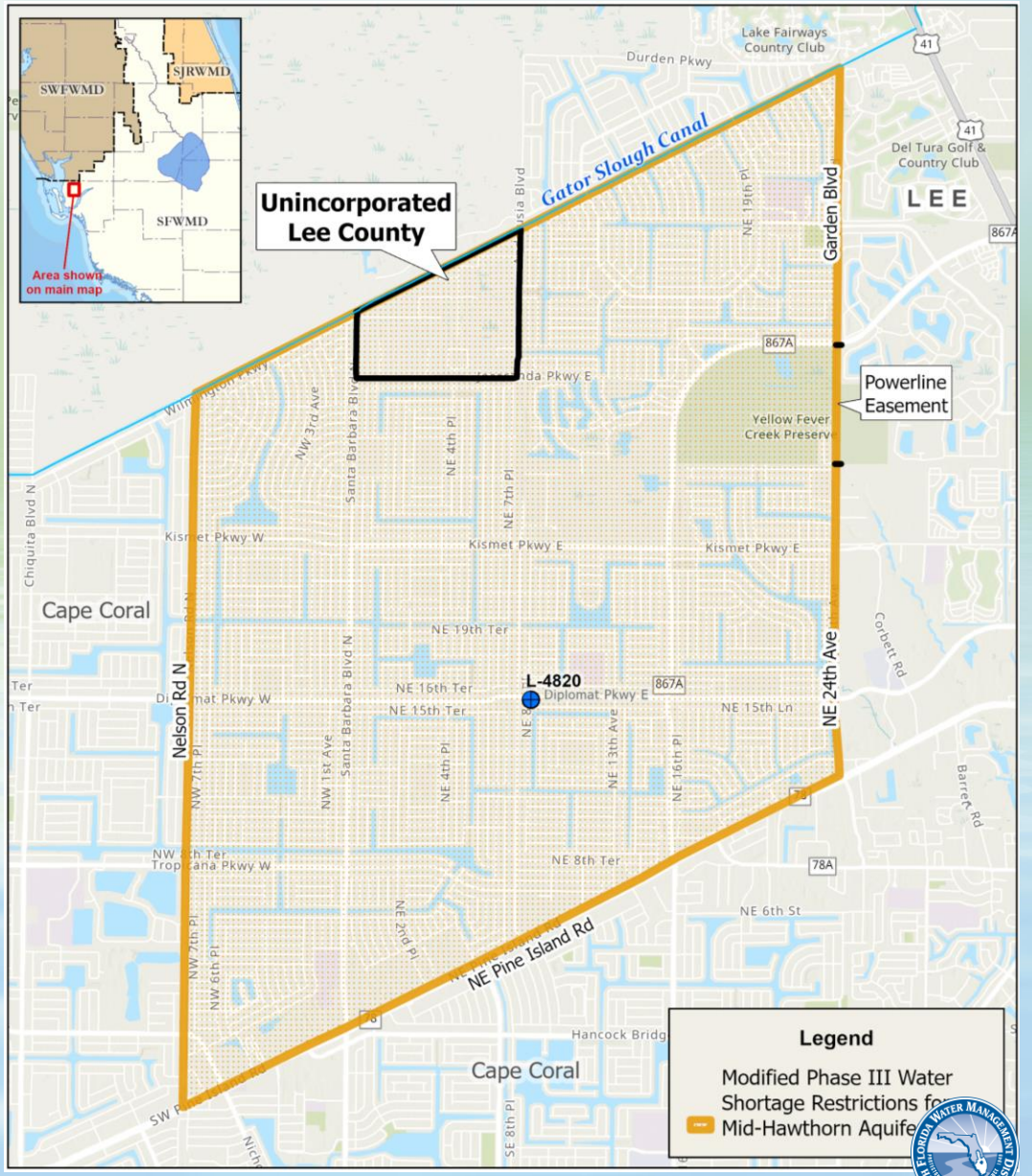
USGS Well L-581 Mid-Hawthorn Aquifer

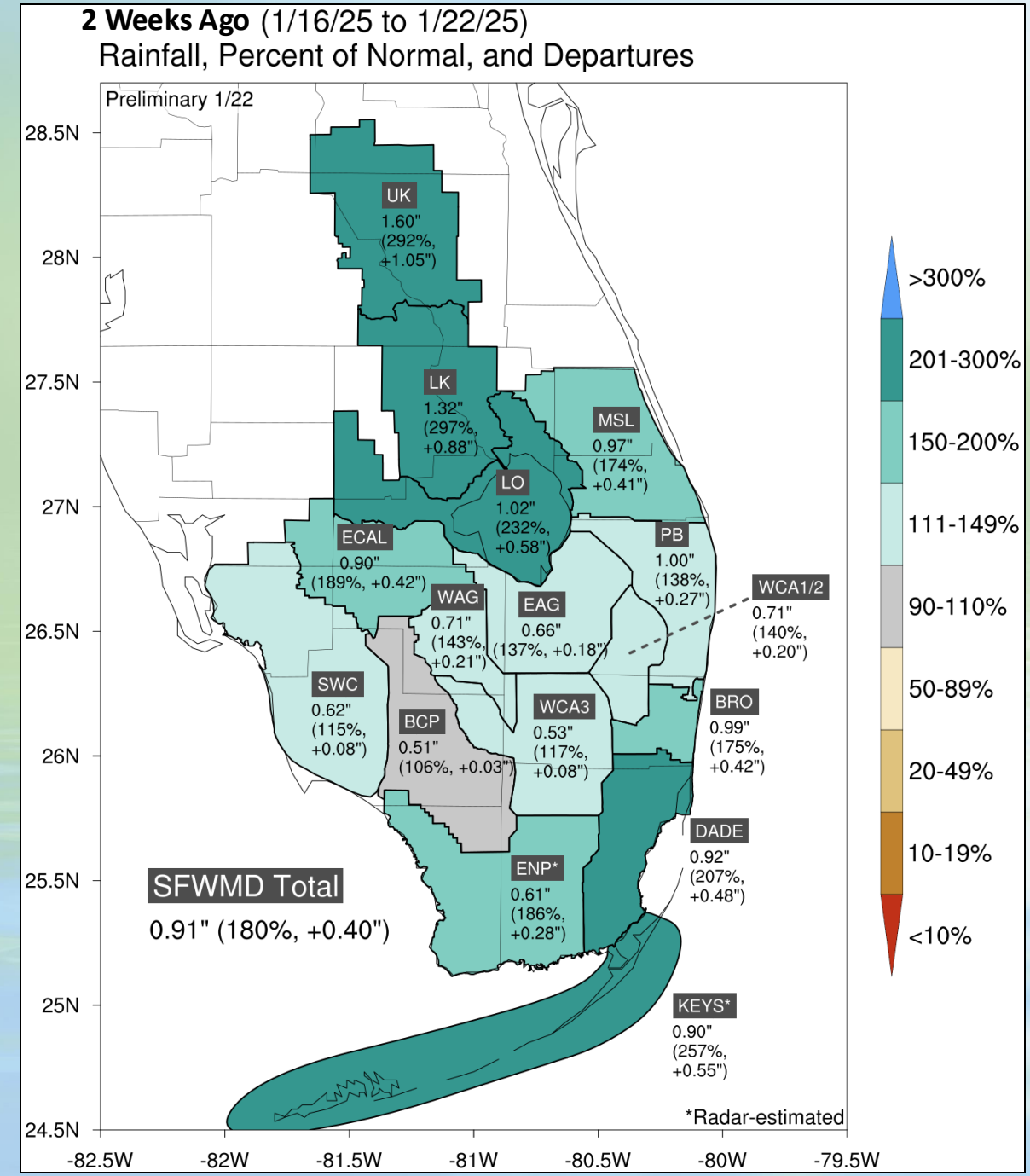


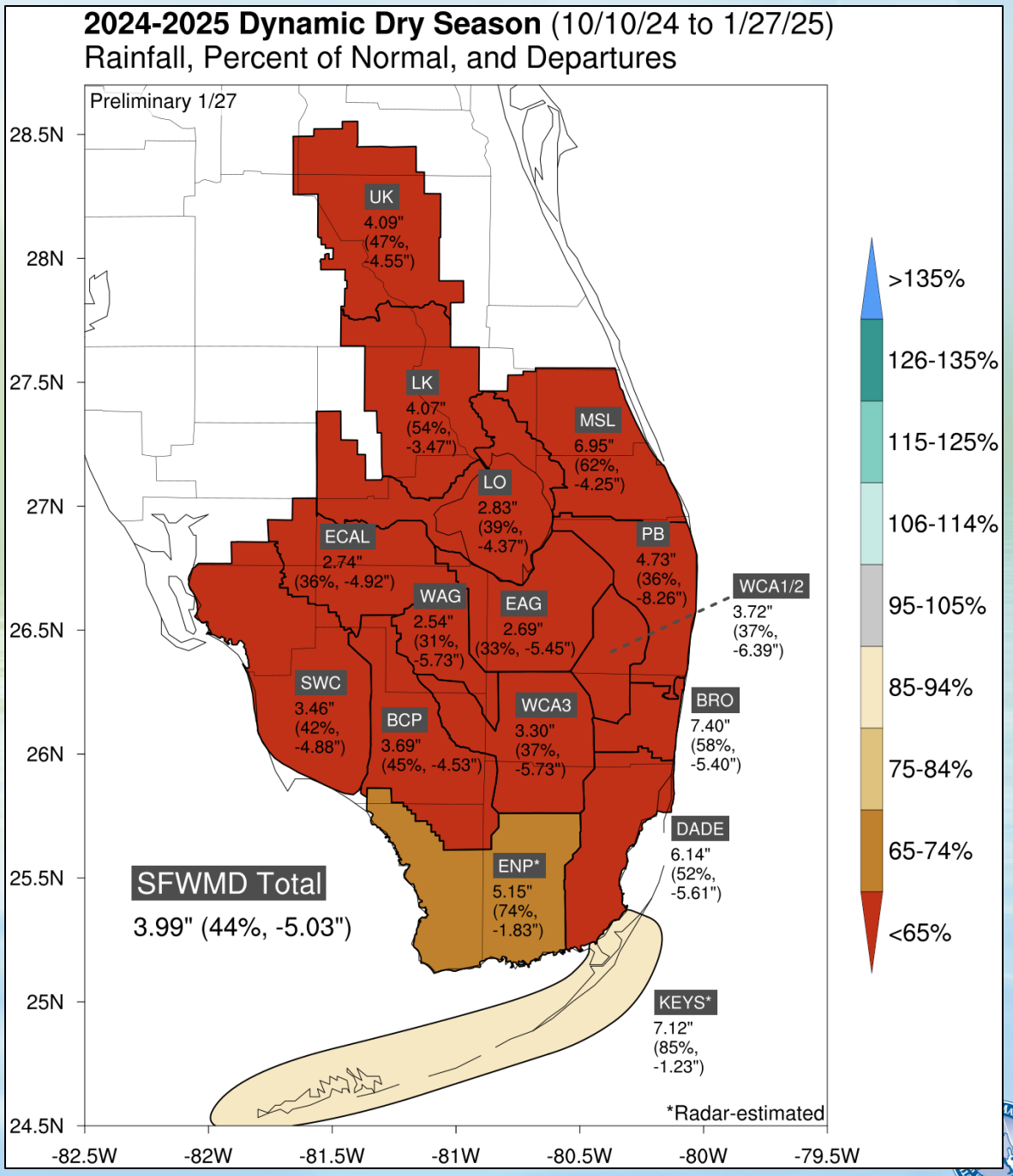
Approximately 60-foot Recovery in Water Levels

SFWMD Water Shortage Order for NE Cape Coral

- Emergency Modified Phase 3 Water Shortage Restrictions in northern Cape Coral <u>for users of the mid-Hawthorn aquifer</u>
  - Landscape irrigation restricted to one day per week
    - Cape Coral
      - Cape Coral's Stage 1 restrictions
    - Unincorporated Lee
      - Odd addresses-Saturday
      - Even addresses-Sunday
      - No irrigation between 9 am and 5 pm
  - Commensurate restrictions for other use classes
- Effective November 28, 2023

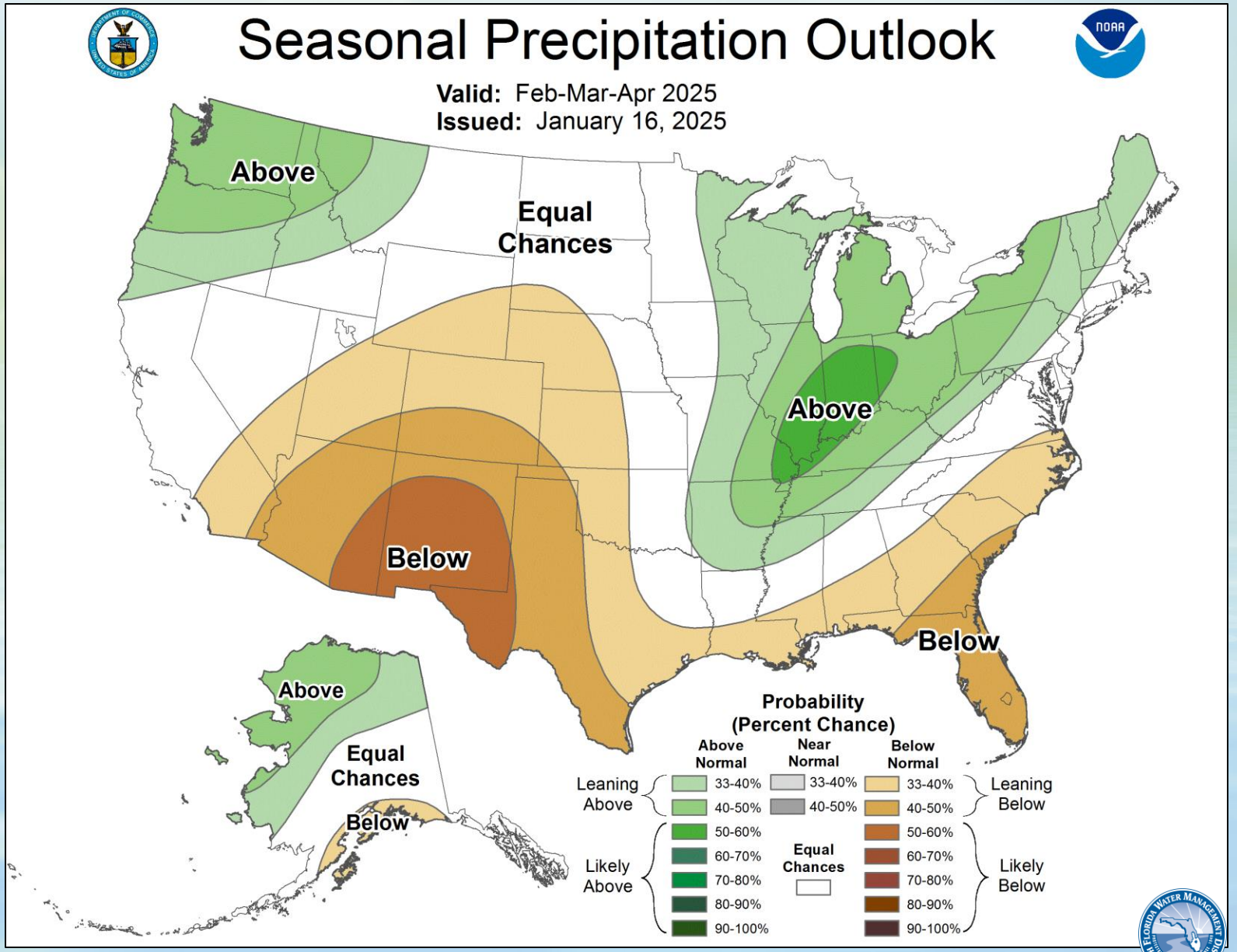



2 Weeks Ago (1/16/25 to 1/22/25)
Rainfall, Percent of Normal, and Departures
Preliminary 1/22
UK 1.60" (292%, +1.05")
LK 1.32" (297%, +0.88")
MSL 0.97" (174%, +0.41")
LO 1.02" (232%, +0.58")
ECAL 0.90" (189%, +0.42")
PB 1.00" (138%, +0.27")
WAG 0.71" (143%, +0.21")
EAG 0.66" (137%, +0.18")
WCA1/2 0.71" (140%, +0.20")
SWC 0.62" (115%, +0.08")
BCP 0.51" (106%, +0.03")
WCA3 0.53" (117%, +0.08")
BRO 0.99" (175%, +0.42")
DADE 0.92" (207%, +0.48")
ENP* 0.61" (186%, +0.28")
KEYS* 0.90" (257%, +0.55")
SFWMD Total
0.91" (180%, +0.40")
*Radar-estimated
>300%
201-300%
150-200%
111-149%
90-110%
50-89%
20-49%
10-19%
<10%
28.5N
28N
27.5N
27N
26.5N
26N
25.5N
25N
24.5N
-82.5W
-82W
-81.5W
-81W
-80.5W
-80W
-79.5W


2024-2025 Dynamic Dry Season (10/10/24 to 1/27/25)
Rainfall, Percent of Normal, and Departures
Preliminary 1/27
UK 4.09" (47%, -4.55")
LK 4.07" (54%, -3.47")
MSL 6.95" (62%, -4.25")
LO 2.83" (39%, -4.37")
ECAL 2.74" (36%, -4.92")
PB 4.73" (36%, -8.26")
WAG 2.54" (31%, -5.73")
EAG 2.69" (33%, -5.45")
WCA1/2 3.72" (37%, -6.39")
SWC 3.46" (42%, -4.88")
BCP 3.69" (45%, -4.53")
WCA3 3.30" (37%, -5.73")
BRO 7.40" (58%, -5.40")
DADE 6.14" (52%, -5.61")
ENP* 5.15" (74%, -1.83")
KEYS* 7.12" (85%, -1.23")
SFWMD Total
3.99" (44%, -5.03")
*Radar-estimated
>135%
126-135%
115-125%
106-114%
95-105%
85-94%
75-84%
65-74%
<65%
28.5N
28N
27.5N
27N
26.5N
26N
25.5N
25N
24.5N
-82.5W
-82W
-81.5W
-81W
-80.5W
-80W
-79.5W

NOAA Climate Prediction Center

- Below normal rainfall: February-April 2025



Joint Action Plan South Florida Water Management District, City of Cape Coral and Lee County for Northeast Cape Coral Water Shortage Area

Jeff Pearson, MSEnvEng, PMP
Utilities Director
City of Cape Coral

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Joint Action Plan
South Florida Water Management District, City of Cape Coral and Lee County for Northeast Cape Coral Water Shortage Area

January 26, 2025

Joint Action Plan

- Collaborative effort between South Florida Water Management District, City of Cape Coral and Lee County
- Plan objectives
  - Protect the MHA in the NE Cape Coral area from permanent damage
  - Prevent loss of drinking water supply to domestic users in the water shortage area
- Incorporates proposed actions based on Monitoring Well L-4820 water levels

Actions to Date

- SFWMD issued Modified Phase III water shortage restrictions on November 28, 2023, limiting landscape irrigation to one day per week in NE Cape Coral
- City hires additional code enforcement staff for the dry season to monitor compliance of the City's irrigation ordinance and the District's water shortage declaration.
- City accelerated planned construction of North Water Reclamation Facility with anticipated completion by 2030
- City reprioritized planned expansions of the UEP to complete North 6 by 2030 corresponding to water shortage area
- City approved purchase of the Southwest Aggregates Mine located in Charlotte County to develop a reservoir to supplement irrigation water supply

Actions to Date (cont)

- New and replacement MHA wells to be drilled into the lower portion of the MHA to reduce impact to the resource

- City, County and SFWMD collaboration on communications to educate the community regarding the seriousness of the MHA declining water levels and the actions being taken to address the situation.

Immediate Actions

- Lee County will require the construction of all new and replacement MHA wells within the water shortage area to the lower portion of the MHA (approximate depth of 250 feet).

- The City will adopt an ordinance requiring mandatory connection to the City's irrigation water supply system once it becomes available in each new UEP sector located north of Pine Island Road.

- In areas where the City's irrigation water supply system is available, mandatory connection to the City's irrigation water supply system will be required when a self-supply well fails in areas located north of Pine Island Road that are already served by City utilities.

- The City, County and District will continue to collaborate and implement a communication plan to educate the community regarding the seriousness of the MHA declining water levels and the actions being taken to address the situation.

Future Actions Part 1

Should water levels decline to less than 10 feet above MFL (-93.01 feet) for two consecutive weeks:

- Limit construction of new MHA wells within the water shortage area to just potable use.
- Limit new potable wells and replacement wells within the water shortage area to the lower portion of the MHA (approximate depth of 250 feet).
- Implement zero irrigation days for all MHA users in the water shortage area.

Future Actions Part 2

Should water levels decline to the MFL (-103.01 feet) for two consecutive weeks:

- Cease issuing new permits for any wells (potable or irrigation) in the MHA within the water shortage area.

- Maintain zero irrigation days for all MHA users in the water shortage area.

Thank You