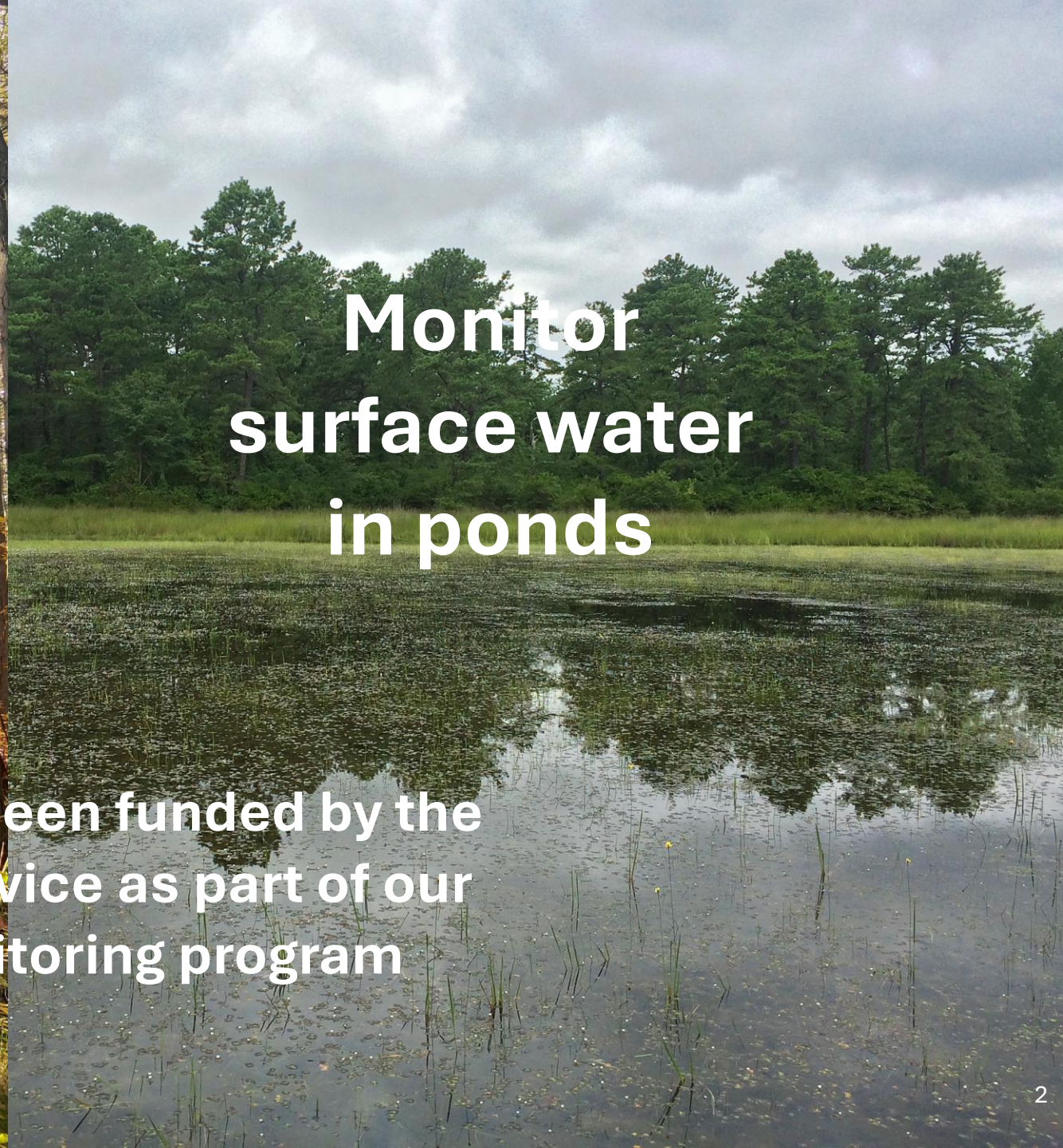
Long-term Water Level Monitoring

Policy and Implementation Meeting

September 26, 2025

Monitor groundwater in forest plots



Monitor surface water in ponds

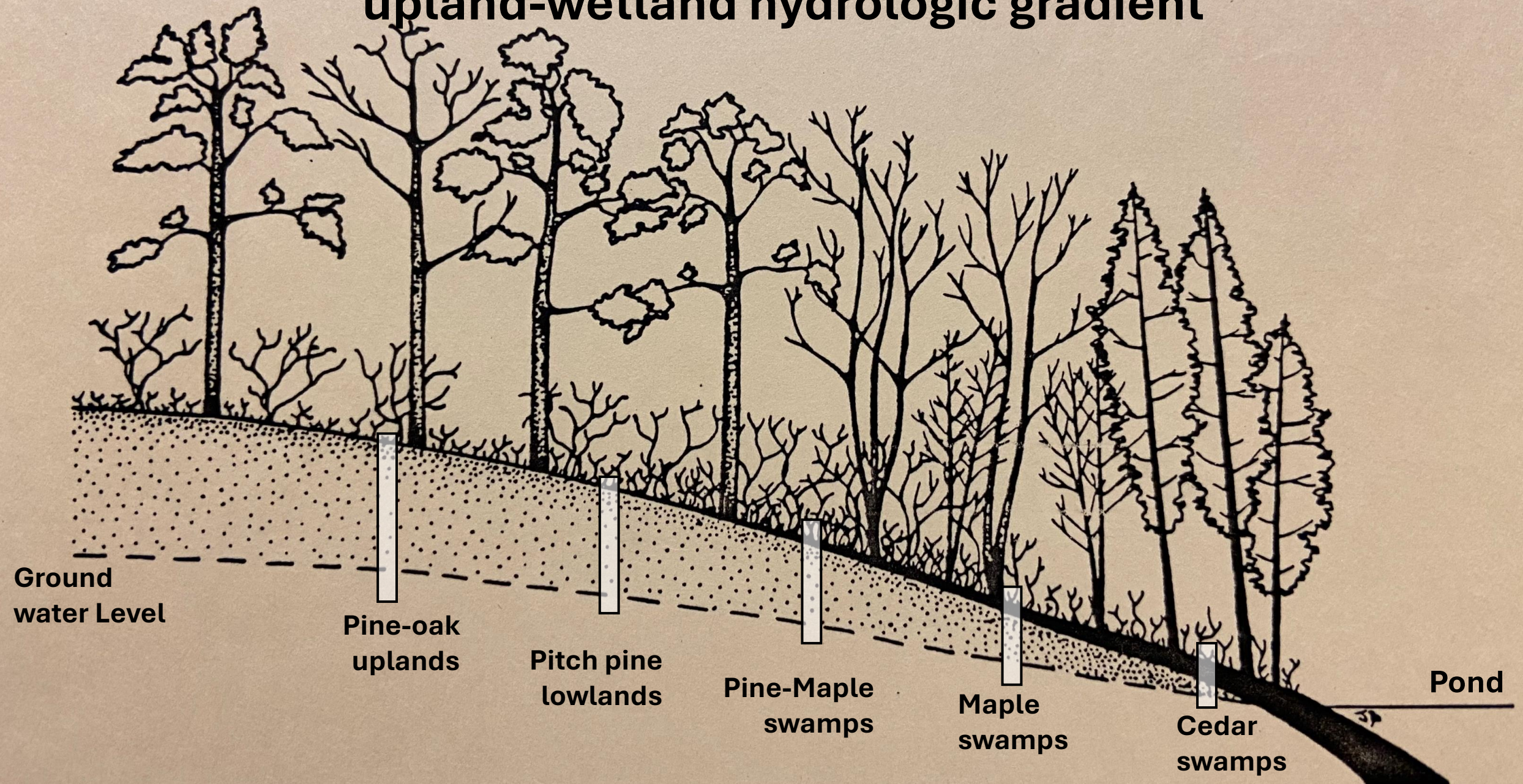
All this work has been funded by the National Park Service as part of our long-term monitoring program

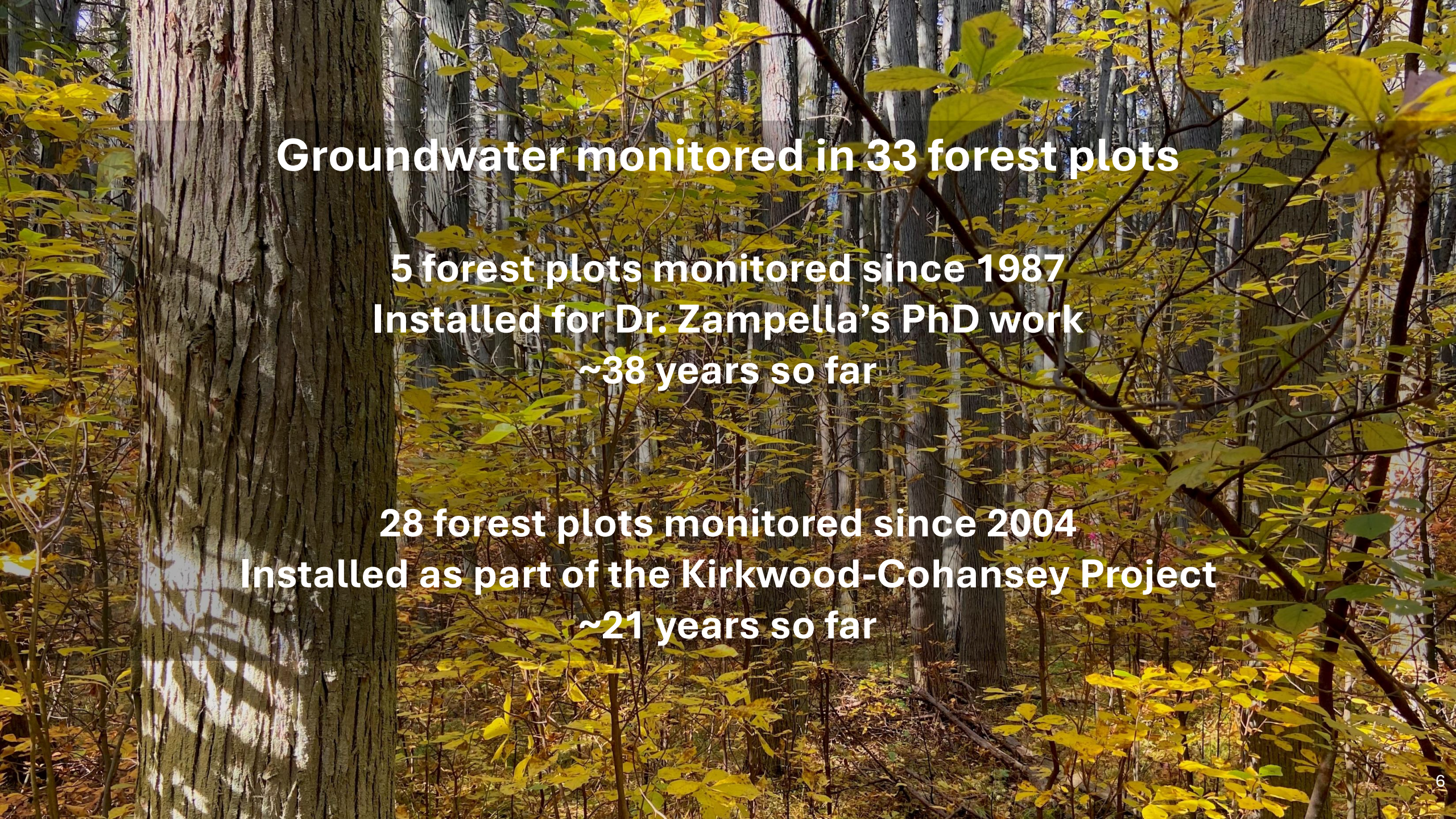
Groundwater Monitoring

Measure water levels in shallow PVC wells installed in forest plots


Joel Mott from the Communications Office measures groundwater levels manually each month using a Solinst water level meter

Wells were installed in forest plots along an upland-wetland hydrologic gradient





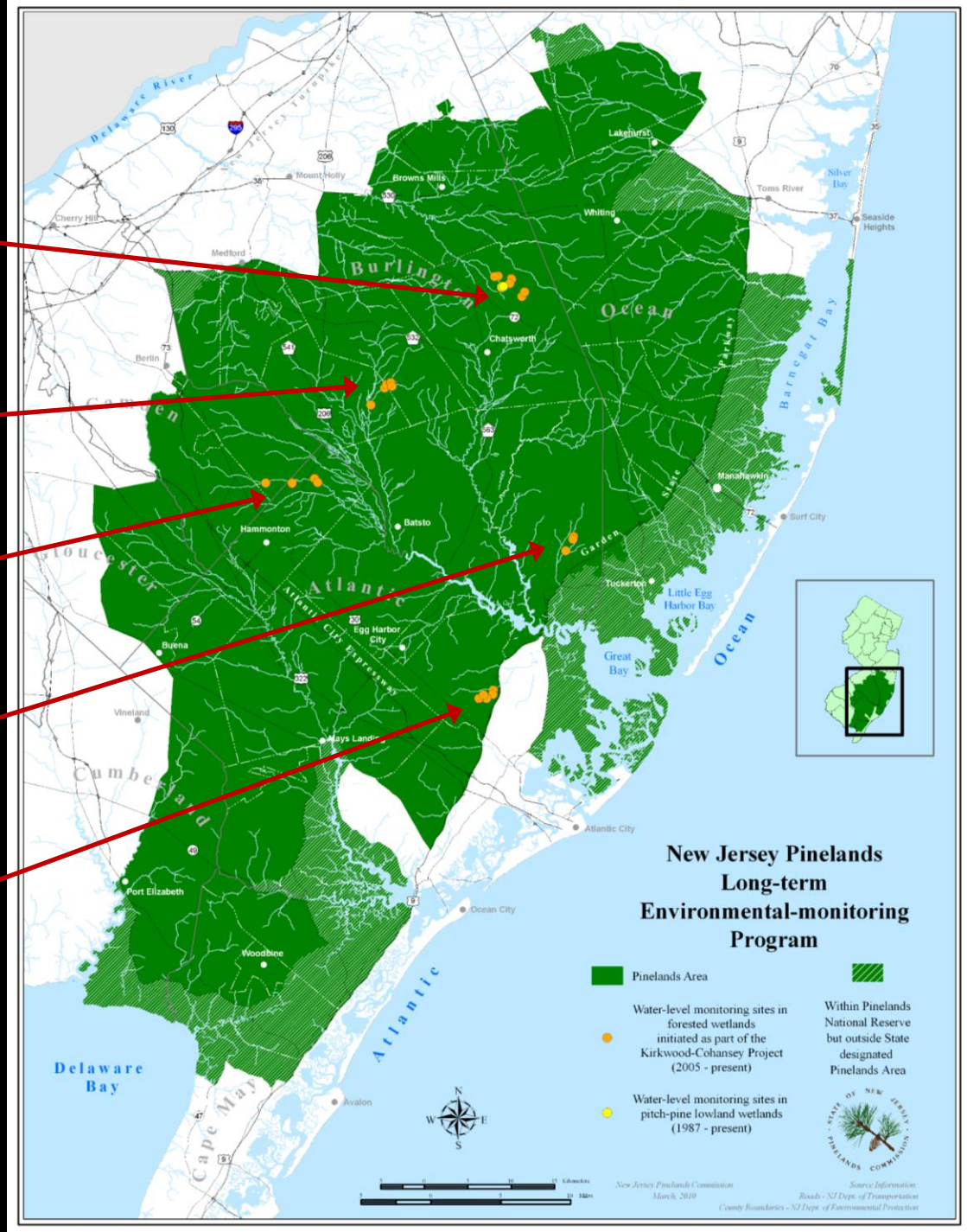
Groundwater monitored in 33 forest plots

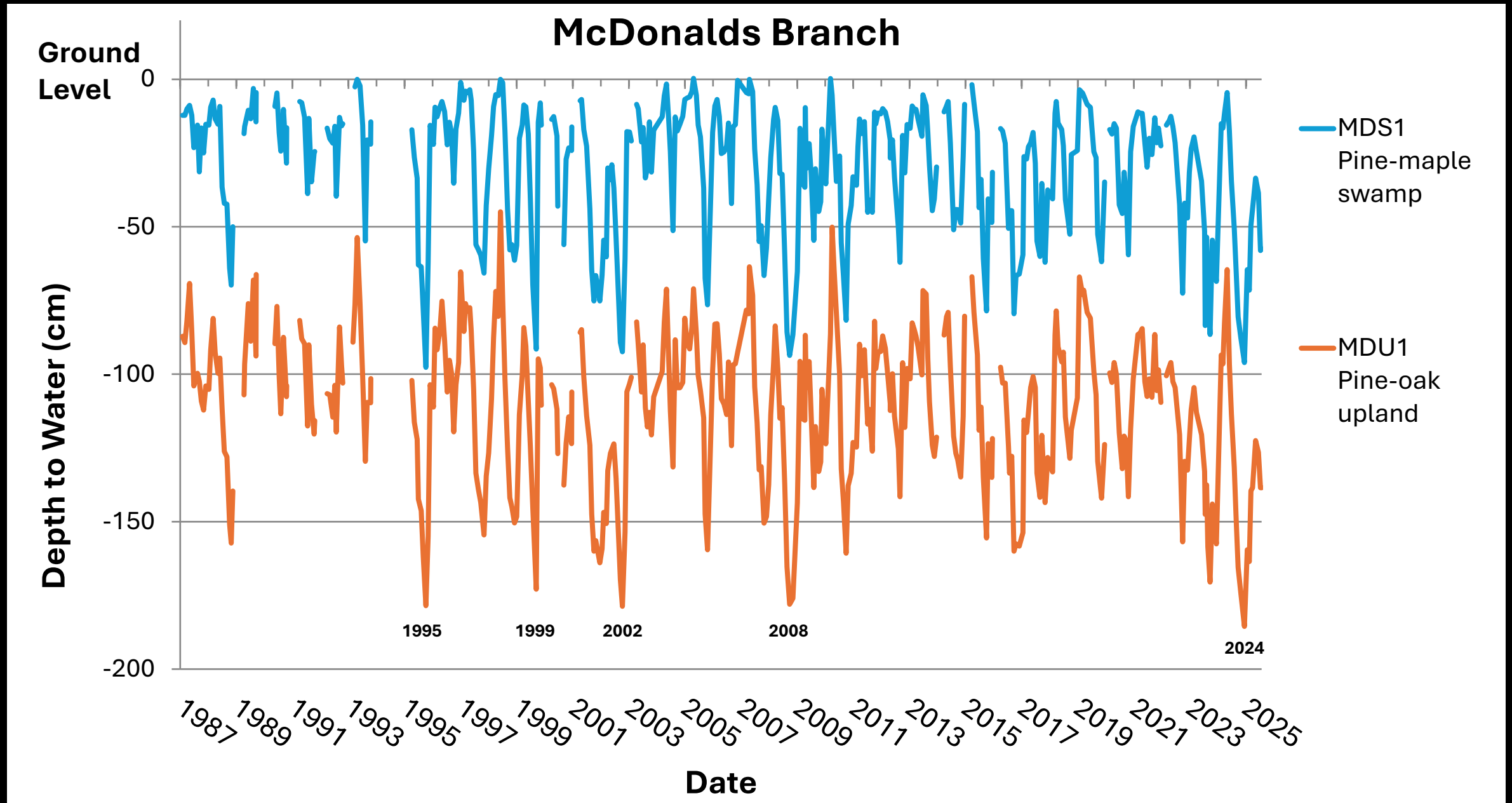
5 forest plots monitored since 1987
Installed for Dr. Zampella's PhD work
~38 years so far

28 forest plots monitored since 2004
Installed as part of the Kirkwood-Cohansey Project
~21 years so far

Location of 33 Forest Plots

Location	# of Plots
McDonalds Branch: Brendan Byrne SF (Undeveloped)	12
Cedar swamp	2
Hardwood swamp	1
Pine-hardwood Lowland	2
Pine-oak upland	2
Pitch pine lowland	5
Skit Branch: Wharton SF (Undeveloped)	6
Cedar swamp	2
Pine-hardwood Lowland	1
Pine-oak upland	1
Pitch pine lowland	2
Albertson Brook: Wharton SF (Impacted)	5
Cedar swamp	1
Hardwood swamp	1
Pine-hardwood Lowland	2
Pitch pine lowland	1
East Branch Bass River: Bass River SF (Undeveloped)	4
Cedar swamp	1
Hardwood swamp	1
Pine-hardwood Lowland	1
Pine-oak upland	1
Morses Mill Stream: Stockton University (Impacted)	6
Cedar swamp	2
Hardwood swamp	1
Pine-hardwood Lowland	1
Pine-oak upland	1
Pitch pine lowland	1
Total	33




McDonalds Branch
Ground Level
0
-50
-100
-150
-200
Depth to Water (cm)
1995
1999
2002
2008
2024
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
2023
2025
Date
MDS1 Pine-maple swamp
MDU1 Pine-oak upland

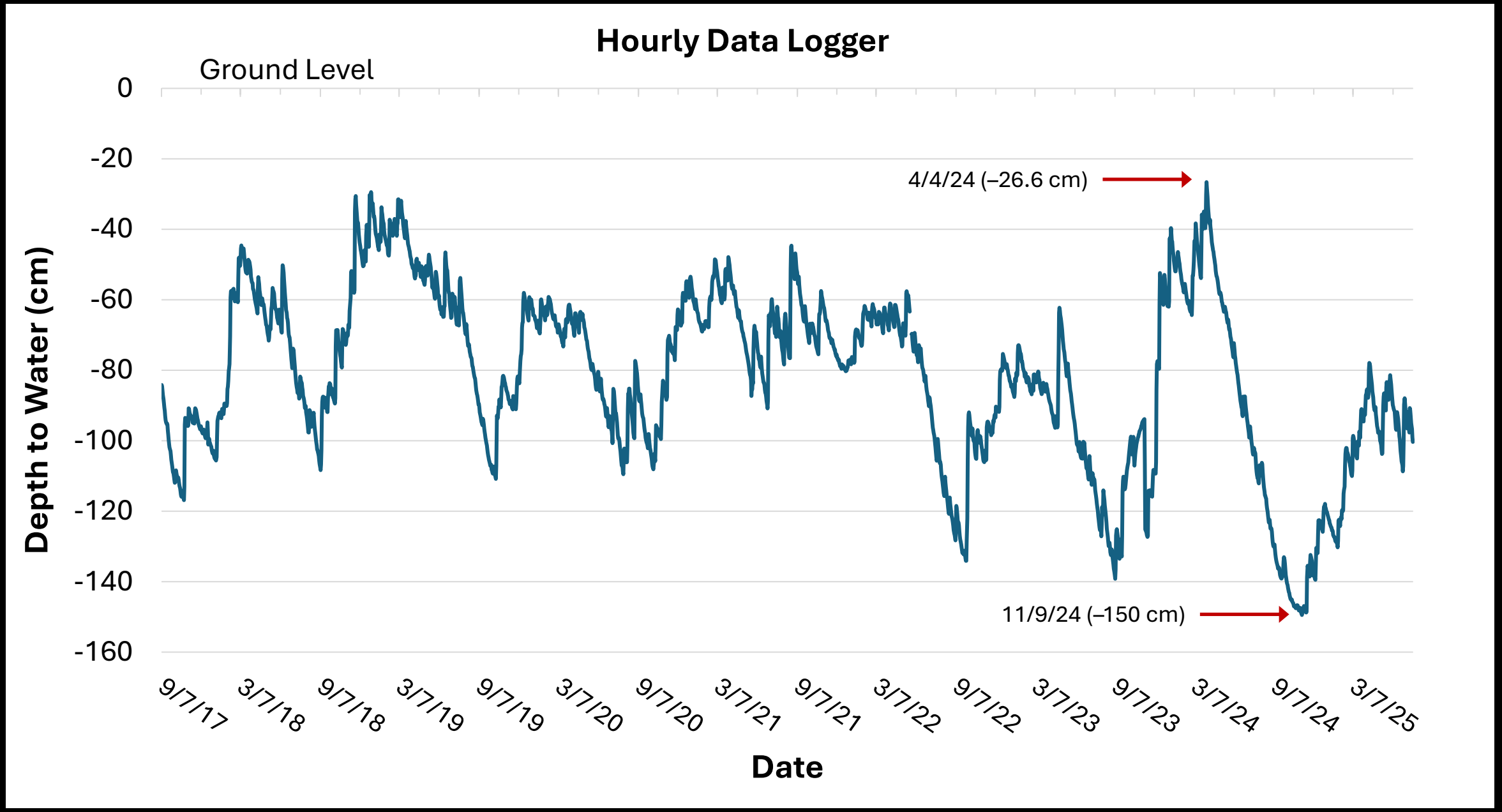
In 2017, a data logger was installed in a USGS metal well at McDonalds Branch

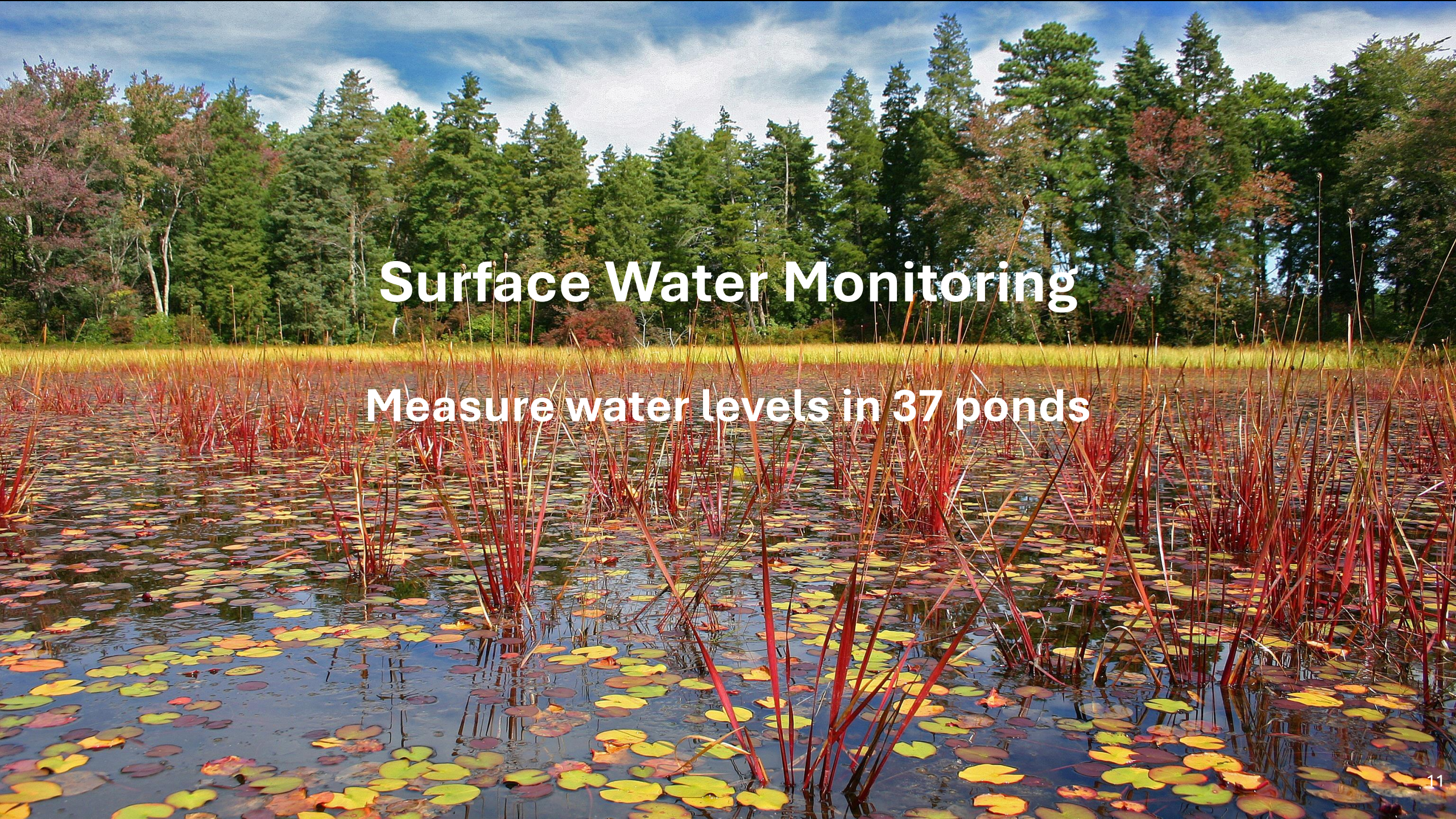
A data logger automatically measures and records groundwater level

This forest plot was measured manually every month since 1987

The data logger has been recording groundwater hourly since 2017

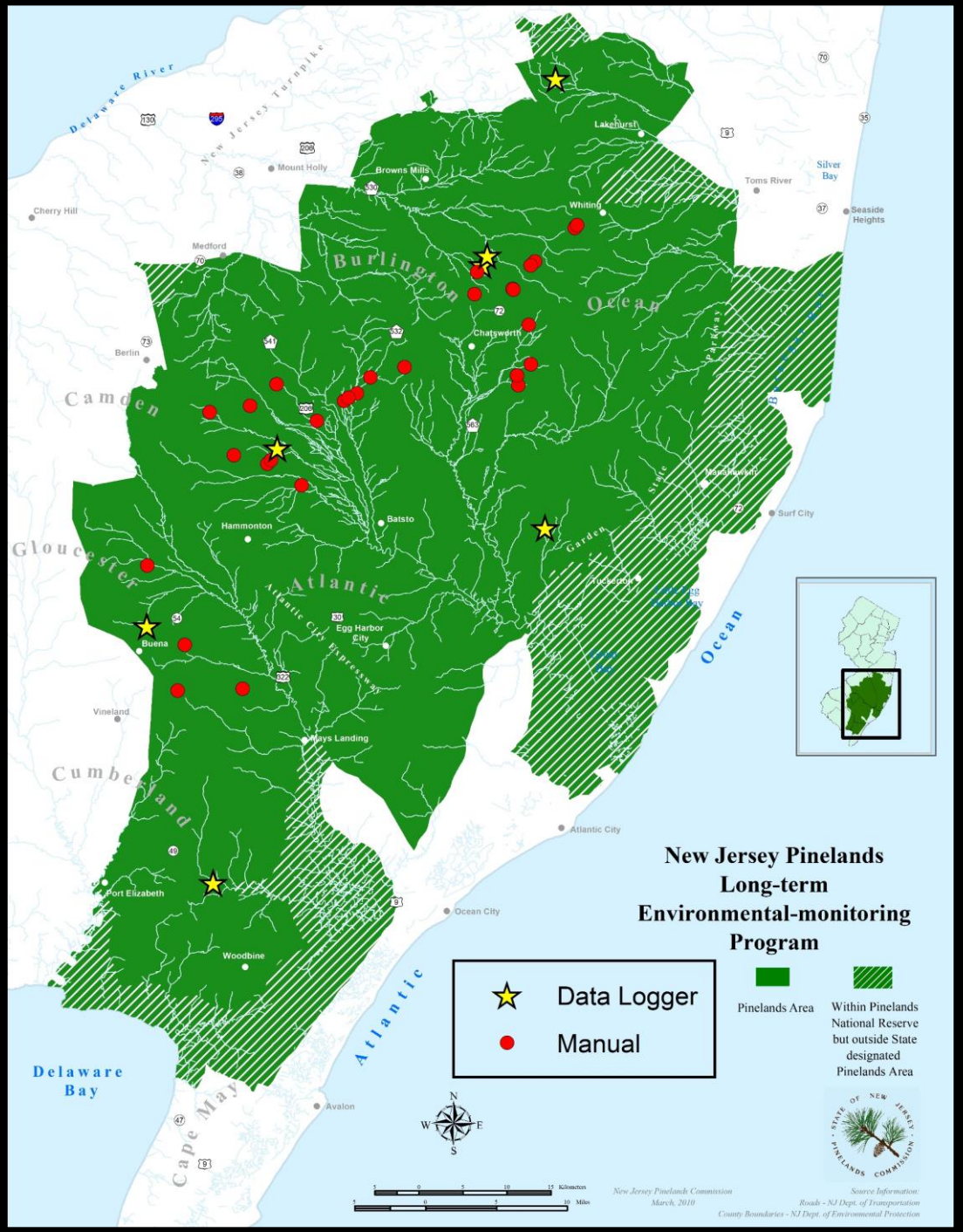
McDonalds Branch Well (Pitch Pine Lowland)



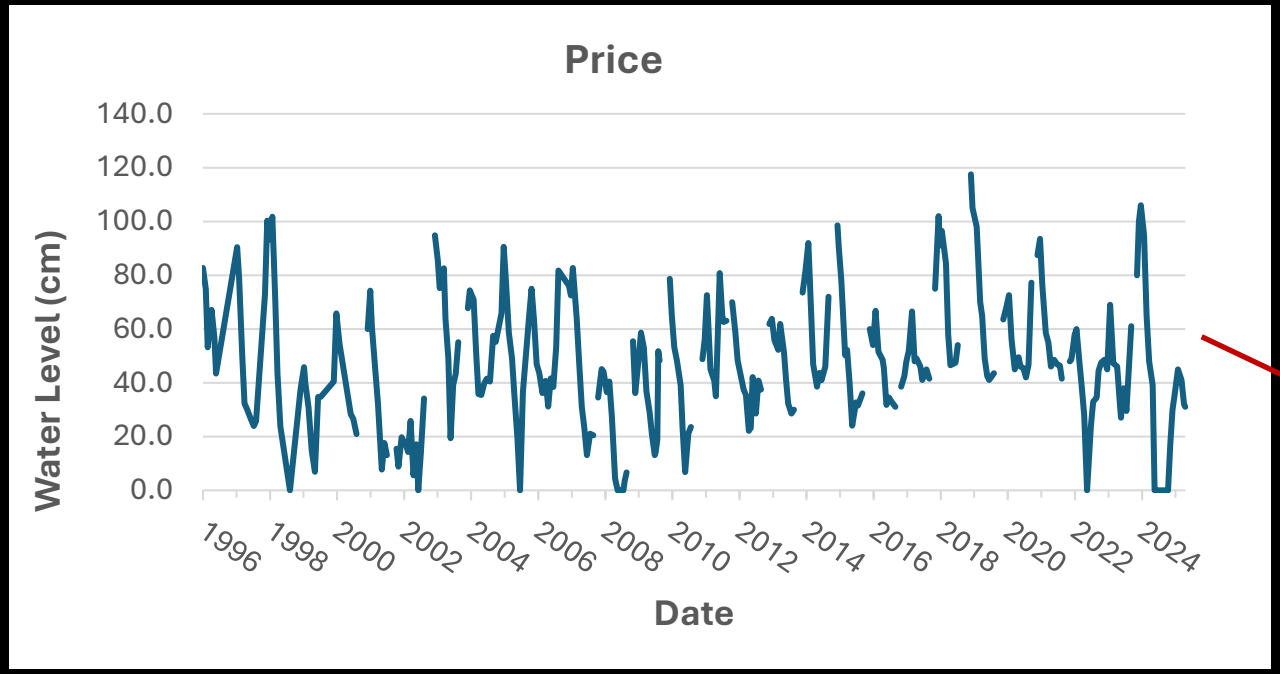

Surface Water Monitoring
Measure water levels in 37 ponds

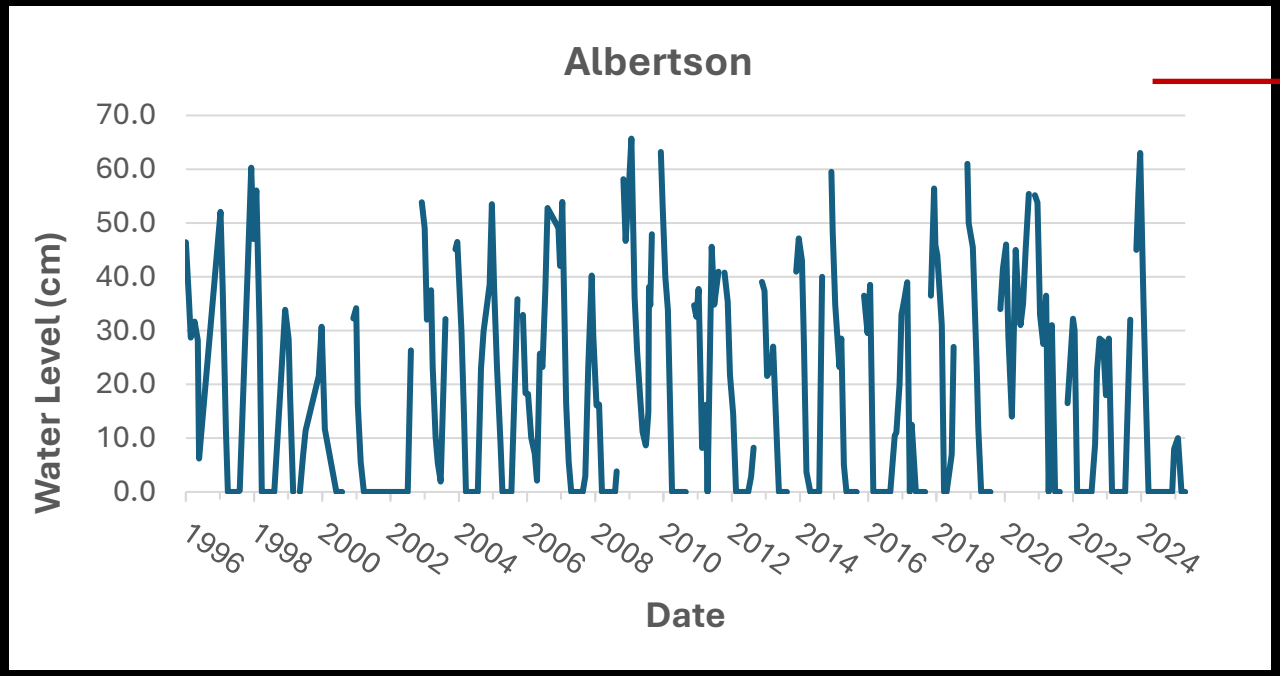
Location of 37 Ponds

Year Initiated	# Ponds Monitored	# Ponds with Data Loggers	Year Data Logger Installed
1996	14	1	2015
2004	15	2	2012, 2014
2010	5	1	2010
2012	3	3	2012
Total # Ponds	37	7	



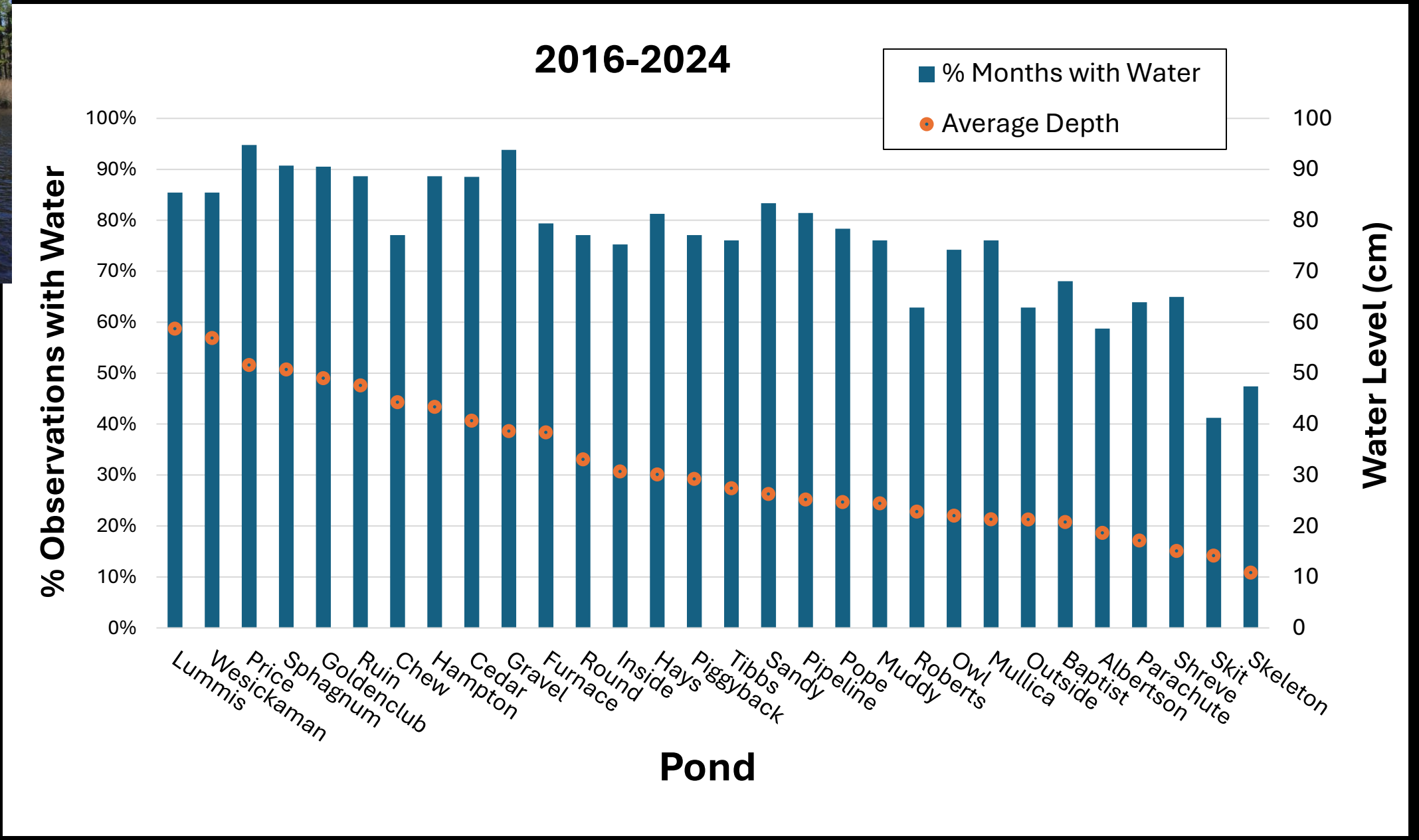
Measure water levels manually each month at 30 ponds using a meter stick



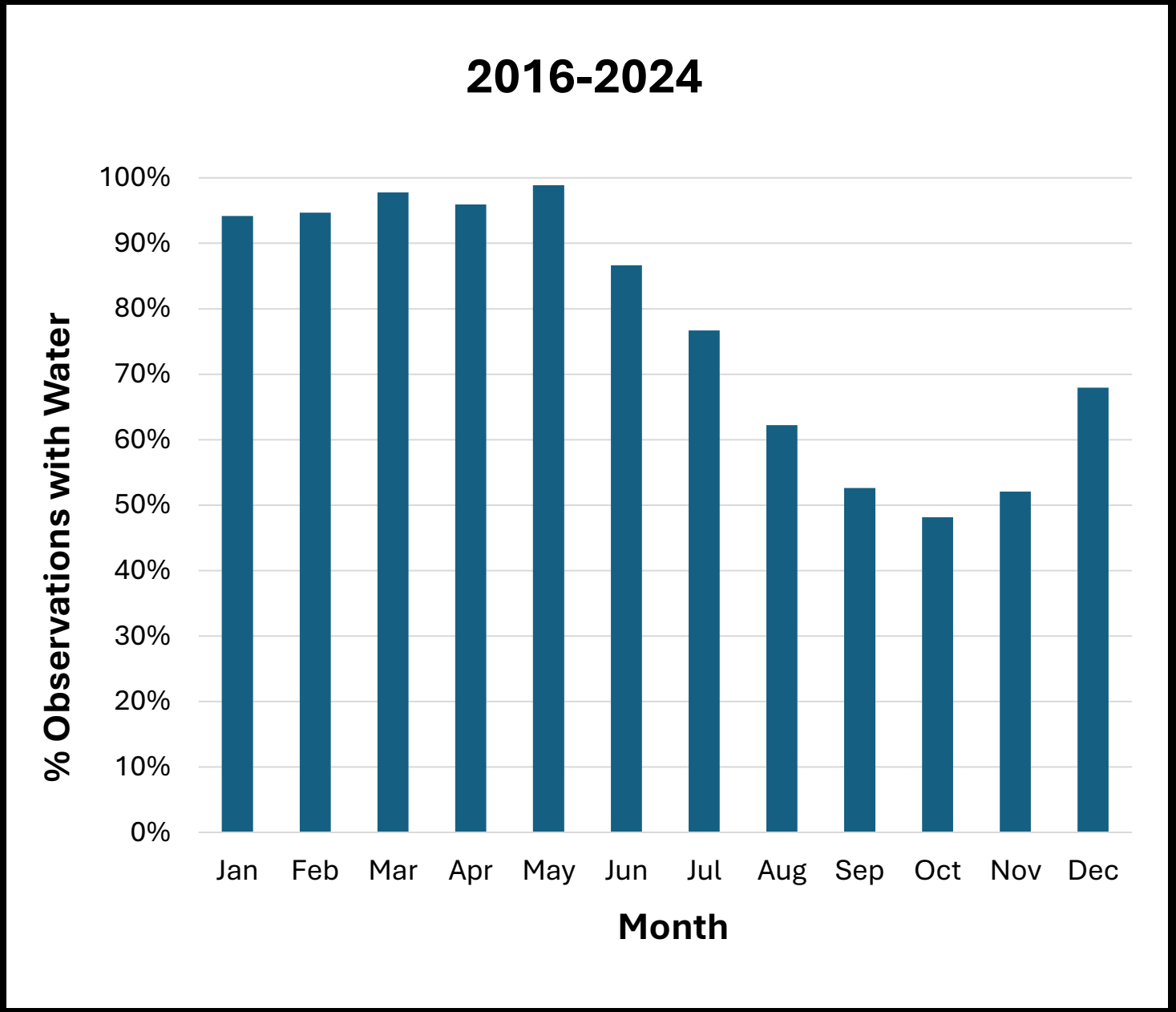


Mullica Basin

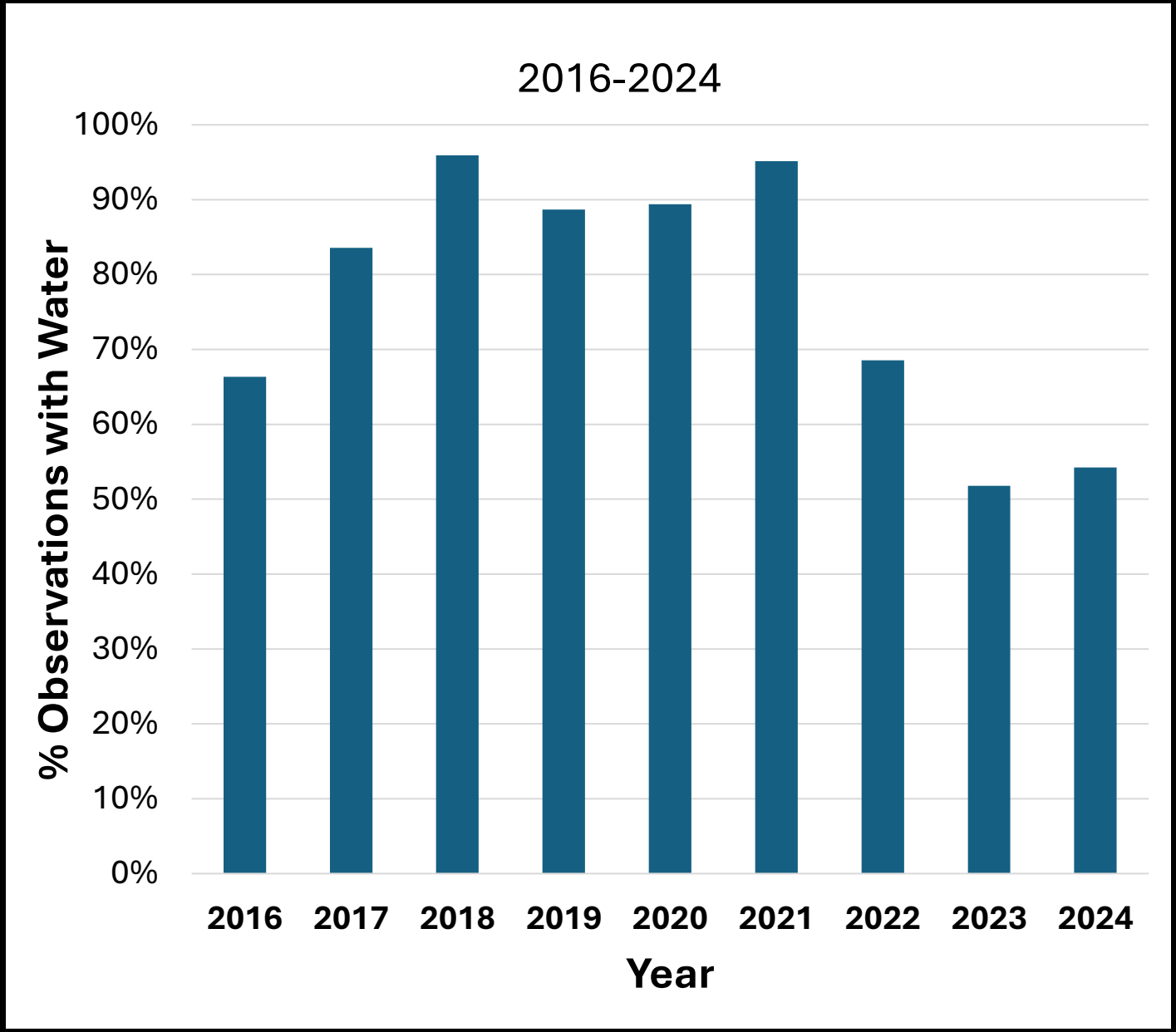
30 Manually Measured Ponds



30 Manually Measured Ponds



30 Manually Measured Ponds



Off Road Vehicle Damage

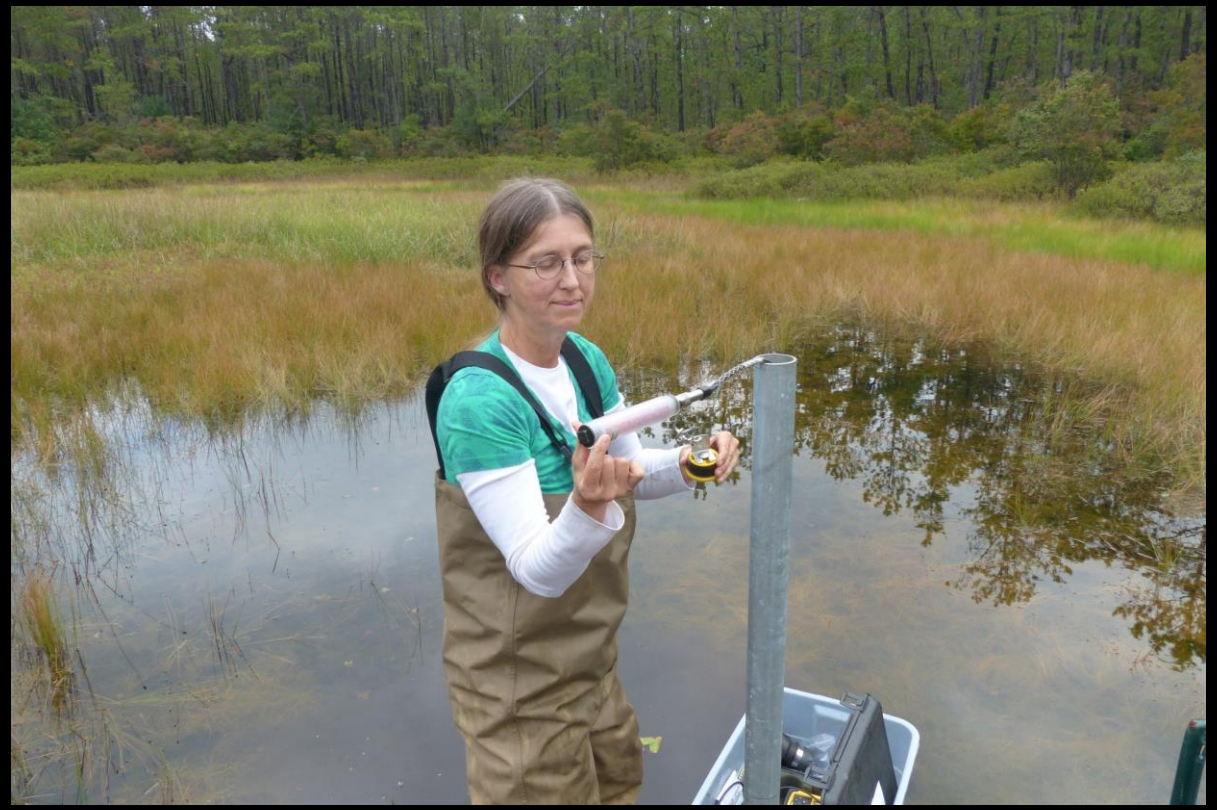
- Damage is reported to NJ Division of Parks & Forestry
- Parks & Forestry may install barriers to block access

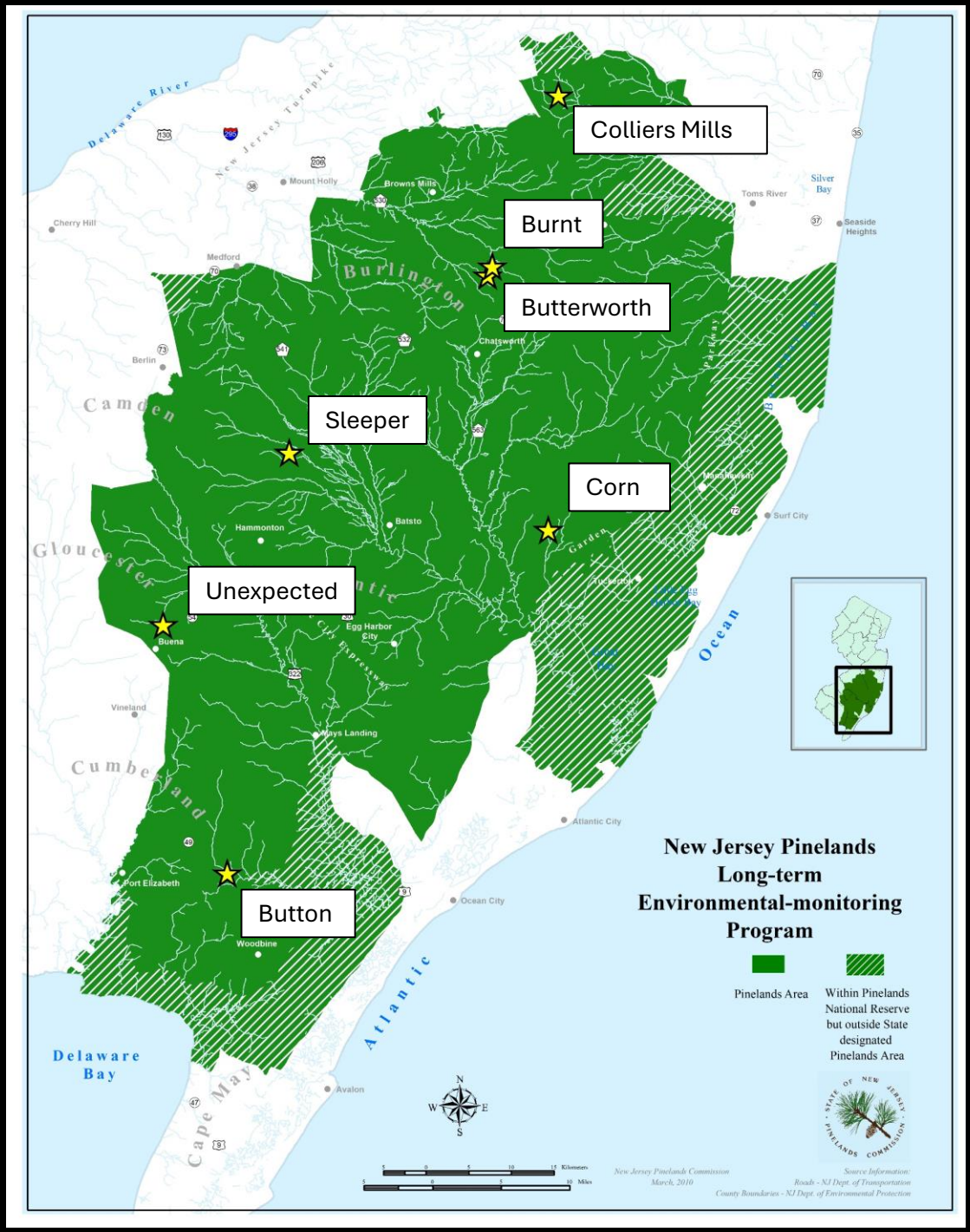
Parachute Pond in Brendan Byrne SF

Albertson Bog in Wharton SF

7 Continuous Pond Data Loggers

Installed between 2010 and 2015





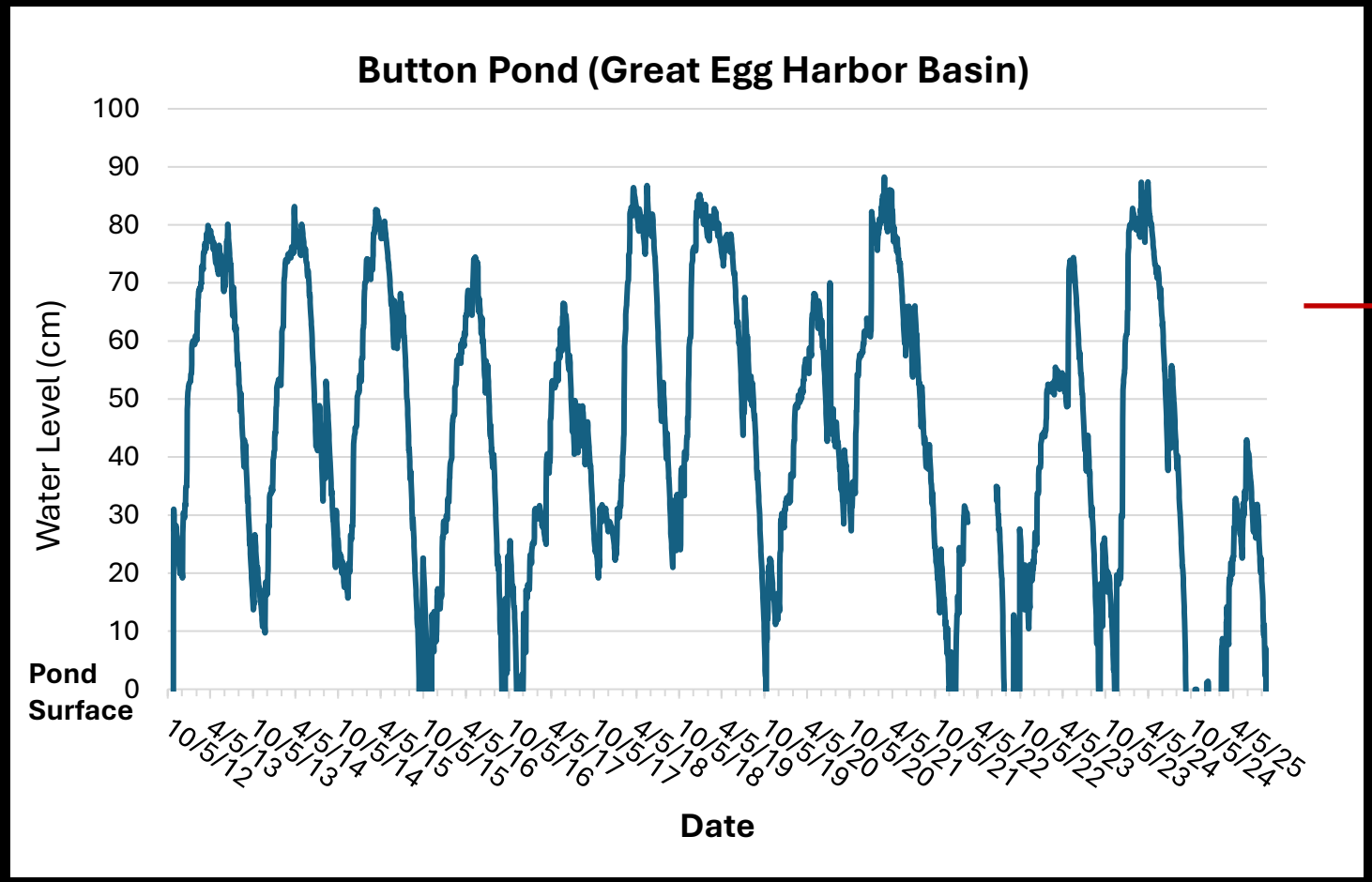
Installation of well point and casing for a data logger

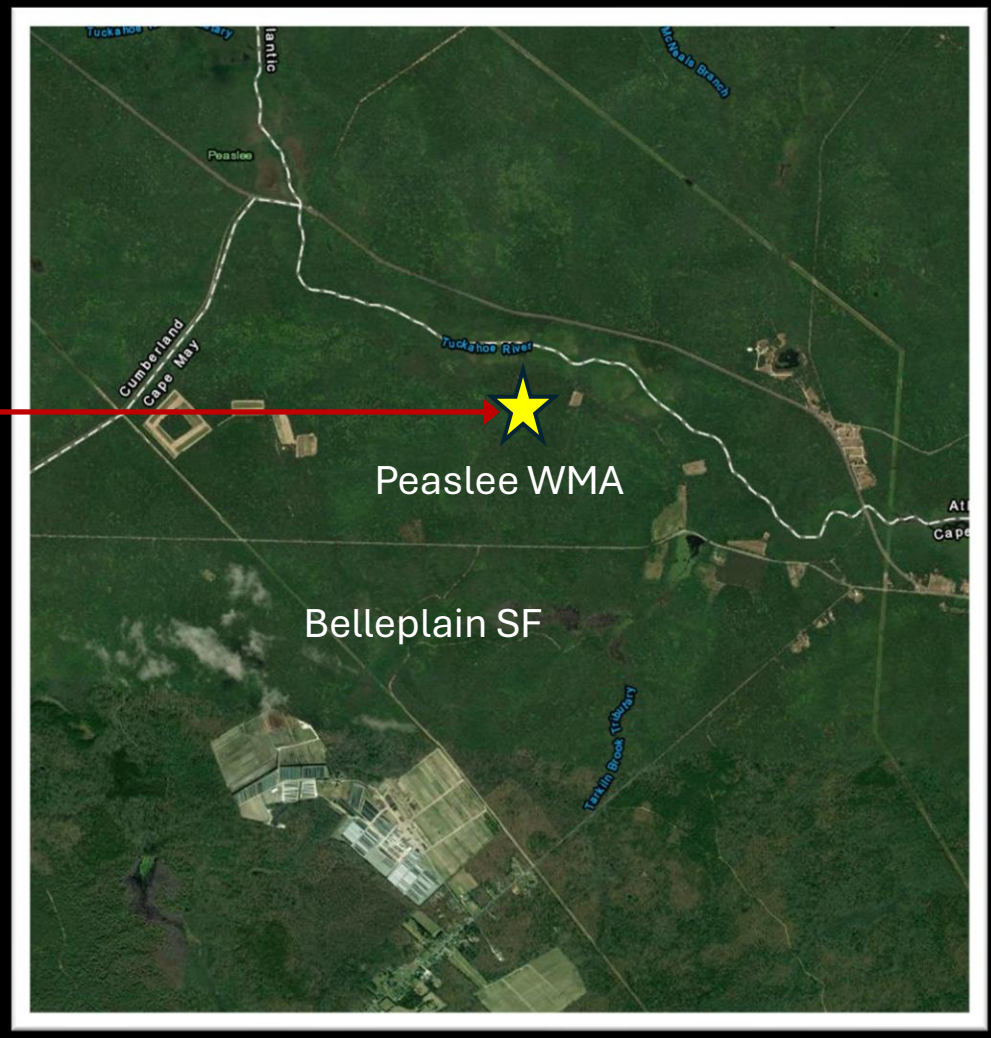

Slotted well point screwed
onto galvanized steel pipe

Install the data logger and desiccant

Continuous Data Logger

13 Years of data





Began replacing water level data loggers with weather stations

Solar Powered

Air Temperature

Humidity

Rain Gauge

Barometric Pressure

Water Depth Sensor

Water Temperature

Button Pond

Butterworth Pond

Advantages of Remote Weather Stations over Depth Loggers

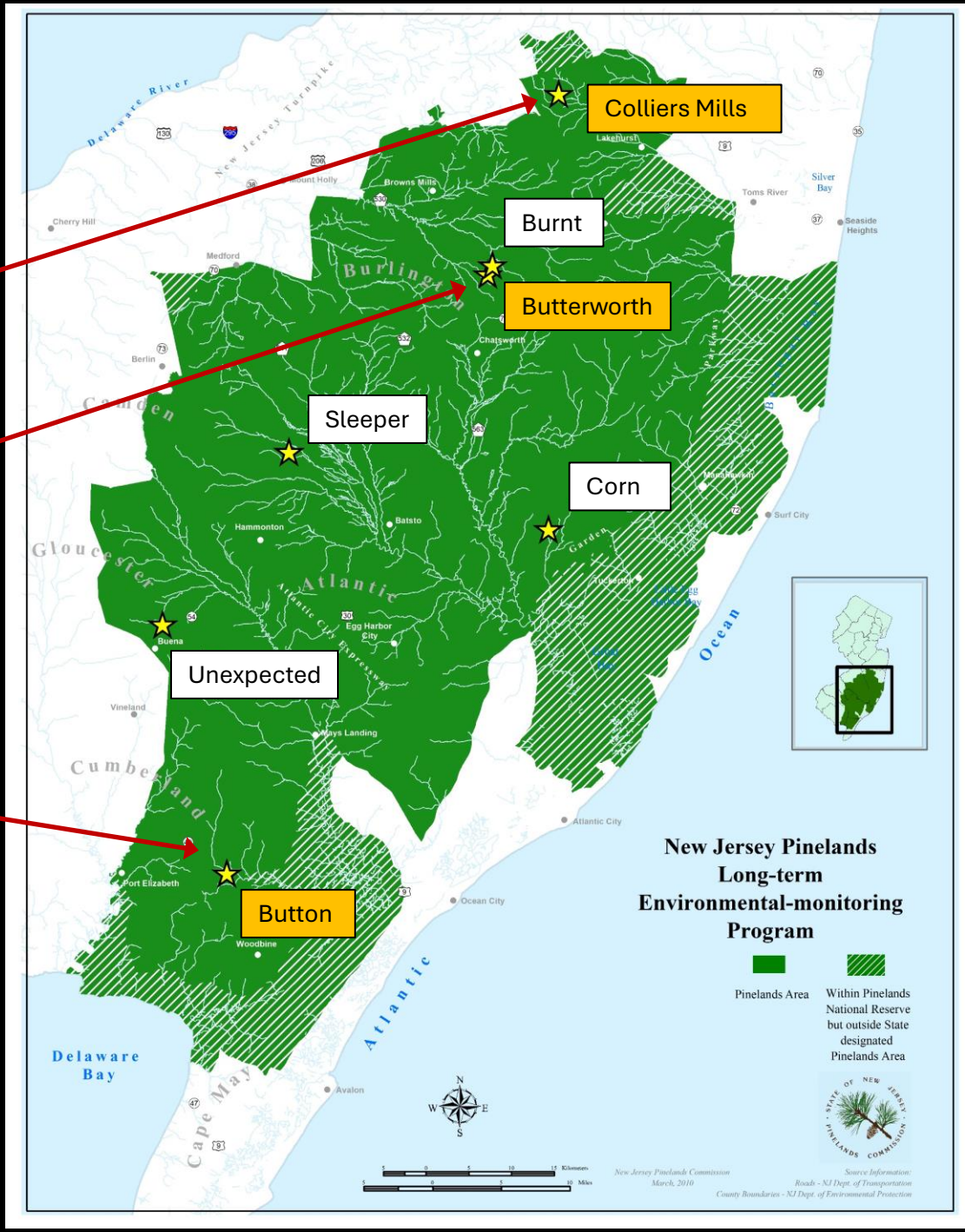
- More data from pond
  - Rain, air temp, humidity
- Low maintenance
  - Fewer maintenance trips
  - Longer service life
- Real time data
  - Check precipitation and water levels from website
- Emailed error warnings
  - Less data loss
- Customizable
  - Additional sensors can be added
    - Wind & light

Current Pond Weather Stations

Colliers Mills

Butterworth

Button



Example of real time data on online

Device Summary

Logging Status

Logging

Configuration Status

Up to date

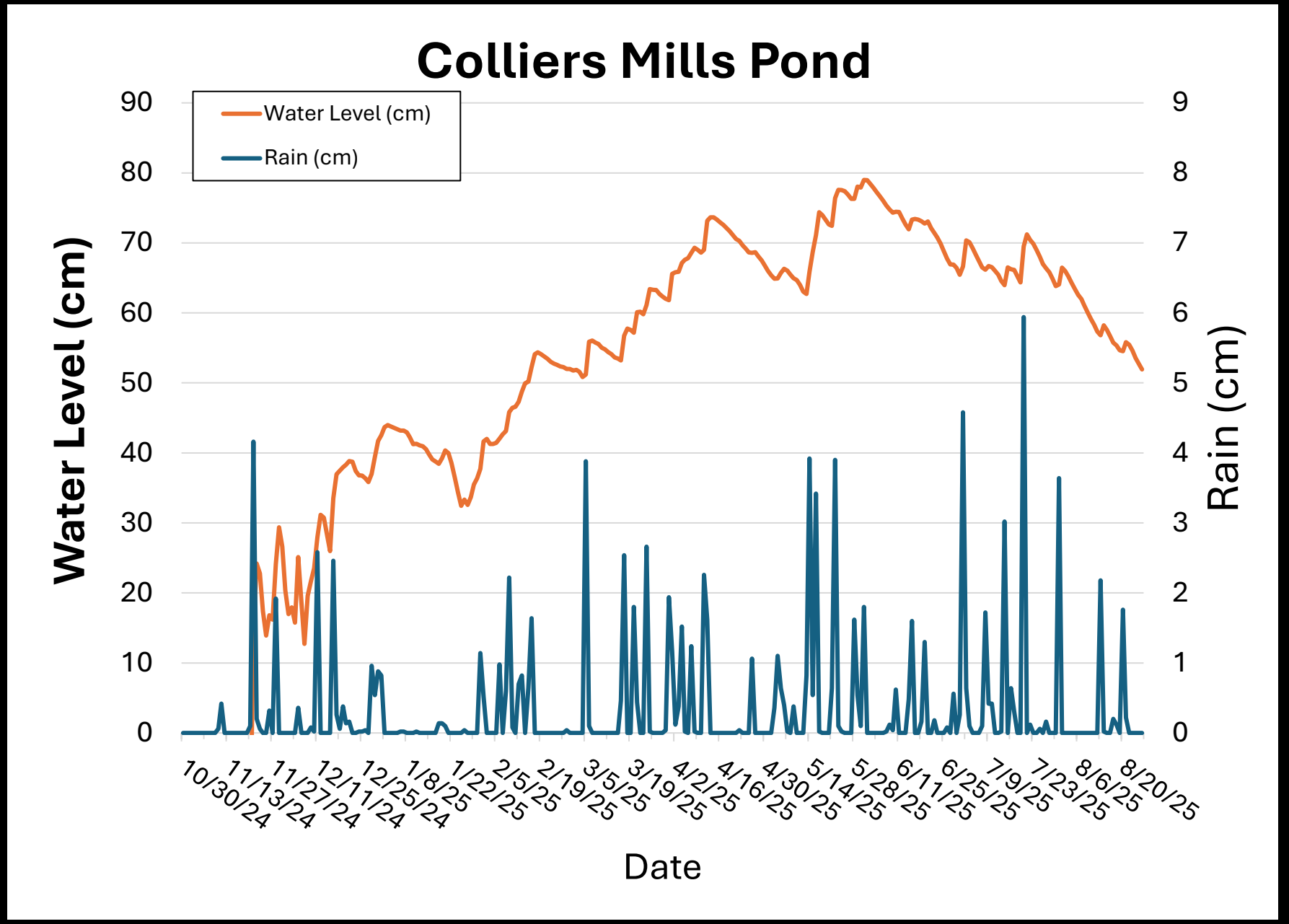
Next Connection

in 11 minutes

0.54955 mete... Water Level	20.73 °C Water Temperature
101.249 kPa Barometric Pressure	23.306 °C Temperature
0 mm Rain	73.703 % % RH

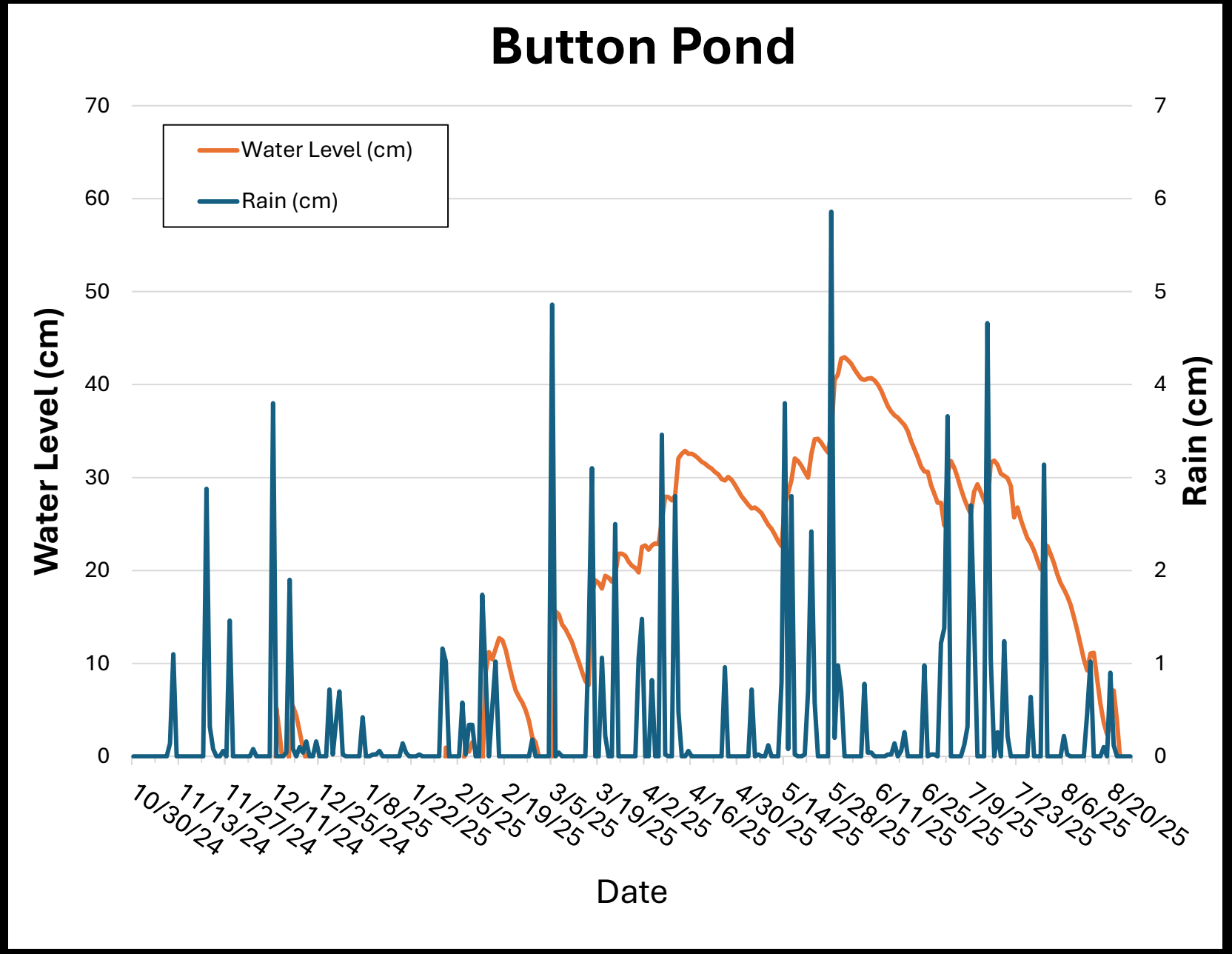
Colliers Mills Pond

Colliers Mills Pond – October 2024


Colliers Mills Pond
Water Level (cm)
Rain (cm)
Water Level (cm)
Rain (cm)
Date
90
80
70
60
50
40
30
20
10
0
9
8
7
6
5
4
3
2
1
0
10/30/24
11/13/24
11/27/24
12/11/24
12/25/24
1/8/25
1/22/25
2/5/25
2/19/25
3/5/25
3/19/25
4/2/25
4/16/25
4/30/25
5/14/25
5/28/25
6/11/25
6/25/25
7/9/25
7/23/25
8/6/25
8/20/25

October 2024

May 2025



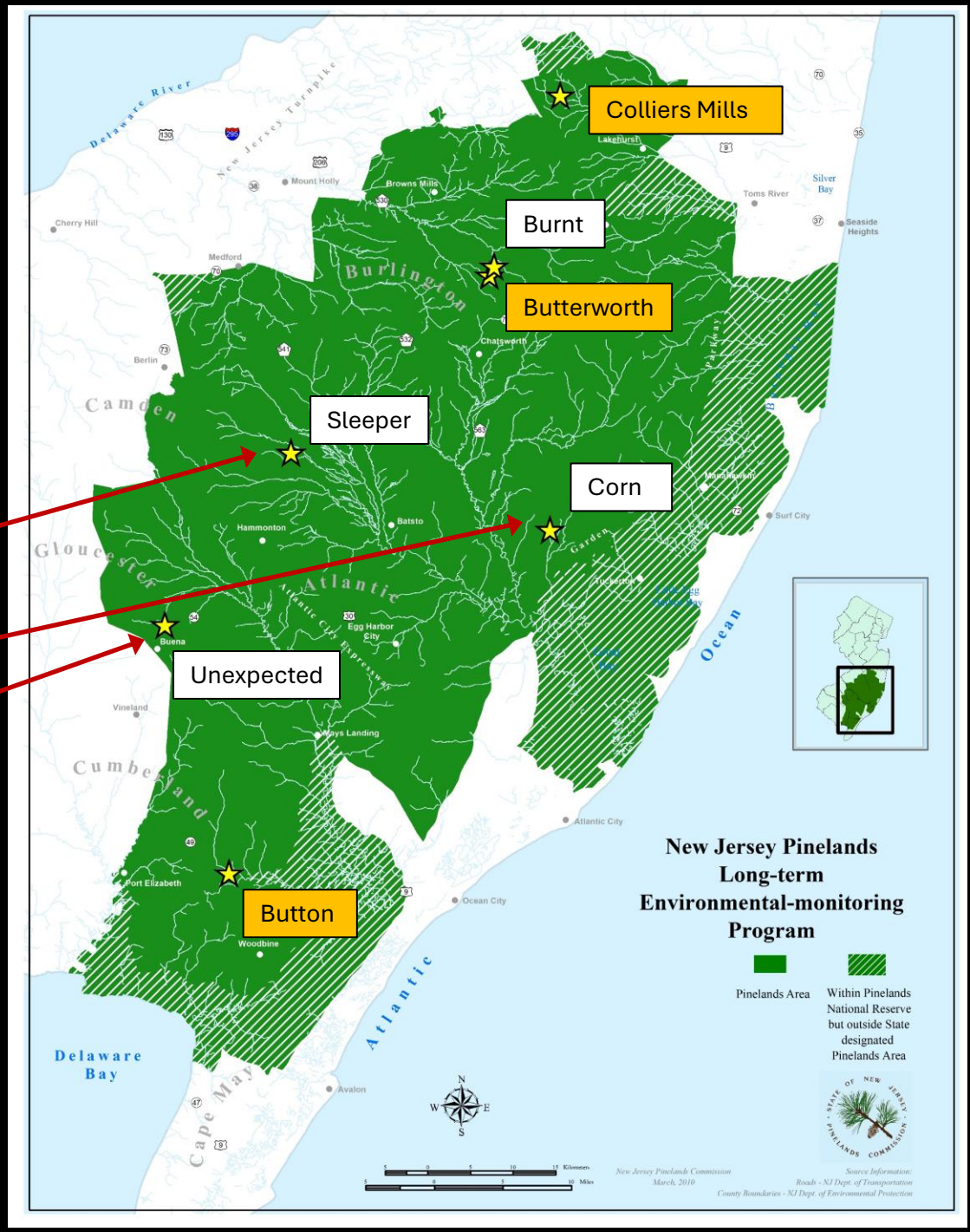
Current Weather Stations

Colliers Mills
Butterworth
Button

Future Weather Station

Sleeper
Corn
Unexpected

We have 1 ready to install and hope to purchase 2 more



Next Steps

- Real time weather data on Pinelands Commission website
- Analyze existing data for long-term trends